

Technical Report
Mineral Resource Estimation
for the
Namdini Gold Project,
Ghana

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Prepared for

Cardinal Resources Limited by

MPR Geological Consultants Pty Ltd

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1. Summary

1.1. Introduction

This Technical Report has been prepared for Cardinal Resources Limited (Cardinal) to describe Mineral Resource estimates for the Namdini Project as announced on the 18th of September 2017.

Cardinal is a Western Australia-based gold exploration and development company, and has been a reporting issuer on the Australian Stock Exchange (ASX) since August 2011 and on the Toronto Stock Exchange (TSX) since July 2017. Cardinal's key assets are located in Ghana and include the Namdini, Bolgatanga, and Subranum Projects.

1.2. Property description

Namdini is approximately 50 kilometres southeast of the regional town of Bolgatanga in northern Ghana and around 60 kilometres south of the Burkina Faso-Ghana border. Namdini lies within the Nangodi Greenstone Belt, one of a series of southwest – northeast trending granite-greenstone belts which host significant gold mineralization in Ghana and Burkina Faso.

Cardinal holds its interest in the Namdini Project through an agreement between Savannah Mining Ghana Limited and Cardinal Mining Services Limited, a wholly-owned subsidiary of Cardinal, and agreements with holders of small scale mining licenses within the project area.

On the 12th of July 2017 the application by Savannah for a Large-Scale Mining Lease over the Namdini Project was granted by the Minister of Lands and Natural Resources of Ghana. Cardinal and Savannah have both signed the necessary documentation to assign the Namdini Mining Licence to CNM for US\$1.00 per the Savannah agreement. The lease is for an initial period of fifteen years and is renewable.

1.3. Resource sampling and assaying

The estimates described in this report are based on RC and diamond information available on the 11th of September 2017, totalling 275 holes for 67,122 metres of drilling. RC and diamond drilling provides around one third and two thirds of the estimation dataset, respectively. The available drilling information includes an additional 33,406 metres relative to the dataset available for previous mineral Resource Estimates reported in April 2017.

Information available to demonstrate the reliability of field sampling for the resource drilling includes core recoveries, recovered RC sample weights, RC sample condition logs and RC field duplicates. These data have established that the RC and diamond sampling is representative and free of any biases or other factors that may materially impact the reliability of the sampling.

All sample preparation and primary gold analyses of samples from the resource drilling were undertaken by independent commercial laboratories. Most primary samples were submitted to SGS Ouagadougou or SGS Tarkwa for analysis for gold by fire-assay. A small proportion of samples were assayed by Intertek in Tarkwa.

Information available to demonstrate reliability of sample preparation and analysis includes assays for blanks, reference standards, and inter-laboratory repeats. These data have established that the assaying is representative and free of any biases or other factors that may materially impact the reliability of the analytical results. The author considers that the sample preparation, security and analytical procedures adopted for the Namdini drilling provide an adequate basis for the current Mineral Resource estimates.

1.4. Mineralization and Mineral Resource estimates

Gold mineralization occurs in altered meta-volcanosedimentary rocks and tonalite. The mineralized domain used for the current estimates trends north-northeast over approximately 1,270 metres of strike and dips to the west at around 70 degrees. It has an average width of approximately 260 metres and extends to 710 metres depth, around 25 metres below the base of drilling.

Mineral Resources were estimated by Multiple Kriging of two metre down-hole composited gold grades from RC and diamond drilling. Estimated resources include a variance adjustment to give estimates of recoverable resources for selective mining dimensions of 5 metres east by 10 metres north by 2.5 metres in elevation with high quality grade control sampling on an 8 by 12 by 1.25 metre pattern, and are reported within an optimal pit shell generated at a gold price of \$US 1,500/oz.

Table 1 shows Namdini Mineral Resource estimates for selected cut off grades as of September 11, 2017. The figures in these are rounded to reflect the precision of the estimates and include rounding errors.

Table 1: September 2017 Namdini Mineral Resource Estimates for selected cut offs

Namdini Indicated Mineral Resource Estimates			
Cut-off (Au g/t)	Tonnes (Mt)	Grade (Au g/t)	Metal (Au Moz)
0.3	159	0.94	4.76
0.5	120	1.10	4.27
0.8	72	1.42	3.28
1.0	51	1.63	2.67
Namdini Inferred Mineral Resource Estimates			
Cut-off (Au g/t)	Tonnes (Mt)	Grade (Au g/t)	Metal (Au Moz)
0.3	111	1.0	3.5
0.5	84	1.2	3.1
0.8	52	1.5	2.4
1.0	37	1.7	2.0

The Mineral Resource estimates have been classified and reported in accordance with NI 43-101 guidelines and classifications adopted by CIM Council in May 2014. Mineral Resources were previously estimated for Namdini in November 2016 and April 2017 respectively.

1.5. Future work

Cardinal are currently undertaking a substantial program of infill drilling within the Namdini resource area, and have commenced a trial grade control drilling program within the main mineralized area. The report author concurs with the general approach of Cardinal's infill and trial grade control drilling program and recommends that additional resource drilling and sampling requirements be assessed after evaluation of results from the current drilling programs.

Cardinal's planned future work is aimed at progressing to PEA and PFS level programs, and consists primarily infill diamond drilling with the goal of converting Inferred Mineral Resources to Indicated Mineral Resources, targeting central portions of the deposit, and trial grade control drilling. Also proposed in is an update of the Mineral Resource estimate followed by a Feasibility Study. The author has reviewed and concurs with Cardinal's proposed work programs for updating Mineral Resources proposed by Richard Bray, Principal Geologist of Cardinal and a Qualified Person under NI 43-101. (Table 2).

Specific recommendations regarding the planned drilling and sampling activities are outlined below:

- Review the identified rare database inconsistencies, including anomalous inter-laboratory repeats and sample weights assigned as gold grades, and update the master database accordingly. The author understands that Cardinal has commenced this work, as part of database personnel's routine activities. Any additional cost, beyond routine expenditure, is likely to be minimal.
- Use of coarse blanks rather than fine blanks for monitoring the reliability of sample preparation and assaying. Removing the cost for pulverising blank material is likely to result in a minor reduction in on-going drill program costs.
- Future infill resource drilling programs should include comprehensive down-hole surveying. The costs in Table 2 include such down-hole surveying
- The author recommends that Cardinal ensure the trial grade control drilling program cover representative Namdini gold mineralization of sufficient volume to allow robust conclusions to be drawn from the results. The author recommends the trial area covers the full width of the mineralization for at least 200 metres along strike and extends well into the fresh mineralization

Table 2: Proposed Exploration Expenditure

Item	Cost (US)
Diamond drilling (35 holes for 15,000 m)	\$3,100,000
Metallurgical test work	\$600,000
Environmental and social studies	\$150,000
Mineral resource update	\$150,000
Subtotal	\$4,000,000
Contingency	\$400,000
Total	\$4,400,000

2. Introduction

This Technical Report has been prepared for Cardinal Resources Limited to describe Mineral Resource estimates for Namdini and associated exploration, drilling, sampling and analysis.

This report is based on the author's observations, the references listed in Section 27 and data files containing sampling and assay information for the Namdini project provided by Cardinal.

The Qualified Person responsible for the Mineral Resources is Nicolas Johnson who is a full-time employee of MPR Geological Consultants Pty Ltd and a member of the Australian Institute of Geoscientists. Mr Johnson visited the project between the 11th and 14th of January 2017 and is responsible for all sections of this Technical Report.

3. Reliance on Other Experts

This report is based on the references listed in Section 27, the author's observations and information in sampling and assay data files supplied by Cardinal. The report relies on other experts for the description of project tenure and ownership. These aspects are detailed and referenced in relevant sections of the report, and listed below:

- Section 4: The description of mineral tenure and project ownership are from Cardinal, 2017, Blakely 2017 and Kuenyehia 2017.
- Section 5: The description of mineral tenure and project ownership progression are Cardinal, 2017, Blakely 2017 and Kuenyehia 2017.

The report author is not qualified to comment on any environmental or legal considerations relating to the status of the Namdini tenements and expresses no opinion as to the ownership status of the property.

4. Property Description and Location

4.1. Location

Namdini is approximately 50 kilometres southeast of the regional town of Bolgatanga in northern Ghana and around 60 kilometres south of the Burkina Faso-Ghana border (Figure 1). Table 3 lists the coordinate extents of the Namdini Gold Project lease. Approximate central coordinates of the deposit are 756400.0 m N, 1177050.0 m E in WGS84/NUTM30 projection or 10°38' 21" N Latitude and 0°39'.23" W Longitude

The lease has covers approximately 19.54 km². Figure 1 shows the Mining Lease boundary relative to the mineralized domain used for resource estimation and drill hole traces.

Table 3: Coordinates of the Namdini Project Lease

Corner	Longitude	Latitude
Top Left	10° 39' 42" N	0° 40' 15" W
Top Right	10° 40' 57" N	0° 38' 30" W
Bottom Right	10° 37' 00" N	0° 38' 30" W
Bottom Left	10° 36' 60" N	0° 40' 15" W

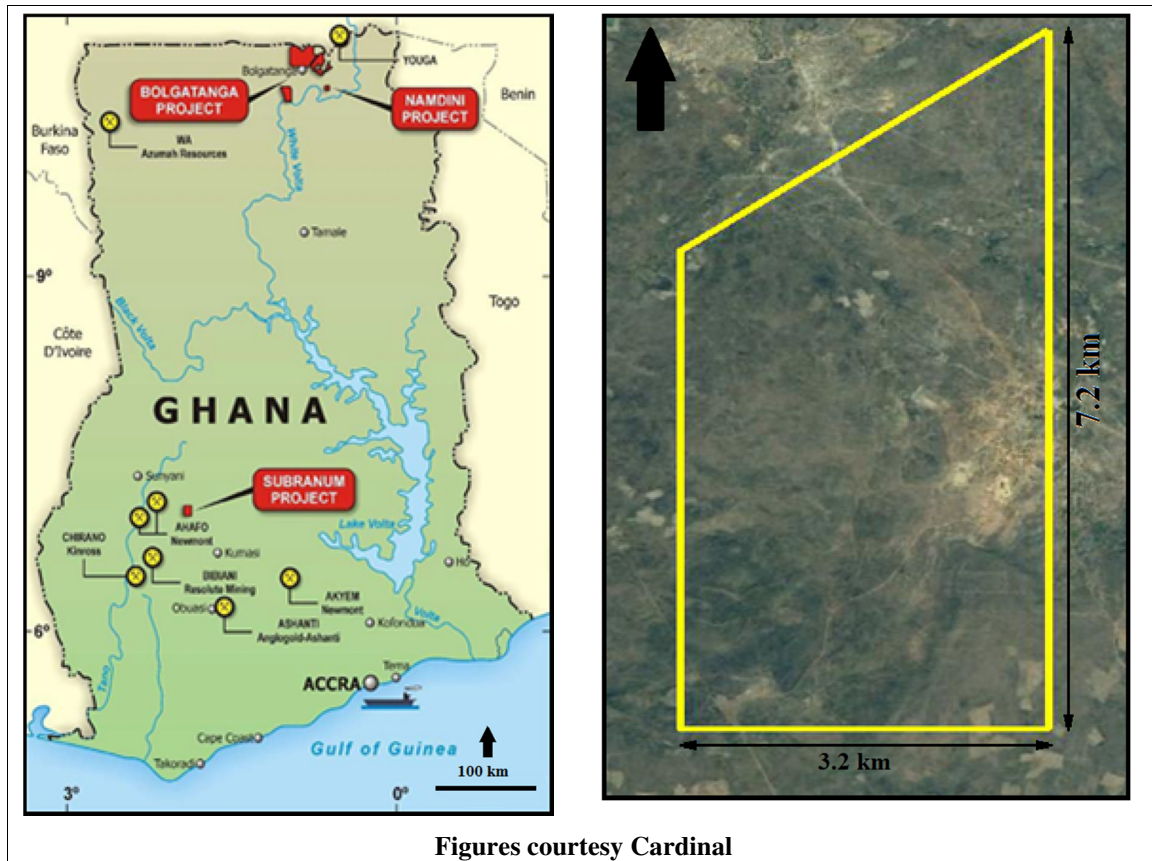


Figure 1: Location diagram and licence boundary

4.2. Mineral tenure and property ownership

The following description of mineral tenure and property ownership for the Namdini deposit was derived from information from Blakely, 2017 and Cardinal, 2017. Confirmation of the status of the mineral tenure for the Namdini deposit and the status of Cardinal's interest in the Namdini Gold Project is provided by Kuenyehia, 2017.

Cardinal holds its interest in the Namdini Gold Project through an agreement dated July 23, 2014 (as amended, the "Savannah Agreement") between Savannah Mining Ghana Limited ("Savannah") and Cardinal Mining Services Limited ("CMS"), a wholly-owned subsidiary of Cardinal, and agreements with the holders of small scale mining licenses ("SML") within the area comprising the Namdini Gold Project. Pursuant to the Savannah Agreement, CMS and Savannah agreed that CMS would have an exclusive right of first refusal to provide technical and financial support towards the development of the mining rights now comprising the Namdini Gold Project, in exchange for which CMS would be entitled to "the entire gross mineral values" won from any mining license in respect of which CMS provided support.

Pursuant to the Savannah Agreement, Savannah has entered into Sale and Purchase Agreements and license relinquishment agreements with holders of small scale mining licenses within the area of the Namdini Lease (as defined below) where the holders of these small-scale mining licenses will have surrendered their small-scale mining licenses and all mineral rights to form part of the proposed Namdini Lease area. The small-scale licenses are in the process of being surrendered. The Savannah Agreement has an indefinite term, and neither party is entitled to assign its rights or obligations under the Savannah Agreement.

Malik Easah, an executive director of Cardinal, is also the sole shareholder and director of Savannah. Savannah's sole business is the Savannah Agreement. Pursuant to an Option & Loan Agreement made in 2015 (the "Option Agreement") between Mr. Easah, Savannah and CMS, CMS holds an option to purchase all the outstanding shares of Savannah from Mr. Easah for US\$1.00 and holds all validly executed and irrevocable documents to give effect to the purchase upon exercise of the option granted under the Option Agreement. The Option Agreement also gives CMS the option to purchase all mining leases held by Savannah for US\$1.00.

Pursuant to the Option Agreement, Savannah has agreed to hold any mining licenses applied for, or granted in favour of, Savannah as trustee for CMS pending CMS exercise of its option to purchase the shares of Savannah or its exercise of its option to purchase such mining licenses. The Option Agreement has an indefinite term, and may be terminated by a non-breaching party in the event that a party is in breach of the agreement and such breach remains uncured for 90 days. CMS is entitled to assign its rights and obligations under the Option Agreement in its absolute discretion and the other parties to the Option Agreement are not permitted to assign their rights or obligations thereunder without the written consent of CMS.

On the 12th of July 2017 the application by Savannah for a Large-Scale Mining Lease covering an area of approximately 19.54 km² over the Namdini Project was granted by the Minister of Lands and Natural Resources of Ghana. Cardinal and Savannah have both signed the necessary documentation to assign the Namdini Mining Licence to CNM for US\$1.00 per the Savannah agreement. The lease is for an initial period of fifteen years and is renewable (Cardinal, 2017).

There are 82 small scale mining licenses within the area of the Namdini Lease. It is Cardinal's intention and expectation that Savannah will purchase all the small-scale mining licenses in the area covered by the Namdini Lease. To date, Savannah has purchased or obtained rights to purchase a significant number of these licenses, including all such licenses covering the areas that Cardinal considers material to the mineralization in the area covered by the Namdini Lease. Small scale licenses held by Savannah are intended to be relinquished to the Minerals Commission at the appropriate time.

Under the 2006 Mining Act the indirect transfer of ownership of a mining lease is subject to the non-objection of the Minister, and direct assignment of a mining lease requires the consent of the Minister. Cardinal does not anticipate that any objection will be made by the Minister to the transfer of the Namdini Lease from Savannah to CNM.

The report author is not aware of any specific environmental liabilities on the property. Cardinal has all required permits to conduct the proposed work on the property. The report author is not aware of any other significant factors and risks that may affect access, title, or the right or ability to perform on-going work programs on the property.

5. Accessibility, Climate, Local Resources and Physiography

The following descriptions of accessibility, local resources and infrastructure are derived from Blakely, 2017 and the other references cited in this section.

Namdini is approximately 50 kilometres southeast of Bolgatanga, the capital of the Bolgatanga Municipal District and Upper East Region of north Ghana. The Property is readily accessible from Bolgatanga along paved highway followed by 15 kilometres of well-travelled gravel roads. Access during the rainy season is slower due to waterlogged roads. However, the main access roads are passable year-round.

The nearest airport is in Tamale, approximately a 2.5 hour drive south of Bolgatanga via 160 kilometres of paved road on National Highway N10. Tamale is serviced by daily one hour scheduled commercial flights from Accra, the capital city of Ghana. Travel time from the Accra to the Project is approximately four hours using a combination of air and road travel, and approximately 14 hours solely by road travel. Accra has regularly scheduled direct flights to the United Kingdom, Europe, South Africa, and the Middle East.

For exploration and resource definition activities to date, personnel have generally commuted daily from Bolgatanga where Cardinal has an Exploration Office.

Evaluation of the project is at an early stage and details of infrastructure for future potential mining have not yet been established. Cardinal infrastructure present at the Namdini Project site is in the form of a Security Hut. Fuel supply for the drill rigs is provided by diesel tankers. Fresh water is taken from a borehole located on the Project site. Cardinal maintains trails on the Project site in order to facilitate exploration and drilling activities.

For future development activities, it will be necessary to build all-weather access roads and infrastructure for sufficient power and water supplies. Cardinal's surface rights allow sufficient areas for potential processing plant sites, tailings storage areas, and waste disposal areas. The Ghana national high voltage power grid runs approximately 30 kilometres west of the Project.

Ghana has a long mining history and has experienced technical personnel including geologists and engineers. Exploration and mining supplies are readily available within Ghana.

In 2002, the Upper East Ghana region had a total population of 964,500. In 2012, Bolgatanga recorded a population of 66,685 people. There are two small settlements in the project vicinity, which generally rely on subsistence farming, artisanal mining, and harvesting of wood. There is a significant local labour pool available for recruitment for any envisioned mining operation (Blakely et al, 2017).

Mean annual temperature in Bolgatanga is 28.3°C. The climate is characterized by a rainy season between May and October where the rainfall is erratic spatially and in duration. Temperatures during this period can be as low as 20°C at night, but can reach more than 35°C during the day (Meteoblue, 2017). There is a long dry season from December to late January. Temperatures during this period can be as low as 15°C at night and as high as 40°C during the day (Ghana Government, 2017).

Weather conditions have not significantly affected Cardinal's exploration activities, nor would they be expected to materially affect any potential mining operations.

Topography of the Namdini area is generally flat to gently undulating (Figure 2) and rises to the south where the area is overlain by sediments. Elevation varies from 200 MASL to 250 MASL.

Physiography of the project area is primarily savannah grassland characterized by short scattered drought-resistant trees, scattered scrub, and grass. The most common trees are the Sheanut, Dawadawa, and Baobab.



Figure 2: Project Site (Looking North)

6. History

6.1. Prior ownership and production

The following description of mineral tenure and property ownership for the Namdini deposit were derived from Blakely 2017 and Bray, 2017. Confirmation of the status of the mineral tenure for the Namdini deposit and the status of Cardinal's interest in the Namdini Gold Project is provided by Kuenyehia, 2017.

Section 4 of this report details ownership progression of the Namdini tenements. Prior to the agreements described in Section 4 there have been no prior owners of the tenements.

Savannah Mining Ghana Limited (Savannah) discovered the Namdini gold mineralization in 2013 under a Heads of Agreement with Cardinal. A small-scale mining license, of approximately 6.25 hectares, was applied for by Savannah and approved in 2014.

In 2013, artisanal miners began applying for additional small-scale mining licenses and exploited surface gold mineralization, resulting in an irregular shallow open pit within mineralized tonalite in the centre of the deposit, north of the Savannah small-scale mining license. Savannah has entered into sale-and-purchase agreements and license relinquishment agreements with holders of small-scale mining licenses that cover the Namdini gold deposit and surrounding area.

Production from the project has been limited to small scale artisanal mining which has not been quantified.

6.2. Historical exploration

The earliest reported gold discoveries in the general Namdini region date from the 1930's (Gleeson and Arthur, 2015) when a local farmer showed a British businessman gold-bearing quartz veins at Nangodi. Historic regional exploration from outside the Namdini project area is of no relevance to Namdini resource estimates and is not detailed in this report.

Modern exploration of the Namdini area prior to discovery of Namdini mineralization in 2013 is limited to regional geophysical surveys which are of little relevance to resource estimates, and are not detailed in this report.

6.3. Previous Mineral Resource estimates

Mineral Resources were previously estimated for Namdini in November 2016 and April 2017 respectively. These previous resources were reported in accordance with the Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves (JORC 2012 code). As presented in this report, the previous Mineral Resource estimates do not include material differences to the Canadian Institute of Mining, Metallurgy and Petroleum (CIM) Definition Standards for Mineral Resources and Mineral Reserves.

Table 4 shows the previous resource estimates at 0.5 g/t cut off along with descriptions of each estimate from original stock exchange announcements or Technical Reports. These estimates are superseded by the Mineral Resource estimates described in Section 14 of this report.

The November 2016 estimates were based on drilling information available up to August 2016 and have an effective date of 31st of October 2016 (Gossage, 2017). They were reported in

accordance with the JORC 2012 code in an announcement to the Australian Stock Exchange on the 7th of November 2016.

The April 2017 estimates were prepared by Roscoe Postle Associates (RPA) from drilling information available up to December 2016 and have an effective date of the 2nd of December 2016. They are described by a Technical Report dated 5th April 2017 (Blakely, 2017) and reported in accordance with JORC 2012.

Table 4: Previous Mineral Resource Estimates at 0.5 g/t cut off

November 2016 Mineral Resource Estimates			
Category	Mt	Au g/t	Au Moz
Indicated	6.22	1.20	0.24
Inferred	89.9	1.3	3.6
Notes:			
1. Mineral resources are not ore reserves and do not have demonstrated economic viability. 2. All figures have been rounded to reflect the relative accuracy of the estimates. 3. Resources were estimated by Multiple Indicator Kriging of 3 m-down hole composites with an upper cut of 15 g/t and change of support reflecting a selective mining unit of 5 mE by 10 mN by 5 RL. 4. For the assessment of reasonable prospects of economic extraction, Mineral Resources have been assessed using pit optimization, based on a gold price of US\$1,550/oz, and the following key input parameters: mill-flotation-concentrate regrind-CIL process route with metallurgical recovery of 0% for oxidized mineralization (estimate only), 50% for transitional mineralization (estimate only), 75% for fresh mineralization; assuming a bulk mining, low to moderate mining selectivity open pit operation with operating costs appropriate for West Africa. 5. Depending on key parameters such as gold price, annual throughput, process plant recoveries and operating costs, cut off grades are likely to be in the range 0.3g/t to 0.6g/t.			
April 2017 Mineral Resource Estimates			
Category	Mt	Au g/t	Au Moz
Indicated	23.861	1.21	0.931
Inferred	100.149	1.13	3.629
Notes:			
1. Numbers may not add due to rounding 2. Mineral Resources constrained by a pit shell generated at \$US1,500/oz. 3. RPA utilized geological wire-frames generated using Leapfrog software and Single Indicator Kriging at 0.1 g/t and 1.0 g/t gold to help constrain grade estimates which were estimated by Ordinary Kriging 4. Assays were capped at between 1.0 and 25 g/t prior to compositing to three metre intervals. 5. Densities were assigned by rock unit and weathering horizon.			

7. Geological Setting and Mineralization

7.1. Regional geological setting

The following description of Namdini's regional geological setting is derived from Blakely, 2017 and Allibone et al, 2004.

Namdini lies within the Paleo- Proterozoic Birimian (2.2 to 2.1 Ga) Nangodi Greenstone Belt, one of a series of southwest – northeast trending granite-greenstone belts which host significant gold mineralization in Ghana and Burkina Faso (Figure 3). These belts are interpreted to be fault bounded, both during their development and post-deposition.

Key units of the greenstone belts include greywackes and phyllites of the Tarkwaian Formation, which are overlain by volcanic and sediment sequences of Birimian age, characterized by interbedded mafic to intermediate volcanic flows, felsic to intermediate tuffs and fine grained sediments.

The greenstone belts are intruded by belt-type and basin-type granitic rocks and late stage diorites. Belt-type granites are metaluminous and commonly tonalitic. Basin-types are peraluminous with higher potassium and rubidium than the belt-type granites and are generally granodiorites.

Much of northern Ghana is covered by post-Birimian Voltaian Basin sediments, and at Namdini this forms the southern limit of exposure of Birimian rocks.

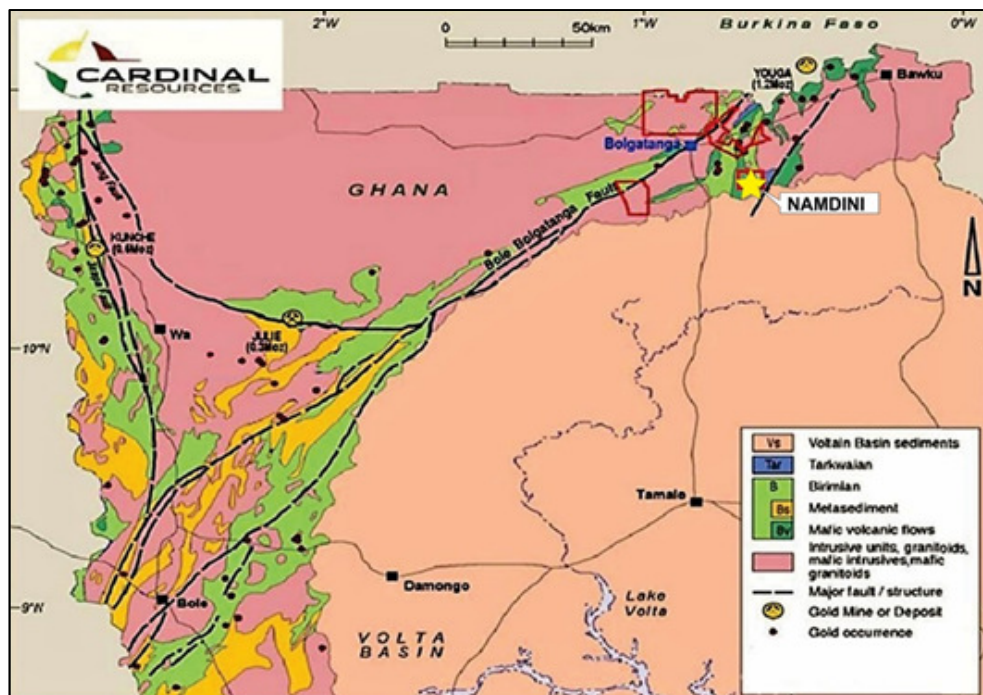


Figure courtesy Cardinal

Figure 3: Regional geological setting

7.2. Namdini geological setting and mineralization

The following description of the Namdini geological setting and mineralization is derived from Davis and Cowan, 2016, Townend 2015, Townend and Townend 2016, Abbott 2017, and Mogoru, 2016.

Namdini rock units comprise a steeply dipping sequence of Birimian inter-bedded meta-sedimentary and meta-volcanic units, which have been intruded by tonalite and diorite. The meta-sedimentary and volcanoclastic rocks have been intensely altered with a pyrite-carbonate-muscovite-chlorite-quartz assemblage. The tonalite is extensively altered and has been overprinted by silica-sericite-carbonate assemblages. In the south of the project area, the Birimian rocks are unconformably overlain by Voltaian Basin clastic sedimentary rocks.

Gold mineralization occurs in altered meta-volcanosedimentary rocks and tonalite. It is associated with quartz-carbonate veins and disseminated pyrite and arsenopyrite in both veins and wall rocks. Mineralization is strongly structurally controlled and the deposit appears to be located in an oblique, sinistral structure in a regionally extensive deformation zone. Mineragraphic analysis has shown that very fine grained gold is dominantly associated with, and as inclusions within, disseminated sulphides and less commonly silicate minerals.

The current estimates are based on a mineralized domain interpreted from composited gold grades from RC and diamond drilling. The mineralized domain trends north-northeast over a strike length of approximately 1,270 metres with horizontal widths ranging from around 80 to 390 metres and averaging approximately 260 metres. The domain dips to the west at around 70 degrees, and is interpreted to a constant elevation of -500 mRL, which represents an average depth of around 710 metres, around 25 metres below the base of drilling.

In the mineralized area, weathering extends to a maximum depth of around 30 metres, with the weathering profile comprising the following:

- Strongly Oxidized: Total oxidation of all primary minerals with little or no primary rock texture. This zone ranges from 1.0 m to 7.5 m in thickness.
- Moderately Oxidized: Material exhibits some primary rock texture, total oxidation of feldspar to clay, and total oxidation of sulphides. This zone ranges from 0.5 m to 13 m in thickness.
- Transition: Material shows strong primary rock textures with partial oxidation of feldspars and sulphides. The transition zone ranges from 2 m to 15 m in thickness.

Figure 4 shows a plan-view of the key rock-units at Namdini relative to the surface expression of the mineralized domain used for the current estimates.

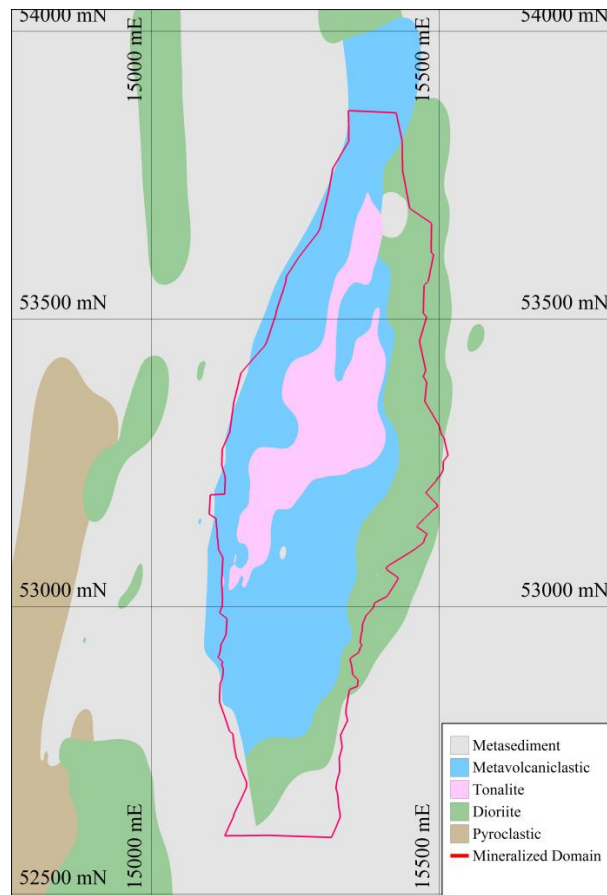


Figure produced by MPR from information supplied by Cardinal

Figure 4: Namdini geological setting

8. Deposit Types

Namdini mineralization occurs in altered meta-volcanosediments and tonalite. It is associated with quartz-carbonate veins and disseminated pyrite and arsenopyrite in both veins and wall rocks. The mineralization is strongly structurally controlled and the deposit appears to be located in an oblique, sinistral structure in a regionally extensive deformation zone.

Namdini was discovered in September 2013 by traditional prospecting methods. Follow up exploration in the region has included aeromagnetic surveying, geological mapping, rock chip sampling and auger drilling.

The current Mineral Resource estimates are based on information from RC and diamond drilling completed by Cardinal since March 2014, as described in Sections 10 and 11 of this report. Exploration activities outside the resource area are of little relevance to the resource estimates and are not detailed in this report

9. Exploration

9.1. Exploration activities

Sections 10 and 11 describe drilling, sampling and assaying for the Namdini resource drilling. Cardinal's regional exploration activities outside the Namdini deposit area are of little relevance to the current resource estimates and are not detailed in this report.

The following summary of Namdini exploration activities is derived from Abbott, 2013 – 16, Gleeson et al 2015, Barnes, 2016 – 17 and Blakely et al, 2016.

Namdini lies within an area reserved for small-scale mining by the Small-Scale Mining Division of the Minerals Commission and no systematic modern exploration had been carried out over the deposit prior to initiation of exploration by Cardinal.

After discovering the Namdini deposit in September 2013 by traditional prospecting methods, Savannah excavated a shallow open pit to expose a westerly dipping gold mineralized zone. Follow up exploration by Cardinal included aeromagnetic surveying, regional and prospect-scale geological mapping and rock chip sampling.

Cardinal commenced RC and diamond drilling at Namdini in March 2014 and October 2015 respectively.

During 2016, Terratec Geophysical Services completed a ground magnetic survey and induced polarisation (IP) survey over the Namdini deposit. Southern Geoscience completed a geological interpretation at 1:50,000 scale of the full survey area. This interpretation provided Cardinal with a geological and structural map for exploration target development and assessment.

In 2016, a program of auger drilling was undertaken over the Namdini Large-Scale Mining License area. This included the resource area in order to calibrate the larger auger program. Results from auger samples were not used for Mineral Resource estimation. This sampling is of no relevance to Mineral Resource estimates and is not detailed in this report.

9.2. Local grid

Consistent with supplied sampling information, the current study was undertaken in a local grid developed by Sahara Mining Services. Unless specified, all coordinate references, and orientations in this report reflect the local grid.

The local grid transformation comprises an eight degree rotation from WGS coordinates (Table 5), with no elevation change. The transformation rotates the obliquely (WGS) trending drill traverses to east-west (local) grid.

Table 5: Local grid translation details

Translation Point	UTM: WGS 84 Zone 30 N		Local	
	East (mE)	North (mN)	East (mE)	North (mN)
1	757,032.992	1,175,611.678	15,000.000	51,800.000
2	757,380.925	1,178,087.348	15,000.000	54,300.000
3	758,569.247	1,177,920.341	16,200.000	54,300.000
4	758,221.314	1,175,444.671	16,200.000	51,800.000

10. Drilling

10.1. Summary

The estimates described in this report are based on RC and diamond information available for Namdini on the 11th of September 2017, totalling 275 holes for 67,122 metres of drilling. RC and diamond drilling provides around one third and two thirds of the estimation dataset respectively.

Key aspects of the resource drilling and the author's opinion of information available to demonstrate sampling reliability include the following:

- Collar locations of all resource holes were accurately surveyed by differential GPS techniques.
- Most diamond holes and deeper RC holes were down-hole surveyed at generally 30 metre intervals. These comprehensively surveyed holes provide around three quarters of the mineralized domain estimation dataset. The remaining composites are from holes with no or incomplete down-hole surveying and have less reliably defined positions. Hole paths have been located with sufficient accuracy for the current estimates. Additional surveying down-hole may be warranted as assessment of the project continues.
- Core recovery measurements, which are available for around 58% of diamond drilling average 99.6% consistent with the author's experience of high quality, reliable diamond drilling.
- RC drilling is dominated by samples logged as dry with moist and wet samples representing insignificant proportions. Any uncertainty over the reliability of moist or wet samples does not affect general confidence in estimated resources.
- At around 85%, average estimated average RC sample recovery is consistent with the author's experience of high quality RC sampling.
- Field duplicates show generally reasonable repeatability consistent with the author's experience of good quality RC sampling for comparable mineralization styles.
- Samples from Cardinal's RC rig show greater variability than those from other RC rigs employed at Namdini. This includes notably lower than average estimated recoveries for the first sample of each drill rod and lower average gold grades for higher grade field duplicates.

The author considers that quality control measures adopted for the Namdini drilling have established that the RC and diamond sampling is representative and free of any biases or other factors that may materially impact the reliability of the sampling. There are, however, some aspects of the sampling that warrant further investigation as assessment of the project continues.

10.2. Available drilling

The estimates described in this report are based on RC and diamond information available on the 11th of September 2017 as summarized in Table 6 and shown in Figure 5. The RC drill metres in this table and figure include pre-collared portions of 39 diamond holes which average 97 metres deep.

Relative to drilling information available for the April 2017 RPA resource estimates, the dataset available for the current estimates includes an additional 33,406 metres of drilling. Mineral Resource estimates include only the resource RC and diamond drilling shown in Table 6 in Figure 5, and exclude non-resource drilling, comprising:

- A single metallurgical hole without routine down-hole assays,
- 71 Sterilisation RC holes from outside the resource area, and
- 172 closely spaced holes, drilled as part of a current grade control trial program which is incomplete at the time of report writing.

The resource drilling comprises east-west trending traverses of easterly inclined holes. Hole spacing varies from around 12.5 by 25 metres in the shallow portions of southern part of the deposit to around 50 by 50 metres and broader in the north and at depth.

Several diamond and RC rigs were employed for the Namdini resource drilling. The database compiled for the current review indicates that the RC rigs included one rig owned by Cardinal, one rig from AMS drilling, one rig from Minerex and two rigs from Toohamit.

Table 7 summarizes the number and proportion of composites from the main mineralized domain by drilling group. This table provides an indication of the relative contribution of each group to resource estimates which is an important consideration for review of sampling quality information. Key features of this summary include the following:

- Diamond drilling provides around two thirds of the dataset with RC sampling contributing around one third.
- Half and quarter core samples represent approximately equal proportions of the diamond core data.
- Most mineralized domain RC composites are from holes drilled by the Cardinal (55%) and AMS rigs (28%) with the Minerex and Toohamit rigs contributing comparatively minor amounts.

Table 6: Namdini RC and diamond drilling

Group	Year	Number of holes			Drill metres		
		RC	Diamond	Total	RC	Diamond	Total
Resource	2014	44	1	45	4,749.00	66.00	4,815.00
	2015	42	9	51	4,939.30	2,128.53	7,067.83
	2016	19	71	90	3,991.40	16,400.04	20,391.44
	2017	36	53	89	8,208.70	26,639.25	34,847.95
	Subtotal	141	134	275	21,888.40	45,233.82	67,122.22
Grade control Metallurgical Sterilisation	2017	172	-	172	7,224.00	-	7,224.00
	2017	-	1	1	-	236.10	236.10
	2017	71	-	71	7,107.00	-	7,107.00
	Subtotal	243	1	244	14,331.00	236.10	14,567.10
Total		384	135	519	36,219.40	45,469.92	81,689.32

Table 7: Mineralized domain estimation dataset by sampling type

Drilling Type	Group		Number of composites	Proportion of drill type	Proportion of total
RC	Drill Rig	Cardinal	4,293	55%	19%
		AMS	2,188	28%	10%
		Minerex	964	12%	4%
		Toohamit	409	5%	2%
		Subtotal	7,854	100%	35%
Diamond	Sample Type	Half core	6,618	47%	30%
		Quarter core	7,593	53%	34%
		Subtotal	14,211	100%	64%
Total			22,065		100%

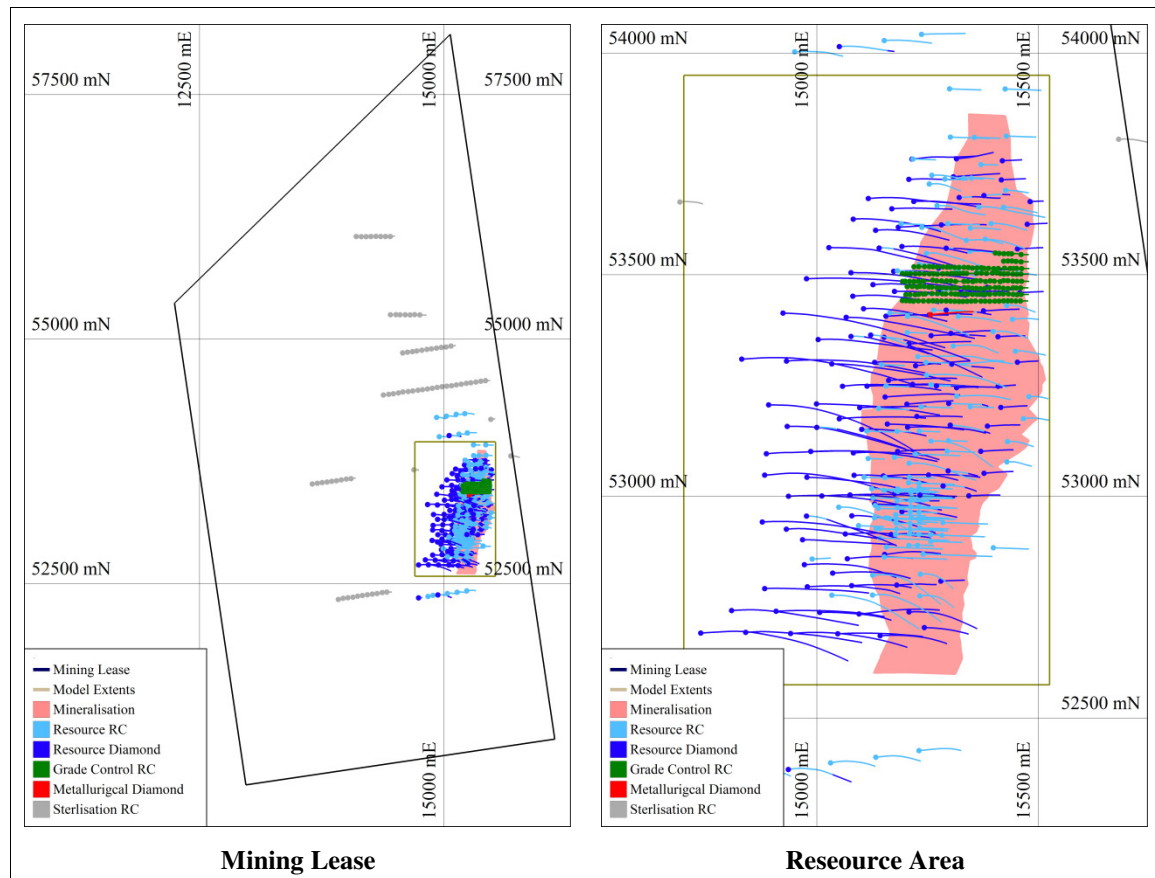


Figure 5: Namdini drilling, mineralized domain, model extents and tenement

10.3. Drilling and sampling procedures

Key aspects of drilling and field sampling procedures for the Namdini RC and diamond drilling include the following:

Reverse circulation drilling:

- A Cardinal project geologist is at the rig site at all times while drilling.
- All holes are collared with six metres of PVC casing
- Samples are collected over one metre down-hole intervals using a cyclone, with sub-sampling by a three tier-riffle splitter. Rare un-mineralized intervals were composited over four metre intervals for analysis (Figure 6).
- The riffle splitter is routinely cleaned with a rubber mallet and compressed air.
- Hole clearance and stabilisation on every rod change and “blow-backs” on each metre of sampling.
- Recovered sample material is routinely weighed for each interval.
- Cessation of the hole if wet samples are encountered with completion by diamond drilling.
- Collection of sieved samples for geological logging in plastic chip trays, with geological logging at the drill site and follow up logging at the Bolgatanga office. The chip trays are securely stored for future reference.

Diamond drilling:

- Cardinal core technicians are at the rig site at all times while drilling.
- Core orientation of every core run.
- Geotechnical logging at the rig prior to core being put in core boxes, including recording recovery for every core run.
- Core photography (wet and dry).
- Geological logging using tablet-based software.
- All diamond drilling was at HQ diameter, with soft near surface materials drilled with a triple tube core barrel to reduce core losses.
- For drilling to approximately April 2016 diamond core was halved for sub-sampling with a diamond saw. For later drilling, the core was quartered for assaying. Sample intervals range from 0.2 to 1.8 metres in length, with most samples assayed over metre intervals (Figure 6).

The photographs in Figure 7 show a typical diamond hole drill site layout and typical RC drilling site at the completion of the hole.

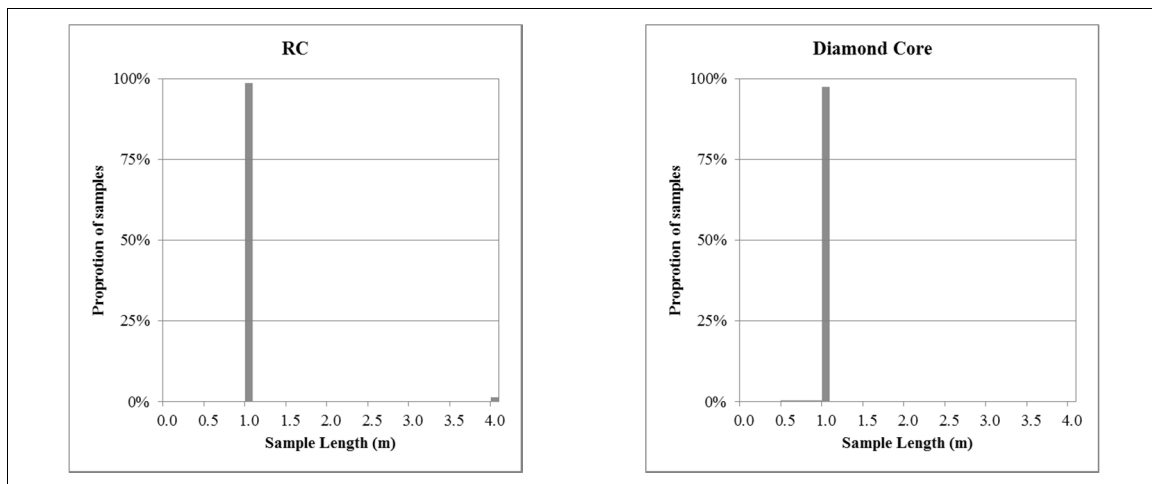


Figure 6: Histograms of sample lengths

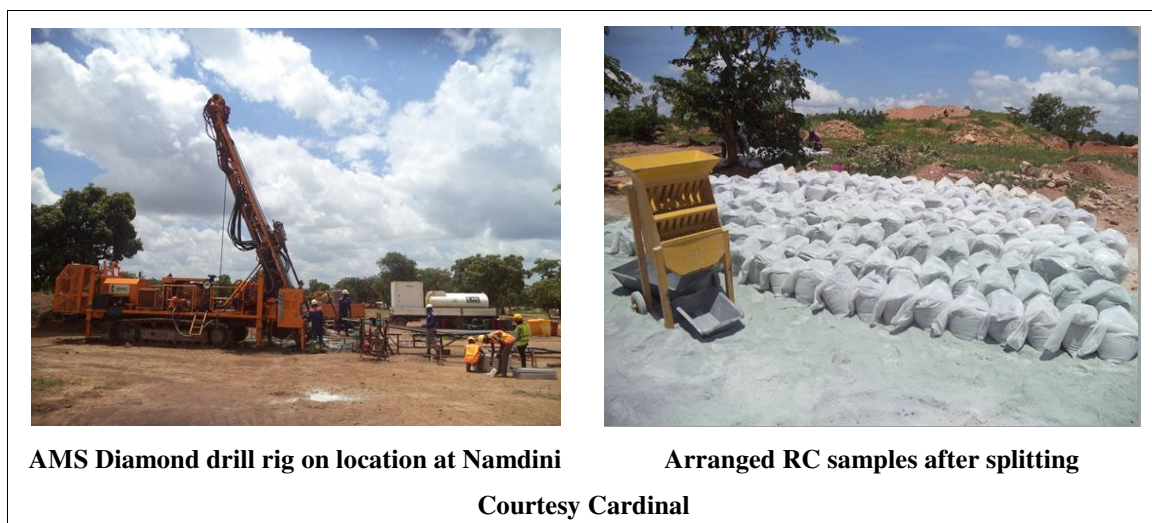


Figure 7: Photographs of RC and diamond drilling sites

10.4. Collar and down-hole surveying

At completion of drilling, hole collars were encased in concrete and hole details inscribed into the concrete and written on the collar pipe. Collar locations were surveyed by qualified independent surveyors from Sahara Mining Services using high accuracy differential GPS (DGPS) techniques.

Table 8 and Figure 8 show the number and proportion of main mineralized domain composites in the estimation dataset by down-hole survey availability.

Most diamond holes and deeper RC holes were surveyed by electronic single-shot tools with an initial survey at six, or rarely around 30 metres depth, and subsequent surveys at generally 30 metre intervals to hole end. These holes with comprehensive down-hole surveying contribute around three quarters of mineralized domain composites. The remaining holes have variable down-hole survey coverage including the following:

- No down-hole surveys are available for holes providing around half of the mineralized domain RC estimation dataset.
- Rare RC holes, which provide 6% of the RC composites, were surveyed within the drill rods giving only inclinations and not azimuths. Locations of these hole paths have not been accurately defined.
- RC portions of pre-collared diamond holes were surveyed within the drill rods giving only inclinations and not azimuths (6%). Without accurately located pre-collars, diamond tails of these holes are less accurately defined than for comprehensively surveyed holes.

The proportion of mineralized domain composites with incomplete or no down-hole surveying reduces with depth. To depths of around 100 metres, less than half of these data have comprehensive down-hole surveys. Below 200 metres depth, around 90% have full down-hole survey information, and below approximately 380 metres, all composites are from comprehensively down-hole surveyed holes.

Due to the relatively wide drill hole spacing and broad mineralized zones, the lack of comprehensive accurate down-hole surveys is of little concern for the current estimates. The author considers that hole paths have been located with sufficient accuracy for the current estimates. Additional down-hole surveying may be warranted as assessment of the project continues.

Table 8: Down-hole surveying for mineralized domain composites

Down-hole survey Availability	Number of composites			Proportion of composites		
	RC	DDH	Total	RC	DDH	Total
Un-surveyed	3,804	-	3,804	48%	-	17%
Dip Only	445	-	445	6%	-	2%
Dip Only. Limited Survey	32	45	77	0.4%	-	0.3%
Pre-collar un-surveyed or limited	401	1,015	1,416	5%	7%	6%
Comprehensive 30m or closer	3,172	13,151	16,323	40%	93%	74%
Total	7,854	14,211	22,065	100%	100%	100%

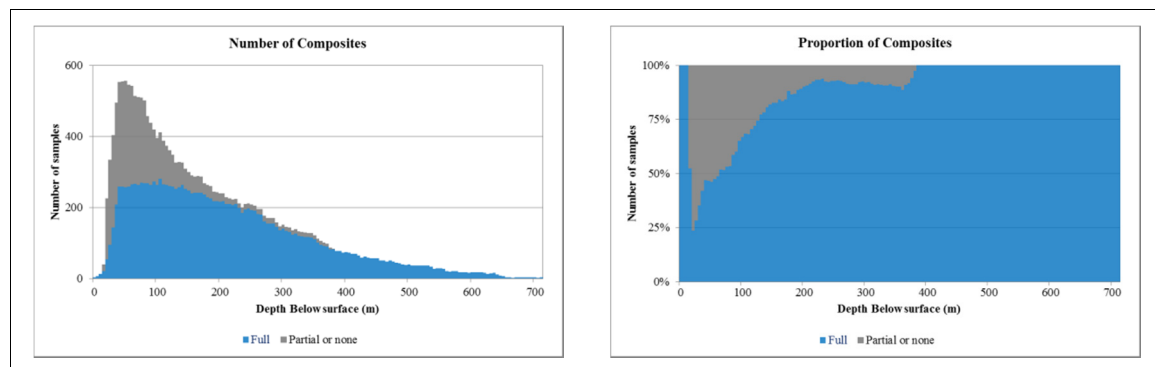


Figure 8: Down-hole surveying for mineralized domain composites

10.5. Diamond core recovery

Core recovery measurements are available for around 58% of the Namdini diamond drilling. The author understands that Cardinal is currently compiling additional recovery estimates.

Core recoveries were supplied as recovered lengths for core runs which range from 0.1 to 8.5 metres in length and are dominated by three metre intervals. These data were composited to three metre intervals to provide a consistent basis for analysis. Table 9 summarizes core recoveries for the three metre composites by modelling domain.

The combined dataset of fresh rock core recoveries averages 99.9% with only approximately 4% of composites showing recoveries of less than 99%. These recoveries are consistent with the author's experience of high quality diamond drilling. Although lower than for fresh rock, average core recoveries for weathered and transitional intervals are within the range shown by the author's experience of high quality diamond drilling.

Table 9: Diamond core recovery by domain

Weathering Domain	Background		Mineralized		Total	
	Number	Avg. Recov.	Number	Avg. Recov.	Number	Avg. Recov.
Weathered	95	95.88%	167	94.32%	262	94.89%
Transition	177	98.14%	176	96.66%	353	97.40%
Fresh	2,598	99.80%	5,528	99.89%	8,126	99.86%
Total	2,870	99.56%	5,871	99.63%	8,741	99.61%

10.6. RC sample reliability

10.6.1. Sample condition logging

In the author's experience sample condition is an important factor in the reliability of RC sampling, and wet samples can be associated with unrepresentative, potentially biased samples.

Table 10 summarizes sample condition logging for assayed RC samples. This table demonstrates that samples logged as moist or wet represent an insignificant proportion of RC drilling. Any uncertainty over the reliability of moist or wet samples does not affect general confidence in estimated resources.

Table 10: RC Sample condition logging for RC samples

	Number of composites				Proportion of composites			
	Dry	Moist	Wet	Total	Dry	Moist	Wet	Total
Cardinal	10,121	-	1	10,122	99.99%	-	0.01%	100.00%
AMS	6,065	29	4	6,098	99.46%	0.48%	0.07%	100.00%
Minerex	2,195	7	2	2,204	99.59%	0.32%	0.09%	100.00%
Toomahit	1,394	-	-	1,394	100.00%	-	-	100.00%
Total	19,775	36	7	19,818	99.78%	0.18%	0.04%	100.00%

10.6.2. Sample recovery

Recovered RC sample weights are available for sample intervals representing around 55% of the combined Namdini resource RC drilling.

In conjunction with bit diameters, density measurements and moisture content estimates, recovered sample weights provide an indication of sample recovery for RC drilling which is an important factor for assessment of the reliability of the sampling. In the author's experience sample recovery for high quality RC drilling typically averages around 80%. Experience also suggests that sample recoveries of consistently less than approximately 70% can be associated with unrepresentative samples and significantly biased assay grades.

Due to progressive wear, average bit diameters are likely to be less than nominal values of 5.0 or 5.5 inches shown in supplied data files. For assessment of sample recovery, specified diameters were reduced by 1/8th of an inch. This value is based on the author's general experience, and is of uncertain accuracy.

For each weighed RC sample, recoveries were estimated using the bulk densities assigned to the current estimates (Table 25), with no allowance for moisture content. The range of moisture contents for Namdini RC samples is uncertain.

Table 11 summarizes average estimated RC sample recovery by drilling rig and weathering domain. At around 86%, average estimated recovery for transition and fresh material which dominates estimated resources, is consistent with the author's experience of high quality RC sampling. At 74%, average recovery estimated for oxide material is somewhat lower, though still within the range of the author's experience of reasonable quality RC sampling.

Figure 9 shows example plots of average estimated RC sample recovery by down-hole depth. The plots for Cardinal's rig show a distinctly cyclic trend with lower values at six metre increments representing the first sample of each six metre drill rod.

In the author's experience of cyclic recovery, trends are common for RC drilling and generally reflect material lost as the driller blows the hole clean at the start of each rod. In cases where the down-hole recovery variability is greater than around 15% it can reflect depth measurement inaccuracies.

At around 30%, the difference between average estimated recovery for the first and subsequent samples of each drilling rod shown by Cardinal's rig is outside the author's experience of high-quality RC samples. Reasons for this trend are uncertain. As shown by the lower-right plot in Figure 9, mineralized domain samples from the Cardinal rig show no consistent variability in average gold grade with rod position, suggesting the variability in sample recovery does not significantly affect representivity of RC samples. Additional investigations of this trend may be warranted as evaluation of the project continues.

Table 11: Average RC sample recovery by domain

	Oxide		Transition		Fresh		Total	
	No.	Avg.	No.	Avg.	No.	Avg.	No.	Avg.
AMS	197	78%	268	90%	4,557	85%	5,022	85%
Cardinal	478	74%	459	86%	2,598	86%	3,535	84%
Minerex	346	73%	208	90%	1,976	88%	2,530	86%
Toomahit	82	74%	78	84%	784	81%	944	81%
Combined	1,103	74%	1,013	87%	9,915	86%	12,031	85%

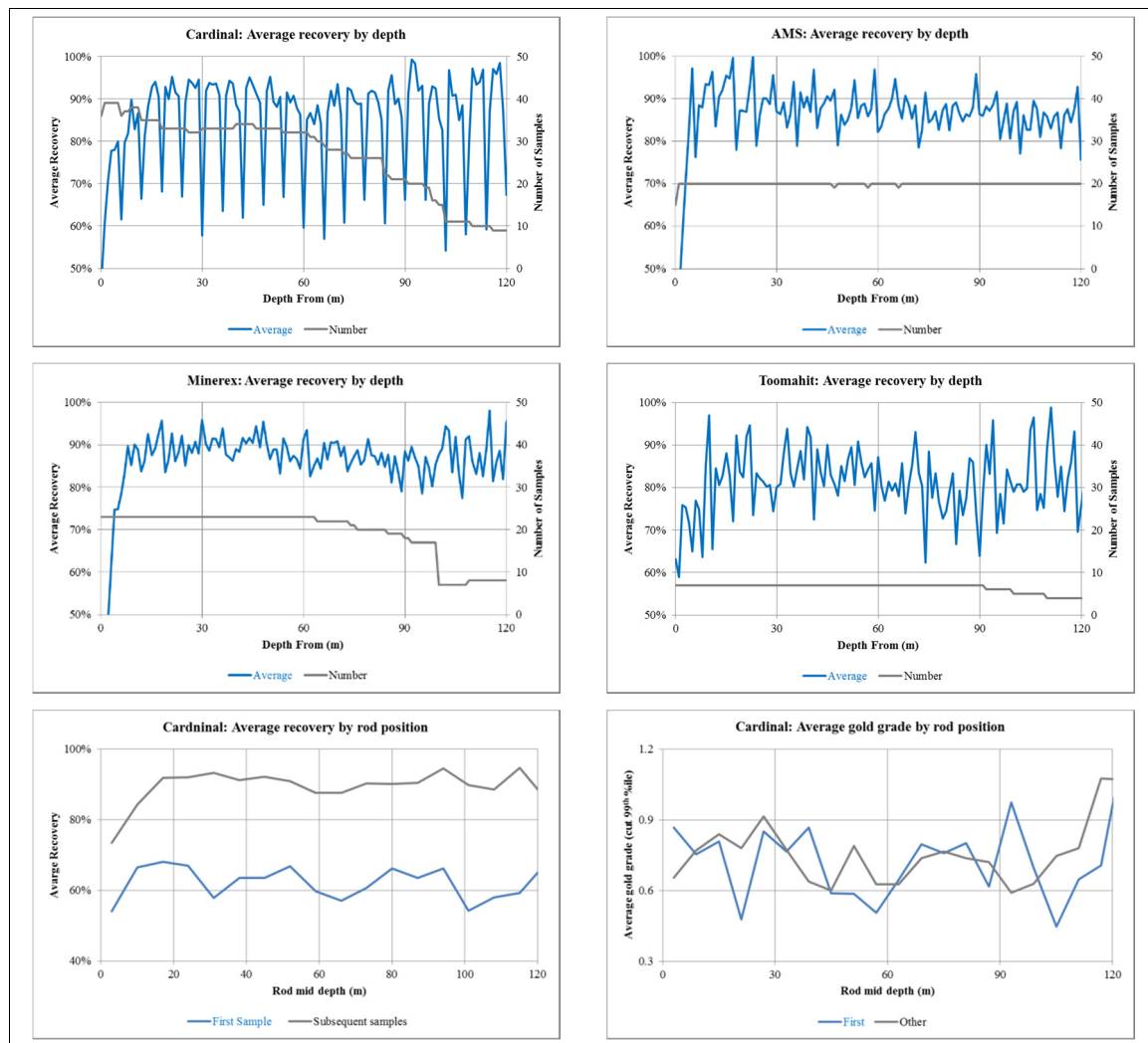


Figure 9: Estimated RC sample recovery by drilling depth

10.6.3. Field duplicates

For Namdini RC drilling field duplicates were collected at an average frequency of around one duplicate per 20 primary samples. The duplicates were collected consistently with, and assayed in the same batch as original samples providing an indication of the repeatability of field sampling.

The comparative statistics in Table 12 and scatter plots in Figure 10 compare gold assays for original and field duplicate samples subdivided by drilling rig.

The field duplicate assays show generally reasonable repeatability which is consistent with the author's experience of good quality RC sampling for comparable mineralization styles and confirms the repeatability of the RC field sampling.

For gold grades of greater than approximately 2.0 g/t, duplicates from Cardinal's rig show lower average grades than original samples. Reasons for this trend, which includes comparatively few samples, are uncertain.

Table 12: RC field duplicates

Au g/t	Cardinal Full Range		AMS Full Range		Minerex Full Range		Toohamit Full Range	
	Orig.	Dup.	Orig.	Dup.	Orig.	Dup.	Orig.	Dup.
Number	507		305		153		70	
Mean	0.72	0.67	0.44	0.44	0.57	0.62	0.48	0.55
Mean dif.		-7%		1%		8%		15%
Coef. Var.	2.40	2.17	2.56	2.61	2.93	2.89	2.96	3.15
Minimum	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01
1 st Quartile	0.03	0.03	0.01	0.01	0.01	0.01	0.01	0.01
Median	0.18	0.19	0.05	0.04	0.12	0.11	0.06	0.05
3 rd Quartile	0.61	0.63	0.43	0.40	0.42	0.43	0.17	0.19
Maximum	15.8	19.2	12.0	10.3	15.0	14.7	10.3	12.9
Correl.	0.85		0.95		0.94		0.99	
Au g/t	Cardinal 0.10 to 10.0 g/t		AMS 0.10 to 6.0 g/t		Minerex 0.10 to 8.0 g/t		Toohamit 0.1 to 6.0 g/t	
	Orig.	Dup.	Orig.	Dup.	Orig.	Dup.	Orig.	Dup.
Number	285		110		74		20	
Mean	0.99	0.97	0.92	0.92	0.77	0.79	0.86	0.92
Mean dif.		-1%		0%		3%		6%
Coef. Var.	1.28	1.20	0.99	0.98	1.38	1.36	1.05	0.92
Minimum	0.11	0.10	0.11	0.12	0.11	0.11	0.11	0.11
1 st Quartile	0.30	0.27	0.34	0.32	0.22	0.25	0.20	0.20
Median	0.50	0.52	0.60	0.65	0.41	0.42	0.56	0.65
3 rd Quartile	1.12	1.25	1.16	1.13	0.75	0.78	1.15	1.19
Maximum	8.62	7.94	4.39	5.42	6.00	6.65	3.20	2.72
Correl.	0.93		0.93		0.91		0.91	

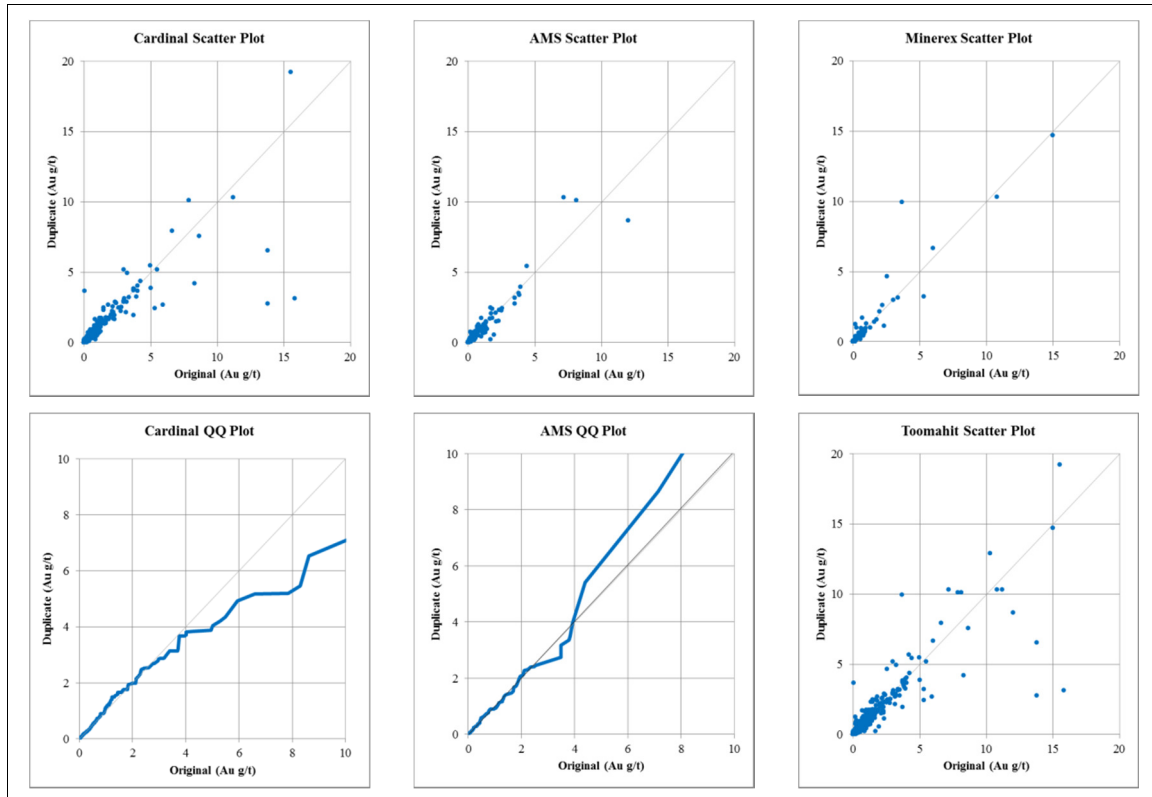


Figure 10: RC field duplicates

11. Sample Preparation, Analyses and Security

11.1. Summary

All sample preparation and gold assaying of primary samples from the Namdini resource drilling was undertaken by independent commercial laboratories. Most primary samples were submitted to SGS Ouagadougou or SGS Tarkwa for analysis for gold by fire-assay. A small proportion were analysed by Intertek in Tarkwa. Key aspects of the information available to demonstrate reliability of these assays includes following:

- Diamond core and RC samples were transported from drill sites to secure storage at Cardinals' Exploration Office by Cardinal employees before being delivered to the assay laboratory by laboratory personnel.
- Assays of coarse blanks included in earlier assay batches which contribute 11% of mineralized domain composites, show no indication of significant contamination or sample misallocation.
- Samples submitted after May 2015 included fine blanks of pulverized material which did not require preparation by the analytical laboratory. These samples primarily test for sample misallocation, and showed no significant misallocation.
- Samples of certified reference standards were submitted at an average frequency of around 1 standard per 41 primary samples. Average assay results generally reasonably reflect expected values, with no evidence of significant biases, supporting the general accuracy of gold grades reported by the laboratories used for primary assaying.
- Results for 746 Intertek inter-laboratory repeats reasonably match the original SGS Ouagadougou results supporting the general accuracy of SGS Ouagadougou assaying.
- No inter-laboratory pulp repeats are available for SGS Tarkwa assays. The author understands that such inter-laboratory repeats are currently underway.
- In July 2016, a consultant geologist employed by Cardinal collected and submitted 49 independent duplicate samples to SGS Tarkwa. For 15 intervals with original SGS Tarkwa assays, the duplicate results closely match original assays by SGS Tarkwa. For 34 intervals with original SGS Ouagadougou assays, the duplicate results average around 35% higher than the original assays. Reasons for this trend are unclear.
- In January 2018, another consultant geologist collected 165 independent quarter core duplicate sample which were submitted to by ALS Ireland giving very similar average gold grades to original SGS Tarkwa assays providing additional confidence in the general reliability of SGS Tarkwa assaying.
- Available density information totals 5,955 immersion measurements by Cardinal and SGS. For weathering/rock units with reasonable numbers of Cardinal and SGS measurements, SGS measurements give very similar average values to Cardinal providing some confidence in the reliability of Cardinal's density measurements.

The author considers that quality control measures adopted for assaying of the Namdini resource drilling have established that the assaying is representative and free of any biases or other factors that may materially impact the reliability of the analytical results. The author considers that the sample preparation, security and analytical procedures adopted for the Namdini drilling provide an adequate basis for the current Mineral Resource estimates.

11.2. Sample security

All sample preparation and gold analyses of the resource samples was undertaken by independent commercial laboratories.

Diamond core and RC samples were transported from the drill site by Cardinal vehicle to secure storage at the Bolgatanga field exploration office. Core yard technicians, field technicians and geologists ensured samples were logged, prepared and securely stored until collected for transportation to the assay laboratories by personnel employed by the assay laboratory.

All samples collected for assaying are retained in a locked secure shed until collected by the assay laboratory. Retained drill core and RC chips are securely stored in the core storage compound, and pulps are securely stored in the core shed (Figure 11).

At the time of sample collection, a sign-off process between Cardinal and the laboratory delivery truck driver ensures samples and paper work correspond. The samples are then transported to the laboratory where they are receipted against the dispatch documents. The assay laboratories are responsible for the samples from the time of collection from the Exploration Office.



Figure 11: Core tray logging and storage

11.3. Sample preparation and analysis for gold

Field sub-sampling procedures are described in Section 10. All sample preparation and gold assaying of primary samples from the Namdini resource drilling was undertaken by independent commercial laboratories. Analyses by Cardinal were limited to around 77% of the density samples.

Most gold analyses were undertaken at SGS laboratories in Ouagadougou in Burkina Faso and SGS Tarkwa in Ghana. A small proportion was undertaken by Intertek in Tarkwa, Ghana. Selected samples from the resource drilling were assayed for additional attributes including sulphur and arsenic. These data were not included in the current estimates.

Samples from sterilization drilling were analysed by ALS in Kumasi, Ghana. These samples are not included in estimated resources and are not discussed in this report.

Samples analysed by SGS Ouagadougou and SGS Tarkwa contribute approximately equal proportions of the mineralized domain estimation dataset (Table 13) with Intertek providing around 1%. All samples analysed by Intertek are from a single drill hole, which intersects an area of Inferred resources.

SGS Tarkwa and Ouagadougou are accredited by the South African National Accreditation System (SANAS) for meeting the requirements of the ISO/IEC 17025 standard for specific registered tests for the minerals industry. Intertek Tarkwa reportedly operates under ISO/IEC 17025 but has not been assessed by a standards association.

SGS Ouagadougou and SGS Tarkwa employed consistent sample preparation and analytical procedures as follows:

- Samples were sorted and weighed before being oven dried before and crushed to 75% passing 2 mm.
- A 1.5 kg riffle split sub sample was pulverized to nominally 85% at 75 µm. Remaining coarse reject was retained.
- Samples were fire assayed for gold using a 30 or 50 gram charge with an atomic absorption finish, with a detection limit of 0.01 g/t. Assays of greater than 100 g/t were re-analysed with a gravimetric finish.
- Remaining reject and pulverized samples were returned to Cardinal's Bolgatanga Exploration Office for secure storage.

Details of sample preparation and analytical methods used by Intertek were not supplied for the current review. The author understands that they were similar to SGS.

Table 13: Estimation dataset by assay laboratory

Assay Laboratory	Number of Composites			Proportion of Composites		
	Background Domain 1	Mineralized Domain 2	Total	Background Domain 1	Mineralized Domain 2	Total
SGS Ouaga.	2,809	9,844	12,653	31%	45%	41%
SGS Tarkwa	6,077	11,993	18,070	67%	54%	58%
Intertek Tarkwa	175	228	403	2%	1%	1%
Total	9,061	22,065	31,126	100%	100%	100%

11.4. Monitoring of assay reliability

11.4.1. Blanks

Cardinal routinely included samples of un-mineralized granite collected from a quarry outside the Namdini area in assay batches. Submission frequency of these samples averaged one blank per 41 primary samples. For sampling prior to May 2015, blanks were inserted as coarse rock chips. For later sampling, samples of pulverized blank material prepared by SGS Tarkwa were used.

The coarse blank samples, which average around 550 grams test for contamination during sample preparation, and provide a check of sample misallocation by field staff, the laboratory and during database compilation. The latter, fine blanks, which average around 95 grams do not require preparation by the analytical laboratory and do not test for contamination during sample preparation. These samples primarily test for sample misallocation.

Table 14 summarizes the composite estimation dataset subdivided by assay laboratory and the type of blank included in each assay batch. This table indicates that coarse blanks were limited to early assay batches assayed by SGS Ouagadougou, which provide around 11% of the estimation dataset.

Table 14: Estimation dataset by blank type

Assay Laboratory	Number of composites				Proportion of Composites			
	Coarse	Fine	None	Total	Coarse	Fine	None	Total
SGS Ouga.	3,271	8,990	392	12,653	26%	71%	3%	100%
SGS Tarkwa	-	17,818	252	18,070	-	99%	1%	100%
Intertek Tarkwa	-	384	19	403	-	95%	5%	100%
Total	3,271	27,192	663	31,126	11%	87%	2%	100%

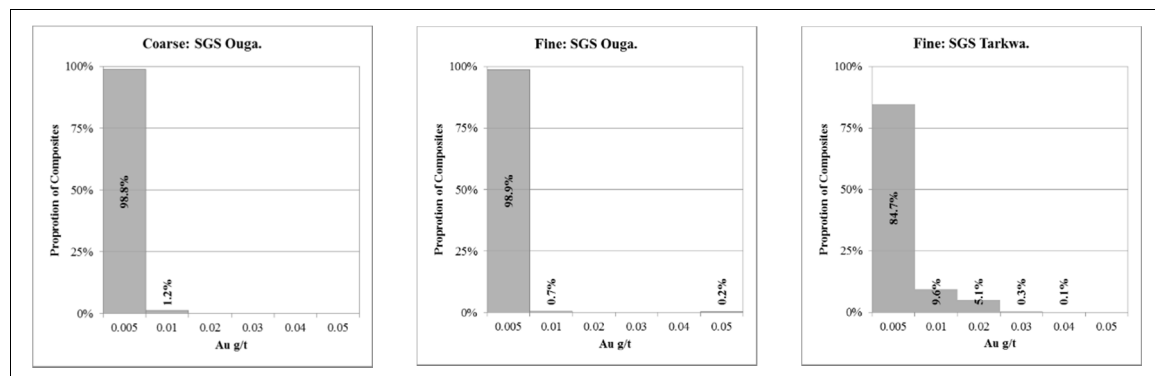
Modifications to the supplied dataset of blank assay results were limited assigning all below detection assays a value representing half the dominant detection limit (0.005 g/t).

Table 15 and Figure 12 summarize blank assay results by type and assay laboratory. This table demonstrates that the blank assays show low gold grades with no indication of common contamination or sample misallocation. Reasons for the higher proportion of above detection assays shown by SGS Tarkwa relative to SGS Ouagadougou for fine blanks are uncertain.

The fine blanks used for the majority of Namdini resource sampling do not check for contamination during sample preparation at the analytical laboratory. In the author's experience, testing for sample contamination is an important aspect of sample quality monitoring for resource datasets, and the lack of coarse blanks is unusual. It is recommended that future resource assaying includes routine submission of appropriate coarse blank material.

Table 15: Blank assay results

Blank Type	Assay Laboratory	Assays (Au g/t)			Above Detection	
		Assays	Average	Maximum	Number	Proportion
Coarse	SGS Ouga.	165	0.00	0.01	2	1%
Fine	SGS Ouga.	452	0.01	0.05	5	1%
	SGS Tarkwa	913	0.01	0.04	139	15%
	Intertek Tarkwa	20	0.01	0.01	-	-


Figure 12: Histogram of blank assay results

11.4.2. Certified reference standards

Cardinal's monitoring of assay reliability included insertion of samples of certified reference standards prepared by Geostats Pty Ltd, Perth, Western Australia in assay batches. The standards, which were inserted at an average rate of around 1 standard per 41 primary samples, have expected gold grades of 0.27 to 6.70 g/t.

Table 16 and Figure 13 summarize reference standard assays by laboratory. This table and figure demonstrate that although there is some variability for individual samples, for all three laboratories, average assay results generally reasonably reflect expected values, with no evidence of material biases.

For standards with expected gold grades of greater than 1.5 g/t, SGS Tarkwa reports average results around 3% higher than expected values. The magnitude of this difference is not significant at the current level of project assessment. As evaluation of the deposit continues, additional investigations such as further inter-laboratory repeat assays may be warranted.

Table 16: Summary of reference standards assays

Laboratory	Expected Value Range	Number Assays	Average grade Au g/t		Avg vs. Expected
			Expected	Assay	
SGS Ouagadougou	<1.5 g/t	354	0.50	0.50	-1%
	>1.5 g/t	264	3.67	3.70	1%
	Subtotal	618	1.86	1.87	1%
SGS Tarkwa	<1.5 g/t	460	0.50	0.50	0%
	>1.5 g/t	450	4.32	4.43	3%
	Subtotal	910	2.39	2.44	2%
Intertek Tarkwa	<1.5 g/t	7	0.34	0.32	-7%
	>1.5 g/t	13	3.29	3.31	0%
	Subtotal	20	2.26	2.26	0%

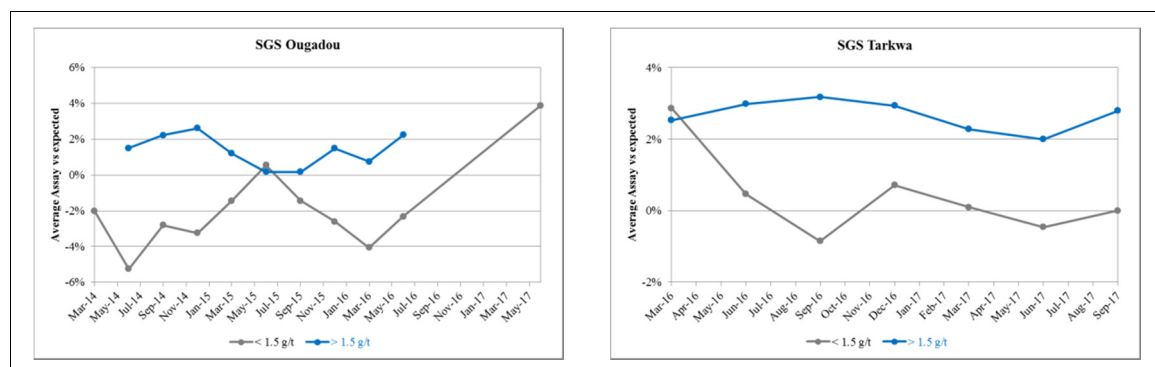


Figure 13: Reference standards assay versus sample date

11.4.3. Inter-laboratory repeats

Cardinal's monitoring of assay reliability included submitting 746 pulp samples initially assayed by SGS Ouagadougou to Intertek for check assaying. No such repeat assays are available for samples assayed by SGS Tarkwa. The author understands that additional inter-laboratory assaying is currently underway.

The author understands that Intertek assayed the pulp samples by fire assay using a comparable method to SGS Ouagadougou.

The supplied inter-laboratory repeat assays include 12 particularly poorly correlating pairs for which Intertek reports notably lower average gold grades than SGS. For many of these pairs the magnitude of the difference is suggestive of sample misallocation. The author recommends that Cardinal investigate database entries for all anomalous repeats.

Table 17 and Figure 14 compare the Intertek repeats and original SGS assays. This table and figure demonstrate that the twelve anomalous results significantly impact correlation statistics. Excluding these samples gives very close average grades for both laboratories, supporting the general accuracy of SGS Ouagadougou assaying.

Table 17: Intertek Inter-laboratory repeats

Au g/t	Full Dataset		Excluding Anomalous	
	SGS Ouga.	Intertek	SGS Ouga.	Intertek
Number	746		734	
Mean	4.23	3.81	3.81	3.80
Mean difference		-10%		0%
Coef. Var.	3.38	2.97	3.17	2.99
Minimum	0.01	0.01	0.01	0.01
1 st Quartile	0.24	0.21	0.23	0.22
Median	1.13	1.12	1.12	1.13
3 rd Quartile	3.46	3.55	3.39	3.55
Maximum	220.0	197.3	220.0	197.3
Pearson Correl.	0.87		0.99	
Spearman. Correl.	0.98		0.99	

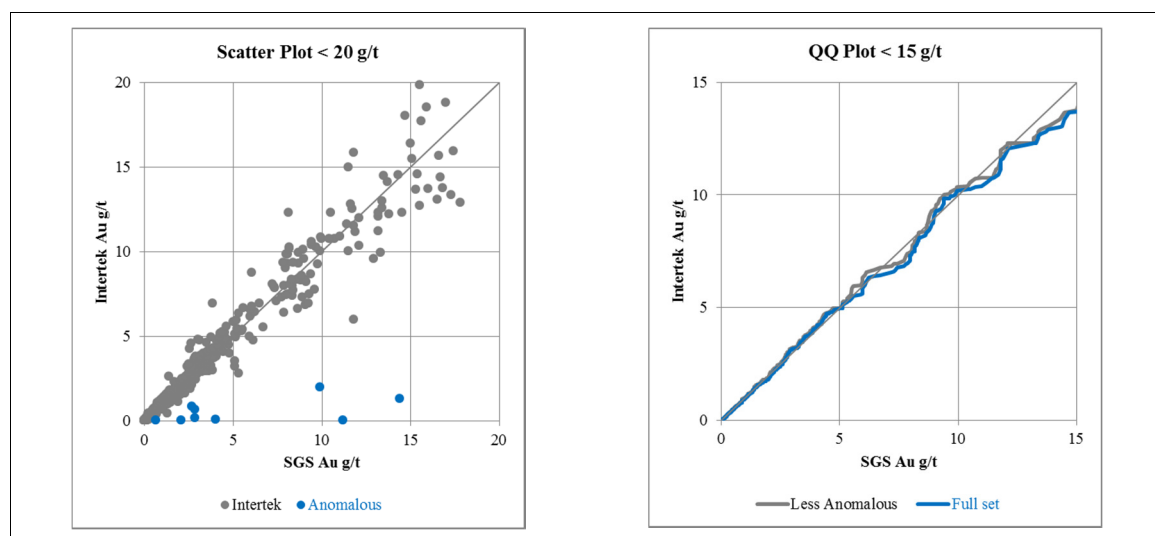


Figure 14: Intertek inter-laboratory repeats

11.4.4. Independent core duplicate sampling

Two sets of duplicate assays from independent quarter core check sampling by consultant geologists employed by Cardinal, are available comprising the following:

- 49 duplicates collected in July 2016, which were assayed by SGS Tarkwa and include 34 samples with original assays by SGS Ouagadougou and 15 samples with original SGS Tarkwa analyses.
- 165 duplicates collected January 2017 and assayed by ALS Ireland, all of which have original assays by SGS Tarkwa.

July 2016 Duplicates

Sample identifiers assigned to duplicate samples in the supplied data represent original sample identifiers with a suffix of “/1”. The duplicates do not appear to strictly represent blind checks, reducing the integrity of the duplicate results.

For intervals with original SGS Tarkwa assays, the duplicate results closely match the original assays (Table 18, Figure 15).

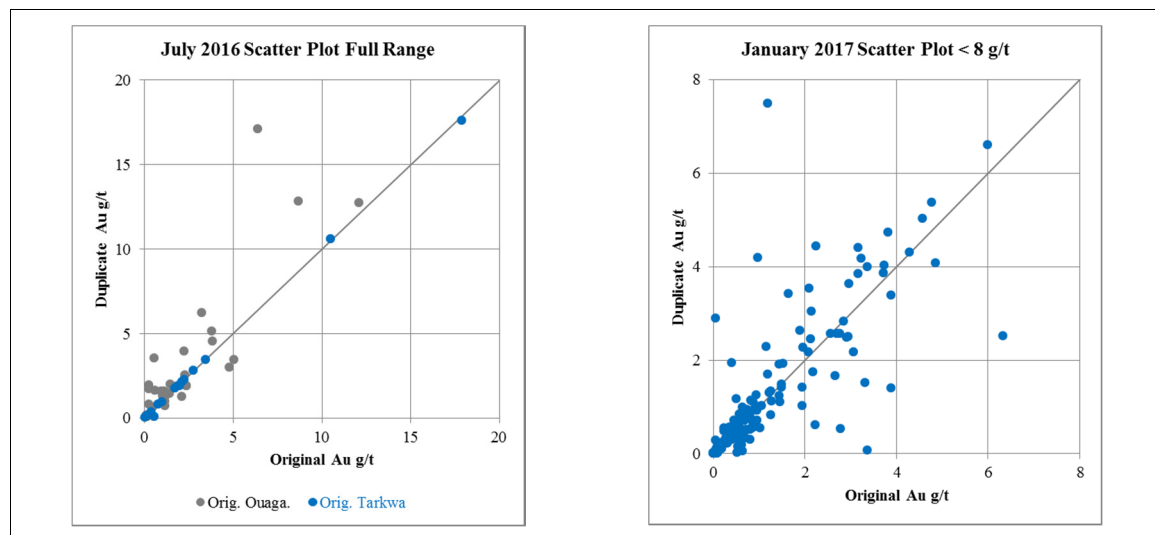
For intervals with original SGS Ouagadougou assays, duplicate results average around 35% higher than the original assays. Reasons for this trend are unclear. It may simply represent an artefact of the small dataset which is too small for the results to be material at the current level of project evaluation

January 2017 Duplicates

The duplicate ALS assay results generally reasonably match original SGS Tarkwa assays, with no notable difference in mean grades (Table 18, Figure 15). These data provide additional confidence in the general reliability of SGS Tarkwa assaying.

Table 18: Independent core duplicates

July 2016 duplicates				
Au g/t	Original SGS Ouagadougou		Original SGS Tarkwa	
	Original SGS Ouaga.	Duplicate SGS Tarkwa	Original SGS Tarkwa	Duplicate SGS Tarkwa
Number	34		15	
Mean	2.26	3.06	3.15	3.11
Mean dif.		35%		-1%
Coef. Var.	1.13	1.24	1.47	1.48
Minimum	0.10	0.09	0.01	0.02
1 st Quartile	0.55	1.25	0.37	0.12
Median	1.30	1.62	1.72	1.74
3 rd Quartile	2.35	2.96	2.24	2.25
Maximum	12.1	17.1	17.9	17.6
Pearson Correl.	0.85		1.00	
Spearman. Correl.	0.77		0.99	
January 2017 duplicates				
Au g/t	Full dataset		< 15.0 g/t	
	Original	Duplicate	Original	Duplicate
Number	165		164	
Mean	1.41	1.34	1.26	1.28
Mean dif.		-5%		1%
Coef. Var.	1.76	1.42	1.33	1.34
Minimum	0.01	0.01	0.01	0.01
1 st Quartile	0.24	0.19	0.24	0.19
Median	0.62	0.56	0.62	0.56
3 rd Quartile	1.53	1.66	1.53	1.66
Maximum	24.6	12.5	11.4	12.5
Pearson Correl.	0.83		0.83	
Spearman. Correl.	0.89		0.88	


Figure 15: Independent core duplicates

11.5. Bulk density measurements

Density measurements available for Namdini comprise 5,955 immersion density measurements performed by Cardinal (4,561) SGS Tarkwa (1,129) and SGS Ouagadougou (265). Weathered and porous samples were wax-coated prior to density measurement. Lengths specified for these samples range from 0.1 to 1.4 metres and average 0.3 metres.

Table 19 summarizes the density measurements by rock type and weathering domain. For preparation of this table the density samples were coded by the weathering and rock type wire-frames used for resource model coding.

Table 19 demonstrates that for weathering and rock unit groups with reasonable numbers of samples for both measurement groups, the combined SGS measurements give very similar average values to Cardinal's measurements. This comparison provides some confidence in the reliability of Cardinal's measurements.

The trend plots in Figure 16 compare density and gold grade for fresh samples. This figure demonstrates that density measurements are not strongly correlated with gold grades. Granite samples show no notable association between density and grade. Metavolcanic and diorite samples demonstrate a slight general increase in average density with increasing grade. Measurements for these units show an increase in average density from around 2.80 t/bcm at low grades to 2.83 t/bcm at gold grades of around 4 g/t, an increase of around 1%. These trends are not significant at the current level of project assessment.

Table 19: Density measurements by rock type

Rock Unit	Weath. Zone	SGS		Cardinal		Combined		Cardinal Vs. SGS
		No.	Avg. t/bcm	No.	Avg. t/bcm	No.	Avg. t/bcm	
Combined	Oxide	19	2.22	120	2.20	139	2.21	-1%
Mata-volcanic	Trans.	26	2.57	21	2.70	47	2.63	5%
	Fresh	617	2.82	1,087	2.80	1704	2.81	-1%
Granite	Trans.	23	2.52	14	2.64	37	2.57	5%
	Fresh	230	2.73	332	2.71	562	2.72	-1%
Diorite	Trans.	-	-	51	2.55	51	2.55	-
	Fresh	328	2.83	1,731	2.79	2,059	2.80	-1%
Meta-sediment	Trans.	59	2.60	66	2.56	125	2.58	-2%
	Fresh	92	2.83	1,080	2.79	1,172	2.79	-2%
Pyroclastic	Trans.	-	-	20	2.60	20	2.60	-
	Fresh	-	-	26	2.73	26	2.73	-

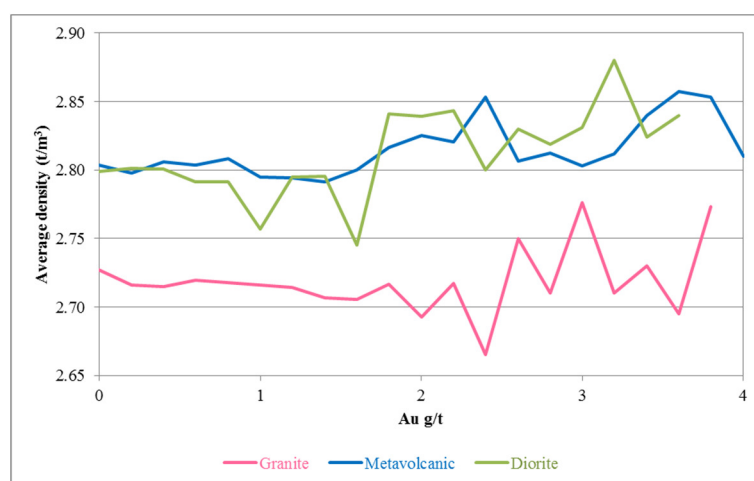


Figure 16: Density versus gold grade for fresh mineralization

12. Data Verification

Verification checks undertaken by the author to confirm the validity of the database compiled for the current study include.

- Checking for internal consistency between, and within database tables,
- Comparison of assay values between nearby holes, and
- Comparison of assay entries with laboratory source files supplied by Cardinal

The consistency checks show no significant issues.

Laboratory source files supplied by Cardinal include gold assay results for 99.7% of primary assays in the compiled database (Table 20). Significant inconsistencies noted by this review were limited to eight samples from a single drill hole (NMRC147) for which received sample weights which average 2.6 kg were incorrectly entered as gold grades. All gold assays for these samples were reported as <0.01 g/t. These samples represent around 0.01% of the assay dataset. They lie outside the main mineralized domain and the incorrectly assigned values do not significantly impact general confidence in the current estimates.

The available information indicates that the drilling database has been generally carefully compiled and validated, and forms an appropriately reliable basis for resource estimation.

Table 20: Laboratory source file checks

Comment	Number of assays	Proportion of assays
No significant differences noted	63,699	99.69%
Sample weight entered as gold grade	8	0.01%
Subtotal checked	63,707	99.7%
Not checked	192	0.3%
Total	63,899	100.0%

13. Mineral Processing and Metallurgical Testing

Several phases of metallurgical testwork of samples of Namdini mineralization have been undertaken since 2015. The following summary of this test-work is derived from Barnes, 2017, Chauraya, 2016 and Chauraya, 2017.

During 2015, metallurgical testwork focused on bottle roll analyses of RC drill cuttings and quarter core samples, and initial gravity and leaching testwork at SGS Vancouver.

In June 2016, the core sampling protocol was adjusted to include routine gold and sulphur analyses of quarter core samples with quarter core allocated for metallurgical testwork.

In July 2016, a 332 kg sample was submitted to Suntech Geomet Laboratories (Suntech) in Johannesburg South Africa for a range of metallurgical tests, focusing on milling, flotation, concentrate regrind and carbon-in-leach processing. The metallurgical sample was produced from quarter core from drill hole NMDD005 in the centre of the deposit, containing gold mineralization in all three key rock units (granite, metavolcanics and diorite). The sample was chosen, to reflect the range of typical grades in each mineralized rock type. Grade of the master composite is 1.42 g/t gold and 1.1% total sulphur.

Suntech completed a range of diagnostic testwork, mineralogical studies, milling and flotation testwork, concentrate regrind and leaching testwork on both the source sample and flotation concentrates. The testwork returned flotation sulphide and gold recoveries averaging 95% at a primary grind size of 80% passing 75 microns into a concentrate of less than 5% of the original rock mass, resulting in a concentrate gold grade exceeding 50 g/t gold and 48% sulphur with no potentially deleterious elements. Milling testwork indicated an optimum initial grind size of 80% passing 75 microns. Regrinding the concentrate and 24 hour leaching produced gold recoveries from the concentrate in excess of 80% for an overall gold recovery of 75%.

A geometallurgical scan sampling program was initiated in August 2016 on 10 metre down-hole composite samples of coarse reject quarter core samples selected at a notional 0.1 g/t gold cut-off. Approximately 9,300 metres of drilling from 49 holes were sampled in the first scan sampling program. The 2.5 kg composite samples were analysed by 24 hour bottle roll after grinding to 80% passing 75 microns, with duplicate 50 gram fire assays of the bottle roll residue, total sulphur and carbon using a LECO furnace, and ICP analysis for a 49 element suite. The scan sampling program covered the entire drilled volume of the deposit at that time. Additional scan geometallurgical sampling has been completed and is currently being analysed.

In early 2017 further testwork was carried out on the original Suntech master composite, focusing on concentrate regrind parameters and extended leach times and pre-leach aeration. This testwork showed overall gold recoveries of approximately 84%. During 2017, metallurgical testwork was significantly expanded with the production of large scale samples of diamond core for the proposed starter pit area (785 kg), life of mine pit (1,226 kg), a dedicated comminution testwork sample, a flotation optimization testwork sample (360 kg) and a specialised oxide metallurgical sample (114 kg). These samples were selected to be representative of the range of gold and sulphur grades for each rock unit and showed overall recoveries of around 86%. Further optimization testwork is underway.

14. Mineral Resource Estimates

14.1. Introduction

Namdini Mineral Resources were estimated by Multiple Indicator Kriging (MIK) incorporating a variance adjustment to reflect open pit mining selectivity, a method that has been demonstrated to provide reliable estimates of gold resources achieved in open pit mining for a wide range of mineralization styles.

The estimates are based on RC and diamond drilling data supplied by Cardinal with an effective date of 11th of September 2017. The compiled database includes an additional 33,406 metres compared to the previous April 2017 RPA resource drilling data.

Micromine software was used for data compilation, domain wire-framing and coding of composite values and GS3M was used for resource estimation. The resulting estimates were imported into Micromine for resource reporting.

The Mineral Resource estimates have been classified and reported in accordance with NI 43-101 guidelines and classifications adopted by CIM Council in May 2014. Mineral Resources were previously estimated for Namdini in November 2016 and April 2017 respectively. These previous resources were reported in accordance with the Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves (JORC 2012 code). As presented in this report, the previous Mineral Resource estimates do not include material differences to the Canadian Institute of Mining, Metallurgy and Petroleum (CIM) Definition Standards for Mineral Resources and Mineral Reserves.

The Qualified Person responsible for the Mineral Resources is Nicolas Johnson who is a fulltime employee of MPR Geological Consultants Pty Ltd and a member of the Australian Institute of Geoscientists. Mr Johnson visited the project between the 11th and 14th of January 2017.

Mineral Resources that are not Mineral Reserves do not have demonstrated economic validity. The extents to which mining, metallurgical, marketing, infrastructure, permitting, marketing and other financial factors may affect the Mineral Resource Estimates are not precisely defined. Information available to the author indicates that the Mineral Resource Estimates have reasonable prospects of eventual economic extraction as defined by CIM guidelines (CIM 2014). Confirmation of the status of the mineral tenure for the Namdini deposit and the status of Cardinal's interest in the Namdini Gold Project is provided by Kuenyehia, 2017.

14.2. Estimation dataset

Relative to the April 2017 dataset, the dataset available for the current review includes 137 additional RC and diamond holes comprising the following:

- 93 holes primarily infilling previously defined volume of gold mineralization increasing confidence in estimated resources;
- 27 holes testing the down-dip extension of gold mineralization throughout the central portion of the deposit; and
- 17 holes drilled to the south extending the southern limit to the mineralization.

The current estimates are based on two metre down-hole composited gold grades from RC and diamond drilling with un-sampled intervals generally assigned gold grades of 0.001 g/t. Peripheral, un-mineralised drill holes not relevant to the resource estimates were removed from the resource dataset.

The compiled resource dataset comprises 31,126 composites with gold grades from 0.001 to 242.05 g/t and averaging 0.59 g/t. Holes completed during 2017 provide around 52% of the resource dataset.

14.3. Mineralized domains

In general, the transition from gold mineralization to barren host rock is characterized by diffuse grade boundaries.

The current estimates are based on a mineralized domain interpreted on the basis of composited gold grades. Domain boundaries were digitised on cross-sections, snapped to drill hole traces where appropriate, then wire-framed into three-dimensional solid designated Domain 2. Domain 1 represents a background domain capturing generally un-mineralized composites outside the mineralized domain wire-frame.

The mineralized domain trends north-northeast over a strike length of approximately 1,270 metres with horizontal widths ranging from around 80 to 390 metres and averaging approximately 260 metres. The domain dips to the west at around 70 degrees, and is interpreted to a constant elevation of -500 mRL, which represents an average depth of around 710 metres, around 25 metres below the base of drilling.

Figure 17 presents a plan-view of the surface expression of the mineralized domain relative to drill hole traces.

Cardinal supplied surfaces representing the base of oxidation and the top of fresh rock interpreted from drill hole logging. These surfaces were used for flagging of the resource composites into oxide, transition and fresh subdomains, density assignment and partitioning final resources by oxidation type. Depth to the interpreted base of complete oxidation ranges from locally one to two metres to around 20 metres and averages approximately 10 metres. Interpreted depth to fresh rock ranges from around 8 to 30 metres depth and averages approximately 18 metres.

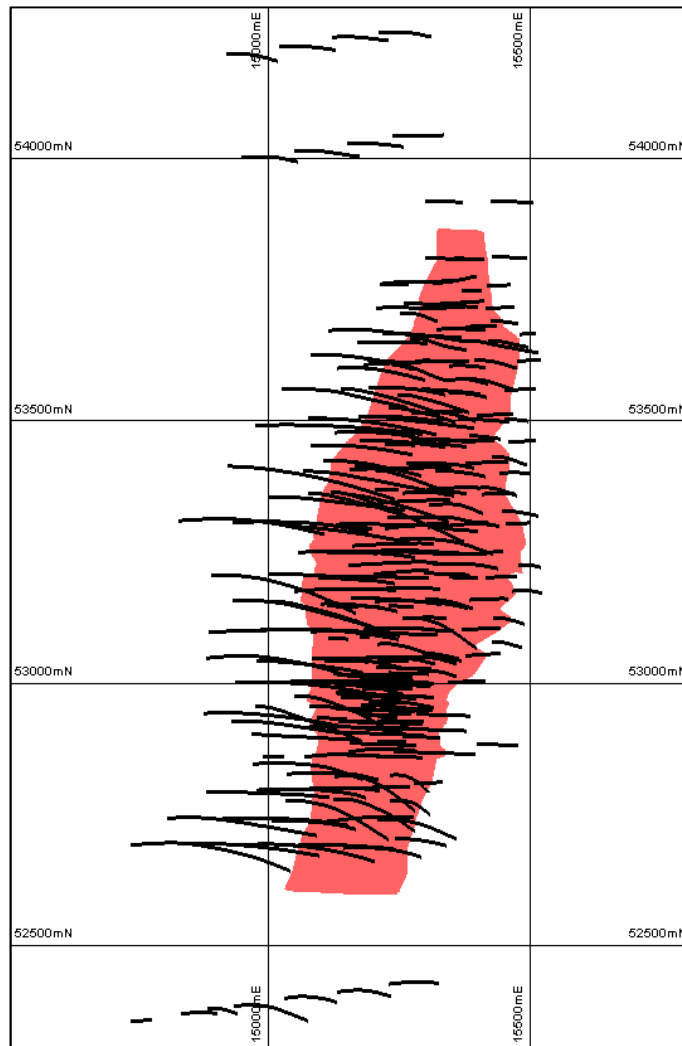


Figure 17: Mineralized domain and drill hole traces

14.4. Exploratory data analysis

Table 21 shows univariate statistics of composite gold grades for the resource dataset subdivided by mineralized and weathering domain. Notable features of these statistics include the following:

- At 0.05 g/t, the mean gold grade for Domain 1 composites is notably lower than for the mineralized domain demonstrating that the domaining has been effective in assigning most mineralized composites into the mineralized domain.
- Typical of many gold deposits, all populations of gold grades show strong positive skewness with coefficients of variation of generally greater than 2.0 indicating that MIK is an appropriate estimation technique and that selective mining above elevated cut-off grades will be difficult.

Table 21: Composite statistics

Domain 1				
Au g/t	Oxide	Transition	Fresh	Combined
Number	407	636	8,018	9,061
Mean	0.079	0.044	0.048	0.049
Variance	0.093	0.034	1.371	1.22
Coef. Var.	3.85	4.23	24.4	22.5
Minimum	0.005	0.005	0.003	0.003
1 st Quartile	0.005	0.005	0.005	0.005
Median	0.018	0.013	0.008	0.008
3 rd Quartile	0.05	0.025	0.018	0.020
Maximum	4.80	4.13	103.09	103.09
Domain 2				
Au g/t	Oxide	Transition	Fresh	Combined
Number	1,213	993	19,859	22,065
Mean	0.832	0.767	0.819	0.817
Variance	2.17	2.47	9.54	8.82
Coef. Var.	1.77	2.05	3.77	3.63
Minimum	0.001	0.005	0.004	0.001
1 st Quartile	0.135	0.078	0.045	0.050
Median	0.385	0.305	0.270	0.275
3 rd Quartile	0.930	0.795	0.800	0.810
Maximum	21.20	22.49	242.05	242.05

14.5. Indicator thresholds and bin average grades

For each dataset formed from each Domain and weathering combination, indicator thresholds were defined using a consistent set of percentiles representing probability thresholds of 0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.75, 0.8, 0.85, 0.9, 0.95, 0.97 and 0.99 for data in each data subset.

All class average grades were determined from bin mean grades with the exception of the upper bins, which were reviewed on a case by case basis and bin grades selected on the basis of bin mean, or median with or without exclusion of high grade composites. This approach was adopted to reduce the impact of a small number of outlier composites. In the author's experience this approach is appropriate for MIK modelling of highly variable mineralization such as Namdini.

Table 22 summarises upper bin thresholds and bin mean grades and describes with the methodology used to determine upper bin grades.

Table 22: Upper bin thresholds and class grades

Domain	Subdomain	Upper bin Au g/t			Source of bin grade
		Threshold	Maximum	Bin grade	
1	Oxide	1.035	4.795	1.865	Median
	Transition	0.460	4.130	0.830	Median
	Fresh	0.475	103.091	0.880	Median
2	Oxide	6.340	21.200	8.770	Median
	Transition	7.800	22.490	9.865	Median
	Fresh	7.350	46.185	13.122	Mean exclude comps. >50g/t Au

14.6. Variogram models

Domain 2 indicator variograms were modelled for thresholds defined using a consistent set of percentiles representing probability thresholds of 0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.75, 0.8, 0.85, 0.9, 0.95, 0.97 and 0.99 for dataset of combined weathering subdomains. For determination of variance adjustment factors a variogram model of composite gold grades was also developed for the dataset. The variograms modelled for Domain 2 were used for modelling Domain 1.

As examples of the variogram models, Figure 18 presents three dimensional variogram surface maps of the median indicator variogram model for Domain 2 at variogram ranges at 90% of sill.

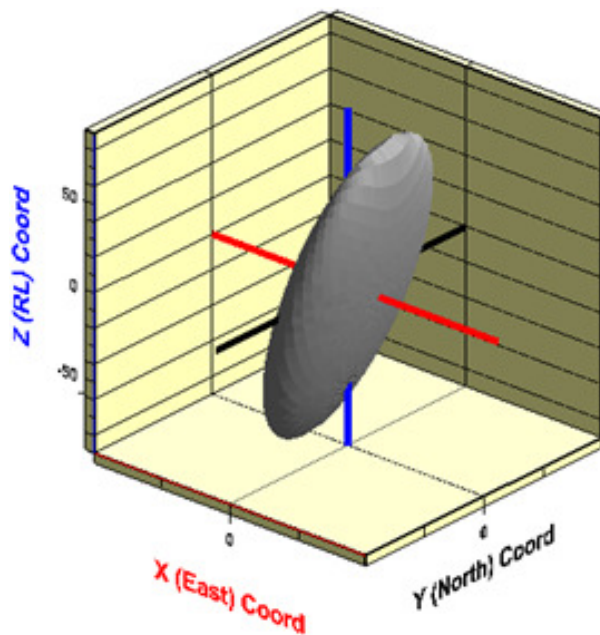


Figure 18: Three dimensional variogram plot

14.7. Estimation parameters

The block model frame work used for MIK modelling covers the full extent of the composite dataset (Figure 5). It includes panels with dimensions of 12.5 metres east-west by 25 metres north-south by 5 metres vertical. The plan-view panel dimensions are consistent with drill hole spacing the in more closely drilled portion of the deposit.

The three progressively more relaxed search criteria used for MIK estimation are presented in Table 23. The search ellipsoids were aligned with the general mineralization orientation.

Table 23: Search criteria

Search	Radii (m) (x,y,z)	Minimum Data	Minimum Octants	Maximum Data
1	65,65,15	16	4	48
2	65,65,15	16	4	48
3	97.5,97.5,22.5	8	2	48

Estimated resources include a variance adjustment to give estimates of recoverable resources for selective mining (SMU) dimensions of 5 metres east by 10 metres north by 2.5 metres in elevation with high quality grade control sampling on an 8 by 12 by 1.25 m pattern. The variance adjustments were applied using the direct lognormal method and the adjustment factors listed in Table 24.

Table 24: Variance adjustment factors

Domain	Block/Panel	Information Effect	Total Adjustment
1	0.135	0.249	0.034
2	0.135	0.249	0.034

Bulk densities were assigned to the block model by rock type and weathering domain. The assigned values (Table 25) were derived from the average of the available measurements (Table 19).

Table 25: Bulk density assignment

Rock type	Bulk density (t/bcm)		
	Oxide	Transition	Fresh
Metavolcanics	2.06	2.54	2.81
Granite	2.06	2.54	2.73
Diorite	2.06	2.58	2.82
Meta-Sediments	2.06	2.58	2.82

14.8. Pit shell constraint

To provide estimates with reasonable prospects for eventual economic extraction, Mineral Resources are reported within an optimized pit shell. The optimization parameters reflect a large scale conventional open pit operation with the cost and revenue parameters detailed in Table 26.

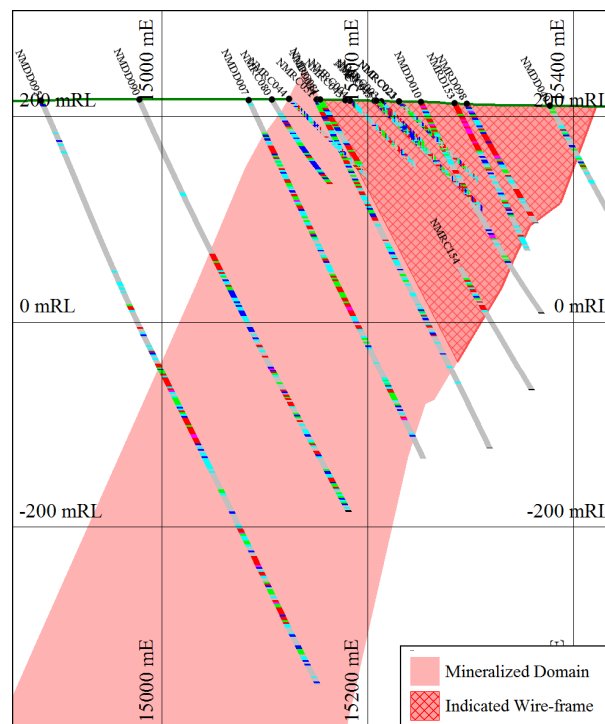
Table 26: Resource pit shell optimization parameters

Description		Value
Gold price		US\$ 1,500/oz
NSR royalty		5.00%
Pit slope angle		45°
Ore and waste mining cost		US \$2.88/t
Mill Recovery	Oxide	90.0%
	Transition and Fresh	86.0%
Mill Processing Cost	Oxide	US\$ 11.61/t
	Transition and Fresh	US\$ 12.08/t

14.9. Resource classification

Resource model blocks have been classified as Indicated or Inferred on the basis of search pass and a wire-frame outlining more closely drilled portions of the mineralization. Figure 19 shows an example cross section showing this wire-frame.

Blocks within the classification wire-frame informed by all search passes are classified as Indicated. Panels outside the classification wire-frame and estimated by pass 1 are classified as Indicated. All remaining blocks estimated by pass 2 and 3 assigned to the Inferred category.



53037.50 mN. Looking North

Figure 19: Indicated wire-frame relative to mineralized domain

14.10. Model reviews

Block model reviews included comparison of estimated block grades with informing composites. These checks comprised inspection of sectional plots of the model and drill data and review of swath plots and showed no significant issues.

Figure 20 shows a representative cross-section of the Namdini resource model. The plots in this figure show resource model panels scaled by the estimated proportion above 0.5 g/t gold cut off, and coloured by resource category and the average estimated gold grade relative to the resource domain and drill hole traces coloured by two metre composited gold grades.

It should be noted that when viewing the vertical sections through the resource model there are situations where the model blocks appear to be un-correlated to the mineralized intercepts in the neighbouring drill holes. This is occurring because of the way the resource model blocks have been presented. The model blocks plotted are only those that contain an estimated resource above 0.5 g/t Au cut-off and the proportion above cut off has been used to scale the east and north dimension of the model block for presentation purposes. The scaling occurs about the model block centroid co-ordinate and therefore introduces the apparent miss-match between data and the resource model blocks.

The swath plots in Figure 21 compare average estimated panel grades for Indicated Resources and average composite grades by easting, northing and elevation. The average composite grades include an upper cut of 50 g/t which is consistent to the upper limit used for generating the MIK domain statistics for Domain 2 and reduces the impact of a small number of outlier composite gold grades of up to 245 g/t.

The plots in Figure 21 show that although, as expected, average block grades are smoothed compared to the average composite grades, they generally closely follow the trends shown by the composite mean grades with the exception of areas of variably spaced or limited sampling. There are minor local deviations between the model and composite trends seen on the plots and these are influenced due to the following features.

- Excluding the highest composite grades from the datasets used for determination of upper bin grades has reduced the amount of metal (grade) estimated in the resource model;
- The use of an octant search strategy in the MIK estimation has a de-clustering effect on the estimates; and
- The data used in the estimation of the MIK block grades are coming from a greater volume than the vertical or horizontal slices being compared which are consistent with model panel dimensions.

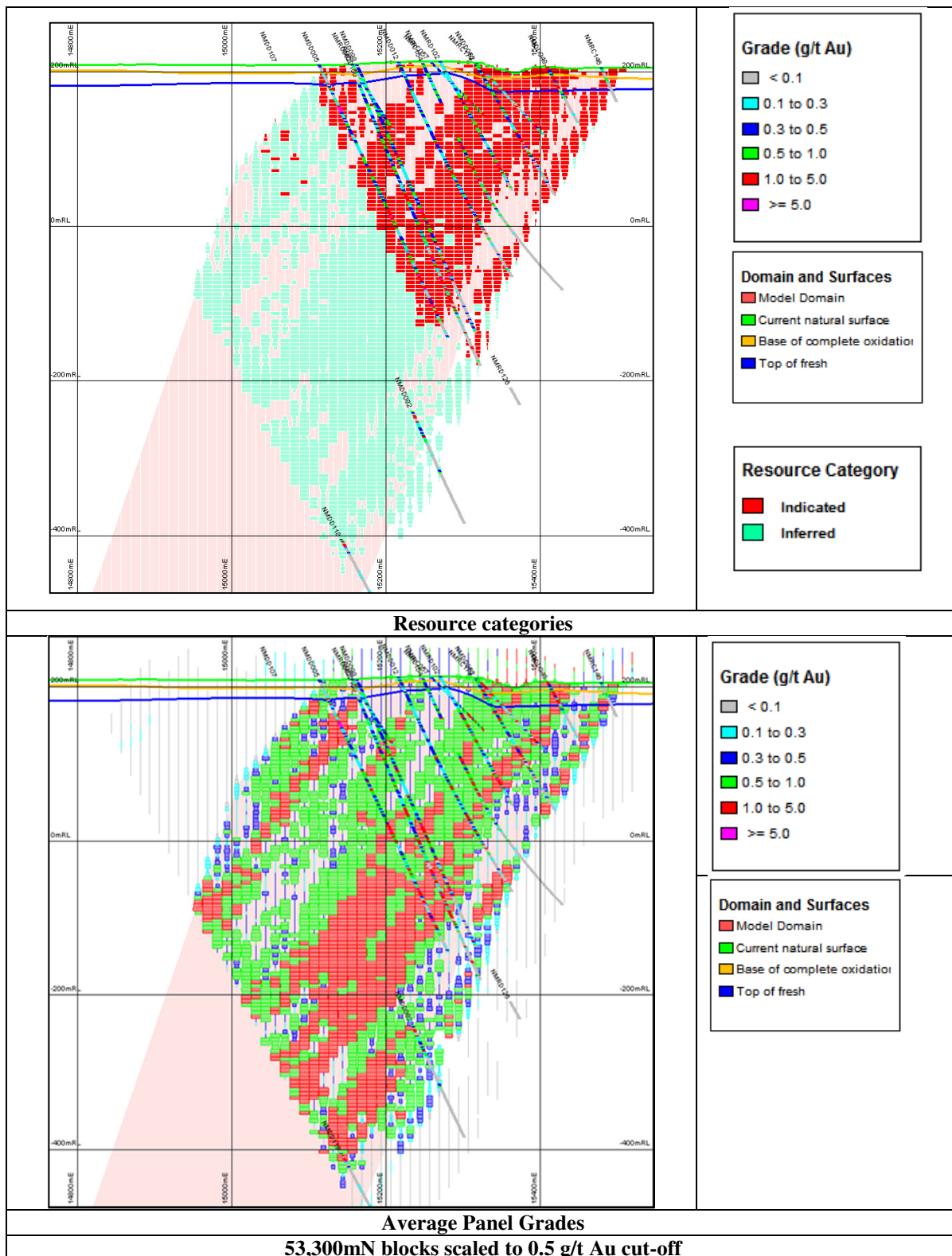


Figure 20: Block model coloured by resource category and gold grade

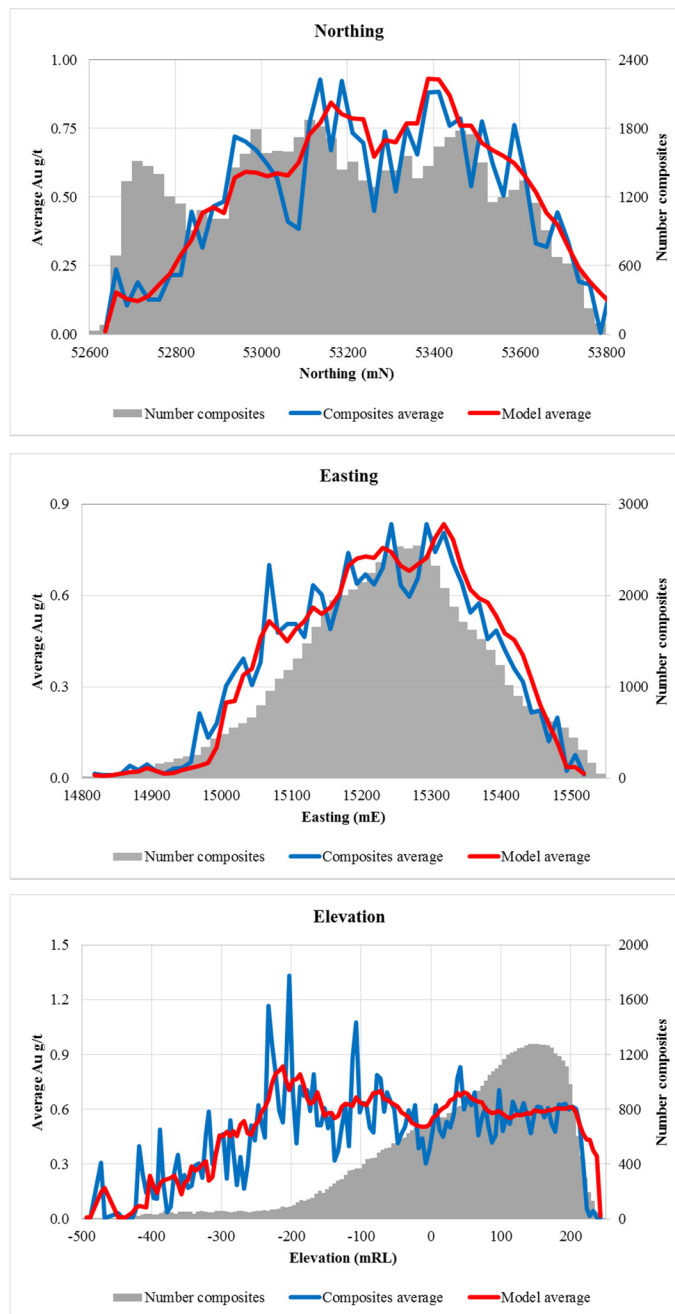


Figure 21: Average estimated panel grades versus composite grades

14.11. Resource Estimates

Table 27 shows the Mineral Resource Estimates for Namdini for a range of cut off grades. The figures in this table are rounded to reflect the precision of the estimates and include rounding errors.

The Mineral Resources are reported within the resource pit shell and extend from natural surface to around 580 metres depth with around 92% of the Indicated Resources, and 44% of the Inferred resources occurring at depths of less than 300 metres. The estimates make no allowance for depletion by artisanal mining, which does not significantly impact the reported estimates.

Oxidised and transitional material hosts around 2% and 2% of the Indicated and Inferred resources, respectively, with the remainder (96%) from fresh rock.

Table 27: September 2017 Namdini Mineral Resource estimates

Indicated Mineral Resources			
Cut-off (Au g/t)	Tonnes (Mt)	Grade (Au g/t)	Metal (Au Moz)
0.2	175	0.87	4.90
0.3	159	0.94	4.76
0.4	140	1.01	4.55
0.5	120	1.10	4.27
0.6	102	1.20	3.95
0.7	86	1.31	3.61
0.8	72	1.42	3.28
0.9	60	1.52	2.96
1.0	51	1.63	2.67
Inferred Mineral Resources			
Cut-off (Au g/t)	Tonnes (Mt)	Grade (Au g/t)	Metal (Au Moz)
0.2	122	0.9	3.6
0.3	111	1.0	3.5
0.4	98	1.1	3.3
0.5	84	1.2	3.1
0.6	72	1.3	2.9
0.7	61	1.4	2.7
0.8	52	1.5	2.4
0.9	44	1.6	2.2
1.0	37	1.7	2.0

15. Mineral Reserve Estimates

This section is not applicable to the report.

16. Mining Methods

This section is not applicable to the report.

17. Recovery Methods

This section is not applicable to the report.

18. Project Infrastructure

This section is not applicable to the report.

19. Market Studies and Contracts

This section is not applicable to the report.

20. Environmental Studies, Permitting and Social or Community Impact

The following description of environmental studies, permitting and social and community impact was provided by Cardinal.

Cardinal's exploration activities are undertaken such that any potential emissions and effects associated exploration activities, which could include habitat modification and associated visual effects, are kept to a minimum.

Auger drilling is used as a primary grassroots exploration tool as this method does not cause significant impact on the hole surroundings. For diamond and RC drilling site preparation and access in the Savannah grassland, it is mostly undergrowth that is cleared, while larger trees are preserved. Drill sites are kept clean of rubbish and free of oil or fuel spills, and are then remediated upon completion of drilling.

Evaluation of potential mining and milling operations are at comparatively early stage. Environmental studies, permitting and of social and community impacts have not yet been assessed in detail.

NEMAS Consult Ltd (NEMAS), of Accra, Ghana, has been contracted by Cardinal to undertake the Environmental Impact Assessment study for the Project. NEMAS has undertaken a site reconnaissance visit and completed the Scoping stage of the process in accordance with the Ghanaian Environmental Protection Agency procedures for the EIA.

The scoping study has been submitted to commence the process of Environmental Impact Statement (EIS) in accordance with Regulations 15(1b) and (1c) of the Environmental Assessment Regulations, 1999 (LI 1652) and Ghana's Environmental Impact Assessment (EIA) Procedures, the Environmental Protection Agency (EPA).

Cardinal believes that there are unlikely to be any specific environmental issues that would preclude potential eventual economic extraction.

21. Capital and Operating Costs

This section is not applicable to the report.

22. Economic Analysis

This section is not applicable to the report.

23. Adjacent Properties

This section is not applicable to the report.

24. Other Relevant Data and Information

This section is not applicable to the report.

25. Interpretation and Conclusions

25.1. Sampling information

The estimates described in this report are based on RC and diamond information available for Namdini on the 11th of September 2017, totalling 275 holes for 67,122 metres of drilling. RC and diamond drilling provides around one third and two thirds of the estimation dataset respectively. Key aspects of the resource drilling and the author's opinion of information available to demonstrate sampling reliability include the following:

- Collar locations of all resource holes were accurately surveyed by differential GPS techniques.
- Most diamond holes and deeper RC holes were down-hole surveyed at generally 30 metre intervals. These comprehensively surveyed holes provide around three quarters of the mineralized domain estimation dataset. The remaining composites are from holes with no or incomplete down-hole surveying and have less reliably defined positions. Hole paths have been located with sufficient accuracy for the current estimates. Additional surveying down-hole may be warranted as assessment of the project continues.
- Core recovery measurements, which are available for around 58% of diamond drilling average 99.6% consistent with the author's experience of high quality, reliable diamond drilling.
- RC drilling is dominated by samples logged as dry with moist and wet samples representing insignificant proportions. Any uncertainty over the reliability of moist or wet samples does not affect general confidence in estimated resources.
- At around 85%, average estimated average RC sample recovery is consistent with the author's experience of high quality RC sampling.
- Field duplicates show generally reasonable repeatability consistent with the author's experience of good quality RC sampling for comparable mineralization styles.
- Samples from Cardinal's RC rig show greater variability than those from other RC rigs employed at Namdini. This includes notably lower than average estimated recoveries for the first sample of each drill rod and lower average gold grades for higher grade field duplicates.

The author considers that quality control measures adopted for the Namdini drilling have established that the RC and diamond sampling is representative and free of any biases or other factors that may materially impact the reliability of the sampling. There are, however, some aspects of the sampling that warrant further investigation as assessment of the project continues.

All sample preparation and gold analyses of primary samples from the Namdini resource drilling was undertaken by independent commercial laboratories. Most primary samples were analysed for gold by SGS Ouagadougou or SGS Tarkwa by fire-assay methods, with Intertek assays providing a small proportion of the estimation dataset. Key aspects of the information available to demonstrate reliability of these assays includes following:

- Diamond core and RC samples were transported from drill sites to secure storage at Cardinals' Exploration Office by Cardinal employees before being delivered to the assay laboratory by laboratory personnel.
- Assays of coarse blanks included in earlier assay batches which contribute 11% of mineralized domain composites, show no indication of significant contamination or sample misallocation.
- Samples submitted after May 2015 included fine blanks of pulverized material which did not require preparation by the analytical laboratory. These samples primarily test for sample misallocation, and showed no significant misallocation.
- Samples of certified reference standards were submitted at an average frequency of around 1 standard per 41 primary samples. Average assay results generally reasonably reflect expected values, with no evidence of significant biases, supporting the general accuracy of gold grades reported by the laboratories used for primary assaying.
- Results for 746 Intertek inter-laboratory repeats reasonably match the original SGS Ouagadougou results supporting the general accuracy of SGS Ouagadougou assaying.
- No inter-laboratory pulp repeats are available for SGS Tarkwa assays. The author understands that such inter-laboratory repeats are currently underway.
- In July 2016, a consultant geologist employed by Cardinal collected and submitted 49 independent duplicate samples to SGS Tarkwa. For 15 intervals with original SGS Tarkwa assays, the duplicate results closely match original assays by SGS Tarkwa. For 34 intervals with original SGS Ouagadougou assays, the duplicate results average around 35% higher than the original assays. Reasons for this trend are unclear.
- In January 2018 another consultant geologist collected 165 independent quarter core duplicate sample which were submitted to by ALS Ireland giving very similar average gold grades to original SGS Tarkwa assays providing additional confidence in the general reliability of SGS Tarkwa assaying.
- Available density information totals 5,955 immersion measurements by Cardinal and SGS. For weathering/rock units with reasonable numbers of Cardinal and SGS measurements, SGS measurements give very similar average values to Cardinal providing some confidence in the reliability of Cardinal's density measurements.

The author considers that quality control measures adopted for assaying of the Namdini resource drilling have established that the assaying is representative and free of any biases or other factors that may materially impact the reliability of the analytical results. The author considers that the sample preparation, security and analytical procedures adopted for the Namdini drilling provide an adequate basis for the current Mineral Resource estimates.

25.2. Mineralization and Mineral Resource Estimates

The current estimates are based on a mineralized domain interpreted on the basis of composited gold grades. The mineralized domain trends north-northeast over a strike length of approximately 1,270 metres with horizontal widths ranging from around 80 to 390 metres and averaging approximately 260 metres. The domain dips to the west at around 70 degrees, and is interpreted to a constant elevation of -500 mRL, which represents an average depth of around 710 metres, around 25 metres below the base of drilling.

Namdini Mineral Resources were estimated by Multiple Kriging of two metre down-hole composited gold grades from RC and diamond drilling. Estimated resources include a variance adjustment to give estimates of recoverable resources for selective mining dimensions of 5 metres east by 10 metres north by 2.5 metres in elevation with grade control sampling on an 8 by 12 by 1.25 metre pattern, and are reported within an optimal pit shell generated at a gold price of \$US 1,500/oz.

Resource model blocks have been classified as Indicated or Inferred on the basis of search pass and a wire-frame outlining more closely drilled portions of the mineralization. Estimated Indicated Mineral Resources at a cut-off grade of 0.5 g/t are 120 Mt at 1.10 g/t for 4.27 Moz of gold. Estimated Inferred Mineral Resources at a cut-off grade of 0.5 g/t are 84 Mt at 1.2 g/t for 3.1 Moz of gold.

26. Recommendations

Cardinal is currently undertaking a substantial program of infill drilling within the Namdini resource area, and have commenced a trial grade control drilling program within the main mineralized area. The report author concurs with the general approach of Cardinal's infill and trial grade control drilling program and recommends that additional resource drilling and sampling requirements be assessed after evaluation of results from the current drilling programs.

Cardinal's planned future work is aimed at progressing to PEA and PFS level programs, and consists primarily infill diamond drilling with the goal of converting Inferred Mineral Resources to Indicated Mineral Resources, targeting central portions of the deposit, and trial grade control drilling. Also proposed in is an update of the Mineral Resource estimate followed by a Feasibility Study. The author has reviewed and concurs with Cardinal's proposed work programs for updating Mineral Resources proposed by Richard Bray, Principal Geologist of Cardinal and a Qualified Person under NI 43-101 (Table 28).

Specific recommendations regarding the planned drilling and sampling activities are outlined below:

- Review the identified rare database inconsistencies, including anomalous inter-laboratory repeats and sample weights assigned as gold grades, and update the master database accordingly. The author understands that Cardinal has commenced this work, as part of database personnel's routine activities. Any additional cost, beyond routine expenditure, is likely to be minimal.
- Use of coarse blanks rather than fine blanks for monitoring the reliability of sample preparation and assaying. Removing the cost for pulverising blank material is likely to result in a minor reduction in on-going drill program costs.
- Future infill resource drilling programs should include comprehensive down-hole surveying. The costs in Table 28 include such down-hole surveying
- The author recommends that Cardinal ensure the trial grade control drilling program cover representative Namdini gold mineralization of sufficient volume to allow robust conclusions to be drawn from the results. The author recommends the trial area covers the full width of the mineralization for at least 200 metres along strike and extends well into the fresh mineralization

Table 28: Proposed Exploration Expenditure

Item	Cost (US)
Diamond drilling (35 holes for 15,000 m)	\$3,100,000
Metallurgical test work	\$600,000
Environmental and social studies	\$150,000
Mineral resource update	\$150,000
Subtotal	\$4,000,000
Contingency	\$400,000
Total	\$4,400,000

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Date and Signature Page

The undersigned prepared this technical report titled: "Technical Report Mineral Resource Estimation for the Namdini Gold Project, Ghana", dated the 19th day of October, 2017, with an effective date of the 11th of September 2017. The format and content of the Technical Report have been prepared in accordance with Form 43-101F1 and National Instrument 43-101 – *Standards of Disclosure for Mineral Projects* of the Canadian Securities Administrators.

Dated this 19th day of October, 2017

A handwritten signature in black ink, appearing to read 'N. Johnson', followed by a small black dot.

Nicolas James Johnson, B.Sc (Hons) (Geol), MAIG, Consulting Geologist

CERTIFICATE of QUALIFIED PERSON

I, Nicholas James Johnson, MAIG, as author of this report entitled “Technical Report Mineral Resource Estimation for the Namdini Gold Project Deposit, Ghana” (the “Report”) prepared for Cardinal Resources Limited dated 19th October, 2017, do hereby state:

1. I am a consulting Geologist, with the firm of MPR Geological Consultants Pty Ltd, 19/123A Colin Street, West Perth, WA 6005, Australia.
2. I am a practising Geologist and registered Member of the Australian Institute of Geoscientists.
3. I am a graduate of the Latrobe University, Melbourne, Australia with a Bachelor of Science (Honours) degree in Geology (1988). I have practiced my profession continuously since 1988.
4. I am a “Qualified Person” as that term is defined in National Instrument 43-101 (Standards of Disclosure for Mineral Projects) (the “Instrument”).
5. I visited the Namdini Project between the 11th January and 14th January 2017. The purpose of the visit was to review the exploration practices and project geology.
6. I am responsible for the entire Report.
7. I am independent of Cardinal pursuant to Section 1.5 of the Instrument.
8. I do not have nor do I expect to receive a direct or indirect interest in Cardinal, and I do not beneficially own, directly or indirectly, any securities of Cardinal or any associate or affiliate of such company.
9. I have read the Instrument and the Report has been prepared in compliance with the Instrument.
10. My involvement with the Namdini project is limited to work on mineral resource estimates since January 2017.
11. As of the effective date of the Report, to the best of my knowledge, information and belief, the Report contains all scientific and technical information that is required to be disclosed to make the report not misleading.

Dated this 19th day of 2017 at Perth Australia.



Nicholas James Johnson, B.Sc (Hons) (Geol), MAIG, Consulting Geologist