13 June 2016

ASX Release **ASX Code: CXX**

ORE RESERVES FOR PANDA HILL DECLARED

Highlights

- **Panda Hill Ore Reserves - 20.6 million tonnes at average grade 0.68% Nb_2O_5**
- **All mill feed within first 10 years of the planned production schedule are now classified as Ore Reserves**

Cradle Resources Limited ("Cradle") is pleased to announce the maiden Ore Reserve Estimate for the Panda Hill Niobium Project ("Project") in Tanzania. The Ore Reserves are reported in accordance with JORC Code (2012) and incorporate the results of the recently completed Cradle Definitive Feasibility Study ("DFS") inclusive of the extensive investigations and work carried out since 2012 by Cradle and more recently by Panda Hill Tanzania Limited ("PHT"). Cradle owns 50% of PHT which in turn owns 100% of the Project.

The Ore Reserves assumes that the Project commences at a throughput of 1.3 million tonnes per annum and is ramped up to 2.6 million tonnes per annum after four years of production and are based on the mine designs generated from the first 3 pushbacks defined in the DFS. These mine designs were based on extensive pit optimisation and included geotechnical inputs, ground and surface water recommendations, metallurgical testwork, environmental studies and detailed mine scheduling. Mining costs were based on a Schedule of Rates received from selected international and local mining contractors that are currently working, or have worked, in Tanzania. Plant and General and Administration costs were based on tenders received from multiple suppliers as part of the DFS enquiry process. Ore Reserves only utilise Measured and Indicated Mineral Resources and are reported above an average cut-off grade of 0.46% Nb_2O_5 (the actual cut-off grade varies by year for the first 10 years).

Panda Hill Ore Reserve Estimate - May 2016

Ore Reserve	Mineralisation Type	Tonnage (Mt)	Nb_2O_5 (%)	Contained Nb_2O_5 (t)
Proved Ore Reserve	Oxide	0.84	0.77	6,424
	Transition	3.46	0.77	26,814
	Fresh	3.02	0.66	20,087
	Subtotal	**7.32**	**0.73**	**53,325**
Probable Ore Reserve	Oxide	0.83	0.68	5,668
	Transition	3.84	0.68	26,294
	Fresh	8.57	0.63	54,353
	Subtotal	**13.25**	**0.65**	**86,315**
Combined Ore	**All Mineralisation Types**	**20.6**	**0.68**	**139,640**

Note: Figures have been rounded. The Ore Reserves exclude a mining loss of 5% of the block tonnage material, above cut-off grade, for each of the Measured and Indicated Mineral Resource categories.

The Mineral Resources underpinning the Ore Reserves have been prepared in accordance with the JORC Code (2012) by Mr Ingvar Kirchner of Coffey Mining (Perth).

The Ore Reserves have been prepared and reported in accordance with the JORC Code (2012) by the DFS consultants. Specific mine planning aspects, relating to the application of the modifying factors, taking into account guidance from other DFS consultants were provided by Mr Sjoerd Duim and Mr Jemini Bhargava of SRK Consulting (Perth). Competent Person statements and the relevant responsible persons, for the group Ore Reserve sign-off, are compiled below.

SUMMARY OF ORE RESERVE ESTIMATE AND REPORTING CRITERIA

The following is a summary of the relevant information used in the estimation of the Ore Reserves with full details provided in Table 1, Checklist of Assessment and Reporting Criteria for Panda Hill, included as Appendix 1. This announcement has been prepared in compliance with the JORC Code (2012) and the ASX Listing Rules.

Material Assumptions

The material assumptions which support the Ore Reserve Estimate are based on the DFS results which are presented in the announcement entitled 'Definitive Feasibility Study on Panda Hill' dated 20 April 2016 and available to view on www.cradleresources.com.au. The assumptions specific to the Ore Reserve estimation are summarised below and are further disclosed within Table 1 included as Appendix 1 to this announcement.

Ore Reserves Summary Data	
Ore Reserves LOM	10 years
Plant throughput (Years 1-4)	1.3Mtpa
Plant throughput (Years 5-10)	2.6Mtpa
Mill Feed Grade (Years 1-4)	0.72%Nb_2O_5
Mill Feed Grade (Years 5-10)	0.67%Nb_2O_5
Metallurgical Recovery (average)*	61%
Upfront Capital Cost	US$196M
Expansion Capital Cost (Year 4)	US$93M
Sustaining Capital	US$3.3M/annum
Operating Cost (average)	US$20.61/kg Nb
Niobium Price (average)	US$40.14/kg Nb
Production (average)	5,700tpa Nb (8,700tpa FeNb)
EBITDA/annum (average)	US$113M
Tax rate	30%
Discount rate	10%
Royalties	3.3%

*Note: excludes 3% loss in FeNb Converter

Criteria Used for the Classification of Ore Reserve

Ore Reserves were estimated only on the Measured and Indicated portion of the Mineral Resource Estimate. The average cut-off grade applied was 0.46% Nb_2O_5, with the actual cut-off grade varying year to year. The Ore Reserve was achieved by creating a Minesight (MSSO) model from the Multiple Indicator Kriging ("MIK") resource model and was driven by the Whittle Optimisation work and the detailed mine design and mine scheduling. The mining schedule includes a 5% mining loss, with the mine dilution incorporated through the MIK model. The Ore Reserves have been classified as Proved and Probable based on guidelines specified in JORC Code (2012).

Mining Method and Assumptions

The mine will consist of an open pit operation using conventional back-hoe type excavators loading both ore and waste onto a fleet of 90 tonne haul trucks. Drill and blast will be required and a bench height of 5m has been assumed with loading on 2 x 2.5m flitches. Waste rock dumps, intermediate stockpiles, haul road, a run of mine ("RoM") pad and associated mining infrastructure e.g. workshops, offices, stores etc. have been included in the capital cost. Mining activities will be carried out by a mining contractor. Mining costs were developed based on international mining contractor Schedule of Rates submissions received in November 2015, along with an owners cost component developed by PHT.

Processing Method and Assumptions

Detailed metallurgical testwork undertaken as part of the Scoping Study, Prefeasibility Study and the DFS have demonstrated that a high grade concentrate can be produced from all the carbonatite ores and furthermore that this concentrate can be 'cleaned' and upgraded through a leach circuit to produce a material suitable for the production of ferroniobium in a single stage converter. The testwork has consisted of three piloting campaigns and extensive benchscale testing using a combination of bulk samples, diamond core and a small amount of reverse circulation ("RC") samples. The process itself consists of a crushing and milling circuit, followed by a two-stage flotation circuit with a concentrate cleaning step and a ferroniobium converter. Metallurgical recoveries vary between 53% and 66% depending on material type, with an average 61% over the reporting period. Deleterious elements are managed within the process and no allowance has been made for these in the final product.

Cut-off Grades

An average cut-off grade of 0.46% Nb_2O_5 was used for the Ore Reserve estimation. The cut-off grade was varied by year to achieve the required head grade with variations ranging from 0.44% to 0.48% Nb_2O_5. The low grade mineralisation will be stockpiled to be potentially used as a plant feed in future years.

Estimation Methodology

A discounted cash flow model was prepared to demonstrate the economic viability of the project. Within this model the impact of operating cost (+25% to -25%), capital cost (+25% to -25%), niobium price (+10% to -10%) and metallurgical recovery (+10% to -10%) were tested. In addition, scenarios considering combinations of these parameters were tested and in all cases a positive Net Present Value ("NPV") was maintained. Further to this, the Whittle pit optimisations completed included sensitivity analysis that considered mining and processing costs (+20%) and the slope angles (reduced by 5 degrees) impact on mining inventory. The assessment concluded that the impacts were minimal.

Other Material Modifying Factors

A mining licence for the project has been issued and is valid until November 2026, after which it can be renewed for further 10 year periods. An Environmental and Social Impact Assessment ("ESIA") was completed for the project in May 2015 and approved by the National Environmental Management Council of Tanzania in August 2015. Further permitting requirements for construction and operation have been identified and their applications will be made as required. The project is located on grounds controlled by the Tanzanian Prison Service ("TPS") and PHT is in an advanced stage of negotiation with the TPS with regard to relocating the low security prison which will be impacted by the operation.

Existing infrastructure within the area is well established consisting of a railway passing through the mining lease, cement factory (5km from project), airport (8km from project), Mbeya City (26km from project) and the major Dar es Salaam - Tunduma highway only 5km away which will be used to transport the final product to the Dar es Salaam port from where it will be exported.

New infrastructure that will be constructed, in addition to the process plant, as part for the project include the tailings storage facility, waste rock dump, intermediate stockpile, access roads, administration buildings and a camp for expatriate staff.

Competent Person's Statement

The information in this document that relates to Exploration Results and Mineral Resources is based on information compiled or reviewed by Mr Neil Inwood who is a Fellow of The Australasian Institute of Mining and Metallurgy and a Member of the Australian Institute of Geoscientists. Mr Inwood is a full time employee of Verona. Mr Inwood has sufficient experience which is relevant to the style of mineralisation and type of deposit under consideration and to the activity which he is undertaking to qualify as a Competent Person as defined in the 2012 Edition of the 'Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves'. Mr Inwood consents to the inclusion in this document of the matters based on his information in the form and context in which it appears.

The information in this document relating to the Panda Hill Mineral Resource Estimate is extracted from the announcement entitled 'Significant Resource Upgrade for Panda Hill Niobium Project' dated 30 April 2015 and is available to view on www.cradleresources.com.au. The Company confirms that it is not aware of any new information or data that materially affects the information included in the original market announcement and that, in the case of Mineral Resources or Ore Reserves, all the material assumptions and technical parameters underpinning the estimates in the relevant market announcement continue to apply and have not materially changed.

The information in this document, as they relate to the Panda Hill Ore Reserves, on the Mining Factors, Production Schedule, Mine Operating Costs and Mine Capital Costs are compiled by Mr Sjoerd Duim. Mr Duim is a consultant for SRK Consulting (Perth, Australia), and is a Member of the AusIMM. Mr Duim has sufficient relevant experience to qualify as a Competent Person as defined in the 2012 edition of the "Australasian Code for Reporting of Mineral Resources and Ore Reserves". Mr Duim has consented to the inclusion of this information in the document in the form and context in which it appears.

The information in this document, as they relate to the Panda Hill Ore Reserves, on the Mining Factors, Pit Optimisation and Pit Designs are compiled by Mr Jemini Bhargava based on the input parameters received from the project team. Mr Bhargava is a consultant for SRK Consulting (Perth, Australia), and is a Member of the AusIMM. Mr Bhargava has sufficient relevant experience to qualify as a Competent Person as defined in the 2012 edition of the "Australasian Code for Reporting of Mineral Resources and Ore Reserves". Mr Bhargava has consented to the inclusion of this information in the document in the form and context in which it appears.

The assumptions, as they relate to the Panda Hill Ore Reserves, on the metallurgical and plant design factors and costs are provided by Mr Roger Gordon Leighton. Mr Leighton is an employee of MDM Engineering, South Africa, and is a Fellow of the SAIMM. Mr Leighton has sufficient relevant experience to qualify as a Competent Person as defined in the 2012 edition of the "Australasian Code for Reporting of Mineral Resources and Reserves". Mr Leighton has consented to the inclusion of this information in the document in the form and context in which it appears.

The assumptions, as they relate to the Panda Hill Ore Reserves, on the Tailings Storage Facility and related Infrastructure are provided by Mr Steven A Dorman. Mr Dorman is a consultant for SLR Consulting (Africa), and is a Professional Engineer Registered with the Engineering Council of South Africa (ECSA). Mr Dorman has sufficient relevant experience to qualify as a Competent Person as defined in the 2012 edition of the "Australasian Code for Reporting of Mineral Resources and Ore Reserves". Mr Dorman has consented to the inclusion of this information in the document in the form and context in which it appears.

The assumptions, as they relate to the Panda Hill Ore Reserves, on the Environmental Aspects are provided by Dr. Willison Kaguga Mutagwaba. Dr Willison Kaguga Mutagwaba is a consultant for MTL Consulting (Tanzania), and is a Consulting Engineer Registered with the Engineers Registration Board of Tanzania and a Member of the Institution of Engineers Tanzania. He is also registered as an Environmental Expert for Environmental Impact Assessment and Expert for Environmental Audit with the National Environment Management Council (NEMC) of Tanzania. Dr. Willison Kaguga Mutagwaba has consented to the inclusion of this information in the document in the form and context in which it appears.

The review of the Panda Hill Cash Flow Model, as it relates to the Panda Hill Ore Reserves, was undertaken by Mr Harry Warries. Mr Warries is a Principle with Mining Focus Consultants, and is a Fellow of the AusIMM. Mr Warries has sufficient relevant experience to qualify as a Competent Person as defined in the 2012 edition of the "Australasian Code for Reporting of Mineral Resources and Reserves". Mr Warries has consented to the inclusion of this information in the document in the form and context in which it appears.

Under the JORC Code (2012), Clause 9, consent has been sought and obtained, where applicable, from the Competent Persons listed above for any initial public release of information related to this report.

Appendix 1 – JORC (2012) Table1

Portions of the JORC Code (2012) Table 1 have been previously filed for the Mineral Resource Estimate and is included here for completeness. Refer to the announcement entitled 'Significant Resource Upgrade for Panda Hill Niobium Project' dated 30 April 2015 that is available to view on www.cradleresources.com.au.

Section 1 Sampling Techniques and Data (Criteria in this section apply to all succeeding sections).

Criteria	JORC Code Explanation	Commentary	Competent Person
Sampling techniques	• Nature and quality of sampling (eg cut channels, random chips, or specific specialised industry standard measurement tools appropriate to the minerals under investigation, such as down hole gamma sondes, or handheld XRF instruments, etc). These examples should not be taken as limiting the broad meaning of sampling. • Include reference to measures taken to ensure sample representivity and the appropriate calibration of any measurement tools or systems used. • Aspects of the determination of mineralisation that are Material to the Public Report. • In cases where 'industry standard' work has been done this would be relatively simple (eg 'reverse circulation drilling was used to obtain 1m samples from which 3kg was pulverised to produce a 30g charge for fire assay'). In other cases more explanation may be required, such as where there is coarse gold that has inherent sampling problems. Unusual commodities or mineralisation types (eg submarine nodules) may warrant disclosure of detailed information.	• Sample intervals for the 2013 and 2014 drill core were based on lithological units. Care was taken not to mix different lithologies or weathering types. Sample intervals were nominally 1m length but range from 0.3m to a maximum of 1.5m in barren uniform material. Sample lengths are kept to 1m in mineralised material where possible. • Quarter core samples were taken from the HQ and ½ core from NQ core for assaying. Competent core was cut using a diamond saw. Friable material was carefully sampled by hand. • RC Samples are split using a cone splitter into 1m samples, then a combined 2m composite is taken using a riffle splitter. RC sample weights are approximately 2kg. • Samples were dispatched to the SGS preparation laboratory in Mwanza, Tanzania, for crushing and pulverising to 85% passing 75µm. Pulps were then sent to SGS Johannesburg, South Africa, for niobium assay by XRF Borate Fusion. • A calibrated hand-held Niton XRF analyser is used to aid in mineralisation identification. • Historic core samples were sampled according to rock type. Sample intervals reportedly varied between 2m and 20m, however the assay data contains some sample intervals much larger than this. Unrealistic intervals were not included in the estimate.	NAI
Drilling techniques	• Drill type (eg core, reverse circulation, open-hole hammer, rotary air blast, auger, Bangka, sonic, etc) and details (eg core diameter, triple or standard tube, depth of diamond tails, face-sampling bit or other type, whether core is oriented and if so, by what method, etc).	• 2013 diamond drilling was conducted by Bamboo Rock drilling. 2014 diamond drilling was conducted by Capital Drilling. Drilling typically started in HQ3 core to allow for safe collaring and to capture sufficient material for metallurgical test work. When difficult drilling conditions were encountered, the HQ rods were left as casing to allow for continuation of drilling using NQ rods. HQ and NQ core is typically taken. • Core orientations were done with the Reflex orientation tool. • RC drilling is by a Schram 450 rig, typically drilling with a 5.5" diameter bit and a 900cfm compressor. No booster compressor was required for RC drilling. • Type of rig and core size were not recorded for the majority of historic holes. One generation of historic holes (drilled by RUDIS) were drilled using a Longyear 38DC rig with NQ core sampled as quarter core and BQ core sampled as half core.	NAI
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	• Core recovery is measured as a proportion (%) and any cavities or missing intervals are recorded. • Recovery was generally high for all core. Up to 6% voids are reported in some regions. • RC recovery is recorded by visual estimation of recovered sample bags and by weighing all sample rejects from the splitter.	NAI

Criteria	JORC Code Explanation	Commentary	Competent Person
	sample recovery and grade and whether sample bias may have occurred due to preferential loss/gain of fine/coarse material.	Recovery is generally good. • Recovery is not recorded for the historic drilling data.	
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.	• Logging of the 2013 and 2014 drillholes included recording of lithological contacts, weathering contacts, vein/dyke orientations, and the orientation of any observed flow banding. Structural measurements (alpha and beta angles) were taken. Wet and dry core photographs were taken. All Cradle core was logged. • Geotechnical logging of the Cradle holes was completed by a geotechnical engineer. RQDs, defects, weathering, strength, infill, and jointing were recorded. • Logging is of sufficient quality for the current studies. • Geological logging of historic holes was qualitative, focusing on rock type and mineralogy, particularly the presence of pyrochlore and apatite, and the carbonate mineralogy. Some holes only had summary log information. Overall the historical logging is repeated by the 2013 logging. The 2013 logging contains the most detail, the RUDIS logging is generally good, and the logging of the original MBEXCO drillholes is generally of less detail than the other drill campaigns.	NAI
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.	• For the 2013 and 2014 drilling, half core samples were sent to SGS Canada (Lakefield) for metallurgical testing and quarter core samples were sent to SGS Johannesburg for assay after being sent to SGS Mwanza (Tanzania) for preparation. • All sampling of the 2013 and 2014 core was carefully supervised. Ticket books were used with pre-numbered tickets placed in the sample bag and the core tray and double checked against the ticket stubs to guard against sample mix ups. • One metre lengths of quarter HQ/NH core, as sampled by Cradle, are considered sufficient to provide an adequately representative sample for chemical assaying. • RC samples were taken as 2m composites using a riffle splitter. • RUDIS sampled NQ core as quarter core and BQ core as half core to ensure similar sample weights were collected. Samples were crushed on site, composited and sent to Yugoslavia for analysis in their own laboratory using a Philips XRF machine. • Details of historic sampling from GST and MBEXCO are not known. • Portions of the 2013 drillholes that twin sections of the historic holes show comparable Nb_2O_5 grades.	NAI
Quality of assay data and laboratory tests	• The nature, quality and appropriateness of the assaying and laboratory procedures used and whether the technique is considered partial or total. • For geophysical tools, spectrometers, handheld XRF instruments, etc, the parameters used in determining the analysis including instrument make and model, reading times, calibrations factors applied and their derivation, etc. • Nature of quality control procedures adopted (eg standards, blanks, duplicates, external laboratory checks) and whether acceptable levels of accuracy (ie lack of bias) and	• Coffey conducted an inspection of the Johannesburg laboratory during a site visit in August 2013 and found the laboratory to be of industry standard with no problems noted. • Matrix-matched standards are inserted every 20 samples on sample numbers ending in 0 (e.g. *00, *20, *40, etc.). Eight different standards were used. Approximately 10g of standard was used for the XRF Borate fusion analysis samples (note: borate fusion only used approximately 4g of pulp). Standards were either supplied pre-packaged or were measured into a small paper bag, and the standards were not blind. One standard appears to be biased high. However, an additional standard sourced from an independent supplier has a very similar expected value and shows no bias, suggesting there is no problem with the assay laboratory i.e. the high bias is inherent in	NAI/EM

Criteria	JORC Code Explanation	Commentary	Competent Person
	precision have been established.	the standard. • Blanks were inserted at a ratio of 1:50 (i.e. samples *10, *70) and at the start of each sample batch. • A programme of coarse reject duplicates was undertaken for the core samples. Duplicates were taken at a rate of approximately 1 in 30. • Field duplicates of RC samples were taken at a rate of 1 in 30. • A selection of pulps were sent to Genalysis in Perth for umpire assaying. Full assay results are still pending at the time of writing but preliminary results do not suggest any assay problems.	
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.	• Coffey conducted site visits in August 2013 and September 2014, during the drilling programmes, observing all drilling procedures. All procedures were considered industry standard, well supervised and well carried out. • Geological data is entered directly into a "Tough Book" logging laptop computer. The data is then directly downloaded to a computer where it is compiled into an Access database. • Assay data is provided as .csv files from the laboratory and extracted through a database query directly into the assay table, eliminating the chance of data-entry errors. Spot checks are made against the laboratory certificates. Datashed is used for final assay import. • 3 RC holes have been drilled to twin the 2013 diamond drilling. • 2 RC holes with diamond tails have been drilled twinning a 2013 diamond drillhole and a 2014 RC drillhole.	NAI/EM
Location of data points	• Accuracy and quality of surveys used to locate drillholes (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.	• Collar positions were set out using a Handheld Garmin GPS with reported accuracy of 3m horizontal. Two pegs lined up using a Suunto compass were used to align the rig. Historic holes were drilled on the Tanzanian ARC60 grid. Cradle Resources are using the WGS84, UTM36S grid. • Drillhole positions have been surveyed by DGPS using a local base station and survey stations and have an average relative accuracy of ±2cm. • Downhole surveys were taken using a Reflex electronic multi shot instrument. Collar surveys were taken using a compass and inclinometer. There is the possibility of some deviation in the recorded azimuth due to the presence of magnetite in the carbonatite, however overall the surveys showed only minor deviations in azimuth and dip. There is no apparent trend to the deviations based on drilling direction.	NAI
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 drillholes are spaced on a nominal 50m to 100m spacing; with 50m section lines. The main Angel zone has been infilled to 25m spaced drillholes on 50m sections. Step out exploration extends to 100m x 100m spacing. • The 2014 drilling had a nominal sample length of 1m for diamond and 2m for RC. • The data spacing is considered suitable for resource estimates.	NAI/EM
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.	• The distribution of pyrochlore and hence of niobium within the carbonatite is fairly uniform for the lower grade material. Higher grade areas occur in the steeply dipping schlieren (flow banding), particularly in the magnetite rich zones. The recent drilling has	NAI/EM

Criteria	JORC Code Explanation	Commentary	Competent Person
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.	been oriented with a dip of 60° with an azimuth of 045 degrees, which is considered acceptable to test the mineralisation.	
Sample security	• The measures taken to ensure sample security.	• Details for sample security for the historic drillholes are not known. • Samples from the 2013 and 2014 drilling were placed into small plastic bags with the pre-printed sample number. These bags were stapled shut in the core yard. The samples were then put into large polyweave or plastic bags with approximately 10 samples per bag. These were sealed shut using tape prior to being transported by dedicated truck to the SGS preparation laboratory in Mwanza (northern Tanzania).	NAI
Audits or reviews	• The results of any audits or reviews of sampling techniques and data.	• Coffey conducted site visits during the drilling program in August 2013 and during the infill drilling programme in September 2014. The sampling techniques were reviewed and found to be of industry standard and entirely appropriate for this type of deposit.	EM

Section 2 Reporting of Exploration Results (Criteria listed in the preceding section also apply to this section).

Criteria	JORC Code Explanation	Commentary	Competent Person
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 area is located on three granted MLs (ML237/2006, 238/206 and 239/2006) located approximately 25km WSW of the regional capital of Mbeya, in southern Tanzania. The three MLs cover an approximate area of 22km2. Cradle Resources holds a 50% interest in all three MLs through its 50:50 joint venture partnership with Tremont Investments Ltd in Panda Hill Tanzania (PHT). The three mining licenses were transferred from RECB to PHT in November 2015. The licenses are not subject to any 3rd party agreements. • The resource and the bulk of ML237/2006 and ML238/2006 are located within a region of designated Prison grounds. The Resource itself is removed from any existing buildings or infrastructure. As the location of the resource is located within the prison boundaries, only the prison-related community would be directly affected by any potential mining activities. • The three granted MLs are current until 16 November 2026. Department of Prisons approval is required for any work to be conducted on ML237/2006 and ML238/2006. Cradle Resources has obtained permission to operate on these areas and is not aware of any impediment for future operations.	NAI
Exploration done by other parties	• Acknowledgment and appraisal of exploration by other parties.	• The Panda Hill Niobium project has been explored since the 1950s. The Geological Survey of Tanzania (GST) and Mbeya Exploration Company (MBEXCO) drilled 83 diamond drillholes for a total depth of 5,187m in the Panda Hill project area in the 1950's and early 1960's. Yugoslavian company RUDIS, in joint venture with the State Mining Company of Tanzania (STAMINCO), drilled 13 diamond drillholes for a total of 1,305m in the period of 1978 to 1980. These holes were drilled on 100m x 100m spaced centres on the Tanzanian ARC60 grid. Drillhole logs and assays are available for the historic drilling. Laboratory certificates have been sighted for the GST drilling and original data printouts have been obtained for the RUDIS drilling	NAI

Criteria	JORC Code Explanation	Commentary	Competent Person
Geology	• Deposit type, geological setting and style of mineralisation.	• The project is characterised as a carbonatite-hosted niobium deposit. The majority of the Panda Hill niobium mineralisation is found within pyrochlore and lesser columbite. The bulk of the known mineralisation is located within carbonatite lithologies, with Nb_2O_5 grades typically ranging from 0.1% to 1%. Higher-grade niobium mineralisation is noted within flow-banding ("schlieren") within the carbonatite and within the surficial weathered cap.	NAI
Drillhole Information	▪ A summary of all information material to the understanding of the exploration results including a tabulation of the following information for all Material drillholes: ◦ easting and northing of the drillhole collar ◦ elevation or RL (Reduced Level – elevation above sea level in metres) of the drillhole collar ◦ dip and azimuth of the hole ◦ down hole length and interception depth ◦ hole length • If the exclusion of this information is justified on the basis that the information is not Material and this exclusion does not detract from the understanding of the report, the Competent Person should clearly explain why this is the case.	• Drillhole coordinates and orientations are provided in Table 2 of this report. • This statement relates to a Mineral Resource. Exploration results have been announced by Cradle Resources previously. • 65 of the historic drillholes have been removed from the drilling database. 38 of these are replaced by new drilling, 8 are adjacent to other better informed historic holes, and the remainder are either outside the resource area or too far from other holes to allow interpretation and estimation in that area, and/or have insufficient assay data or data quality to be able to be used. • Three RC drillholes drilled by Cradle were removed from the resource database as they lie north of the resource area. Two diamond drillholes drilled by Cradle were not included in the resource database in the resource as they were used as geotechnical drillholes.	NAI/EM
Data aggregation methods	• In reporting Exploration Results, weighting averaging techniques, maximum and/or minimum grade truncations (eg 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. •	• This statement relates to a Mineral Resource. Exploration results have been announced by Cradle Resources previously.	
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 drillhole angle is known, its nature should be reported. • If it is not known and only the down hole lengths are reported, there should be a clear statement to this effect (eg 'down hole length, true width not known').	• This statement relates to a Mineral Resource. Exploration results have been announced by Cradle Resources previously.	
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 drillhole collar	• A drillhole plan and accompanying cross-sections are provided in Figures 2 to 4 of this report.	NAI/EM

Criteria	JORC Code Explanation	Commentary	Competent Person
	locations and appropriate sectional views.		
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.	• This statement relates to a Mineral Resource. Exploration results have been announced by Cradle Resources previously.	
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.	• Detailed geological mapping has been conduction by the Tanganyika Geological Survey in the 1950s and RUDIS in the 1980s. Two papers detailing the geology of the Panda Hill carbonatite were subsequently published in Economic Geology. • Cradle conducted geological mapping at the same time as the drilling program. Both the recent and historic mapping provides information relating to the orientation of the flow banding within the carbonatite. • Metallurgical test work has been conducted by MBEXCO and RUDIS in the past. MBEXCO also conducted trial mining. Cradle has undertaken metallurgical test work on the mineralized carbonatite material. This has compromised of the three programs of work covering benchscale and piloting for both the milling and flotation circuit, as well as the concentrate leach circuit.	NAI
Further work	▪ The nature and scale of planned further work (eg tests for lateral extensions or depth extensions or large-scale step-out drilling). • Diagrams clearly highlighting the areas of possible extensions, including the main geological interpretations and future drilling areas, provided this information is not commercially sensitive.	• Four high priority target regions have been identified (see announcement 23 February 2015). And these will be the focus of future planned drilling with an aim to define further high grade mineralisation.	NAI

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	Competent Person
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 2013 and 2014 data collection was directly into logging tablets. Entry of 2013 assay data into the database was through direct extraction via an Access query from the laboratory files. In 2014 the database was migrated through to a Datashed relational database. Final assay importation of the.csv files provided by the assay laboratory has been into Datashed, eliminating the potential for data entry errors. Spot checks have been conducted on all aspects of the data by Cradle. • Coffey has conducted its own validation process on the data, with checks looking for missing/overlapping intervals, missing data and extreme values. Coffey has also carried out spot checks on the assay data against the laboratory certificates. • Historic data was compiled by the Canadian National Geo. Expl. Ltd. (CINGEX) in 1972-1973. Neil Inwood of Verona Capital has validated this data compilation against original laboratory assay sheets for the GST and MBEXCO drilling, and found only 1 data transposition. The compilation was also validated against an original computer printout of the RUDIS database, and found to be fully in accordance. No original geological logs were found for validation.	NAI/EM

<table>
<tr><th>Criteria</th><th>JORC Code Explanation</th><th>Commentary</th><th>Competent Person</th></tr>
<tr><td>Site visits</td><td>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.</td><td>Neil Inwood supervised the Cradle Resources 2013 and 2014 drilling programmes on site.
Ellen Maidens conducted site visits during the August 2013 drilling programme and the September 2014 drilling programme. All drilling, logging and sampling procedures were observed and found to be of industry standard with no problems highlighted. Ellen Maidens also conducted a site visit of the SGS Johannesburg assay laboratory with Keith Bowes of Cradle Resources during the 2013 visit. The laboratory was found to be of industry standard with no material problems noted.</td><td>NAI/EM</td></tr>
<tr><td>Geological interpretation</td><td>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.</td><td>The understanding of the orientation of the flow-banding from mapping and recent drilling has been used to support the orientations seen in the Variography and used in the Resource estimate.
It is apparent that over the extent of the Resource area, there are areas of different orientations. It is planned to use further mapping and drilling to delineate these area into discrete domains.</td><td>NAI</td></tr>
<tr><td>Dimensions</td><td>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.</td><td>The block model dimensions are given below:
<table>
<tr><th></th><th>Easting (X)</th><th>Northing (Y)</th><th>RL (Z)</th></tr>
<tr><td>Model Origin</td><td>526,000</td><td>9,004,800</td><td>1,150</td></tr>
<tr><td>Model Extent (m)</td><td>1,400</td><td>1,800</td><td>500</td></tr>
<tr><td>Parent Cell dimension (m)</td><td>25</td><td>25</td><td>5</td></tr>
<tr><td>Minimum Sub-cell dimension (m)</td><td>5</td><td>5</td><td>1</td></tr>
<tr><td>Number of Parent Cells</td><td>56</td><td>72</td><td>110</td></tr>
</table>
Note that due to drillhole depths, mineralisation is only modelled to a maximum vertical extent of approximately 410m below surface. Mineralisation occurs from surface.</td><td>IK</td></tr>
<tr><td>Estimation and modelling techniques</td><td>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 (eg sulphur for acid mine drainage characterisation).
In the case of block model interpolation, the</td><td>Multiple Indicator Kriging (MIK) with change of support for a final SMU model is considered a robust method for the style of mineralisation and intended purpose of the model. An indicator based grade shell (IND0P30) was generated using a 0.3% Nb_2O_5 indicator threshold on all data and a (0.2) 20% Probability (IND0P30 > 0.2) for use in the MIK modelling (Zonecode 100). The estimation was carried out using the Datamine mining software package.
No top cut is used in the MIK estimation process, and a top cut of 3% Nb_2O_5 was applied to the Nb_2O_5 composites used for variography and geostatistical validation. This was based on analysis of the Nb_2O_5 population distribution.
MIK grade estimation with change of support has been applied to produce ‘recoverable’ Nb_2O_5 estimates targeting a Selective Mining Unit (SMU) of 6.25m x 12.5m x 5m.
Search ellipses were oriented dipping to the SW based on variography and geology. Estimation was generally conducted in a 2 pass strategy with the second estimate completed with expanded sample searches and relaxed composite collection criteria.</td><td>IK</td></tr>
</table>

Criteria	JORC Code Explanation	Commentary	Competent Person
	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 process of validation, the checking process used, the comparison of model data to drillhole data, and use of reconciliation data if available.	• Validation was by visual and statistical comparison of the estimation with the input data. The previous 2014 resource estimate is available for comparison. • The new drilling has increased the confidence in the geology and grade continuity, resulting in the conversion of a large part of the Resource to Indicated category and allowing for the conversion of a portion of the Resource to Measured category. Deeper drilling and removal of waste by the indicator based grade shell has resulted in an overall increase in tonnage and metal content for the project. • There is no mining at Panda Hill to date. • No assumptions are made regarding recovery of by-products. • Additional elements (Fe2O3, SiO2, CaO, Ta and TiO2) were estimated by Ordinary Kriging (OK). • Probability Kriging was conducted for lithology (fenites) and the oxidation/weathering variables. • The panel size of 25mx25mx5m is appropriate to the sample spacing and style of mineralisation.	
Moisture	• Whether the tonnages are estimated on a dry basis or with natural moisture, and the method of determination of the moisture content.	• Tonnages are based on in-situ dry bulk density measurements.	IK
Cut-off parameters	• The basis of the adopted cut-off grade(s) or quality parameters applied.	• A nominal reporting grade of 0.3% Nb_2O_5 has been chosen to reflect a potentially economic mining cut off. Further work is required to define this cut-off.	IK/NAI
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.	• Based on the studies completed, there is sufficient data to support the design of a typical moderate scale open cut mine to economically extract the contained resource and reasonable prospects for eventual economic extraction. • The SMU dimension of 6.25m x 12.5m x 5m assumes a moderate level of mining selectivity if required. • The assumption is that there is existing, steady demand and price for the niobium product.	IK/NAI
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.	• Ferro-niobium has been economically produced from carbonatite ores for many years. In 2002, preliminary test work undertaken on the Panda Hill fresh carbonatite by SGS Lakefield reported an Nb_2O_5 recovery of 69% at 56% grade. Recent testwork carried out at SGS Canada tested the range of carbonatite materials identified in the drilling program and through a program of benchscale and pilot plant testwork demonstrated niobium recoveries in the range 52 to 72% with weighted average of 61% recovery. Published recovery[1] for a similar carbonatite ore body currently in production in Canada is 58% Nb_2O_5. Both the producing plant and the test work share a similar flow sheet consisting of reverse gangue flotation followed by direct niobium mineral flotation. • [1] "The Production of Ferro-niobium at the Niobec Mine" by Claude Dufrense and Ghislain Goyette;	NAI
Environmental factors	• Assumptions made regarding possible waste and process residue disposal options. It is	• Tailings Storage Facility (TSF) – a location study for the TSF was performed as part of the PFS scope and a preliminary design	SD, WM, ML,SJD

<table>
<tr><th>Criteria</th><th>JORC Code Explanation</th><th>Commentary</th><th>Competent Person</th></tr>
<tr><td>or assumptions</td><td>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.</td><td>generated. This design was further optimised during the FS, supported by geotechnical investigations and tailings characterisation testwork.
• Waste Rock Dump (WRD) – based on a top down dumping methodology with the location selected to minimise haulage distances. The footprint and sizing was confirmed as part of the FS and the associated foundations analysed as part of the geotechnical study
• Intermediate Stockpile (ISP) – temporary storage of low grade material which may be used as mill feed at end of LOM. Based on a top down dumping methodology with the location selected to minimise haulage distances and to be close to the plant for potential future recovery. The footprint and sizing was confirmed as part of the FS and the associated foundations analysed as part of the geotechnical study
• The hydrology and hydrogeology assessments considered the impact of the pit, WRD, ISP, TSF and associated infrastructure on both ground water and surface water during various phases of the operation. This work was also used to define the water demand of the project at its various stages.
• The Environmental Impact Assessment was completed as part of the FS and considered the TSF, WRD and ISP infrastructure as part of the assessment.</td><td></td></tr>
<tr><td>Bulk density</td><td>▪ . 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.</td><td>• A total of 2,793 density measurements have been taken from Cradle core. The majority of these have been determined using the calliper method. In 2013, density measurements were also determined using the Archimedes method. A statistical comparison revealed negligible difference between the methods.
<table>
<tr><th>Oxidation state</th><th>Mineralised Zone</th><th>Waste</th></tr>
<tr><td>Oxidised</td><td>2.04t/m³</td><td>2.27t/m³</td></tr>
<tr><td>Moderately oxidised</td><td>2.54t/m³</td><td>2.54t/m³</td></tr>
<tr><td>Fresh</td><td>2.65t/m³</td><td>2.68t/m³</td></tr>
</table>
• After statistical review of the density data, average bulk density values have been assigned to the block model as follows:
• The bulk density values for material within the mineralisation envelope incorporate a 6% void factor for oxide material, and a 3% void factor for transitional and fresh material resulting from statistical estimates of voids/cavities recorded during drilling.
• The bulk density values are slightly lower than those used in the December 2014 Resource estimate.</td><td>IK</td></tr>
<tr><td>Classification</td><td>• The basis for the classification of the Mineral Resources into varying confidence categories.
• Whether appropriate account has been taken of all relevant factors (ie 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.</td><td>• Resource classification was developed from the confidence levels of key criteria including drilling methods, geological understanding and interpretation, sampling quality, data density and location, grade estimation and quality of the estimates, as well as the various and more subjective considerations discussed in this table.</td><td>IK</td></tr>
<tr><td>Audits or reviews</td><td>• The results of any audits or reviews of Mineral Resource estimates.</td><td>• The 2012 Resource estimate for Panda Hill, completed by Coffey, was reviewed in an Independent Geologist's Report by Ravensgate Mining Industry Consultants and found to be</td><td>EM</td></tr>
</table>

Criteria	JORC Code Explanation	Commentary	Competent Person
		appropriate though conservative.	
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 grade estimate is based on the assumption that small to medium scale open cut mining methods will be applied. • The Resource is a recoverable model assuming a 6.25m x 12.5m x 5m SMU. • The MIK SMU estimation process is deemed appropriate for use in this style of deposit. • Factors affecting the confidence and relative accuracy of the Resource are primarily: o Incorporation of the historic drillhole data. This data is gradually being phased out and superseded by current drilling. o Increased drilling density might vary model results in localised areas. o Accuracy of averaged bulk density data and associated void factors. There has been a substantial amount of data collected by Cradle Resources. Mineralisation and lithology may prove to be more variable than the current scale of drilling suggest. o The variance adjustment factor applied for the SMU model may vary in future estimates according to the amount of data available within the domains being modelled. o Geology and domains are possibly more complex than assumed by the current resource model, particularly with respect to strike and dip of mineralisation and possible multiple potential orientations related to the complex geometry of the intrusives. o Fenite lithology definition may vary with available data, and is significant for metallurgical processing. o Cut-off grades may vary in future according to mining studies.	IK

Section 4 - Estimation and Reporting of Ore Reserves (Criteria listed in section 1, and where relevant in sections 2 and 3, also apply to this section.)

Criteria	JORC Code explanation	Commentary	Co-Signatory
Mineral Resource estimate for conversion to Ore Reserves	• Description of the Mineral Resource estimate used as a basis for the conversion to an Ore Reserve. • Clear statement as to whether the Mineral Resources are reported additional to, or inclusive of, the Ore Reserves.	• The Mineral Resources used in the Study are the same as referred to in the previous Table 1 and preceding document. The Mineral Resources estimation was undertaken by Coffey Mining and was released in April 2015. • The first 10 years of the Study concentrated on the Measured and Indicated Mineral Resource core of the deposit. The following 20 years include a significant (about 70%) component based on the Inferred Mineral Resources. • The Mineral Resources are reported inclusive of the Ore Reserves.	IK, NAI
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.	• Site visits were undertaken by representatives of MDM Consulting (Steve Roper - Engineering), SLR Consulting (Steve Dorman - Tailings and Hydrological), MTL Consulting (Willison Mutagwaba - EISA and Environmental) and SRK Consulting (Sjoerd Duim -Mining) towards the middle of May 2015 as part of the Feasibility Study kick-off process. Various discussions were held on site during the 3 day visit and the feedback from these visits were used to develop the current Feasibility Study. • Site visits were also undertaken by Ellen Maidens (Coffey Mining) during the August 2013 and September 2014 drilling programs.	SRD, SD, WM, Others

<table>
<tr><th>Criteria</th><th>JORC Code explanation</th><th>Commentary</th><th>Co-Signatory</th></tr>
<tr><td>Study status</td><td>
• The type and level of study undertaken to enable Mineral Resources to be converted to Ore Reserves.
• The Code requires that a study to at least Pre-Feasibility Study level has been undertaken to convert Mineral Resources to Ore Reserves. Such studies will have been carried out and will have determined a mine plan that is technically achievable and economically viable, and that material Modifying Factors have been considered.</td><td>
• The Study is classified as a Feasibility Study.
• The portion of the study dealing with Mineral Resources has been undertaken in accordance to the JORC Code 2012 Edition.
• The study utilises Measured and Indicated Mineral Resources only in the first 10 years of the project.
• The broader study utilises Inferred Mineral Resources in the later years (after Year 10) of the project and these cannot be used to support an Ore Reserve.
• The Study has been undertaken by a team of industry professionals as listed below:
o Cradle Resources – Neil Inwood - Geology
o Coffey Mining – Ellen Maidens / Ingvar Kirchner – Mineral Resources
o SGS Canada – Dan Imeson - Metallurgical Testwork
o MDM Consulting – Steve Roper / Roger Leighton – Process, Metallurgy, Engineering, Plant Capital and Operating costs
o SLR Consulting - Steve Dorman – Tailings, Hydrogeology and Hydrology
o MTL Consulting - Willison Mutagwaba -ESIA and Environmental
o SRK Consulting - Sjoerd Duim –pit optimisation, pit design, production scheduling, mine capital and operating costs
o SRK Consulting – Richard Stuklis – Geotechnical assessment
o Roskill Consulting Group – Marketing
o TSI – Financial Modelling</td><td>All</td></tr>
<tr><td>Cut-off parameters</td><td>
• The basis of the cut-off grade(s) or quality parameters applied.</td><td>
• The lower cut-off grade was initially determined from a first-principles analysis of the expected recovery, cost to mine, cost to process and market and estimate of the appropriate market sales price (approximately 0.3% Nb_2O_5).
• This cut-off was then raised to enable an aggressive high-grade mining scenario utilising a variable lower cut-off (above 0.44%) in the first 10 years of mining. The cut-off parameters used by year were:
<table>
<tr><th>Year</th><th>Cut-off grade (%Nb_2O_5)</th></tr>
<tr><td>1</td><td>0.47</td></tr>
<tr><td>2 to 3</td><td>0.48</td></tr>
<tr><td>4</td><td>0.45</td></tr>
<tr><td>5</td><td>0.47</td></tr>
<tr><td>6</td><td>0.48</td></tr>
<tr><td>7</td><td>0.46</td></tr>
<tr><td>8 to 10</td><td>0.44</td></tr>
<tr><td>11 onwards</td><td>0.30</td></tr>
</table>
• The low grade mineralisation will be stockpiled to be utilised as plant feed in future years.</td><td>SRD, JB</td></tr>
<tr><td>Mining factors or assumptions</td><td>
• The method and assumptions used as reported in the Pre-Feasibility or Feasibility Study to convert the Mineral Resource to an Ore Reserve (i.e. either by application of appropriate factors by optimisation or by preliminary or detailed design).
• The choice, nature and appropriateness of the selected mining method(s) and other mining parameters including associated design issues such as pre-strip, access, etc.</td><td>
• The Feasibility Study (FS) has focussed on an open pit mining scenario as this best suits the deposit.
• Mineralisation outcrops on the hill and the mineralisation is generally massive with localised high-grade tabular zones.
• The FS was based on 100% Measured and Indicated Mineral Resources in the first 10 years of mining for mill feed.
• For the following 10 years, about 26% of the production is based on Measured Mineral Resources and (predominantly) Indicated Mineral Resource, and the remaining 74% based on the Inferred Mineral Resource. For the remaining mine life of 10 years, the production is based on an inventory with about 31% Indicated Mineral Resource and 69% Inferred</td><td>SRD, JB, RS</td></tr>
</table>

Criteria	JORC Code explanation	Commentary	Co-Signatory
	• The assumptions made regarding geotechnical parameters (eg pit slopes, stope sizes, etc), grade control and pre-production drilling. • The major assumptions made and Mineral Resource model used for pit and stope optimisation (if appropriate). • The mining dilution factors used. • The mining recovery factors used. • Any minimum mining widths used. • The manner in which Inferred Mineral Resources are utilised in mining studies and the sensitivity of the outcome to their inclusion. • The infrastructure requirements of the selected mining methods.	Mineral Resource. • The Ore Reserve is declared based on the planned production for the first 10 years of the operation which are purely based on Measured and Indicated Mineral Resources. Planned production for the remaining life of the mine (20 years) is not included in the Ore Reserve as it is driven by the Inferred Mineral Resources (about 70%). • Open pit slope design parameters were developed by combining and then re-evaluating all relevant geotechnical data from the 2014 PFS and the additional data obtained for the FS in 2015. Bench-stack pit slope angles of 46º and 49º were derived for weathered material domains and 50º and 55º for fresh material domains. These angles were empirically determined from assessment of geotechnical data. Overall pit slope angles of 25º and 29º for weathered material domains and 47º for fresh material domains were used as input to mining open pit optimisation. • As the Mineral Resource model used was a Multiple Indicator Kriged (MIK) model with a generally broad mineralisation halo, it was considered appropriate by the mineral resource estimators that no mining dilution be added, as this was mathematically incorporated during the Mineral Resource Estimation phase in the Mineral Resource model. A 5% mining loss was used in the production scheduling. • The proposed FS mining plan was based on exploiting the Panda Hill niobium deposit at a processing plant throughput rate of 1.3 million tonnes per annum (Mtpa) for the first four years of the operation, and at a rate of 2.6 Mtpa from the Year 5 of the operation to the end of the mine life (30 years). The excavation was planned to be undertaken by conventional open pit mining techniques, using excavators and haul trucks for both ore and waste. • The average head feed grade to the processing plant was planned to be kept higher in the first 10 years of the operation, to ensure an increased revenue stream to assist with early capital expenditure payback. • With continuous exploration, Cradle plans to upgrade the Mineral Resources whilst the mine is in operation. This will potentially assist in upgrading the Mineral Resource classification as a result of in-fill drilling and potentially increase the life of mine (LOM) beyond the currently envisaged 30 years. • A minimum mining width of 50m was designed for pit push backs. Haulroads used 16m for single lane access and 25m for dual access haul roads. A bench height of 5m benches was used with loading on 2 x 2.5m flitches. • The FS incorporates Inferred Mineral Resource material, substantially so after 10 years. The impact on not including Inferred Mineral Resource material has been tested and would still result in a project of economic value to be achieved; albeit with a significantly lower expected NPV. • The use of 120 tonne class backhoe-type excavators is planned for loading ore and waste material onto a fleet of 90 tonne payload capacity class trucks during peak production periods. Additionally, relevant stores, workshop and administration buildings will be required. Total material mined has been limited to a maximum of 12Mtpa • A process plant will be required along with associated infrastructure. A 2km haul road along the eastern hill side is planned to access the mineralisation and provide a transport route to the ROM pad.	
Metallurgical factors or assumptions	• The metallurgical process proposed and the appropriateness of that process to the style of mineralisation. • Whether the metallurgical process is well-tested technology or novel in nature.	• Based upon the results of the 2015/2016 piloting campaigns, a two-stage flotation process was selected as the optimal processing strategy for the Panda Hill niobium mineralisation. This involved 3 piloting campaigns supported by 243 open circuit and 23 locked cycle tests undertaken at SGS Canada (specialists in niobium processing). Sample selection focused on	RL

Criteria	JORC Code explanation	Commentary	Co-Signatory
	• The nature, amount and representativeness of metallurgical test work undertaken, the nature of the metallurgical domaining applied and the corresponding metallurgical recovery factors applied. • Any assumptions or allowances made for deleterious elements. • The existence of any bulk sample or pilot scale test work and the degree to which such samples are considered representative of the orebody as a whole. • For minerals that are defined by a specification, has the ore reserve estimation been based on the appropriate mineralogy to meet the specifications?	representative samples over the first 10 year life of mine with over 3 tonnes of diamond core sampled through the lateral and vertical extent of the deposit and 105 tonnes of bulk sample for the piloting. • The process flowsheet described is similar to the circuits of the current niobium operations (Catalão, CBMM and Niobec), with the flotation regime most similar to Niobec which has a similar geology and mineralogy to the Panda Hill primary material. • This processing involves crushing by a 2-stage SAG ball mill circuit, desliming then calcite reverse flotation followed by niobium flotation. The niobium flotation circuit is a standard rougher scavenger circuit with up to 5 stages of concentrate cleaning. The flotation chemistry is based on an amine system of collectors with acid for pH control in the cleaners to reject silicate. Niobium recoveries in the range 52 to 72% were obtained for the range of carbonatite materials tested. These materials make up more than 90% of the potential feed to the process plant. Based on the production schedule a weighted average niobium recovery of 61% is calculated. • The flotation concentrate, although high grade (~40-45% Nb_2O_5), does contain some impurities which must be removed prior to the ferroniobium converter. This is done in a two-stage leaching circuit (acid pre-leach followed by caustic leach) similar to Catalao's leaching circuit. This circuit has been tested and developed at SGS Canada using pilot plant concentrates as the feed. Benchscale, semi-continuous and continuous leaching tests have been carried out on multiple concentrate samples representing the range of impurities likely to occur, with the final residues meeting the converter quality requirements. Minimum niobium losses occur in this part of the circuit due to the refractory nature on the niobium minerals • The final leach residue is dried and fed to a DC furnace for standard grade ferroniobium production using aluminium as a reductant. This conversion process is similar to the final stage of converter used by CBMM. The final ferroniobium product is then crushed and packaged to meet the specific customer specifications. Niobium recoveries in the furnace are estimated at 97% based on existing operations and expert opinion.	
Environmental	• The status of studies of potential environmental impacts of the mining and processing operation. Details of waste rock characterisation and the consideration of potential sites, status of design options considered and, where applicable, the status of approvals for process residue storage and waste dumps should be reported.	• As part of the initial development work undertaken by the previous owners an EIA Certificate for Panda Hill was approved in June 2005 and based on this a mining licence was issued to Panda Hill Mines Ltd. Although the mining licences are still in effect, a new ESIA is required as no development at the mine site was undertaken in the three years after the issuing of the certificate. As such a new Terms of Reference (ToR) and ESIA Scoping document was prepared. The ToR was accepted by the National Environmental Management Council (NEMC) in late 2013. • The full ESIA program of work, including the wet season and dry season baseline studies and the social studies were undertaken during the PFS and FS studies. The ESIA documentation was submitted to the NEMC in May 2015 and the EIA Certificate issued for the project on 18 August 2015. This ESIA, which complies with the Tanzanian standards, has now updated with the latest results from the dry season baseline study so as to meet the IFC complaint ESIA. The final ESIA report was issued in April 2016. • Geochemical characterisation of waste rock, intermediate stockpiled material, tailings and ROM ore has been completed. Based on these results and ground water modelling the impact of the project on groundwater quality is expected to be minimal. The waste rock dump, intermediate stockpile and RoM pad have been included in the ESIA work. • A site has been selected for the Tailings Storage Facility. A high density deposition methodology has been chosen for the project to maximise	WM

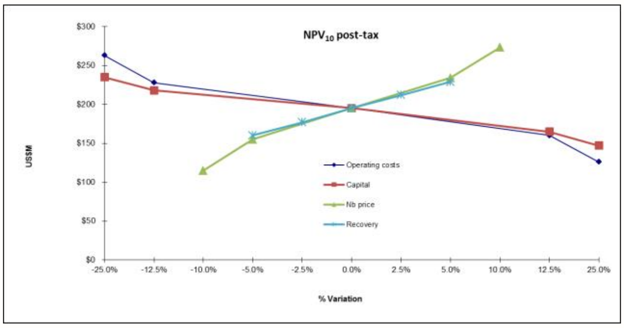
Criteria	JORC Code explanation	Commentary	Co-Signatory
		water recovery and minimise seepage. The impact of the TSF with regard to both ground water and surface water resources has been determined and comply with IFC standards. The TSF location and impact has been included in the ESIA work.	
Infrastructure	• The existence of appropriate infrastructure: availability of land for plant development, power, water, transportation (particularly for bulk commodities), labour, accommodation; or the ease with which the infrastructure can be provided, or accessed.	• The Project area has good general infrastructure with a major highway only 5km from the project and a railway line which passes through the northern portion of the Mining Lease (2km away). A major cement factory is located approximately 5km north of the project and a new international airport is located 8km north-east of the project. The general area has a good base for skilled and semi-skilled labour. Skilled labour is expected to be sourced from existing mines located in Northern Tanzania, as well as Dar es Salaam. These complimented by a small number of expatriate staff. • The plant and associated infrastructure, including the TSF, are all located within the mining leases, which themselves are contained with the grounds of the Songwe Prison. No communities are impacted by the mine, plant or infrastructure other than the prison for which an agreement has been formalised for the relocation of the prison buildings and compensation for occupied farm land. • Power is available in the area, but the project has selected to use an onsite power plant (HFO) for the early years of operation, with the connection to the national grid to occur in Year 4 during the proposed expansion stage. This strategy has been selected to avoid any delays associated with negotiating the power agreements and permitting issues. • Water is available from either the nearby Songwe river or from underground aquifers that have been identified in the preliminary water bore drilling program. The project has also included in the capital the costs associated with large stormwater dams that are sized to store sufficient water for the dry season to meet the water demands of the process during this period. All three sources of water are likely to be used during the life of mine. • A small accommodation camp has been included in the project capital to house the expatriate and senior staff during the operation phase. Tanzania nationals will be expected to make use of housing which is readily available nearby and in Mbeya City located only 26km away.	RL, SD, Others
Costs	• The derivation of, or assumptions made, regarding projected capital costs in the study. • The methodology used to estimate operating costs. • Allowances made for the content of deleterious elements. • The source of exchange rates used in the study. • Derivation of transportation charges. • The basis for forecasting or source of treatment and refining charges, penalties for failure to meet specification, etc. • The allowances made for royalties payable, both Government and private.	• All costs used in the Feasibility Study were based upon modelling a 30 year life of mine and are reported in US$. The Ore Reserve only refers to the first 10 years of mining based on Measured and Indicated Mineral Resource. • Mining costs were based on international mining contractor Schedule of Rates (SoR) submissions, provided in November 2015. • Capital costs for the plant and infrastructure were based on costs supplied by MDM engineering and have an expected accuracy of +15%- 10%. • Mining capital costs were based on quotes obtained from mining contractors in March 2016. • Allowances for grade control, fixed general & administration costs, dewatering and ROM rehandle have been included. • The average Annual mining costs vary between US$ 4.0/t Material Mined to US$ 6.0/t Material Mined. • The FS assumes the use of contactor mining, with rates based upon quotes from suitably experienced overseas and Tanzanian based mining contractors. • The FS assumes a laboratory is on a lease arrangement with a budgeted sampling and analysis cost for mill and grade control samples. • Power costs have been based on the assumption of a leased heavy fuel oil (HFO) power plant plus supply fee.	SRD, JB, Others

Criteria	JORC Code explanation	Commentary	Co-Signatory

		• A ferroniobium end-product will be produced on site, no external refining will be required and the product can be sold directly to the customer. The plant capital and operating costs reflect a facility suitable to produce a saleable product.
		• Transport charges are based upon rail or road haulage to Dar es Salaam port then shipping to customers in Europe and Asia.
		• A 3% national government royalty, a 0.3% local government royalty and 30% tax rate have been included in cost estimations.
		• Key input parameters for the Ore Reserve model are summarised below:
		  o Initial capital expenditure - US\$165M
		  o Pre-production and working capital - US\$31M
		  o Expansion Capital – US\$93M
		  o Average sustaining capital - US\$3.3M/annum
		  o Average Annual operating cost - US\$57.64/t mill feed (US\$20.61/kg Nb)
		  o Plant throughput – 1.3Mtpa ramping up to 2.6Mtpa in Year 5
		  o RoM grades – 0.54% Nb2O5 LOM (0.68% Nb2O5 for the first 10 years)
		  o Metallurgical recoveries - 61% (with 97% recovery in converter)
		  o Metal price – as per Roskill report
		  o Government Royalty – 3%
		  o Local Royalty – 0.3%
		  o Tax rate – 30%	

Revenue factors	• The derivation of, or assumptions made regarding revenue factors including head grade, metal or commodity price(s) exchange rates, transportation and treatment charges, penalties, net smelter returns, etc. • The derivation of assumptions made of metal or commodity price(s), for the principal metals, minerals and co-products.	• The head grade is based upon the recoverable SMU MIK Resource model. Detailed production scheduling was undertaken on Localised Indicator Kriged (LIK) model and the head grades are based upon this model. • Operating costs used in the study are inclusive of mining, processing, general & admin, marketing and product transportation (FOB Dar es Salaam). Further treatment charges, impurity penalties etc. are not applicable. • The niobium price used has been used based upon the analysis conducted by Roskill Consulting Group. The price is assumed to escalate over the life of mine in accordance with the Roskill analysis. • All prices are based on USD.	NAI, IK, RL, Others
Market assessment	• The demand, supply and stock situation for the particular commodity, consumption trends and factors likely to affect supply and demand into the future. • A customer and competitor analysis along with the identification of likely market windows for the product. • Price and volume forecasts and the basis for these forecasts. • For industrial minerals the customer specification, testing and acceptance requirements prior to a supply contract.	• Cradle through a number of consultants has undertaken a market assessment and analysed the supply and demand dynamics of the niobium market. Ferro niobium forms 90% of world niobium sales and is the most saleable niobium product. • Roskill Consulting Group (RSG) was contracted to undertake a marketing study and price forecast as part of the FS. • Discussions are currently underway with potential offtake partners. The ferroniobium will be marketed worldwide with the offtake agreements in place with the major steel mills. In some areas sales may be through metal traders or trading houses. • Standard customer specifications shown below, along with expected specifications from the Project. The Panda specification is based on preliminary benchscale testwork undertaken on pilot plant concentrate samples.	Others

Element	Spec (%)	Panda Hill (%)
Niobium	63.0	69.0
Iron	Balance	27.0
Aluminium	<2.00	1.00
Tantalum	<0.50	0.23
Silicon	<3.00	0.50
Phosphorous	<0.20	0.04
Titanium	<2.00	0.20
Sulphur	<0.10	0.03

<table>
<tr><th>Criteria</th><th>JORC Code explanation</th><th>Commentary</th><th>Co-Signatory</th></tr>
<tr><td></td><td></td><td>
<table>
<tr><td>Carbon</td><td><0.20</td><td>0.05</td></tr>
<tr><td>Manganese</td><td><0.75</td><td>0.11</td></tr>
</table>
</td><td></td></tr>
<tr><td>Economic</td><td>• The inputs to the economic analysis to produce the net present value (NPV) in the study, the source and confidence of these economic inputs including estimated inflation, discount rate, etc.
• NPV ranges and sensitivity to variations in the significant assumptions and inputs.</td><td>• No Inferred Resources in the production schedule.
• The financial modelling only considers the first 10 years of the production schedule when measured and indicated resources are mined.
• The financial modelling undertaken as part of the Ore Reserve determination indicated a net present value (NPV) of US$245M after tax and an internal rate of return of 25% after tax. The key financial parameters include:
<table>
<tr><td colspan="2">Summary Financial Data</td></tr>
<tr><td>NPV$_8$ (before tax)</td><td>US$370M</td></tr>
<tr><td>IRR (before tax)</td><td>30%</td></tr>
<tr><td>NPV$_8$ (after tax)</td><td>US$245M</td></tr>
<tr><td>IRR (after tax)</td><td>25%</td></tr>
<tr><td>EBITDA/annum (LOM)</td><td>US$113M</td></tr>
<tr><td>Payback Period</td><td>4.75 years</td></tr>
<tr><td>Av LOM Production</td><td>5,700t Nb (8,700t FeNb)</td></tr>
<tr><td>LOM</td><td>30 years (10 years for Ore Reserves)</td></tr>
</table>
• Sensitivity analysis on product pricing, Opex costs and recovery are summarised in the graph below:


</td><td>HW</td></tr>
<tr><td>Social</td><td>• The status of agreements with key stakeholders and matters leading to social licence to operate.</td><td>• The Project lies within the boundary of a minimum security prison farm. As such, the Tanzanian Prisons Service (TPS) is the major social stakeholder in the project. Cradle has a good relationship with the TPS and an agreement to move the prisons buildings and accommodation as well as compensation for the occupied farm lands has been reached. This is required as the prison is currently located within the blast zone of the open pit and the prison buildings area will eventually be covered by part of the WRD and TSF infrastructure. The costs for this are included in the FS capital costs.
• As part of the ESIA study by MTL, consultation has been held with stakeholders within the broader area of the project, no material issues have been identified to date.
• The EIA report outlines the community plan that will be implemented as the project develops</td><td>WM</td></tr>
<tr><td>Other</td><td>• To the extent relevant, the impact of the following on the project and/or on the estimation and classification of the Ore Reserves:
• Any identified material naturally occurring risks.
• The status of material legal agreements and marketing arrangements.
• The status of governmental agreements and approvals critical to the viability of the project, such as</td><td>• Financing and product off-take negotiations are ongoing and are expected to be finalised in Q4 2016.
• As there is a lag time between the completion of this FS and the finalisation of the financing and off-take. Some Value Engineering activities are planned for this period as well as some Front-end Engineering & Design (FEED) activities to allow a quicker ramp-up in the execution phase.
• A number of recommendations have been identified as part of the FS study that would have a positive impact on the capital costs and execution schedule. These will be investigated as part of FEED
• The project has an existing Mining License granted until November 2026.</td><td>Others</td></tr>
</table>

Criteria	JORC Code explanation	Commentary	Co-Signatory
	mineral tenement status, and government and statutory approvals. There must be reasonable grounds to expect that all necessary Government approvals will be received within the timeframes anticipated in the Pre-Feasibility or Feasibility study. Highlight and discuss the materiality of any unresolved matter that is dependent on a third party on which extraction of the reserve is contingent.	• The project has an EIA Certificate • The permits required for construction and operation have been identified and their applications will be made as required. • The Project must currently access through Tanzanian Prison Service (TPS) controlled grounds. Cradle has an agreement with the TPS, and the Tanzanian Government and has no reason to believe that ongoing access will not occur.	
Classification	• The basis for the classification of the Ore Reserves into varying confidence categories. • Whether the result appropriately reflects the Competent Person's view of the deposit. • The proportion of Probable Ore Reserves that have been derived from Measured Mineral Resources (if any).	• The Ore Reserve is classified as Proven and Probable for the corresponding Mineral Resource in Measured and Indicated categories, respectively. • The Feasibility Study includes Inferred Mineral Resource in the production schedule after the first 10 years. These cannot be used to support an Ore Reserve and are excluded from the Ore Reserve statement.	SRD, JB
Audits or reviews	• The results of any audits or reviews of Ore Reserve estimates.	• The Feasibility Study and Ore Reserve Statement has been reviewed both internally by Cradle and PHT and by the appointed Competent Persons as outlined in the body of the announcement.	All
Discussion of relative accuracy/ confidence	• Where appropriate a statement of the relative accuracy and confidence level in the Ore Reserve 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 reserve within stated confidence limits, or, if such an approach is not deemed appropriate, a qualitative discussion of the factors which 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. • Accuracy and confidence discussions should extend to specific discussions of any applied Modifying Factors that may have a material impact on Ore Reserve viability, or for which there are remaining areas of uncertainty at the current study stage. • It is recognised that this may not be possible or appropriate in all circumstances. These statements of relative accuracy and confidence of the estimate should be compared with production data, where available.	• The project size is sensitive to the world demand for ferroniobium and has been tailored to enter the market in such a way as to optimise value for the product. • Niobium being a strategic commodity with relatively fewer players in the market, 'economic viability' of the Ore Reserve is dependent upon successful potential sale of the product. Offtake agreements are currently being negotiated and will increase the level of confidence in the Ore Reserve. • All relevant modifying factors have been applied to the design mining shapes on a global scale. • The Feasibility Study includes Inferred Mineral Resource in the production schedule after the first 10 years. These cannot be used to support an Ore Reserve. The Ore Reserve is limited to the first 10 years of Production based on Measured and Indicated classified mineral resource. • No recent production has occurred on the project.	SRD, JB