Hitting the scandium motherlode.

Last year when we first brought Scandium to the attention of Investorintel's followers, one of the names we mentioned was EMC Metals (then TSX: EMC) with its mixed basket of assets. Since then the company has sharpened its focus, changing its name to Scandium International Mining Corp. (TSX: SCY).

Previously its interest had been in Tungsten, but in 2013 it vended those assets and restyled itself as a specialty metals mining group with its operational focus is on scandium project holdings, specifically the Nyngan Scandium project (and the neighbouring Honeybugle property) in Australia and the Tordal Scandium project in Norway.

Nyngan

The Nyngan scandium resource is located approximately 500 kilometers northwest of Sydney, Australia. It has in its time been trawled over by such substantial (now disappeared) players as Selection Trust, North Broken Hill and Anaconda. The property consists of two exploration licenses encompassing over 9,000 hectares, and is accessible via a 25 km sealed road from the local town of Nyngan.

The NSW laterite clay belt offers a unique production advantage. The Nyngan deposit is large and the grades are rather stunning. Nyngan might be described as the "Bayan Obo of Scandium". The JORC-compliant resource estimate at Nyngan consists of a Measured Resource of 2,718,000 tonnes at 274 ppm Sc and an Indicated Resource of 9,294,000 tonnes at 258ppm Sc. Stripping averages a low 1.1/1.

In October 2014, the company published its Technical Report on

the Feasibility on Nyngan prepared by the engineering firm of Larpro Pty Ltd, of Brisbane. The main mining assumptions were that a portion of limonite-only resource, in one particular area of the overall resource, will provide a 20 year mining pit sufficient to supply the processing facility at a rate of 75,000 tpa, at an average grade of 371 ppm scandium. The main findings of the PEA were:

It is important to note that the estimates utilized an AUD/USD foreign exchange rate of US$0.90. Though it should be noted that the rate is now currently more like US$0.78.

The PEA premised a conventional flow sheet, employing high pressure acid leach (HPAL) and solvent extraction (SX) techniques, which have been modeled and validated from METSIM modeling and bench scale/pilot scale metallurgical test work.

Ownership

The licenses, the mineral rights and the surface rights were controlled by Jervois Mining up until June of last year, as per the 2013 settlement agreement. The terms of the settlement required (the then-) EMC to pay Jervois AUD$2.6M cash over 18 months, for a 100% position in the Nyngan project, including the land and mineral license rights. The final payment of AUD$1.4M was made in June 2014. In production, Scandium International must additionally pay Jervois a 1.7% NSR on scandium produced, for 12 years from first production.

To effect the final payment to Jervois and settle other debts, in June 2014, EMC secured a US$2.5mn convertible loan facility (18 month term) with Scandium Investments LLC, a company owned by a US private investor group. Amongst other terms, the 20% JV partner has a carried interest until the listed entity meets two milestones: (1) filing a Feasibility Study on SEDAR, and (2) receiving a mining license, on either JV property.

Scandium – the "not really" Rare Earth

When the Rare Earth boom was in full flight the universe was dictated to be the Lanthanide series plus Yttrium PLUS Scandium. This was generous of the promoters as Scandium was nowhere to be seen in their mineralisations so they were essentially giving a free plug for someone else's product. However it was a bit of safe bet as no-one we can recall was making any claims to having a Scandium resource. The metal was regarded as something that was produced "somewhere in Russia" and thus not something to easily wrap one's brain around let along get one's hands on a deposit. With the global trade estimated to be around 100 pounds of pure metal per annum, it was not something to hold one's breathe over. Intriguingly though we even heard Scandium described as a "spice metal", which was a new one for us!

Usage

The main application of scandium, by weight, is as a grain-refining agent in aluminium-scandium alloys for minor aerospace industry components. The positive effects of scandium on aluminium alloys were discovered in the 1970s. These alloys, composed of as little as 0.5% scandium, make a significant difference in strength. It can be added to most of the standard alloy grades to improve tensile strength, corrosion resistance, weldability and heat working tolerances. It reduces temperature creep in alloys, and combines particularly well with magnesium and zirconium to add unique enhancements to alloy performance. Scandium does not reduce electrical conductivity in aluminum alloys to the extent other alloy combinations suffer degradation.

Scandium-stabilized zirconia enjoys a growing market demand for use as a high efficiency electrolyte in solid oxide fuel cells (SOFCs), including those of the leading commercial supplier, Bloom Energy. The SOFC business is a fast emerging application, albeit still small, accounting for half or more

(in some estimations) of the current world Scandium consumption. These natural gas powered electrical generation systems are highly efficient, reliable, clean, and completely independent of traditional electrical grid systems.

One area that intrigues us is the Sc_2O_3 that is used annually in the United States to make high-intensity discharge lamps. Scandium iodide, along with sodium iodide, when added to a modified form of mercury-vapor lamp, produces a form of metal halide lamp. This lamp is a white light source with high color rendering index that sufficiently resembles sunlight to allow good color-reproduction with TV cameras. About 80 kg of scandium is used in metal halide lamps/light bulbs globally per year. This would seem to be an application where a greater, more reliable supply of the metal might result in a significant expansion in usage, particularly into more household applications. We could also see potential in sports arena lighting.

Scandium also has uses in sports equipment, guns and dental inputs. Some of its applications can be substituted with Titanium.

Chicken & Egg

The absence of reliable, secure, stable and long term production has limited commercial applications of scandium. Despite this low level of use, scandium offers significant benefits. The potential for substantial expansion in usage and demand clearly exists and to an extent it is one of those “rare” metals stories where the supply could potentially generate the demand rather than the other way around. The most obvious areas where this might happen are in lighting systems and aluminium alloys.

Production

Scandium is distributed sparsely and occurs in trace amounts

in many minerals. Rare minerals from Scandinavia and Madagascar such as thortveitite, euxenite, and gadolinite are the only known concentrated sources of this element. Thortveitite can contain up to 45% of scandium in the form of scandium oxide.

Scandium is present in most of the deposits of rare earth and uranium compounds, but it is extracted from these ores in only a few mines worldwide. Because of the low availability and the difficulties in the preparation of metallic scandium, which was first achieved in 1937, it took until the 1970s before applications for scandium were developed.

World production of scandium is in the order of two tonnes per year in the form of scandium oxide. The primary production is 400 kg while the rest is from stockpiles of Russia generated during the Cold War. These stockpiles are bound to be exhausted within the foreseeable future, and alternative sources are therefore likely to be needed.

In 2003, only three mines produced scandium:

- the uranium and iron mines in Zhovti Vody in Ukraine,
- the rare earth mines in Bayan Obo, China
- the apatite mines in the Kola peninsula, Russia

In each case, scandium was a byproduct from the extraction of other elements. It should be noted that the Kola peninsula mines were the main source of product for Molycorp’s Silmet facility in Estonia and also that these mines are now in terminal decline (if not already shuttered).

In the US, the fluorite tailings from the Crystal Mountain deposit near Darby, Montana, are known to contain thortveitite and associated scandium-enriched minerals. Smaller scandium resources are contained in tungsten, molybdenum, and titanium minerals from the Climax molybdenum deposit in Colorado.

The USGS has estimated that global scandium consumption was

less than 10 tons per year in 2013. However, as this metal is one of the least intermediated metals around (i.e. most of its trade is directly between end-users and the “producers”, one has to wonder how reliable the USGS numbers are. We have knowledgeable parties who put demand at three times that level.

Prices

The current price of the metal is somewhat murky (like so many of the minor specialty metals) with indications that its trades at over US$5,000 per kg. This compares with $1,620 per kg as recently as 2010.

Conclusion

Scandium International has clearly found itself an interesting niche with an excellent deposit. Right-sizing is going to be the challenge. Its rated production is higher than the perceived global consumption, but that global consumption number is suspect and more likely to be upwardly revised than to be an over-estimation. The dynamic of “build it and they will come” also seems to have promise here with Scandium having a potential for expanded demand if only end-users could be sure they can get all they need if they tool up for greater production of lamps or whatever. The challenge is getting financiers to stump up funds for the project build in what is a tough financial environment for any mineral let alone one with Scandium’s obvious attractions.

Certainly Nyngan moving into operation would also drive down prices making the metal more accessible to potential users with the potential to create a virtuous cycle of affordability and enhanced supply driving widened applications. Beyond all this it creates a market for a specialty metal, in a safe Western jurisdiction, which the Chinese do not have a stranglehold.