

11th February 2020

Positive Initial Metallurgical Testwork - Laramie Rare Earths (REE) Project, Wyoming USA

- ◆ Positive first pass initial tests show that both of the simple mineral separation techniques assessed will allow upgrading through concentration of the REE minerals from the Company's 100% owned Laramie REE project located in Wyoming, USA;
- ◆ Mineral separation by magnetic methods recovered 87% of the REE minerals into 27% of the mass whilst rejecting 73% of the waste material at a crush size of -0.5mm;
- ◆ Mineral separation using gravity methods recovered 76% of the REE minerals into 22% of the mass whilst rejecting 78% of the waste material at a crush size of -2mm;
- ◆ Samples the subject of testing were coarse low grade (0.27% TREE) residues left over from the recent systematic chip sample traverses that returned results: 80m @ 0.40% TREO and 137m @ 0.37% TREO, indicating potential for large tonnages (ZNC ASX Release 6th Nov 2019);
- ◆ Results are deemed encouraging, supporting immediate follow-up test work.

Zenith Minerals Limited ("Zenith" or "the Company") is pleased to announce that it has now received results from a program of initial metallurgical tests on REE samples from the Company's 100% owned Laramie REE project in Wyoming USA.

A 100kg bulk composite surface rock sample was subject to a series of tests to determine if simple magnetic and/or gravity beneficiation techniques at coarse grainsizes can easily upgrade the concentration of REE minerals and reject gangue minerals. The work being completed by Nagrom at its Western Australian metallurgical test work facility has shown early encouraging results.

Mineral separation by magnetic methods recovered 87% of the REE minerals into 27% of the mass at a crush size of -0.5mm, whilst mineral separation using gravity methods recovered 76% of the REE minerals into 22.2% of the mass at a crush size of -2mm.



Magnetic Concentrate
(high REE content) –
27% of mass



Non-magnetic Concentrate
(very low REE content) – 73% of mass

Corporate Details

ASX: ZNC

Issued Shares (ZNC)	243.4M
Unlisted options	5.6M
Mkt. Cap. (\$0.05)	A\$13M
Cash (31 st Dec 19)	A\$1.6M
Debt	Nil

Directors

Michael Clifford:
Managing Director

Mike Joyce:
Non-Exec Chairman

Stan Macdonald:
Non-Exec Director

Julian Goldsworthy:
Non-Exec Director

Graham Riley:
Non-Exec Director

Major Shareholders

HSBC Custody. Nom.	12%
J P Morgan	6.1%
Nada Granich	5.5%
Miquilini	4.4%
Abingdon	4.2%

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The magnetic metallurgical tests completed to date were completed on laboratory/pilot scale testing equipment that has “off-the-shelf” industry standard commercial processing equivalents, hence the focus of follow-up work will be using the magnetic separation method.

Stage 2 test work will now assess how easy it is to liberate the REE minerals from the REE concentrate generated by the Phase 1 magnetic separation. The follow-up test will involve finer grinding and subjecting the concentrate to both magnetic and flotation separation methods. This work is planned to recommence shortly.



Coarse crushed Laramie REE samples at Nagrom's Facility in Western Australia



Project Background

Zenith recently secured federal lode claims and state lease applications over the Laramie REE Project located in central Wyoming USA, as announced to the ASX 17th Oct 2019. Wyoming is home to multiple existing major mining operations (coal and uranium) and has local engineering and construction companies capable of supporting mine project development.

The project area has excellent existing infrastructure being located 3km from the national road network, 30km to interstate and 35km to rail, in addition Wyoming has abundant low-cost commercial electricity. Rare Element Resources (OTCQB: REEMF) are currently assessing the advanced Bear Lodge REE project in north east Wyoming.

The Laramie REE Project occurs within the Laramie Anorthosite Complex a Proterozoic massif consisting of three anorthositic intrusions, three syenitic to monzonitic intrusions and several smaller intrusions of leucogabbro and ferrodiorite.

REE's are reported to occur at the Laramie REE project predominantly as the mineral allanite hosted by clinopyroxene and hornblende syenites that are part of a very large differentiated Laramie anorthosite complex, providing Zenith with the opportunity to define a very large-scale exploration target once initial follow-up work is completed.

Background on Rare Earth's (REE)

A renewed interest in REE projects has come about as a result of the recent US – China trade dispute. The USA has listed REE's as critical minerals in the federal report "A Federal Strategy to Ensure Secure and Reliable Supplies of Critical Minerals 1". There is strong Federal US Government support to secure a stable domestic REE supply.

REE projects in production, development and exploration stages span a wide range of size and grade (Figure 1). Deposit size, grade, mineability and metallurgical performance are key factors in the economic viability of all mining projects but in the case of REE projects the type of REE minerals present are critically important.

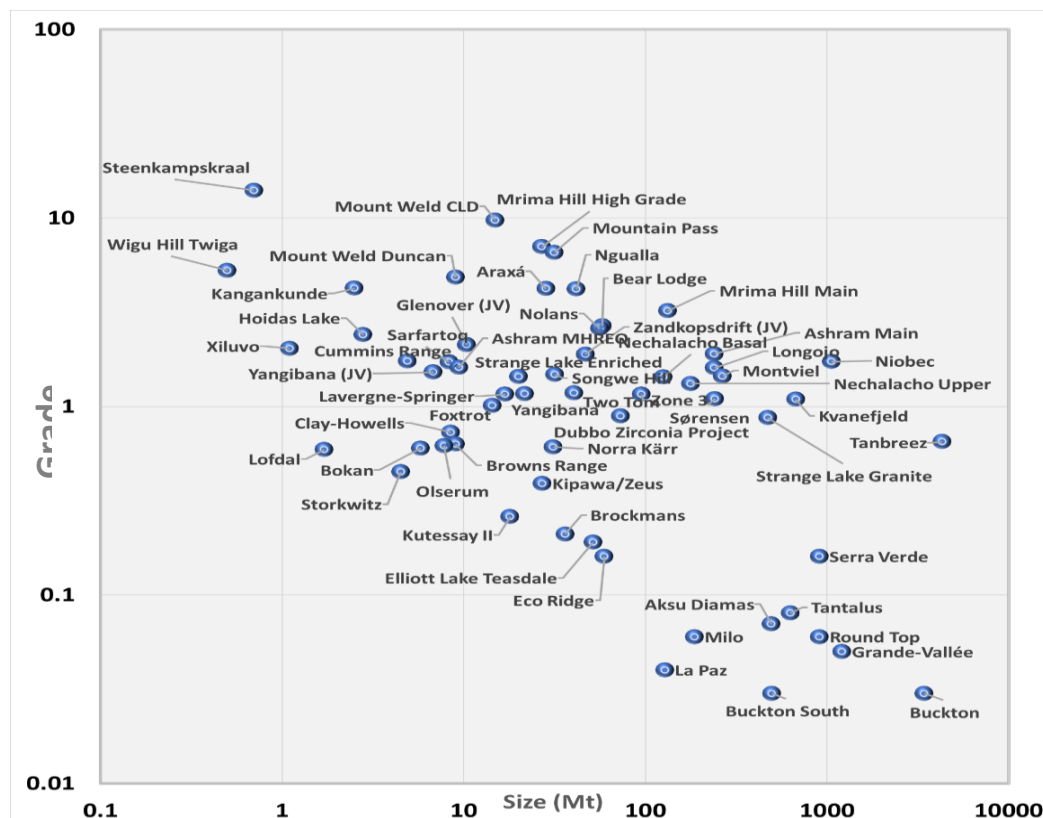


Figure 1: World REE Projects Size and Grade³



The 17 chemical elements that occur together in the periodic table are referred to as rare earth elements (REE's). The group consists of yttrium and the 15 lanthanide elements (lanthanum, cerium, praseodymium, neodymium, promethium, samarium, europium, gadolinium, terbium, dysprosium, holmium, erbium, thulium, ytterbium, and lutetium)². A project may have a very high content of total rare earth oxides (TREO) but what is more important is the proportion of highly valuable REE's such as neodymium, praseodymium and dysprosium. Notably it is those elements that are strongly anomalous in the regional reconnaissance sampling results from the Laramie REE project area.

References:

- ¹ As defined in Executive Order 13817, a critical mineral is "a mineral identified by the Secretary of the Interior [pursuant to the Executive Order] to be (i) a non-fuel mineral or mineral material essential to the economic and national security of the United States, (ii) the supply chain of which is vulnerable to disruption, and (iii) that serves an essential function in the manufacturing of a product, the absence of which would have significant consequences for our economy or our national security." 82 Fed. Reg. 60835; 2017; <https://www.federalregister.gov/documents/2017/12/26/2017-27899/a-federal-strategy-to-ensure-secure-and-reliable-supplies-of-critical-minerals>
- ¹ Department of the Interior, "Final List of Critical Minerals 2018," 83 Fed. Reg. 23295; 2018, <https://www.federalregister.gov/documents/2018/05/18/2018-10667/final-list-of-critical-minerals-2018>
- ¹ U.S. Geological Survey, "Mineral Commodity Summaries 2018," 2018, <https://doi.org/10.3133/70194932>
- ² <https://geology.com/articles/rare-earth-elements/>
- ³ Source: <http://www.techmetalsresearch.com/metrics-indices/tmr-advanced-rare-earth-projects-index/> updated where new information available by Zenith 29-05-2019 from Company ASX reports and from SEDAR for TSX listed entities .

Competent Persons Statement

The information in this report that relates to Exploration Results is based on information compiled by Mr Michael Clifford, who is a Member of the Australian Institute of Geoscientists and an employee of Zenith Minerals Limited. Mr Clifford has sufficient experience which is relevant to the style of mineralisation and type of deposit under consideration and to the activity which he is undertaking to qualify as a Competent Person as defined in the 2012 Edition of the 'Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves'. Mr Clifford consents to the inclusion in the report of the matters based on his information in the form and context in which it appears.

11th February 2020

Authorised for release by the Zenith Minerals Limited Board of Directors

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Section 1 Sampling Techniques and Data

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

Criteria	JORC Code explanation	Commentary
Sampling techniques	<i>Nature and quality of sampling (e.g. 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.</i>	<p>Individual grab rock samples and systematic traverse chip samples along measured lines with samples taken every 1m and composited up to 20m in length, were collected by hand, at the surface, from in-situ outcrops.</p> <p>Mineralogical samples were taken from four (4) separate grab samples that were considered representative of the syenite host rock sequence from sampling areas shown on Figure 2.</p> <p>From 90 x1kg of -2mm crushed rock composite samples a subsample of 4.2kg was subject to magnetic and gravity beneficiation test work at Nagrom in Kelmscott Western Australia.</p>
	<i>Include reference to measures taken to ensure sample representivity and the appropriate calibration of any measurement tools or systems used.</i>	<p>Grab samples are believed to be representative of the outcrops they come from based on visual inspection by a geologist using a hand lens.</p> <p>Samples were subject to blending and split to produce a ¼ composite, the remainder reserved for future use.</p>
	<i>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 (e.g. '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 (e.g. submarine nodules) may warrant disclosure of detailed information.</i>	<p>1-2kg rock samples were collected by a geologist, samples were broken using a hammer from outcrop. Rock samples were crushed in the laboratory and then pulverised before analysis.</p> <p>Metallurgical studies included:</p> <ul style="list-style-type: none"> o 1x 0.1kg Analysis/Moisture Determination/Semi-Quantitative XRD o 1x 0.1kg INCA/Petrographic Mineralogy o 1x 1kg Size by Assay o 1x 1kg Heavy Liquid Separation (HLS) o 3x 1kg Grind Establishment o 1x 1kg WHGMS145 (wet high gauss magnetic separation)
Drilling techniques	<i>Drill type (e.g. core, reverse circulation, open-hole hammer, rotary air blast, auger, Bangka, sonic, etc.) and details (e.g. 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.).</i>	No Drilling
Drill sample recovery	<i>Method of recording and assessing core and chip sample recoveries and results assessed.</i>	No Drilling



	<i>Measures taken to maximise sample recovery and ensure representative nature of the samples.</i>	No Drilling
	<i>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.</i>	No Drilling
Logging	<i>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.</i>	Rock samples were subject to petrographic study and photographed and 1x 0.1kg Analysis/Moisture Determination/Semi-Quantitative XRD and 1x 0.1kg INCA/Petrographic Mineralogy
	<i>Whether logging is qualitative or quantitative in nature. Core (or costean, channel, etc.) photography.</i>	Qualitative logging with quantitative mineral size measurements under a microscope, 1x 0.1kg Analysis/Moisture Determination/Semi-Quantitative XRD but Microanalysis of P100 -2mm sample by INCA Mineral Liberation Analysis. The technique uses automated particle analysis combined with a scanning electron microscope (SEM) with energy dispersive X-ray spectroscopy (EDS), which is called SEM-EDS automated particle analysis.
	<i>The total length and percentage of the relevant intersections logged.</i>	No Drilling
Sub-sampling techniques and sample preparation	<i>If core, whether cut or sawn and whether quarter, half or all core taken.</i>	No Drilling
	<i>If non-core, whether riffled, tube sampled, rotary split, etc. and whether sampled wet or dry.</i>	No Drilling
	<i>For all sample types, the nature, quality and appropriateness of the sample preparation technique.</i>	Laboratory composite prepared by Nagrom by riffle splitting.
	<i>Quality control procedures adopted for all sub-sampling stages to maximise representivity of samples.</i>	Industry standard sub-sampling using riffle splitting in a clean laboratory environment was used.
Sub-sampling techniques and sample preparation - continued	<i>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.</i>	Grab sampling was selective based on geological observations.
	<i>Whether sample sizes are appropriate to the grain size of the material being sampled.</i>	Each sample was 1kg to 2kg in weight which is appropriate to test for the grain size of material. These initial tests were conducted on 90% passing -2mm for HLS test work and 90% passing -0.5mm for WHGMS145.
Quality of assay data and laboratory tests	<i>The nature, quality and appropriateness of the assaying and laboratory procedures used and whether the technique is considered partial or total.</i>	Analysis by ICP and XRF analysis, as well as moisture determination and size analysis of head sample and concentrates produced using HLS & magnetic separation.



	<i>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.</i>	No geophysical tools used this sampling program
	<i>Nature of quality control procedures adopted (e.g. standards, blanks, duplicates, external laboratory checks) and whether acceptable levels of accuracy (i.e. lack of bias) and precision have been established.</i>	Repeat sample analysis of composites against initial laboratory analysis as well as head grade versus back calculated grade from composites produced all indicate acceptable levels of precision and accuracy.
Verification of sampling and assaying	<i>The verification of significant intersections by either independent or alternative company personnel.</i>	Two consulting company personnel have observed the assayed samples, whilst company personnel have observed the concentrate material.
	<i>The use of twinned holes.</i>	No drilling
	<i>Documentation of primary data, data entry procedures, data verification, data storage (physical and electronic) protocols.</i>	Field data were all recorded in field note books and sample record books and then entered into a digital database
	<i>Discuss any adjustment to assay data.</i>	No adjustments were made.
Location of data points	<i>Accuracy and quality of surveys used to locate drill holes (collar and down-hole surveys), trenches, mine workings and other locations used in Mineral Resource estimation.</i>	Sample location is based on GPS coordinates +/- 5m accuracy
	<i>Specification of the grid system used.</i>	The grid system used to compile data was NAD27 Zone 13 N.
Location of data points - continued	<i>Quality and adequacy of topographic control.</i>	Topography control is +/- 10m.
Data spacing and distribution	<i>Data spacing for reporting of Exploration Results.</i>	All samples are from areas shown on Figure 2 and Table 1 of ASX Release 17 th Oct 2019.
	<i>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.</i>	The data alone will not be used to estimate mineral resource or ore reserve
	<i>Whether sample compositing has been applied.</i>	Yes sample compositing has been applied to head sample subject to metallurgical test work.
Orientation of data in relation to geological structure	<i>Whether the orientation of sampling achieves unbiased sampling of possible structures and the extent to which this is known, considering the deposit type.</i>	Rock samples were taken of selected outcrops that were considered representative of varying rock types.
	<i>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.</i>	No drilling



Sample security	<i>The measures taken to ensure sample security.</i>	Samples were kept in numbered bags until delivered to the laboratory
Audits or reviews	<i>The results of any audits or reviews of sampling techniques and data.</i>	Sampling techniques are consistent with industry standards

Section 2 Reporting of Exploration

Results

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

Criteria	JORC Code explanation	Commentary
Mineral tenement and land tenure status	<i>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.</i>	The Laramie REE Project is located within applications for State of Wyoming Mineral Leases. The leases will either be held via Zenith's consultant on bare trust for Zenith or via Zenith's wholly owned USA subsidiary. Federal lode mining claims have been claim staked. Sampling has been carried out under an exploration permit issued by the State of Wyoming.
	<i>The security of the tenure held at the time of reporting along with any known impediments to obtaining a licence to operate in the area.</i>	As above. The leases are applications with no known impediment to future granting of exploitation rights. Federal claims are current and considered validly staked.
Exploration done by other parties	<i>Acknowledgment and appraisal of exploration by other parties.</i>	Zenith's consultant undertook rock sampling within the region as part of a uranium exploration program to follow-up on information provided by a retired geologist.
Geology	<i>Deposit type, geological setting and style of mineralisation.</i>	Based on the initial site visit and academic papers referenced in this ASX release the geological setting and geochemical association at the Laramie REE project is that of a large scale anorthosite complex. REE elements are hosted within syenite that is part of that complex.
Drill hole Information	<i>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:</i>	No drilling
	<i>o easting and northing of the drill hole collar</i>	
	<i>o elevation or RL (Reduced Level – elevation above sea level in metres) of the drill hole collar</i>	
	<i>o dip and azimuth of the hole</i>	
	<i>o down hole length and interception depth</i>	
	<i>o hole length.</i>	
	<i>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.</i>	
Data aggregation methods	<i>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.</i>	No high-grade cutting



	<i>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.</i>	No aggregation used
<i>Data aggregation methods - continued</i>	<i>The assumptions used for any reporting of metal equivalent values should be clearly stated.</i>	No metal equivalents used.
<i>Relationship between mineralisation widths and intercept lengths</i>	<i>These relationships are particularly important in the reporting of Exploration Results.</i>	No drilling
	<i>If the geometry of the mineralisation with respect to the drill hole angle is known, its nature should be reported.</i>	No drilling
	<i>If it is not known and only the down hole lengths are reported, there should be a clear statement to this effect (e.g. 'down hole length, true width not known').</i>	No drilling
<i>Diagrams</i>	<i>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.</i>	Refer to descriptions and diagrams in body of text and in previous ZNC ASX release dated 31 Jan 2020.
<i>Balanced reporting</i>	<i>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.</i>	All results reported on Figure 2 and Table 1 of ASX Release dated 17 th October 2019.
<i>Other substantive exploration data</i>	<i>Other exploration data, if meaningful and material, should be reported including (but not limited to): geological observations; geophysical survey results; geochemical survey results; bulk samples – size and method of treatment; metallurgical test results; bulk density, groundwater, geotechnical and rock characteristics; potential deleterious or contaminating substances.</i>	Initial metallurgical testwork reported in this ASX release includes: o 1x 0.1kg INCA/Petrographic Mineralogy o 1x 1kg Size by Assay o 1x 1kg Heavy Liquid Separation (HLS) of (wet high gauss magnetic separation) of p80 -2mm feed composite sample followed by microscopy and analysis by XRF & ICP o 3x 1kg Grind Establishment o 1x 1kg WHGMS145 (wet high gauss magnetic separation) of p80 -0.5mm feed composite sample followed by microscopy and analysis by XRF & ICP
<i>Further work</i>	<i>The nature and scale of planned further work (e.g. tests for lateral extensions or depth extensions or large-scale step-out drilling).</i>	Further mapping and sampling along with more detailed and metallurgical test work is planned leading to drill targets.
	<i>Diagrams clearly highlighting the areas of possible extensions, including the main geological interpretations and future drilling areas, provided this information is not commercially sensitive.</i>	Refer to figures in body of report dated 31 Jan 2020.