

ASX ANNOUNCEMENT AND MEDIA RELEASE

21 March 2017

INTERIM METALLURGICAL UPDATE

Cardinal Resources Limited (ASX: CDV) ("**Cardinal**" or "**the Company**") is pleased to report a second interim metallurgical update for the Namdini Project ("**Namdini**").

HIGHLIGHTS

- A number of conventional gold recovery improvement techniques are showing that overall gold recoveries of 84% are easily achievable.
- A conventional crush-float-fine grind-CIL flowsheet continues to be the preferred processing option, which allows for a low mass flotation concentrate with superior operating costs due to low volumes of high grade concentrate to be processed

Cardinal Resources Project Technical Manager Julian Barnes said:

"We have undertaken further optimisation testwork on the master composite sample reserves that remained from the 2016 metallurgical programme and these have shown a significant improvement in overall gold recovery to 84%. Further optimization testwork is ongoing.

"The objective of this recent optimisation test work was to investigate the possibility of improving overall gold recovery with the main focus on the following:

- Optimising the leach residence time; and
- Pre-leach aeration."

Cardinal's Project Manager, Bruce Lilford said:

"This baseline result is extremely encouraging for our next phase of testwork which will target a significantly higher improvement in overall recovery."

"Independent Metallurgical Operations (IMO) in conjunction with Oreway Mineral Consultants (OMC – a subsidiary of Lycopodium) from Perth, Australia have recently been contracted to develop a metallurgical programme which is representative of the entire Namdini deposit. The resulting report from this new programme is due during Q3 2017 and will be of a level sufficient to complete a feasibility study."

Cardinal's CEO / MD, Archie Koimtsidis said:

"This second round of interim results from the 2016 NMDD005 master composite has demonstrated further significant improvements as part of our ongoing metallurgical optimisation programme.

"We anticipate further improvements in overall recoveries as we continue with the testwork, in addition to growing the maiden resource of 4Moz in both size and confidence categories."

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Forward-looking statements

Certain statements contained in this Announcement, including information as to the future financial or operating performance of Cardinal and its projects, may also include statements which are 'forward-looking statements' that may include, among other things, statements regarding targets, estimates and assumptions in respect of mineral reserves and mineral resources and anticipated grades and recovery rates, production and prices, recovery costs and results, capital expenditures, and are or may be based on assumptions and estimates related to future technical, economic, market, political, social and other conditions. These 'forward – looking statements' are necessarily based upon a number of estimates and assumptions that, while considered reasonable by Cardinal, are inherently subject to significant technical, business, economic, competitive political and social uncertainties and contingencies, and involve known and unknown risks and uncertainties that could cause actual events or results to differ materially from estimated or anticipated events or results reflected in such forward- looking statements.

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All forward-looking statements made in this Announcement are qualified by the foregoing cautionary statements. Investors are cautioned that forward-looking statements are not guarantees of future performance and accordingly investors are cautioned not to put undue reliance on forward-looking statements due to the inherent uncertainty therein.

No verification

Although all reasonable care has been undertaken to ensure that the facts and opinions given in this Announcement are accurate, the information provided in this Announcement (including information derived from publicly

Statement

Information in this release that relates to the Namdini Project is based on the results of the Metallurgical Testwork program undertaken at SunTech Laboratories, Johannesburg, South Africa. The work has been monitored on behalf of Cardinal Resources by Bruce Lilford, MAusIMM, who has sufficient experience that is relevant to the style of mineralisation and type of deposit under consideration and the activities being reported. Mr Lilford consents to the inclusion in this report of the statements based on the information in the form and context in which it appears.

Competent Person's Statement

The overall release has been compiled by Dr Julian F. H. Barnes, FAusIMM, MAIG, Technical Manager of Cardinal Resources, who has sufficient experience that is relevant to the style of mineralisation and type of deposit under consideration and the activities being reported upon 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". Dr Barnes consents to the inclusion in this report of the statements based on the information in the form and context in which it appears.

Information in this release that relates to the Namdini Project is based on the results of the Metallurgical Testwork program undertaken at SunTech Laboratories, Johannesburg, South Africa. The work has been monitored on behalf of Cardinal Resources by Dr Simon Meik, FAusIMM CP (No. 106146), who has sufficient experience that is relevant to the style of mineralisation and type of deposit under consideration and the activities being reported upon 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". Dr Meik consents to the inclusion in this report of the statements based on the information in the form and context in which it appears.

JORC CODE 2012 EDITION – TABLE 1
INTERIM METALLURGICAL UPDATE
Section 1 – Sampling Technique and Data

Criteria	JORC Code Explanation	Commentary
Sampling techniques	Nature and quality of sampling (eg cut channels, random chips, or specific specialised industry standard measurement tools appropriate to the minerals under investigation, such as down hole gamma sondes, or handheld XRF instruments, etc). These examples should not be taken as limiting the broad meaning of sampling.	Nature and quality of sampling is carried out under QAQC procedures as per industry standards, with standards and blanks inserted every 22 samples.
	Include reference to measures taken to ensure sample representivity and the appropriate calibration of any measurement tools or systems used.	Sample representivity is ensured through carefully logging, with samples selected according to their lithological units.
	Aspects of the determination of mineralisation that are Material to the Public Report.	The determination of mineralisation is not yet known.
	In cases where 'industry standard' work has been done this would be relatively simple (eg 'reverse circulation drilling was used to obtain 1 m samples from which 3 kg was pulverised to produce a 30 g charge for fire assay'). In other cases more explanation may be required, such as where there is coarse gold that has inherent sampling problems. Unusual commodities or mineralisation types (eg submarine nodules) may warrant disclosure of detailed information.	HQ core is quartered, with the same quarter consistently sampled. 1m samples are taken irrespective of lithological units. The quarter core samples weigh ~2 kg, which are dried, then crushed and a split portion of <1.5 kg is pulverised to produce a 50 gm charge for fire assay.
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).	HQ core drilling with a standard tube. Triple tube in saprolite at top of the hole. Core is orientated using Reflex equipment
Drill sample recovery	Method of recording and assessing core and chip sample recoveries and results assessed.	Method of recording and assessing core samples was on a hand held Motion F5te Tablet PC using a set of standard templates supplied by Maxwell Geoservices, Perth (Maxwell).
	Measures taken to maximise sample recovery and ensure representative nature of the samples.	The measures taken to maximize sample recovery are by measuring core length drilled against core length recovered
	Whether a relationship exists between sample recovery and grade and whether sample bias may have occurred due to preferential loss/gain of fine/coarse material.	No relationship is known to exist between sample recovery and grade, and no sample bias may have occurred due to preferential loss/gain of any fine/coarse material.
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.	Core samples have been geologically logged to a level of detail to support appropriate future Mineral Resource estimations.
	Whether logging is qualitative or quantitative in nature. Core (or costean, channel, etc) photography.	Logging is qualitative and quantitative. Core is photographed both in dry and wet form.
	The total length and percentage of the relevant intersections logged.	All holes are logged in full.

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.	HQ core has been drilled, quartered and sampled, with the remaining three quarters of core stored in the original core trays and stacked on shelves under cover in the core shed
	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.	Sample preparation is completed at SGS Laboratories, Ouagadougou, Burkina Faso. All preparation equipment is flushed with barren material prior to the commencement of sample preparation. The entire sample is dried, crushed to a nominal 2mm using a Jaw Crusher, then <1.5 kg is split using a Jones type riffle. The reject sample is retained in the original sample bag. The split is pulverised in a LM2 grinding mill to a nominal 85% passing 75 micron size fraction. An approximate 200 gram sub-sample split is taken for fire assay with the pulverized residue retained in a plastic bag. The pulverized split is fire assayed by standard procedures with an AAS finish to 10 ppb detection limit. Both the remaining reject and pulverized samples are returned and stored at Cardinal's Bolgatanga premises.
	Quality control procedures adopted for all sub-sampling stages to maximise representivity of samples.	Quality control procedures adopted for all sub-sampling stages to maximize representivity of samples uses commercial certified reference material (CRM) for standards.
	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.	Measures taken to ensure that the core sampling is representative is to sample quarter core at 1m intervals irrespective of lithologies.
	Whether sample sizes are appropriate to the grain size of the material being sampled.	The sample sizes are considered appropriate to give an accurate indication of gold mineralisation.
Quality of Assay data and laboratory tests	The nature, quality and appropriateness of the assaying and laboratory procedures used and whether the technique is considered partial or total.	The pulverized rock sample is weighed and mixed with flux and fused using lead oxide at 1,100°C, followed by cupellation of the resulting lead button (Dore bead). The bead is digested using 1:1 HNO ₃ and HCl and the resulting solution is submitted for analysis.
		<p>The digested sample solution is aspirated into the Flame Atomic Absorption Spectrometer (AAS), aerosolised, and mixed with the combustible gas, acetylene and air. The mixture is ignited in a flame whose temperature ranges from 2,100 to 2,800°C. During combustion, atoms of the gold in the sample are reduced to free, unexcited ground state atoms, which absorb light. Light of the appropriate wavelength is supplied and the amount of light absorbed can be measured against a standard curve.</p> <p>Results have a lower gold detection limit of 10 ppb. The AAS equipment is calibrated with each</p>

Criteria	JORC Code Explanation	Commentary
		<p>job.</p> <p>The analytical technique is industry standard fire assay which is considered to be a total digest of gold.</p>
	<p>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.</p> <p>Nature of quality control procedures adopted (eg standards, blanks, duplicates, external laboratory checks) and whether acceptable levels of accuracy (ie lack of bias) and precision have been established.</p>	<p>No hand held geophysical tools are used.</p> <p>Sample preparation checks for fineness are carried out by the laboratory as part of their internal procedures to ensure the grind size of 85-90% passing 75 micron is being attained. Each batch of 84 samples has 10 laboratory checks (20%), with the grind size varying between 87-99% passing 75 micron, which is acceptable. Laboratory QAQC involves the use of internal lab standards using certified reference material and blanks.</p> <p>Certified reference materials, having a range of values, and in-house blanks are inserted in the ratio of 1:22. No duplicate samples are taken as quarter core samples are submitted for fire assay.</p> <p>External laboratory checks are done on a three monthly basis through Laboratories Quality Services International (LQSI). Recent LQSI checks of Fire Assay analyses on Low Grade Oxide Material produced acceptable levels of accuracy and precision.</p>
Verification of sampling and assaying	The verification of significant intersections by either independent or alternative company personnel.	The verification of significant intersections by either independent or alternative company personnel has not occurred.
	The use of twinned holes.	There has been no use of twinned holes.
	Documentation of primary data, data entry procedures, data verification, data storage (physical and electronic) protocols.	Primary data was collected on a hand held Motion F5te Tablet PC using a set of standard templates supplied by Maxwell Geoservices, Perth (Maxwell). Daily data was synchronised and digitally captured by Maxwell for validation and compilation into Excel and Access spreadsheets and stored on the Cardinal servers located in Bolgatanga, Ghana, West Africa.
	Discuss any adjustment to assay data.	No adjustments were made to assay data.
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.	Accuracy of drill hole collar surveys is +/- 3m using a hand held Garmin GPSmap 62s GPS.
	Specification of the grid system used.	WGS84 Sector 30N, with local grid baseline at 010° True North and lines at 50m to 100m intervals and stations at 50m along lines.
	Quality and adequacy of topographic control.	The quality and adequacy of topographic control is

Criteria	JORC Code Explanation	Commentary
		+/- 3m using a hand held Garmin GPSmap 62s GPS.
Data spacing and distribution	Data spacing for reporting of Exploration Results.	Data spacing is 50-100m (northing) and 50-100m (easting).
	Whether the data spacing and distribution is sufficient to establish the degree of geological and grade continuity appropriate for the Mineral Resource and Ore Reserve estimation procedure(s) and classifications applied.	The data spacing and distribution is considered to be sufficient to establish a degree of geological and grade continuity appropriate for the Mineral Resource and Ore Reserve estimation procedure(s) and classifications applied.
Orientation of data in relation to geological structure	Whether sample compositing has been applied.	No sample compositing has been applied.
	Whether the orientation of sampling achieves unbiased sampling of possible structures and the extent to which this is known, considering the deposit type.	The orientation of sampling achieves unbiased sampling of possible structures as drilling is orientated normal to the dip and foliation of the deposit.
	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.	No orientation based sampling bias has been identified in the data to date.
Sample security	The measures taken to ensure sample security.	The measures taken to ensure sample security are through an independent Ghanaian security contractor. Samples are stored at Cardinal's base camp located at Bolgatanga, Ghana, West Africa under security until collected by SGS Laboratories and transported to their Ouagadougou laboratory in Burkina Faso.
Audits or reviews	The results of any audits or reviews of sampling techniques and data.	Sampling techniques are of industry standards. Data is audited by Maxwell Geoservices (Perth), who have not made any other recommendations.

Section 2 – Reporting of Exploration Results

(Criteria listed in section 1 will also apply to this section where relevant)

Criteria	JORC Code Explanation	Commentary
Mineral Tenement and Land Status	Type, name/reference number, location and ownership including agreements or material issues with third parties including joint ventures, partnerships, overriding royalties, native title interests, historical sites, wilderness or national park and environmental settings.	The Namdini Mining Licence is located in NE Ghana. Namdini Mining Limited (NML) holds the mining licence. NML signed a Heads of Agreement with Savannah Mining Ltd (Savannah) to provide "Mining Support" services to NML. Savannah has signed a Heads of Agreement with Cardinal Mining Services Ltd (CMS) to provide "Mining Support" services in relation to the Namdini Mining Licence.
	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.	There are no known impediments to offer "Mining Support" services to Namdini Mining Limited within the Namdini Mining licence area.
Exploration Done by Other Parties	Acknowledgment and appraisal of exploration by other parties.	No previous systematic exploration has been undertaken.

Criteria	JORC Code Explanation	Commentary
Geology	Deposit type, geological setting and style of mineralisation	<p>The deposit type comprises gold mineralisation within sheared and highly altered rocks containing sulphides (pyrite and arsenopyrite).</p> <p>The geological setting is a Paleo-Proterozoic Greenstone Belt comprising Birimian metavolcanics, volcanoclastics & metasediments located in close proximity to a major 30 km ~N-S regional shear zone with splays.</p> <p>The style of mineralisation is hydrothermal alteration containing disseminated gold-bearing sulphides</p>
Drill hole information	<p>A summary of all information material to the understanding of the exploration results including tabulation of the following information for all Material drill holes:</p> <ul style="list-style-type: none"> • Easting and northing of the drill hole collar • Elevation or RL (Reduced Level – elevation above sea level in meters) of the drill hole collar • Dip and azimuth of the hole • Down hole length and interception depth • Hole length <p>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.</p>	<p>A summary of all information is contained within this announcement.</p> <p>There has been no exclusion of information.</p>
Data aggregation methods	<p>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.</p> <p>Where aggregated 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.</p> <p>The assumptions used for any reporting of metal equivalent values should be clearly stated.</p>	<p>No weighting averaging techniques nor cutting of high grades have yet been undertaken as assay results are awaited.</p> <p>Aggregated intercepts incorporating short lengths of high grade results within the lithological units are calculated to include no more than intervals of 3-5m below grades of <0.5 g/t Au when assay results are received</p> <p>No metal equivalent values were used for this report.</p>
Relationship between mineralisation widths and intercept lengths	<p>These relationships are particularly important in the reporting of exploration results.</p> <p>If the geometry of the mineralisation with respect to the drill hole angle is known, its nature should be reported.</p> <p>If it is not known and only the down hole lengths are reported, there should be a clear statement to</p>	<p>The relationship between mineralisation widths and intercept lengths is not yet known.</p> <p>The geometry of the mineralisation with respect to the drill hole angle is not yet known.</p> <p>Only down hole lengths are reported when assay results are received and true widths of mineralisation are not yet known.</p>

Criteria	JORC Code Explanation	Commentary
	this effect (e.g. 'down hole length, true width not known').	
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 plane view of drill hole collar locations and appropriate sectional views.	Appropriate locality map, plan view and sections are included in this announcement.
Balanced Reporting	Where comprehensive reporting of all Exploration Results is not practical, representative reporting of both low and high grades and/or widths should be practiced to avoid misleading reporting of Exploration Results.	The assay results of the drill holes NMDD472-754, NMDD470-774 and NMRC470-784 are attached.
Other substantive exploration data	Other exploration data, if meaningful and material, should be reported including (but not limited to): geological observation; 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.	<p>The interpretation of the geological observations shown in Figures 1 and 2 are subject to possible change as new information is gathered.</p> <p>No geochemical surveys, bulk sampling, metallurgical, mineralogical or geotechnical assessments were undertaken.</p>
Further Work	<p>The nature and scale of planned further work (e.g. tests for lateral extensions or depth extensions or large – scale step – out drilling).</p> <p>Diagrams clearly highlighting the areas of possible extensions, including the main geological interpretations and future drilling areas, provided this information is not commercially sensitive.</p>	<p>A combination of reverse circulation and diamond drilling is planned, followed by possible additional ground geophysical surveys depending on the results of the drilling.</p> <p>The plan included shows the possible extent of mineralisation based on geological observations and previous assay results. Future drilling is planned north and west within the Namdini Project Area to obtain strike and down dip extensions to the gold mineralisation.</p>