

### **Australian Securities Exchange Announcement**

21 January 2020

# Highlights

- Sulphuric acid leach testwork on magnetite concentrate, non-magnetic concentrate fractions and run of mine rock now supports the potential of a smaller scale project development design where Alumina is primarily targeted and extracted by leaching rock that has only been mined, crushed and ground to 0.15mm without further beneficiation.
- These changes in the PFS process design to focus on HPA, with V, Ti and Fe co-products, may deliver positive economic impacts on the Speewah project.

King River Resources Limited (ASX: KRR) is pleased to provide this Prefeasibility Study ("PFS") update on the company's 100% owned Speewah Specialty Metals ("SSM") Project in the East Kimberley of Western Australia. KRR has been examining a new process route to produce high purity alumina ("HPA"), vanadium pentoxide ( $V_2O_5$ ), titanium dioxide pigment (TiO<sub>2</sub>) and iron oxide (Fe<sub>2</sub>O<sub>3</sub>) products in a smaller scaled operation for the Prefeasibility Study ("PFS") (refer KRR ASX release 26 November 2019).

### Study developments

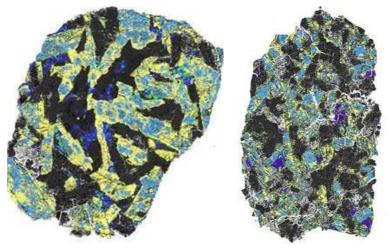
- KRR made a breakthrough in extracting aluminium (AI) directly from the V, Ti, Fe, AI and Mg rich sulphuric acid leach solution as the first precipitation product (KRR ASX release 26 November 2019) from which 99.98% Al<sub>2</sub>O<sub>3</sub> HPA was produced by a new process (KRR ASX release 6 December 2019).
- KRR is progressing flowsheet development of its new process to make HPA, and also the extraction of V<sub>2</sub>O<sub>5</sub>, TiO<sub>2</sub> and Fe<sub>2</sub>O<sub>3</sub> by conventional solvent extraction methods.
- HPA testwork has focussed on simplifying the process steps to improve AI recovery and ensure the lowest level of contaminants for the production of 4N (99.99% AI<sub>2</sub>O<sub>3</sub>) HPA.
- Sulphuric (H<sub>2</sub>SO<sub>4</sub>) acid leach testwork has compared the merits of leaching concentrates, non-magnetic fractions and whole rock samples. This has enabled KRR to select leaching of whole rock magnetite gabbro as the preferred initial design for a small scale operation that delivers the optimal amount of HPA. The grade of Al in the whole rock material is typically 12.7% Al<sub>2</sub>O<sub>3</sub>, with 0.36-0.38% V<sub>2</sub>O<sub>5</sub>, 3.6% TiO<sub>2</sub> and 21.3% Fe<sub>2</sub>O<sub>3</sub>. This smaller scale start-up SMM project development plan may provide a basis for its future scale-up to produce more V, Ti and Fe products in proportion to prices and demand.
- The latest whole rock leach results are summarised below. The drill core samples tested are from the high grade zone of SDH11-09 (see Figure 1), ground to P<sub>80</sub> 0.15mm, leached in 20% H<sub>2</sub>SO<sub>4</sub> at 70°C and 20, 30% and 35% pulp densities, for 96 hours.

Agitated	Pulp Density		Leach Extractions (%)				Mass Loss	Acid Consumption	
Leach Test	(%)	V	Fe	Ti	Mg	AI	Ca	%	kg/t
AVL#39	20	90	75	58	55	42	3.52	26	622.9
AVL#40	30	87	71	54	50	37	2.70	25	586.6
AVL#41	35	89	75	59	55	39	2.53	29	586.7



Further leach testwork is planned to try to increase the AI extraction to >50% by reducing the grind size and extending the leach time. Previous agitated vat tests on lump material had achieved >50% AI extraction over 10 days under similar leach conditions (KRR ASX announcement 18 January 2019).

 Mineral characterisation studies on the magnetite gabbro have shown zonation of the alumina-rich plagioclase feldspar (see bright colours in left SEM map image, unleached) with the outer rim of the mineral more soluble in dilute acid (right SEM map image, leached). This may explain the high AI and low Na and K extractions in all leach testwork, and also the acid penetration of the rock mass in column leach testwork (KRR ASX release 1 March 2019).



• The Junction vanadium deposit drill results (KRR ASX announcement 27 September 2019), located on the granted Mining Lease M80/267 (Figure 1), provide further optionality for the development and timing of the SSM project.

### **Directors Comments**

KRR continues to make very positive steps forward towards identifying the most prudent process route and scale for the Speewah Specialty Metals (SSM) Project.

The incorporation of HPA product to our process flowsheet may deliver a valuable improvement to project economics.

Simple run of mine (ROM) rock that has been crushed to 150 micron (0.15mm) and used as the feedstock into the acid leaching process may also reduce operating and capital costs.

Our new HPA process is also expected to simplify the solvent extraction of V, Ti and Fe.

The current focus of studies is aiming to reduce initial start-up scale, thus reducing capex and risk whilst retaining strong margins.

The Board has also identified that the cost of sulphuric acid and the electricity in the volume required for the type of mineral processing envisaged in the SSM may be materially cheaper in some overseas locations.

Studies to consider the economic benefits of offshore processing will be addressed at the Bankable Feasibility Study stage.



#### **Statement by Competent Person**

The information in this report that relates to Exploration Results, Mineral Resources, Metallurgy and Previous Studies is based on information compiled by Ken Rogers (BSc Hons) and fairly represents this information. Mr. Rogers is the Chief Geologist and an employee of King River Resources Ltd, and a Member of both the Australian Institute of Geoscientists (AIG) and The Institute of Materials Minerals and Mining (IMMM), and a Chartered Engineer of the IMMM. Mr. Rogers has sufficient experience of relevance to the styles of mineralisation and the types of deposits under consideration, and to the activities undertaken, to qualify as a Competent Person as defined in the 2012 Edition of the Joint Ore Reserves Committee (JORC) Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves. Mr. Rogers consents to the inclusion in this report of the matters based on information in the form and context in which it appears.

This announcement was authorised by the Chairman of the Company.

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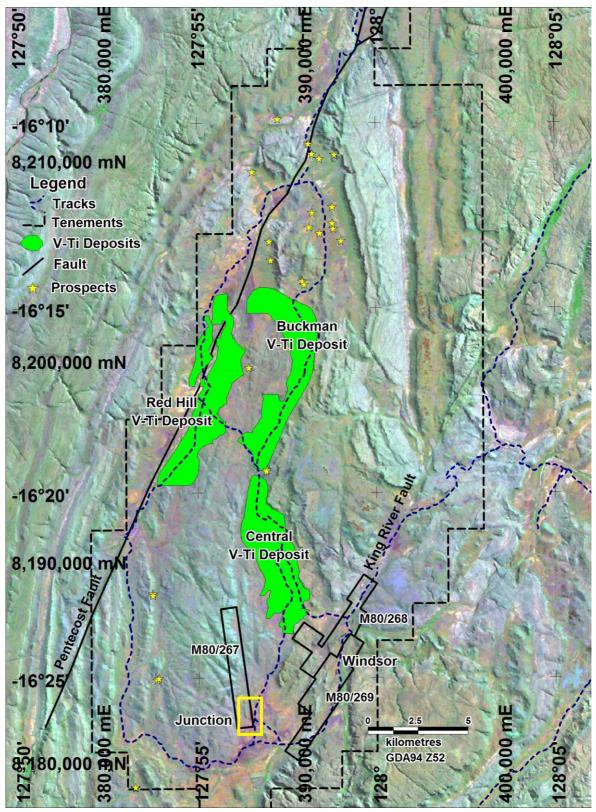


Figure 1: Location of the Junction Prospect (yellow box) and Mining Leases at Speewah.



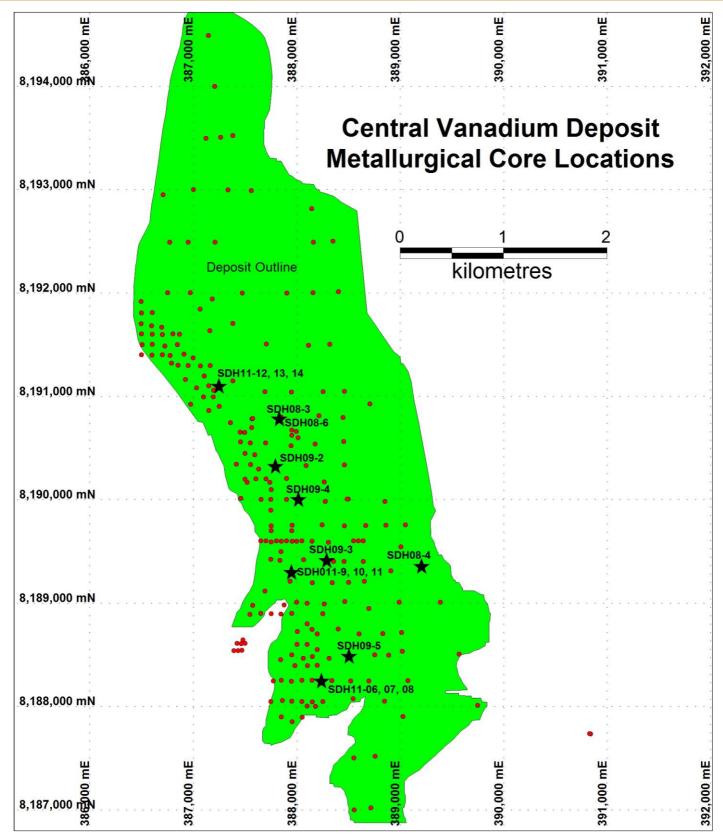


Figure 2: Diamond core hole locations (black stars) and Reverse Circulation drill holes (red dots) within the Central Vanadium Deposit, including metallurgical core hole SDH11-09 referred to in this announcement. Diamond core hole collar data is given in Table 1.



Hole_id	Deposit	East GDA	North_GDA	RL	Depth	Dip	Azimuth	Tenement
		m	m	m	m	degrees	degrees	
SDH08-3	Central	387830.42	8190778.6	197.037	80	-90	0	E80/2863
SDH08-4	Central	389203.71	8189358.8	190.014	75	-90	0	E80/2863
SDH08-6	Central	387831.84	8190783.9	197.187	450.5	-90	0	E80/2863
SDH09-2	Central	387793.53	8190327.7	196.267	50	-90	0	E80/2863
SDH09-3	Central	388287.08	8189417.5	189.987	70.5	-90	0	E80/2863
SDH09-4	Central	388016.74	8190007.5	194.698	42.1	-90	0	E80/2863
SDH09-5	Central	388502.3	8188487.8	186.4	57.1	-90	0	E80/2863
SDH11-06	Central	388234.08	8188240.6	188.018	39.4	-90	0	E80/2863
SDH11-07	Central	388234.04	8188243.7	187.999	41.6	-90	0	E80/2863
SDH11-08	Central	388234.08	8188246.9	187.941	40.9	-90	0	E80/2863
SDH11-09	Central	387946.28	8189294	191.676	40.9	-90	0	E80/2863
SDH11-10	Central	387945.75	8189295.9	191.643	39.4	-90	0	E80/2863
SDH11-11	Central	387945.33	8189297.8	191.706	40.9	-90	0	E80/2863
SDH11-12	Central	387243.47	8191101.7	212.529	41	-90	0	E80/2863
SDH11-13	Central	387242.63	8191101.2	212.467	41	-90	0	E80/2863
SDH11-14	Central	387241.65	8191100.6	212.457	40.1	-90	0	E80/2863

# Table 1: Diamond core holes drilled in the Central deposit



## Appendix 1: King River Resources Limited Speewah Project JORC 2012 Table 1

# SECTION 1 : SAMPLING TECHNIQUES AND DATA

Criteria	JORC Code explanation	Commentary
Sampling Techniques	<ul> <li>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.</li> <li>Include reference to measures taken to ensure sample representivity and the appropriate calibration of any measurement tools or systems used.</li> <li>Aspects of the determination of mineralisation that are Material to the Public Report.</li> <li>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.</li> <li>Unusual commodities or mineralisation types (e.g. submarine nodules) may warrant disclosure of detailed information.</li> </ul>	This ASX Release dated 21 January 2020 provides a PFS Update and reports on sulphuric acid leach testwork on a sample from the high grade zone of the Central Vanadium deposit at KRR's Speewah Project. <i>Diamond Core Sample</i> 16 HQ and PQ diamond drill (DD) core holes were drilled in the Central Vanadium deposit (see Figure 1 and Table 1 for locations). One of the PQ core holes from the high grade zone (SDH11-09 - 21-37.5m) has been used in the hydrometallurgical metallurgical tests reported in this announcement. Nagrom received a 60kg composite magnetite gabbro sample of PQ ¼ core from the high grade zone of drillhole SDH11-09 - 21-37.5m downhole. The head grade of this sample is 0.36% V <sub>2</sub> O <sub>5</sub> , 3.65% TiO <sub>2</sub> , 21.37% Fe <sub>2</sub> O <sub>3</sub> , 12.74% Al <sub>2</sub> O <sub>3</sub> , 8.36% CaO, 4.33% MgO and 44.75% SiO <sub>2</sub> (KRR ASX 1 March 2019). <i>Leach Sample</i> .A subsample of the as received sample was used in the leach testwork reported in this announcement. It assayed: 0.36% V <sub>2</sub> O <sub>5</sub> , 3.64% TiO <sub>2</sub> , 21.37% Fe <sub>2</sub> O <sub>3</sub> , 12.74% Al <sub>2</sub> O <sub>3</sub> , 8.36% CaO, 4.33% MgO, 2.32% Na <sub>2</sub> O, 1.12% K <sub>2</sub> O and 44.75% SiO <sub>2</sub>
Drilling techniques	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.).	<ul> <li>Diamond (NQ and HQ3 size) drilling was completed to support the preparation of the Mineral Resource estimate. Holes drilled vertical.</li> <li>Metallurgical testwork was completed on ¼ PQ core composite sample from one metallurgical diamond drill core hole (Figure 2 and Table 1):</li> <li>SDH11-09 21-37.5m (High Grade Zone).</li> </ul>
Drill sample recovery	Method of recording and assessing core and chip sample recoveries and results assessed.	No qualitative recovery data was recorded. Qualitative examination and photography suggested RC and diamond recoveries are very high. Good ground conditions exist which suggests recovery is likely to be very high.
	Measures taken to maximise sample recovery and ensure representative nature of the samples.	PQ drilling was used to maximise diamond sample recovery.
	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.	No relationship between grade and recovery has been identified.
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.	DD core and RC chips were geologically logged, with descriptions of mineralogy and lithology noted.
	Whether logging is qualitative or quantitative in nature. Core (or costean, channel, etc.) photography.	Logging was generally qualitative in nature. DD core photographed wet.
	The total length and percentage of the relevant intersections logged.	SDH11-09 – 0-40.9m, 100% logged.



Sub-sampling techniques and	If core, whether cut or sawn and whether quarter, half or all core taken.	DD core was cut in half with a core saw. Some half sections sawn in quarters. ¼ core used in testwork.
sample preparation	If non-core, whether riffled, tube sampled, rotary split, etc. and whether sampled wet or dry.	Not applicable as samples used in the reported testwork were DD core.
	For all sample types, the nature, quality and appropriateness of the sample preparation technique.	Whole continuous lengths of DD ¼ core samples collected, composited and used in testwork. These were collected to represent the composite intervals of both the High Grade and Low Grade Zones.
	Quality control procedures adopted for all sub-sampling stages to maximise representivity of samples.	Subsampling is performed during the preparation stage according to the metallurgical laboratories' internal protocol.
	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.	Use of DD core in metallurgical testwork gives a continuous insitu sample. PQ ensures high recovery rates. DD core twinned previous RC drill holes. Whole sample interval used in testwork.
	Whether sample sizes are appropriate to the grain size of the material being sampled.	Sample sizes are considered appropriate to the grain size of the material being sampled.
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.	The acid leach testwork was undertaken by Nagrom Nagrom Testwork All solid samples have been analysed via XRF. The prepared sample is fused in a lithium borate flux with a lithium nitrate additive. The resultant glass bead is analysed by XRF. Loss on Ignition (LOI) is also conducted to allow for the determination of oxide totals. All solution samples are diluted and then analysed by ICP. Dilutions bring the concentration level to within the analytical range of the ICP instruments. Diluents are matched to sample matrix.
	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.	No geophysical data was collected.
	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.	Nagrom is certified to a minimum of ISO 9001:2008.
Verification of sampling and	The verification of significant intersections by either independent or alternative company personnel.	Significant intersections have been verified by alternative company personnel.
assaying _	The use of twinned holes.	All metallurgical DD core holes twinned previous RC holes. SDH11-09 has been twinned by SDH11-10 and SDH11-11 (see Figure 2 and Table 1) which is being used in current metallurgical testwork.
	Documentation of primary data, data entry procedures, data verification, data storage (physical and electronic) protocols.	Templates have been set up to facilitate geological logging. Prior to the import into the central database, logging data is validated for conformity and overall systematic compliance by the geologist. Assay results are received from the laboratory in digital format. Assays, survey data and geological logs incorporated into a database.
	Discuss any adjustment to assay data.	No adjustments or calibrations will be made to any primary assay data collected for the purpose of reporting assay grades and mineralised intervals.



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 Resource estimation. Specification of the grid system used. Quality and adequacy of topographic control.	Almost 90% of the collars used in the resource estimate have been surveyed using a differential global positioning system (DGPS) instrument, with the remaining surveyed using a hand-held GPS. Downhole deviations have been measured by downhole survey instruments on 3 holes only using a Globaltech Pathfinder digital downhole camera. All but four holes are vertical. All metallurgical holes are vertical. The vertical and shallow nature of the drilling means that the absence of downhole surveys is not considered a material risk. The adopted grid system is GDA 94 Zone 52. A topographic file provided by KRR was calibrated for use in the Mineral Resource estimate
Data spacing and distribution	Data spacing for reporting of Exploration Results.	<ul> <li>using DGPS and GPS collar data. The Competent Person considers that the topography file is accurate given the use of DGPS data in the Mineral Resource area.</li> <li>RC drill spacing is mostly 250 m by 250 m at the Central deposit, closing down to 100 m by 100 m in the western area (see Figure 1).</li> <li>Metallurgical DD core holes are spaced about 500 m apart (see Figure 1).</li> </ul>
	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.	The Competent Person believes the mineralised domains have sufficient geological and grade continuity to support the classification applied to the Mineral Resources given the current drill pattern.
	Whether sample compositing has been applied.	Metallurgical samples were composited to represent the High Grade and Low Grade Zones within the magnetite gabbro and within the resource envelope. This was considered appropriate given the metallurgical testwork was designed to test the lower and high grade zones of the mineralisation and it provided for a bulk sample suitable for the testwork.
Orientation of data in relation to geological	Whether the orientation of sampling achieves unbiased sampling of possible structures and the extent to which this is known, considering the deposit type.	All metallurgical DD core holes are vertical. This allows the holes to intersect the mineralisation at a high-angle as the magnetite gabbro has a very shallow dip to the east.
structure	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.	The relationship between the drilling orientation and the orientation of key mineralised structures is not considered to have introduced a sampling bias.
Sample security	The measures taken to ensure sample security.	Chain of Custody is managed by the Company until samples pass to a duly certified metallurgical laboratory for subsampling, assaying, beneficiation and hydrometallurgical test work. The DD core samples are stored on secure sites and delivered to the metallurgical laboratory by the Company or a competent agent. The chain of custody passes upon delivery of the samples to the metallurgical laboratory.
Audits or Reviews	The results of ay audits or reviews of sampling techniques and data.	No external audits have been completed.



## SECTION 2 : REPORTING OF EXPLORATION RESULTS

Criteria	JORC Code explanation	Commentary
Mineral tenement and land tenure status	<ul> <li>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.</li> <li>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.</li> </ul>	The Speewah Project comprises 9 Exploration Licences, three Mining Leases and two Miscellaneous Licences. Details are listed in Table 1 Schedule of Tenements held at 30 September 2019 reported previously in the September 2019 Quarterly Report. The Speewah testwork reported in this announcement are from samples collected entirely within E80/2863. The tenements are 100% owned by Speewah Mining Pty Ltd (a wholly owned subsidiary of King River Resources Limited), located over the Speewah Dome, 100km SW of Kununurra in the East Kimberley. The tenements are in good standing and no known impediments exist. No Native Title Claim covers the areas sampled and drilled. The northern part of the tenements (but not E80/2863) is in the Kimberley Heritage Area.
Exploration done by other parties	Acknowledgment and appraisal of exploration by other parties.	No exploration completed by other parties is relevant for the metallurgical testwork reported herein.
Geology	Deposit type, geological setting and style of mineralisation.	The ferrovanadium titanium (Ti-V-Fe) deposits represent part of a large layered intrusion (the Hart Dolerite), which was intruded c1790 Ma into the Palaeo-Proterozoic sediments and minor volcanics of the 1814 Ma Speewah Group in the East Kimberley Region of Western Australia. The deposits occur within the Speewah Dome, which is an elongated antiform trending N-S. The dome is about 30 km long and attains a maximum width of about 15 km. The Hart Dolerite sill forms the core of the dome. Since the deposit discovery in 2006, at least two distinct types of felsic granophyres and three mafic gabbros have been identified in the Hart Dolerite as follows: • K felsic granophyre (youngest) • Mafic granophyre • Pegmatoidal gabbro • Magnetite gabbro (host unit) • Felsic gabbro (oldest). The vanadium-titanium mineralisation is hosted within a magnetite bearing gabbro unit of the Hart Dolerite, outcropping in places and forming a generally flat dipping body that extends over several kilometres of strike and width. The layered sill is up to 400m thick. Given the mode of formation, mineralisation displays excellent geological and grade continuity which was considered when classifying the Mineral Resource estimate. Exposure is limited and fresh rock either outcrops or is at a shallow depth of a few metres. Ti-V-Fe mineralisation occurs as disseminations of vanadiferous titano-magnetite and ilmenite. Within the tenements the vanadium deposits have been divided into three deposits – Central, Buckman and Red Hill. The test work reported in this announcement was sampled from the Central vanadium deposit (Figure 1).



Drill hole Information	<ul> <li>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: <ul> <li>easting and northing of the drill hole collar</li> <li>elevation or RL (Reduced Level – elevation above sea level in metres) of the drill hole collar</li> <li>dip and azimuth of the hole</li> <li>down hole length and interception depth</li> <li>hole length.</li> </ul> </li> <li>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.</li> </ul>	New exploration results are not being reported. Locations of diamond (DD) core holes, including metallurgical core holes used in this announcement, are shown on Figure 2 and Table 1.
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.	Exploration results are not being reported. Continuous lengths of ¼ core composited for metallurgical samples from the Low Grade and High Grade Zones.
	The assumptions used for any reporting of metal equivalent values should be clearly stated.	No metal equivalent values are used for reporting.
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 (e.g. 'down hole length, true width not known').	Due to the very shallow dip of the mineralisation, the vertical metallurgical DD core holes represent almost the true width of the mineralisation.
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.	Figure 2 shows the location of diamond core holes within the Central Vanadium deposit referred to in this announcement.
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.	Reports on previous metallurgical results can be found in ASX Releases that are available on our website, including announcements 1 April 2010, 15 July 2010, 9 November 2010, 8 February 2012, 21 April 2017, 21 August 2017, 9 October 2017, 4 December 2017, 30 January 2018, 27 February 2018, 21 March 2018, 25 June 2018, 23 July 2018, 15 October 2018,19 November 2018, 18 January 2019, 1 March 2019, 21 March 2019, 22 March 2019, 9 May 2019, 7 June 2019, 27 September 2019, 26 November 2019 and 6 December 2019.



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 samples – size and method of treatment; metallurgical test results; bulk density, groundwater, geotechnical and rock characteristics; potential deleterious or contaminating substances.	Updated vanadium resource estimates in accordance with the JORC 2012 guidelines were reported in KRR ASX announcement 26 May 2017. 1 April 2019 and 6 November 2019.
Further work	The nature and scale of planned further work (e.g. 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.	Further metallurgical tests are planned to increase metal recoveries, shorten leach times and reduce acid consumption, and trialing selective chemical precipitation, thermal hydrolysis, ion exchange and solvent extraction methods to precipitate vanadium pentoxide, titanium dioxide, iron oxide and high purity alumina (HPA).