

# Parsing the Scandium in the NioCorp PEA

The Elk Creek deposit of NioCorp in Nebraska has become one of those rare “all things to all people” deposits like Alkane’s Dubbo project and Texas Rare Earth’s Round Top deposit. They all have in common multiple mineralisations with a wide variety of metals in the mix. In the case of Elk Creek, it started out as Rare Earths (at least in recent times though Molycorp seemed to explore it for Niobium in the 1970s). Then Quantum Rare Earths morphed into NioCorp and the focus turned (back) to the deposit’s origins as a Niobium prospect. To further square this circle, Molycorp’s former CEO became the CEO of NioCorp. Now we note from NI 43 -101 reports this year (first the resource estimate in February and now a second PEA just published) there is a meaningful strand of Scandium to the NioCorp story and as many investors are aware, Scandium is a metal that gets our pulse racing.

## **Scandium in the Mix**

In the resource estimate published earlier this year it was noted that as the metallurgical testwork advanced during 2014 and 2015 the ability to obtain a titanium dioxide ( $TiO_2$ ) and Scandium (Sc) product, became apparent.  $TiO_2$  is typically found to be related to the niobium grades with a range of between 3:1 to 4:1 found within the core of the deposit. The Scandium mineralization does not directly correlate to niobium mineralization but does show a grade increase with increasing niobium at low grades, but then a scatter of grades (on average considered higher grades 60 to 80 ppm).

## **Scandium’s Chicken & Egg Dilemma**

We strongly feel that Scandium is a “built and they will come” metal meaning that inadequate and unreliable supplies have

cramped efforts to expand applications. 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 (particularly in aerospace).

## **The Latest PEA**

It is seldom that a company comes up with two PEAs in the space of one year but indeed Niocorp has come up with two in the space of less than six months.

The latest one, termed PEA2 was published just this week and highlights include:

- Pre-tax NPV of US\$3.07 billion.
- Pre-tax IRR of 31.7%.
- After-tax NPV of US\$2.30 billion.
- After-tax IRR of 27.6%.
- Average pre-tax cash flow of US\$438 million
- An increase in annualized Scandium Trioxide production to 97 tonnes.
- Annualized Ferroniobium production of 7,490 tonnes.
- Annualized Titanium Dioxide production of 23,960 tonnes.

These are some chunky production numbers and, as one might expect come with a chunky total upfront capital investment of US\$979 million.

As far as Scandium is concerned these highlights reflect the “base case” Scandium pricing scenario, which NioCorp has selected to use for the PEA2. The “base case” is taken from an independent Scandium marketing report, prepared for NioCorp by OnG Commodities. The report provides two cases for Scandium pricing:

- The “base case”, which reflects pricing based on the current demand for Scandium from the fuel cell industry, along with the expected adoption of Scandium-Aluminum alloys by the aerospace industry.
- The “slow aerospace case”, which reflects a slower uptake of Scandium by the aerospace industry, comparatively.

The basis for the PEA2 is a 2,700 tonne per day mine production rate over a 32-year operating life with an average grade of 0.80% Nb<sub>2</sub>O<sub>5</sub>, 2.84% TiO<sub>2</sub> and 73 ppm Sc. Over the operating life, a total of 31.086 million tonnes of the resource would be mined and processed to produce Ferroniobium, Titanium Dioxide and Scandium Trioxide products.

## **Elk Creek**

For those who need reminding on Elk Creek, this is NioCorp’s main asset and is located in South East Nebraska (an hour south of Lincoln). Quantum Rare Earths first secured the property in 2011 as a REE prospect. However, as noted earlier, the property hosts concentrations of Niobium, REE, Scandium, Titanium and Barium mineralization within the Elk Creek Carbonatite.

The USGS has commented that Elk Creek is potentially one of the “largest global resources of Niobium”.

## **Elk Creek Geology**

The property is comprised of the Elk Creek Carbonatite that has intruded into the older Precambrian granitic and metamorphic basement rocks. The Elk Creek Carbonatite and Precambrian rocks are unconformably overlain by layer of roughly 200 m of Palaeozoic marine sedimentary rocks of Pennsylvanian age (approximately 299 to 318 Ma). There are no surface expressions of the Elk Creek Carbonatite on the property.

The Elk Creek Carbonatite has been identified as a carbonatite since its discovery in 1971 through drilling. The 3D graphic at the right shows the conceptual appearance of the Nb-bearing carbonatite.



Current studies suggest that the Elk Creek Carbonatite was emplaced about 500 million years ago due to stress along the Nemaha Uplift boundary. Three other geophysical anomalies were analyzed and drilled near the Elk Creek Carbonatite along the Nemaha Uplift but were found to be gabbroic intrusive rocks.

The Elk Creek Carbonatite consists predominantly of dolomite, calcite, and ankerite with lesser chlorite, barite, phlogopite, pyrochlore, serpentine, fluorite, sulphides and quartz.

The image that follows shows the shape of the mineralisation within the carbonatite.



## **The Resource**

The company published a new resource in February of 2015 which became the basis for the current PEA. This was prepared by the consulting firm, SRK.

The numbers speak for themselves with a very sizeable debut in both the Titanium and Scandium numbers.



Its worth noting that for the purposes of PEA2, NioCorp elected to base the mine plan on indicated resources only, as opposed to indicated and inferred resources.

## **Conclusion**

Up until now the most attractive and advanced Scandium projects in the world have been those in Australia. We have written here before about Scandium International's Nyngan project in New South Wales. The recent developments at Elk Creek have revealed the potential for NioCorp to be a major North American producer of the metal should the Defence Department in Washington care to give the company the endorsement as "most favoured" Scandium producer in the same way as it has done for the beryllium producer, Materion.

The relevance of this is that it makes the high-capex Elk Creek project move out of the theoretical column into the fundable category if it can glean such a huge sponsor.