Namdini Gold Project

Mineral Resource Estimate Study Report

Prepared by EGRM Consulting Pty Ltd on behalf of:

Cardinal Resources Limited

Namdini Gold Project

Mineral Resource Estimate Study Report

Prepared by EGRM Consulting Pty Ltd on behalf of:

Cardinal Resources Limited

Author(s):	Brett Gossage	BAppSc (Geol), PGrad Cert (Geostats), MAusIMM

Date:	17 February 2017	
Job Number:	CAR001	
Copies:	Clients	(2)

Table of Contents

List of Tables

List of Figures

1 INTRODUCTION

1.1 Scope of Work

EGRM Consulting Pty Ltd (EGRM) was retained by Cardinal Resources Limited (CDV) to complete Mineral Resource estimation studies on the Namdini Gold Project, Ghana.

The scope of the work included a site visit to review the geology, exploration data collection, and data quality, interpret mineralisation constraints, generated a grade estimate and report a Mineral Resource in accordance with the guidelines set out in The 2012 Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves (the ‘JORC Code’). Preliminary conditional simulation studies were completed to assist in risk analysis of the resource model and to investigate mining selectivity sensitivities.

All geological modelling and structural analysis was completed by consultants Orefind (Davis and Cowan, 2016).

The effective date of the mineral resource estimate is 31st October 2016 and is based on drilling completed on or before the 12th of August 2016.

1.2 Participants and Site Assessment

The study was completed by Brett Gossage, Principal Consultant of EGRM. Mr Gossage is a geologist and resource estimation specialist with over 27 years of experience including substantial experience working on applicable deposit types.

A site visit was completed by Mr Gossage between the 18th July 2016 and the 23rd July 2016.

1.3 Project Location and Access

The Namdini Project and is located approximately 50 km south east of the Bolgatanga in the north of Ghana, West Africa, relatively close to, and south of, the Burkina Faso border, as shown in Figure 1.3_1.

Access to the project areas is via unsealed roads from Bolgatanga. The unsealed roads, gravel and tracks, provide good dry weather access. Travel time is approximately 1 hour from Bolgatanga to the project area.

Figure 1.3_1
Location map of the Namdini Project

2 GEOLOGY

The descriptions of the regional and local geology, contained in Section 2, has been sourced from the April 2015 SRK report “Independent Geological Report and Review. Namdini Gold Project Northern Ghana, West Africa” (U6375, Gleeson, P, 2015). Where quoted, the text is highlighted below in italics.

2.1 Regional Geology

The project occurs in Paleo Proterozoic granite - greenstone terrain in the NE district of Ghana close to the border with Burkina Faso. The region contains several producing mines both on the Ghana side of the border and in Burkina Faso. Evidence of artisanal workings occurs throughout the area.

Geologically the Bolgatanga – Namdini area lies in a series of highly prospective granite greenstone belts (Bole – Nangodi belts). These belts form part of the NE extension of the Paleo-Proterozoic Birimian basins that formed during the collision of the West African and Guyana Archean Shields. In Ghana, there are seven Paleo Proterozoic granite – greenstone belts, five of which are oriented in a general NE- SW direction (Abbott 2010). The principal Birimian metavolcanic (greenstone) belts and intervening meta-sedimentary basins in Ghana are:

1. *Kibi-Winneba belt*
2. *Cape Coast belt*
3. *Ashanti belt*
4. *Kumasi basin*
5. *Sefwi-Bibiani belt*
6. *Sunyani belt*

The location of the belts is displayed in Figure 2.1_1

The main lithologies in the belts are volcanic – sediment sequences of Birimian age (interbedded basic to intermediate flows, felsic tuffs and fine grained sediments) overlying the earlier intervening sedimentary basins (greywackes and phyllites) of the Tarkwaian formation. These basins are separated by major faults. These faults probably controlled early syn Birimian sedimentary basin down faulting.

Along with the sedimentary rocks are various granitoid intrusions. These granitoids can be divided into two types; 1. Belt Type and 2. Basin type. The belt types have a metaluminous character and are often tonalitic and are confined to the Birimian greenstone belts (Allibone 2004). The basin types have a peraluminous character and are higher in K and Rb relative to the belt granitoids and are mainly granodiorites. Late stage intermediate diorite stocks and dykes intrude the belts themselves. These granite greenstone belts extend NE into Burkina Faso and are geologically identical.

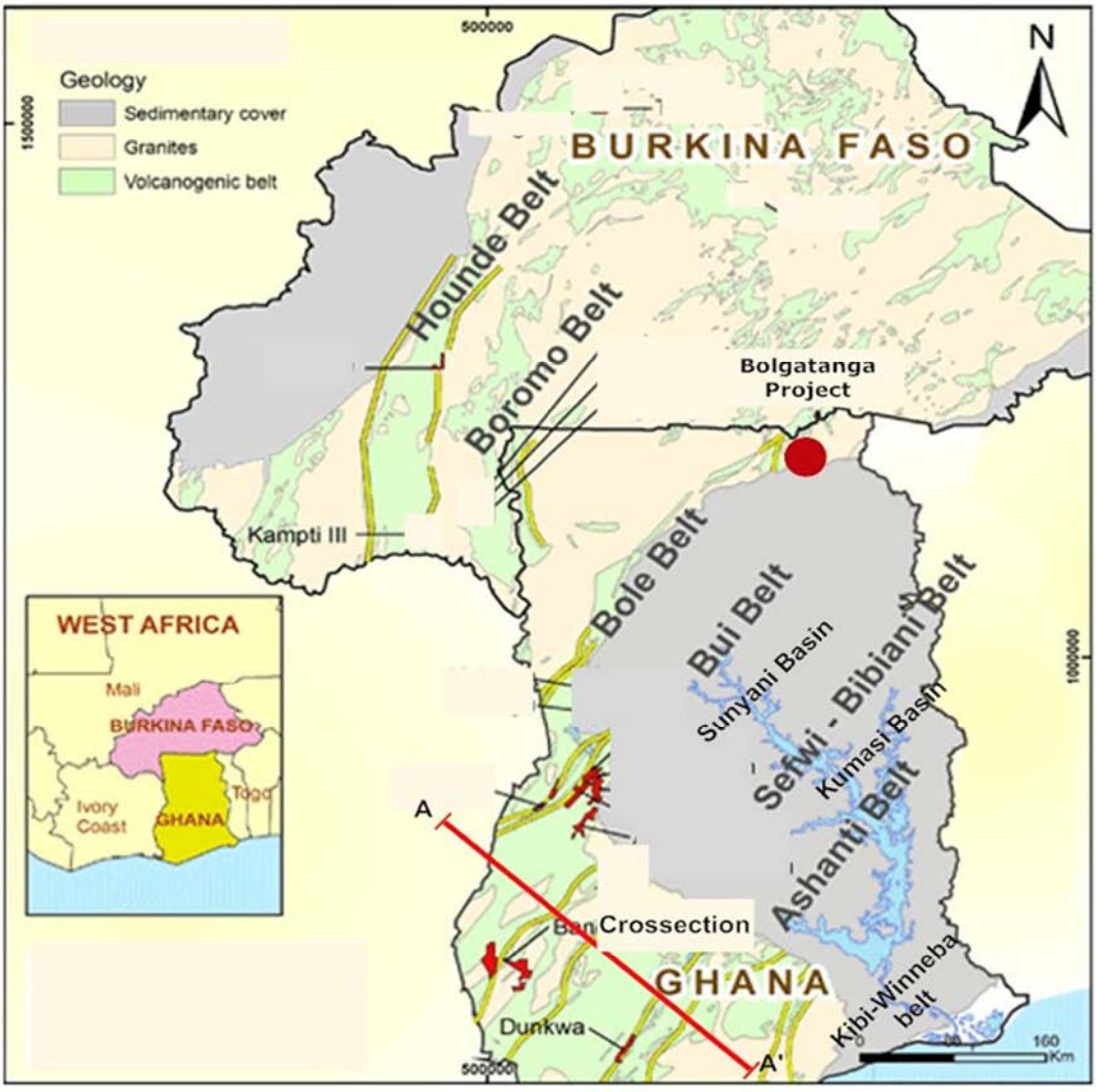
The Geology of the NE region of Ghana in which the Project is located is displayed in Figure 2.1_2.

The Bolgatanga project lies along the NW trend of the Bole Greenstone Belt and is separated from the Nangodi Belt by the Bole – Bolgatanga fault. Much of the area to the south of the *tenements is covered by later Voltaian Basin sediments, though this cover may be shallow and the Birimian belts certainly continue underneath it.*

The Namdini project area is located in the Nangodi Greenstone Belt.

The Nangodi Greenstone Belt is the extension of the belt that crosses the border into Southern Burkina Faso and in which is located the Youga Gold Mine. Locally the belt trends NNE-SSW over a distance of 30 kilometres and turns to a more ENE-WSW trend in the south of the area around Namdini. The belt is comprised of Birimian age interbedded metavolcanics (mainly basalt flows) and meta-sediments (phyllites) and occasional cherty horizons. Some small basic to intermediate intrusions occur within the belt and have associated gold mineralisation. Adjacent and underlying the belt are meta-sediments of Tarkwaian age. This is recognised as important as the gold mineralisation of the nearby Youga mine is hosted in similar age sediments.

Figure 2.1_1
Birimian meta-sedimentary belts and basins in Ghana and Burkina Faso
(source Gleeson 2015)

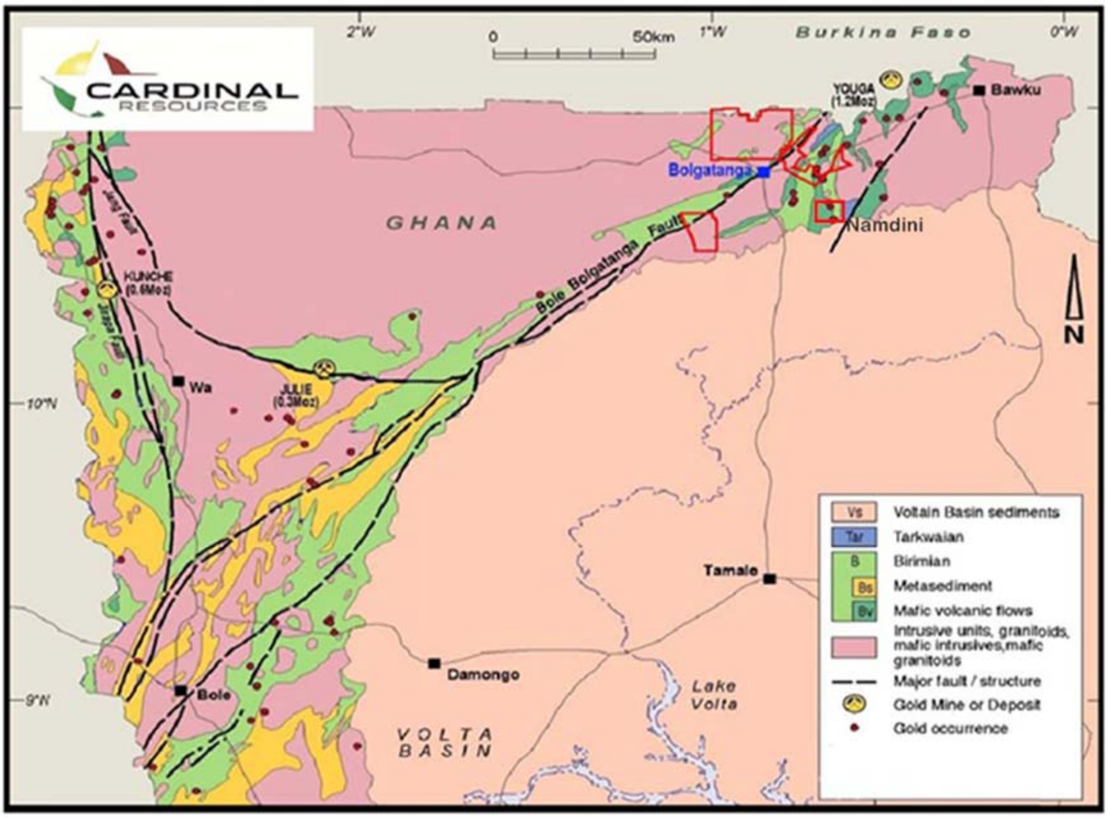


A study of the cherty chemical sediments outcropping in the Nangodi area (Griffis R, 2000) was carried out in 1994. These sediments are interbedded with basaltic flows and in the general transition zone with meta-sediments and volcaniclastic units. The chemical sediments feature a variety of facies including manganese-rich varieties (gondites and manganese oxides), chert, carbonates, pyritic carbonaceous cherts, barium-rich phyllites, carbonaceous phyllites, and tourmalinites. Most of these facies are considerably enriched in gold with average values commonly in the range 20-30 ppb, which are about 4-5 times the background values of most of the volcanic, sedimentary and intrusive suites in the area. Virtually all of the gold deposits in the immediate vicinity of Nangodi occur in shear structures quite close to this transition zone chemical sediments and it has been proposed that the gold in the vein deposits have been remobilized from the chemical sediments by hydrothermal fluids of metamorphic origin. In addition to the Birimian sediments, the belts are flanked by sedimentary basin of Tarkwaian age, which feature conglomerates, quartzites and cross-bedded sandstones. The coarse clastic component of the conglomerates consists mainly of phyllites and fine-grained, pink granitoids in a matrix of dark grey sandstone (greywacke). The contacts of these clastic sequences generally feature considerable shearing so that stratigraphic relationships with adjacent units are not very clear.

Figure 2.1_2

Regional geology of Northern Ghana showing the Cardinal permits (in red)

(source Gleeson 2015)



2.2 Local Geology and Stratigraphy

The project geology description is taken from the report prepared by consultant structural geologists Orefind Pty (Cardinal_Orefind_Namdini_geology_report_20160904_final, B Davis and J Cowan, December 2016). Excerpts from the report are highlighted in italics.

Rock types comprising the Namdini project include a steeply dipping Birimian sequence of inter-bedded foliated metasedimentary and metavolcanic units, which have been intruded by a medium-grained granitoid and diorite. The southern part of the Namdini project is covered by flat lying Voltaian Basin clastic sedimentary rocks that have been deposited unconformably on the Birimian sequence. This report pertains to the Birimian sequence only and the Voltaian will not be discussed further as it post-dates mineralisation and the host sequence.

From west to east across the Namdini area, the Birimian units include:

- *• Metasedimentary rocks*
- *• Metavolcaniclastic rocks*
- *• Granitoid (tonalite)*
- *• Diorite*
- *• Metasedimentary rocks*

The metasedimentary rocks have been described in thin-section by Townend and Townend (2015) as fine- grained chlorite-muscovite schists. The metavolcaniclastic rocks have been described in thin section as very fine-grained, chlorite-muscovite phyllites. Townend and Townend (2016) undertook petrological examination of granitoid samples and classified them as altered, sheared, sulphide-bearing tonalite. A tectonic foliation is developed in the intrusive rocks, but is not pervasive in the granitoid.

The metasedimentary and volcaniclastic rocks have been intensely altered with a pyrite-carbonate-muscovite-chlorite-quartz. Alteration is especially strong in the volcaniclastic rocks. Similarly, the tonalite is extensively altered and has been overprinted by silica-sericite-carbonate assemblages. The identity of carbonate alteration is difficult and is best described as iron-carbonate in the absence of petrological or geochemical characterization. Fe-dolomite and ankerite have been noted by Townend and Townend (2015, 2016) but these can be notoriously difficult to unequivocally identify due to a wide range of compositions noted in orogenic gold systems (e.g. Davis et al., 2001).

All lithologies have been overprinted by sulphides, titanium oxides and gold. Extensive veining is developed in all rock types and is usually dominated by quartz-carbonate compositions with variable amounts of sulphide and chlorite. Variations in mineralogy, morphology, geometry and overprinting relationships has identified a protracted veining history comprising pre-gold, syn-gold, and post-gold populations.

2.3 Structure and Structural History

The Namdini deposit structural description is taken from the report prepared by consultant structural geologists Orefind Pty (Cardinal_Orefind_Namdini_geology_report_20160904_final, B Davis and J Cowan, December 2016). Excerpts from the report are highlighted below in italics.

A geological history has been constructed for Namdini based largely on diamond drill core examination and, to a lesser extent, overprinting and geometric relationships noted in the field. The history comprises a protracted vein emplacement sequence accompanied by alteration and structure development. The sequence of events can be broadly divided into pre-gold, syn-gold and post-gold stages, the majority (all?) of which occurred during contractional deformation.

The local deformation history for the Birimian host-rocks at Namdini two contractional events. These events are denoted D1 and D2 and have not been integrated into the regional deformation history. Both events produced foliations, S1 and S2, which are evident in diamond core and in the field.

S1 is a pervasive foliation and commonly occurs in the hinges of D2 differentiated crenulations. S2 manifests variably as an intense foliation, a spaced cleavage, a differentiated crenulation cleavage, and as a contributor to a composite S1-S2 produced by transposition of S1. Intense deformation during D2 has commonly resulted in rotation of the S1 into the S2 orientation, resulting in transposition of S1 with S2 and the formation of a pervasive composite S1-S2 foliation.

Traverses across the mineralised sequence demonstrate the S1-S2 asymmetry is consistent right across the deposit. S1 strikes acutely clockwise of strike of S2. This asymmetry is consistent with D2 kinematic indicators, which indicate a constant sinistral sense of shear in plan. In section, the kinematics during D2 appear to have been E-side-up. Overall, the mineralized package has accommodated sinistral, E-side-up, oblique shear.

All rock-types are extensively veined, with the principal contributor minerals being quartz, carbonate and chlorite. Vein populations are inferred as being emplaced during contractional deformation associated with D1 or D2. D2 folding and/or shearing of all vein types has been noted in the meta-volcanosedimentary host-rocks. Veins in the tonalite are deformed but do not define fold geometries because the rheologically strong, feldspathic host-rock has largely resisted ductile deformation

The structural age for mineralisation is not unequivocal and gold appears to have been emplaced during two sequential stages of contractional deformation, D1 and D2. Review of diamond core and outcrops suggest two discrete stages of gold deposition and emplacement of vein minerals and associated alteration. Currently, the structural overprinting, geometries and kinematics suggest are consistent with deposition of mineralisation in both D1 and D2. It is likely that this represents two stages of gold deposition punctuated by a deformation hiatus between D1 and D2, i.e. the emplacement of successive mineralisation-associated vein stages does not represent a single evolving event

The Namdini mineralised system is located in a zone of oblique, sinistral, E-side-up shearing that developed during D2. However, S1 is also an intense foliation and much of the foliation *development is represented by a penetrative, composite S1-S2. This suggests formation of the host shear zone during D1, with intense reactivation of the system in D2.*

2.4 Mineralisation

The Namdini deposit structural description is taken from the report prepared by consultant structural geologists Orefind Pty (Cardinal_Orefind_Namdini_geology_report_20160904_final, B Davis and J Cowan, December 2016). Excerpts from the report are highlighted below in italics.

Mineralisation at the Namdini project area is developed in both the meta-volcanosedimentary rocks and tonalite. The tonalite has been extensively mined by artisanal miners, with lesser amount of artisanal activity in the volcanosedimentary units.

In all rock types the mineralisation is accompanied by visible disseminated sulphides of pyrite and arsenopyrite in both the veins and wall rocks. In diamond core the mineralized zones are visually distinctive due to the presence of mm- to cm-width quartz-carbonate veins that are commonly folded and that possess yellow-brown sericite-carbonate selvedges.

Petrological work by Townend and Townend (2015, 2016) showed gold as primarily associated with sulphides, in particular pyrite where it commonly occurs as inclusions and on the crystal margins. Gold was also noted in phyllite matrix and, to a much lesser extent, in association with ilmenite.

Only two examples of visible gold were identified during the current study. These occurred in strongly altered granite and were associated with silica-sericite shears that had sub-mm widths.

3 EXPLORATION DATA COLLECTION

3.1 Exploration Phases and Operators

All exploration at Namdini has been completed by Cardinal and has been supervised by Cardinal technical staff. No drilling was being undertaken on the Namdini deposit during the EGRM site visit, however a RC drillhole was being drilled by Cardinal.

EGRM completed a review of the drilling protocols, reviewed diamond sampling practices, reviewed logging and completed check sampling during the site visit. Based on the review and the available data, the drilling, logging and sampling was being completed in accordance with the Cardinal exploration procedures.

A summary of the drilling and sampling is provided below along with observations from the site visit. The aspects of the exploration data collection and data quality has been reviewed previously SRK Consulting (UK) Limited (Pittuck and Gleeson, 2015) and Hiscen Ltd (Barnes, 2016).

3.2 Drilling

The drilling has been completed by a combination of drilling contractor African Mining Services (AMS), Minerex Drilling Contractors Limited (Minerex) and Geodrill Limited (Geodrill) or by Cardinal, as summarised below in Table 3.2_1. The mineral resource estimate is based on drilling completed on or before the 12th of August 2016. The final assay report date for the drilling is the 23rd of August 2016 and the last drillhole included in the database is NMDD381-737.

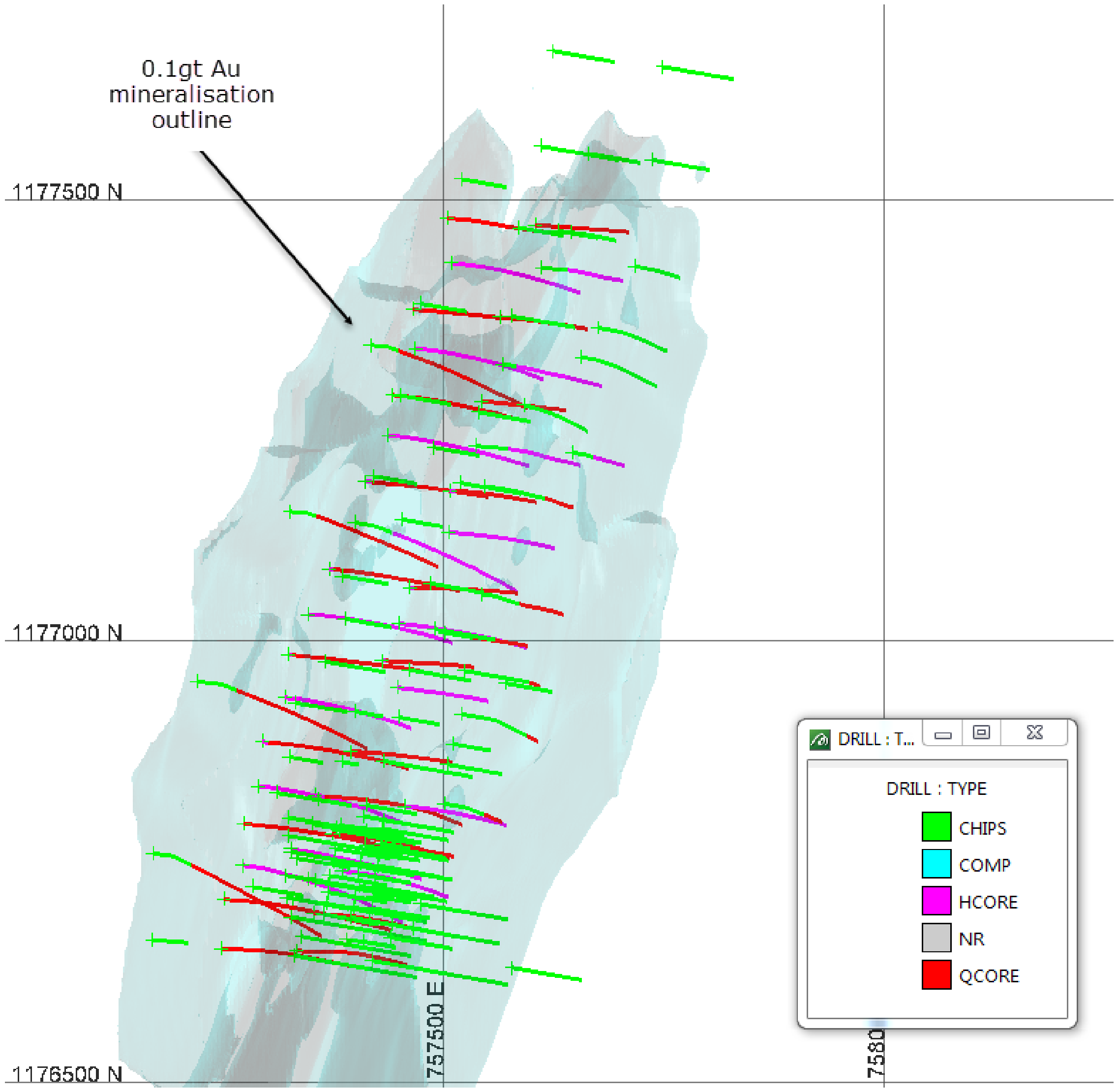
Table 3.2_1
Drilling summarised by operator and drillhole type

Drilling Company	Hole Type	Drill Rig	Number of Holes	Drilling Dates	Number of metres
AMS	DD	SANDVIC DE710	10	4th April 2016 to present	3132.25
Cardinal	DD	HANJIN D&B-30MULTI	26	15th March 2014 to present	7573.59
Cardinal	RC	HANJIN D&B-30MULTI	87		9509.5
Geodrill	DD	SCHRAMM	10	4th April 2016 to 8th June 2016	3113.33
Minerex	DD	SANDVIK DE710	3	19th Oct 2015 to 24th Nov 2015 12th June 2016 to 23rd July 2016 21st Oct 2016 to present	578
Minerex	RC	M3UDR-650	23		2209.5

Namdini has been drill tested with a combination of DD and RC drilling, as shown in Figure 3.2_1, which presents a drillhole plan plus the 0.1gt Au mineralisation envelope. A small region of the deposit has been subject to close spaced drilling, principally RC drilling. The drilling has generally been completed on approximate 50m drill sections with drilling approximately 50m or less along section but can be 50mE by 100mN in spacing. The close spaced drilling is generally 25m spaced or better and often 20m spaced on section and along section.

Figure 3.2_1

Drillhole location plan showing the drillholes coloured by sampled type (DD red/purple and RC blue/green) and the 0.1gt Au mineralisation outline (shadowed)



3.2.1 Diamond Drilling and Sampling

A total of 49 HQ diamond drillholes have been completed and used in the resource estimation study. All drilling has been surveyed by DGPS and have been electronically surveyed every 30 metres down hole, all core runs are routinely oriented using a Reflex digital orientation instrument.

All core runs are routinely oriented and core recovery is measured and geotechnical logging completed at the rig site prior to transport from site to the Bolgatanga office complex. The collar is cemented (Figure 3.2.1_1) and the site is left with as little disturbance as possible.

Detailed geological logging is completed at the Bolgatanga office facility with the geological data entered using data-loggers that includes lookup tables and fixed formatting to enforce the use of the geological code system. A number of diamond cores were reviewed during the site visit and the logging was assessed. The logging is considered consistent and robust.

Figure 3.2.1_1
Example of a cemented diamond drill collar (NMRD451-766)

The core is photographed wet and dry (Figure 3.2.1_2) at the Bolgatanga facility, and after logging onto digital data recorders, the core is cut in one metre sample intervals. A quarter HQ core sample is submitted to the laboratory for assay. Quarter core is retained for metallurgical sampling and half HQ core is retained for reference. The same sector of quarter core, relative to the core orientation mark, is routinely sampled for assaying. Figure 3.2.1_3 shows core being sampled at the Bolgatanga facility. Note original sampling of diamond core has been completed on geological intervals (variable sample intervals and not standard 1m intervals) and half diamond core has also been sampled.

Competent core is cut with a diamond saw while highly oxidised material is sampled using knife/splitter and scooped into the *sample* bag. The sampling method is considered to represent good industry practice.

The individual sample bags for diamond core are sealed at the Bolgatanga site office, and are grouped into tens for placement in a large plastic bag, which is sealed with Cardinal anti-tamper tape, as shown in Figure 3.2.1_4. The assay laboratory provides sample transport from Bolgatanga, such that the chain of custody passes from Cardinal to the assay laboratory at the Bolgatanga sample logging facility.

The quality control includes the addition, a suite of internationally accredited and Certified Reference Material (CRMs or standards) along with blanks. These are included in the sample submission sequence at a rate of 1 in every 22. The standards, sourced from Gannet Holdings, Australia, cover the gold grade range expected at Namdini.

Once sample bags and pulps are returned from the assay laboratory to Cardinal's Bolgatanga facility, a representative suite of pulps, covering the entire range of both sample batches and gold grades are chosen for 'referee' analysis at an accredited independent laboratory. As with the routine sample submission, a suite of CRMs and blanks are inserted into the referee assaying pulp sequence at a rate of one in 22.

Figure 3.2.1_2
Core photography example

Figure 3.2.1_3

Diamond Core being sampled at the Bolgatanga core facility

Figure 3.2.1_4

Individual diamond core samples (top) and sealed grouped samples (bottom) with Cardinal seal tape

The sample weights sent to the laboratory are recorded and provide a relative measure of recovery. Figure 3.2.1_5 displays histograms of these sample weights for grouped by half core and quarter core sampling. The half core sample weight averages 3.77kg and the core samples average 2.02kg, however there is a substantial spread of submitted sample weights. A review of the sample weight versus the gold assay (Figure 3.2.1_6) shows no relationship between the recovery (sample weight) and grade.

Figure 3.2.1_5

Diamond core sample weights (g) grouped by sample type – half core top and quarter core bottom

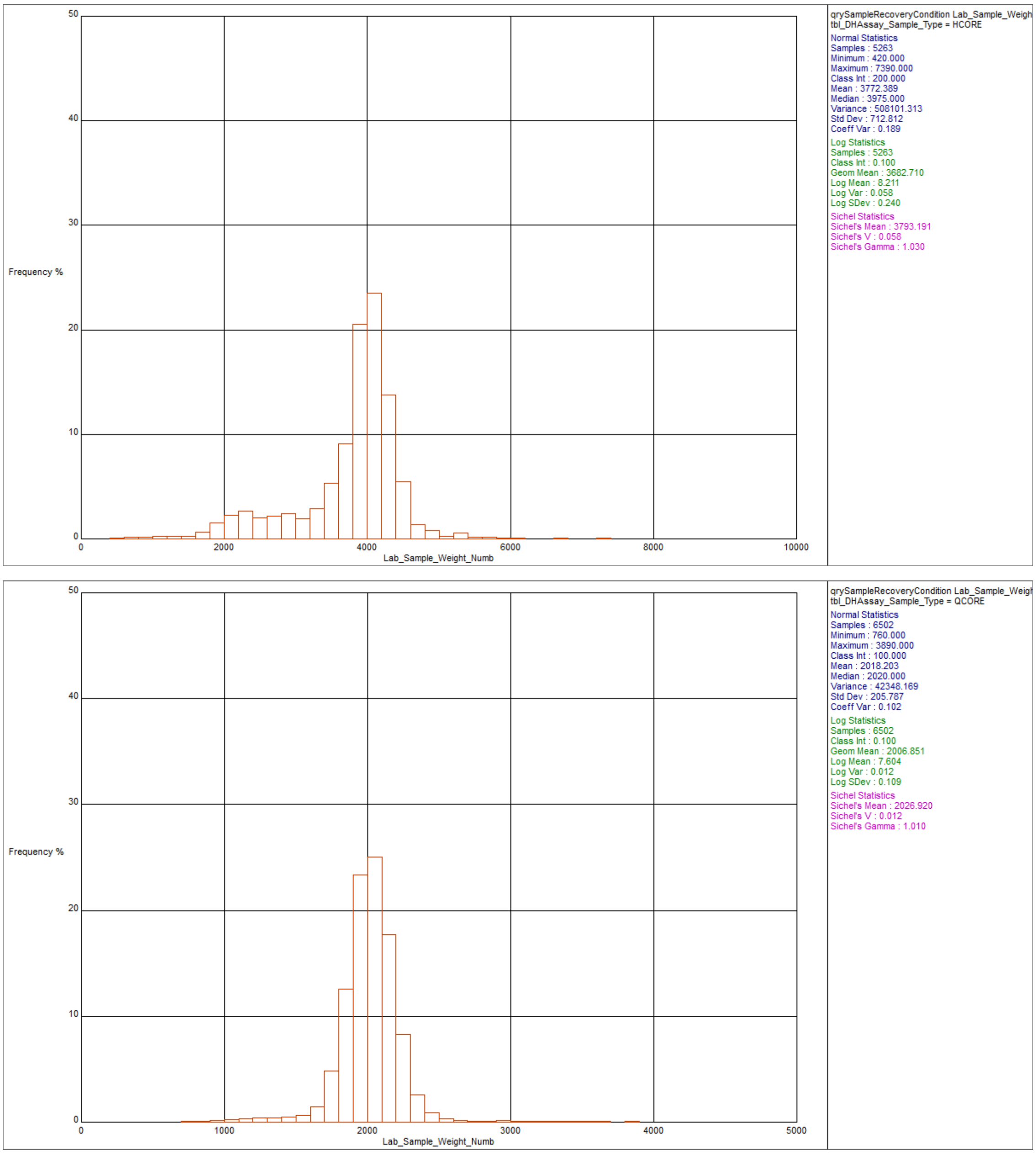
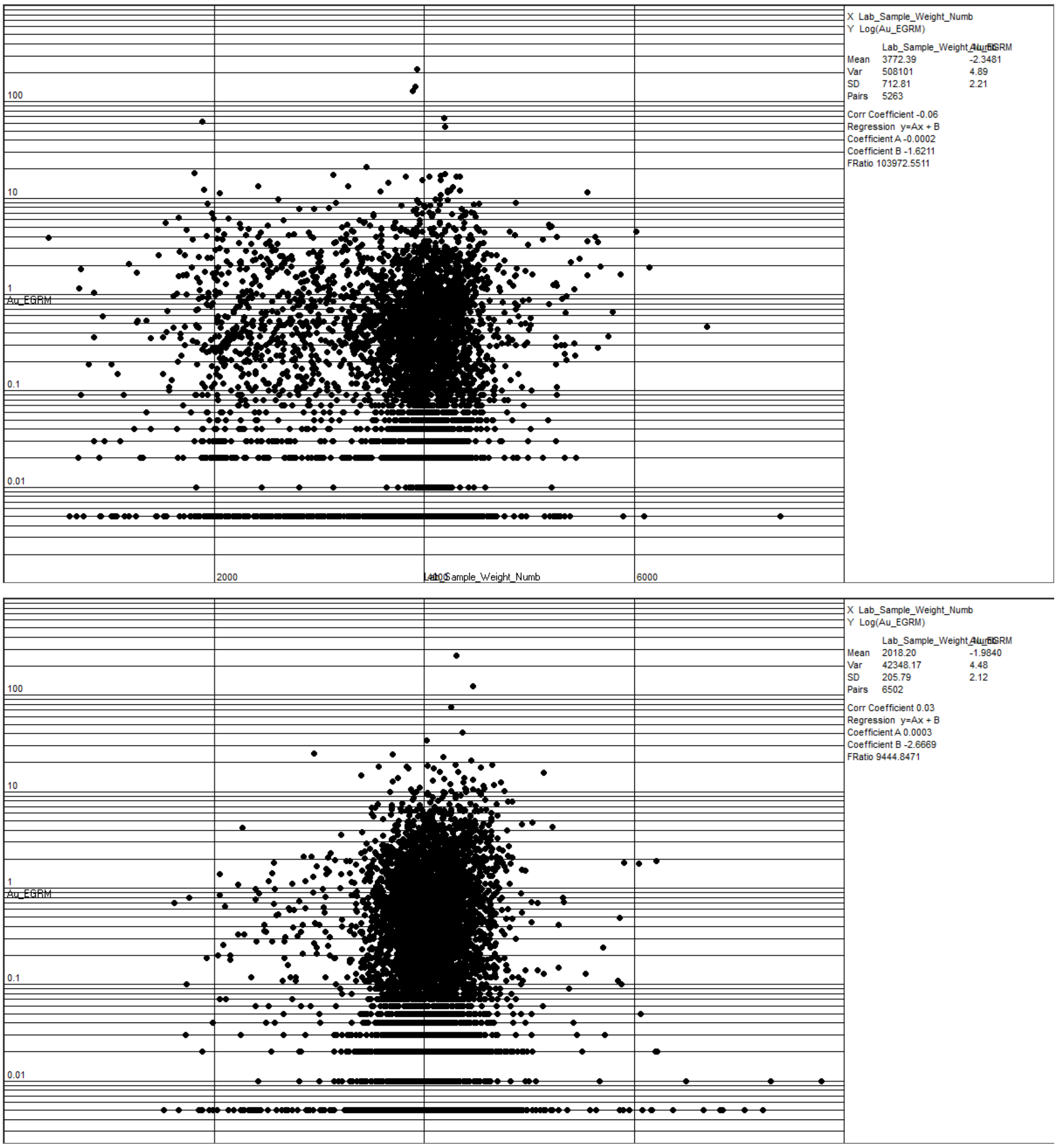


Figure 3.2.1_6

Diamond Core sample weights (g) versus gold grade (gt) grouped by sample type – half core top and quarter core bottom



As part of the resource estimation validation process, EGRM supervised a programme of independent check sampling and assaying. Six holes were selected and 49 check intervals sampled and sent for assay. The samples collected represented different lithologies and drilling programmes.

Table 3.2.1_1 provides a listing of the check sample intervals and the original and check assay result. Figure 3.2.1_7, shows comparative statistics of the check samples versus the original data. The check sampling returns similar tenor mineralisation, albeit significant variability, as expected, is noted and the check assays are slightly higher grade. The check sampling confirms the mineralisation presence and broad tenor.

Table 3.2.1_1

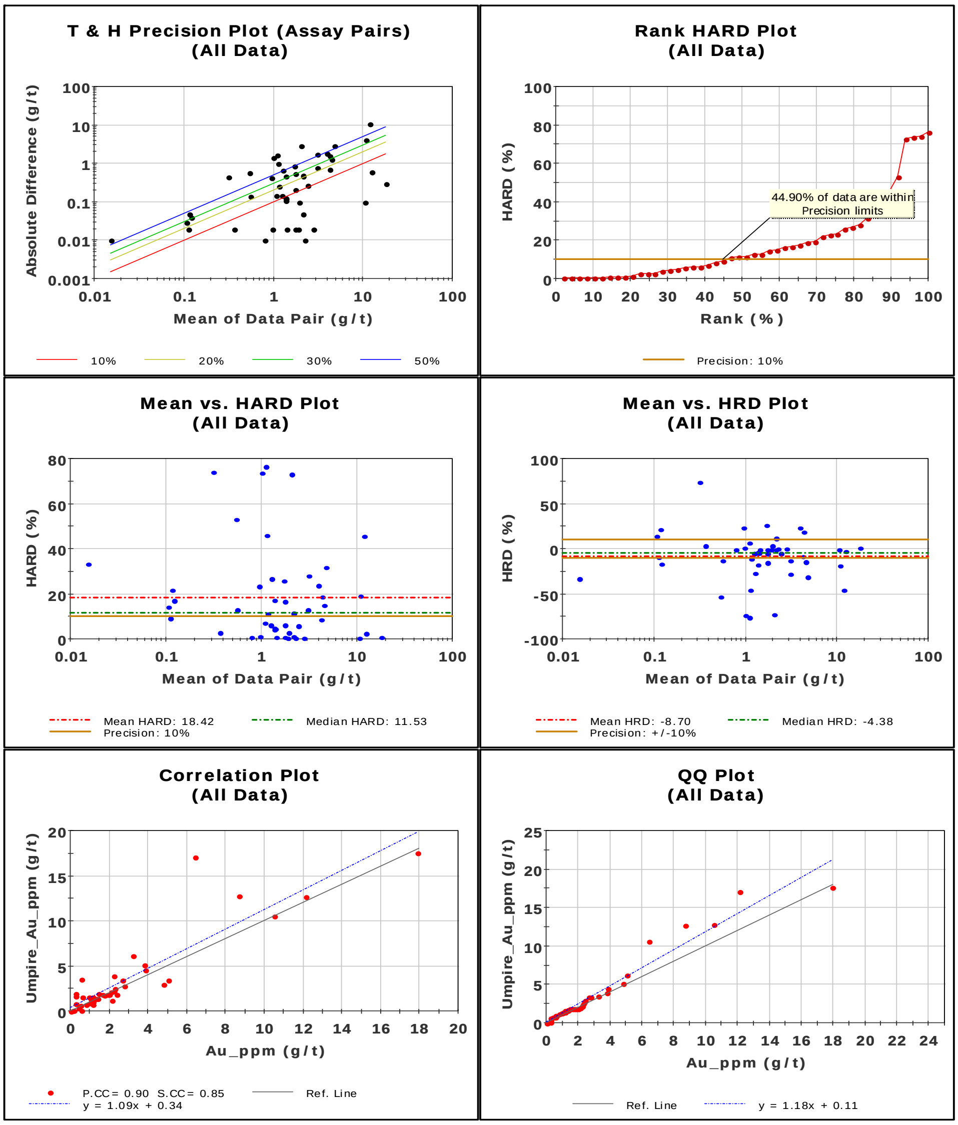
Summary Statistics – Independent Check Sampling and Assaying

Hole ID	From (m)	To (m)	Geology				Original Assay (Au ppm)	Umpire Assay (Au ppm)
			Lith	Weath	Alt 1	Min		
NMDD364-743	105	105.85	MVO	FR	Cl	pyr	2.35	1.88
NMDD364-743	105.85	107	MVO	FR	Cl	pyr	2.22	3.96
NMDD364-743	107	108	MVO	FR	Cl	pyr	3.21	6.20
NMDD364-743	108	109	MVO	FR	Cl	pyr	3.84	4.55
NMDD420-756	154	155	GRA	FR	Ep	pyr	0.26	1.72
NMDD420-756	155	156	GRA	FR	Ep	pyr	0.92	1.59
NMDD420-756	156	157	GRA	FR	Si	pyr	1.12	1.59
NMDD420-756	157	158	GRA	FR	Si	pyr	1.31	1.43
NMDD420-756	158	159	GRA	FR	SI	pyr	1.63	1.84
NMDD452-748	163	164	GRA	FR	Ep	pyr	2.66	3.44
NMDD452-748	164	165	GRA	FR	Ep	pyr	0.97	0.95
NMDD452-748	165	166	GRA	FR	cb	pyr	2.24	2.25
NMDD452-748	166	167	MVO	FR	cb	pyr	2.09	2.14
NMDD452-748	167	168	MVO	FR	cb	pyr	2.77	2.79
NMDD452-748	168	169	MVO	FR	cb	pyr	10.50	10.60
NMDD452-748	169	170	MVO	FR	cb	pyr	17.90	17.60
NMDD481-759	163	164	GRA	FR	Cl	pyr	0.48	0.62
NMDD481-759	164	165	GRA	FR	Cl	pyr	1.02	1.28
NMDD481-759	165	166	GRA	FR	Cl	pyr	1.40	1.42
NMDD481-759	166	167	GRA	FR	Cl	pyr	1.30	1.41
NMDD481-759	167	168	GRA	FR	Cl	pyr	2.27	2.54
NMDD481-759	168	169	GRA	FR	Cl	pyr	5.03	3.44
NMDD481-759	169	170	GRA	FR	Cl	pyr	4.77	2.96
NMDD481-759	170	171	MVO	FR	Cl	pyr	8.69	12.8
NMDD481-759	171	172	MVO	FR	Cl	pyr	2.12	1.25
NMDD481-759	172	173	MVO	FR	Cl	pyr	1.28	1.41
NMDD481-759	173	174	MVO	FR	Cl	pyr	1.16	1.31
NMDD481-759	174	175	GRA	FR	Cl	pyr	1.15	1.00
NMDD481-759	175	176	GRA	FR	Cl	pyr	6.39	17.10
NMDD481-759	176	177	GRA	FR	Cl	pyr	12.10	12.70
NMDD481-759	177	178	GRA	FR	Cl	pyr	0.26	1.94
MNDD462-754	156.00	156.60	MVO	FR	Cl	pyr	0.1	0.14
MNDD462-754	156.60	157.20	MVO	FR	Cl	pyr	2.37	1.88
MNDD462-754	157.20	158.00	MVO	FR	Cl	pyr	1.15	0.72
MNDD462-754	158.00	158.85	MVO	FR	Cl	pyr	0.60	1.62
MNDD462-754	158.85	159.40	MVO	FR	Cl	pyr	3.80	5.13
MNDD462-754	159.40	160.15	MVO	FR	Cl	pyr	0.14	0.09
MNDD462-754	160.15	161.00	MVO	FR	Cl	pyr	0.12	0.09
MNDD462-754	161.00	162.00	MVO	FR	Cl	pyr	1.44	2.00
MNDD462-754	162.00	163.00	MVO	FR	Cl	pyr	0.55	3.51
MNDD462-754	163.00	164.00	MVO	FR	Cl	pyr	0.25	0.82
NMDD411-752	247.00	248.00	DIO	FR	Cl	pyr	0.01	0.02
NMDD411-752	248.00	249.00	DIO	FR	Cl	pyr	0.54	0.08
NMDD411-752	249.00	250.00	DIO	FR	Cl	pyr	0.37	0.35
NMDD411-752	250.00	251.00	DIO	FR	Cl	pyr	1.97	1.87
NMDD411-752	251.00	252.00	DIO	FR	Cl	pyr	1.72	1.74
NMDD411-752	252.00	253.00	DIO	FR	Cl	pyr	1.87	1.89
NMDD411-752	253.00	254.00	DIO	FR	Cl	pyr	0.78	0.79
NMDD411-752	254.00	255.00	DIO	FR	Cl	pyr	0.10	0.12

Figure 3.2.1_7

Comparative statistics – Original Assay versus Independent Check Samples Assays

	Au_ppm	Umpire_Au_ppm	Units			Result
No. Pairs:	49	49			Pearson CC:	0.90
Minimum:	0.01	0.02	g/t		Spearman CC:	0.85
Maximum:	17.90	17.60	g/t		Mean HARD:	18.42
Mean:	2.52	3.07	g/t		Median HARD:	11.53
Median	1.40	1.74	g/t			
Std. Deviation:	3.36	4.05	g/t		Mean HRD:	-8.70
Coefficient of Variation:	1.34	1.32			Median HRD	-4.38



3.2.2 Reverse Circulation Drilling and Sampling

RC samples are collected on a one metre interval basis into plastic bags from the cyclone. Sub sampling is completed via a multitier tier riffle splitter. The cyclone is thoroughly cleaned on each rod change and the splitter is cleaned after each metre sample.

The drillhole cuttings are logged on site by CDV technical staff with the cutting sieved and stored in chip trays for future reference (Figure 3.2.2_1). All geological and field data is entered using data-loggers that includes lookup tables and fixed formatting to enforce the use of the geological code system.

Figure 3.2.2_1
RC sample chip trays and sieving

The sample bag for each metre interval are now routinely weighed, as are the split samples, prior to submission to the assay laboratory. No sample weights are available for early phases of RC drilling. The sub-samples (riffle spilt samples) weights are generally noted to be approximately 2.5 kg to 3 kg (averaging 2.6kg), although the sample weight is range significantly as shown in histogram of submitted sample weights presented in Figure 3.2.2_2.

The split samples are grouped into tens for placement in a large plastic bag, which is, in turn, sealed transported to the Bolgatanga site office. Sample dispatch, as with the diamond core samples, is from the Bolgatanga office with the assay laboratory provides sample transport. As such that the chain of custody passes from Cardinal to the assay laboratory at the Bolgatanga sample logging facility.

While little drilling was being undertaken during the EGRM site visit period, the sample condition (wet, moist and dry) has been routinely recorded into the drillhole database. Greater than 99.9% of the RC drilling is dry with only three 1m intervals recorded as wet.

Sample weight has been recorded for 42.7% (5005 of the 11,709) of the sample intervals. The drill cutting sample weights average 28.1kg excluding 3 intervals which appear erroneous, as shown in Figure 3.2.2_3. Note no relationship is identified between RC recovery (sample weight) and gold grade as shown in Figure 3.2.2_4.

The quality control includes duplicate field samples that are routinely collected (one in 22) as a second split from the cyclone using the multi-tier riffle splitter. In addition, a suite of internationally accredited and CRMs along with blanks are included in the sample submission sequence at a rate of 1 in every 22. The CRMs, sourced from Gannet Holdings, Australia, cover the gold grade range expected at Namdini.

As with the diamond core samples, a representative suite of pulps returned from the laboratory, are chosen for 'referee' analysis at an accredited independent laboratory. A suite of CRM and blanks are inserted into the referee assaying pulp sequence at a rate of one in 22.

Figure 3.2.2_2
Histogram of RC sample submission (laboratory) sample weight

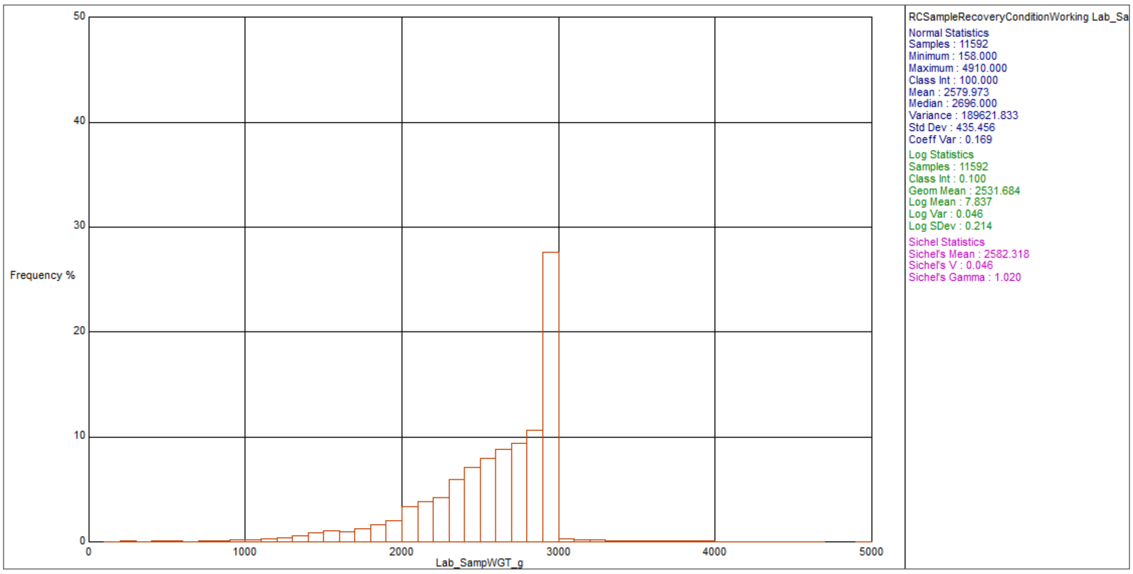


Figure 3.2.2_3
Histogram of the RC sample weight

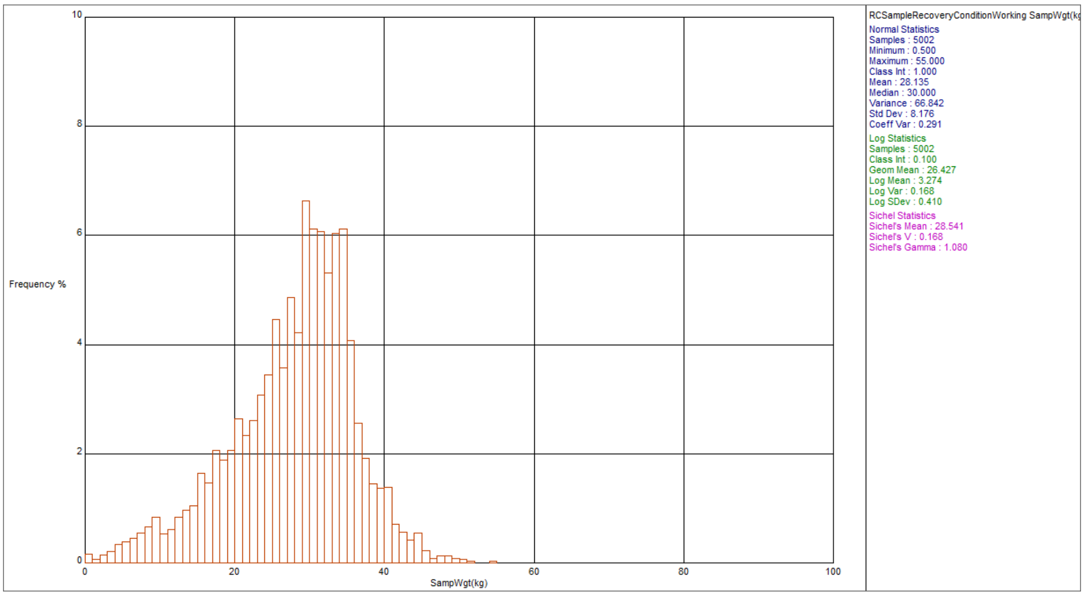
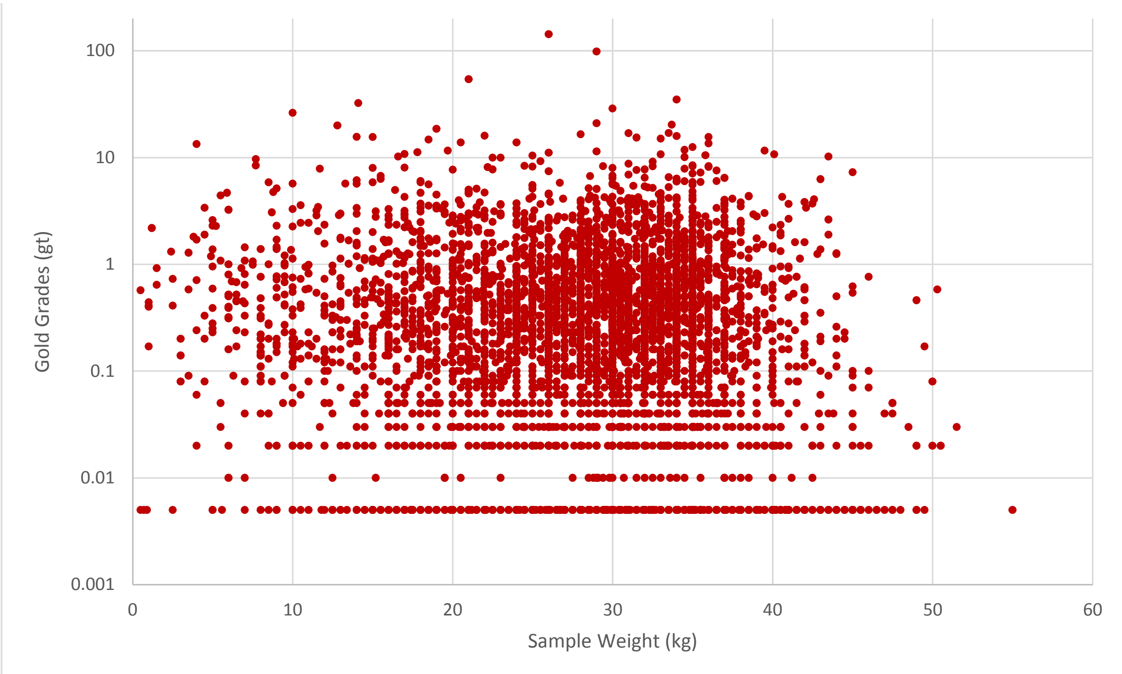


Figure 3.2.2_4
Sample weight versus Gold Grade (In-situ Samples)



3.3 Survey (inclusive of Topography)

Sahara Mining Services (Sahara) was engaged by Cardinal to establish a survey grid on the project in UTM WGS 84 Zone 30 north. This involved the construction of 4 concrete survey beacons and the observation of the beacons using a DGPS. This work was completed in June 2016.

Sahara used a Trimble R8 GPS in static survey mode to coordinate the established survey control beacons. The GPS was used in RTK survey mode for the surveying of the drilled hole collars and the property boundary points. The instrument has sub centimetre accuracy for both horizontal coordinates and a vertical coordinates. Two receivers (one base receiver and one rover receiver) were utilised during the survey.

Sahara has flown a UAV (drone) survey over the project based on established survey control. A detailed topographic surface has been generated using a 2m by 2m grid. This topography has been applied to this study.

The survey control, topography and collar survey are considered to be accurate and appropriate.

3.4 Assaying

Assaying has principally been completed by SGS at the Ouagadougou laboratory in Burkina Faso and with a lesser amount also completed by the SGS Tarkwa laboratory in Ghana. The principal assay method is 50g fire assay with an AAS finish. Samples have also been submitted for bottle roll assaying, although this data has been excluded from the resource estimation and generally does not include a residual assay of the leached residue 'tail' and therefore represents a partial assay. In addition to the SGS assaying, umpire assaying has been completed by Intertek-Genalysis Tarkwa, Ghana using a 50g fire assay method with an AAS finish.

Sample preparation completed by SGS included drying and crushing of sample to 75% passing 2 mm prior to a 1.5 kg split (subsample) being taken via a riffle splitter. The 1.5kg subsample was then pulverized to 85% passing 75µm in a ring and puck pulveriser. The pulverised samples were subject to screen tests with fails milled to attain the required particle size. If the samples were delivered to SGS as pulps, one in twenty samples will be screened to ensure 85% passing 75µm.

Analyses of gold was completed via Fire Assay as per the SGS Geochem Methods FAA303 / FAA505. This included the 50g sub sample being fused with litharge based flux, cupelled and prill dissolved in aqua regia prior to gold assay being determined by flame Atomic absorption spectroscopy (AAS). The detection limited for the assaying is 0.01ppm. A limited number of high grade intervals were re-assayed via Fire Assay with gravimetric finish when the original assay returned significantly high grades.

SGS quality control procedures included the following:

- Sample preparation rock/core samples:
    - Every 50th sample screened to confirm % passing 2 mm and 75 µm

  - o Crusher and pulverisers cleaned with barren material at the start of every batch
  - o Percentage dust loss determined once per week
- Fire Assay assaying:
  - o 1 reagent blank assaying every 84 assays
  - o 1 preparation blank assay (preparation process blank) every 84 assays
  - o 2 weighed replicate assays every 84 assays
  - o 2 preparation duplicate assays (re split) every 84 assays
  - o 4 SRM's (Standards) in every 84 assays

3.5 Analytical Quality Control Data Review

A review of the available quality control data was completed including CDV submitted CRM or Standard, RC field duplicates, laboratory resplits and repeats, and blanks. Only the CDV submitted Standards were reviewed in detail. In addition, an umpire check assaying was completed on a suite CDV resubmitted pulps by Intertek laboratories.

The EGRM statistical assessment was completed using a number of comparative analyses for each dataset. The objectives of these analyses were to determine relative precision and accuracy levels between various sets of assay pairs and the quantum of relative error. The results of the statistical analyses are presented as summary plots, which include the following:

- ***Thompson and Howarth Plot***, showing the mean relative percentage error of grouped assay pairs across the entire grade range, used to visualise precision levels by comparing against given control lines.
- ***Rank % HARD Plot***, which ranks all assay pairs in terms of precision levels measured as half of the absolute relative difference from the mean of the assay pairs (% HARD), used to visualise relative precision levels and to determine the percentage of the assay pairs population occurring at a certain precision level.
- ***Mean vs % HARD Plot***, used as another way of illustrating relative precision levels by showing the range of % HARD over the grade range.
- ***Mean vs %HRD Plot*** is similar to the above, but the sign is retained, thus allowing negative or positive differences to be computed. This plot gives an overall impression of precision and also shows whether or not there is significant bias between the assay pairs by illustrating the mean percent half relative difference between the assay pairs (mean % HRD).
- ***Correlation Plot*** is a simple plot of the value of assay 1 against assay 2. This plot allows an overall visualisation of precision and bias over selected grade ranges. Correlation coefficients are also used.
- ***Quantile-Quantile (Q-Q) Plot*** is a means where the marginal distributions of two datasets can be compared. Similar distributions should be noted if the data is unbiased.
- ***Standard Control Plot*** shows the assay results of a particular reference standard over time. The results can be compared to the expected value, and the ±10% precision lines are also plotted, providing a good indication of both precision and accuracy over time.

3.5.1 Standards (Certified Reference Material)

A review of the available standards has been completed grouped by assay laboratory has been completed. Summary statistics of standards assaying is provided as Table 3.5.1_1. Selected standard control charts are also provided and referenced in Table 3.5.1_1.

Based on a review of the data the following observations are made:

- There is clear mixing of standards. For example, in Figure 3.5.1_1 (STD08), there are outliers which correspond to STD501. Care needs to be taken with the sample submission to ensure the correct standards are being included into the sampling chain.
- Both laboratories are preforming acceptably in terms of accuracy.
- STD544 assaying is relatively poor in both laboratories. Standards STD08 and STD501 are similar grade standards and return acceptable results.
- No clear drift is observed in control charts for any standards except for STD39 where the standards drifts high and then resets low over time presumably with a recalibration of the internal laboratory standard.
- Clear recalibration changes are noted for many of the low grade Standards.
- The assaying is considered accurate and suitable for mine planning purposes.

It is recommended that the standards be monitored on a batch-by-batch basis and assay batches rejected (not uploaded to the database) should the standards fail. By implementing this approach, any typographical errors and standard mixing are resolved and, importantly, all data loaded to database has met the minimum accuracy requirement.

Table 3.5.1_1

Summary Statistics – Cardinal Submitted Standards (Certified Reference Material)

Standard	STD (08)	STD (39)	STD (413)	STD (501)	STD (544)	STD (588)	STD (611)
Expected Value (Au ppm)	0.32	1.68	0.79	0.43	0.28	1.6	4.08
Expected Value Range (Au ppm)	0.29 to 0.35	1.51 to 1.85	0.71 to 0.87	0.39 to 0.47	0.25 to 0.30	1.44 to 1.76	3.67 to 4.49
SGS - Ouagadougou							
Count	52	63	76	85	33	25	42
Minimum	0.3	0.33	0.71	0	0.24	1.49	3.97
Maximum	0.41	1.85	0.82	0.44	0.27	1.78	4.24
Mean	0.32	1.64	0.77	0.41	0.25	1.62	4.1
Std Dev	0.01	0.24	0.03	0.05	0.01	0.08	0.06
% in 10% Tolerance	98.08%	92.06%	96.05%	98.82%	84.85%	92.00%	100.00%
% Bias	-0.60%	-2.29%	-3.10%	-3.93%	-8.76%	1.25%	0.47%
% RSD	4.70%	14.54%	4.18%	11.13%	2.97%	4.95%	1.36%
Figure Number	3.5.1_1	3.5.1_2		3.5.1_3			3.5.1_5
SGS - Tarkwa							
Count			27	20	21	23	22
Minimum			0.78	0.39	0.2	0.42	3.97
Maximum			0.85	1.61	1.65	1.76	4.17
Mean			0.80	0.48	0.34	1.59	4.05
Std Dev			0.02	0.26	0.30	0.25	0.06
% in 10% Tolerance			100.00%	95.00%	85.71%	95.65%	100.00%
% Bias			1.69%	10.81%	22.57%	-0.49%	-0.82%
% RSD			2.03%	54.64%	87.02%	15.97%	1.44%
Figure Number				3.5.1_4			3.5.1_6

Figure 3.5.1_1
Standard Control Chart – SGS Ouagadougou - STD08

Standard: Element: Units: Detection Limit: Expected Value (EV): E.V. Range:	STD (08) Au ppm 0.32 0.29 to 0.35		No of Analyses: Minimum: Maximum: Mean: Std Deviation: % in Tolerance % Bias % RSD	52 0.30 0.41 0.32 0.01 98.08 % -0.60 % 4.70 %

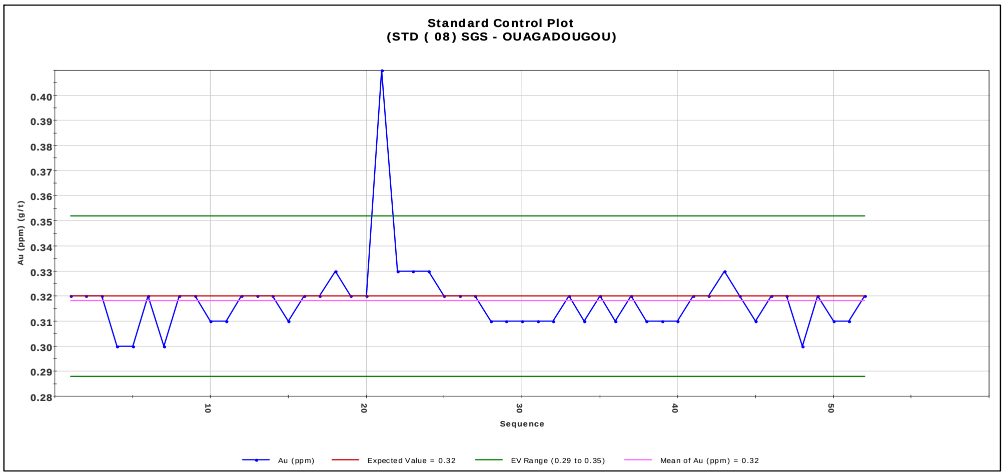


Figure 3.5.1_2
Standard Control Chart – SGS Ouagadougou – STD39

Standard: Element: Units: Detection Limit: Expected Value (EV): E.V. Range:	STD (39) Au ppm 1.68 1.51 to 1.85		No of Analyses: Minimum: Maximum: Mean: Std Deviation: % in Tolerance % Bias % RSD	63 0.33 1.85 1.64 0.24 92.06 % -2.29 % 14.54 %

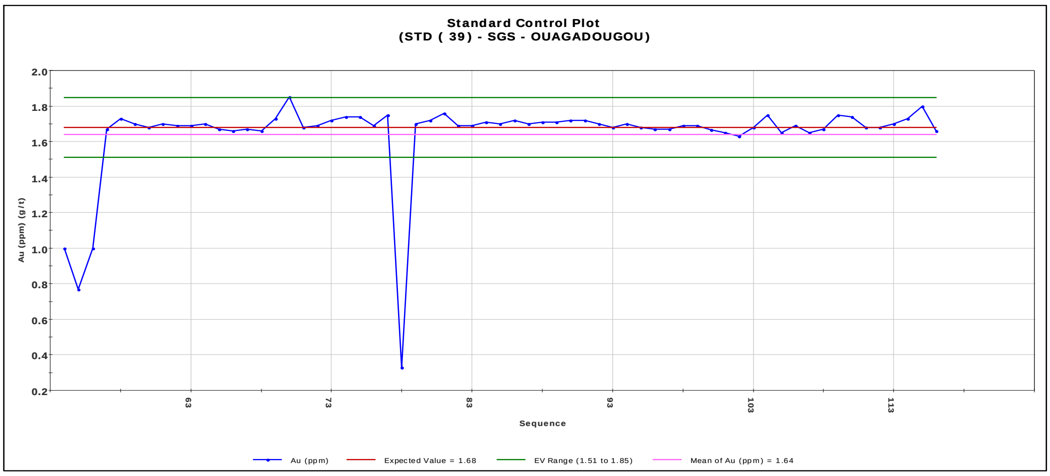


Figure 3.5.1_3
Standard Control Chart – SGS Ouagadougou – STD501

Standard:	STD (501)		No of Analyses:	85
Element:	Au		Minimum:	0.00
Units:	ppm		Maximum:	0.44
Detection Limit:			Mean:	0.41
Expected Value (EV):	0.43		Std Deviation:	0.05
E.V. Range:	0.39 to 0.47		% in Tolerance	98.82 %
			% Bias	-3.93 %
			% RSD	11.13 %

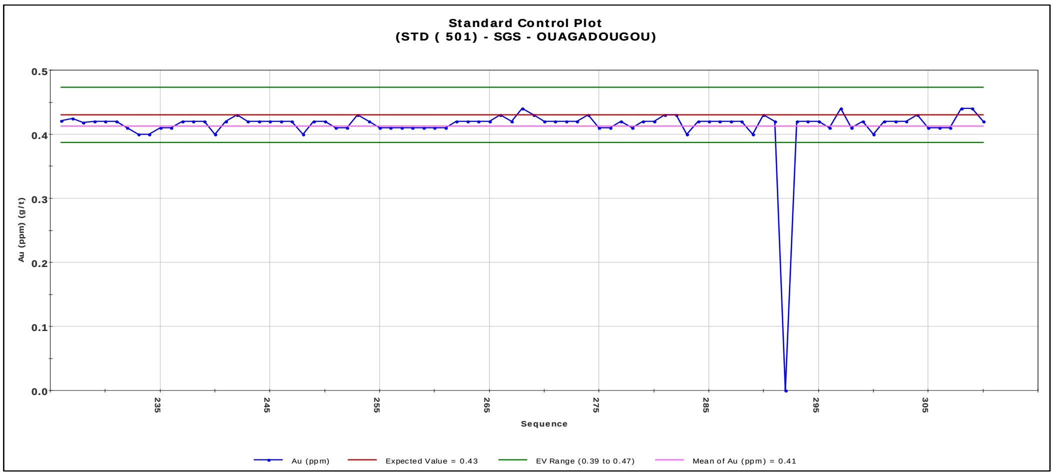


Figure 3.5.1_4
Standard Control Chart – SGS Tarkwa – STD501

Standard:	STD (501)		No of Analyses:	20
Element:	Au		Minimum:	0.39
Units:	ppm		Maximum:	1.61
Detection Limit:			Mean:	0.48
Expected Value (EV):	0.43		Std Deviation:	0.26
E.V. Range:	0.39 to 0.47		% in Tolerance	95.00 %
			% Bias	10.81 %
			% RSD	54.64 %

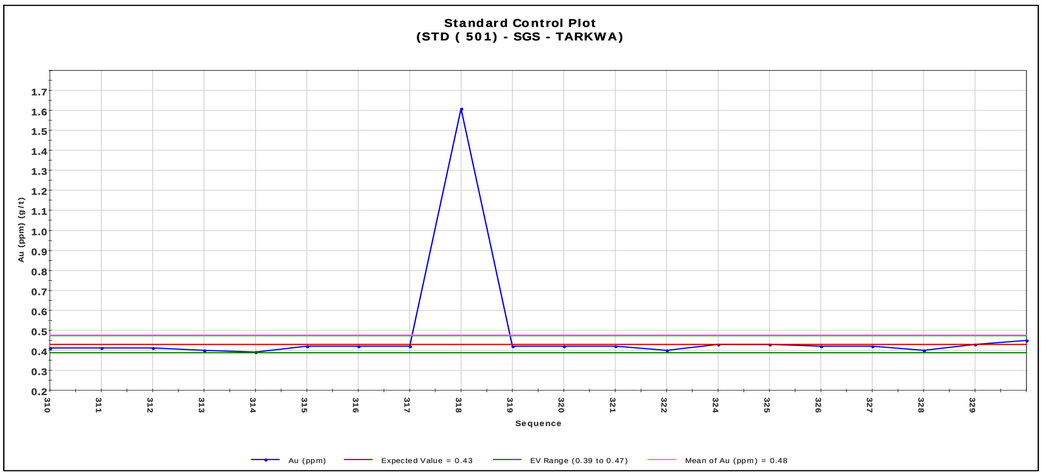


Figure 3.5.1_5

Standard Control Chart – SGS Ouagadougou – STD611

Standard:	STD (611)	No of Analyses:	42
Element:	Au	Minimum:	3.97
Units:	ppm	Maximum:	4.24
Detection Limit:		Mean:	4.10
Expected Value (EV):	4.08	Std Deviation:	0.06
E.V. Range:	3.67 to 4.49	% in Tolerance	100.00 %
		% Bias	0.47 %
		% RSD	1.36 %

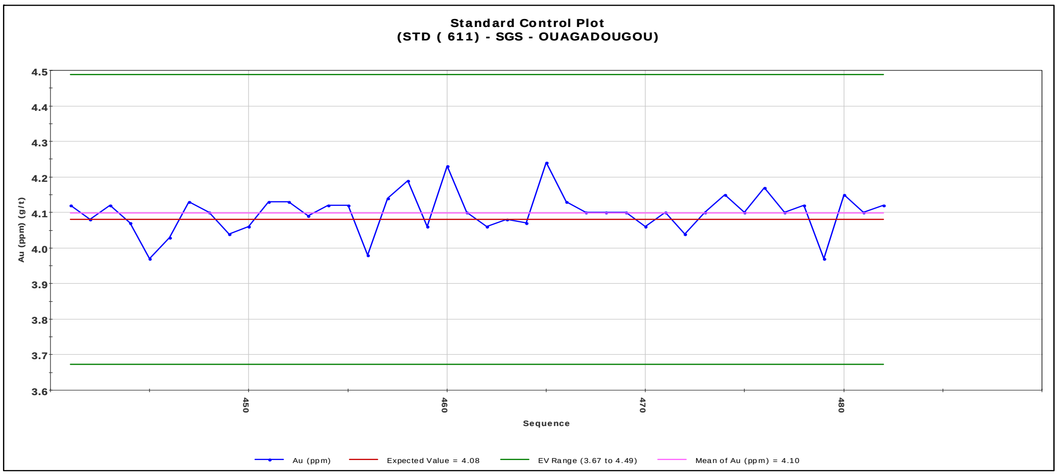
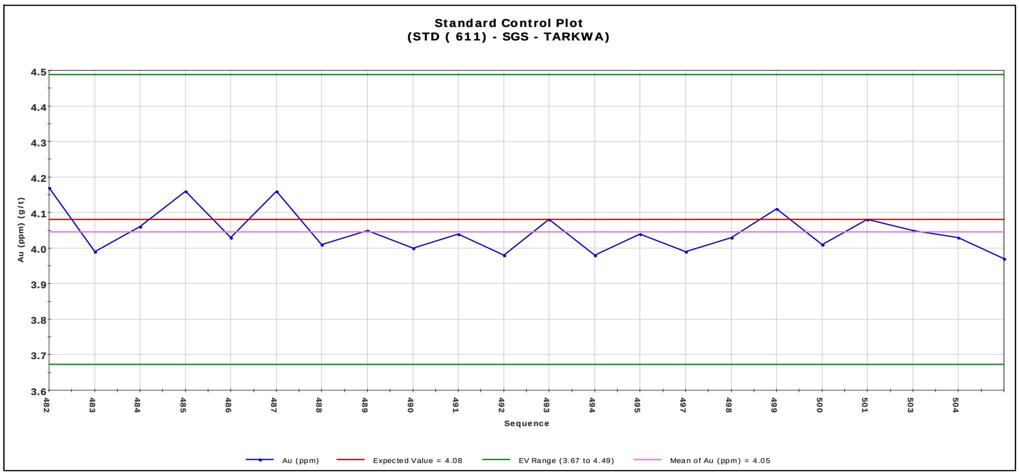


Figure 3.5.1_6

Standard Control Chart – SGS Tarkwa – STD611

Standard:	STD (611)	No of Analyses:	22
Element:	Au	Minimum:	3.97
Units:	ppm	Maximum:	4.17
Detection Limit:		Mean:	4.05
Expected Value (EV):	4.08	Std Deviation:	0.06
E.V. Range:	3.67 to 4.49	% in Tolerance	100.00 %
		% Bias	-0.82 %
		% RSD	1.44 %



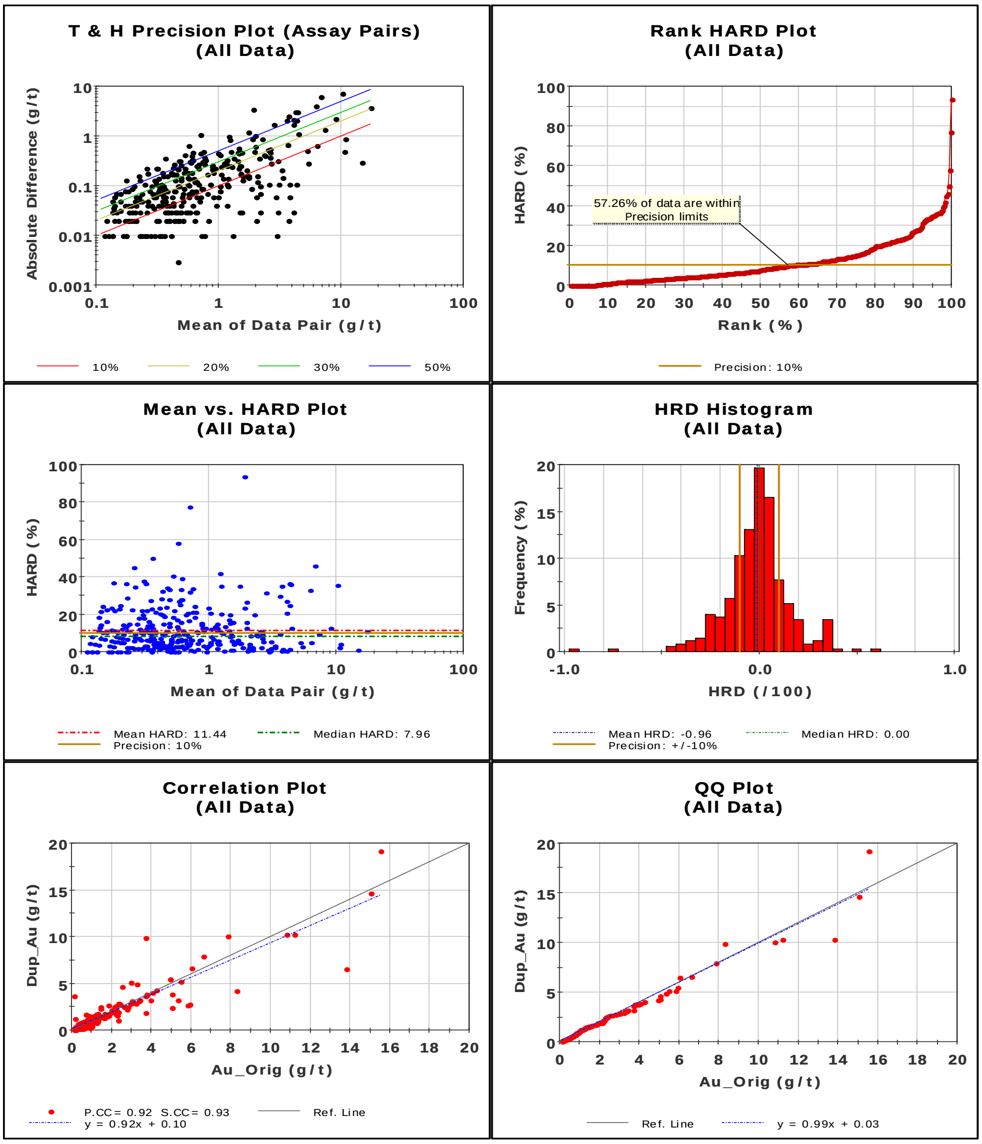
3.5.2 Field Duplicates

A review of the available 584 RC field duplicates assays (351 =>0.1gt Au) shows an acceptable level of precision is being achieved in sampling, albeit only 47% of the field duplicates (>0.1gt Au) are within 10% of the original assay and approximately 80% better than +/-20%. As shown in Figure 3.5.2_1, a high level of correlation (r=0.92) is noted and a relative precision (Mean HARD) of 11.4. No relative bias is identified between the data sets with a relative accuracy (Mean HRD) or -0.96. Based on the RC field duplicates, the total error including RC sampling error, is considered reasonable.

Figure 3.5.2_1

Quality Control Charts of RC Field Duplicates Assays (Combined SGS Assay)

	Au_Orig	Dup_Au	Units			Result
No. Pairs:	351	351			Pearson CC:	0.92
Minimum:	0.11	0.11	g/t		Spearman CC:	0.93
Maximum:	15.50	19.20	g/t		Mean HARD:	11.44
Mean:	1.13	1.14	g/t		Median HARD:	7.96
Median	0.50	0.50	g/t			
Std. Deviation:	1.93	1.93	g/t		Mean HRD:	-0.96
Coefficient of Variation:	1.70	1.69			Median HRD	0.00



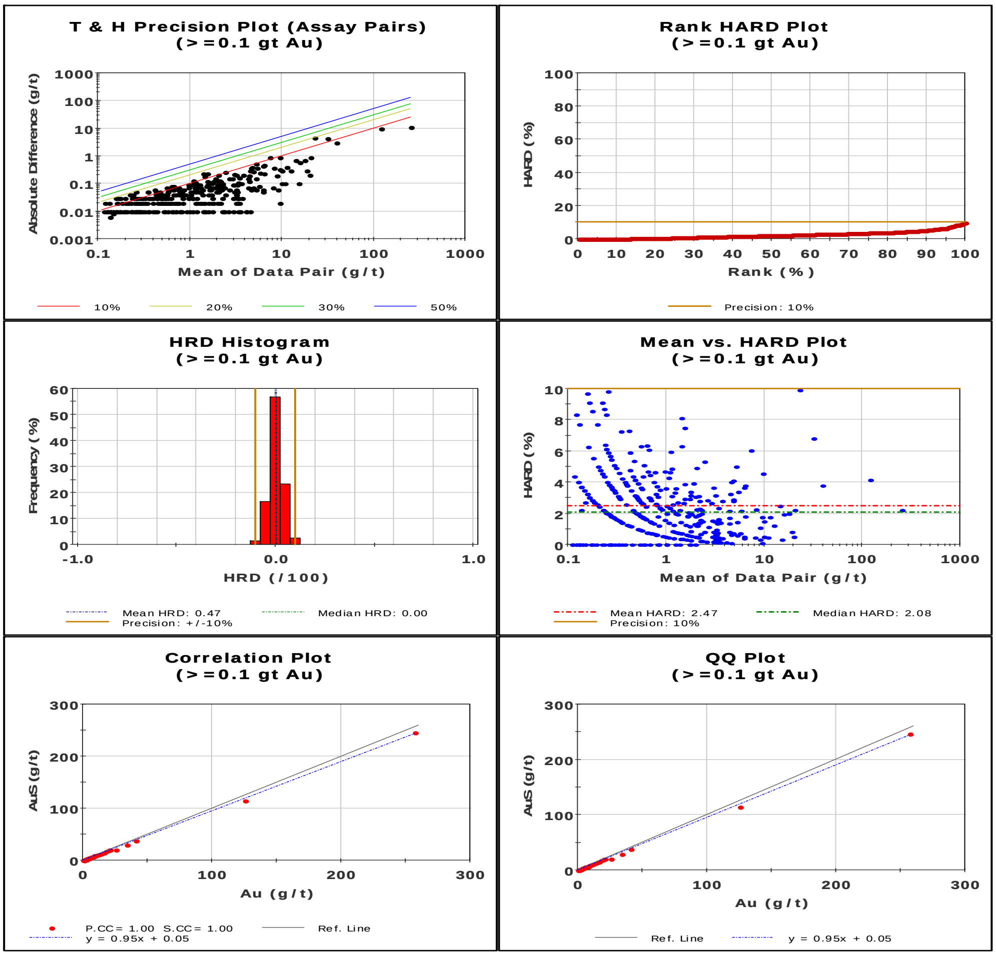
3.5.3 Resplit Assays

A review of the 691 resplit assays (laboratory duplicates) shows a very high level of precision in being achieved. As shown in Figure 3.4.4_1, which presents only those data >0.1gt, a very high level of repeatability between the original and resplit assay is shown. This level of relative precision is very high relative to expectation with all data within a 10% relative precision (HARD) measure. The outcome is consistent with fine grained gold that is relatively homogeneously distributed throughout the mineralisation and indicates pulverisation in sample preparation is sufficient for high quality (high precision) assaying.

Figure 3.4.4_1

Quality Control Charts - Gold Resplit Assays (Combined SGS Assay) =>0.1gt Au

	Au	AuS	Units			Result
No. Pairs:	391	391			Pearson CC:	1.00
Minimum:	0.11	0.11	g/t		Spearman CC:	1.00
Maximum:	257.00	246.00	g/t		Mean HARD:	2.47
Mean:	3.06	2.95	g/t		Median HARD:	2.08
Median	0.75	0.76	g/t			
Std. Deviation:	14.85	14.09	g/t		Mean HRD:	0.47
Coefficient of Variation:	4.86	4.77			Median HRD	0.00



3.5.4 Repeat Assays

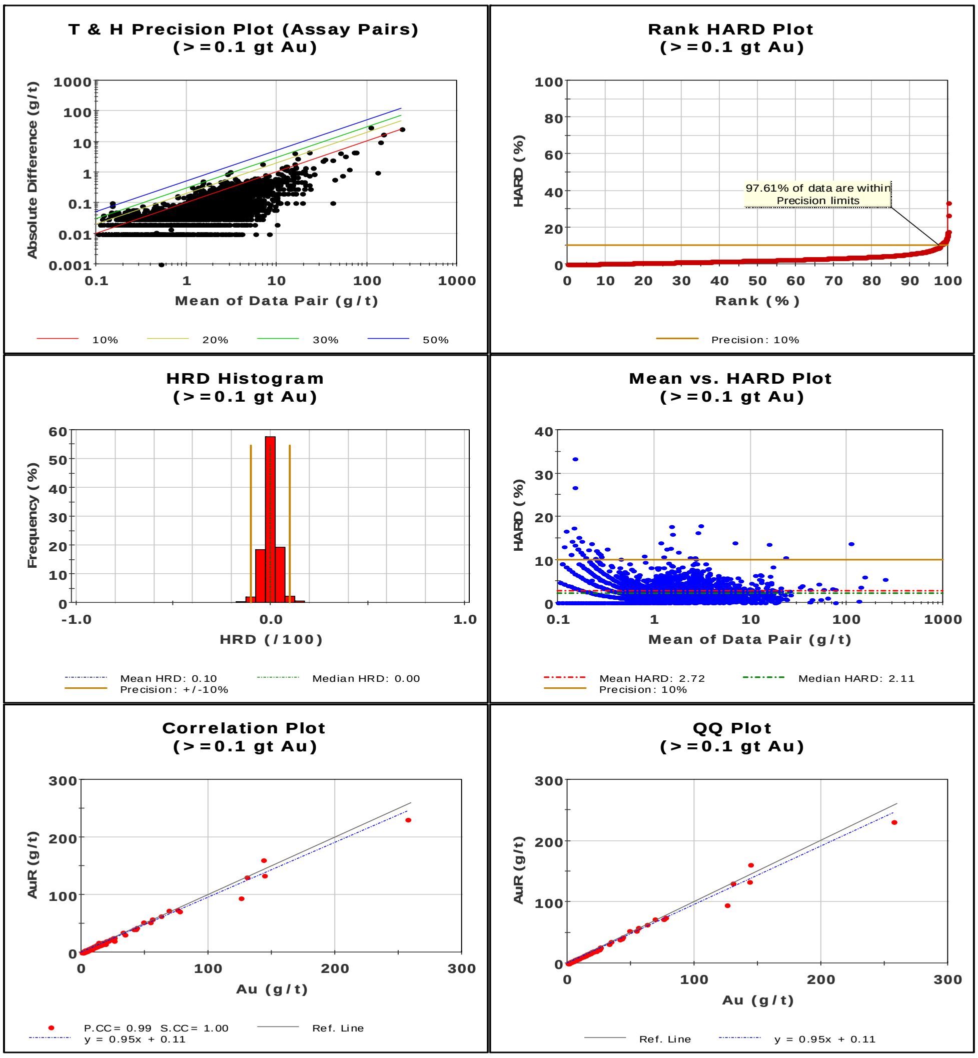
The repeat assaying (weighted replicate assays), is shown above 0.1gt Au in Figure 3.4.5_1, shows a very high level of correlation (r=0.99) and precision (Mean HRD = 0.10). Similar to the resplit assays, the precision is very high relative to expectation for fire assay analysis of gold. It is of note that the precision of the repeats is slightly lower than the resplit assays. This is unexpected given a repeat analysis should exclude some sample preparation error and be more precise. Ongoing review of the quality control data is recommended and this difference should be monitored and explained.

Figure 3.4.5_1

Quality Control of Gold Resplit Assays (Combined SGS Assay)

SGS Repeats (>=0.1gt)
(>=0.1 gt Au)

	Au	AuR	Units			Result
No. Pairs:	2,554	2,554			Pearson CC:	0.99
Minimum:	0.10	0.10	g/t		Spearman CC:	1.00
Maximum:	257.00	231.00	g/t		Mean HARD:	2.72
Mean:	2.98	2.95	g/t		Median HARD:	2.11
Median	1.40	1.42	g/t			
Std. Deviation:	8.71	8.34	g/t		Mean HRD:	0.10
Coefficient of Variation:	2.93	2.83			Median HRD	0.00



3.5.5 Blank Assaying

The blank assaying is shown as stardard control charts in Figure 3.5.5_1 and Figure 3.5.5_2 for the SGS Ouagadougou and Tarkwa laboratories respectively. Relatively few non-blank assays (<2.5%) are noted. It is likely that standards and blanks have been mixed where assays siginificanlty above the detection limit have been returned. While this mixing is not common, increased care should be taken to ensure this is minimised in the future.

The blank assaying results are considered acceptable and indicate no significant contamination in the sample preparation or assaying.

Figure 3.5.5_1

Standard Control Chart of Blank Assaying - SGS Ouagadougou

Standard: Element: Units: Detection Limit: Expected Value (EV): E.V. Range:	BLK Au ppm - 0.00 0.00 to 0.01		No of Analyses: Minimum: Maximum: Mean: Std Deviation: % in Tolerance % Bias % RSD	409 0.00 2.96 0.04 0.26 96.58 % 699.95 % 642.23 %

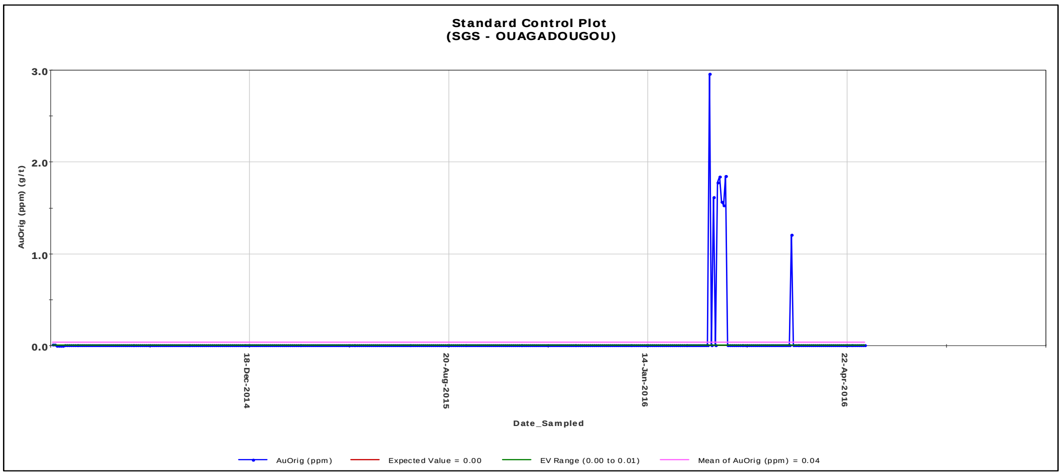
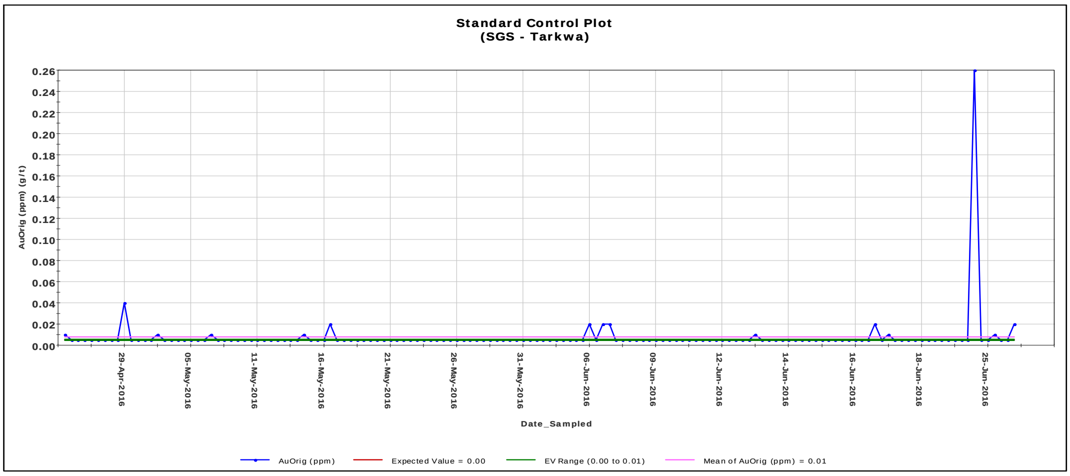


Figure 3.5.5_2

Standard Control Chart of Blank Assaying - SGS Tarkwa

Standard: Element: Units: Detection Limit: Expected Value (EV): E.V. Range:	BLK Au ppm - 0.00 0.00 to 0.01		No of Analyses: Minimum: Maximum: Mean: Std Deviation: % in Tolerance % Bias % RSD	144 0.01 0.26 0.01 0.02 89.58 % 57.64 % 272.81 %



3.5.6 Umpire Assays

Umpire assaying was by independent laboratory Intertek-Genalysis in Tarkwa, Ghana.

The umpire assay sample dataset used sample pulps, prepared by SGS Ouagadougou and SGS Tarkwa, which had been securely stored at the Cardinal sample storage facility in Bolgatanga. The sample pulps were carefully chosen in order to accommodate the following:

- The 120 highest assays that had been returned at the time of the referee sampling compilation (29th June 2016).
- A representative number of pulps (three to four) from every batch of samples submitted to SGS (representing approximately 5% of the total dataset).
- Ensuring that the chosen samples were dominantly above detection limit (with most greater than 0.1g/t).
- Also to ensure that the referee samples adequately represented RC chips, and quarter and half core samples.

In addition, for QAQC purposes, a set of blanks and reference samples (standards from Gannet Laboratories, Perth, Western Australia) were also inserted into the referee assay sampling sequence as follows:

- Blank: expected value <0.01g/t
- ST501: Expected value 0.43g/t (35 samples)
- ST588: Expected value 1.60g/t (21 samples)
- ST611: Expected value: 4.08g/t (16 samples)
- ST640: Expected value 6.70g/t (6 samples)

Table 3.5.6_1 presents the submitted CRM assay results. Relatively poor accuracy is noted in the CRM assaying with a high number of outside tolerance assays. The assay accuracy issues impacts the relative comparison of the umpire assaying. The blanks assaying showed no sign of contamination.

Some 746 data pairs were compiled from the Intertek-Genalysis assay data and compared against the accepted SGS gold assays. This data is presented as Figure 3.5.6_1. In addition, the same umpire assay data is presented as Figure 3.5.6_2 with a single umpire assay (sample id NMRC08099) removed and considering only those data above 0.1gt Au. This data pair significantly distorted the comparison between the two data sets.

The umpire assay (with outliers removed) generally reproduces the original SGS assaying with a relative precision between the two data sets, measured in terms of the mean HARD, being 7.28 and a linear correlation of r=0.97. The mean HRD, a measure of relative bias is 0.57, which is consistent with the original SGS being slightly higher grade (4.2% higher mean grade).

The umpire assaying is considered to support the original SGS assaying accuracy.

Table 3.5.6_1

Summary Statistics – Umpire Assaying - Cardinal Submitted Standards (Certified Reference Material)

Standard	STD (08)	STD (39)	STD (544)	STD (588)	STD (611)
Expected Value (Au ppm)	0.43	0.43	1.6	4.08	6.7
Count	35	33	21	16	6
Mean	0.39	0.41	1.63	4.01	6.83
% in 10% Tolerance	84.4	90	66.7	81.3	66.7
Number of Fails	4	2	7	3	2
% Bias	-8.9	-5	2	-1.6	1.9
% RSD	18.42	7.82	10.05	16.04	6.39

Figure 3.5.6_1
Quality Control Charts – SGS versus Intertek Umpire Assays – All Data

	Au_ppm	Inter_Au1	Units			Result
No. Pairs:	746	746			Pearson CC:	0.87
Minimum:	0.01	0.01	g/t		Spearman CC:	0.98
Maximum:	220.00	197.28	g/t		Mean HARD:	11.46
Mean:	4.23	3.81	g/t		Median HARD:	5.24
Median	1.14	1.13	g/t			
Std. Deviation:	14.31	11.32	g/t		Mean HRD:	4.74
Coefficient of Variation:	3.38	2.97			Median HRD	0.00

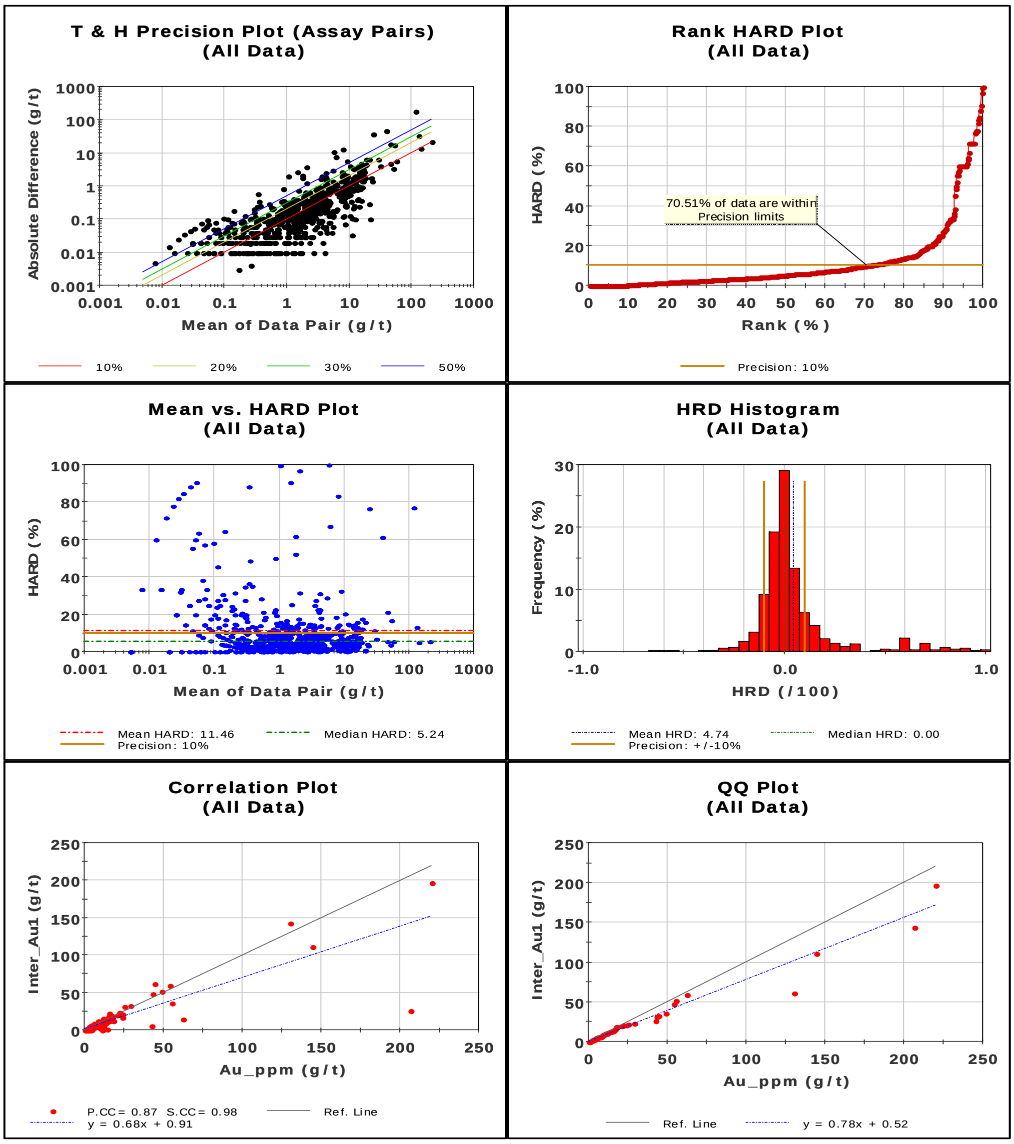
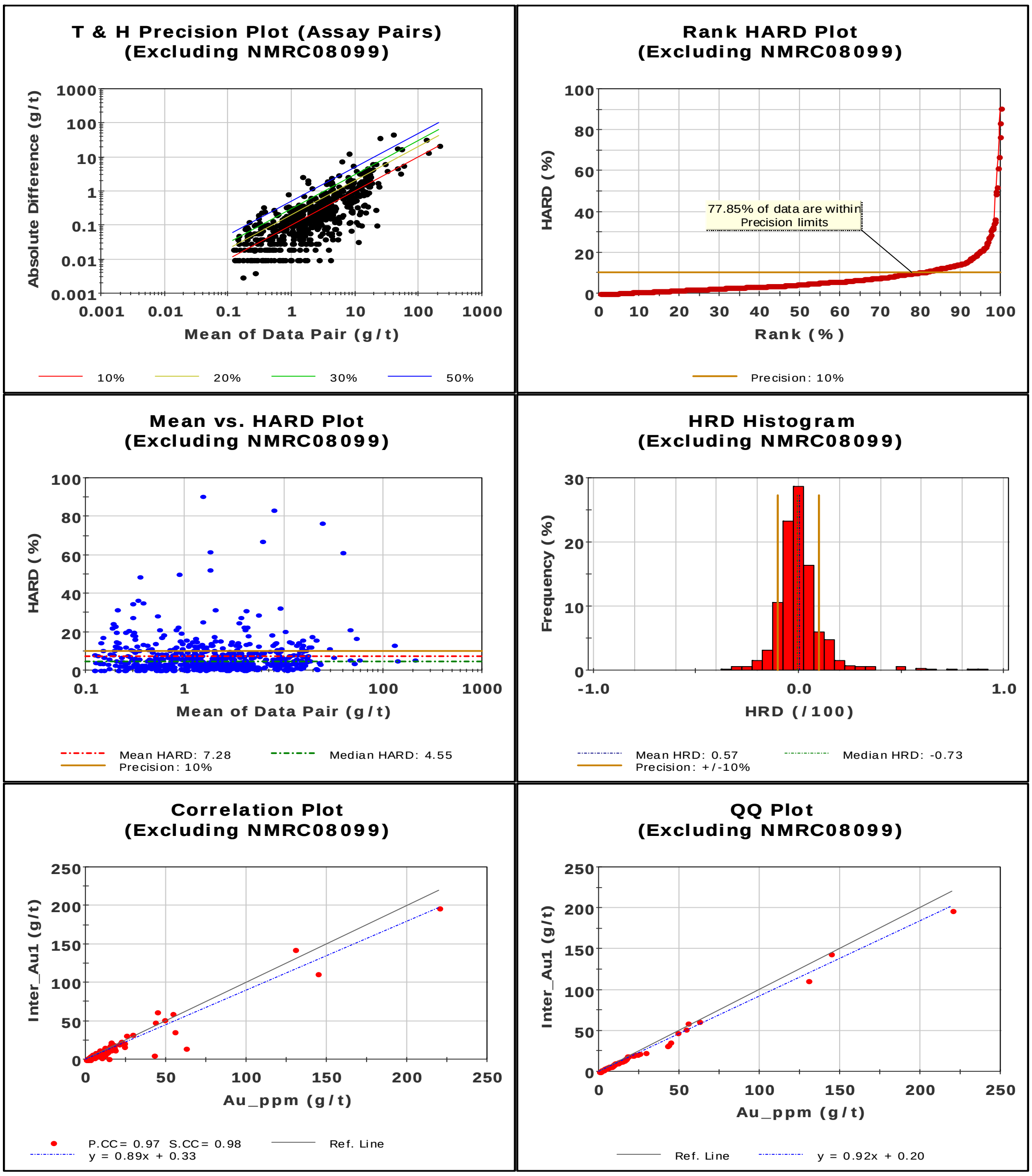


Figure 3.5.6_2

Quality Control Charts – SGS versus Intertek Umpire Assays – Outlier removed

	Au_ppm	Inter_Au1	Units			Result
No. Pairs:	605	605			Pearson CC:	0.97
Minimum:	0.12	0.11	g/t		Spearman CC:	0.98
Maximum:	220.00	197.28	g/t		Mean HARD:	7.28
Mean:	4.84	4.64	g/t		Median HARD:	4.55
Median	1.66	1.61	g/t			
Std. Deviation:	13.44	12.38	g/t		Mean HRD:	0.57
Coefficient of Variation:	2.78	2.67			Median HRD	-0.73



3.5.7 Quality Control Summary

The reviewed quality control data supports the veracity of the analytical data used for the study. The data is considered to be suitable for use in mine planning studies and is both accurate and precision relative to the mineralisation style and deposit type. It is recommended that as part of future drilling programmes:

- All data is compiled on an ongoing basis and that assay batches failing required assay accuracy (based on CRM assaying) are rejected.
- Coarse reject (after crushing) diamond duplicates are implemented. This will allow a relative field duplicate assay for diamond core drilling.
- All repeat and resplit assays are routinely compiled to the database for review. Currently this data is not readily available in the database provided to EGRM.
- Umpire assaying, which should routinely be completed for all batches, be completed on an ongoing basis and regularly assessed.
- Regular assessment of all quality control data be completed with the findings documented, reviewed and acted upon, should there be a requirement, as part of normal exploration report. For example, monthly exploration reports should compile this information.

3.6 Bulk Density Data

A total of 1395 bulk density determinations have been collected from drill core. All density determinations have been completed by Independent laboratory (SGS) completed the testing via water immersion method (PHY04V) with a wax coating used on porous samples. Figure 3.6_1 shows a plan of bulk density data and the interpreted mineralisation envelope. Table 3.6_1 presents the summary statistics of the bulk density data grouped by lithology and weathering.

Sufficient bulk density data is available for high confidence density determination for the major mineralised lithologies. Additional weathered density collection is recommended. In addition, additional density is recommended to be collected for the metasediment and diorite.

The bulk density collection approach is considered robust. Routine bulk density data collection should continue. The mean density per grouping was applied to the resource estimation study for tonnage reporting where sufficient data existed. The SOX density was assumed to be 1.80g/cc and the MOX density was based on the available data but rounded to a maximum 2.2g/cc for the granite and metasediments, and 2.0g/cc for the metavolcanics and diorite. The density assigned for tonnage reporting is shown in Table 7_3.

Figure 3.4.6_1

Plan showing the distribution of Bulk Density Data

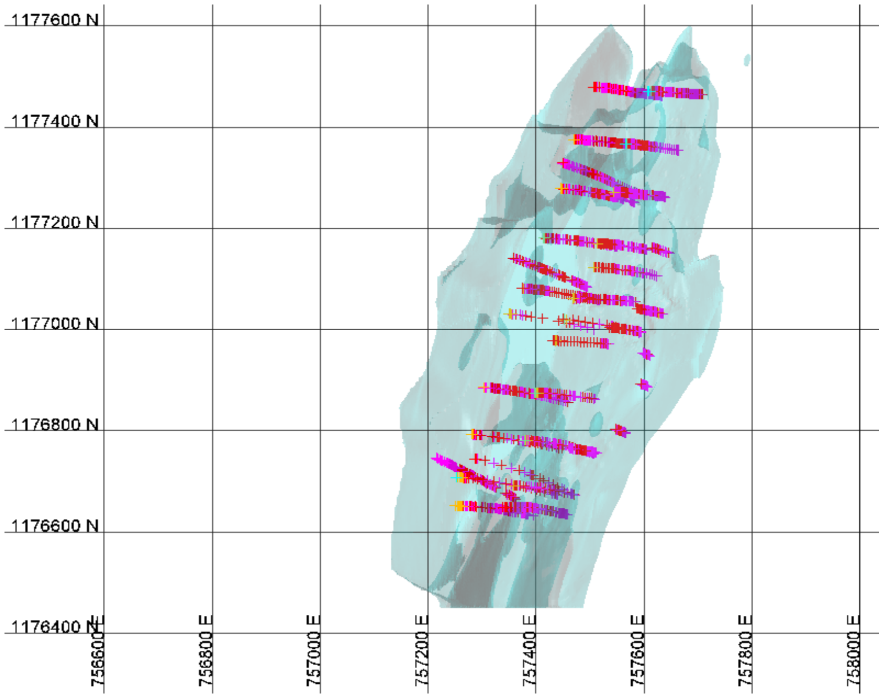


Table 3.6_1

Summary Statistics – Dry bulk density (g/cc) grouped by weathering and lithology

Weathering	Number	Minimum	Maximum	Mean	Median	Std Dev
			Granite			
SOX	1	2.61	2.61	2.61	2.61	
MOX	7	2.16	2.65	2.41	2.34	0.21
TRS	23	2.16	2.75	2.52	2.52	0.16
FRS	227	2.64	2.88	2.73	2.72	0.03
			Metavolcanics			
SOX	0					
MOX	7	1.82	2.12	1.98	1.97	0.11
TRS	26	2.25	2.89	2.57	2.61	0.18
FRS	618	2.52	3.16	2.82	2.81	0.06
			Diorite			
SOX	0					
MOX	0					
TRS	0					
FRS	331	2.37	2.98	2.83	2.82	0.05
			Meta-sediments			
SOX	0					
MOX	4	1.98	2.34	2.22	2.26	0.16
TRS	58	2.22	2.90	2.60	2.59	0.17
FRS	93	2.73	2.97	2.83	2.84	0.05

3.7 Database Management

All geological and field data is entered using data-loggers and software developed by independent database specialists Maxwell GeoServices. The data loggers includes lookup tables and fixed formatting to enforce the use of the Cardinal geological code system and sample protocol. Data is then loaded to the Datashed database, which was managed by consultants Maxwell GeoServices with access on site for the Cardinal database personnel. A full data dump of the Datashed database was requested by Cardinal technical management. The data dump was then used as the basis for a complete validation and re-build of the Namdini drill hole database. Cardinal technical personnel validated the database using Micromine software. The validated Micromine database for Namdini was used as the data source for the resource estimate. The database was further checked against the original logging spreadsheets and the assay data was checked against the supplied assay certificates.

As part of standard operating procedures, after data importation, a series of digital checks for duplication and non-conformity are undertaken, followed by manual validation by the relevant project geologist. Manual checks of the collar, survey, assay and geology data for errors against the original field data and final paper copies of the assays is completed. The process is documented, including the recording of holes checked, errors found, corrections made and the date of the database update.

EGRM completed a review of the logging based on the provided database and found the logging to consistent and robust. In addition, EGRM loaded the laboratory assay certificates and checked these data against the drillhole database. More than 90% of the assay data were checked and the data was found to be robust with no material issues identified.

The database was also reviewed for consistency including:

- Collar location relative to the topography
- Overlapping intervals
- Inconsistence of downhole depths between different data files
- Significant survey deviation
- Reviewed in 3D

Based on the review completed, the resource development database is considered to be robust.

4 GEOLOGICAL MODELLING

The geological modelling has been completed by Orefind and EGRM. Orefind has generated the weathering and lithological models. EGRM generated the final mineralisation constraint that has been applied for grade estimation and mineral resource reporting.

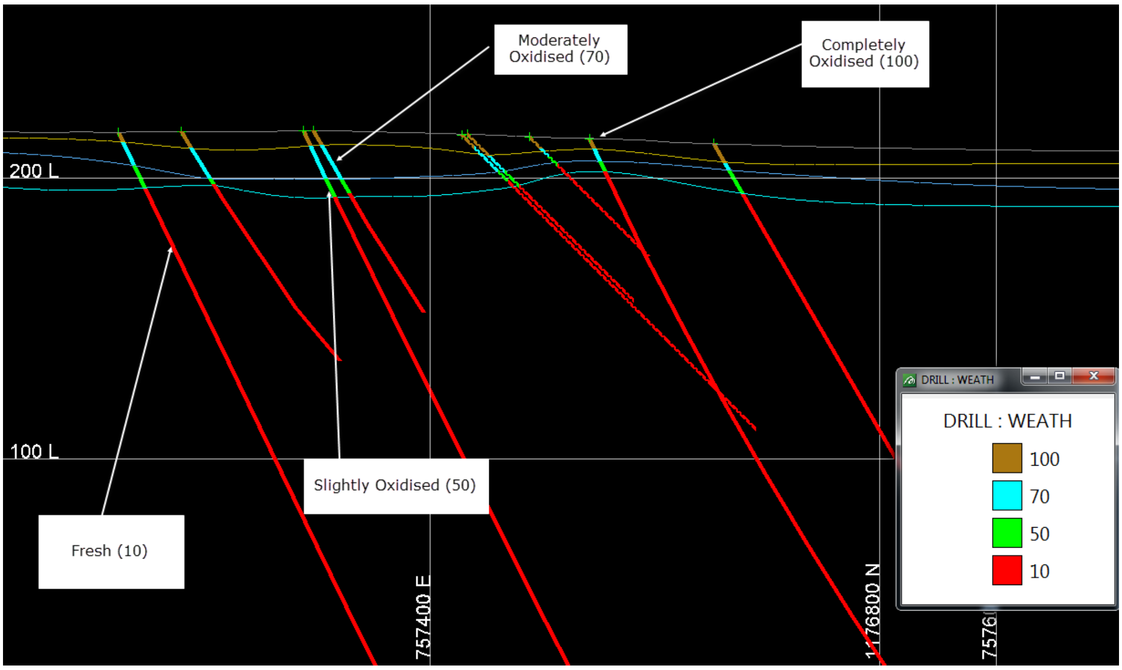
4.1 Weathering/Oxidation Model

The weathering model has been provided by consultants Orefind (Davis and Cowan, 2016) as a series of wireframe surfaces representing:

- Base of complete weathering (SOX) - totally oxidised showing little or no primary rock texture. Complete oxidation of all primary minerals.
- Base of moderate oxidation (MOX) – material exhibits some primary rock texture, total oxidation of feldspar to clay, and total oxidation of sulphides.
- Base of transition or weak oxidation (TRANS) - material showing strong primary rock textures, partial oxidation of feldspars to clay, partial oxidation of sulphides (often showing iron oxide staining).

Figure 4.1_1 shows a typical cross section through the deposit. The weathered rock represents a relatively shallow veneer, which is approximately 20m deep, although this can be significantly shallower.

Figure 4.1_1
Example cross section showing the drillhole data (coded weathering) and interpreted weathering surfaces



4.2 Lithology

The lithology model has been provided by Orefind (Davis and Cowan, 2016) as a series of wireframe solids based on the simplified lithological logging. The following lithologies were modelled:

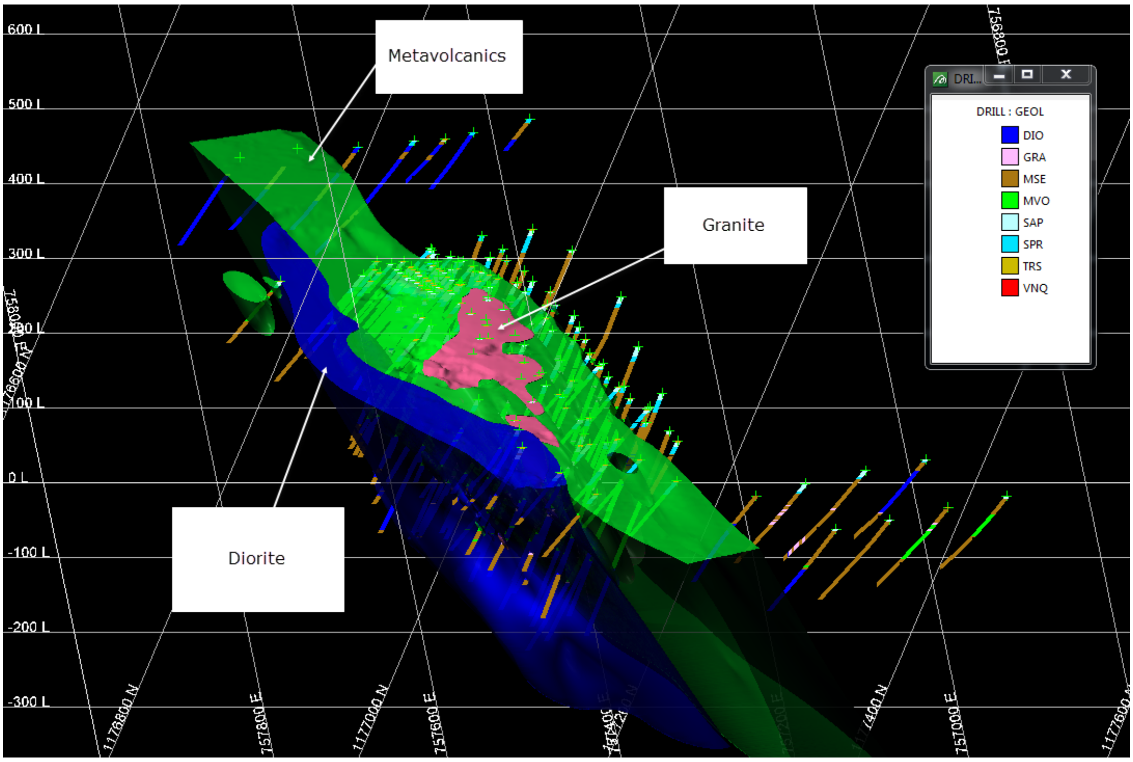
- Granite (GRA)
- Metavolcanics (MVO)
- Diorite (DIO)
- Metasediments (MSE)

The MSE were subdivided into the Western and Eastern metasedimentary units.

The geological logging was reviewed during the site visit and is considered robust. Figure 4.2_1 shows a 3D view of the lithology wireframe and drilling, excluding the metasediments which are encapsulate the other units.

Figure 4.2_1

3D view (looking NE) of the lithology wireframe and drilling (note the metasediments not shown but encapsulate the other lithological units)



4.3 Mineralisation

The grade estimate has been based on a mineralisation constraint generated by indicator kriging, using the gold grades applying a 0.1gt Au lower cutoff grade. The cutoff grade was selected after a detailed review of the available drilling in 3D, a statistical review of the gold data relative to the geological model, and also considered the likely mining approach and most suitable estimation method.

A review of the drilling data and geology was completed comparing the mineralised intercepts at a range of lower cutoff grades, as shown in Figure 4.3_1. Observations provided from this data review included:

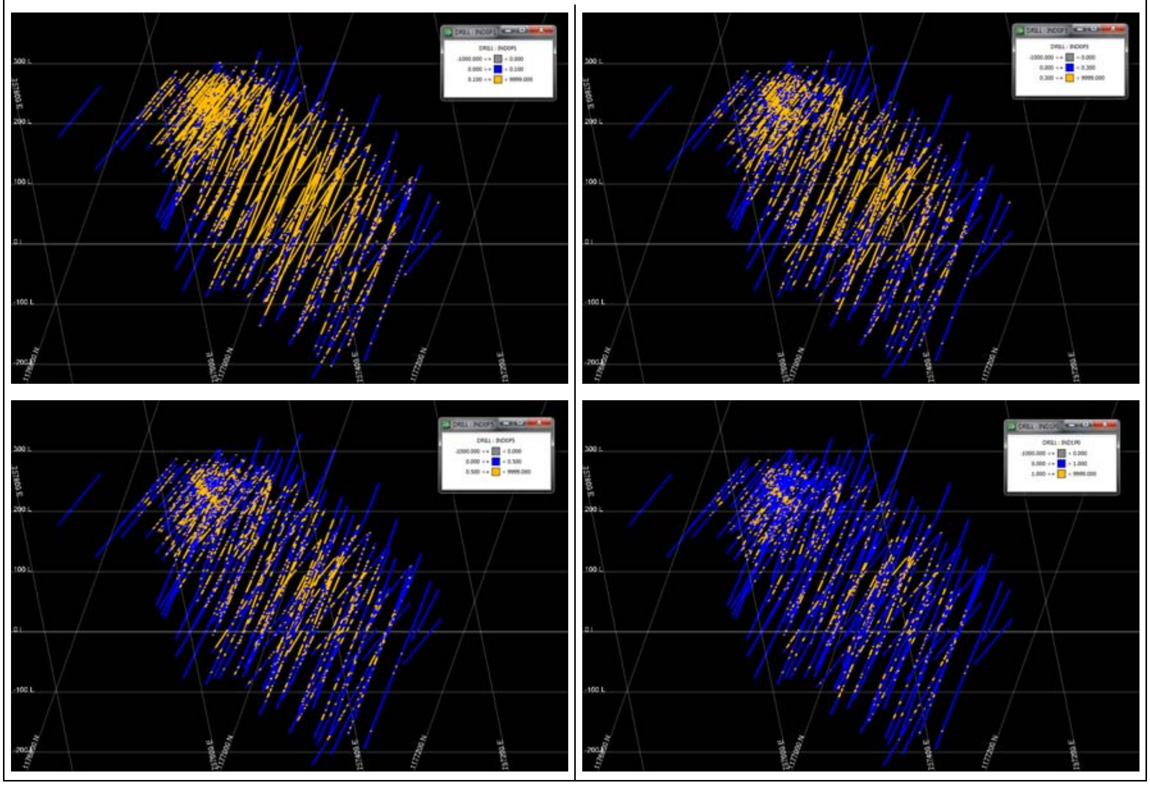
- A broad zone of mineralisation can be interpreted based on lower cutoff grades between 0.1gt Au and 0.3gt Au.
- The zone mineralisation zone geometry is sensitive to lower cutoff grade. At the current drill hole spacing, the continuity of mineralised zones at cut-off grades above 0.5gt Au is reduced, compared to the continuity at lower cut-off grades.
- A more selective mining scenario interpretation (applying a greater than 0.5gt Au lower cutoff grade) would likely result in high levels of ore loss and mining dilution and requires a higher density of drilling to robustly interpret the mineralisation zones.
- No clear breaks are observable in the data distributions that might suggest possible discrete grade distributions and therefore appropriate (or 'natural') lower cutoff grades, which could be applied to mineralisation interpretation.

Based on the review of the data, and the likely moderate to low mining selectivity mining approach, it was decided appropriate to investigate the following three lower cutoff scenarios, 0.1gt Au, 0.2gt Au and 0.3gt Au. The aim of the interpretation (and the choice of lower cutoff grade) was define and separate the potentially mineralised material from potential waste based on grade estimation via probabilistic methods such as Multiple Indicator Kriging (MIK) or equivalents. Given the style and geometry of gold mineralisation at Namdini, it is not considered appropriate to define a mineralisation zone representing a deterministic (mineable) grade constraint. Probabilistic estimation methods were deemed to be appropriate, given the observed spatial characteristics of the mineralisation, the likely open pit mining methods and the requirements for a robust resource model over a range of lower cutoff grades.

The drillhole database was composited to a 3m down-hole interval and indicator variography was generated for 0.1gt Au, 0.2gt Au and 0.3gt Au grade thresholds. Indicator kriging (IK) estimates were produced for the above indicator cutoff grades with the sample searches oriented consistent with the geological observations and variography (oriented with a 200º strike, no plunge and a dip of 60° towards 290º). Example indicator variograms (correlograms) are provided as Figures 4.3_2 and 4.3_3 for the 0.1gt Au and 0.2gt Au lower thresholds respectively. Well-structured variography was modelled with maximum ranges of continuity modelled significantly in excess of the current drill spacing.

Figure 4.3_1

3D view (looking NE – 16=>035) showing the drillhole data (gold gt) as 3m composites coloured above 0.1gt Au (top left), 0.3gt Au (top right), 0.5gt Au (bottom left) and 1.0 gt Au (bottom right). Above cutoff grade is colour yellow and below cutoff is coloured blue.



These IK estimates were reviewed and grade shells generated representing a 0.50 or greater probability of exceeding the particular cut-off grade. These wireframes (as shown in Figure 4.3_4 and Figure 4.3_5) were reviewed prior to adopting the 0.1gt Au mineralisation constraint as the basis for the grade estimation. The 0.1gt Au mineralisation zone is considered robust and suitable for grade estimation by MIK grade estimation. The 0.2gt Au and 0.3gt Au were also validated and coded into the drillhole database and block model. The 0.2gt Au was applied to the resource classification coding to exclude lower confidence tonnage blocks from resource reporting.

While the current constraint is considered robust and appropriate for this study, it is recommended that for future studies, based on infill drilling, the mineralisation interpretation is refined with a sectional interpretation. This will improve the zone geometry and ensure the capture of the anomalous mineralisation while excluding appropriate zones of waste. The current mineralisation interpretation has areas coded as between 0.1gt to 0.2gt lower cutoff yet is significantly above a 0.3gt Au lower cutoff grade. These external areas (ie the boundary between the 0.1 gt and 0.2 gt wireframes) are characterised by higher levels of spatial variability and therefore not well modelled by the indicator constraint. As a result they have been omitted from grade-tonnage reporting until infill drilling is completed.

Figure 4.3_2

Indicator Variogram for the 0.1gt Au lower grade threshold

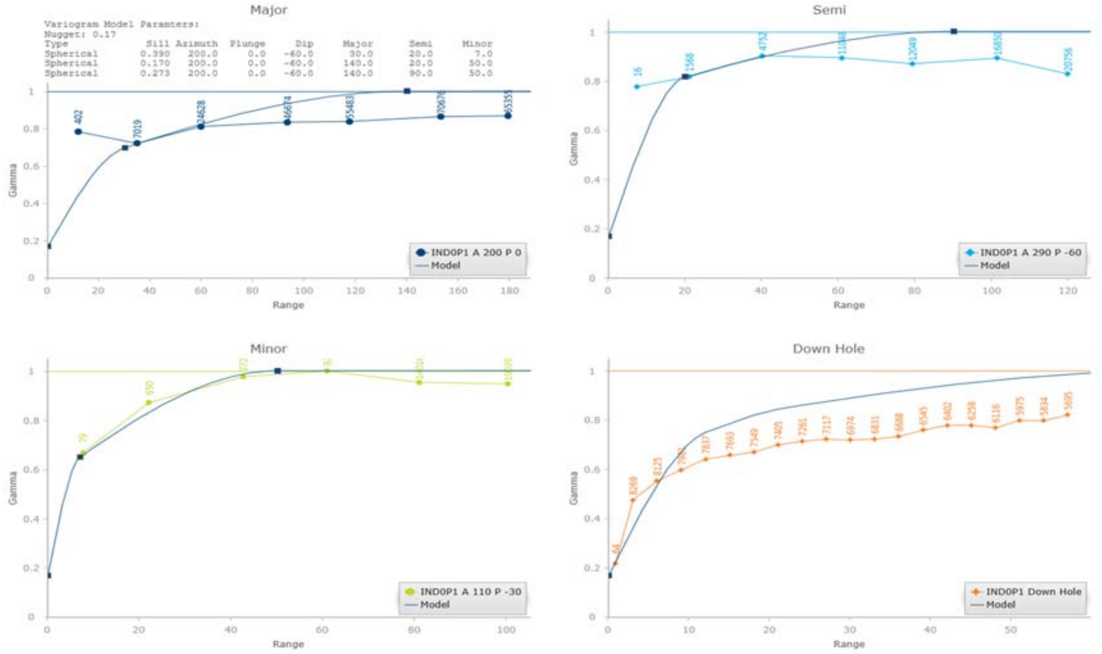


Figure 4.3_3

Indicator Variogram for the 0.2gt Au lower grade threshold

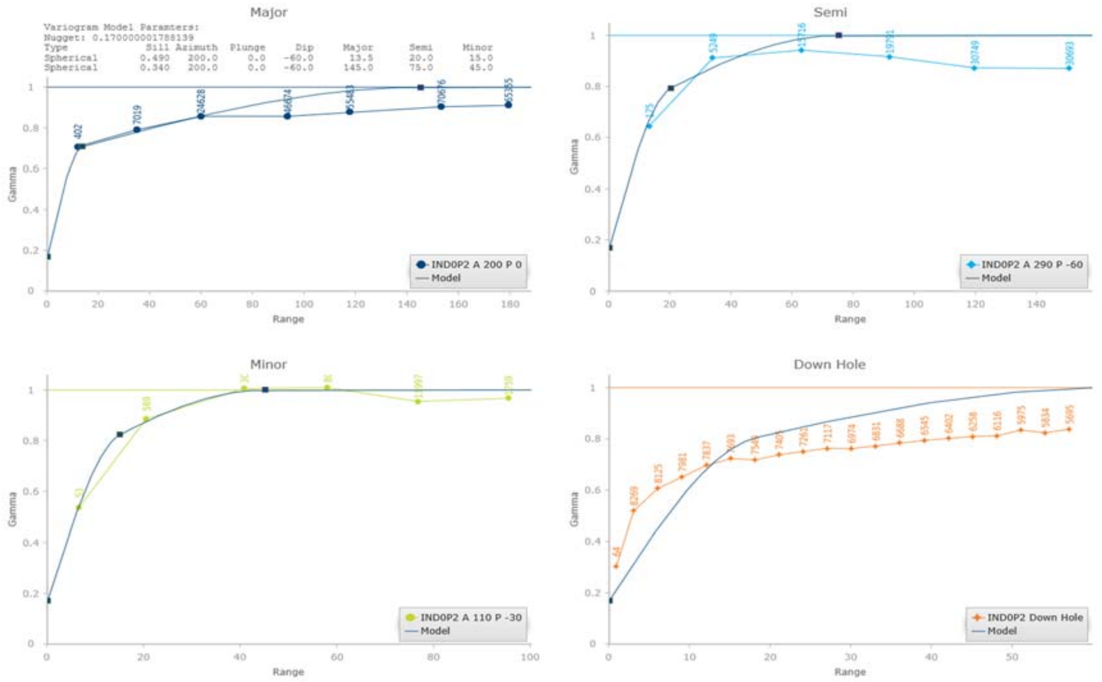


Figure 4.3_4

Example cross section showing the drillhole data (gold gt) and the mineralisation constraints generated at 0.1gt Au, 0.2gt Au and 0.3gt Au lower cutoff grades

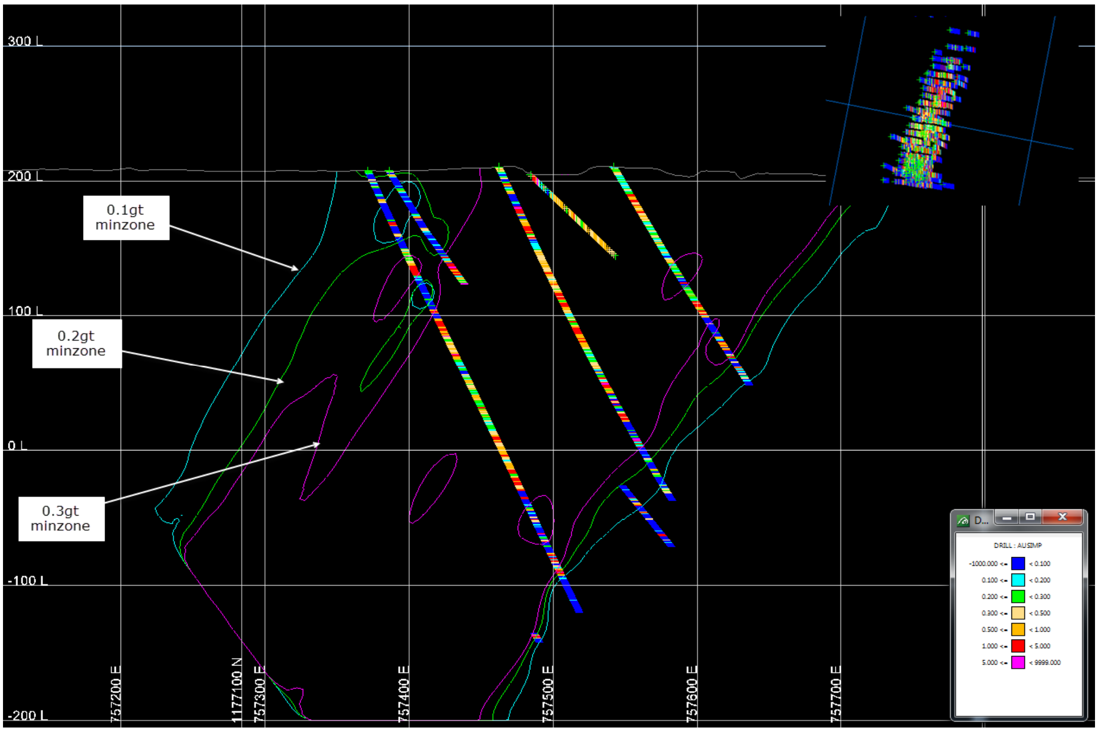
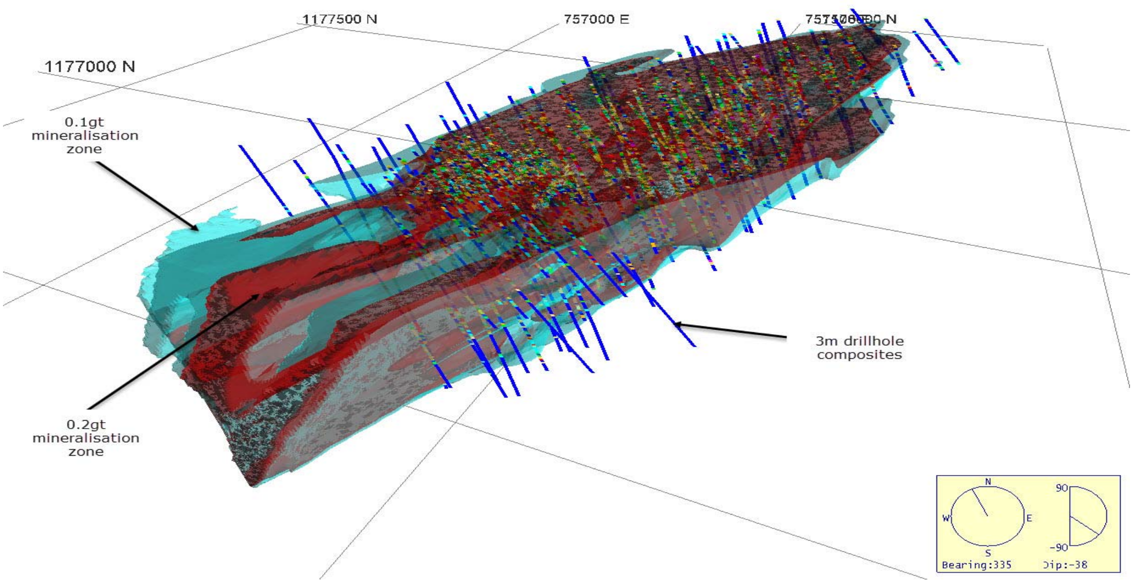


Figure 4.3_5

3D perspective (looking from above and towards the northwest) of the 0.1gt and 0.2gt mineralisation grade shells



5 STATISTICAL ANALYSIS

Statistical and geostatistical investigations have been completed using the constructed geological model and drillhole data coded with these constraints. The investigations included compositing, exploratory data analysis (EDA), determination of and applicability of high-grade cuts and the generation and modelling of variography.

5.1 Compositing

The drillhole database was coded with the lithology, weathering and mineralisation zones prior to being composited as a means of achieving a uniform sample support. Based on the various investigations, a regular 3m downhole composite was selected as the most appropriate composite interval. The decision to produce 3m downhole composites was based on the following factors:

- The majority of the drillhole data at (>95%) were collected at a 1m sample interval or less (Figure 5.1_1).
- It is envisaged that the resource will be mined in an open pit using a bench height 3m or greater (likely 5m or greater).
- Grade variability occurs over short ranges. Averaging of data over 3m composites reduced and stabilised the total sample variance as shown in Figure 5.1_2.

The compositing was completed using the Vulcan mining software package.

A series of trials were completed comparing the sample at different down hole composite lengths which confirmed that a 3m down hole interval is appropriate for the MIK estimation method.

Figure 5.1_1
Histogram of Composite Lengths Grouped by Hole Type

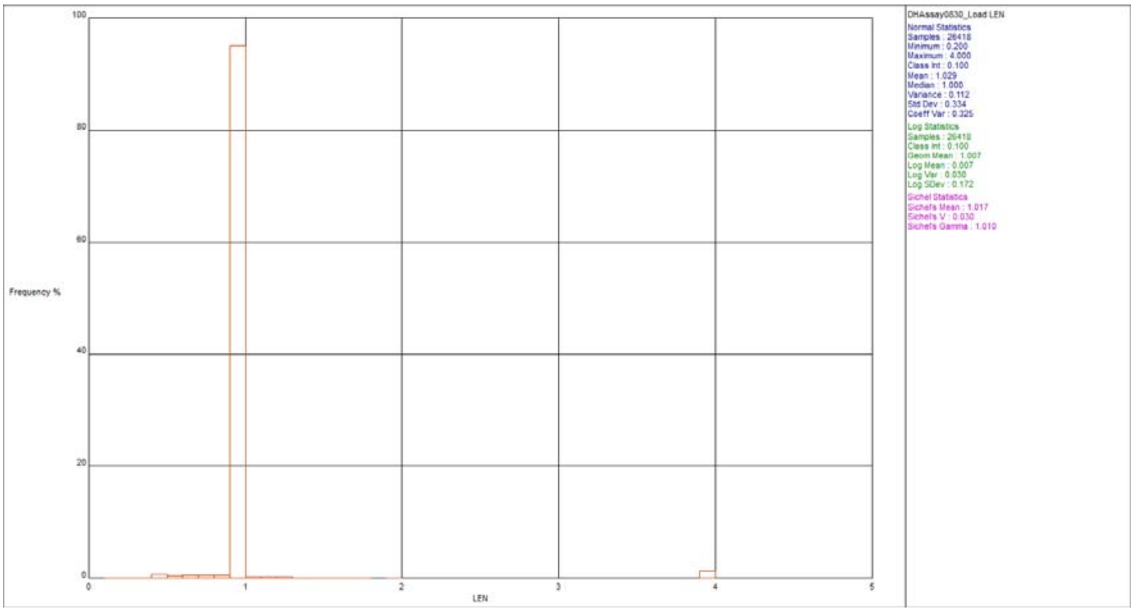
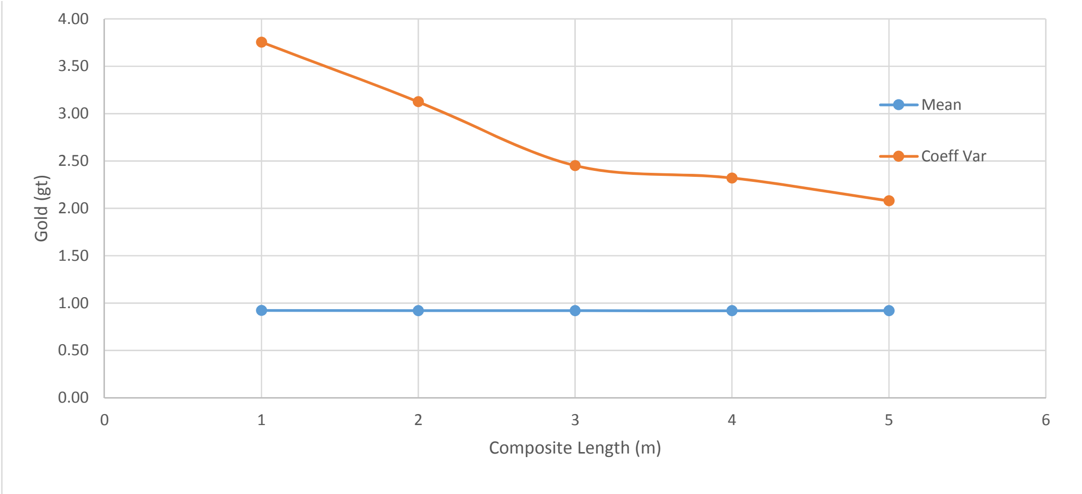


Figure 5.1_2
Trials of Composite Length versus Gold Statistics



5.2 Comparison of drill types

A comparison of the different drilling types was completed to test the suitability of grouping the different sample types. This comparison was completed within the 0.1gt Au mineralisation constraint, as described in Section 4.3 of this report, and was based on the 3m composites and grouped by sample type. The available sample types are DD core (quarter core and half core) and RC drill cuttings in the form of riffle split RC chips. A single composite was excluded as the sample type was not coded.

Table 5.2_1 present the summary statistics of the 3m composite data grouped by data type includes naïve (not declustered) and declustered data. All data have been cut to a high grade maximum of 15gt Au. Figure 5.2_1 shows a QQ plot, which compares the marginal distribution of the DD core samples versus the RC data sets. Figure 5.2_2 shows a QQ plot comparing the combined DD half core samples versus the DD quarter core data.

No apparent difference is noted between the half and quarter core data. The data sets are considered comparable. The RC versus DD data sets are also comparable, however when the RC data is declustered the mean grade increases given that a small area of the deposit, which is generally lower tenor than average, has been RC drilled to a closer spacing, as shown in Figure 3.2_1. Based on the investigations, grouping of the different drillhole type data sets is considered reasonable.

Table 5.2_1

Summary Statistics – Gold (g/t) 3m Composites Grouped by Sample (Drillhole) Type

Estimation Domain composites only excluding 1 non coded datum - All data has 15gt High Grade Cut applied

Description	Count	Minimum	Maximum	Mean	Std. Dev.	CV
	No Declustering					
DD - QCORE	1944	0.005	15.00	0.88	1.34	1.53
DD - HCORE	1170	0.005	15.00	0.86	1.44	1.68
ALL DD	3114	0.005	15.00	0.87	1.38	1.59
RC - CHIPS	3191	0.005	15.00	0.88	1.50	1.70
	Declustered 20mE by 50mN by 10mRL					
DD - QCORE	1944	0.005	15.00	0.87	1.35	1.55
DD - HCORE	1170	0.005	15.00	0.87	1.50	1.74
ALL DD	3114	0.005	15.00	0.87	1.41	1.62
RC - CHIPS	3191	0.005	15.00	0.94	1.63	1.73

Figure 5.1_1

QQ Plot comparing DD Core composites (horizontal axis) with RC chips composites (vertical axis)

3m composite data with 15gt high grade cut applied

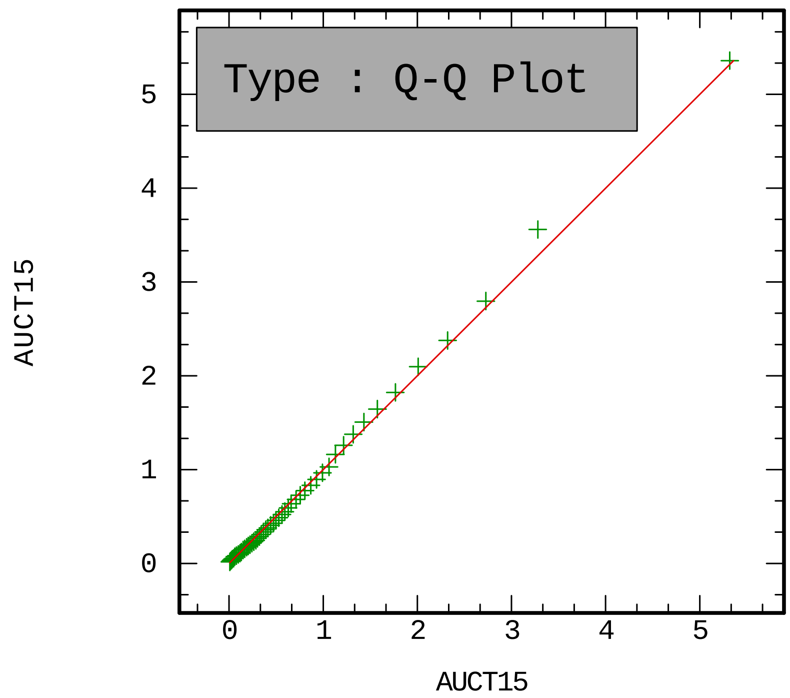
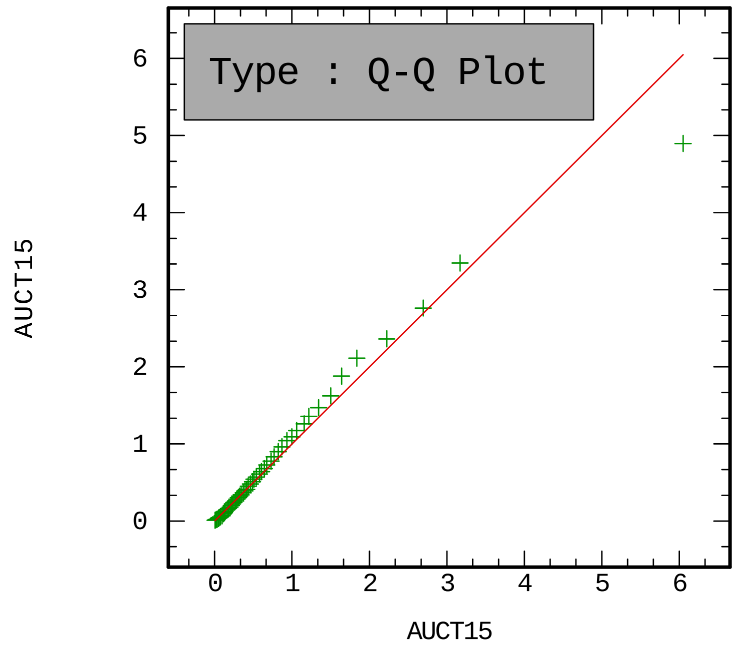


Figure 5.1_2
QQ Plot comparing DD Half Core composites (horizontal axis) with DD Quarter Core composites (vertical axis)
3m composite data with 15gt high grade cut applied



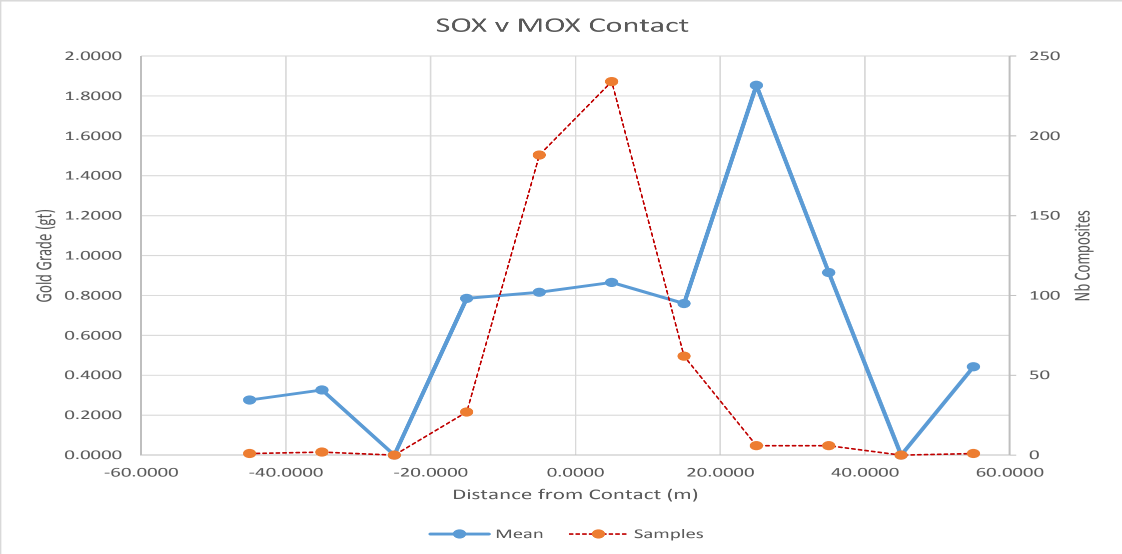
5.3 Contact Analysis

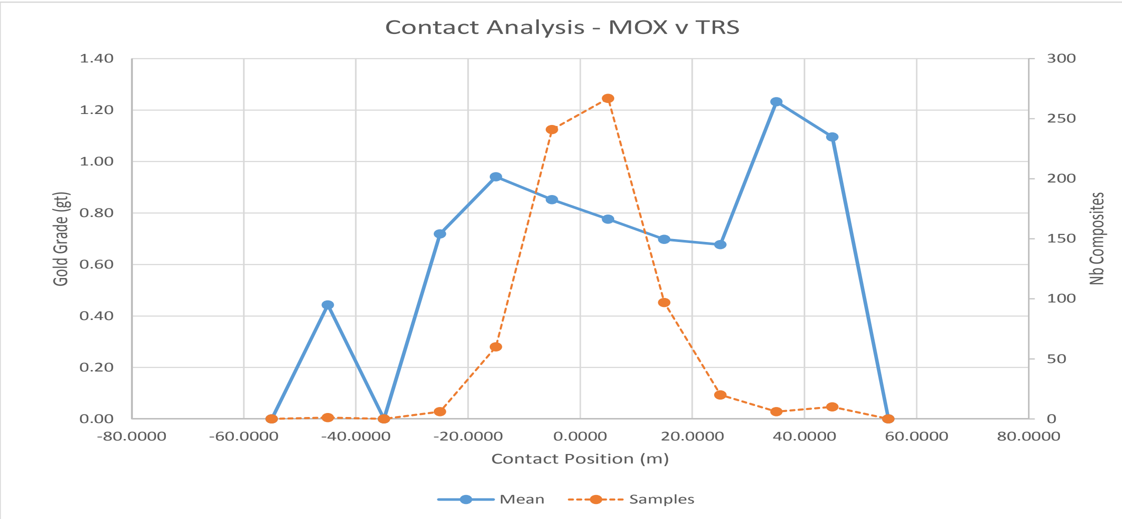
The definition of geological and mineralisation estimation domains relies on the subjective interpretation of the geologist and on their understanding of the genetic processes that controlled the mineralisation. Various interpretations are therefore possible. To check the 'condition' or 'nature' of the interpreted boundaries, 'Contact Analysis' plots were completed for all combinations of adjacent domains. The contact plots were prepared using the 3m composites in Vulcan where holes are flagged and distance between samples used as distance from boundary within the 0.1gt Au mineralisation envelope.

Critical boundaries requiring contact assessment were the weathering and lithology contacts. The contact charts are presented in Figure 5.2_1 and Figure 5.3_2 for weathering and lithology respectively. The major conclusions from this work are:

- Weathering contacts can be treated as soft boundaries and the data is combined as no change in grade is noted across these interpreted contacts.
- For the main lithological contacts (mineralised lithologies) there is no grade change noted at the contacts. For grade estimation purposes, all data is grouped. A substantial grade drop-off is noted in the metasediments, which are poorly mineralised.

Figure 5.3_1
Contact Analysis Plots – Weathering contacts





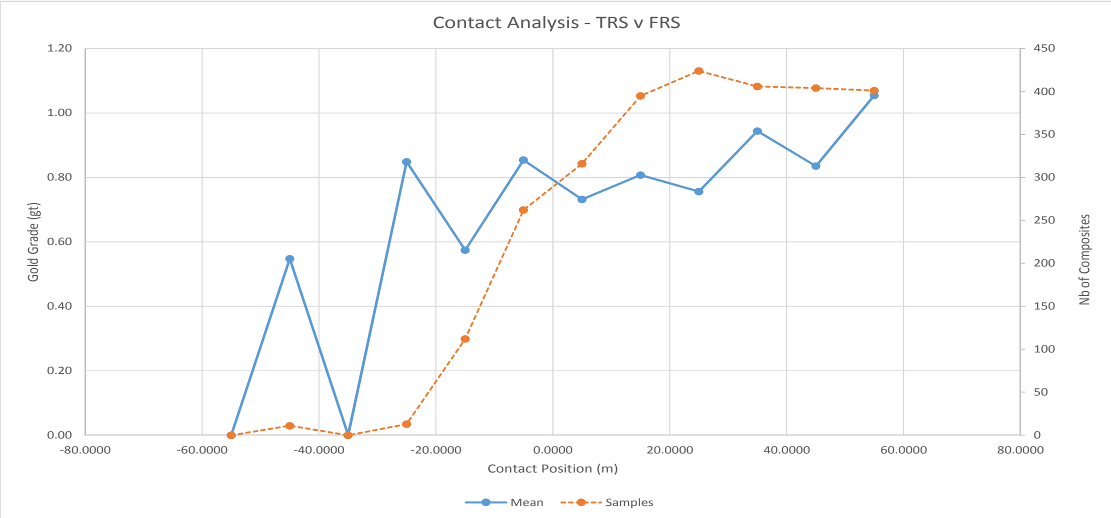


Figure 5.3_1

Contact Analysis Plots – Lithology Contacts

5.4 High Grade Outliers Analysis

High grade, possible outlier, gold grade data was reviewed to determine the need for high-grade cutting. Relatively few high grade composites exist in the drill hole database. The approach taken is as follows:

- Review the distribution plots to determine any deviation of the high grade data from the sample distribution.
- Review of the contribution of high grade data to the mean and metal of the domain.
- Review the relative clustering of the higher grade data to determine if the high grade data were isolated or grouped with other high grade data.

Based on this review, a high grade cut (cap) of 15gt Au was selected. As shown in the statistical summary of pre and post high cutting composites presented in below in Table 5.4_1, 16 composites have been cut, which has reduced the mean grade by 4.5%. Outlier charts are provided as Figure 5.4_1 and show the relative spatial location and impact these outliers have on the data distribution. Figure 5.4_2 shows histograms (normal and log) and log probability lots of the cut gold 3m composites.

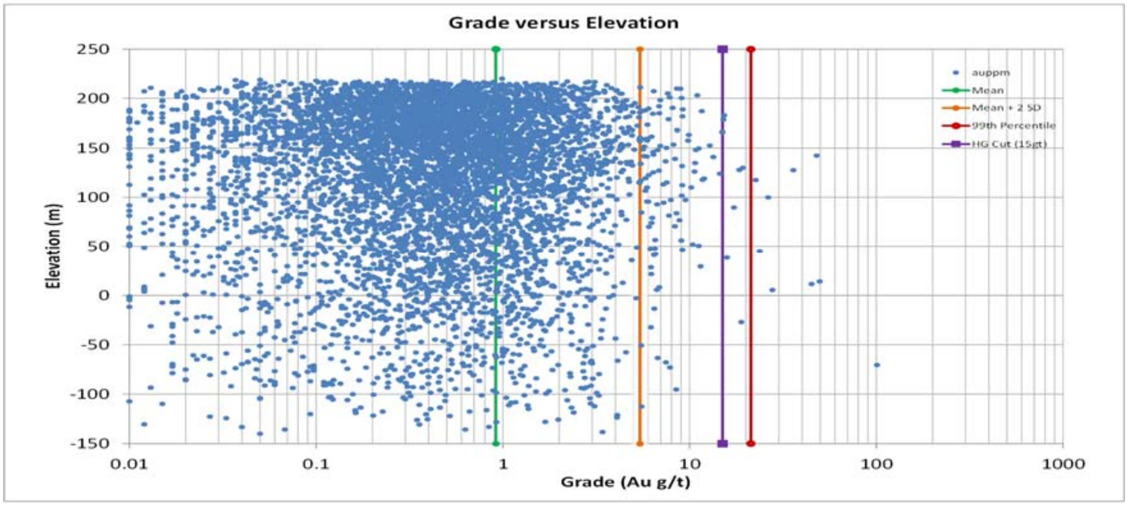
Table 5.4_1

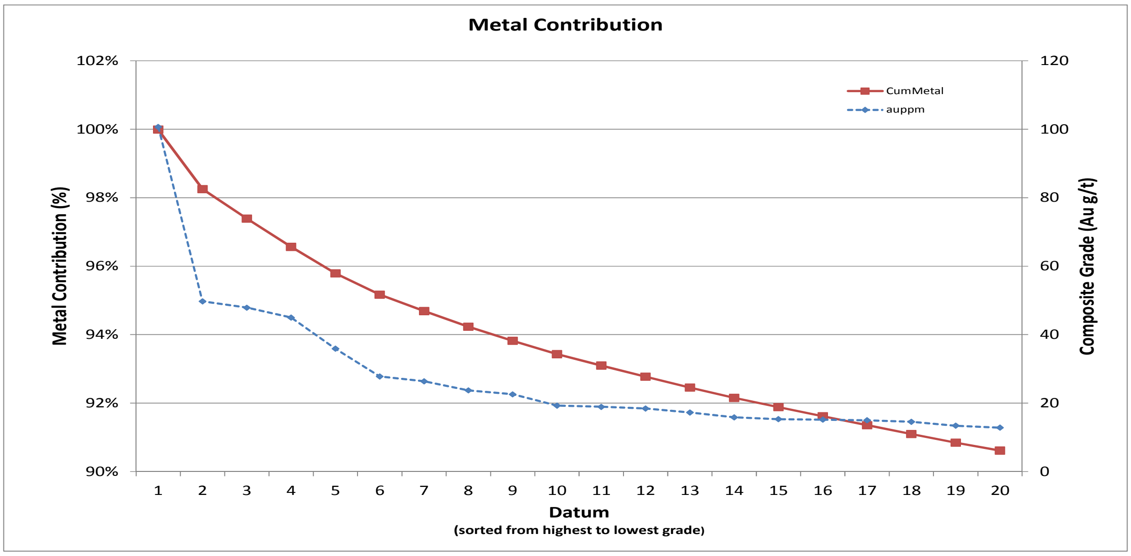
Summary of High Grade Cutting – 3m Run Length Composites (Au g/t) – Declustering Applied

Zone No	Prior to Cut					HG Cut	Nº Cut	Post Cut			% Diff
	Numb	Max	Mean	Std Dev	CV			Mean	Std Dev	CV	Mean
Min Zone	6306	100.70	0.92	2.25	2.45	15	16	0.88	1.44	1.65	4.5%

Figure 5.4_1

Estimation Domain - Outlier Analysis 3m Composites (Au g/t)





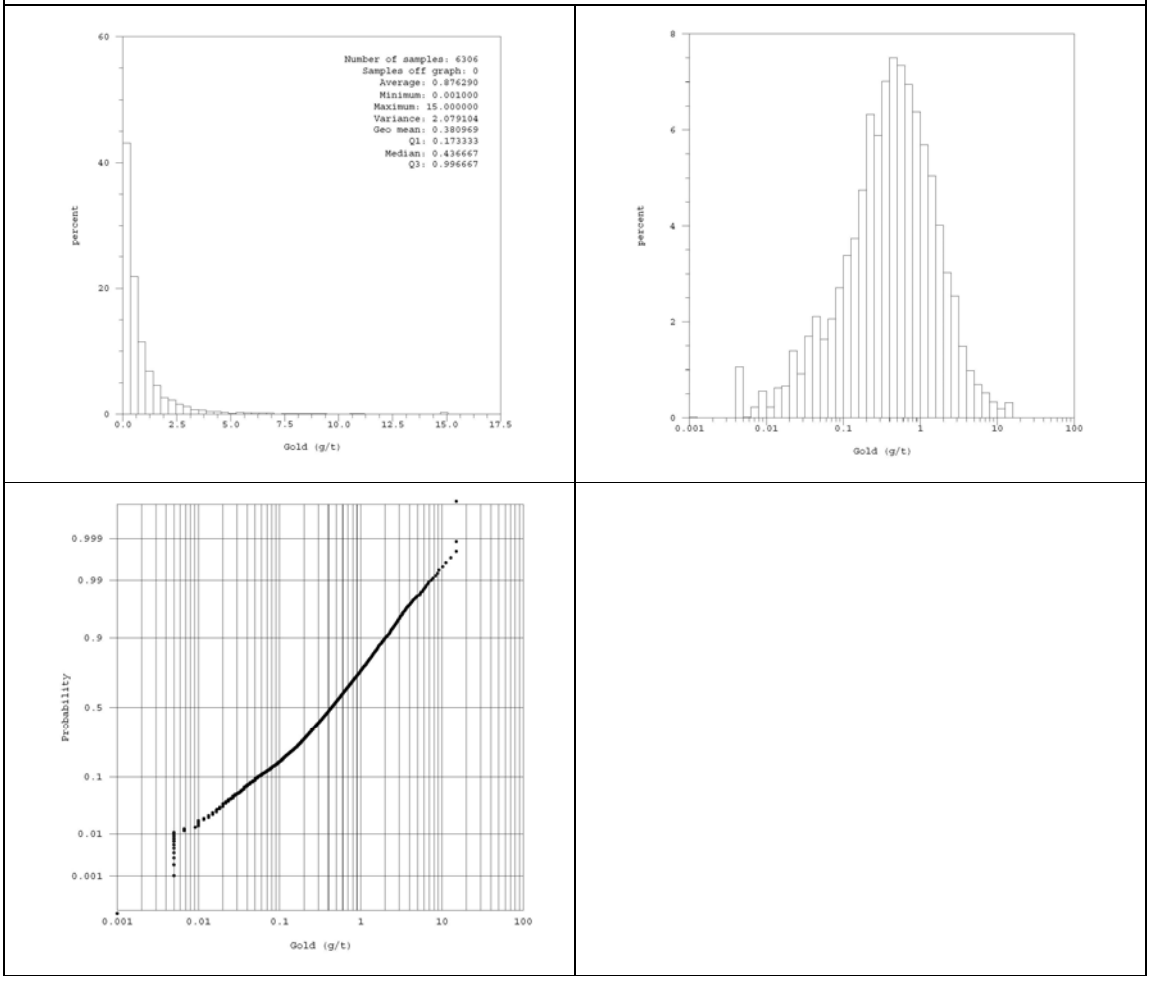
5.5 Exploratory Data Analysis (EDA)

Summary statistics were generated based on 3m composites within the estimation domain as shown in Table 5.5_1. Figure 5.4_1 provides the histogram, log histogram and log probability plot of the 3m composite data.

Table 5.5_1
Summary Statistics – Gold (g/t) 3m Composites Grouped by Estimation Domain
(Not declustered)

Domain	Count	Minimum	Maximum	Mean	Std. Dev.	CV
Waste	2157	0.001	103.09	0.20	2.89	14.26
Min Zone	6306	0.001	100.70	0.92	2.25	2.45
Min Zone – High Grade Cut	6306	0.001	15	0.88	1.44	1.65

Figure 5.5_1
Histogram of Estimation Domain 3m Composite Data – Au g/t (high grade cut 15 gt)



Descriptive and distribution statistics were generated for the total data set and also grouped by lithology and weathering as shown in Tables 5.5_2 and 5.5_3. A box plot of the composite data is shown as Figure 5.5_2 grouped by weathering.

The metavolcanic and granite composites are similar in tenor (when high grade cuts are applied), with the diorite the next highest data set and the metasediments being the lowest tenor mineralisation. While the metavolcanics and granites are the highest grade lithologies the grade change is gradational between the relatively lithologies.

Table 5.5_2

Summary Statistics (Gold g/t) – 3m Composites Grouped by lithology

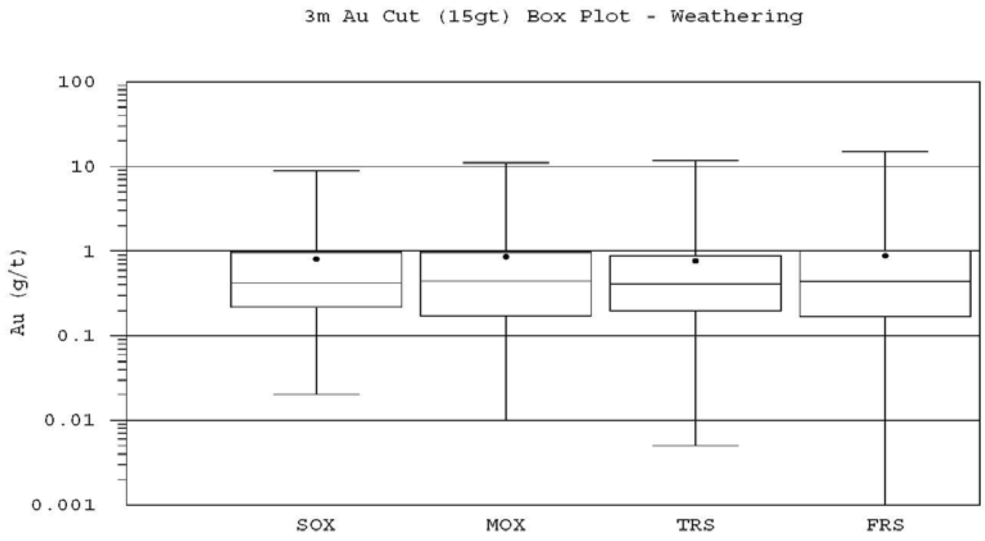
Lithology Code	CODE	Count	Minimum	Maximum	Mean	Std. Dev.	Coeff. of Var.
Uncut Data							
10	GRA	1289	0.00	100.70	0.99	3.47	3.51
20	MVO	4414	0.01	49.73	0.92	1.84	2.00
30	DIO	563	0.01	27.78	0.78	1.59	2.05
40	MSE	40	0.01	4.23	0.51	0.78	1.53
High Grade Cut Applied							
10	GRA	1289	0.00	15.00	0.87	1.37	1.57
20	MVO	4414	0.01	15.00	0.90	1.49	1.66
30	DIO	563	0.01	15.00	0.75	1.26	1.68
40	MSE	40	0.01	4.23	0.51	0.78	1.53

Table 5.5_3

Summary Statistics (Gold g/t) – 3m Composites Grouped by Weathering

Weathering Code	CODE	Count	Minimum	Maximum	Mean	Std. Dev.	Coeff. of Var.
Uncut Data							
100	SOX	218	0.02	8.93	0.81	1.09	1.35
70	MOX	309	0.01	11.00	0.86	1.26	1.45
50	TRS	400	0.01	11.62	0.77	1.15	1.50
10	FRS	5379	0.00	100.70	0.94	2.38	2.55
High Grade Cut Applied							
100	SOX	218	0.02	8.93	0.81	1.09	1.35
70	MOX	309	0.01	11.00	0.86	1.26	1.45
50	TRS	400	0.01	11.62	0.77	1.15	1.50
10	FRS	5379	0.00	15.00	0.89	1.48	1.67

Figure 5.5_2
Box Plot grouped by Weathering of 3m Composite Data – Au g/t (high grade cut 15 gt)



	SOX	MOX	TRS	FRS
Min	0.020	0.010	0.005	0.001
Q1	0.220	0.172	0.200	0.170
Median	0.420	0.443	0.410	0.440
Q3	0.967	0.967	0.885	1.003
Max	8.933	10.997	11.617	15.000
Mean	0.806	0.863	0.767	0.888
SD	1.087	1.255	1.153	1.483
Samples	218	309	400	5379

The declustering has been completed using cell declustering and has applied a cell size of 30mE x 50mN x 10mRL rotated 200°. The declustering approach is considered appropriate to enable representative histogram generation and change of support analysis.

The impact of the composites was small, however the declustered mean grade increased with declustering as a lower grade area in the south of the deposit (see drillhole location plan in Figure 3.2_1) has been relatively more densely drilled. Table 5.5_4 provides the summary statistics of the 3m composite data both clustered and declustered.

Table 5.5_4
Summary Statistics – Gold (g/t) 3m Composites Grouped by Declustering

Declustered	Count	Minimum	Maximum	Mean	Std. Dev.	CV
No	6306	0.001	15	0.88	1.44	1.65
Yes	6306	0	15.0	0.89	1.49	1.67

5.6 Indicator Statistics

To enable grade estimation by indicator kriging methods, indicator thresholds were selected and intra-class statistics generated. The selection of indicator thresholds was based on discretising the data population while selecting additional high grade indicator thresholds for the higher grade portions of the distribution which are critical for estimating the deposit metal. Table 5.6_1 presents the indicator statistics.

Table 5.6_1

Indicator Thresholds and Interclass Statistics

(Grouping as applied for variography calculation)

Domain	Threshold	Nb Data	Min	Max	Mean	Std Dev
Q10	0.05	565	0.00	0.05	0.02	0.01
Q20	0.13	694	0.05	0.13	0.09	0.02
Q30	0.22	676	0.13	0.22	0.18	0.03
Q40	0.32	622	0.22	0.32	0.27	0.03
Q50	0.44	612	0.32	0.44	0.38	0.03
Q55	0.51	303	0.44	0.51	0.48	0.02
Q60	0.60	315	0.51	0.60	0.55	0.02
Q65	0.70	315	0.60	0.70	0.65	0.03
Q70	0.83	316	0.70	0.83	0.77	0.04
Q75	1.00	316	0.83	1.00	0.91	0.05
Q80	1.22	311	1.00	1.22	1.10	0.06
Q85	1.51	314	1.22	1.51	1.36	0.08
Q90	2.00	312	1.51	2.00	1.73	0.14
Q92.5	2.41	164	2.00	2.41	2.22	0.12
Q95	3.01	155	2.42	3.01	2.71	0.17
Q97	3.99	126	3.01	3.98	3.40	0.27
Q99	7.27	127	3.99	7.27	5.36	0.97
>99		63	7.43	15.00	10.99	2.82

6 VARIOGRAPHY

Variography is used to describe the spatial variability or correlation of an attribute (Au, Ni, Cu etc). The spatial variability is traditionally measured by means of a variogram, which is generated by determining the averaged squared difference of data points at a nominated distance (h), or lag. The averaged squared difference (variogram or γ(h)) for each lag distance is plotted on a bivariate plot, where the X-axis is the lag distance and the Y-axis represents the average squared differences (γ(h)) for the nominated lag distance. The term variogram will be used as a generic term to describe **all spatial measures** in this document.

Several types of variogram calculations are employed to determine the directions of the continuity of the mineralisation:

- Traditional variograms are calculated from the raw assay values and Gaussian transformed data, with back transformation into real space.
- Correlograms are 'standardized' by the variance calculated from the sample values that contribute to each lag.

The variography was calculated and modelled in the Isatis geostatistical software package, Isatis and also using the Vulcan mining software package. Variography was generated for the gold grade data and the indicator thresholds All variography is based on the 3m downhole composites. High grade cuts were applied to the composites prior to generating the variography, as described in Section 5.3.

Variography has been generated using the composted gold data and as Gaussian transformed data, which required the model to be back-transformed to real space. In addition, correlograms have been generated and modelled for the gold grade data as a check. The back transformed Gaussian variogram has been used as the gold variogram. Indicator variograms have been generated as correlograms.

A summary of the key aspects of the variography is provided in bullet form below:

- All variography has been oriented consistent with the mineralised zone interpretation and has been modelled with south-southeast strike and moderate westerly dip (Azimuth=200.00 Dip=60.00 Pitch=0.00). This is consistent with field observations.
- The relative nugget (the percentage of the nugget variance relative to the total variogram variance) for the gold variogram has been modelled at 42%. This is considered typical for this style of gold deposit, where relative nuggets are generally 40% and above.
- The short-range structures generally contribute a significant portion of the non-nugget variance, and have been fitted with a range approximating the drill spacing (approximately 20m to 30m) or less.
- Overall ranges are noted to be in excess of the current drill spacing. A maximum major axis range of 115m has been fitted with the semi-major range of up to 87m also fitted. The minor axis range has been fitted with ranges between 7.5m and 33.5m.

- The variogram model relationship for the indicators is shown in Figures 6.1_3. Relative nuggets range from a low of 35% at the median to 69% for high grade thresholds. Extended ranges of up to 100m are modelled for the low grade thresholds while the highest grade variograms are relatively poorly structured and the models are inferred.

The variogram models fitted are provided in Table 6.1_1. The modelled Au variograms are presented in Figures 6.4_1 to 6.4_2 for this domain.

Table 6_1

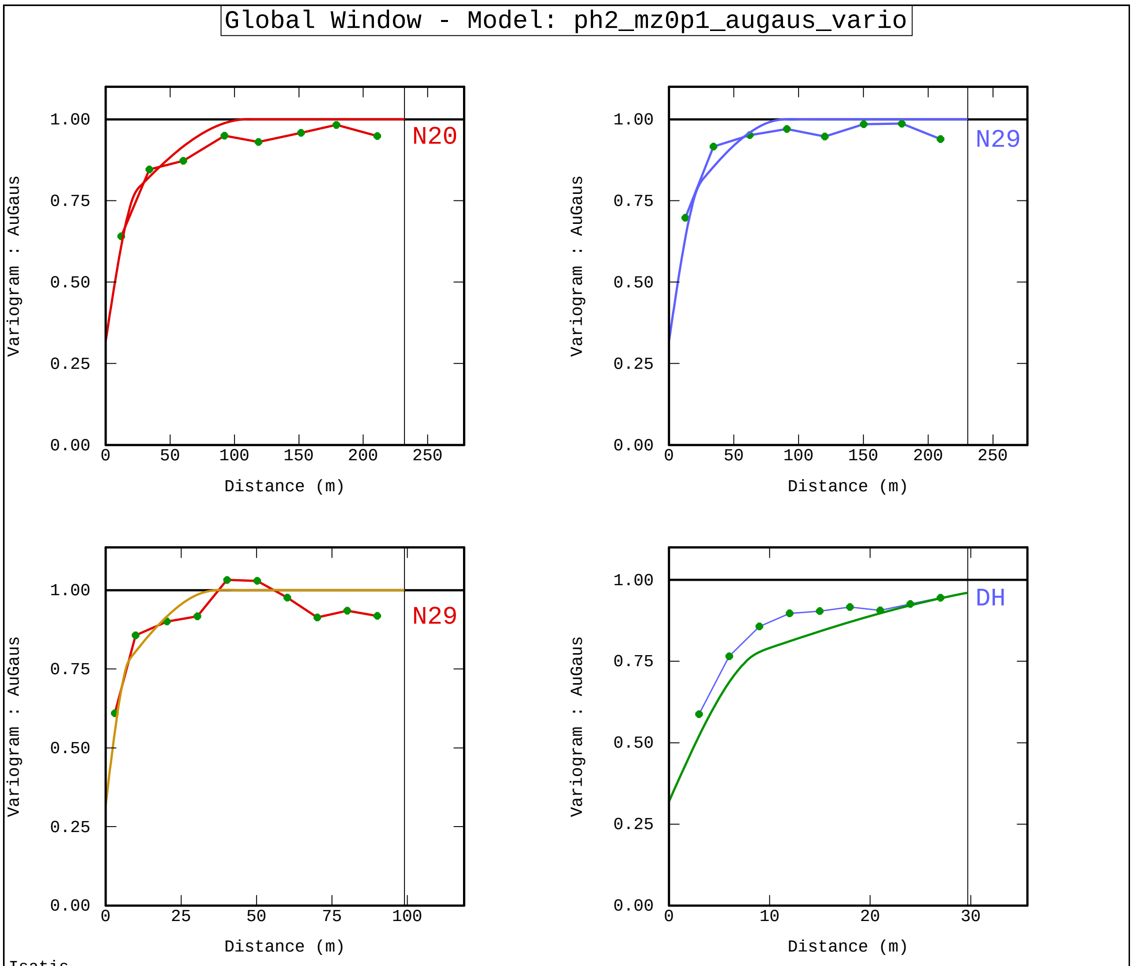
Gold and Indicator Variogram Models
Normalised Sill (Indicators)

Rotation Azimuth=200.00 Dip=60.00 Pitch=-0.00 (Geologist)

Variable	C0	C1	Range 1			C2	Range 2		
			X	Y	Z		X	Y	Z
Au Gaus (BT)	**0.87**	**0.74**	**32**	**23**	**7.5**	**0.467**	**115**	**87**	**33.5**
0.053	0.47	0.40	26.6	20.5	10.2	0.13	100.4	75.6	50.8
0.133	0.42	0.43	25.5	20.5	10.2	0.15	99.7	75.6	50.8
0.218	0.42	0.40	28.4	20.5	11.3	0.18	99.7	75.6	44.1
0.317	0.40	0.43	28.4	20.5	10.6	0.17	89.8	78.9	39.1
0.437	0.35	0.48	28.0	20.5	10.5	0.17	87.3	78.9	35.2
0.507	0.35	0.48	28.0	20.5	10.5	0.17	89.3	85.9	35.2
0.597	0.37	0.46	28.8	20.5	10.5	0.18	89.1	74.8	35.2
0.700	0.37	0.44	27.7	15.1	9.8	0.19	84.4	71.3	33.9
0.833	0.44	0.41	26.3	15.1	10.2	0.16	84.4	71.3	30.3
0.993	0.46	0.38	26.3	15.1	10.2	0.16	84.4	71.3	30.3
1.213	0.48	0.36	26.3	15.1	10.9	0.17	84.4	62.1	30.3
1.513	0.50	0.36	22.0	19.4	10.9	0.13	70.6	62.5	30.3
2.038	0.55	0.32	22.0	18.7	9.9	0.12	62.4	60.9	30.3
2.433	0.58	0.28	18.4	18.3	8.5	0.14	61.4	60.2	27.5
3.033	0.61	0.24	15.3	18.3	8.5	0.15	49.0	59.0	27.5
4.047	0.63	0.30	14.9	16.0	8.5	0.08	49.7	54.4	22.2
7.267	0.69	0.24	14.9	12.9	4.6	0.07	30.0	30.0	12.0

Figure 6_1

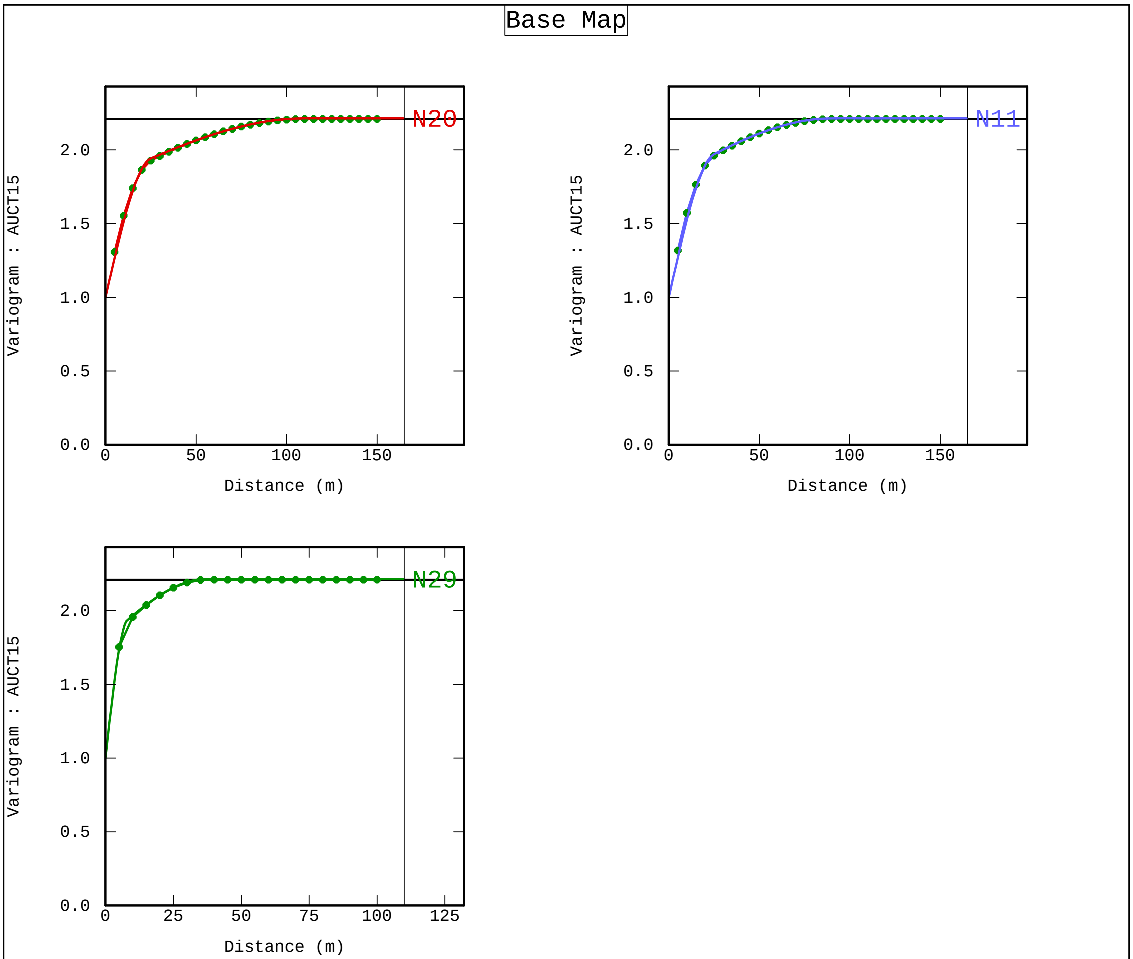
Modelled Gold Variogram (Gaussian)




```
Isatis
Comps/3mest_lns(Sel_Zone_0p1{1})                                    Owner
- Variable #1 : AuGaus
Variogram : in 4 direction(s)                                  Sep 09 2016    11:28:50
D1   : N200                                                         Namdini
      Angular tolerance =   22.00
      Lag =  30.000m, Count = 8 lags, Tolerance = 50.00%
      Horizontal Slicing =  100.000m
      Vertical Slicing =  100.000m
D2   : N290 D60
      Angular tolerance =   22.00
      Lag =  30.000m, Count = 8 lags, Tolerance = 50.00%
      Horizontal Slicing =  100.000m
      Vertical Slicing =  100.000m
D3   : N290 D-30
      Angular tolerance =   22.00
      Lag =  10.000m, Count = 10 lags, Tolerance = 50.00%
      Horizontal Slicing =  100.000m
D4   : DH
      Angular tolerance =   45.00
      Lag =  3.000m, Count = 10 lags, Tolerance = 50.00%
Model : 3 basic structure(s)
Global rotation = Azimuth=N200.00 Dip=60.00 (Geologist Plane)
S1   - Nugget effect, Sill =       0.32
S2   - Spherical - Range = 8.000m, Sill =       0.36
      Directional Scales = (      25.000m,      25.000m,       8.000m)
S3   - Spherical - Range = 37.000m, Sill =       0.32
      Directional Scales = (     110.000m,      90.000m,      37.000m)
```

Figure 6_2

Modelled Gold Variogram (Back Transformed)



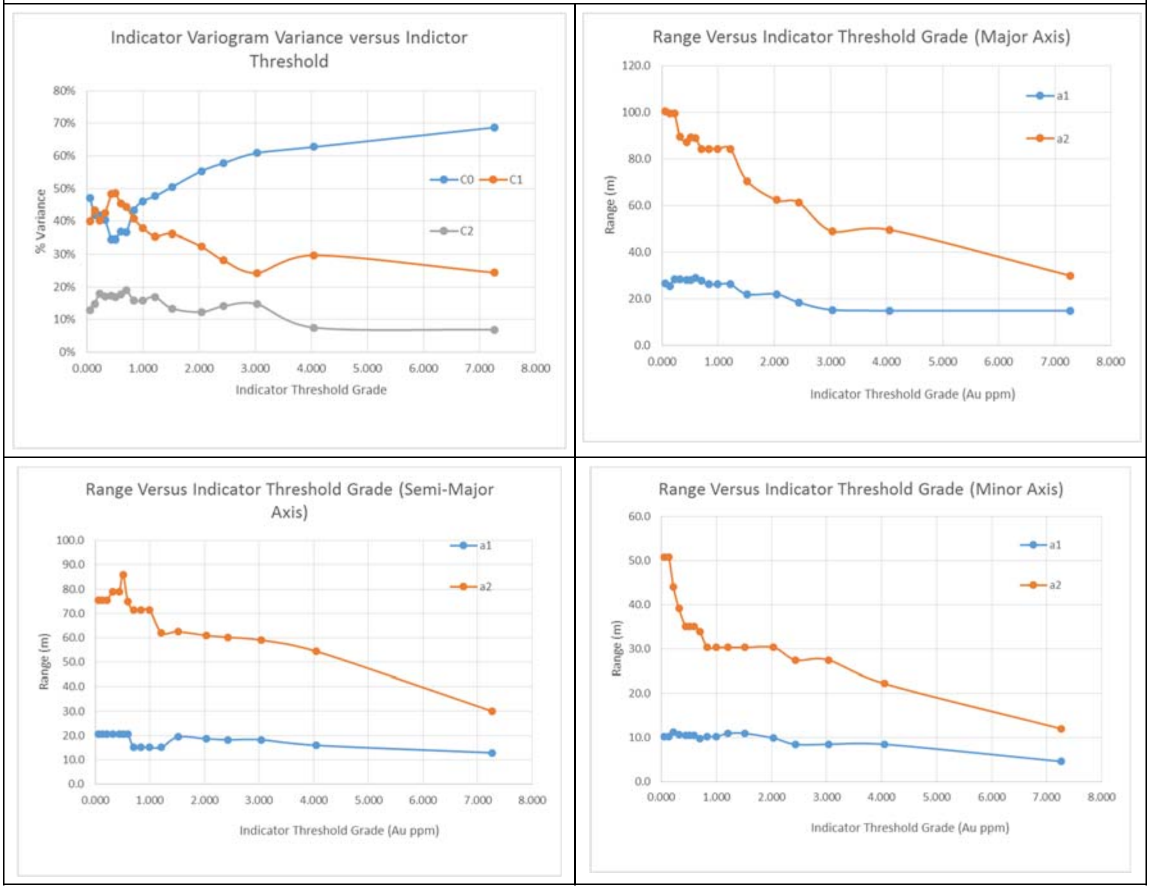

```
Isatis
Comps/3mest_lns(Sel_Zone_0p1{1})
- Variable #1 : AUCT15
Variogram : in 3 direction(s)
D1  : N200
      Lag =  5.000m, Count = 30 lags
D2  : N110 D-60
      Lag =  5.000m, Count = 30 lags
D3  : N290 D-30
      Lag =  5.000m, Count = 20 lags
Model : 3 basic structure(s)
Global rotation = Azimuth=N200.00 Dip=60.00 (Geologist Plane)
S1  - Nugget effect, Sill =          1
S2  - Spherical - Range = 8.000m, Sill =      0.805
      Directional Scales = (      25.000m,      25.000m,       8.000m)
S3  - Spherical - Range = 37.000m, Sill =       0.41
      Directional Scales = (     110.000m,      90.000m,      37.000m)
```

Owner

Sep 09 2016   11:31:19

Namdini

Figure 6_3
Indicator Variography – Sill/Variance and Range relationship



7 BLOCK MODEL DEVELOPMENT

A series of block models were developed based on the geological interpretation. Three block models have been generated.

The grade is based a panel model, generated to allow MIK grade estimation, using a parent size of 20mE by 50mN by 10mRL. The panel dimension are approximately half the drill spacing in the easting direction and the approximate drill spacing in the northing and is considered appropriate for high confidence grade estimation. This model was been sub-blocked to the selective mining unit (SMU) size of 5mE by 10mN by 5mRL to allow better volume representation of the geological interpretation. The MIK grade estimate was localised (see Section 8 of this report) to the 5mE by 10mN by 5mRL block size.

Subsequent to the grade estimation, a waste model was generated with panel block dimensions of 20mE by 20mN by 10mRL with sub-blocking completed to 5mE by 10mN by 5mRL, as summarised in Table 7_1. The local MIK SMU model (regular 5mE by 10mN by 5mRL SMU grade estimate) described above was then added to the waste model in order to generate the final block model. This final model was generated with a reduced parent cell size to ensure sufficient resolution for mine planning.

Table 7_1
Final Block Model Construction Parameters

	Origin	Extent	Parent Cell Size (m)	Sub-Cell Size (m)
East	756600	1600	20	5
North	1176100	1900	20	10
Elevation	-200	500	10	5

The block model volumes were reported and checked against the wireframes to ensure robust coding of the model. The model accurately replicates the wireframes as shown in Tables 7_2 which presents the comparative volume data (model versus wireframes) for lithology and weathering.

All variables necessary to record the domain coding, grade estimates and related estimation statistics, density assignments and resource category assignments were incorporated into the block model.

Table 7_2 Model versus Wireframe Volumes				
Region	**Wireframe Volume (m3)**	**Block Model Volume (m3)**	**Difference (M3) (m)**	**% Difference**
Lithology				
Granite	17,616,394	17,608,250	8,144	0.0462%
Metavolcanics	128,891,530	128,822,000	69,530	0.0539%
Diorite	47,837,171	47,841,250	-4,079	-0.0085%
Metasediments	1,045,950,725	1,045,943,500	7,225	0.0007%
Oxidation				
SOX	16,956,264	16,941,250	15,014	0.089%
MOX	15,170,473	15,021,750	148,723	0.980%
TRANS	30,310,968	30,301,750	9,218	0.030%
FRESH	1,177,868,610	1,177,950,250	-81,640	-0.007%

Bulk density was assigned on the basis of the bulk density database and assumptions for the weathering and lithology. The bulk density values assigned to the block model is summarised in Table 7_3.

Table 7_3 Bulk Density Assignment					
		Lithology			
		Granite	**Metavolcanics**	**Diorite**	**Metasediments**
Weathering	**SOX**	1.80	1.80	1.80	1.80
	MOX	2.20	2.00	2.00	2.20
	TRANS	2.52	2.57	2.52	2.60
	FRESH	2.73	2.82	2.83	2.83

8 GRADE ESTIMATION

Gold grades were generated by Multiple Indicator Kriging (MIK) with a change of support to produce a selective mining model. The grade estimation was completed using the Vulcan mining software package while the geostatistical parameters have been generated in the Isatis geostatistical software package.

EGRM consider MIK to be an appropriate resource estimation technique based on a review of the data and the geostatistical investigations. Significant levels of short scale variability (the nugget effect plus variability between adjacent holes) were noted in geostatistical analysis which are considered to make deterministic grade/zone interpretation problematic whereas MIK is considered to be a much more appropriate estimation technique.

The MIK SMU model was then processed using a localising process (Abzalov, 2006) to convert the panel MIK to a SMU sized blocks.

8.1 Estimation Method

The MIK technique is implemented by completing a series of OK estimates of binary transformed data. A composite datum, which is equal to or above a nominated cutoff or threshold, is assigned a value of 1, with those below the nominated indicator threshold being assigned a value of 0. Variography is computed and modelled on these binary transformed datasets to determine kriging parameters, with a series of OK estimates then undertaken for each of the nominated indicator thresholds using the transformed datasets.

The indicator estimates, with an inclusive range between 0 and 1, represent the probability the point will exceed the indicator cutoff grade. The probability of the points exceeding a cutoff can also be considered equivalent to the proportion of a nominated block that will exceed the nominated cutoff grade.

The estimation of a complete series of indicator cutoffs allows the reconstitution of the local histogram or conditional cumulative distribution function (ccdf) for the estimated block. This, therefore, allows the investigation of a series of local or block properties, such as the block mean of the grade (termed the E-type estimate) and proportion (tonnes), above or below a nominated cutoff grade.

A SMU model can be generated using a combination of mean grades for the lower grade bins and the high grade cut declustered gold grade for the upper bin and a change of support as discussed in Section 8.3 of the report. The SMU modelling emulated mining units of 5mE by 10mN by 5mRL.

8.2 Parameters

Grade estimation within the interpreted mineralised envelopes was undertaken by MIK, based on the 3m composite gold data for each domain. Kriging parameters were determined from the variography and a sample search routine based on detailed neighbourhood testing. Grade was generally interpolated in three passes with the sample search parameters expanded by 50% for each pass. A 4th estimation was completed to ensure all areas of the mineralisation domain was estimated, however the majority of these blocks, estimated during Pass 4, were excluded during resource classification. **Note any blocks in excess of 75m from data were excluded from resource reporting as an additional grade-tonnage reporting constraint.**

The estimation sample searches applied to MIK grade estimation are summarised below:

- 1st pass: a sample search of 50m by 50m by 30m with a minimum of 16 and maximum of 32 composites, and a maximum of 6 composites per drillhole used in the estimation.
- 2nd pass: a sample search of 75m by 75m by 45m with a minimum of 16 and maximum of 32 composites, and a maximum of 6 composites per drillhole used in the estimation.
- 3rd pass: a sample search of 100m by 100m by 60m, minimum of 10 and maximum of 32 composites, and a maximum of 6 composites per drillhole used in the estimation.
- 4th pass: a sample search of 150m by 150m by 90m, minimum of 8 and maximum of 32 composites, and a maximum of 6 composites per drillhole used in the estimation.

Grade estimation was generated using a block discretisation of 4 X by 6 Y by 4 Z. Searches were oriented to the direction of the variography with the major axis (strike) oriented 200°, the semi-major axis (dip) oriented -60°(towards 290) and the minor axis (plunge) oriented 0°.

8.3 Change of Support

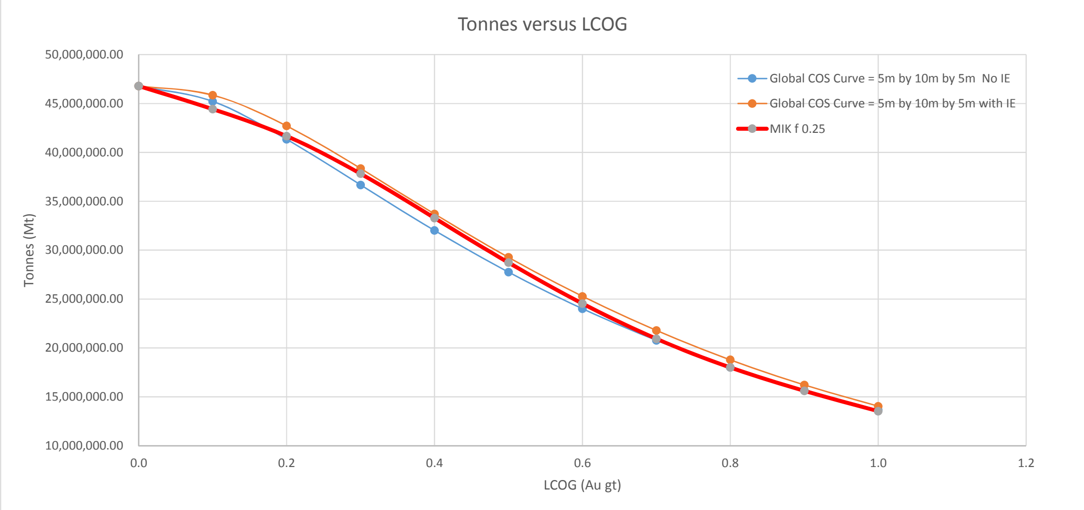
A change of support was applied to the MIK estimate which produces a resource reflecting the anticipated mining selectivity. The objective when estimating local recoverable resources is to obtain the proportion of ore above a particular cutoff grade within panels large enough for robust estimation. An indirect log normal change of support was used to estimate a selective mining unit (SMU) of 5mE by 10mN by 5mRL. A change of support coefficient (f) of 0.25 was applied.

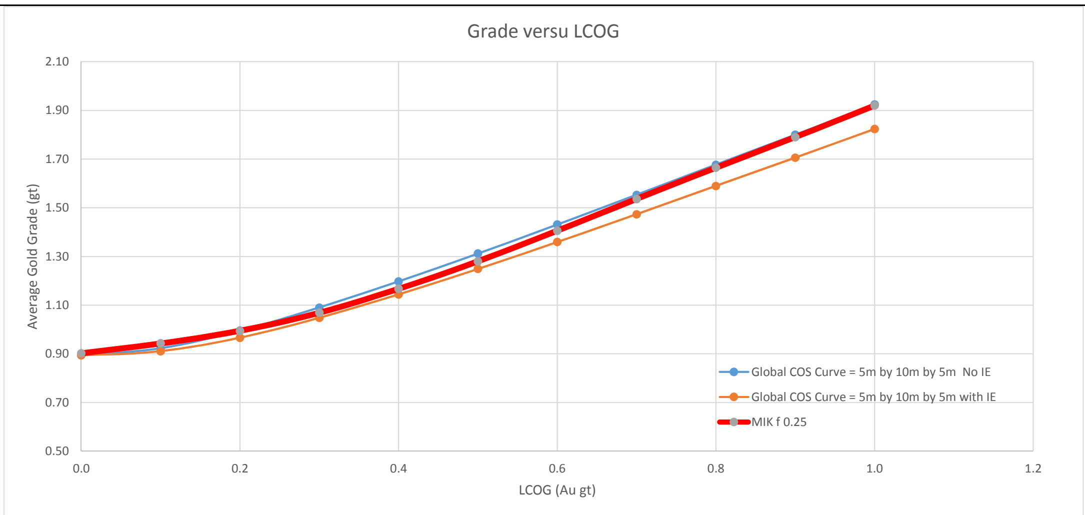
The MIK estimate with the change of support applied was compared against a global change of support correction generated using the discrete Gaussian change of support for validation. Information effect using 10mE x 10mN x 2mRL grade control sampling pattern was applied to the global change of support. Information effects model the errors made when defining ore/waste boundaries in mining with imperfect grade control drilling. The result of the inclusion of the information effect is to reduce the modelled mining selectivity. The comparison of the MIK with the global change of support is provided as Figure 8.3_1.

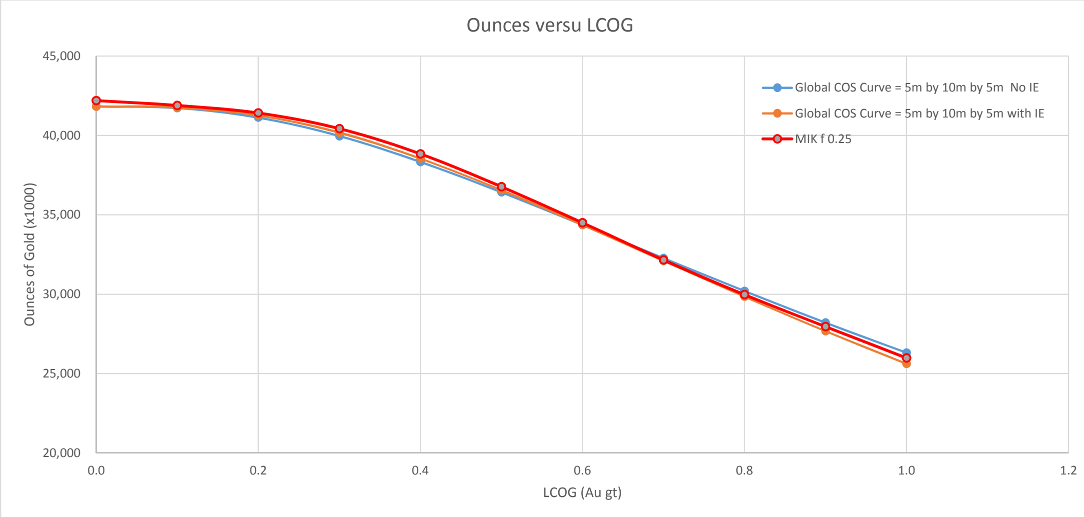
Acceptable levels of correlation are noted for the tonnage, grade and ounces for the lower cutoff grade range targeted (0.3gt to 0.6gt). The MIK appears overly slightly selective above and below these cutoff grades. While the change of support is considered robust for the targeted SMU, effective grade control and mining practises are required to reproduce this level of selectivity. If a more selective mining approach is to be modelled, the change of support and information effect parameter, based on the level of grade control drilling required, will require reassessment. Addition drilling data is required to investigate these potential changes.

Figure 8.3_1

MIK versus Global Change of Support Comparison







8.4 Local MIK Processing

The MIK grade estimate represents a series (multiple) of probabilities (proportions or tonnes) and grades above or below a nominated cutoff grade for a targeted SMU block size. These estimates are generated in larger panels (big blocks). Local post-processing of the MIK aims at providing a more “intuitive” presentation of these results by producing a single SMU block grade. The main idea consists in assigning to each SMU sized block a grade such that the distribution of block grades in the panel matches the local grade tonnage curve estimated by MIK.

The MIK estimate was localised to SMU blocks applying the geostatistical software Isatis applying a ranking Ordinary Kriging (OK) grade estimate. The grade tonnage reports of the panel MIK estimate and local MIK estimate were compared as part of validation.

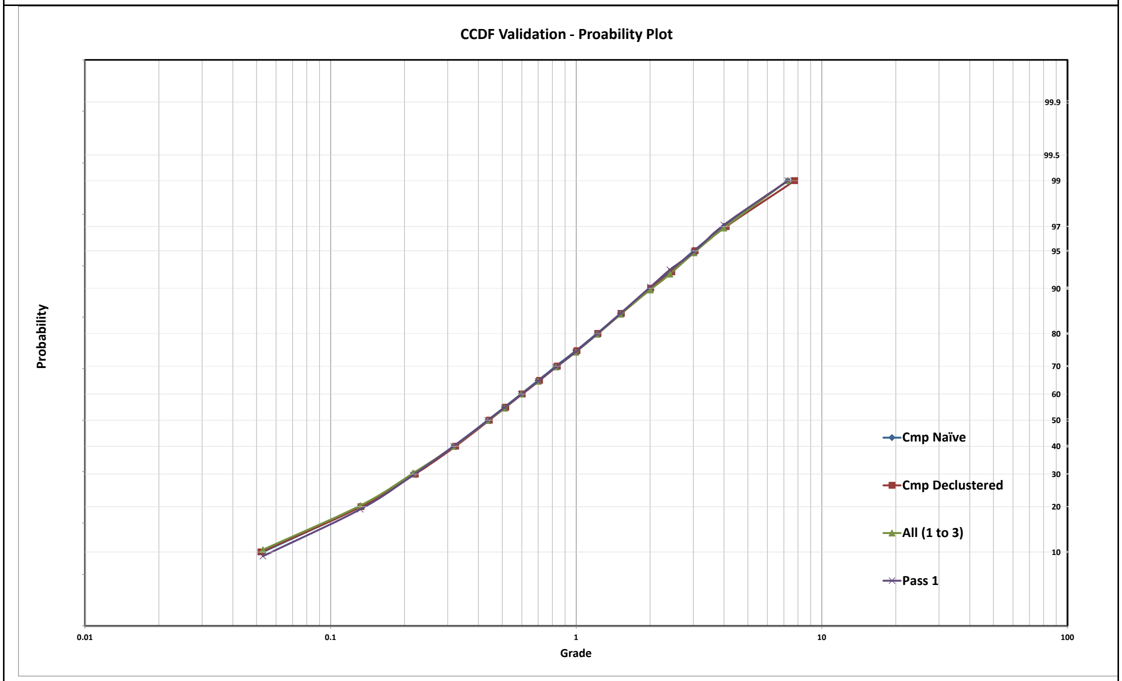
8.5 Validation

Validation of the grade estimate was completed visually and statistically. The validation included a visual comparison of the input data against the model. The statistical review included a comparison of the mean grade of the input composites against the model grade.

A preliminary validation step was completed, comparing the input composites (both not declustered and declustered) against the MIK grade estimate prior to the change of support. The MIK estimate should reproduce the input composite in a robust grade estimation. Figure 8.5_1 presents a log probability showing the MIK versus the composite data. The MIK estimate reproduces the base composites well.

Figure 8.5_1

Log Probability plot comparing the MIK estimate and 3m gold (ppm) composites (declustered and not declustered)



Visual review of the estimate versus the input composite showed the estimate to adequately map the input data where sufficient data existed. However in the regions of low data density, the estimates appeared to be less robust and showed evidence of smoothing, as evident in Easting swath plot. This review as completed in 3D and via swath plots.

Swath plots (estimation passes 1, 2 and 3 combined) are presented as Figures 8.3_2 to 8.3_4 for easting, northing and elevation slices. Naïve and declustered statistics for the input composites and the block model are presented in the swath plots and show the model reproduces the input data well.

Figure 8.3_2

Swath Plots of Local MIK E versus Composite Data – 40m Easting Slice

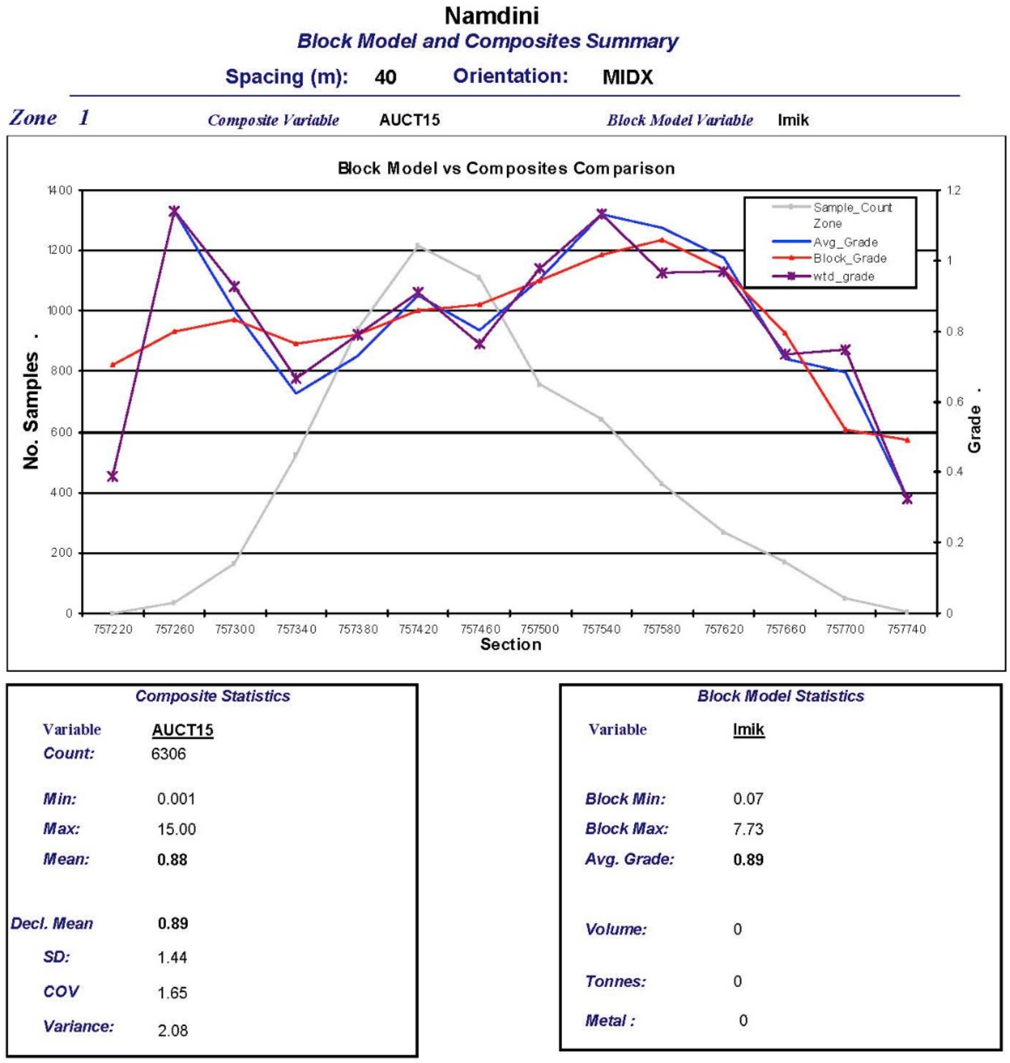


Figure 8.3_3

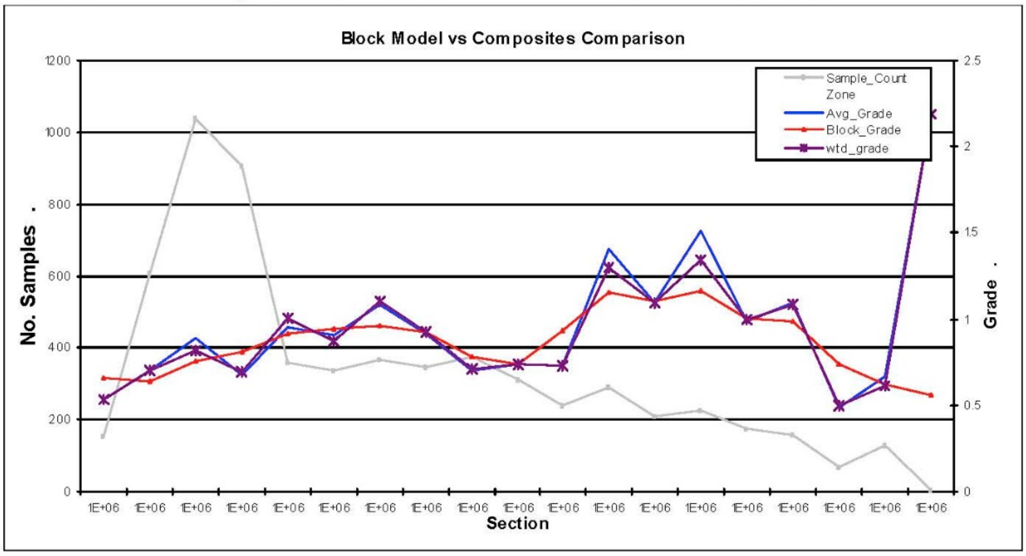
Swath Plots of Local MIK E versus Composite Data – 50m Northing Slice

Namdini

Block Model and Composites Summary

Spacing (m): **50** **Orientation:** **MIDY**

Zone 1 *Composite Variable* AUCT15 *Block Model Variable* Imik



Composite Statistics

Variable	<u>AUCT15</u>
Count:	6306
Min:	0.001
Max:	15.00
Mean:	**0.88**
Decl. Mean	**0.89**
SD:	1.44
COV	1.65
Variance:	2.08

Block Model Statistics

Variable	<u>Imik</u>
Block Min:	0.07
Block Max:	7.73
Avg. Grade:	**0.89**
Volume:	0
Tonnes:	0
Metal :	0

Figure 8.3_4

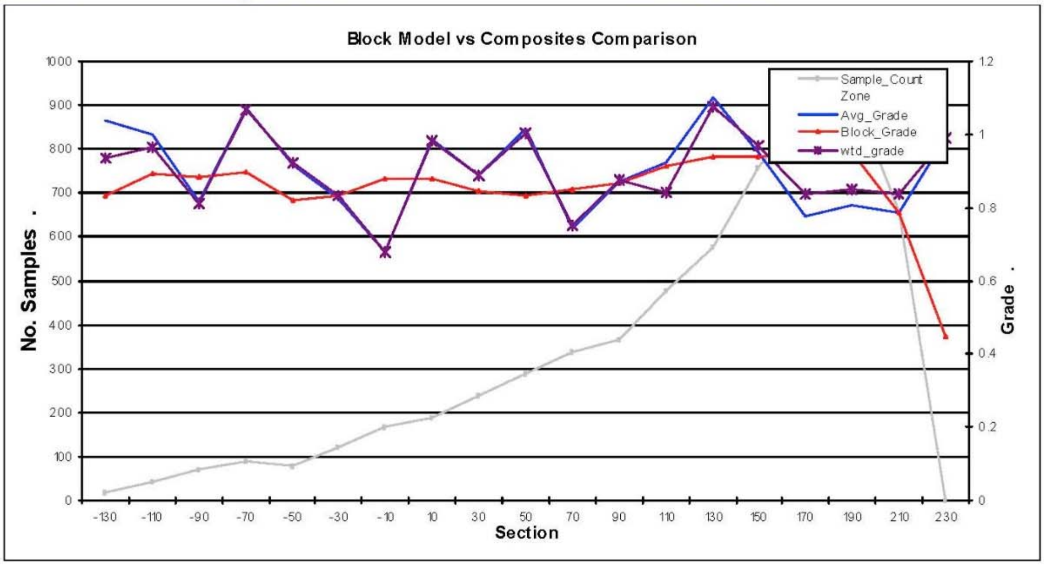
Swath Plots of Local MIK E versus Composite Data – 20m Elevation Slice

Namdini

Block Model and Composites Summary

Spacing (m): 20 **Orientation:** MIDZ

Zone 1 *Composite Variable* AUCT15 *Block Model Variable* lmik



Composite Statistics

Variable	AUCT15
Count:	6306
Min:	0.001
Max:	15.00
Mean:	**0.88**
Decl. Mean	**0.89**
SD:	1.44
COV	1.65
Variance:	2.08

Block Model Statistics

Variable	lmik
Block Min:	0.07
Block Max:	7.73
Avg. Grade:	**0.89**
Volume:	0
Tonnes:	0
Metal :	0

9 CONDITIONAL SIMULATION STUDY

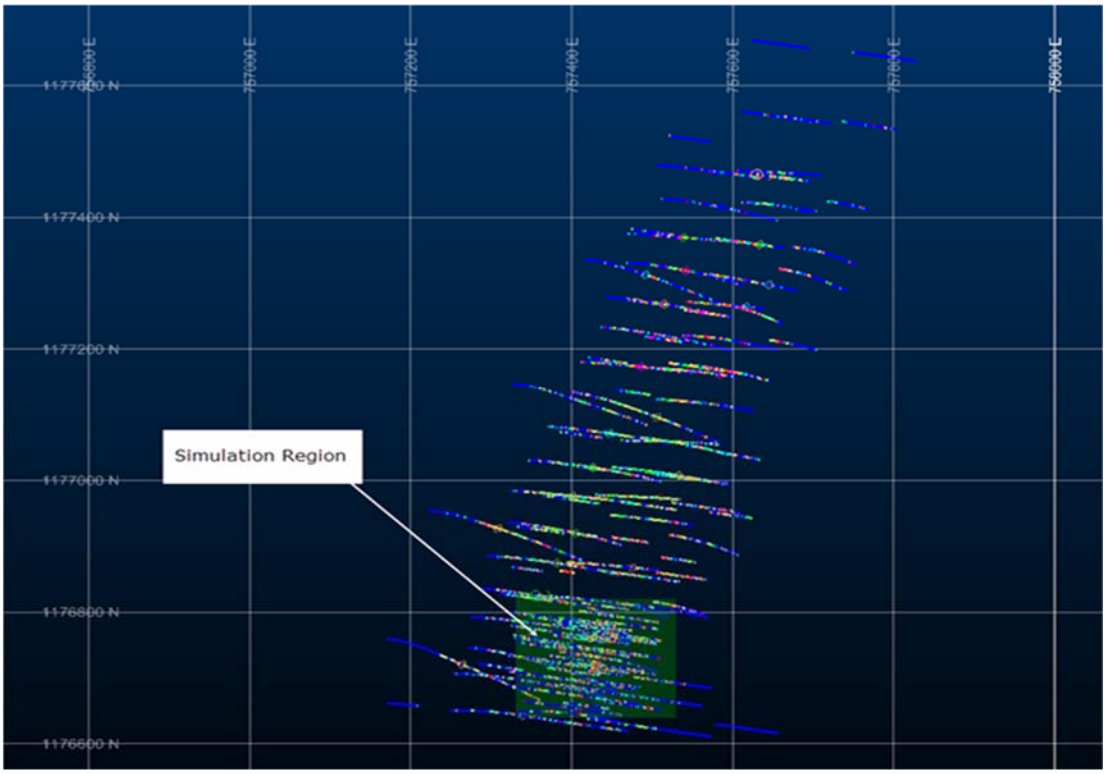
An initial, high level, conditional simulation (CS) study was completed to investigate the risk and variability related to the reported grade-tonnage estimate. The CS study was also used to provide an initial review of the effect of increasing or decreasing the level of mining selectivity.

A small region of the southern portion of the deposit has been drilled to a closer spacing (approximately 10m to 20m) compared to the average drill hole spacing for the deposit as a whole. The simulation region is shown below in Figure 9_1 and is defined in Table 9_1. It is of note that this close spaced drilling is not considered representative of the entire deposit as it is relatively lower grade, when compared to the overall Namdini deposit. This limits the applicability of the conclusions that can be made from this CS study when applied to the deposit as a whole.

Table 9_1
Conditional Simulation Study Region Extents

	Min	Max	Extent (m)
East	757330	757530	200
North	1176640	1176820	180
Elevation	60	240	180

Figure 9_1
Plan showing the drilling, the 0.1gt Au mineralisation envelope and the Conditional Simulation study region



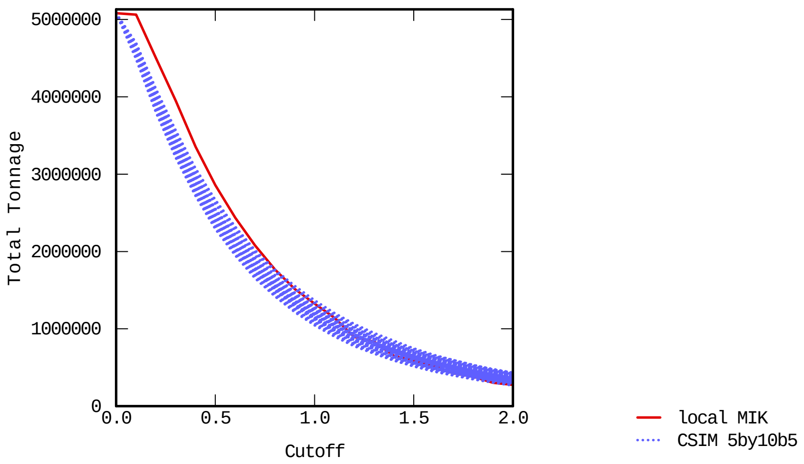
A CS model based on a point grid of 1mE by 2.5m N by 1m RL was generated using the Isatis geostatistical software package, using the Turning Band method and based on 1m down-hole composites. This simulation was used for various post processing investigations. Some 50 realisations were generated for the study.

The CS model was regularised to a 5mE by 10mN by 5mRL and 10mE by 10mN by 5mRL and compared against the localised MIK estimate. Comparative grade tonnage curves are provided as Figure 9_2 and 9_3. It is important to note that the regularised (SMU sized) CS model excludes the Information Effect, as discussed in Section 8.3 and therefore models a best-case scenario. When comparing the results of the two studies, the following observations are made:

- A more representative region of the deposit, drilled to grade control spacing, is required to improve this study and limited conclusion are drawn from this work.
- The CS model reports higher grades and lower tonnes than the comparable local MIK estimate. This can be partly explained by the CS model being exclusive of the Information Effect adjustment and also the impact of composites used in the local MIK estimate that lie outside the CS domain (ie broader domain containing more composites has been used during grade estimation for the local MIK estimate).
- The local MIK model reports grade-tonnage similar to the 10m by 10m by 5m CS Model. As discussed above, this is consistent with expectations, but represents a significant reduction in mining selectivity when compared to the MIK SMU block size.
- The CS scenarios indicate that increasing the mining selectivity modelled in the MIK results, as expected, in a reduction of tonnes and an increase in gold grade at a nominated cut off grade.
- The study indicates there is potential to increase the level of mining selectivity represented by the MIK resource model which would increase the resource grade, at the expense of tonnes, and impact the project economics. Initial cost-benefit analysis has suggested that there is little advantage in materially increasing the mining selectivity and that there may be advantages in modelling a less selective mining scenario, based on economies of scale. However, additional drilling data will be required improve the geological confidence and understanding of the 3D grade distribution to model higher levels of mining selectivity.
- The local MIK grade estimate represents a robust grade estimate inclusive of dilution.

Figure 9_2

Comparative Grade Tonnage Curves – Conditional Simulation versus Local MIK Estimate – Simulation region only – 5m by 10m by 5m CS Model



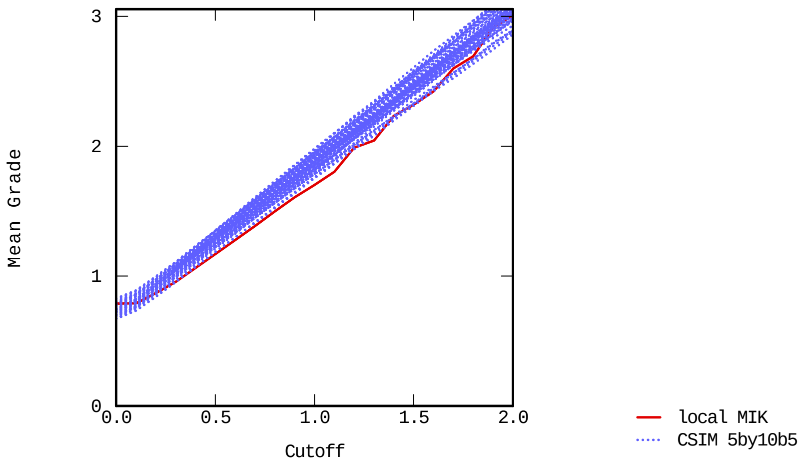
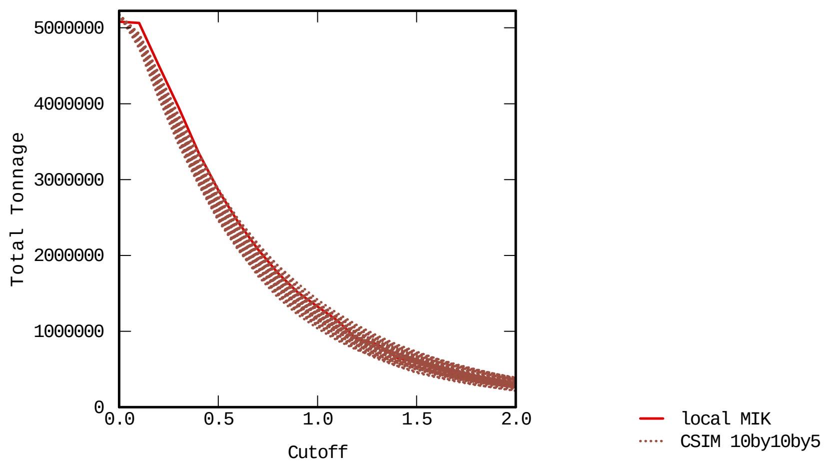
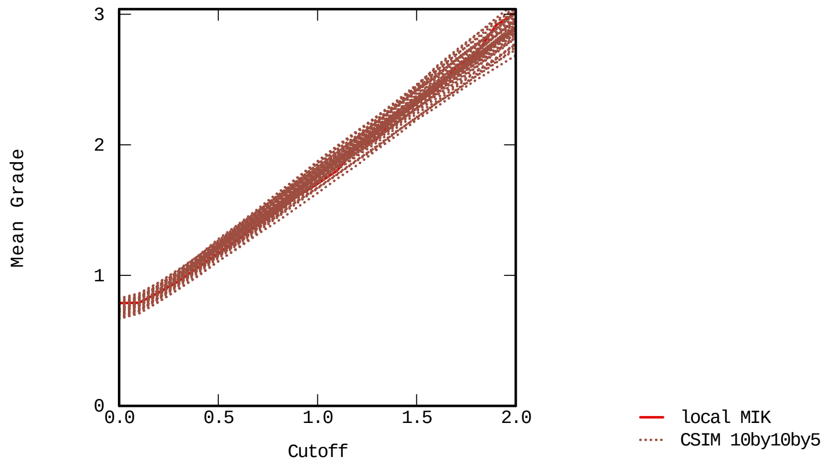


Figure 9_2

Comparative Grade Tonnage Curves – Conditional Simulation versus Local MIK Estimate – Simulation region only





10 RESOURCE CLASSIFICATION AND MINERAL RESOURCE REPORTING

The model has been classified in accordance with the guidelines set out in The 2012 Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves (the 'JORC Code'). Based on this assessment of the data quality, geological controls and the estimation outcomes a series of criteria were developed and used to classify the model as summarised in Table 10_1.

Table 10_1
Namdini Deposit
Confidence Levels of Key Categorisation Criteria
Effective Date: 31st October 2016

Items	Discussion	Confidence
Drilling Techniques	Industry standard approaches to RC and DD drilling.	High
Logging	Geological logging is completed using a standard nomenclature to a high standard.	High
Drill Sample Recovery	Good drill recovery was noted for the vast majority of the drilling.	Moderate to High
Sub-sampling Techniques & Sample Preparation	Industry standard sampling.	High
Quality of Assay Data	Ongoing quality control assessment completed.	Moderate to High
Verification of Sampling and Assaying	Industry standard approaches to RC and DD drilling.	High
Location of Sampling Points	Majority drillhole collars have been surveyed. Vast majority of the drillholes have downhole surveys.	High
Data Density and Distribution	The current data spacing is considered appropriate for resource evaluation. Given the high level of special variability noted, additional drilling would be required for higher confidence resource estimation.	Low to Moderate
Audits or Reviews	The current resource estimation has not been audited by independent parties.	NA
Database Integrity	Detailed checking of the supplied drillhole database against source information has been completed by EGRM. No material issues were noted.	High
Geological Interpretation	Mineralisation boundaries are continuous and match the geological model. The application of the 0.1g/t Au lower cutoff grade results in contiguous zone interpretations, however variations are noted in areas outside the core zone. As such, the resource excludes material between the 0.1gt and 0.2gt grade shells to limit potential over reporting of tonnes. Additional infill drilling is required.	Moderate to High
Estimation and Modelling Techniques	The resource estimate has been generated via MIK with a change of support. The MIK estimation approach is appropriate to replicate the selective mining practise targeted.	Moderate
Cutoff Grades	A notional 0.1g/t Au cutoff grade has been used to complete the interpretation of mineralisation domain envelopes to exclude material that is definitely waste. The model is reported at a range of cutoff grades and excludes material below a 0.2 gt grade shell, which is considered appropriate.	Moderate
Mining Factors or Assumptions	No other mining factors have been considered. The SMU targets a moderate to low level of mining selectivity. Effective grade control and mining practises are required to reproduce this level of selectivity. If the grade a control and mining practises are unsuccessful in exploiting these selectivity levels, additional dilution will result and more tonnage at lower grades will result.	Moderate
Tonnage Factors	The model bulk density assignment is based on 1395 sealed core measurements and is considered robust.	Moderate

Based on the above criteria, the Namdini grade estimate was categorised as a combination of Indicated and Inferred Resources. The Indicated Mineral Resource category is restricted to the more closely drilled region of the deposit which has a drilling density of 20mE by 20mN or better (highlighted in red in Figure 10_1). The remaining resources were considered to be regions of the deposit which were drilled to a spacing of between approximately of 50mE by 50mN and 50mE by 100mE and have been estimated with a high confidence grade interpolation (with a further constraint of blocks located within 75m of drilling data). These additional resources were classified as an Inferred Mineral Resource. An additional constraint was applied wherein only those blocks which fall within the 0.2gt Au mineralisation envelope are considered as Mineral Resources (ie any blocks lying between the 0.1g/t Au and 0.2gt Au mineralisation envelopes were excluded from mineral resource classification). This reporting approach excludes less continuous and lower grade mineralisation at the periphery of the main in order to limit potential over-estimation of the tonnage. The model was targeted between cutoff grades of 0.3gt Au to 0.6gt Au.

The grade tonnage report grouped by JORC resource category is provided below (Table 10_2) for the selective mining model. The distribution of Indicated and Inferred Resource blocks, for a selected 'long section' slice through the Namdini resource, is shown below as Figure 10_1. A grade tonnage curve of the resource is provided as Figure 10_2. Detailed grade tonnage reports grouped by lithology and weathering are provided in Tables 10_2 and 10_3 respectively.

Figure 10_1

Long section (looking east) showing the distribution of the resource classification

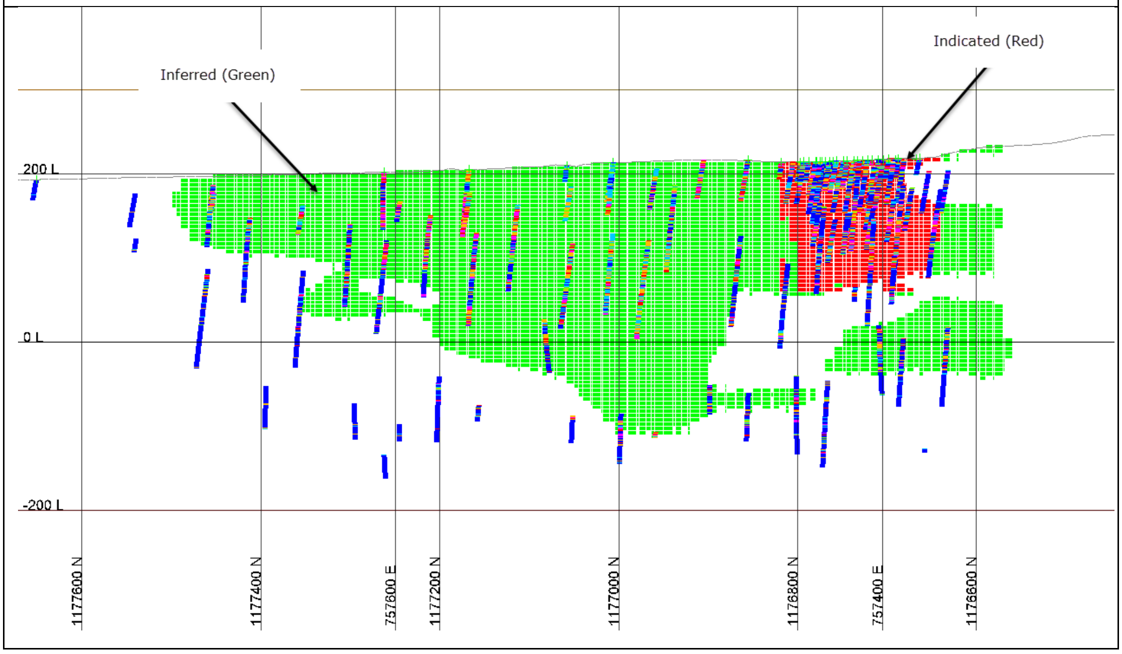


Table 10_2 Namdini Gold Deposit Grade Tonnage Report – Local Multiple Indicator Kriging with a Change Support Selective Mining Unit (5m by 10m by 5m) -Classified in accordance with JORC 2012 Effective Date: 31st October 2016			
LCOG (Au g/t)	**Tonnes**	**Ave Grade (Au g/t)**	**kOz**
Indicated Resource			
0.2	9,175,655	0.93	273
0.3	8,278,470	1.00	266
0.4	**7,201,050**	**1.10**	**254**
0.5	6,217,100	1.20	240
0.6	5,350,887	1.30	224
0.7	4,596,382	1.41	209
0.8	3,949,050	1.52	193
0.9	3,407,270	1.63	178
1.0	2,990,620	1.72	166
Inferred Resource			
0.2	124,262,381	1.00	4,014
0.3	114,710,738	1.07	3,936
0.4	**102,785,479**	**1.15**	**3,801**
0.5	89,911,981	1.25	3,615
0.6	76,995,226	1.37	3,388
0.7	65,732,547	1.49	3,153
0.8	56,180,334	1.62	2,924
0.9	48,355,339	1.74	2,710
1.0	42,233,554	1.86	2,524
Indicated + Inferred Resource			
0.2	133,438,035	1.00	4,287
0.3	122,989,208	1.06	4,202
0.4	**109,986,528**	**1.15**	**4,055**
0.5	96,129,081	1.25	3,855
0.6	82,346,114	1.36	3,612
0.7	70,328,929	1.49	3,362
0.8	60,129,384	1.61	3,117
0.9	51,762,609	1.74	2,888
1.0	45,224,174	1.85	2,690
Note: Appropriate levels of rounding are required for public reporting. The cutoff grades between 0.3gt Au and 0.6gt Au are recommended for reporting			

Figure 10_2

Grade tonnage curves – Total Resource

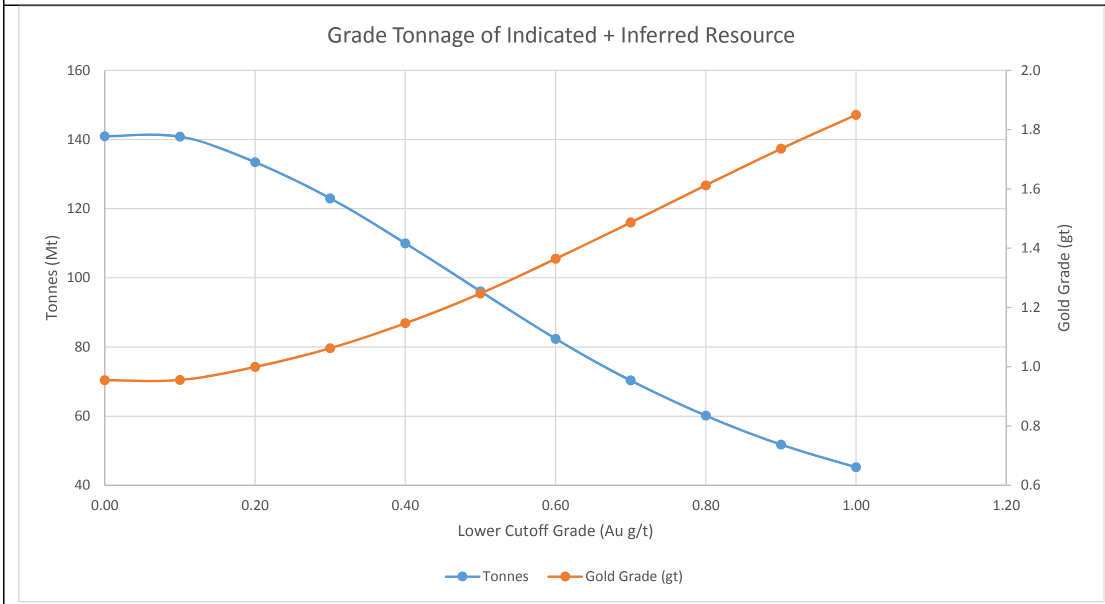


Table 10_3

Namdini Gold Deposit

Grade Tonnage Report – Local Multiple Indicator Kriging with a Change Support

Selective Mining Unit (5m by 10m by 5m)

Classified in accordance with JORC 2012 and Grouped by Classification and Lithology

Effective Date: 31st October 2016

	Granite			Metavolcanics			Diorite			Metasediments		
Lower Cutoff (Au gt)	kTonnes	Au (g/t)	koz Au	kTonnes	Au (g/t)	koz Au	kTonnes	Au (g/t)	koz Au	kTonnes	Au (g/t)	koz Au
Indicated												
0.2	183	0.70	4	8,829	0.93	264	163	1.03	5	1	0.70	0
0.3	169	0.73	4	7,955	1.00	257	154	1.08	5	1	0.70	0
0.4	**147**	**0.79**	**4**	**6,910**	**1.10**	**245**	**144**	**1.13**	**5**	**1**	**0.70**	**0**
0.5	124	0.85	3	5,960	1.21	231	133	1.19	5	1	0.70	0
0.6	91	0.96	3	5,142	1.31	217	118	1.27	5	1	0.70	0
0.7	68	1.06	2	4,425	1.42	202	103	1.36	5	1	0.70	0
0.8	52	1.16	2	3,800	1.53	187	97	1.40	4	0	0.00	0
0.9	40	1.26	2	3,283	1.64	173	84	1.48	4	0	0.00	0
1.0	32	1.34	1	2,884	1.73	161	75	1.55	4	0	0.00	0
Inferred												
0.2	38,657	0.94	1,168	67,467	1.07	2,329	17,742	0.88	504	397	1.00	13
0.3	36,975	0.97	1,154	61,778	1.15	2,283	15,585	0.97	486	373	1.05	13
0.4	**33,547**	**1.03**	**1,115**	**55,360**	**1.24**	**2,210**	**13,550**	**1.06**	**464**	**329**	**1.15**	**12**
0.5	29,154	1.12	1,051	48,771	1.35	2,115	11,697	1.16	437	289	1.24	12
0.6	24,335	1.24	966	42,535	1.47	2,006	9,881	1.27	405	244	1.37	11
0.7	19,915	1.37	874	37,222	1.58	1,895	8,376	1.39	374	220	1.44	10
0.8	16,230	1.51	786	32,534	1.70	1,782	7,226	1.49	346	191	1.55	10
0.9	13,347	1.65	707	28,570	1.82	1,674	6,275	1.59	320	163	1.67	9
1.0	11,151	1.79	640	25,463	1.93	1,580	5,481	1.68	296	139	1.80	8
Total												
0.2	38,839	0.94	1,172	76,296	1.06	2,593	17,905	0.88	509	398	1.00	13
0.3	37,144	0.97	1,158	69,733	1.13	2,540	15,738	0.97	492	374	1.05	13
0.4	**33,694**	**1.03**	**1,119**	**62,270**	**1.23**	**2,455**	**13,693**	**1.06**	**469**	**329**	**1.14**	**12**
0.5	29,278	1.12	1,055	54,730	1.33	2,347	11,830	1.16	442	290	1.24	12
0.6	24,426	1.23	969	47,676	1.45	2,222	9,999	1.27	410	244	1.37	11
0.7	19,983	1.36	877	41,646	1.57	2,097	8,478	1.39	378	221	1.44	10
0.8	16,282	1.51	788	36,334	1.69	1,969	7,323	1.49	350	191	1.55	10
0.9	13,387	1.65	709	31,853	1.80	1,847	6,359	1.58	324	163	1.67	9
1.0	11,183	1.79	642	28,347	1.91	1,740	5,556	1.68	299	139	1.80	8

Note: Appropriate levels of rounding are required for public reporting. The cutoff grades between 0.3gt Au and 0.6gt Au are recommended for reporting

Table 10_4

Namdini Gold Deposit

Grade Tonnage Report – Local Multiple Indicator Kriging with a Change Support

Selective Mining Unit (5m by 10m by 5m)

Classified in accordance with JORC 2012 and Grouped by Classification and Weathering

Effective Date: 31st October 2016

	SOX			MOX			TRANS			FRESH		
Lower Cutoff (Au gt)	kTonnes	Au (g/t)	koz Au	kTonnes	Au (g/t)	koz Au	kTonnes	Au (g/t)	koz Au	kTonnes	Au (g/t)	koz Au
Indicated												
0.2	193	0.87	5	322	0.83	9	456	0.80	12	8,205	0.94	248
0.3	176	0.93	5	303	0.86	8	407	0.87	11	7,391	1.01	241
0.4	**153**	**1.02**	**5**	**257**	**0.95**	**8**	**338**	**0.98**	**11**	**6,452**	**1.11**	**230**
0.5	133	1.11	5	214	1.05	7	285	1.07	10	5,586	1.21	218
0.6	113	1.20	4	178	1.16	7	233	1.19	9	4,827	1.32	204
0.7	92	1.33	4	148	1.26	6	190	1.31	8	4,166	1.42	191
0.8	77	1.45	4	116	1.40	5	160	1.42	7	3,596	1.53	177
0.9	64	1.56	3	99	1.49	5	135	1.53	7	3,109	1.64	164
1.0	56	1.65	3	82	1.61	4	118	1.61	6	2,734	1.73	152
Inferred												
0.2	1,057	1.00	34	2,131	1.00	69	3,473	1.06	118	117,600	1.00	3,793
0.3	984	1.05	33	2,000	1.05	68	3,278	1.11	116	108,450	1.07	3,719
0.4	**865**	**1.15**	**32**	**1,780**	**1.14**	**65**	**2,933**	**1.19**	**113**	**97,207**	**1.15**	**3,591**
0.5	733	1.28	30	1,537	1.25	62	2,524	1.31	107	85,118	1.25	3,417
0.6	621	1.41	28	1,315	1.37	58	2,175	1.44	101	72,884	1.37	3,201
0.7	530	1.54	26	1,137	1.48	54	1,898	1.55	95	62,168	1.49	2,978
0.8	450	1.68	24	962	1.61	50	1,637	1.68	88	53,131	1.62	2,761
0.9	396	1.79	23	850	1.71	47	1,429	1.80	83	45,681	1.74	2,558
1.0	360	1.87	22	768	1.79	44	1,269	1.91	78	39,837	1.86	2,380
Total												
0.2	1,250	0.98	39	2,453	0.98	77	3,930	1.03	130	125,805	1.00	4,041
0.3	1,160	1.03	39	2,303	1.03	76	3,685	1.08	128	115,841	1.06	3,959
0.4	**1,018**	**1.13**	**37**	**2,037**	**1.11**	**73**	**3,271**	**1.17**	**123**	**103,660**	**1.15**	**3,822**
0.5	866	1.25	35	1,751	1.22	69	2,808	1.29	116	90,704	1.25	3,634
0.6	734	1.38	32	1,493	1.34	64	2,409	1.41	109	77,710	1.36	3,406
0.7	622	1.51	30	1,284	1.45	60	2,088	1.53	103	66,334	1.49	3,169
0.8	526	1.64	28	1,078	1.59	55	1,797	1.66	96	56,728	1.61	2,938
0.9	460	1.76	26	950	1.69	52	1,563	1.78	89	48,790	1.73	2,721
1.0	416	1.84	25	851	1.78	49	1,387	1.89	84	42,571	1.85	2,532

Note: Appropriate levels of rounding are required for public reporting. The cutoff grades between 0.3gt Au and 0.6gt Au are recommended for reporting

11 CONCLUSIONS AND RECOMMENDATIONS

The following conclusions are provided:

- Exploration drilling completed to date has defined a significant deposit at Namdini.
- The current drill density is between approximately 50m by 50m and 50m by 100m with a small area drilled to approximately 20m by 20m. The current drill density is generally sufficient for global estimation. Further infill drilling is required to better define the mineralisation controls, especially if evaluating the deposit at higher cutoff grades.
- The current close-spaced drilled area is not considered to be representative of the deposit and is lower grade than other areas of the deposit.
- Recent drilling has focused on defining the limits of the mineralisation, however the deposit remains open down dip/plunge and along strike. Potential remains to expand the resource inventory with further systematic exploration.
- The sampling procedures adopted for the Namdini Project exploration activities are consistent with good industry practice.
- The available assay quality control database has been reviewed. The assay accuracy and precision is considered acceptable for mine planning studies.
- Independent check sampling and assaying has been completed which confirms the location and tenor of the original drill intercepts.
- Independent checks of the database were completed by EGRM prior to grade estimation studies. This checking included a review of the database assay data against the original laboratory certificates. No material errors were identified.
- An extensive bulk density database has been collected via the water immersion method, including wax coating of core for porous core billets. The testing has been completed by independent laboratory SGS and is appropriate. Additional data is required to be collected for the weathered portion of the deposit, however this represents a relatively small proportion of the deposit.
- Weathering, lithology and mineralisation models have been generated for the study. The geological models are considered robust, however further interpretation based on additional drilling is warranted.
- A broad mineralisation constraint has been estimated using a 0.1gt Au lower cutoff grade. This mineralisation is considered robust and suitable for non-linear grade estimation applying 0.1gt Au. Additional drilling will allow improved interpretation and controls of the mineralisation constraints. This will be important if higher cutoff grades (above 0.6gt Au) are required.
- Robust grade estimation studies have been completed at Namdini based on the available data set. Indicated and Inferred Resources have been reported.

- A moderate to low level of selectivity is targeted in the model. While consistent with the currently envisaged mining approach, further investigation of the mining selectivity is required once additional data is available. Should grade estimation be required to test higher cutoff grades (above 0.6gt Au), drilling of a representative volume of the deposit at likely grade control spacing will be required in order to provide information for the mining selectivity investigations.

It is recommended that:

- While the current constraint is considered robust and appropriate for this study, it is recommended that for future studies, based on infill drilling, the mineralisation interpretation is refined with a sectional interpretation. This will improve the zone geometry and ensure the capture of the anomalous mineralisation while excluding appropriate zones of waste.
- Additional drilling is completed to test the depth and strike extensions of the deposit which are currently not drill tested.
- Drilling is completed on infill sections, with drillholes off set, relative to current drillholes, along sections. The infill drilling is required to further refine the geological model and to allow estimation higher confidence estimates to further refine the geological model.
- The geological model and mineralisation constraints are reviewed based on the infill drilling. This will allow for improved confidence resource estimation.
- Quality control data be reviewed on an ongoing basis to ensure high levels of precision and accuracy are achieved in assaying.
- Additional bulk density data be collected for weathered material. Additional bulk density data should also be collected for the diorite and metasediment lithologies.
- Additional grade-control spaced drilling of representative areas will be required to refine selective mining estimates, as a part of feasibility studies, and to provide information on the optimal level of mining selectivity and hence mining and processing throughput.

12 REFERENCES

Abzalov, M., 2006. Localised Uniform Conditioning (LUC): A New Approach for Direct Modelling of Small Blocks, Mathematical Geology, 38(4): 393-411

Barnes, J.F.H., 2016. Namdini Gold Project, Independent Project Review, Northern Ghana, West Africa. Unpublished Hiscen Ltd report 00147 to Cardinal Resources Limited, May 2016. 182 pages.

Davis, B., and Cowan, J., 2016. Structural geological analysis of the Namdini gold deposit, NE Ghana. Orefind 5 September 2016 Revision 1. 56 pages

Davis, B.K., Hickey, K.A., and Rose, S., 2001. Superposition of Au-mineralization on pre-existing carbonate alteration: Structural evidence from the Mulgarrie gold deposit, Yilgarn craton. Australian Journal of Earth Sciences, 48, 131-14

Pittuck, M. and Gleeson, P., 2015. Independent geological report and review. Namdini gold project northern Ghana, West Africa. Unpublished SRK report U6375 to Cardinal Resources Ltd, April 2015. 205 pages.

Townend, R., 2015. Preparation of three polished thin sections of three rock samples and petrographic/mineragraphic descriptions with particular regard to gold. Unpublished Townend mineralogy laboratory report 23898 to Archie Koimtsidis, Cardinal Resources, 4 October 2015. 20 pages.

Townend, R. and Townend, D., 2016. Preparation of 10 polished thin sections and petrographic/mineragraphic descriptions of 10 drill cores. Unpublished Townend mineralogy laboratory report 23948 to Archie Koimtsidis, Cardinal Resources, 10 February 2016. 85 pages.