ASX / Media Announcement
23 June 2021

VITAL'S METALLURGICAL TESTWORK AT TARDIFF RETURNS POSITIVE RESULTS FOR STAGE 2 OPERATIONS

HIGHLIGHTS

- **Vital plans to mine the Tardiff Zone at Nechalacho in Stage 2 operations, creating a larger scale, longer life rare earths project**
- **Metallurgical testwork on ore from Tardiff Zone at Nechalacho shows potential to use similar process flowsheet as ore mined from North T Zone**
- **Testwork shows potential to incorporate additional processes, including gravity and flotation separation in Stage 2 to achieve a high-grade (>35% TREO) rare earth concentrate**
- **Using Stage 1 process equipment in Stage 2 will reduce capital costs and de-risk the project**
- **Vital Metals to become Canada's first rare earths producer with rare earths production from Stage 1 at Nechalacho on track to commence this month via ore sorting.**

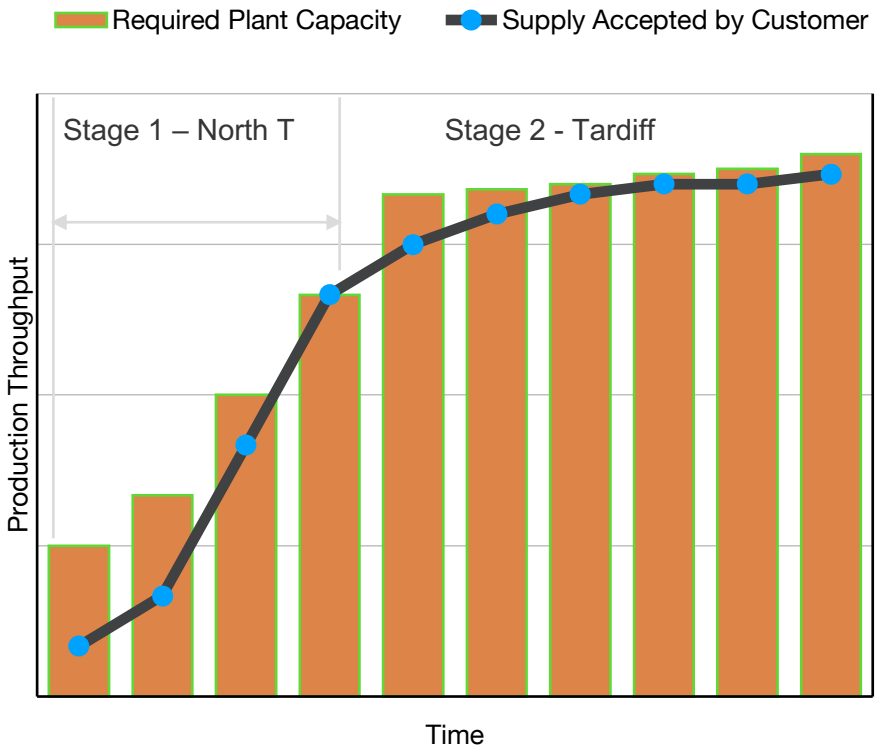
Vital Metals Limited (ASX: **VML**) (**"Vital"**, "**Vital Metals**" or "**the Company**") is pleased to announce positive results from metallurgical testwork completed on samples from the Tardiff zone at Vital's Nechalacho rare earths project in Canada.

Vital Metals' Managing Director Geoff Atkins said the Tardiff metallurgical testwork demonstrated the potential to continue a similar process flowsheet in Stage 2, with the introduction of an additional beneficiation process due to the finer nature of rare earth mineralisation at Tardiff.

"The testwork program achieved results which were better than expected and indicates that we will be able to utilise the same process from Stage 1 at Nechalacho in Stage 2, with the addition of an additional beneficiation step, such as a flotation plant. Achieving this will greatly reduce capital costs and risk," he said.

"As expected, due to the finer grain sizes at Tardiff than at North T, the testwork has indicated that an additional process step, will likely be required to achieve the required feed grade into the kiln. Flotation showed great promise in terms of high REO grade, low mass pull and reasonable REO recovery."

"The ability to utilise plant and equipment from the Stage 1 – North T operation in Stage 2 is critical to achieving our target of funding the development of the Tardiff Zone out of Stage 1 operating revenue."



Background

Testwork has indicated potential to use a similar process flowsheet in both of Vital's planned stages of rare earths production at Nechalacho – the North T zone in Stage 1 and the Tardiff zone in Stage 2 – to produce a beneficiated product with a REO grade greater than 35%.

Vital aims to mine the much larger Tardiff Zone, which has a total resource of 95 million tonnes @ 1.46% total rare earth oxides (TREO) (1.3 million tonnes of contained TREO)[1], after North T during Stage 2 of the development strategy. Development of the Tardiff Zone is targeted for commencement in 2025.

Vital Metals is set to commence production via ore sorting from the North T zone at Nechalacho this month, and once in production, will be the first rare earths producer in Canada and the second in North America.

In its metallurgical scouting test program, Vital aimed to test the amenability of ore from the Tardiff Zone 1 area to the North T zone process flowsheet, which is in the final stages of construction. Using a 770kg sample taken from Tardiff Zone 1, the program tested grindability, ore sorting via X-ray transmission, several separation methods – heavy liquid, gravity and magnetic, and acid leaching.

The sample also underwent flotation testwork, which is not part of the Stage 1 flowsheet, and returned promising results.

A report on the testwork concluded the sample demonstrated amenability to each step of the Stage 1 process flow sheet. Details of the testwork and results are included below.

[1] *Refer ASX announcement dated 13 December 2019: Vital announces JORC 2012 compliant resource for the Nechalacho Rare earth deposit.*

Drilling has been completed at Tardiff to assist Vital to define a mine plan for Stage 2 at Nechalacho, which is expected to be a larger-scale, longer life mining operation following Stage 1 at North T.

In Vital Metal's staged strategy for Nechalacho, Stage 2 envisages the development of several high-grade zones identified within the Tardiff (Upper Zone) deposit. The Company previously announced this deposit's total resource of 95 million @ 1.46% total rare earth oxides (TREO) (1.3 million tonnes of contained TREO)[2]. The Tardiff deposits are envisaged as providing the resource for the long-term operation and expansion of the project.

In addition to rare earths, this zone also contains zircon and niobium grades which are comparable with other polymetallic rare earth projects and were also the subject of feasibility test work previously undertaken at Nechalacho by Avalon Advanced Materials Inc. Key features of the proposed Stage 2 operations are as follows:

- Long-term/large-scale commercial operation providing long term security to the rare earth supply chain;
- Fund expansion and the development of Tardiff deposit through the sale of mixed RE carbonate from the North T zone currently being mined; and
- Vital Metal's Definitive Offtake Agreement with REEtec (see ASX Announcement 2 February 2021) provides the option for the supply of up to 5,000t REO (ex-Cerium)/yr for a period of more than 10 years. Should this option be exercised, this will be a cornerstone for Stage 2 operations at the Tardiff Zone.

Tardiff Zone 1 Metallurgical Testwork Overview

Vital's scouting test program aimed to determine the amenity of Tardiff Zone 1 ore to the Stage 1 North T flowsheet currently being constructed. The goal of this testwork was to demonstrate the potential to produce a beneficiated product with a REO grade of greater than 35% REO with reasonable recoveries.

The North T flowsheet consists of the following stages:

- Crushing of ore to -60mm
- -60/+8mm with be sorted utilising a sensor based ore sorter to produce a +30% beneficiated product before being crushed to -2mm
- -8mm/+2mm material crushed to -2mm
- -2mm/+0. 5mm beneficiated using Dense Media Separation
- -0.5mm +0.15mm product beneficiated using Shaking Tables
- -0.15mm fines dewatered and combined with the DMS and shaking table concentrates
- Beneficiated product 35%-40% TREO.

North T beneficiated product will then be calcined, prior to hydrochloric acid leaching, purification and precipitation.

---

[2] *Refer ASX announcement dated 13 December 2019: Vital announces JORC 2012 compliant resource for the Nechalacho Rare Earth deposit.*

Bulk Sample Preparation

Vital prepared a 770kg bulk sample of drill core typical of the mineralogy from the Tardiff Zone 1 for the testwork scouting programme. One set of drill core samples was shipped to Saskatchewan Research Council (SRC) for TOMRA ore sorting testwork, and the other set of samples was shipped to the SGS laboratory in Garson for Minalyzer core scan analysis.

The rest of the received sample was staged crushed to nominal 19mm using a combination of jaw and cone crushers, About 30 kg subsample was taken for grindability testwork and another 170kg subsample was stage crushed to 100% passing 3.3mm. The sample was blended and then split into 10kg and 2kg test charges for metallurgical testwork.

The bulk sample was selected from historical drill holes. These holes are shown in the figure below, together with intercepts previously reported. [3]

- L07-055 – 30m at 4.85% TREO from 17m
- L09-144 – 17.7m at 2.55% TREO from 21.3m
- L10-212 – 31.4m at 5.27% TREO from 14m
- L10-213 – 40.5m at 2.51% TREO from 28m
- L13-520 – 31.8m at 2.57% TREO from 12.2m
- L13-521 – 29.8m at 2.62% TREO from 16m

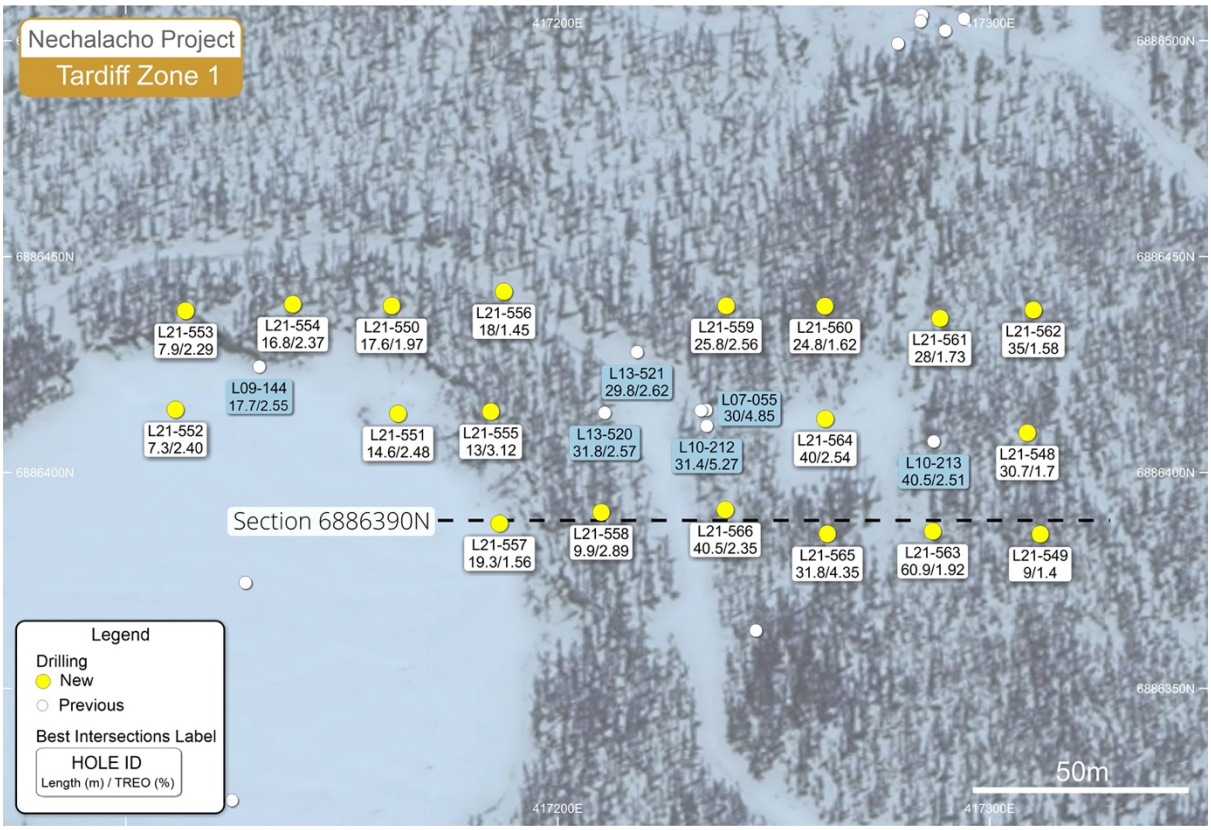


Figure 1 - Drill plan showing holes used for Tardiff sample [3]

[3] *Refer ASX announcement dated 26 May 2021: Vital intersects broad high grade REO in near surface drilling at Tardiff Zone.*

Figure 2 - NQ ½ core with variants of bastnaesite mineralization from hole L07-055

Figure 3 - Quarter HQ, intervals intact, with various bastnaesite mineralization from hole L10-212

It is noted that the samples used cannot be considered representative of Tardiff Zone 1, but rather was intended to provide an indication of the amenability of this mineralisation to the North T process flow sheet. Prior to further testwork being undertaken a representative sample will be collected utilising samples from the recent Tardiff Zone 1 drill program (refer ASX Announcement 26th May 2021).

Head Chemical Analysis

The North Tardiff Comp head sample contained mainly light REE and minor heavy REE, with a TREO grade of 2.43%.

One sample, referred to as North Tardiff Comp (NT Comp) was received by SGS Advanced Mineralogical facility for mineralogical examination. The mineralogical work was conducted with QEMSCAN (Quantitative Evaluation of Materials by Scanning Electron Microscopy), electron probe micro spectrometer (EDX), X-Ray diffraction and chemical analyses. The purpose of this test program was to determine the overall mineral assemblage of the sample and the occurrence of REE minerals. The analysis concluded that the REE deportment varied depending on the rare earth element. The LREE were mainly hosted by REE Flouro-Carbonates (bastnaesite, and synchysite/parisite), monazite, and allanite. The HREE were mainly hosted by zircon, columbite/pyrochlore, and fergusonite.

Head Assays for the North Tardiff Comp are summarised below:

Element	TREO	ZrO_2	Nb_2O_5	HfO_2	LOI
Assay %	2.43%	2.34%	0.31%	0.11%	6.1%

Whilst the current testwork program and initial operations are focussing on rare earths, as can be seen from the above comp assays, Tardiff Zone contains significant grades of Zircon and Niobium which may provide future revenue opportunities.

Testwork Results Summary

Grindability

The Bond rod work index (RWI) and Bond ball (BWI) showed the North Tardiff Comp was moderately hard to hard, with a RWI at 17KWh/t and a BWI at 16.4 KWh/t. The Bond abrasion test indicated the sample was of medium abrasiveness, with an AI of 0.323g.

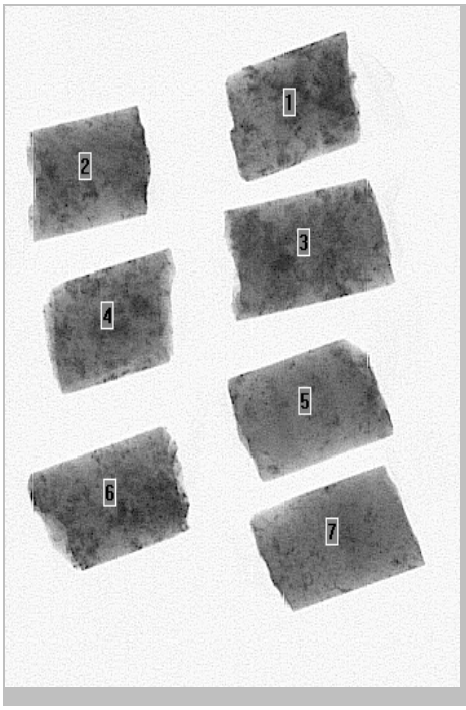
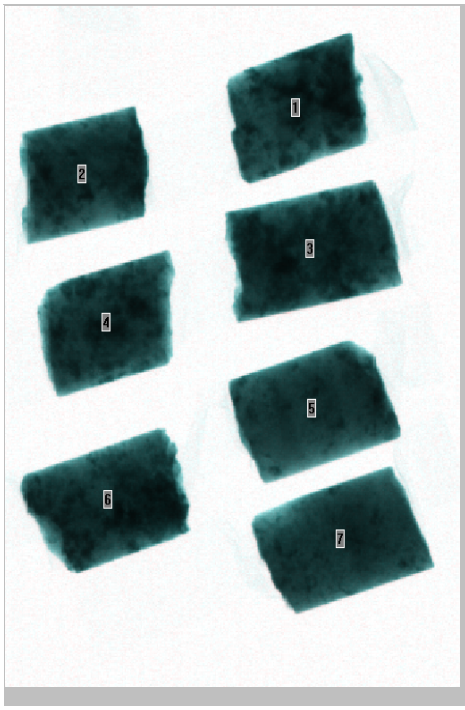
Ore sorting

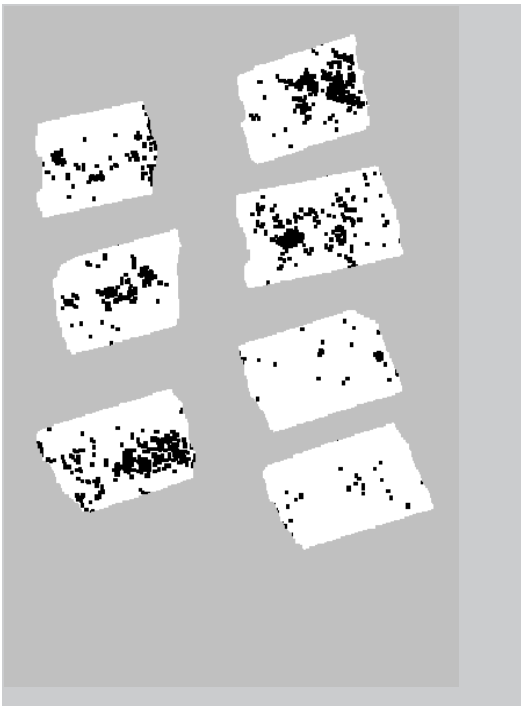
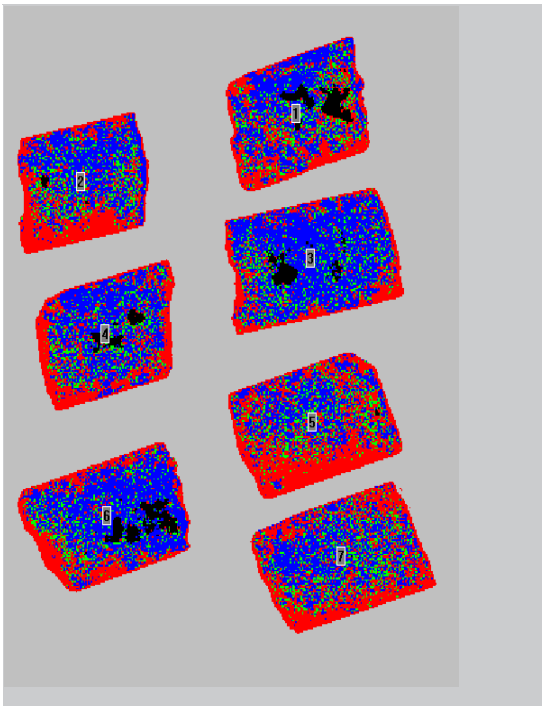
A sample was sent to TOMRA to evaluate the amenability of this material to XRT using the same TOMRA model machine that is about to be used to sort the North T ore for the demonstration project. The selected sensing technique for this material is X-ray transmission (XRT) sensor because of the expected difference in atomic density of the mineralised material and waste.

In order to investigate the separability of the bulk sample, the sorter was trained, software parameterised and images were taken of the different test sheets.

For the training of the sorter, samples were exposed to high energy x-rays. And the resultant image was captured by the sensor. The x-ray sensor signal depends on the atomic density and thickness of the material and relays information about the internal composition of the particles. Examples of the raw and processed sensor images collected are shown in the figures below. For images recorded, TOMRA's image processing software is used to classify changes in the intensity of the x-ray passing through the samples as either high atomic density or low atomic density. Note that because the sorter is tailored to the material being tested, the terms high atomic density and low atomic density are used in a relative context. The different colour classes are then assessed as a percentage of the single rock area. This percentage is used as a parameter to determine the sorting cut. There are two different image processing methods for the XRT images (Dual and Inclusions). For this application both processing methods have been utilised

Classification scheme XRT Dual:	Given colors Inclusion	Given colors Dual
Low atomic density	White	Red & green
High atomic density	Black	Blue & black
Background	Grey	Grey

	RAW Inclusion image	RAW Dual image
Sheet 368740		

Sheet 368740	Processed XRT Inclusion image	Processed XRT Dual image
		

Unlike the North T zone, which contains extremely coarse rare earth minerals, Tardiff ore, whilst still coarse, is finer and therefore the purpose of ore sorting will be to reduce mass and increase the grade of feed into other beneficiation processes, rather than as a standalone process as it is with North T.

The results achieved from the preliminary assessment are extremely promising with mass reductions of greater than 50% achieved with recoveries of ~85%. With further testwork using representative samples it would be expected that these results can be improved, but testwork carried out demonstrates the amenability of North T ore to XRT sorting and the ability to utilise the North T sorter in upgrading ore from Tardiff Zone 1.

Preconcentration by HLS, Gravity or Magnetic Separation

The North T project will utilise Dense Media Separation (DMS) and gravity techniques to process sorted and undersize material to ensure a homogenous feed into the rare earth extraction plant's leaching circuit whilst providing the added benefit of further upgrading the feed. Due to the finer nature of the Tardiff Zone rare earth mineralisation, these processing methodologies are expected to play a more significant role in upgrading ore prior to being fed into the leaching circuit. The purpose of testwork was to determine the amenability of Tardiff Zone 1 ore to processes which will form part of the Stage 1 Extraction Plant. Note that testwork was carried out on standard ore, not previously sorted material.

Heavy Liquid Separation (HLS) is a simple, cost effective technique used in the lab to help predict the performance of an ore sample to DMS and gravity separation techniques. The HLS results showed good potential to separate rare earth minerals from silicate gangue by gravity separation.

For the very coarse size fraction (-2.0/+0.6mm), the grade of the sink product was ~4% TREO with a recovery of ~90% REO and a mass yield of ~52%. For the medium size fraction (-0.6/+0.15m), the grade of the sink product was ~5% TREO with a recovery of ~89-91% and a mass yield of ~42-44%. The HLS results of the medium size fraction were slightly better than those of the coarse fraction., likely due to improved mineral liberation at the finer particle sizes.

Heavy liquid separation tests showed the excellent potential for doubling the grade of the rare earth minerals by dense medium separation. A projected REE recovery of ~90% in ~50% mass pull was indicated for material in the -2 mm/+0.6 mm size fraction. This would be suitable feed for a DMS plant and concentrating the feed in this way would approximately halve the feed to the mill and flotation plant.

The finer fraction (-0.6 mm/+0.075 mm) would not be suitable for DMS but could also be upgraded by gravity separation. Mozley, Knelson and Falcon concentrators were tested and the best gravity separation results on -0.6 mm material were achieved with a Mozley Table. REE recoveries of 60% to 75% were demonstrated (varying with particle size) achieving a concentrate grade of ~4.6% TREO

Magnetic separation testwork was only conducted on feed that had been milled to 100% passing 0.075 mm (75 µm) and the best results were achieved using Wet High-Intensity Magnetic Separator (WHIMS). REE recoveries ranging from 75% to 80% were demonstrated.

The results achieved, demonstrate the amenability of Tardiff Zone 1 ore to North T's beneficiation processes and provide confidence that Stage 1 beneficiation processing equipment would be able to be utilised during Stage 2. Should this occur this will greatly reduce capital costs for Stage 2.

Concentration by Flotation

Due to the slightly finer nature of the material the use of an additional beneficiation stage will be likely. To test whether a high-grade concentrate will be achievable, preliminary flotation testwork was undertaken on Tardiff Zone 1 ore.

A total of 20 batch flotation tests were carried out to develop a preliminary flotation flowsheet for REE beneficiation. The flotation testwork was performed on Tardiff Zone 1 composite ore by evaluating different collector types, depressants, pulp temperature, pulp density, cleaning/recleaning, primary grind size, and pulp pH. The optimum grind established for flotation was 100% passing 75 µm. Rougher flotation achieved very high REE recoveries in the range 90 to 97% in less than 40% of the mass. Under the optimum rougher and cleaner flotation conditions in this brief programme, a final (2nd cleaner) concentrate with a grade of ~30% TREO was achieved at a ~61% recovery, in ~ 5% mass pull.

These results are extremely promising, and indicate that with further optimisation a target concentrate grade of 35% TREO with a 75% recovery should be achievable, which would be considered a high grade concentrate and would provide an ideal feedstock into an extraction plant. Further, with the use of sorting and gravity separation to increase the grade of feed into a flotation circuit this will provide further opportunities for optimisation and improvement.

Calcination and Hydrochloric Acid Leaching

Upon completion of flotation testwork a 200g sample of flotation concentrate was subjected to hydrochloric acid leaching, utilising the same process flowsheet as that currently in development for the North T deposit. With the majority of rare earths at Tardiff Zone 1 contained with rare earth fluoro-carbonates (bastnaesite and synchesite) the purpose of this testwork was to confirm that the amenability of the current process flowsheet for these minerals.

As anticipated, the batch tests undertaken confirmed that all rare earth fluoro-carbonates with Tardif Zone 1 ore respond in a similar manner to North T material. Once confirmed by further testwork this will provide the opportunity to utilise existing extraction infrastructure as Vital moves from Stage 1 to Stage 2 of our development plan and expands our operation.

It is expected that rare earths contained within other minerals, eg monazite, will be able to be stockpiled for further processing at a later date.

Conclusion

The results of the scouting testwork program achieved results which were better than expected. Of particular note, was that the composite sample demonstrated amenability to each step of the North T process flow sheet. As expected due to the finer grain sizes at Tardiff, than exist at North T, the testwork has indicated that a flotation circuit, or some other additional beneficiation technique, will likely be required to achieve the required feed grade into the kiln. Flotation showed great promise in terms of high REO grade, low mass pull and reasonable REO recovery.

The best flowsheet may include, ore sorting, DMS on +0.6 mm crushed ore to reduce the mass of ore feeding the mill by ~50%, followed by milling of the DMS concentrate and the -0.6 mm ore to a grind size of 100% passing ~ 75 µm. The mill product would then be upgraded to final concentrate grade by flotation, but could also include gravity and or magnetic separation for certain process streams.

Of particular note was that with optimisation, flotation demonstrated the potential to achieve a 35% REO grade as a standalone process treating ore with a grade of 2.3% REO. When preconcentration steps of ore sorting, HMS and shaking table circuits are added, the testwork indicates that a grade of 7-8% REO should be achievable going into the flotation circuit. This should improve the final concentrate grades and recoveries even further. It should be noted however that further testwork on representative samples is required to optimise this flowsheet.

In addition to the beneficiation testwork, the confirmation that Tardiff Zone 1 material will also be amenable to the North T leaching process is also extremely promising. The ability to maximise the utilisation of existing processing infrastructure provides the opportunity to greatly reduce capital costs as we transition from processing North T ore to Tardiff Zone 1 in Stage 2.

- ENDS-

Contact:
Mr Geoff Atkins
Managing Director
Vital Metals Limited
Phone: +61 2 8823 3100
Email: vital@vitalmetals.com.au

This announcement has been authorised for release by the Managing Director of Vital Metals.

ABOUT VITAL
Vital Metals Limited (ASX:VML) is an explorer and developer focussing on rare earths, technology metals and gold projects. Our projects are located across a range of jurisdictions 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 measured, indicated and inferred JORC Resource of **94MT at 1.46% TREO**.[4]

Qualified/Competent Persons Statement

Nechalacho Rare Earth Project
The information in this report relating to Exploration Results at the Nechalacho Rare Earths Project is based on, and fairly represents, information and supporting documentation prepared for Vital Metals Limited by Mr Brendan Shand. Mr Shand is a Competent Person and a member of the Australasian Institute of Mining and Metallurgy and an employee of the Company. Mr Shand has sufficient experience that is relevant to the style of mineralisation and type of deposit under consideration and to the activity being undertaken to qualify as a Competent Person as defined in the 2012 Edition of the 'Australian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves'. Mr Shand consents to the inclusion in the report of the matters based on his information in the form and context in which it appears.

The information in this announcement that relates to Metallurgical Test Work Results is based on information reviewed by Mr Ray Anguelov (B.Sc in Mineral Science (Extractive Metallurgy), MAusIMM(CP)). Mr Anguelov is a process engineer working for the Company's subsidiary, Cheetah Resources Corp. and has 25 years of relevant experience in this area of work. Mr Anguelov consents to the inclusion in this announcement of the matters based on information provided to him and in the form and context in which it appears.

ASX Listing Rule Information

This announcement contains information relating to Exploration Results extracted from an ASX market announcement reported previously and published on the ASX platform on 26 May 2021. The Company confirms that it is not aware of any new information or data that materially affects the information included in the original market announcement.

This announcement contains information relating to Mineral Resource Estimates extracted from ASX market announcements reported previously and published on the ASX platform on 13 December 2019. The Company confirms that it is not aware of any new information or data that materially affects the information included in the original market announcements and that all material assumptions and technical parameters underpinning the estimates in the original market announcements continue to apply and have not materially changed.

Forward Looking Statements
This release includes forward looking statements. Often, but not always, forward looking statements can generally be identified by the use of forward-looking words such as "may", "will", "expect", "intend", "plan", "estimate", "anticipate", "continue", and "guidance", or other similar words and may include, without limitation statements regarding plans, strategies and objectives of management, anticipated production or construction commencement dates and expected costs or production output.

Forward looking statements inherently involve known and unknown risks, uncertainties and other factors that may cause the company's actual results, performance and achievements to differ materially from any future results, performance or achievements. Relevant factors may include, but are not limited to, changes in commodity prices, foreign exchange fluctuations and general economic conditions, increased costs and demand for production inputs, the speculative nature of exploration and project development, including the risks of obtaining necessary licences and permits and diminishing quantities or grades of resources or reserves, political and social risks, changes to the regulatory framework within which the company operates or may in the future operate, environmental conditions including extreme weather conditions, recruitment and retention of personnel, industrial relations issues and litigation.

Forward looking statements are based on the company and its management's good faith assumptions relating to the financial, market, regulatory and other relevant environments that will exist and affect the company's business and operations in the future. The company does not give any assurance that the assumptions on which forward looking statements are based will prove to be correct, or that the company's business or operations will not be affected in any material manner by these or other factors not foreseen or foreseeable by the company or management or beyond the company's control.

Although the company attempts to identify factors that would cause actual actions, events or results to differ materially from those disclosed in forward looking statements, there may be other factors that could cause actual results, performance, achievements or events

[4] Refer ASX Announcements dated 13 December 2019. The Company confirms that it is not aware of any new information or data that materially affects the information included in the original market announcement and that all material assumptions and technical parameters underpinning the estimates in that market announcement continue to apply and have not materially changed.

not to be anticipated, estimated or intended, and many events are beyond the reasonable control of the company. Accordingly, readers are cautioned not to place undue reliance on forward looking statements.

Forward looking statements in this release are given as at the date of issue only. Subject to any continuing obligations under applicable law or any relevant stock exchange listing rules, in providing this information the company does not undertake any obligation to publicly update or revise any of the forward-looking statements or to advise of any change in events, conditions or circumstances on which any such statement is based.

APPENDIX 1: JORC Code, 2012 Edition – Table 1 report – Nechalacho Upper Zone Metallurgy Test Work

Section 1 Sampling Techniques and Data

(Criteria in this section apply to all succeeding sections.)

	JORC Code explanation	Commentary
Sampling techniques	• *Nature and quality of sampling (eg cut channels, random chips, or specific specialised industry standard measurement tools appropriate to the minerals under investigation, such as down hole gamma sondes, or handheld XRF instruments, etc). These examples should not be taken as limiting the broad meaning of sampling.* • *Include reference to measures taken to ensure sample representivity and the appropriate calibration of any measurement tools or systems used.* • *Aspects of the determination of mineralisation that are Material to the Public Report.* • *In cases where 'industry standard' work has been done this would be relatively simple (eg 'reverse circulation drilling was used to obtain 1 m samples from which 3 kg was pulverised to produce a 30 g charge for fire assay'). In other cases more explanation may be required, such as where there is coarse gold that has inherent sampling problems. Unusual commodities or mineralisation types (eg submarine nodules) may warrant disclosure of detailed information.*	• Samples used for the scoping level metallurgy test work were half and quater core splits of typical rare earth oxide mineralisation from the Tardiff Zone 1. • Samples were taken from core available from holes drilled by Avalon Materials Incorporated in the Tardiff Zone 1 area and reported by the Company on 26 May 2021 (Refer Appendix 2). The core used was mineralogically typical of the rare earth mineralisation in the Tardiff Zone 1 area. • A total of 772 kg of core with typical rare earth minerlisation was collected and sent to SGS to create a master composite bulk sample. A small subset ore sample was sent to SRC to evaluate the ameniability of ore sorting. Another small subset was sent to SGS Garsen for Minalyser core scan analysis. The remaining sample was stage crushed to a nominal 19mm. A 200kg subsample was taken for a scoping level metallurgical test-work program at SGS to evaluate the ameniability to DMS, gravity, magnetic and flotation separation technologies. In addition, the sample was also tested to understand its grindability and abrasivity characteristics using standard Bond Ball and Bond Rod work indice tests.
Drilling techniques	• *Drill type (eg core, reverse circulation, open-hole hammer, rotary air blast, auger, Bangka, sonic, etc) and details (eg core diameter, triple or standard tube, depth of diamond tails, face-sampling bit or other type, whether core is oriented and if so, by what method, etc).*	• All core used in the metallurgical test work was NQ half and quarter core.
Drill sample recovery	• *Method of recording and assessing core and chip sample recoveries and results assessed.* • *Measures taken to maximise sample recovery and ensure representative nature of the samples.* • *Whether a relationship exists between sample recovery and grade and whether sample bias may have occurred due to preferential loss/gain of fine/coarse material.*	• Avalon noted good core recovery in the 6 historic holes in the Tardiff Zone 1 area. This was verified by Vital Metals on inspection of the core.

	JORC Code explanation	Commentary
Logging	• *Whether core and chip samples have been geologically and geotechnically logged to a level of detail to support appropriate Mineral Resource estimation, mining studies and metallurgical studies.* • *Whether logging is qualitative or quantitative in nature. Core (or costean, channel, etc) photography.* • *The total length and percentage of the relevant intersections logged.*	• Geological drill logs completed by an experienced professional geoscientist were produced to a standard to support a mineral resource estimation. • All the core used in the metallurgical test work was logged but no photographs were taken.
Sub-sampling techniques and sample preparation	• *If core, whether cut or sawn and whether quarter, half or all core taken.* • *If non-core, whether riffled, tube sampled, rotary split, etc and whether sampled wet or dry.* • *For all sample types, the nature, quality and appropriateness of the sample preparation technique.* • *Quality control procedures adopted for all sub-sampling stages to maximise representivity of samples.* • *Measures taken to ensure that the sampling is representative of the in situ material collected, including for instance results for field duplicate/second-half sampling.* • *Whether sample sizes are appropriate to the grain size of the material being sampled.*	• A total of 772 kg of core with typical rare earth minerlisation was collected and sent to SGS. A 14kg subset of sample was sent to SRC for ameniability of ore sorting test work. Another small subset was sent to SGS Garsen for Minalyser core scan analysis. The remaining sample was stage crushed to a nominal 19mm. A 200kg subsample was taken for a scoping level metallurgical test-work program. The crushing to 19mm gave a blending of the sample that was representative when a 200kg subset was taken. • The half and quarter core was of sufficient size to enable the various test-work programs to be carried out.
Quality of assay data and laboratory tests	• *The nature, quality and appropriateness of the assaying and laboratory procedures used and whether the technique is considered partial or total.* • *For geophysical tools, spectrometers, handheld XRF instruments, etc, the parameters used in determining the analysis including instrument make and model, reading times, calibrations factors applied and their derivation, etc.* • *Nature of quality control procedures adopted (eg standards, blanks, duplicates, external laboratory checks) and whether acceptable levels of accuracy (ie lack of bias) and precision have been established.*	• The assay methods for the REE include lithium borate fusion followed by ICP-MS and are thus considered total.
Verification of sampling and assaying	• *The verification of significant intersections by either independent or alternative company personnel.* • *The use of twinned holes.* • *Documentation of primary data, data entry procedures, data verification, data storage (physical and electronic) protocols.* • *Discuss any adjustment to assay data.*	• The metallurgical test-work was reviewed by Mr Ray Anguelov and Mr Anguelov is of the view the test work was done to a very high standard. • Further test-work to be carried out to enhance and verify the test work reported.
Location of data points	• *Accuracy and quality of surveys used to locate drill holes (collar and down-hole surveys), trenches, mine workings and other locations used in Mineral*	• The grid system used is UTM NAD83 Zone 12 N, currently the standard system used in the area.

	JORC Code explanation	Commentary
	Resource estimation. • *Specification of the grid system used.* • *Quality and adequacy of topographic control.*	• All historic Avalon drill holes have been surveyed by professional surveyors.
Data spacing and distribution	• *Data spacing for reporting of Exploration Results.* • *Whether the data spacing and distribution is sufficient to establish the degree of geological and grade continuity appropriate for the Mineral Resource and Ore Reserve estimation procedure(s) and classifications applied.* • *Whether sample compositing has been applied.*	• Not applicable
Orientation of data in relation to geological structure	• *Whether the orientation of sampling achieves unbiased sampling of possible structures and the extent to which this is known, considering the deposit type.* • *If the relationship between the drilling orientation and the orientation of key mineralised structures is considered to have introduced a sampling bias, this should be assessed and reported if material.*	• Work undertaken is of an initial scoping nature and further work is required and planned to provide further representative metallurgical characteristics.
Sample security	• *The measures taken to ensure sample security.*	• The 772kg sample sent to SGS and all subsamples of this were securely packaged.
Audits or reviews	• *The results of any audits or reviews of sampling techniques and data.*	• As the metallurgical test-work is only recent no audits have been carried out.

Section 2 Reporting of Exploration Results

(Criteria listed in the preceding section also apply to this section.)

	JORC Code explanation	Commentary
Mineral tenement and land tenure status	• *Type, reference name/number, location and ownership including agreements or material issues with third parties such as joint ventures, partnerships, overriding royalties, native title interests, historical sites, wilderness or national park and environmental settings.* • *The security of the tenure held at the time of reporting along with any known impediments to obtaining a licence to operate*	• The Upper Zone is located on Mining Lease NT-3178 registered to Avalon Advanced Materials Inc. and expires 21 May 2027. On June 24, 2019, Avalon Advanced Materials Inc. announced that it has entered into a definitive agreement with Cheetah Resources Pty Ltd. to transfer ownership of the near-surface mineral resources on the Property, which includes the Upper Zone (see Avalon News Release NR 19-04). On October 30, 2019, it was announced that

	JORC Code explanation	Commentary
	in the area.	Avalon received the full payment from Cheetah Resources Pty Ltd. for the near-surface resources on the Nechalacho rare earth elements property at Thor Lake (see Avalon News Release NR 19-04). On February 6, 2020, the completion of a co-ownership agreement was announced, under which Cheetah Resources Pty Ltd. acquired ownership of the near-surface resources on the property, including the Upper Zone, and a jointly-owned special purpose vehicle to hold and manage the permits and authorizations to operate at the site was created (see Avalon News Release NR 20-01). • Operating licenses in the Northwest Territories are subject to the approvals by provincial and environmental regulators and require consultation with local communities.
Exploration done by other parties	• *Acknowledgment and appraisal of exploration by other parties.*	• The historic resource development drilling was carried out by Avalon Materials Inc with the bulk of this drilling carried out between 2007 and 2013. • The geologist who supervised the historic work, J.C. Pedersen, P. Geo, is an experienced geologist in the rare earths field and is well known as a reliable geoscientist to the present parties. He also supervised the 2021 drilling program.
Geology	• *Deposit type, geological setting and style of mineralisation.*	• The Upper Zone is a polymetallic (REE, Nb, Zr) deposit hosted by the Thor Lake Syenite. It is a large layered magmatic deposit. • REO mineralization in the Lake Zone is layered in separate zones of light rare earths at the top of the deposit (Upper Zone) and a mixture of light and heavy REO mineralisation in the lower part of the deposit (Basal Zone).
Drill hole Information	• *A summary of all information material to the understanding of the exploration results including a tabulation of the following information for all Material drill holes:* ○ *easting and northing of the drill hole collar* ○ *elevation or RL (Reduced Level – elevation above sea level in metres) of the drill hole collar* ○ *dip and azimuth of the hole*	• Not applicable as exploration results are not reported in this announcement. Reported previously on 26 May 2021.

	JORC Code explanation	Commentary
	○ *down hole length and interception depth* ○ *hole length.* • *If the exclusion of this information is justified on the basis that the information is not Material and this exclusion does not detract from the understanding of the report, the Competent Person should clearly explain why this is the case.*	
Data aggregation methods	• *In reporting Exploration Results, weighting averaging techniques, maximum and/or minimum grade truncations (e.g. cutting of high grades) and cut-off grades are usually Material and should be stated.* • *Where aggregate intercepts incorporate short lengths of high-grade results and longer lengths of low-grade results, the procedure used for such aggregation should be stated and some typical examples of such aggregations should be shown in detail.* • *The assumptions used for any reporting of metal equivalent values should be clearly stated.*	• Not applicable as exploration results are not reported in this announcement.
Relationship between mineralisation widths and intercept lengths	• *These relationships are particularly important in the reporting of Exploration Results.* • *If the geometry of the mineralisation with respect to the drill hole angle is known, its nature should be reported.* • *If it is not known and only the down hole lengths are reported, there should be a clear statement to this effect (eg 'down hole length, true width not known').*	• Not applicable as exploration results are not reported in this announcement.
Diagrams	• *Appropriate maps and sections (with scales) and tabulations of intercepts should be included for any significant discovery being reported These should include, but not be limited to a plan view of drill hole collar locations and appropriate sectional views.*	• See figures in this ASX release for maps.
Balanced reporting	• *Where comprehensive reporting of all Exploration Results is not practicable, representative reporting of both low and high grades and/or widths should be practiced to avoid misleading reporting of Exploration Results.*	• The results of all metallurgical tests performed have been reported on. No results have been excluded.
Other substantive exploration data	• *Other exploration data, if meaningful and material, should be reported including (but not limited to): geological observations; geophysical survey results; geochemical survey results; bulk*	• All metallurgical test work results are outlined in the text of this report.

	JORC Code explanation	Commentary
	samples – size and method of treatment; metallurgical test results; bulk density, groundwater, geotechnical and rock characteristics; potential deleterious or contaminating substances.	
Further work	• *The nature and scale of planned further work (eg tests for lateral extensions or depth extensions or large-scale step-out drilling).* • *Diagrams clearly highlighting the areas of possible extensions, including the main geological interpretations and future drilling areas, provided this information is not commercially sensitive.*	• A larger more representative sample from the 2021 drilling campaign will go through a more detailed metallurgical program.

APPENDIX 2: List of historic Avalon Drill Holes used in the metallurgical test-work

Hole_ID	Northing	Easting	Elevation	Length (m)	Azimuth	Dip
L07-055	6886414.46	417234.35	241.75	200.4	0	-90
L09-144	6886424.49	417130.92	240.59	200.25	0	-90
L10-212	6886410.8	417234.51	241.56	221	270	-75.2
L10-213	6886407.17	417287.04	241.12	227.4	0	-88.75
L13-520	6886413.81	417210.87	241.5	52.3	0	-89.48
L13-521	6886427.87	417218.35	241.46	50	315	-72