

Groundbreaking Discovery for Ionic Clays: Appia's PCH Project Signals a New Era for Rare Earth Exploration

written by Tracy Weslosky | October 31, 2023

Rare Earth Elements (REEs) have been the backbone of the modern tech revolution, powering everything from our smartphones to electric cars and renewable energy technologies. Appia Rare Earths & Uranium Corp. (CSE: API | OTCQX: APAAF), a leading player in the exploration and mining of REEs, has recently made a groundbreaking discovery that could have significant global implications.

Rare earths expert Alastair Neill on Vital Metals

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"Overall Vital appears well on the way to producing commercial quantities of rare earth concentrate, a first in Canada." – Alastair Neill, President, Critical Minerals Institute

[Vital Metals Limited](#) (ASX: VML | OTCQB: VTMXF) is an Australian listed company whose subsidiary, [Cheetah Resources](#), is developing the Nechalacho project in the Northwest Territories of Canada. The deposit was previously owned by [Avalon Advanced Materials Inc.](#) (TSX: AVL | OTCQB: AVLNF), and they sold the

rights in 2019 to Cheetah for the material 150 meters above sea level. Avalon retained the rights to the basal zone deposit which is underground. The deposit is reported to have 94.7 million tonnes at 1.46% REO (0.1% Nd/Pr cutoff). The mineral hosting the rare earths is bastnaesite, which is good as this mineral has been processing successfully for many years.

Vital raised A\$45 million recently through a targeted share placement at A\$0.04 per share. According to their [press release](#) the funds will be used for:

- Finalisation of construction activities and undertake commissioning, ramp-up and operations at its Rare Earth Extraction Facility in Saskatoon, which will produce a rare earth carbonate product
- Accelerated development of Tardiff deposit at Nechalacho, Canada, including mining studies

A strong balance sheet for ongoing working capital requirements

This project is the most advanced rare earth project currently in Canada. The initial focus is the North T zone which has a resource of 101,000 metric tonnes at 9.01% contained Total Rare Earth Oxides (TREO). Based on tests run at their Saskatoon rare earth extraction plant they can get a 75% recovery to produce a 43.7% concentrate. Based on this, the deposit would produce 6,825 metric tonnes of TREO which would contain 1,600 tonnes of Neodymium (Nd) and Praseodymium (Pr). Tests have been done using X-ray Transmission (XRT) to sort the ore as the ore is hosted in quartz, which is white, and the rare earth mineral which is red. This is a simple way to upgrade the TREO content at site.

There is an offtake agreement with REEtec, a Norwegian company that is developing a new rare earth separation process. The agreement is for Vital to deliver 1,000 tonnes per year (TPY) of

TREO (excluding Cerium (Ce)). Based on that Ce will be eliminated before shipping the concentrate to Norway. This is a step that has been done before by Molycorp in the 1980s. It reduces the material handling by 50% and obviously the size of downstream processing equipment. The North T zone will provide 3,400 of the 5,000 tonnes which means Cheetah will have to open the Basal zone to meet the balance of the supply contract.

Looking at today's prices on Shanghai Metal Market (SMM) the separated value of this contract is over US\$286 million. Assuming Vital gets 1/3 of the value for the concentrate this would produce revenues of over US\$95 million of which US\$92 million would come from Nd/Pr. Details of the agreement are not revealed so REEtec may be a toll arrangement which could produce more revenue for Vital though I expect the initial target would be to sell La, Nd and Pr in Europe as there are customers in Europe.

Interestingly the extraction plant is located beside the Saskatchewan Research Council (SRC) which has announced that they will be building a rare earth separation facility to process monazite by 2024. SRC has two rare earth experts from China on staff. SRC is also putting in an Nd/Pr metal facility which takes the oxide to the next level in the supply chain.

In addition to the Nechalacho project, Vital has a project in Tanzania called Wigu Hill. Vital has signed a project development and option agreement with Montero Mining & Exploration Ltd. (TSXV: MON), to acquire and develop the Wigu Hill project. The Wigu Hill project is a light rare earth element deposit and consists of a large carbonite complex with bastnaesite mineralization with a NI 43-101 Inferred resource estimate of 3.3Mt at 2.6% light REOs. This is also a bastnaesite mineral.

Overall Vital appears well on the way to producing commercial quantities of rare earth concentrate, a first in Canada. Questions that do need to be answered are what are the costs of operating an open pit mine in Northern Canada and the costs to transport material to Saskatoon.

Rare earths ore production continues to ramp up at Vital Metals' Nechalacho Mine

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In the rare earths' business junior miners need to work with off-take partners to find and meet very strict product qualification requirements. These are specialty products, especially when it comes to the high value magnet rare earths used in electric motors for electric vehicles (EV). All of this takes time.

What this means for investors is that it is wise to first check a rare earths junior's partnerships and off-take relationships before investing. This is because the off-take partners will be very selective as they need a high spec product (low impurity, etc) and those juniors that have succeeded in securing off-take agreements are well on their way to success. The juniors still have to successfully ramp up their production of the 'at spec material', but if successful can then fully qualify their product and hence stand the best chance at progressing to larger scale production. The process can take years not months.

One company doing the above is [Vital Metals Limited](#) (ASX: VML) (Vital). Vital has an off-take agreement with REEtec in Norway and another with Ucore in the USA. In both cases, Vital is working with them to develop a qualified end product at commercial scale that can then be sold to end-use customers.

Rare earths ore production continues to ramp up at Vital's Nechalacho Mine

Vital is already mining (lifting, crushing and [sorting](#) ore are performing well) at its Nechalacho' Mine in Canada's Northwest Territories (NWT). The Nechalacho Mine is a high grade, light rare earth (bastnaesite) project with a world class resource of [94.7Mt at 1.46% REO](#) (M& I, and Inferred). Nechalacho's North T Zone hosts a high-grade resource of 101,000 tons at 9.01% LREO (2.2% NdPr) and is where mining from a starter pit began in 2021 (Stage 1). Stage 2 will involve the development of the much larger Tardiff deposit.

Further ore processing is to be done at Vital's, under construction, Saskatoon cracking and leaching facility once completed, with first product expected [by June 2022](#). Vital aims to produce a minimum of 5,000 tons of contained REO by 2025 from the Nechalacho Mine.

Construction is underway on Vital's rare earth extraction facility in Saskatoon. Dense Media Separator (right) to be used in the extraction process



Source: [Vital Metals September 2021 Quarterly Report](#)

Vital [states](#): "More than \$120 million has been spent by previous owners on drilling, permitting and project development at Nechalacho, which includes a 40-person camp and airstrip. Vital

aims to be the largest independent supplier of clean mixed rare earth feedstock outside China.”

Vital's off-take agreements

- Vital has a binding off-take agreement with Norwegian company REEtec for Stage 1 production with the supply of 1,000t REO (ex-Cerium)/yr for an initial five-year period. This was later increased to rare earth carbonate product containing a minimum of 750t NdPr, contained within [2,000t/year total rare earth oxides](#) (TREO) with a maximum of 25% cerium. The amended agreement extends Vital's product sales to REEtec to 2028 and provides the option to further expand operations during an additional 10 year long term supply agreement to provide up to 2,500t NdPr per annum contained within ~6,800 tonnes TREO (containing a maximum 25% cerium). It also means that the increase to 2,000t/year equates to [75%](#) of Vital's expanded Saskatoon plant capacity.
- Non-binding MOU with [Ucore Rare Metals Inc.](#) (TSXV: UCU | OTCQX: UURAF) 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 (ie: 2,500t TREO/yr) by 2026. Customer acceptance protocols will include the supply of a sample (1-2kg) in Q4 2021 and with a 1t sample supplied in H2 2022.

The reason for the small initial volumes is that it allows both parties to scale together. As I discussed in the opening paragraphs, it takes time for miners to scale production of a high spec qualified rare earths product and for off-takers to go through their acceptance testing. The positive for Vital is that the process has begun with their two off-take partners, and a pathway towards full production and sale has been mapped out.

Vital Metal's other projects

Vital [is acquiring](#) the Zeus heavy rare earth project and 68% of the Kipawa Project in Canada, from Quebec Precious Metals Corporation, for C\$8 million, payable over 4 years. Vital also owns a second [light rare earths project](#) in Tanzania.

Vital [states](#): "These projects have the potential to complement our light rare earths operations at Nechalacho and transform Vital into the only North American producer of both light and heavy rare earths."

Closing remarks

Vital Metals is the first commercial scale [rare earths producer](#) in Canada and only the second in North America, since rare earth mining was revived earlier in this century. Production began on a small scale in mid 2021 with ore crushing and sorting at the Nechalacho' Mine in NWT, Canada. Further ore processing will begin to produce product from June 2022 from Vital's Saskatoon cracking and leaching facility.

Off-take qualification of a scaled up rare earths' product is ongoing with REEtec in Norway and with Ucore in the USA, but it can take up to 2 years. Vital will grow its production as its customers accept more qualified product. In other words, scale production with your customer, thereby being capital efficient in terms of Vital's capital outlay.

The pieces of the puzzle are all in place for Vital Metals to build a significant rare earths operation. Investors with a little patience should potentially be well rewarded this decade as demand for rare earths takes off.

Vital Metals trades on a market cap of [A\\$204 million](#).