19 February 2019

Huge upgrade in Mineral Resource estimate sends Longonjo to the top of the world league

Pensana Metals Ltd (ASX: PM8) is pleased to announce a very substantial upgrade to the Mineral Resource estimate for its Longonjo deposit which has transformed it into one of the world's largest and highest grade NdPr deposits at a time when demand for NdPr in EV drivetrains is taking off.

Highly respected international mining industry consultants SRK Consulting has reported an Inferred Mineral Resource estimate of:

240 million tonnes at 1.60% REO including 0.35% NdPr
for 3,850,000 tonnes of REO including 840,000 tonnes of NdPr
*NdPr = neodymium+praseodymium oxide. REO = total rare earth oxides. A 0.1% NdPr cut is applied. Tables 1 to 3 summarise the estimate at a range of cut off grades, material types and total rare earth oxide grades.

This new Mineral Resource estimate represents a more than seven-fold increase in tonnes and contains well over four times the amount of NdPr compared with the maiden Mineral Resource estimate reported to the ASX on 26 September 2017 at equivalent cut-off grades.

The deposit occurs as a blanket of soft weathered material averaging around 30 metres in thickness and up to 75 metres in places. The highest grades occur from surface. The deposit remains open at depth and in a number of directions laterally. Further drilling is expected to increase the Mineral Resource estimate.

The initial focus will be on the resource occurring within a cut off around .65% NdPr which totals 22.9 million tonnes at 4.16% REO and .86% NdPr containing around 953,000 tonnes of REO including 197,000 tonnes of NdPr.

Executive Director Dave Hammond commented:

"Longonjo now ranks amongst the very largest and highest grade NdPr projects worldwide and is expected to get bigger at a time when China controls 96% of rare earth magnet production.

The demand for NdPr is set to take off as EV manufacturers invest over US$300 billion in what has been described as the biggest energy transformation in history. More than 75% of vehicle manufacturers are expected to use only electric powertrains by 2025.

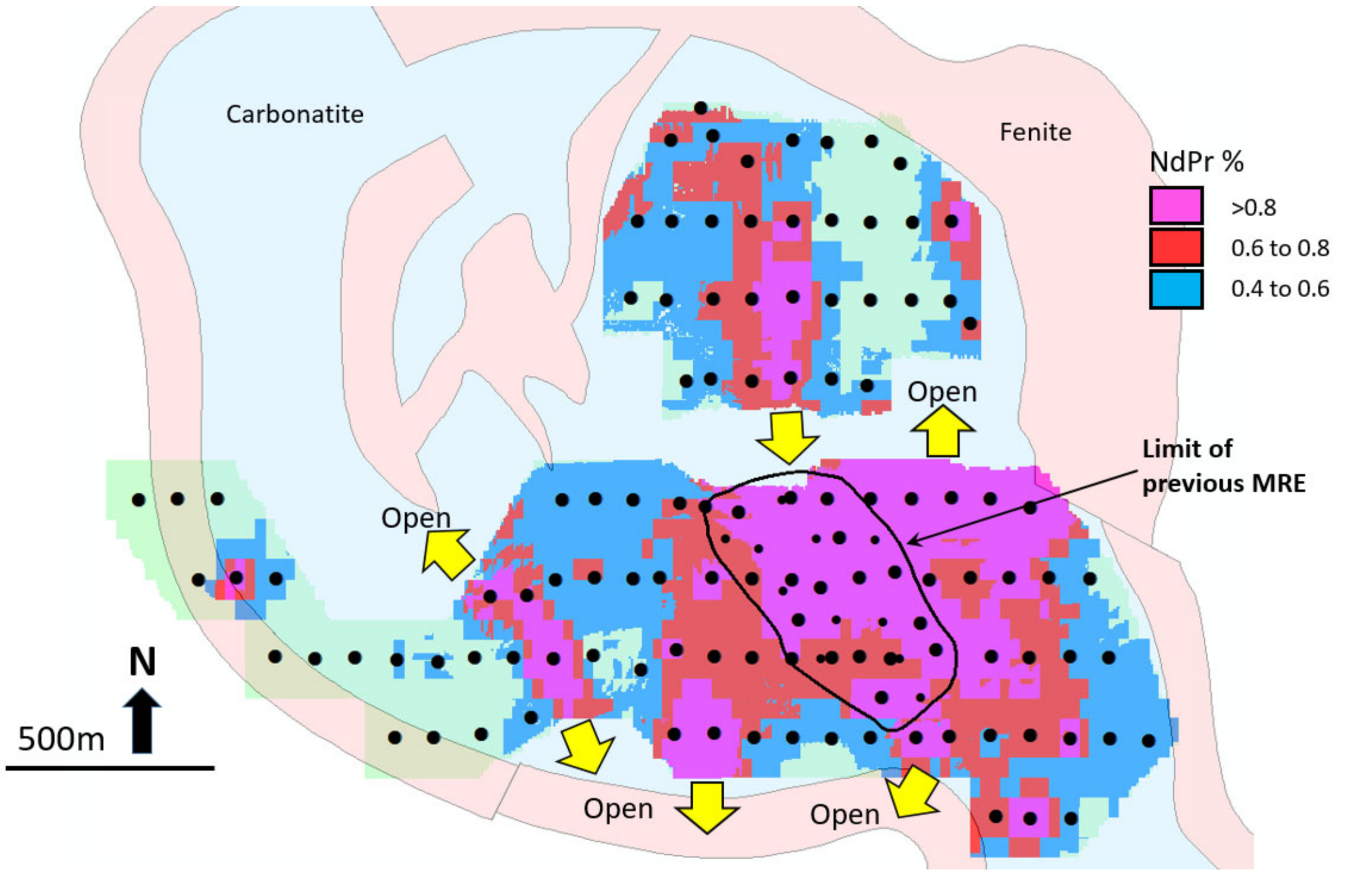
It's not just Longonjo's high grade and sheer scale that gets us excited. It's the fact that it's located right next door to the Chinese-built US$1.8 billion Benguela rail line which links the project with the Atlantic deep-water port of Lobito and directly onto customers in China.

The earlier Scoping study by WOOD highlighted the benefits of the Chinese funded infrastructure, the high NdPr grade, low mining costs, good metallurgy and the available low-cost hydro-electric power.

We are now working with them to engineer and design a low capital cost flotation operation that can establish Pensana as a long-term reliable supplier of high value NdPr concentrates to customers in China."

Technical Report

A new Mineral Resource estimate has been completed for the Longonjo NdPr Project to incorporate data and significant mineralised intersections from the 108 drill holes completed in 2018. The drilling was designed to test the full prospective area of the carbonatite.



Plan view of Mineral Resource block model coloured by maximum NdPr grade over simplified geology of the Longonjo Carbonatite. Drill holes are shown as black dots. The limit of the previous Mineral Resource is shown as the black outline.

As the plan above shows, the high grade, near surface mineralisation remains open in several directions, offering the potential for further extensions to the Mineral Resource estimate with additional drilling.

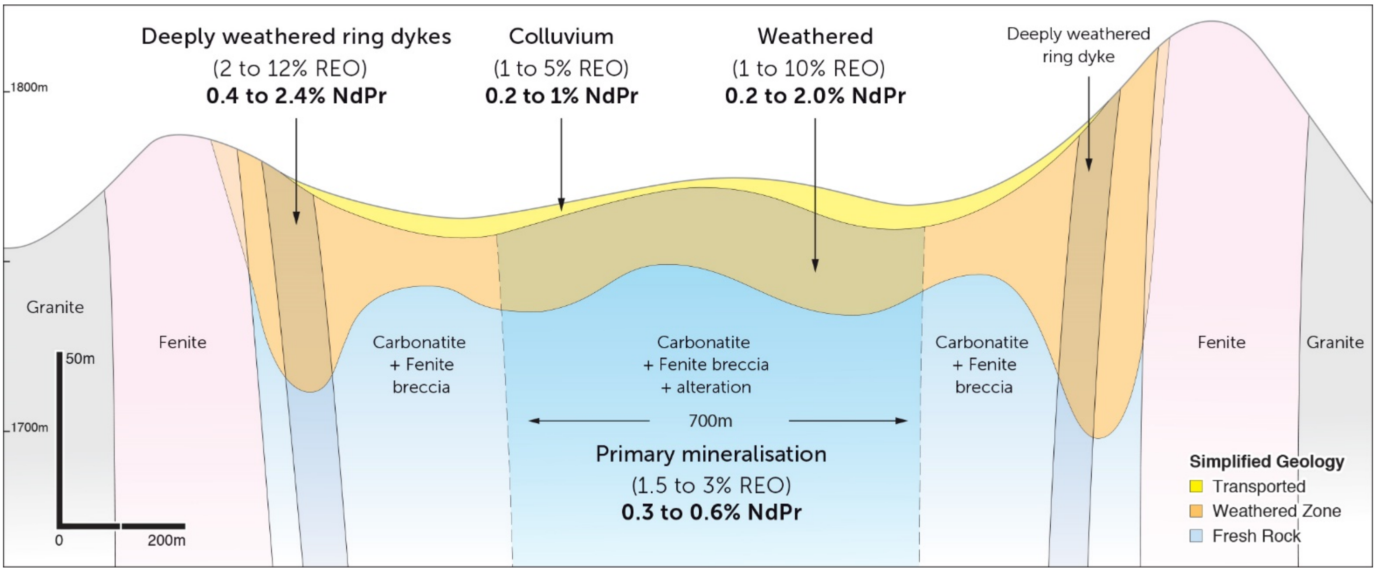
The Mineral Resource estimate was completed by independent mining consultants SRK Consulting (Australasia) Pty Ltd and is reported in accordance with the JORC Code and Guidelines 2012.

The Inferred category Mineral Resource estimate is reported in Tables 1 to 3 following for the Total, Weathered and Unweathered mineralisation at a range of NdPr cut-off grades. Data and estimation criteria used in the estimates are detailed in the Material Information Summary and in JORC Code (2012) Sections 1, 2 and 3 in the Appendix.

Comparison with previous estimate

The new Mineral Resource estimate (MRE) represents a more than seven fold increase in tonnes and contains well over four times the amount of NdPr as the maiden Mineral Resource estimate for the weathered zone at Longonjo (ASX announcement 26 September 2017) at equivalent cut off grades.

The weathered zone contains the most favourable NdPr mineralisation for mining and processing due to its high grades from surface and forms a thick blanket of soft material extending up to 75 metres in depth.



Schematic geological cross section across the Longonjo carbonatite showing styles and typical grades of NdPr mineralisation. Note vertical exaggeration.

The table following compares the new Mineral Resource estimate with the maiden 2017 Mineral Resource estimate (ASX announcement 26 September 2017) for the weathered zone at equivalent cut off grades.

Comparison of Longonjo weathered Mineral Resource estimates

Mineral Resource estimate	Cut off grade*	Million tonnes	Grade		Contained Oxide	
			NdPr %	**REO %**	**NdPr (tonnes)**	**REO (tonnes)**
2017	1% REO	11.6	0.86	4.30	100,000	499,000
2019	0.2% NdPr	85.2	0.52	2.39	443,000	2,030,000

*The 2017 maiden Mineral Resource estimate used a REO cut off, whereas an NdPr grade cut was used in the 2019 as NdPr is the main value driver. 0.2% NdPr is equivalent to 1% REO

Next Steps

Infill drilling has already commenced on site to upgrade the highest-grade portion of the deposit to an Indicated JORC Category for the Preliminary Feasibility Study.

Additional metallurgical testwork is also planned to optimise the flotation flowsheet that has been developed to produce a high grade concentrate from Longonjo's mineralisation.

Material Information Summary

Geology and geological interpretation

The Project area covers a near vertical sub circular carbonatite plug known as the Longonjo Carbonatite that is intruded into older Neoproterozoic granitic rocks. The carbonatite is a diatreme – an explosive volcanic vent - that has been partially eroded to form a ring structure approximately 2.5 kilometres in diameter.

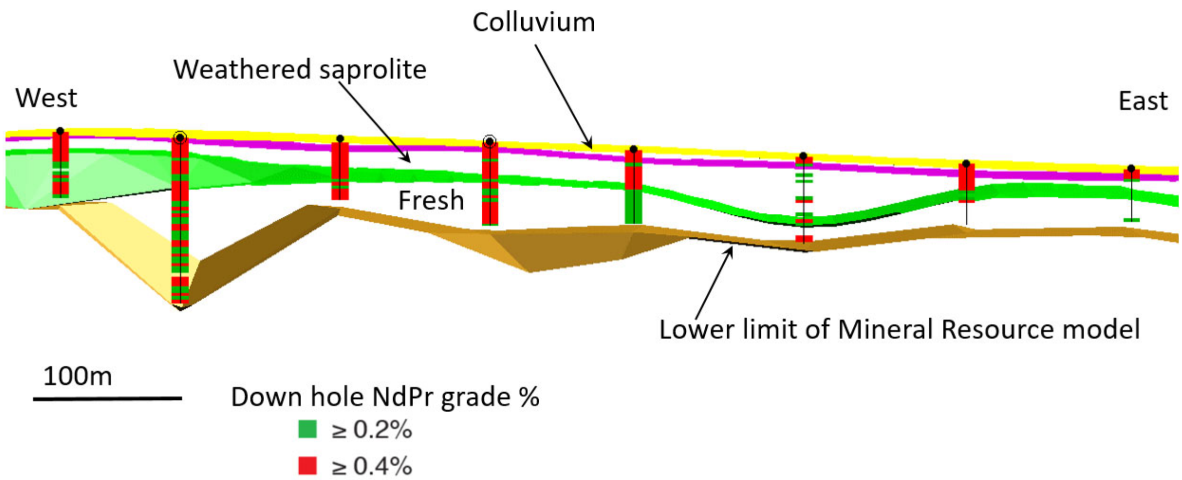
A more resistive fenite ring of altered granitic country rocks forms a horseshoe shaped ring of hills around the carbonatite. High level explosion breccias of mixed carbonatite and fenite form the bulk of the carbonatite body with carbonatite ring dykes and plugs cutting the northern and southern margin of the diatreme.

NdPr rare earth mineralisation is particularly enriched in the weathered zone of the carbonatite and associated colluvium. Weathering processes have removed the original carbonate minerals, leaving behind a residually enriched, ferruginous mineralised zone typically ranging from 10 to 60 metres in thickness. Mineralisation also occurs in fresh rock within a north south orientated central zone and peripheral ring dykes.

Four domains have been defined to constrain grade estimation:

- Colluvium: A brown ferruginous surface layer of soil, iron oxide and locally transported pisolithic gravel typically 2 to 10 metres thick
- Weathered: in-situ highly weathered carbonatite and mixed carbonatite – fenite breccia. Typically 10 to 40 metres in thickness and up to 75 metres
- Fresh: Unweathered pale grey to white carbonatite or carbonatite – fenite breccia beneath the weathered zone
- Fresh Float: Minor large fragments of fresh carbonatite contained within a weathered matrix

The domains are defined by Pensana geologists on the basis of geological logging with geochemistry as a validation. The figure below illustrates the wireframe surfaces that constrain the mineralisation domains and grade interpolation.



Above: a detail from vertical cross section 8,571,000N displaying drilling, NdPr grade and the wireframes used in the Mineral Resource modelling to define the lithological domians: Collivium, Weathered and Fresh (Unweathered).Yellow is surface, red the base of colluvium, green the base of weathering and brown the lower limit extent of the model

Sampling and subsampling techniques

The Longonjo NdPr deposit has been evaluated using RC, diamond core and RAB drilling.

RC: Samples from RC drilling were collected at 1m intervals into woven polypropylene bags. Samples were riffle split using a 3 tier splitter to obtain approximately 4kg of sample from the one metre rig sample for sample preparation and combined to provide 2m composite samples for assay. All samples were riffle split when dry. Wet samples were sun-dried in a protected environment prior to sampling.

Core: Diamond core samples were collected over a nominal length of 2m within lithological units. Quarter core samples were submitted for sample preparation. The diamond core samples were cut on site using a diamond saw by an experience field technician. The less competent material such as colluvium and weathered material was quartered using a knife.

RAB: Assays from the early RAB drilling (four metre composite samples of 1m rig samples) were not used in the Mineral Resource estimate but geological logging of 1m samples collected from the rig was used to help define the geological domains.

Entire down hole lengths were sampled from surface to end of hole and all samples were sent for assay.

Field duplicates, certified reference material and blanks were inserted at random and on average every 27 samples as part of company QAQC protocols to check sample preparation, analytical accuracy and sampling variance. Laboratories also run and report internal QAQC checks including assay and preparation duplicates.

Drilling techniques

Drilling within the Longonjo Carbonatite is vertical to achieve optimum sampling in the horizontal colluvium mineralisation and variable (predominantly horizontal) weathered bedrock mineralisation. Drill hole spacing is 100m x 200m. The type and number of holes drilled are summarised in the Table below:

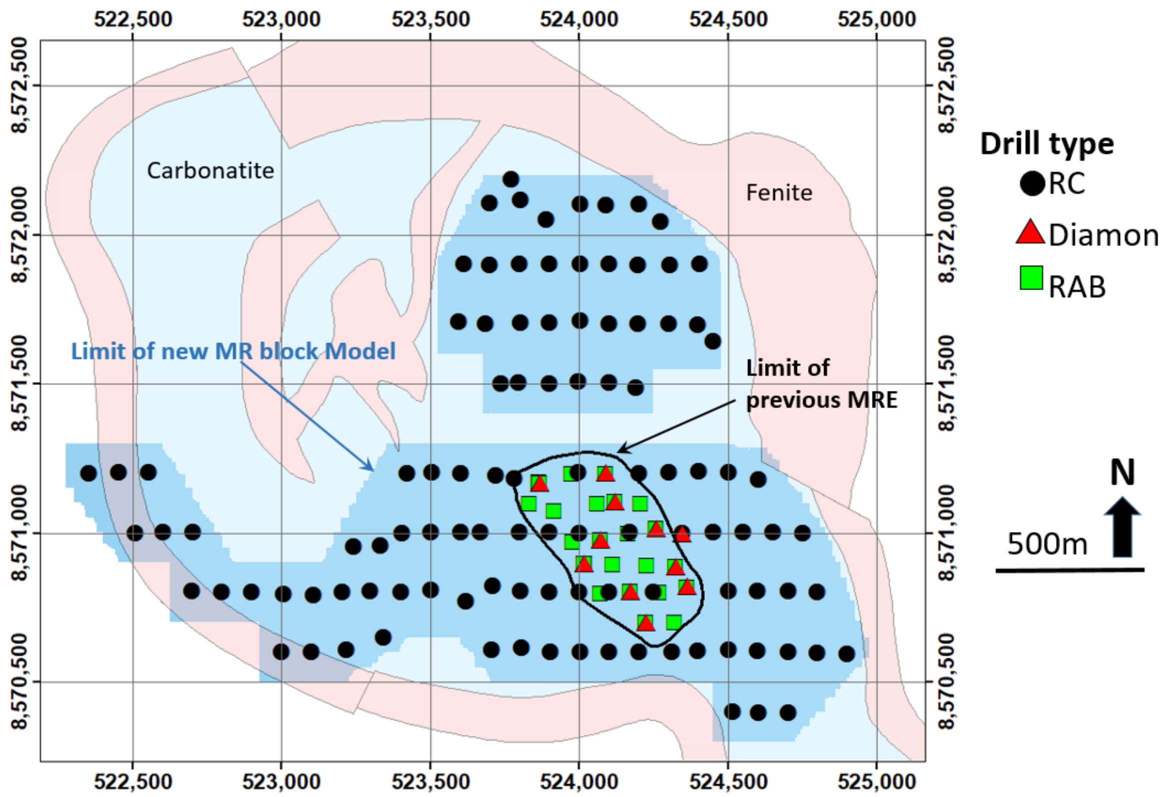
Summary of holes drilled at Longonjo.

Hole Type	Dates Drilled	Total No. Holes	Total Metres	Typical Depth (m)
Diamond	2017	10	655	50
RC	Aug-2018 to Nov-2018	108	4,208	45
RAB	2014	22	657	30

Reverse Circulation (RC) drilling (131mm diameter drill bit) was the primary drilling technique and was chosen to drill the weathered bedrock due to variably hard formations. A combination of blade in the first few metres (0 – 10m on average but up to 15m) with face hammer sampling to end of hole was used to achieve optimum sample recovery and quality.

The diamond drilling was undertaken using a PQ-sized (116mm) bit, except for LJD002 which was collared using PQ to 51.85m below surface and completed with a HQ bit to a depth of 100.4m below surface. Triple tube barrels were employed in the drilling process to ensure maximum core recovery.

Rotary Air Blast (RAB) drilling was carried out to blade refusal, or when samples returned wet. A 4.5" blade drill bit was used together with 3m rods. RAB geological logging was used as a reference to assist in building the geological model but the assays were not used to estimate the Mineral Resource.



Above: New Mineral Resource estimate block model extents (blue) and drilling types on which the model is based. Geological information was used but no assay data from RAB drilling. Plan also shows extent of extrapolation from drill data – a maximum of 100m, or half the maximum drill spacing

Classification criteria

An Inferred Mineral Resource classification has been applied to the estimates based on a consideration of the confidence in the geological interpretation, the quality and quantity of the input data, the confidence in the estimation technique, and the likely economic viability of the material.

Resource tabulations reported at a range of NdPr cut-off grades are presented in Tables 1 through to Table 3.

The largest source of uncertainty is considered to be the reliability of the local estimates and the accuracy of the lithological interpretation, both of which are influenced by drill hole spacing, and the limited amount of density data.

Sampling analysis method

A total of 34 elements were analysed to provide accurate information on rare earth and associated gangue element concentrations.

Samples were prepared by oven drying of the full 3-4kg 2m composite RC sample, splitting to a representative 1kg sample, pulverising to 85% passing 75 micron and splitting to a representative 100g sample pulp.

On average 3kg of diamond core material was pulverised to produce a 30g charge for fusion and ICP-MS analysis, undertaken by Nagrom Laboratories, Perth, Western Australia.

Samples were assayed for Al, Ba, Ca, Ce, Dy, Er, Eu, Fe, Gd, Hf, Ho, K, La, Lu, Mg, Mn, Nb, Nd, P, Pb, Pr, S, Si, Sm, Sr, Ta, Tb, Th, Ti, Tm, U, Y, Yb, Zn, by peroxide fusion followed by ICP analysis (MS or OES as appropriate) at Nagrom Laboratories, Perth, Western Australia.

Estimation methodology

Resource estimates were prepared using conventional block modelling techniques. A single model was prepared to represent the defined extents of the mineralisation and drilling. The resource modelling and estimation study was performed using Datamine Studio RM®, Supervisor®, and X10®. The drill spacing and the domain geometry were used to assist with the selection of a parent cell size of 25m x 50m x 2m, with a subcell size of 5m x 5m x 1m (XYZ). The model cells were flagged using the domain wireframes. A digital elevation model prepared from the topography data was used to remove cells located above the current surface.

Prior to grade estimation, the model cells were transformed relative to local datum planes, such that cells within similar parts of the profile were assigned similar elevations. Identical transforms were applied to the drill hole data to retain the original geometric relationship between the samples and model cells. These transformations were applied to improve estimation control.

Local estimates were prepared for all the analytes contained in the drillhole file. Ordinary Kriging (OK) was used for grade interpolation and all domain contacts were treated as hard boundary constraints. Kriging neighbourhood analysis (KNA) studies were used to assist with parameter selection. Estimates were made into the discretised parent cells.

A three-pass search strategy was implemented using discoid-shaped search ellipsoids. The dimensions were primarily based on the variography studies, and the ellipsoid orientation was adjusted to match the ring structure characteristics of the carbonatite (dynamic anisotropy).

For each lithological domain, a single variogram model defined using the REO dataset was used for all analytes to ensure that any grade relationships in the estimation dataset were reproduced in the model. The REO variograms were very similar to those generated for Nd_2O_3 and Pr_6O_{11} (the other constituents of prime importance).

Octant searching and keyfield (drill hole) restrictions were invoked for additional estimation control. Default grades, which were equivalent to the average grades of estimation datasets for each domain, were assigned to any cells that did not receive estimated grades. Extrapolation was limited to approximately half of the drill spacing and the vertical limit of drilling. After estimation, the model cells were back-transformed to their original locations.

Bulk density tests were performed on a total of 77 core samples, comprising 8 weathered carbonatite samples and 69 fresh carbonatite samples. In recognition of the limited number of tests on weathered mineralisation, and through comparisons with the estimated densities similar carbonatite deposits, the following dry bulk density values for resource tonnage estimation:

- Transported: 2.40 t/m^3
- Oxide: 2.20 t/m^3
- Fresh: 2.98 t/m^3

The limited number of density estimates has been taken into account when assigning classifications to the Mineral Resource estimates.

Cut-off grade

The adopted reported cut-off grade of 0.1% NdPr is selected on the basis of the current and future potential value of an NdPr concentrate, internal estimates of processing costs, the demand for NdPr and for comparison to other projects.

Mining and metallurgical methods and parameters

Open pit mining using selective mining of NdPr mineralisation has been assumed for the entire deposit. The higher grade weathered mineralisation occurs as a thick blanket from surface and is likely to be predominantly free dig material with a very low waste to mineralisation ratio.

Metallurgical testwork on fresh rock and weathered mineralisation has indicated that the weathered zone mineralisation is most amenable to upgrade to a high grade concentrate using a two stage flotation process. Optimisation work on this process is continuing. Fresh rock mineralisation is similar to other known deposits. Preliminary metallurgical testwork including gravity, magnetic separation and processes provided some encouragement in the potential to concentrate these additional styles of mineralisation. The long mine life initially supported by the weathered mineralisation provides the company with the opportunity to optimise these processes, which could be brought in at a later stage of the operation to develop the large tonnages of this style of mineralisation available.

The following tables summarise the Mineral Resource at a range of NdPr cut off grades and mineralisation styles. All are categorised as Inferred according to the JORC (2012) Code and Guidelines.

Table 1: Longonjo NdPr Mineral Resource estimate – Total

		Grade		Contained oxide	
Cut off (% NdPr)	**Million tonnes**	**NdPr %**	**REO %**	**NdPr (tonnes)**	**REO (tonnes)**
0.10	240	0.35	1.60	840,000	3,850,000
0.20	178	0.42	1.94	744,000	3,460,000
0.30	114	0.51	2.43	585,000	2,770,000
0.40	68.4	0.63	2.98	428,000	2,040,000
0.50	44.3	0.72	3.47	321,000	1,540,000
0.60	29.6	0.81	3.93	240,000	1,160,000
0.65	23.9	0.86	4.16	205,000	997,000
0.70	19.3	0.90	4.39	174,000	848,000
0.80	11.7	1.00	4.92	117,000	577,000
0.90	6.87	1.11	5.53	76,200	380,000
1.00	4.05	1.22	6.12	49,600	248,000

NdPr is contained within and is a subset of REO. REO = total rare earth oxides, the sum of La_2O_3, CeO_2, Pr_6O_{11}, Nd_2O_3, Sm_2O_3, Eu_2O_3, Gd_2O_3, Tb_4O_7, Dy_2O_3, Ho_2O_3, Er_2O_3, Tm_2O_3, Yb_2O_3, Lu_2O_3, Y_2O_3. See Table 4 for breakdown of all individual rare earth oxides. Figures may not sum due to rounding

Table 2: Longonjo NdPr Mineral Resource estimate – Weathered* mineralisation

		Grade		Contained oxide	
Cut off (% NdPr)	**Million tonnes**	**NdPr %**	**REO %**	**NdPr (tonnes)**	**REO (tonnes)**
0.10	106	0.45	2.03	474,000	2,130,000
0.20	85.2	0.52	2.38	444,000	2,030,000
0.30	65.6	0.60	2.81	395,000	1,840,000
0.40	51.5	0.67	3.18	346,000	1,640,000
0.50	39.5	0.74	3.53	292,000	1,40,000
0.60	28.1	0.82	3.93	229,000	1,100,000
0.65	22.9	0.86	4.16	197,000	953,000
0.70	18.6	0.90	4.39	168,000	816,000
0.80	11.4	1.00	4.91	114,000	560,000
0.90	6.68	1.11	5.51	74,200	368,000
1.00	3.92	1.23	6.10	48,100	239,000

*The Weathered Mineral Resource is contained within and is a subset of the Total Mineral Resource

Table 3: Longonjo NdPr Mineral Resource estimate – Unweathered* mineralisation

		Grade		Contained oxide	
Cut off (% NdPr)	Million tonnes	NdPr %	REO %	NdPr (tonnes)	REO (tonnes)
0.10	135	0.27	1.27	366,000	1,710,000
0.20	92.7	0.32	1.54	301,000	1,430,000
0.30	48.0	0.40	1.92	190,000	921,000
0.40	17.0	0.49	2.37	82,500	403,000
0.50	4.83	0.60	2.97	29,000	143,000
0.60	1.51	0.74	3.85	11,100	58,000
0.65	1.02	0.79	4.23	8,130	43,300
0.70	0.71	0.85	4.52	6,010	32,100
0.80	0.30	0.99	5.60	2,910	16,600
0.90	0.19	1.07	6.34	1,990	11,800
1.00	0.13	1.13	6.78	1,430	8,530

*The Unweathered Mineral Resource is contained within and is a subset of the Total Mineral Resource

Table 4: Longonjo Mineral Resource estimate: Individual rare earth oxide grades and % of total REO

Rare Earth Oxides		Oxide grade (%)	% of Total REO
Lanthanum	La_2O_3	0.385	24.05
Cerium	CeO_2	0.737	46.09
Praseodymium	**Pr_6O_{11}**	0.079	4.91
Neodymium	**Nd_2O_3**	0.271	16.98
Samarium	Sm_2O_3	0.039	2.45
Europium	Eu_2O_3	0.009	0.57
Gadolinium	Gd_2O_3	0.019	1.22
Terbium	Tb_4O_7	0.002	0.13
Dysprosium	Dy_2O_3	0.009	0.59
Holmium	Ho_2O_3	0.001	0.09
Erbium	Er_2O_3	0.003	0.20
Thulium	Tm_2O_3	0.000	0.02
Ytterbium	Yb_2O_3	0.002	0.11
Lutetium	Lu_2O_3	0.000	0.02
Yttrium	Y_2O_3	0.041	2.57
Total REO*	**REO**	**1.60**	**100.00**

*Above distribution is calculated for all mineralisation at a 0.10% NdPr lower grade cut.

Competent Persons Statement

The information in this report that relates to Geology, Data Quality and Exploration results is based on information compiled and/or reviewed by David Hammond, who is a Member of The Australian Institute of Mining and Metallurgy. David Hammond is the Chief Operating Officer and a Director of the Company. He has sufficient experience which is relevant to the style of mineralisation and type of deposit under consideration and the activity which he is undertaking to qualify as a Competent Person in terms of the 2012 Edition of the Australian Code for the Reporting of Exploration Results, Mineral Resources and Ore Reserves. David Hammond consents to the inclusion in the report of the matters based on his information in the form and contest in which it appears.

The information in this statement that relates to the 2019 Mineral Resource estimates is based on work done by Rodney Brown of SRK Consulting (Australasia) Pty Ltd. Rodney Brown is a member of The Australasian Institute of Mining and Metallurgy and has sufficient experience that is relevant to the style of mineralisation and type of deposit under consideration, and to the activity he is undertaking, to qualify as a Competent Person in terms of The Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves (JORC Code 2012 edition).

Section 1 Sampling Techniques and Data

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

Criteria	JORC Code explanation	Commentary
Sampling techniques	• *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.* • *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 (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.*	The database compiled by Pensana for the Longonjo Project contains 142 drill holes, totalling over 6.3 km of drilling, and comprises diamond coring (DDH), reverse circulation (RC), and rotary air blast (RAB) drilling. The drill hole dataset used directly for Mineral Resource estimation comprised a total of 10 DDH holes (655 m) and 108 RC holes (4,208 m). The RAB data were used to assist with the geological modelling but were not used for resource estimation. Diamond core samples were collected over a nominal length of 2 m within lithological units and core blocks. Quarter-core samples were submitted for sample preparation. Samples from vertical RC drilling were collected on 1 m intervals and field composited to 2 m intervals, with approximately 4 kg splits collected for laboratory submission. RAB samples were collected on 1 m intervals and field composited to 4 m intervals, with approximately 4 kg splits collected for laboratory submission. The full length of each hole was sampled. Sampling was carried out under Pensana QAQC protocols, which Pensana considers follows best practice approaches. Triple-tube drilling was undertaken to assist in maximising core recoveries for the diamond drill campaign. During RC drilling, the drill string was cleaned by flushing with air and the cyclone cleaned regularly. RC sample returns were closely monitored, managed and recorded, with a reference weight used to regularly calibrate the weighing scale. RC and RAB samples were riffle split using a 3-tier splitter, which was cleaned between every sample. During the RAB drilling campaign, regular air and manual cleaning of the cyclone was undertaken to remove clay accumulations. The diamond core sample preparation and testing were performed by Nagrom (Perth). The samples, which typically weighed 3 kg, were pulverised to produce a 30 g charge for laser ablation ICP-MS analysis. The analytical suite included Ag, Al, Ba, Be, Ca, Ce, Cu, Dy, Er, Eu, Fe, Gd, Hf, Ho, K, La, Li, Lu, Mg, Mn, Nb, Nd, P, Pb, Pr, Si, Sm, Sn, Sr, Ta, Tb, Th, Tm, U, W, Y, Yb, Zn, and Zr. The RC 2 m field composites sample preparation was performed by Analabs (Windhoek). The samples, which typically weighed 3–4 kg, were dried, split, and pulverised, with a 100 g pulp sample collected for assaying. Assaying was performed by Nagrom (Perth), with laser ablation used to assay for Al, Ba, Ca, Ce, Dy, Er, Eu, Fe, Gd, Hf, Ho, K, La, Lu, Mg, Mn, Nb, Nd, P, Pb, Pr, S, Si, Sm, Sr, Ta, Tb, Th, Ti, Tm, U, Y, Yb, and Zn. RAB geological logging was used as a reference to assist in building the geological model, but the assays were not used to estimate the Mineral Resource. All commercial laboratories used use industry best practice procedures and QAQC checks. For each hole, the entire hole length was submitted for assay.

Criteria	JORC Code explanation	Commentary
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.).*	The diamond drilling was undertaken using an Atlas Copco Mustang track-mounted drill rig. The diamond drilling was undertaken using a PQ-sized (116 mm) bit, except for LJD002 which was drilled to 51.85 m using PQ3 coring equipment, and then completed to 100.40 m using HQ3 equipment. RC drilling was completed using a Super Rock 100 drill rig with a face sampling hammer button bit of 131 mm diameter and 5 m rods. A 131 mm diameter blade RC bit was used in some holes in the weathered zone (generally in the first 10 m). RAB drilling was carried out to blade refusal, or when samples returned wet. The rig was equipped with a 4.5” blade drill bit and 3 m rods.
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.*	The diamond core runs were marked and checked against the drillers’ core blocks to ensure any core loss was recorded. Recoveries for the diamond drill core varied from 52% to 100%, with the average being 90.8%. The average recovery for fresh carbonatite was 92% with a minimum of 70%. An average recovery of 87% was achieved for the saprolite, and an average recovery of 89.7% was achieved for the transported material. RC recoveries were monitored closely, recorded and assessed regularly over the drilling program. Every 1 m sample from the rig was weighed using a frequently calibrated set of scales. The moisture content for each 1 m interval was estimated and recorded. RAB recovery and meterage were assessed by comparing drill cutting volumes (sample bags) for individual metres. Routine checks for correct sample depths were undertaken for every rod. RAB sample recoveries were visually checked for recovery, moisture and contamination. Triple-tube barrels were used in the diamond drilling process to ensure maximum core recovery. RC sample weights were compared against expected weights for the drill diameter and geology. Drill pipes and cyclone were flushed and cleaned regularly. Some short intervals (typically 1–3 metres) of reduced sample recovery occurred in the soft weathered zone. Data analysis has not identified any significant relationship between recovery and grade.
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.*	The entire length of each hole was geologically logged by trained geologists. All relevant features, such as lithology, mineralogy, weathering, structure, texture, grain size, alteration, veining style and mineralisation, were recorded in the geological log. All logging was qualitative. All diamond core trays and RC chip trays were photographed.

Criteria	JORC Code explanation	Commentary
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.*	Quarter-core was taken for laboratory submission. The diamond core samples were cut on site by an experienced field technician using a diamond saw. The less competent material, such as transported and weathered material, was quartered using a knife. The 1 m RC samples and 2 m field composites were riffle split using a 3-tier splitter. All samples were riffle split when dry. Wet samples were sun-dried in a protected environment prior to sampling. The samples were prepared using conventional industry practices, which involved oven drying the full 3–4 kg sample, splitting to a representative 1 kg sample, pulverising to 85% passing 75 micron and splitting to a representative sample pulp. Field duplicates, certified reference materials (CRMs) and blanks were inserted at random, with a resultant average frequency of 1 in 27 samples. The laboratories also conducted and reported their own internal QAQC checks, including assay and preparation duplicates. The QAQC results do not show evidence of significant sampling issues. The sample sizes are considered suitable for the disseminated mineralisation style and grain size of material sampled. Repeatability of assays was observed to be good.
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 (e.g. standards, blanks, duplicates, external laboratory checks) and whether acceptable levels of accuracy (i.e. lack of bias) and precision have been established.*	The analysis was carried out by an accredited independent assay laboratory: Nagrom Laboratory, in Perth, Western Australia. Diamond core samples were assayed for Ag, Al, Ba, Be, Ca, Ce, Cu, Dy, Er, Eu, Fe, Gd, Hf, Ho, K, La, Li, Lu, Mg, Mn, Nb, Nd, P, Pb, Pr, Si, Sm, Sn, Sr, Ta, Tb, Th, Tm, U, W, Y, Yb, Zn, and Zr by LA ICP-MS (Laser ablation inductively coupled plasma mass spectrometry) analysis. RC samples were assayed for Al, Ba, Ca, Ce, Dy, Er, Eu, Fe, Gd, Hf, Ho, K, La, Lu, Mg, Mn, Nb, Nd, P, Pb, Pr, S, Si, Sm, Sr, Ta, Tb, Th, Ti, Tm, U, Y, Yb, and Zn, LA by ICP-MS. The assay technique is considered to give total analyses. No geophysical or portable analysis tools were used to determine assay values stored in the database. In addition to the laboratory's internal QAQC protocols, CRM, and blanks were included at random with the field samples at an average of 1 of each type for every 27 primary samples. Samples were selected periodically and screen tested to ensure pulps are pulverised to the required specifications. Analysis of QAQC data results indicates acceptable levels of accuracy and precision.

Criteria	JORC Code explanation	Commentary
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.*	Significant intersections were verified by Pensana management staff. No twinned hole drilling has been undertaken during this early stage of the Project. Field data were logged into an OCRIS logging package and uploaded to the main, secure database in Perth. The data collection package has built-in validation settings and look-up codes. All field data and assay data were verified and validated upon receipt. The database is managed offsite by an independent and professional database manager. Data collection and entry procedures were documented and training was given to all staff. Scans of original field data sheets are stored digitally without alteration. Digital data entry is checked and validated against original field sheets if not entered directly. The laboratory reported the assay data in elemental form and were converted into oxide form during data storage and management using the following conversion factors: • La to La_2O_3 – 1.1728 • Ce to CeO_2 – 1.2284 • Pr to Pr_6O_{11} – 1.2082 • Nd to Nd_2O_3 – 1.1664 • Sm to Sm_2O_3 – 1.1596 • Eu to Eu_2O_3 – 1.1579 • Gd to Gd_2O_3 – 1.1526 • Tb to Tb_4O_7 – 1.1762 • Dy to Dy_2O_3 – 1.1477 • Ho to Ho_2O_3 – 1.1455 • Er to Er_2O_3 - 1.1435 • Tm to Tm_2O_3 – 1.1421 • Yb to Yb_2O_3 – 1.1387 • Lu to Lu_2O_3 - 1.1371 • Y to Y_2O_3 – 1.2699. Intersection grades are reported as NdPr (the sum of Nd_2O_3 and Pr_6O_{11}) as well as REO, which includes all of the above oxide (including NdPr).

Criteria	JORC Code explanation	Commentary
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.*	The survey data have been collected and reported using the WGS84 UTM Zone 33S grid system. A digital elevation model (DEM) covering the Project area was prepared by Core GPX using data acquired from *Ortho-Ready Standard Level 2A WorldView-3* stereo imagery captured in September 2018. Ground control points were surveyed by Geosurveys using RTK DGPS equipment. The DEM covers an area of approximately 3.5 × 3.5 km centred over the Project region. For modelling purposes, SRK extracted a sub-area of approximately 335 ha centred over the drilling and extending slightly beyond the planned model limits. On completion of the drilling program, the drill hole collars were surveyed by Geosurveys using RTK DGPS equipment. All holes were planned and assumed to be vertical. A spirit level was used to confirm that the drill rig mast was vertical prior to drilling each hole. Downhole surveying was not conducted. Prior to use for resource modelling, the drill hole collars were registered to the DEM, with the final collar elevations derived from the topographic data.
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.*	The nominal drill hole spacing is 200 × 100 m, with samples collected over 2 m downhole intervals. The drill spacing is considered suitable for the identification of zones of NdPr and REO mineralisation at a confidence level sufficient to allow the assigned classification of the Mineral Resource. The 1 m RC drill samples were combined in the field after riffle splitting to prepare 2 m composite samples for submission to laboratory. The use of 2 m composites is considered adequate for the resource estimation for this style of mineralisation.
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.*	The high grade NdPr mineralisation at Longonjo occurs as a sub-horizontal blanket of disseminated mineralisation averaging 20 m or more in thickness and with good lateral continuity. The vertical drilling and 2 m sampling are considered appropriate for this style of mineralisation. No significant sampling bias is considered to have been introduced by the drilling orientation.
Sample security	• *The measures taken to ensure sample security.*	Sample security is managed by Pensana. After collection from the drill site, the samples are stored at camp in locked sea containers. A customs officer checks and seals the samples into containers on site before transportation by the Company directly to the preparation laboratory. The preparation laboratory submits the samples to the assay laboratory by international air freight, with the samples again being inspected by customs and sealed prior to despatch. The laboratories audit the samples on arrival and report any discrepancies back to the Company. No such discrepancies occurred.

Criteria	JORC Code explanation	Commentary
Audits or reviews	• *The results of any audits or reviews of sampling techniques and data.*	No external review of the sampling program has been carried out. The database is compiled by an independent consultant and is considered by the Company to be of sufficient validity to support the results reported. In addition, from time to time, the Company carries out its own internal data audits.

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	• *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 in the area.*	The Project is located within Prospecting Licence 013/03/09T.P/ANG-M.G.M/2015. Pensana owns an 84% holding in the Project with Ferrangol (10%), an agency of the Angolan government, and other Angolan partners (6%). The concession is in good standing and no known impediments exist.
Exploration done by other parties	• *Acknowledgment and appraisal of exploration by other parties.*	Previous workers in the area include Black Fire Minerals and Cityview Corporation Ltd.
Geology	• *Deposit type, geological setting and style of mineralisation.*	The Longonjo NdPr deposit is a rare earth enriched carbonatite with particularly high grades occurring within the weathered regolith zone from surface as a result of the dissolution of carbonate minerals and residual enrichment. Some mineralisation also occurs within the underlying fresh carbonatite. Mineralisation is disseminated in style. The Longonjo Carbonatite is a subcircular and subvertical explosive volcanic vent (diatreme) approximately 2.6 × 2.4 km in diameter. Primary rock types include carbonatite lava and magma, extensive mixed carbonatite - fenite breccia, and tuffaceous deposits. The iron-rich weathered zone that is host to the higher-grade mineralisation discovered to date extends over much of the carbonatite.
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* – *down hole length and interception depth* – *hole length.*	No new exploration results are included in this Mineral Resources report. All exploration results have been fully reported previously in ASX announcements: • 24/08/2017: Positive diamond drilling results at Longonjo • 10/09/2018: First results confirm new areas for further high grade NdPr • 31/10/201: First drill results extend NdPr mineralisation at Longonjo • 29/11/2018: Second drill results at Longonjo extend mineralisation • 27/12/2018: New drill results extend NdPr Mineralisation at Longonjo • 17/01/2019: Wide high-grade intersections from surface.

Criteria	JORC Code explanation	Commentary
	• *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.*	A cut-off grade of 0.20% NdPr oxide was used for the reporting of intersections and 0.40% NdPr oxide for high grade 'Highlights' in the reports listed above. No upper grade cuts have been applied for the reporting of intersection grades. Intersections are reported as length-weighted averages above the specified cut-off grade. Length-weighted grade averages for REO and NdPr are presented. Intercepts may include a maximum of 2 m internal dilution. No metal equivalent values have been used for the reporting of these Exploration Results.
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').*	The mineralisation occurs in sub-horizontal layers and the drill holes are all vertical. As such, the mineralised zones are approximately orthogonal to the drill holes, and the reported drill hole intercepts can be considered true thicknesses
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.*	Appropriate plans and sections are included in the accompanying documentation and the exploration reports listed above.
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.*	No new Exploration Results are included in this Mineral Resource report.

Criteria	JORC Code explanation	Commentary
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.*	Previously reported evaluations of the NdPr mineralisation at Longonjo, including the September 2017 Maiden Mineral Resource estimate and drilling program results are contained within previous ASX releases.
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.*	Infill RC drilling is planned in key areas with the aim of acquiring information to support an Indicated Mineral Resource estimate. Diamond drilling is planned to provide samples for metallurgical testwork, dry bulk density measurements and to supplement geotechnical information. Mineralisation remains open in several directions and further drilling will be planned to test these extensions and the potential to expand the current Mineral Resource. Appropriate diagrams are provided in the accompanying documentation.

Section 3 Estimation and Reporting of Mineral Resources

(Criteria listed in Section 1 and where relevant in Section 2, also apply to this section.)

Criteria	JORC Code explanation	Commentary
Database integrity	• *Measures taken to ensure that data has not been corrupted by, for example, transcription or keying errors, between its initial collection and its use for Mineral Resource estimation purposes.* • *Data validation procedures used.*	The drill hole data for the Longonjo Project are stored in a secure central OCRIS database managed by Expedio. All assay and survey data loading was done by electronic transfer from checked primary data sources. Most geological logging data were entered onto templates for direct import via the OCRIS interface. Any manually entered data was cross-checked. The Longonjo data were provided to SRK as database extracts in MS Excel tables. The datasets were checked by SRK for internal consistency and logical data ranges prior to using the data for Mineral Resource estimation.
Site visits	• *Comment on any site visits undertaken by the Competent Person and the outcome of those visits.* • *If no site visits have been undertaken indicate why this is the case.*	Competent Person (CP) sign-off for the Mineral Resource estimates has been jointly shared by Dave Hammond, who is a full-time employee of Pensana, and Rodney Brown, who is a full-time employee of SRK. Dave Hammond has assumed CP responsibility for the interpreted geology and data quality, and Rodney Brown has assumed responsibility for resource modelling. Dave Hammond has been to site on numerous occasions and has had direct involvement in all aspects of the exploration programs. Rodney Brown has not visited the site.
Geological interpretation	• *Confidence in (or conversely, the uncertainty of) the geological interpretation of the mineral deposit.* • *Nature of the data used and of any assumptions made.* • *The effect, if any, of alternative interpretations on Mineral Resource estimation.* • *The use of geology in guiding and controlling Mineral Resource estimation.* • *The factors affecting continuity both of grade and geology.*	The main controls on mineralisation were interpreted by Pensana in section and linked to form a 3D geological model. The geological interpretation is considered consistent with drilling and mapping data, and with site observations. The interpreted setting is also consistent with the generally accepted understanding within the mining community for this style of mineralisation. Lithology definition was primarily based on a combination of geological logging and geochemical data, with boundaries typically corresponding to distinct changes in physical and geochemical characteristics. Because the main mineralisation is hosted within carbonate, the domain geometry is complex in places, and the irregular weathering profile has a significant impact on grade and lithological continuity.
Dimensions	• *The extent and variability of the Mineral Resource expressed as length (along strike or otherwise), plan width, and depth below surface to the upper and lower limits of the Mineral Resource.*	As described in Section 1, the mineralisation is hosted within and upon a carbonatite pipe, with elevated REO concentrations occurring both within the weathered and fresh carbonatite, and in the colluvial cover material. Mineralisation has been modelled over an irregular area that has lateral extents of approximately 2.6 km in the east–west direction and 1.9 km in the north–south direction. The defined resources have an areal extent of approximately 200 ha. For resource modelling, a total of four separate estimation domains were defined: • Colluvium covers approximately 80% of the resource area, and has an average thickness of approximately 4 m, with a maximum thickness of approximately 12 m.

Criteria	JORC Code explanation	Commentary
		• Weathered carbonatite covers essentially all of the resource area, and has an average interpreted thickness of approximately 20 m, and a maximum thickness of 70 m. • Fresh carbonatite was intercepted in approximately 90% of the holes and has been interpreted over the full resource extents. None of the drilling intersected the base of the fresh carbonatite and, for estimation purposes, the modelling base was set to immediately below the base of drilling. This resulted in an average interpreted thickness of 20 m. • Fresh float. Four drillholes encountered a very small number of fresh carbonatite boulders within the oxide zone. These were modelled separately.
Estimation and modelling techniques	• *The nature and appropriateness of the estimation technique(s) applied and key assumptions, including treatment of extreme grade values, domaining, interpolation parameters and maximum distance of extrapolation from data points. If a computer assisted estimation method was chosen include a description of computer software and parameters used.* • *The availability of check estimates, previous estimates and/or mine production records and whether the Mineral Resource estimate takes appropriate account of such data.* • *The assumptions made regarding recovery of by-products.* • *Estimation of deleterious elements or other non-grade variables of economic significance (e.g. sulphur for acid mine drainage characterisation).* • *In the case of block model interpolation, the block size in relation to the average sample spacing and the search employed.* • *Any assumptions behind modelling of selective mining units.* • *Any assumptions about correlation between variables.* • *Description of how the geological interpretation was used to control the resource estimates.* *Discussion of basis for using or not using grade cutting or capping.*	The Mineral Resource estimates were prepared using conventional block modelling and geostatistical estimation techniques. A single model was prepared to represent the defined extents of the mineralisation. The resource modelling and estimation study was performed using Datamine Studio RM®, Supervisor®, and X10®. Kriging neighbourhood analyses (KNA) studies were used to assess a range of parent cell dimensions, and a size of 25 × 50 × 2 m (XYZ) was considered appropriate given the drill spacing, and grade continuity characteristics. Sub-celling down to 5 × 5 × 1 m was applied to enable the wireframe volumes to be accurately modelled. The lithology wireframes were used as hard boundary estimation constraints Probability plots were used to assess for outlier values, and grade cutting was applied to a small number of samples. The parent cell grades were estimated using ordinary block kriging. Search orientations and weighting factors were derived from variographic studies. Unfolding and dilation were used to more accurately reproduce some of the grade trends in the profile. Dynamic anisotropic searching was used to adjust the local lateral search orientations to more closely match the ring structure of the carbonatite pipe. A multiple-pass estimation strategy was invoked, with KNA used to assist with the selection of search distances and sample number constraints. Extrapolation was limited to approximately half the nominal drill spacing. Local estimates were generated for a total of 33 elements expressed in oxide form. These included the rare earth elements, the major gangue elements, and a suite of minor elements that could potentially have processing or marketing implications. Estimates were also prepared for several derived constituents, including TREO, HREO, LREO, and NdPr A complete list of constituents is included in the accompanying resource estimation summary. Model validation included: • Visual comparisons between the input sample and estimated model grades • Global and local statistical comparisons between the sample and model data

Criteria	JORC Code explanation	Commentary
	The process of validation, the checking process used, the comparison of model data to drill hole data, and use of reconciliation data if available.	• An assessment of estimation performance measures including kriging efficiency, slope of regression, and percentage of cells estimated in each search pass • A check estimate using nearest neighbour and inverse distance cubed interpolation.
Moisture	• *Whether the tonnages are estimated on a dry basis or with natural moisture, and the method of determination of the moisture content.*	The resource estimates are expressed on a dry tonnage basis, and in situ moisture content has not been estimated. A description of density data is presented below.
Cut-off parameters	• *The basis of the adopted cut-off grade(s) or quality parameters applied.*	A total NdPr Oxide cut-off grade of 0.1% has been used for resource reporting. The range of mineral resource cut-off grades has been selected for transparency and to facilitate a comparison with the 2017 estimates (NdPr represents approximately one fifth of total REO, and therefore a cut-off grade of 0.2% NdPr = 1% REO). Cut-off grades are based on assumptions made by Pensana that are considered realistic in terms of considerations of long-term historical and predicted NdPr prices, processing and mining costs and the demand for the NdPr products. Higher cut-off grades of 0.6%–0.8% NdPr have been included for the weathered material mineralisation to reflect the typical geological grade distribution of this material type, which is expected to form the early years' feed in the Preliminary Feasibility Study currently in progress.
Mining factors or assumptions	• *Assumptions made regarding possible mining methods, minimum mining dimensions and internal (or, if applicable, external) mining dilution. It is always necessary as part of the process of determining reasonable prospects for eventual economic extraction to consider potential mining methods, but the assumptions made regarding mining methods and parameters when estimating Mineral Resources may not always be rigorous. Where this is the case, this should be reported with an explanation of the basis of the mining assumptions made.*	Mine planning studies conducted as part of a December 2017 Scoping Study indicate the mineralisation will likely be exploited using conventional selective open pit mining methods, utilising small-scale hydraulic excavator mining and dump truck haulage. No blasting is expected to be needed as the weathered zone is soft material, and the blanket-style morphology of the main mineralised zones indicates that stripping ratios, ore loss and dilution are expected to be low. It is anticipated that both ore and waste will be excavated on 2.5 m flitches (5 m benches) Mining dilution assumptions have not been factored into the resource estimates.
Metallurgical factors or assumptions	• *The basis for assumptions or predictions regarding metallurgical amenability. It is always necessary as part of the process of determining reasonable prospects for eventual economic extraction to consider potential metallurgical methods, but the assumptions regarding metallurgical treatment processes and parameters made when reporting Mineral Resources may not always be rigorous. Where this is the case, this should be reported with an explanation of the basis of the metallurgical assumptions made.*	A metallurgical process to produce a high-grade concentrate has been developed and demonstrated at bench scale by Pensana for the weathered zone mineralisation and is currently being further developed and optimised. The process uses a 2-stage flotation approach. Fresh rock mineralisation is similar to other known deposits for which effective metallurgical treatment processes have been developed. Less rigorous metallurgical testwork has been completed to date on the fresh material by Pensana but preliminary metallurgical testwork, including gravity, magnetic separation and flotation techniques, support the potential for their effective treatment. The long mine life initially supported by the weathered mineralisation provides the Company with the opportunity to optimise these processes, which could be brought in at a later stage of the operation to develop the large available tonnages of this style of mineralisation.

Criteria	JORC Code explanation	Commentary
Environmental factors or assumptions	• *Assumptions made regarding possible waste and process residue disposal options. It is always necessary as part of the process of determining reasonable prospects for eventual economic extraction to consider the potential environmental impacts of the mining and processing operation. While at this stage the determination of potential environmental impacts, particularly for a greenfields project, may not always be well advanced, the status of early consideration of these potential environmental impacts should be reported. Where these aspects have not been considered this should be reported with an explanation of the environmental assumptions made.*	The deposit is contained within the approved lease boundary. Waste landforms are to be developed adjacent to existing landform features to minimise the environmental impact. An in-waste tailings landform is being designed for process residues to be stored within mine waste material in order to limit the footprint of the overall waste landform and reduce the requirement for additional mining. There is no evidence of acid rock drainage due to the oxidised nature of the mineralisation, the carbonate rock host, and the absence of sulphide minerals. Approvals for process residue storage and waste dumps have not yet been sought. An Environmental Impact Assessment (EIA) is planned and will be completed prior to the commencement of mining.
Bulk density	• *Whether assumed or determined. If assumed, the basis for the assumptions. If determined, the method used, whether wet or dry, the frequency of the measurements, the nature, size and representativeness of the samples.* • *The bulk density for bulk material must have been measured by methods that adequately account for void spaces (vugs, porosity, etc.), moisture and differences between rock and alteration zones within the deposit.* • *Discuss assumptions for bulk density estimates used in the evaluation process of the different materials.*	Bulk density tests were performed on a total of 77 core samples, comprising 8 weathered carbonatite samples and 69 fresh carbonatite samples. The tests were performed by recording the weight of each sample and estimating the volume from measurements of the core length and diameter. The core samples were sun-dried prior to weighing. The fresh sample density results show a relatively well-defined pseudo-normal distribution with an average value of 2.98 t/m^3. The weathered sample density dataset average is 2.43 t/m^3 but there are insufficient results to comment on the reliability of this number. No test results are available for the transported material. In recognition of the limitations with the density dataset, Pensana has used the test results in combination with the estimated densities for other carbonatite deposits with which it is familiar, and has chosen the following dry bulk density values for resource tonnage estimation: • Transported: 2.40 t/m^3 • Oxide: 2.20 t/m^3 • Fresh: 2.98 t/m^3. The drilling did not encounter any large voids, and the tonnage estimates have not been factored to account for any potential void occurrences.
Classification	• *The basis for the classification of the Mineral Resources into varying confidence categories.* • *Whether appropriate account has been taken of all relevant factors (i.e. relative confidence in tonnage/grade estimations, reliability of input data, confidence in continuity of geology and metal values, quality, quantity and distribution of the data).* • *Whether the result appropriately reflects the Competent Person's view of the deposit.*	The classifications have been applied to the resource estimates based on a consideration of the confidence in the geological interpretation, the quality and quantity of the input data, the confidence in the estimation technique, and the likely economic viability of the material. Based on these considerations, the largest source of uncertainty is in the reliability of the local estimates and the accuracy of the lithological interpretation (both of which are influenced by drill hole spacing), and the limited amount of density data. A boundary was interpreted approximately half the drill spacing beyond the extents of relatively uniform drill coverage and used to define the lateral extents of the resource. A model base was interpreted immediately below the base of drilling. A classification of Inferred Mineral Resource

Criteria	JORC Code explanation	Commentary
		was assigned to all estimates that were located within the lateral extents and above the model base.
Audits or reviews	• *The results of any audits or reviews of Mineral Resource estimates.*	An independent review of the Mineral Resource estimates has not been completed.
Discussion of relative accuracy/ confidence	• *Where appropriate a statement of the relative accuracy and confidence level in the Mineral Resource estimate using an approach or procedure deemed appropriate by the Competent Person. For example, the application of statistical or geostatistical procedures to quantify the relative accuracy of the resource within stated confidence limits, or, if such an approach is not deemed appropriate, a qualitative discussion of the factors that could affect the relative accuracy and confidence of the estimate.* • *The statement should specify whether it relates to global or local estimates, and, if local, state the relevant tonnages, which should be relevant to technical and economic evaluation. Documentation should include assumptions made and the procedures used.* • *These statements of relative accuracy and confidence of the estimate should be compared with production data, where available.*	The Mineral Resource estimates have been prepared and classified in accordance with the guidelines that accompany the JORC Code, and no attempts have been made to further quantify the uncertainty in the estimates. The validation checks indicate good consistency between the model grades and the input datasets. The largest sources of uncertainty are considered to be related to the local accuracy of the geological interpretation and grade estimates, which is primarily due to the relatively wide drill spacing, and the tonnage estimates because of the limited amount of density data. The Mineral Resource quantities should be considered as global and regional estimates only. The accompanying model is considered suitable to support concept studies and subsequent exploration programs but is not considered suitable for detailed design studies.