

# Energy Fuels on Path to Become the American Critical Mineral Powerhouse

written by InvestorNews | October 18, 2023

Uranium has been a winning sector in 2023 with uranium prices up 41% YoY, making it the best performing energy commodity in the past year. As the uranium price hovers near a 12 year record high (US\$69/lb), today's company is set to benefit.

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## A profitable Energy Fuels acquires a rare earth project in Brazil and leads the way for critical minerals in the USA

written by InvestorNews | October 18, 2023

Energy Fuels Inc. (NYSE American: UUUU | TSX: EFR) ("Energy Fuels") has been going from strength to strength in 2023. As the leading US uranium producer, recent expansion to rare earths processing has made Energy Fuels a leading US supplier of critical minerals.

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# **With plans to become a significant producer of the magnet rare earths, Defense Metals deserves a deeper dive**

written by Tracy Weslosky | October 18, 2023

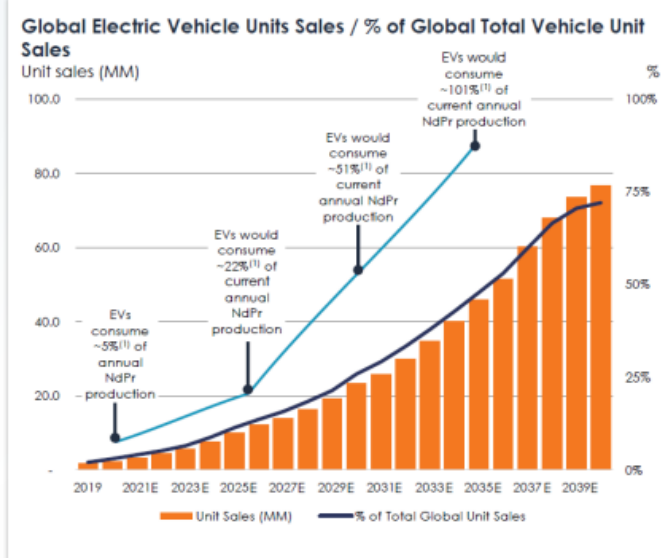
**The Wicheeda Project plans to produce 25,000tpa of REO which represents ~10% of the current global production**

Magnet rare earths demand is forecast to surge this decade. This is because an electric vehicle (“EV”) uses 1kg to 3kg of neodymium–iron–boron (“NdFeB”) magnets in standard drivetrain electric motors. NdFeB magnets are in [93%](#) of all EVs. Global demand for EVs is expected to grow from 6.75 million in 2021 to over 70 million by (or before) 2040. This will require huge amounts of neodymium.

**Every ten million new EVs require ~10,000 tonnes of additional neodymium or ~20% of the current annual global supply**

## ELECTRIC VEHICLES – A DRIVER FOR RARE-EARTH DEMAND

- An electric vehicle (EV) uses 1kg to 3kg of neodymium-iron-boron (NdFeB) magnets in standard drivetrain motors
- NdFeB magnets are in 93% of all electric vehicles. Tesla, GM, Ford, VW, Hyundai, Toyota and others build vehicles using these magnets
- Every ten million new EVs require ~10,000 tonnes of additional neodymium or ~20% of current annual global supply. Over 70 million electric vehicles are expected to be sold when internal-combustion-engine vehicles are phased out



DEFENSE METALS CORP. TSXV:DEFN OTCQB:DFMTF FSE:35D

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Source: [Company presentation](#)

The key problem for the EV industry is where will the new magnet rare earths supply come from and can the West become independent from Chinese supply. Today's company is working towards a solution.

**[Defense Metals Corp.](#)** (TSXV: DEFN | OTCQB: DFMTF | Frankfurt: 35D) ('Defense Metals') plans to become a significant producer of the magnet rare earths neodymium and praseodymium from their 100% owned Wicheeda Rare Earth Element Project spread over 4,244 hectares and located 80 km northeast of Prince George, British Columbia, Canada.

Brought to my attention a few dozen times over the last 2-years, I am fond of Dr William Bird, Director – who is deemed a leader in understanding rare earths in our sector; and likewise, President & Director Luisa Moreno who has at least 10,000 professional hours in this sector by now I suspect. With a PhD in Materials Science and Mechanics, this is the theme we are stressing at the [Critical Minerals Summit](#) on Wednesday, November

9th and that is the scarcity of talented professionals with both the experience and education to tackle the formidable task of creating a decarbonized economy.

The Project has an Indicated Mineral Resource of [5 million tonnes averaging 2.95% LREO](#) (“Light Rare Earth Oxide”), and an Inferred Mineral Resource of 29.5 million tonnes averaging 1.83% LREO. Key rare earths contained include neodymium (Nd) and praseodymium (Pd), as well as cerium (Ce) and lanthanum (La). The Resource is amenable to an open pit project and contains a mix of monazite and bastnaesite ore.

Some of the best drill results to date at the Wicheeda Rare Earth Element Project include:

- WI21-49 – [3.79% Total Rare Earth Oxide \(“TREO”\) over 150 Metres](#)
- WI21-54 – [3.81% TREO over 117 metres](#).
- I21-58 – [3.09% TREO over 251 metres](#).
- WI21-59 – 2.76% TREO over 212 metres.

### **Strong PEA result with a NPV8% of C\$517 million**

The Wicheeda Project [PEA](#) (Jan. 2022) resulted in a post-tax NPV8% of [C\\$517 million](#) and a post-tax IRR of 18%, using a price assumption of US\$100/kg NdPr. Initial CapEx is estimated at [C\\$440 million](#).

Once in production Defense Metals targets to produce 25,423tpa of REO over a 16 year mine life, which would make the company a globally significant rare earths producer with ~10% of the current global production.

**The Wicheeda Project plans to produce ~25,000tpa of REO which represents ~10% of the current global production**

## CHINA CONTROLS THE RARE-EARTH SUPPLY CHAIN

Projected Wicheeda annual  
production 25,000 tonnes REO

~10% of the Global Current Production

(tonnes REO)		SUPPLY CHAIN		
		Mining & Mineral Upgrade	Cracking	Separation
	Country	Ore Conc	Mixed Chemical Conc	Separate Oxides
140,000	China	China	China	China
38,000	United States	United States	China	China
30,000	Myanmar	Myanmar	Myanmar, China	China
25,000	WICHEEDA	(projected)		
17,000	Australia	Australia	Malaysia	Malaysia, China
3,000	India	India	India	India
2,700	Russia	Russia	Estonia	Estonia
4,000	Madagascar	Madagascar	China	China
2,000	Thailand	Thailand	Thailand	Thailand
1,000	Brazil	Brazil	Brazil	Brazil
1,000	Vietnam	Vietnam	Vietnam	Vietnam
500	Burundi	Burundi	China	China

Source: [Company presentation](#)

The Wicheeda Project is accessible by a major forestry road that connects to a highway, with the town of Prince George 80kms away. Power lines and a gas pipeline are <40kms away and a major rail line is nearby.

Next steps for Defense Metals include a PFS to be completed in H1 2023, a pilot plant in 2024, and a FS completed in 2025.

**The Wicheeda Project location map and key points showing adequate road access and reasonable local infrastructure including access to power and gas <40kms away**

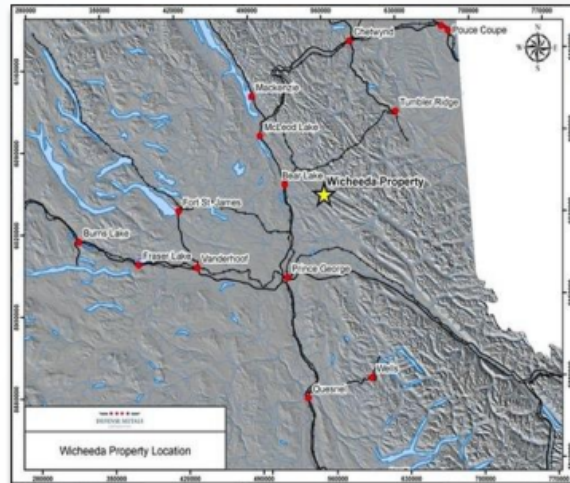
## WICHEEDA DEPOSIT IN STRATEGIC LOCATION

Strategically positioned 80 km from Prince George and accessible from a major forestry service road, which connects to **Highway 97**

The 100% owned 4,244-hectare Wicheeda deposit, has power transmission lines, a gas pipeline and a major rail line nearby

Prince George, British Columbia, is a mining centre, with a skilled workforce

Port of Prince Rupert is 500km to the west and accessible by rail and road



DEFENSE METALS CORP TSXV:DEFN OTCQB:DFMTF FSE:35D

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Source: [Company presentation](#)

Given the size and quality of the resource, safe location in Canada (with forestry road access, power & gas not too far away) and strong fundamentals supporting key magnet rare earths demand this decade; most investors would agree Defense Metals is worthy of a deeper look. Defense Metals current market cap is [C\\$44 million](#).

# What does the replacement of the Australian Strategic Materials CEO mean?

written by Jack Lifton | October 18, 2023

[Australian Strategic Materials Ltd.](#) (ASX: ASM) has accomplished

the execution of a business model first described by Canada's former Great Western Minerals and then appropriated by the (second) American Molycorp, neither of which could ultimately pull it off – the vertical integration of a critical mineral producer from the mine to the finished mass-produced product ready for end-user product fabrication.

For ASM the first integrated production will be of rare earth metals, titanium, and zirconium, the mineral supply chain for each of them originates with the company's Australian mining operation, and the final processing to metals is done in a Korean joint venture, already proven at the pilot plant level and with a full-scale plant being contracted for with Hyundai Engineering.

I have no doubts that the entire output of ASM's Korean operations will be sold into the Korean market. The sister company of Hyundai Engineering, Hyundai Motors, is already mass producing a low-cost battery powered EV, which needs rare earth permanent magnet electric motors made independently of Chinese critical metals.

The Korean nuclear power industry needs zirconium (and its sister metal, hafnium [also to be produced by ASM in Korea]) for the cladding of fuel rods. And the Korean domestic armaments industry needs rare earth permanent magnet motors and titanium for its aircraft and shipbuilding (Korea's first full-scale aircraft carrier is now being planned).

ASM, having now structured its total supply chain for critical metals, just last week [installed a new CEO](#), its former COO, Rowena Smith, who has almost 30 years of global mining experience in strategic planning and mineral processing with senior mining corporations, including roles at South 32, Rio Tinto, and BHP. Previous CEO David Woodall abruptly stepped down

from his roles and left the company.

It's important at this point to understand the significance of the replacement of now former CEO, David Woodall, by former COO, now CEO, Rowena Smith. Those who plan wars, or even battles, rarely carry them out. During David Woodall's tenure, the vertical integration of ASM was planned and the component ventures were acquired, modified and themselves integrated. During that time Rowena Smith, as COO, familiarized herself with the plan, helped to implement it, and took over the day-to-day operations of the system as it matured. She has overseen areas of the Dubbo project and the Korean Metals Plant. Last week the board of the company determined that ASM was ready for her operationally-experienced and skilled management to assume overall control, and the management change was implemented.

ASM is now the first non-Chinese company to complete a vertically integrated business model from the mine through to the production of high purity critical metals for the EV, shipbuilding, aerospace, and nuclear industries.

ASM is Australian-owned and sited, and its first customers are in Korea.

The rest of the non-Chinese mining and processing world should look closely at this success and emulate this model.

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## **Geoff Atkins talks about Vital**



# Metals' transitional year from developer to producer in 2022

written by InvestorNews | October 18, 2023

In this InvestorIntel interview with host Tracy Weslosky, [Vital Metals Limited](#)'s (ASX: VML | OTCQB: VTMXF) Managing Director Geoff Atkins talks about the company moving from rare earths miner to producer in the coming months.

In the interview, which can also be viewed in full on the InvestorIntel YouTube channel ([click here](#)), Geoff talks about production from Vital's Nechalacho rare earths project in the Northwest Territories going to its Saskatoon extraction plant, with production of high purity rare earth carbonate forecast to commence in June 2022, and its rare earths product to be sold to Vital's take off partner in Norway later this year. Geoff goes in to explain, for Vital "this year is that transformational process from developer through to operator."

Being an Australian company with both its cornerstone project and processing facility in North America, Geoff also discusses increasing the company's presence in the North American markets in the coming months as it moves to producer.

Don't miss other InvestorIntel interviews. Subscribe to the InvestorIntel YouTube channel by [clicking here](#).

## About Vital Metals Limited

Vital Metals Limited (ASX: VML) is Canada's first rare earths producer following commencement of production at its Nechalacho rare earths project in Canada in June 2021. It holds a portfolio of rare earths, technology metals and gold projects located in Canada, Africa and Germany.

To know more about Vital Metals Limited, [click here](#)

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If you have any questions surrounding the content of this

interview, please contact us at +1 416 792 8228 and/or email us direct at [info@investorintel.com](mailto:info@investorintel.com).

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

written by InvestorNews | October 18, 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.

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# America's Energy Fuels offers investors a way to make the "green" revolution happen in the USA

written by InvestorNews | October 18, 2023

This decade is all about converting our society from fossil fuels to green energy and establishing locally sufficient and secure supply chains. If we agree that nuclear is the best form of base-load electricity to get us off of fossil fuels, then that makes uranium the key green energy source. Solar and wind will also play an important role in future years but are at best intermittent sources of electricity so that they require that lithium-ion and vanadium batteries be used for energy storage. Our motor vehicles will increasingly be powered by electric motors of the permanent magnet type, the best of and most efficient of which are those made from the magnet rare earths (Nd, Pr, Dy, Tb) and "fueled" from rechargeable storage batteries onboard the vehicles,

To make the "green" revolution happen in the USA a local supply chain must be developed to supply the key and critical materials to manufacture the electricity required and the batteries required to store that electricity until it is needed. This is why late last month the White House released a fact sheet: ["Securing a made in America supply chain for critical minerals."](#)

We can see by the price action below (for the full year 2021) how demand for key metals is pushing up prices:

- Uranium oxide – Up 38%.
- Neodymium-Praseodymium oxide (NdPr) – Up 112%.

- Vanadium oxide – Up 62%.

### [Source](#)

Note: Prices for each of these commodities have continued to show significant strength in 2022, especially uranium.

Today's Company is the USA leader in uranium production processing, which also has vanadium production processing, and is a growing rare earths processor, which today is America's only producer of the mixed rare earth carbonates required by the rare earth industry as a feedstock for the manufacturing of individual and blended rare earth chemicals used in the production of rare earth permanent magnets.

### **Energy Fuels Inc.**

[Energy Fuels Inc.](#) (NYSE American: UUUU | TSX: EFR) has been very busy for the past two years. While others were talking, Energy Fuels was taking action. The Company has been **building up uranium & vanadium inventory and producing and selling mixed rare earths' products**,

Financial results of a net income of [US\\$1.5 million](#) for 2021 are very deceptive, as Energy Fuels chose not to sell uranium and was still in the process of developing its rare earths processing capabilities and securing additional feed sources. In fact, Energy Fuels is sitting very nicely as they state in their [March 2022 update](#):

“At December 31, 2021, the Company had a robust balance sheet with \$143.2 million of working capital, including \$113.0 million of cash and marketable securities, \$30.8 million of inventory, and no short term (or long term) debt. At current commodity prices, the Company's December 31, 2021 product inventory would have a value of approximately \$60.6 million.....While the Company chose to not sell any uranium during



2021, it is now actively engaged in pursuing selective long-term uranium sales contracts.”

### **Uranium prices have almost doubled the past year**

The current uranium price is [US\\$57.25/lb](#), almost double that from a year ago when it sat at about US\$30/lb. This means it makes sense for Energy Fuels to “actively engaged in pursuing selective long-term uranium sales contracts”. This may allow Energy Fuels to dramatically ramp up revenues in 2022.

Furthermore, if we get a uranium supply chain disruption from Russia controlled Kazakhstan ([41%](#) of supply) or Russia ([6%](#) of supply) we may see uranium prices move well above US\$100/lb.

Energy Fuels would be in pole position to start selling their uranium inventory and ramping up U.S based uranium production.

**Energy Fuels is the leader in U.S. uranium production used for nuclear fuel that can be used for fossil free U.S. electricity**



Source: [Energy Fuels website](#)

### **China dominates rare earths supply**

Around [85%](#) of the global supply of rare earths comes from China. Should the USA and China have any type of “trade war” or disagreement over the current Russia-Ukraine war, China could choose to stop exporting rare earths products to the USA. Just as with uranium, this would have crippling consequences for the USA.

There are very few secure and available sources of rare earths outside of China. U.S. based Energy Fuels would suddenly become a key and critical supplier.

Energy Fuels is rapidly moving to grow their range of rare earths products. In their March update the Company [stated](#):

- “The Company produced approximately 270 metric tonnes of mixed rare earth element (**REE**) carbonate (**RE Carbonate**), containing 120 metric tons of total rare earth oxides (**TREO**) during 2021, as it commenced ramping up its REE recovery infrastructure. Energy Fuels’ RE Carbonate is the most advanced REE material being produced in the U.S. today.
- The Company is currently in active discussions with several sources of natural monazite sands around the world to significantly increase the supply of feed for its growing REE initiative.
- During Q1-2022, the Company began commercially separating Lanthanum (La) and Cerium (Ce) on a small scale from its RE Carbonate, using an existing solvent extraction circuit at the Mill. This represents the first commercial level REE separation to occur in the U.S. in many years.
- The Company is planning to install a full separation circuit at its White Mesa Mill (the **Mill**) to produce both “light” and “heavy” separated REE oxides in the coming years, subject to successful licensing, financing, and commissioning, and continued strong market conditions.”

**Energy Fuels is producing rare earths used in many electric vehicles and wind turbine electric motors**



Source: [Energy Fuels website](#)

Energy Fuel CEO & President, Mark Chalmers, summed up Energy Fuels nicely, [stating](#):

“In 2021, we believe Energy Fuels **further strengthened its**

**position as America's leading multi-commodity, critical mineral company**, as we made excellent progress on our uranium, REEs, vanadium and medical isotope initiatives. We are deploying our 'one-of-a-kind' licenses, facilities, and expertise to responsibly recover the critical elements needed for carbon-free nuclear energy, electric vehicle powertrains, wind generation, advanced electronics, grid-scale batteries, other clean energy and advanced technologies, and potentially cancer therapeutics."

*Note: Bold emphasis by the author.*

### **Closing remarks**

Energy Fuels offers investors a critical materials (uranium, vanadium, rare earths) growth play, as well as an investment that can outperform if either Russia (uranium) or China (rare earths) decide to punish the USA.

What a great combination! Growth as the green revolution takes off and protection from Russia and/or China in the unfortunate case that the geopolitical environment gets worse.

Energy Fuels trades on a market cap of [C\\$1.911 billion](#) ([US\\$1.516 billion](#)).

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**Geoff Atkins discusses  
exceeding expectations in**

# Vital Metals' output of rare earths with Peter Clausi

written by InvestorNews | October 18, 2023

In a recent InvestorIntel interview, Peter Clausi spoke with Geoff Atkins, Managing Director of [Vital Metals Limited](#) (ASX: VML) about Vital Metals' recent [news release](#) on redesigning the North T Pit at Vital's Nechalacho Rare Earths Mine after the ore sorter exceeded expectations.

In this InvestorIntel interview, which may also be viewed on YouTube ([click here to subscribe to the InvestorIntel Channel](#)), Geoff Atkins went on to say that Vital Metals' Nechalacho ore sorter is now able to sort even lower grade materials allowing Vital to process significant quantities of material previously identified as waste. He went on to explain the unique nature of mineralization at the North T Deposit allowing Vital to classify ore and waste visually without having to send materials to a lab for assaying.

To watch the full interview, [click here](#).

## About Vital Metals Limited

Vital Metals Limited is Canada's first rare earths producer following commencement of production at its Nechalacho rare earths project in Canada in June 2021. It holds a portfolio of rare earths, technology metals and gold projects located in Canada, Africa and Germany.

## Nechalacho Rare Earth Project – Canada

The Nechalacho project is a high grade, light rare earth (bastnaesite) project located at Nechalacho in the Northwest Territories of Canada and has potential for a start-up operation

exploiting high-grade, easily accessible near surface mineralisation. The Nechalacho Rare Earth Project hosts within the Upper Zone, a JORC Resource of **94.7MT at 1.46% TREO** comprised of a Measured Resource of 2.9MT at 1.47% TREO, an Indicated Resource of 14.7MT at 1.5% TREO, and an Inferred Resource of 77.1MT at 1.46% TREO.

To learn more about Vital Metals Limited, [click here](#)

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# Hastings Technology Metals secures Australian Government Funding for Yangibana, World's Richest NdPr Deposit

written by InvestorNews | October 18, 2023

Many are now asking will [Hastings Technology Metals Ltd.](https://www.hastingsmetals.com) (ASX: HAS) ("Hastings") be Australia's next rare earths producer?

The answer is 'maybe yes' after the Company [announced](#) on February 2, 2022: "NAIF approves \$140 million loan for Yangibana Rare Earths Project.....NAIF loan forms part of A\$300-400 million of total debt financing required for Yangibana."

Yangibana is the first Australian rare earths project to receive NAIF funding. The above mentioned Northern Australia Infrastructure Facility (NAIF) loan has a 12½-year tenure and is subject to pre-completion conditions.

Hastings [stated](#): “Yangibana early works construction and design for long-lead items underway in anticipation of plant construction commencing in September 2022 Quarter.” The NAIF loan first drawdown is expected to occur in early 2023, aligned to the Yangibana funding schedule.

Hastings [states](#) about its planned project: “The Yangibana project, which comprises a mine and beneficiation plant at the Yangibana site and a hydrometallurgical plant at the Ashburton North Strategic Industrial Area (ANSIA) near Onslow, will become Australia’s second rare earths producer and expands the country’s strategic capability in downstream processing of rare earths minerals.”

### **More about Hastings Technology Metals Ltd.**

Hastings controls two rare earth projects in Western Australia. They are the [Yangibana](#) and [Brockman](#) Projects. The more advanced Yangibana Project contains a predominance of neodymium, praseodymium, dysprosium and europium.

### **The Yangibana Project (mine, beneficiation plant, and hydrometallurgical plant) – Western Australia**

Hastings [state](#): “Yangibana has the world’s highest composition of neodymium and praseodymium and is located in the Tier 1 mining jurisdiction in Western Australia.” The significance here is that neodymium and praseodymium (NdPr) are the highly valued magnet metals.

The Yangibana Project [Proven & Probable Reserve](#) is 16.7Mt at 0.95% TREO (0.35% NdPr oxide) for a total contained 158,419 t TREO. The Total Mineral Resource has a contained TREO of 266,417 t (at 0.97% TREO).

**Yangibana Project has great metrics – Has a 37% NdPr content –**

**double the world average**



Source: [Company presentation](#)

The Yangibana Project's CapEx is estimated at [A\\$516 million](#) (A\$67 million contingency) but is currently being revised. The Project's November 2019 NPV was [A\\$549 million](#) (IRR 21.1%). NdPr prices have increased significantly since then, so updated Project economics are expected soon.

The Yangibana Project is planned to have a [1.2Mtpa ore throughput](#), a 15 year mine life, ~15,000 tpa of MREC production, ~8,500 tpa TREO production and [3,400tpa NdPr](#) production. Commissioning is targeted for 2024, subject to final project funding.

**Hastings' Yangibana Rare Earths Project and their planned Onslow hydromet plant in Western Australia**



Source: [Company presentation](#)

Hastings has commenced early site works at Yangibana (Mining Proposal [has been approved](#)) and recently received Commonwealth environmental approvals to develop the hydrometallurgical plant site at ANSIA near Onslow. Subject to funding, Hastings intends to then commence construction of the beneficiation plant and the hydrometallurgical plant.

On February 2, 2022, Hastings Executive Chairman Charles Lew, [stated](#)

"The commitment by NAIF will enable Hastings to finalise the funding requirements for Yangibana's development and move into



full-scale construction throughout 2022, with the objective of delivering first production by 2024. Yangibana is an amazing, rare earths, opportunity that will supply the world's highest composition neodymium and praseodymium concentrate to Tier 1 customers in Europe and Asia. This is an exciting time not just for Hastings but for Australia's emerging rare earths sector. We look forward to finalizing the funding arrangements that will enable the Hastings' Board to make a final investment decision in the coming months."

### **Hastings Technology Metals investment highlights (as of November 25, 2021)**



Source: [Company presentation](#)

Note: The 52% NdPr to TREO ratio refers to the highest-grade deposit within Yangibana called Simon's Find, which contains [52%](#) of rare earths as NdPr. It potentially provides strong early cash flows to the Project.

### **Closing remarks**

Hastings Technology Metals certainly looks well on the way to becoming Australia's next rare earths producer, and only the second one following on from the very successful [Lynas Rare Earths Limited](#) (ASX: LYC) (market cap [~A\\$8 billion](#)).

Hastings ticks all the right boxes in terms of a great resource, high NdPr content, location, integrated project, off-take contracts signed, and now is getting closer to achieving project funding ([awaiting final credit-approved commitments](#) from lenders' consortium) with only [minor regulatory approvals remaining](#). Executive Chairman Charles Lew owns 7.1% of the Company so that is also a great endorsement.

All going well Hastings could begin Yangibana Project construction in 2022 ([September Quarter 2022](#)) and commercial production in 2024. Hastings Technology Metals trades on a market cap of [A\\$516 million](#) and looks set to have a very big 2022.

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# Rare Earths developer Search Minerals charging towards a 2022 PEA

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[Search Minerals Inc.](#) (TSXV: SMY | OTCQB: SHCMF) (“Search”) is an emerging rare earths developer with three properties in Labrador, Canada. The three are:

1. The Port Hope Simpson (PHS) property ( flagship) – Includes Foxtrot, Deep Fox, Silver Fox, Awesome Fox, and Fox Meadow deposits.
2. .The Henley Harbour Area in Southern Labrador, and
3. .The Red Wine Complex located in Central Labrador, plus some newer [acquisitions.](#)

**Search Minerals has a rare earths district scale opportunity in Labrador, Canada**



Source: [June 2021 corporate presentation](#)

At the Port Hope Simpson (PHS) property, Search is currently

working on advancing its Direct Extraction Process test work, a resource upgrade, a Preliminary Economic Assessment (“PEA”) completed in Q1 2022 (fully funded), and a [demonstration plant](#) (subject to funding) to be operational in 2022. Search targets being ready to build its full-scale rare earths processing plant by the end of 2023 (subject to funding) and once complete to become a North American rare earths producer by about 2025 or shortly thereafter.

### **The Direct Extraction Process test work – Bulk sample magnetic separation testing**

Current work at the flagship PHS Project consists of taking an ~80 tonnes bulk sample from the Deep Fox and the Foxtrot resources for the testing of the Magnetic Pilot Plant. Search [states](#): “The bulk sample will be used to scale up our successful bench scale results using Low Intensity Magnetic Separation (“LIMS”) along with Wet High Intensity Magnetic Separation process (“WHIMS”) to produce a Rare Earth Element concentrate for further testing of the Direct Extraction Process. The use of magnetic separation for rare earth ore processing is uniquely suited to our deposits in SE Labrador. The 80 tonnes bulk sample is expected to demonstrate that a continuous process involving crushing, grinding, and magnetic separation (LIMS and WHIMS) can treat large samples of mineralization from Foxtrot and Deep Fox and achieve the potential recoveries and quality of concentrates suggested by the small scale testing.”

### **PHS Project – Foxtrot/Deep Fox Resource PEA 2022 commencing and for completion in Q1 2022.**

Search recently [announced](#) the commissioning of a Preliminary Economic Assessment (“PEA”), for the combined Foxtrot/Deep Fox Resource, due for completion in Q1 2022, and called “PEA 2022”. Search is already [fully funded](#) to achieve PEA 2022.

This PEA is an expansion of the [2016 PEA](#) which included only the Foxtrot Resource and was based on a 1,000 tons per day processing rate. The post-tax NPV8% was C\$48 million with an IRR of 16.7%, an initial CapEx of C\$152 million, and a mine life of 14 years (8 years open pit, 6 years underground).

Search [states](#) that there are multiple improvements in the upcoming 2022 PEA including:

- PEA 2022 will incorporate the results of the 7000 m drilling program completed at Deep Fox in 2021.
- The combination of the Deep Fox and Foxtrot resources will potentially allow for an increase in production rate to 2,000 tons per day compared to the 2016 PEA (1,000 tons/day).
- Assays from Deep Fox have shown higher grades of the key rare earth elements used in the permanent magnet market (neodymium, praseodymium, dysprosium and terbium) than those in Foxtrot.
- The optimization of the Direct Extraction Process in two pilot plant programs has resulted in increased recoveries of key elements (Nd, Pr, Dy, Tb).
- Magnetic separation in the mineral processing flowsheet results in multiple improvements such as production of an iron ore concentrate by-product and concentration of the rare earths to 15-27% of the ore mass resulting in a smaller extraction plant, and it opens the possibility of making a zirconium/hafnium by-product.
- The company will produce a mixed rare earth carbonate to supply the separation facility.
- New grinding and magnetic beneficiation added to the flowsheet to optimize capital and operating costs.
- Rare earth prices have increased significantly over the past year.

## Catalysts

Assay results from the recent 7,000 m drilling program completed at Deep Fox will be reported very soon once all the results have been received and interpreted. Following this investors can expect an updated resource estimation by October 31, 2021 and the 2022 PEA in Q1, 2022

There will also be news regarding early stage exploration at the company's Red Wine Complex located in Central Labrador and of other possible district exploration in the following months.

Greg Andrews, President/CEO [stated](#) recently: "Our immediate goal is to advance our Critical Rare Earth Element District to production. This will require (a) advancing our **DEEP FOX** project to a measured and indicated resource, (b) providing engineering and economic studies such as Preliminary Economic Assessments and Feasibility Studies and (c) developing and submitting an Environmental Assessment report to initiate the environmental and permitting process for **DEEP FOX**. Our goal is to have the updated Preliminary Economic Assessment report by January 2022. Also, we will continue our exploration work in the District to advance some of our other prospects to be drill ready for 2022."

**Search Minerals' strategic plan and potential catalysts (PEA is now expected in Q1 2022)**



Source: [June 2021 corporate presentation](#)

## Closing remarks

Search is making steady progress on their milestones towards production, as they charge towards PEA results in the New Year. Investors can also look forward to assay results, a resource upgrade, direct extraction process test work results, and the

2022 PEA. The 2022 Foxtrot/Deep Fox PEA has potential to improve significantly on the 2016 Foxtrot PEA.

Search Minerals trades on a market cap of C\$52 million.