Zirconium and establishing a domestic rare earths supply chain

A clear path forward required for reducing our reliance on China

Despite its relative obscurity, zirconium remains a critical material with significant supply risk. China controls most of the industrial production capacity to process zirconium mineral concentrates into the basic starting compounds needed for downstream zirconium products. In fact, **China controls 95% of the world's production of the key zirconium compound** Zirconium Oxychloride ("ZOC"), which is the starting material required for downstream manufacturing into various commercial products including nuclear-powered naval vessels. Currently, 100% of the ZOC used outside China must be purchased from producers in China. A second basic zirconium compound required by industry is Zirconium Basic Carbonate (ZBC). The ZBC is derived from ZOC. The current North American annual demand for ZOC is approximately 50,000 tonnes. Worldwide demand outside of China is approximately 150,000 tonnes per year.

To reduce reliance on China for a domestic supply of critical zirconium starting compounds such as ZOC, a North American production facility for zirconium compounds must be established. And, with zirconium minerals often found associated with rare earth minerals, developing a rare earth supply chain could create an opportunity to establish a new primary supply of zirconium minerals at the same time.

There are several examples in North America of primary rare earth resources that also contain zirconium minerals. This is commonly the case with rare earth deposits that occur in alkaline igneous intrusive rocks. These rocks may contain resources of a number of critical minerals as well as some more familiar metallic commodities such as copper and iron ore. In some cases, where such resources were mined for base metals, the tailings may contain significant quantities of recoverable critical minerals. An appropriate rare earth / zirconium resource could supply the ZOC compound for the zirconium production industry as well as the refined rare earth products to downstream users.

Zirconium dioxide is a white crystalline oxide of zirconium. Its most naturally occurring form is the mineral baddeleyite.

Zirconium is usually found in the silicate mineral zircon (ZrSiO4) which always contains another rare element, hafnium, averaging a low 2% concentration. Hafnium can be a valuable by-product of zirconium recovery from a zircon resource. One interesting application for hafnium is its addition to nickel-based superalloys used in gas turbines. The other zirconium ore mineral occasionally found in a type of alkaline intrusive rock called carbonatite is baddeleyite, a pure ZrO2 mineral that offers a simpler processing solution to produce ZOC, if it can be found in sufficient concentrations to justify recovery.

Unlike the rare earth industry’s lack of domestic, downstream-refining and manufacturing capacity to make the needed derivative products such as magnet alloys, **the zirconium industry does have downstream manufacturers for all the current products needed in industry**. Because the downstream manufacturing capacity of zirconium products is available, it could be argued that an attractive development option for a combined rare earth / zirconium resource would be to start by selling ZOC and stockpile the rare earths until downstream rare earth consumers can come on line. There is also a potential role for government to purchase the rare earths for a government managed stockpile of critical minerals until the downstream components of the supply chain are established.

The critical importance of zirconium alone could be sufficient to justify the need for bringing a combined rare earth zirconia resource into production. Significantly, there are many applications that require both a rare earth and zirconium to develop the necessary properties for the application. One example is the use of yttria-stabilized zirconia in hydrogen fuel cell technology.

Zirconium needs to be considered part of the solution for establishing a rare earths supply chain, along with other critical minerals such as scandium, that often occur together with rare earths in the same resource. Developing these resources in alkaline igneous rocks, of which there are a number of examples in North America, offers a clear path forward for reducing our reliance on China for a basket of critical materials.

Search Minerals expands their rare earths discovery with critical materials' zirconium and hafnium

As the West looks to establish a non-Chinese source of supply of critical rare earth elements, one Canadian company has been successfully expanding its rare earths project, as well as discovering some additional valuable metals like zirconium (Zr) and hafnium (Hf).

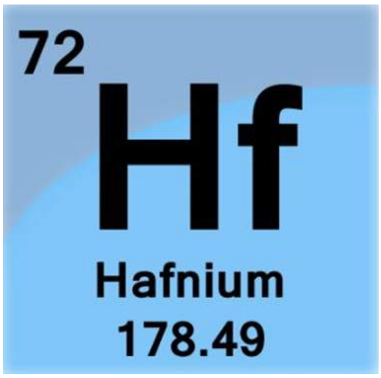
Zirconium dioxide (ZrO_2) is used in laboratory crucibles, metallurgical furnaces, as a refractory material, and in ceramics (including use in dental ceramics); because it is mechanically strong and flexible. Zircon ($ZrSiO_4$) and the cubic zirconia (ZrO_2) are cut into gemstones for use in jewelry. Ceria-zirconia is widely used as a component in current three-way catalytic converters.

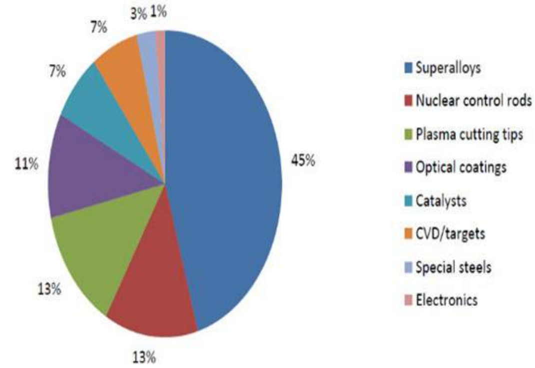
Zirconium is used in ceramics, jewelry, dentistry, and catalytic converters

Hafnium is a good absorber of neutrons and is used to make control rods, such as those found in nuclear power plants and submarines.

Hafnium is used in some superalloys for special applications such as jet engine turbines in combination with niobium, titanium, or tungsten. Hafnium oxide is used as an electrical insulator in microchips, filaments and electrodes.

Hafnium is used in superalloys, nuclear rods in nuclear submarines, microchips, and jet engine turbines



Search Minerals discovers zirconium and hafnium

Search Minerals Inc. (TSXV: SMY) recently announced that they have discovered zirconium and hafnium, in addition to their existing valuable rare earths dysprosium (Dy), neodymium (Nd), praseodymium (Pr), terbium (Tb) and yttrium (Y). The discovery was made at their Silver Fox Deposit.

With regards to the Silver Fox discovery Search Minerals stated: "This surface expression is significantly longer, but thinner, than the surface expressions of the nearby and related **FOXTROT** and **DEEP FOX** Resources. The mineralization is similarly hosted by peralkaline volcanic rocks and contains slightly lower grades of the REE magnet materials (Nd, Pr, Tb and Dy) but significantly higher grades of Zr and Hf."

Dr. David Dreisinger commented: "The objective of metallurgical testing of the **SILVER FOX** (and other deposits) will be to recover a high grade zirconium by-product for sale with minimal processing cost and complexity. Search is engaged with our technology advisor, SGS Canada, to identify process flowsheet options."

Search Minerals expands the mineralized zone at Fox Meadow

Search Minerals also recently announced that they have successfully expanded the critical rare earth element mineralized zone at Fox Meadow. The Company stated:"The trenching/channelling programs at **FOX MEADOW** have outlined a mineralized zone of up to 123.6 m wide and at least 500m in strike length; mapping and airborne magnetic anomalies suggest that the zone is up to 650m long. In contrast, both the **DEEP FOX** and **FOXTROT** mineralized resources are about 350-450m long and up to 40m thick."

About Search Minerals

Search is focused on finding and developing critical rare earth element mineral assets in Labrador, Canada. The Company controls properties in three distinct areas of this region; the Port Hope Simpson (PHS) Critical Rare Earth Element District in SE Labrador; the Henley Harbour Area in Southern Labrador; and the Red Wine Complex located in Central Labrador.

Within the Port Hope Simpson District, Search's main discoveries are the Foxtrot Resource, Deep Fox, Fox Meadow, and Silver Fox deposits which contain rare earths including dysprosium (Dy), neodymium (Nd), praseodymium (Pr), terbium (Tb) and yttrium (Y).

The flagship Foxtrot Resource covers a 70 km long and 8 km wide belt. At Foxtrot the Total Indicated Resource is 7.392 million tonnes with grades of neodymium oxide (1,732ppm), neodymium (1,485ppm), praseodymium (397ppm), and dysprosium (191ppm).

The 14 year LOM Foxtrot Project offers an IRR of 16.7% on an after tax NPV10% of $48 million, with a CapEx of $152 million.

Investors should note the NPV quoted above is only for the Foxtrot Project, so once the other projects are combined into a bigger project the NPV should improve materially.

Closing remarks

Search Minerals is both expanding their existing very promising rare earths project as well as finding other valuable metals zirconium and hafnium. Investors will need some patience, as more exploration work needs to be done to further grow the resource and improve on the economics.

Combined with an excellent management team, and strong Government and local support, the Company continues to advance their Port Hope Simpson District project at a steady pace. Rare earths expert Jack Lifton recently stated about Search Minerals: “I think it may well be Canada’s first commercial rare earth producer.”

With a market cap of just C$9 million there is plenty of potential upside ahead for investors if Jack is right.