

17 September 2021

Vital Metals Limited

COLTS - Metals and Mining

Rating
SPECULATIVE BUY

Price Target
A\$0.11

VML-ASX

Price
A\$0.06

Market Data

52-Week Range (A\$) :	0.02 - 0.09
Avg Daily Vol (000s) :	18,690
Market Cap (A\$M) :	269.0
Shares Out. (M) :	4,165.0
Enterprise Value (A\$M) :	230



Source: FactSet

Priced as of close of business 16 September 2021

Vital Metals Limited is an ASX-listed mineral developer focused on rare earths. Its key assets are the advanced Nechalacho project in Northwest Territories, Canada, recently acquired interests in the Kipawa heavy rare earth project located in Quebec and rights to the high grade Wigu Hill project in Tanzania.

Canaccord Genuity (Australia) Limited has received a fee as Lead Manager to the Vital Metals Limited Capital Raising announced 17 March 2021.

Canaccord Genuity (Australia) Limited has received a fee as Lead Manager to the Vital Metals Limited Capital Raising announced 24 September 2020.

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Taking the road less travelled...

Nechalacho - an emerging North American rare earths project... Nechalacho is located in the Mackenzie Mining District of the NWT, Canada, ~100km SE of Yellowknife. VML acquired the rights to the LREE-dominant near-surface Resources (comprising 95Mt at 1.46% TREO) at Nechalacho in 2019, including the small but high-grade satellite Resource (105kt at 9% TREO) at North T. Outside of Mountain Pass, Nechalacho presents as one of the largest rare earth deposits in North America, while favourable mineralogy (amenable to low-cost beneficiation and lower capex/physical footprint), valuable REE distribution (~25% NdPr:TREO ratio leading to potential for high REO basket prices), significant expenditure by previous operators, and near-term production via a staged development strategy (*see below*) makes Nechalacho one of the more advanced RE development projects globally, in our view.

... taking a lower capex/risk approach to project development... Unlike prior operators' plans for a high capex, fully integrated REO project, VML intends on developing Nechalacho via a staged approach, consisting of "demonstration scale" production (1ktpa TREO saleable product in MREC) from 2022 via exploitation of high grade Resources at North T, ahead of project assessment and potential development of commercial scale production (CGe development/production scenario ~5ktpa saleable TREO inc. ~2.4ktpa) from the mid-2020s. Based on the large scale Resource, we see potential for a >20-year mine life at Nechalacho.

In our view, VML's development plan presents as a lower capex/risk strategy, allowing accelerated market entry and product acceptance (Stage 1 offtake secured), versus typical long lead times for assessment and development of rare earth projects.

... which is strategically placed to service the development of a North American critical minerals supply chain: Much has been written and reported on the desire/requirement for the development of a North American critical minerals supply chain to deliver independence from China's dominance of the production of rare earths. Noting the project's strategic location, and provincial government support/planned investment in Canadian rare earths processing capacity, we see VML as well placed to potentially service any development of a localised critical mineral/rare earths supply chain.

Longer-term opportunities to diversify product markets and production base: VML recently announced the acquisition of a 68% interest in the Kipawa Heavy Rare Earths project in Quebec, Canada, in partnership with Investissement Quebec (32% interest). Kipawa hosts resources of 20Mt at 0.41% TREO with a HRE dominant REE distribution (i.e. high value Dy+Tb), with previous operators having completed studies for development of a 3-4ktpa TREO project (inc. ~165tpa Dy+Tb). VML is undertaking assessment of development options for Kipawa, which could include utilising planned RE processing capacity for Nechalacho. In the longer term, VML has the potential to expand its production base via assessment and development of the Wigu Hill rare earths project in Tanzania.

Valuation and recommendation

We initiate coverage with a SPECULATIVE BUY rating and \$0.11 target price. Our valuation is preliminary in nature and should be viewed as a "what-if" case, given no formal development studies have been completed. Our valuation (risked NPV_{10%}) is based on our modelled long-term development scenario at Nechalacho, with additional value ascribed to other projects including Kipawa and Wigu Hill.

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The recommendations and opinions expressed in this research report accurately reflect the research analysts' personal, independent and objective views about any and all the companies and securities that are the subject of this report discussed herein.

For important information, please see the Important Disclosures beginning on page 21 of this document.

Company overview

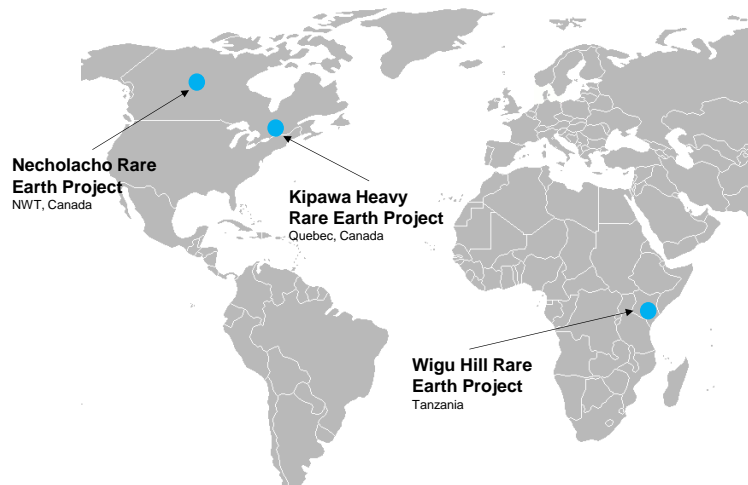
Vital Metals Limited (VML-ASX) is an ASX-listed mineral developer focused on rare earths. Its key assets are the advanced Nechalacho project in Northwest Territories, Canada, recently acquired interests in the Kipawa heavy rare earth project located in Quebec and rights to the high grade Wigu Hill project in Tanzania.

VML is targeting a staged development strategy for its primary asset at Nechalacho, consisting of a Stage 1 “demonstration scale” operation (~1ktpa TREO saleable product), ahead of assessment and potential development of a commercial scale (~5ktpa TREO saleable product). Initial production from Nechalacho Stage 1 is currently expected in early 2022.

At the recently acquired Kipawa project, VML is assessing development options for potential higher value heavy rare earth production (potentially leveraging off processing infrastructure being developed for Nechalacho), while Wigu Hill presents longer term optionality.

VML’s Nechalacho project is one of the world’s more advanced rare earth development projects (ex-China), which in our view benefits from significant expenditure by previous operators (~C\$120m), and VML’s lower capex, staged development strategy (facilitating accelerated market entry). Nechalacho’s location, large scale Resource base, and planned Canadian government investment in downstream processing sees VML as well placed to potentially serve the development of North American critical mineral supply chain, in our view.

Figure 1: Project location map



Source: Company reports, Canaccord Genuity

Directors and management

See Appendix 1 for full director bios.

- Non-Executive Chairman – Evan Cranston
- Managing Director – Geoff Atkins
- Non-Executive Director – James Henderson
- Chief Financial Officer – Louisa Martino
- Chief Operating Officer – Tony Haldley

Capital structure

VML has 4,165m shares on issue and an addition 443m outstanding options and performance rights at varying strike prices and maturity dates (Figure 2). VML has a fully diluted (inc. ITM options/performance rights) market cap of A\$304m.

Figure 2: Capital structure

Issued Shares	m	4,165.00	\$0.07		
Options 1	m	6.25	0.010	0.06	17/11/2021
Options 2	m	16.33	0.150	2.45	19/07/2022
Options 3	m	22.50	0.020	0.45	31/01/2025
Options 4	m	22.50	0.025	0.56	31/01/2025
Options 5	m	22.50	0.030	0.68	31/01/2025
Options 6	m	110.00	0.020	2.20	22/10/2024
Options 7	m	110.00	0.025	2.75	22/10/2024
Options 8	m	110.00	0.030	3.30	22/10/2024
Options 9	m	5.00	0.030	0.15	24/12/2023
Options 10	m	6.00	0.020	0.12	31/01/2025
Options 11	m	6.00	0.025	0.15	31/01/2025
Options 12	m	6.00	0.030	0.18	31/01/2025
Total Options	m	443.08	0.029	13.05	
Fully Diluted	m	4608.083			

Source: Company reports

Substantial shareholders

Substantial shareholders include Luxor Capital Group (5%), Transocean Group (5%), with Board and Management holdings totalling ~ 7.6%.

Balance sheet and liquidity

VML had a reported cash position of A\$39m as at 30 June 2021. Its most recent capital raising was a A\$43m placement at A\$0.065/share completed in March 2021.

Valuation

Our valuation is underpinned by our risk-weighted NPV_{10%} estimate based on our longer-term development scenario (see CG development/production scenario) for the Nechalacho rare earths project. Rare earth pricing assumptions (see [Rare earths | Acceleration of EV adoption and renewables lift NdPr demand expectations](#)) are outlined in Figure 7. Our valuation is preliminary in nature, and should be viewed as a "what-if" case, noting that VML is yet to complete formal studies for longer term/commercial scale development/production.

Our NAV also includes an ascribed value for VML's interests in the Kipawa heavy rare earths project and the Wigu Hill project in Tanzania. Our sum of the parts valuation for VML of \$0.11/share (diluted) is detailed in Figure 3.

Figure 3: Sum-of-the-parts valuation for VML

DCF DISCOUNT RATE	10%			Shares	4165.000
				ITM Options	426.750
				Fully Diluted	4591.750
	A\$m	RISK ADJ.	EQUITY	A\$m	PER SHARE
Nehcalacho	456.7	75%	100%	342.5	\$0.07
Exploration & Projects	150.0			140.0	\$0.03
Corporate	-50.8			-50.8	\$0.01
Cash	34.9			34.9	\$0.01
Debt	0.0			0.0	\$0.00
ITM options	10.6			10.6	\$0.00
TOTAL	602.0			487.8	A\$0.11
				Target (Rounded)	A\$0.11
				P/NAV	0.60x

Source: Canaccord Genuity estimates

Figure 4: Key RE pricing assumptions

(China EXW US\$/kg)	2020a	2021e	2022e	2023e	2024e	2025e	2026e	2027e	2028e	2029e	2030e
NdPr	45	84	85	85	70	80	90	90	90	90	90
La	1.53	1.46	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35
Ce	1.57	1.52	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.40
Sm	1.92	1.72	2.05	2.05	2.05	2.05	2.05	2.05	2.05	2.05	2.05
Dy	339	395	400	400	380	425	425	425	425	425	425
Tb	844	1,263	1,300	1,300	1,200	1,400	1,450	1,450	1,450	1,450	1,450

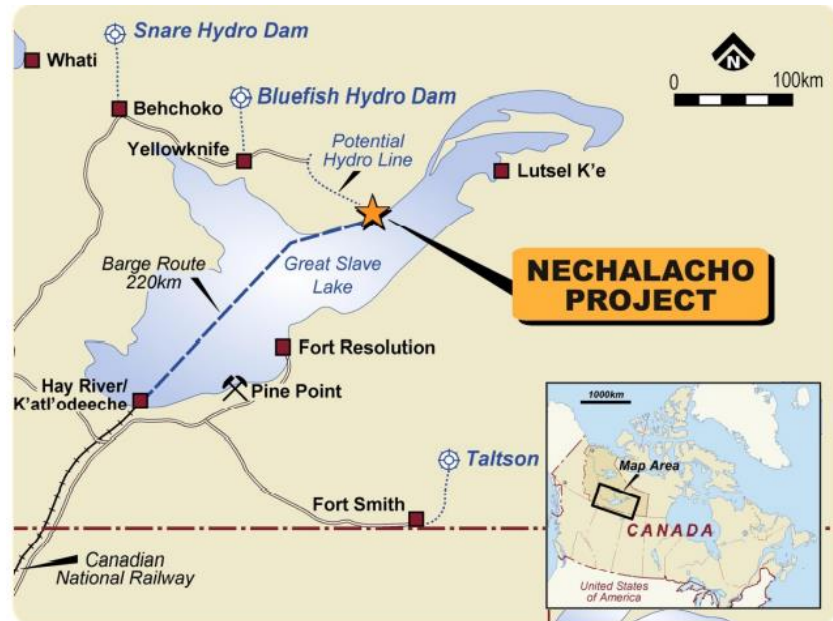
Source: Asian Metals, Canaccord Genuity estimates

Asset overview: Nechalacho Rare Earth Project

Location, access and infrastructure

The Nechalacho Rare Earth Project is located at Thor Lake, in the Mackenzie Mining District of the Northwest Territories, approximately 100km southeast of the city of Yellowknife. The district contains substantial infrastructure including roads and railways, direct barge access during summer (ice roads during winter) and the potential for access to hydro power.

Figure 5: Nechalacho project location



Source: Company reports

Ownership

In 2019, VML acquired Cheetah Resources, a private Australian company that had signed a binding agreement to acquire near surface resources of the Thor Lake Rare Earth Project from Avalon Advanced Materials (AVL-TSX-V | Not Rated).

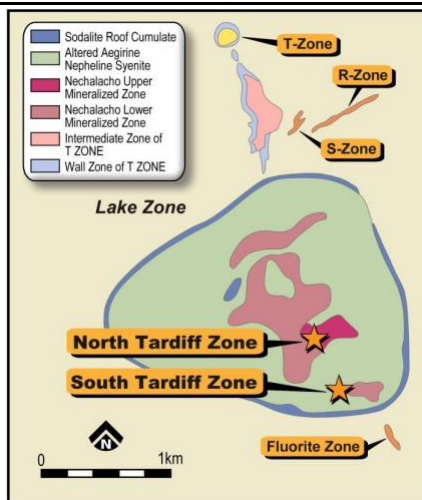
Under the Avalon agreement, Cheetah had acquired 100% of the mineral rights to all mineralisation between surface and a depth of 150m above sea level (the "Upper Zone"), including the near surface, high grade resources in the T-Zones (including North T and South T) and Upper Lake Zones (includes North Tardiff and South Tardiff) as defined in Avalon's 2013 Feasibility Study (see Figure 7 below). Avalon retains ownership of the Resources within the basal zone.

Deposit geology and Mineral Resources

The Nechalacho deposit is hosted by a syenite intrusion which is part of the Blatchford Lake Intrusive Complex. One of several magmatic layers, collectively referred to as the Upper Zone, host rare earth mineralisation in the upper part of the Nechalacho intrusion.

Mineralisation consists of light rare earth elements (LREE) principally occurring in allanite, bastnaesite and monazite, with the proportion of Heavy Rare Earth element (HREE) mineralisation increasing with depth. A key feature (and benefit) of the rare earth mineralisation at Nechalacho is the low uranium/thorium content owing to the dominant allanite/bastnaesite mineralogy. The main Nechalacho deposit varies in thickness from 80m to 190m (alteration typically starting at surface).

Figure 6: Basic deposit geology showing location of North T and Tardiff Zones

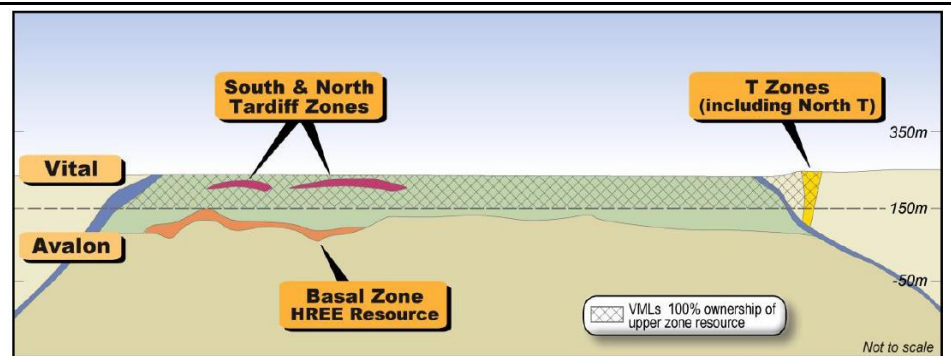


Source: Company reports

The North T satellite deposit is a peripheral pegmatite to the Nechalacho intrusion, which hosts high-grade rare earth mineralization in multiple lenses.

As illustrated in Figure 7 below, VML own's the rights to mineralisation between surface and a depth of 150m above sea level (the "Upper Zone"). This includes near surface, high grade resources in the T-Zones (including North T and South T) and Upper Lake Zones (includes North Tardiff and South Tardiff).

Figure 7: Cross section depicting ownership zones of Nechalacho Rare Earth Project with Vital owing 100% of the Upper Zone Resource and Avalon Advanced Metals owning the Basal Zone



Source: Company reports

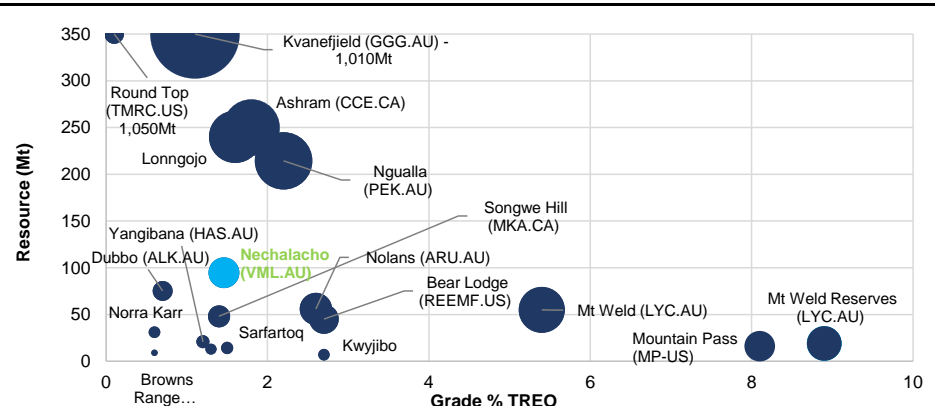
A JORC 2012 compliant Mineral Resource estimate for the Upper Zone deposit was reported by VML in 2019, which outlined a large-scale Resource of 95Mt at 1.46% TREO (inc. 0.29% Nd).

Figure 8: Nechalacho Upper Zone Resource estimate at 0.1% Nd cut off (Dec 2019)

Category	Tonnage Mt	REO %	LREO %	HREO %	Nd %	Pr %	NdPr:TREO %
Measured	1.1	2.00	1.82	0.19	0.39	0.11	25.0
	2.9	1.47	1.33	0.14	0.29	0.08	24.9
Indicated	6.2	1.93	1.76	0.17	0.38	0.10	25.0
	14.7	1.51	1.37	0.14	0.30	0.08	24.9
Inferred	30.9	1.80	1.64	0.16	0.36	0.09	25.3
	77.2	1.46	1.32	0.13	0.29	0.08	25.3
	38.3	1.83	1.66	0.16	0.36	0.10	25.2
Total	94.7	1.46	1.33	0.13	0.29	0.08	25.2

Source: Company reports

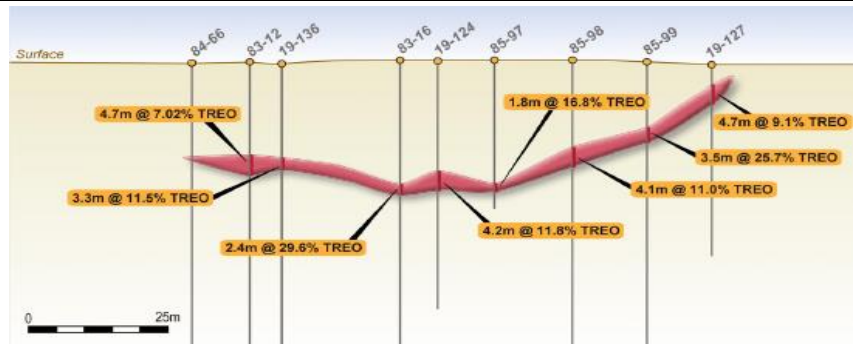
Figure 9: Selected rare earth deposit Resource comparisons



Source: Company reports, Canaccord Genuity estimates

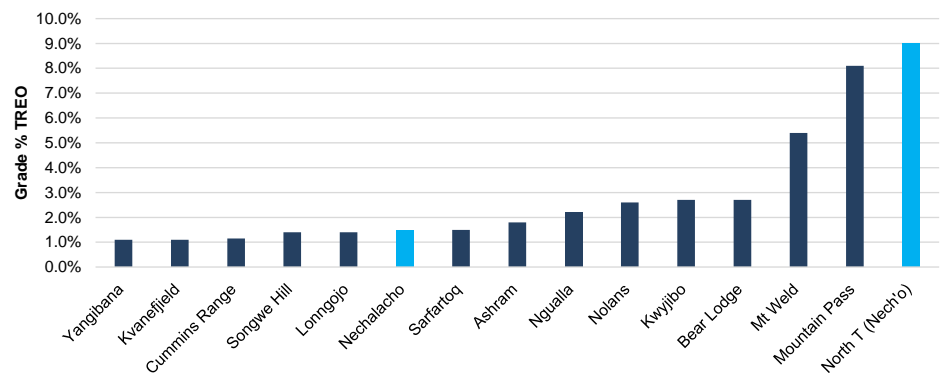
The high-grade North T deposit is located approximately 2km north of the centre of the main Nechalacho deposit (see Figure 7), and contains two distinct zones of REE mineralisation, a Bastnaesite Subzone at surface (to ~45m depth), and a deeper underlying Xenotime Subzone. North T hosts M+I Resources of 105kt at 9% TREO using a 0.3% Nd cut-off, and while small in scale, it ranks as one of the highest-grade rare-earth deposits in the world (Figure 10).

Figure 10: North T Zone starter pit resource



Source: Company reports

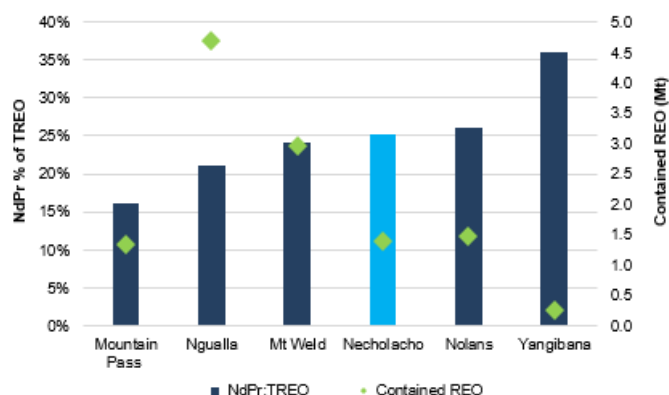
Figure 11: Selected rare earth deposit grade comparisons



Source: Company reports

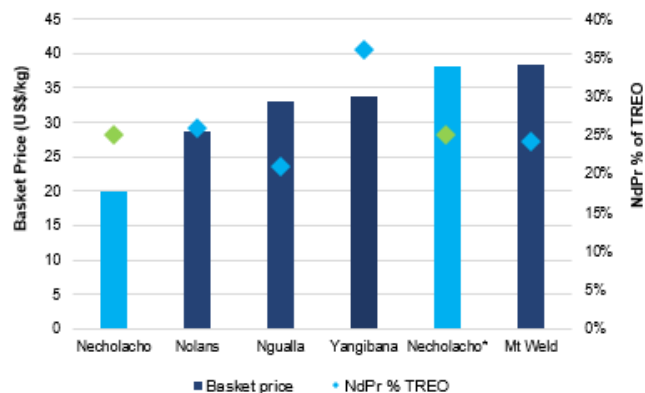
REE distribution at Nechalacho shows La and Ce to be the dominant LREEs representing 47% of total TREO, with higher value NdPr at ~25%. HREE's represent 8% of contained TREO, including high value Dy/Tb at 2%. A higher NdPr content (+Dy/Tb) results in higher weighted-average basket prices, and therefore higher margins. At current market prices we estimate an average basket price for Nechalacho (pre-separation cost adjustments) of US\$38/kg ex Cerium (China EXW).

Figure 12: Selected NdPr:TREO ratio comparisons



Source: Company reports, Canaccord Genuity estimates

Figure 13: CGe basket price comparisons



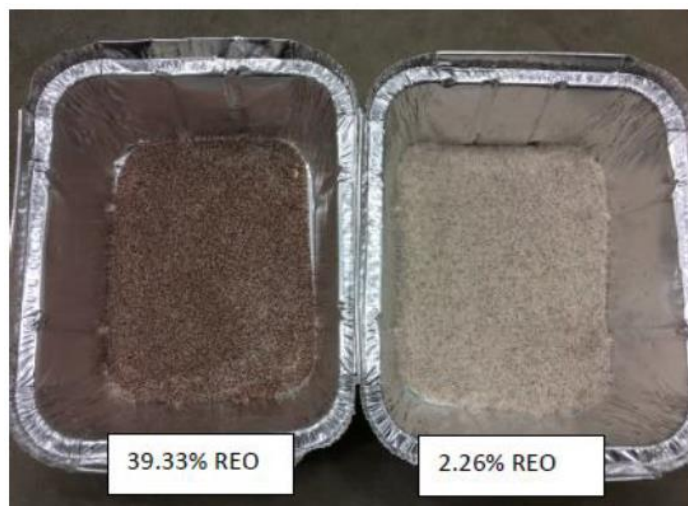
Source: Company reports, Canaccord Genuity estimates
*Ce not included in basket price

Metallurgy

Independent test work carried out in 2019 (North T) and 2021 (Tardiff) has shown that mineralisation is amenable to beneficiation through ore sorting using x-ray transmission (XRT). Beneficiation via ore sorting has the benefits of increasing TREO grades via low-cost separation of quartz gangue from ore, in turn leading to a reduction in required plant feed rates. Other benefits from use of ore sorting include a smaller physical footprint, lower water consumption, and no reagent use or tailings storage facilities.

Results from ore sorting test work suggest that a 36% TREO concentrate can be produced from feed containing 10% REO at a TREO recovery of 70%. In addition, fines (<8mm) produced in the mining, crushing and screening stages were demonstrated to be able to be processed to produce a high grade pre-concentrate (up to 40% TREO) utilising gravity recovery methods.

Figure 14: A high-grade REO concentrate and corresponding reject sample from one of the shaker table runs



Source: Company reports

Figure 15: Ore sample from North T Zone showing red bastnaesite crystals (RE mineralisation) with quartz gangue



Source: Company reports

Project development – lower capex, staged development planned for Nechalacho

2013 feasibility study (Avalon)

Avalon completed a feasibility study in 2013, which assessed the development at Nechalacho (previously known as Thor Lake) as part of an integrated, separated REO project focusing on HREE's as a primary product. Avalon's development plan consisted of three key components:

- UG mine and concentrator located at Thor Lake, 100km southeast of Yellowknife;
- hydrometallurgical plant to be located at Pine Point, 85km east of Hay River; and
- rare earth refinery to be located in Geismar, Louisiana which was planned to produce separated REO's and carbonates.

Key study outcomes are detailed in Figure 16, with total prior expenditure by Avalon on resource definition and feasibility studies estimated to total ~C\$120m.

Figure 16: Avalon 2013 feasibility study

Parameter	2013 Feasibility
Mine life (years)	20
Upfront capex (US\$m)	\$1,575
Production (Separated REO ktpa)	7
Production (REE carbonate products ktpa)	24
Primary product (>50% of revenue)	HREE
Mining method	Underground
NPV10% Pre-tax (US\$m)	\$1,351

Source: Company reports

Staged development plan

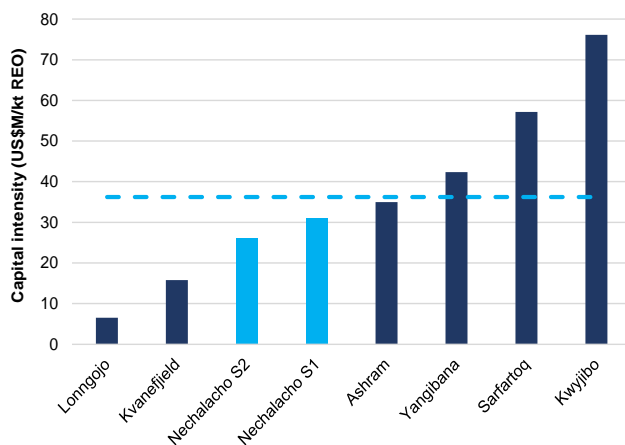
In contrast to the project's previous owner, VML plans on developing Nechalacho via a *staged* approach. This is based around a start-up "demonstration" operation exploiting high-grade, easily accessible near surface mineralisation at North T, ahead of technical/economic assessment and potential development of a larger, commercial-scale operation based on exploitation of the larger Resource base at Tardiff. VML's development concept involves:

- **Stage 1 – Nechalacho-North T:** Near-term/low capex "demonstration-scale" rare earth production based on high grade feed from North T for proof of concept (process flow sheet, product customer acceptance). Concentrate is planned to be transported to Saskatoon for processing into mixed rare earth carbonate (MREC) through a planned RE extraction plant (via partnership with the Saskatoon Research Council – see CG development/production scenario). Stage 1 targets a 1ktpa TREO production rate (saleable), including ~500tpa of higher NdPr.
- **Stage 2 – Nechalacho-Tardiff:** Long term/larger scale, commercial operation based on exploitation of the much larger Resource at Tardiff. testwork and studies are underway as part of the assessment for the development of a larger, 5ktpa TREO (excluding Ce) operation (inc. ~2.4ktpa NdPr) in an MREC product. Based on defined Resources at Tardiff, we see potential for a >20-year mine life.
- **Stage 3 – Kipawa (VML 68%)** – potential diversification of product markets through possible development of the Kipawa Rare Earth Project in Quebec (see Asset overview: Kipawa Project, Quebec). Kipawa features a heavy REE dominant mineralogy, including high value Dysprosium (Dy) and Terbium (Tb). Kipawa is located ~2,000km from planned rare earth processing facilities in Saskatoon, suggesting the potential for operating/processing synergies with Nechalacho (equidistant from Saskatoon).
- **Stage 4? - Wigu Hill, Tanzania (VML agreement to acquire 81%):** longer-term potential for further increases in production capacity expansion through potential development of high-grade Resources in Tanzania (pending resolution of permitting/approvals).

In our view, VML's development plan represents a potentially lower-capex, lower-risk strategy for rare earths production. In the near term, we highlight the potential for a faster market entry than 'conventional' rare earth project development routes (i.e. typically carrying long lead times, high capital costs, and high technical/ramp up risks), noting significant project expenditure by prior project owners of ~C\$120m provides a 'short cutting' of typical greenfield project lead times.

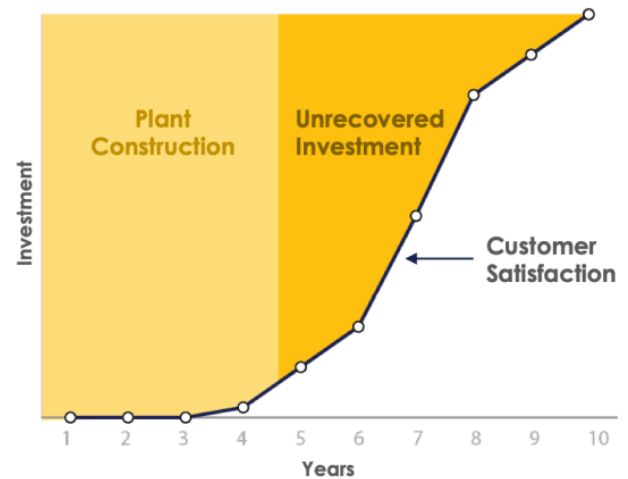
In the longer term, we note potential upside could come through diversification into HREE production (i.e. Kipawa) and longer-term potential for increases in production capacity through possible exploitation of high-grade Resources at Wigu Hill, Tanzania.

Figure 17: Selected RE project capital intensity comps (concentrate and MREC)



Source: Company reports, Canaccord Genuity estimates

Figure 18: Illustrative example of required investment and lead times for "typical" rare earth projects



Source: VML company presentation

CG development/production scenario

Our modelled development scenario for Nechalacho is based on VML's staged development plan, with key considerations/assumptions including:

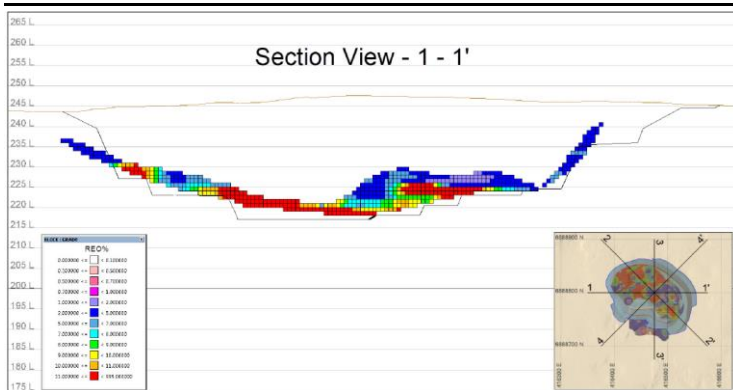
Stage 1 "Demo scale" production

- Mining and ore sorting:** VML is currently targeting a "start-up" scale operation exploiting the high-grade, easily accessible, near surface mineralisation at the North T Zone. Ore is currently being mined via open-pit methods (campaign over May-Oct'21), based on a minable inventory of 74kt at 10.8% TREO (see Figure 20).

Mined material is to be stockpiled and then transported to VML's on-site ore sorter for initial beneficiation. As outlined earlier in this report, ore sorting/gravity processing is planned to produce a concentrate of 35-37% REO produced from an ore feed grade of 9-10% TREO. Concentrate is then to be transported offsite for further processing into a Mixed Rare Earth Carbonate.

Initial capital costs for mining and construction of ore sorting are estimated by VML at ~C\$15m. Development costs are partially offset by C\$1.3m in funding from the Canadian Northern Economic Development Agency (CNEDC) for processing infrastructure (on site ore sorting). CNEDC funding is by way of a zero-interest, non-recourse loan repayable over 10 years from FY23/24.

Figure 19: Planned North T Pit Cross Section



Source: Company reports

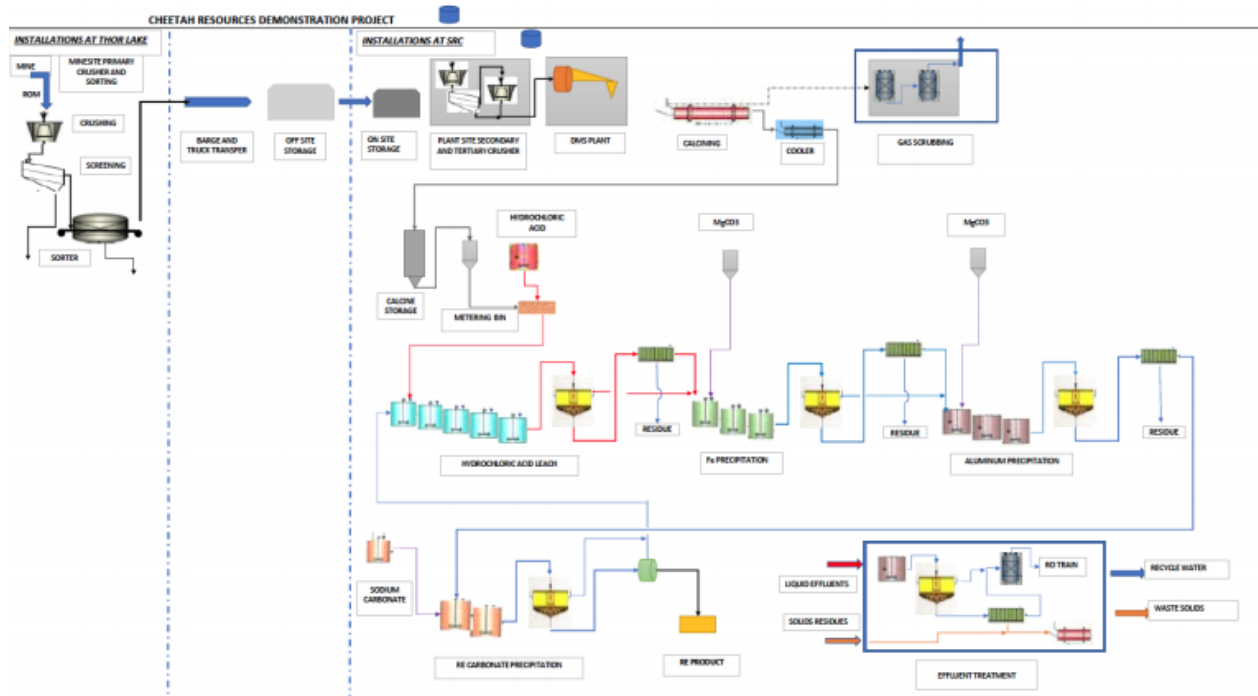
Figure 20: Nechalacho Stage 1 mining inventory and production plan

Item	Unit	Resource Inventory
Ore	t	74,124
Grade	REO %	10.8
Waste Overburden	t	84,946
Waste Pegmatite	t	420,300
Waste Total	t	505,245
All Materials	t	579,370
Stripping Ratio	W:O	6.8
Contained REO	t	8,028

Source: Company reports

- Rare Earth extraction and production:** VML has signed a binding term sheet with the Saskatchewan Research Council (SRC) to negotiate definitive agreements for the construction and operation of a Rare Earth Extraction (REP) demonstration plant, to be located in Saskatoon, Saskatchewan, ~1,900km from Nechalacho. Our development scenario assumes that concentrate from Nechalacho is transported to Saskatoon for processing into a MREC product. As illustrated in Figure 21, process design is expected to consist of a hydrometallurgical circuit involving treating beneficiated concentrate with sulphuric acid, followed by calcination, HCl acid leach, impurity removal (i.e. Al, Mn, Fe, Th, U) via ion exchange, and final precipitation to produce an MREC product. Overall process recovery based on testwork is estimated by VML at 75%, with an MREC grade of ~37% TREO. Stage 1 is designed to produce 2,000tpa of TREO in MREC (1,000tpa TREO saleable product excl. low value Cerium), including ~500tpa of higher value NdPr.

Figure 21: Stage 1 (demo) process flow sheet including upstream ore sorting/concentration and rare earth extraction



Source: Company reports

We assume commencement of concentrate production in 2022, with VML targeting initial MREC production in Q1'22. We model a 18-24 month ramp-up to the targeted 1ktpa TREO production rate, with a total Stage 1 production life of three years.

Capital costs for the demo scale REP were estimated by the SRC in 2020 at ~C\$6m, with processing costs charged to VML (consisting of a base and variable fee). The terms of the binding term sheet with the SRC allows for the expansion of capacity of the facility by up to 250% (i.e. ~5ktpa TREO). In August 2020, the SRC and Government of Saskatchewan announced a C\$31m funding package for the development of Canada's first rare earth processing facility, including both the REP and additional planned facilities to produce separated rare earth oxides. The SRC has reported that construction was planned start in 2021, and be fully operational in 2022.

At present, VML plans to sell MREC production from the REP to third parties (see Product marketing and offtake), but the planned development of separation facilities by the SRC presents as a potential alternative/additional customer for any expanded increase in MREC production (i.e. Nechalacho Stage 2?).

Stage II "Commercial scale"

- VML's plan for Stage II development at Nechalacho envisages exploitation of several high-grade zones identified within the significantly larger Tardiff (Upper Zone) deposit, to support a long term, commercial scale expansion of production to 10ktpa TREO (~5ktpa saleable TREO excluding Ce, including ~2,500tpa NdPr).
- VML expects to undertake detailed studies ahead of any commercial-scale development at Nechalacho. Key aspects of our modelled Stage 2 development scenario include:
 - **Mining:** VML recently completed an infill drilling program to inform the development of a mine plan for potential Stage 2 production. We note that mineralisation at Tardiff is close to surface (i.e. low strip ratio), with our assumed Stage 2 based on an assumed mining inventory 44Mt at 1.4% TREO (vs Resources of 95Mt at 1.46% TREO), and annual ore production of 1.6Mtpa (at an assumed waste:ore ratio of ~3:1).
 - **Concentrate processing:** Resources at the Tardiff Upper Zone feature lower grades compared to North T. Rare earth mineralisation at Tardiff is also reported to be finer grained in nature vs North T. However, we note test work reported by VML suggests Tardiff mineralisation is amenable to ore sorting and other beneficiation techniques (i.e. dense media separation and flotation). This has clear benefits to Stage 2 project design, in our view, with beneficiation allowing a reduction in feed mass (i.e. lower capex?) and associated increase TREO feed grades.
 Preliminary float testwork undertaken on composite mineralisation from Tardiff showed that grinding to 75µm and processing via rougher flotation achieved recoveries of 90-97% from a 40% mass pull. Under optimum flotation (rougher + cleaner?) conditions, the preliminary testwork resulted in a flotation concentrate grade of ~30% TREO at a 61% recovery. VML reported that the application of pre-beneficiation via ore sorting and gravity (increases feed grade into float circuit) could support production of a higher-grade concentrate (i.e. ~35% TREO) and recoveries up to 75%.
 - **Rare earth extraction:** batch testwork consisting of HCl acid leaching of flotation concentrate demonstrated the potential to utilise similar hydrometallurgical processing as planned for Stage 1 as the basis for Stage 2. VML has suggested an optimal flow sheet design may include ore sorting, DMS, milling/flotation (plus potential gravity and/or magnetic separation) to achieve a concentrate grade of ~35% TREO from a beneficiated ore grade of 7-8% TREO. VML plans to undertake further testwork to confirm the suitability of expanding Stage 1 processing infrastructure for expansion of production capacity.

- **Production:** We model a Stage 2 production rate of 10ktpa TREO (incl. ~2.5ktpa NdPr; saleable TREO in MREC of ~5ktpa excl. low value Ce), but note that this will require additional investment in expanding Saskatoon REP capacity.

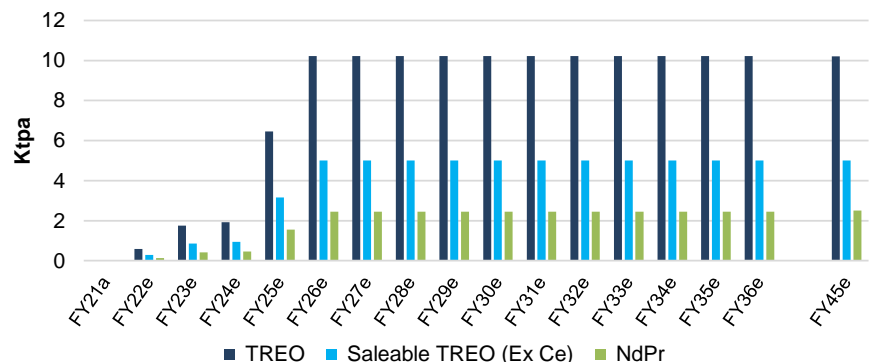
Key assumptions for our modelled development scenario include:

- **Nechalacho Stage 1** - Upfront capital costs of US\$19m for campaign mining at North T (CGe assumed inventory of ~70kt at 9% TREO), and construction of a 60-100ktpa crushing and ore sorting capacity to produce 11kt of concentrate containing 37% TREO. Concentrate is assumed to be transported to SRC's planned REP in Saskatoon, with first saleable MREC production modelled for mid'22. We assume an extended production ramp up with targeted Stage 1 production of ~1ktpa TREO (ex Ce) achieved in 2022 until late 2024. Based on our current rare earth price deck (see [Rare earths | Acceleration of EV adoption & renewables lift NdPr demand expectations](#)), we estimate an average Stage 1 TREO gross basket price of US\$34/kg TREO (~97% NdPr), against estimated avg Stage 1 cash costs of ~US\$15/kg (unadjusted for assumed US\$3.50/kg TREO separation costs), delivering an estimated Stage 1 net cash flow of ~US\$13m.

- **Nechalacho Stage 2** - While plans for expansion of production to commercial scale is subject to completion of studies and funding, our conceptual Stage II production scenario consists of ~5ktpa saleable TREO in MREC inc. 2.5ktpa NdPr (total TREO production of 10ktpa inc Ce) in MREC. We assume Stage II capex of US\$130m to increase concentrate production capacity to ~41ktpa (Stage II assumed to utilise Stage 1 processing infrastructure and expansion of REP capacity) from 2025 over a mine life of 24 years (assumed mining inventory of 44Mt vs defined Upper Zone Measured+Indicated Resources of 95Mt).

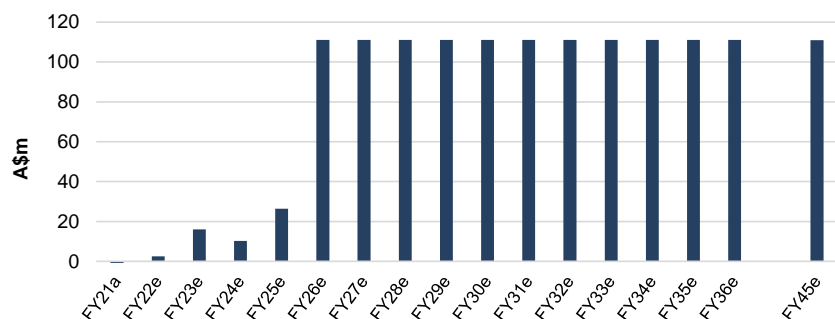
We model cash costs of US\$19/kg TREO (pre separation costs) against CGe long-term basket price estimates of US\$38/kg TREO, generating estimated annual EBITDA of A\$111m over our modelled LOM.

Figure 22: TREO/NdPr production under CGe development scenario



Source: Canaccord Genuity estimates

Figure 23: LOM EBITDA under CG assumed development scenario



Source: Canaccord Genuity estimates

Product marketing and offtake

VML executed a definitive offtake agreement with Scandinavian advanced materials company REEtec in February 2021. Under the agreement, VML is to supply MREC containing an annual volume of 1,000tpa TREO (excluding Ce) over an initial 5 years. The agreement includes an option to increase volumes to 5ktpa TREO over 10 years. The offtake is conditional upon both VML and REEtec proceeding with an FID for their respective commercial plants.

Pricing structures for the offtake agreement are based on a profit arrangement on production of separated REO production.

We note the potential for VML to enter into additional supply arrangements for any surplus production (i.e., Nechalacho Stage II) to other parties including the SRC's planned separation facilities in Saskatoon.

About REEtec

REEtec is an advanced materials company that is reported to have developed a new process for the manufacturing of high purity rare earth products. The company has operated a pilot-scale production facility (with backing by the Norwegian Research Council and Innovation Norway) at Porsgrunn, Norway.

REEtec is a subsidiary of Norwegian-listed Scatec SA (SCATC-OSL: Market Cap ~US\$3.3bn | Not Rated) which specialises in the development, construction, and operation of renewable energy projects (hydro, solar, wind) around the world including Europe, Asia and Africa. Major shareholders include Norwegian state-owned multi-national energy company, Equinor.

Longer-term upside potential – heavy RE opportunity at Kipawa

We note that our production modelling excludes potential upside from possible development of:

- Kipawa – advanced, heavy rare earths project located in Quebec, Canada; and
- Wigu Hill – high grade (based on reported Resources) rare earths project located in Tanzania.

Asset overview: Kipawa Project, Quebec

Background

VML announced in August 2021 that it had reached agreement with Quebec Precious Metals Corporation (QPM-TSX | Not Rated) to acquire QPM's 68% interest in the Kipawa Rare Earths project, and 100% of the Zeus Rare Earths Project, both located in Quebec, Canada.

Investissement Quebec ('IQ'; a Canadian investment company owned by the provincial Government of Quebec) holds the remaining 32% of the Kipawa project on a contributing basis. Toyota Tsushu's prior JV interest and offtake rights in the project have been converted into a 10% net profit interest in 2014.

Key terms of the acquisition include:

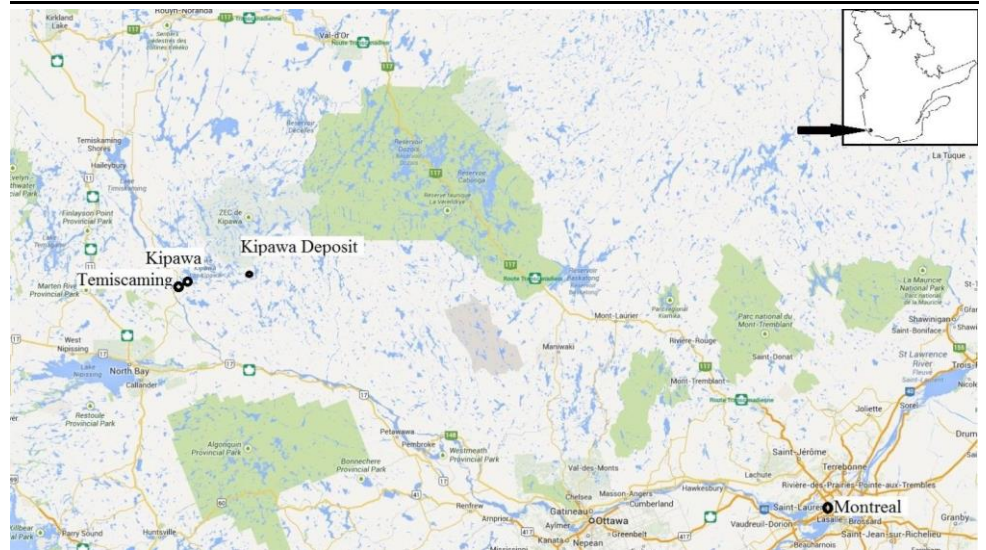
- Total consideration of C\$8m (staged payments inc. C\$2.35m on acquisition, and C\$5.5m payable in tranches over four years from acquisition);
- Completion of due diligence;
- Waiver of IQ's rights of first refusal and consents to QPM's sale of its interests and JV obligations to VML; and
- Other customary conditions including third party approval.

Kipawa hosts 43-101 Resources of 27Mt at 0.41% TREO, consisting of a heavy rare earths (Dy + Tb) and NdPr dominant REE distribution.

Location, access and infrastructure

The Kipawa/Zeus projects are located 50km east of the town of Temiscaming, Quebec, and ~200km east of Sudbury, Ontario. The properties cover 43km², with access via logging roads of variable quality. Nearby towns and regional centres are all connected by well-maintained public roads.

Figure 24: Project location map

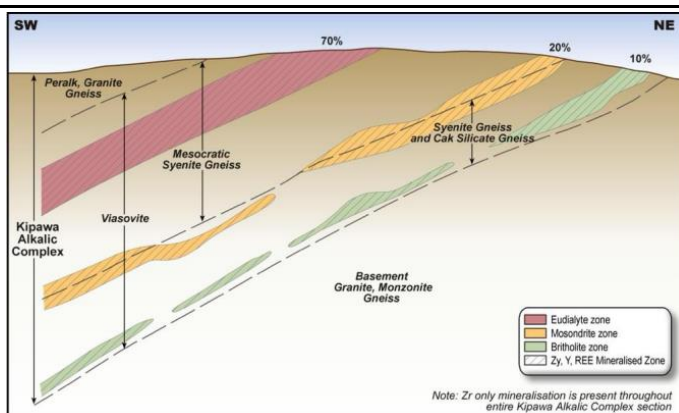


Source: Company reports

Geology, mineralogy and Resources/Reserves

The Kipawa and Zeus deposits form part of the Kipawa Alkaline Complex. Deposit geology is generally characterised by a granitic gneiss overlaying syenite unit, which typically hosts the rare earth mineralisation in three main, stacked zones. The mineralised syenite outcrops and is considered to remain open laterally and at depth. The main rare earth bearing minerals at Kipawa include eudialyte (an acid soluble silicate), mosandrite, britholite (silico phosphate) and some minor apatite, with eudialyte the most prevalent.

Figure 25: Kipawa cross section



Source: Company reports

Figure 26: Project Resources/Reserves (2017)

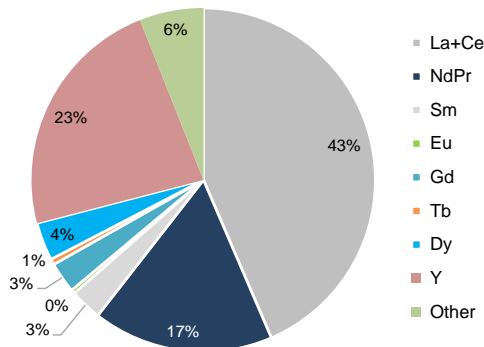
Mineral Resources			
Category	Mt	TREO grade	TREO (mt)
Measured	10	0.46%	0.048
Indicated	13	0.36%	0.048
Inferred	3	0.31%	0.010
Total	27	0.39%	0.106

Ore Reserves			
Category	Mt	TREO grade	TREO (mt)
Proven	10	0.41%	0.042
Probable	10	0.41%	0.039
Total	20	0.41%	0.081

Source: Company reports

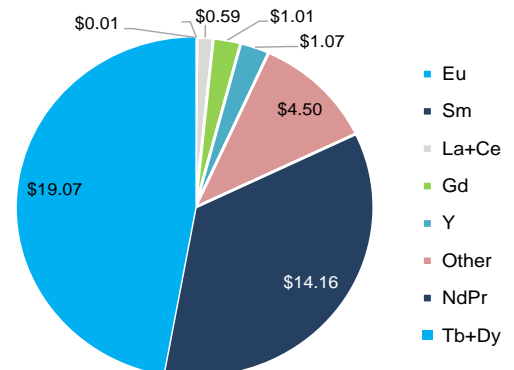
Kipawa hosts a 43-101 Mineral Resource (2017) of 27Mt at 0.4% TREO, and Ore Reserves (based on a 2017 Feasibility by prior owners) of 19.8Mt at 0.4105% TREO. Kipawa is considered to have a Heavy Rare Earths dominant mineralogy, with its REE distribution shown in Figure 27.

Figure 27: Kipawa REE distribution (volume)



Source: Company reports

Figure 28: Kipawa REE dist. (value in basket price US\$/kg)



Source: Asian Metals, Canaccord Genuity estimates

Project development

Matamec (now QPM) completed a feasibility study for Kipawa in 2017, targeting the development of an integrated mine and hydromet/purification process plant capable of producing ~3-4ktpa TREO (inc 600-700tpa NdPr and ~165ktpa Dy+Tb). Project capex was estimated at US\$374m, with cash costs of US\$21/kg TREO (vs 2017 avg. basket prices of US\$50/kg).

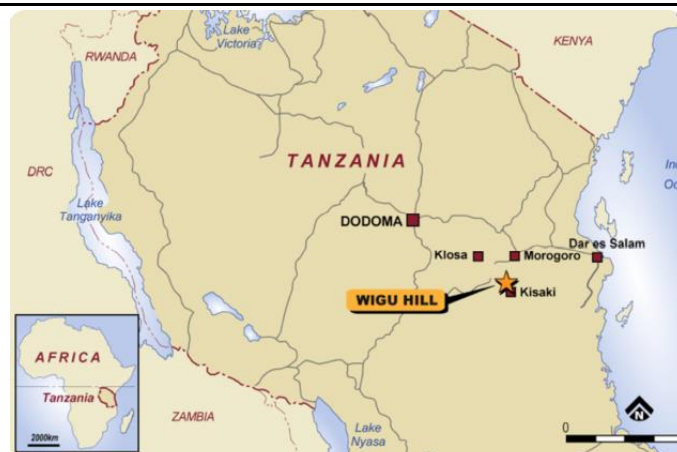
VML is commencing assessment of development options for Kipawa, which we expect could look to follow a similar development strategy as Nechalacho. Moreover, we note that this could include the potential to utilise any expanded hydromet processing capacity in Saskatoon, with Kipawa roughly equidistant from Saskatoon as Nechalacho (~2,000km by road). In addition, potential development at Kipawa could provide VML with a significantly more diversified product mix (including high value heavy rare earths such as Dy and Tb) as well as increasing overall NdPr production capacity.

Asset overview: Wigui Hill

Location, access and infrastructure

The Wigui Hill rare earth project covers an area of approximately 142km² and is located approximately 200 km south-west of Dar es Salam and 68 km of Morogoro, the nearest major regional centre. The project is considered to have reasonable access to transport links including existing roads and railway.

Figure 29: Wigui Hill project location



Source: Company reports

Ownership

Similar to Nechalacho, VML acquired the rights to the Wigu Hill project through the purchase of Cheetah Resources in 2019, which had previously signed a project development and option agreement with Montero Mining & Exploration (MON-TSX-V | Not Rated), to acquire its 81% interest and rights to develop the Wigu Hill Project located near Kisaki in Tanzania. Remainder ownership of the project is held by RSR (Tanzania) Ltd. Total consideration under the transaction was reported at C\$1.2m and a requirement to fund a \$500k technical due diligence program.

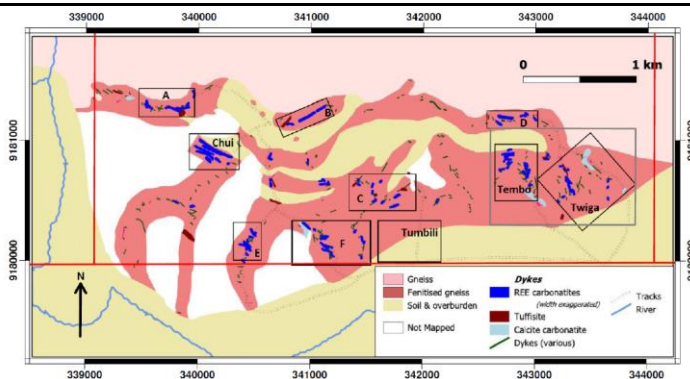
Wigu Hill had previously been covered by a Retention Licence until 2018, when all Retention Licences in Tanzania were revoked by the government. At the time of the revocation, Montero had applied for a Mining Licence over the project area.

Geology, mineralogy and resources

Wigu Hill consists of a large carbonatite complex that outcrops over a 3km wide zone over a strike length of 6km. Rare earth mineralisation features a predominant LREO mineralogy, and is hosted within numerous carbonatite dykes which vary in size and composition across the complex. Mineralisation occurs primarily as bastnaesite (and minor monazite and synchysite).

The project area features four main zones of mineralisation (Twiga, Tembo, Tumbili, and Chui; Figure 30) with limited drilling/sampling by prior owners defining an Inferred Resource (43-101) of 3.2Mt at 2.6% LREO. REE distribution within defined Resources consists predominantly lower value La and Ce (~85% La/Ce:LREO). Exploration by previous operators suggests the potential for upside to defined Resources, noting that the defined deposits remain open at depth and along strike, while other mapped mineralisation remains untested by detailed exploration.

Figure 30: Geological map of Wigu Hill project area showing main zones of identified mineralisation



Source: Company reports

Figure 31: Wigu Hill Project Resources (2011)

Mineral Resources

Zone	Mt	LREO grade %	NdPr %
Twiga - NE	1.60	2.58%	0.33%
Twiga - SW	0.50	3.49%	0.43%
Tembo - NW	0.90	2.21%	0.32%
Tembo - SE	0.20	2.17%	0.37%
Total	3.20	2.59%	0.34%

Source: Company reports

Project development

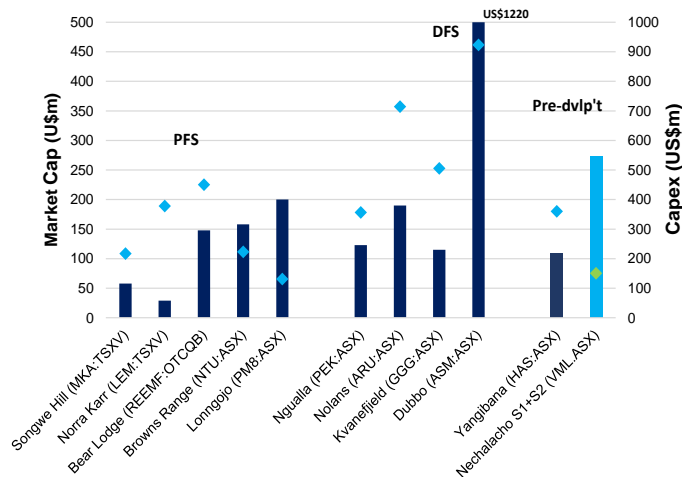
VML reported it is in discussions with the Government of Tanzania for the issuance of a Mining Licence at Wigu Hill, notwithstanding Montero's push for arbitration over retribution rights following revocation of the previously Retention Licence.

We note a new government in Tanzania (led by newly sworn-in President Samia Suluhu Hassan) has adopted a more open approach to foreign investment in the Tanzanian mining sector. In our view, this can be evidenced by the 2020 resolution of the dispute with Barrick Gold, signing of a framework JV agreement for the Kabanga nickel project, extension of the operating licence for AngloGold's Geita gold mine, and issuance of Special Mining Licences for OreCorp's (ORR-ASX: \$0.69 | SPECULATIVE BUY, \$1.35 TP) Nyanzaga project and Peak Resources (PEK-ASX | Not Rated) Ngualla rare earths project.

Subject to the success of VML's application for a Mining Licence and completion of technical/financial assessment, Wigu Hill presents longer term potential for project development and rare earth production incremental to Nechalacho.

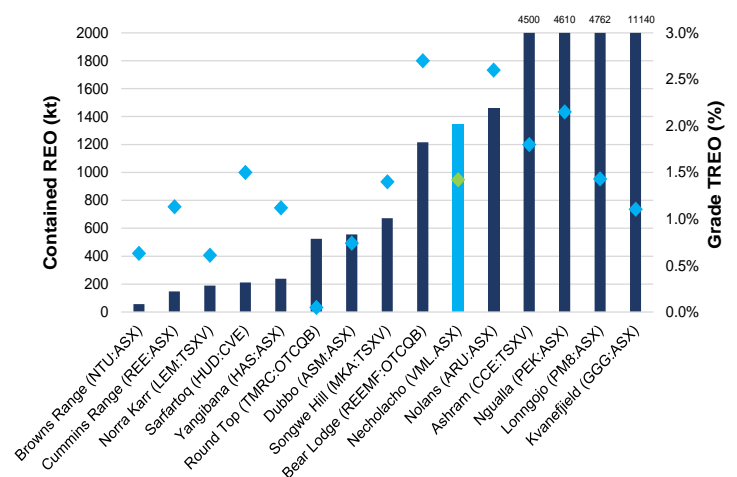
Comps

Figure 32: Nechalacho is an advanced project



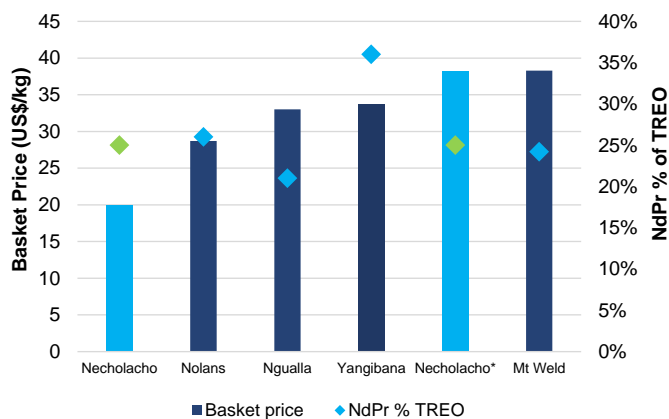
Source: Company reports, Canaccord Genuity estimates

Figure 33: RE project Resource comps



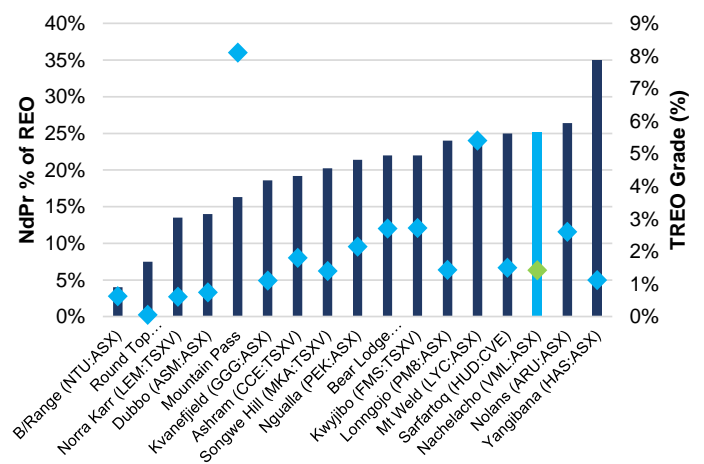
Source: Company reports, Canaccord Genuity estimates

Figure 34: CGE basket price comps



Source: Company reports, Canaccord Genuity estimates

Figure 35: Nechalacho REE distribution



Source: Company reports, Canaccord Genuity estimates

Figure 36: Selected Rare Earth development projects

Project	Company	Code	Exchange	M/Cap US\$m	Location	Equity	Resource Mt	Grade % TREO	Contained REO (kt)	Type	% NdPr	Stage	Capex US\$m	Product	REO ktpa
Nolans	Arafura Resources	ARU	ASX	190	Australia	100%	56.0	2.6%	1,456	LREE	26%	DFS	714	REO	13.3
Dubbo	Australian Strategic Metals	ASM	ASX	1,206	Australia	100%	75.2	0.7%	556	LREE	14%	DFS	923	RE Metal	6.3
Ngualla	Peak Resources	PEK	ASX	123	Tanzania	75%	214.4	2.2%	4,610	LREE	21%	DFS	356	REO	8.0
Yangibana	Hastings Tech. Metals	HAS	ASX	297	Australia	100%	27.5	1.0%	266	LREE	35%	DFS	360	MREC	8.5
Kvanefjeld	Greenland Minerals	GGG	ASX	115	Greenland	100%	1010.0	1.1%	11,140	LREE	19%	DFS	505	MREC	32.0
Browns Range	Northern Minerals	NTU	ASX	158	Australia	100%	9.0	0.6%	57	HREE	4%	PFS	223	RE CON	2.9
Songwe Hill	Mkango Resources	MKA	TSX-V	58	Malawi	51%	48.0	1.4%	672	HREE	20%	PFS	217	RE CON	2.8
Ashram	Commerce Res.	CCE	TSX-V	14	Canada	100%	250.0	1.8%	4,500	LREE	19%	PEA	578	RE CON	16.5
Round Top	Texas Mineral Res.	TMRC	OTCQB	102	USA	100%	1050.0	0.1%	525	HREE	8%	PEA	350	RE CON	2.3
Bear Lodge	Rare Element Res.	REEMF	OTCQB	148	USA	100%	45.0	2.7%	1,215	HREE	22%	PFS	450	REO	6.8
Norra Karr	Leading Edge Materials	LEM	TSX-V	29	Sweden	100%	31.1	0.6%	190	HREE	14%	PFS	378	MREC	5.3
Nechalacho	Vital Metals	VML	ASX	207	Canada	100%	94.7	1.4%	1,345	LREE	25%	ResDev	-	RE CON	-
Cummins Range	RareX Resources	REE	ASX	36	Australia	100%	13.0	1.1%	147	LREE	-	ResDev	-	RE CON	-
Lonngojo	Pensana	PRE	LON	280	Angola	100%	333.0	1.4%	4,762	LREE	24%	PFS	131	RE CON	20.0
Kwyjibo	Focus Graphite	FMS	TSX-V	27	Canada	50%	6.9	2.7%	188	LREE	22%	PEA	723	RE CON	9.5
Sarfartoq	Hudson Resources	HUD	CVE	11	Greenland	100%	14.1	1.5%	212	LREE	25%	PEA	343	RE CON	6.0
Makuutu	Ionic Rare Earths	IXR	ASX	79	Uganda	100%	315.0	0.1%	205	HREE	23%	ReDev	-	RE CON	-
BioLantanidos	Hochschild	HOC	LON	1,460	Chile	100%	125.0	0.1%	100	LREE	22%	PFS	40	REO	1.7

Source: Company reports, Canaccord Genuity estimates

Appendix 1: Board of Directors

Evan Cranston - Non-Executive Chairman

Mr Cranston is an experienced mining executive with a background in corporate and mining law. He is the principal of corporate advisory and administration firm Konkera Corporate and has extensive experience in the areas of equity capital markets, corporate finance, structuring, asset acquisition, corporate governance and external stakeholder relations. He holds both a Bachelor of Commerce and Bachelor of Laws from the University of Western Australia.

Geoff Atkins - Managing Director

Mr Atkins is a Civil Engineer with over 20 years of project and corporate development experience across commercial, industrial, mining and infrastructure sectors with responsibility for driving projects from concept, through feasibility and development to operational assets.

Mr Atkins was a founder of Cheetah Resources, with other recent roles including Corporate Planning Manager at Lynas Corporation where he oversaw development and implementation of the corporate strategic planning process. This included the management and governance of capital works and business development programs for Mt Weld mine and concentrator, LAMP in Malaysia, and the Kangankunde project in Malawi.

James Henderson - Non-Executive Director

Mr Henderson is the founder and Chairman of Transocean Group since 1987, and has over 35 years' experience in providing financial advisory services in Australia and overseas across a wide range of industries including medical devices, aged care, clean energy and natural resources.

Prior to Transocean Mr Henderson was National Chairman at Sothertons Chartered Accountants in Western Australia specialising in taxation, accountancy and corporate structures.

Louisa Martino – Company Secretary and Chief Financial Officer

Ms Martino has provided company secretarial and accounting services for eight years to a number of listed entities. Previously she worked for a corporate finance company, assisting with company compliance (ASIC and ASX) and capital raisings.

She also has experience working for a government organisation in its Business Development division where she performed reviews of business opportunities and prepared business case analysis for those seeking Government funding. Prior to that, Ms Martino worked for a major accounting firm in Perth, London and Sydney where she provided corporate advisory services and performed due diligence reviews. She has a Bachelor of Commerce from the University of Western Australia, is a member of Chartered Accountants Australia and New Zealand and a member of the Financial Services Institute of Australasia (FINSIA).

Tony Hadley – Chief Operating Officer

Mr Hadley is regarded as one of the world's leading experts in rare earth processing outside of China. He has extensive experience in operations, technical development, project design and management, engineering and commissioning. His project experience has encompassed feasibility studies in three different countries, piloting, construction and commissioning of process plants.

Mr Hadley has a broad technical knowledge in mineral processing covering comminution, flotation, cracking, leaching and neutralisation of rare earth concentrates, wastewater and waste gas treatment, solvent extraction, pressure oxidation, albion oxidation, roasting, cyanide destruction, filtration, drying, gravity and magnetic separation.

Appendix 2: Investment Risks

Financing risks

Our research suggests that VML may require additional capital to fund the longer-term development costs for its Nechalacho Rare Earth Project and other projects. VML may be reliant on equity/debt/external capital to fund any additional capital commitments, and there is no guarantee that accessing these markets will be achieved without dilution to shareholders.

Furthermore, accurate estimates of capital costs remain subject to completion of updated studies, which may see capital requirements exceed our model assumptions.

Operational risks

Once in production, the company will be subject to risks such as plant/equipment breakdowns, metallurgical, geological and other technical issues. An increase in operating costs could reduce the profitability and free cash generation from the operating assets and negatively impact valuation.

Exploration risks

Exploration is subject to a number of risks and can require a high rate of capital expenditure. Risks can also be associated with conversion of Inferred Resources and lack of accuracy in the interpretation of geochemical, geophysical, drilling and other data. It is not known whether exploration will delineate further Mineral Resources, nor that the company will be able to convert the current mineral resource into minable reserves.

Commodity price and currency fluctuation

As a potential rare earths producer, VML is exposed to commodity price and currency fluctuations, often driven by macro-economic forces including inflationary pressure, interest rates and supply and demand of commodities.

More specifically to VML, China produces approximately 80% of global Rare Earths supply, and changes to Chinese policies (i.e. export quotas, production quotas, production taxes, environmental regulation) has historically seen instances of major interruptions to global supply, and extreme volatility in pricing.

These factors are external and could reduce the profitability, costing and prospective outlook for the company.

Appendix: Important Disclosures

Analyst Certification

Each authoring analyst of Canaccord Genuity whose name appears on the front page of this research hereby certifies that (i) the recommendations and opinions expressed in this research accurately reflect the authoring analyst's personal, independent and objective views about any and all of the designated investments or relevant issuers discussed herein that are within such authoring analyst's coverage universe and (ii) no part of the authoring analyst's compensation was, is, or will be, directly or indirectly, related to the specific recommendations or views expressed by the authoring analyst in the research, and (iii) to the best of the authoring analyst's knowledge, she/he is not in receipt of material non-public information about the issuer.

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Sector Coverage

Individuals identified as "Sector Coverage" cover a subject company's industry in the identified jurisdiction, but are not authoring analysts of the report.

Investment Recommendation

Date and time of first dissemination: September 17, 2021, 00:39 ET

Date and time of production: September 17, 2021, 00:39 ET

Target Price / Valuation Methodology:

Vital Metals Limited - VML

Our valuation is based on a risk-weighted NPV10% of our modelled development scenario for the Nechalacho Project. This valuation should be considered preliminary in nature, noting VML is yet to complete detailed studies for longer-term development/production plans.

Risks to achieving Target Price / Valuation:

Vital Metals Limited - VML

Financing risks

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Distribution of Ratings:

Colts Stock Ratings (as of 09/17/21)

Rating	Coverage Universe		IB Clients
	#	%	%
Buy	0	0.00%	0.00%
Hold	0	0.00%	0.00%
Sell	0	0.00%	0.00%
Speculative Buy	7	100.00%	57.14%
	7*	100.0%	

*Total includes stocks that are Under Review

Canaccord Genuity Ratings System

BUY: The stock is expected to generate risk-adjusted returns of over 10% during the next 12 months.

HOLD: The stock is expected to generate risk-adjusted returns of 0-10% during the next 12 months.

SELL: The stock is expected to generate negative risk-adjusted returns during the next 12 months.

NOT RATED: Canaccord Genuity does not provide research coverage of the relevant issuer.

"Risk-adjusted return" refers to the expected return in relation to the amount of risk associated with the designated investment or the relevant issuer.

Risk Qualifier

SPECULATIVE: Stocks bear significantly higher risk that typically cannot be valued by normal fundamental criteria. Investments in the stock may result in material loss.

12-Month Recommendation History (as of date same as the Global Stock Ratings table)

A list of all the recommendations on any issuer under coverage that was disseminated during the preceding 12-month period may be obtained at the following website (provided as a hyperlink if this report is being read electronically) <http://disclosures-mar.canaccordgenuity.com/EN/Pages/default.aspx>

Required Company-Specific Disclosures (as of date of this publication)

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In the past 12 months, Canaccord Genuity or its affiliated companies have received compensation for Investment Banking services from Vital Metals Limited .

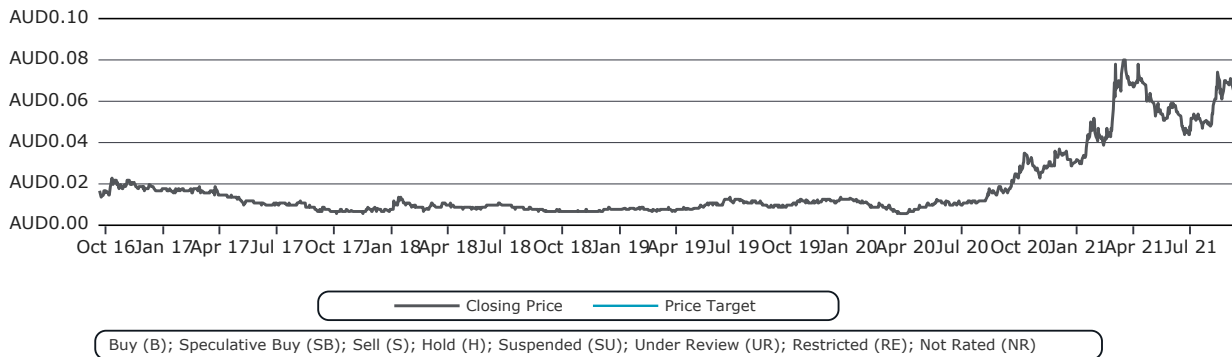
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Vital Metals Limited Rating History as of 09/16/2021



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