# Ucore’s rare earths processing technology facility offers Louisiana a blue ribbon opportunity for the critical minerals supply chain

written by InvestorNews | January 26, 2023

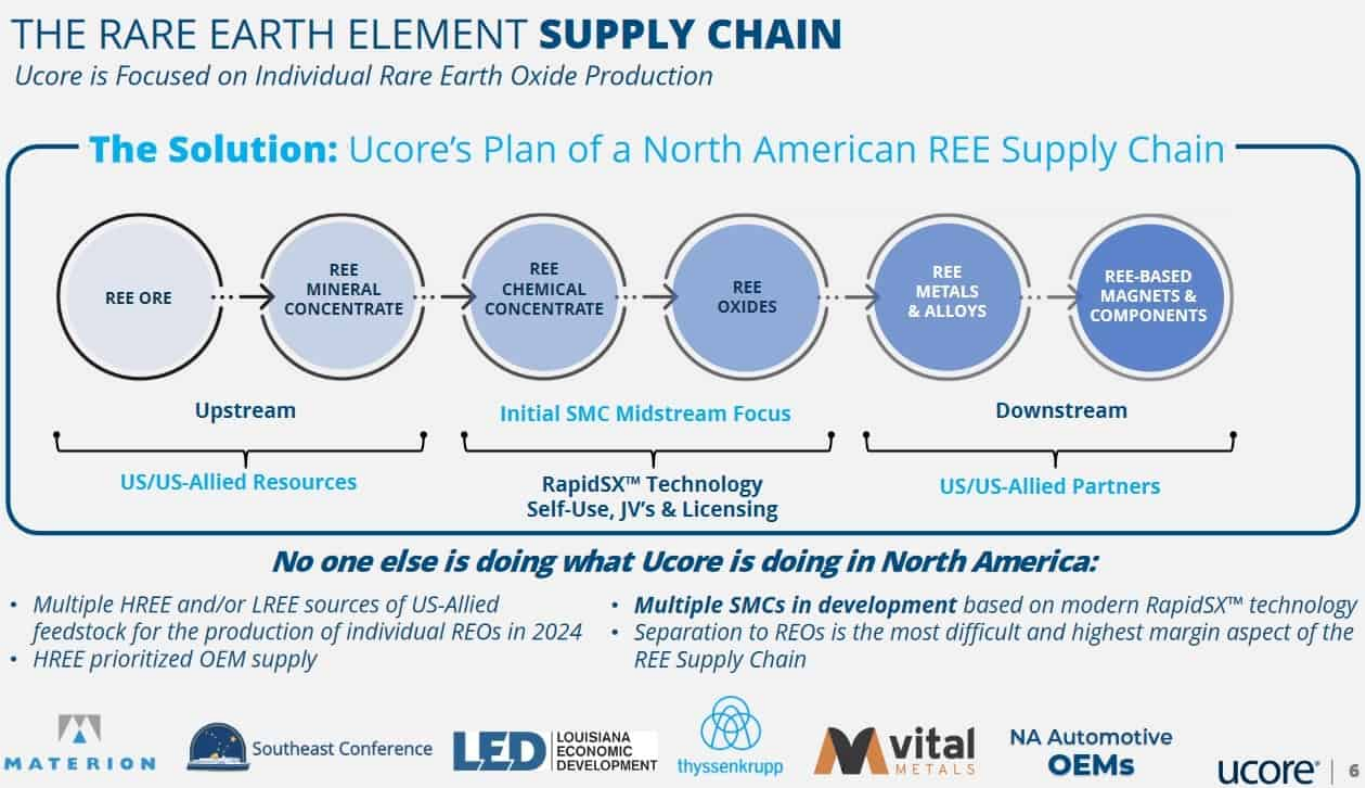
As most readers of InvestorIntel know by now, demand for the magnet rare earths is set to surge this decade as the EV and renewable energy booms takes off. Electric vehicles require the magnet rare earths in their electric motors as do many of the most powerful wind turbines.

The problem right now is that there are no rare earths separation facilities of scale in the USA, meaning the market is reliant on China.

Today’s company is one of very few western companies that is making big moves to change that. Notably to develop rare earths separation facilities in North America.

Ucore Rare Metals Inc. (TSXV: UCU | OTCQX: UURAF) (“Ucore”) 100% own the Bokan-Dotson Ridge REE Project (contains Dysprosium (Dy), Terbium (Tb) & Yttrium (Y)) in Alaska and has plans to build a rare earth separation facility in Louisiana, USA.

**Ucore is focused on Rare Earth Oxide separation (production) in North America for both heavy (HREE) and light (LREE) rare earth elements**




*Source: Ucore company presentation*

As announced on November 22, 2022, Ucore is in the process of selecting a site for their Louisiana facility and is choosing between three existing brownfield facilities in Southwest and Central Louisiana. Ucore states that they intend "to select a location in Q1-2023 to maintain the development schedule required by prospective OEM partners." Ucore indicated that they hope to have the facility in operation by end-2024 (Phase 1 – 2,000 tpa TREO) and Phase 2 (5,000 tpa TREO) by 2026 (see chart on page 11).

Ucore states that the Louisiana separation facility (known as the Louisiana Strategic Metals Complex ("**LSMC**")) is being designed to:

- "process 2,000 tonnes of TREO from mixed rare earth concentrates on a per annum basis ("**tpa**") in the first and second year of operation, after that, expanding to 5,000 tpa:

- from multiple US-friendly sources, including heavy REE ("**HREE**") and light REE ("**LREE**") feedstocks.

- initially be capable of processing all RapidSX™ splits required to produce individual praseodymium, neodymium, terbium, and dysprosium from each applicable feedstock source. The product line will expand to other individual rare earth elements as the Western REE market develops."

The four primary rare earth oxides used to produce NdFeB permanent magnet motors are neodymium, praseodymium, dysprosium, and terbium.

**Rapid SX™ technology and demonstration plant commissioning**

The LSMC will use Ucore's 100%-owned Innovation Metals Inc. Rapid SX™ technology which has already been successfully piloted. Ucore states that "RapidSX™ is a transformative REE Separation Technology" that is faster and has a lower CapEx and OpEx than conventional separation technologies. It is also very scalable.

The longer term Ucore plan is to develop several Strategic Metals Complex Facilities (separation facilities) across North America.

The demonstration plant work is a focus for early 2023. Last month Ucore announced that:

"Commissioning will take place over the next several months. A program designed to demonstrate the significant advantages of utilizing its RapidSX™ technology platform for separating light and heavy rare earth elements into high-purity individual elements/compounds……..The Demo Plant is designed to process tens of tonnes of HREE and LREE feedstock annually. Once the

commissioning trials are completed, the Company is planning two additional 10-ton processing campaigns for the commercial demonstration and products qualification program."

Usually, once potential off-take partners have qualified the material, it can lead to off-take agreements. This then typically lends support for potential project funding.

**Ucore's next steps and master plan**


*Source: Ucore company presentation*

**Project funding – U.S desperately needs to develop rare earths separation facilities**

According to Ucore, there is currently no rare earths separation facilities of scale in North America. This would suggest that Ucore may receive some assistance from the U.S. government to get their Louisiana facility funded. Alastair Neill recently pointed out in an InvestorIntel article: "MP received US$35 million and Lynas US$120 million. This begs the question of whether or not the DoD will support Ucore with this plan of action." Syrah Resources Limited (ASX: SYR), Talon Metals Corp. (TSX: TLO) and Piedmont Lithium Inc. (Nasdaq: PLL | ASX: PLL)

are others that have recently received U.S. grants for their spherical graphite processing, nickel processing, and lithium chemical processing plans respectively. There is also the U.S. loans program office that is looking to support critical metals projects in the USA.

The Louisiana Economic Development ("LED") organization has already stepped up to support Ucore with a non-binding Letter of Intent ("LOI") for a 10-year US$9.6 million plus tax incentives package (over the first ten years of operation) in consideration for Ucore's projected investment of US$55 million for the Louisiana facility. There is also an expedited process for all required state permits.

**Closing remarks**

Ucore still has several hurdles ahead to achieve their goals, but management appears to be laser focused on the task. With some support already from LED and hopefully from the U.S Federal government the future for Ucore is starting to shape up nicely.

Ucore Rare Metals Inc. trades on a market cap of C$53 million and is cashed up after a recent ~C$4.59 million raise in December, 2022. Stay tuned.

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# June 2022 start for Vital Metals to produce mixed rare

# earth carbonates with feed from its own mines

written by InvestorNews | January 26, 2023

The rare earths sector has been doing very well lately, especially the highly valued magnet rare earths for which prices have doubled over the past year. Neodymium (Nd) and praseodymium (Pr) are the key magnet rare earths used commonly in electric motors. They also fall into the category of the 'light rare earths'. Another group of rare earths, known as the 'heavy rare earths', also have value. They include europium, gadolinium, terbium, dysprosium, holmium, erbium, thulium, ytterbium, lutetium and yttrium. Dysprosium (Dy) in particular is very valuable and is critically necessary for and used in alloys for neodymium based magnets subject to high temperature swings in operation.

Today's company is working towards becoming a North American producer of both light and heavy rare earths.

Vital Metals Limited (ASX: VML | OTCQB: VTMXF) (Vital) is a rare earths ore producer from their Nechalacho Rare Earths Mine in the Northwest Territories (NWT), Canada. Nechalacho has a measured, indicated and inferred resource of 94.7Mt at 1.46% REO for 1.3Mt contained TREO. The focus to date has been on the high-grade, light rare earths, found in the bastnaesite mineralization there.

Vital has off-take agreements with REEtec in Norway and with Ucore Rare Metals Inc. (TSXV: UCU | OTCQX: UURAF) in the USA. In both cases, Vital is working with them to develop a qualified feed stock for them end at commercial scale. In some good recent news, offtake buyer, REEtec, signed a supply agreement with Germany's large OEM automotive supplier,Schaeffler, thereby

potentially securing Vital's revenue from the sale of its product to REEtec.

Vital is currently constructing a Saskatoon, Saskatchewan, based cracking and leaching facility, with first feed to the facility expected in June 2022. An additional C$5 million of funding/reimbursement was recently achieved to help support the commissioning and ramp-up stage. Vital aims to produce a minimum of 5,000 tons annually of contained REO by 2025 at the Nechalacho Mine.

Vital Metals' Managing Director Geoff Atkins stated: "With production forecast to commence in June 2022, this will make Vital North America's only producer of high purity rare earth carbonate with feed from its own mines providing security of supply for the global rare earths supply chain."

**Expansion into heavy rare earths**

As announced on April 29, 2022, Vital is now planning to expand their existing light rare earths mine operation to also include heavy rare earths. Vital plans to investigate developing a zone of xenotime mineralization, the principle heavy rare earth hard-rock mineral, at Nechalacho's North T pit, targeting a 10-year operation from the zone. Xenotime, is an yttrium phosphate mineral, and is the only known commercially feasible hard-rock source of dysprosium and terbium, which are the critical magnet rare earth additives for high temperature operations. As Vital stated: "Tardiff contains elevated heavy rare earths mineralization which may complement North T's xenotime deposit as part of Vital's strategy to produce heavy and light rare earths."

**Next steps**

In 2022, in addition to commencing production at the Saskatoon

facility and working on expanding into heavy rare earths, Vital plans further drilling at the Tardiff zone to define a maiden Ore Reserve.

**Vital Metals 3 stage strategy to become a North American producer of both light & heavy rare earths**

*Source: Vital Metals March 2022 quarterly report*

**Closing remarks**

Vital Metals continues to march forward at a rapid pace. In late June 2021 the Nechalacho mine came into production, notably being Canada's first-ever producing rare earths mine. Then only a year later in June 2022, the Saskatoon cracking and leaching facility's first production of a mixed rare earth carbonate is set to commence.

If that wasn't good enough the Company is now planning to also produce heavy rare earths, also from the Nechalacho Mine. Once achieved Vital announced that they would become the "the world's first producer of both heavy and light rare earth oxides."

Vital Metals trades on a market cap of A$204 million. Exciting times ahead.

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# Hunting the big North American

# rare earths elephant

written by Jack Lifton | January 26, 2023

*"Amazing discovery… I keep making this point that there is a deficit of rare earths worldwide and Appia is the premier rare earths discovery in North America."* – Jack Lifton, Global Critical Materials Expert

A mineral discovery is the natural occurrence of a specific chemical compound or a mix of chemical compounds, which may be processed mechanically and chemically to isolate one or more forms of individual chemical elements, and then be purified and converted into useful forms for industrial use. If the discovery is extensive enough and the contained chemical compounds are of a sufficiently high enough grade for efficient and economical separation of them from each other and then can be further processed into forms that can be utilized industrially, then the large-scale production and concentration of the initial mineral concentrate is called mining.

How do you evaluate a rare earth discovery? The best way is to determine if it contains "valuable" rare earth elements, which can be economically and efficiently recovered in the jurisdiction in which it is located, in such quantities that the capital expended can be recovered at a profit.

The old-timers (aka, experienced exploration geologists and mining engineers) have just two simple metrics they use in first determining whether or not there is any point in answering this question: Grade and accessible tonnage.

Appia Rare Earths & Uranium Corp.'s (CSE: API | OTCQB: APAAF) rare earth discovery at Alces Lake, Saskatchewan, meets the first of the above requirements, and the company is now in the process of a comprehensive drill program to determine if the

second one is met as well.

The Appia discovery is of the mixed rare earth mineral, monazite, the most desirable rare earth bearing mineral on the planet. Monazite was the original rare earth mineral mined commercially in the late nineteenth century, not for rare earths, but for its contained thorium, which was heated, as an oxide in the form of a mixed ceramic mantle, with natural gas, to produce a brilliant white light for illuminating the stage in theatrical performances. Monazite fell out of favor as a mineral resource after World War II because of thorium's natural radioactivity being highlighted as a danger in the early atomic age. Of course, electric lights, had by then long eclipsed the need for thorium.

In the 1950s though, thorium again became of interest when it was discovered that nuclear reactors for the commercial production of electricity could be fueled with thorium, which could not easily be used to make nuclear weapons. Anglo-American Mining in that period discovered the highest-grade thorium and rare earths deposit then known in the world in South Africa and began producing thorium for the UK's civilian nuclear reactor program. Thorium reactors fell out of favor by the mid 1960s and thorium (monazite) mines were shut down, even though they were associated with high grade rare earths, because of the problems of disposing of the thorium and the then extremely expensive processes for separating the rare earths from each other, ion exchange, and fractional crystallization.

The discovery of a huge primary, accessible, mineable deposit of the rare earth mineral bastnaesite at Mountain Pass, California, in the late 1940s, and the development in the 1960s of the commercial application of solvent extraction to the separation of the rare earths, led to the eclipse of the use of high thorium monazites by bastnaesite as the primary mineral for rare

earth mining.

The development of the rare earth permanent magnet in the late 1970s, at first using the rare earth element, samarium, and the rare earth elements neodymium and praseodymium, revived interest in monazite, because monazite contains 50% more, by weight, of neodymium and praseodymium, than bastnaesite.

However, the low thorium bastnaesite in California, because of its accessibility, became the world's largest source of the magnetic rare earths, samarium , neodymium and praseodymium by the early 1980s. It was eclipsed by the bastnaesite recovered, more economically, as a byproduct of  iron mining in China's Inner Mongolia by the late 1980s. The Chinese iron deposits also contained some monazite, and this was processed there also to recover the rare earths. The thorium co-produced was stored, but its radioactivity ultimately led China to bring its control under the aegis of its China Nuclear Corporation (CNC), which stored it along with any other thorium produced as a byproduct of rare earths or its own uranium minerals processing.

Today, as Chinese bastnaesite grades seem to have declined from high grading and as pollution (environmental) consciousness has come of age in China, monazite, as a source of magnetic rare earths has revived dramatically in China. And China has become the world's largest processor of monazite. Chinese mining and processing companies already import nearly 40% of their rare earth ore needs annually. They get bastnaesite from California and CNC is licensed to process up to 5o,ooo tons per year of monazites containing up to 30,000 tons of rare earths. All monazite imported into China must first go to CNC for thorium and uranium removal, before it goes to the Chinese purchaser, which will then recover the rare earths contained. China buys monazites as ore concentrates from the USA (until very recently), Brazil, Madagascar, Australia, and Myanmar, and

Chinese companies are scouring the world seeking more.

The Chinese had the use of monazites as a source of magnetic rare earths to themselves until 2017, when Australia's Lynas Rare Earths (ASX: LYC) went into commercial production and separation of the individual rare earths from its massive monazite mine at Mt. Weld, Australia. Then. in 2020, the only privately owned licensed uranium ore processor and thorium storage facility in the USA, Energy Fuels Inc. (NYSE American: UUUU | TSX: EFR), began a project to process monazite for its rare earths and to stockpile and sell the uranium recovered and store the thorium. Energy Fuels is and remains the sole such facility in the Americas. Its business plan is to become vertically integrated by building, on-site, a separation facility, and a rare earth metals and alloys operation also.

Energy Fuels has acquired domestically produced American monazite from the heavy mineral sands operations of The Chemours Company, and is actively seeking additional materials both domestically and internationally. Energy Fuels has already produced and sold commercial quantities of mixed rare earth carbonates cleaned of uranium and thorium.

Now, at last, we come to Appia and Canada's entry into the rare earths' mining and processing arena.

Australia's Vital Metals Limited (ASX: VML | OTCQB: VTMXF) is now mining bastnaesite just outside of Yellowknife in Canada's Northwest Territory from a high-grade deposit discovered by Avalon Advanced Materials Inc. (TSX: AVL | OTCQB: AVLNF) and licensed to Vital. The ore concentrate will be first sent to an operation being built by the Saskatchewan Resource Council (SRC), a Crown Corporation, where the uranium and thorium will be removed and a mixed rare earth carbonate produced for use in further downstream processing. The first such production has

already been pre-sold to both American and European processing customers.

But the SRC has plans to construct not only a cracking, leaching, and radioactive recovery and storage system (Saskatchewan is Canada's largest uranium mining and processing province, so the business there is well established and understood), but also a rare earths separation system in the form of a dedicated solvent extraction facility, the first of its kind in Canada.

Now we come to Appia Rare Earths & Uranium Corp., a Canadian company, originally exploring for uranium in Saskatchewan's world-famous Athabasca Basin. About 5 years ago its then geologist discovered a dramatically high-grade sample of monazite on the company's Alces Lake Property in Saskatchewan. He soon found that the sample had come from an outcrop showing extensive monazite veining. He continued to explore the area and predicted that the monazite field was extensive.  Analysis of samples he took showed that it was also the highest grade neodymium rich monazite ever found in North America.

I was a speaker that year at a Metal Events' Rare Earth Conference in Henderson, Nevada, and the Appia geologist, James Sykes, was an attendee. I had never met him, but we shared a cab to the airport, and he excitedly told me the Alces lake, monazite, story. I was intrigued, but I had reservations about the thorium and uranium that would be present in such a high-grade material. I thought of the highest grade rare earths deposit ever worked, Steencompskraal, in South Africa, which was actually worked as a thorium mine with no interest (in the 196os) in the rare earths contained. I didn't then know of the monazite project in China or CNC's role in it. I listened politely to Mr Sykes and wondered what anyone would do with this discovery if it were confirmed to be extensive enough to qualify

as a NI 43-101 resource.

Did I mention that James Sykes also said that he believed the extended discovery to be near surface, so that a quarrying operation would obviate the need for underground operations?

It is now the Spring of 2022, and Appia has raised approximately $15.5 million in the last year. This funding is for a drilling program which is underway to prove a resource.

Energy Fuels is processing monazite, the Saskatchewan Resource Council has approved $31 million to acquire monazite, and other rare earth ore concentrates, and build a first of its kind in Canada cracking and leaching and separation facility dedicated to rare earths, and Canada's Ucore Rare Metals Inc. (TSXV: UCU | OTCQX: UURAF) has begun construction of a Strategic Metals Center in Alaska for the central processing of critical metals, beginning with rare earth mixed carbonates from a variety of sources including Canadian and Australian monazites.

Appia's drilling results so far are very encouraging, and have been extensively reported.

I think we may see the highest grade neodymium-rich monazite in the America's flow from Alces lake before 2025. If so, It will certainly be in high demand.

Did I mention that the Appia monazite discovery contains 1% of xenotime, the hard rock mineral source of yttrium, dysprosium, and terbium? A one-stop-shop for magnet makers?

The stars and this planet are coming into alignment for this one. Monazite is back.

*Disclosure: Jack Lifton is a member of Appia Rare Earths & Uranium Corp.'s Advisory Board and the Advisory Board for Energy Fuels Inc., and may hold securities or options in some of*

*the companies mentioned in the above article.*

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# Ucore targets to fill the processing gap in a Western rare earths supply chain by 2024

written by InvestorNews | January 26, 2023

As most investors familiar with the critical materials sector know, China currently dominates the space, especially in downstream critical materials 'processing'. This leaves the Western world very vulnerable to supply chain interruptions that can threaten the supply of end-user products such as electrical and electronic components, electric vehicles, wind turbines, solar panels, and/or military systems.

Today's company, Ucore Rare Metals Inc. (TSXV: UCU | OTCQX: UURAF) (Ucore), is working to bridge that gap, domestically, and become a USA 'processor' first of the rare earths, and ultimately of other key critical materials. They also plan to be a vertically integrated individual, separated, heavy rare earths producer.

Ucore is focused on initially developing an Alaska-based Strategic Metals Complex (SMC) rare earths' central processing facility with commissioning targeted for 2024. After that Ucore plans to develop its own magnet rare earths' deposit located on Bokan Mountain on Prince of Wales Island, Alaska. The ultimate

plan for Ucore is to have their Bokan-Dotson Ridge REE Project – containing the heavy rare earths' Dysprosium (Dy), Terbium (Tb) & Yttrium (Y) – feed their first, Alaska located, SMC processing facility. The underlying technology for this and other planned SMCs is the RapidSX™ REE separation technology platform, which will be operated by Ucore's wholly owned subsidiary, Innovation Metals Corp. (IMC).

**Ucore plans to fill the processing gap in creation of a Western rare earths supply chain with their SMC facilities**

Source: Ucore news January 2022

A key part of getting the Alaskan SMC processing facility up and running is to secure material supply agreements. The facility will have an initial 2,000 tpa total rare earth oxide (TREO) separation and purification capacity, ramping to at least 5,000t/year TREO by 2026.

**Feedstock agreements are progressing well for Ucore's planned Alaskan SMC processing facility**

In October 2021 Ucore signed a non-binding Memorandum of Understanding (MOU) with Vital Metals Limited (ASX: VML | OTCQB: VTMXF) for the supply of a mixed rare earth carbonate, beginning H1 2024. The deal is for "Vital to sell to Ucore a minimum of 500t REO (ex-cerium)/year, commencing H1 2024. Vital to expand production to support a minimum of 50% of Ucore's envisioned 5,000t TREO/yr processing capability by 2026."

It also was announced last week on April 20, 2022, that Ucore and Germany's ThyssenKrupp Materials Trading had executed a feedstock supply MOU for the Alaska SMC. Under the MOU "ThyssenKrupp Materials Trading is expected to begin the supply

of a minimum of 1,000 tpa of mixed rare earth carbonate to Ucore in 2024 for ten years." The announcement also states that the non-binding MOU allows for increasing quantities in subsequent years and that the two parties will work towards a 10-year binding contract.

The above MOU is a great achievement and positive endorsement for Ucore, as ThyssenKrupp Materials Services is the biggest mill-independent materials distributor and services provider in the Western world with around 380 locations, in more than 30 countries.

The loud and clear message for investors is that Ucore is putting together a North American individual rare earths supply chain from mixed rare earths carbonate (concentrate) all the way to the final product of separated individual rare earth oxides, used to make rare earth metal alloys (including magnets) such as those required for many critical and green energy products. It will be a key initial step for the USA to gain rare earths processing independence from China, which currently dominates the sector.

**Ucore is also developing processing technology for other critical metals in Ontario**

As announced on April 19, 2022 Ucore is improving the management and technical team for their Ontario RapidSX™ Commercialization and Development Facility (CDF). The demonstration plant construction is ongoing and is scheduled for commissioning in mid-2022.

What I find most interesting is that Ucore is also working on nickel laterite ore processing technologies as well as lithium-ion battery recycling, including working with clients such as Li-Cycle Holdings Corp.

Full details on Ucore's 2022 plans can be read here and include:

- A commercial demonstration plant for their RapidSX™ technology in Ontario.
- Development of the Alaska SMC Project.
- Exploring the potential of developing an SMC in Canada.
- Accelerating the development of the Bokan Project as a vital US supply chain component to provide a long-term secure source of HREEs; the most expensive and scarce inputs of the permanent magnet alloys.

**Ucore's business summary – Includes a target for construction of the Alaska SMC by 2023, subject to finance**

Source: Ucore Rare Metals Inc. website – Alaska 2023

**Closing remarks**

The Western world needs to develop its own complete end-to-end supply chains for critical strategic metals. In the case of rare earths, Ucore is advancing well and steadily moving towards becoming a U.S. individual separated rare earths producer by 2024, all going to plan. Of course, investors should remember these dates are the best guide from the company only and are subject to variables such as successful funding.

Ucore Rare Metals Inc. trades on a market cap of C$37 million. Ucore still has a long way to go with several hurdles and risks ahead, partially explaining the very low market cap. Still, if they succeed the potential reward could be significant.

# China Is Consolidating its Industrial Economy – The Case of the “Medium and Heavy Rare Earths’ Industry”

written by Jack Lifton | January 26, 2023

Perhaps the most significant announcement in the commodity space last week, one that was almost completely overlooked by the mainstream press, although it was picked up by some of the the “wire” services, and the New York Times, was the announcement that the Chinese “medium [samarium, europium, and gadolinium] and heavy {mainly terbium, dysprosium, and yttrium] rare earth producers and processors” were consolidating their operations. Those of you who follow the Chinese rare earth industry know that in the mid-teens  [around 2015] China’s mandarins reformed the Chinese rare earth industry by consolidating all of its operations under the umbrella of just 6 companies, which each became responsible for the rare earth companies in their geographic areas meeting and not exceeding their government specified quotas for production and processing. The ostensible purpose of this initial consolidation was twofold. It was intended to corral illegal rare earth mining and to address the rampant pollution from all domestic Chinese rare earth mining.

Most of my “in-the-know” colleagues scoffed at both stated purposes. They said that no one could or wanted to control Chinese illegal mining and no one in China really cared about pollution. They were all wrong; they did not understand that these goals were set by China’s president, Xi Jinping, and that it would be very unhealthy for any Chinese businessman to scoff at these goals or to impede them.

For most of the last two years the production of heavy rare earths from China's ionic clays has been completely curtailed due to pollution, and China today is importing more than a third of its rare earth bearing ore concentrates including most of its needs for heavy rare earths. This is a result not only of the crackdown on pollution but to continue the ban on working Chinese ionic clays, both to reduce pollution and to conserve a scarce and diminishing resource.

Last week the Chinese government announced the implementation of a second phase of consolidation in its domestic rare earths' industry. Two or three of the six rare earths' production managing companies will merge their medium and heavy rare earths' operations to form just one Chinese manager of all of China's medium and heavy rare earth production centered on the city of Ganzhou, which is the center of the Chinese medium and heavy rare earth industry.

My guess is that before 2025 a third phase, the consolidation of all Chinese rare earths' production and processing, light, medium, and heavy, will be announced and implemented so that there will be then just one Chinese Rare Earths producer and processor. If that happens then there will be no possibility of any non-Chinese company controlling the prices, or supply, of rare earths.

I doubt that any nation or region that has not secured a sufficient supply of rare earths for its critical needs by 2025 will never after that be able to do so. China today has not only a near monopoly on all rare earths production and processing but also has a monopsony of demand for rare earth permanent magnets. The numerical size of the Chinese domestic market is twice that of the USA and Europe combined, and the Chinese Communist Party's plan, also known as Xi Jinping "thought," is for every Chinese to have the world's highest standard of living by 2049.

That’s going to require a billion EVs, billions of home appliances, and thousands of passenger aircraft, just to name a few large-scale users of rare earth permanent magnets.

Its becoming harder and harder for Western companies to pretend that their fiercest competitor is not China, Inc. Its also harder and harder to believe that Xi’s “dual circulation” [in which domestic consumption grows to be greater than export volumes] reformation of the approach to China’s economy is not already dominant.

To achieve its goal of being the world’s richest nation by 2049 China has already implemented its plan to become the world center of critical metals processing. Its progress is apparent from the graph below.

In reality, all Chinese businesses are SOEs, state-owned-companies, because they all take their direction from Beijing.

The centralization of China’s critical metals industries is well underway. Rare Earth production and processing is just the beginning.

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# Imperial Mining is set to announce a Resource Estimate

# that will Highlight Significant Grades of Scandium and Related Technology Metals

written by InvestorNews | January 26, 2023

Imperial Mining Group Ltd. (TSXV: IPG | OTCQB: IMPNF) ("Imperial") is due to shortly release a 43-101 preliminary Resource Estimate for their 100% owned Crater Lake Scandium-Rare Earth Project in northeastern Quebec, Canada. What can investors expect?

The Crater Lake Project consists of 57 contiguous claims covering 27.8km$^2$. The Project has ~14 km of potential mineralized horizon (only 1/4 drill tested) spread over several zones, some of which have drill tested high-grade scandium and some rare earths deposits, including and yttrium. There is also potential for niobium and tantalum.

**Imperial Mining's Crater Lake location showing excellent infrastructure nearby**

Drilling has defined several mineralized zones of over 600m in total strike length and from surface to a vertical depth of up to 200m.

Source: Company presentation

**Excellent drill results at Crater Lake continue in 2021**

Past drilling has shown some excellent long length, high-grade,

scandium oxide results ranging from 0.0235% to 0.056% (235-506 g/t).

For example, in April 2021 the Company announced excellent drill results at Crater Lake that included **92.5 m @ 291g/t scandium oxide ($Sc_2O_3$).** Elevated levels of total rare earth oxides plus yttrium of up to 0.42% were also found. There is also a parallel niobium target showing grab assay results of between 0.20% and 1.42% Nb2O5 which sits 250m west of the scandium target.

Then in May 2021, Imperial announced:

- "Assay results from the first four drill hole continue to return impressive intercepts of **111.9 m (367.0') grading 298 g/t scandium oxide ($Sc_2O_3$),** including 40.5 m (132.8') grading 336 g/t $Sc_2O_3$and 34.77 m (114.0′) grading 321 g/t $Sc_2O_3$.
- Elevated levels of **total rare earth oxides plus yttrium (TREO+Y) of up to 0.38 %."**

More recent drill results announced in June 2021 included:

- **"99.8 m (327.3') grading 299 g/t scandium oxide ($Sc_2O_3$),** including 24.2 m (79.4') grading 331 g/t $Sc_2O_3$ and 77.3 m (253.5′) grading 313 g/t $Sc_2O_3$.
- Elevated levels of **total rare earth oxides plus yttrium (TREO+Y) of up to 0.46%** characterize the scandium-bearing intercepts."

**Crater Lakes' critical minerals mean a 10MT resource can potentially be very valuable**

Imperial's 'target' at Crater Lake is to define a scandium-REE mineral resource of a minimum of 10 Mt, sufficient for a 25-year operating model. What some investors miss is that a small relatively shallow resource-rich in valuable metals such as

scandium, niobium, and rare earths can be highly valuable. The chart below highlights this by expressing the results as 6.5 to 12.0 g/t 'gold equivalent'. If Imperial Mining was able to achieve 10MT of ore at say 6.5 g/t Au equivalent (lower range) that would be equivalent to 65 million grams (2.1 million troy ounces) of gold in terms of value. If the grade was in the higher range then the gold equivalent would be almost double. Of course, the 10MT is a 'target" and not yet a reality, as we will have to wait to see what the upcoming resource estimate is.

**The Crater Lake TG Zone drill results are equivalent to 6.5 to 12.0 g/t gold equivalent**

Source: Company presentation

Once a resource is grown the other important issue is the extraction method and recovery rates. In June 2021 news Imperial announced that they had developed a "high-recovery extraction process for scandium and rare earth elements for Crater Lake mineralization…..as part of its current Phase 3 Hydrometallurgical Development Program." Scandium extraction was at **84-87%**, and total rare earth elements, including yttrium (TREE+Y) was **84%**. This is excellent news.

**Near term stock catalysts**

Imperial President & CEO, Peter Cashin, stated in August: "We are now in the final stages of the surface evaluation of our Crater Lake property. In addition to delivering the inaugural 43-101 resource estimation on our TG Zone later this month, we look forward to delivering on the results of the remainder of the targets present on the Crater Lake property. We clearly believe that much additional critical metal potential remains to be evaluated on our property as we have only drill-tested one-

quarter of the favourable 14-km-long mineralized horizon. We also intend to assess a high-grade niobium-tantalum mineralized area identified in 2010, north and northwest of the scandium-bearing Crater Lake Complex.”

Imperial will now embark on a Summer 2021 campaign that will include surface evaluation of additional high priority scandium rare earth exploration targets outside of the drilled TG Zone mineralized area. 50-tonne bulk samples at the STG mineralized Zone will be used in a pilot plant study to further test and optimize Imperial’s metallurgical process method. Next, a detailed assessment of historical high grade rare earth, niobium, tantalum occurrences at the Crater Lake Extension property area will be undertaken. Following this will be a pilot plant study and a Preliminary Economic Assessment.

**Closing remarks**

Imperial Mining trades on a market cap of a mere C$20 million. Considering the outstanding drill results over the past year, outstanding hydromet recovery rates achieved to date, and the impending 43-101 preliminary Resource Estimate due out any day now the stock looks likely to be potentially re-rated higher soon. Don’t wait too long!

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# MOU with the Saskatchewan Research Council signals

# another milestone for Search Minerals on their quest to produce rare earths in NA

written by InvestorNews | January 26, 2023

A likely Biden victory in the USA is positive for all the rare earths miners. This is because one of Biden's key policies is a massive $2 trillion green infrastructure and jobs plan over his first term in office that aims to have a US carbon pollution-free power sector by 2035. This would be a huge tailwind for the US renewable energy sector (solar and wind) as well as supportive to the US electric vehicle (EV) industry. Any North American rare earths suppliers who can potentially supply the USA and/or Canada with rare earths would be likely to benefit as North America embraces the green revolution.

One rare earth miner worth considering is Search Minerals Inc. (TSXV: SMY) ("Search"). Search is focused on finding and developing critical rare earth element mineral assets in Labrador, Canada.

In some very exciting recent news Search has signed a Memorandum of Understanding (MOU) with the Saskatchewan Research Council (SRC). The MOU outlines a collaboration with SRC as they build their Rare Earth Processing Facility in Saskatchewan, Canada.

Search Minerals President and CEO, Greg Andrews, commented: "We anticipate using the (SRC) conventional solvent extraction process to enable Search to validate the ability to produce the individual rare earth oxides necessary to enter the rare earth supply chain.

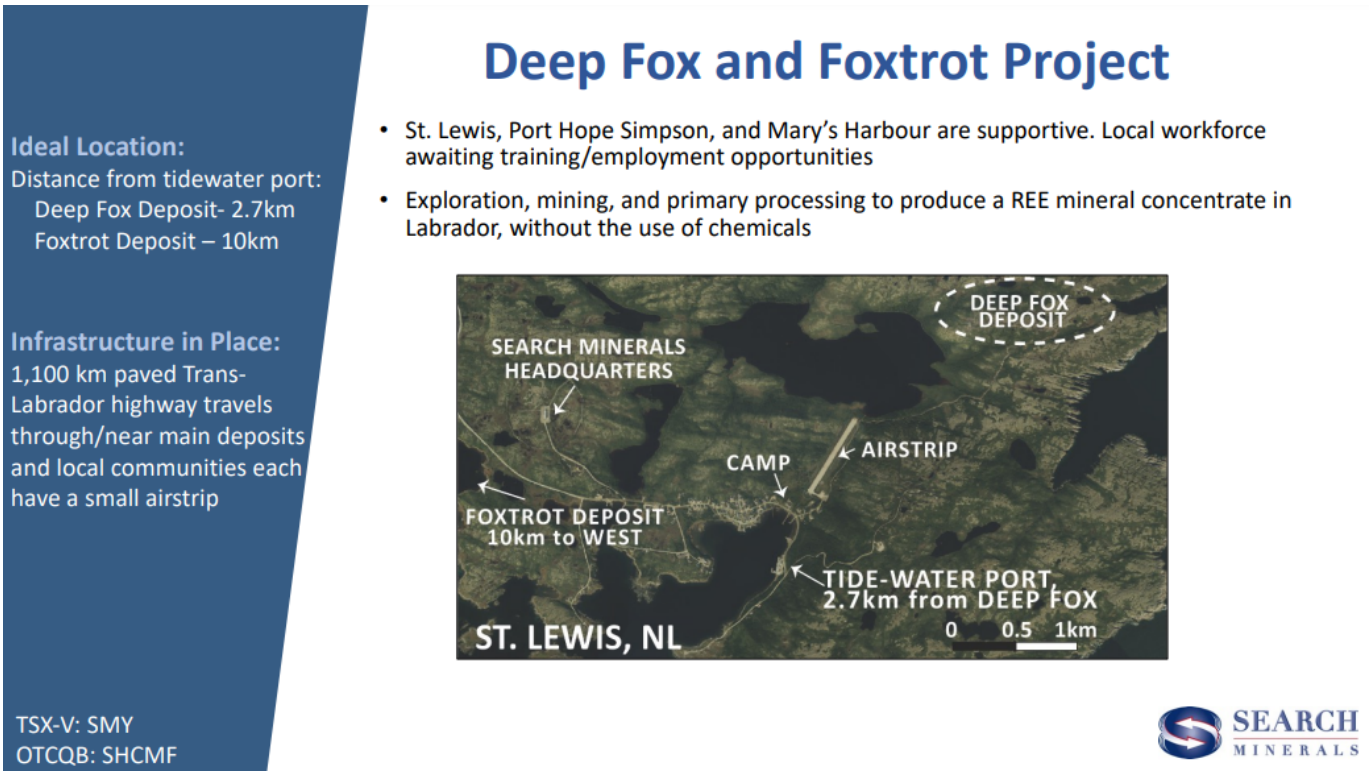
Recent announcements regarding building electric cars in Canada

and other government led initiatives for clean and green technology provides the framework for industry access to a secure rare earth supply chain in Canada. We believe Search is well positioned to capitalize on these opportunities."

Search controls properties in three areas of Labrador, Canada. These are:

- The Port Hope Simpson (PHS) Critical Rare Earth Element District in SE Labrador
- The Henley Harbour Area in Southern Labrador
- The Red Wine Complex located in Central Labrador

**Search Minerals has nearby infrastructure in place at St. Lewis, Labrador, Canada**




Source

Within the Port Hope Simpson District Search's main discoveries are the **Foxtrot Resource**, **Deep Fox**, **Fox Meadow**, **Silver Fox, and**

**Awesome Fox deposits** which contain rare earths including dysprosium (Dy), neodymium (Nd), praseodymium (Pr), terbium (Tb), yttrium (Y), zirconium (Zr), and hafnium (Hf).

The district covers a 63 km long and 2 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 Life of Mine (LOM) Foxtrot Project offers an IRR of 16.7% on an after tax Net Present Value (NPV) 10% of $48M, with a CapEx of only $152M. 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.

At Fox Meadow, 2020 channel assay results outlined two mineralized zones on the surface: The NW zone is up to 175m wide and the SE zone is up to 116m wide. Combined, the mineralization is at least 790m long and contains similar grades of the REE magnet materials (Nd, Pr, Tb and Dy) as Foxtrot and Deep Fox. This is a good result as it means Search is continuing to find more REE mineralization to potentially further grow their resource.

At Silver Fox, Search has recently successfully expanded the Silver Fox high grade zirconium-hafnium (REE) mineralized zone. In the news release Search commented: “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 lower grades of the REE magnet materials (Nd, Pr, Tb and Dy) but significantly higher grades of Zr and Hf.”

At Awesome Fox, the 2020 channel program (7 new channels) along with previous channels has outlined a REE mineralized zone

ranging from about 4-43m thick and 850m long.

**Closing remarks**

Earlier in 2020, rare earths expert Jack Lifton stated about Search Minerals: “I think it may well be Canada’s first commercial rare earth producer.” Given Search has completed a Resource estimate (Foxtrot, Deep Fox), a PEA (Foxtrot), has successfully produced 99% purity REO concentrate from their pilot plant and patented process, and now has a potential larger scale processing option with SRC; this all combines to suggest that Search Minerals is well on the way towards commercial production. Next steps would involve a BFS and potentially some trial production with SRC once their facility is built.

Search Mineral’s current market cap is only C$10.5M suggesting there may be plenty of upside potential ahead, especially if they continue to successfully advance towards production.

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

written by InvestorNews | January 26, 2023

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.

# TMRC's Chairman Anthony Marchese on what the US-China Trade Agreement means to the US Rare Earths Market

written by InvestorNews | January 26, 2023

"If you look at the specifics of the trade agreement (US-China Phase One Deal), the way they have listed is, all of the rare earths including scandium and yttrium because a lot of people don't consider especially yttrium a rare earth. So it is all of the rare earths and scandium and yttrium and any of the alloys. It is true that the United States currently has zero manufacturing capacity…I look at it as another potential market for our products when we get into production. Remember this is phase 1. There is going to be phase 2 and hopefully phase 3. They are committed to buying it once we get into production. We will be able to sell 100% of our goods to the American market. China then becomes a secondary market for some of our products. It gives acknowledgment to the fact that we have a potential supply chain resurgence in the United States." States Anthony Marchese, Chairman of Texas Mineral Resources Corp. (OTCQB: TMRC), in an interview with InvestorIntel's Tracy Weslosky.

Anthony went on to say that Texas Mineral Resources is developing the Round Top Heavy Rare Earth and Critical Minerals Project in Texas with its funding and development partner, USA Rare Earth LLC. The Round Top Project has the optimal infrastructure to move materials to other parts of the country as it is very close to Interstate Highway 10 and a major

railroad. The project is located on State property and not on Federal property which is a huge advantage for the company. Anthony also said that the Round Top project will provide a balanced and diversified revenue stream as a third of the output will be rare earths, another third will be critical materials like scandium and lithium and remaining will be industrial minerals.

To access the complete interview, click here