

**PRESS RELEASE**  
31 October 2019

**ASX/TSX: CDV**  
2019-19

## **QUARTERLY ACTIVITIES FOR THE PERIOD ENDED 30 SEPTEMBER 2019**

**Cardinal Resources Limited** (ASX: CDV; TSX: CDV) ("**Cardinal**" or "**the Company**") a Ghana gold focused exploration and development company, is pleased to present its Quarterly activities report for the period ended 30 September 2019.

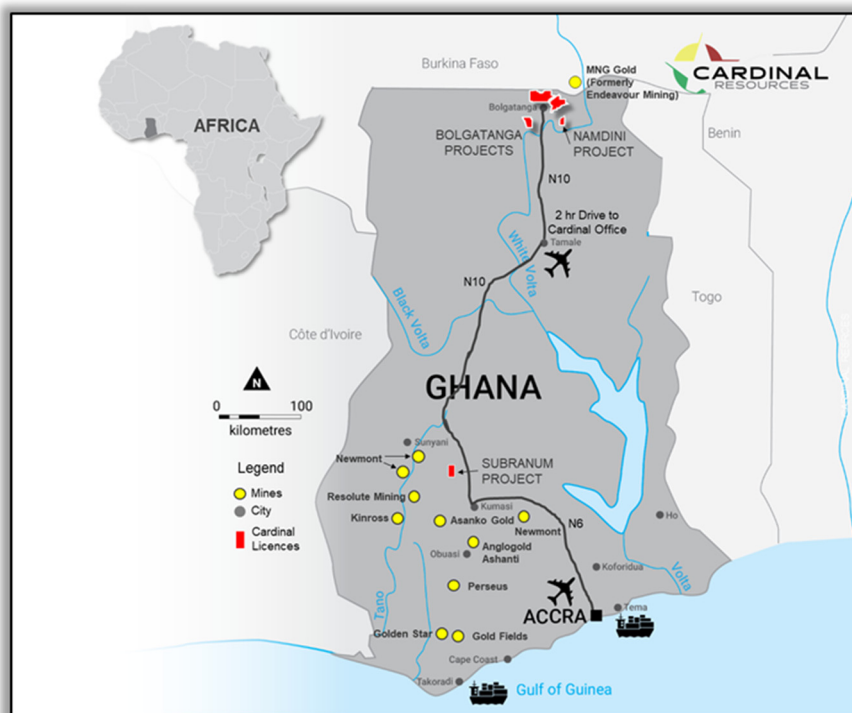
### **HIGHLIGHTS**

- On July 10, 2019 the Company announced further intersections of shallow, high-grade gold mineralisation from diamond drill programme at the new Ndongo East discovery, located approximately 24km north of the Namdini Gold Project in Ghana, West Africa.
- On July 12, 2019 the Company held a successful Public Hearing and Presentation for Traditional Paramount Chief which demonstrated strong local support for the Namdini Gold Project.
- On July 16, 2019 the Company announced positive results from infill drilling testing of a selected area within the proposed starter pit that encompasses the first 2 to 3 years production at its flagship Namdini Gold Project, which provided another layer of confidence that the spatial distribution and tenor of gold within the test area are in line with the Mineral Resource expectations.
- On September 4, 2019 the Company announced a key appointment of Mr. David Anthony to the position of Chief Operating Officer ahead of its Namdini Gold Project development in Ghana, West Africa.
- On September 30, 2019 the Company announced its Feasibility Study status in reference to its announcement of June 4, 2019 in relation to its proposed Feasibility Study release scheduled for Q3, 2019. Having received the awaited Maelgwyn (Aachen<sup>TM</sup>) laboratory data, the Company released its Feasibility Study on October 28, 2019.

### **OUTLOOK**

The principal activity of the Company is gold exploration and mine development in Ghana. The Company holds tenements prospective for gold mineralisation in Ghana in two granite-greenstone belts: the Bolgatanga Project and the Namdini Gold Project ("Namdini Gold Project" or "Namdini"), which are, respectively, located within the Greenstone Belts in northeast Ghana and the Subranum Project, which is located within the Sefwi Greenstone Belt in southwest Ghana.

The main focus of activity is the Namdini Gold Project which has a gold Ore Reserve of 5.1 Moz (138.6Mt @ 1.13g/t Au; 0.5g/t Au cut-off) inclusive of 0.4 Moz Proved (7.4 Mt @ 1.31g/t Au; 0.5 g/t Au cut-off) and 4.7 Moz Probable (131.2 Mt @ 1.12 g/t Au; 0.5g/t Au cut-off).



**Figure 1: Cardinal Resources Tenements in Ghana**

#### Subsequent to end of Quarter

- On October 3, 2019 the Company announced that it successfully raised \$17.6M through exercise of listed options. A total of 117,398,958 of the Listed Options were exercised, being 99.84% of the Listed Options on issue, raising approximately \$17.6 million in cash proceeds. Only 188,081 Listed Options expired unexercised.
- On October 28, 2019 the Company released its Feasibility Study confirming the Namdini Project as a tier one gold project.

### THE NAMDINI GOLD PROJECT

#### Property Title / Mining Lease

A Large-Scale Mining License covering the Namdini Mining Lease was granted to Cardinal Namdini Mining Limited (“**Cardinal Namdini**”), a wholly owned subsidiary of Cardinal, by the Minister of Lands and Natural Resources under the Ghanaian Minerals and Mining Act 2006 (Act 703) in December 2017. The Large-Scale Mining License covers 19.54 km<sup>2</sup> in the Dakoto area of the Talensi District Assembly in Upper East Region of Ghana evidenced by a Mining Lease for an initial period of 15 years and is renewable.

#### Project Development and Finance Update

Project Finance Adviser, Cutfield Freeman & Co, continues to work closely with Cardinal to ensure that Cardinal is well positioned to execute project finance for the Namdini Gold Project as swiftly as possible following completion and release of the Feasibility Study, which was released on October 28, 2019.

The company has received substantial interest from a range of potential financiers, providing the Company with a high level of confidence that it will be able to secure the necessary project funding package on favourable terms.

Cardinal’s Project Finance team continues to evaluate Indicative Term Sheets from a number of project financiers including traditional senior debt lenders.

### Project Development Partners

COMPANY	ROLE
Lycopodium	Feasibility Study Managers. Process plant and associated infrastructure. Capital and Process Operating cost estimation.
Golder Associates	Mine design, planning, optimisation and scheduling. Geotechnical, Hydrology and Hydrogeological engineering. Mine operational costs.
Orway Minerals Consultants	Comminution data analysis, crushing and grinding option studies.
ALS Laboratory (Perth)	Metallurgical testwork to support the process design criteria.
Knight Piésold Consulting	Tailings Storage Facility and selected infrastructure design.
Independent Metallurgical Operations	Metallurgical testwork management, analysis and process flowsheet development.
MPR Geological Consultants	Mineral Resource modelling of the Namdini Deposit.
Orefind	Geology and deposit structural genesis.
Sebbag Group International	Mine Design Review.
NEMAS Consult & Geoscience Consulting	Environmental Impact Assessment Study.
Whittle Consulting	Enterprise Optimisation of the Namdini Project.
Alastri Software	Tactical Scheduling, Haulage Modelling and Reserving Software.
Maelgwyn Mineral Services Africa	Aachen™ process metallurgical optimisation.
BDO Advisory	Financial Model Integrity & Reviewer (PEA, PFS and FS).
MKM Social	Socio-Economic Study and Resettlement Action Plan.

**Table 4: Study Team**

### Project Metallurgical Update

Testwork continued at Maelgwyn Mineral Services Africa (MMSA) laboratory in South Africa to demonstrate potential uplift in gold recovery for principle lithologies and grade bins.

Independent Metallurgical Operations (IMO) sent a flotation specialist to assist MMSA with the testwork focusing on optimising their larger flotation cells used for testwork. In addition to this visit Daryl Evans from IMO, and one of Cardinal's Competent Persons for the Namdini Project and Bruce Lilford, Cardinal's Project Manager, undertook an inspection of the testwork being undertaken by MMSA.

Mr. Lilford also visited the Pan African Resources Elikhulu process plant in Evander, South Africa which utilises the Aachen technology in their operation. Operations Management at Elikhulu reported positive results from the Aachen installation.

Results from the MMSA testwork are being received on an ongoing basis and the detailed costs benefit analysis continues to be on-going to define the optimal regrind selection size.

In addition to the MMSA testwork, further testwork is being undertaken at the ALS laboratory in Perth to define process design criteria data for Lycopodium's process design, as well to provide umpiring results for the work being undertaken by MMSA. MMSA has further transported test samples to ALS for audit purposes. The results of the audit are still pending.

## Feasibility Study Update

During the Quarter the Company announced that its Feasibility Study (FS) is near completion and would be released during October 2019, the FS was released on October 28, 2019. The FS was postponed to allow the Company's engineering consultants further time to detail the Namdini Gold Project design for further mining, processing and infrastructure definition.

Cardinal's engineering consultants, Lycopodium, have solicited a time validity extension for the detailed quotations and tenders for the majority of the equipment and materials in the design.

The capital and operating cost estimates are being updated with recent testwork results from MMSA and ALS to ensure full integration of the testwork results into the design.

Further mine schedule and cost optimisation is being completed by Sebbag Group International, Golder Associates (Golder) and Alastri Software (Alastri) to enhance project economics. This has included, but has not been limited to:

- Whittle Consulting optimised internal phase pit shell recommendations. These have been utilised by Golder to convert pit shells to practical mine phase designs, which will result in bringing revenue forward and maximising NPV.
- Pit design initiatives include rationalisation of ramp development, integration of geotechnical berms and interphase interactions over the LOM, plus selective smoothing to reduce waste mining.
- Golder utilised mine optimisation software to strategically schedule the pit / phase extraction sequences, to guide the tactical mine schedule, balance process throughput and mining constraints.
- Further optimisation is in progress using Alastri, to develop tactical mine schedule and optimised mine haulage (i.e. waste dump placement and stockpile management).
- Whittle Consulting are further consulting and will provide advice with respect to cut-off optimisation and strategic scheduling, once finalised mine and phase designs have been completed.

Geochemical testing undertaken by Golder has reported the following:

- There is an excess of buffering capacity in the system that can offset the acidity generated by oxidation of sulphides.
- Data suggest that most rock types are unlikely to generate acid leachate.
- The mine schedule will be updated once the testwork results confirm the acid generating potential of the waste.

The Company has also updated the High Voltage (HV) power supply study for the FS design. Three options were presented to Cardinal by ECG who are undertaking the HV study. Further options were being considered for FS and were finalised during the study.

## Environmental and Social Update

Developing a successful and sustainable gold mine continues to be a key focus for Cardinal. Progress on the environmental permitting is as follows:

- Environmental Impact Study (EIS) has been submitted to the Ghana Environmental Protection Agency (EPA) for approval.
- TSF EIS Scoping Report Submitted in May 2019 to the EPA, with the EIS to be submitted shortly.
- A successful Public Hearing was conducted July 2019.

Ghana based company, MKM Social are continuing with development of the Relocation Action Plan (RAP) and Socio-Economic and Health Baseline Study. The aim of this study is to outline the framework to meet Ghana's Environmental Protection Agency permit requirement and international best practice such as the Equator Principles, the International Finance Corporation's (IFC) Performance Standards on Social and Environmental Sustainability. Below is a summary of the progress, as follows:

- Reconnaissance of Project Affected People and Facilities has been in completed.
- The baselining site visit was completed in August 2019.

- MKM representatives attended the environmental Public Hearing in July 2019.
- The first draft for the baseline report is expected in October 2019.

### Project Development Timeline

The Company released its FS after Quarter end, on October 28, 2019, having received the awaited Maelgwyn (Aachen™) laboratory results (Refer to ASX/TSX press release September 30, 2019).

Milestone	Target Timeline
Completion of Pre-Feasibility Study ( <b>Completed</b> )	Q3 2018
Completion of Feasibility Study ( <b>Completed</b> )	Q4 2019
Final Investment Decision	Q4 2019
Target Production Commencement	H2 2022

**Table 5: Namdini Project Development Timeline**

The above schedule is subject to available funding, positive outcomes for the Feasibility Study and favorable timelines for permitting.

### Namdini Project Drilling

#### *Namdini Infrastructure Sterilisation Drilling*

The Company continued with sterilisation drilling of the proposed infrastructure area within the Namdini Mining License.

To date, approximately 32,610m of drilling has been completed, comprising of 333 RC holes for approximately 3,1975m and 2 diamond drill holes for approximately 635m (Figure 2).

During the Quarter, 19 RC holes were completed for a total of 1,859m with 2,036 samples, including QAQC controls, and have been submitted to the laboratory for gold analysis using Fire Assay analytical technique (Table 6). This drilling was conducted to complete the sterilisation programme planned over the northern area of the mining lease and the proposed plant area.

Sterilisation drilling to date has returned no significant mineralisation.

Programme	No. Holes	RC (m)	DD (m)	Total (m)	No. Samples	No. Duplicates	No. Blanks	No. Stds	Total Samples
Sterilisation Drilling	19	1,859	-	1,859	1,859	88	44	45	2,036

**Table 6: Namdini Sterilisation Drilling**

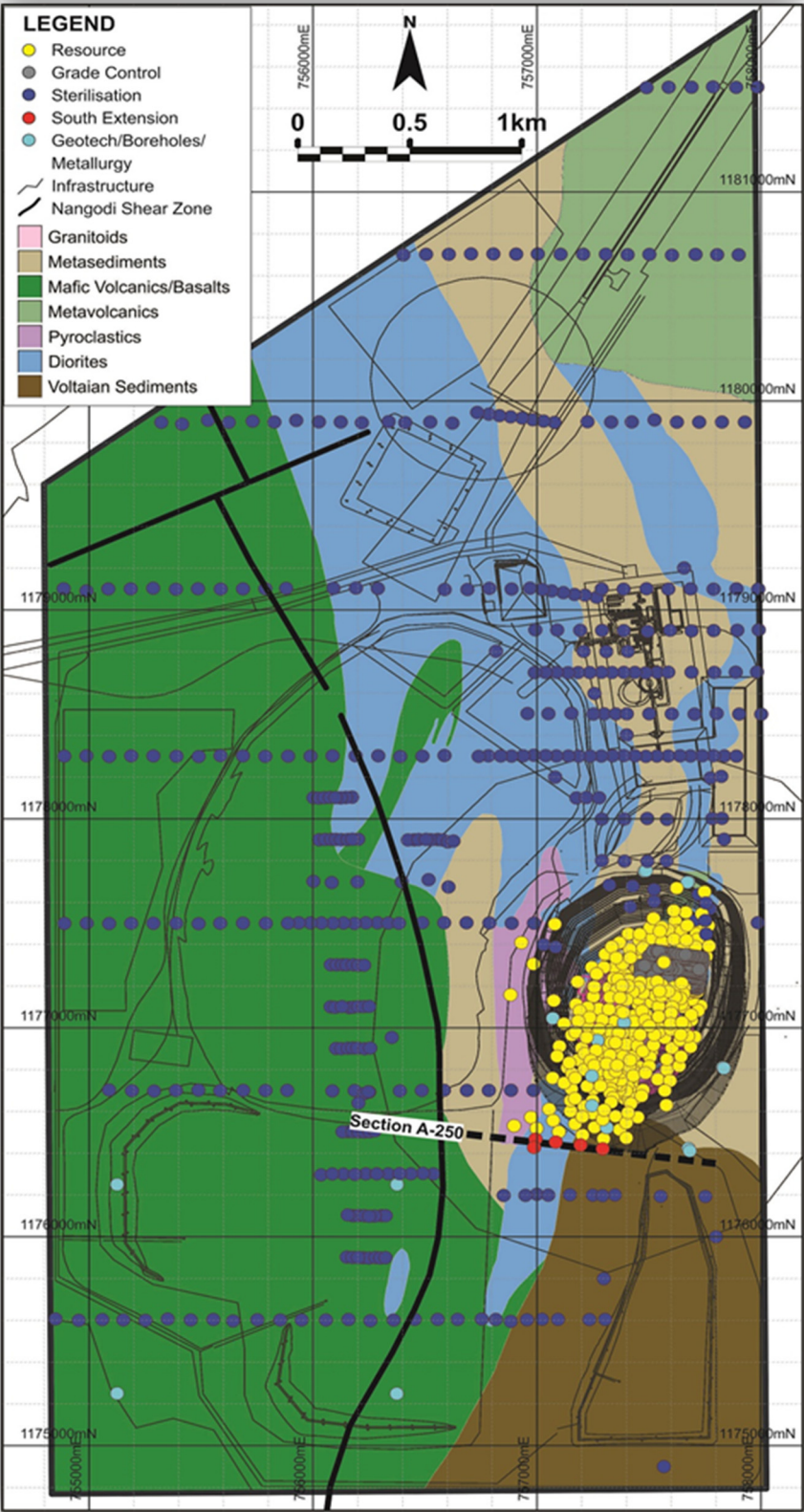


Figure 2: Namdini Project Drill Locations Showing the Proposed Infrastructure and the Designed Pit

### Namdini Southern Extension Drilling

During the quarter the Company received results from the three diamond drill holes, totaling approximately 2,200m, that were completed during the June 2019 quarter on a fence 50m south of the Namdini deposit (Figure 2 - Section A-250). This drilling was aimed at testing the southerly strike extension of the mineralisation beyond the current planned Open Pit containing 5.1Moz Ore Reserve (138.6 Mt @ 1.13 g/t Au; 0.5 g/t Au cut-off), inclusive of 0.4Moz Proved (7.4 Mt @ 1.31 g/t Au; 0.5 g/t cut-off) and 4.7Moz Probable (131.2 Mt @ 1.12 g/t Au; 0.5 g/t cut-off).

All drill holes returned significant intersections including, **3m @ 0.8g/t Au** from 370.5m, **3m @ 0.7g/t Au** from 378.5m and **6m @ 1.9g/t Au** from 402.5m all in NMDD167; **3m @ 2.2g/t Au** from 215m in NMDD176 and **7.0m @ 1.0g/t Au** from 121m in NMDD175 (Figure 3).

The intercepts are hosted within moderately altered diorites, minor metavolcanics, granitoid slivers, quartz stringers and disseminated pyrites.

These drill results, in addition to mapping of nearby artisanal mine exposures, show that the mineralisation continues along strike to the south. The mineralisation appears to be a narrow vein structural system, compared to the more coherent and broad-zones of disseminated mineralisation, defined in the Namdini Deposit.

The Company is encouraged by the coherent lithology and mineralisation intersected by drilling at depth and below the current pit optimisation. The underground potential of the mineralisation will be tested by exploration drilling targeting the depth extensions below the current planned open pit.

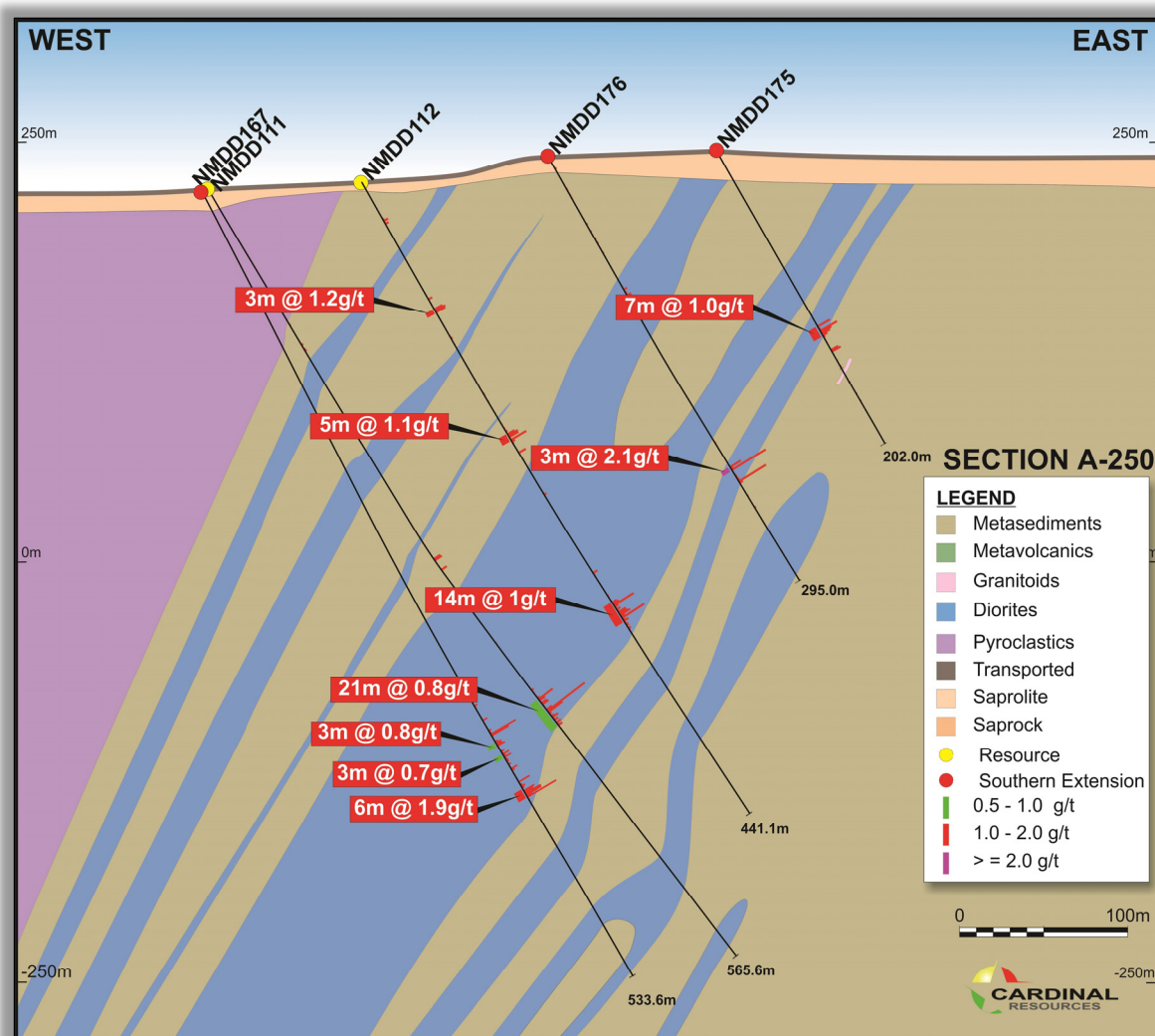


Figure 3: Section Through the Southern Extension Drill Holes

## REGIONAL EXPLORATION UPDATE

The Company has two exploration projects: The Bolgatanga Project which includes Bongo, Kungongo and Ndongo Prospecting License Areas (Figure 4) in the northeast of Ghana and the Subranum Project located in southwest Ghana (Figure 1).

The main focus of the Company's regional exploration program during the Quarter was completing diamond drilling, auger drilling and preliminary bottle roll cyanide leach testing at Ndongo East on its highly prospective areas along the Nangodi Shear Zone, within the Ndongo Prospective License. Detailed ground geophysical surveys were also ongoing over the Ndongo License area during the Quarter. During Q1, Q2 and Q3 of 2019, Cardinal reported several intersections of high-grade gold at its new Ndongo East discovery within the Ndongo License (refer to ASX/TSX news releases dated January 23, 2019, March 27, 2019 and July 10, 2019).

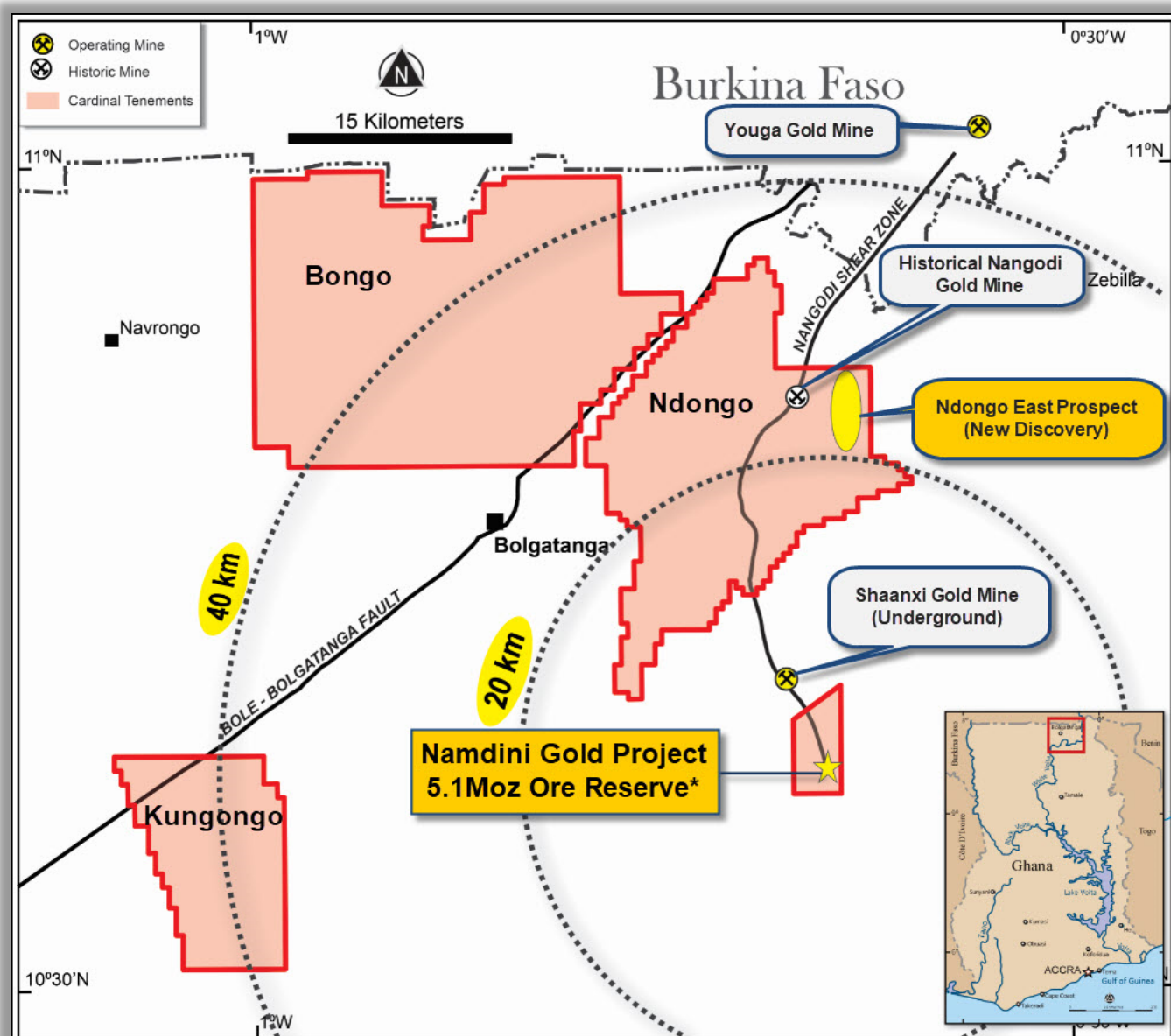


Figure 4: Namdini Mining License and Bolgatanga Project Tenements

\*7.4Mt @ 1.31g/t Au for 0.4Moz Au Proved and 131.2Mt @ 1.12g/t Au for 4.7Moz Au Probable; 0.5g/t Au cut-off

## BOLGATANGA PROJECT

### Ndongo License Area

The Company has continued to concentrate its exploration focus this Quarter on the Ndongo License which covers an area of 325km<sup>2</sup> (Figure 4). Exploration has defined seven prospects (Figure 5) totalling approximately 70km in strike length within approximately 15-25km north of the Namdini Gold Project.

The Nangodi Shear Zone which lies within the Ndongo tenement is spatially related to no fewer than four major gold discoveries, including the Company's Namdini Gold Project, the Shaanxi Mine, the historic Nangodi Gold Mine and the Youga Gold Mine in Burkina Faso, adjacent to the Ghana border (Figure 5). In addition, there are numerous historic shallow artisanal workings along many parts of this shear zone.

### Ndongo East Prospect

#### Diamond Drilling

Two Diamond Drill holes were completed on the Ndongo East Prospect during the Quarter for a total of 378.66m with 413 samples, including QAQC controls. All samples were submitted to SGS Ghana analytical laboratory for analysis of gold using the Fire Assay analytical method (Table 7).

Prospect	Drill Method	No. Holes	Total (m)	No. Samples	Duplicates	Blanks	Stds	Total Samples
Ndongo East	DD	2	378.66	395	-	9	9	413

**Table 7: Ndongo East Exploration Drilling for Q3 2019**

Assay results from the two drill holes together with three diamond drill holes that were completed in the previous Quarter were received. The drilling was completed on a representative section (E1-E1) within the well-defined mineralised zone (Figure 6) with the objective of systematically testing the mineralisation at depth and up dip where the mineralised zone is expected to sub crop. Drilling on the fence was approximately to 25 to 50m centres.

Best intercepts in the new drill holes this Quarter include:

- **4.1m @ 13.1g/t Au** from 96m in NDDD085
- **9.1m @ 2.9g/t Au** from 37m in NDDD086
- **7.6m @ 4.8g/t Au** from 151m in NDDD088

These intercepts are hosted within a gold-bearing, pyrite-silica-ankerite carbonate altered, shear zone which dips to the northwest. As shown in Figures 6 and 7.

- The first two deep holes NDDD088 and NDDD089 end in mineralisation and add approximately 90 metres down dip extent to this section of the ore zone.
- The two shallow holes NDDD086 and NDDD087 on the same section confirm the mineralisation sub cropping with encouraging grades and width of **9.1m @ 2.9g/t Au** from 37m and **5m @ 1.8g/t Au** from 5m respectively.
- Results to date have indicated shallow mineralisation intercepts to approximately 80 metres vertically below surface with encouraging grades and thickness.
- The mineralised system remains open along a northeast-southwest strike and at depth with multiple mineralised intersections.

Previously, numerous shallow depth intersections over significant widths were intercepted in numerous holes including:

- **5.3m @ 13.9g/t Au** from 78m in NDDD063\*
- **5.5m @ 3.8g/t Au** from 31m in NDDD072\*
- **3.7m @ 3.3g/t Au** from 59m in NDDD064\*
- **2.7m @ 7.7g/t Au** from 19m in NDDD068\*
- **2.0m @ 18.3g/t Au** from 59m in NDDD066\*
- **14.0m @ 7.0g/t Au** from 69m in NDDD046\*
- **9.0m @ 23.3g/t Au** from 60m in NDRC248\*
- **8.3m @ 11.3g/t Au** from 76m in NDDD059\*

- **5.2m @ 4.5g/t Au** from 60m in NDDD060\*
- **3.0m @ 29.3g/t Au** from 45m in NDDD036\*

\*Refer to ASX/TSX press releases dated 16 July and 29 August 2018, 23 January 25 March and 10 July 2019

These encouraging results to date at the Ndongo East Prospect continue to encourage further carefully measured investment into establishing viable shallow high-grade mineralised zones which could develop into possible satellite pits for the Namdini Gold Project located approximately 24km south.

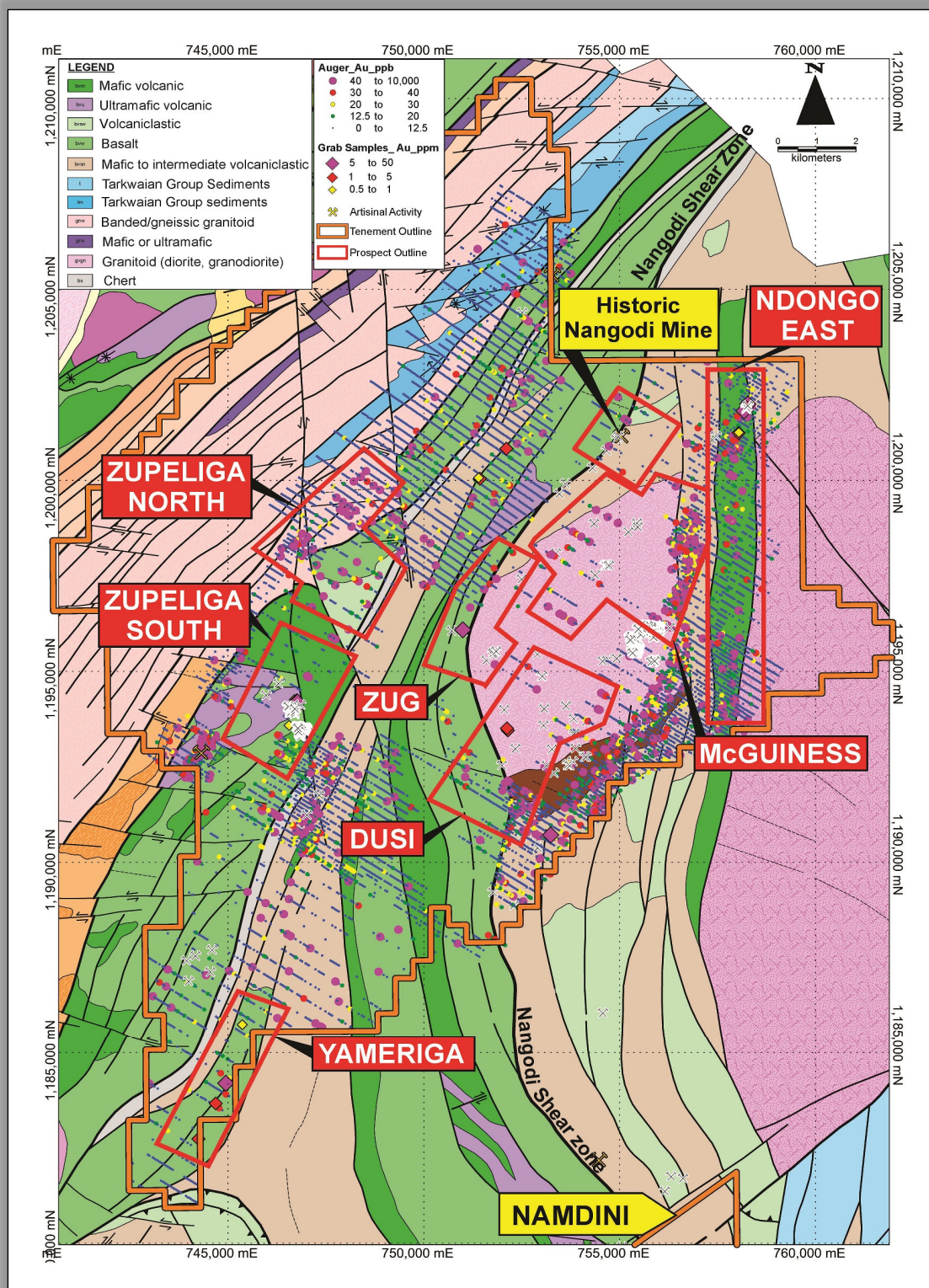


Figure 5: Ndongo Prospecting License showing Local Prospects

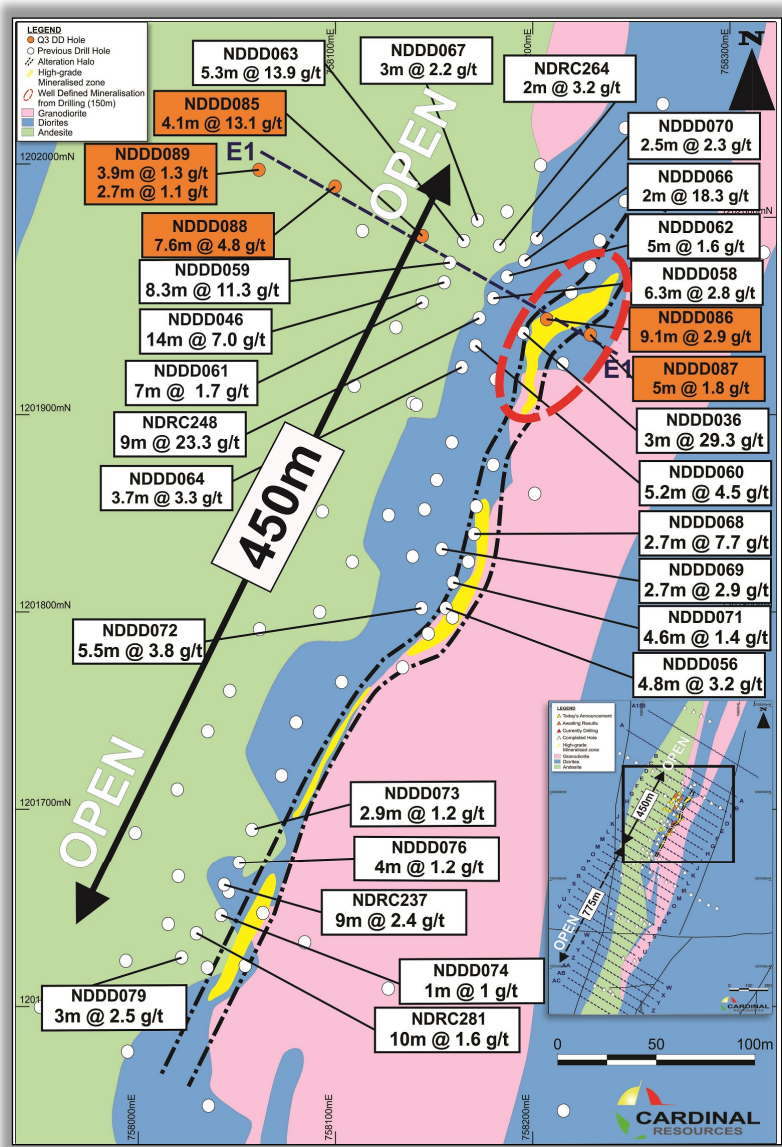


Figure 6: Ndongo East Prospect with Drill Locations showing NE-SW Mineralised Structures Open Along Strike

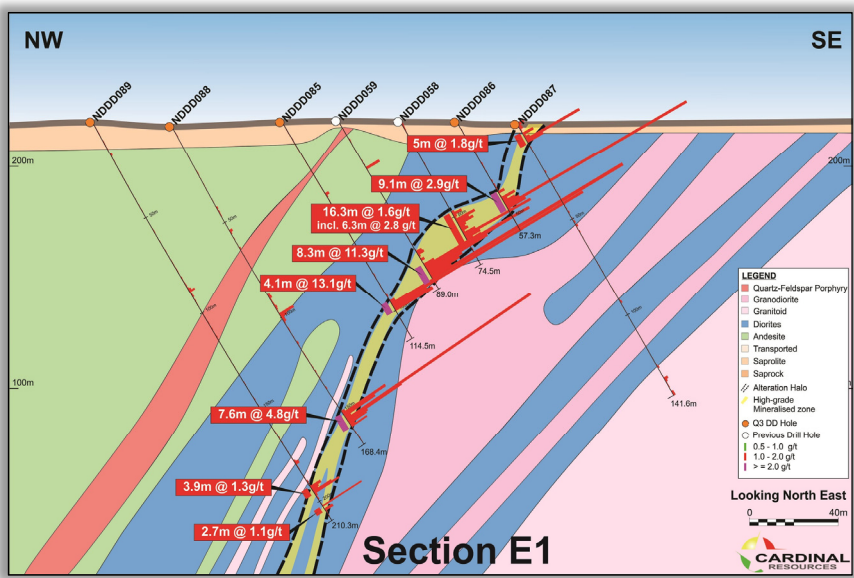


Figure 7: Ndongo East Prospect Section E1-E1.

## Auger Drilling

The Company continued field work focused on confirmation of targets, field mapping and auger infill drilling of previously defined gold anomalies within the structural corridor hosting the Ndongo East initial discovery.

After an extensive 2,047 auger infill drilling programme of previously identified gold anomalies defined by 200m by 50m - 100m spaced sampling (refer to ASX/TSX press releases dated December 13, 2017 and May 28, 2018) to 50m centres along 100m spaced lines, for a total of 7,952m, the soil geochemical gold anomalies are now defined to a higher confidence extending over approximately 9km in strike length and between 0.5 to 1km wide. All results to date are illustrated on Figures 8 and 9. The anomaly highlights two subparallel trends consisting of:

- a more coherent geochemical gold anomaly trending NNE-SSW along the contact between mafic to intermediate volcanoclastic and granitoid rocks, over approximately 7km, open to the southwest; and
- a cluster of geochemical gold anomalies starting immediately to the south of the Ndongo East discovery and trending NS over 7km to the south. Each of these anomalies strike over approximately 1.2 to 1.5km lengths with similar signature to the initial discovery zone. The results of the new infill auger results for Au > 40ppb have been summarised in Schedule 1 Table 16 of the report. The Company plans to drill test these gold geochemical anomalies, as the soil sampling results to date suggest a potential to discover additional high-grade shallow mineralisation such as Ndongo East.

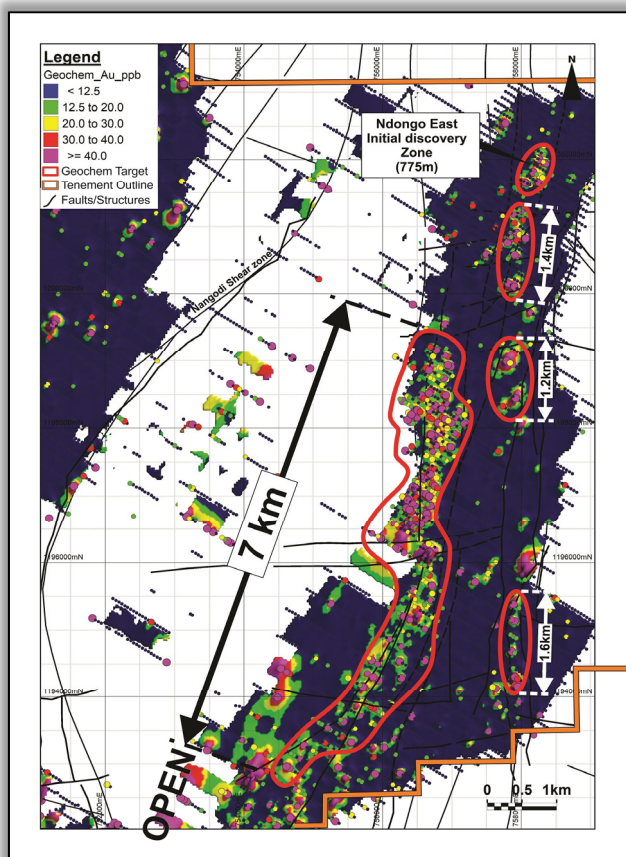


Figure 8: Ndongo East Targets over Auger Points and Gold Grade Contours

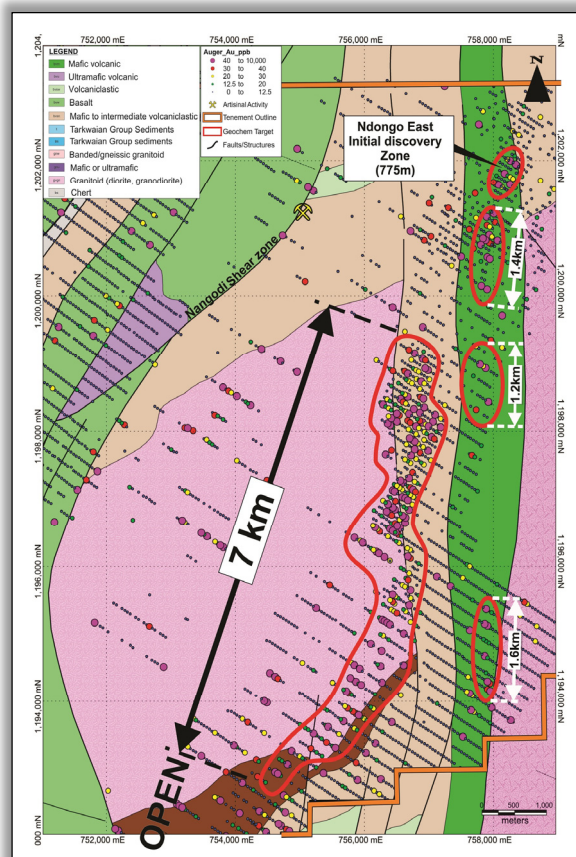


Figure 9: Ndongo East Target over Auger Results and Geology

### ***Preliminary Bottle Roll Cyanide Leach Test***

The Company is encouraged by the results of preliminary bottle roll cyanide extraction tests completed at the Ndongo East prospect. These preliminary results suggest that the mineralisation at Ndongo East will be suitable to conventional cyanide leach gold extraction.

The preliminary bottle roll cyanide leach testing was conducted using samples selected from 12 representative diamond drill holes. Samples used for the tests weighed approximately 2kg each and were taken primarily from fresh rock mineralised intercepts. The purpose of the bottle roll tests was to initially assess the gold recovery through a simple industry standard cyanide leaching process. The tests were conducted at the certified SGS Laboratories in Ghana and South Africa.

#### **Bottle Roll Cyanide Leach Test Samples Collection:**

Twelve coarse reject samples from twelve diamond drill hole intercepts, that had previously been crushed to 75% passing -2mm with predicted gold grade range of 1.4 to 29.3g/t based on original Fire Assay results were selected. These samples were representative of potential ore-grade mineralisation of the Ndongo East initial discovery zone and were selected from varying depths within the fresh rock.

Each sample selected was homogenised by passing the entire sample several times through the riffle splitter and then splitting off a 3.0 kg sample.

Test sample locations are shown in Figure 9 and described in Table 8 below:

HoleID	SampleID	Depth From (m)	Depth To (m)	Length (m)	Predicted Head Grade <sup>^</sup> (Au g/t)
NDDD036	NDMC0001	45.0	48.0	3.0	29.3
NDDD037	NDMC0002	122.0	125.0	3.0	4.1
NDDD046	NDMC0003	73.0	82.0	9.0	10.5
NDDD054	NDMC0004	2.0	6.0	4.0	2.0
NDDD056	NDMC0005	7.3	12.0	4.8	3.3
NDDD058	NDMC0006	51.2	64.5	13.3	1.8
NDDD059	NDMC0007	75.7	84	8.3	11.3
NDDD060	NDMC0008	60.0	65.2	5.2	4.5
NDDD061	NDMC0009	76.7	82.7	6.0	1.6
NDDD063	NDMC0010	78.0	83.3	5.3	4.2
NDDD071	NDMC0011	19.0	23.6	4.6	1.4
NDDD072	NDMC0012	31.3	36.8	5.5	3.8

**Table 8: Ndongo East Preliminary Cyanide Leach Test Sample Information**

Notes to Table 8:

<sup>^</sup>Predicted Head Grade is the length weighted average of the original diamond drill hole Fire Assay results.

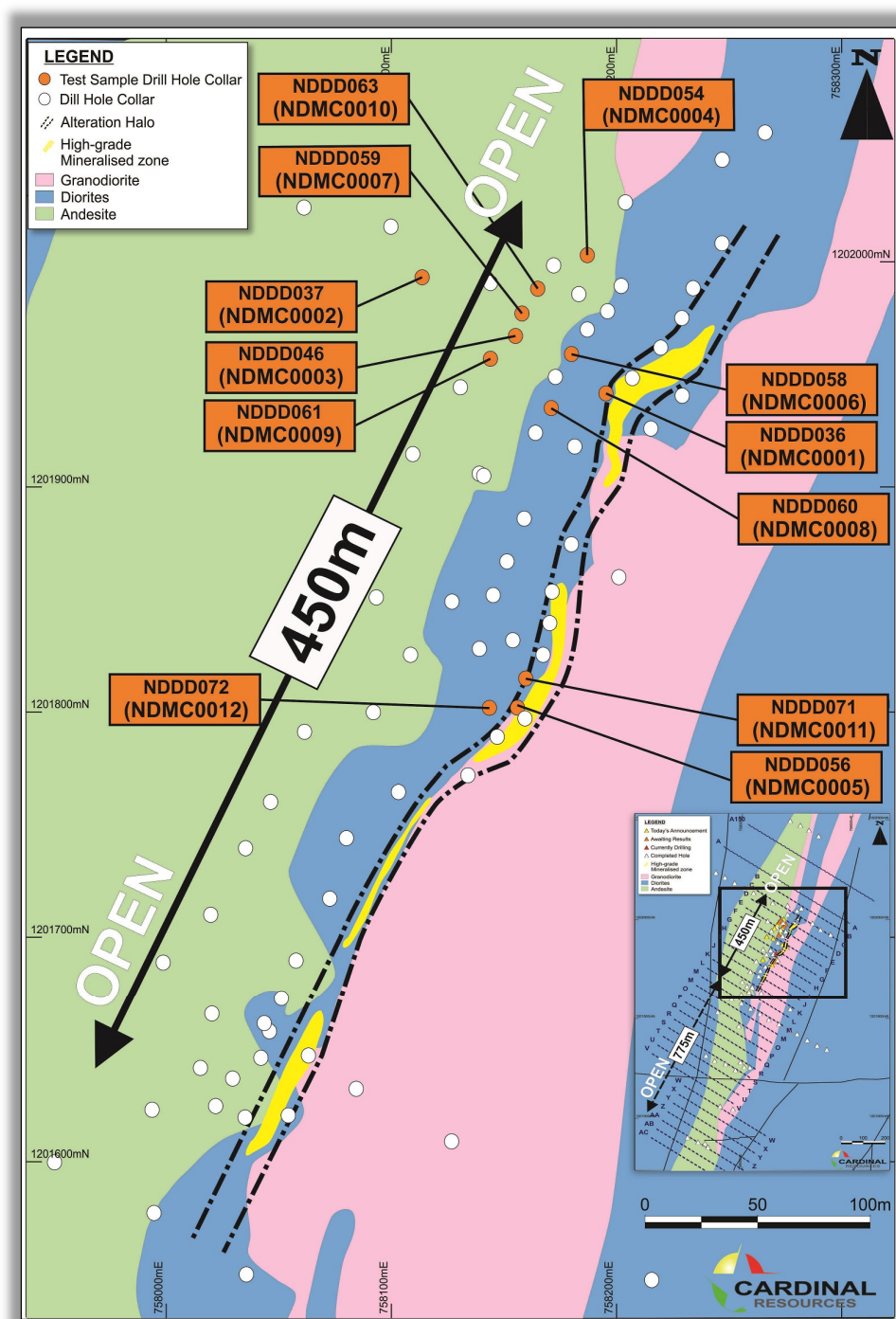


Figure 9: Ndongo East Prospect on Geology Showing Locations of Preliminary Bottle Roll Test Samples

Test Work Completed:

The entire 3kg sample was re-crushed by the laboratory to ensure 75% passing -2mm, split and then pulverised to a homogenised 85% passing 75µm material. A 2kg split of each thoroughly homogenised sample underwent the following tests:

- A bottle roll cyanide leach, 24-hour solvent extraction with AAS finish;
- Total Sulphur and Carbon by LECO;
- Aqua Regia extraction for Arsenic with AAS; and
- The sub-sample of each of the bottle roll residue material was analysed by two separate Fire Assay tests for

gold, total Sulphur and Carbon by LECO and Arsenic determined by Aqua Regia instrument finish.

Head grade samples were analysed by the following methods:

- Screen Fire Assay for gold;
- Total Sulphur and total Carbon by LECO;
- Aqua Regia extraction for Arsenic; and
- Multielement 4-Acid digest ICPOES/MS analysis for a total of 59 elements.

All services at SGS laboratories are provided with Quality assurance protocol in line with ISO 17025 (quality accreditation system for commercial laboratories – ISO 10725).

#### Test Work Results:

The results of the bottle roll cyanide leach results are summarised in Tables 9 and 10.

The recoveries of gold at the end of 24 hours range between 75.0% to 93.6%. These encouraging preliminary bottle roll gold recovery results confirm that the Ndongo East ore should be amendable to conventional cyanide leaching.

HoleID	SampleID	Recovered Gold (Au g/t)	Gold in Tail (Au g/t)	Calculated Head Grade* (Au g/t)	Assay Head Grade# (Au g/t)	Predicted Head Grade^ (Au g/t)	Recovery (%)
NDDD036	NDMC0001	36.0	3.4	39.4	33.2	29.3	91.4
NDDD037	NDMC0002	5.5	0.9	6.5	5.1	4.1	85.9
NDDD046	NDMC0003	8.4	0.7	9.1	9.0	10.5	92.3
NDDD054	NDMC0004	1.0	0.3	1.3	1.8	2.0	76.9
NDDD056	NDMC0005	3.2	0.5	3.7	3.2	3.3	86.5
NDDD058	NDMC0006	1.5	0.3	1.8	1.6	1.8	83.3
NDDD059	NDMC0007	11.8	1.3	13.1	9.5	11.3	90.1
NDDD060	NDMC0008	3.8	0.8	4.6	3.6	4.5	82.6
NDDD061	NDMC0009	1.4	0.4	1.8	1.7	1.6	77.8
NDDD063	NDMC0010	4.4	0.3	4.7	3.1	4.2	93.6
NDDD071	NDMC0011	1.0	0.2	1.2	1.1	1.4	83.3
NDDD072	NDMC0012	2.7	0.9	3.6	3.3	3.8	75.0

**Table 9: Gold Recoveries from Ndongo East Preliminary Bottle Roll Cyanide Leach Tests**

Notes to Table 9:

1. \* The Calculated Head Grade is computed by mathematically combining the actual recovered gold and the gold in tails
2. #Assay Head Grade is the calculated weighted average of the plus and fine fractions from Screen Fire Assay results reported by the laboratory
3. ^Predicted Head Grade is the length weighted average of the original drill Fire Assay results

The excellent correlation between the Calculated Head Grade (BLEG) against both the Assay Head Grade (Screen Fire Assay) and Predicted Head Grade (Original Fire Assay) is an indication of the homogenous nature of the test samples.

Upon completion of the leach cycle, the gold remaining in the leached tails was determined by duplicate Fire Assay instrument finish, with the resulting average taken as the gold in tails. The Calculated Head Grade is computed by mathematically combining the actual recovered gold and the gold in tails. The leached tails were also analysed for Arsenic by aqua regia with instrument finish and total Carbon and Sulphur by LECO. The detailed results are summarised in Table 10.

HoleID	SampleID	BLEG	LECO	LECO	Aqua Regia	Tails				
		Au (g/t)	C (%)	S (%)	As (g/t)	Au (g/t)	Au(R) (g/t)	C (%)	S (%)	As (g/t)
NDDD036	NDMC0001	36.0	1.9	1	141	3.5	3.4	1.9	1.1	139
NDDD037	NDMC0002	5.5	2.2	1.2	960	0.9	1.0	2.2	1.2	1000
NDDD046	NDMC0003	8.4	2.3	0.9	230	0.6	0.7	2.2	0.8	244
NDDD054	NDMC0004	1.0	<0.1	<0.1	333	0.3	0.2	<0.1	<0.1	327
NDDD056	NDMC0005	3.2	0.2	<0.1	320	0.5	0.5	0.2	<0.1	303
NDDD058	NDMC0006	1.5	2.1	1.1	225	0.3	0.3	2.1	1.1	206
NDDD059	NDMC0007	11.8	2.1	1.5	270	1.3	1.3	2.0	1.6	260
NDDD060	NDMC0008	3.8	2.6	1.2	160	0.8	0.8	2.6	1.2	157
NDDD061	NDMC0009	1.4	2.2	1.3	521	0.4	0.4	2.2	1.4	525
NDDD063	NDMC0010	4.4	1.6	0.9	69	0.3	0.3	1.6	0.9	70
NDDD071	NDMC0011	1.0	2.1	0.6	144	0.2	0.2	2.1	0.7	119
NDDD072	NDMC0012	2.7	2.5	2.2	285	0.9	1.0	2.4	2.2	282

**Table 10: Ndongo East Preliminary Detailed Bottle Roll Cyanide Leach Results**

The Assay Head Grade was determined by Screen Fire Assay using a nominal 500g sub-sample which was screen through the nominated cloth to 106µm. The entire coarse fraction (including the disposable screen cloth) was analysed for gold by Fire Assay instrument finish. The fine fraction was analysed for gold by Fire Assay instrument finish in duplicate. A weighted average was then calculated to determine the total gold content as the Assay Head Grade as summarised in Table 11.

HoleID	SampleID	Au+ (g/t)	Weight+ (g)	Au1- (g/t)	Au2- (g/t)	Au Calculated (g/t)
NDDD036	NDMC0001	25.7	22.1	33.9	33.3	33.2
NDDD037	NDMC0002	5.1	49.2	5.1	5.1	5.1
NDDD046	NDMC0003	21.5	47.9	7.2	8.2	9.0
NDDD054	NDMC0004	1.9	46.4	1.9	1.8	1.8
NDDD056	NDMC0005	2.1	26.6	3.2	3.4	3.2
NDDD058	NDMC0006	1.6	34.8	1.6	1.8	1.7
NDDD059	NDMC0007	18.6	19.3	9.6	8.7	9.5
NDDD060	NDMC0008	3.9	39.6	3.5	3.7	3.6
NDDD061	NDMC0009	1.5	26.1	1.8	1.6	1.7
NDDD063	NDMC0010	0.8	38.1	3.3	3.2	3.1
NDDD071	NDMC0011	0.3	15.4	1.1	1.2	1.1
NDDD072	NDMC0012	1.7	28.9	3.5	3.4	3.3

**Table 11: Screen Fire Assay Results**

On a separate split of the homogenous composite sample, a Mixed Acid Digest with ICPOES/MS finish multielement analysis was undertaken at the SGS Randfontein laboratory in South Africa. Elements tested include Al ,Ba, Ca ,Cr ,Cu ,Fe ,K, Li ,Mg ,Mn ,Na, P ,S ,Sr, Ti, V, Zn, Zr, Ag, As, Be, Bi ,Cd, Ce, Co, Cs, Dy, Er, Eu, Ga, Gd, Ge, Hf, Ho, In, La, Lu, Mo, Nb, Nd, Ni, Pb, Pr, Rb, Sb, Sc, Se, Sm, Sn, Ta ,Tb, Te, Th, Tl, Tm, U, W ,Y, and Yb. The full results of the multielement analysis has been provided in Table 17 in Schedule 1.

The Company is encouraged by these preliminary results and plan to submit a larger set of samples for further cyanide leach and more specific testing in establishing the deportment of gold in this highly prospective area.

### **Kungongo Licence Area**

The Kungongo License is located in northeast Ghana some 45km west of the Company's Namdini Gold Project. The License covers an area of approximately 120.12km<sup>2</sup> and is a renewable Exploration License (Figure 4).

No exploration activity was undertaken at Kungongo during the Quarter. Programme of works has been submitted to the Forrest Commission of Ghana to undertake Gradient Array IP survey over the extended tenements across the Bole-Bolgantanga Shear. The programme of work is expected to be approved by the Forrest Commission to allow this planned non-destructive survey to be undertaken soon after the wet season in Ghana.

### **Bongo Licence Area**

The Bongo Licence covers an area of approximately 465 km<sup>2</sup> adjacent to the regional Bole-Bolgatanga Shear and is dominated by three major intrusive complexes, predominantly granitoids of intermediate to foliated felsic basin types intercalated with mafic volcanic flows (Figure 4).

During the Quarter, an auger sampling programme was completed in the north east corner of the tenement along the Bole-Bolgatanga Shear. This programme was an extension to the original 400m by 50m auger programme completed immediately to the SW within this licence area. The programme consisted of 779 holes totalling 3,106m on a grid of 200m by 50m spacing. A total of 857 samples, including QAQC samples, were submitted for BLEG analyses. Results are pending.

### **SUBRANUM PROJECT**

The Subranum Project covers an area of 69km<sup>2</sup> located in southwest Ghana. The license straddles the eastern margin of the Sefwi Gold Belt which is bounded by the regional Bibiani Shear Zone ("**BSZ**") stretching about 200km across southwestern Ghana.

There is 9km of the BSZ developed within the Subranum license trending NE to SW. The BSZ forms a very prospective, sheared contact between Birimian phyllites and greywackes to the southeast and mafic to intermediate volcanics and volcanoclastics to the northwest. Granitoid stocks of the Dixcove suite intrude this shear zone.

The portion of the Bibiani Shear Zone occurring within the Subranum tenement is 9km long, trending SW to NE. Previous extensive exploration has outlined a 5km long gold target, extending from the SW tenement boundary towards the NE, with the remaining 4km of the 9km strike length remaining relatively unexplored.

Only a very small portion of this 5km long gold target was diamond drilled during drilling programmes in 2018.

No exploration activities were undertaken on this tenement during this Quarter due to the wet season in southern Ghana.

**TENEMENT SCHEDULE - ASX LISTING RULE 5.3.3**

The following mining tenement information is provided pursuant to ASX Listing Rule 5.3.3. No tenements in part or whole were relinquished, surrendered or otherwise divested during the quarter ended 30 September 2019.

Tenement	License Status	Ref	Interest Acquired During Quarter	Interest Divested During Quarter	Interest Held at End of Quarter
<b>Ghana</b>					
<b><i>Bolgatanga Project</i></b>					
Ndongo	Prospecting	PL9/13, PL9/19, PL9/22 & PL936	-	-	100%
Kungongo	Prospecting	RL9/28	-	-	100%
Bongo	Prospecting	PL9/29, PL9/37 & PL9/38	-	-	100%
<b><i>Namdini Project</i></b>					
Namdini	Mining License	LVB14619/09	-	-	100%
<b><i>Subranum Project</i></b>					
Subranum	Prospecting	PL/309	-	-	100%

**CORPORATE**

During the Quarter the Company was pleased to announce the appointment of Mr David (Dave) Anthony to the position of Chief Operating Officer (COO) for the Company's Namdini Gold Project in Ghana, West Africa.

Dave is a qualified Mining Engineer from Queens University in Canada. He has more than 30 years' experience in mining and mineral processing and has worked at senior management and executive levels in the design, construction and operation of gold processing plants and mines globally. Dave was responsible for the design and delivery of mines with capital costs of up to USD\$3.8 Billion and with total material movements of up to 40 million tonnes per annum.

Dave's extensive global experience includes the design, construction, optimisation and operation of 12 mines of which six gold mining projects were with Barrick Gold, including four in Africa. Dave was appointed COO of Barrick Africa in 2009 which was listed on the London Stock Exchange in March 2010 with a market capitalization of \$3.8 Billion and was ranked in the FTSE 100 within two months of listing.

Dave is well recognised as a resourceful Team Leader with a track record of delivering high quality production assets on time, on budget and with exemplary safety and environmental performance. His global experience and industry contacts will be highly valuable assets to Cardinal in the construction of the proposed 9.5mtpa mine for the 5.1 Moz\* Mineral Ore Reserve within the Namdini open pit gold deposit.

Together with Cardinal's expanding Construction Owners' Team, Dave will complement the two Directors on the Cardinal Board who have extensive successful gold mine build experience; Dr. Kenneth G. Thomas who has over 45 years' experience building mines with companies including Barrick and Kinross, and Mr. Trevor Schultz who also has over 45 years' experience building mines with companies including AngloGold Ashanti in Ghana and most recently with Centamin Plc in Egypt.

## CAPITAL STRUCTURE

As at 30 September 2019 the Company had the following capital structure;

Capital Structure	Listed	Unlisted	Total
Fully Paid Ordinary Shares (CDV)	410,397,776	-	410,397,776
Options Ex. \$0.15 on or before 30 Sep 2019	117,587,039	-	117,587,039
Unlisted Options Ex. \$0.22 on or before 18 Mar 2020	-	6,000,000	6,000,000
Unlisted Options Ex. \$0.75 on or before 21 Dec 2022	-	1,000,000	1,000,000
Milestone Options Ex. \$0.50 on or before 12 Apr 2022	-	18,500,000	18,500,000
Milestone Options Ex. \$0.965 on or before 21 Dec 2022	-	2,018,100	2,018,100
Milestone Options Ex. \$0.679 on or before 21 Dec 2022	-	2,180,049	2,180,049
Milestone Options Ex. \$0.59 on or before 21 Dec 2022	-	2,180,049	2,180,049
Unlisted Options Ex. \$1.00 on or before 21 Dec 2022	-	1,867,817	1,867,817
Class C Performance Shares	-	60	60

## Cash Balance

The Company's cash balance at 30 September 2019 was approximately AU\$14.7 million.

Subsequent to period end, on October 3, 2019 the Company announced that AU\$17.6m was raised through the exercise of Listed Options.

## ABOUT CARDINAL

Cardinal Resources Limited (ASX/TSX: CDV) is a West African gold-focused exploration and development Company that holds interests in tenements within Ghana, West Africa.

The Company is focused on the development of the Namdini Project, for which the Company has published a gold **Ore Reserve of 5.1Moz** (138.6 Mt @ 1.13 g/t Au; 0.5 g/t cut-off), inclusive of 0.4Moz Proved (7.4 Mt @ 1.31 g/t Au; 0.5 g/t cut-off) and 4.7Moz Probable (131.2 Mt @ 1.12 g/t Au; 0.5 g/t cut-off), and a soon to be completed Feasibility Study.

Exploration programmes are also underway at the Company's Bolgatanga (Northern Ghana) and Subranum (Southern Ghana) Projects.

Cardinal confirms that it is not aware of any new information or data that materially affects the information included in its announcement of the Ore Reserve of April 3, 2019. All material assumptions and technical parameters underpinning this estimate continue to apply and have not materially changed.

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## Competent / Qualified Person Statement

The scientific and technical information in this Quarterly report that relates to Exploration Results, Mineral Resources and Ore Reserves at the Namdini Gold Project has been reviewed and approved by **Mr. Richard Bray**, a Registered Professional Geologist with the Australian Institute of Geoscientists and **Mr. Ekow Taylor**, a Chartered Professional Geologist with the Australasian Institute of Mining and Metallurgy. Mr. Bray and Mr. Taylor have more than five years' experience relevant to the styles of mineralisation and type of deposits under consideration and to the activity which is being undertaken 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" and as a Qualified Person for the purposes of NI43-101. Mr. Bray and Mr. Taylor are full-time employees of Cardinal and hold equity securities in the Company.

The scientific and technical information in this Quarterly report that relates to Exploration Results at the Bolgatanga Project and Subranum Project is based on information prepared by **Mr. Paul Abbott**, a full-time employee of Cardinal Resources Limited, who is a Member of the Geological Society of South Africa. Mr. Abbott 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".

Cardinal confirms that it is not aware of any new information or data that materially affects the information included in its announcement Ore Reserve of 03 April 2019. All material assumptions and technical parameters underpinning this estimate continue to apply and have not materially changed.

## ASX Listing Rule 5.23.2

This report contains information extracted from the following reports which are available for viewing on the Company's website [www.cardinalresources.com.au](http://www.cardinalresources.com.au) :

- 30 Sept 2019 Feasibility Study Update
- 04 Sept 2019 Cardinal Makes Key Appointment Ahead of Project Development
- 16 July 2019 Cardinal's Starter Pit Infill Drilling Results
- 10 July 2019 Cardinal Reports Further Shallow High-Grade Gold
- 04 June 2019 Positive Metallurgical Update on the Namdini Project
- 18 April 2019 Addendum to Namdini Ore Reserve Press Release
- 10 April 2019 Feasibility Study and Project Finance Updates
- 03 April 2019 Cardinal's Namdini Ore Reserve Now 5.1 Moz
- 27 March 2019 Cardinal Intercepts High-Grade Shallow Gold at Ndongo East
- 23 Jan 2019 Cardinal Hits More High-Grade Shallow Gold at Ndongo East
- 28 Nov 2018 New Drill Season hits high-grade shallow gold at Ndongo East
- 18 Sept 2018 Cardinal Namdini Pre-Feasibility Study 4.76Moz Ore Reserve
- 29 Aug 2018 Cardinal Extends Ndongo East Discovery Strike Length
- 31 July 2018 Cardinal Executes US\$5 Million Term Sheet with Sprott
- 16 July 2018 Cardinal Makes New Gold Discovery at Ndongo East
- 28 May 2018 Encouraging First Pass Gold Results at Ndongo
- 19 April 2018 Technical Report on Namdini Gold Project Filed on SEDAR
- 04 April 2018 First Pass Regional Exploration Drilling Underway
- 05 Mar 2018 Cardinal Upgrades Indicated Mineral Resource to 6.5Moz
- 22 Feb 2018 Cardinal Infill Drilling Results Returned
- 05 Feb 2018 Namdini Gold Project Preliminary Economic Assessment
- 22 Jan 2018 Namdini Infill Drilling Results Returned
- 14 Dec 2017 Namdini Drilling and Regional Exploration Update
- 12 Dec 2017 Cardinal Grade Control Drill Results Returned

The Company confirms it is not aware of any new information or data that materially affects the information included in this report relating to exploration activities and all material assumptions and technical parameters underpinning the exploration activities in those market announcements continue to apply and have not been changed. The Company confirms that the form and context in which the Competent Person's findings are presented have not been

materially modified from the original market announcements. Cardinal is not aware of any new information or data that materially affects the information included in its announcement of the Ore Reserve of 3 April 2019. All material assumptions and technical parameters underpinning this estimate continue to apply and have not materially changed.

#### **Disclaimer**

This ASX / TSX press release has been prepared by Cardinal Resources Limited (ABN: 56 147 325 620) ("Cardinal" or "the Company"). Neither the ASX or the TSX, nor their regulation service providers accept responsibility for the adequacy or accuracy of this press release.

This press release contains summary information about Cardinal, its subsidiaries and their activities, which is current as at the date of this press release. The information in this press release is of a general nature and does not purport to be complete nor does it contain all the information, which a prospective investor may require in evaluating a possible investment in Cardinal.

By its very nature exploration for minerals is a high-risk business and is not suitable for certain investors. Cardinal's securities are speculative. Potential investors should consult their stockbroker or financial advisor. There are a number of risks, both specific to Cardinal and of a general nature which may affect the future operating and financial performance of Cardinal and the value of an investment in Cardinal including but not limited to economic conditions, stock market fluctuations, gold price movements, regional infrastructure constraints, timing of approvals from relevant authorities, regulatory risks, operational risks and reliance on key personnel and foreign currency fluctuations.

Except for statutory liability which cannot be excluded and subject to applicable law, each of Cardinal's officers, employees and advisors expressly disclaim any responsibility for the accuracy or completeness of the material contained in this press release and excludes all liability whatsoever (including in negligence) for any loss or damage which may be suffered by any person as a consequence of any information in this Announcement or any error or omission here from. Except as required by applicable law, the Company is under no obligation to update any person regarding any inaccuracy, omission or change in information in this press release or any other information made available to a person nor any obligation to furnish the person with any further information. Recipients of this press release should make their own independent assessment and determination as to the Company's prospects, its business, assets and liabilities as well as the matters covered in this press release.

#### **Forward-looking statements**

Certain statements contained in this press release, 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, amongst other things, statements regarding targets, anticipated timing of the feasibility study (FS) on the Namdini project, estimates and assumptions in respect of 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.

Cardinal disclaims any intent or obligation to update publicly or release any revisions to any forward-looking statements, whether as a result of new information, future events, circumstances or results or otherwise after today's date or to reflect the occurrence of unanticipated events, other than required by the Corporations Act and ASX and TSX Listing Rules. The words 'believe', 'expect', 'anticipate', 'indicate', 'contemplate', 'target', 'plan', 'intends', 'continue', 'budget', 'estimate', 'may', 'will', 'schedule' and similar expressions identify forward-looking statements.

All forward-looking statements made in this press release 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.

**SCHEDULE 1**  
**NAMDINI PROJECT AND NDONGO LICENSE AREA DRILL RESULTS**

Hole ID	Type	Depth	Dip	Azim	Grid_ID	mEast	mNorth	mRL
NMDD16	DDH	533.6	-61.4°	83.2°	UTM_WGS84Zone_30	756,988	1,176,427	220.6
NMDD17	DDH	202.05	-60.6°	97.1°	UTM_WGS84Zone_30	757,294	1,176,421	245.8
NMDD17	DDH	295.0	-60.7°	99.7°	UTM_WGS84Zone_30	757,195	1,176,440	242.3

**Table 12: Meta-Data Listing of Namdini Drill Holes**

HoleID	mFrom	mTo	mLength	Au_ppm
NMDD167	370.5	373.5	3.0	0.8
NMDD167	378.5	381.5	3.0	0.7
NMDD167	402.5	408.5	6.0	1.9
NMDD175	121.0	128.0	7.0	1.0
NMDD176	215.0	218.0	3.0	2.1

**Table 13: Summary of Individual Intercepts – Namdini Drill Holes**

Hole ID	Typ	Dept	Dip	Azimu	Grid_ID	mEast	mNorth	mRL
NDDD085	DD	114.5	-59.6°	118.5°	UTM_WGS84Zone_30	758,140	1,201,993	220.8
NDDD086	DD	57.3	-59.6°	119.4°	UTM_WGS84Zone_30	758,205	1,201,948	219.9
NDDD087	DD	114.5	-61.2°	117.8°	UTM_WGS84Zone_30	758,228	1,201,934	219.7
NDDD088	DD	168.4	-61.3°	119.4°	UTM_WGS84Zone_30	758,098	1,202,019	221.4
NDDD089	DD	210.3	-61.4°	117.0°	UTM_WGS84Zone_30	758,060	1,202,026	221.6

**Table 14: Meta-Data Listing of Ndongo East Drill Holes**

HoleID	mFrom	mTo	mLength	Au_ppm
NDDD085	96.0	100.1	4.1	13.1
NDDD086	37.0	46.1	9.1	2.9
NDDD087	5.0	10.0	5.0	1.8
NDDD088	151.0	158.6	7.6	4.8
NDDD089	192.0	195.9	3.9	1.3

**Table 15: Summary of Individual Intercepts – Ndongo East**

	Type	Grid_ID	mEast	mNorth	mRL	mFrom	mTo	Au_ppb
NGAS1813	Auger	WGS84_30N	757,773	1,202,541	214	2	3	89
NGAS1950	Auger	WGS84_30N	757,905	1,200,577	211	2	3	70
NGAS1951	Auger	WGS84_30N	757,943	1,200,549	207	2	3	40
NGAS2180	Auger	WGS84_30N	757,901	1,200,103	215	2	3	85
NGAS2182	Auger	WGS84_30N	757,813	1,200,154	212	4	5	82
NGAS2274	Auger	WGS84_30N	757,880	1,198,936	231	2	3	44
NGAS2276	Auger	WGS84_30N	757,792	1,198,992	228	2	3	231
NGAS2296	Auger	WGS84_30N	757,094	1,198,249	233	2	3	57
NGAS2300	Auger	WGS84_30N	756,926	1,198,357	229	2	3	41
NGAS2307	Auger	WGS84_30N	756,670	1,198,513	233	2	3	300
NGAS2350	Auger	WGS84_30N	756,396	1,196,564	216	2	3	1,209
NGAS2351	Auger	WGS84_30N	756438	1,196,536	219	2	3	49
NGAS2383	Auger	WGS84_30N	756,275	1,195,218	206	2	3	43
NGAS2384	Auger	WGS84_30N	756,311	1,195,200	210	4	5	68
NGAS2385	Auger	WGS84_30N	756,353	1,195,175	207	4	5	46
NGAS2386	Auger	WGS84_30N	756,396	1,195,147	208	3	4	47
NGAS2391	Auger	WGS84_30N	756,609	1,195,014	211	2	3	50
NGAS2446	Auger	WGS84_30N	757,921	1,198,439	234	2	3	219
NGAS2492	Auger	WGS84_30N	756,502	1,198,149	231	4	5	48
NGAS2494	Auger	WGS84_30N	756,416	1,198,200	231	4	5	123
NGAS2536	Auger	WGS84_30N	756437	1,195,592	210	4	5	53
NGAS2570	Auger	WGS84_30N	757907	1,194,303	223	6	7	239
NGAS2584	Auger	WGS84_30N	756249	1,194,533	203	4	5	93
NGAS2716	Auger	WGS84_30N	756,630	1,196,654	222	2	3	72
NGAS2734	Auger	WGS84_30N	756,671	1,196,155	218	2	3	877
NGAS2746	Auger	WGS84_30N	756,713	1,195,657	215	4	5	92
NGAS2767	Auger	WGS84_30N	755,910	1,193,802	200	4	5	48
NGAS2778	Auger	WGS84_30N	755,436	1,193,628	202	3	4	69
NGAS2793	Auger	WGS84_30N	755,548	1,193,319	201	2	3	99
NGAS2795	Auger	WGS84_30N	755,209	1,193,531	206	4	5	48
NGAS2817	Auger	WGS84_30N	758,135	1,199,719	225	2	3	50
NGAS2883	Auger	WGS84_30N	756692	1,197,319	218	2	3	301
NGAS2936	Auger	WGS84_30N	755,780	1,194,355	211	2	3	47
NGAS2938	Auger	WGS84_30N	755,866	1,194,300	208	2	3	76
NGAS2940	Auger	WGS84_30N	755,949	1,194,252	205	1	2	61
NGAS2941	Auger	WGS84_30N	755,717	1,194,155	207	1	2	163
NGAS2946	Auger	WGS84_30N	754,870	1,193,272	199	2	3	80
NGAS2976	Auger	WGS84_30N	754,806	1,193,075	199	2	3	42
NGAS3013	Auger	WGS84_30N	756,271	1,194,287	205	4	5	113
NGAS3038	Auger	WGS84_30N	753,088	1,192,497	216	2	3	127
NGAS3133	Auger	WGS84_30N	758,172	1,201,812	212	2	3	164
NGAS3248	Auger	WGS84_30N	758,258	1,201,651	209	2	3	318
NGAS3367	Auger	WGS84_30N	757,803	1,200,756	210	2	3	60
NGAS3445	Auger	WGS84_30N	758,361	1,201,937	216	2	3	49
NGAS1813	Auger	WGS84_30N	757,773	1,202,541	214	2	3	89
NGAS3474	Auger	WGS84_30N	758,080	1,201,644	214	2	3	111

Table 16: Ndongo East Auger Results &gt; 40ppb Au

Hole ID	Type	Grid_ID	mEast	mNorth	mRL	mFrom	mTo	Au_ppb
NGAS3519	Auger	WGS84_30N	757,936	1,200,904	209	3	4	51
NGAS3522	Auger	WGS84_30N	758,062	1,200,819	212	2	3	79
NGAS3556	Auger	WGS84_30N	757,499	1,200,585	215	4	5	120
NGAS3566	Auger	WGS84_30N	756,713	1,200,959	220	2	3	64
NGAS3680	Auger	WGS84_30N	757,895	1,201,167	215	2	3	43
NGAS3826	Auger	WGS84_30N	756,985	1,198,907	233	6	7	72
NGAS3827	Auger	WGS84_30N	756,941	1,198,932	233	5	6	56
NGAS3848	Auger	WGS84_30N	756,913	1,198,485	232	6	7	110
NGAS3850	Auger	WGS84_30N	756,288	1,198,399	231	6	7	56
NGAS3856	Auger	WGS84_30N	756,501	1,198,264	233	8	9	73
NGAS3861	Auger	WGS84_30N	756,798	1,198,078	227	8	9	112
NGAS3868	Auger	WGS84_30N	757,040	1,197,924	232	10	11	40
NGAS3876	Auger	WGS84_30N	756,722	1,197,652	220	6	7	46
NGAS3881	Auger	WGS84_30N	756,327	1,197,666	223	6	7	251
NGAS3892	Auger	WGS84_30N	756,559	1,197,283	217	9	10	40
NGAS3893	Auger	WGS84_30N	756,600	1,197,254	216	6	7	55
NGAS3897	Auger	WGS84_30N	756,753	1,197,147	218	4	5	92
NGAS3916	Auger	WGS84_30N	756,671	1,198,853	243	6	7	345
NGAS3922	Auger	WGS84_30N	756,882	1,198,736	235	8	9	53
NGAS3931	Auger	WGS84_30N	756,558	1,198,481	232	10	11	60
NGAS3937	Auger	WGS84_30N	756,765	1,198,333	230	8	9	61
NGAS3939	Auger	WGS84_30N	756,860	1,198,277	231	6	7	161
NGAS3945	Auger	WGS84_30N	757,063	1,198,149	229	8	9	50
NGAS3948	Auger	WGS84_30N	757,181	1,198,067	234	6	7	69
NGAS3951	Auger	WGS84_30N	756,984	1,197,722	229	8	9	106
NGAS3957	Auger	WGS84_30N	756,780	1,197,856	220	3	4	536
NGAS3958	Auger	WGS84_30N	756,743	1,197,881	223	6	7	69
NGAS3959	Auger	WGS84_30N	756,700	1,197,904	223	8	9	99
NGAS3963	Auger	WGS84_30N	756,399	1,198,091	228	6	7	101
NGAS3964	Auger	WGS84_30N	756,359	1,198,120	229	4	5	51
NGAS3968	Auger	WGS84_30N	756,438	1,197,137	213	8	9	179
NGAS3969	Auger	WGS84_30N	756,466	1,197,121	213	10	11	653
NGAS3972	Auger	WGS84_30N	756,585	1,197,041	218	6	7	48
NGAS3973	Auger	WGS84_30N	756,631	1,197,026	219	6	7	72
NGAS3974	Auger	WGS84_30N	756,671	1,196,994	219	4	5	89
NGAS3991	Auger	WGS84_30N	756,164	1,196,589	212	2	3	46
NGAS4011	Auger	WGS84_30N	756,637	1,196,735	219	8	9	100
NGAS4012	Auger	WGS84_30N	756,593	1,196,762	217	8	9	62
NGAS4015	Auger	WGS84_30N	756,472	1,196,857	217	8	9	41
NGAS4016	Auger	WGS84_30N	756,442	1,196,886	218	8	9	40
NGAS4018	Auger	WGS84_30N	756,363	1,196,938	216	8	9	398
NGAS4025	Auger	WGS84_30N	756,342	1,196,824	217	6	7	63
NGAS4026	Auger	WGS84_30N	756,389	1,196,795	219	6	7	113
NGAS4038	Auger	WGS84_30N	756,508	1,196,612	218	10	11	45
NGAS4039	Auger	WGS84_30N	756,551	1,196,578	219	6	7	53

Table 16 (continued): Ndongo East Auger Results &gt; 40ppb Au

HoleID	From	To	Al	Ba	Ca	Cr	Cu	Fe	K	Li	Mg	Mn	Na	P	S	Sr	Ti	V	Zn	Zr	Ag	As
	(m)	(m)	(%)	(ppm)	(%)	(ppm)	(ppm)	(%)	(%)	(ppm)	(%)	(ppm)	(%)	(ppm)	(%)	(ppm)	(%)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
NDDD036	45.0	48.0	6.14	221	3.42	94	61.7	3.14	0.86	11	1.98	524	3.28	768	1.31	571	0.09	92	50	56.1	7.3	143
NDDD037	122.0	125.0	6.99	279	3.93	71	72.9	3.46	1.26	9	2.07	581	3.58	878	1.45	631	0.07	112	46	81	1.6	981
NDDD046	73.0	82.0	6.62	270	4.06	112	65.5	3.36	1.04	10	2.22	636	3.52	506	1.11	822	0.07	100	46	41.5	0.8	250
NDDD054	2.0	6.0	6.72	526	0.21	157	57	4.58	1.1	9	0.34	1020	2.37	416	0.02	206	0.09	137	52	63.2	0.3	311
NDDD056	7.3	12.0	5.94	203	0.44	69	23.6	3.63	1.2	3	0.22	502	4.81	622	0.02	253	0.08	89	35	89.7	0.5	264
NDDD058	51.2	64.5	6.36	268	3.42	77	47.4	3.23	0.89	9	1.77	527	3.36	741	1.29	651	0.06	84	48	48.5	0.4	201
NDDD059	75.7	84.0	5.3	193	3.18	80	64.1	2.85	0.74	6	1.52	479	3.01	530	1.72	604	0.03	79	37	40.6	0.7	244
NDDD060	60.0	65.2	5.19	182	4.26	114	28.3	3.22	0.85	12	2.29	718	2.6	387	1.47	670	0.07	92	33	37.8	0.7	164
NDDD061	76.7	82.7	6.67	282	3.65	103	64.8	3.17	1.11	7	1.8	533	3.45	861	1.52	637	0.07	97	41	61.7	0.7	484
NDDD063	78.0	83.3	4.3	162	2.61	72	41.4	2.57	0.61	8	1.49	409	2.21	514	0.99	379	0.05	67	34	35.4	0.6	72
NDDD071	19.0	23.6	7.81	316	3.76	63	39.9	3.42	1.41	9	1.92	575	3.95	973	0.85	715	0.11	97	43	84.8	0.3	121
NDDD072	31.3	36.8	8.31	211	4.32	66	40.6	3.7	1.13	6	2.08	602	5	859	2.71	781	0.11	94	38	107	0.5	284

HoleID	From	To	Be	Bi	Cd	Ce	Co	Cs	Dy	Er	Eu	Ga	Gd	Ge	Hf	Ho	In	La	Lu	Mo	Nb	Nd
	(m)	(m)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
NDDD036	45.0	48.0	0.5	0.68	0.02	61.3	19	0.43	1.41	0.67	1.01	13.4	3.39	<0.1	1.34	0.27	0.03	28	0.1	0.94	1.6	28.9
NDDD037	122.0	125.0	0.7	0.26	0.02	73.5	19.1	0.7	1.79	0.69	1.25	15.6	4.16	<0.1	1.93	0.32	0.03	32.9	0.12	0.82	1	34.9
NDDD046	73.0	82.0	0.6	0.23	0.04	44.1	19.5	0.56	1.31	0.56	0.74	14.1	2.45	<0.1	1.04	0.25	0.03	19.9	0.09	0.85	0.8	20.7
NDDD054	2.0	6.0	0.8	0.14	0.03	65.3	25	0.84	2.19	0.92	1.16	16.2	3.82	<0.1	1.7	0.41	0.04	29.8	0.15	0.75	2.3	29.4
NDDD056	7.3	12.0	0.5	0.15	0.03	77.1	18.2	0.45	2.12	0.94	1.34	15.7	4.51	<0.1	2.01	0.37	0.03	34.9	0.14	0.96	2.2	36.2
NDDD058	51.2	64.5	0.5	0.07	0.04	58.8	16.7	0.46	1.56	0.55	0.94	12.8	3.18	<0.1	1.16	0.26	0.03	25	0.09	0.42	0.8	27.6
NDDD059	75.7	84.0	0.4	0.09	0.05	50.2	14.6	0.33	1.08	0.41	0.74	10.4	2.49	<0.1	0.96	0.19	0.02	21.8	0.07	0.64	0.2	22.9
NDDD060	60.0	65.2	0.4	0.08	0.06	43.4	17.6	0.65	1.24	0.53	0.81	9.8	2.78	<0.1	0.91	0.22	0.02	18.6	0.09	0.8	0.4	22.5
NDDD061	76.7	82.7	0.6	0.07	0.03	68.5	16.6	0.56	1.83	0.65	1.08	14.5	3.65	<0.1	1.45	0.26	0.03	29.1	0.1	0.42	1.5	31.4
NDDD063	78.0	83.3	0.4	0.08	0.03	48.9	15.1	0.39	1.16	0.47	0.81	9.9	2.76	<0.1	0.96	0.2	0.02	20.7	0.08	0.38	1.2	23.8
NDDD071	19.0	23.6	0.6	0.08	0.03	78.1	16.6	0.61	1.85	0.76	1.26	15.7	4.27	<0.1	1.87	0.32	0.03	32.8	0.12	0.52	0.6	37.4
NDDD072	31.3	36.8	0.5	0.47	0.02	92	18.7	0.45	2.11	0.82	1.43	15.9	4.9	<0.1	2.25	0.35	0.03	38	0.13	1.44	1.6	44.1

Table 17: Composite Sample Multielement 4-Acid Digest Results – Ndongo East

HoleID	From	To	Ni	Pb	Pr	Rb	Sb	Sc	Se	Sm	Sn	Ta	Tb	Te	Th	Tl	Tm	U	W	Y	Yb
	(m)	(m)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
NDDD036	45.0	48.0	57.1	15.5	7.24	21.6	4.01	12.8	3	4.6	0.4	0.64	0.24	1.52	3	<0.2	0.11	0.76	10.1	6.7	0.5
NDDD037	122.0	125.0	58.7	8.7	8.72	32.1	3.36	13	3	5.6	0.4	0.6	0.32	1.36	4	<0.2	0.12	0.93	17	8.3	0.7
NDDD046	73.0	82.0	67.8	10.3	5.16	26.5	3.23	14.2	4	3.3	<0.3	0.5	0.15	0.81	2	<0.2	0.09	0.52	14.4	6.3	0.6
NDDD054	2.0	6.0	63.4	10.7	7.33	36.4	3.8	18.7	4	4.9	0.5	1.43	0.29	0.76	3.3	<0.2	0.16	0.79	13.4	10.1	0.9
NDDD056	7.3	12.0	52	16.1	9.15	27.2	4.16	15	3	5.9	0.3	0.93	0.37	1.23	4.4	<0.2	0.14	1.09	24.8	10.2	0.9
NDDD058	51.2	64.5	50.6	8.5	6.98	21.7	2.22	11.2	3	4.2	<0.3	0.27	0.22	0.7	2.5	<0.2	0.11	0.63	47.7	6.7	0.5
NDDD059	75.7	84.0	44.3	8	5.88	17.6	2.93	9.4	3	3.4	<0.3	<0.05	0.12	0.69	2	<0.2	0.07	0.45	6.6	5.1	0.4
NDDD060	60.0	65.2	58.4	13	5.31	18.6	1.29	13.7	4	3.8	<0.3	0.14	0.15	0.69	1.7	<0.2	0.08	0.52	8.4	6.2	0.5
NDDD061	76.7	82.7	51.3	7.9	7.99	27	3.41	11.7	4	4.8	0.3	0.27	0.3	0.43	3.3	<0.2	0.1	0.83	16.6	7.9	0.6
NDDD063	78.0	83.3	53	7.1	5.92	16.9	3.27	10.2	3	3.8	<0.3	0.06	0.16	0.34	2	<0.2	0.08	0.53	10.2	5.9	0.5
NDDD071	19.0	23.6	53.9	12.8	9.41	28.9	2.58	12.1	3	5.8	<0.3	0.2	0.32	0.36	3.7	<0.2	0.11	0.77	6.3	8.9	0.7
NDDD072	31.3	36.8	56.9	17	11.2	21.3	3.52	12.6	3	6.7	<0.3	0.26	0.38	0.89	4.3	<0.2	0.13	0.9	14.7	9.9	0.8

Table 17 (continued): Composite Samples Multielement 4-Acid Digest Results – Ndongo East

## APPENDIX 1

### JORC CODE 2012 EDITION

#### TABLE 1 REPORTING OF EXPLORATION RESULTS – NAMDINI PROJECT

##### Section 1 – Sampling Technique and Data

Criteria	JORC Code Explanation	Commentary
<b>Sampling techniques</b>	Nature and quality of sampling (e.g. cut channels, random chips, or specific specialised industry standard measurement tools appropriate to the minerals under investigation, such as down hole gamma sondes, or handheld XRF instruments, etc.). These examples should not be taken as limiting the broad meaning of sampling.	<p>The southern extension resource drilling comprises three diamond core holes totalling 2,200 m.</p> <p>Diamond core sampling was half-core sampling of HQ core size.</p>
	Include reference to measures taken to ensure sample representivity and the appropriate calibration of any measurement tools or systems used.	<p>Sampling is guided by Cardinal Resources protocols and Quality Control procedures as per industry standard.</p> <p>Sample intervals range from 1.0 to 1.5 m in length, with majority of samples assayed over 1 m intervals.</p>
	<p>Aspects of the determination of mineralisation that are Material to the Public Report.</p> <p>In cases where ‘industry standard’ work has been done this would be relatively simple (e.g. ‘reverse circulation drilling was used to obtain 1 m samples from which 3 kg was pulverised to produce a 30 g charge for fire assay’). In other cases, more explanation may be required, such as where there is coarse gold that has inherent sampling problems. Unusual commodities or mineralisation types (e.g. submarine nodules) may warrant disclosure of detailed information.</p>	<p>The determination of mineralisation is based on observed alterations, silicification and shearing of the lithologies.</p> <p>Diamond drill samples are crushed to -2mm, and a &lt;1kg split sample is then pulverised via LM2 Ring Pulveriser to a nominal 85% passing -75µm.</p> <p>A 200g sub-sample is taken from the pulverised material for analysis. A 50g of the sub-sample is used for lead collection Fire Assay analysis for gold.</p>
<b>Drilling techniques</b>	Drill type (e.g. core, reverse circulation, open-hole hammer, rotary air blast, auger, Bangka, sonic, etc.) and details (e.g. core diameter, triple or standard tube, depth of diamond tails, face-sampling bit or other type, whether core is oriented and if so, by what method, etc.).	<p>Diamond core drilling is completed with core size of HQ with a standard tube. Triple tube is used in saprolite at the tops of the holes. Core is orientated to determine both azimuth and dip using digital Reflex ACT II RD orientation tool.</p> <p>Drill holes are inclined at -60° to -61° angles for optimal zone intersection. All drill collars are surveyed using Trimble R8 RTK GPS with</p>

Criteria	JORC Code Explanation	Commentary
		downhole surveying every 30m using Reflex digital surveying instruments.
<b>Drill sample recovery</b>	Method of recording and assessing core and chip sample recoveries and results assessed.	<p>Diamond core recovery is logged and captured into the database. The Method of recording chip and core sample recoveries was to enter the relevant data on a hand-held Motion F5te Tablet PC using a set of standard templates supplied by Maxwell Geoservices, Perth (Maxwell).</p> <p>Core recovered from each drill run is measured and compared with the drill run length drilled to calculate an estimated percentage core recovery. For core drilling overall recoveries are excellent with weighted average recovery greater than 99.8%.</p>
	Measures taken to maximise sample recovery and ensure representative nature of the samples.	<p>All drilling activities are supervised by company geologists.</p> <p>Measures taken include the use of bigger HQ core size diamond drilling to maximise recovery, having a geologist onsite to examine core and core metres marked and orientated to check against the driller's blocks and ensuring that all core loss is taken into account.</p>
	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 seen to exist between sample recovery and grade, and no sample bias has occurred due to preferential loss/gain of any fine/coarse material due to the acceptable sample recoveries obtained by the drilling methods employed.
<b>Logging</b>	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.	<p>All drill holes are fully logged. The lithology, alteration and geotechnical characteristics of core are logged directly to a digital format on a Field Toughbook laptop logging system following procedures and using Cardinal geologic codes. Data is imported into Cardinal's central database after validation in LogChief™.</p> <p>In the opinion of the Component Persons all geological logging is to a level of detail to support future Mineral Resource estimation.</p>
	Whether logging is qualitative or quantitative in nature. Core (or costean, channel, etc.) photography.	<p>Logging is both quantitative and qualitative.</p> <p>Diamond core is photographed both in dry and wet form.</p>

Criteria	JORC Code Explanation	Commentary
	The total length and percentage of the relevant intersections logged.	All drill holes are logged in full and to the total length of each drill hole.
<b>Sub-sampling techniques and sample preparation</b>	If core, whether cut or sawn and whether quarter, half or all core taken.	Orientation of core is completed for all diamond holes and all are marked prior to sampling. Longitudinally cut half core samples are produced using a Core Saw with diamond impregnated blades. Samples are weighed and recorded.
	If non-core, whether riffled, tube sampled, rotary split, etc. and whether sampled wet or dry.	No non-core sampling was undertaken for this announcement.
	For all sample types, the nature, quality and appropriateness of the sample preparation technique.	<p>Drill core samples are sorted, dried at 105°C for 4 hours and weighed. Samples are crushed through Jaques crusher to nominal -10mm. A second stage crushing is through Boyd crusher to nominal -2mm and then split to &lt;1.0kg. The reject sample is retained in the original bag and stored. The split is pulverised in a LM2 Ring Pulveriser to a nominal 85% passing 75µm and approximately 200g sub-sample of the pulverised material is used for fire assay.</p> <p>All preparation equipment is flushed with barren material prior to commencement of the job.</p>
	Quality control procedures adopted for all sub-sampling stages to maximise representivity of samples.	<p>Cardinal Resources has protocols that cover the sample preparation at the laboratories and the collection and assessment of data to ensure that accurate steps are used in producing representative samples for the analytical process. Key performance indices include:</p> <ul style="list-style-type: none"> <li>• Contamination index of 95% (that is at least 95% of blanks pass); failures can only be attributed to probable minor laboratory contamination.</li> <li>• Crushed Size index of 95% passing 2 mm (1:50 sample screened).</li> <li>• Grind Size index of 85% passing 75 microns (minimum 1:50 sample screened).</li> <li>• Check Samples returning at worst 20% precision at 90th percentile and bias of 5% or better.</li> </ul> <p>Crusher and pulveriser are flushed with barren material at the start of every batch.</p>
	Measures taken to ensure that the sampling is representative of the in- situ material collected, including for instance	Measures taken to ensure that the core sampling is representative is to sample half core at 0.5m (minimum) to 1.5m (maximum)

Criteria	JORC Code Explanation	Commentary
	results for field duplicate/second-half sampling.	<p>intervals through the recognisable altered, silicified, mineralised shear zones.</p> <p>Results of Check Sample for DD samples are all evaluated to ensure that the results of each assay batch are acceptable.</p> <p>1:20 grind quality checks are completed for 85% passing 75µm criteria to ensure the representativeness of sub-samples.</p>
	Whether sample sizes are appropriate to the grain size of the material being sampled.	Sample sizes are considered appropriate to the grain size.
<b>Quality of Assay data and laboratory tests</b>	The nature, quality and appropriateness of the assaying and laboratory procedures used and whether the technique is considered partial or total.	<p>All analysis was completed at SGS Ghana and who provide Quality assurance protocol in line with ISO 17025 (quality accreditation system for commercial laboratories – ISO 10725).</p> <p>All samples are analysed for gold by lead collection Fire Assay method of a 50g charge with AAS finish; the assay charge is fused with the litharge-based flux, cupelled and prill dissolved in aqua regia with gold tenor determined by flame AAS. Fire assay is considered a total assay technique.</p> <p>The analytical method is considered appropriate for the mineralisation style and is of industry standard.</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.	No hand-held geophysical tools are used.
	Nature of quality control procedures adopted (e.g. standards, blanks, duplicates, external laboratory checks) and whether acceptable levels of accuracy (i.e. lack of bias) and precision have been established.	<p>Cardinal's QAQC protocol is considered industry standard with certified reference materials (CRMs) are submitted on a regular basis with routine samples. The CRMs having a range of values and blanks are inserted in the ratio of 1:20. Duplicates are taken at the riffle splitter every 20<sup>th</sup> sample. No duplicate samples are taken from core samples.</p> <p>Pulps are submitted to a secondary laboratory for checks on the accuracy and precision of the primary laboratory. Coarse rejects are submitted back to the primary laboratory to assess the adequacy of the sub-sampling process.</p>

Criteria	JORC Code Explanation	Commentary
		Laboratories' QAQC involves the use of internal laboratory standards using certified reference material and blanks. The internal laboratory QAQC checks are reported by the laboratory on a monthly basis and a review of the QAQC reports suggests the laboratory is performing within acceptable limits.
<b>Verification of sampling and assaying</b>	The verification of significant intersections by either independent or alternative company personnel.	Significant intersections have been verified by alternative company personnel.
	The use of twinned holes.	None of the drill holes in this report are twinned.
	Documentation of primary data, data entry procedures, data verification, data storage (physical and electronic) protocols.	Primary data are captured on field tough book laptops using LogChief™ Software. The software has validation routines and data is then imported onto a secure central database.
	Discuss any adjustment to assay data.	The primary data is always kept and is never replaced by adjusted or interpreted data.
<b>Location of data points</b>	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.	Initially, the drill hole collar coordinates are obtained using handheld Garmin GPSmap 64s GPS within $\pm 3\text{m}$ accuracy.  Subsequently all drill collars are accurately surveyed using Trimble R8 RTK DGPS system within $\pm 10\text{mm}$ of accuracy (X, Y, Z).  Coordinates are based on three control stations established at Namdini.  Accuracy and quality of downhole surveys of RC and DD drill holes are determined by using Reflex Ez-Shot survey instrument at regular 30m intervals.
	Specification of the grid system used.	Coordinate and azimuth are reported in UTM WGS84 Zone 30 North.
	Quality and adequacy of topographic control.	Topographic control was established from aerial photography using 12 surveyed control points. A 1m ground resolution DTM was produced by Sahara Mining Services from a UAV survey using a DJI Inspire 1 UAV at an altitude of 100m.
<b>Data spacing and distribution</b>	Data spacing for reporting of exploration results.	The drilling was carried out initially on a spacing of 100m along the southern extension fence line.
	Whether the data spacing and distribution is sufficient to establish the degree of geological and grade continuity appropriate for the Mineral Resource	The current drill data spacing and distribution at the southern extension are insufficient to establish geological and grade continuity that are appropriate for incorporating into the

Criteria	JORC Code Explanation	Commentary
	and Ore Reserve estimation procedure(s) and classifications applied.	reporting Mineral Resources and Ore Reserves at the Namdini Project.
<b>Orientation of data in relation to geological structure</b>	Whether sample compositing has been applied.	No sample compositing has been applied to the samples.
	Whether the orientation of sampling achieves unbiased sampling of possible structures and the extent to which this is known, considering the deposit type.	Drill holes are orientated to achieve intersection angles as close to perpendicular to the mineralisation as practicable. Some sampling bias may occur.
	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 significant orientation-based sampling bias is known at this time.
<b>Sample security</b>	the measures taken to ensure sample security.	<p>An independent Ghanaian security contractor is used to ensure sample security.</p> <p>The drilling contractor is accountable for drill core and RC chip production at the drill site. Final delivery from the drill site to the laydown area within the core yard is managed by Cardinal. The core yard technicians, field technicians and Geologists ensure the core and chips are logged, prepared and stored under security until conveyed to a nearby accredited sample preparation laboratory by Cardinal.</p> <p>At the time of sample delivery at the laboratory, a sign-off process between Cardinal and the laboratory ensures that samples and paperwork correspond and samples are receipted against the Cardinal submission sheets. The sample preparation laboratory is responsible for the samples from the time of collection from Cardinal until pulps and rejects are collected and checked by Cardinal Geologists.</p> <p>Two pulp samples are produced:</p> <ul style="list-style-type: none"> <li>• one pulp dispatched by Cardinal to the appropriate laboratory for assay;</li> <li>• the duplicate pulp and reject stored by Cardinal in a secure storage facility for possible re-assay or other testwork.</li> </ul>
<b>Audits or reviews</b>	The results of any audits or reviews of sampling techniques and data.	The sampling techniques and data collection processes are of industry standard and have

Criteria	JORC Code Explanation	Commentary
		<p>been subjected to multiple internal and external reviews.</p> <p>The most recent audit of the SQL database was completed by Maxwell Geoservices (Perth) and found the database to be consistent with industry standards.</p>

## Section 2 – Reporting of Exploration Results

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

Criteria	JORC Code Explanation	Commentary
<b>Mineral Tenement and Land Status</b>	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.	<p>The Mining Licence LVB14619/09 covering Cardinal's Namdini Project over an area of approximately 19.54 km<sup>2</sup> is located in the Northeast region of Ghana.</p> <p>The previous holder of the Mining Licence, Savannah Mining Ghana Limited (Savannah) completed an initial Environmental Impact Statement (EIS) and lodged the EIS with the Environmental Protection Agency of Ghana. The application by Savannah for a Large-Scale Mining Licence over an area of approximately 19.54 km<sup>2</sup> in the Upper East Region of Ghana covering Cardinal's Namdini Project has been granted by the Minister of Lands and Natural Resources of Ghana.</p> <p>Savannah applied for the assignment of this Large-Scale Mining Licence to Cardinal Namdini Mining Limited (Cardinal Namdini), a wholly owned Subsidiary of Cardinal. The assignment has been granted by the Minister of Lands and Natural Resources of Ghana.</p>
	The security of the tenure held at the time of reporting along with any known impediments to obtaining a license to operate in the area.	All tenements are current and in good standing. The Mining Lease for Namdini was granted for an initial 15 years which is renewable.
<b>Exploration Done by Other Parties</b>	Acknowledgment and appraisal of exploration by other parties.	Aside from Cardinal there has been no recent systematic exploration undertaken on the Namdini Project.
<b>Geology</b>	Deposit type, geological setting and style of mineralisation	The deposit type comprises gold mineralisation within sheared and highly altered rocks containing sulphides; mainly pyrite with minor arsenopyrite. The geological setting is a Paleoproterozoic Greenstone Belt comprising Birimian

Criteria	JORC Code Explanation	Commentary
		metavolcanics, volcanoclastics and metasediments located in close proximity to a major 30 km ~N-S regional shear zone with splays. The style of mineralisation is hydrothermal alteration containing disseminated gold-bearing sulphides.
<b>Drill hole information</b>	A summary of all information material to the understanding of the exploration results including tabulation of the following information for all Material drill holes: <ul style="list-style-type: none"> <li>• Easting and northing of the drill hole collar</li> <li>• Elevation or RL (Reduced Level – elevation above sea level in meters) of the drill hole collar</li> <li>• Dip and azimuth of the hole</li> <li>• Down hole length and interception depth</li> <li>• Hole length</li> </ul>	A summary of drill hole information is provided in this document.
	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.	There has been no exclusion of information.
<b>Data aggregation methods</b>	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.	No cutting of high grades has been undertaken.
	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.	Aggregated intercepts incorporating minimum 3m lengths of high-grade results above 0.5g/t Au are calculated to include no more than intervals of 3m below grades of <0.5 g/t Au when assay results are reported.
	The assumptions used for any reporting of metal equivalent values should be clearly stated.	No metal equivalents are used in the intersection calculation.
<b>Relationship between mineralisation widths and intercept lengths</b>	These relationships are particularly important in the reporting of exploration results.	The relationship between mineralisation widths and intercept lengths are not yet fully understood.
	If the geometry of the mineralisation with respect to the drill hole angle is known, its nature should be reported.	The geometry of the mineralisation with respect to the drill hole angles is not yet known.
	If it is not known and only the down hole lengths are reported, there should be a clear statement to this effect (e.g. 'down hole length, true width not known').	The geometry of the mineralisation is unknown; only downhole length is reported (no true width of mineralisation is reported).
<b>Diagrams</b>	Appropriate maps and sections (with scales) and tabulations of intercepts should be included for any significant discovery being	Appropriate locality map, cross sections of the drilling, interpreted geology and assays

Criteria	JORC Code Explanation	Commentary
	reported. These should include, but not be limited to a plane view of drill hole collar locations and appropriate sectional views.	are included within the body of the accompanying document.
<b>Balanced Reporting</b>	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 accompanying document is considered to represent a balanced report.
<b>Other substantive exploration data</b>	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>Other exploration data collected is not considered material to this document at this stage.</p> <p>The interpretation of the geological observations shown in the cross sections are subject to possible change as new information is gathered.</p> <p>Further data collection will be reviewed and reported when considered material.</p>
<b>Further Work</b>	<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>	Exploration drilling will continue to target projected lateral and depth extensions of the mineralisation along with infill drilling designed to increase confidence in Mineral Resource estimates.

## APPENDIX 2

### JORC CODE 2012 EDITION

#### TABLE 1 REPORTING OF EXPLORATION RESULTS - NDONGO EAST

##### Section 1 – Sampling Technique and Data

Criteria	JORC Code Explanation	Commentary
<b>Sampling techniques</b>	Nature and quality of sampling (e.g. cut channels, random chips, or specific specialised industry standard measurement tools appropriate to the minerals under investigation, such as down hole gamma sondes, or handheld XRF instruments, etc.). These examples should not be taken as limiting the broad meaning of sampling.	<p>Diamond sampling is by half-core samples of HQ core size.</p> <p>Auger samples is collected using a purpose-built drive auger rig contracted from Sahara Natural Resources. The majority of the auger drilling are to depths ranging from 1.0m to 5m targeting the saprolite zone collecting one representative sample from the end of each hole. A few auger holes were drilled to a point of refusal and could be up to 15m in depth. The technique and medium collected is considered a surface geochemical sample.</p>
	Include reference to measures taken to ensure sample representivity and the appropriate calibration of any measurement tools or systems used.	<p>All sampling is guided by Cardinal Resources protocols and Quality Control procedures as per industry standard to ensure sample representativity.</p> <p>HQ diamond core samples are taken selectively through the altered, silicified and shear zones, with minimum 0.5m and maximum 1.5m lengths of sample.</p> <p>Sahara Natural Resources and Cardinal's supervising geologists are always present onsite when sampling to ensure the appropriate horizon is collected from each hole for the auger drilling.</p>
	Aspects of the determination of mineralisation that are Material to the Public Report.	<p>The determination of mineralisation in core is based on observed alterations, silicification and shearing of the lithologies.</p> <p>For the auger drilling, in case ground condition prevents drilling from reaching the saprolite zone, a sample taken after the depth of 0.5m will be accepted if well logged to indicate the soil horizon or the soil type sample that was collected. When the depth of a hole is less than a meter and efforts to go further are unsuccessful in a transported environment, the sample is logged but no sample taken for laboratory analysis.</p>

Criteria	JORC Code Explanation	Commentary
	<p>In cases where 'industry standard' work has been done this would be relatively simple (e.g. 'reverse circulation drilling was used to obtain 1 m samples from which 3 kg was pulverised to produce a 30 g charge for fire assay'). In other cases, more explanation may be required, such as where there is coarse gold that has inherent sampling problems. Unusual commodities or mineralisation types (e.g. submarine nodules) may warrant disclosure of detailed information.</p>	<p>Diamond drill samples are crushed to -2mm, and a &lt;1kg split sample is then pulverised via LM2 Ring Pulveriser to a nominal 85% passing -75µm. A 200g sub-sample is taken from the pulverised material for analysis. A 50g of the sub-sample is used for lead collection Fire Assay analysis for gold.</p> <p>Based on the original Fire Assay drill results, a 2kg split composite samples submitted for the Ndongo East were used for the preliminary Bottle Roll test at SGS. The following analysis were completed:</p> <ul style="list-style-type: none"> <li>• Active Cyanide Leach, 24-hour solvent extraction;</li> <li>• Screen Fire Assay for gold;</li> <li>• Total Sulphur by LECO;</li> <li>• Total Carbon by LECO;</li> <li>• Aqua Regia for Arsenic; and</li> <li>• Multielement 4-Acid digest for a total of 59 elements.</li> </ul> <p>The whole 2kg auger drill sample submitted is pulverised to 85% passing 75µm and 1kg sample split is used for the cyanide leach 24-hour solvent extraction.</p>
<b>Drilling techniques</b>	<p>Drill type (e.g. core, reverse circulation, open-hole hammer, rotary air blast, auger, Bangka, sonic, etc.) and details (e.g. core diameter, triple or standard tube, depth of diamond tails, face-sampling bit or other type, whether core is oriented and if so, by what method, etc.).</p>	<p>Diamond core drilling is completed with core size of HQ with a standard tube. Triple tube is used in saprolite at the tops of the holes. Core is orientated to determine both azimuth and dip using digital Reflex ACT II RD orientation tool.</p> <p>Diamond drill holes are inclined at -45° to -60° angles for optimal zone intersection. All drill collars are surveyed using Trimble R8 RTK GPS with downhole surveying every 30m using Reflex digital surveying instruments.</p> <p>Geochemical sampling is by open hole auger drilling.</p>
<b>Drill sample recovery</b>	<p>Method of recording and assessing core and chip sample recoveries and results assessed.</p>	<p>Diamond core recovery is logged and captured into the database. The method of recording chip and core sample recoveries was to enter the relevant data on a hand-held Motion F5te Tablet PC using a set of standard templates supplied by Maxwell Geoservices, Perth (Maxwell).</p> <p>Core recovered from each drill run is measured and compared with the drill run</p>

Criteria	JORC Code Explanation	Commentary
		length drilled to calculate an estimated percentage core recovery. For core drilling overall recoveries are excellent with weighted average recovery greater than 98%.  For auger drilling recovery is 100% due to the method of sampling.
	Measures taken to maximise sample recovery and ensure representative nature of the samples.	Measures taken include the use of bigger HQ core size diamond drilling to maximise recovery, having a geologist onsite to examine core and core metres marked and orientated to check against the driller's blocks and ensuring that all core loss is taken into account.  For auger drilling saprolite zone is preferentially sampled.
	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 seen to exist between sample recovery and grade, and no sample bias has occurred due to preferential loss/gain of any fine/coarse material due to the acceptable sample recoveries obtained by the drilling methods employed.  There is low potential for sample bias for auger drilling due to the method of geochemical sampling.
<b>Logging</b>	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.	All diamond drill holes are fully logged. The lithology, alteration and geotechnical characteristics of core are logged directly to a digital format on a Field Toughbook laptop logging system following procedures and using Cardinal geologic codes. Data is imported into Cardinal's central database after validation in LogChief™.  In the opinion of the Competent Persons all geological logging of diamond core is to a level of detail to support future Mineral Resource estimation  Auger chip samples are fully logged. The sample material, alteration, colour, lithology, weathering, and quartz abundance are noted.
	Whether logging is qualitative or quantitative in nature. Core (or costean, channel, etc.) photography.	Diamond core and auger chips logging are both quantitative and qualitative depending on the field being logged.  Diamond core is photographed both in dry and wet form.

Criteria	JORC Code Explanation	Commentary
	The total length and percentage of the relevant intersections logged.	All drill holes are logged in full and to the total length of each drill hole.
<b>Sub-sampling techniques and sample preparation</b>	If core, whether cut or sawn and whether quarter, half or all core taken.	Orientation of core is completed for all diamond holes and all are marked prior to sampling. Longitudinally cut half core samples are produced using a Core Saw with diamond impregnated blades. Samples are weighed and recorded.
	If non-core, whether riffled, tube sampled, rotary split, etc. and whether sampled wet or dry.	A sample scoop was used to collect approximately 2kg sample of auger sample from the end of the hole.
	For all sample types, the nature, quality and appropriateness of the sample preparation technique.	<p>Drill core samples are sorted, dried at 105°C for 4 hours and weighed. Samples are crushed through Jaques crusher to nominal -10mm. A second stage crushing is through Boyd crusher to nominal -2mm and then split to &lt;1.0kg. The reject sample is retained in the original bag and stored. The split is pulverised in a LM2 Ring Pulveriser to a nominal 85% passing 75µm and approximately 200g sub-sample of the pulverised material is used for fire assay.</p> <p>Cyanide leach test samples for the preliminary bottle roll test at Ndongo East were composited to a greater than 3kg for each interval selected and submitted to the laboratory. Samples were sorted and dried in an oven for 8 hours and weighed. The entire sample was crushed to -2mm using RSD Boyd crusher and pulverised to 85% passing 75µm:</p> <p>A 2kg sub-sample of the homogenised pulverised material was used for cyanidation bottle roll analysis for gold.</p> <p>On a separate sub-sample of the homogenised pulverised material, screen fire assay analysis for gold, total sulphur determination by LECO and total carbon determination by LECO analysis were undertaken.</p> <p>On a separate sub-sample of the homogenised pulverised material, 4-Acid Digest multielement analysis was completed for a total of 59 elements.</p> <p>Auger sample preparation and analyses was carried out by Intertek laboratory in Ghana. All samples are dried, crushed, pulverised to</p>

Criteria	JORC Code Explanation	Commentary
		<p>85% passing 75µm and 1 kg sample split was used for bulk leach extractable gold analysis over 24 hours.</p> <p>All preparation equipment is flushed with barren material prior to commencement of the job.</p>
	Quality control procedures adopted for all sub-sampling stages to maximise representivity of samples.	<p>Cardinal Resources has protocols that cover the sample preparation at the laboratories and the collection and assessment of data to ensure that accurate steps are used in producing representative samples for the analytical process. Key performance indices include:</p> <ul style="list-style-type: none"> <li>• Contamination index of 95% (that is at least 95% of blanks pass); failures can only be attributed to probable minor laboratory contamination.</li> <li>• Crushed Size index of 95% passing 2 mm (1:50 sample screened).</li> <li>• Grind Size index of 85% passing 75 microns (minimum 1:50 sample screened).</li> <li>• Check Samples returning at worst 20% precision at 90th percentile and bias of 5% or better.</li> </ul> <p>Crusher and pulveriser are flushed with barren material at the start of every batch.</p>
	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.	<p>Measures taken to ensure that the core sampling is representative is to sample half core at 0.5m (minimum) to 1.5m (maximum) intervals through the recognisable altered, silicified, mineralised shear zones.</p> <p>Measures taken to ensure that the auger sampling is representative is to collect 2kg of sample at the end of each hole within the target saprolite zone and to take field duplicate samples every 15<sup>th</sup> sample.</p> <p>Results of field duplicates for auger samples and Check Samples for diamond samples are all evaluated to ensure that the results of each assay batch are acceptable.</p> <p>1:20 grind quality checks are completed for 85% passing 75µm criteria to ensure the representativeness of sub-samples.</p>

Criteria	JORC Code Explanation	Commentary
	Whether sample sizes are appropriate to the grain size of the material being sampled.	Sample sizes are considered appropriate to the grain size.
<b>Quality of Assay data and laboratory tests</b>	The nature, quality and appropriateness of the assaying and laboratory procedures used and whether the technique is considered partial or total.	<p>Diamond core sample analysis was completed at SGS Ghana and South Africa laboratories who provide Quality assurance protocol in line with ISO 17025 (quality accreditation system for commercial laboratories – ISO 10725).</p> <p>All diamond core samples are analysed for gold by lead collection Fire Assay method of a 50g charge with AAS finish; the assay charge is fused with the litharge-based flux, cupelled and prill dissolved in aqua regia with gold tenor determined by flame AAS. Fire assay is considered a total assay technique.</p> <p>Cyanide leach test samples were analysed using the following methods:</p> <p>Active Cyanide Leach, 24-hour Solvent Extraction of a 2kg Sample with AAS Finish: This analysis was undertaken at the Tarkwa laboratory in Ghana. Though, the cyanide leach method is considered a partial extraction technique, the 24-hour leach time should ensure high extraction. The larger sample volumes used for the leach method usually result in better representativity of grade where coarse grained gold/nuggety gold could potentially exist when compared to Fire Assay method which uses a much smaller sample volume that may not be representative due to coarse grained gold/nuggety gold existing in the sample volume;</p> <p>Screen Fire Assay: The analysis was completed at the Tarkwa laboratory. A separate 500g sub-sample sample was screened to 106µm. The entire coarse fraction was fire assayed for gold and a duplicate fire assay was performed on the fine fraction. The size fraction weights, coarse and fine fraction gold content and total gold content were reported. The screen fire assay method is typically used to analyse samples containing coarse gold. This method is considered a total assay technique.</p>

Criteria	JORC Code Explanation	Commentary
		<p>Total Carbon and Total Sulphur Analysis: Carbon and sulphur were analysed at the Ghana laboratory by the LECO carbon-sulphur analyser and high temperature combustion infrared detection. With this method, carbon and sulphur in the samples were converted to carbon dioxide and sulphur dioxide respectively and concentrations were measured by infrared detectors.</p> <p>Aqua Regia Digest: Analysis undertaken at the Ghana laboratories. Arsenic was determined from an aqua regia test tube digest followed by flame AAS. Aqua regia digests are considered the weakest of the digestions and will not attack silicate minerals. As such, the leach provides partial results for most elements.</p> <p>Mixed Acid Digest with ICPOES/MS finish: Multielement 4-Acid digest test was undertaken at the Randfontein laboratory in South Africa. On a separate split of the homogenous composite sample, the samples were digested and refluxed with a mixture of acids. This extended digest method approaches a total digest for many elements however some refractory minerals are partially digested. Elements tested include Al ,Ba, Ca ,Cr ,Cu ,Fe ,K, Li ,Mg ,Mn ,Na, P ,S ,Sr, Ti, V, Zn, Zr, Ag, As, Be, Bi ,Cd, Ce, Co, Cs, Dy, Er, Eu, Ga, Gd, Ge, Hf, Ho, In, La, Lu, Mo, Nb, Nd, Ni, Pb, Pr, Rb, Sb, Sc, Se, Sm, Sn, Ta ,Tb, Te, Th, Tl, Tm, U, W ,Y, and Yb.</p> <p>Auger samples were analysed at Intertek laboratory in Ghana using Active Cyanide Leach, 24-hour Solvent Extraction of a 2kg sample. Though, the cyanide leach method is considered a partial extraction technique, the 24-hour leach time should ensure high extraction.</p> <p>The analytical methods are considered appropriate for the mineralisation style and is of industry standard.</p>
	For geophysical tools, spectrometers, handheld XRF instruments, etc., the parameters used in determining the analysis including instrument make and	No hand-held geophysical tools are used.

Criteria	JORC Code Explanation	Commentary
	<p>model, reading times, calibrations factors applied and their derivation, etc.</p> <p>Nature of quality control procedures adopted (e.g. standards, blanks, duplicates, external laboratory checks) and whether acceptable levels of accuracy (i.e. lack of bias) and precision have been established.</p>	<p>Cardinal's QAQC protocol is considered industry standard with certified reference materials (CRMs) are submitted on a regular basis with routine samples. The CRMs having a range of values and blanks are inserted in the ratio of 1:20. Duplicates are taken at the riffle splitter every 20<sup>th</sup> sample. No duplicate samples are taken from core samples.</p> <p>Pulps are submitted to a secondary laboratory for checks on the accuracy and precision of the primary laboratory.</p> <p>Coarse rejects are submitted back to the primary laboratory to assess the adequacy of the sub-sampling process.</p> <p>Laboratories' QAQC involves the use of internal laboratory standards using certified reference material and blanks. The internal laboratory QAQC checks are reported by the laboratory on a monthly basis and a review of the QAQC reports suggests the laboratory is performing within acceptable limits.</p>
<b>Verification of sampling and assaying</b>	The verification of significant intersections by either independent or alternative company personnel.	Significant intersections have been verified by alternative company personnel.
	The use of twinned holes.	None of the drill holes in this report are twinned.
	Documentation of primary data, data entry procedures, data verification, data storage (physical and electronic) protocols.	Primary data are captured on field tough book laptops using LogChief™ Software. The software has validation routines and data is then imported onto a secure central database.
	Discuss any adjustment to assay data.	The primary data is always kept and is never replaced by adjusted or interpreted data.
<b>Location of data points</b>	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.	<p>Initially, all drill hole collar coordinates are obtained using handheld Garmin GPSmap 64s GPS within <math>\pm 3\text{m}</math> accuracy.</p> <p>Subsequently all diamond drill collars are accurately surveyed using Trimble R8 RTK DGPS system within <math>\pm 10\text{mm}</math> of accuracy (X, Y, Z).</p> <p>Coordinates are based on three control stations established at Namdini.</p>

Criteria	JORC Code Explanation	Commentary
		Accuracy and quality of downhole surveys of diamond drill holes are determined by using Reflex Ez-Shot survey instrument at regular 30m intervals.
	Specification of the grid system used.	Coordinate and azimuth are reported in UTM WGS84 Zone 30 North.
	Quality and adequacy of topographic control.	Topographic control at Ndongo was supplied by Southern Geoscience Consultants (Perth) using satellite imagery.  Topographic control is considered adequate.
<b>Data spacing and distribution</b>	Data spacing for reporting of exploration results.	The diamond drilling was carried on a spacing of 50m to 100m along fence lines testing mineralisation to a vertical depth of approximately 180m and to confirm the mineralisation intersected by the previous RC drilling.  Some step out diamond drilling at 12.5m spacing from the initial high-grade section lines was carried out to ensure that plunges of the mineralised structures are understood before embarking on a wider spaced drill campaign along strike.  The infill auger drilling was carried out to ensure a grid of 50m centres over 100m line spacing.
	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.	Exploration is at the early stage, and as such drill data spacing and distribution are insufficient to establish geological and grade continuity that are appropriate for reporting Mineral Resources and Ore Reserves.
<b>Orientation of data in relation to geological structure</b>	Whether sample compositing has been applied.	No sample compositing has been applied to the primary diamond drill samples.  The preliminary cyanide leach test samples were collected from original diamond drill intervals with lengths between 3 to 13.3m and composited to approximately 3kg by passing them multiple times through a 3-tier riffle splitter.
	Whether the orientation of sampling achieves unbiased sampling of possible structures and the extent to which this is known, considering the deposit type.	Diamond drill holes are orientated to achieve intersection angles as close to perpendicular to the mineralisation as practicable based on ground magnetic modelling data and previous RC drilling. Some sampling bias may occur.

Criteria	JORC Code Explanation	Commentary
		Systematic geological mapping and structural information from the current diamond drilling are required to determine the true orientation of dips and structures of the mineralisation.
	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 significant orientation-based sampling bias is known at this time.
<b>Sample security</b>	the measures taken to ensure sample security.	<p>An independent Ghanaian security contractor is used to ensure sample security.</p> <p>The drilling contractor is accountable for drill core and RC chip production at the drill site. Final delivery from the drill site to the laydown area within the core yard is managed by Cardinal. The core yard technicians, field technicians and Geologists ensure the core and chips are logged, prepared and stored under security until conveyed to a nearby accredited sample preparation laboratory by Cardinal.</p> <p>At the time of sample delivery at the laboratory, a sign-off process between Cardinal and the laboratory ensures that samples and paperwork correspond and samples are receipted against the Cardinal submission sheets. The sample preparation laboratory is responsible for the samples from the time of collection from Cardinal until pulps and rejects are collected and checked by Cardinal Geologists.</p> <p>Two pulp samples are produced:</p> <ul style="list-style-type: none"> <li>• one pulp dispatched by Cardinal to the appropriate laboratory for assay;</li> <li>• the duplicate pulp and reject stored by Cardinal in a secure storage facility for possible re-assay or other testwork.</li> </ul>
<b>Audits or reviews</b>	The results of any audits or reviews of sampling techniques and data.	Sampling techniques are of industry standards.

## Section 2 – Reporting of Exploration Results

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

Criteria	JORC Code Explanation	Commentary
<b>Mineral Tenement and Land Status</b>	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 Ndongo Exploration Permit is on PL9/13, PL9/19, PL9/22 and PL9/36 licenses over an area of 324.9 sq. km located in the North-East region of Ghana.
	The security of the tenure held at the time of reporting along with any known impediments to obtaining a license to operate in the area.	All tenements are current and in good standing.
<b>Exploration Done by Other Parties</b>	Acknowledgment and appraisal of exploration by other parties.	<p>Exploration in the region has been undertaken by a number of groups including:</p> <ul style="list-style-type: none"> <li>• 1933 - Colonial discovery of Gold at Nangodi.</li> <li>• 1934 to 1942 - Nangodi Gold Mine production and other small development projects in the area (e.g. Zug, Pelungu, Money Palava).</li> <li>• 1992 to 1994 - BHP conducted regional exploration programmes including regional stream sediment and broad soil sampling to follow-up on stream sediment anomalies. Project was abandoned when BHP withdrew from activity in West Africa.</li> <li>• 1996 to 1997 – Africwest granted regional Reconnaissance License and undertook extensive soil sampling at Nangodi.</li> <li>• 2006 - Etruscan (JV with Red Back): Conducted data review and compilation, soil and rock sampling and RAB drilling. Identified blind mineralisation at Zupeliga.</li> <li>• 2011 - Abzu (JV with Red Back): Completed data compilation, RC/diamond drilling at Nangodi and Zoog.</li> <li>• 2012 - Abzu (JV with Red Back): Conducted trenching, rock sampling, ground geophysics survey (magnetic and EM) and geologic mapping.</li> </ul>
<b>Geology</b>	Deposit type, geological setting and style of mineralisation	Drill samples were collected within sheared and folded rocks containing sulphides; mainly pyrite with minor arsenopyrite.

Criteria	JORC Code Explanation	Commentary
		<p>The geological setting is a Paleoproterozoic Greenstone Belt comprising Birimian metavolcanics, volcanoclastics and metasediments located along portion of the regional Bole-Bolgatanga Shear Zone and a splay off this Shear Zone (the Nangodi Shear Zone).</p> <p>Gold mineralisation occurs within shear zones comprising alteration haloes containing higher grade lenses of altered, silicified, sheared metavolcanics and disseminated sulphides</p>
<b>Drill hole information</b>	<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"> <li>• Easting and northing of the drill hole collar</li> <li>• Elevation or RL (Reduced Level – elevation above sea level in meters) of the drill hole collar</li> <li>• Dip and azimuth of the hole</li> <li>• Down hole length and interception depth</li> <li>• Hole length</li> </ul>	A summary of drill hole information is provided in this document.
	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.	There has been no exclusion of information.
<b>Data aggregation methods</b>	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.	No cutting of high grades has yet been undertaken on diamond drill samples.
	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.	Aggregated intersections incorporating short lengths of high-grade results within the shear zones are calculated to include no more than intervals of 3m below grades of <0.5 g/t Au when assay results are reported.
	The assumptions used for any reporting of metal equivalent values should be clearly stated.	No metal equivalents are used in the intersection calculation.
<b>Relationship between mineralisation widths and intercept lengths</b>	These relationships are particularly important in the reporting of exploration results.	The relationship between mineralisation widths and intercept lengths are not yet fully understood.
	If the geometry of the mineralisation with respect to the drill hole angle is known, its nature should be reported.	The geometry of the mineralisation with respect to the drill hole angles is not yet known.

Criteria	JORC Code Explanation	Commentary
	If it is not known and only the down hole lengths are reported, there should be a clear statement to this effect (e.g. 'down hole length, true width not known').	The geometry of the mineralisation is unknown; only downhole length is reported for diamond drilling (no true width of mineralisation is reported).
<b>Diagrams</b>	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, cross sections of the drilling, interpreted geology and assays are included within the body of the accompanying document.
<b>Balanced Reporting</b>	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 accompanying document is considered to represent a balanced report.
<b>Other substantive exploration data</b>	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>Other exploration data collected is not considered material to this document at this stage.</p> <p>The interpretation of the geological observations shown in the cross sections are subject to possible change as new information is gathered.</p> <p>Further data collection will be reviewed and reported when considered material.</p>
<b>Further Work</b>	<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>Geological mapping, surface rock sampling, trenching, geochemical surveys, geophysical surveys are continuing.</p> <p>Once all results have been received, further RC/DD drilling will be considered along strike and at depth to further delineate this gold mineralised zone and to determine whether more sub-parallel mineralised horizons can be located.</p>

## Appendix 5B

### Mining exploration entity and oil and gas exploration entity quarterly report

Introduced 01/07/96 Origin Appendix 8 Amended 01/07/97, 01/07/98, 30/09/01, 01/06/10, 17/12/10, 01/05/13, 01/09/16

**Name of entity**

Cardinal Resources Limited

**ABN**

56 147 325 620

**Quarter ended ("current quarter")**

30 September 2019

Consolidated statement of cash flows	Current quarter \$A'000	Year to date (3 months) \$A'000
<b>1. Cash flows from operating activities</b>		
1.1 Receipts from customers	-	-
1.2 Payments for		
(a) exploration & evaluation	(7,143)	(7,143)
(b) development	-	-
(c) production	-	-
(d) staff costs	(579)	(579)
(e) administration and corporate costs	(997)	(997)
1.3 Dividends received (see note 3)	-	-
1.4 Interest received	84	84
1.5 Interest and other costs of finance paid	(580)	(580)
1.6 Income taxes paid	-	-
1.7 Research and development refunds	-	-
1.8 Other (provide details if material) – VAT/GST/FX	1,533	1,533
<b>1.9 Net cash from / (used in) operating activities</b>	<b>(7,682)</b>	<b>(7,682)</b>
<b>2. Cash flows from investing activities</b>		
2.1 Payments to acquire:		
(a) property, plant and equipment	(132)	(132)
(b) tenements (see item 10)	-	-
(c) investments	-	-

Consolidated statement of cash flows		Current quarter \$A'000	Year to date (3 months) \$A'000
	(d) other non-current assets	-	-
2.2	Proceeds from the disposal of:		
	(a) property, plant and equipment	-	-
	(b) tenements (see item 10)	-	-
	(c) investments	-	-
	(d) other non-current assets	-	-
2.3	Cash flows from loans to other entities	-	-
2.4	Dividends received (see note 3)	-	-
2.5	Other (provide details if material)	-	-
2.6	<b>Net cash from / (used in) investing activities</b>	<b>(132)</b>	<b>(132)</b>

<b>3.</b>	<b>Cash flows from financing activities</b>		
3.1	Proceeds from issues of shares	-	-
3.2	Proceeds from issue of convertible notes	-	-
3.3	Proceeds from exercise of share options	4,074	4,074
3.4	Transaction costs related to issues of shares, convertible notes or options	-	-
3.5	Proceeds from borrowings	-	-
3.6	Repayment of borrowings	-	-
3.7	Transaction costs related to loans and borrowings	-	-
3.8	Dividends paid	-	-
3.9	Other (provide details if material)	-	-
3.10	<b>Net cash from / (used in) financing activities</b>	<b>4,074</b>	<b>4,074</b>

<b>4.</b>	<b>Net increase / (decrease) in cash and cash equivalents for the period</b>		
4.1	Cash and cash equivalents at beginning of period	18,736	18,736
4.2	Net cash from / (used in) operating activities (item 1.9 above)	(7,682)	(7,682)
4.3	Net cash from / (used in) investing activities (item 2.6 above)	(132)	(132)
4.4	Net cash from / (used in) financing activities (item 3.10 above)	4,074	4,074
4.5	Effect of movement in exchange rates on cash held	(255)	(255)
4.6	<b>Cash and cash equivalents at end of period</b>	<b>14,741</b>	<b>14,741</b>

5.	<b>Reconciliation of cash and cash equivalents</b> at the end of the quarter (as shown in the consolidated statement of cash flows) to the related items in the accounts	Current quarter \$A'000	Previous quarter \$A'000
5.1	Bank balances	4,857	4,301
5.2	Call deposits	9,884	14,435
5.3	Bank overdrafts		-
5.4	Other (provide details)		-
5.5	<b>Cash and cash equivalents at end of quarter (should equal item 4.6 above)</b>	<b>14,741</b>	<b>18,736</b>

**6. Payments to directors of the entity and their associates**

- 6.1 Aggregate amount of payments to these parties included in item 1.2
- 6.2 Aggregate amount of cash flow from loans to these parties included in item 2.3
- 6.3 Include below any explanation necessary to understand the transactions included in items 6.1 and 6.2

Current quarter \$A'000
323
-

N/A

**7. Payments to related entities of the entity and their associates**

- 7.1 Aggregate amount of payments to these parties included in item 1.2
- 7.2 Aggregate amount of cash flow from loans to these parties included in item 2.3
- 7.3 Include below any explanation necessary to understand the transactions included in items 7.1 and 7.2

Current quarter \$A'000
-
-

N/A

## Mining exploration entity and oil and gas exploration entity quarterly report

8.	<b>Financing facilities available</b> <i>Add notes as necessary for an understanding of the position</i>	<b>Total facility amount at quarter end</b>	<b>Amount drawn at quarter end</b>
		<b>\$A'000</b>	<b>\$A'000</b>
8.1	Loan facilities	\$39,102	\$39,102
8.2	Credit standby arrangements	-	-
8.3	Other (please specify)	-	-
8.4	Include below a description of each facility above, including the lender, interest rate and whether it is secured or unsecured. If any additional facilities have been entered into or are proposed to be entered into after quarter end, include details of those facilities as well.		

Please see press release dated 31 July 2018 for more information.

9.	<b>Estimated cash outflows for next quarter</b>	<b>\$A'000</b>
9.1	Exploration and evaluation	3,361
9.2	Development	-
9.3	Production	-
9.4	Staff costs	1,164
9.5	Administration and corporate costs	1,449
9.6	Other (provide details if material)	-
9.7	<b>Total estimated cash outflows</b>	<b>5,974</b>

10.	<b>Changes in tenements (items 2.1(b) and 2.2(b) above)</b>	<b>Tenement reference and location</b>	<b>Nature of interest</b>	<b>Interest at beginning of quarter</b>	<b>Interest at end of quarter</b>
10.1	Interests in mining tenements and petroleum tenements lapsed, relinquished or reduced	-	-	-	-
10.2	Interests in mining tenements and petroleum tenements acquired or increased	-	-	-	-

**Compliance statement**

- 1 This statement has been prepared in accordance with accounting standards and policies which comply with Listing Rule 19.11A.
- 2 This statement gives a true and fair view of the matters disclosed.

Sign here: Sarah Shipway  
Company Secretary

Date: 31 October 2019

Print name: Sarah Shipway

**Notes**

1. The quarterly report provides a basis for informing the market how the entity's activities have been financed for the past quarter and the effect on its cash position. An entity that wishes to disclose additional information is encouraged to do so, in a note or notes included in or attached to this report.
2. If this quarterly report has been prepared in accordance with Australian Accounting Standards, the definitions in, and provisions of, AASB 6: Exploration for and Evaluation of Mineral Resources and AASB 107: Statement of Cash Flows apply to this report. If this quarterly report has been prepared in accordance with other accounting standards agreed by ASX pursuant to Listing Rule 19.11A, the corresponding equivalent standards apply to this report.
3. Dividends received may be classified either as cash flows from operating activities or cash flows from investing activities, depending on the accounting policy of the entity.