Helio Resource Corporation

Mineral Resource Estimate for the SMP Gold Project

Project No. L607

NI 43-101 Report for the Saza-Makongolosi Gold Project, Tanzania

Effective Date: 28 February 2015

Final

SNOWDEN

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IMPORTANT NOTICE

This report was prepared as a National Instrument 43-101 Technical Report, in accordance with Form 43-101F1, for Helio Resource Corporation by Snowden Mining Industry Consultants ("Snowden"). The quality of information, conclusions, and estimates contained herein is consistent with the level of effort involved in Snowden's services, based on: (i) information available at the time of preparation; (ii) data supplied by outside sources; and (iii) the assumptions, conditions, and qualifications set forth in this report. This report is intended to be used Helio Resource Corporation, subject to the terms and conditions of its contract with Snowden. That contract permits Helio Resource Corporation to file this report as a Technical Report with Canadian Securities Regulatory Authorities pursuant to provincial securities legislation. Except for the purposes legislated under provincial securities law, any other use of this report by any third party is at that party's sole risk.

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1 Summary

This Technical Report describes the Saza-Makongolosi Project (“SMP”), a gold exploration and development area located in the Mbeya region of Tanzania. The SMP is owned by BAFEX Tanzania Ltd which is wholly owned by Helio Resource Corporation (“Helio”), a mineral exploration and development company based in Vancouver, Canada.

The SMP covers an area of 200 km^2 and is located approximately 700 km southwest of the city of Dar es Salaam. The project comprises of 12 contiguous and valid licences, four retention licences (“RLs”) and eight prospecting licences (“PLs”), plus one PL in application. Within this area, Helio has identified over 30 exploration targets. The SMP is part of the Lupa Goldfield which lies along the eastern edge of the Western Rift Valley close to Lake Rukwa. Mbeya, the capital of the Mbeya Region, is approximately 100 km southeast by road from the SMP.

This Technical Report primarily concerns six of these targets: Kenge Main, Mbenge, Snakebite, Porcupine Main, Gap and Konokono.

The effective date of the Mineral Resource statement declared in this report is 28 February 2015.

1.1 Summary of geology and mineralisation

The Lupa Goldfield is situated off the south-western part of the Tanzanian Craton, within the Lower Proterozoic mobile belt of the Ubendian System (1.8 billion years (Ga)). Granitic, intermediate and mafic intrusive rocks, together with ferruginous quartzites, constitute the lithology. The west-northwest trending Rukwa Faults bound the Lupa Goldfield to the south and the west. To the north it is bounded by the east-southeast trending Northern Boundary fault and to the east by the northeast trending Usangu Rift faults.

Several structural trends are observed in the Lupa Goldfield, of which the east-northeast Saza Shear Zone is the most dominant. Outcrops and satellite imagery show a strong west-northwest to northwest trend, together with east-northeast trending structures. Major dextral shear zones are associated with the regional foliations. The igneous suite that underlies the SMP area is dominated by two distinct granites, namely the Ilunga Granite observed extensively in the northern half of the SMP, and the Saza Granite occurring in the southern portion of the project area. Gold mineralisation occurs in both the Ilunga and Saza granites.

Gold in the Lupa Goldfield is deposited in shear zone mineralisation dominantly associated with “Saza-parallel” (070° strike) and “Kenge-parallel” (120° strike) shear zones. Whether this mineralisation style is orogenic or intrusion-related is still unclear. Mineralisation is widespread across the SMP and varies in size from metre- to kilometre-scale deposits.

The mineralogy at the SMP is relatively simple, comprising pyrite (generally less than 1% by volume) with minor chalcopyrite and molybdenite, plus occasional scheelite and galena. Gold occurs as free gold, electrum and rarely as tellurides. Mineralisation is associated with quartz veining, silicification, sericitisation, haematisation and locally chloritisation.

1.2 Summary of exploration concept

A number of companies undertook historical exploration programs in the Project area. Technoexport carried out detailed gold prospecting in the Lupa Goldfield from 1970 to 1974, followed by exploration from 1995 to 1999 by Princess Resources/CSA Africa. Tanzanian subsidiaries of Anglo American Corporation/Anglogold carried out exploration activities from 1997 to 1999 as part of joint ventures with two companies.

Exploration operations by Helio on the Saza PL began in early 2006. To date, Helio and its subcontractors have completed the following work within the Project area:

- Structural studies on the controls of mineralisation
- Airborne magnetic and radiometric geophysical surveys
- Induced polarisation (“IP”) and ground magnetic geophysical surveys
- Regional and detailed soil geochemistry
- Diamond and reverse circulation (“RC”) drilling
- Metallurgical testing.

Drilling done by Helio on the SMP since 2006 totals 379 diamond holes for 68,438 m and 567 RC holes for 51,695 m.

There are 64,677 primary assays in Helio’s database. These were assayed by African Assay Laboratories, a member of the SGS Group, which is located in Mwanza, northern Tanzania. The assay method was 50 g fire assay.

1.3 Metallurgical testing

SGS Lakefield Research Limited (“SGS”) in Ontario (Canada) conducted a program of preliminary metallurgical testwork to determine the processing characteristics of the Kenge and Porcupine mineralised material, and to develop a preliminary process flowsheet. The tests included head grade analysis, mineralogical evaluation, gravity separation, flotation, cyanidation (of whole ore, gravity tailings and flotation concentrates) and preliminary environmental testing. Amenability to conventional gravity and cyanidation gold recovery techniques were indicated by the testwork results.

During May 2009, SGS conducted a follow up cursory heap leach amenability study on the Kenge mineralised material.

Further metallurgical testwork, representing a wider spectrum of mineralisation, will be required to optimise grinding sizes and flotation flowsheet configurations.

1.4 Mineral Resource estimates

Four main target areas are defined in the SMP, namely Kenge, Porcupine, Gap and Konokono. Kenge comprises the Kenge Main, Mbenge and Snakebite deposits. Porcupine is made up of the Porcupine Main, Porcupine Quill and Porcupine West deposits. No additional mineralisation outside these deposits was modelled in this 28 February 2015 Mineral Resource estimate. The Tumbili, Porcupine Quill and Porcupine West deposits are excluded from the Mineral Resource estimate.

Construction of volumetric solids for the zones of mineralisation, three dimensional (“3D”) source modelling and grade estimation was undertaken using CAE Datamine Studio 3™. The geostatistical analyses were done with the use of Snowden Supervisor V8.3™.

The low grade, mineralised domain was defined on a combined lithological and grade boundary, using a 0.3 g/t Au cut-off as a guideline. Where geologically and statistically appropriate, a high grade domain was delineated within the low grade mineralised domain, based on a combined lithological (veining) and grade boundary, using a 2.5 g/t Au cut-off as a guideline. Both low grade and high grade domains were applied in the estimations of the Kenge Main, Mbenge and Porcupine Main deposits. A single domain was applied for the estimation of the Snakebite, Gap and Konokono deposits. There are intercepts of higher grade in adjacent drillholes, though there is not enough confidence in their geological continuity to define separate domains within these deposits at present.

Snowden undertook exploratory data analysis for all the deposits, examining domaining, twinning, declustering, compositing, variography, top cutting and kriging neighbourhood analysis (“KNA”).

Drillhole intersections that fall within the modelled mineralisation envelopes were selected from the database and composited to 1 m composite lengths. Mineralisation domains (KZONE) were used as zonal control to ensure that samples were composited within the different domains.

Experimental variograms were generated and modelled for gold for all deposits and domains.

Top cuts were applied according to the statistical lognormal distribution of the sample populations. All samples that were greater than the top cut value were reset to the top cut value.

Diamond drillholes are the dominant source of composites for almost all the deposits. Generally there seems to be a bias toward higher grades in diamond drillholes than in RC holes. However, the number of twinned drillholes is insufficient to definitively establish any bias and, therefore, both the RC and diamond composites were retained for use during the estimations.

Ordinary kriging was used as the interpolation method for updating the SMP estimates due to the well-defined high grade shoots and surrounding lower grade shear hosted mineralisation that resulted in moderate sample variance. The block sizes for the models were determined by the density of the exploration drilling grids, the shape of the mineralisation and the mining parameters. The number of composites and search dimensions were determined by carrying out a KNA and reviewing the kriging quality parameters from a series of test runs. A three-phased search pass was applied and the orientation of the search ellipsoid was primarily aligned to the modelled variography. The wireframed mineralised domain boundaries were used as hard boundaries.

The rock types within the deposits vary, and separate bulk densities, per domain (KZONE), were calculated from measurements taken on drillhole samples. These bulk densities were assigned per KZONE to the updated SMP resource models.

The estimated Mineral Resource has been classified according to CIM guidelines and to the knowledge of and confidence in the input data, geological continuity and grade continuity. Factors taken into account during the classification of the models were:

- Data quality
- Drillhole distributions
- Search volume parameters during estimation
- Model validations against drillhole samples
- Geological controls for mineralisation
- Qualified Person’s assessment/review.

Based on these criteria, Snowden created classification strings and wireframes at 10 m intervals in plan view using CAE Datamine Studio 3™. Areas were classified as Indicated Resources where drillhole spacing was generally within 25 mE by 25 mN. Estimated blocks outside the Indicated wireframes were classified as Inferred Resources.

Snowden conducted validations of the kriged block estimates against the declustered input drillhole data. A number of techniques were used for the validation. These included visual validation of block grades compared to input drillhole sample data, global comparisons between average block model grade and average declustered top cut composite grade, and slicing plots through the deposits in northing, easting and elevation which compare average block model grades with average declustered top cut composite grades for each slice. Generally, the estimates compare well with the input data and show that the grades in the composites align with the corresponding grades in the block models.

1.5 Conclusions and recommendations

The current Mineral Resource estimate is the fourth published for the SMP, with previous estimates being done by Golder Associates (“Golder”) in November 2010, SRK Consulting (Australasia) Pty Ltd (“SRK”) in February 2012, and Caracle Creek International Consulting MinRes (Pty) Ltd (“CCIC”) in February 2014.

The sampling collection, preparation, security and analytical procedures used by Helio meet generally accepted industry best practices. These procedures are therefore consistent with generating data of a quality suitable for Mineral Resource estimation.

Table 1.1 and Table 1.2 summarise the results of the independent Mineral Resource estimate for the SMP Gold Project, by category and area. The effective date of this Mineral Resource estimate is 28 February 2015.

Mineral Resources that form part of this update (Kenge Main, Mbenge, Snakebite, Porcupine Main, Gap and Konokono) that have reasonable prospects of economic extraction by open pit mining are stated at a 0.5 g/t Au cut-off within US$1,400 pit shells. The Mineral Resources for these deposits that have reasonable prospects of economic extraction by underground mining are stated at a 2.5 g/t Au cut-off and fall outside the US$1,400 pit shells.

The total Indicated Mineral Resource inside pit envelopes for all six updated deposits is estimated at 5.9 million tonnes (“Mt”), grading 1.8 g/t Au, with an additional Inferred Mineral Resource of 0.3 Mt, grading 1.6 g/t Au. The total Indicated Mineral Resource for the underground mineable portions of all six updated deposits is estimated at 1.6 Mt, grading 4.9 g/t Au, with an additional Inferred Mineral Resource of 0.2 Mt, grading 3.8 g/t Au.

The total Indicated Mineral Resource for pit envelope constrained and underground potential for the SMP is 7.5 Mt, grading 2.4 g/t Au, for a contained 590,000 oz Au. The sum of the total Inferred Mineral Resource for pit envelope constrained and underground potential for the SMP is 0.6 Mt, grading 2.5 g/t Au, for an equivalent of 45,000 oz Au.

Snowden has been informed by Helio that there are no known litigations potentially affecting the SMP, and furthermore that there are no known environmental, socio-political, marketing or taxation issues that may materially affect the project.

Table 1.1 Mineral Resource statement – 28 February 2015, SMP Gold Project pit envelope constrained (reported at a cut-off grade of 0.5 g/t Au and economic constraints applied)

Category	Area	Tonnage (kt)	Grade (g/t Au)	Contained Au (koz)
Indicated	Kenge Main	1,951	1.6	100
	Mbenge	796	2.0	51
	Snakebite	-	-	-
Kenge Indicated		**2,747**	**1.7**	**152**
Indicated	Porcupine Main	2,856	1.8	163
	Gap	3	1.0	-
Porcupine Indicated		**2,859**	**1.8**	**163**
Indicated	Konokono	299	1.8	17
Konokono Indicated		**299**	**1.8**	**17**
Total Indicated		**5,905**	**1.8**	**332**
Inferred	Kenge Main	-	-	-
	Mbenge	37	1.2	1
	Snakebite	112	2.4	9
Kenge Inferred		**149**	**2.1**	**10**
Inferred	Porcupine Main	23	0.6	-
	Gap	56	1.5	3
Porcupine Inferred		**79**	**1.2**	**3**
Inferred	Konokono	105	1.2	4
Konokono Inferred		**105**	**1.2**	**4**
Total Inferred		**333**	**1.6**	**17**

Notes: 1: Resource classification according to CIM guidelines.

2: Tonnage is reported in metric tonnes ("t"), grade as grammes per tonne gold ("g/t Au") and contained gold in troy ounces ("oz Au").

3: Tonnages are rounded to the nearest 1,000 t. Ounces are rounded to the nearest 1,000 oz Au. Figures may not compute exactly due to rounding.

4: Economic parameters have been applied and Mineral Resources reported are inside US$1,400 pit shells at a cut-off grade of 0.5 g/t Au.

5: Mr. Roderick Carlson is designated as the Qualified Person regarding the Mineral Resource Estimation (MRE) and is a member in good standing of the MAusIMM, MAIG with RPGeo status (Mining and Mineral Exploration).

Table 1.2 Mineral Resource statement – 28 February 2015, SMP Gold Project underground potential (reported at a cut-off grade of 2.5 g/t Au and economic constraints applied)

Category	Area	Tonnage (kt)	Grade (g/t Au)	Contained gold (koz)
Indicated	Kenge Main	516	5.1	84
	Mbenge	120	3.8	15
	Snakebite	-	-	-
Kenge Indicated		**636**	**4.8**	**99**
Indicated	Porcupine Main	940	5.0	152
	Gap	49	3.6	6
Porcupine Indicated		**989**	**5.0**	**158**
Indicated	Konokono	9	3.3	1
Konokono Indicated		**9**	**3.3**	**1**
Total Indicated		**1,634**	**4.9**	**258**
Inferred	Kenge Main	4	4.2	1
	Mbenge	8	3.2	1
	Snakebite	44	3.3	5
Kenge Inferred		**57**	**3.3**	**6**
Inferred	Porcupine Main	99	4.3	14
	Gap	14	2.9	1
Porcupine Inferred		**113**	**4.1**	**15**
Inferred	Konokono	58	3.4	6
Konokono Inferred		**58**	**3.4**	**6**
Total Inferred		**228**	**3.8**	**27**

Notes: 1: Resource classification according to CIM guidelines.

2: Tonnage is reported in metric tonnes ("t"), grade as grammes per tonne gold ("g/t Au") and contained gold in troy ounces ("oz Au").

3: Tonnages are rounded to the nearest 1,000 t. Ounces are rounded to the nearest 1,000 oz Au. Figures may not compute exactly due to rounding.

4: Economic parameters have been applied and Mineral Resources reported are outside US$1,400 pit shells at a cut-off grade of 2.5 g/t Au.

5: Mr. Roderick Carlson is designated as the Qualified Person regarding the Mineral Resource Estimation (MRE) and is a member in good standing of the MAusIMM, MAIG with RPGeo status (Mining and Mineral Exploration).

Mineralisation in all targets is open at depth. As well, additional mineralisation is open along strike at Mbenge, Porcupine Main, Gap, Konokono and Snakebite. A second high grade zone in the footwall of Porcupine Main, in the southwest, should also be investigated further. Additionally, there are more than 20 targets at SMP where there is as yet insufficient information for estimating Mineral Resources.

This Technical Report has been prepared by Snowden Mining Industry Consultants ("Snowden") in order for Helio to file a current NI 43-101 compliant Technical Report on the System for Electronic Document Analysis and Retrieval ("SEDAR") in support of their recent Press Release (26 March 2015). The Technical Report serves to provide background information to this Mineral Resource Statement on the SMP, and as a summary of the work carried out by Helio since 2006.

2 Introduction

2.1 Company and project name

This Technical Report has been prepared by Snowden for Helio, in compliance with the disclosure requirements of the Canadian National Instrument 43-101 ("NI 43-101"). The trigger for preparation of this report is the 26 March 2015 press release of Helio, disclosing an updated Mineral Resource for the project.

The Saza-Makongolosi Project (SMP) is a gold exploration project located in the Mbeya Region of Tanzania. Helio, through its wholly owned subsidiary, BAFEX Tanzania Ltd, either holds or is in the process of renewing the licences that make up the project area.

2.2 Terms of reference and purpose of the Technical Report

A Maiden Mineral Resource estimate for the SMP was prepared by Golder in November 2010 and released by Helio. SRK was commissioned by Helio in August 2011 to visit the SMP property and prepare an updated geological model and Mineral Resource estimate (released 14 February 2012). Following this, CCIC was retained in October 2013 by Helio to prepare an Independent Technical Report on the SMP. All reports have been filed on the System for Electronic Document Analysis and Retrieval (SEDAR).

Snowden provides technical consulting and advisory services to exploration and mining companies, and to legal and financial institutions with interests in the mining sector. Services include operational improvement, feasibility studies (resource estimates, mining studies, and geotechnical studies), investment governance (resource governance, technical audits and reviews), and mine and project valuations. The company also designs and develops mining software, including tools such as Reconcilor, Supervisor and Regulator. Snowden operates as a subsidiary of Downer EDI Limited.

Mr. Roderick Carlson is designated as the Qualified Person ("QP") regarding the Mineral Resource estimation and is a member in good standing of the MAusIMM, MAIG with RPGeo status (Mining and Mineral Exploration). He has more than 25 years' experience in the mineral resources sector, having commenced his career in exploration then moving through to roles in resource definition, production and management. As Senior Principal Consultant for Applied Geoscience with Snowden at the time of the Mineral Resource, Mr. Carlson has undertaken many resource estimates, technical reviews, audits, due diligence and reconciliation reviews for clients in many geological settings and commodities.

The Mineral Resource was estimated by Dr. Belinda van Lente (Senior Consultant for Applied Geoscience with Snowden) under the guidance of the QP, Mr. Rod Carlson.

The responsibilities of each author are provided in Table 2.1.

Table 2.1 Responsibilities of each co-author

Author	Responsible for section/s
Belinda van Lente	11.8, 14, 25, 26
Roderick Carlson	All sections

2.3 Independence

Snowden is not an insider, associate or an affiliate of Helio and has no economic or other interests that could reasonably be regarded as affecting its ability to provide an unbiased opinion in relation to Helio's SMP and the Mineral Resource estimate as discussed in this Report. The conclusions or opinions expressed in this Report by Snowden are not dependent on any prior agreements concerning the conclusions to be reached, nor are there any undisclosed understandings concerning any future business dealings.

2.4 Sources of information

The sources of information that were provided for the preparation of the SMP Mineral Resource estimate and the resultant Technical Report were provided by Helio, under the direction of Mr C. MacKenzie. Much of the background information has been sourced and updated from three previous Technical Reports, which detail the SMP. Snowden has no reason to doubt the reliability of the information provided by Helio.

Source documents referenced during the Mineral Resource estimate included the following:

- Mineral Resource Estimate of the Saza-Makongolozi Project for Helio Resource Corp. – Technical Report (Golder, 2010)
- NI 43-101 Mineral Resource Estimate Update for the Saza-Makongolosi Gold Project, Tanzania (SRK, 2012)
- Saza-Makongolosi Gold Project (SMP), Tanzania Technical Report NI 43-101 (CCIC, 2014)
- Review of All High-Grade Gold Assays in Drilling at the SMP Gold Project, Lupa Goldfields, Tanzania, including the Description of the High-Grade Shoot at the Konokono Target. (MacKenzie, 2013a)
- Review of the High-Grade Gold Shoots, and their Exploration Potential, at the Kenge and Porcupine Resources, SMP Gold Project, Lupa Goldfields, Tanzania (MacKenzie, 2013b)
- Structural Geology of the SMP Gold Project, Lupa Goldfield, Southern Tanzania (Impel, 2010).

Additional information included:

- Discussions with Helio personnel
- Drillhole database, including quality assurance/quality control ("QA/QC") data, provided as Microsoft Excel files
- Topography and mineralisation wireframes (.dxf and Datamine format)
- Previous resource models (SRK, 2012 and CCIC, 2014)
- Plans and maps (.png format).

2.5 Personal inspection of the property

The QP, Mr Roderick Carlson, visited the project site between 2 November 2014 and 6 November 2014 and personally inspected the property.

The site visit was aimed at:

- Satisfying the regulatory requirements for the Snowden QP associated with an NI 43-101 resource update

- Ensuring that the drilling, core collection, core logging, sample collection and QA/QC procedures are appropriate and are being carried out correctly
- Verifying personally the location of historic holes with respect to their stated location in previous reports
- Reviewing core from historic holes to ensure it is consistent with previous reports
- Enabling the Snowden Mineral Resources QP to obtain a first-hand understanding of site geology with respect to the topography and the infrastructure.

Snowden was given full access to relevant data and conducted interviews of Helio personnel to obtain information on the past exploration work, and to understand procedures used to collect, record, store and analyse historical and current exploration data.

2.6 Units of measure

All measurements in this Technical Report use the metric system, unless otherwise specified. Ages of various rock units are given in millions of years before present (Ma) or billions of years before present (Ga).

Universal Transverse Mercator ("UTM") coordinates are used within this Technical Report, and are reported in UTM zone 36S, WGS 84 datum. Unless otherwise stated, all currencies are expressed in US dollars ("US$").

3 Reliance on other experts

For the purpose of this Report, Snowden has relied on ownership information provided by Helio. Snowden has not verified the legal status and ownership of the SMP land title and tenure, nor any underlying agreement(s) that may exist concerning the licences or other agreement(s) between third parties, but have relied on the information provided by Helio, as outlined in Section 4 of this Report.

Property information in this Report is sourced from previous reports updated by Helio and Snowden is not responsible for the accuracy of any property data, and do not make any claim or state any opinion as to the validity of the property disposition described herein.

Helio has informed Snowden that there are no known litigations potentially affecting the SMP, and furthermore that there are no known environmental, socio-political, marketing or taxation issues that may materially affect the project.

Snowden has relied on the metallurgical testwork reports supplied by SGS and accepts responsibility that Section 13 is an accurate representation of the information contained in those reports and that the data is representative of likely metallurgical outcomes.

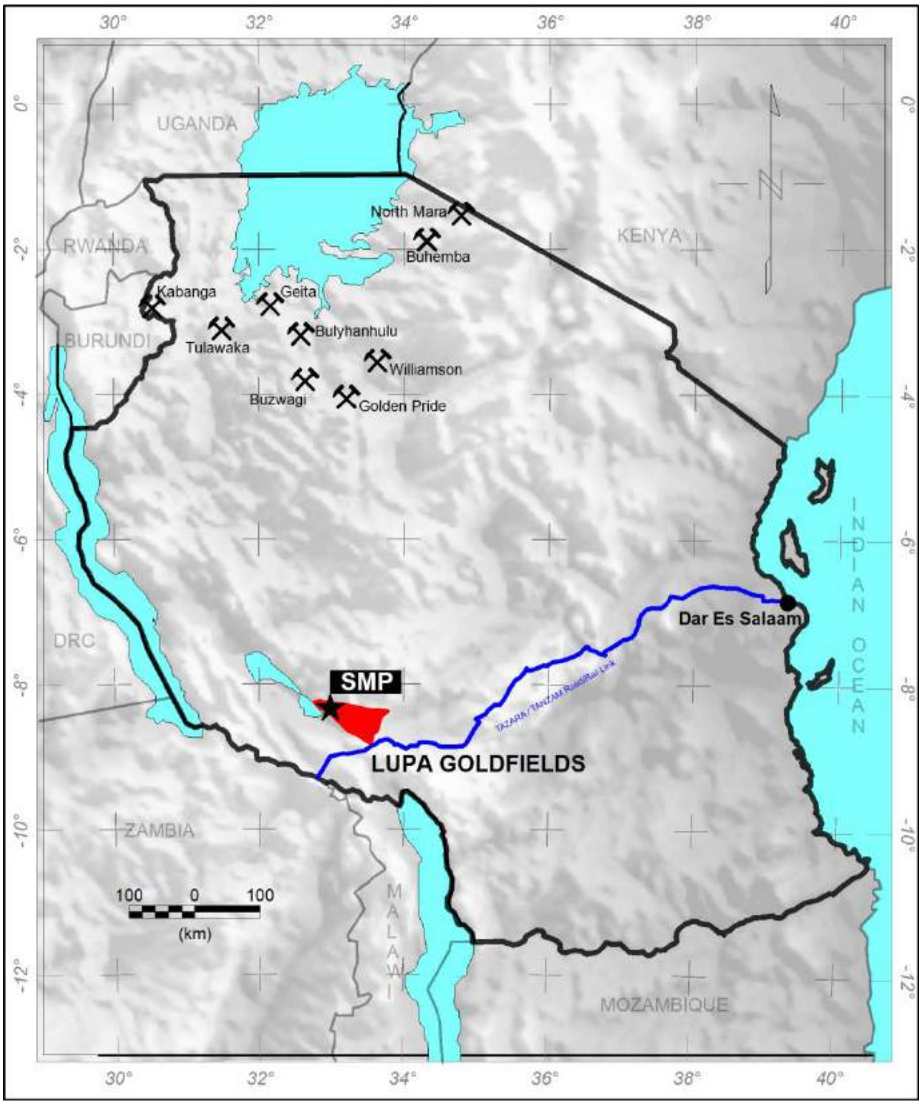
4 Property description and location

4.1 Area and location

The United Republic of Tanzania is located in East Africa between longitudes 29º and 41º east and latitudes 1º and 12º south. Tanzania is bordered by Rwanda, Burundi, and the Democratic Republic of Congo to the west, Uganda and Kenya to the north and northeast, and Zambia, Malawi and Mozambique to the south. It comprises both the mainland and the Zanzibar Archipelago and is the largest country in East Africa (943,000 km^2).

The SMP covers an area of approximately 200 km^2 and is located in the Mbeya Region of Tanzania, 100 km northwest by road from the regional capital, Mbeya (Figure 4.1). The city of Mbeya lies some 760 km by road to the southwest of Dar es Salaam, the main port in Tanzania.

Figure 4.1 Locality map for the SMP within Tanzania



4.2 Mineral tenure

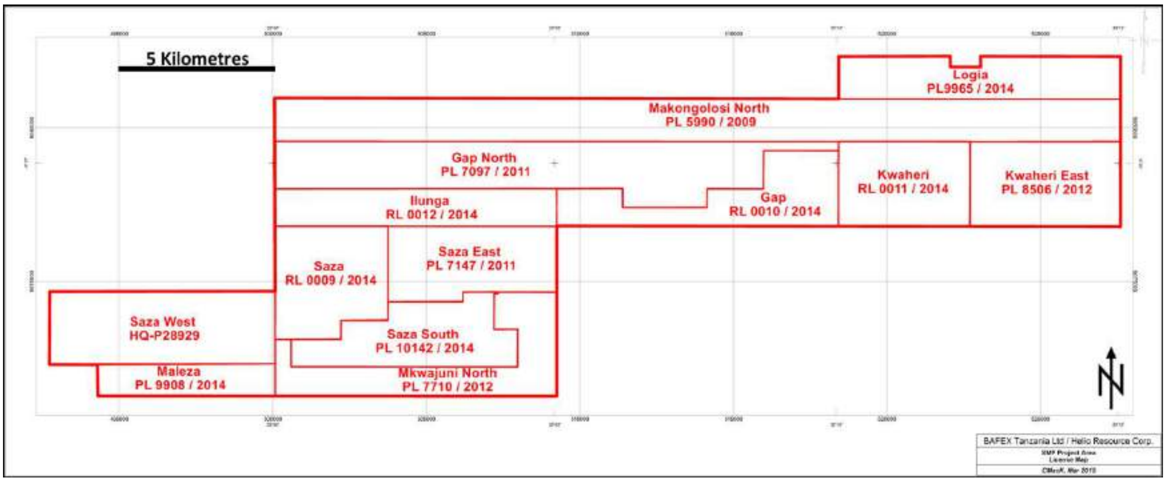
The SMP area was initially defined by the licence boundaries of five PLs which were acquired in transactions with Thorntree Minerals Limited ("TTML") and Dhahabu Resources and Mining Company Limited ("Dhahabu"). Helio, through its wholly owned subsidiary BAFEX Tanzania Ltd (BTL), either holds or is in the process of renewing the RLs and PLs that make up the project area. Helio has completed the earn-in for a 100% interest in each of the original PLs subject to a 2% royalty, which can be reduced to 1% by a payment of CA$1,000,000 (Canadian Dollars) by Helio to the local joint venture partner prior to commencement of commercial production.

Table 4.1 summarises the licence numbers, ownership and current status, and Figure 4.2 shows the configuration of the RLs and PLs which currently make up the SMP. The licence boundaries are marked by beacons, which are surveyed using a Global Positioning System ("GPS").

Table 4.1 Status of prospecting licences

Informal name	Owner	Licence type and no.	Size (km^2)	Date granted	Relinquish/ extension	Status
Saza	BTL	RL0009/2014	12.54	1 Sep 2014	31 Aug 2019	Current
Gap	BTL	RL0010/2014	12.59	1 Sep 2014	31 Aug 2019	Current
Kwaheri	BTL	RL0011/2014	11.83	1 Sep 2014	31 Aug 2019	Current
Ilunga	BTL	RL0012/2014	11.27	1 Sep 2014	31 Aug 2019	Current
Makongolosi North	BTL	PL5990/2009	38.04	12 Jun 2009	11 Jun 2017	Current
Gap North	BTL	PL7097/2011	26.85	17 Nov 2011	16 Nov 2020	Current
Saza East	BTL	PL7143/2011	12.58	3 Aug 2011	2 Aug 2020	Current
Mkwajuni North	TTML	PL7710/2012	13.22	20 Feb 2012	19 Feb 2021	Current
Kwaheri East	BTL	PL8506/2012	13.53	12 Dec 2014	11 Dec 2021	Current
Maleza	BTL	PL9908/2014	5.95	8 Jul 2014	7 Jul 2023	Current
Logia	BTL	PL9965/2014	12.31	10 Jul 2014	9 Jul 2023	Current
Saza South	BTL	PL10142/2014	12.32	29 Aug 2014	28 Aug 2023	Current
Saza West	BTL	HQ-P28929	17.09	-	-	Pending

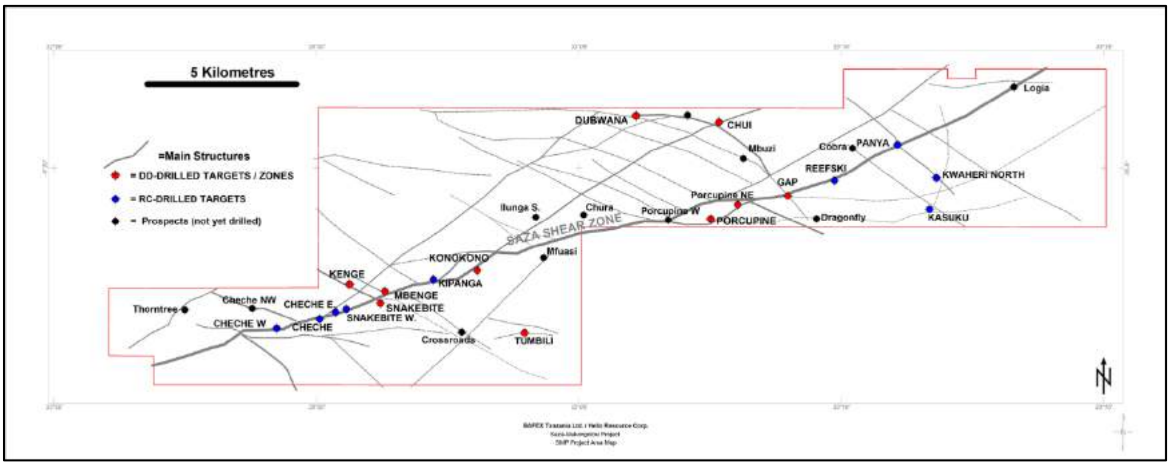
Figure 4.2 Map of the SMP licences



4.3 Location of mineralised zones

Over 30 targets (Figure 4.3) within the area covered by the SMP licences have been identified by Helio. This report mostly concerns the targets for which Snowden updated the Mineral Resource estimates. These targets are located in the Kenge Main, Mbenge, Snakebite, Porcupine Main, Gap and Konokono prospects.

Figure 4.3 Map of prospects within the SMP area



4.4 Environmental liabilities and permits

Snowden is not aware of any environmental issues or liabilities on the SMP and has no reason not to believe that all proper permits required to conduct exploration activities on the SMP have been obtained.

5 Accessibility, climate, local resources, infrastructure and physiography

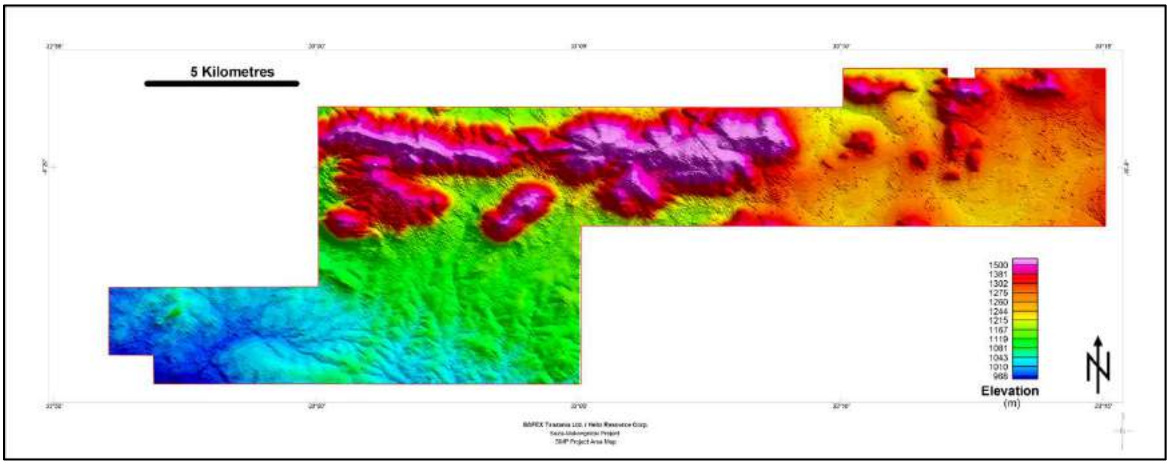
5.1 Topography, elevation and vegetation

Most of the mainland (at between 900 mRL and 1800 mRL) of Tanzania is made up of a large central plateau, the mountain ranges of the Southern and Northern Highlands, and the Eastern Arc that cuts across Tanzania to form part of the Great Rift Valley.

Tanzania is a land of geographical extremes, with the largest lake (Lake Victoria), the highest peak (Mount Kilimanjaro), and the lowest point (the lake bed of Lake Tanganyika), on the continent.

The SMP is located on the Lupa Block, which lies along the eastern edge of the Western Rift Valley close to Lake Rukwa. The project area is generally flat, aside from a series of hills called the Ilunga range. The elevation ranges from around 900 mRL to 1729 mRL (Figure 5.1).

Figure 5.1 Topography within the SMP



Vegetation throughout the area tends to be of the Miombo or Brachystegia-type woodland with occasional areas of thorn scrub. Moderate to intense deforestation for fuel and farming has occurred over much of the SMP and the surrounding countryside.

5.2 Access

Mbeya, the capital of Mbeya Region, is located approximately 100 km southeast by road from the SMP. Mbeya is located on the Tanzania-Zambia highway, TANZAM, and the main Tanzanian Railway, TAZARA, both of which link Dar es Salaam with Zambia. It is thus a main hub for communications between eastern, central and southern Africa. In 2012, Songwe International Airport (20 km southwest of Mbeya, 100 km from the SMP) was opened and supports daily scheduled flight services from and to Dar es Salaam.

The SMP project is accessed by a dirt road from Mbeya, a journey that takes approximately two to two and a half hours.

The regional capital of Chunya is approximately one hour's drive east from the SMP, and the road from Mbeya to Chunya is currently being tarred.

5.3 Proximity to population centre and transport

During the early part of the 20th Century, the Lupa Block was very sparsely populated and the majority of the population were nomadic herdsmen (Grantham, 1932). It is reported that by the mid-1970s the population of the Chunya district was 'about 50 thousand' with the population primarily engaged in agriculture. However, from the 1930s to the 1950s, many local people were employed in gold mining (Luena *et al*., 1974). According to figures published by the Tanzanian Bureau of National Statistics from the 2002 census, the population of the Chunya district stood at just under 206,000.

5.4 Climate

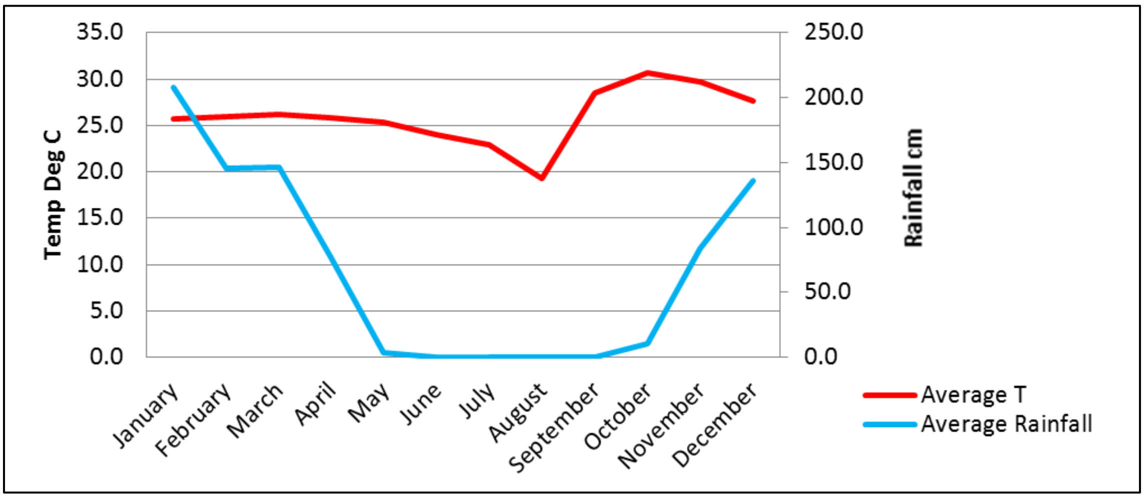
The coolest months in Tanzania occur during the southern hemisphere's winter, and all-year round the weather remains pleasant and comfortable. Temperatures range from around 10°C in the northern highlands to about 23°C on the coast between the months of June and October. During December to March, temperatures range from the mid-20s to the low-30s.

Tanzania's climate is sub-tropical and the climatic variation between the different regions of the country is significant. Coastal areas and mountainous regions in particular are subject to significantly more rain than the lowlands and high plateau areas. Tanzania experiences two seasons of rain each year, the masika or long rains that fall from mid-March to the end of May, and the mvuli or short rains, that come intermittently throughout November and parts of December, and sometimes stretch into early January. The beginning of both rainy seasons is marked by a change in the winds which, historically, marked the time for trading boats to set off on expeditions across the Indian Ocean or return to their native lands.

Systematic weather monitoring stations are rare and the closest to the SMP is at the Songwe International Airport. However, given its proximity to a major mountain range and notably higher altitude compared to the SMP, it is significantly cooler and wetter than the project area.

Helio has collected rainfall and temperature figures at the Mkwajuni office since November 2007. The average monthly temperature (daytime) and rainfall (24 hours) recorded between November 2007 and December 2011 are shown in Figure 5.2.

Figure 5.2 Temperature and rainfall averages (November 2007 to December 2011)



Temperature readings were taken four times per day; 7am, 11am, 3pm and 7pm. Rainfall is recorded as a total over a 24-hour period; 7am to 7am. The temperature and rainfall data for 2008 to 2011 are shown in Figure 5.3 and Figure 5.4. Recording of this data is sporadic over December and January, due to reduced staffing levels. This has a minor effect on the average recorded temperature, however rainfall for these months is consistently low. Unreliable temperature data was collected between August and November 2011 (due to low battery power in the digital thermometer), therefore this data has been excluded from the dataset (SRK, 2012).

Figure 5.3 Temperature (2008 to 2011)

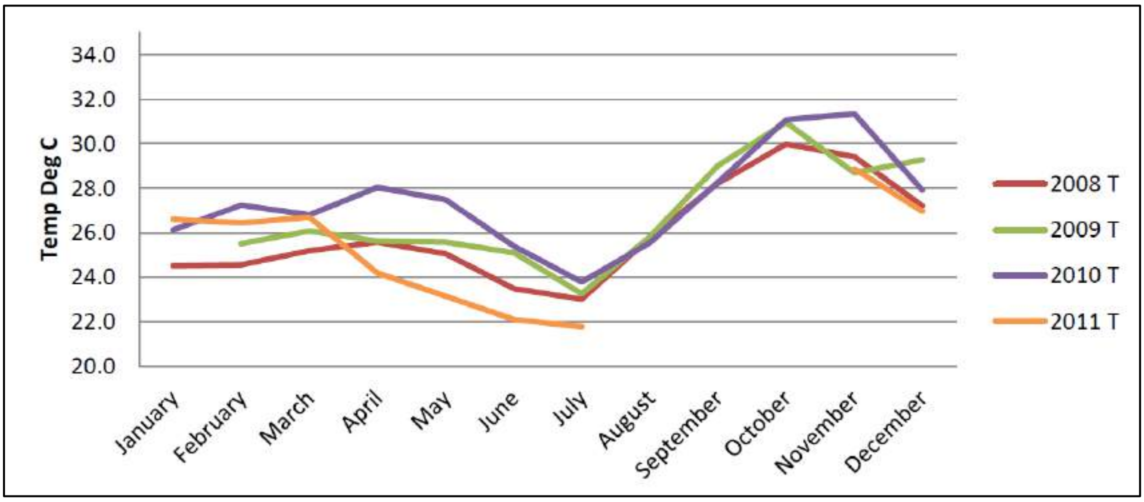
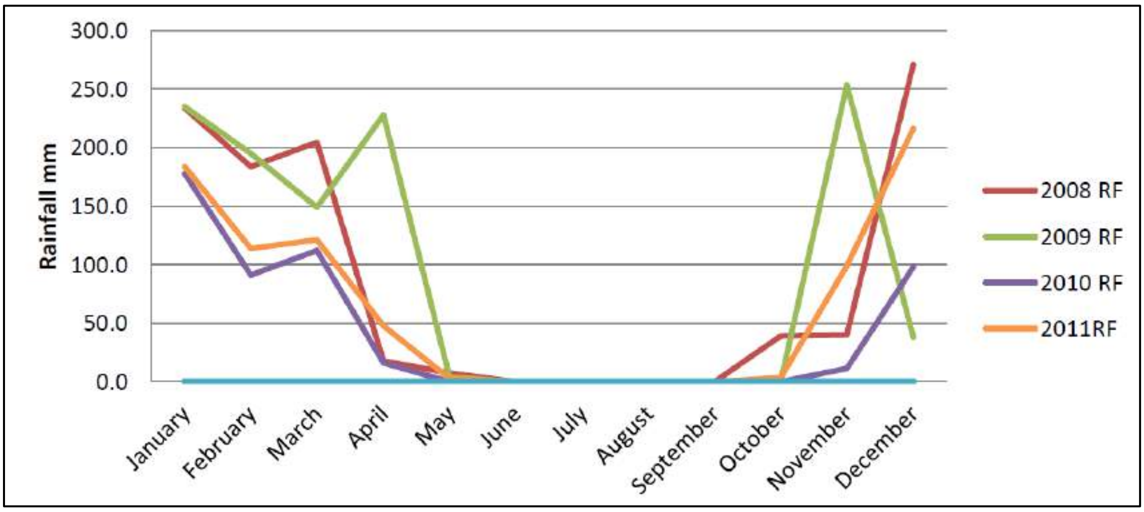


Figure 5.4 Rainfall (2008 to 2011)



Helio have not found that climatic conditions ever significantly limited exploration activities since commencing work on the SMP in 2006.

5.5 Infrastructure

From Chunya to Mbeya, a 33 kVA power line runs along the road, through the SMP and on to Mkwajuni, where the Helio field camp is located. Mains electricity is available on site. All the major mobile phone networks have pylons in Mkwajuni and Makongolosi, with an additional Vodacom tower situated on the peak of the eastern end of the Ilunga hills (outside of the SMP).

Exploration services and equipment are accessible through the road and rail networks of Tanzania and small scale fly camps are regularly mobilised to more remote areas to facilitate more efficient working schedules.

There is no mining infrastructure located on the SMP. However, Shanta Gold Ltd has been operating the New Luika Gold Mine in a property immediately adjacent to the SMP since late 2012.

Tanzania has an established mining industry and a reasonably qualified workforce could be recruited from other areas of the country, especially the Lake Victoria region. Subsistence farmers and occasional artisanal miners primarily comprise the local workforce.

During early 2006, Helio established an exploration camp in Mkwajuni (some 5 km south of the SMP project area), based in a renovated National Bank of Commerce building set within a large secure compound. This camp has been expanded and improved as the project has developed. The building provides a large office area and living quarters for staff and the compound is large enough to allow for core logging, storage and cutting areas, as well as secure sample storage, diesel storage facilities and vehicle maintenance areas.

6 History

6.1 Prior ownership and ownership changes

Before the mid-1990s, the ownership of the SMP is uncertain. Dhahabu Exploration and Mining Company (Demco) owned the Gap and Saza West PLs, and exploration was conducted here from 1995 to 2000 by Anmercosa Services (Eastern Africa) Limited (“Anmercosa”), a subsidiary of Anglogold Exploration Tanzania Limited (“Anglogold”).

The Ilunga and Kwaheri PLs were owned by Princess Resources from 1995 to 1999, and the Saza and Saza West licences were owned by Tanganyika Gold from 1995 to 2000. Anmercosa conducted the exploration.

During 2004, the Gap, Kwaheri and Ilunga licences were acquired by Dhahabu Resources and Mining Company Limited (Dhahabu), and the Saza and Saza West licences by TTML. Helio entered into option agreements with these two companies for the five PLs in 2006.

It is not clear what the status of the licences was between 1999 to 2000 and 2004.

6.2 Previous exploration

There have been a number of exploration programs conducted over the areas that now make up the SMP since Tanzania gained independence on 9 December 1961. A brief summary of historic exploration in the area is shown in Table 6.1, and the previous exploration is discussed in detail in Section 9.1.

Table 6.1 Historic exploration in the SMP area

Company	Exploration period
Technoexport	1970 to 1974
Princess Resources	1995 to 1999
Anglogold	1997 to 1999

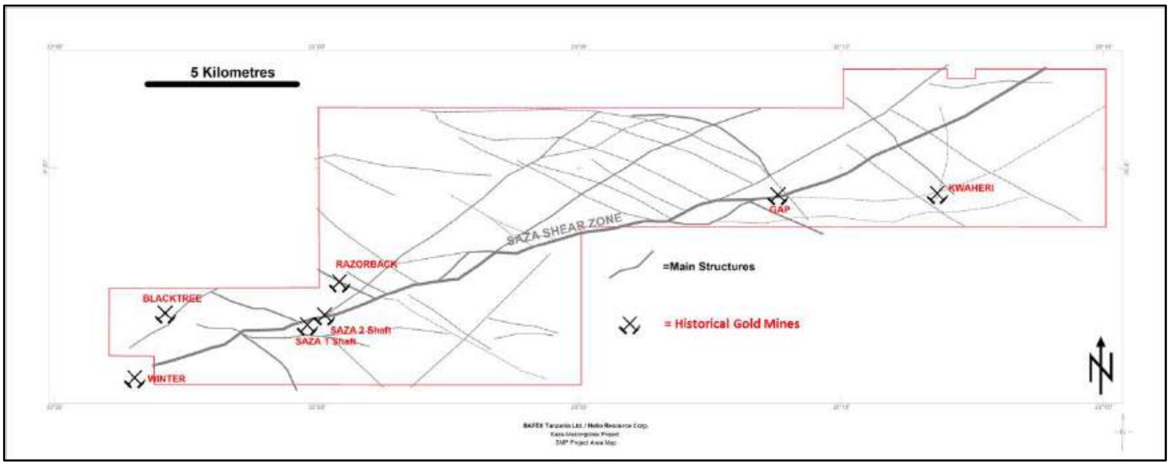
6.3 Production history

The Lupa Goldfield began production as an alluvial field in 1922 after gold was discovered in the early 1900s (Teale and Oates, 1946). East African Goldfields started systematic mining at the Saza Mine in 1935 to 1936, which was subsequently continued between 1939 and 1956 by New Saza Mines Ltd. The New Saza Mine was the largest mine on the goldfield and drew material from the Saza Mine Shafts 1 and 2, Blacktree, Winter, Luika and Razorback mines. Between 1939 and 1956, the reported production was 270,770 oz of gold and 242,942 oz of silver from 1.1 Mt of ore (Harris, 1962).

Kwaheri, Gap and Nkatano were other small-scale colonial era mines that were exploited in the area. However, production is not clearly reported for these mines (Smith and Sango, 2000a, 2000b).

The location of historical mines located within the SMP is shown in Figure 6.1 and includes the New Saza Mine (Shafts 1 and 2), Razorback, Blacktree, Winter, Gap and Kwaheri mines.

Figure 6.1 Location of historical mines within the SMP area



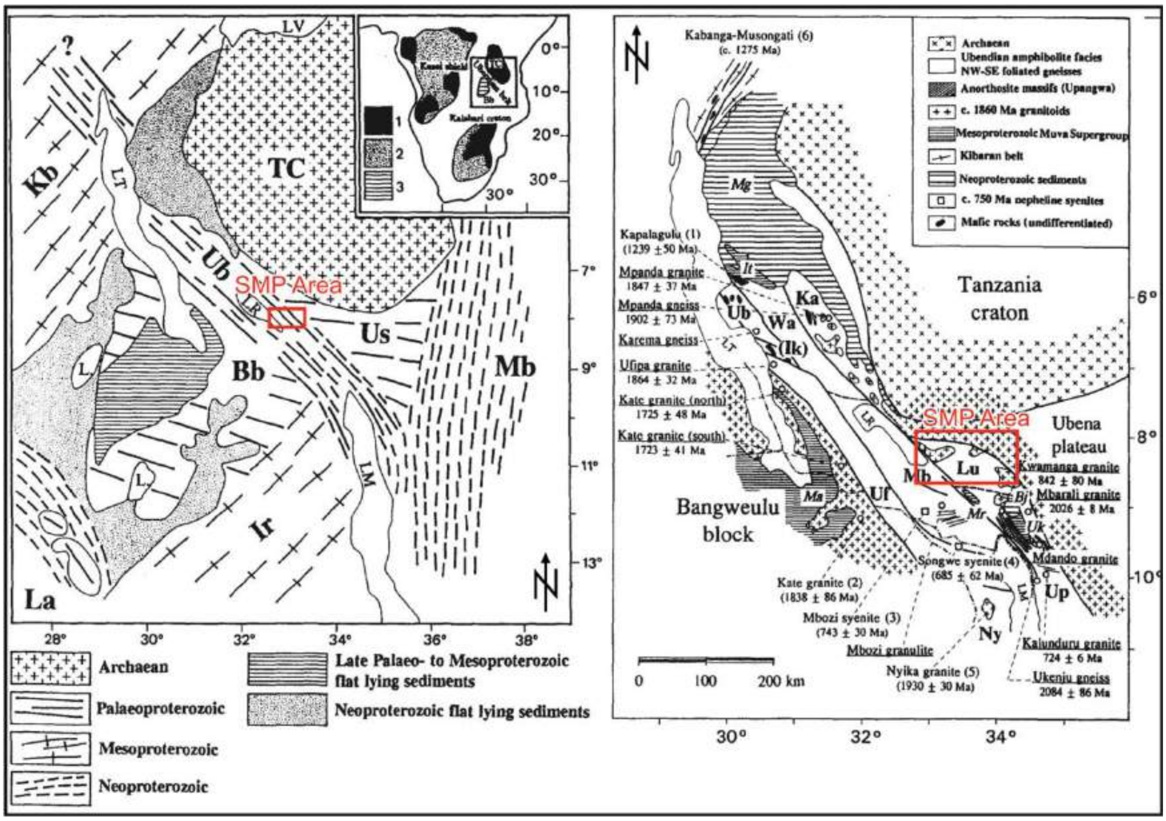
7 Geological setting and mineralisation

The following section is modified after CCIC (2014) and references therein.

7.1 Regional geology

The Lupa Goldfield is situated along the south-western edge of the Tanzanian Craton (Figure 7.1), within the Lower Proterozoic mobile belt of the Ubendian System (1.8 Ga). Lithologies comprise granitic, intermediate and mafic intrusive rocks together with ferruginous quartzites. The west-northwest trending Rukwa Faults bound the Lupa Goldfield to the south and west. It is bounded to the east by the northeast trending Usangu Rift Faults and to the north by the east-southeast trending Northern Boundary Fault.

Figure 7.1 Regional setting of the Ubendian Belt and the SMP area (Lenoir *et al.*, 1995)



The ferruginous quartzites are banded quartz-magnetite rocks and are presumed to be the oldest formation to occur (Smith and Sango, 2000a, 2000b). There are a number of stages of felsic and mafic intrusions:

- The earliest phase of granite intrusion is commonly sheared and mylonitised
- The intrusion of diorites appears to have been roughly coeval, however intrusive relationships are difficult to establish at some locations
- The Ilunga granite forms a prominent ridge (Ilunga Hills), is distinctly crystalline in texture (hypidiomorphic) and tends towards alkali composition
- The Saza granite is a true granite or granodiorite, and is hypidiomorphic in texture

- Intermediate to basic intrusive rocks of dioritic to gabbroic compositions are common in the Lupa Goldfield
- Dolerite dykes are the youngest intrusionst.

Several prominent structural trends are observed in the Lupa Goldfield. A strong west-northwest to northwest trend is seen in outcrop and satellite imagery and this foliation has been found to be due to major dextral shear zones. Many of the west-northwest structures show northwest-southeast splays, which link adjacent shears and are common near contacts between lithologic units.

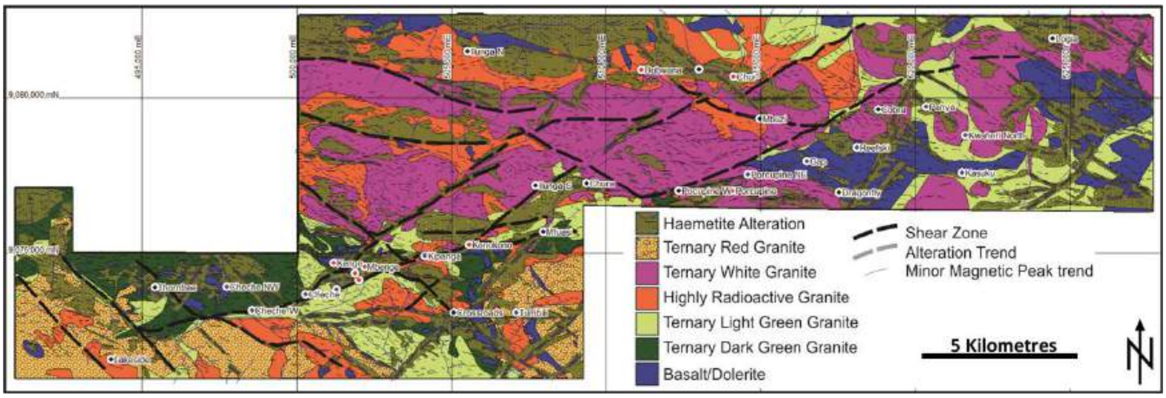
The prominent east-northeast to east-west trend occurs as shears and mylonite zones. These zones also appear to be dextral in nature, although a later sinistral displacement has also been reported. In some places they cut and displace the west-northwest structures, suggesting that they are younger.

The Saza Shear Zone is one of the well-known east-northeast to west-southwest trending structures. It is over 35 km long and hosts, or is closely associated with, most of the known significant gold mineralisation in the western part of the Lupa Goldfield. North-northwest trending structures are also known in the goldfield. In most cases they are not extensive and are often bounded by west-northwest trending shears. Northeast-southwest trending shears are also common and they displace the west-northwest trending shears with a dextral sense of movement. All structures have had long histories of reactivation, the latest period occurring during post-Cretaceous rifting.

7.2 Property geology

The SMP is located on the western margin of the Lupa Goldfield and the south-western corner of the property covers a minor amount of the Rukwa Trough. The geology of the SMP area is dominated by granites with numerous small and irregularly shaped mafic and intermediate igneous bodies (Figure 7.2). However, in the small area of the property that lies within the Rukwa Trough, recent sediments are present.

Figure 7.2 Geology map of the SMP area (Impel, 2010)



The igneous suite is dominated by granite and granodiorite. Two distinct granites are observed:

- Saza Granite – a post-tectonic hornblende-biotite granite with coarse grained quartz and feldspar, in places grading to a granodioritic composition
- Ilunga Granite – a medium grained, leucocratic, alkali granite, thought to have been intruded towards the end of the Ubendian Orogeny.

The Ilunga granite is observed extensively in the northern half of the SMP. It crops out prominently and is the primary constituent of the east-west trending Ilunga hills and of the smaller hills in the east of the licences. The Saza Granite is observed extensively in the southern portion of the prospect area. Gold mineralisation occurs in both the Ilunga and Saza granites.

Significant diorite/gabbro bodies are observed in the southern portion of the SMP. Contacts are often mutually intrusive and therefore relationships between the mafic and felsic rocks can be difficult to ascertain.

Except where the rocks are sheared, primary igneous textures are preserved. Lower greenschist facies metamorphism is common, and there is little evidence for a major thermal event.

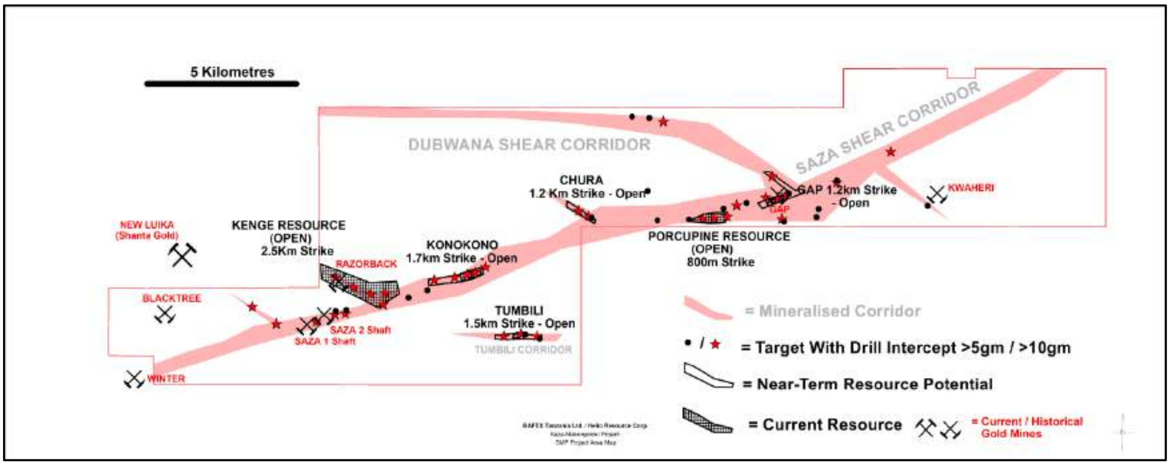
The Saza Shear Zone is the dominant structure in the area (Figure 7.3), striking 070° and traceable for over 35 km within the project area. The New Saza Mine's 1 and 2 Shafts, as well as the Gap and Winter mines, are located at various points along the Saza Shear.

Two structural sets stand out in the SMP, both of which are associated with mineralisation. As such, they have been given names which reflect the nature of structures where they were first identified (the Saza Shear Zone and the Kenge Target):

- Saza-parallel (striking 070º)
- Kenge-parallel (striking 120º).

The significance of the intersections of these two structural orientations is becoming increasingly apparent. For example, the main zone of the Porcupine Target lies on an intersection of Saza-parallel and Kenge-parallel structures.

Figure 7.3 The Saza and Dubwana shear zones in relation to targets and historical workings



7.3 Mineralisation

Gold mineralisation in the Lupa Goldfield is generally associated with structurally controlled shear zones. Whether this mineralisation style is orogenic or intrusion-related is still unclear. Mineralisation is widespread across the SMP and is highly variable in scale.

The deposit areas which are the main focus of this report, Kenge, Porcupine and Konokono, display the following characteristics.

7.3.1 Kenge

The Kenge target has a strike length in excess of 2,000 m and is made up of Kenge Main, Mbenge and Snakebite.

Mineralisation is focused on a series of massive anastamosing quartz veins, which are emplaced in a shear zone that trends 120º and generally follows the contact between the Saza Granite and granodiorite bodies. Gold mineralisation is up to 40 m in thickness and is associated with the vein quartz and the mylonitised Saza Granite and granodiorite wall rocks.

7.3.2 Porcupine

The Porcupine target has a strike length in excess of 3,500 m and is made up of Porcupine Main, Porcupine NW, Porcupine Quill and Gap.

The Porcupine deposit is located in the hangingwall of a mafic dyke complex and is surrounded by numerous diorite intrusions. Post-granite intrusions are rare.

The gold mineralisation is associated with a sheeted quartz vein system within the Ilunga Granite, at the intersection of two structures (trending towards 070º and 120º). The granites are composed of haematite-altered feldspar and quartz with accessory leucoxene, chalcopyrite and pyrite. The same granite outside the gold deposit contains patches of chlorite-magnetite and hornblende. Gold mineralised zones up to 90 m thick consist of sheeted quartz veining within altered host granite.

7.3.3 Konokono

The Konokono target has a strike length of more than 1,500 m. The mineralisation corresponds broadly with the Porcupine system, however a number of different granites are observed and significantly more mafic material is present.

7.3.4 Associated mineralogy and alteration

Mineralisation at the SMP is relatively simple, comprising of pyrite (generally less than 1% by volume) with minor chalcopyrite and molybdenite plus rare scheelite and galena. Gold occurs as free gold, and occasionally as telurides. Mineralisation is associated with quartz veining, silicification, sericitisation, haematisation (demagnetisation), and occasionally chloritisation. Minor brecciation is important in localising mineralisation at Porcupine, and mylonitisation is dominant at the Kenge Main Zone.

8 Deposit types

The following section is modified after CCIC (2014) and references therein.

The SMP gold deposits can be broadly described as shear zone-hosted orogenic or intrusion-related gold systems. Mineralisation is dominantly associated with Saza parallel (070º) and Kenge parallel (120º) shear zones, which are parallel to the Palaeoproterozoic Ubendian and Usagaran belts respectively. There is little evidence to suggest a major thermal event and age-dating of mineralisation and fluid inclusion work has yielded ambiguous results.

Helio has conducted Re-Os dating on molybdenite at the SMP. Kenge has recorded an age of around 1.93 Ga and Porcupine of 1.88 Ga. As such, the mineralisation at the SMP is similar to deposits of the Birimian in West Africa (e.g. Chirano and Ahafo deposits). Elsewhere in Tanzania, gold deposits are commonly Archaean in age.

The deposit characteristics of the Kenge (including Mbenge), Porcupine and Konokono targets are as follows.

8.1 Kenge

- Bulk target is hosted within a ductilely deformed rocks, with high grade targets in brittle structures
- Mineralisation is focussed along a 120° trending shear zone (which follows the contact of a granitoid)
- Gold is contained in pyrite bearing quartz veins and mylonitised wall rock, which has undergone sulphidation and sericitisation
- Quartz veins range from 10 cm to 10 m in thickness
- Intersections of the main mineralised structure are up to 40 m thick
- Alteration is dominated by sericite-chlorite-carbonate, which is characteristic of low temperature and pressure hydrothermal systems.

8.2 Porcupine

- Target is hosted within a brittle deformation zone
- Mineralisation is focussed by the intersection of Kenge-parallel and Saza-parallel shear zones within the Ilunga Granite
- Gold mineralisation is associated with a sheeted vein quartz, quartz/pyrite and pyrite fracture system
- Coincident pervasive mineralisation and alteration of the granite host rock is characterised by sulphidation and sericitisation
- Quartz veins range from 0.5 cm to 5 m in thickness
- Mineralised structures are up to 90 m thick
- Alteration is dominated by sericite-chlorite-carbonate, which is characteristic of low temperature and pressure hydrothermal systems.

8.3 Konokono

The mineralisation observed at Konokono corresponds broadly with the Porcupine system, however a number of different granites are observed and significantly more mafic material is present. The highest grades of gold are associated with late-stage brittle deformation.

9 Exploration

The following section is modified after CCIC (2014) and references therein.

9.1 Pre-2014 exploration

9.1.1 Technoexport, 1970 to 1974 (Luena *et al*., 1974)

The Soviet-Tanzanian Agreement of 1969 allowed Technoexport to provide Tanzania technical assistance in geological investigations, including detailed prospecting for gold in the Lupa Goldfields. This is thought to be the first systematic prospecting and evaluation of the Lupa Goldfield. A summary of the total work conducted by Technoexport across the entire Goldfield is given in Table 9.1.

Table 9.1 Work conducted by Technoexport between 1970 and 1974

Type of work	Unit	Total amount
Prospecting traverses	Kilometre	450
Geochemical survey	Sample	1,014
Heavy concentrates	Sample	7,050
Channel sampling	Sample	2,550
Drilling		
For Reef gold	Metre	5,636
For alluvial gold	Metre	1,525
Trenching	Cubic metre	4,800
Pitting (including cross cuts)	Metre	3,150
Geophysical survey		
Magnetics	Stations	12,742
Electrical profiling	Stations	17,504
Vertical electrical sounding	Stations	344

Technoexport reported reef gold across the Lupa Goldfields, at several deposits, including Saza. Most of gold was reported to be in the north-western part of the goldfield. The report, recommended further exploration of the area.

Information from Luena *et al*. (1974) was used by Helio for initial regional target generation when Helio first began work on the SMP. The whereabouts of core generated by Technoexport is unknown.

9.1.2 Princess Resources and CSA Africa, 1995 to 1999 (Henderson and Lewis, 1998 – various CSA quarterly reports)

Princess Resources held five PLs in the Makongolosi area in the mid to late 1990s, including ones that correspond to Helio's Ilunga and Kwaheri licences. Information on this work is fragmented; however it is clear the following activities took place:

- Remote sensing interpretation
- Structural analysis
- Geological mapping
- Regional and detailed soil sampling

- Rock chip and trench sampling
- RC and diamond drilling.

Discussions with the inhabitants of the village, built out of the remains of the camp from which CSA Africa (“CSA”) operated, led to the discovery of a large pile of core which had been emptied out of its trays. None of this material is useful. A number of RC chip trays were recovered. However, many were damaged and missing material, and the holes which contained the best grades were absent.

Helio’s initial exploration over areas previously explored by Princess Resources and CSA revealed that there were major issues with CSA’s sampling methodology, as well as the accuracy and precision of their ability to locate their samples and drillhole locations. Therefore, the work carried out by Princess Resources and CSA has not been used to assist in the formulation of Helio’s exploration strategy, other than in general terms.

9.1.3 Anglogold Exploration Tanzania Limited, 1997 to 1999 (Smith and Sango, 2000a, 2000b)

Anglogold worked across 11 PLs in the Lupa Goldfields. These PLs were owned by two separate companies, Tanganyika Gold Limited (“TGL”) and Dhahabu Exploration and Mining Company (Demco). Anglogold entered into separate joint ventures with both companies whereby their subsidiary, Anmercosa, managed all exploration across all licences. Exploration across all the PLs was conducted between September 1997 and October 1999.

Tanganyika Gold Limited joint venture work

Of the nine licences held by TGL, only five have direct links to the SMP. The licence areas included those on Helio’s current Gap, Saza and Saza West licences. Listed below is the work conducted by Anmercosa during the joint venture between Anglogold and TGL:

- Interpretation of regional airborne geophysical and Landsat image data
- Integrated structural analysis
- Landform and regolith mapping
- Sampling, trenching and drilling displayed in Table 9.2.

Table 9.2 Work conducted by Anmercosa between 1997 and 1999 across the nine prospecting licences belonging to Tanganyika Gold Limited

Type of work	Unit	Total amount
Regional soil grid	Sample	5,693
Detailed soil grid	Sample	1,578
Rock grabs	Sample	191
Trenching	Metres	1,080
Trench samples	Sample	570
RAB drilling	Metre	5,239
RC drilling	Metre	649
Diamond drilling	Metre	949.5

Anmercosa identified two areas of interest for detailed exploration: the Stockwork Zone and the Saza Mine 2 shaft (Helio targets Konokono and Cheche). Anmercosa concluded there was no significant gold mineralisation worthy of follow up. The joint venture was terminated in 2000.

Dhahabu Exploration and Mining Company (Demco) – Anglo American joint venture

The two PLs held by Demco contained the Razorback and Gap mines. Listed below is the work conducted by Anmercosa (an Anglo American subsidiary) during the joint venture:

- Interpretation of regional airborne geophysical and Landsat image data
- Integrated structural analysis
- Landform and regolith mapping
- Sampling, trenching and drilling displayed in Table 9.3.

Table 9.3 Work conducted by Anmercosa between 1997 and 1999 across the two prospecting licences belonging to DEMCO

Type of work	Unit	Total amount
Regional soil grid	Sample	427
Stream sediment sampling	Sample	32
Rock grabs	Sample	74
Trenching	Metres	726
Trench samples	Sample	367
RAB drilling	Metre	4,513

Anmercosa targeted the Saza Mine 1 shaft (Helio's Cheche West) and Gap targets for detailed exploration, and concluded that during their exploration no significant gold mineralisation worthy of follow up was identified. The joint venture was terminated in 2000.

Anmercosa's data obtained by Helio has been digitised and, where possible, ground-truthed. The data is in relatively good order, however it has not been used by Helio for any other purpose than to carry out initial regional target generation when Helio first began work on the SMP. The whereabouts of the drill core generated by Anmercosa is unknown.

9.2 Exploration conducted by Helio Resource Corporation

Helio began exploration operations on the Saza PL (PL2580/2004 – now RL0009/2014) in April 2006. In the last quarter of 2006, the Gap, Kwaheri and Ilunga PLs (2963/2004, 2964/2004 and 2965/2004 – now RL0010/2014, 0011/2014 and 0012/2014 respectively) were added to the SMP and initial field work was conducted there. In October 2008, the Saza West PL (5326/2008) was added to the project. The current licence names are as follows: Saza, Gap, Kwaheri, Ilunga, Makongolosi North, Gap North, Saza East, Mkwajuni North, Kwaheri East, Maleza, Saza West, Logia, and Saza South.

Since the beginning of exploration activities in 2006, Helio and its subcontractors conducted a number of geophysical, geochemical, RC and diamond drilling ("DD") and remote sensing exercises across the SMP. Exploration conducted on the SMP since 2006 is summarised in Table 9.4 to Table 9.11 below. In addition to the work listed in these tables, Helio has also conducted mapping exercises of varying complexities over many areas and specific targets within the SMP at all stages of the project to date. During this field work a total of 548 rock samples have been collected and analysed. These rock samples were not used in the current Mineral Resource estimate.

Table 9.4 Regional soil geochemistry

PL	Year	Samples	Specifications
Gap (2963/2004)	2007	866*	250 m by 250 m offset grid
Kwaheri (2964/2004)	2007	865*	250 m by 250 m offset grid
Ilunga (2965/2004)	2007	843*	250 m by 250 m offset grid
Saza (2580/2004)	2007	865*	250 m by 250 m offset grid
Saza West (5326/2008)	2008	565*	250 m by 250 m offset grid

**The number of samples includes duplicate samples and Certified Reference Materials (CRMs) inserted for QA/QC.*

Table 9.5 Detailed soil geochemistry

PL	Year	Target	Samples	Specifications
Gap (2963/2004)	2007	Dubwana	245*	50 m by 100 m offset grid
Kwaheri (2964/2004)	2007	Panya	258*	25 m by 100 m offset grid
Saza South (4963/2008)	2008	Tumbili	1,087*	25 m by 100 m offset grid
Combined program				
Saza East (7143/2011)			2,880*	
Ilunga (2965/2004)	2011	Saza East and surrounds	1,358*	25 m by 100 m offset grid
Saza (2580/2004)			503*	
Saza South (4963/2008)			288*	

**The number of samples includes duplicate samples and CRMs inserted for QA/QC.*

Table 9.6 Geophysical surveys

PL	Year	Method	Line km
Saza (2580/2004)	2006	IP – Gradient Array and Pole-Dipole. Magnetics	130
Saza (2580/2004)	2007	IP – Gradient Array. Infill lines	8
Saza (2580/2004)	2007	Magnetics	50
Gap (2963/2004)	2007	IP – Gradient Array	78
Kwaheri (2964/2004)	2007	IP – Gradient Array	130
Ilunga (2965/2004)	2007	IP – Gradient Array	50

Table 9.7 Airborne magnetic and radiometric geophysical surveys

Year	Line km	Specifications
2007*	1,130	200 m line spacing, 20 m to 30 m elevation (terrain dependent)
2009*	5,290	50 m line spacing, 20 m to 30 m elevation (terrain dependent)

**In 2007 the SMP consisted of the Saza, Gap, Kwaheri and Ilunga Licence, whereas in 2009 it also included Saza West. The airborne surveys covered all licence areas which were operated by Helio at the time of flying.*

Table 9.8 Summary of number of holes drilled by licence and year

Licence	2006		2007		2008		2009		2010		2011		2013		2014		Total
	RC	DD	RC	DD	RC	DD	RC	DD	RC	DD	RC	DD	RC	DD	RC	DD	
Saza (2580/2004)	33	6	88	67	-	112	12	2	17	-	-	11	-	4	-	-	**352**
Kwaheri (2964/2004)	-	-	3	-	-	-	23	-	26	-	-	-	-	-	-	-	**52**
Gap (2963/2004)	-	-	6	-	20	41	100	20	31	31	-	50	-	-	-	-	**299**
Ilunga (2965/2004)	-	-	-	-	-	-	-	-	-	-	-	16	-	-	-	-	**16**
Makongolosi North (5990/2009)	-	-	-	-	-	-	-	5	33	-	-	-	-	-	-	-	**38**
Saza South (4963/2008)	-	-	-	-	-	-	-	-	16	4	36	-	-	-	-	-	**56**
Saza West (5326/2008)	-	-	-	-	-	-	25	-	10	-	-	-	-	-	-	-	**35**
Saza East (7143/2011)	-	-	-	-	-	-	-	-	-	-	37	-	-	-	-	-	**37**
Saza East (7147/2011)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	24	-	**24**
Gap (0010/2014)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	25	6	**31**
Total year	**33**	**6**	**97**	**67**	**20**	**153**	**160**	**27**	**133**	**35**	**73**	**77**	**-**	**4**	**49**	**6**	**940**

Table 9.9 Summary of drilling totals by year

Year	RC holes	RC metres	DD holes	DD metres	Total holes	Total metres
2006	33	3,138	6	1,027.55	39	4,165.55
2007	97	8,531	67	9,485.82	164	18,016.82
2008	20	1,621	153	27,177.85	173	28,798.85
2009	160	15,049	27	8,945.45	187	23,994.45
2010	133	12,136	35	7,809.2	168	19,945.20
2011	73	6,561	77	10,200.17	150	16,761.17
2013	-	-	4	781.81	4	781.81
2014	49	4,728.6	6	3,164.60	55	7,893.2
Total	**565**	**51,765**	**375**	**68,592**	**940**	**120,357**

Table 9.10 Metallurgical testing

PL	Job no.	Drill material	Date of report
Saza (2580/2004)	11940-001	50 kg composite of SZD011, 013 and 021	August 2008
Saza (2580/2004)	11940-002	Remaining material from job 11940-001 (SZD011, 013 and 021)	May 2009
Gap (2963/2004)	11940-003	50 kg of material from GPD004	August 2009

**See Section 13 for detailed metallurgical reporting*

Table 9.11 Work conducted by consultants

PL	Contractor	Work conducted	Date
Saza (2580/2004)	Dave Coller	Study of structural controls of Au mineralisation in the Kenge target	April 2008
Gap (2963/2004)	SRK	Study of structural controls of Au mineralisation in the Porcupine target	January 2010
All SMP	Impel Geoscience	Study of structural controls of Au mineralisation across the SMP	July 2010
All SMP	Golder	Mineral Resource estimation	November 2010
All SMP	SRK	Review of Mineral Resource estimation	January 2011
All SMP	SRK	Mineral Resource estimation	February 2012
All SMP	SRK	Preliminary Economic Assessment	September 2012
All SMP	CCIC	Mineral Resource estimation	March 2014
All SMP	Snowden	Review of Mineral Resource estimation	August 2014
All SMP	Snowden	Mineral Resource estimation	February 2015

10 Drilling

The following section is modified after CCIC (2014) and references therein.

Helio has undertaken a number of drilling campaigns on the SMP. The statistics of each campaign are shown in Table 10.1.

RC drilling is mainly utilised as a first pass exploration tool: once a target is identified through geochemical, geophysical or mapping work, an RC rig is used to drill exploratory drill fences which allows the company to quickly test large areas of ground at moderate expense.

Diamond core drilling is used mainly to follow up any discoveries made by RC drilling. The diamond rig will in most cases replicate the original RC hole to confirm the original drilling and assess the degree of upgrade in assay results which is frequently seen when comparing RC to diamond drill assay grades. If the repeated DD hole confirms the discovery in the RC hole a grid pattern will be drilled around the discovery hole to assess the strike, dip and plunge extensions of the discovery. If a discovery is significant, a drill plan will be designed on a local grid to regulate the drilling in the area.

Table 10.1 Drilling programs on the SMP to December 2014

Year	Company	Rig	Type	Drillholes	Metres
2006	Major Drilling Tanzania	KL150	RC	33	3,138
	Geo-Logical Drilling Ltd	Longyear 38	DD	6	1,027.55
2007	Stanley Mining Services Ltd	UDR650	RC	97	8,531
	Geo-Logical Drilling Ltd	Longyear 38	DD	67	9,485.82
		Longyear 44			
2008	Capital Drilling Tanzania Ltd	KL600	RC	20	1,621
	Geo-Logical Drilling Ltd	2 x Longyear 38's	DD	153	27,177.85
		Longyear 44			
		2 x Goldenbears			
2009	Tandrill Ltd	Smith Capital 10RSH	RC	160	15,049
	Geo-Logical Drilling Ltd	Goldenbear	DD	27	8,945.45
2010	Tandrill Ltd	Smith Capital 10RSH	RC	133	12,136
	Geo-Logical Drilling Ltd	Longyear 38	DD	35	7,809.20
		Goldenbear			
2011	Layne Drilling Ltd		RC	73	6,561
	Geo-Logical Drilling Ltd	2 x Longyear 38	DD	77	10,200.17
2013	Geo-Logical Drilling Ltd	Longyear 38	DD	4	781.81
2014	Hallcore Drilling Ltd	Thor	RC	49	4,441.50
	Geo-Logical Drilling Ltd	Longyear 38	DD	6	3,451.70
Total				**940**	**120,357**

On occasion, access and availability constraints will result in RC and diamond rigs swapping roles so as to enable first pass and detailed drilling in areas which are off limits to the machines that would normally be used.

Of the 940 holes drilled, all but 51 were surveyed using digital downhole survey tools. Major Drilling did not survey their work; neither did Capital Drilling (however, two of the holes drilled by Major Drilling were subsequently surveyed by Geo-Logical in order to replicate discovery holes). The following tools were used by the other drilling contractors:

- Geo-Logical Drilling: Reflex
- Stanley Mining Services: Flex-it
- Tandrill: Reflex
- Layne: Flex-it.

Of the 375 diamond drillholes, 86 were drilled using orientation equipment, 16 using Ezi-Mark tools, 74 with a Reflex Act tool. All holes are located during drilling using a standard handheld GPS. Once the rig has vacated the site a DGPS unit is used to record an accurate and precise set of X, Y and Z coordinates.

10.1 Reverse circulation drilling

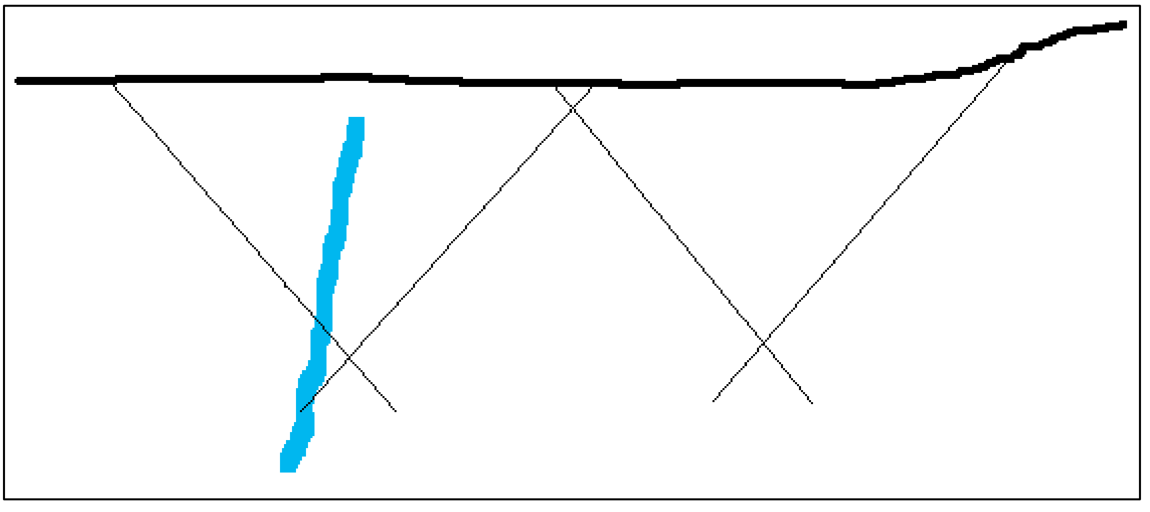
Helio's standard operating procedures ("SOPs") describe set practices for RC drilling (Helio, 2010). This section summarises the procedures.

10.1.1 Positioning of reverse circulation drillholes

The vast majority of RC drilling conducted by Helio takes the form of fence drilling. Once a target is identified, a line of RC holes is planned. The holes are positioned so that there is an overlap at the top and bottom of each hole. Figure 10.1 illustrates how an RC fence allows for precise quantities of drilling to be planned and executed whilst ensuring anomalous zones (depicted in blue) are sampled regardless of the spatial extent of the zone compared to the length of the hole.

In rare instances there may be factors which require an RC rig to drill single holes, in which case the target is thoroughly surveyed and a cross section drawn up to ensure the hole is drilled to sufficient depth to intersect any postulated zones of mineralisation.

Figure 10.1 Illustration of an RC drill fence (drillholes in black, anomalous zone in blue)



10.1.2 Reverse circulation drilling procedures

The material produced by an RC rig is collected directly from the machine's cyclone by a Helio employee by the metre in specially prepared and marked rice sacks. To minimise downhole smearing of anomalies, the driller is instructed to lift the rod string slightly and blow out the hole after every metre is drilled. Once removed from the cyclone, the sample is weighed.

The drilling contractor is required to clean out the cyclone at least between holes, or at the end of the day. If significant water is intersected in the hole the cyclone is cleaned more frequently.

The sampling/logging area is located up-wind of the machine to minimise contamination from dust released during the drilling process. Except where there are small amounts of recovered material or where the sample is wet (in which case pipe sampling is used), all material is passed through a three-tier riffle splitter to homogenize the sample and reduce it to a suitable volume. Depending on the size of the bit used to drill the hole, the remaining 1/8th portion of recovered material results in a sample size of 2 kg to 4 kg.

In order to maximise the detail of sampling in each hole, whilst at the same time minimising the cost of sample transportation and analysis, RC holes are composited into 2 m samples. Prior to 2014, 2 m composite samples were usually made up from consecutive sub-samples, which are homogenised through the splitter. This results in two samples being collected: a 2 m composite laboratory sample; and a 2 m composite reference sample which is stored by Helio. From 2014, 1 m samples were used, and a 1 m reference sample retained.

To reduce the possibility of cross-contamination between samples, a compressed air gun using the HP take-off from the rig's compressor is used to clean the splitter between samples. Where this is not possible, stringent (water-free) efforts to clean the splitter are made to reduce the possibility of cross-contamination.

Lithological logging is conducted using washed chips which are subsequently stored by the metre in a chip tray. Lithological observations are recorded using prescribed forms and standard lithological codes. Helio has modified the Australian Geological Survey Organisation ("AGSO") drill codes to give a standard Helio Code for each metre drilled. In addition to the chip tray which is stored in the Mkwajuni office upon completion, a chip pad of material is created for each hole: drill chips (washed in a sieve) from each 1 m drill sample are piled next to the dust from the same sample in the order in which they are drilled. A photograph of the chip pad is taken in uniform lighting which will give a record of both the solid and powdered colours of the material drilled (Figure 10.2).

Figure 10.2 RC chip pad

At all times sample integrity is paramount. Should the production rate of the rig surpass the sampling rate, then all logging exercises are suspended to ensure that the sampling procedure is rigorously applied.

Magnetic susceptibility is measured in the initial 1 m rice sack sample where possible.

RC holes are routinely surveyed to record azimuth and dip. Holes are surveyed at approximately 15 m depth to confirm that the set-up of the rig is correct; a survey at the base of the hole is also taken to confirm the path of the hole. In holes longer than 100 m, a third survey is taken midway down the hole.

10.2 Diamond drilling

Helio's SOPs describe set practices for DD (Helio, 2010). This section summarises the procedures.

10.2.1 Positioning of diamond holes

DD is usually conducted as a follow up to RC drilling: once a target has been confirmed by analysis of RC samples, a diamond rig is mobilised to re-drill the RC hole to replicate the results. The vast majority of diamond holes drilled are part of a plan which is devised around the known and postulated extents of mineralised areas. Should a target show good potential for strike and dip extent a 'mine grid' is generated, usually on 25 m by 25 m centres, which allows for systematic drill location on a variety of scales.

In rare instances, a diamond rig may be used as a first pass exploration tool, in which case fence drilling programs (like those described for RC drilling) may be undertaken. Alternatively a diamond rig might be used to test new targets in which case the target area is thoroughly investigated and a cross-section drawn up to ensure the hole is drilled to sufficient depth to intersect any postulated zones of mineralisation.

10.2.2 Diamond core drilling procedures

Once recovered core has been reconstructed and cleaned, it is placed in a core tray with a core block introduced to the core string after each drill run. All core boxes are labelled with the hole number, box number and metres (from and to). Should a core orientation tool be used on a hole, the reorientation and marking of the bottom line on the core is completed prior to the core being inserted into the core tray. Any artificial core breaks made by the drillers are clearly marked so as to give an indication of fractures not to be included in rock quality designation ("RQD") measurements.

Once the core is cleaned, reconstructed, marked and in the core tray, it is stacked at the drill site and removed to the core processing site. Core is transported in a metal frame, which holds the core trays safely in place. Each tray is covered with a thick layer of foam padding to stop the core from moving during transportation.

On arrival at the core processing site, a summary log is immediately completed by the geologist. This allows the geologist to monitor the progress of the drilling and make a rapid assessment of how the actual rock types intersected by the hole compare against the predicted lithologies and mineralisation. On the basis of this, progress reports are made to Helio management.

Geotechnicians receive the core at the processing site and it is given a second, thorough cleaning, after which it is reconstructed and compressed to provide the most accurate depiction of the rock as it was in situ. Where orientated core is being handled, the core is reconstructed and the bottom of core mark extended to its fullest extent, whilst comparing the bottom of core mark up- and down-hole to the next bottom of core mark. Where core is un-orientated or orientations are not possible, an arbitrary line is drawn on the core in a different colour. The location of the line is chosen to ensure that core is representatively sampled. The lines on the core (orientated or un-orientated) are used as cutting guides when the core is split for sampling.

Using the core blocks inserted at the bottom of each core run, the core is metre-marked to aid with logging and sampling. At this stage the core is photographed dry and wet to create a record of the core in its original state.

Once the core has been fully prepared and photographed a number of different logs and processes are recorded:

Lithological log

All holes are subject to a comprehensive lithological log. The log records depth, lithology, contacts, structure, alteration, veining, and mineralisation. Logging of core is done using prescribed forms and standard lithological codes. Helio's logging codes are modified after the standard codes used by the AGSO.

Structural log

If the core is orientated, the α, β and γ angles are measured for contacts, fractures, veins, foliations, lineations and any other structure found in the core.

Sample log, preparation and dispatch

Sampling regimes differ depending on the knowledge of the target. If the target has not been drilled previously or the understanding of the target is poor, then the entire hole is sampled. If there is a good understanding of mineralisation controls at the target, then zones of interest are sampled continuously. Zones of interest have a bracket of sampling around them appropriate to the size of the zone. Areas believed to be barren are sampled at least once per box.

Once samples are defined, the core is split, the samples bagged and dispatched to the laboratory (see Section 11).

Core recovery and RQD log

Core recovery percentage is determined by comparing the measured length (“ML”) of the core between two core blocks and dividing it by the indicated length (“IL”) noted by the driller on the end of run core block (ML/IL x 100 = core recovery %).

The quality of the core (RQD) is defined as the percentage of core recovered during drilling, counting only those pieces of intact rock over 100 mm long.

Magnetic susceptibility log

Magnetic susceptibility readings are taken at each metre on the metre. Additional readings are taken over anomalous zones where these do not coincide with the default 1 m spacing.

Bulk density log

The in-situ dry bulk density of the sample is estimated by using the Archimedes principle. Each sample taken is weighed in air, and again in water, and the following calculation used to calculate the bulk density of the sample:

$$\text{Bulk density} = \text{weight in air} / (\text{weight in air} - \text{weight in water})$$

This is usually done once the core has been split and the samples dispatched to the laboratory. Each piece of half core in the sample has a number written on it to aid with reconstructing the core once the bulk density is measured.

Porosity is seldom an issue, as there is no deep weathering, few vugs, etc.

11 Sample preparation, analyses, and security

The following section is modified after CCIC (2014) and references therein. Section 11.8 was completed by Snowden.

11.1 General

Prior to arrival at the work site, all Helio employees involved in taking any type of samples for laboratory analysis are required to remove any metal rings and bracelets or any item of clothing or jewellery which has potential to contaminate samples.

Samples submitted to laboratories are given sample numbers together with instructions for preparation and analysis. No information is transmitted which would allow a laboratory to geographically locate the sample, or to aid in the identification of duplicate, CRM or blank samples.

CRM is obtained from Geostats Pty Ltd of Perth, Australia. Blank material is created by Helio using stored reference RC material which is known to have null values and not be proximal to areas of known mineralisation; numerous null-grade reference samples are homogenised and multiple random samples of the resulting blank are sent for analysis to confirm that the gold content of the blank is below detection limit before it is introduced into general usage.

11.2 Soil sampling

Soil geochemistry has been used as a regional and targeted exploration tool within the SMP. Regional soil sampling is conducted on a 250 m by 250 m offset grid. Where large areas have returned good soil geochemistry results, detailed soil sampling grids have been carried out with associated mapping and rock sampling. These detailed soil grids have been conducted at 25 m by 100 m, 50 m by 100 m and 25 m by 200 m offset grids.

The entire SMP has been covered by regional soil sampling: 4,004 samples were collected. In addition, 6,619 soil samples have been collected on detailed soil grids over the Panya, Dubwana and Tumbili targets, as well as over the entire area of the Saza East PL and its surrounds (these figures include QA/QC samples.)

Samples are collected on a pre-determined grid. Sample sites are moved only if the site is in a stream or river bed, or if it was directly on top of outcropping rock. Should the sample site not be suitable, the closest suitable site is identified and sampled and the new coordinates are noted. Prior to the commencement of the sampling program, duplicate and CRM samples are added alternately every 25 samples to the sequence to assist in Helio’s QA/QC regime.

Each soil sample is collected from a hand-dug pit to the soil-rock interface, or 50 cm, whichever is shallower. Soil from the base of the pit is sieved and approximately 100 g to 150 g of the -250 µm fraction is retained for analysis. Should a sample be damp when excavated, a 3 kg bulk sample is collected. This material is then dried and sieved to collect the sample. The -250 µm fraction is placed in a wire sealable ‘kraft’ sample packet, which in turn is enclosed in a plastic zip-lock bag and boxed for shipment.

Helio submits soil samples to Acme Laboratories in Vancouver, Canada for 36 element aqua regia digestion ICP-MS analysis, Group 1DX 30g, which has a lower limit of detection (“LLD”) of 0.5 ppb for Au.

11.3 Rock sampling

Rock sampling is conducted in one of two ways: channel sampling and grab sampling. Of these two methods, grab sampling has been used for the vast majority of rock sampling conducted to date on the SMP.

A channel sample is conducted by collecting a continuous set of rock chips across a specified length of outcropping rock. This is a difficult operation to achieve without introducing a bias to the results without the use of a motorised channel sampler; every effort is taken not to introduce sampling bias when carrying out a channel sample with a geological hammer. For this reason, channel sampling is not frequently conducted by Helio.

Grab samples are a representative collection of 1 kg to 2 kg of rock taken from within 20 m to 50 m of the sample site. Samples are double bagged securely in durable plastic bags labelled inside and out with the sample number. A sample tag is also included in the bag, which is secured using cable ties.

Samples are submitted to African Assay Laboratories (Tanzania) Limited (“AAL”) in Mwanza, Tanzania, which is part of the SGS Group, for fire assay with Atomic Absorption Spectrometry (“AAS”) finish.

11.4 Reverse circulation sampling

When an RC hole is drilled, the entire length of the hole is sampled. Whilst planning the sampling sequence, the geologist will use a ready-printed form which has designated samples; a CRM, blank material or duplicate samples. In a 46 sample sequence, two CRMs, two duplicate, two blank and one “salted” blank sample are inserted. As well as the ready-printed sample sheet, a waterproof three-tag sample book is used; one tag is inserted inside the sample bag that is sent to the laboratory, one inside the reference sample bag, and the third tag remains in the book as a second record of the sample sequence.

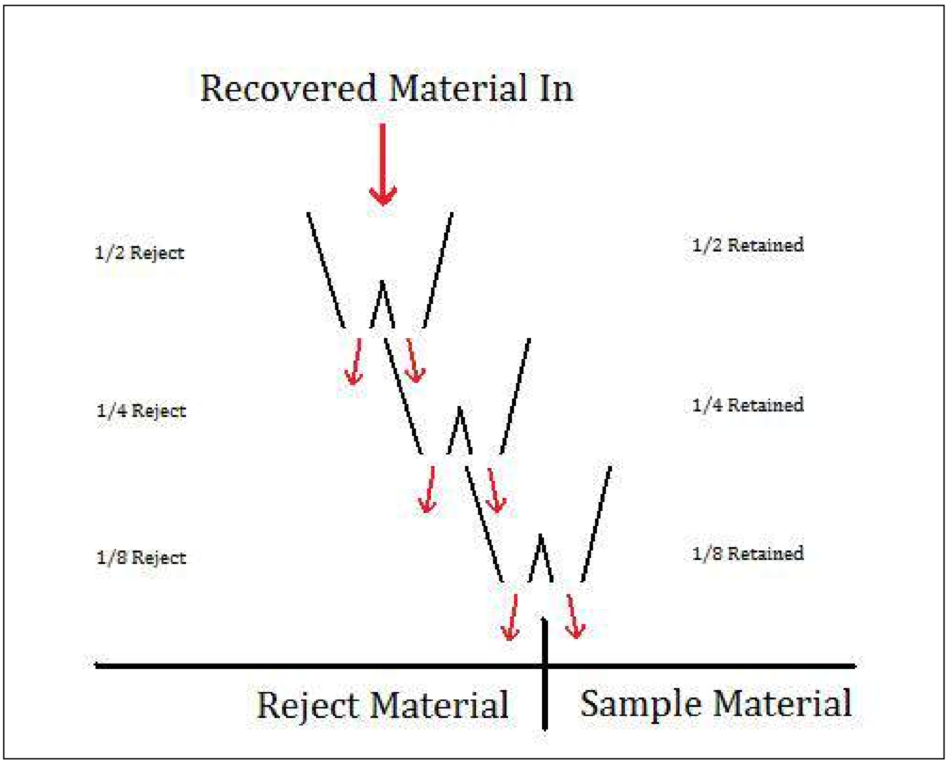
Material is collected from the cyclone in a plastic lined polyweave ‘rice sack’ which has metre numbers marked on it. The rice sack is secured to the cyclone using a length of rubber bungee cord. The driller indicates to the Helio employee manning the cyclone when a metre has been completed, at which stage driller will then lift the drill string from the base of the hole and blow the hole out to reduce any downhole smearing caused by residual heavy minerals in the hole, before removal of the rice sack. Once the hole is cleared the bag for the next interval is attached and drilling recommences.

The cyclone is cleaned between holes and whenever an obvious build-up of material is observed, especially if the sample is damp or wet.

The rice sack containing the recovered material is weighed and then is moved away from the rig to the sampling and logging area, which is located upwind of the machine. Recovered material usually weighs 30 kg to 40 kg, depending on the diameter of the drill bit. Weighing the recovered material not only gives an indication of the density of the material recovered, but also serves as a check to ensure the driller is measuring metres drilled accurately and correct sample return is being produced.

Recovered material is homogenised and reduced to a usable quantity by passing through in a three-tier riffle splitter (Figure 11.1). The 1/8th split is retained, the other 7/8ths are returned to the rice sack, which is then removed from the sample area and put in consecutive order with previous samples.

Figure 11.1 Riffle splitting



Prior to the drilling, the geologist in charge fills out a sample sheet and sample tag book for the hole. Prior to 2014, the protocol was as follows: each sample is a composite of two consecutive metres, therefore each sample will have two sample bags prepared, one of which is marked as a reference sample. Once the drilled material for the first metre of the sample has been split, the retained material is placed in the first sample bag. When the second metre of the sample has been split and placed in the reference sample bag, both sets of material are passed through a single split, thus homogenising the two separate metres into one single sample. The two splits of this 2 m composite sample are then returned to the two sample bags. The sample which is being submitted to the laboratory is always taken from the same side of the splitter. Sample tickets are added and the bags securely sealed. Since 2014, individual 1 m samples were taken and a reference sample retained.

Once 10 samples are collected, they are placed inside marked rice sacks. The samples are sent for analysis in the next sample shipment, the material marked as reference is stored by Helio as insurance against accident or loss of the original sample, or for further analytical work in the future.

Occasionally, water is encountered in RC holes. If water ingress is minimal, then the hole can continue, but if significant water is encountered the hole is abandoned to reduce the potential for downhole contamination. Where material is recovered wet, pipe sampling is used so as not to contaminate the riffle splitter. After mixing and homogenising the material comprising the sample, the rice sack containing the sample is laid flat on the floor and its contents are evened out. A PVC pipe with an internal diameter of 45 mm is inserted into the bag as shown in Figure 11.2 to obtain a representative sample of the metre drilled.

Figure 11.2 Pipe sampling procedure

In total 25,193 (from a combined total of 64,677) samples have been generated with RC drilling. This number excludes CRM, blank and duplicate samples, as well as samples which have been resubmitted to laboratories for umpiring. Samples are submitted to AAL (Mwanza, Tanzania) which is part of the SGS Group for fire assay with AAS finish. Screen fire assay and ICP work is conducted on selected samples at Acme Laboratories in Vancouver, Canada and Genalysis Laboratory Services, Perth, Australia respectively.

11.5 Diamond core sampling

Once diamond core has been moved to the processing site it is cleaned, marked, photographed and logged. When planning the sampling sequence, the geologist uses a ready-printed form which has designated samples which will be CRM, blank material or duplicate samples. In a 46 sample sequence two CRMs, two duplicate, two blank and one “salted” blank sample will be inserted. As well as the ready-printed sample sheet, a waterproof three-tag sample book is used; one tag is stuck inside the core tray to indicate the sample specifications, one is inserted inside the sample bag that is sent to the laboratory, and the third tag remains in the book as a duplicate record of the sample sequence.

Zones of interest are identified by the presence of alteration (haematite, sericite or chlorite), veining, structural deformation and disseminated pyrite. Barren zones are commonly unaltered with no pyrite.

Sampling of core is conducted using the following conventions:

- Zones of interest are sampled continuously, with samples extending into the hanging wall and footwall (the “bracket zone”); the area is bracketed by sampling around it appropriate to the size of the zone
- Areas believed to be barren are sampled at least once per box (7 m or so)
- Samples are taken from the metre (or half metre) mark cut. Up until 2010 samples were nominally 1 m or to lithological contact, since 2010 sampling was strictly cut to the metre and do not always respect lithological contacts. Sample intervals are cut perpendicular to the axis of the core
- HQ core is sampled at 2 m, 1 m or 0.5 m intervals and NQ core is sampled at 2 m or 1 m intervals, depending on whether the core is identified as mineralised or waste. The obviously mineralised intervals are sampled more often
- When a sample cuts across a change in core size, the length of each type of core in the sample is recorded
- Areas of extreme core loss, where there is insufficient sample to submit to the laboratory, are composited into the nearest appropriate sample
- A sample is always taken at the end of the hole
- Holes drilled on new targets are normally sampled in their entirety until the mineralisation is adequately understood.

The third point listed above was adopted in 2008; core sampled prior to this was sampled according to lithology. Core recovery from the SMP is approximately 95%.

Once the geologist has identified the intercepts to be sampled, sample tags are inserted into the core box at the start of each sample and secured in place with a sticker which has the interval marked on it. The core itself is marked with the sample number and the half which is to be submitted to the laboratory is clearly marked using a grease pencil. Core is split using CorStore core splitters and Almonte automated core cutting machines. After cutting through any interval with visible gold, a cleaning block will be cut afterwards, to avoid any potential contamination of the following piece of core. The core is split along the bottom-of-hole line when the core is orientated or along the arbitrary centre of core line where it is not. Once split the core is returned to the core tray and once all core that requires cutting in the tray is split, the core tray is removed from the cutting room and on to the sampling benches.

The same half of the core is submitted for all samples to ensure no bias is introduced, as it is usual that a core splitter will not split the core exactly in half. Core is double bagged in durable plastic sample bags along with a sample ticket. Prior to packaging for transportation the samples are photographed for reference.

In total 39,484 (from a combine total of 64,677) samples have been generated with diamond drilling. This number excludes CRM, blank and duplicate samples, as well as samples which have been resubmitted to laboratories for umpiring. Samples are submitted to AAL (Mwanza, Tanzania) which is part of the SGS Group, for fire assay with AAS finish. Screen fire assay and ICP work is conducted on selected samples at Acme Laboratories in Vancouver, Canada and Genalysis Laboratory Services, Perth, Australia respectively.

11.6 Sample storage and dispatch

The collection and processing of all samples prior to dispatch to the laboratory is conducted by Helio employees. Duplicates, CRM and blank material are inserted into all sample sequences by the geologist responsible before dispatch to the laboratory.

All sampling is divided into batches; one batch is an entire drillhole, collections of related rock samples or collections of related soil samples. Samples are submitted using a standardised laboratory submission form, which lists the sample numbers, type of material and analysis required and batch number.

Drilling samples are stored outside at the Mkwajuni Office. After collection, the samples are stockpiled in a designated covered area within the core processing area, which is a fenced and gated area inside the secure Helio office compound in Mkwajuni. The compound is patrolled 24 hours by guards from the Security Group Tanzania Limited. Access to the core processing area is restricted to Helio employees.

All drilling samples are initially submitted to AAL in Mwanza, and are transported from site to the laboratory in a secure truck. Individual samples bags are double bagged inside polyweave ‘rice sacks’ and a photograph of each hole is taken as a record of what is dispatched. Samples arriving at AAL are checked into the laboratory against the laboratory submission form provided both electronically to the laboratory and by hard copy, which accompanies the samples. AAL provides Helio with sample reconciliation data which lists samples received, as well as additional or missing samples if such situations arise.

Samples which are sent to laboratories outside of Tanzania must be examined by the Ministry of Energy and Minerals of the United Republic of Tanzania, the Madini, and cleared for exportation. Upon clearance the samples are securely packaged and secured inside the transportation container with an official wax seal, the samples are then dispatched to their destination via courier.

11.7 Laboratory procedures

11.7.1 African Assay Laboratories

AAL are based in Mwanza, northern Tanzania and are part of the SGS Group. AAL’s Mwanza laboratory operates a quality system that has been accredited to ISO/IEC 17025 standard in other countries. The laboratory also participates in numerous formal proficiency testing and round robin reference material certification programs. AAL applies QC procedures by inserting CRM and duplicate analysis into submitted sample sequences.

Samples are weighed on receipt, recorded and reported. RC and diamond core material is dried in trays, crushed to a nominal 2 mm using a jaw crusher and cone crusher, then approximately 1 kg is split using a Jones type riffle splitter. Rejected material is retained in the original bar. The split is pulverised in a chrome steel bowl to a nominal 75 µm. A 50 g sub-sample is taken for assay, with the pulverised residue retained in a plastic bag.

The 50 g sub-sample is fused with a litharge based flux in a ceramic crucible, the resulting glass bead is dissolved in aqua regia and the quantity of gold in the sample is determined by flame AAS. The detection range for this analysis is 0.01 g/t Au to 100 g/t Au.

Rejected course and pulped material is returned to Helio's Mkwajuni office compound in returning sample trucks. It is catalogued and stored for later re-sampling. Once all work has been completed on the samples and at least six months has elapsed, permission is sought from Helio management to dispose of unwanted material. Samples that are part of mineralised zones are generally retained.

11.7.2 Acme Laboratories

Acme Laboratories (Acme) in Vancouver attained ISO 90001 accreditation in 1996 and has maintained its registration in good standing since then.

Helio uses Acme for ICP-MS analysis of soils and pulp materials.

Soils are dried at 60ºC to minimise the loss of volatile element and are screened to -180 µm. Preparation of soils is conducted in a specific part of the laboratory, which is exclusive to soils, till and sediment. Aqua regia is used to digest the sample and ICP-MS used to determine the values for 36 elements.

Acme applies quality control procedure by inserting CRM and duplicate analysis into submitted sample sequences.

11.7.3 Genalysis Laboratory Services Pty Ltd

Genalysis Laboratory Services Pty Ltd ("Genalysis") is part of the Intertek Group. Genalysis holds ISO/IEC 17025 (which includes ISO 9001:2000) accreditation.

Helio uses Genalysis to umpire results generated by AAL. Reference RC material or diamond core is submitted for screen fire assay; both the coarse fraction and the screen mesh used to screen the fine fraction are also analysed to ensure any unacceptable sampling error from coarse gold is resolved.

Genalysis applies quality control procedure by inserting CRM and duplicate analysis into submitted sample sequences.

11.8 QA/QC

QA describes the confidence in validity (i.e. data reflects what it is supposed to represent) and correct storage (i.e. data is stored accurately and may be recovered easily and without error) that is perceived for a given dataset.

Blanks, salted blanks, CRMs and duplicates (field and pulp) were inserted into the sample streams in order to carry out QA/QC protocols on the assay results. The integrity of the sampling procedures and assay results were verified with various statistical analyses done on these CRMs, blanks and duplicates.

Snowden received an excel spreadsheet database from Helio, which was separated into pre-2014 data and 2014 (current) data. The pre-2014 dataset contained a total of 58,885 samples and the current 2014 dataset contained 5,792 samples. Errors with regards to QA/QC database entries were also checked to ensure consistency in the databases.

11.8.1 QA/QC database errors

Checks were carried out on the QA/QC database entries to ensure that CRM names are properly captured and samples and duplicates are correctly labelled. Since the previous database check done by CCIC (2014), errors flagged have been corrected. These are shown in Table 11.1. No additional errors were noted by Snowden.

Table 11.1 Corrected QA/QC database errors

CRM name	Names in database (flagged by CCIC, 2014)	Corrected names in database
G302-2	3022, G03022, G302, G3022	G3022
G303-8	G303, G3038	G3038
G305-1	3051, G3051	G3051
G306-1	3061, G3061	G3061
G306-4	G3064	G3064
G307-3	G3073	G3073
G310-4	G3104	G3104
G310-10	G31010	G31010
G399-2	G3992	G3992
G901-7	9017, G9017	G9017
G901-9	G9019	G9019
G902-1	9021, G9021	G9021
G998-6	G9986	G9986
G999-4	9994, G9994	G9994
GAP 02	GAP02, GAP2	GAP02
GAP 03	GAP03, GAP3	GAP03
GAP 04	GAP04, GAP4	GAP04
GAP 07	GAP07, GAP7	GAP07

11.8.2 Blanks

Blanks in a QA/QC program are used to measure levels of contamination at the laboratory, especially in the preparation process.

Blank material is created by Helio using stored reference RC material, which is known to have null values and not be proximal to areas of known mineralisation. Numerous null-grade reference samples are homogenised and multiple random samples of the resulting blank are sent for analysis to confirm that the gold content of the blank is below detection limit before it is introduced into general usage.

Within the pre-2014 database, a total of 1,366 blanks were submitted with 58,885 samples tested for Au content. This is equivalent to an insertion rate of 2.3%, which is below the recommended industry standard of 5.0%. For the 2014 samples submitted for Au analyses, 289 blanks were submitted within 5,792 samples, equating to an insertion rate of 5.0%, in line with the recommended industry standard. An upper limit of 10 times the detection limit (“DL”) was utilised (0.05 g/t Au), beyond which a blank sample can be considered to have been exposed to contamination (Figure 11.3 and Figure 11.4). The blanks analysed showed a low failure rate for both the pre-2014 data (2.0%) and the 2014 data (1.0%), and as such Snowden deems the results acceptable.

Figure 11.3 Pre-2014 dataset – graph showing analysis of blanks for Au g/t

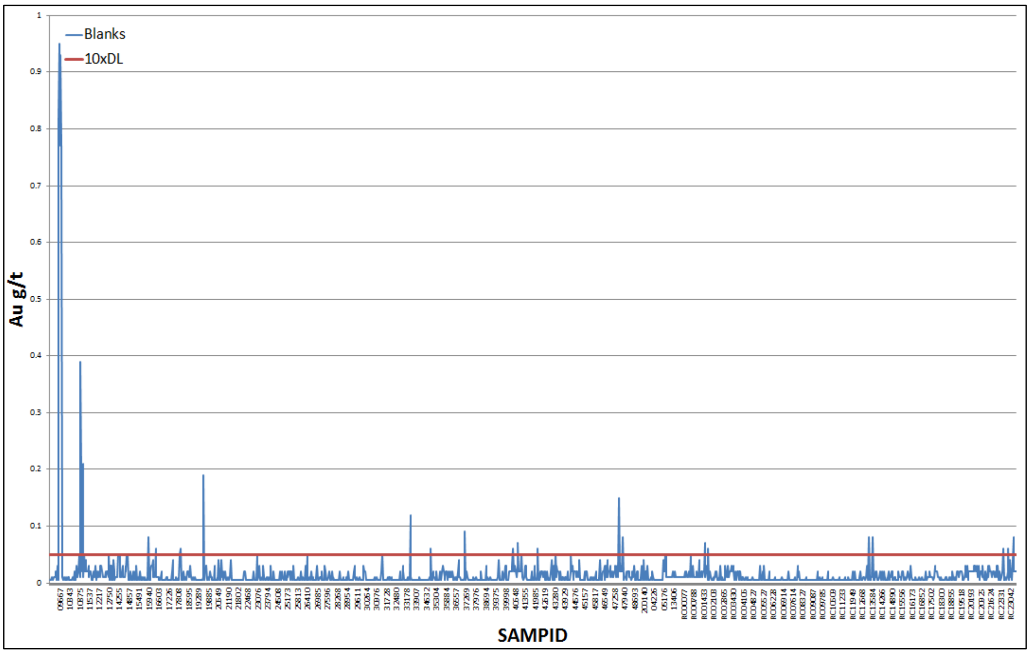
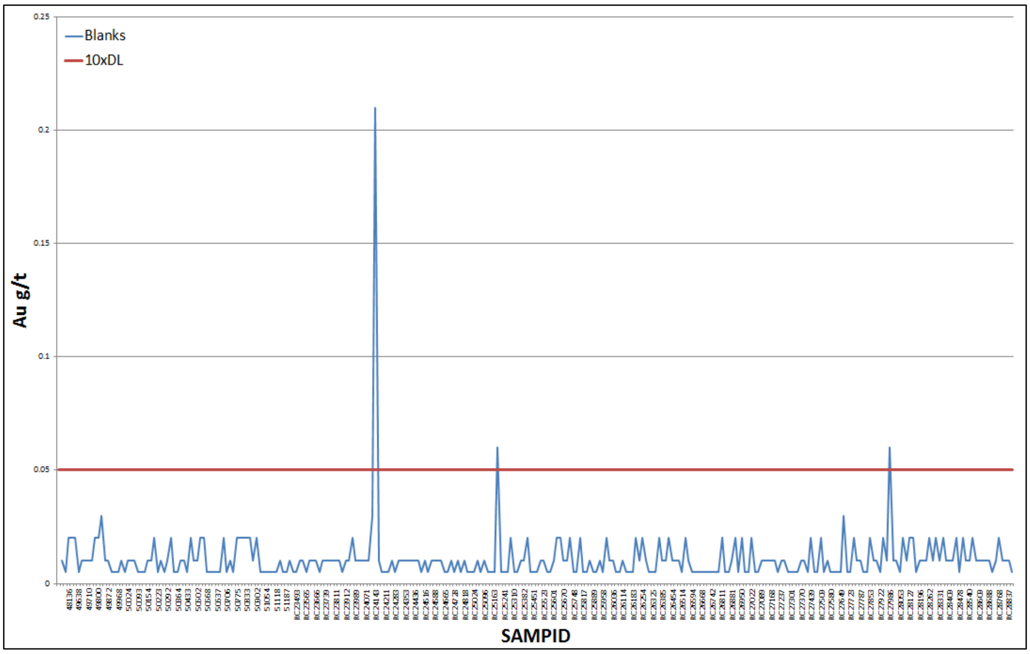


Figure 11.4 2014 dataset – graph showing analysis of blanks for Au g/t



11.8.3 Salted blanks

Helio started using “salted” blanks in 2011 to increase scrutiny of the laboratory. These are normal 1 kg blank samples to which a prill of known grade, sourced from Geostats Pty Ltd in Australia, have been added. Four prills were used, GAP02, GAP03, GAP04 and GAP07.

A total of 72 salted blanks were submitted with 58,885 samples within the pre-2014 database, which is equivalent to an insertion rate of 0.1%. For the 2014 database, 141 blanks were submitted within 5,792 samples, equating to an insertion rate of 2.4%.

The expected grade of the "salted" sample depends on the laboratory preparation and assaying procedures. The standard deviation is 5% of the target value and therefore three standard deviations would correspond to ±15% difference of the target value. CCIC (2014) noted that the prill is inserted into the blank without being broken up and therefore, depending on the preparation, may not necessarily be detected. For example, if the sample is riffled early on and not adequately crushed, the prill may report to the reject material. The graphic results in Figure 11.5 to Figure 11.12 with fluctuations below target values could be a result of that. It does not, however, explain values that are above the upper limits. The pre-2014 data have a failure rate of 56.9% and the 2014 data have a failure rate of 12.8%.

The periodic failure of the salted blanks pre-2014 may indicate some preparation failures, but this does not wholly compromise the expected quality of analysis, as independent CRM and independent analysis checks rule out major discrepancies.

Figure 11.5 Pre-2014 dataset – graph showing analysis of salted blank GAP02

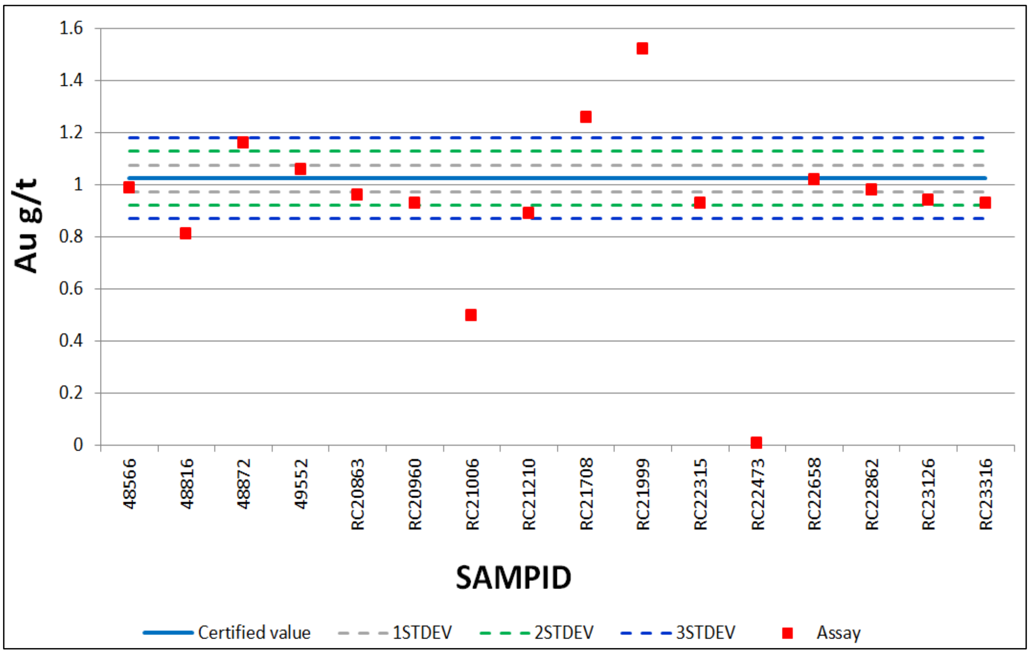


Figure 11.6 2014 dataset – graph showing analysis of salted blank GAP02

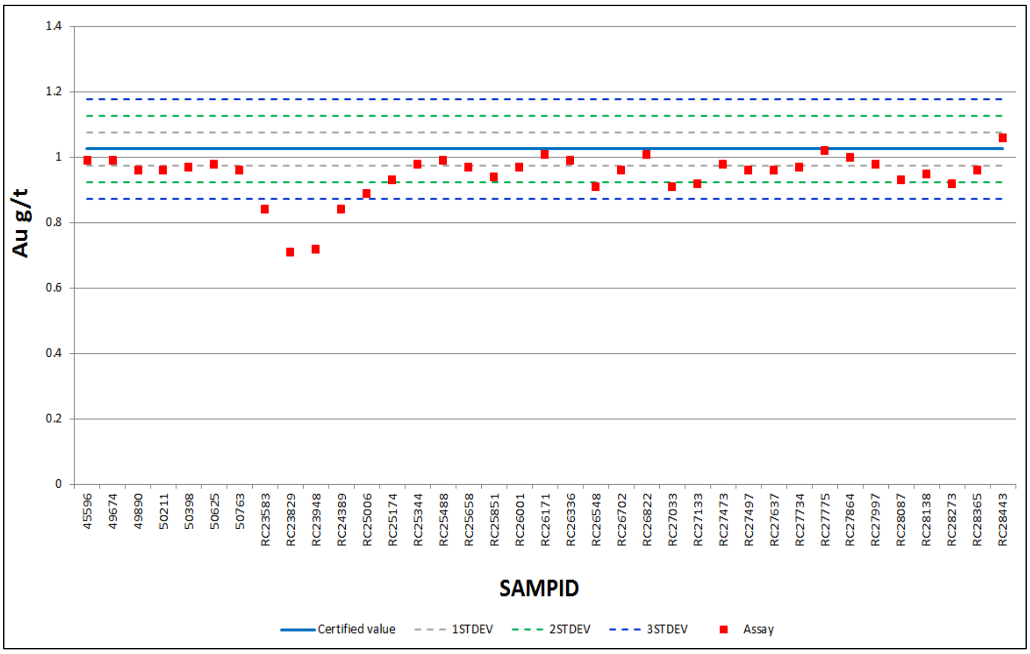


Figure 11.7 Pre-2014 dataset – graph showing analysis of salted blank GAP03

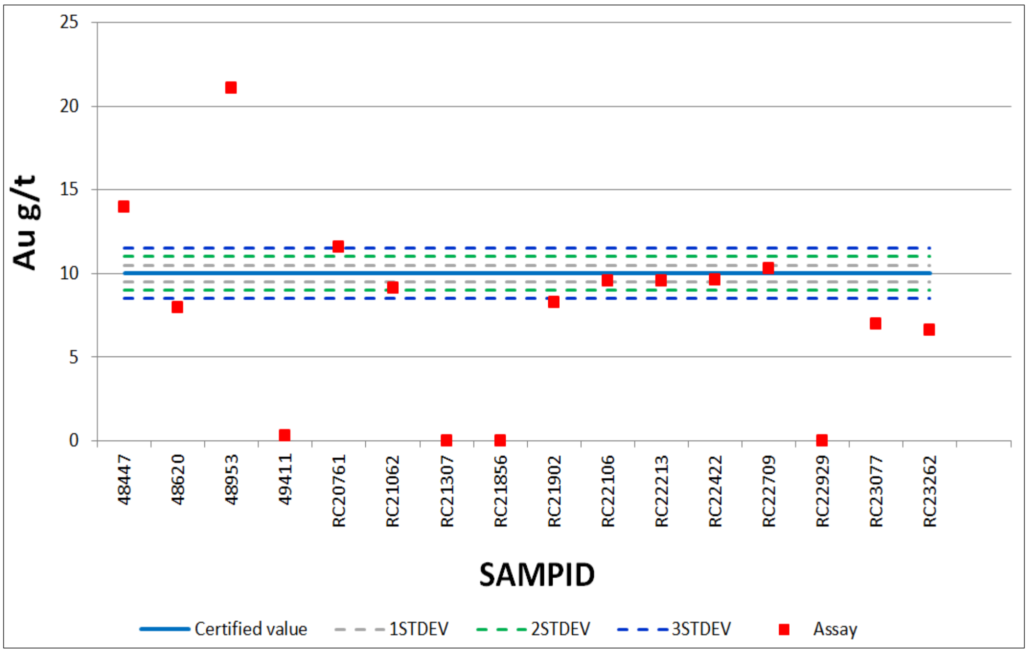


Figure 11.8 2014 dataset – graph showing analysis of salted blank GAP03

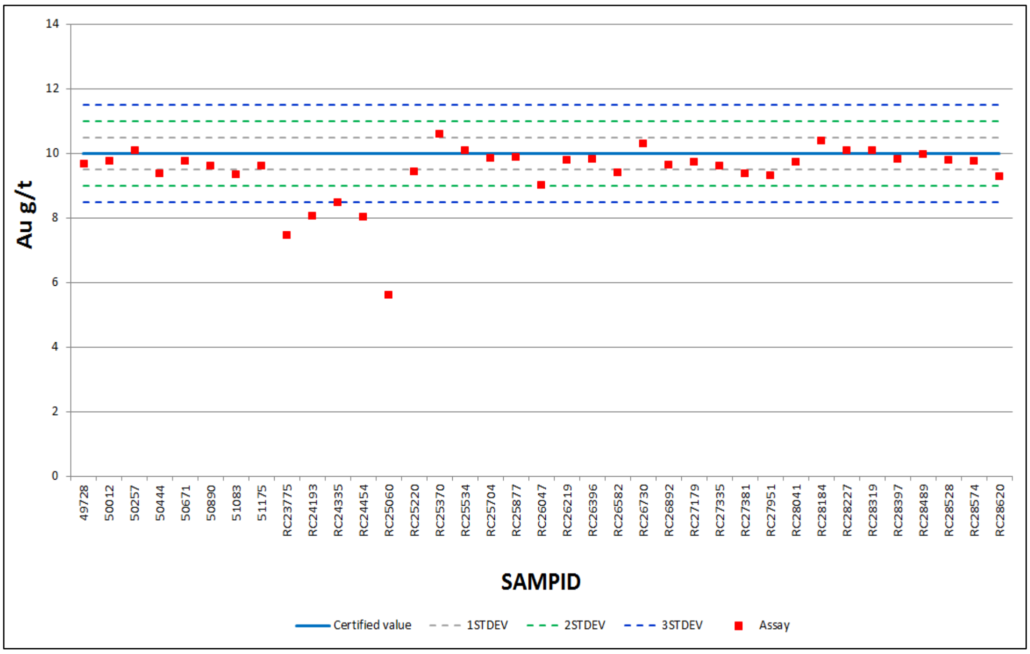


Figure 11.9 Pre-2014 dataset – graph showing analysis of salted blank GAP04

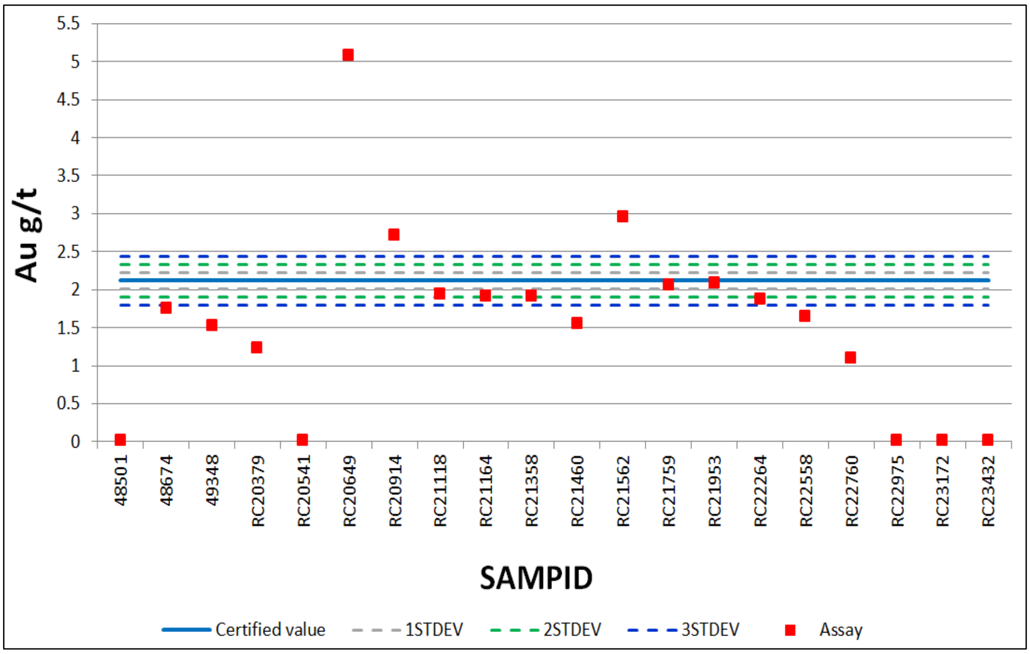


Figure 11.10 2014 dataset – graph showing analysis of salted blank GAP04

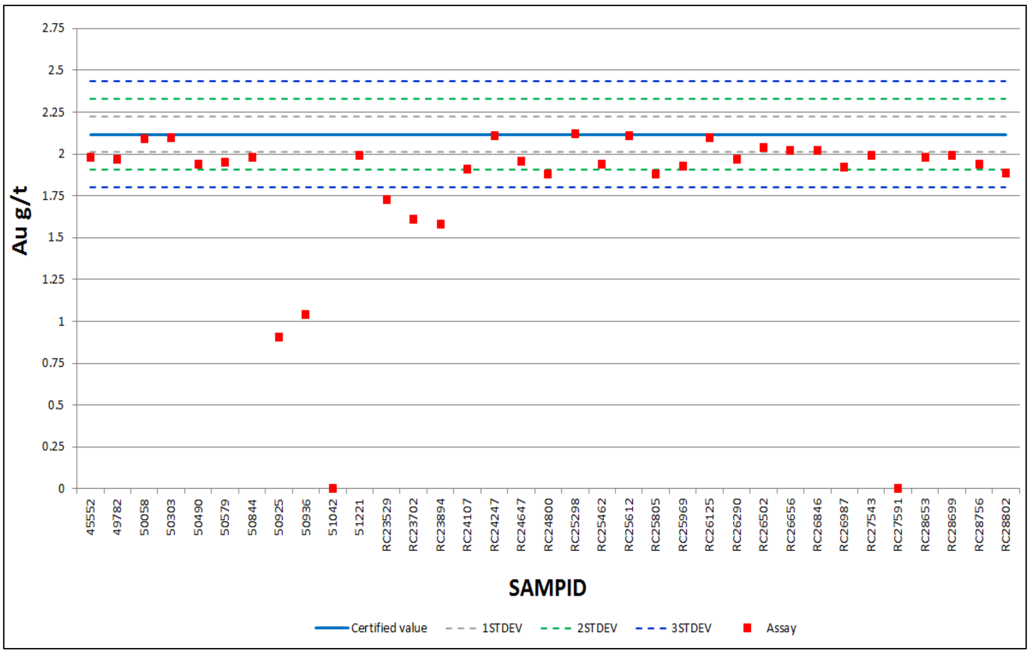


Figure 11.11 Pre-2014 dataset – graph showing analysis of salted blank GAP07

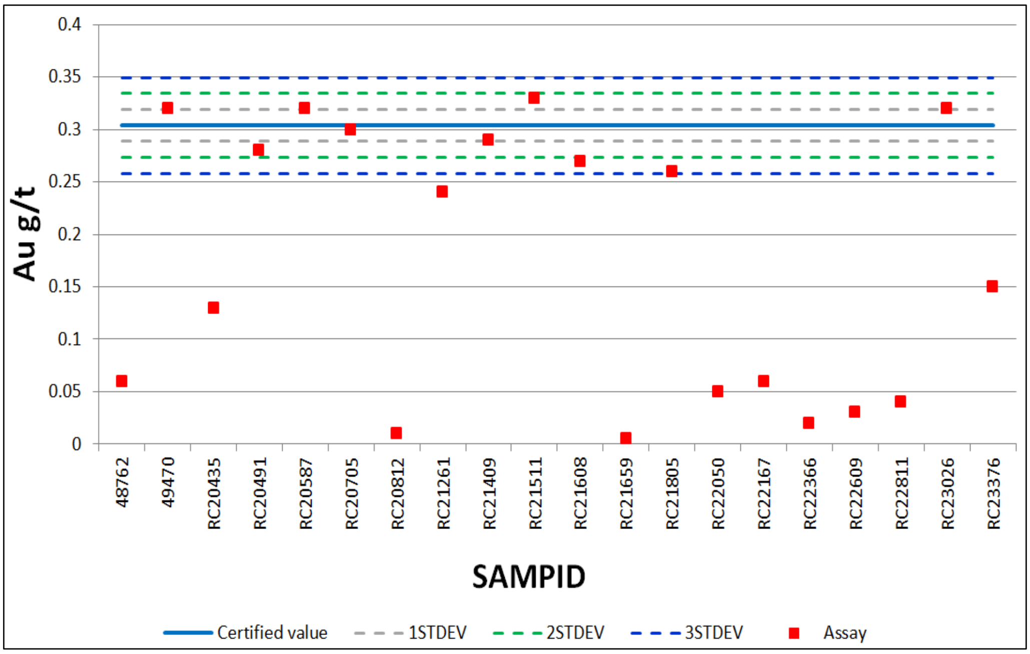
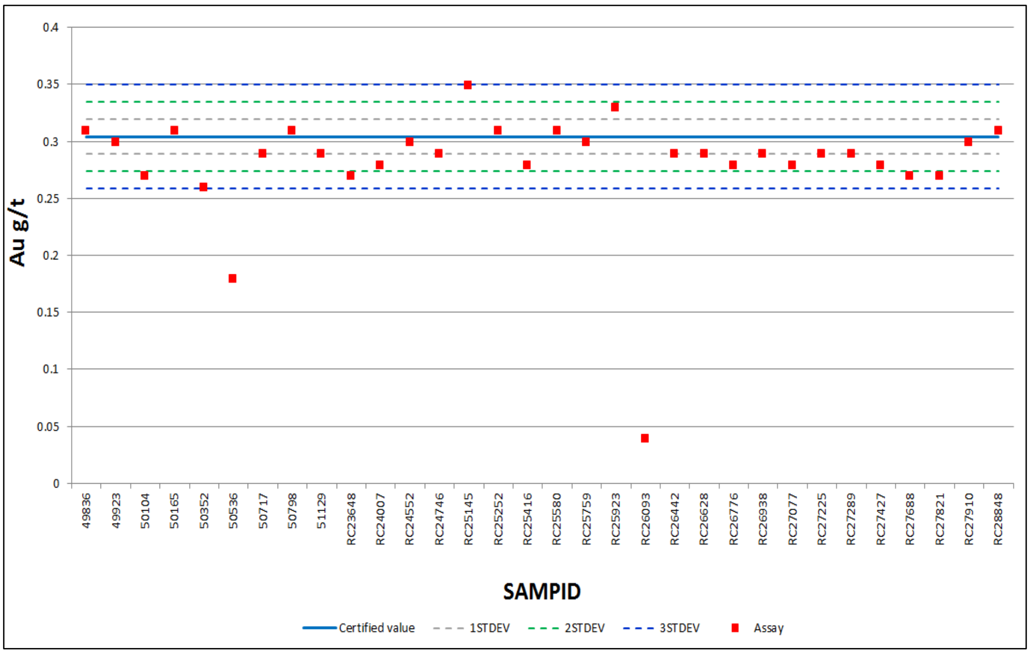


Figure 11.12 2014 dataset – graph showing analysis of salted blank GAP07



11.8.4 Certified Reference Materials

CRMs, also known as standards, are made of material with a known value which was certified through round robin analyses. In a QA/QC program, CRMs are used to help evaluate the accuracy of the analytical process.

CRM samples should be submitted into the normal sample stream by clients of laboratories, blind to the laboratory. The insertion should be at pre-determined and sequential intervals, i.e. every 20th sample in the sequence should be a CRM.

The reference material assays provide a method by which analytical accuracy is monitored and quantified.

Two parameters are taken into account when reporting analytical accuracy:

- The relative assay deviation from the expected value of the reference material
- The average bias over time.

The deviation of a reference material's assay is measured and expressed as a relative standard deviation (δ). Acceptable limits are considered to be 95% of samples submitted to be within ±2δ.

A summary of the results analysed are shown in Table 11.2 and Table 11.3. In total, 2,542 samples of standards were submitted within the 58,885 samples of the pre-2014 database, which equates to a 4.3% insertion rate. This is close to the recommended insertion rate of 5%. For the 2014 database of 5,792 samples, 333 samples of standards were submitted, which equates to a 5.7% insertion rate. This is in line with the recommended industry standard. The standards analysed showed a low failure rate for both the pre-2014 data (1.9%) and the 2014 data (0%), and as such Snowden deems the results acceptable for the Mineral Resource estimate.

Table 11.2 Summary of CRMs validation results – pre-2014 dataset

Standard	No. of samples submitted	No. of samples failed	Failure %
G302-2	374	4	1.1
G303-8	84	2	2.4
G305-1	255	9	3.5
G306-1	314	5	1.6
G306-4	325	6	1.8
G307-3	14	0	0
G307-4	1	0	0
G307-5	1	0	0
G307-6	2	1	50.0
G307-8	1	0	0
G310-4	12	0	0
G310-8	2	0	0
G310-9	1	0	0
G310-10	12	0	0
G399-2	65	2	3.1
G901-7	299	6	2.0
G901-9	42	1	2.4
G902-1	284	4	1.4
G906-1	1	0	0
G907-3	2	0	0
G909-7	1	0	0
G998-6	71	2	2.8
G999-4	350	2	0.6
GBM901-4	29	5	17.2
Total	**2,542**	**49**	**1.9**

Table 11.3 Summary of CRMs validation results – 2014 dataset

Standard	No. of samples submitted	No. of samples failed	Failure %
G303-8	6	0	0
G306-1	35	0	0
G307-3	10	0	0
G307-4	42	0	0
G307-5	30	0	0
G307-6	1	0	0
G307-8	9	0	0
G310-4	25	0	0
G310-8	25	0	0
G310-9	11	0	0
G310-10	8	0	0
G399-2	21	0	0
G901-9	10	0	0
G907-2	1	0	0
G907-3	39	0	0
G909-7	27	0	0
G999-4	33	0	0
Total	**333**	**0**	**0**

Eleven of the 24 CRMs from the pre-2014 database were selected to display graphically, shown in Figure 11.3 to Figure 11.23. Twelve of the 17 CRMs from the 2014 database were selected to display graphically, shown in Figure 11.24 to Figure 11.35.

Figure 11.13 Pre-2014 dataset – graph showing analysis of Au g/t for G302-2

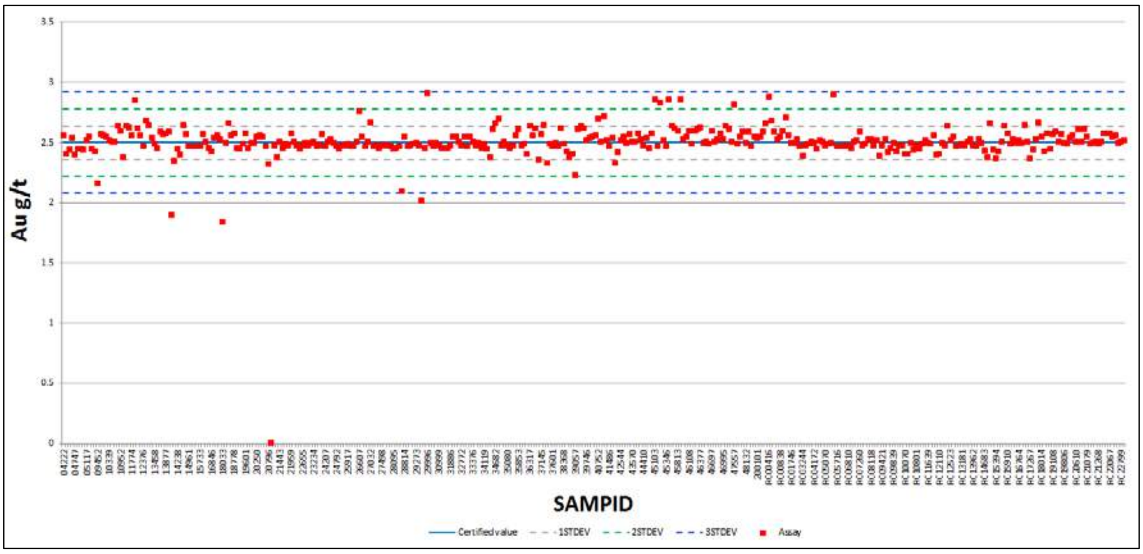


Figure 11.14 Pre-2014 dataset – graph showing analysis of Au g/t for G303-8

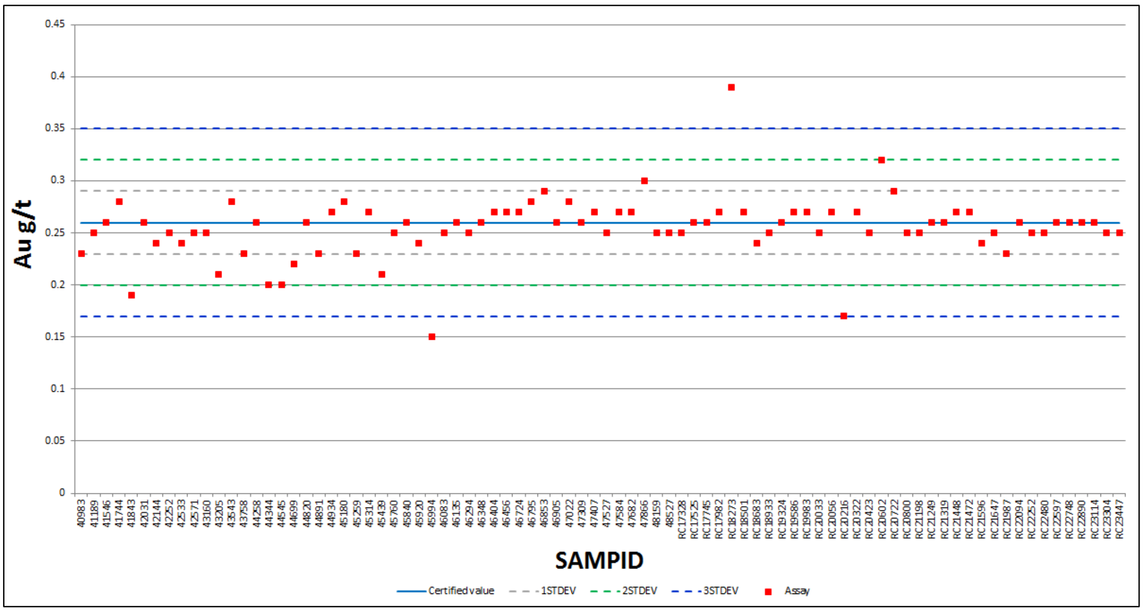


Figure 11.15 Pre-2014 dataset – graph showing analysis of Au g/t for G305-1

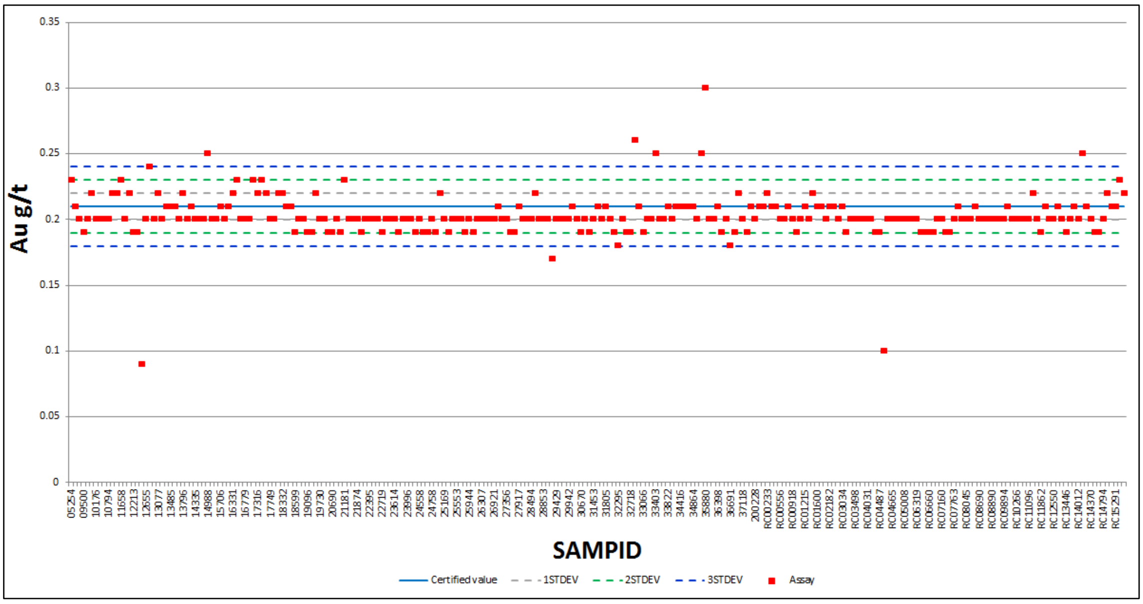


Figure 11.16 Pre-2014 dataset – graph showing analysis of Au g/t for G306-1

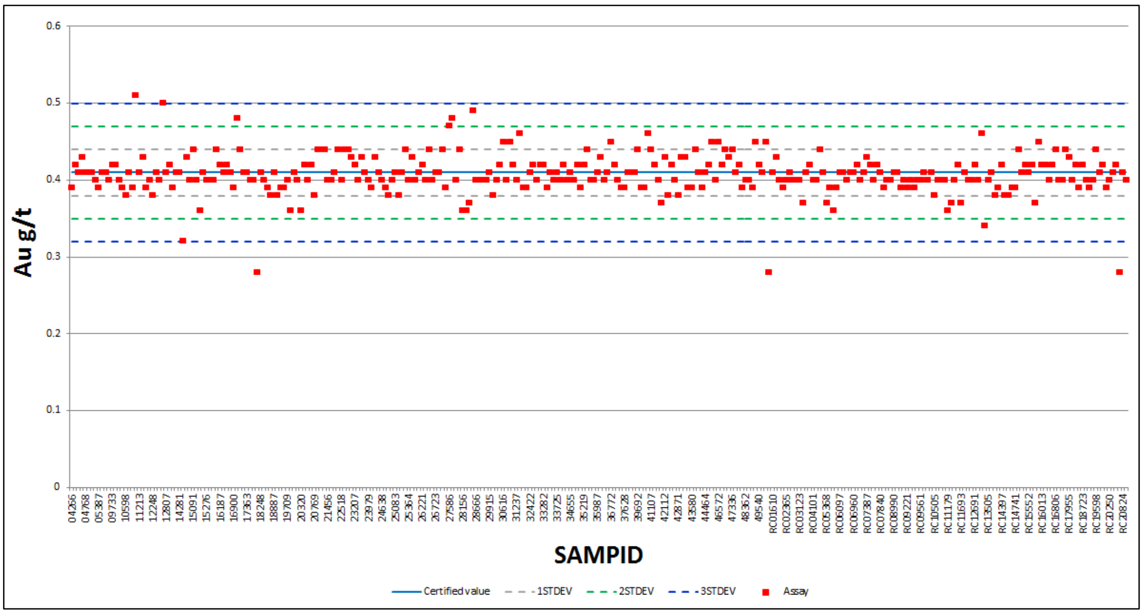


Figure 11.17 Pre-2014 dataset – graph showing analysis of Au g/t for G306-4

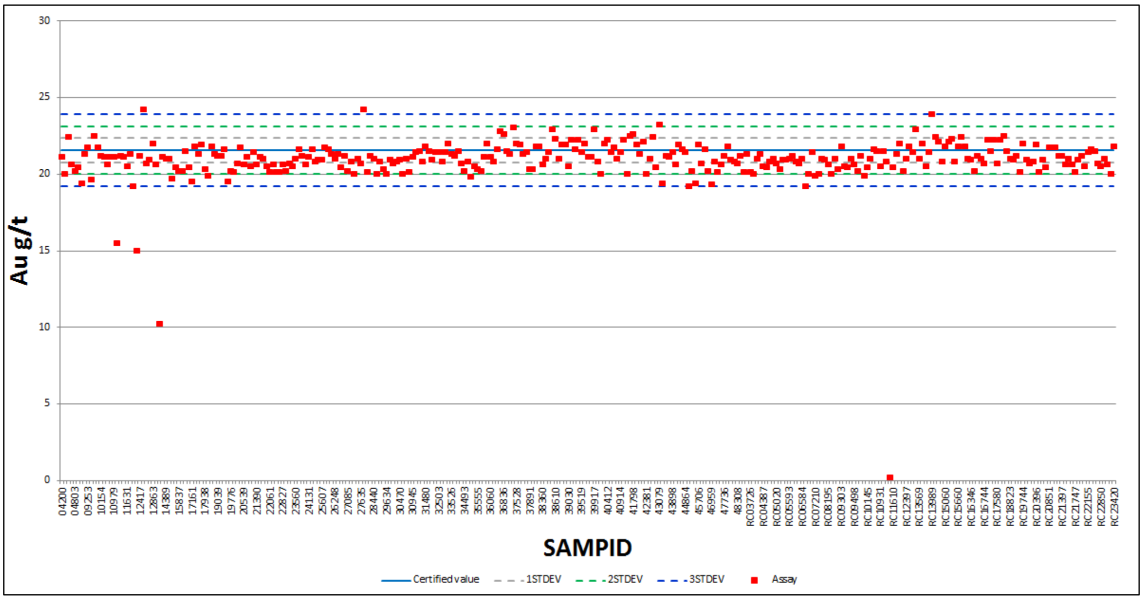


Figure 11.18 Pre-2014 dataset – graph showing analysis of Au g/t for G399-2

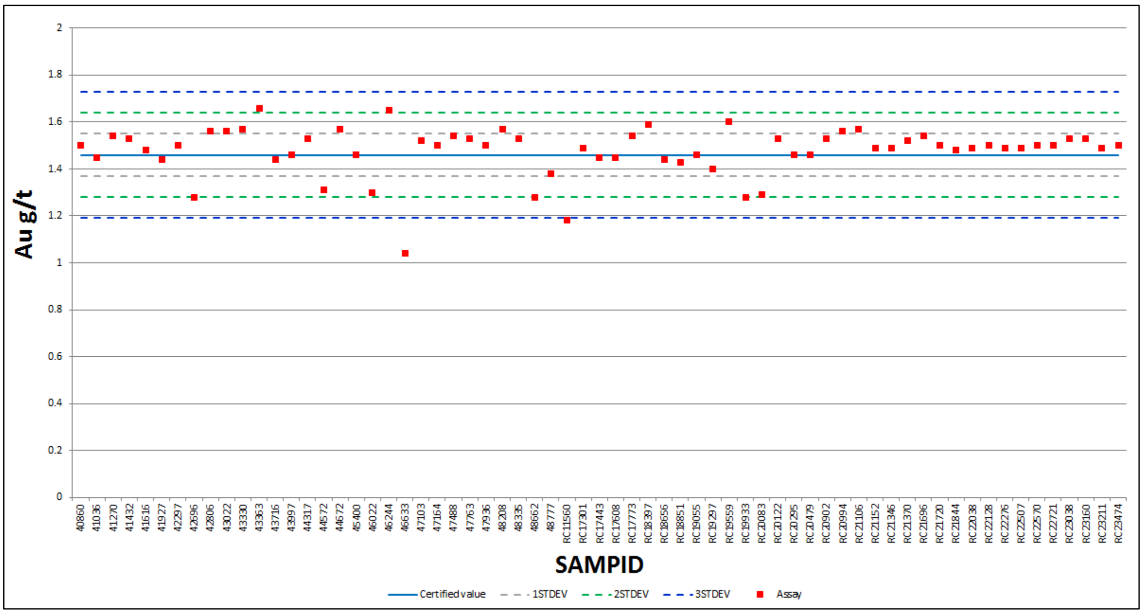


Figure 11.19 Pre-2014 dataset – graph showing analysis of Au g/t for G901-7

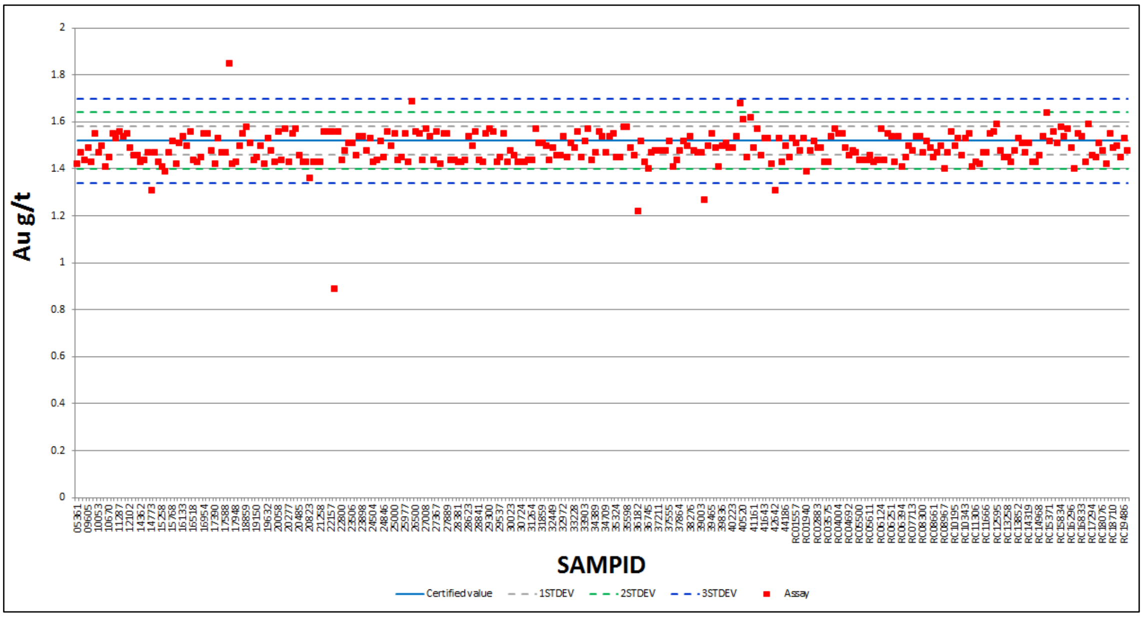


Figure 11.20 Pre-2014 dataset – graph showing analysis of Au g/t for G901-9

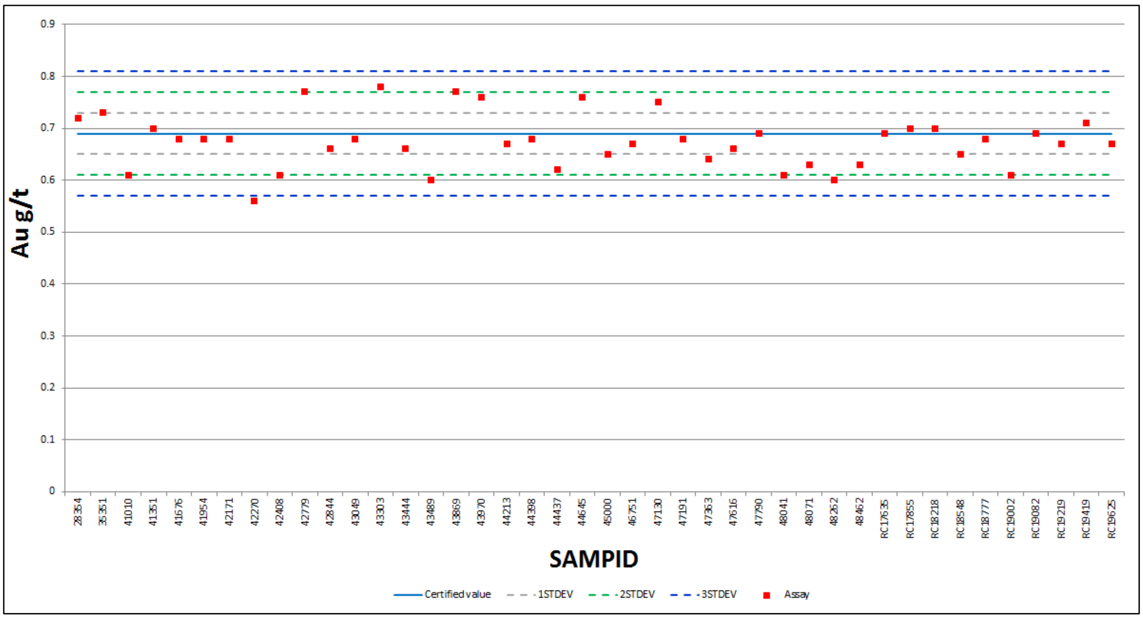


Figure 11.21 Pre-2014 dataset – graph showing analysis of Au g/t for G902-1

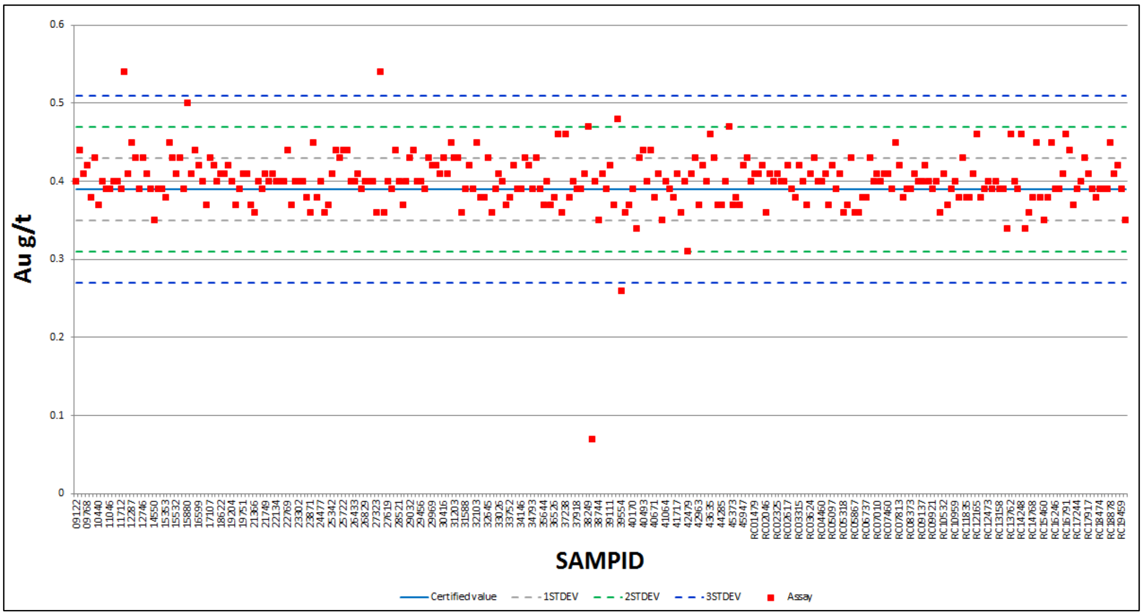


Figure 11.22 Pre-2014 dataset – graph showing analysis of Au g/t for G998-6

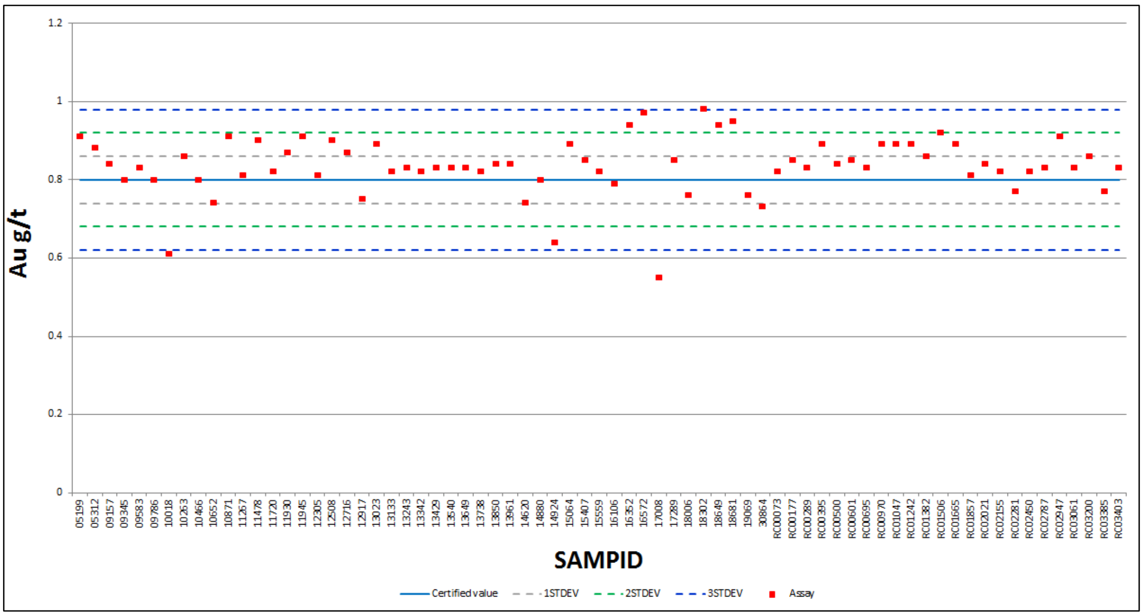


Figure 11.23 Pre-2014 dataset – graph showing analysis of Au g/t for G999-4

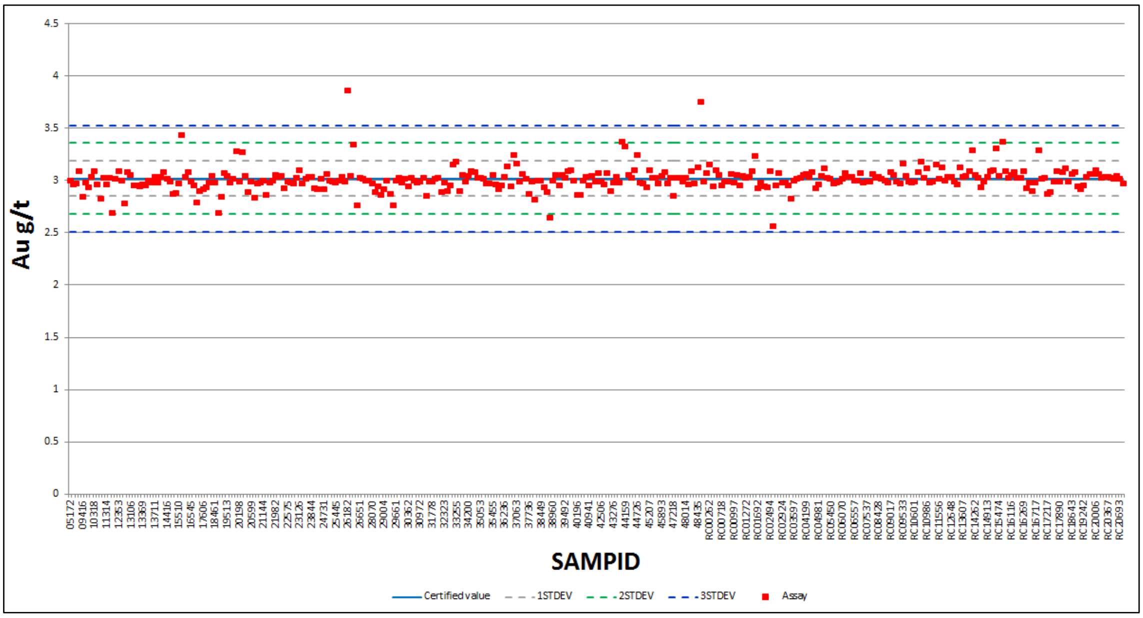


Figure 11.24 2014 dataset – graph showing analysis of Au g/t for G306-1

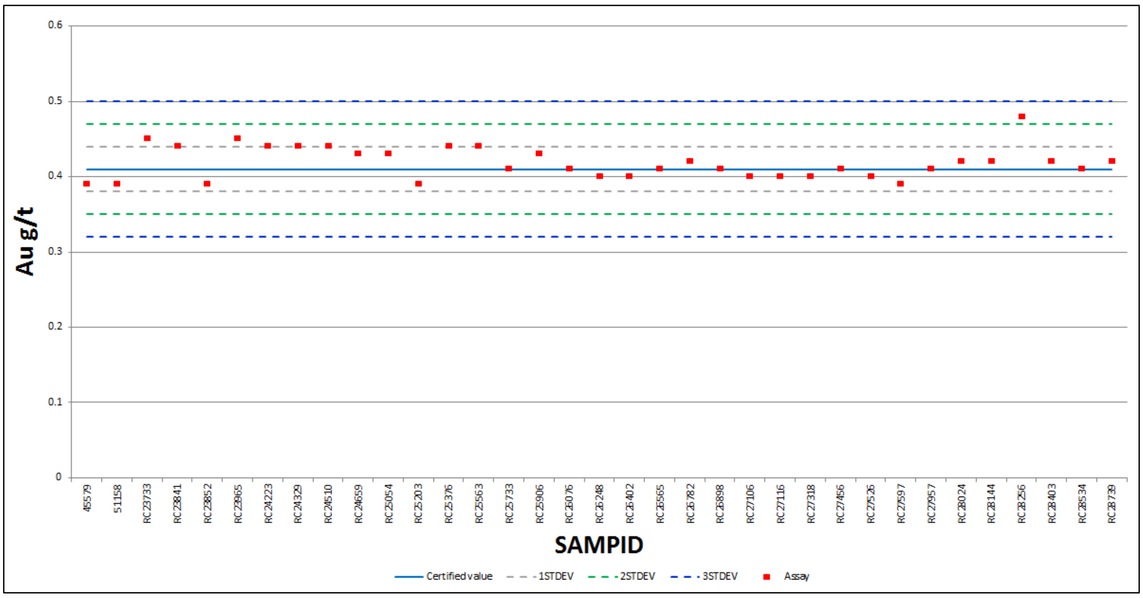


Figure 11.25 2014 dataset – graph showing analysis of Au g/t for G307-3

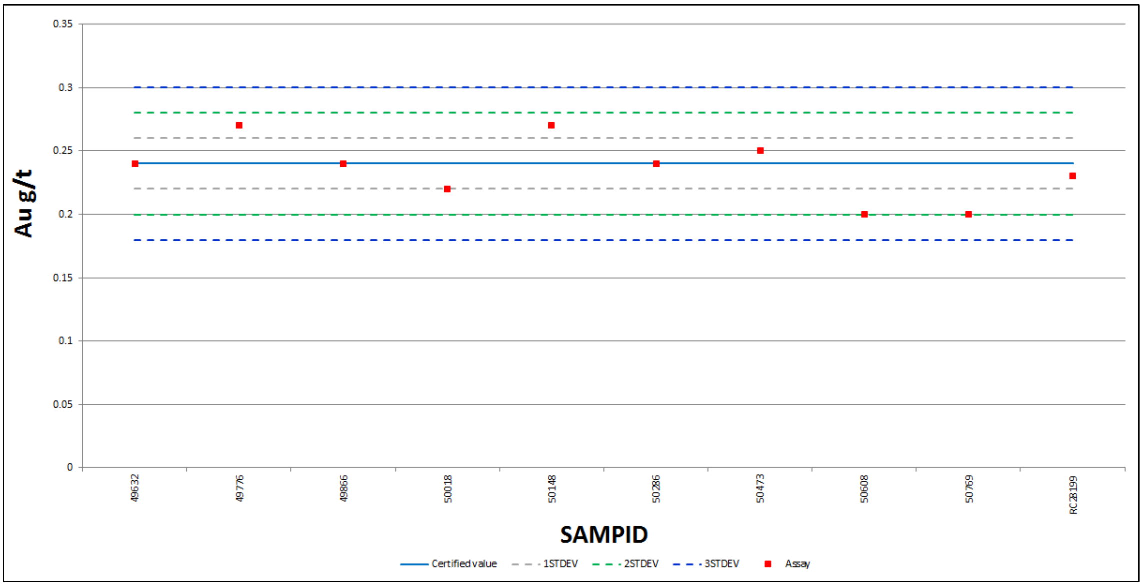


Figure 11.26 2014 dataset – graph showing analysis of Au g/t for G307-4

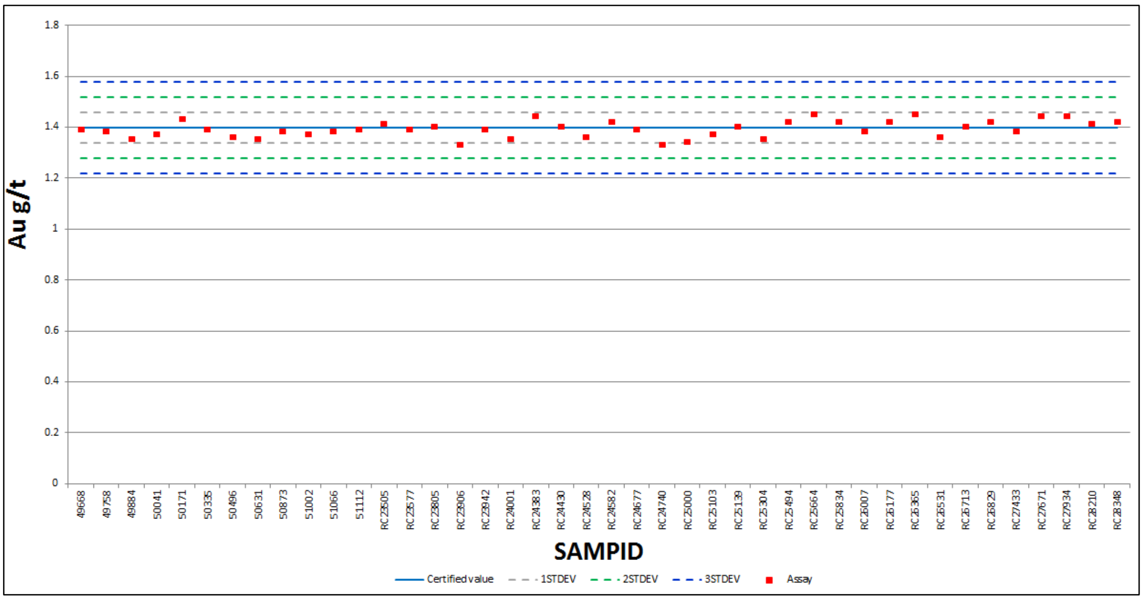


Figure 11.27 2014 dataset – graph showing analysis of Au g/t for G307-5

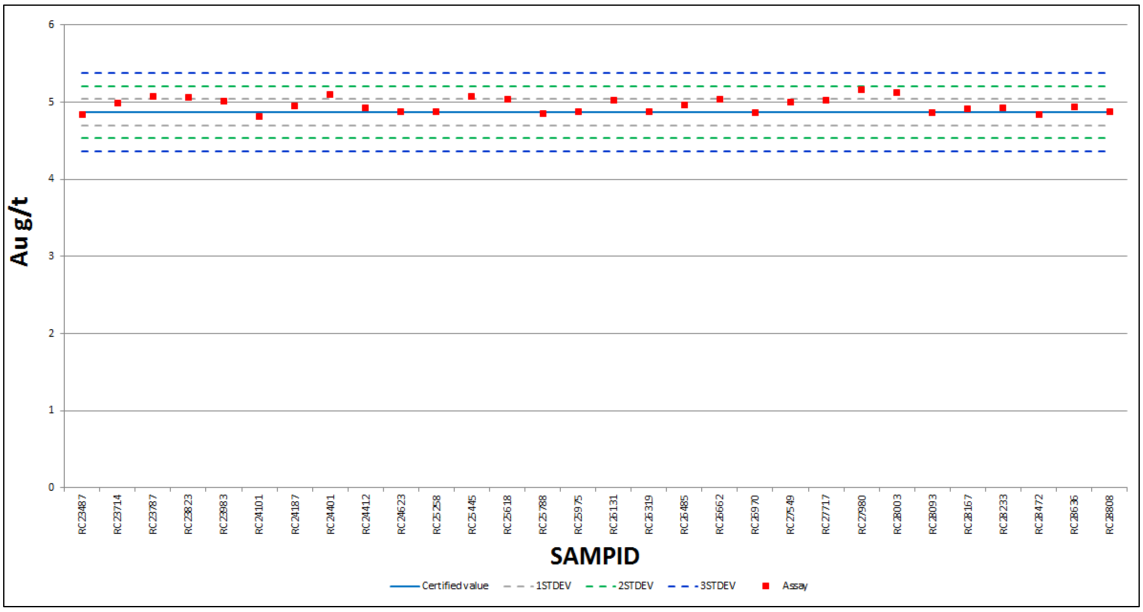


Figure 11.28 2014 dataset – graph showing analysis of Au g/t for G310-4

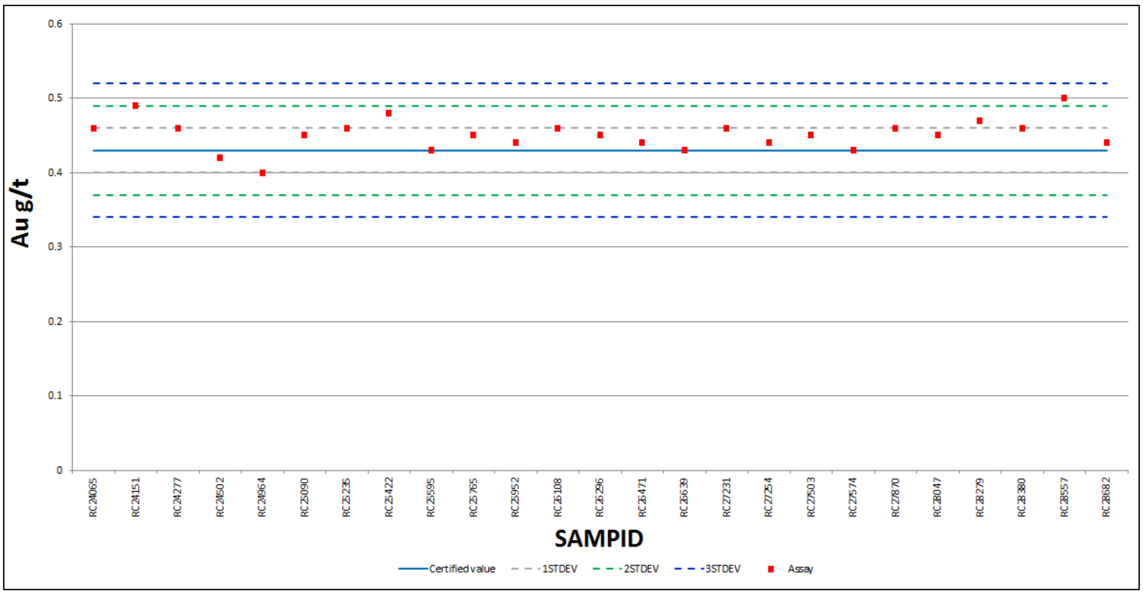


Figure 11.29 2014 dataset – graph showing analysis of Au g/t for G310-8

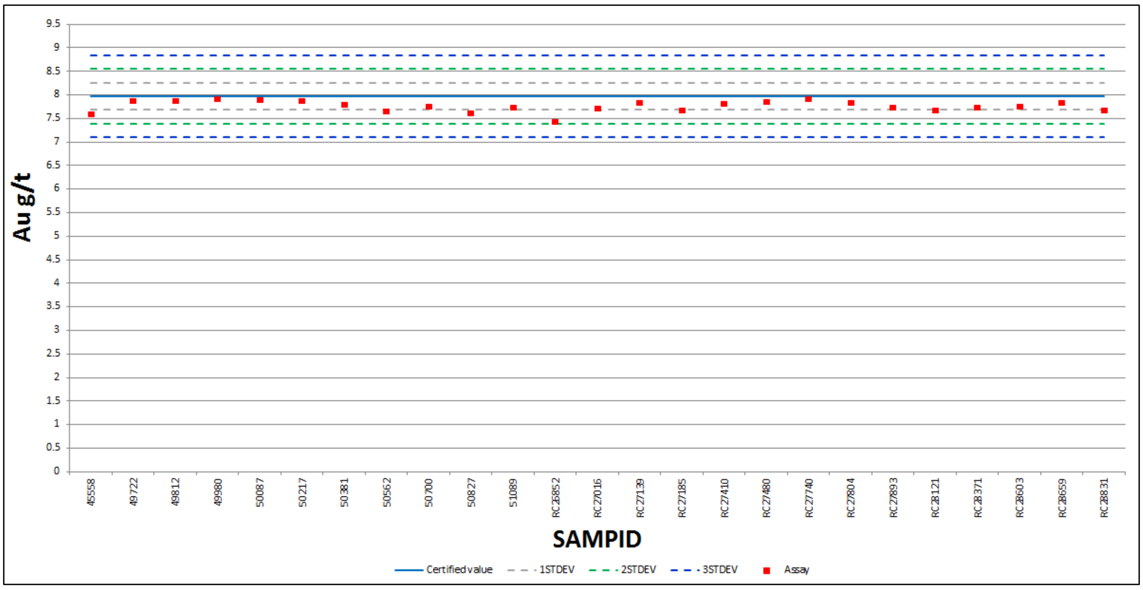


Figure 11.30 2014 dataset – graph showing analysis of Au g/t for G310-9

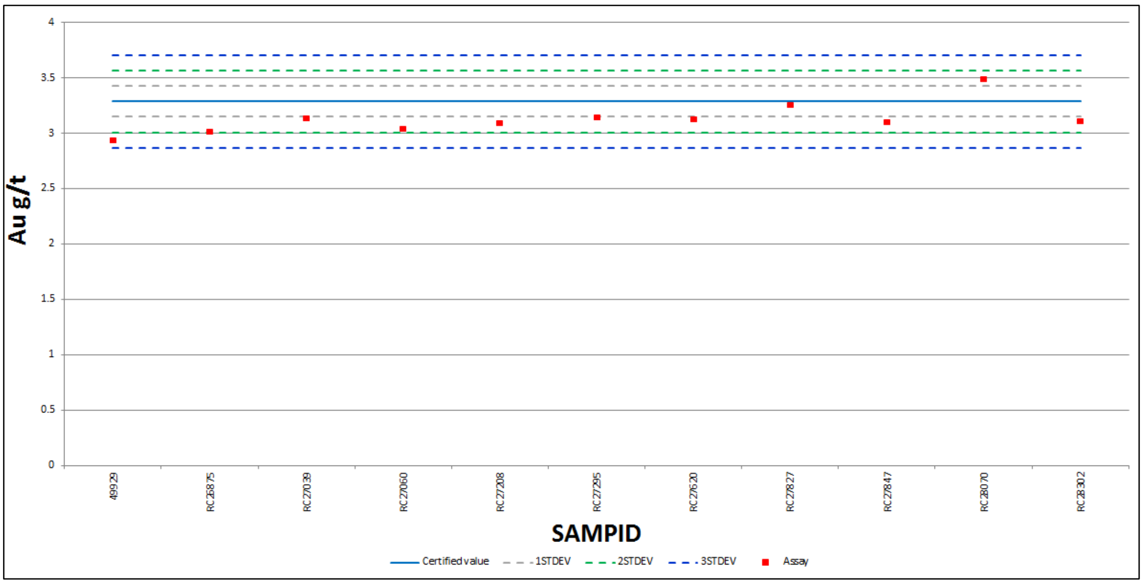


Figure 11.31 2014 dataset – graph showing analysis of Au g/t for G399-2

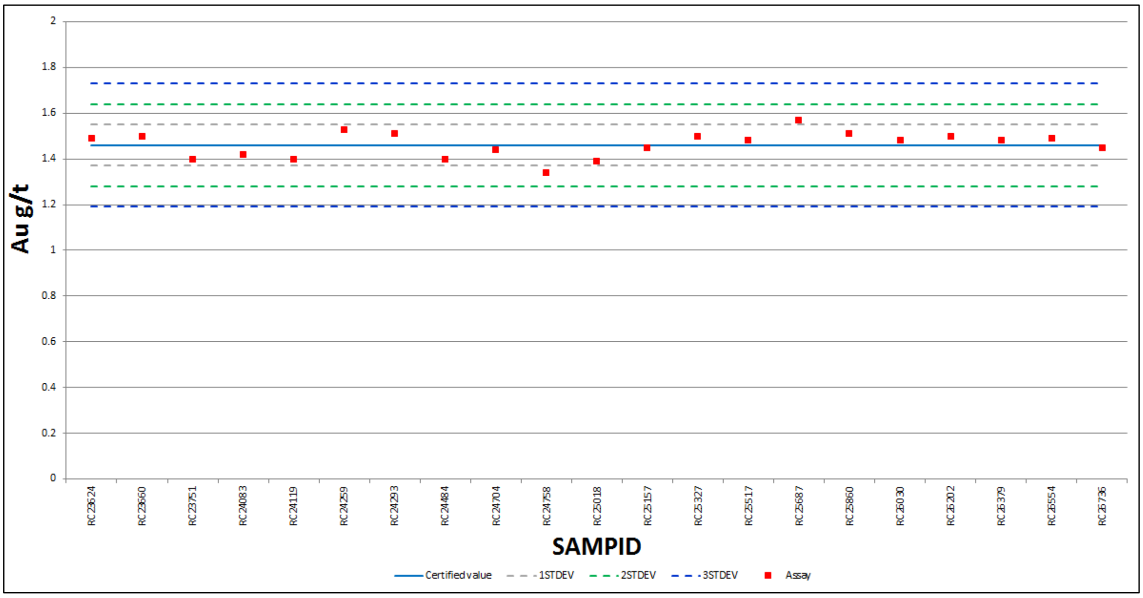


Figure 11.32 2014 dataset – graph showing analysis of Au g/t for G901-9

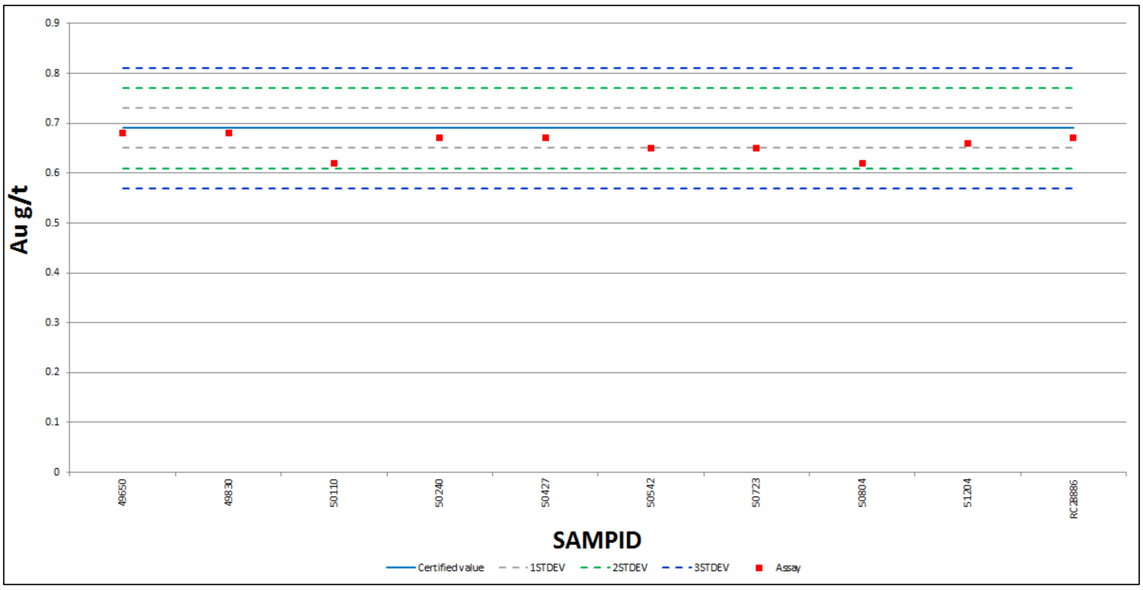


Figure 11.33 2014 dataset – graph showing analysis of Au g/t for G907-3

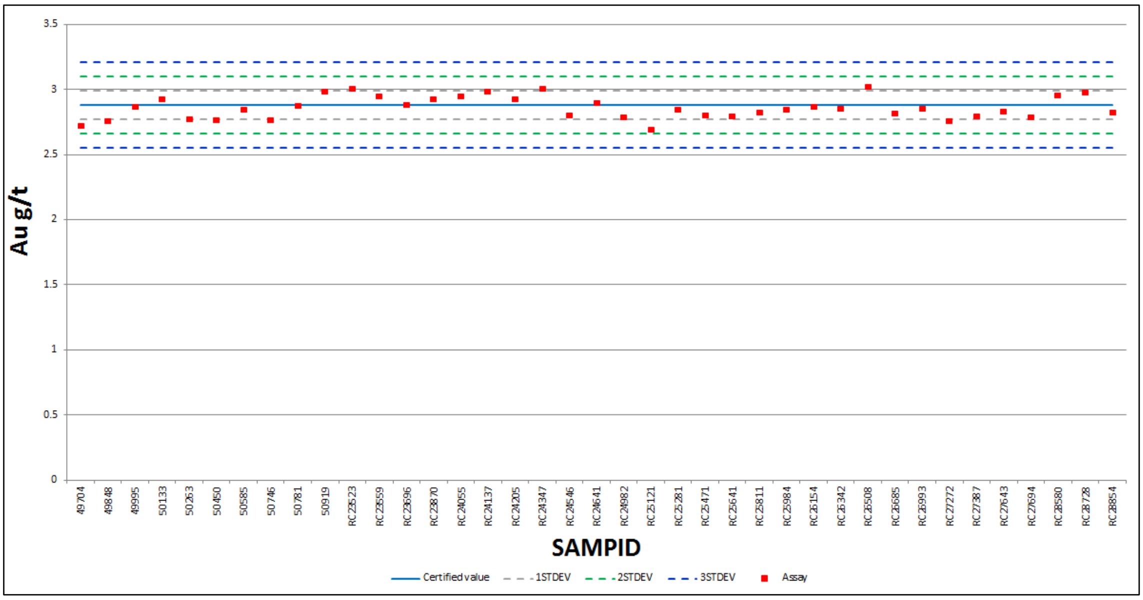


Figure 11.34 2014 dataset – graph showing analysis of Au g/t for G909-7

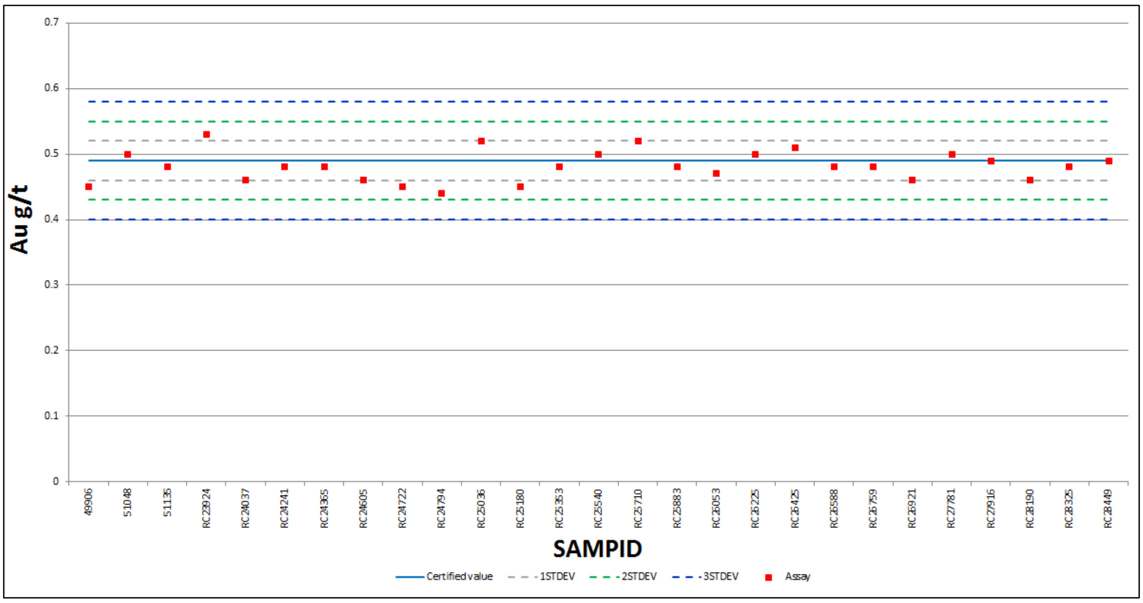
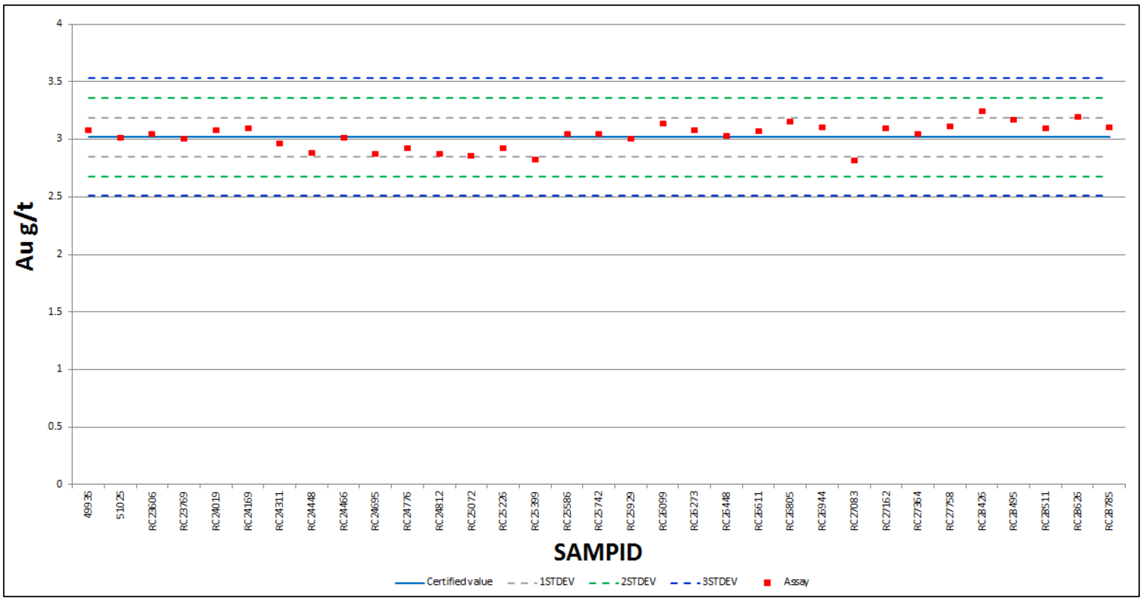


Figure 11.35 2014 dataset – graph showing analysis of Au g/t for G999-4



11.8.5 Field duplicates

The purpose of field duplicates in a QA/QC program is to assess the precision accompanying the sub-sampling process in the field.

A precision pairs plot compares the pair mean (plotted on the X-axis) to the half absolute difference ("HAD") (plotted on the Y-axis). The maximum HAD value possible is the pair mean, which equates to a 100% relative difference. This can be plotted on the precision pairs plot as a diagonal line which no sample should be above (any samples above this line indicates an error in the calculations). Precision lines equivalent to 30%, 20% and 10% relative difference were also plotted to allow an assessment of the proportion of samples within a given precision level.

The HAD value for each duplicate pair is calculated using the following equation:

$$HAD = \frac{\left|x_{orig} - x_{dup}\right|}{2}$$

In total, 2,485 field duplicates were submitted within the 58,885 samples of the pre-2014 database, which equates to a 4.2% insertion rate. This is close to the recommended insertion rate of 5.0%. For the 2014 database, 424 field duplicates were submitted within 5,792 samples, equating to a 7.3% insertion rate. This is in line with the recommended industry standards.

A summary of the field duplicate analyses for the pre-2014 and 2014 databases is shown in Table 11.4. The field duplicate analyses show that results for both RC and diamond core within the pre-2014 and 2014 databases have lower than optimal precision for the pairs (Figure 11.36 to Figure 11.43). The log QQ plots show no bias for the pre 2014 results, however the 2014 RC splits are biasing marginally low, notably in the 0.1 g/t Au to 1 g/t Au range. The poor precision and potential bias may be due to the set-up of the RC field splitter (Figure 11.44). The RC splitting configuration whilst not optimal is not considered to have a significant impact on the reported grade of the primary assay in the opinion of the Qualified Person.

Table 11.4 Summary of field duplicate results (>0.01 g/t Au and >0.1 g/t Au)

Database	Drillhole type	Total field duplicate sample pairs	Percentage within 10% HAD	Percentage within 20% HAD
Pre-2014	DD	1,112 (Au ≥ 0.01 g/t)	52	65
		363 (Au ≥ 0.10 g/t)	72	81
	RC	673 (Au ≥ 0.01 g/t)	40	52
		107 (Au ≥ 0.10 g/t)	47	67
2014	DD	52 (Au ≥ 0.01 g/t)	25	48
		22 (Au ≥ 0.10 g/t)	32	59
	RC	201 (Au ≥ 0.01 g/t)	44	59
		52 (Au ≥ 0.10 g/t)	44	62

Figure 11.36 Pre-2014 dataset – precision pairs plot for diamond field duplicate analysis

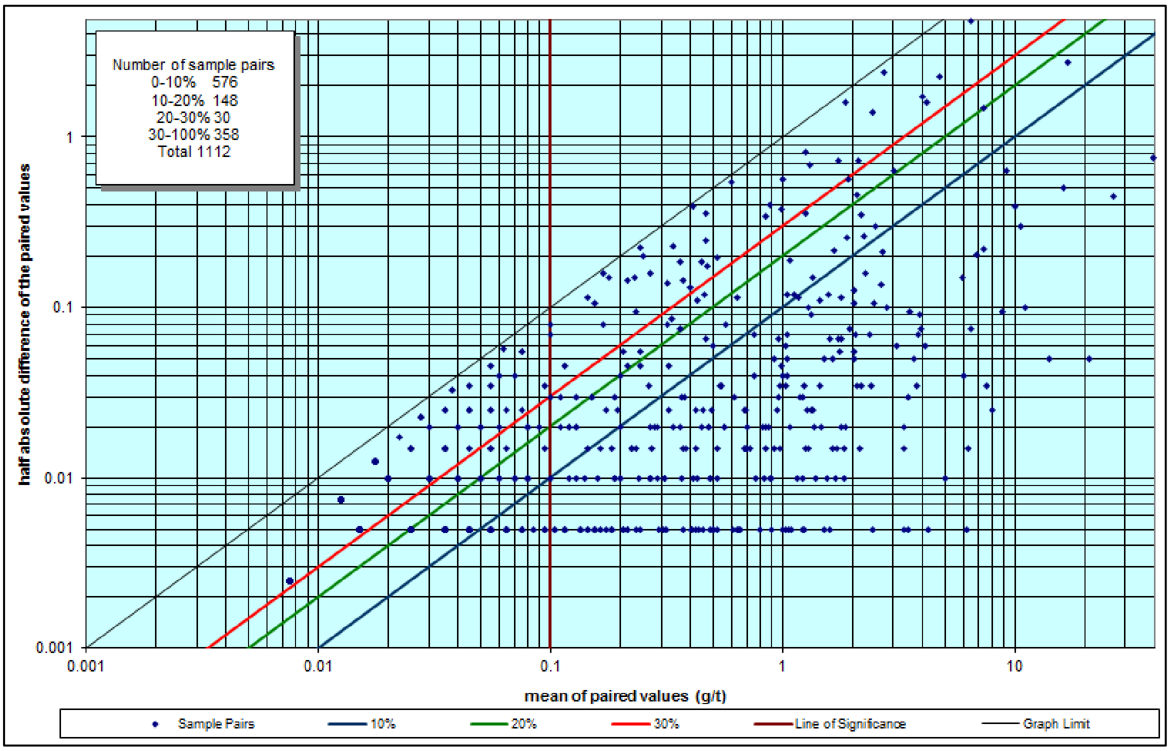


Figure 11.37 Pre-2014 dataset – log QQ plot for diamond field duplicate analysis

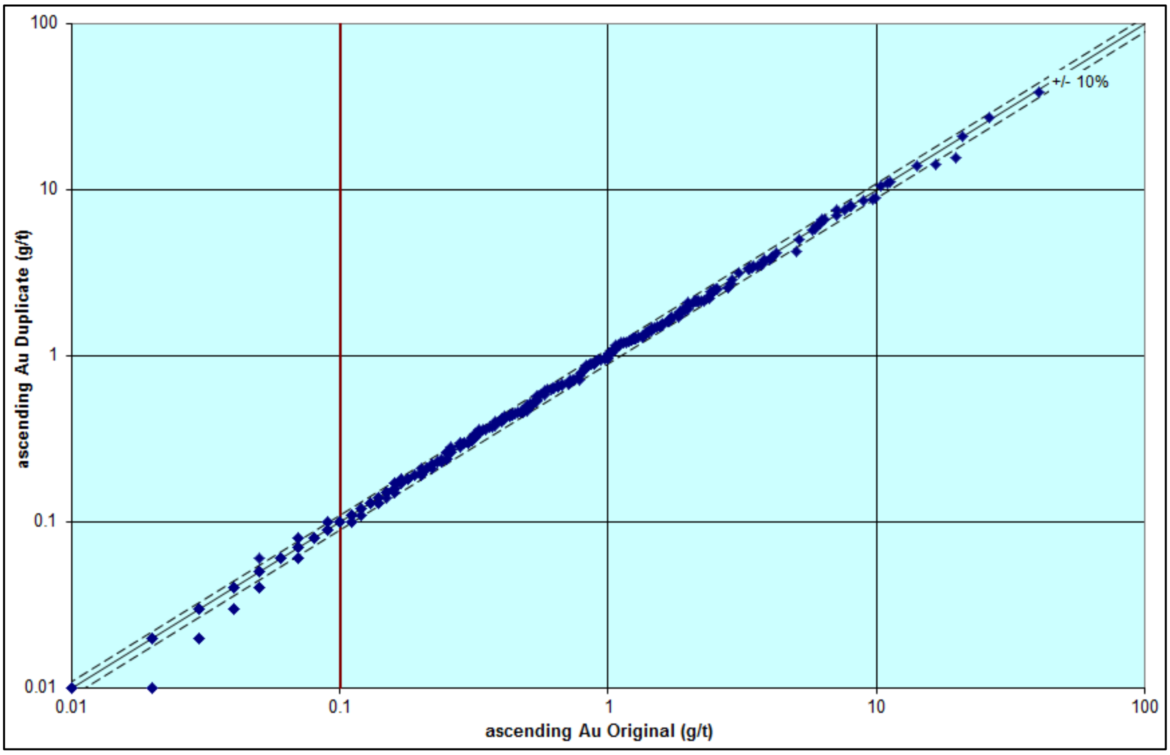


Figure 11.38 Pre-2014 dataset – precision pairs plot for RC field duplicate analysis

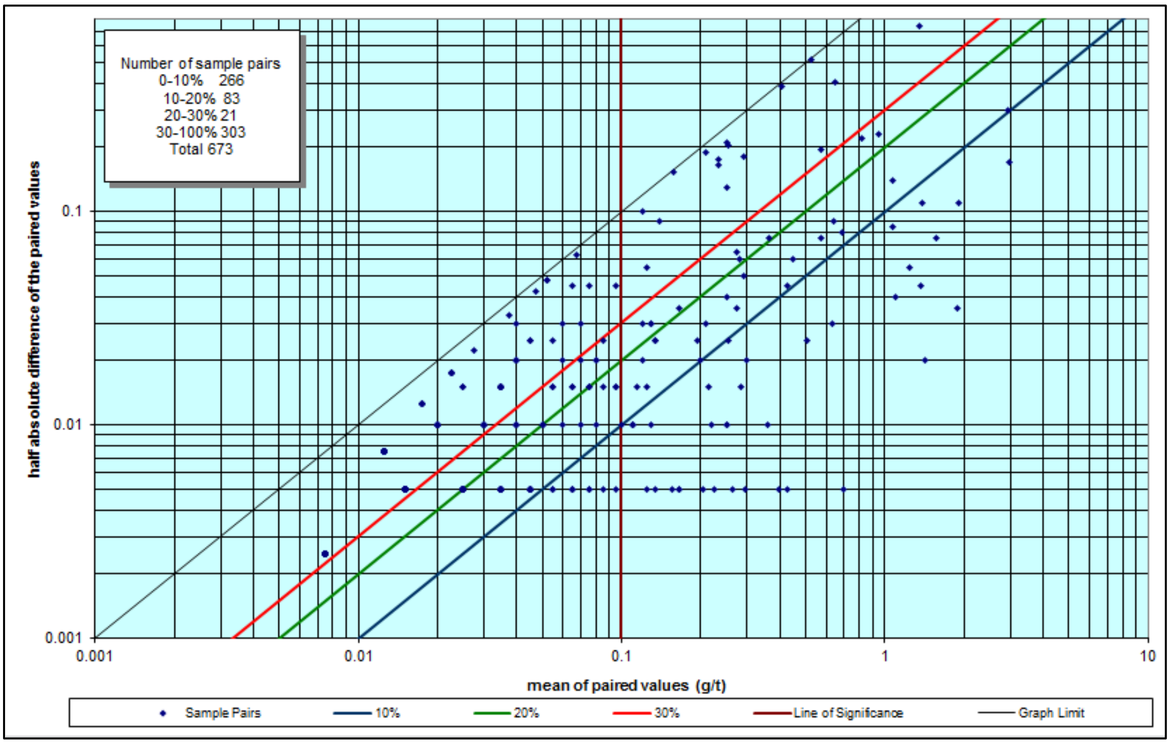


Figure 11.39 Pre-2014 dataset – correlation plot for RC field duplicate analysis

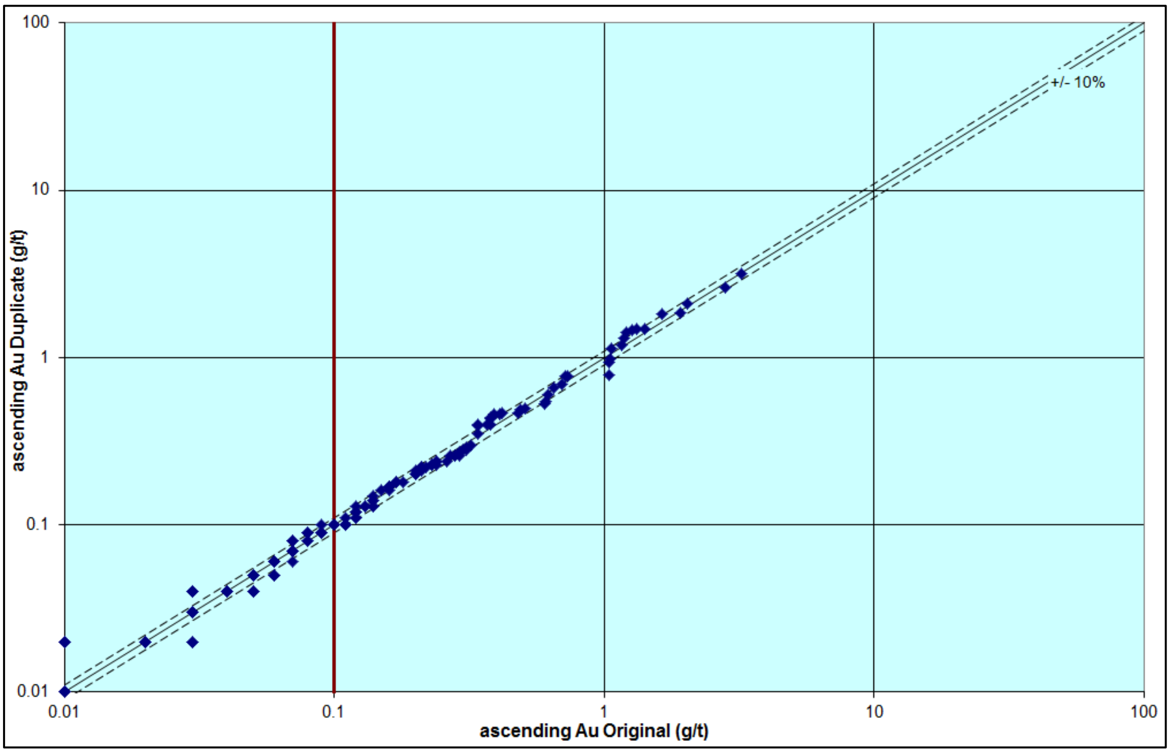


Figure 11.40 2014 dataset – precision pairs plot for diamond field duplicate analysis

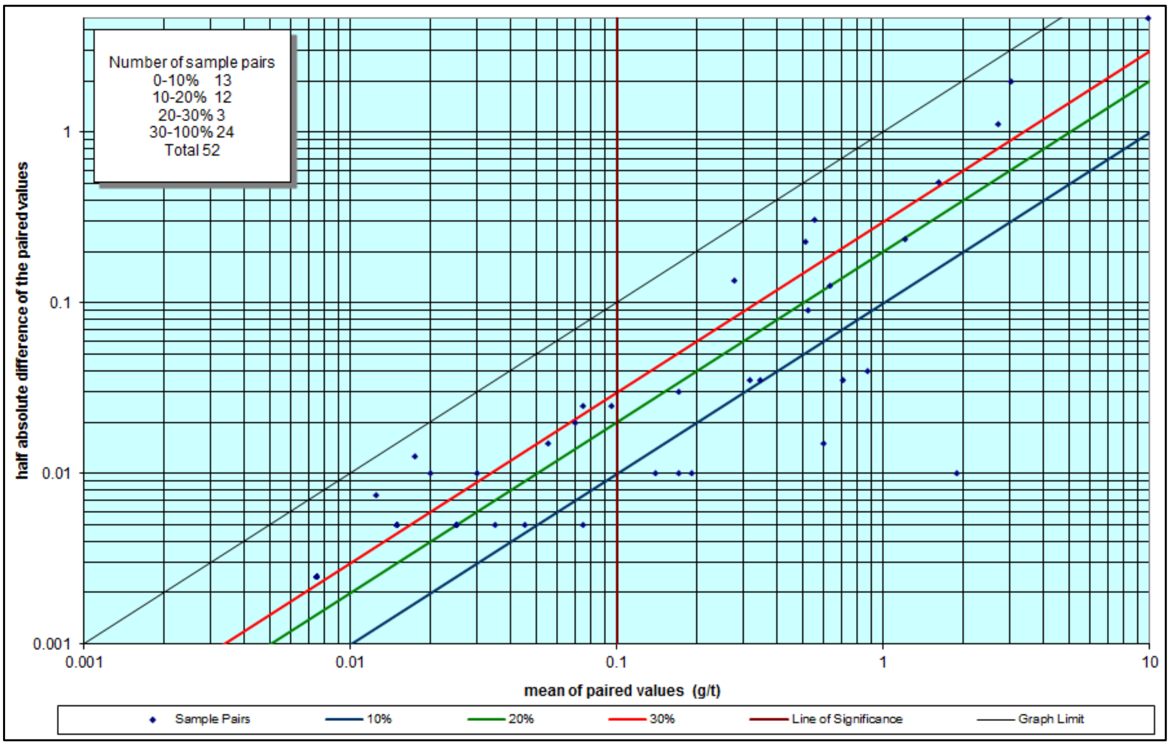


Figure 11.41 2014 dataset – log QQ plot for diamond field duplicate analysis

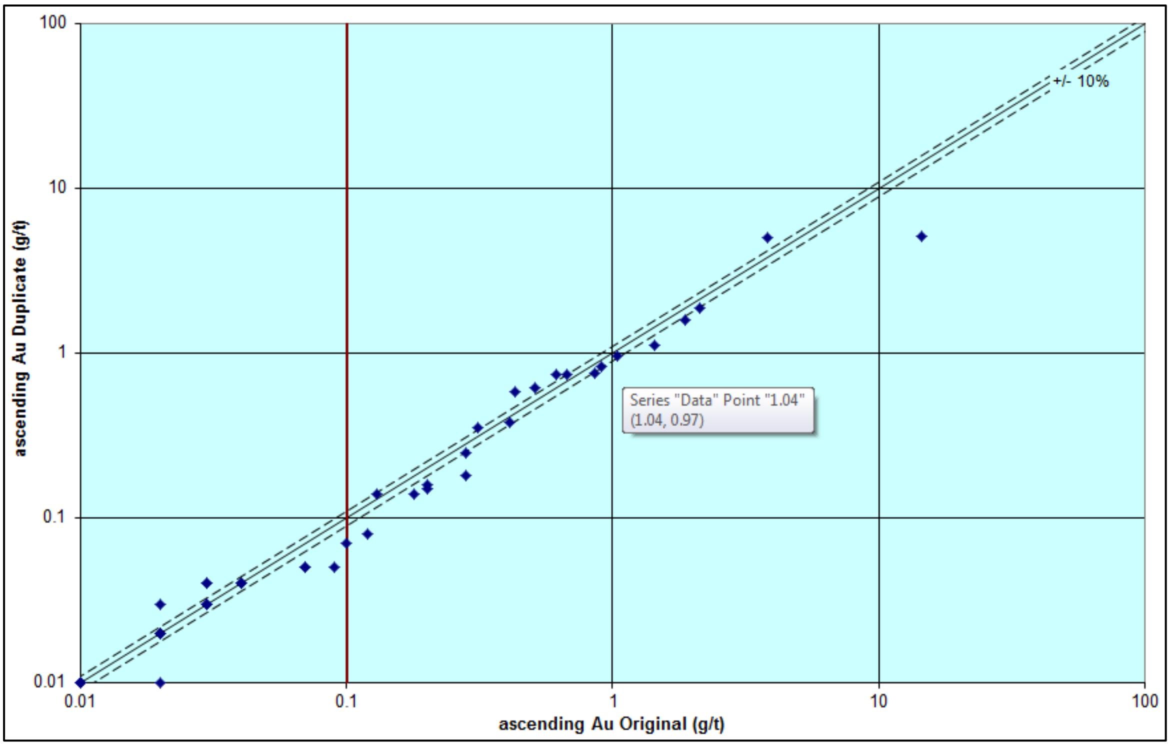


Figure 11.42 2014 dataset – precision pairs plot for RC field duplicate analysis

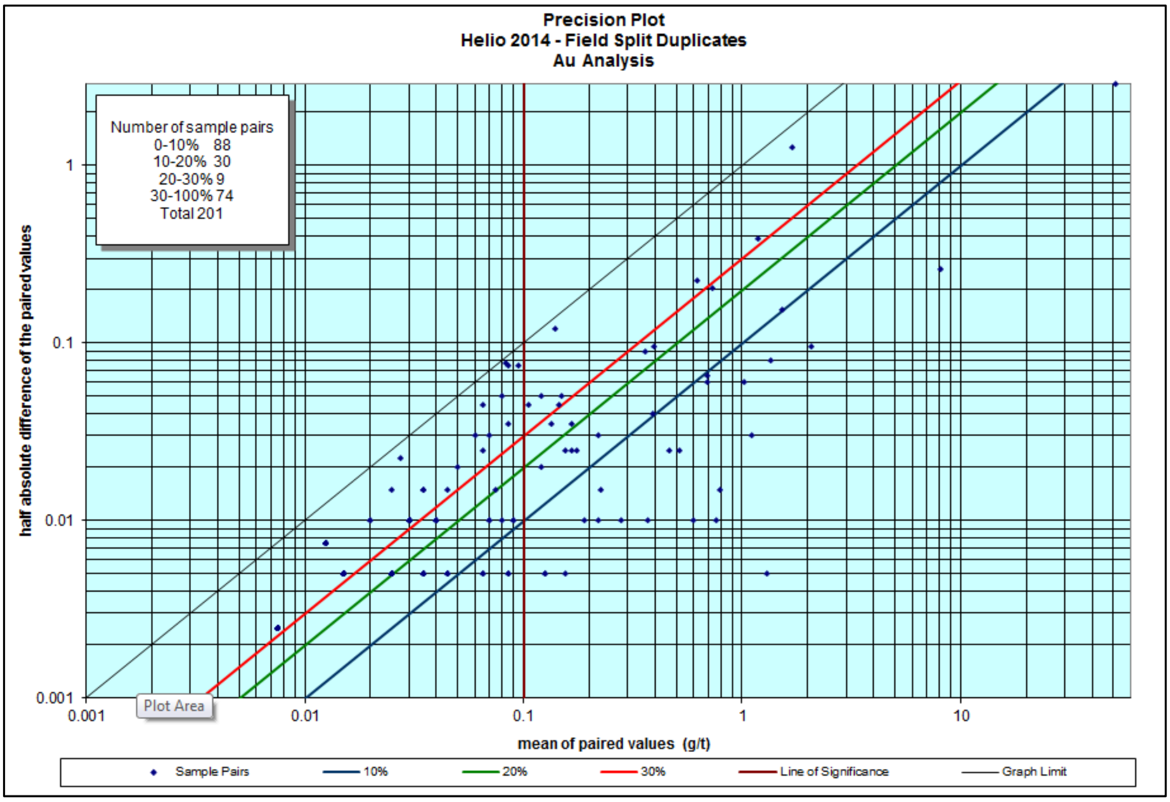


Figure 11.43 2014 dataset – log QQ plot for RC field duplicate analysis

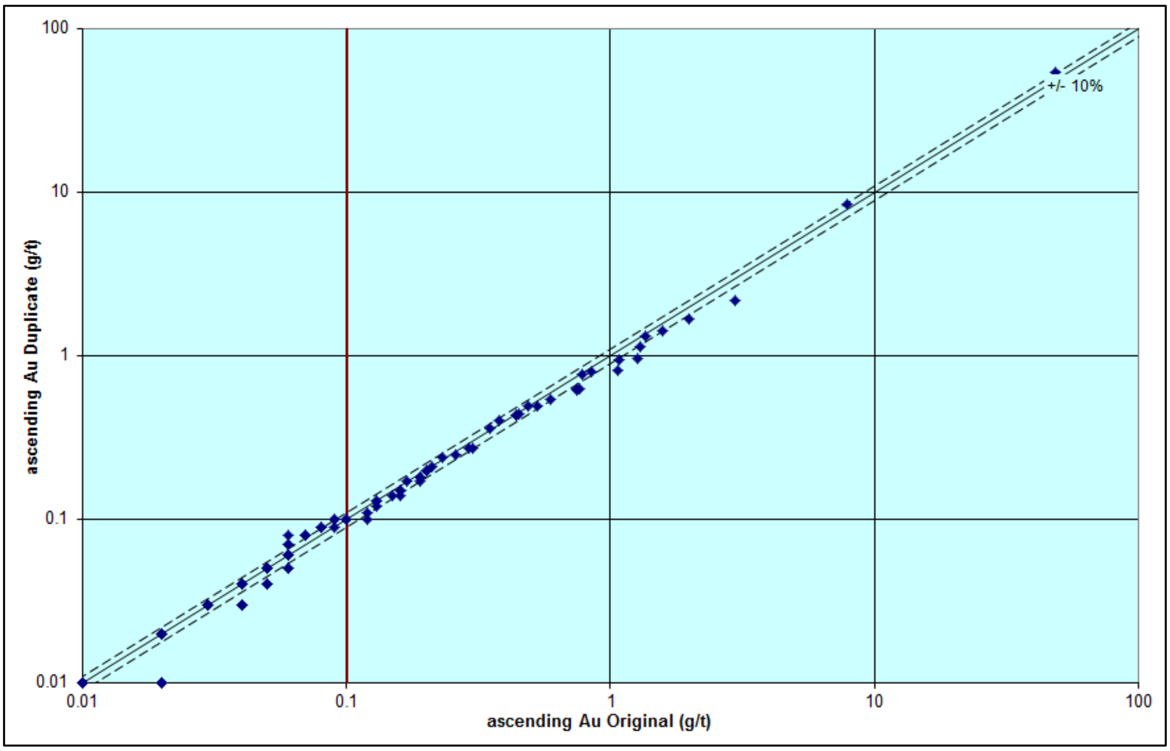


Figure 11.44 Photograph of field splitter setup on site

11.8.6 RC field replicates

The purpose of field replicates in a QA/QC program is to assess the repeatability of field split samples that have been re-numbered and submitted in a separate batch to the primary batch.

For the 2014 database, 113 field split replicates were submitted within 5,792 samples, equating to a 2% insertion rate. This is in line with the recommended industry standards.

A summary of the field split replicate analyses for the 2014 databases is shown in Table 11.5. The field replicate analyses show that results for RC field replicates within the 2014 database have lower than optimal precision for the pairs (Figure 11.45 to Figure 11.46). The poor precision and potential bias may be due to the setup of the RC field splitter as discussed previously. The RC splitting configuration whilst not optimal is not considered to have a significant impact on the reported grade of the primary assay in the opinion of the Qualified Person.

Table 11.5 Summary of RC field replicate results (>0.01 g/t Au and >0.1 g/t Au)

Database	Drillhole type	Total field replicate sample pairs	Percentage within 10% HAD	Percentage within 20% HAD
2014	RC	102 (Au ≥ 0.01 g/t)	36	48
		34 (Au ≥ 0.10 g/t)	53	71

Figure 11.45 2014 dataset – precision pairs plot for RC field replicate analysis

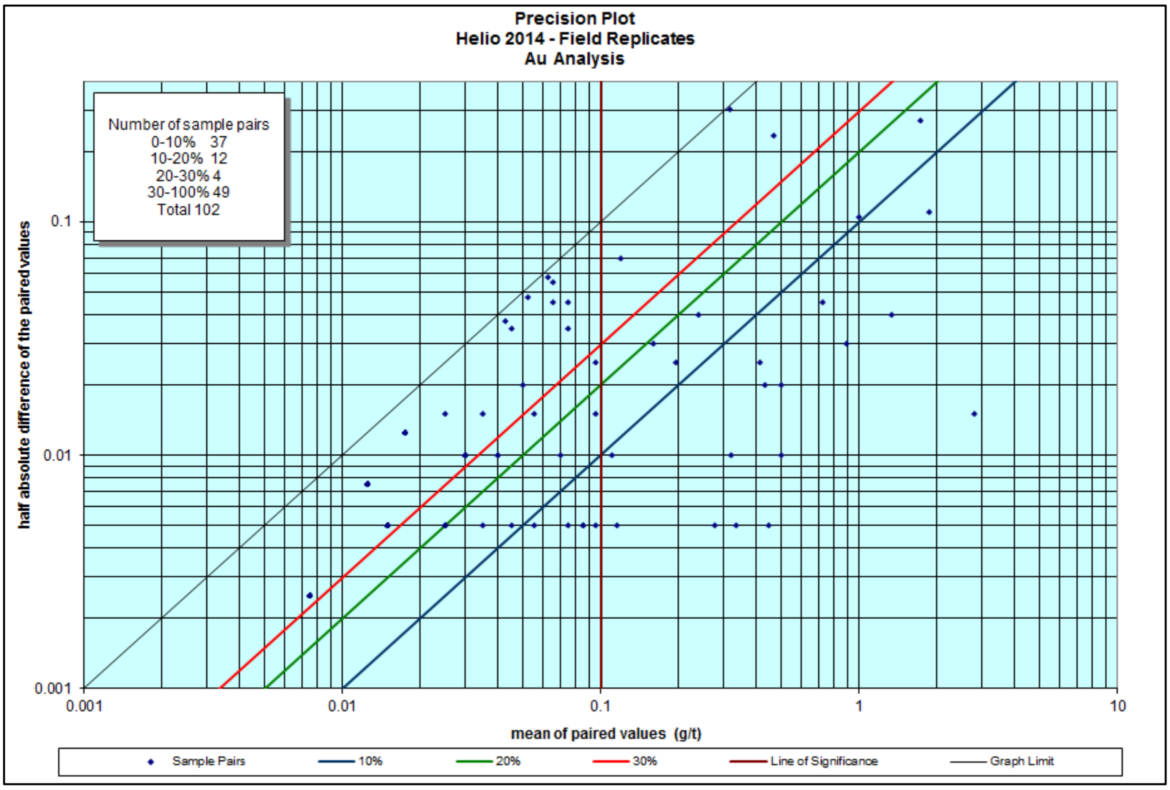
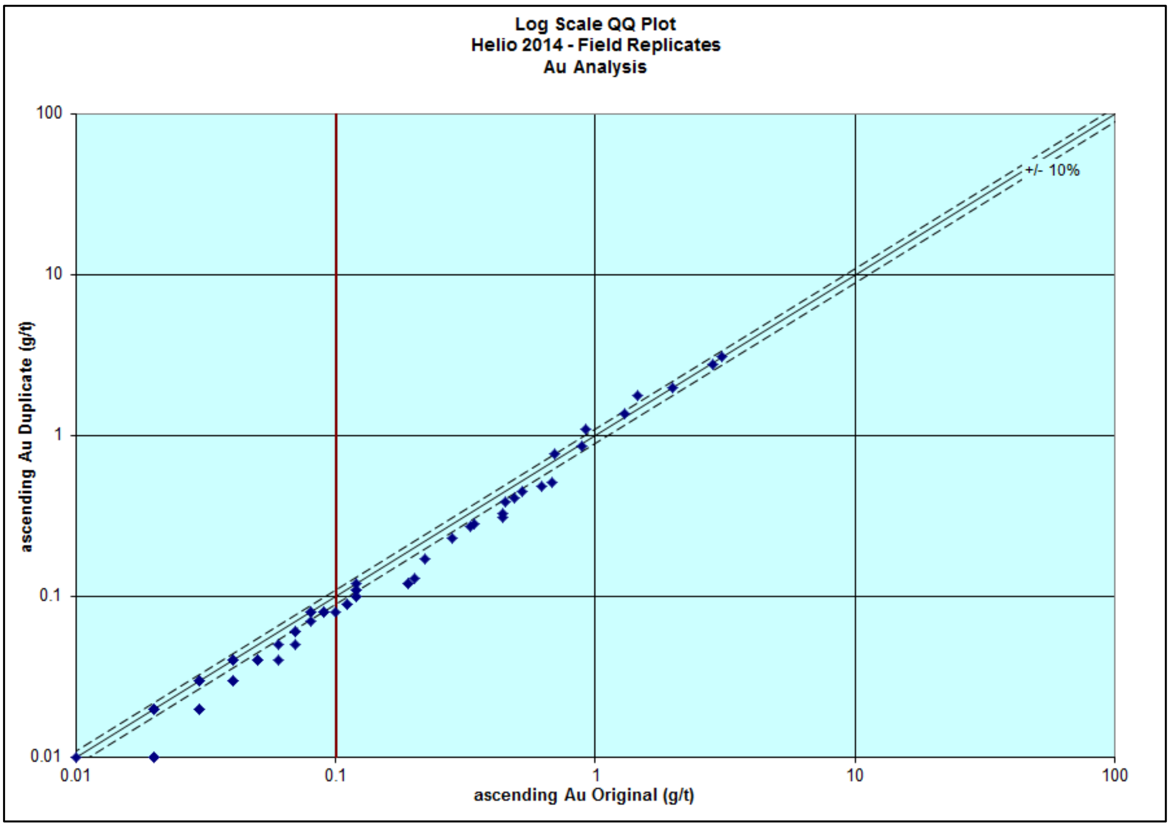


Figure 11.46 2014 dataset – log QQ plot for RC field replicate analysis



11.8.7 Pulp duplicates

Pulp duplicates were not done by the primary laboratory. It is recommended that 5% insertion of pulp duplicates to the normal laboratory should be done in future as well.

11.8.8 Umpire laboratory pulp duplicates

The purpose of pulp duplicates in a QA/QC program is to assess the precision accompanying the sample preparation procedure in the laboratory. In this case, for the 2014 database, the pulp duplicates were used for the purpose of check assaying by an Umpire laboratory, to evaluate the level of precision and accuracy at the primary assay laboratory.

In total, 357 pulp duplicates were submitted within the 5,792 samples of the 2014 database, which equates to a 6.2% insertion rate. This is in line with the recommended industry standard.

A summary of the pulp duplicate analyses for the 2014 database are shown in Table 11.6. The pulp duplicate analyses showed >85% within 20% HAD of the duplicate data, for both RC and diamond core within the 2014 database (Figure 11.47 to Figure 11.50). This shows adequate precision in the sub-sampling process in the laboratory.

Table 11.6 Summary of umpire pulp duplicate results

Database	Drillhole type	Total umpire pulp duplicate sample pairs	Percentage within 10% HAD	Percentage within 20% HAD
2014	DD	66 (Au ≥ 0.01 g/t)	38	55
	DD	29 (Au ≥ 0.10 g/t)	66	90
	RC	59 (Au ≥ 0.01 g/t)	46	86
	RC	59 (Au ≥ 0.10 g/t)	46	86

Figure 11.47 2014 dataset – precision plot for umpire diamond pulp duplicate analysis

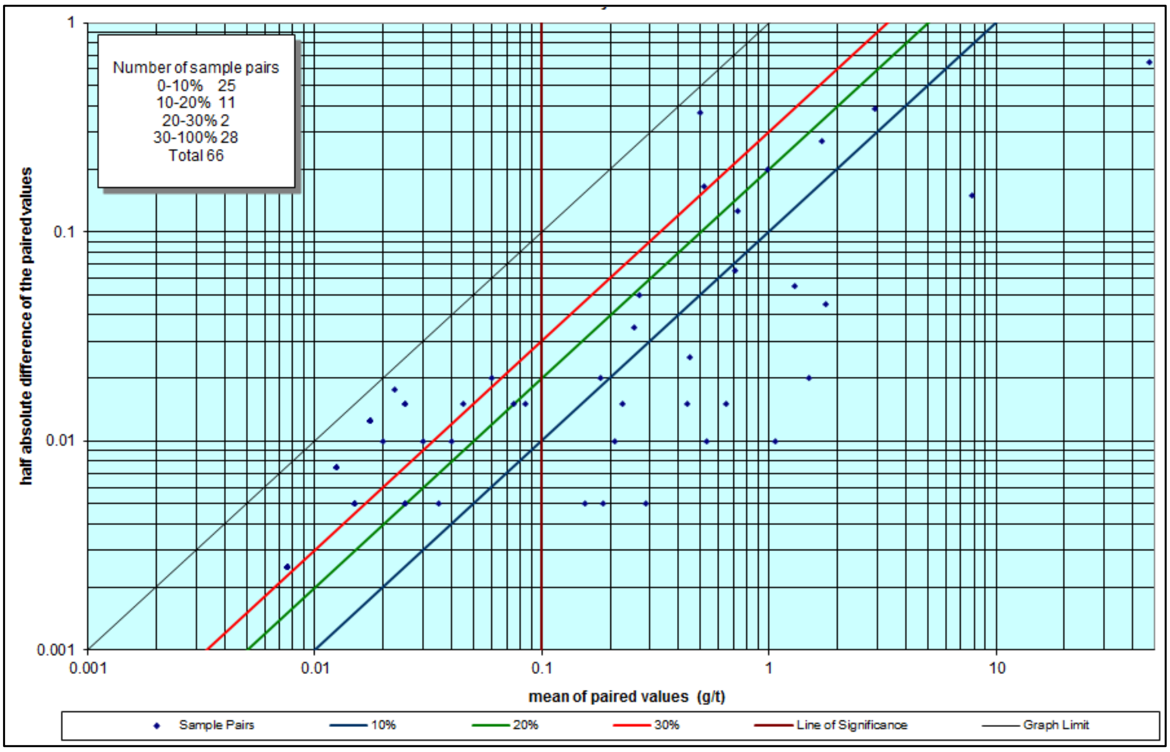


Figure 11.48 2014 dataset – correlation plot for umpire diamond pulp duplicate analysis

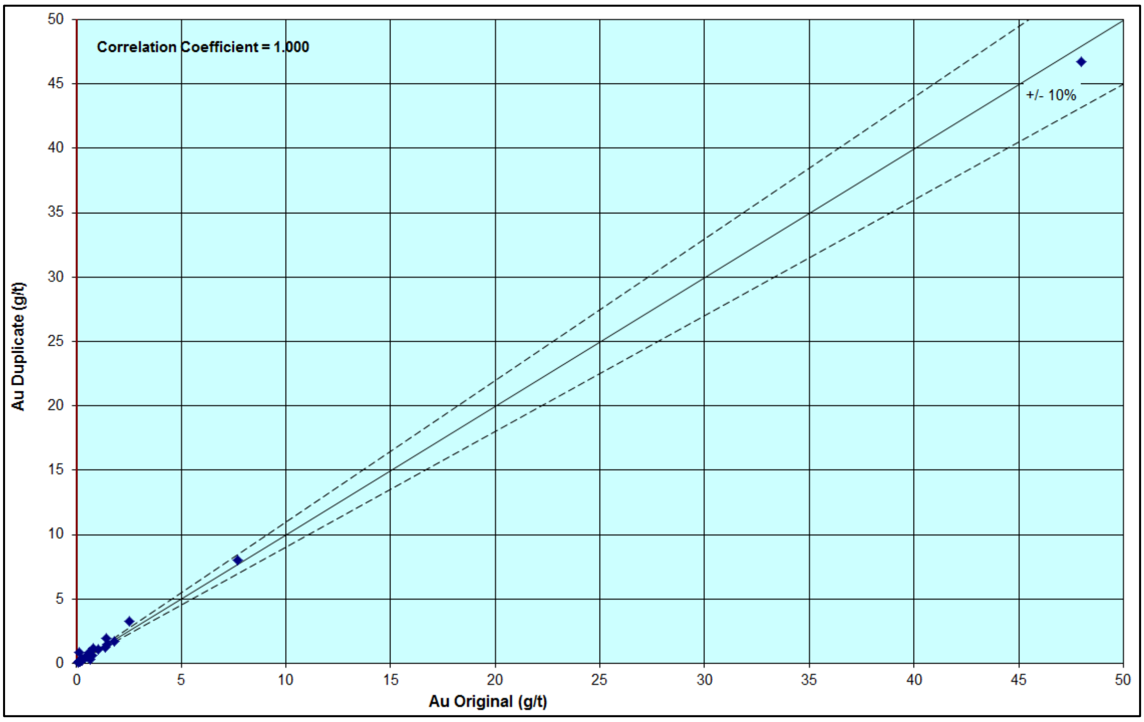


Figure 11.49 2014 dataset – precision plot for umpire RC pulp duplicate analysis

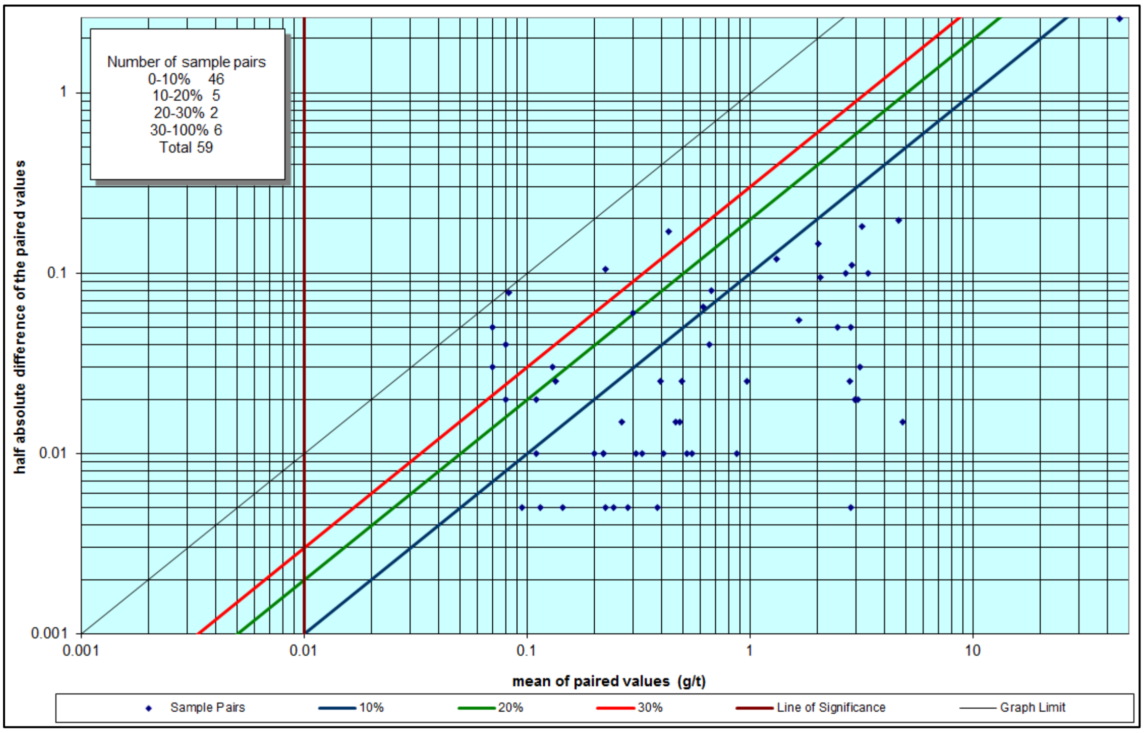
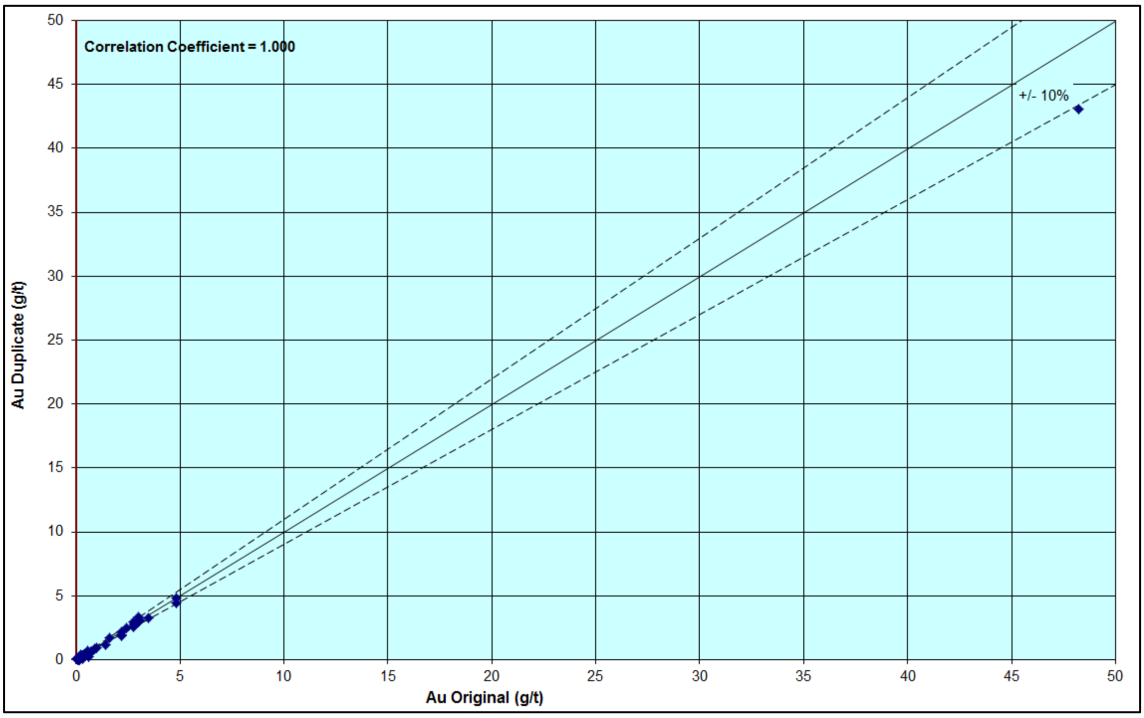


Figure 11.50 2014 dataset – correlation plot for umpire RC pulp duplicate analysis



11.9 Author's opinion on the adequacy of sample preparation, security, and analytical procedures

The sampling of diamond core and RC samples has been shown to be representative of the sampled interval. Some minor factors could be improved such as the method of RC splitting, but in the opinion of the Author the sampling is adequate for representation of the material drilled and is appropriate to be included in a Mineral Resource estimate.

12 Data verification

Source documents referenced during the Mineral Resource estimate included the following:

- Mineral Resource Estimate of the Saza-Makongolozi Project for Helio Resource Corp. – Technical Report (Golder, 2010)
- NI 43-101 Mineral Resource Estimate Update for the Saza-Makongolosi Gold Project, Tanzania (SRK, 2012)
- Saza-Makongolosi Gold Project (SMP), Tanzania Technical Report NI 43-101 (CCIC, 2014)
- Review of All High-Grade Gold Assays in Drilling at the SMP Gold Project, Lupa Goldfields, Tanzania, including the Description of the High-Grade Shoot at the Konokono Target. (MacKenzie, 2013a)
- Review of the High-Grade Gold Shoots, and their Exploration Potential, at the Kenge and Porcupine Resources, SMP Gold Project, Lupa Goldfields, Tanzania (MacKenzie, 2013b)
- Structural Geology of the SMP Gold Project, Lupa Goldfield, Southern Tanzania (Impel, 2010).

Data files used during the MRE include drillhole data (Excel format), topography and mineralisation wireframes (.dxf and Datamine format), and previous resource models (SRK, 2012; CCIC, 2014). Graphic files showing vertical sections, plans and maps, were also provided (.png format).

The drillhole data included collar, assay, downhole survey, lithology and density files for the SMP deposits. Azimuth and bearing measured at 0 m were recorded in the collar file and incorporated into the survey file prior to desurveying.

The fields in these files that were used in the creation of the resource models are shown in Table 12.1 to Table 12.5.

Table 12.1 Collar file fields

Field	Description
BHID	Drillhole ID
XCOLLAR	X-collar coordinate (west to east)
YCOLLAR	Y-collar coordinate (north to south)
ZCOLLAR	Z-collar coordinate (elevation)
DEPTH	Drillhole depth
PROSPECT	Prospect/deposit name
DHTYPE	Drillhole type

Table 12.2 Survey file fields

Field	Description
BHID	Drillhole ID
AT	Distance from collar to test point
BRG	Azimuth
DIP	Vertical angle

Table 12.3 Assays file fields

Field	Description
BHID	Drillhole ID
FROM	Interval start depth
TO	Interval end depth
LENGTH	Thickness
SAMPID	Sample ID
Au	Gold content, g/t

Table 12.4 Lithology file fields

Field	Description
BHID	Drillhole ID
FROM	Interval start depth
TO	Interval end depth
LITH	Lithology code
LITHSIMP	Simplified lithology code
DESCRIPT	Lithology description

Table 12.5 Density file fields

Field	Description
BHID	Drillhole ID
FROM	Interval start depth
TO	Interval end depth
SG	Bulk density (g/cm^3)

Snowden carried out validations for the following:

- Overlaps and gaps
- Duplicate samples/collars
- Anomalous recovery and grade values
- Anomalous survey results
- Negative values.

Snowden found a small percentage of errors in the raw Excel data files that were addressed and corrected prior to the Mineral Resource estimate.

12.1 Collar and downhole surveys

A handheld GPS was used for the siting of the drill rig, after which a DGPS was used to survey the collars once the drill rig had vacated the area. Initially, the DGPS survey was conducted in-house, but there were some issues with elevation (Z) values. This is thought to be related to the calibration of the base station. In order to resolve these issues, Gregory Symons Geophysics of Windhoek, Namibia conducted DPGS surveys in 2013 and 2014, using a Trimble R8 differential GPS plus ancillaries.

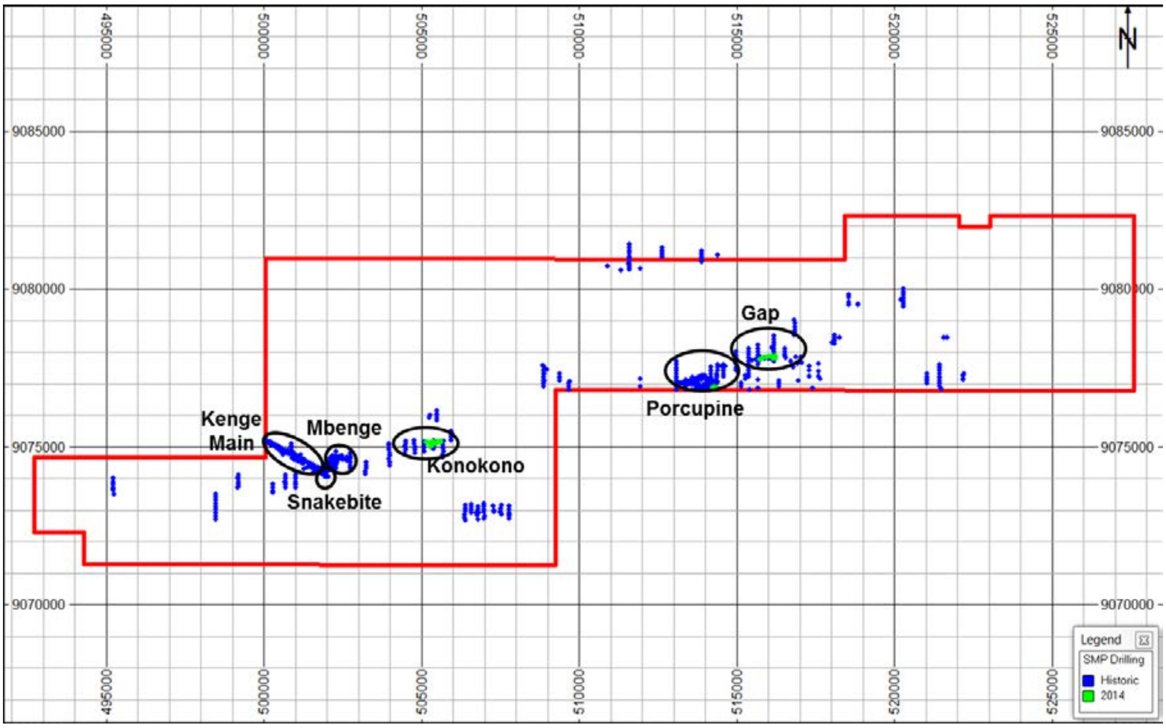
Diamond core holes are routinely surveyed to record azimuth and dip. Holes are surveyed at the top of the hole at the start of drilling to confirm that the setup of the rig is correct, a survey is taken every 50 m downhole and a final survey is taken at the base of the hole to confirm the path of the hole.

Drillhole collars from all campaigns, including the 2014 drilling, were verified in the field during the Snowden site visit. There are numerous cases where collars set with a concrete collar cap and inscribed have been removed by indigenous miners when looking for gold and so many of the permanent record locations are lost. A percentage of holes were photographed (Figure 12.1) and positions validated by independent GPS.

Figure 12.1 Photographic examples of pre-2014 drilling collar cement caps

A plan view of the drillhole collars in the SMP database is shown in Figure 12.2.

Figure 12.2 Plan view of the drillhole collars within the SMP lease area



12.2 Drillhole twinning

A number of RC and diamond drillholes have been twinned to test the accuracy of RC sampling using adjacent diamond core. Drillhole twinning is discussed in more detail in Section 14.3.4.

12.3 Qualified Person's opinion on the adequacy of the data for the purposes used in the technical report

The SMP drill data is considered acceptable for the use in estimation of a Mineral Resource with a moderate to high level of confidence.

Appropriate levels of database maintenance, record validation, density readings, geological continuity and evidence of high grade gold orientations are established. Analysis methods and QA/QC checks, including field replicate and umpire laboratory pulp duplicate analysis checks, are in place and indicate minimal concern.

13 Mineral processing and metallurgical testing

The following section is modified after CCIC (2014) and references therein.

13.1 General

A program of preliminary metallurgical testwork was conducted on behalf of Helio by SGS in Ontario, Canada, to determine the processing characteristics of the Porcupine and Kenge mineralised material, and to develop a preliminary process flowsheet (SGS 2008, 2009a). Results from the Kenge study were published in August, 2008, followed by results from Porcupine in September, 2009. The tests included head grade analysis, mineralogical evaluation, comminution test work, gravity separation, flotation, cyanidation (of whole ore, gravity tailing and flotation concentrate) and preliminary environmental testing. Both testwork programs indicated amenability to conventional gravity and cyanidation gold recovery techniques. A follow-up cursory heap leach amenability study was conducted in May 2009 by SGS on the Kenge mineralised material (SGS, 2009b).

Summary results of this testwork are reported below:

13.1.1 Kenge optimum circuit responses (% Au recoveries), SGS (2008)

- 95.6% by Gravity Separation + Gravity Tailing Flotation
- 95.6% by Whole Ore Flotation
- 94.5% by Gravity Separation + Gravity Tailing Cyanidation
- 93.3% by Gravity Separation + Flotation Concentrate Cyanidation
- 92.5% by Whole Ore Cyanidation
- 34.7% by Gravity Separation
- Bond ball mill work index of 15 (metric) – “intermediate hardness”
- No preg-robbing activity detected
- Low cyanide consumption
- Tailings should be non-acid generating and free from environmentally deleterious elements.

13.1.2 Porcupine optimum circuit responses (% Au recoveries), SGS (2009a)

- 94.8% by Whole Ore Flotation
- 93.4% by Gravity Separation + Gravity Tailing Flotation
- 91.9% by Gravity Separation + Flotation Concentrate Cyanidation
- 89.1% by Gravity Separation + Gravity Tailing Cyanidation
- 88.9% by Whole Ore Cyanidation
- 22.0% by Gravity Separation
- Bond ball mill work index of 15.7 (metric) – “moderately hard”
- No preg-robbing activity detected
- Low cyanide consumption

- Tailings should be non-acid generating and free from environmentally deleterious elements.

13.2 Metallurgical sample selection

A 50 kg test sample was composited using coarse reject material from mineralised drill core from the Kenge target. Material for the test sample was sourced from three diamond drill holes (SZD011 from Kenge SE Zone, and SZD013 and SZD021 from Kenge Main Zone). Helio composited the test sample to have a weighted average head grade of 3.05 g/t Au on the basis of previously reported assaying. Screened metallic tests by SGS indicated an average head grade for the test sample of 3.6 g/t Au.

A 50 kg composite test sample taken from the counterpart half-core from diamond drillhole GPD004 was used in the Porcupine testwork. The intercept chosen assayed 3.3 g/t Au over 49.63 m from 52.76 m, including 0.60 m at 33.2 g/t Au from 66.10 m and 1.80 m at 39.1 g/t Au from 69.40 m. Head grade analysis of the bulk sample from GPD004 conducted by SGS indicated that the sample graded 2.4 g/t Au.

Samples were created for the flotation and cyanidation testwork from the gravity tailings of the initial gravity concentration testing. Whole ore samples were also used in the testwork.

13.3 Mineralogical evaluation

Mineralogical evaluations of the samples by polished section and x-ray diffraction (“XRD”) identified that pyrite was the major sulphide present, whereas minor amounts of chalcopyrite and galena were observed in the Kenge mineralised material and minor amounts of chalcopyrite, covellite and chalcocite were observed in the Porcupine mineralised material. The results also support internal petrological, mineralogical and analytical studies indicating that mineralised material from the Porcupine and Kenge targets has a simple mineralogy.

13.4 Mineral processing

13.4.1 Comminution assessment

Comminution testing using standard Bond ball mill work index tests recorded metric work indices of 15, considered to be of “intermediate hardness” and 15.7, considered to be of “moderate hardness” for the Kenge and Porcupine mineralised material, respectively. The implication of these indicated characteristics on milling energy and maintenance costs is that they will not be particularly onerous.

13.4.2 Gravity separation testwork

Gravity separation analysis was conducted on samples within a grind size range of 105 µm to 133 µm (P_{80}) for the Porcupine material and a grind size range of 92 µm to 126 µm (P_{80}) for the Kenge material.

The initial Kenge tests indicate that gold recoveries up to 34.7% can be achieved by conventional gravity separation techniques. In a similar test scenario gravity separation of the Porcupine material indicated gold recoveries up to 22.0%. The high recovery rates observed in both tests suggest that inclusion of a gravity circuit in plant design and future test work would be an obvious step towards optimising recovery.

13.4.3 Flotation test work

In both series of gravity tailing flotation and whole ore flotation tests, high recoveries were observed. The Kenge test work demonstrated an “excellent” response to gold recovery by flotation. Processing by flotation of gravity tailings produced gold recoveries from 93.9% (92 µm – P_{80}) to 95.6% (75 µm –P_{80}). Whole ore flotation tests concluded gold recoveries from 93.4% (125 µm – P_{80}) to 95.6% (100 µm – P_{80}).

For Porcupine, gold recoveries for the combined gravity and flotation process ranged from 91.6% (133 µm – P_{80}) to 93.4% (105 µm – P_{80}). Similarly high recoveries were also observed during whole ore flotation testing ranging from 90.5 % (256 µm – P_{80}) to 94.8% (61 µm – P_{80}).

In the Kenge test work minimal grind size to gold recovery variations were noted. In Porcupine, a potential relationship between finer grinding and increased gold recovery was established although further test work is required to confirm this, and even so, recoveries of over 90% at grind sizes of 256 µm are particularly encouraging.

13.4.4 Cyanidation test work

Standard bottle roll testing was used for the cyanidation test work. The grind sizes tested for the Kenge material ranged from 126 µm to 52 µm (P_{80}). Gold recoveries for cyanidation of the gravity tailings ranged from 89.9% (126 µm – P_{80}) to 94.5% (59 µm – P_{80}). Whole ore cyanidation tests concluded gold recoveries from 86.7% (96 µm – P_{80}) to 92.5% (58 µm – P_{80}).

The grind sizes tested for the Porcupine material ranged from 174 µm to 79 µm (P_{80}) for cyanidation of the gravity tailings, however, a coarser feed was used to assess the response of whole ore samples to cyanidation, from 406 µm to 75 µm (P_{80}). Gold recoveries for cyanidation of the gravity tailings ranged from 82.0% (174 µm – P_{80}) to 89.1% (79 µm – P_{80}). Whole ore cyanidation tests concluded gold recoveries from 70.3% (406 µm – P_{80}) to 88.9% (75 µm – P_{80}).

Both the Kenge and Porcupine material showed a trend towards increased gold recovery with finer grind sizes in both whole ore and gravity tailing tests.

Carbon-in-leach (“CIL”) tests on single samples of gravity tailings for both the Kenge and Porcupine material showed no increased gold recovery; therefore no preg-robbing activity is expected in either ore. It is also notable that both tests concluded the material has low cyanide consumption, in the region of 0.04 kg/t to 0.11 kg/t for Kenge, and 0.11 kg/t to 0.62 kg/t for Porcupine.

In both tests, cyanidation of the flotation concentrate was conducted to determine the influence of regrinding before cyanidation on gold recovery. In both tests, significant increases in recovery were recorded.

Further test work was undertaken in May 2009 by SGS on material retained from the previous 2008 Kenge study to assess amenability to heap leaching. The test focused on coarse material bottle roll cyanidation testing. The material used represented the coarsest material retained by SGS and ranged in size from 1.7 mm to 3.35 mm. Results from this phase of test work indicated that gold recoveries in the order of 70% are possible, coupled with low reagent consumptions.

13.5 Environmental implications

Various acid generation tests on mineralised material and broad spectrum ICP testing suggest that tailings should be non-acid generating and free from environmentally deleterious elements.

13.6 Additional work and further work planned

Further metallurgical test work, including samples representing a wider spectrum of mineralisation considered probable for future processing, should be undertaken in order to optimise grinding sizes and flotation flowsheet configurations.

14 Mineral Resource estimates

Previous Mineral Resource estimates were completed by Golder (2010), SRK (2012) and CCIC (2014). This Mineral Resource estimate represents the fourth Mineral Resource estimate prepared for the SMP.

Four main target areas are defined in the SMP, namely Kenge, Porcupine, Gap and Konokono. Kenge comprises the Kenge Main, Mbenge and Snakebite deposits. Porcupine is made up of the Porcupine Main deposit (the Porcupine Quill and Porcupine West deposits are excluded from this Mineral Resource estimate). The Tumbili deposit is excluded from this MRE.

This Mineral Resource estimate concerns the Kenge, Mbenge, Snakebite, Porcupine Main, Gap and Konokono target areas. Porcupine Quill, Porcupine West and Tumbili remain unchanged since the SRK estimates (2012) and are not included or quoted in this Mineral Resource estimate or this Technical Report.

The database used was verified and is sufficiently reliable to support a Mineral Resource estimate. The approach and methodologies applied in this resource estimation are in accordance with international resource reporting guidelines, including NI 43-101.

Construction of volumetric solids for the zones of mineralisation, 3D resource modelling and grade estimation was undertaken using CAE Datamine Studio 3™. The geostatistical analyses were done with the use of Snowden Supervisor V8.3™.

The coordinate system used for modelling was the same as the primary coordinate system stored in Helio’s drillhole database: UTM Zone 36S, datum WGS 84.

14.1 Summary

Mineral Resource estimates are currently reported for the SMP as in Table 14.1 and Table 14.2.

Table 14.1 Mineral Resource statement – 28 February 2015, SMP Gold Project Pit envelope constrained - reported at a cut-off grade of 0.5 g/t Au and economic constraints applied

Category	Area	Tonnage (kt)	Grade (g/t Au)	Contained Au (koz)
Indicated	Kenge Main	1,951	1.6	100
	Mbenge	796	2.0	51
	Snakebite	-	-	-
Kenge Indicated		**2,747**	**1.7**	**152**
Indicated	Porcupine Main	2,856	1.8	163
	Gap	3	1.0	-
Porcupine Indicated		**2,859**	**1.8**	**163**
Indicated	Konokono	299	1.8	17
Konokono Indicated		**299**	**1.8**	**17**
TOTAL INDICATED	**SMP**	**5,905**	**1.8**	**332**
Inferred	Kenge Main	-	-	-
	Mbenge	37	1.2	1
	Snakebite	112	2.4	9
Kenge Inferred		**149**	**2.1**	**10**
Inferred	Porcupine Main	23	0.6	-
	Gap	56	1.5	3
Porcupine Inferred		**79**	**1.2**	**3**
Inferred	Konokono	105	1.2	4
Konokono Inferred		**105**	**1.2**	**4**
TOTAL INFERRED	**SMP**	**333**	**1.6**	**17**

Notes: 1: Resource classification according to CIM guidelines.

2: Tonnage is reported in metric tonnes (“t”), grade as grammes per tonne gold (“g/t Au”) and contained gold in troy ounces (“oz Au”).

3: Tonnages are rounded to the nearest 1,000 t. Ounces are rounded to the nearest 1,000 oz Au. Figures may not compute exactly due to rounding.

4: Economic parameters have been applied and Mineral Resources reported are inside US$1,400 pit shells at a cut-off grade of 0.5 g/t Au.

5: Mr. Roderick Carlson is designated as the Qualified Person regarding the Mineral Resource Estimation (MRE) and is a member in good standing of the MAusIMM, MAIG with RPGeo status (Mining and Mineral Exploration).

Table 14.2 Mineral Resource statement – 28 February 2015, SMP Gold Project underground potential (reported at a cut-off grade of 2.5 g/t Au and economic constraints applied)

Category	Area	Tonnage (kt)	Grade (g/t Au)	Contained gold (koz)
Indicated	Kenge Main	516	5.1	84
	Mbenge	120	3.8	15
	Snakebite	-	-	-
Kenge Indicated		**636**	**4.8**	**99**
Indicated	Porcupine Main	940	5.0	152
	Gap	49	3.6	6
Porcupine Indicated		**989**	**5.0**	**158**
Indicated	Konokono	9	3.3	1
Konokono Indicated		**9**	**3.3**	**1**
Total Indicated		**1,634**	**4.9**	**258**
Inferred	Kenge Main	4	4.2	1
	Mbenge	8	3.2	1
	Snakebite	44	3.3	5
Kenge Inferred		**57**	**3.3**	**6**
Inferred	Porcupine Main	99	4.3	14
	Gap	14	2.9	1
Porcupine Inferred		**113**	**4.1**	**15**
Inferred	Konokono	58	3.4	6
Konokono Inferred		**58**	**3.4**	**6**
Total Inferred		**228**	**3.8**	**27**

Notes: 1: Resource classification according to CIM guidelines.

2: Tonnage is reported in metric tonnes ("t"), grade as grammes per tonne gold ("g/t Au") and contained gold in troy ounces ("oz Au").

3: Tonnages are rounded to the nearest 1,000 t. Ounces are rounded to the nearest 1,000 oz Au. Figures may not compute exactly due to rounding.

4: Economic parameters have been applied and Mineral Resources reported are outside US$1,400 pit shells at a cut-off grade of 2.5 g/t Au.

5: Mr. Roderick Carlson is designated as the Qualified Person regarding the Mineral Resource Estimation (MRE) and is a member in good standing of the MAusIMM, MAIG with RPGeo status (Mining and Mineral Exploration).

14.2 Disclosure

Mineral Resources reported in Section 14 were prepared by Dr Belinda van Lente, Senior Consultant, a full-time employee of Snowden, and reviewed by Mr Roderick Carlson, Senior Principal Consultant for Snowden at the time of the Mineral Resource estimate

Mr Roderick Carlson is a Member of the Australian Institute of Geoscientists (#1443) and a Registered Professional Geologist (Mining and Exploration) (#10,122) and a member of the AusIMM (#208,187), and as such is a Qualified Person as defined in NI 43-101. Snowden is independent of Helio.

Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.

14.2.1 Known issues that materially affect Mineral Resources

Snowden is unaware of any issues that materially affect the Mineral Resources in a detrimental sense. These conclusions are based on the following:

- Helio rehabilitate drill sites and drill access roads on an ongoing basis
- Helio has represented that there are no outstanding legal issues; no legal action, and injunctions pending against the SMP
- Helio has represented that the mineral and surface rights have secure title
- There are no known marketing, political, environmental or taxation issues
- Helio has represented that the SMP has strong local community support.

14.3 Assumptions, methods and parameters – Snowden Mineral Resource estimates

The basis of this Mineral Resource estimate for the SMP deposits are discussed in this section.

The estimates were prepared in the following steps:

- Data validation – this was undertaken by Mr. C. MacKenzie (Helio) and reviewed by Snowden
- Data preparation – this and subsequent steps are discussed below
- Geological interpretation and modelling
- Establishment of block models
- Compositing of assay intervals
- Exploratory data analysis of Au
- Analysis of top cuts
- Variogram analysis
- Derivation of kriging plan and boundary conditions
- Grade interpolation of Au
- Validation of Au grade estimates
- Classification of estimates with respect to Canadian Institute of Mining (“CIM”) guidelines
- Mineral Resource tabulation and resource reporting.

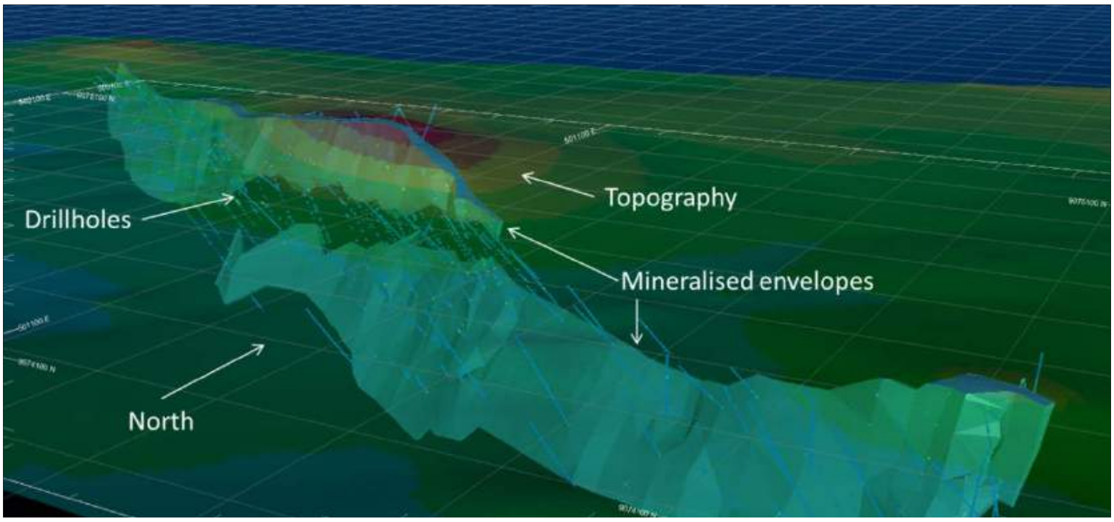
14.3.1 Topography

The 3D surface profile at the project area was created from a detailed 2009 airborne magnetic and radiometric geophysical survey flown by NRG Ltd. The geophysical survey was conducted by a helicopter with a mean ground clearance of 30 m and a flight line spacing of 50 m east-west. The topography of the SMP was confirmed to be relatively unchanged according to observations made during the site visit. The modelled surface corresponds to the drillhole information, namely the collar positions, surveyed using a DGPS, and the logged information. Figure 12.2 gives an overview of the locations of Kenge Main, Mbenge, Snakebite, Porcupine Main, Gap and Konokono within the SMP.

Kenge Main

The Kenge deposit (Figure 14.1) outcrops along a ridge at approximately 1100 mRL, strikes at 120º and dips at 60º to 70º towards the southwest.

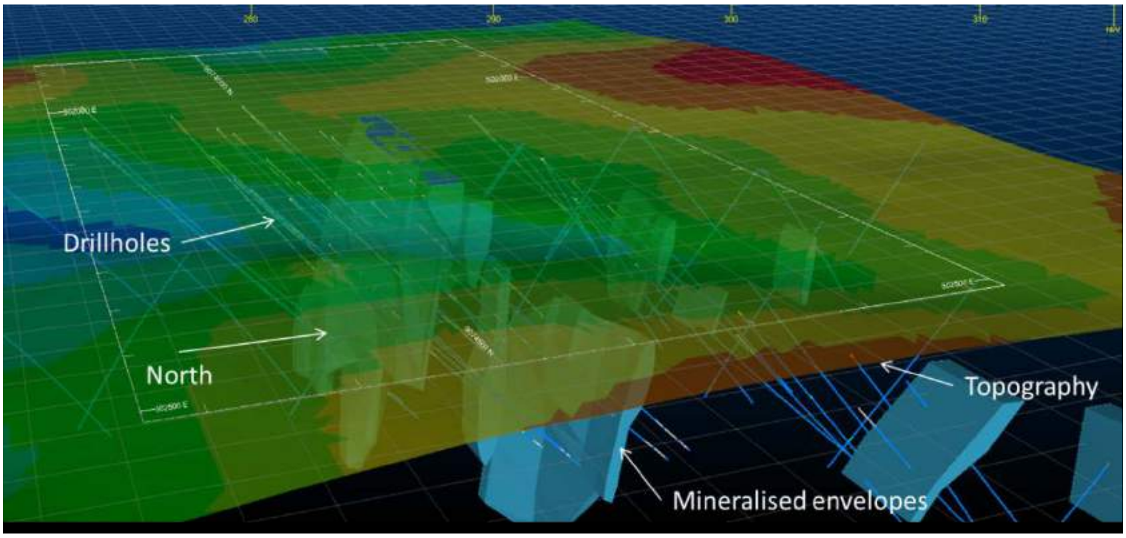
Figure 14.1 Topography and mineralisation zones for the Kenge Main deposit



Mbenge

The Mbenge deposit occurs at a lower elevation than Kenge (Figure 14.2), with the mineralisation striking 090º to 100º and dipping at 60º to 70º to the south.

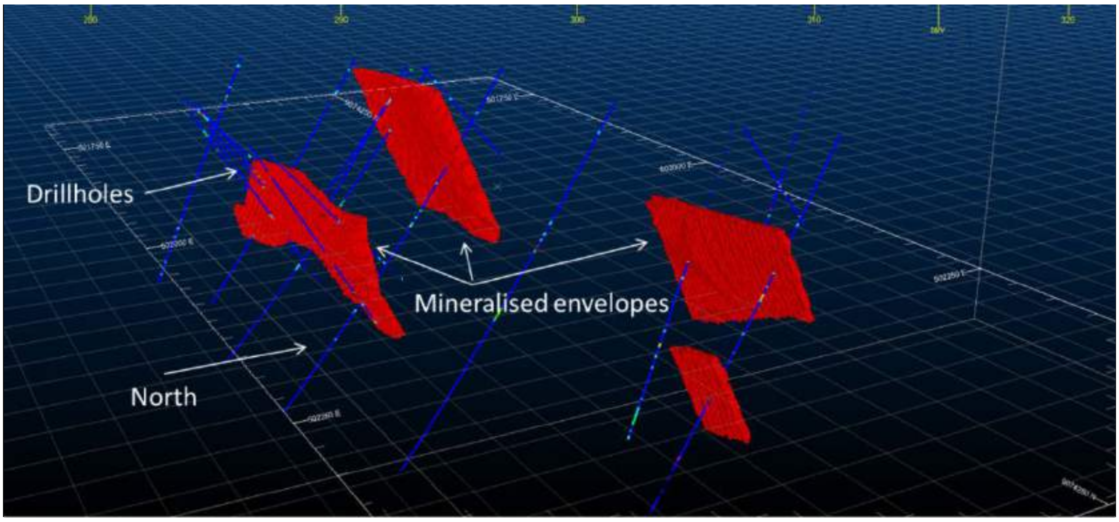
Figure 14.2 Topography and mineralisation zones for the Mbenge deposit



Snakebite

The Snakebite deposit (Figure 14.3) occurs south of the Mbenge deposit, with the mineralisation striking 80º and dipping 65º towards the north.

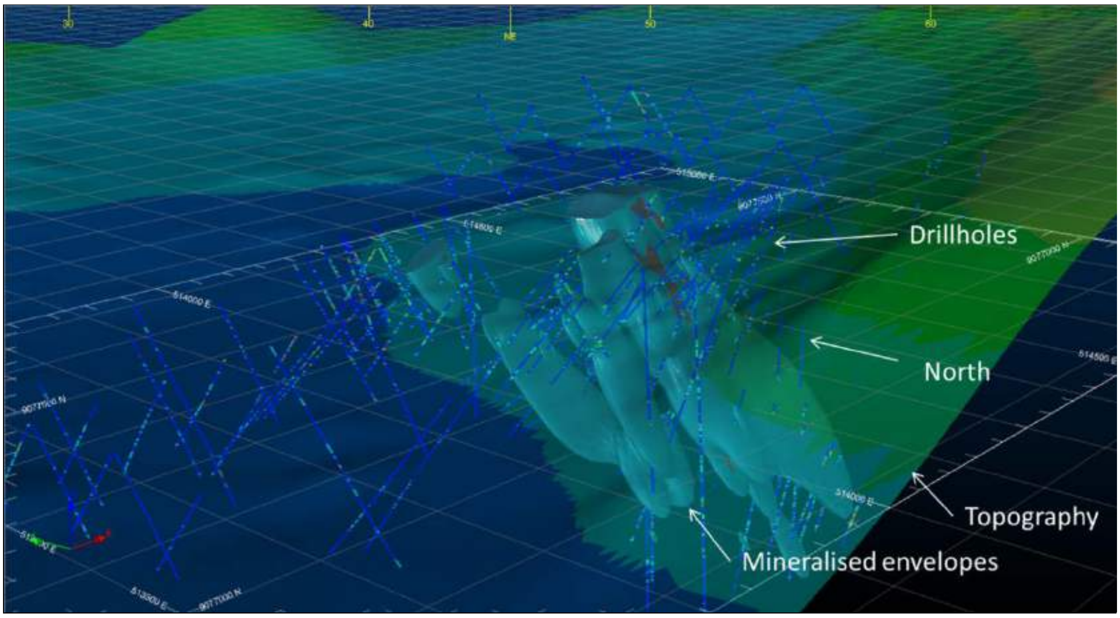
Figure 14.3 Mineralisation zones for the Snakebite deposit



Porcupine Main

The Porcupine Main deposit (Figure 14.4) occurs at approximately 1220 mRL, creating a ridge on surface, striking at 070º and dipping 60º towards the south, with a plunge of ~65º to the east.

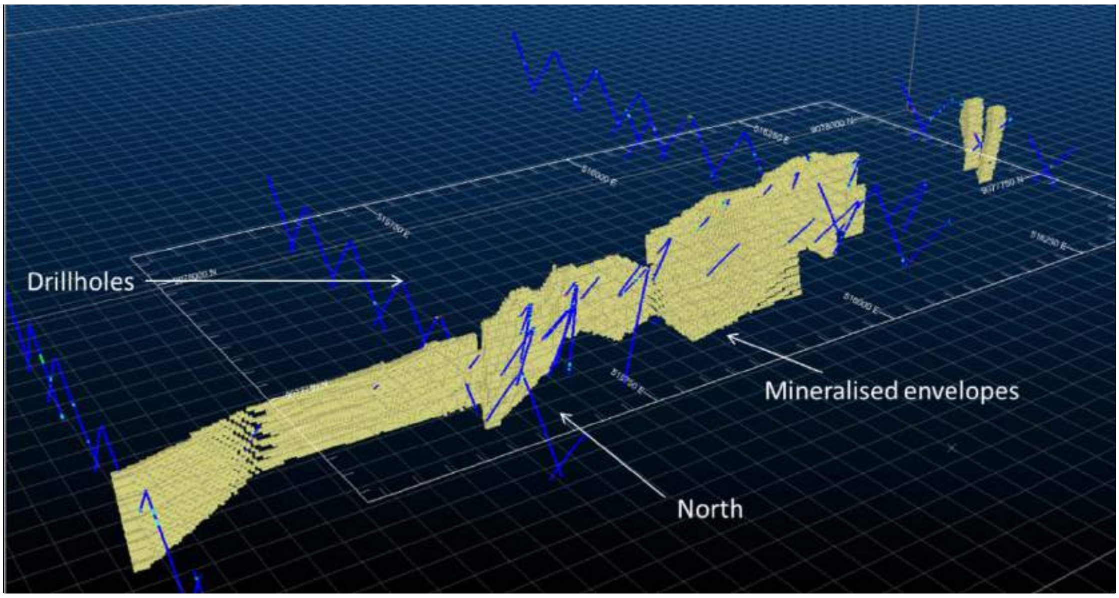
Figure 14.4 Topography and mineralisation zones for the Porcupine Main deposit



Gap

The Gap deposit (Figure 14.5) is located to the northeast of Porcupine Main deposit, with the mineralisation striking 80º and dipping almost vertically.

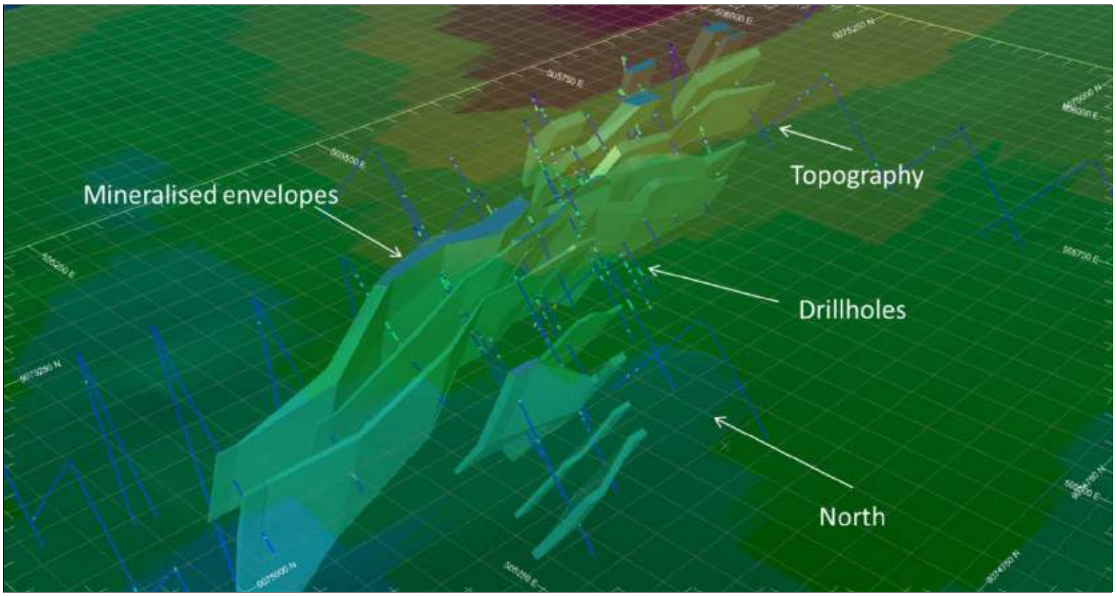
Figure 14.5 Mineralisation zones for the Gap deposit



Konokono

The mineralisation of the Konokono deposit (Figure 14.6) strikes almost east-west and dips towards the north at around 60º.

Figure 14.6 Topography and mineralisation zones for the Konokono deposit



14.3.2 Drillhole locations

Helio supplied the drillhole database information in an Excel format, including collars, survey, assays and lithology files. Since the previous Mineral Resource estimate by CCIC (2014), an additional 49 RC drillholes (Gap and Konokono; includes diamond drill tails on four RC holes), and six diamond drillholes (Porcupine Main), were added to the database and used in the current Mineral Resource estimate. These additional drillholes were completed between October and December, 2014.

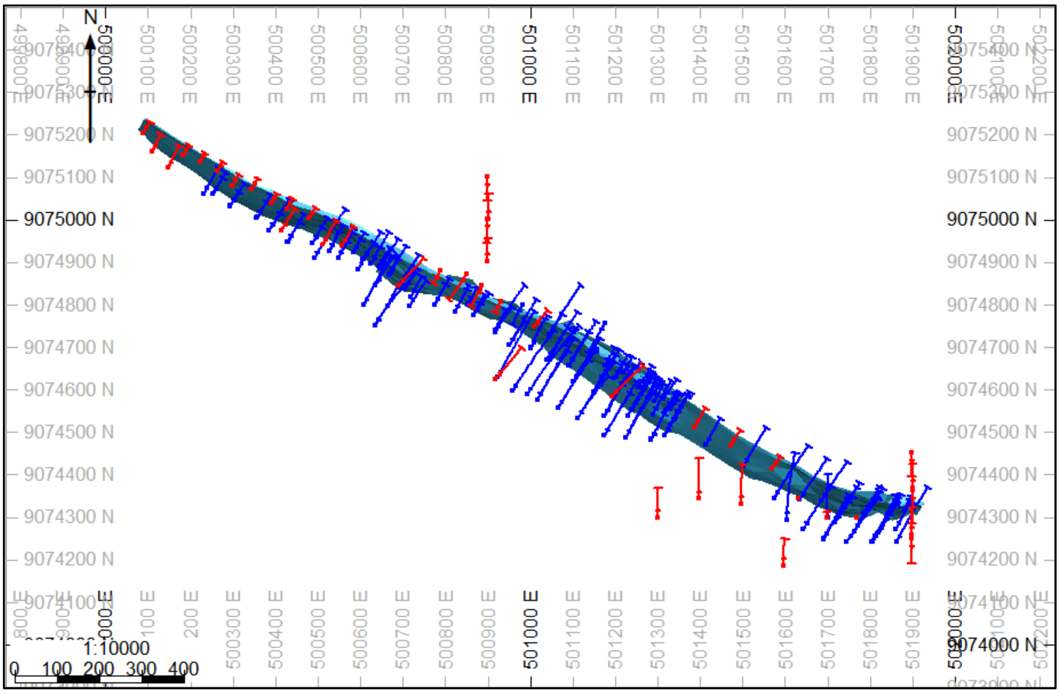
This Mineral Resource estimate update for the SMP deposits is based on a total of 521 drillholes (~74,770 m), a summary of which is shown in Table 14.3. The locations of these drillholes and the respective deposits are shown in Figure 14.7 to Figure 14.12.

Table 14.3 Summary of drillholes per deposit used in the SMP Mineral Resource estimate (Snowden, 2015)

Area	Total RC	Total RC length (m)	Total DD	Total DD length (m)
Kenge Main	41	3,282.00	147	21,824.14
Mbenge	38	3,929.00	36	6,320.30
Snakebite	3	314.00	16	2,654.37
Porcupine Main	18	1,712.00	78	20,348.49
Gap	75	6,740.00	14	1,784.68
Konokono	50	4,940.70*	5	920.24
Total	**225**	**20,917.70**	**296**	**53,852.22**

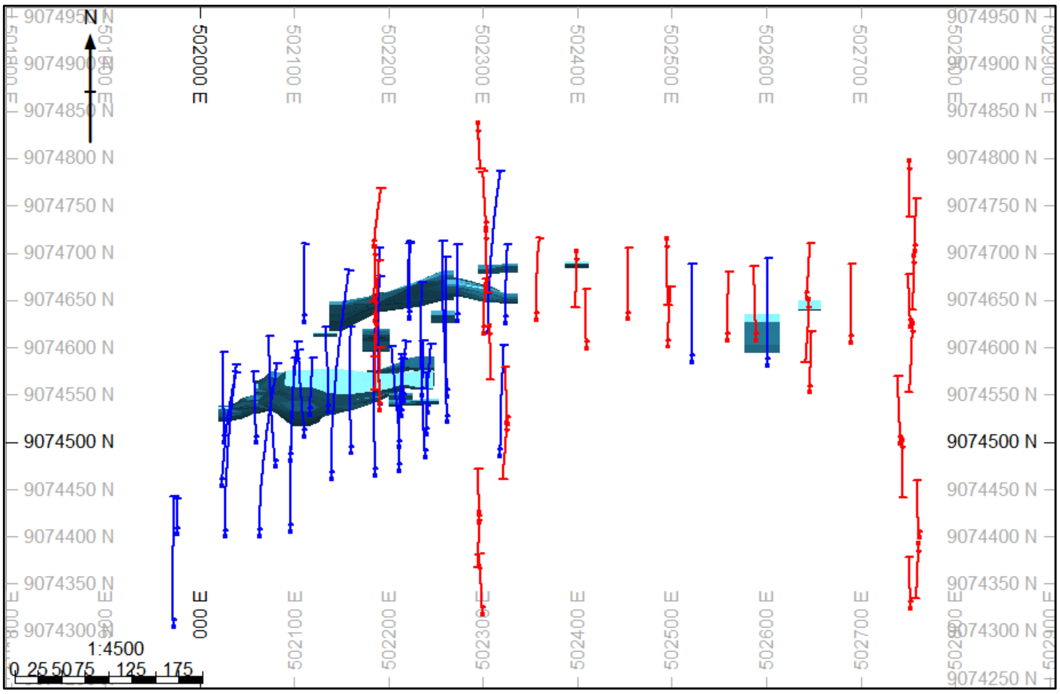
**Includes diamond drill tails*

Figure 14.7 Plan view showing drillholes and interpreted mineralisation for the Kenge Main deposit



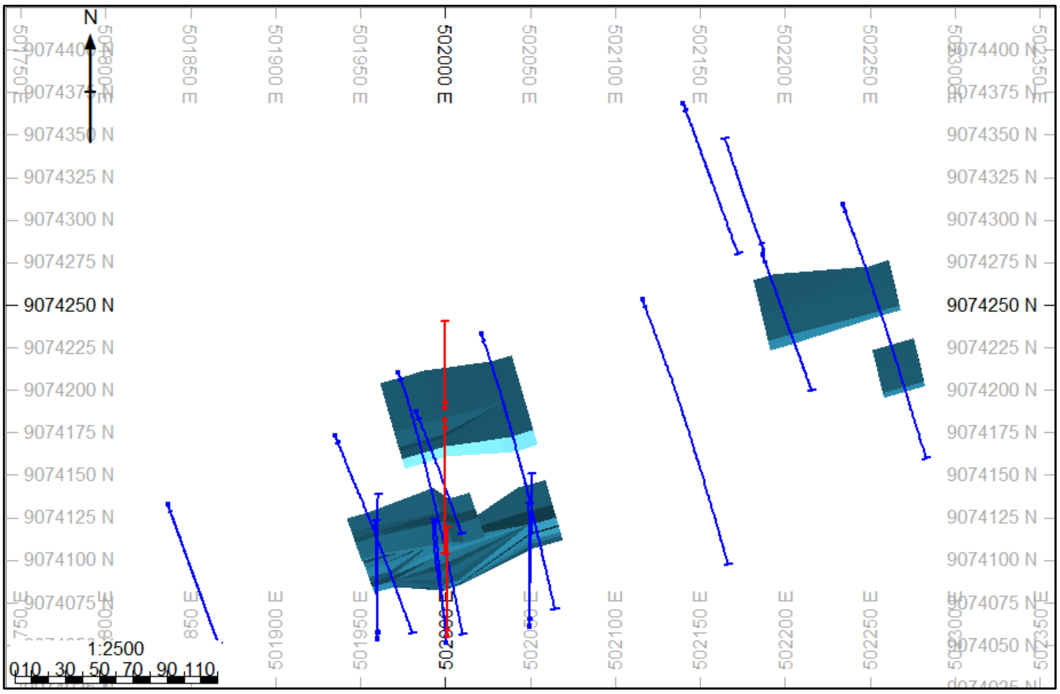
RC = Red; DD = Blue

Figure 14.8 Plan view showing drillholes and interpreted mineralisation for the Mbenge deposit



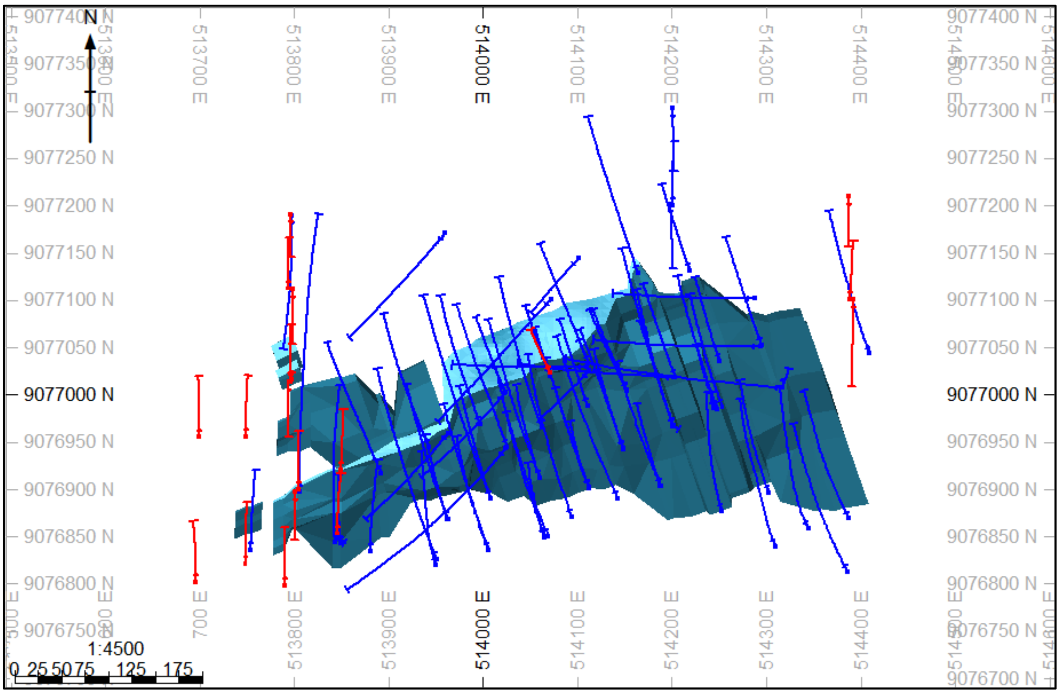
RC = Red; DD = Blue

Figure 14.9 Plan view showing drillholes and interpreted mineralisation for the Snakebite deposit



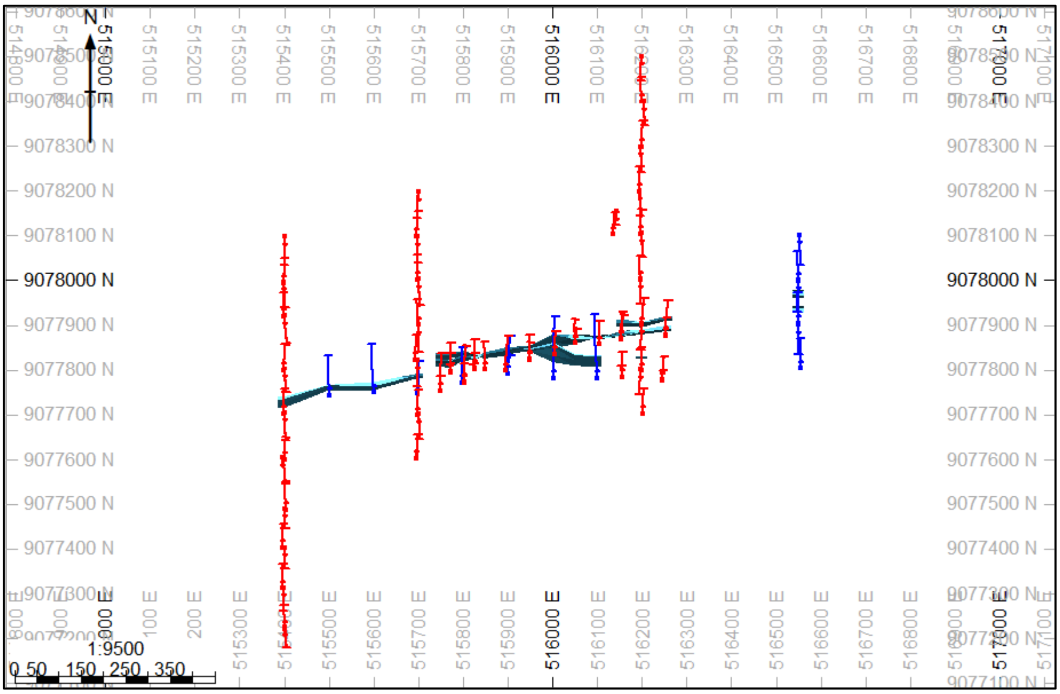
RC = Red; DD = Blue

Figure 14.10 Plan view showing drillholes and interpreted mineralisation for the Porcupine Main deposit



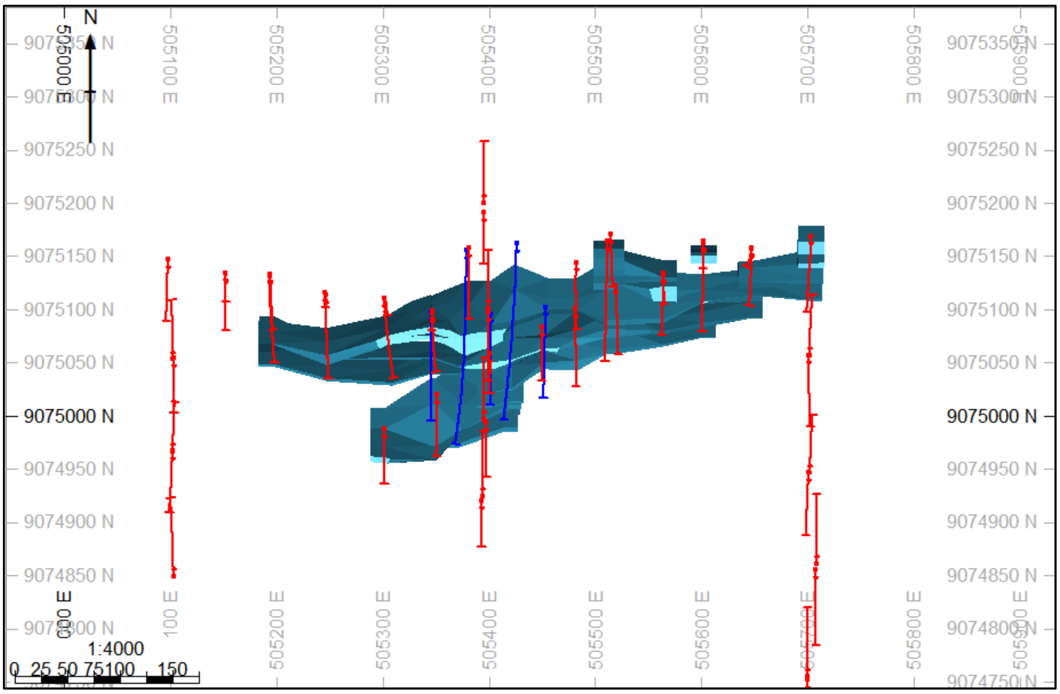
RC = Red; DD = Blue

Figure 14.11 Plan view showing drillholes and interpreted mineralisation for the Gap deposit



RC = Red; DD = Blue

Figure 14.12 Plan view showing drillholes and interpreted mineralisation for the Konokono deposit



RC = Red; DD = Blue

Generally, the drillholes are oriented to intersect the shear zones perpendicularly, and inclined at between 50º and 70º. The average drilling lengths recorded for the SMP deposits updated in this Mineral Resource estimate are shown in Table 14.4.

Table 14.4 Summary of average drilling lengths per deposit used in the SMP Mineral Resource estimate (Snowden, 2015)

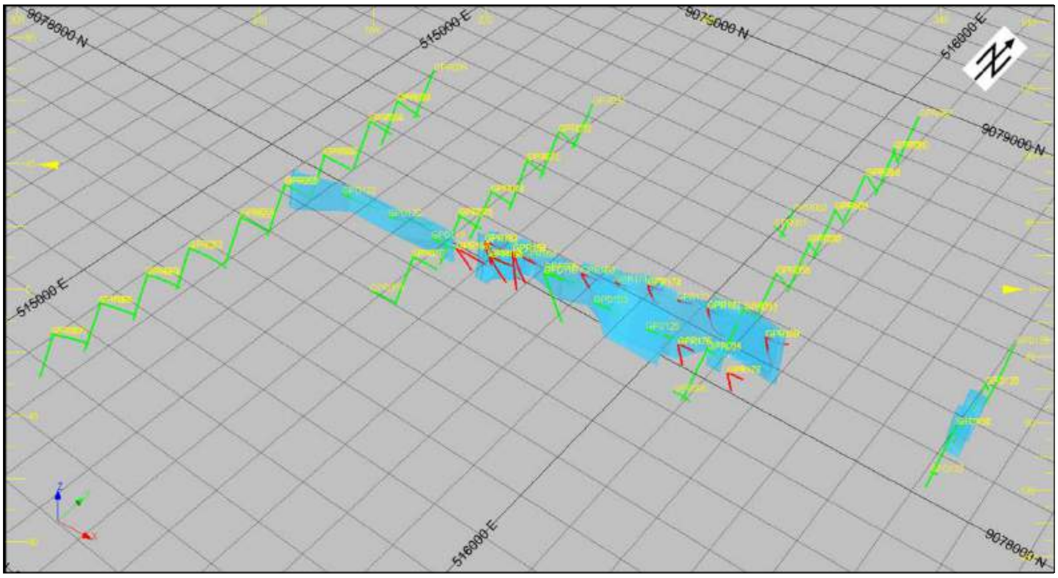
Area	Total RC	Average RC length (m)	Total DD	Average DD length (m)
Kenge Main	41	80.05	147	148.46
Mbenge	38	103.39	36	175.56
Snakebite	3	104.67	16	165.90
Porcupine Main	18	95.11	78	260.88
Gap	75	89.87	14	127.48
Konokono	50	98.81*	5	184.05
Total	**225**	**92.97**	**296**	**181.93**

**Includes diamond drill tails*

A total of 25 RC drillholes (Gap), 24 RC drillholes (Konokono; includes DD tails) and six diamond drillholes (Porcupine Main) were completed by December 2014. These drillholes are shown in Figure 14.13 to Figure 14.15 and are as follows:

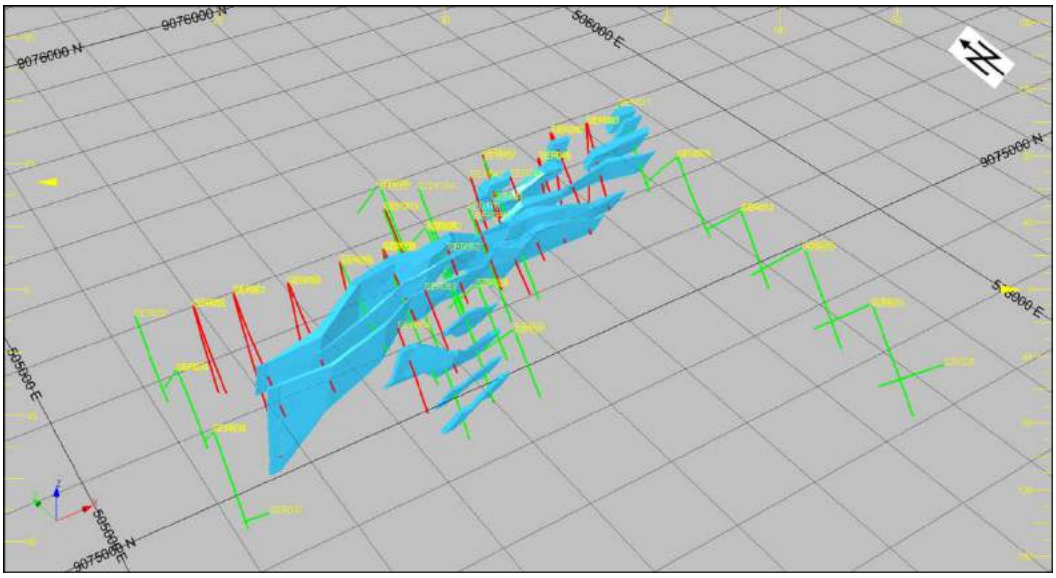
- Gap: GPR158 to GPR182
- Konokono: SER038 to SER061 (includes diamond drill tails on SER)
- Porcupine Main: GPD136 to GPD141.

Figure 14.13 3D view showing additional RC drilling at Gap since SRK (2012) report



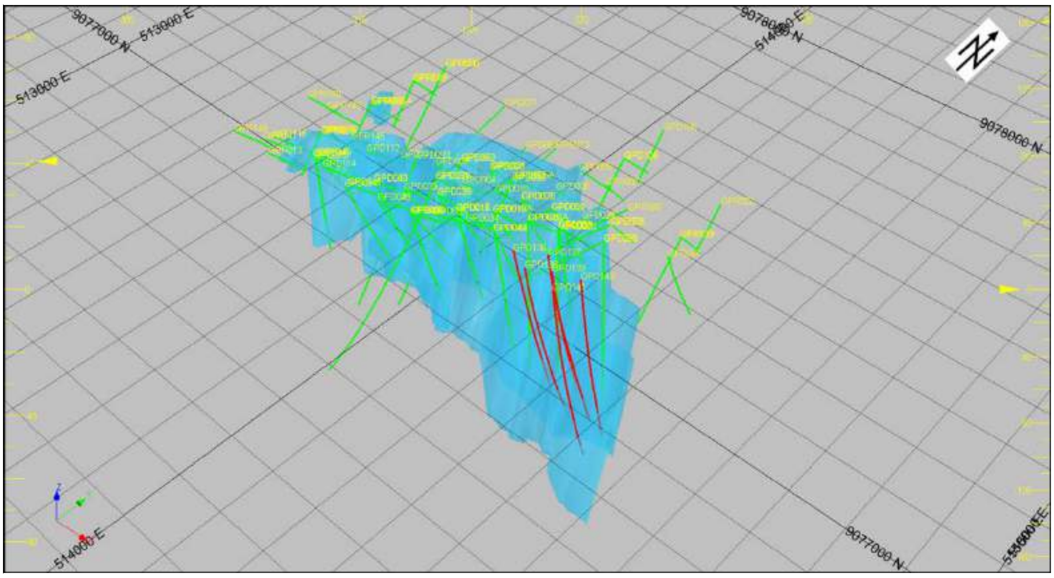
Green = Existing drilling; Red = New drilling

Figure 14.14 3D view showing additional RC drilling at Konokono since SRK (2012) estimate



Green = Existing drilling; Red = New drilling

Figure 14.15 3D view showing additional DD drilling at Porcupine since CCIC (2014) estimate



Green = Existing drilling; Red = New drilling

The purpose of the RC drillholes at Gap and Konokono was to confirm the extensions along strike, whereas the purpose of the DD drillholes at Porcupine was to confirm the interpretation of the high grade mineralisation plunging between 60^{o} and 70^{o} towards the southeast.

14.3.3 Geological interpretation and modelling

Mineralisation interpretation

When considering boundaries for the estimation volume, the following are defined:

- The boundaries of mineralisation, normally by grade or geology, often both
- Estimation domains (volumes) to achieve stationarity for estimation (i.e. that a single statistically consistent population can be estimated within a domain).

Ultimately, an estimation domain has defined margins that are represented by wireframes in the 3D model. These constrain the block model.

Domains are critical for controlling estimation. Clear domaining almost always leads to better variography and estimation. Poor domaining results in obscured continuity in the variograms and incompatible variogram models for estimation.

The use of a nominal grade cut-off for defining areas of mineralisation is fairly common practice but should be approached with caution. If there is a geological or statistical reason for the grade change, then using grade as a guide for domain definition is acceptable. The use of economic cut-offs for domain definition is not recommended.

The low grade, mineralised domain is based on a combined lithological and grade boundary, using a 0.3 g/t Au cut-off as guideline. The selected cut-off was based on the inflection point seen in the log probability plots which indicates a change in statistical population (Figure 14.16) and is denoted by a red vertical line. Note there is commonly overlap between two statistical populations and the inflection point grade cannot be treated as an exact cut-off. A similar approach was used by both SRK (2012) and CCIC (2014).

Where geologically and statistically appropriate, a high-grade domain was delineated within the low grade mineralised domain, based on a combined lithological (veining) and grade boundary, using a 2.5 g/t Au cut-off as guideline (Figure 14.17) and shown as a red vertical line. CCIC (2014) used a similar approach, with the exception of using a 3.0 g/t Au cut-off as guideline.

Both low-grade and high-grade domains were applied in the estimations of the Kenge Main, Mbenge and Porcupine Main deposits. A single domain was applied for the estimation of the Snakebite, Gap and Konokono deposits; whilst there are sections (veins) of higher grade in adjacent drillholes, there is currently not enough confidence in their geological continuity to define separate domains within these deposits.

Figure 14.16 Log probability plot – selected modelling low-grade cut-off at 0.3 g/t Au

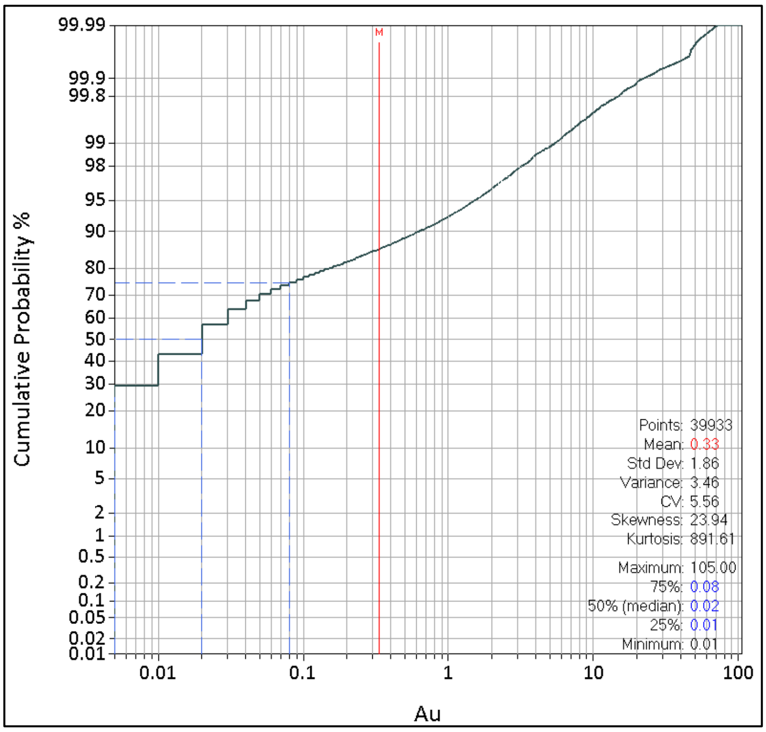
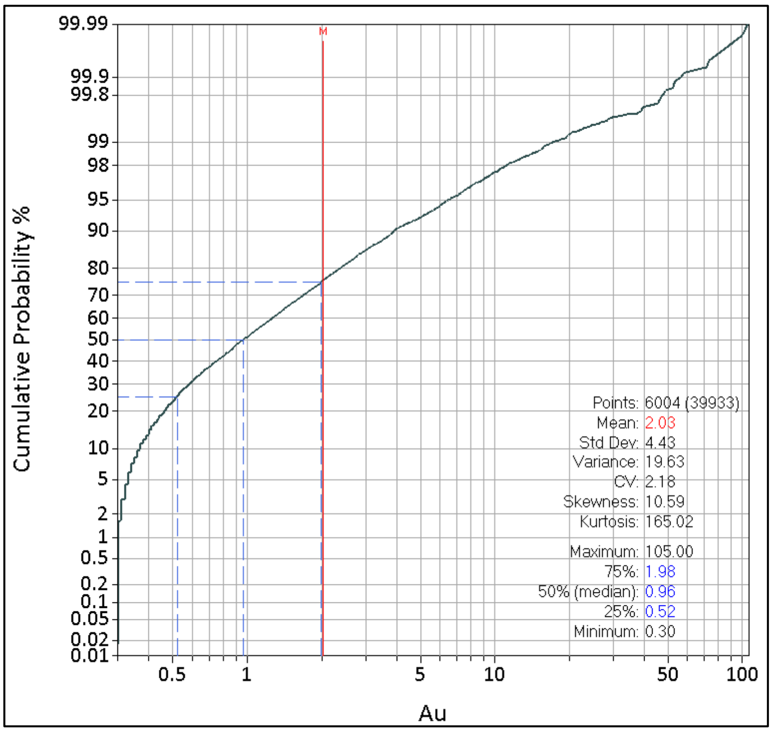


Figure 14.17 Log probability plot – selected modelling high-grade vein cut-off at 2.5 g/t Au



To use the geological logging to aid in the definition of the mineralisation boundaries, the numerous lithology codes recorded in the database were grouped together and simplified, also taking gold values into account. The simplified lithology codes are summarised in Table 14.5.

The mineralised domain is predominantly composed of foliated or sheared granites and quartz veining, with the highest grades mainly associated with quartz veining.

Table 14.5 Summary of simplified lithological codes

Logging code	Description
GRT	Granite
DRT	Diorite
DLT	Dolerite
VEIN	Vein
FLT	Fault
FOLZ	Foliated Zone
GRD	Granodiorite
SHRZ	Shear Zone

Kenge Main

The mineralisation for the Kenge Main deposit, shown in Figure 14.18 to Figure 14.20, strikes at 120º and dips 60º to 70º towards the southwest. The high-grade mineralisation plunges west with a rake of ~25°. The low-grade domain is shown in blue and the high-grade domain in red. The approximate true thickness of the mineralised low-grade domain varies from about 0.5 m to 20 m, and for the high-grade domain from about 0.5 m to 6 m.

Figure 14.18 Section view of the Kenge Main deposit – drillhole simplified lithology data and mineralisation

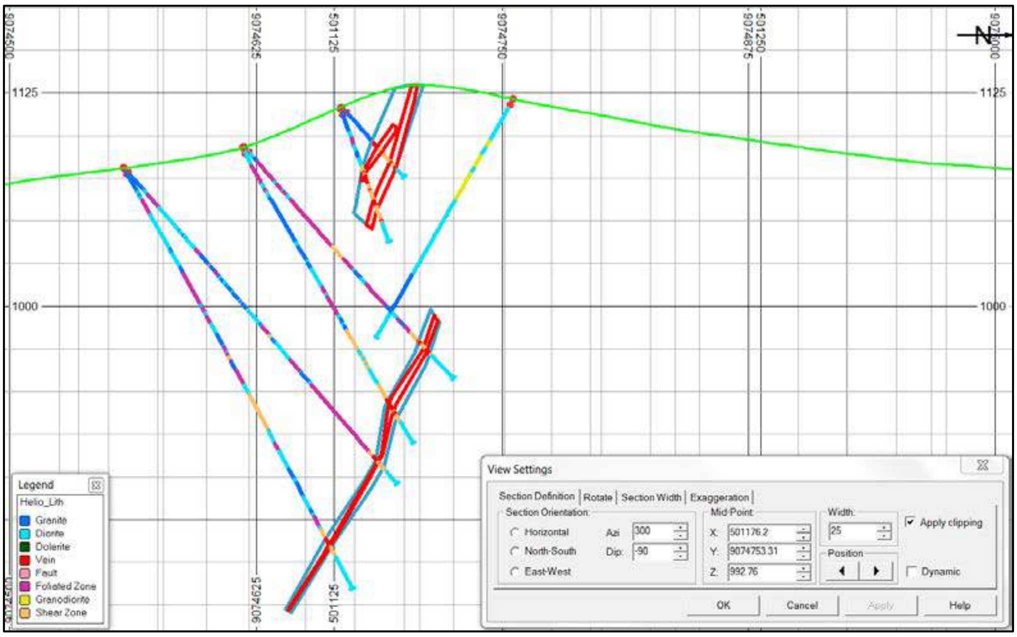


Figure 14.19 Section view of the Kenge Main deposit – drillhole assay data and mineralisation

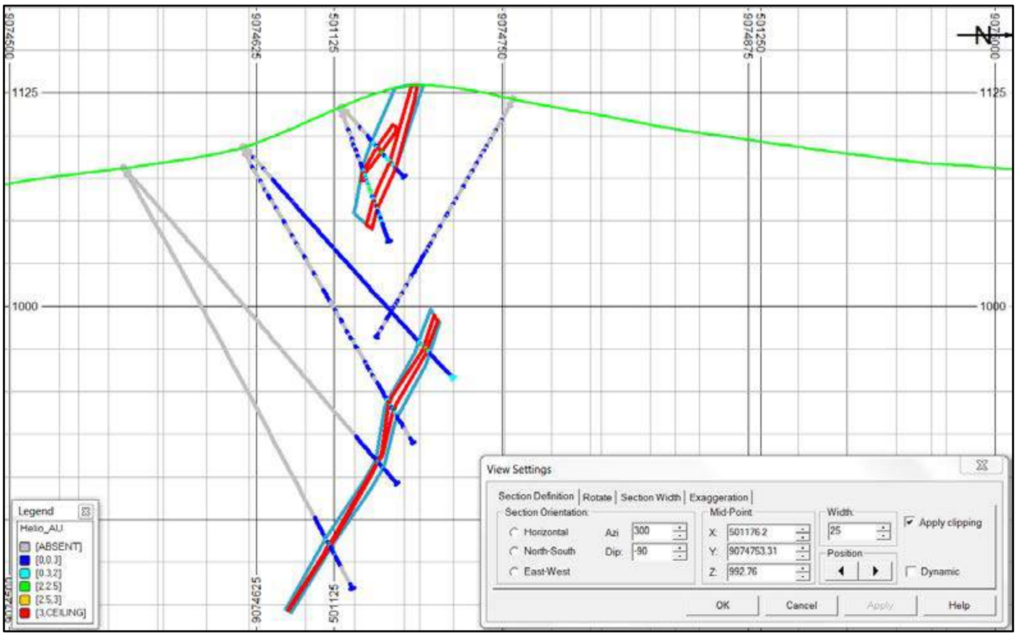
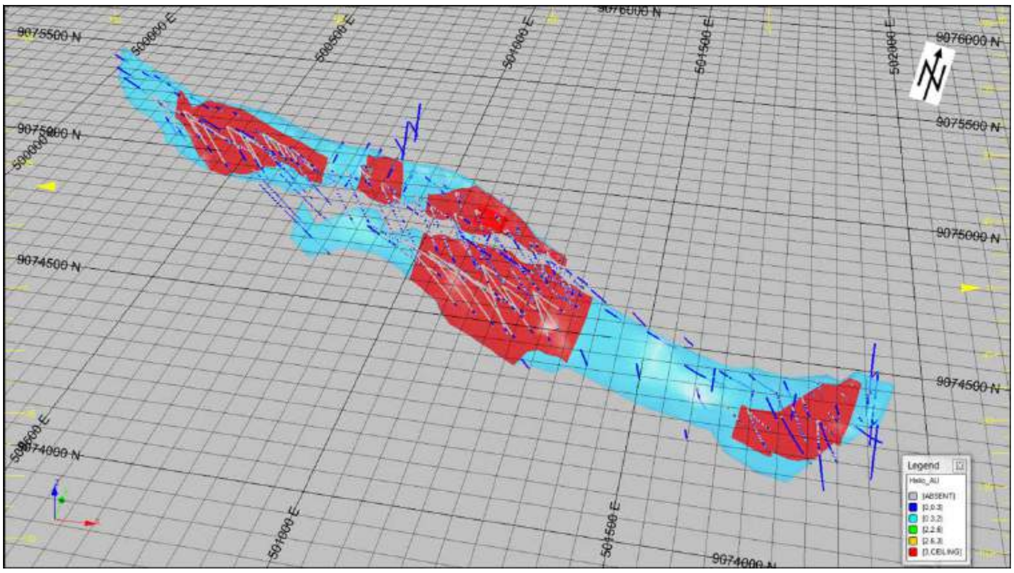


Figure 14.20 3D view – Kenge Main mineralisation envelopes and drillhole assay data



Mbenge

The mineralisation for the Mbenge deposit, shown in Figure 14.21 to Figure 14.23, strikes 090º to 100º and dips at 60º to 70º to the south. The high-grade mineralisation plunges south with a rake of 20°. The low-grade domain is shown in blue and the high-grade domain in red. The approximate true thickness of the mineralised low-grade domain averages about 30 m, and for the high-grade domain averages about 6 m.

Figure 14.21 Section view of the Mbenge deposit – drillhole simplified lithology data and mineralisation

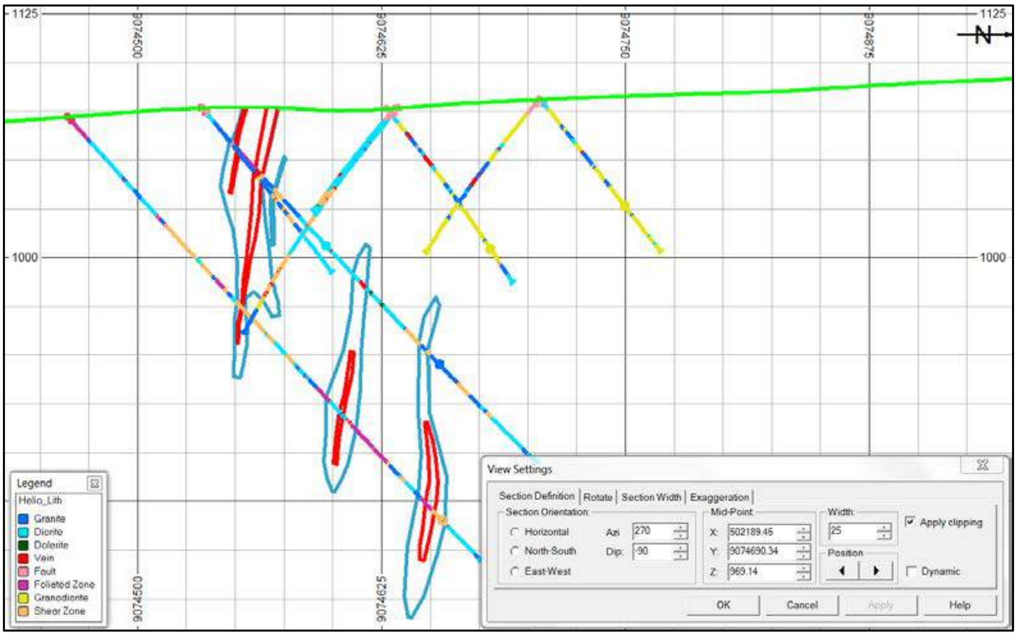


Figure 14.22 Section view of the Mbenge deposit – drillhole assay data and mineralisation

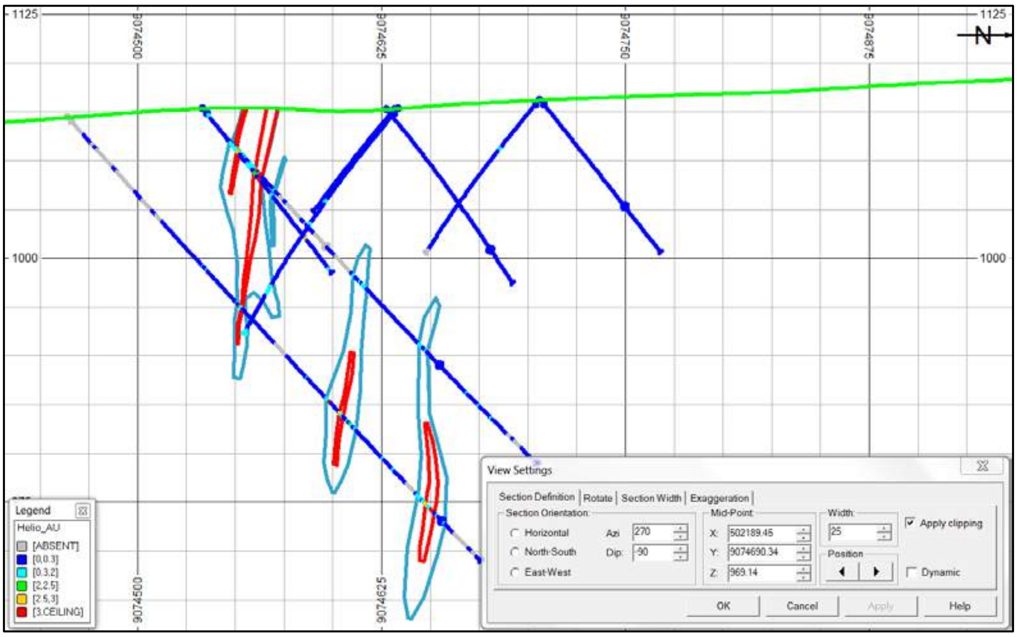
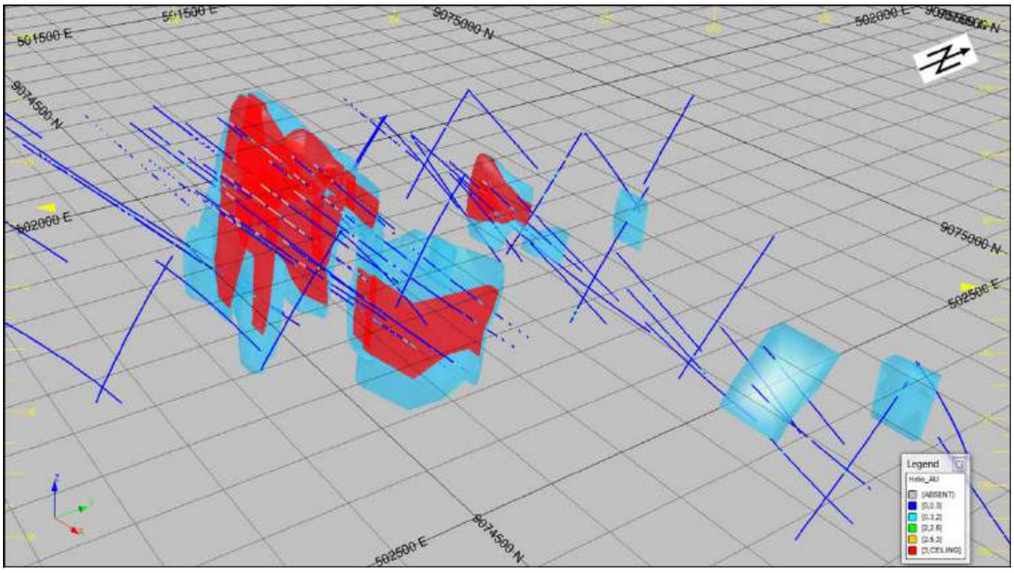


Figure 14.23 3D view – Mbenge mineralisation envelopes and drillhole assay data



Snakebite

The mineralisation for the Snakebite deposit, shown in Figure 14.24 to Figure 14.26, occurs south of the Mbenge deposit and strikes 80º, dipping 65º towards the north. No high-grade domain was modelled since there is not enough confidence in the geological continuity to define such a domain within this deposit. The mineralisation is shown in blue. The approximate true thickness of the mineralised domain averages about 8 m.

Figure 14.24 Section view of the Snakebite deposit – drillhole simplified lithology data and mineralisation

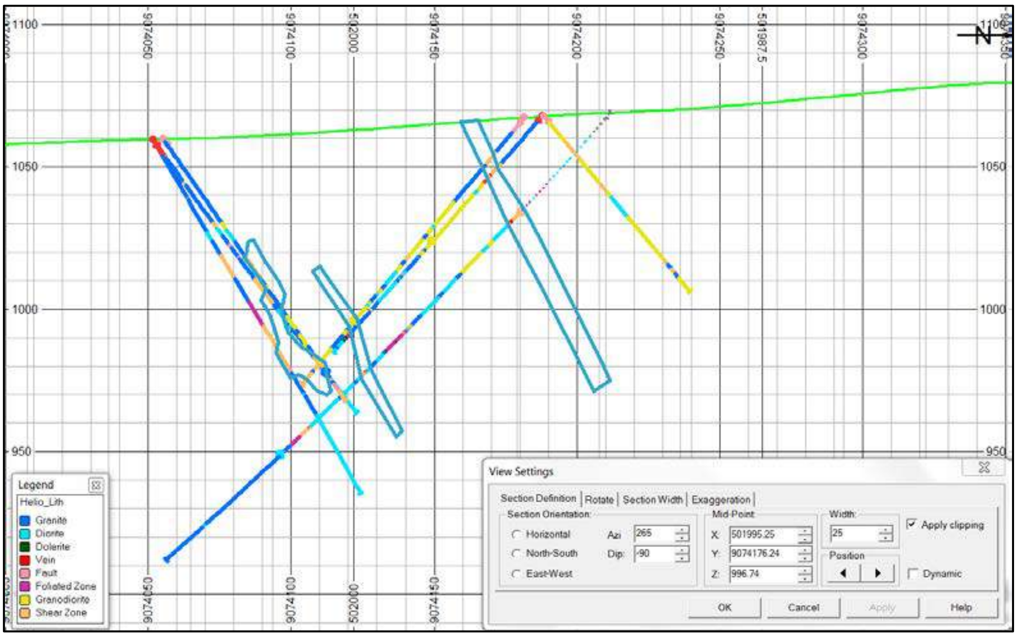


Figure 14.25 Section view of the Snakebite deposit – drillhole assay data and mineralisation

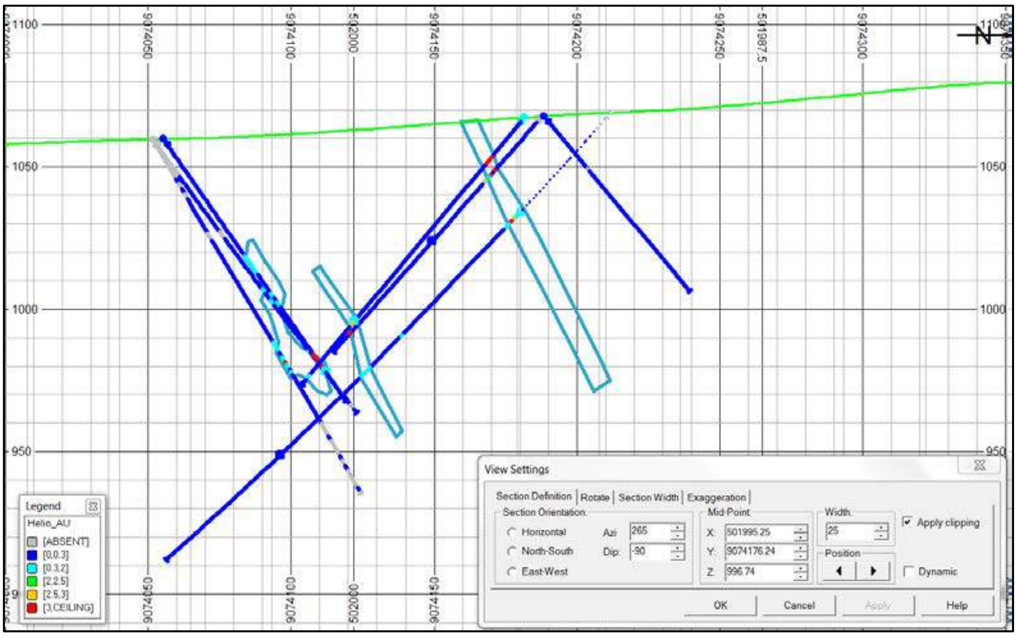
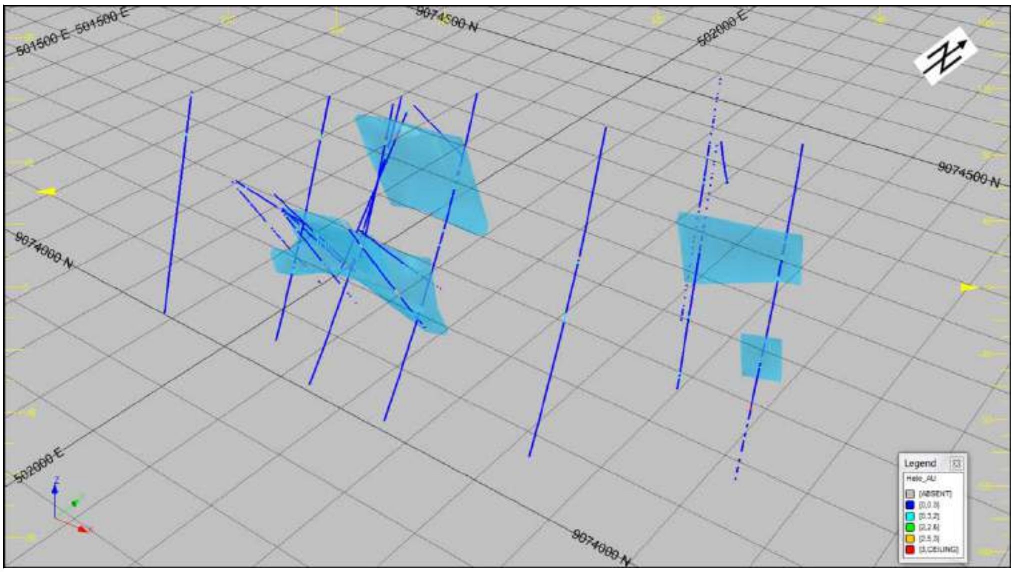


Figure 14.26 3D view – Snakebite mineralisation envelopes and drillhole assay data



Porcupine Main

The mineralisation for the Porcupine Main deposit, shown in Figure 14.27 to Figure 14.29, strikes 070º, dips at 60º towards the south and plunges with a rake of ~65° towards the southeast. The low-grade domain is shown in blue and the high-grade domain in red. The approximate true thickness of the mineralised low-grade domain averages about 40 m. The high-grade domain consists of subsets of veins, ranging in thickness from about 0.5 m to about 15 m.

Figure 14.27 Section view of the Porcupine Main deposit – drillhole simplified lithology data and mineralisation

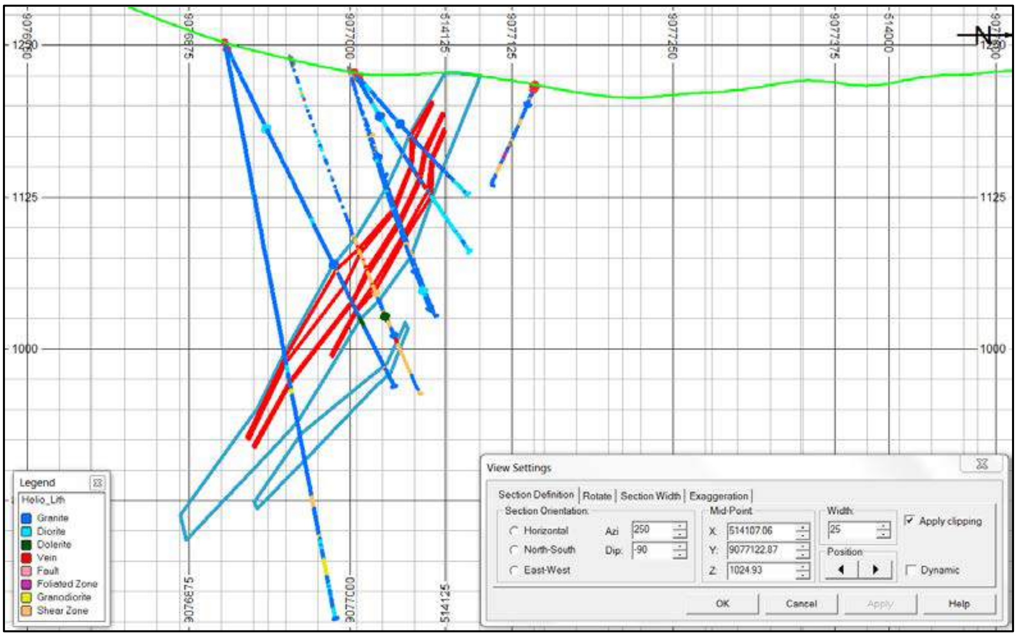


Figure 14.28 Section view of the Porcupine Main deposit – drillhole assay data and mineralisation

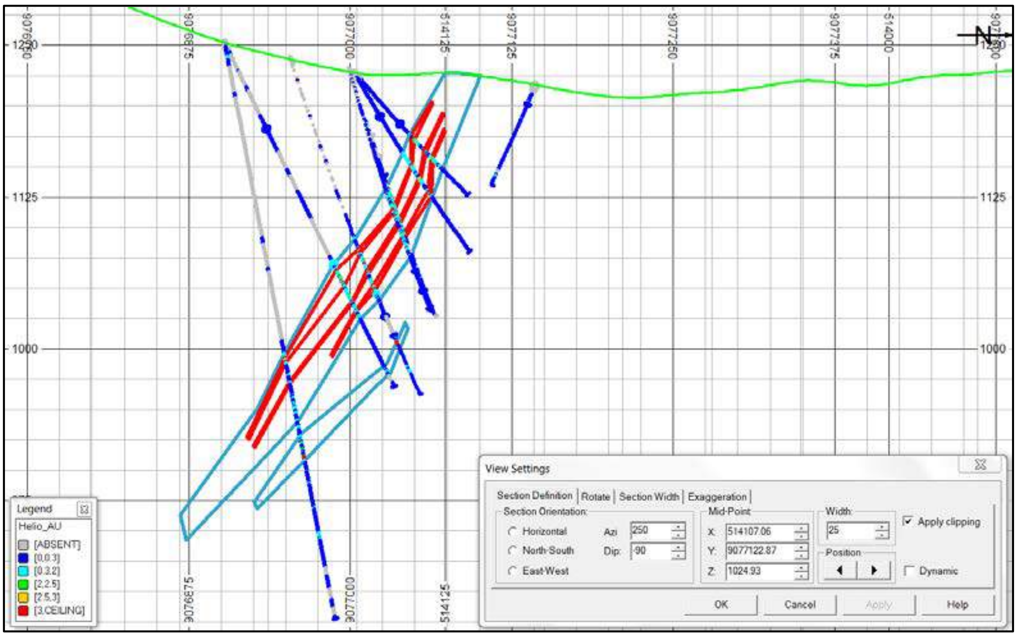
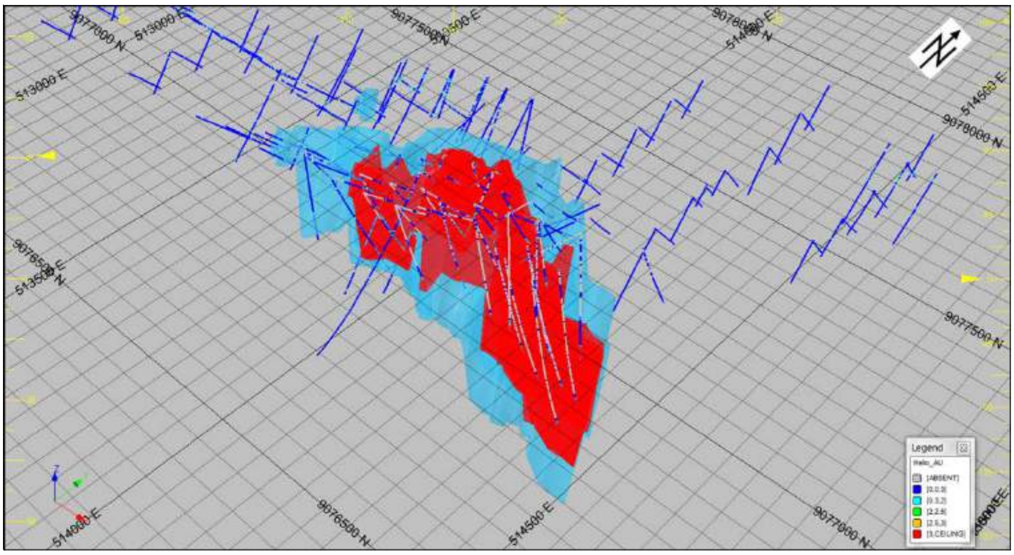


Figure 14.29 3D view – Porcupine Main mineralisation envelopes and drillhole assay data



Gap

The mineralisation for the Gap deposit, shown in Figure 14.30 to Figure 14.32, occurs to the northeast of the Porcupine Main deposit and strikes 80º, dipping almost vertically. No high-grade domain was modelled since there is not enough confidence in the geological continuity to define such a domain within this deposit. The mineralisation is shown in blue. The approximate true thickness of the mineralised domain ranges from about 2 m to about 15 m.

Figure 14.30 Section view of the Gap deposit – drillhole simplified lithology data and mineralisation

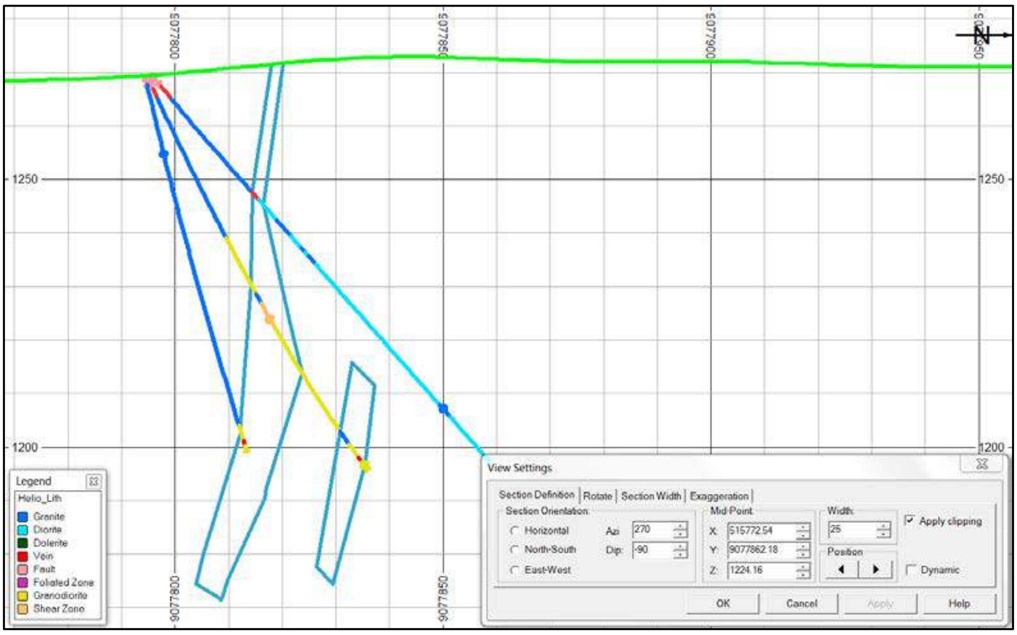


Figure 14.31 Section view of the Gap deposit – drillhole assay data and mineralisation

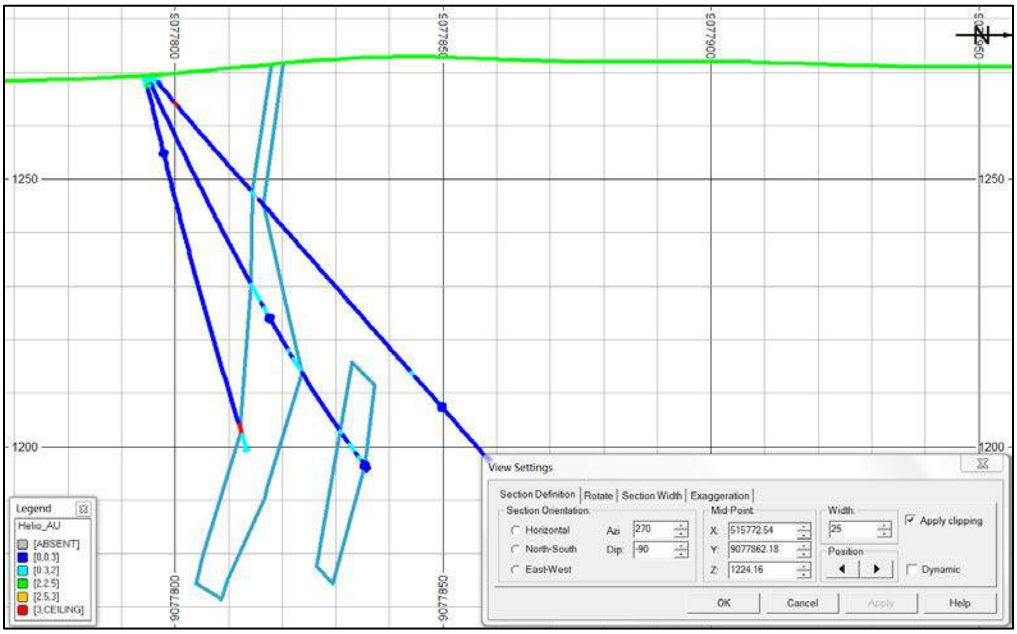
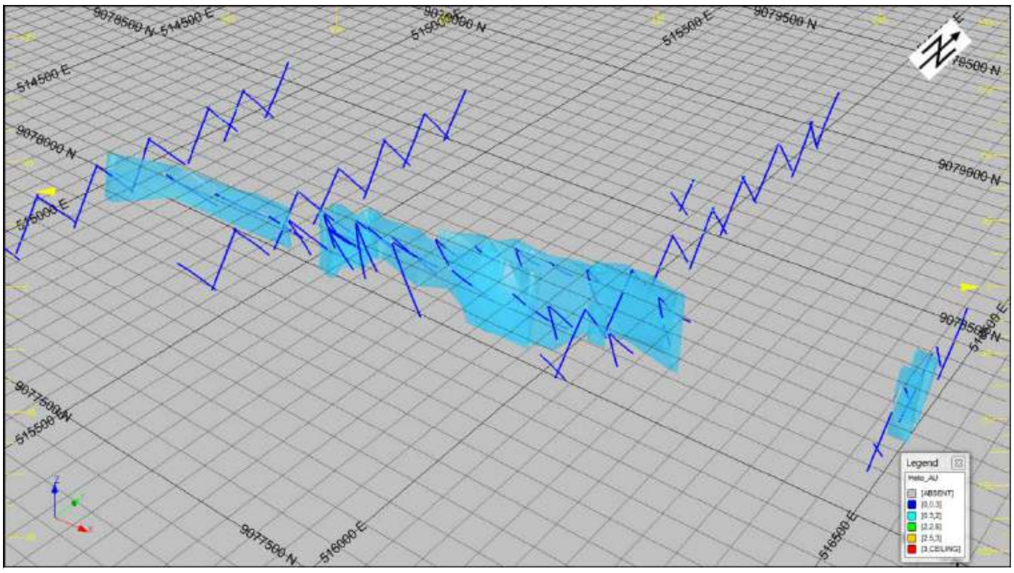


Figure 14.32 3D view – Gap mineralisation envelopes and drillhole assay data



Konokono

The mineralisation for the Konokono deposit, shown in Figure 14.33 to Figure 14.35, strikes almost east-west and dips towards the north at around 60º. No high-grade domain was modelled since there is not enough confidence in the geological continuity to define such a domain within this deposit. The mineralisation is shown in blue. The approximate true thickness of the mineralised domain ranges from about 1 m to about 20 m.

Figure 14.33 Section view of the Konokono deposit – drillhole simplified lithology data and mineralisation

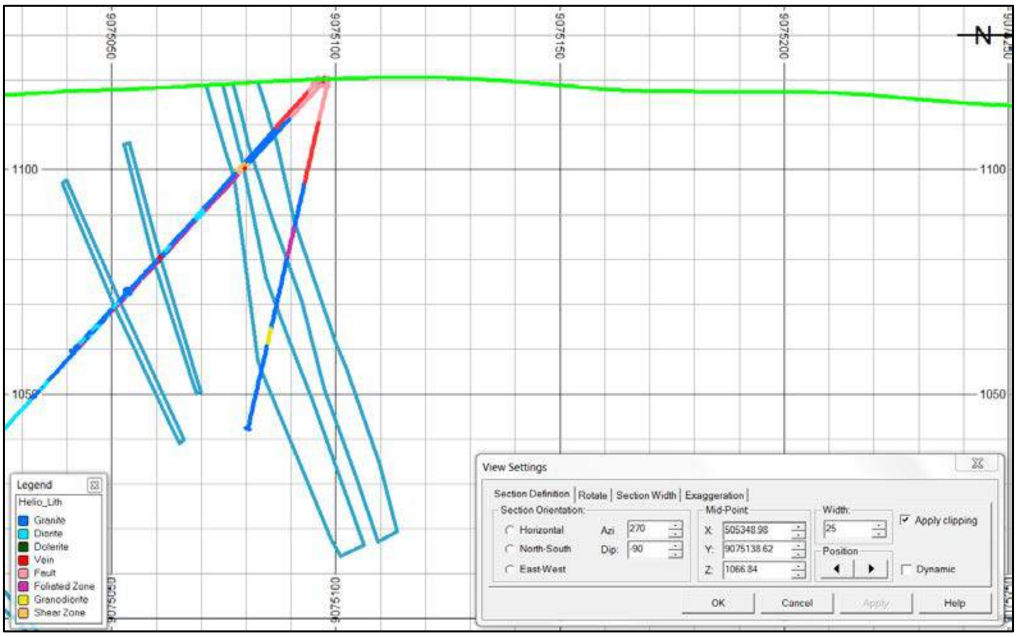


Figure 14.34 Section view of the Konokono deposit – drillhole assay data and mineralisation

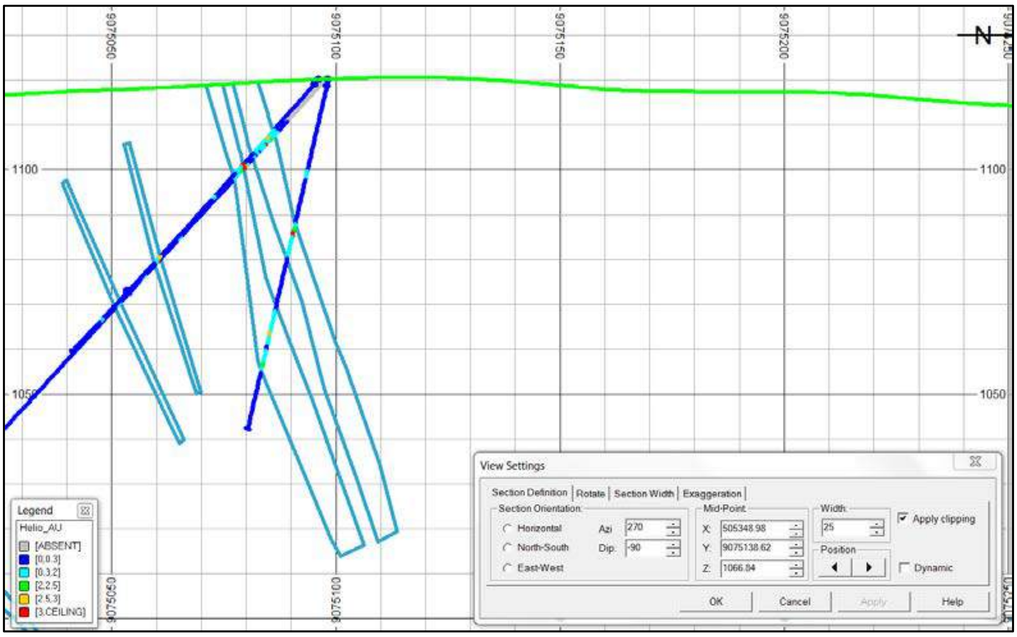
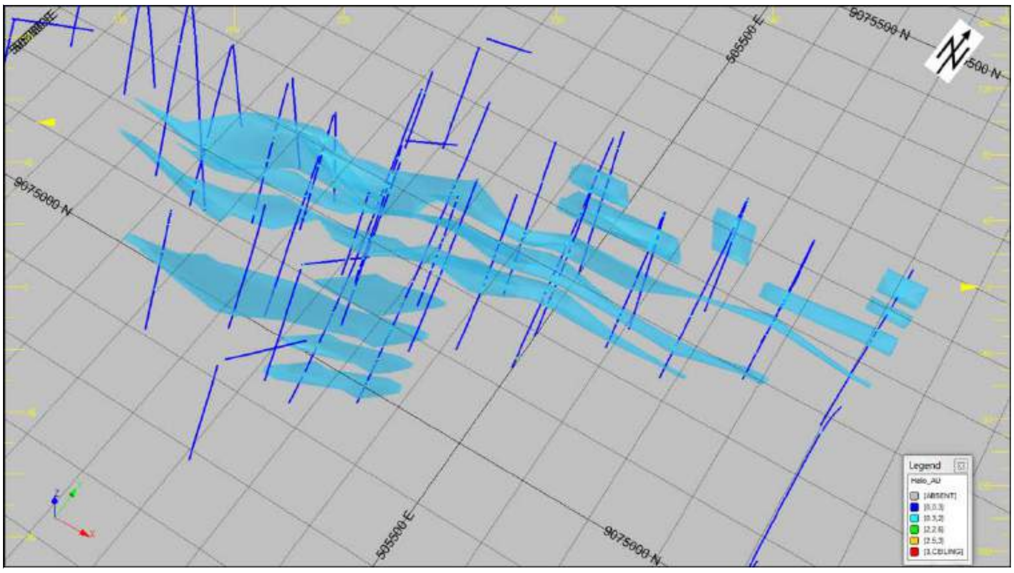


Figure 14.35 3D view – Konokono mineralisation envelopes and drillhole assay data



The shape and orientation of the mineralised envelopes is an accurate reflection of the mineralisation trends shown in the drillhole data. The mineralised zone values are stored in a field labelled MIN in the model. Blocks that fall within the mineralised envelopes have a MIN value of 1 (mineralisation). Blocks outside the mineralised envelopes have an MIN value of 0 (waste).

14.3.4 Exploratory data analysis

Before undertaking the estimate, the data was first analysed in order to understand how the estimate should be accomplished. Exploration samples were assessed statistically, and variograms were calculated to determine spatial continuity for Au.

Mineralisation wireframes were used to select drillhole data and code the field KZONE. A summary and description of these KZONE codes, used to distinguish the data during geostatistical analysis and estimation, are shown in Table 14.6 below.

Table 14.6 Summary of KZONE codes

KZONE	Description	Deposit
0	Waste	All
100	Low grade mineralisation	Kenge Main
200	High grade mineralisation	Kenge Main
300	Low grade mineralisation	Mbenge
400	High grade mineralisation	Mbenge
500	All mineralisation	Snakebite
600	All mineralisation	Gap
700	All mineralisation	Konokono
800	Low grade mineralisation	Porcupine Main
900	High grade mineralisation	Porcupine Main

Boundary analysis

Boundaries are either classified as ‘hard’ or ‘soft’. Where hard boundaries are abrupt, they generally represent a sharp geological contact such as the edge of a quartz vein on its host rocks and where the boundary marks the margin of metal grade. A soft boundary is a gradational one, and represents a gradual reduction in grade, for example as one would find in the alteration zone of a copper porphyry system.

It is important to understand the nature of the boundaries between domains. If domain boundaries are gradational, then data from the adjacent domains should be used during estimation (soft boundary). If there are abrupt boundaries then estimation should be restricted to only use the data within that domain (hard boundary).

A contact analysis was carried out to assess the nature of the domain boundaries by graphing the average grade with increasing distance from the domain boundary. The average grades can be calculated by incrementally expanding the wireframes or manually by coding the samples based on distance from the domain contact, as was done in this instance. The boundaries between the mineralisation and waste, as well as the boundaries between the low and high grade mineralisation, were analysed. The results for the updated SMP deposits are shown in Figure 14.36 to Figure 14.44. Based on the results of the boundary analysis, the mineralised boundaries were all deemed to be hard.

Figure 14.36 Mineralised boundary test graph for the Kenge Main deposit – mineralisation versus waste

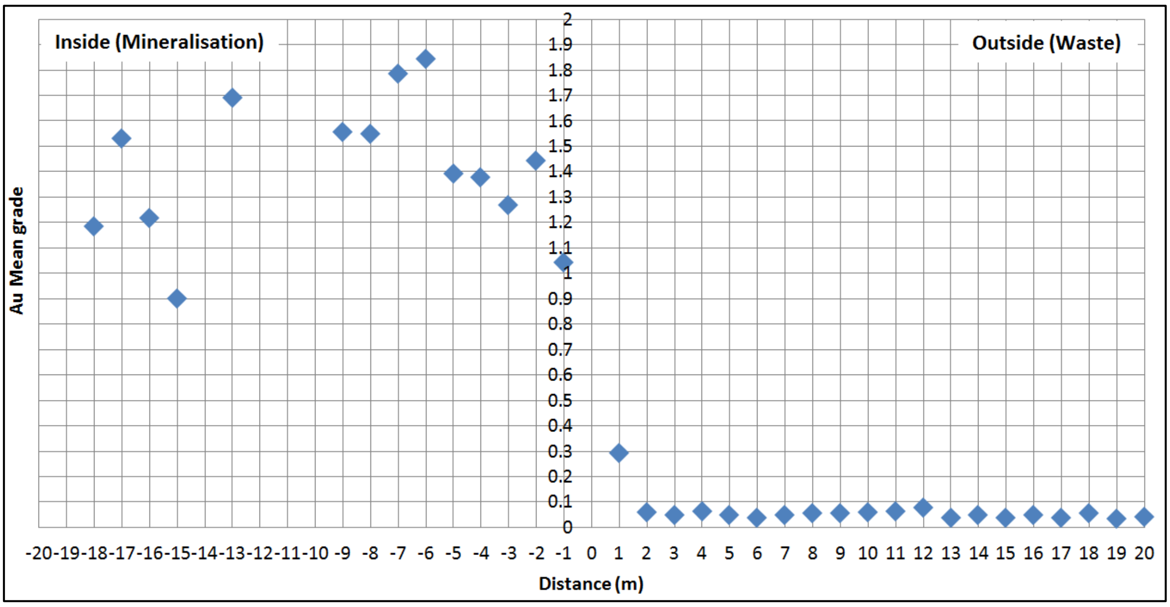


Figure 14.37 Mineralised boundary test graph for the Kenge Main deposit – low grade mineralisation versus high grade mineralisation

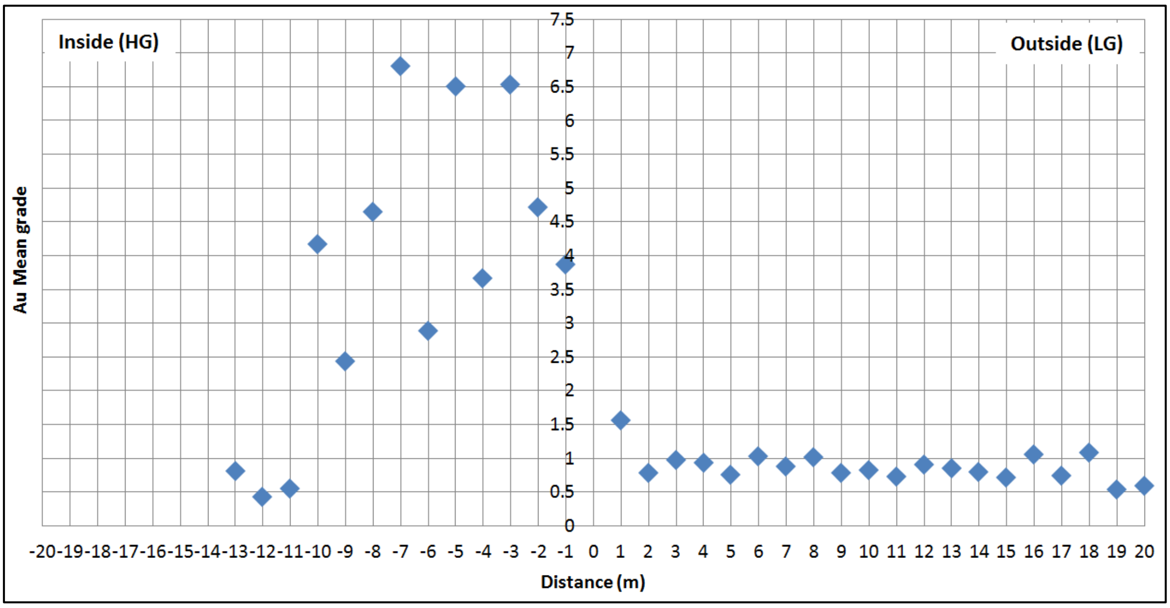


Figure 14.38 Mineralised boundary test graph for the Mbenge deposit – mineralisation versus waste

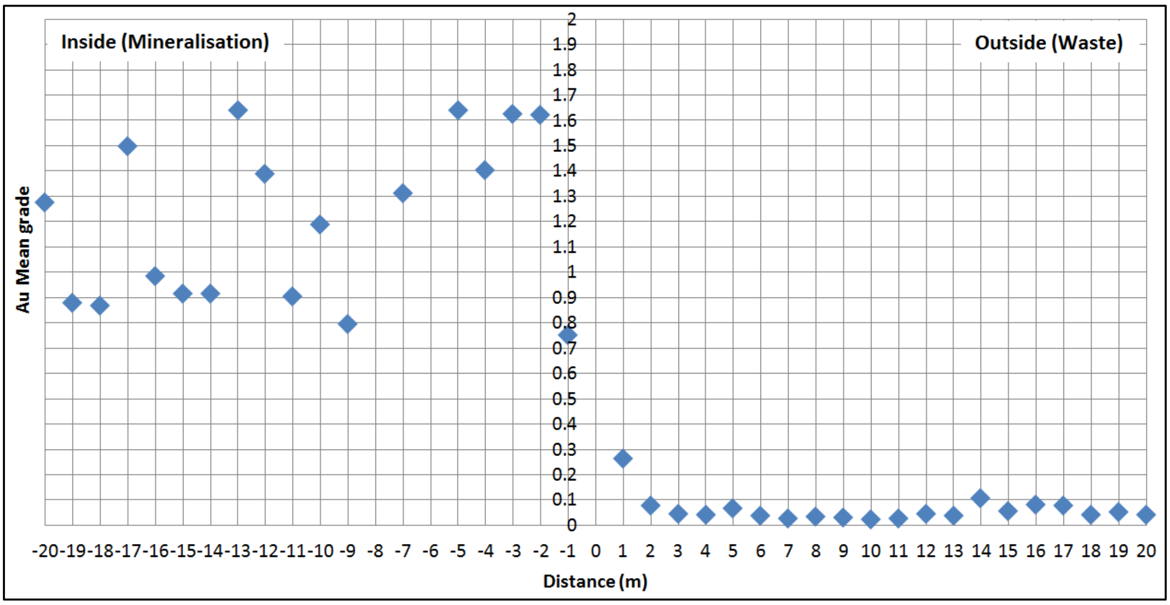


Figure 14.39 Mineralised boundary test graph for the Mbenge deposit – low grade mineralisation versus high grade mineralisation

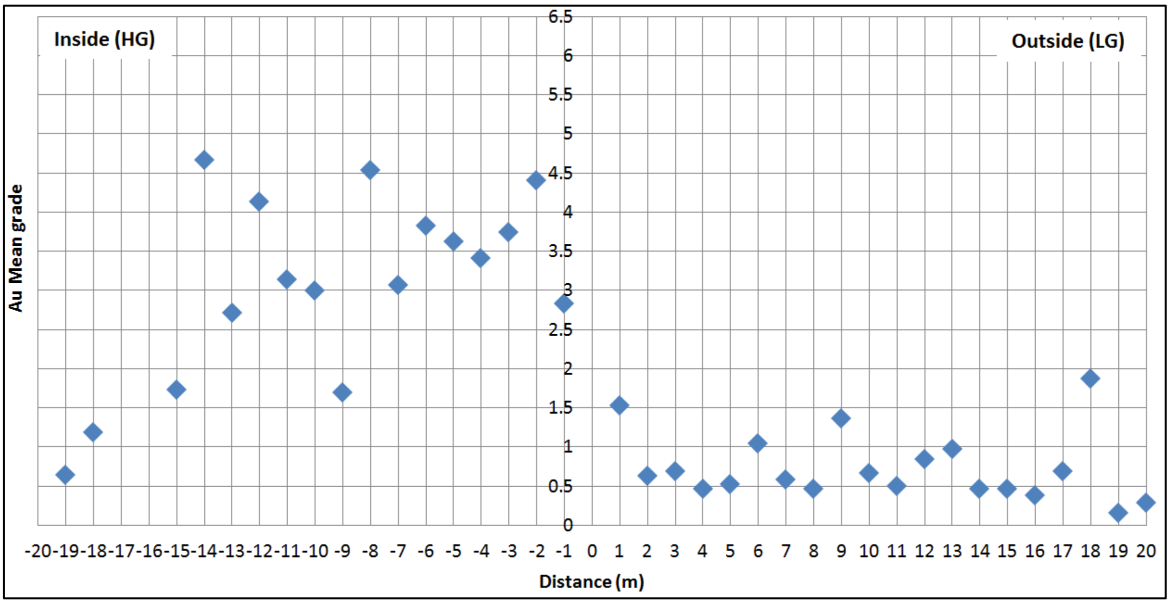


Figure 14.40 Mineralised boundary test graph for the Snakebite deposit – mineralisation versus waste

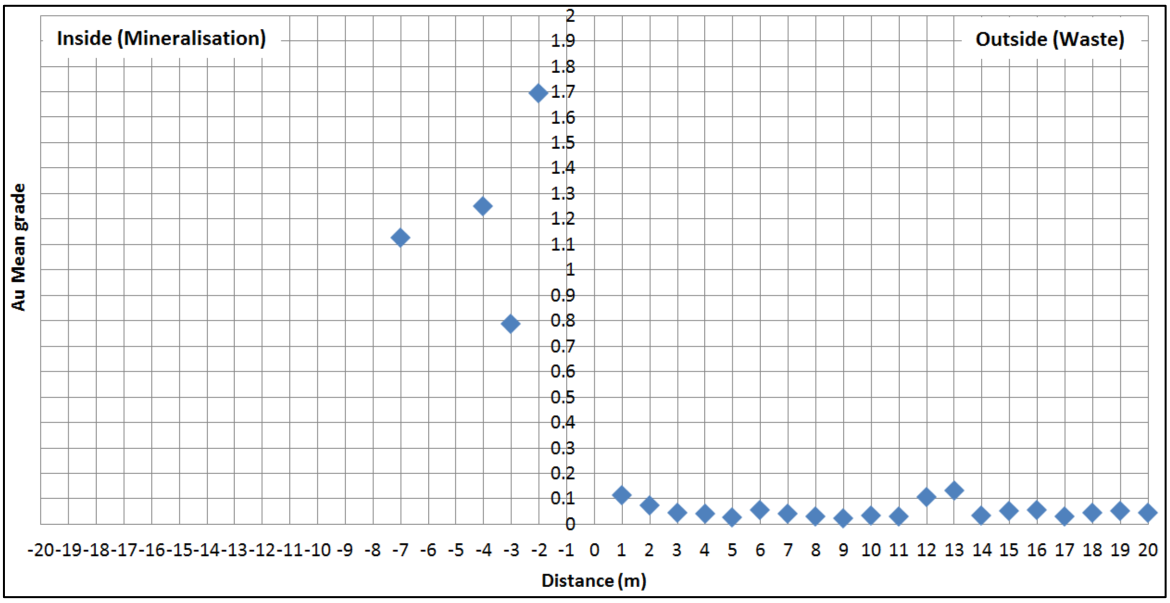


Figure 14.41 Mineralised boundary test graph for the Porcupine Main deposit – mineralisation versus waste

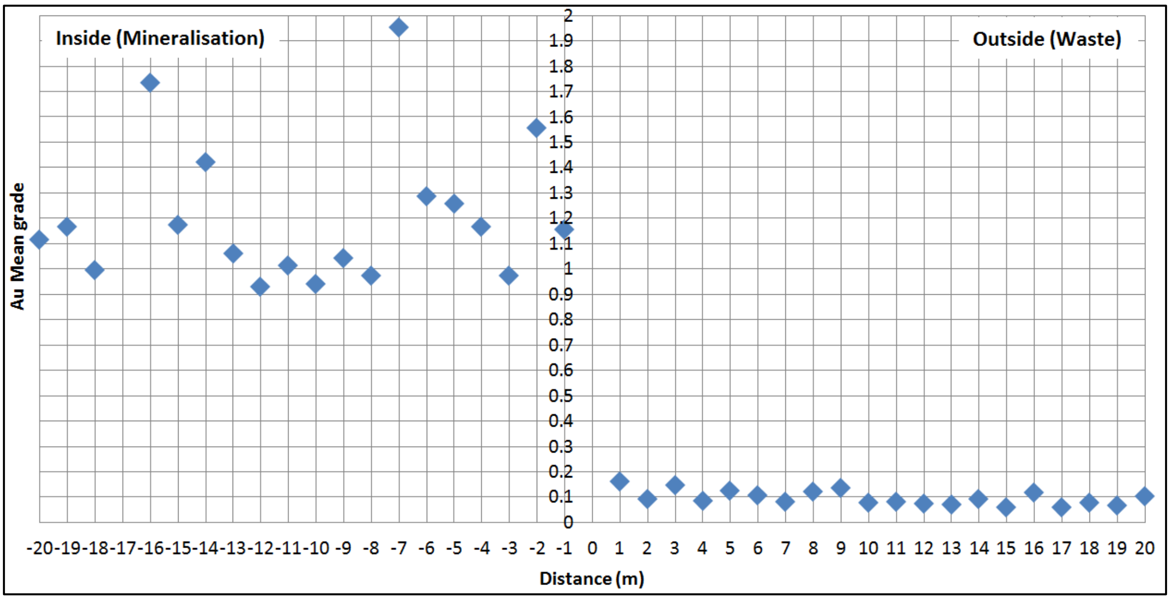


Figure 14.42 Mineralised boundary test graph for the Porcupine Main deposit – low grade mineralisation versus high grade mineralisation

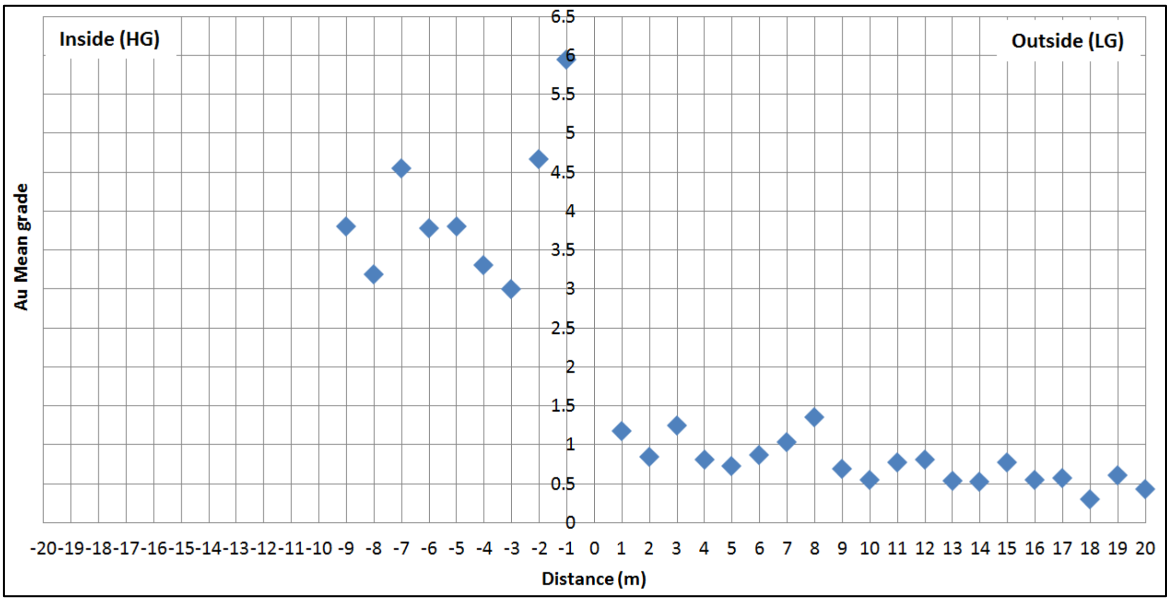


Figure 14.43 Mineralised boundary test graph for the Gap deposit – mineralisation versus waste

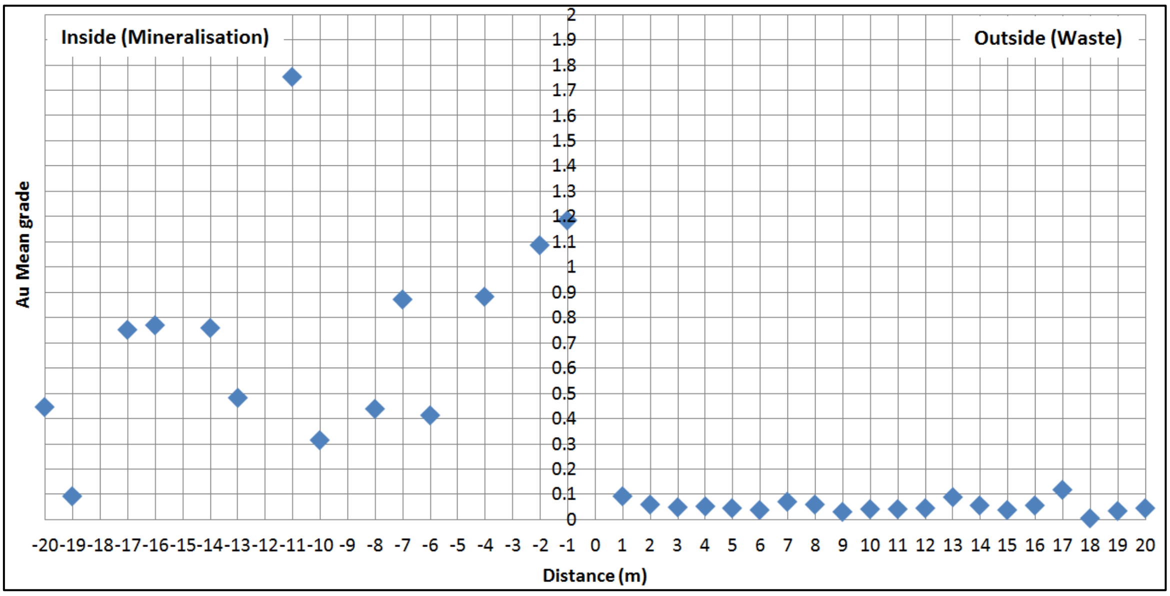
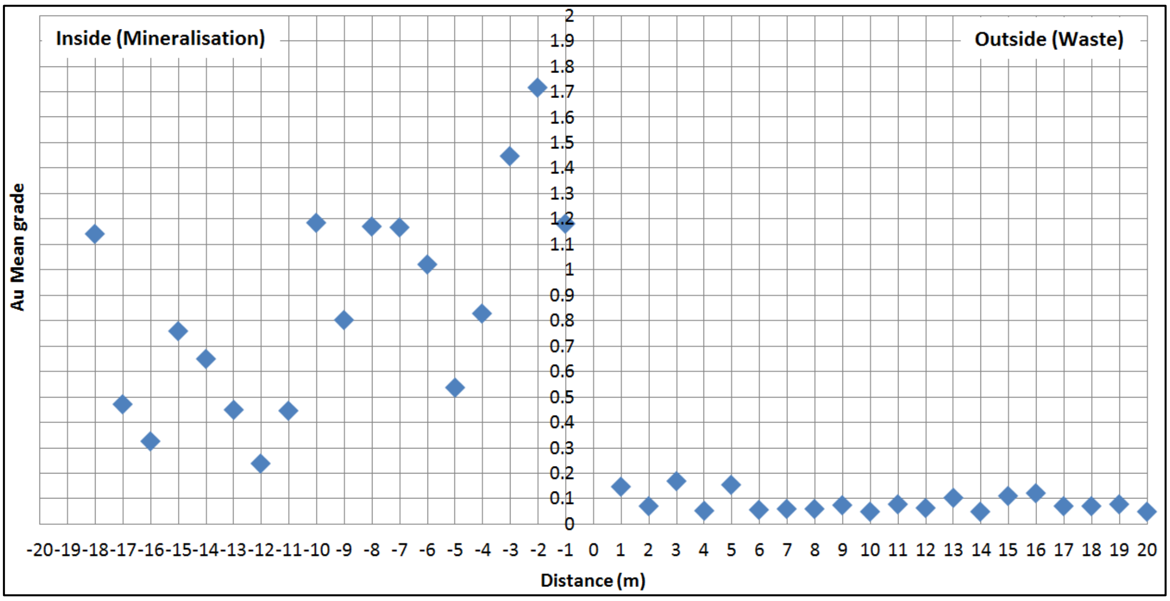


Figure 14.44 Mineralised boundary test graph for the Konokono deposit – mineralisation versus waste



Twinning

Diamond drillholes are the dominant source of composites for almost all the deposits. A summary of the ratio of RC to diamond drillholes within the mineralisation zones, as defined by the updated wireframes for the SMP deposits, is summarised in Table 14.7 below.

Table 14.7 Ratio of RC and DD drillholes within the mineralisation envelopes

Deposit	Total RC	Total DD	Ratio RC:DD
Kenge Main	23	133	1:5.8
Mbenge	6	25	1:4.2
Snakebite	2	11	1:5.5
Porcupine Main	9	66	1:7.3
Gap	23	9	1:0.4
Konokono	23	5	1:0.2

A summary of the number of twinned drillhole pairs to total drillholes per deposit, within the modelled mineralised zones, is shown in Table 14.8. The statistics of the diamond and RC drillhole pairs are summarised in Table 14.9.

Table 14.8 Summary of total twinned diamond and RC drillholes per total deposit drillholes

Deposit	Total twins	Total drillholes
Kenge Main	3	156
Mbenge	2	31
Snakebite	2	13
Porcupine Main	3	75
Gap	2	32
Konokono	4	28

Table 14.9 Summary of twinned diamond and RC drillholes

Deposit	RC BHID	DD BHID	Distance between inter-section centres (m)	Length of RC inter-section (m)	Weighted mean grade of RC inter-section (m)	Length of DD inter-section (m)	Weighted mean grade of DD inter-section (m)
Kenge Main	SZR010	SZD019	8.27	16.00	1.63	10.50	3.27
	SZR011	SZD013	2.65	18.00	1.61	19.66	1.90
	SZR111	SZD071	3.60	24.00	2.10	20.36	1.38
Total				**58.00**	**1.82**	**50.52**	**1.98**
Mbenge	SZR052	SZD074	1.12	26.00	1.09	23.59	1.69
	SRZ058	SZD176	12.31	12.00	0.32	18.00	0.43
Total				**38.00**	**0.85**	**41.59**	**1.14**
Snakebite	SZR015	SZD188	9.43	22.00	0.35	9.00	0.41
	SRZ016	SZD026	11.49	6.00	3.44	5.18	2.75
Total				**28.00**	**1.01**	**14.18**	**1.26**
Porcupine Main	GPR004	GPD001	1.20	46.00	1.89	43.06	3.90
	GPR146	GPD094	8.93	18.00	1.98	12.00	2.46
	GPR147	GPD115	13.42	4.00	0.62	3.00	3.67
Total				**68.00**	**1.84**	**58.06**	**3.59**
Gap	GPR003	GPD116	5.35	10.00	1.03	7.00	0.59
	GPR164	GPD118	6.34	12.00	0.24	15.00	2.18
	GPR164	GPD118	6.76	5.00	0.56	5.00	0.72
Total				**27.00**	**0.59**	**27.00**	**1.50**
Konokono	SER038	SZD175	1.49	13.00	2.52	14.93	3.67
	SER051	SZD178	14.90	9.00	1.39	2.00	1.28
	SER058	SZD177A	5.79	19.00	0.77	25.00	0.59
	SZR025	SZD172	4.00	18.00	2.21	16.55	1.31
Total				**59.00**	**1.69**	**58.48**	**1.60**

Generally there seems to be a bias in higher grade towards the diamond drillholes. However, the number of twins is insufficient to confidently establish this and therefore, both the RC and diamond composites were retained for use during the estimations.

An example of twinning within each deposit is shown as cross-sections in Figure 14.45 to Figure 14.50. The overall trend of mineralisation and grades between RC and diamond drillholes is preserved, even though there is grade variability between individual samples.

Figure 14.45 Kenge Main deposit – section view comparing Au values between RC and diamond drillholes (SZR011 vs. SZD013)

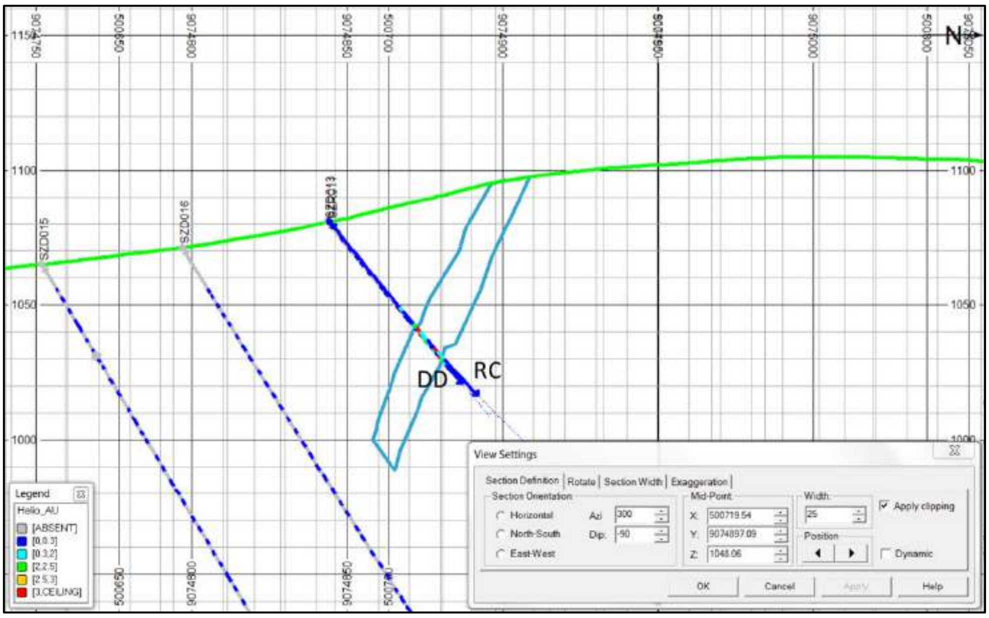


Figure 14.46 Mbenge deposit – section view comparing Au values between RC and diamond drillholes (SZR052 vs. SZD074)

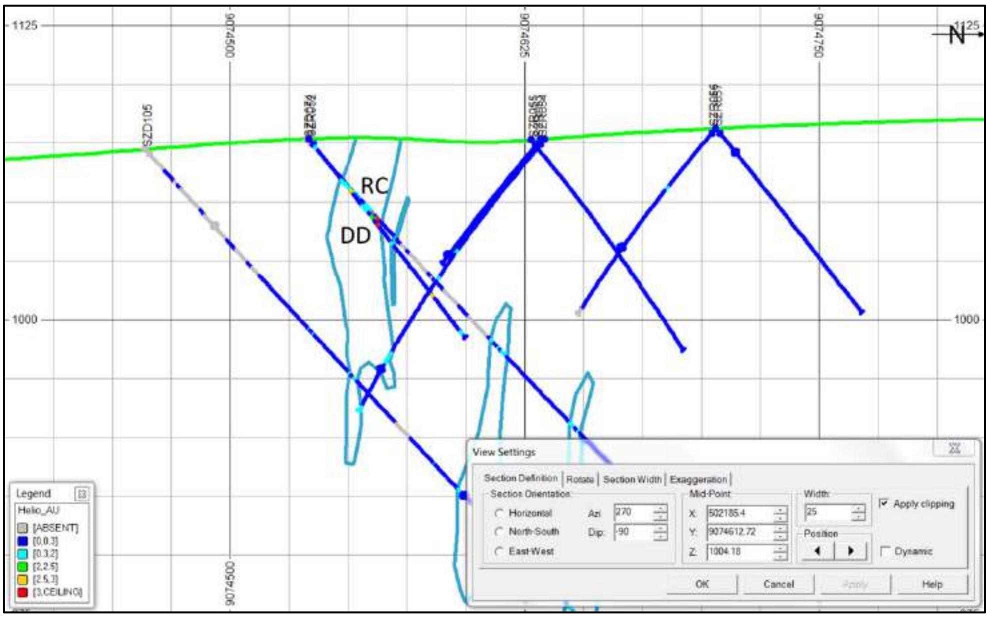


Figure 14.47 Snakebite deposit – Section view comparing Au values between RC and diamond drillholes (SZR015 vs. SZD188 and SZR016 vs. SZD026)

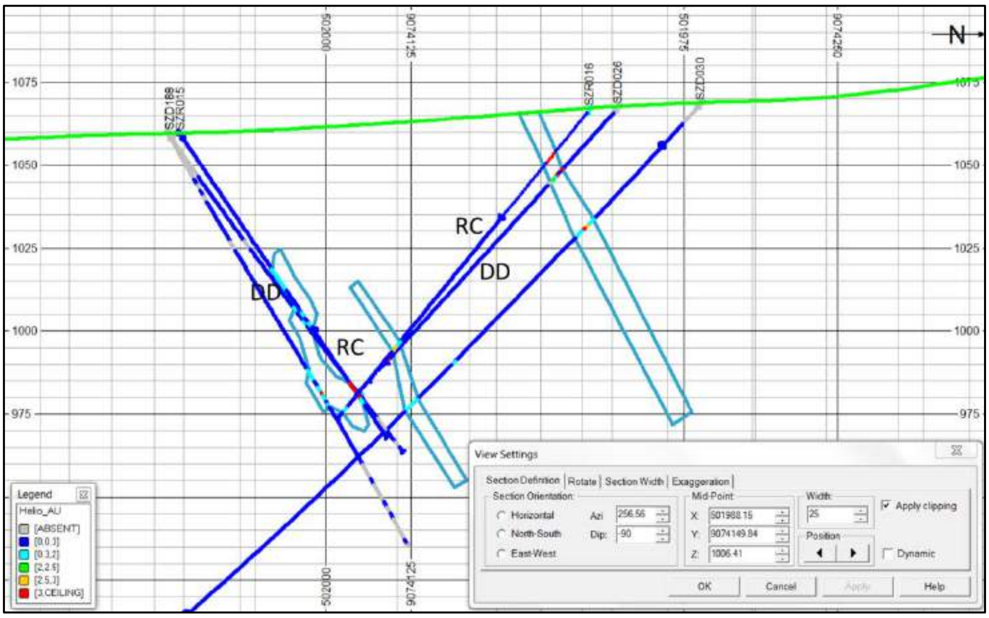


Figure 14.48 Porcupine Main deposit – section view comparing Au values between RC and diamond drillholes (GPR004 vs. GPD001)

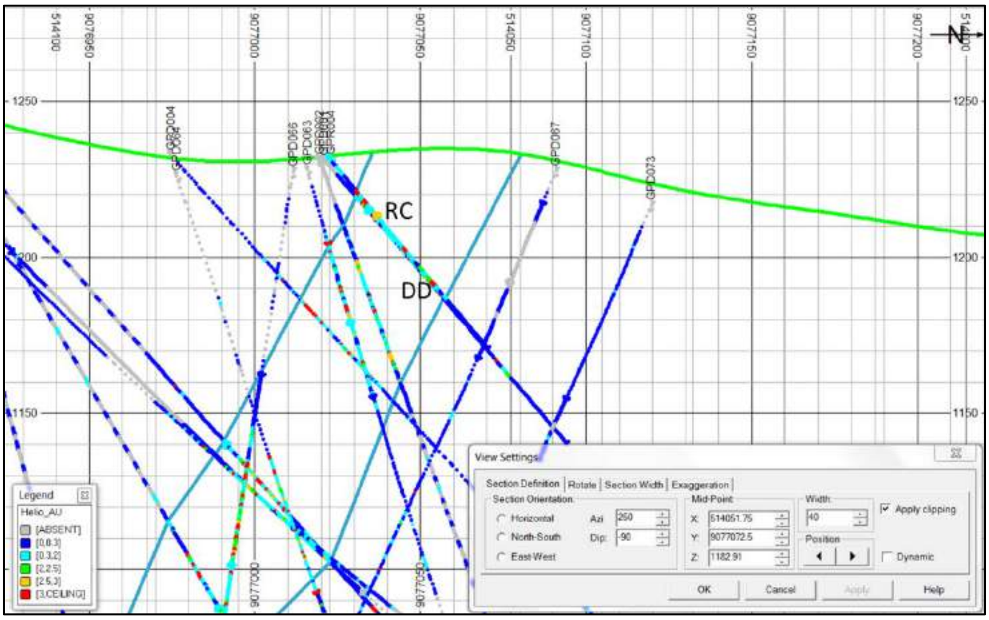


Figure 14.49 Gap deposit – section view comparing Au values between RC and diamond drillholes (GPR164 vs. GPD118)

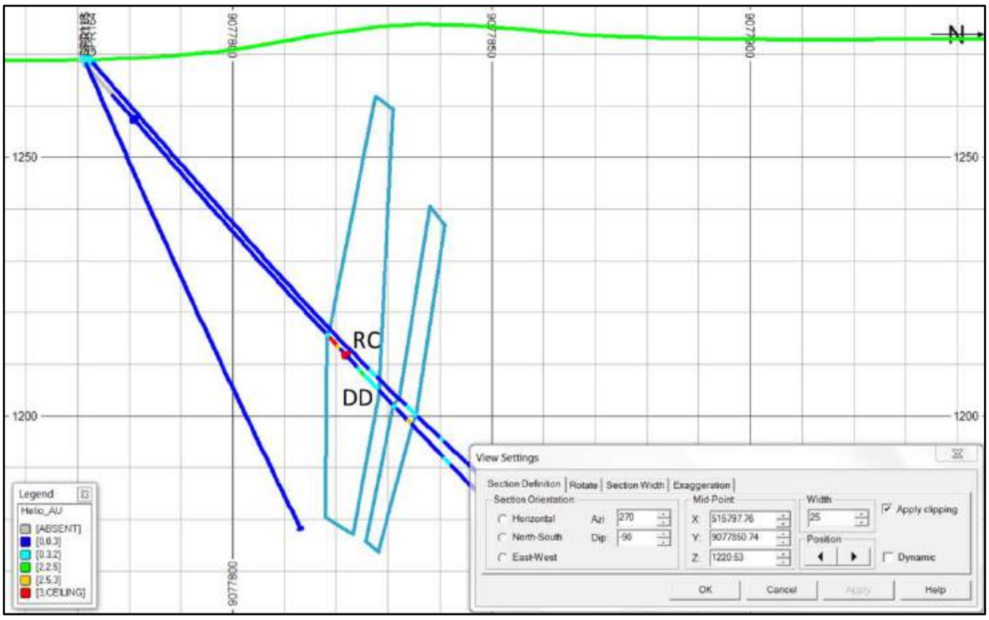
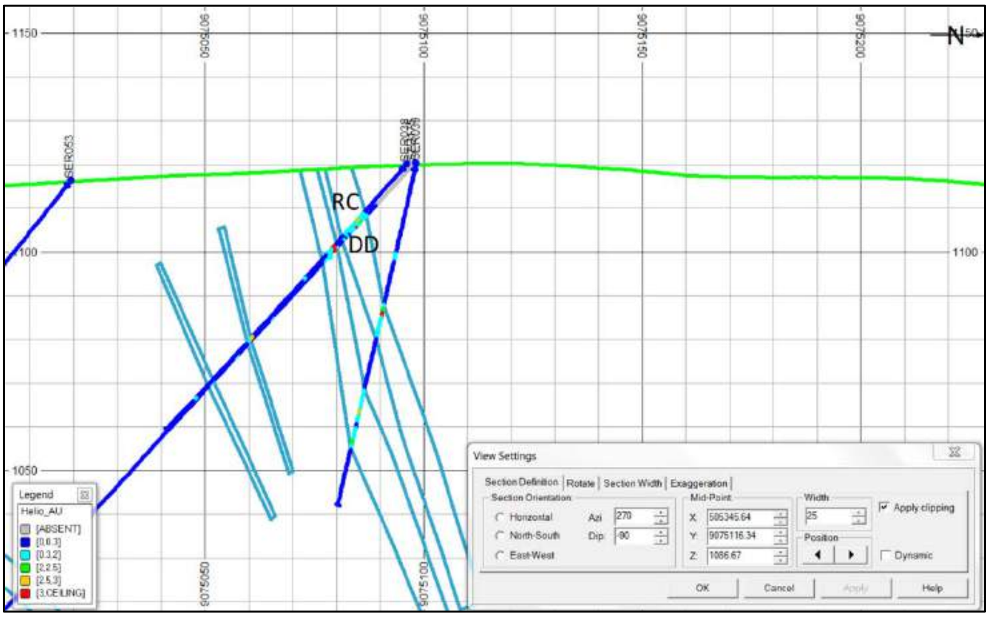


Figure 14.50 Konokono deposit – section view comparing Au values between RC and diamond drillholes (SER038 vs. SZD175)



14.3.5 Declustering

Clustering is caused by irregular sampling of a volume, most commonly through infill drilling or fan drilling. Clustering results in extra samples (usually high grades) in the dataset used for statistical analysis.

The clustering of samples within a high-grade area can manifest itself in the histogram as mixed populations. The calculated mean and variance can also be biased by the additional high-grade sample values.

There are many ways to decluster data, each giving different results. These include interactive filtering, polygonal declustering, nearest neighbour declustering and cell-weighted declustering.

The method used for geostatistical analysis and validation for the current Mineral Resource estimates is cell-weighted declustering, since all samples are considered when determining the average. It involves placing a grid of cells over the data. Each cell that contains at least one sample is assigned a weight of one. That weight of one is distributed evenly between the samples within each cell.

Declustering is not necessary for ordinary kriging estimation, as the estimation process takes into account data clustering. It does, however, give a good indication of the global mean and is used in the validation of the estimate (comparison of the means). Declustering was applied to remove any bias due to drill spacing prior to validation and it varies by deposit. The parameters are summarised in Table 14.10.

Table 14.10 Summary of declustering parameters

Deposit	Cell size (m)			Block cell origin		
	X	Y	Z	X	Y	Z
Kenge Main	15	5	10	499,900	9,073,945	700
Mbenge	10	5	10	501,795	9,073,890	700
Snakebite	10	5	10	501,795	9,073,890	700
Porcupine Main	15	5	10	513,285	9,076,435	500
Gap	15	10	15	515,000	9,077,190	1,050
Konokono	15	10	15	504,575	9,074,555	700

14.3.6 Compositing of assay intervals

Drillhole intersections that fall within the modelled mineralisation envelopes were selected from the database and composited to 1 m composite lengths. KZONE was used as zonal control to ensure that samples were composited within the different domains. 1 m was chosen as the composite sample length based on the frequency distribution of the sample lengths, as well as the thickness of the envelopes in sections with smaller widths (Figure 14.51 to Figure 14.56).

Figure 14.51 Histogram of the Kenge Main deposit dataset sample lengths for raw drillhole assay data within the mineralisation wireframe

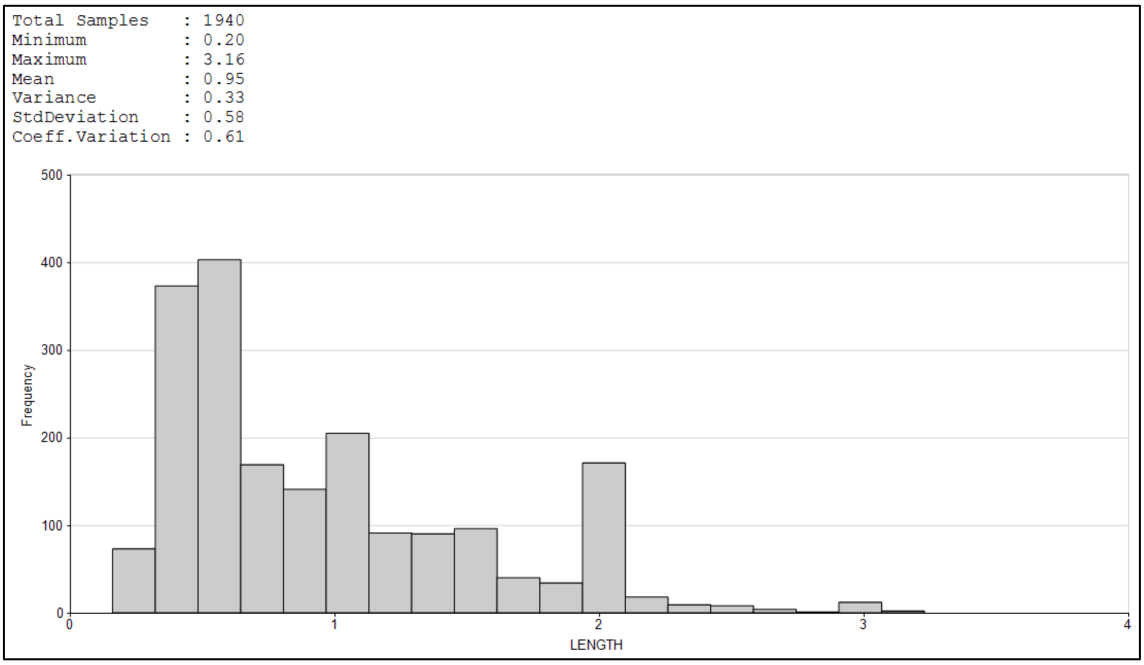


Figure 14.52 Histogram of the Mbenge deposit dataset sample lengths for raw drillhole assay data within the mineralisation wireframe

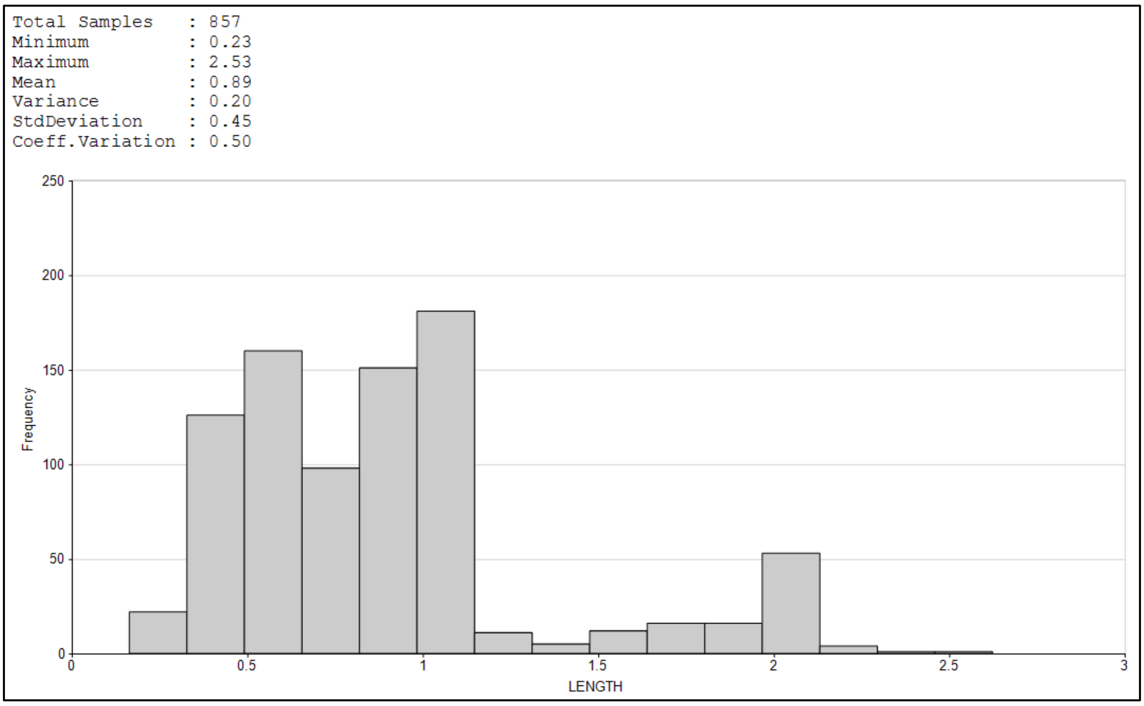


Figure 14.53 Histogram of the Snakebite deposit dataset sample lengths for raw drillhole assay data within the mineralisation wireframe

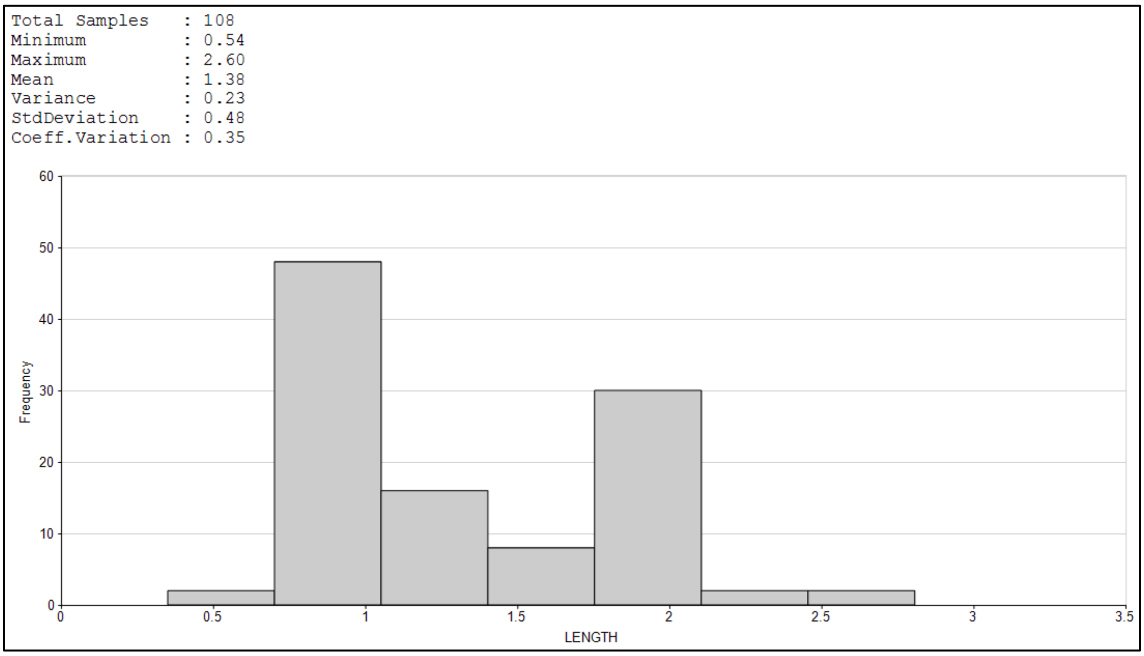


Figure 14.54 Histogram of the Porcupine Main deposit dataset sample lengths for raw drillhole assay data within the mineralisation wireframe

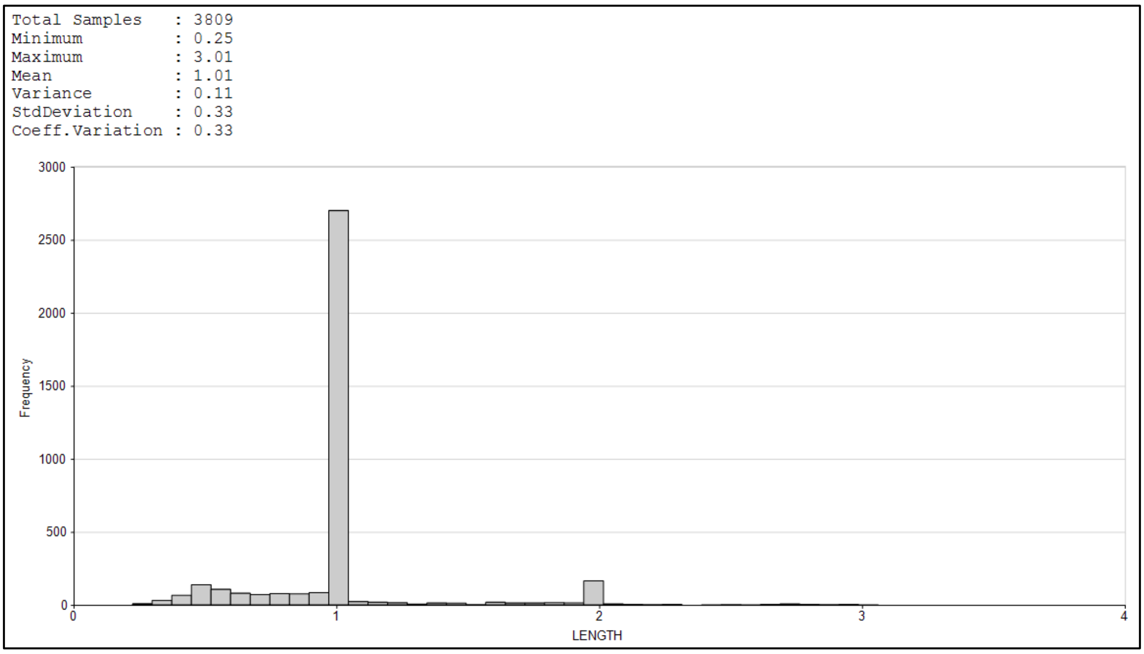


Figure 14.55 Histogram of the Gap deposit dataset sample lengths for raw drillhole assay data within the mineralisation wireframe

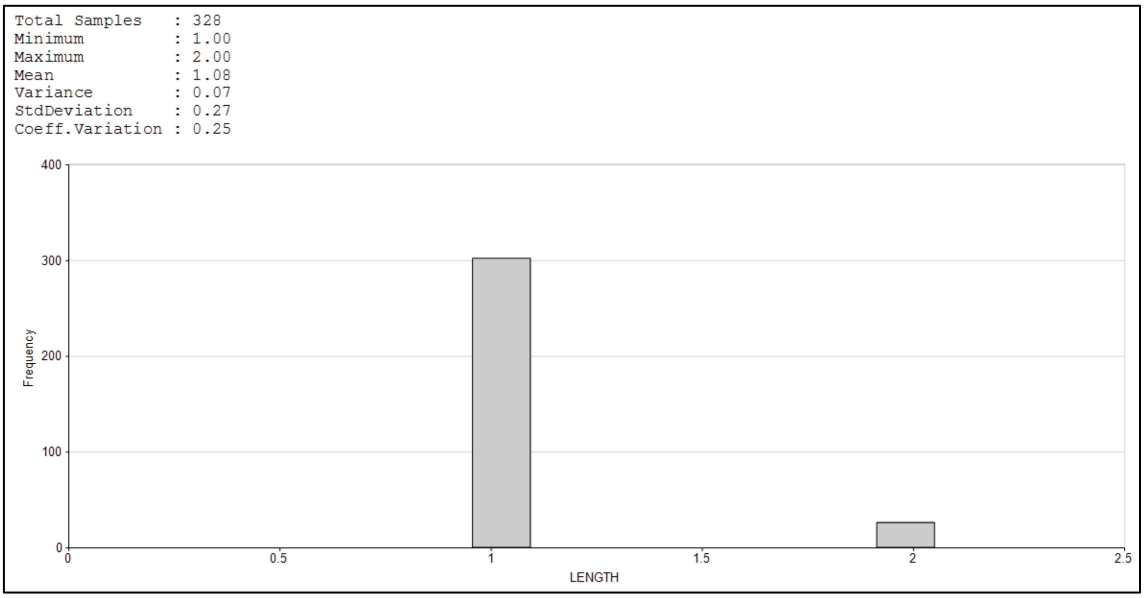
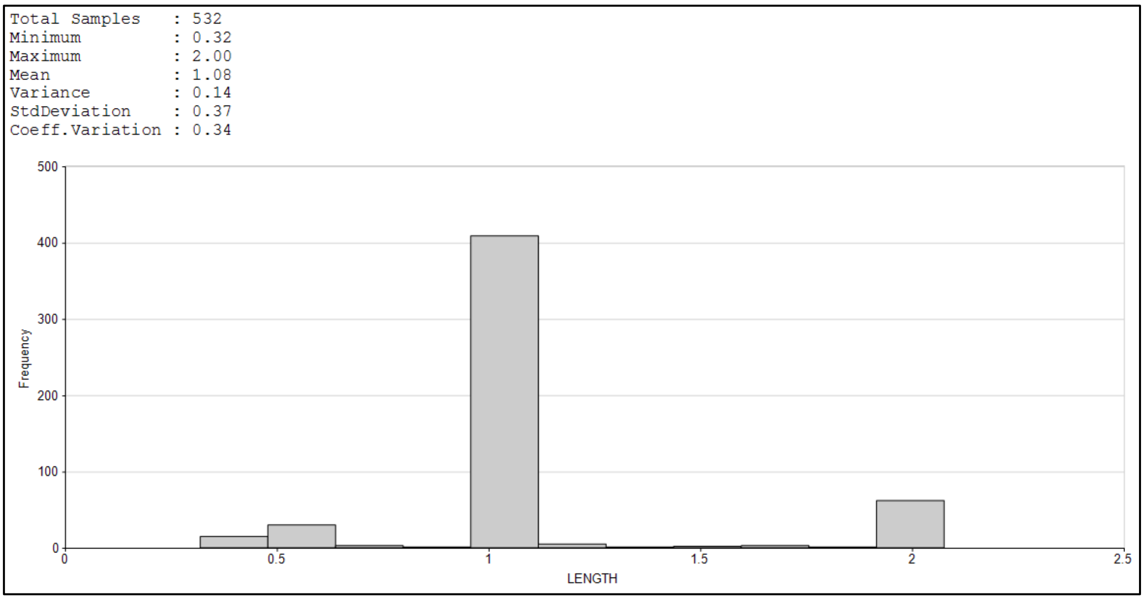


Figure 14.56 Histogram of the Konokono deposit dataset sample lengths for raw drillhole assay data within the mineralisation wireframe



The summary statistics for the clustered, composited Au values for the samples, per KZONE, are shown in Table 14.11, followed by the associated histograms (Figure 14.57 to Figure 14.65).

Table 14.11 Summary statistics for composited Au g/t sample values

	KZONE								
	100	**200**	**300**	**400**	**500**	**600**	**700**	**800**	**900**
Total samples	1,486	361	582	180	149	354	577	3,393	456
Minimum	0.01	0.01	0.01	0.08	0.01	0.01	0.01	0.01	0.03
Maximum	10.90	52.40	22.28	14.10	39.40	48.20	27.44	61.63	100.00
Mean	0.82	4.85	0.72	3.75	1.98	1.35	1.09	0.79	5.07
Variance	0.71	29.95	1.90	4.94	24.54	21.76	5.25	3.95	77.11
Standard deviation	0.84	5.47	1.38	2.22	4.95	4.66	2.29	1.99	8.78
*CV	1.02	1.13	1.92	0.59	2.50	3.45	2.11	2.51	1.73

**Coefficient of Variance*

Figure 14.57 Sample distributions for KZONE 100

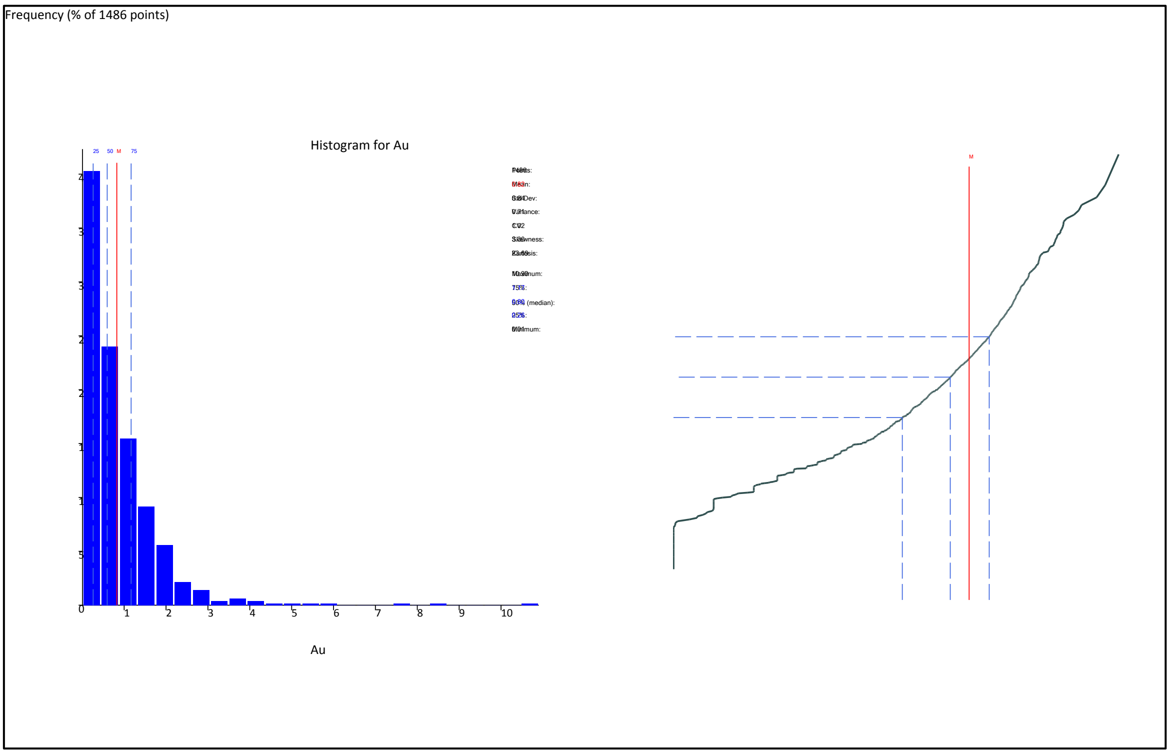


Figure 14.58 Sample distributions for KZONE 200

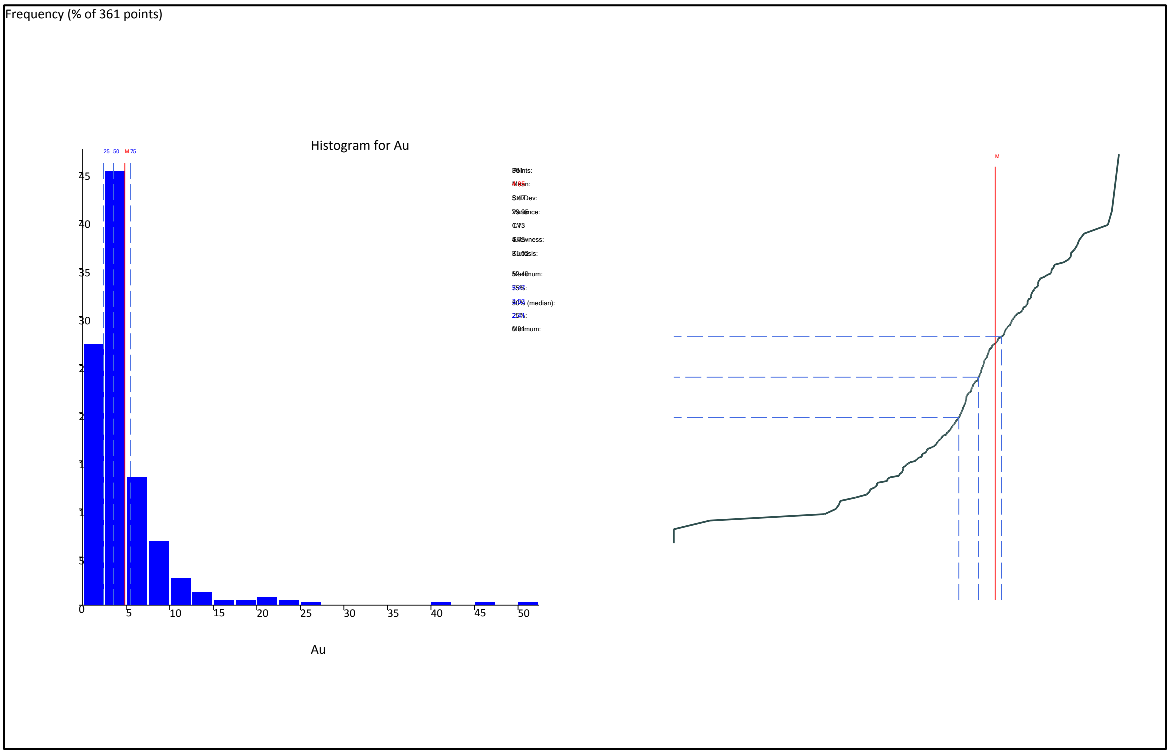


Figure 14.59 Sample distributions for KZONE 300

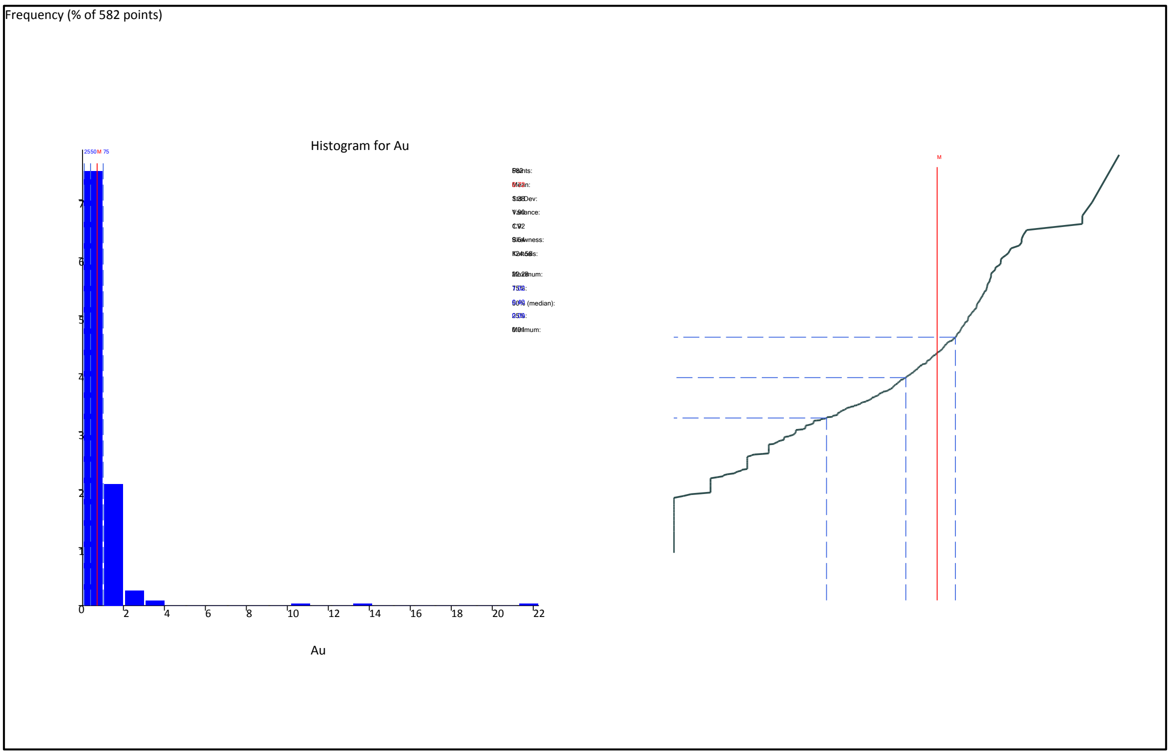


Figure 14.60 Sample distributions for KZONE 400

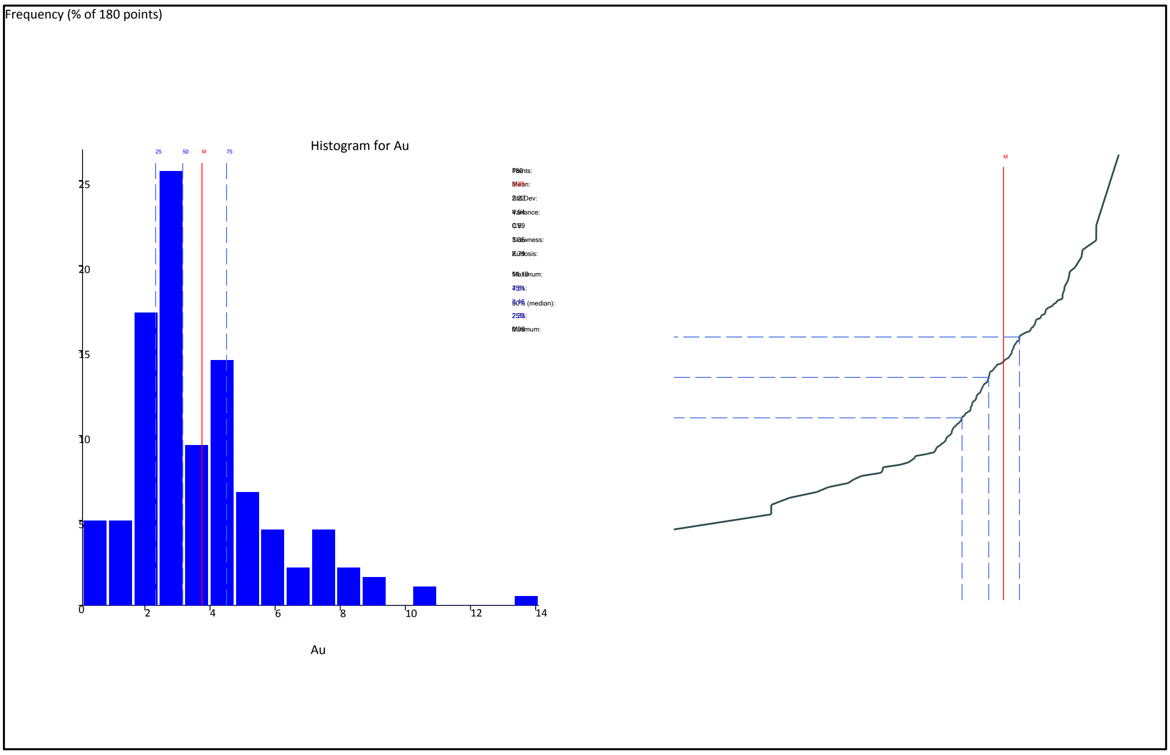


Figure 14.61 Sample distributions for KZONE 500

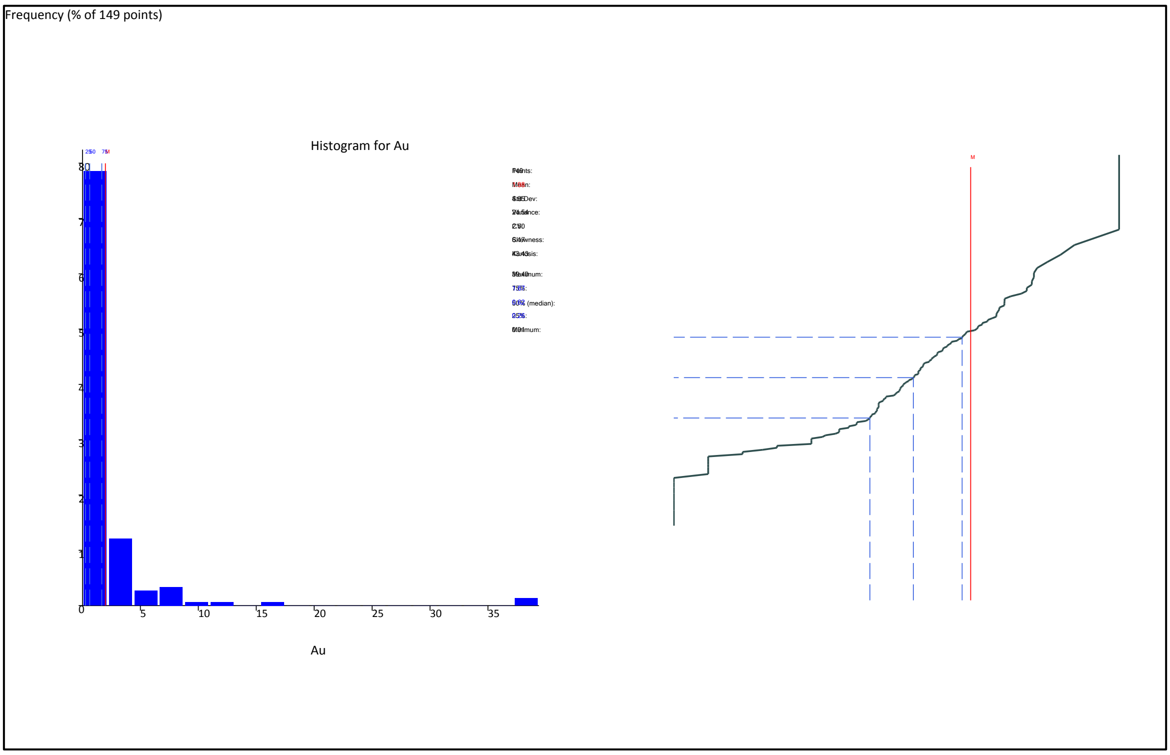


Figure 14.62 Sample distributions for KZONE 600

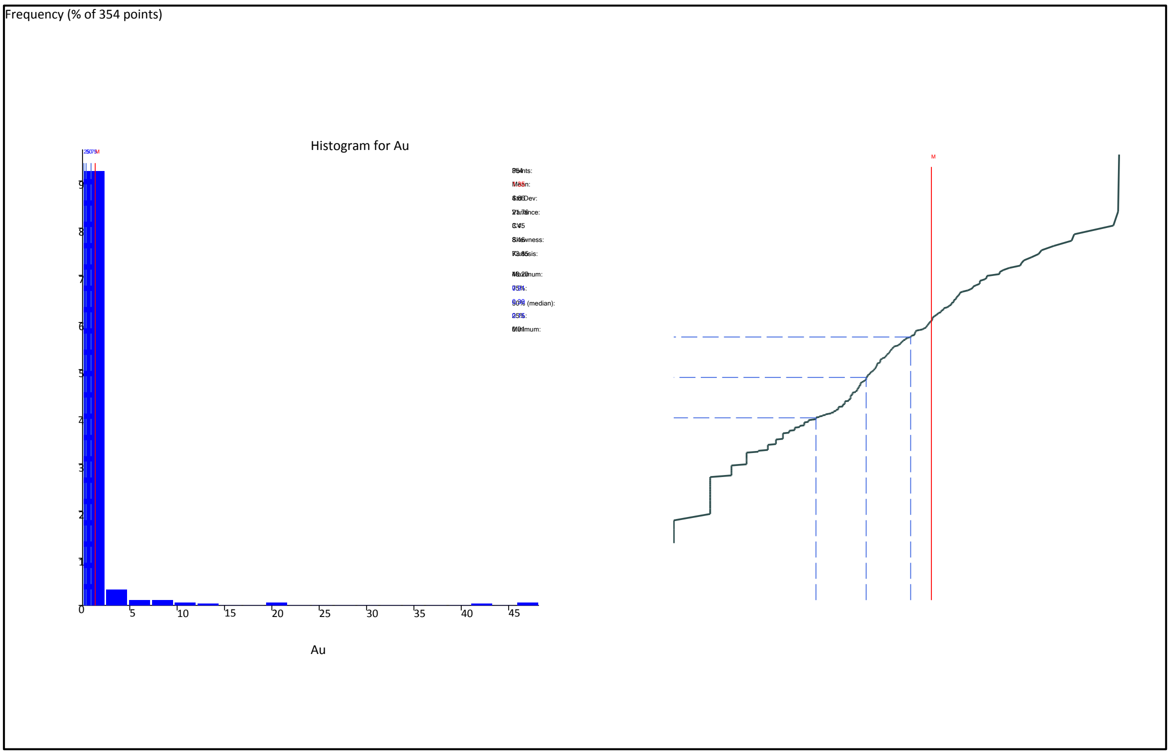


Figure 14.63 Sample distributions for KZONE 700

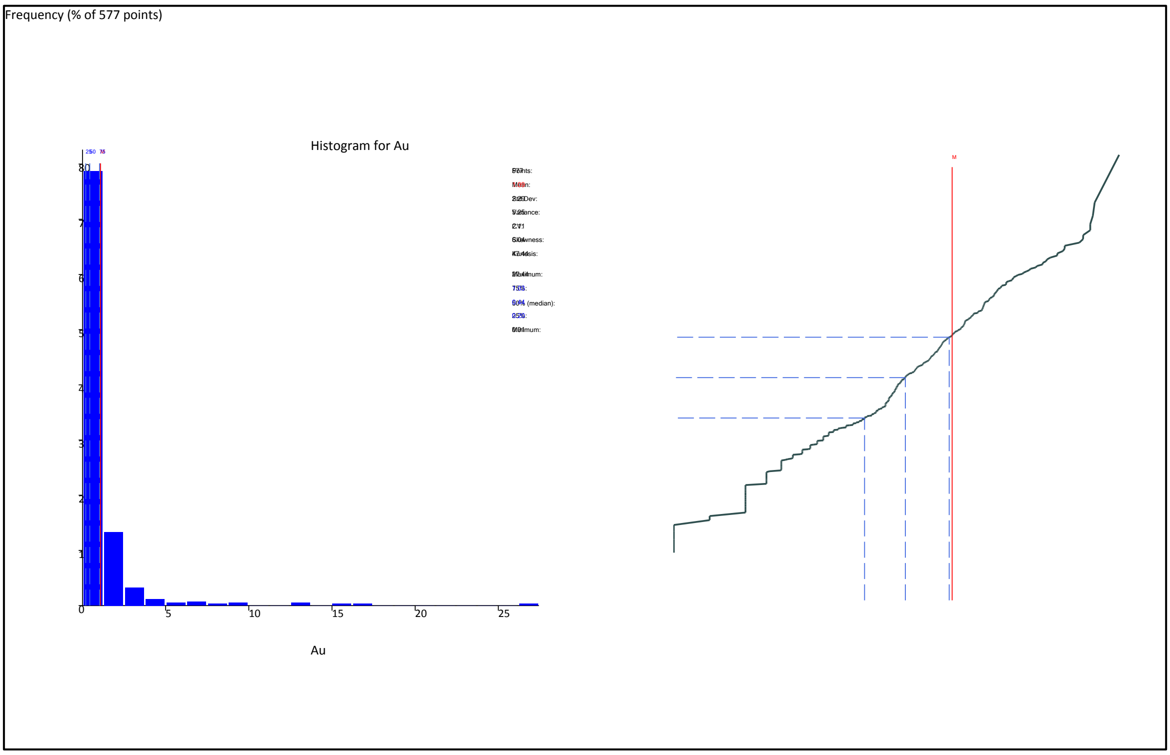


Figure 14.64 Sample distributions for KZONE 800

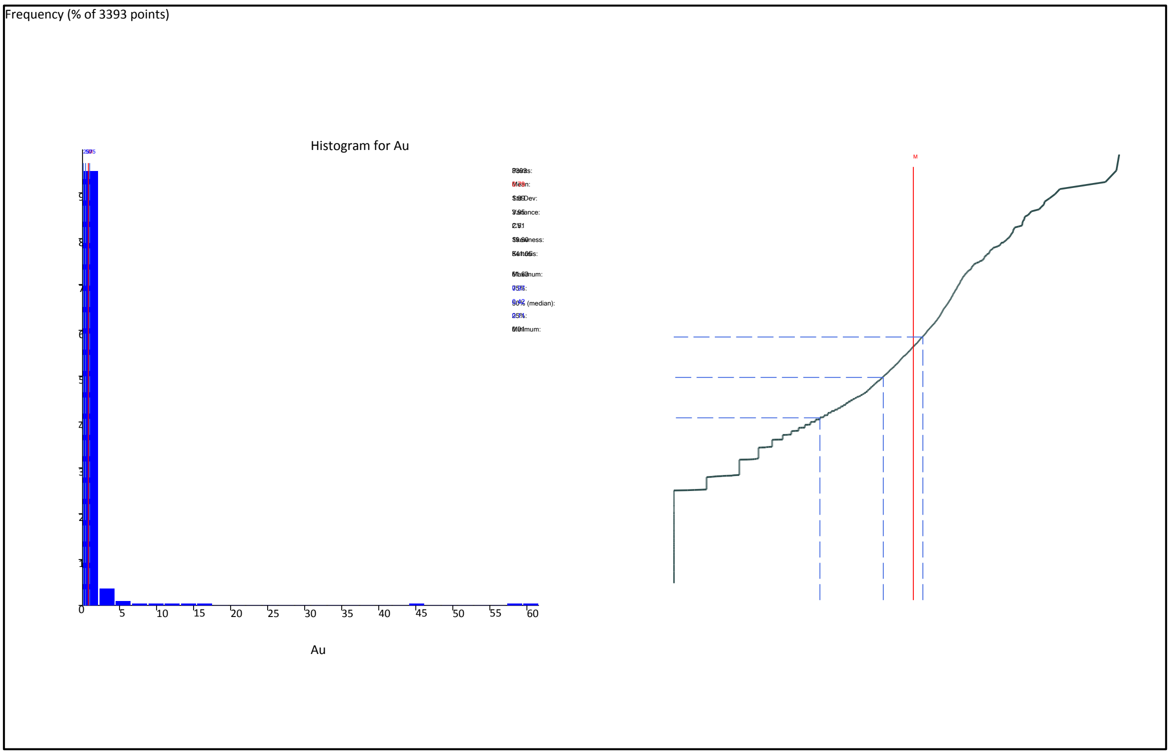
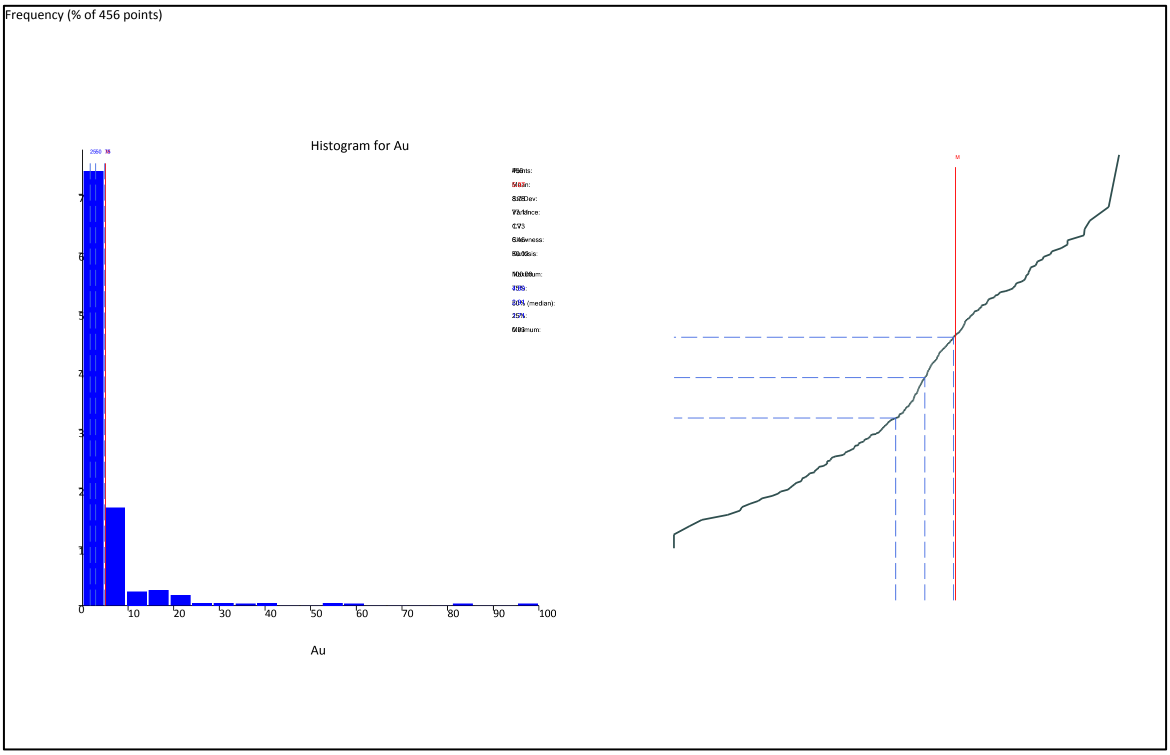


Figure 14.65 Sample distributions for KZONE 900



14.3.7 Variogram analysis

Variograms were modelled for Au per domain (KZONE) for the SMP deposits, using un-cut composited data. Nuggets were obtained from the downhole variograms, where the lag was set equal to the composite length of 1 m. Normal scores transform was used for modelling the Au variograms as this provides better structured variograms in positively skewed datasets (Figure 14.66 to Figure 14.74). Variograms were modelled using one or two spherical structures.

All variograms were back transformed prior to estimation. Variogram parameters are detailed in Table 14.12.

Table 14.12 Back transformed variogram parameters

KZONE	Grade	Orientation	Nugget	Structure 1		Structure 2	
				Sill	Range	Sill	Range
100	Au	-09 → 115 59 → 039 30 → 200	0.07	0.59	36 13 4	0.34	68 46 6
200	Au	-10 → 110 80 → 110 00 → 200	0.05	0.65	42 36 4	0.29	66 45 7
300	Au	00 → 080 -80 → 350 10 → 350	0.16	0.66	64 23 20	0.19	107 87 59
400	Au	00 → 080 -80 → 350 10 → 350	0.01	0.99	20 20 20	0	40 40 40
500	Au	40 → 350 00 → 260 50 → 170	0	0.76	3 44 3	0.24	15 45 12
600	Au	00 → 080 -80 → 350 10 → 350	0.46	0.49	46 64 23	0.06	131 139 59
700	Au	-00 → 080 -80 → 350 10 → 350	0	0.73	27 27 24	0.27	43 53 40
800	Au	70 → 330 00 → 060 -20 → 330	0.44	0.46	13 17 13	0.09	59 117 43
900	Au	80 → 340 00 → 070 -10 → 340	0.15	0.62	32 42 15	0.23	41 47 19

Figure 14.66 KZONE 100 – Experimental variograms used for Au g/t estimation

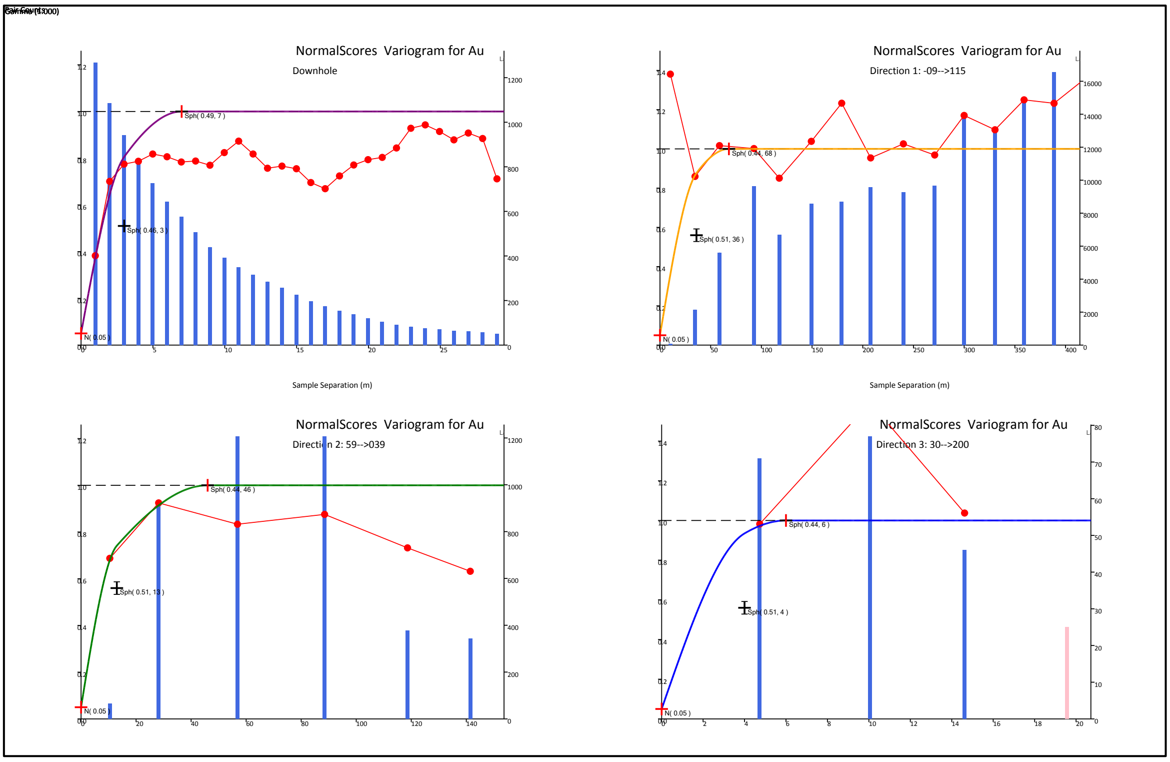


Figure 14.67 KZONE 200 – Experimental variograms used for Au g/t estimation

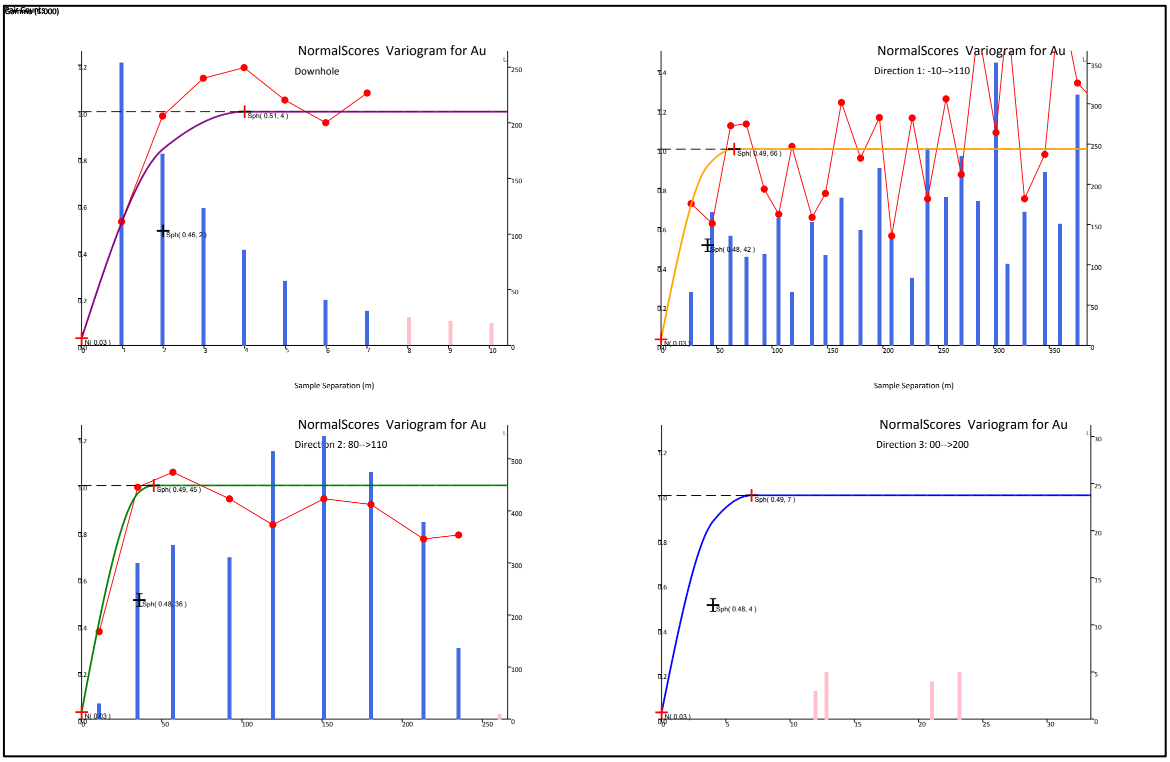


Figure 14.68 KZONE 300 – Experimental variograms used for Au g/t estimation

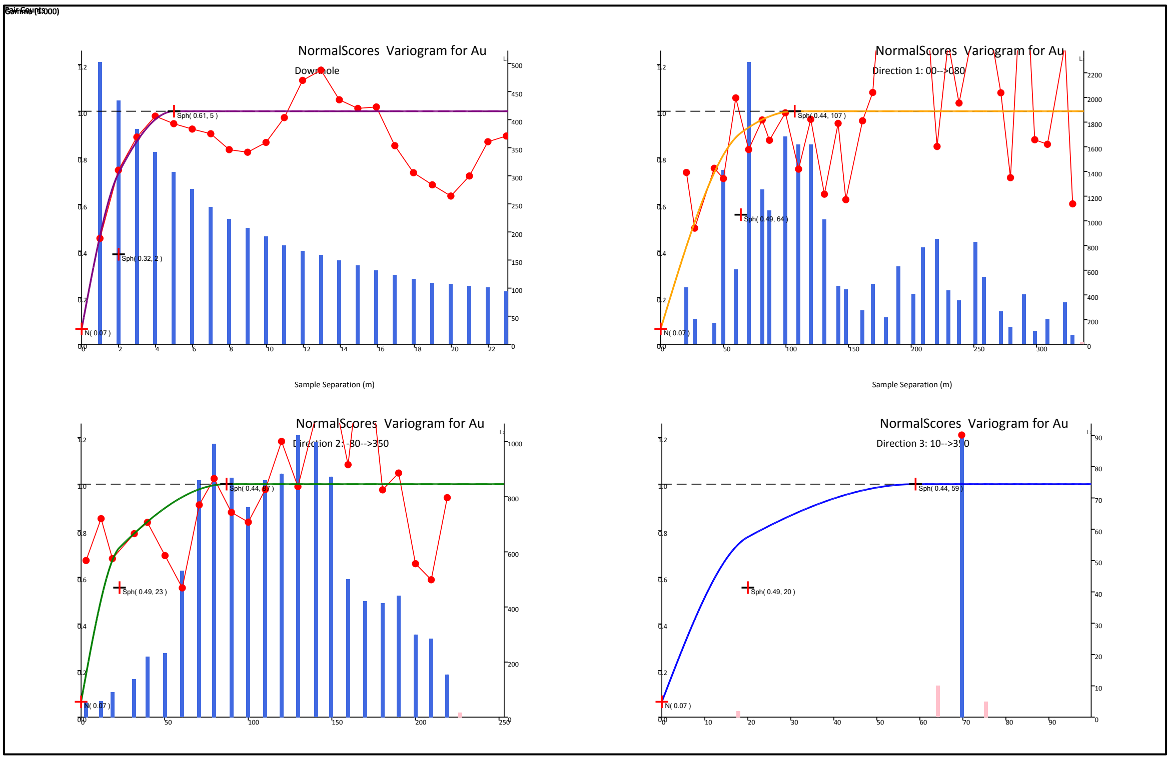


Figure 14.69 KZONE 400 – Experimental variograms used for Au g/t estimation

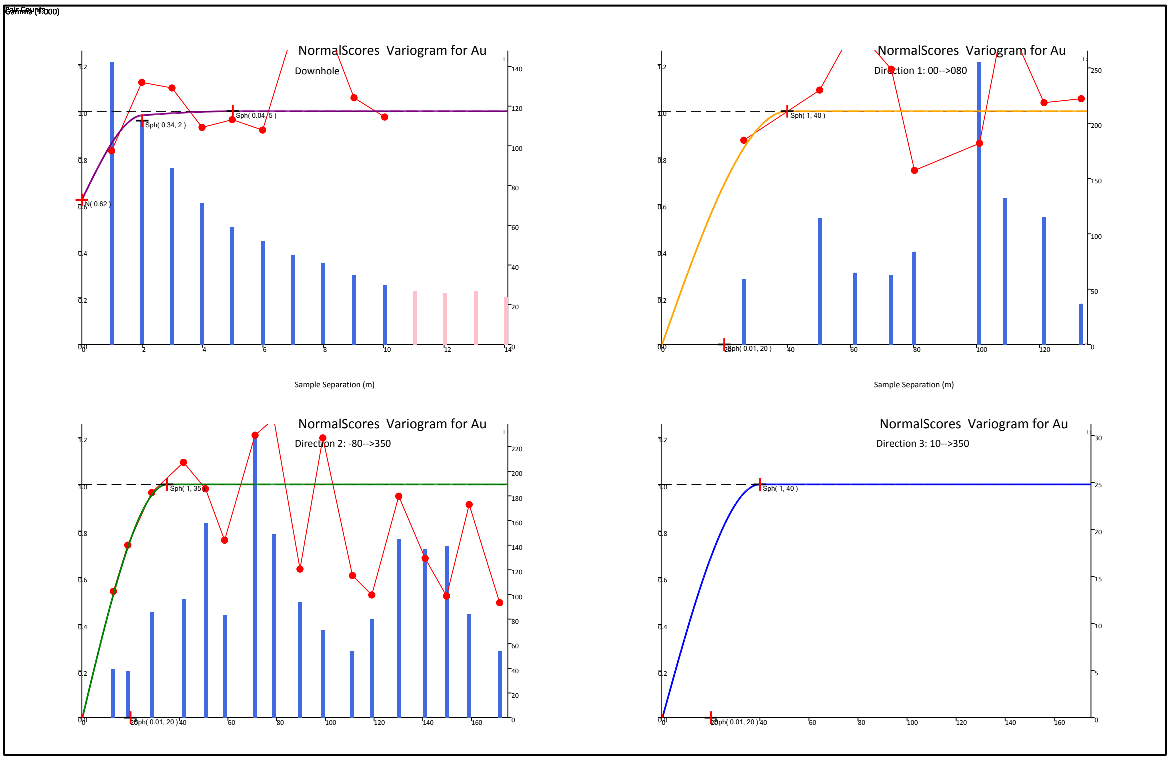


Figure 14.70 KZONE 500 – Experimental variograms used for Au g/t estimation

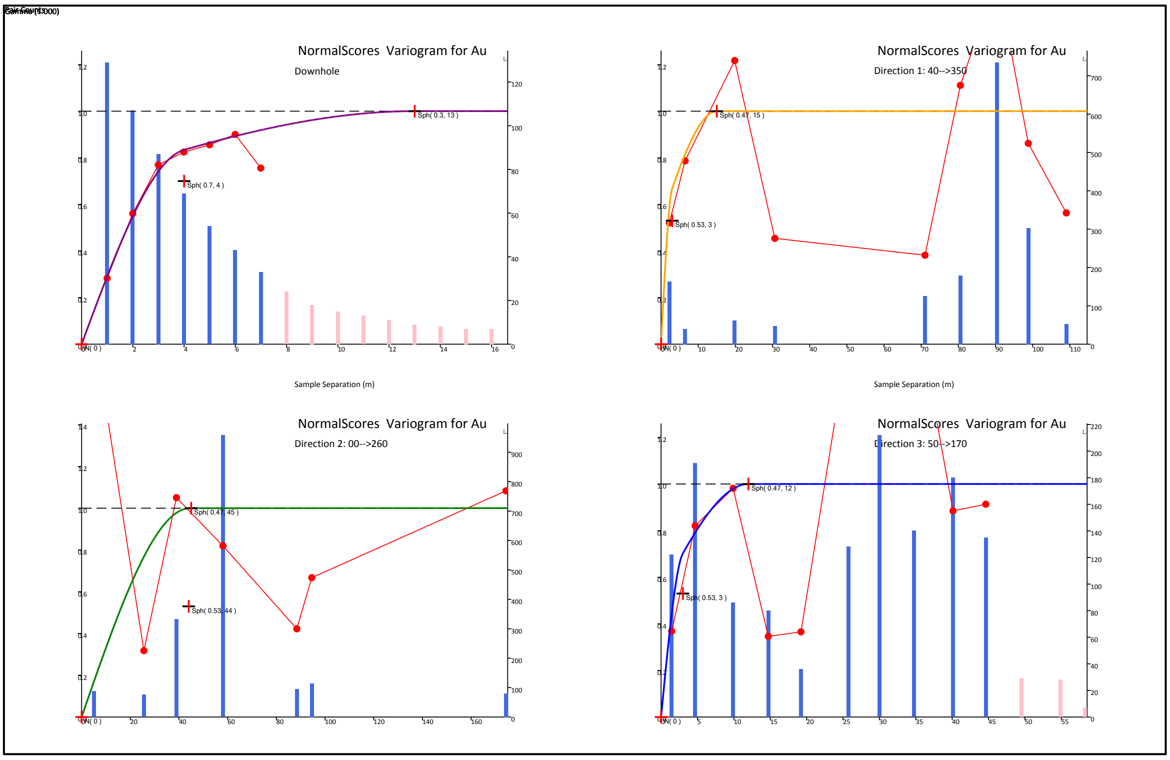


Figure 14.71 KZONE 600 – Experimental variograms used for Au g/t estimation

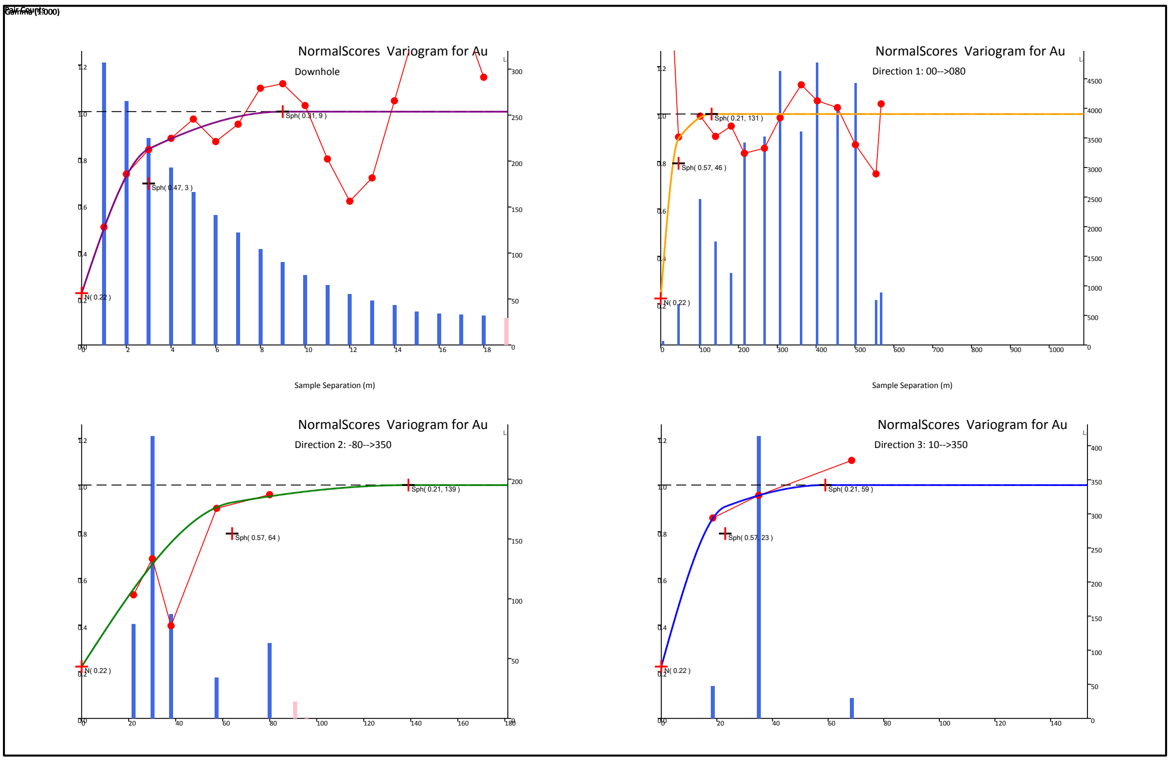


Figure 14.72 KZONE 700 – Experimental variograms used for Au g/t estimation

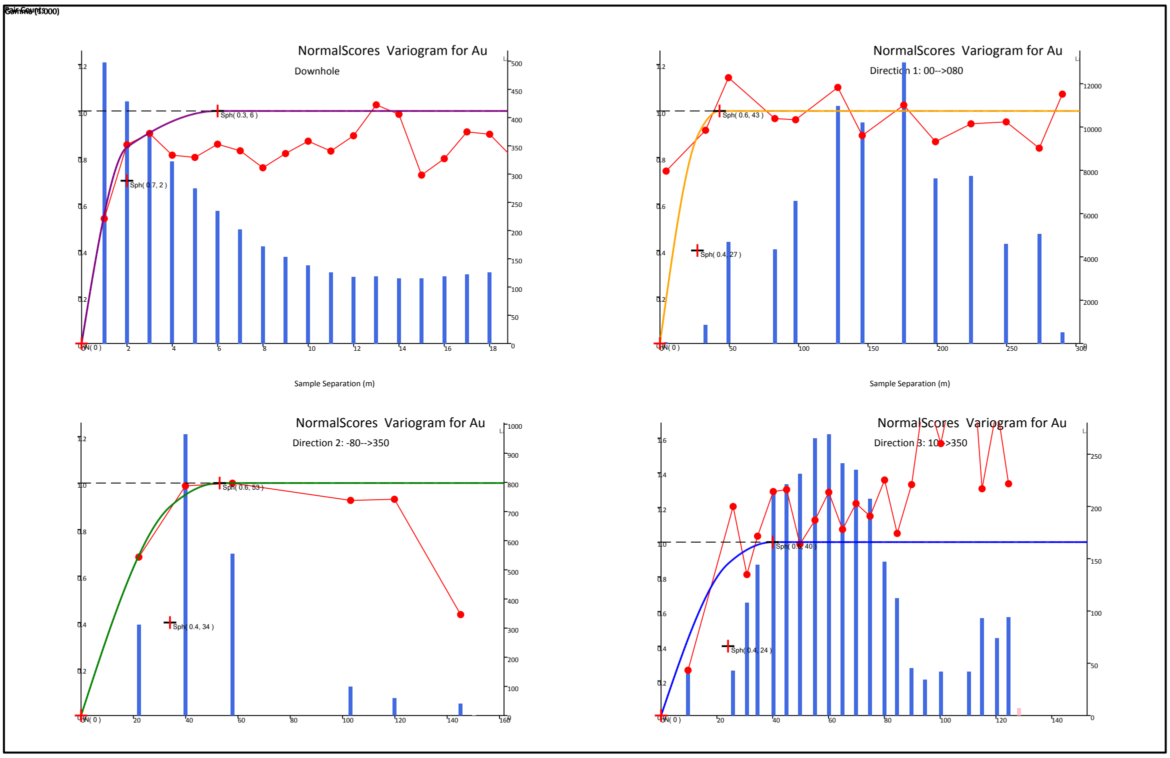


Figure 14.73 KZONE 800 – Experimental variograms used for Au g/t estimation

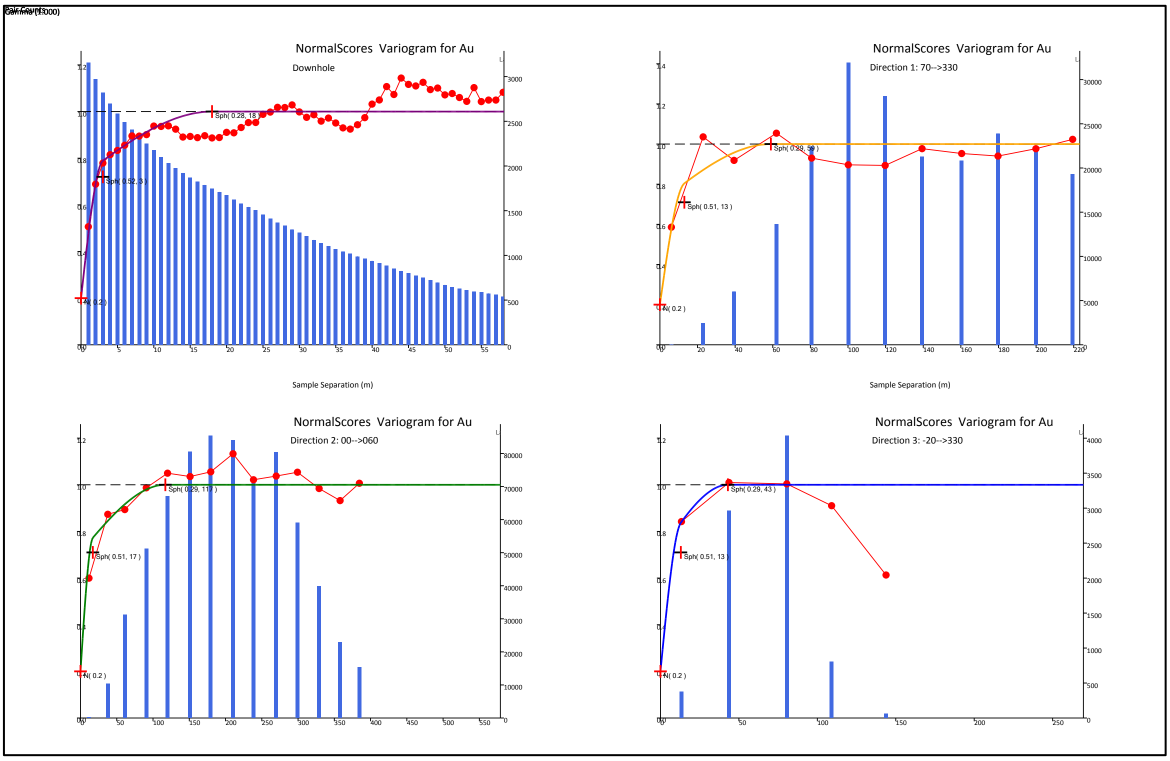
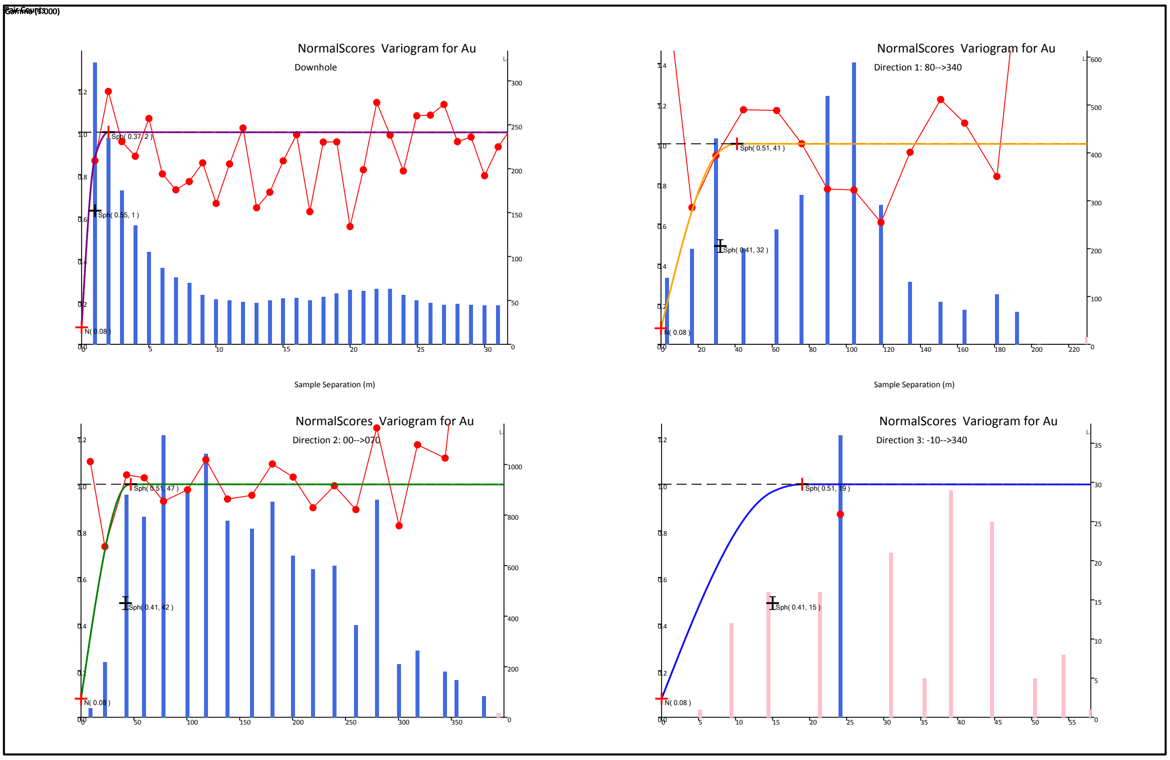


Figure 14.74 KZONE 900 – Experimental variograms used for Au g/t estimation



14.3.8 Top cuts

Grade cutting (top cutting) is generally applied to data used for estimations in order to lessen the effect of individual high grade samples in the local estimates. In cases where individual samples would unduly influence the values of surrounding model cells, without the support of other high-grade samples, top cuts are applied according to the statistical distribution of the sample population.

Cutting strategy should be applied based on the following:

- Skewness of the data
- Probability plots
- Spatial position of extreme grades
- Model validations and trend analysis studies.

The top cuts that were applied to the samples, per KZONE, are listed in Table 14.13. All samples that were greater than the top cut value were reset to the top cut value.

Table 14.13 Summary of top cuts and top cut statistics

KZONE	Top cut	No. samples cut	Percentage samples cut	Mean (before cutting)	Mean (after cutting)	CV (before cutting)	CV (after cutting)
100	4.45	6	0.40	0.82	0.81	1.02	0.94
200	26.80	3	0.83	4.85	4.68	1.13	0.93
300	3.90	4	0.69	0.72	0.65	1.92	1.11
400	14.10	0	0	3.75	3.75	0.59	0.59
500	16.00	2	1.34	1.98	1.67	2.50	1.72
600	11.00	6	1.69	1.35	0.99	3.45	1.92
700	17.00	2	0.35	1.09	1.07	2.11	1.98
800	17.50	3	0.09	0.79	0.76	2.51	1.64
900	60.00	2	0.44	5.07	4.94	1.73	1.53

The summary statistics for the clustered, composited and top cut Au values for the samples, per KZONE, are shown in Table 14.14.

Table 14.14 Summary statistics for declustered, composited and top cut Au g/t sample values

	KZONE								
	100	200	300	400	500	600	700	800	900
Total samples	1,486	361	582	180	149	354	577	3,393	456
Minimum	0.01	0.01	0.01	0.08	0.01	0.01	0.01	0.01	0.03
Maximum	4.45	26.80	3.90	14.10	16.00	11.00	17.00	17.50	60.00
Mean	0.81	4.68	0.65	3.75	1.67	0.99	1.07	0.76	4.94
Variance	0.58	19.08	0.52	4.94	8.17	3.64	4.47	1.54	57.30
Standard deviation	0.76	4.37	0.72	2.22	2.86	1.91	2.12	1.24	7.57
*CV	0.94	0.93	1.11	0.59	1.72	1.92	1.98	1.64	1.53

**Coefficient of Variance*

14.4 Block modelling

14.4.1 Block model set up

A block model was created for each deposit using the model prototypes summarised in Table 14.15. Parent cell sizes were defined based on the results of a KNA, the density of the exploration drilling grids, the shape of the mineralisation and the mining parameters. The models were cut to below the topographic surface and codes within the mineralised domains (KZONE) as per the composited drillhole data. Sub-cell splitting was used to ensure that the volumes of the mineralisation zones are adequately represented. The number of sub-cells used for Kenge Main, Mbenge, Snakebite and Gap were 5 by 5 by 5 (X, Y, Z), for Konokono 5 by 10 by 5 (X, Y, Z) and for Porcupine Main 15 by 5 by 10 (X, Y, Z).

Table 14.15 SMP block model prototype parameters

Deposit	Origin			Block size			Number of blocks		
	mE	mN	mRL	mE	mN	mRL	mE	mN	mRL
Kenge Main	499900	9073945	700	15	5	10	147	330	50
Mbenge	501795	9073890	700	10	5	10	108	201	50
Snakebite	501795	9073890	700	10	5	10	108	201	50
Porcupine Main	513285	9076435	500	15	5	10	101	213	105
Gap	515000	9077190	1050	15	10	15	135	130	23
Konokono	504575	9074555	700	15	10	15	102	109	34

14.4.2 Block model fields

Fields used in the block models are summarised in Table 14.16.

Table 14.16 SMP block models fields

Field/s	Description
IJK	Block index
XC, YC, ZC	Sub-cell coordinates
XINC, YINC, ZINC	Size of sub-cells
MIN	Mineralisation or waste indicator
KZONE	Kriging domain codes
DENSITY	In-situ dry bulk density [g/cm^3]
CLASS	Mineral Resource classification
AU	Estimated gold (Au g/t)
NSAMP	Number of samples used to estimate the AU block
SVOL	Search volume
XMORIG, YMORIG, ZMORIG	Block model origin (bottom left corner)
NX, NY, NZ	Number of parent cells in X, Y and Z (E, N and RL)

14.4.3 Grade interpolation

Estimation of gold grades was carried out using ordinary kriging into parent cells. Parent cell sizes were optimised for each deposit using a KNA which determines the optimal theoretical estimation and search parameters during kriging. Geology and practicality are also taken into account when deciding parameters to be used.

Zonal control was applied during grade estimation with each grade domain in the block model assigned a unique KZONE number, corresponding to the KZONE field in the input composite data.

The search neighbourhood criteria were defined based on the variography and the KNA testwork. The minimum number of composites was selected to ensure enough composites were available to inform a block.

The KNA shows that once too many composites are used for estimation, negative weights begin to be assigned to composites. As a result, the maximum number of composites was selected at a point before negative weights are introduced. The maximum composites per drillhole used to inform a single block was set to three to avoid over-smoothing in the downhole direction. The use of a restriction of three composites, together with the smallest minimum of eight samples, ensures that at least three drillholes are used for the estimation of any block.

A summary of the number of composites used for Au estimation per kriging zone (KZONE) is shown in Table 14.17.

Table 14.17 Summary of number of composites used for estimation

Deposit	KZONE	Minimum	Maximum
Kenge Main	100	8	30
	200	8	30
Mbenge	300	8	30
	400	8	30
Snakebite	500	12	30
Gap	600	8	30
Konokono	700	12	30
Porcupine Main	800	10	30
	900	10	30

Data from the experimental semi-variograms were used in conjunction with the block sizes and number of samples to determine the appropriate search ellipses as shown in Table 14.18.

Table 14.18 Summary of search parameters used for the estimations

Deposit	KZONE	Search distance mE	Search distance mN	Search distance mRL
Kenge Main	100	60	40	10
	200	60	40	10
Mbenge	300	100	80	20
	400	40	40	20
Snakebite	500	40	10	10
Gap	600	60	40	20
Konokono	700	50	50	20
Porcupine Main	800	60	40	20
	900	40	40	20

A three-phased search pass was applied and the orientation of the search ellipsoid was primarily aligned to the modelled variography. This process involves the estimation being performed three times. During each individual estimation run a factor increases the size of the search ellipse used to select samples. This method ensures that blocks which are not estimated and populated with a grade value in the first run, are populated during one of the subsequent runs.

The expansion factors and sample numbers used for the second and third search volumes are shown in Table 14.19.

Table 14.19 Search criteria used for second and third search volumes

Search volume 2			Search volume 3		
Expansion factor	Minimum no. of samples	Maximum no. of samples	Expansion factor	Minimum no. of samples	Maximum no. of samples
1.5	6	30	3	2	30

A discretisation grid should be defined when using kriging for estimation. This grid is placed around the interpolation point when kriging.

The optimum discretisation grid was selected as the point at which no significant improvement was made in reducing the average covariance (measure of how much two variables change together) between pairs of points. The optimum grid was: 5 points in the X direction, 5 points in the Y direction and 5 points in the Z direction.

14.4.4 Density

The prominent rock types within the deposits vary and separate bulk densities, per KZONE, were calculated from measurements taken on drillholes. The summary for the density measurements, per KZONE, are shown in Table 14.20. These bulk densities were assigned per KZONE to the updated SMP Mineral Resource models.

Table 14.20 Summary of the bulk densities applied per KZONE

Deposit	KZONE	Description	Bulk density (g/cm^3)	No. of samples
Kenge Main	0	Waste	2.75	1,347
	100	Low grade mineralisation	2.74	197
	200	High grade mineralisation	2.78	76
Mbenge	0	Waste	2.71	62
	300	Low grade mineralisation	2.70	30
	400	High grade mineralisation	2.72	53
Snakebite	0	Waste	2.76	271
	500	All mineralisation	2.76	5
Gap	0	Waste	2.75	1,212
	600	All mineralisation	2.72	104
Konokono	0	Waste	2.67	265
	700	All mineralisation	2.64	9
Porcupine Main	0	Waste	2.64	9,910
	800	Low grade mineralisation	2.64	2,845
	900	High grade mineralisation	2.64	407

14.5 Model validation

In order to validate the block estimates, the models were compared against the input drillhole data for each estimate. A number of techniques were used for the validation. These included visual validation of block grades compared to input drillhole sample data, global comparisons between average block model grade and average declustered top cut composite grade, and slicing plots through the deposits in northing, easting and elevation, comparing average block model grades with average declustered top cut composite grades for each slice.

14.5.1 Global mean comparisons

Snowden reviewed the global statistics and compared the mean grade of Au in the estimated model blocks to the declustered, top cut composite data, per kriging zone, as shown in Table 14.21 to Table 14.29.

Generally the models validate well, with the difference between the model mean grades per KZONE in comparison to the mean grades of the declustered, top cut composites ≤5%. The KZONE 600 domain has a small numbers of composites and does not validate as well as the other domains.

Table 14.21 KZONE100 – mean grade comparison for Au g/t

[1]Kenge Main LG	Field	Total samples	Min.	Max.	Mean	Standard deviation	Variance	[2]CV
Composite	AuC	1,486	0.01	4.45	0.85	0.74	0.55	0.88
Model	AU	175,130	0.06	2.02	0.84	0.29	0.09	0.35
Difference [(Composite Grade – Model Grade)/Model Grade]					**+1%**			

1 – Low grade mineralisation
2 – Coefficient of Variance

Table 14.22 KZONE200 – mean grade comparison for Au g/t

[1]Kenge Main HG	Field	Total samples	Min.	Max.	Mean	Standard deviation	Variance	[2]CV
Composite	AuC	361	0.01	26.80	4.68	4.45	19.83	0.95
Model	AU	35,208	1.54	15.65	4.72	1.86	3.47	0.39
Difference [(Composite Grade – Model Grade)/Model Grade]					**-1%**			

1 – High grade mineralisation
2 – Coefficient of Variance

Table 14.23 KZONE300 – mean grade comparison for Au g/t

[1]Mbenge LG	Field	Total samples	Min.	Max.	Mean	Standard deviation	Variance	[2]CV
Composite	AuC	582	0.01	3.90	0.68	0.71	0.51	1.05
Model	AU	53,900	0.10	1.66	0.67	0.24	0.06	0.35
Difference [(Composite Grade – Model Grade)/Model Grade]					**+1%**			

1 – Low grade mineralisation
2 – Coefficient of Variance

Table 14.24 KZONE400 – mean grade comparison for Au g/t

[1]Mbenge HG	Field	Total samples	Min.	Max.	Mean	Standard deviation	Variance	[2]CV
Composite	AuC	180	0.08	14.10	3.92	2.32	5.38	0.59
Model	AU	15,571	1.17	12.62	3.89	0.93	0.86	0.24
Difference [(Composite Grade – Model Grade)/Model Grade]					**+1%**			

1 – High grade mineralisation
2 – Coefficient of Variance

Table 14.25 KZONE500 – mean grade comparison for Au g/t

[1]Snakebite	Field	Total samples	Min.	Max.	Mean	Standard deviation	Variance	[2]CV
Composite	AuC	149	0.01	16.00	1.60	2.41	5.83	1.51
Model	AU	21,501	0.001	7.99	1.61	1.07	1.14	0.66
Difference [(Composite Grade – Model Grade)/Model Grade]					**-1%**			

1 – All mineralisation
2 – Coefficient of Variance

Table 14.26 KZONE600 – mean grade comparison for Au g/t

[1]Gap	Field	Total samples	Min.	Max.	Mean	Standard deviation	Variance	[2]CV
Composite	AuC	354	0.01	11.00	1.07	1.87	3.50	1.74
Model	AU	11,960	0.19	6.16	0.96	0.68	0.46	0.71
Difference [(Composite Grade – Model Grade)/Model Grade]					**+11%**			

1 – All mineralisation
2 – Coefficient of Variance

Table 14.27 KZONE700 – mean grade comparison for Au g/t

[1]Konokono	Field	Total samples	Min.	Max.	Mean	Standard deviation	Variance	[2]CV
Composite	AuC	577	0.01	17.00	1.12	2.03	4.11	1.81
Model	AU	68,808	0.001	8.38	1.18	0.76	0.58	0.64
Difference [(Composite Grade – Model Grade)/Model Grade]					**-5%**			

1 – All mineralisation
2 – Coefficient of Variance

Table 14.28 KZONE800 – mean grade comparison for Au g/t

[1]Porcupine Main LG	Field	Total samples	Min.	Max.	Mean	Standard deviation	Variance	[2]CV
Composite	AuC	3,393	0.01	17.50	0.77	1.19	1.41	1.53
Model	AU	1,585,794	0.07	4.11	0.76	0.40	0.16	0.53
Difference [(Composite Grade – Model Grade)/Model Grade]					**+1%**			

1 – Low grade mineralisation
2 – Coefficient of Variance

Table 14.29 KZONE900 – mean grade comparison for Au g/t

[1]Porcupine Main HG	Field	Total samples	Min.	Max.	Mean	Standard deviation	Variance	[2]CV
Composite	AuC	456	0.03	60.00	5.18	7.20	51.78	1.39
Model	AU	343,408	0.001	28.83	5.33	2.41	5.82	0.45
Difference [(Composite Grade – Model Grade)/Model Grade]					**+1%**			

1 – High grade mineralisation
2 – Coefficient of Variance

14.5.2 Swath plots

As part of the validation process, the block models and input composites (declustered and top cut) that fall within defined sectional criteria were compared and the results displayed graphically to check for visual discrepancies between grades (swath plots).

The validation plots comparing the mean of the declustered, top cut composite grades (blue) to the mean of the model grades (black), per KZONE, are presented in Figure 14.75 to Figure 14.83. The grey bars represent the number of samples. The plots show good correlation between the input composites and output models. Generally the models follow the pattern of the composite grades, with some smoothing of higher and lower grades. Some instances of local variability in the grades were identified, which is a result of low data density.

Figure 14.75 KZONE100 – Au g/t validation plots

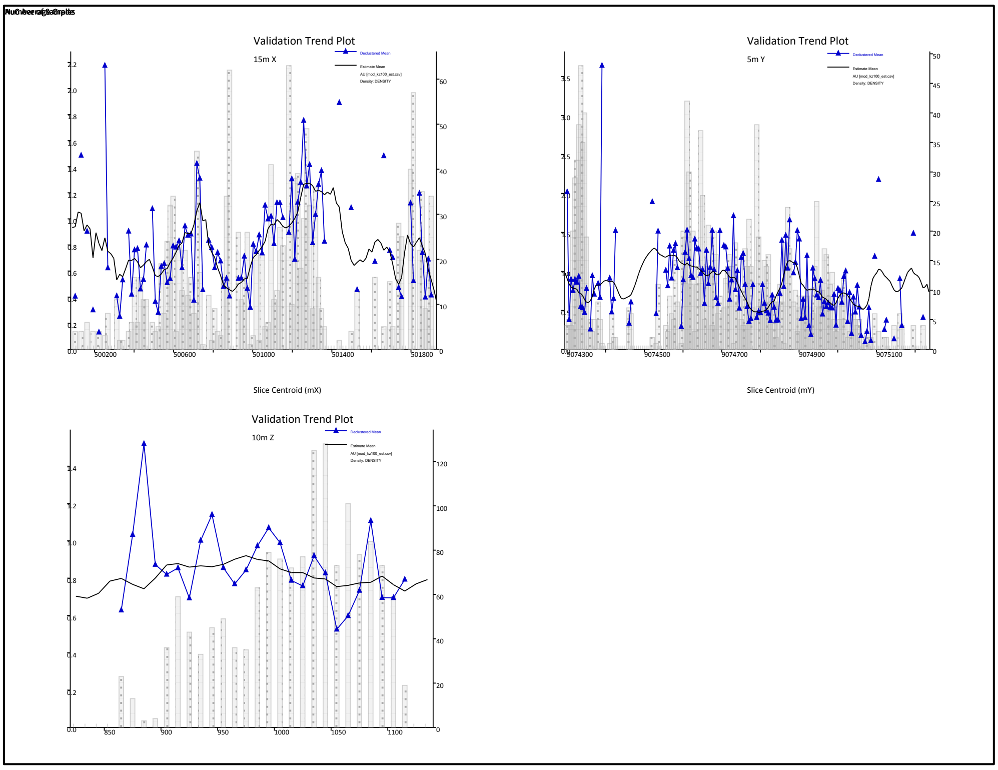


Figure 14.76 KZONE200 – Au g/t validation plots

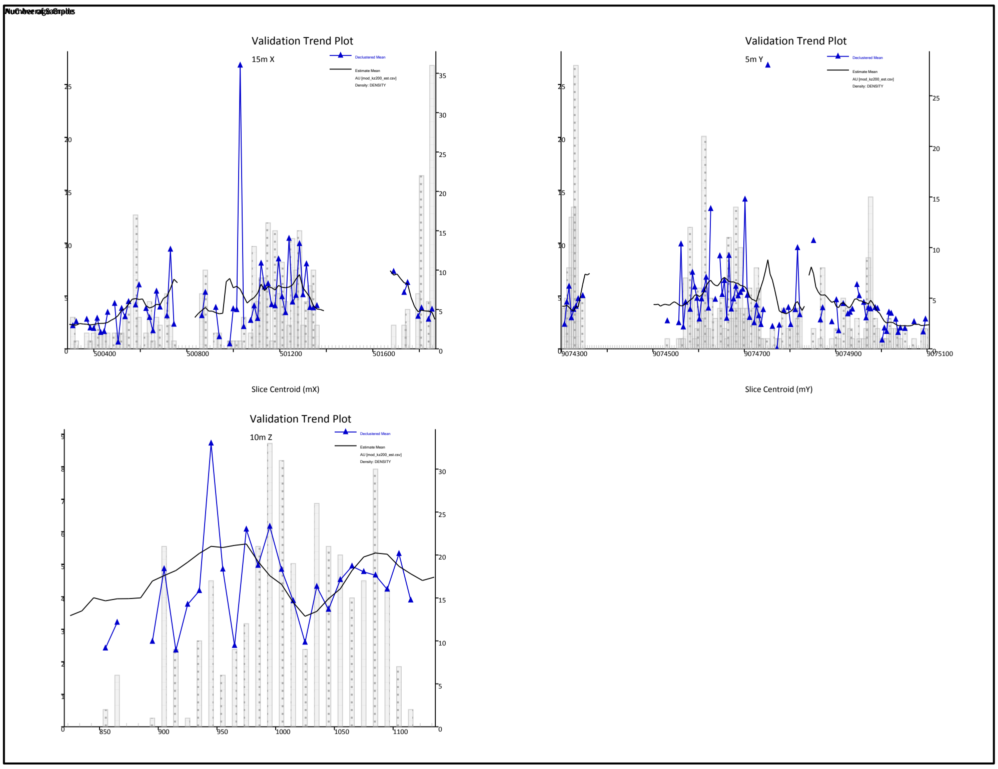


Figure 14.77 KZONE300 – Au g/t validation plots

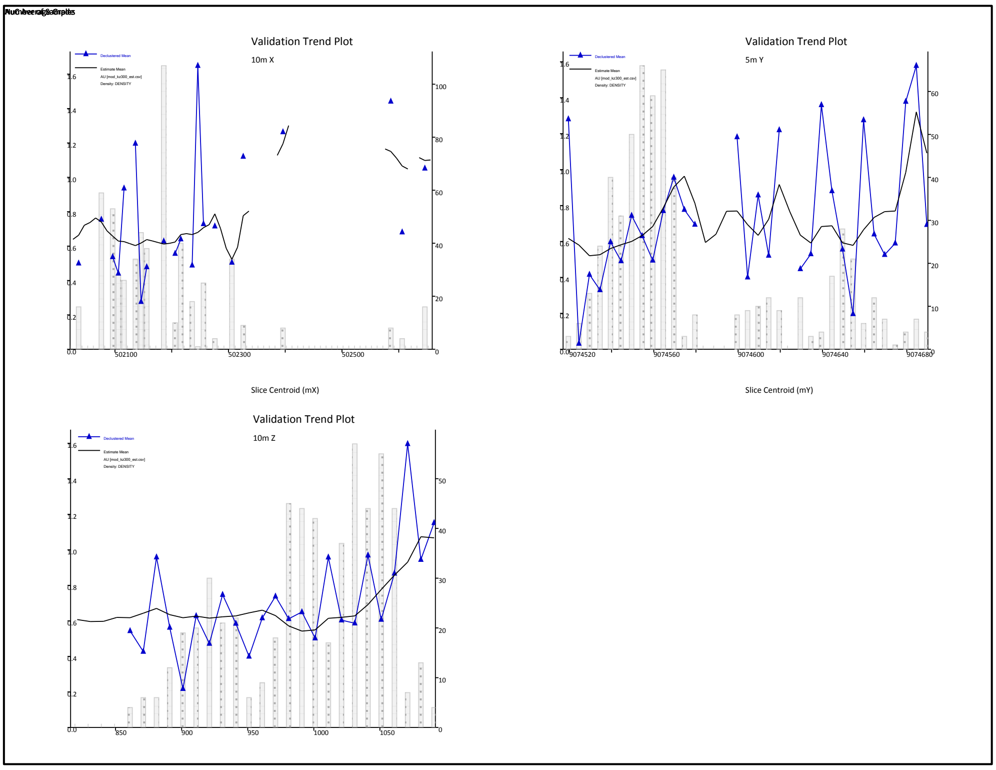


Figure 14.78 KZONE400 – Au g/t validation plots

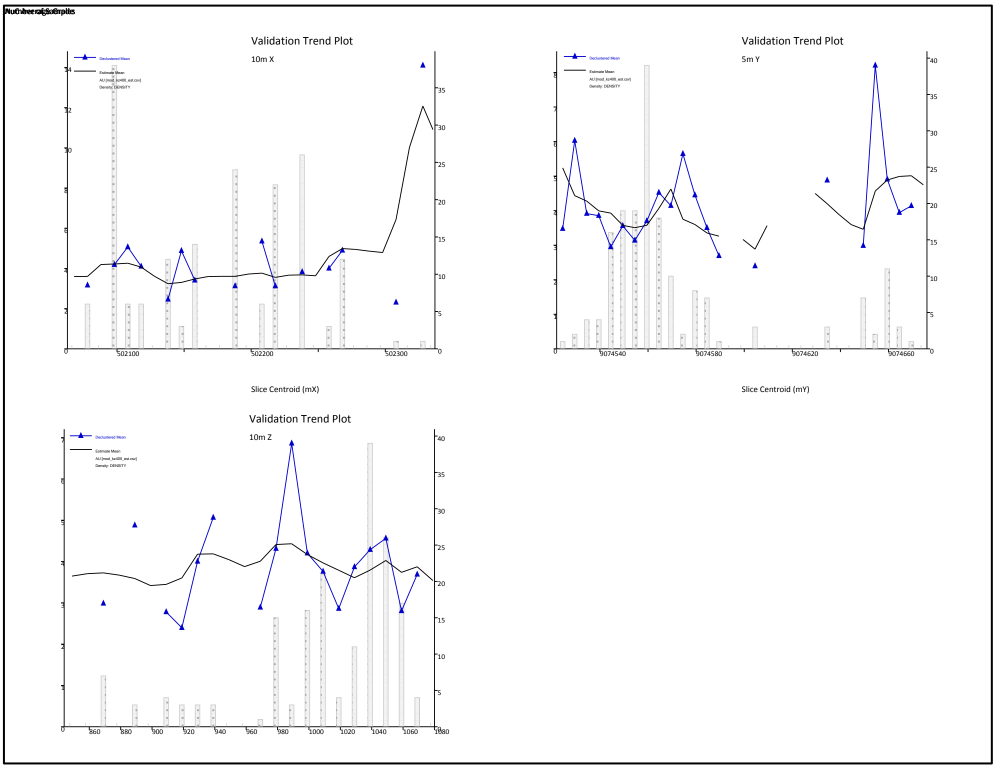


Figure 14.79 KZONE500 – Au g/t validation plots

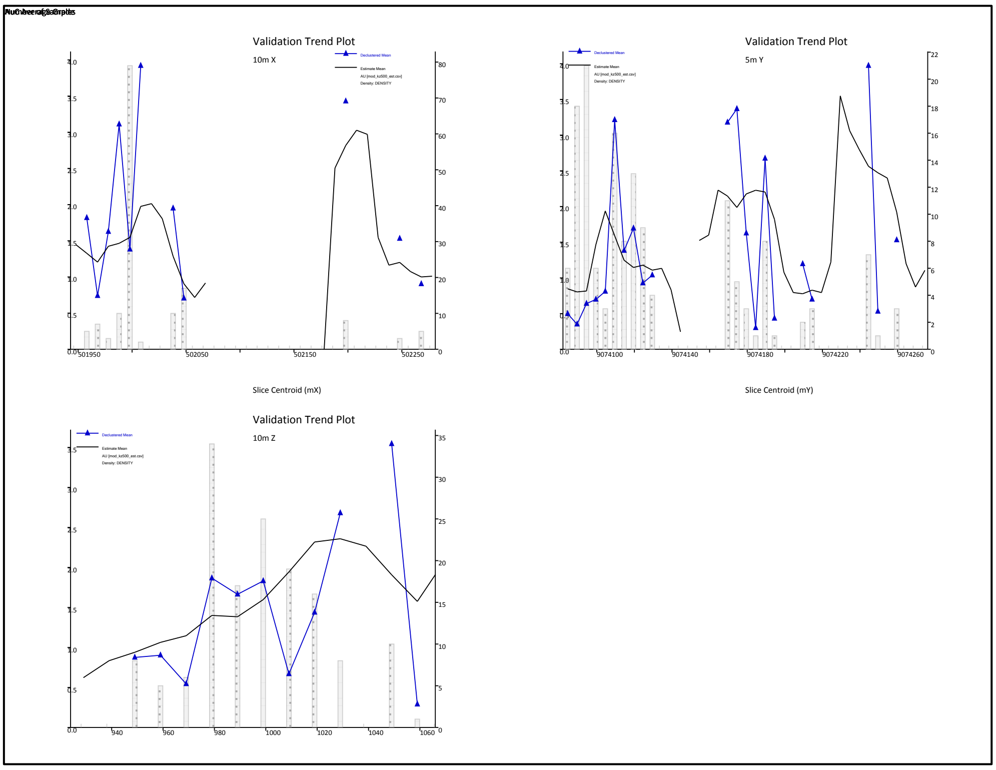


Figure 14.80 KZONE600 – Au g/t validation plots

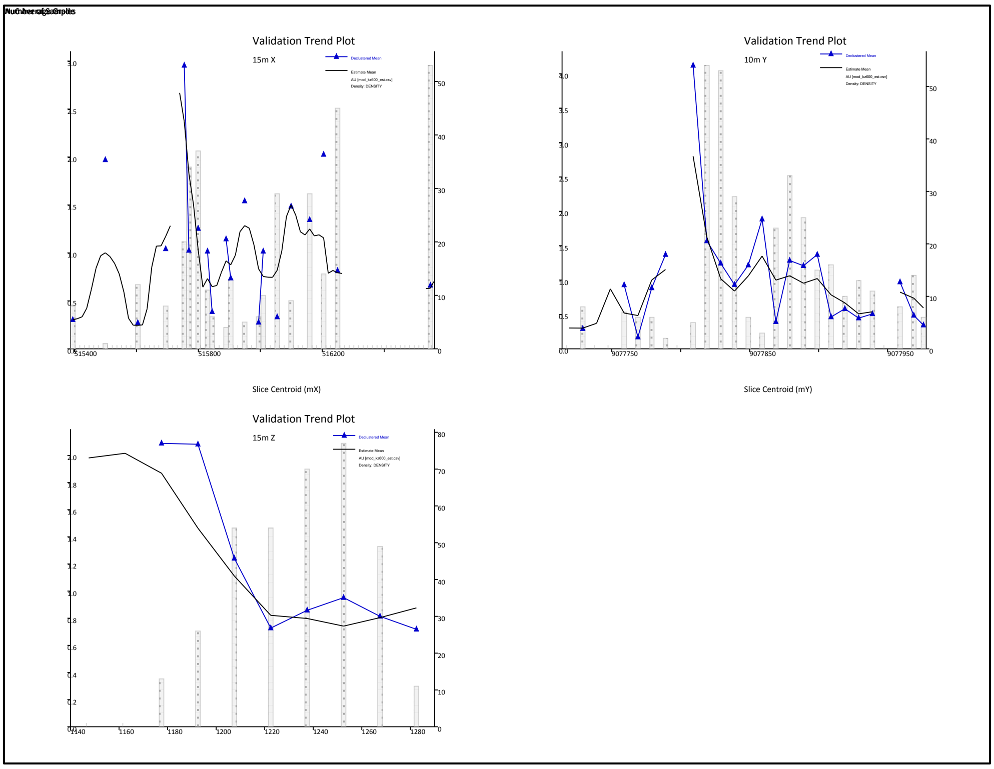


Figure 14.81 KZONE700 – Au g/t validation plots

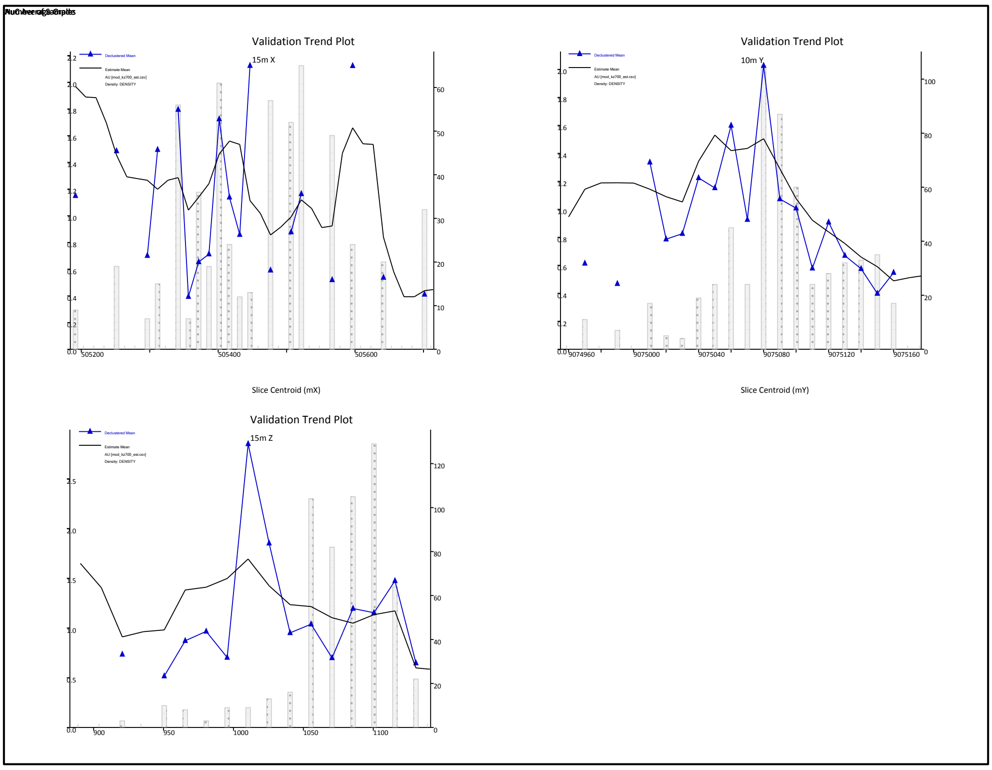


Figure 14.82 KZONE800 – Au g/t validation plots

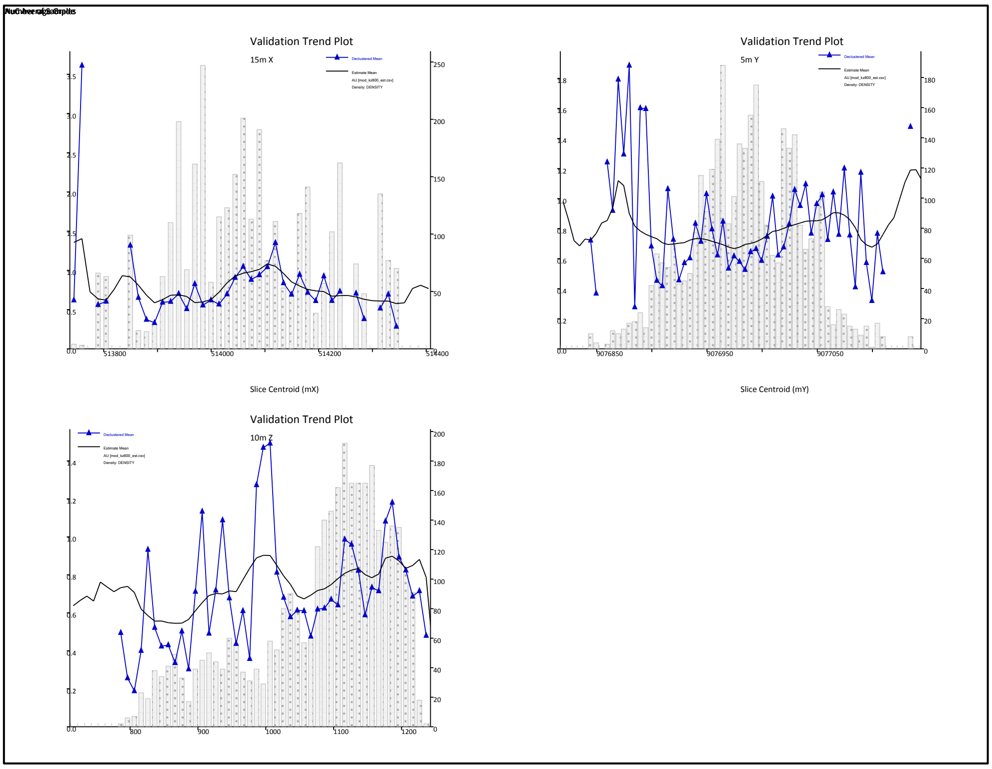
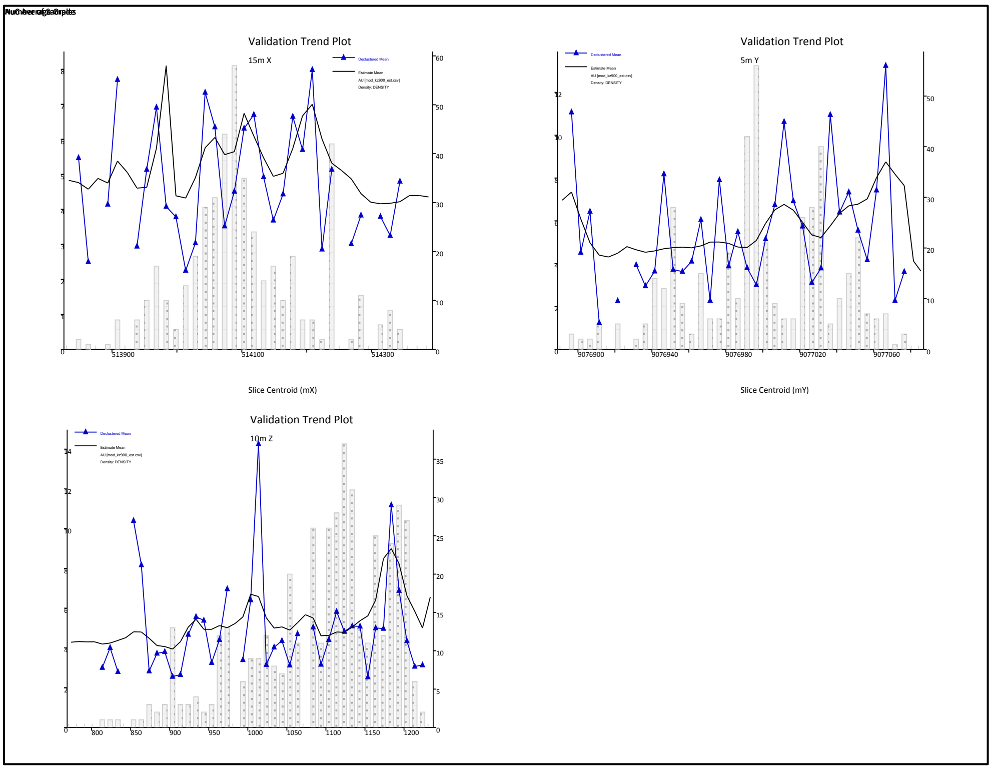


Figure 14.83 KZONE900 – Au g/t validation plots



14.5.3 Visual validation

Snowden inspected section slices to see if the input composite grades and estimated grades are visually comparable (Figure 14.84 to Figure 14.89).

Generally, the estimates compare well with the input data and show that the grades in the composites align with the corresponding grades in the block models. There is global smoothing of the grades into the parent cells.

Figure 14.84 Kenge Main – section view showing the block model and associated drillhole data, coloured on Au g/t

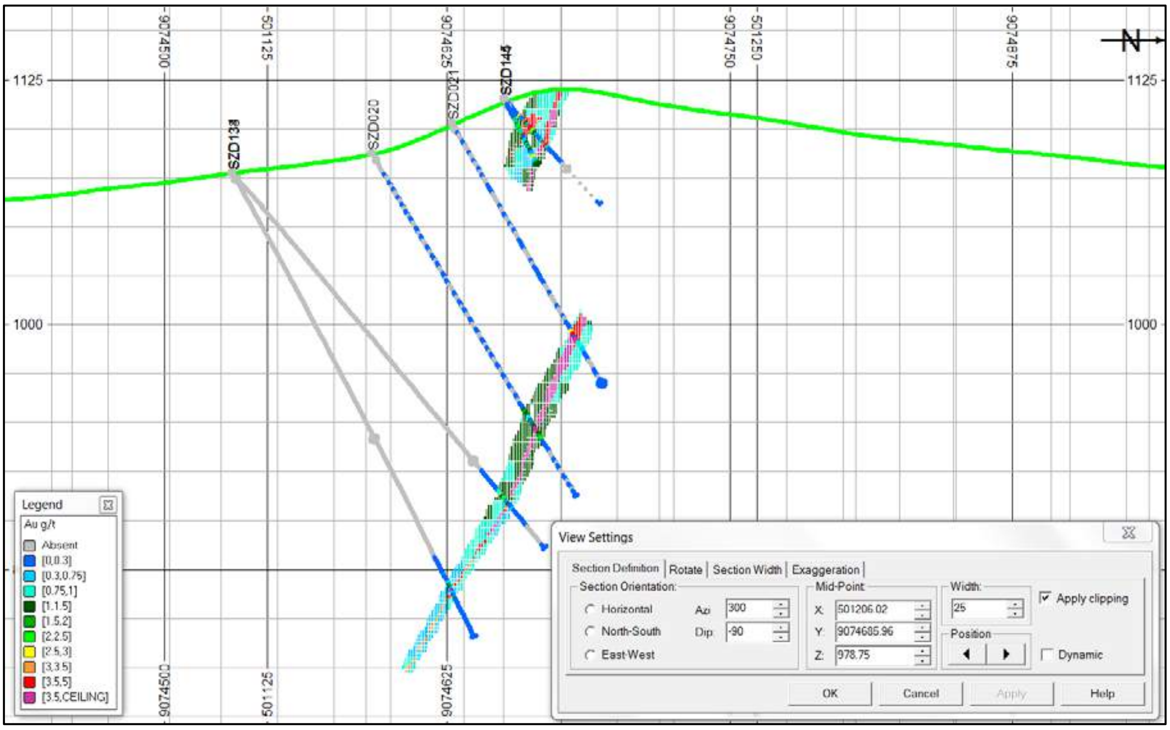


Figure 14.85 Mbenge – section view showing the block model and associated drillhole data, coloured on Au g/t

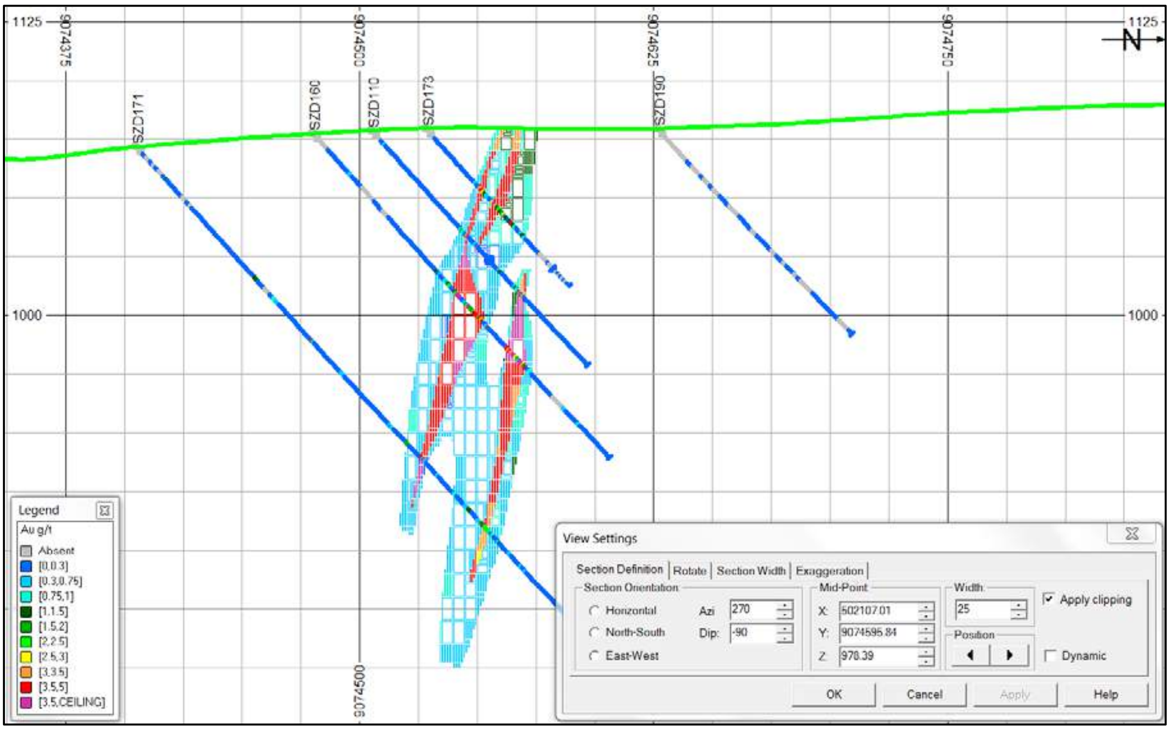


Figure 14.86 Snakebite – section view showing the block model and associated drillhole data, coloured on Au g/t

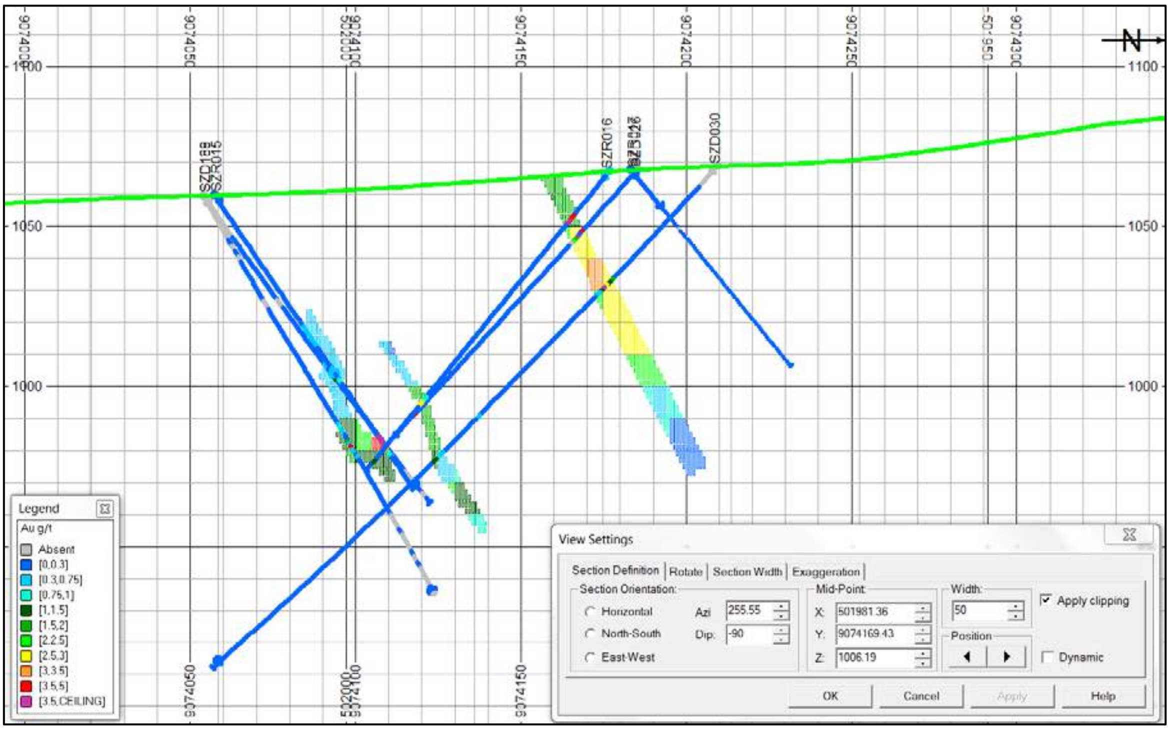


Figure 14.87 Gap – section view showing the block model and associated drillhole data, coloured on Au g/t

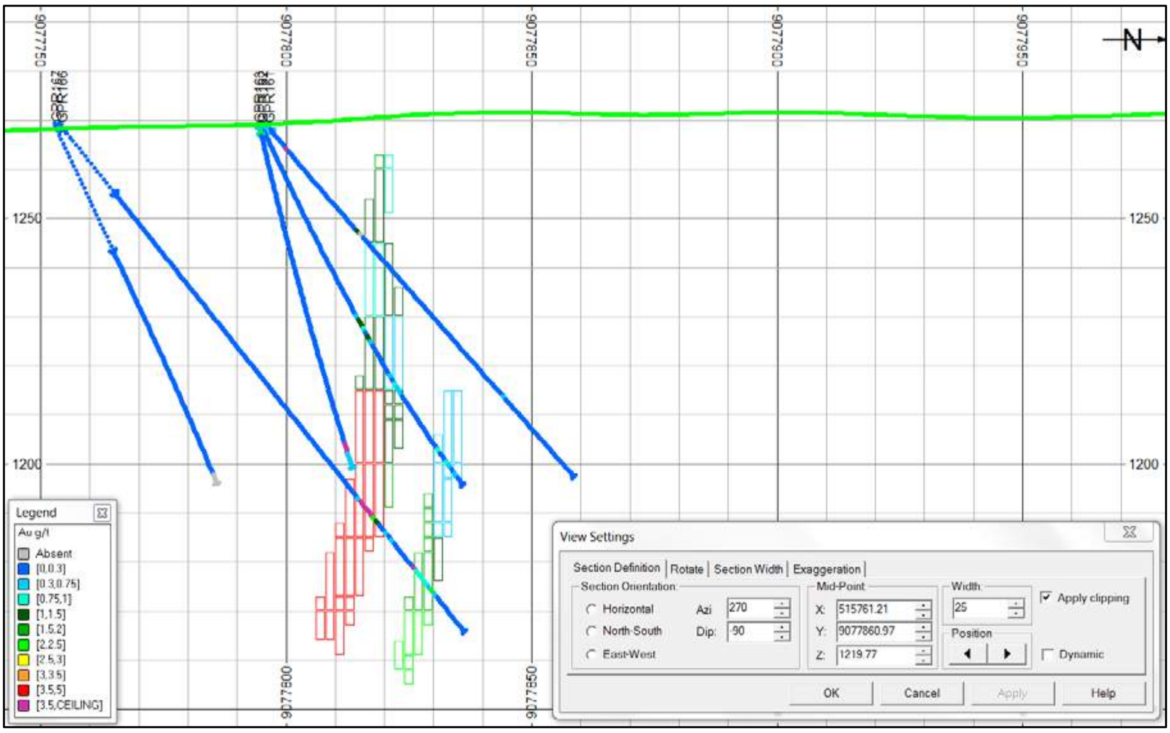


Figure 14.88 Konokono – section view showing the block model and associated drillhole data, coloured on Au g/t

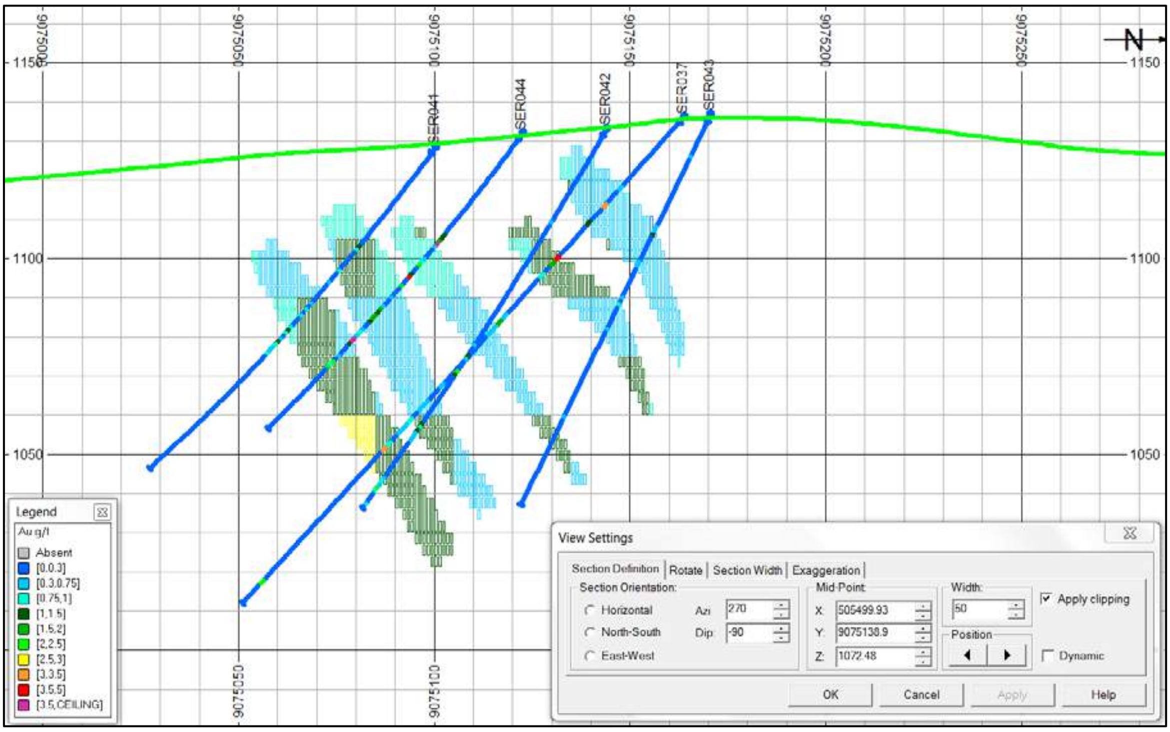
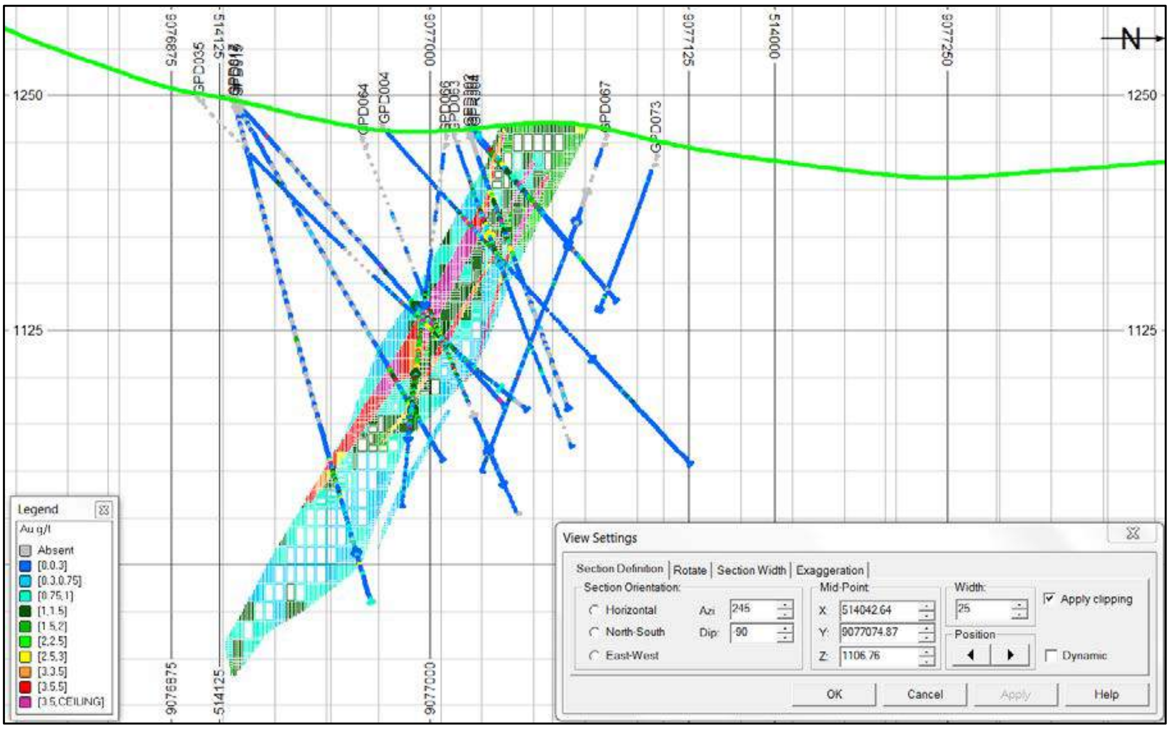


Figure 14.89 Porcupine Main – section view showing the block model and associated drillhole data, coloured on Au g/t



14.6 Mineral Resource classification

The definition of a Mineral Resource according to the CIM reporting code (2014) is:

A “Mineral Resource” is a concentration or occurrence of solid material of economic interest in or on the Earth’s crust in such form, grade or quality and quantity that there are reasonable prospects for eventual economic extraction. Material of economic interest refers to diamonds, natural solid inorganic material, or natural solid fossilised organic material including base and precious metals, coal, and industrial minerals.

The location, quantity, grade or quality, continuity and other geological characteristics of a Mineral Resource are known, estimated or interpreted from specific geological evidence and knowledge, including sampling.

The term Mineral Resource covers mineralisation and natural material of intrinsic economic interest which has been identified and estimated through exploration and sampling and within which Mineral Reserves may subsequently be defined by the consideration and application of Modifying Factors. The phrase ‘reasonable prospects for eventual economic extraction’ implies a judgment by the Qualified Person in respect of the technical and economic factors likely to influence the prospect of economic extraction.

Mineral Resources are subdivided, in order of increasing geological confidence, into Inferred, Indicated and Measured categories. An Inferred Mineral Resource has a lower level of confidence than that applied to an Indicated Mineral Resource. An Indicated Mineral Resource has a higher level of confidence than an Inferred Mineral Resource, but has a lower level of confidence than a Measured Mineral Resource:

- Implied continuity – Inferred Resource
- Assumed continuity – Indicated Resource
- Confirmed continuity – Measured Resource.

The estimated Mineral Resource has been classified according to the knowledge of and confidence in the geological and grade information. Factors taken into account during the classification of the models were:

- Data quality
- Drillhole distributions
- Search volume parameters during estimation
- Model validations against drillhole samples
- Geological controls for mineralisation
- Qualified Person's assessment/review.

Classification strings and wireframes were created at 10 m intervals in plan view using CAE Datamine Studio 3™. Areas were defined as Indicated Resources where drillhole spacing was generally within 25 mE by 25 mN. Estimated blocks outside the Indicated wireframes were classified as Inferred Resources.

Additionally, for blocks to be classified at the Indicated or Inferred level of classification, a general geological continuity should be shown. This was determined by the variography and the search volumes calculated from the variogram ranges.

A summary of the classification codes applied in the models are shown in Table 14.30.

Table 14.30 Description of classification codes used in the models

Class	Description
0	Not estimated – waste
1	Measured – none defined
2	Indicated
3	Inferred

Figure 14.90 to Figure 14.101 show examples of sectional slices and 3D views of the block models and their classification.

Figure 14.90 3D view showing the Kenge Main deposit, coloured on Mineral Resource classification

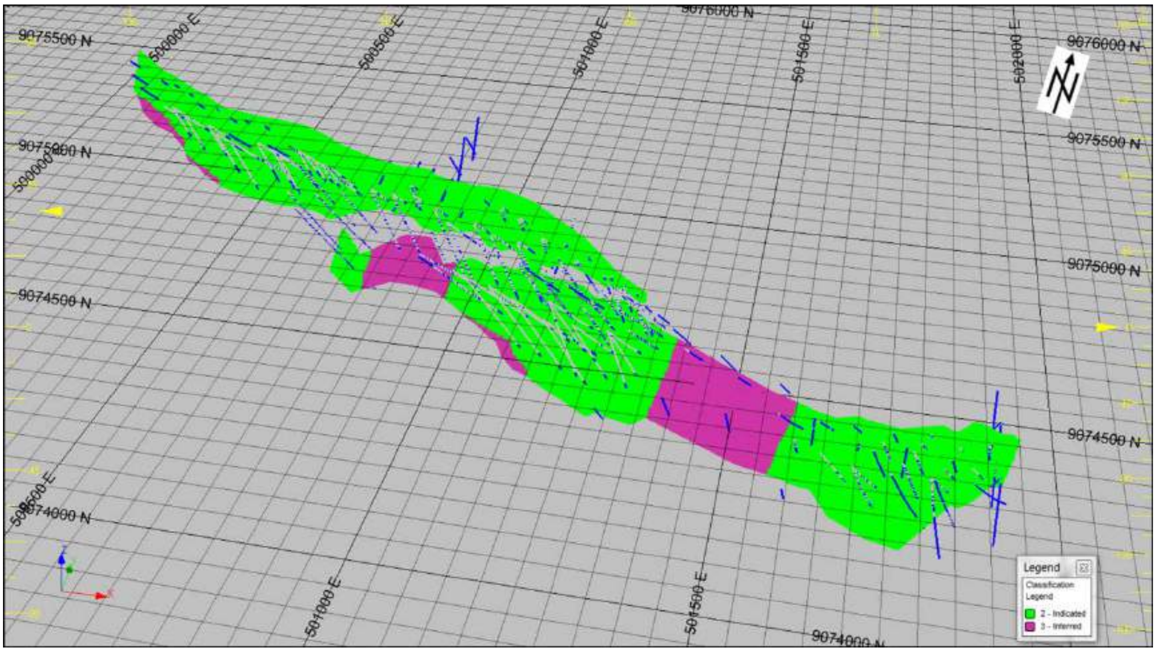


Figure 14.91 Section view through the Kenge Main deposit, coloured on Mineral Resource classification

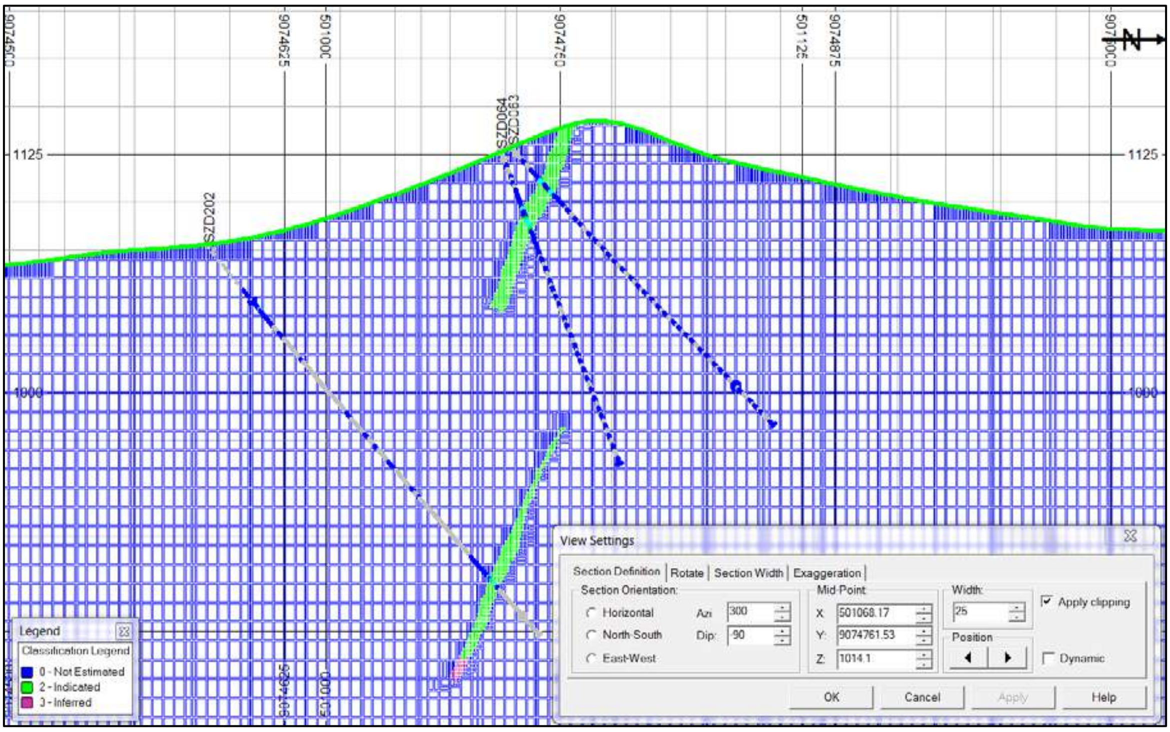


Figure 14.92 3D view showing the Mbenge deposit, coloured on Mineral Resource classification

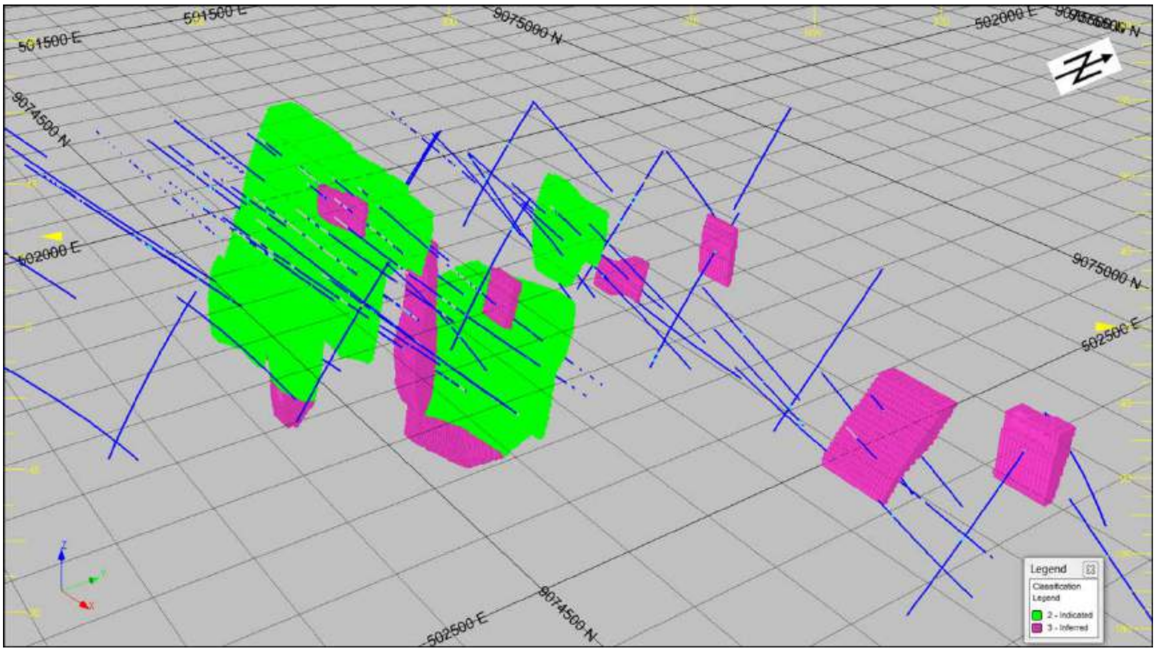


Figure 14.93 Section view through the Mbenge deposit, coloured on Mineral Resource classification

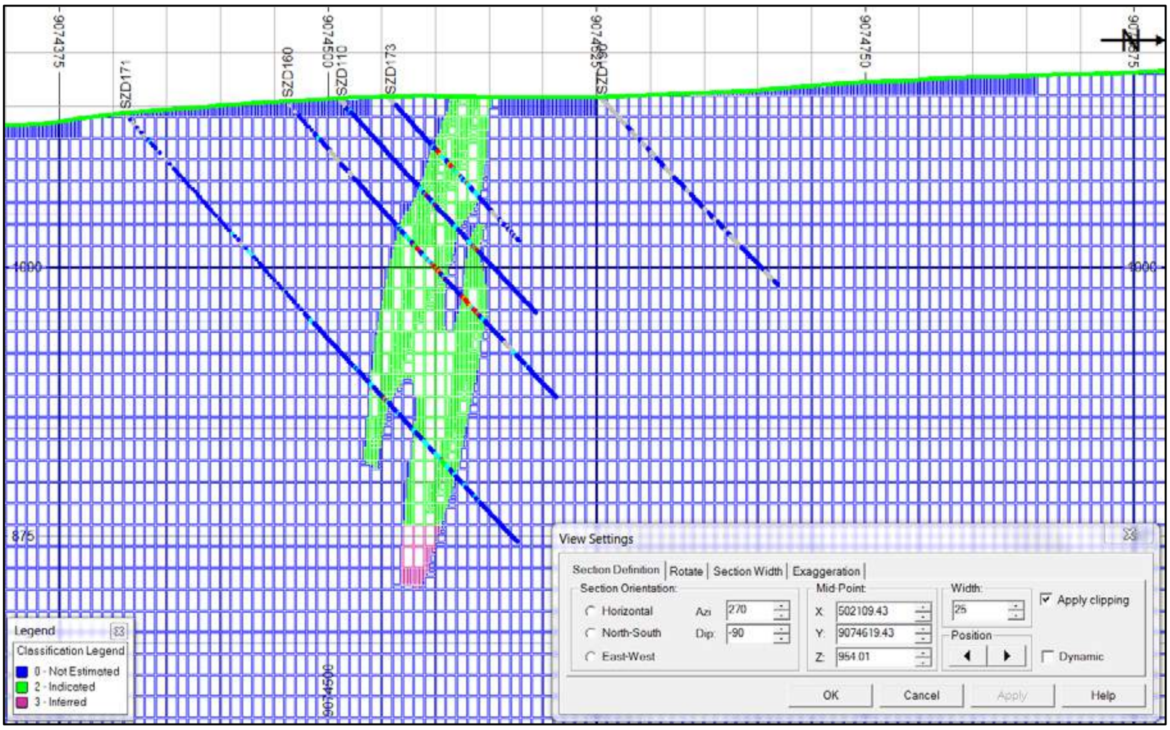


Figure 14.94 3D view showing the Snakebite deposit, coloured on Mineral Resource classification

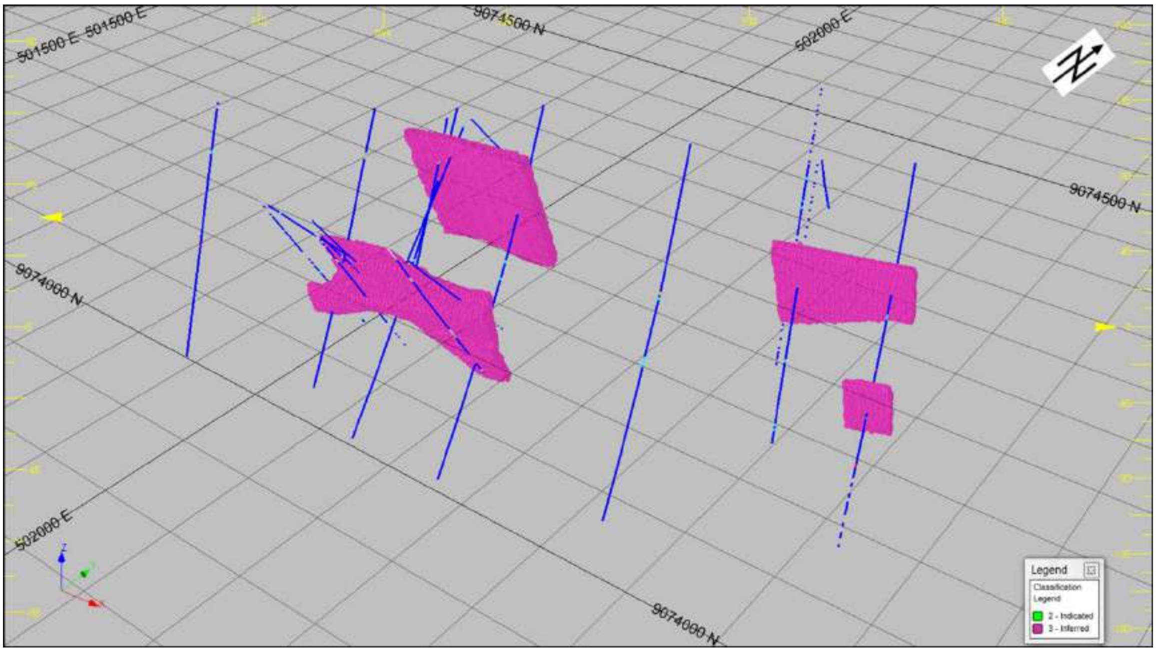


Figure 14.95 Section view through the Snakebite deposit, coloured on Mineral Resource classification

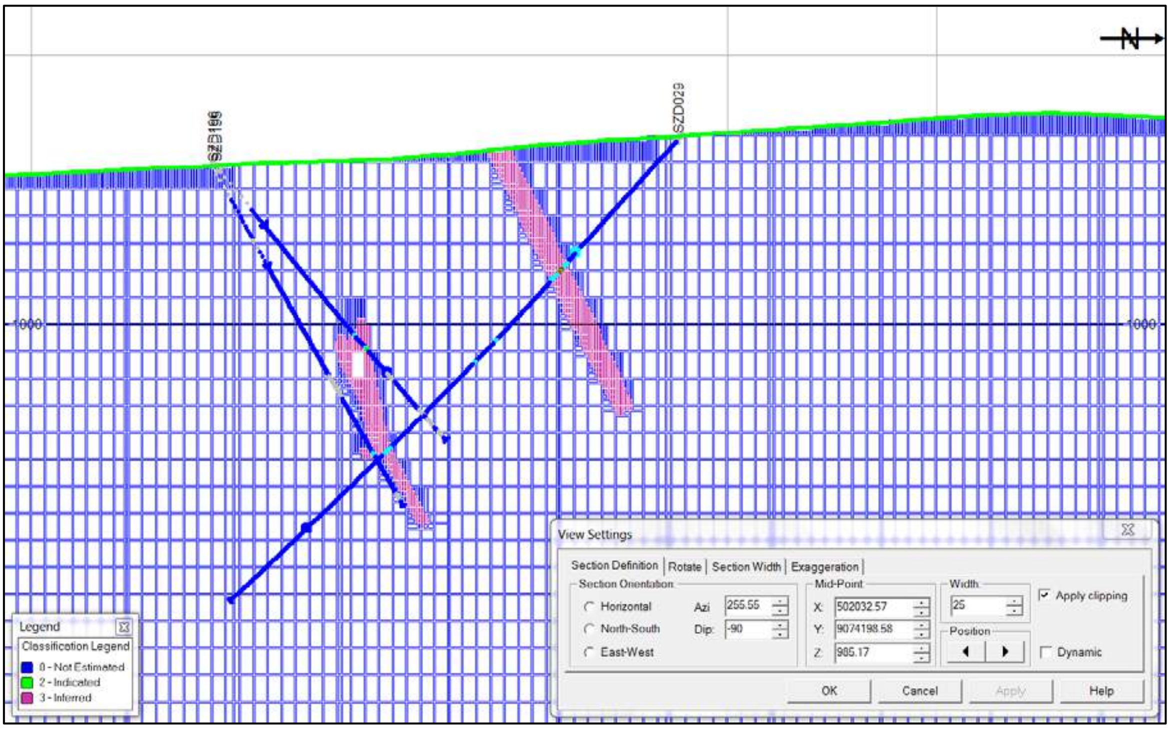


Figure 14.96 3D view showing the Gap deposit, coloured on Mineral Resource classification

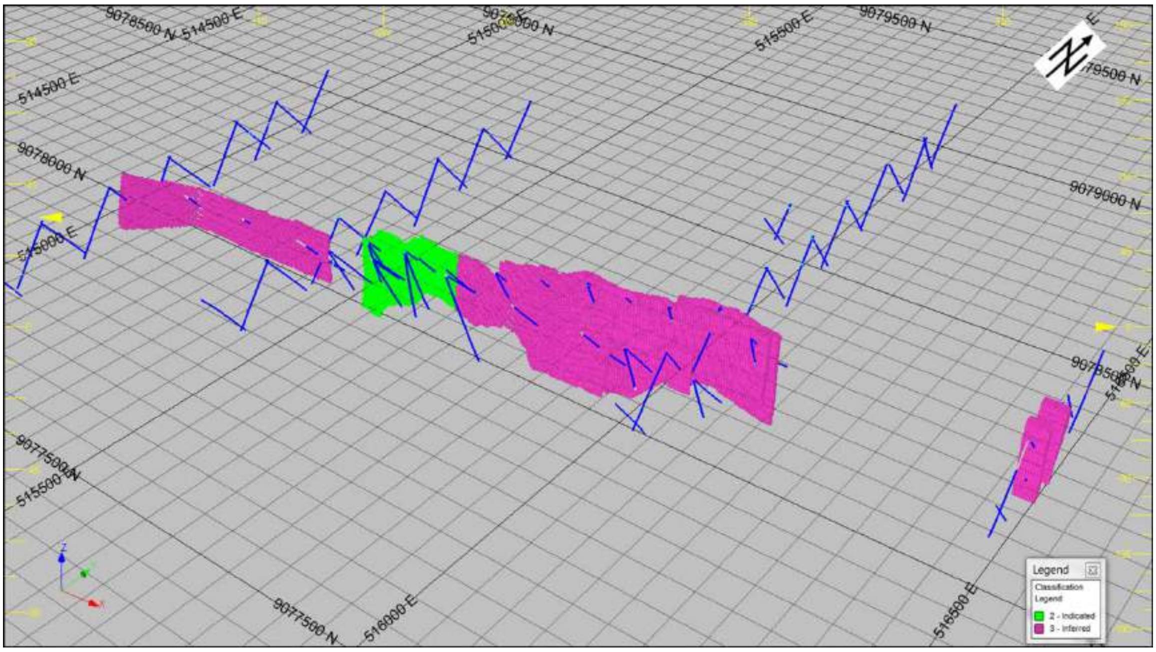


Figure 14.97 Section view through the Gap deposit, coloured on Mineral Resource classification

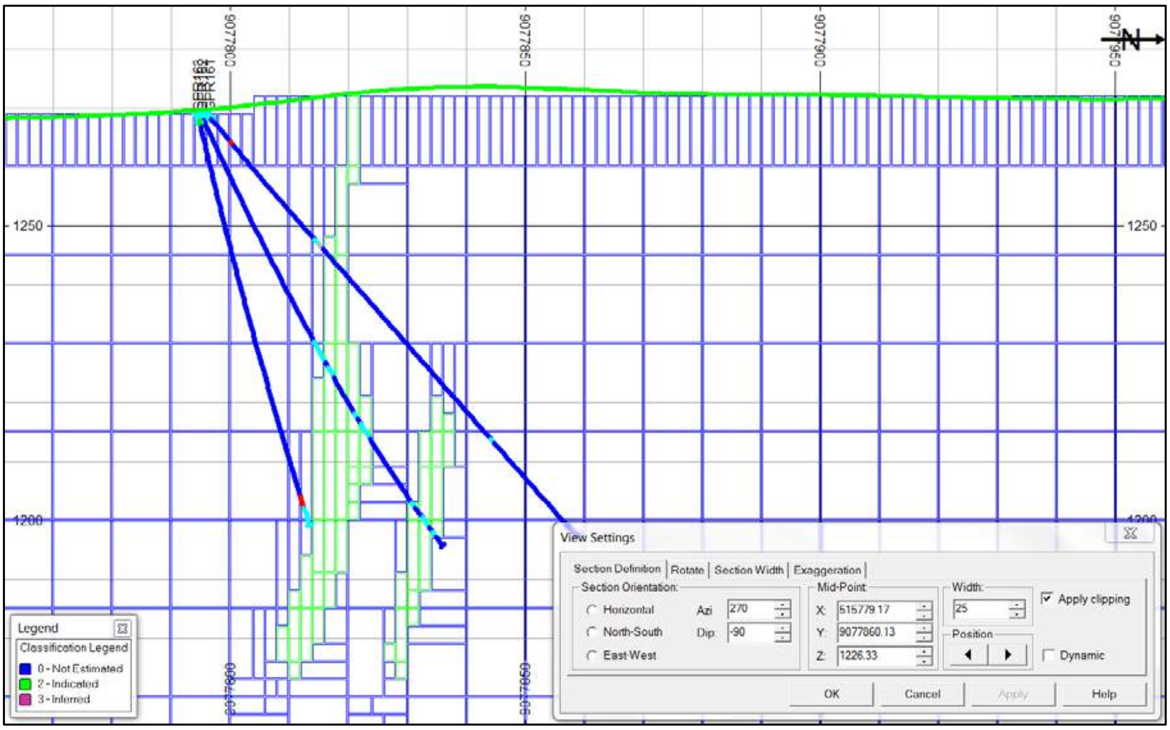


Figure 14.98 3D view showing the Konokono deposit, coloured on Mineral Resource classification

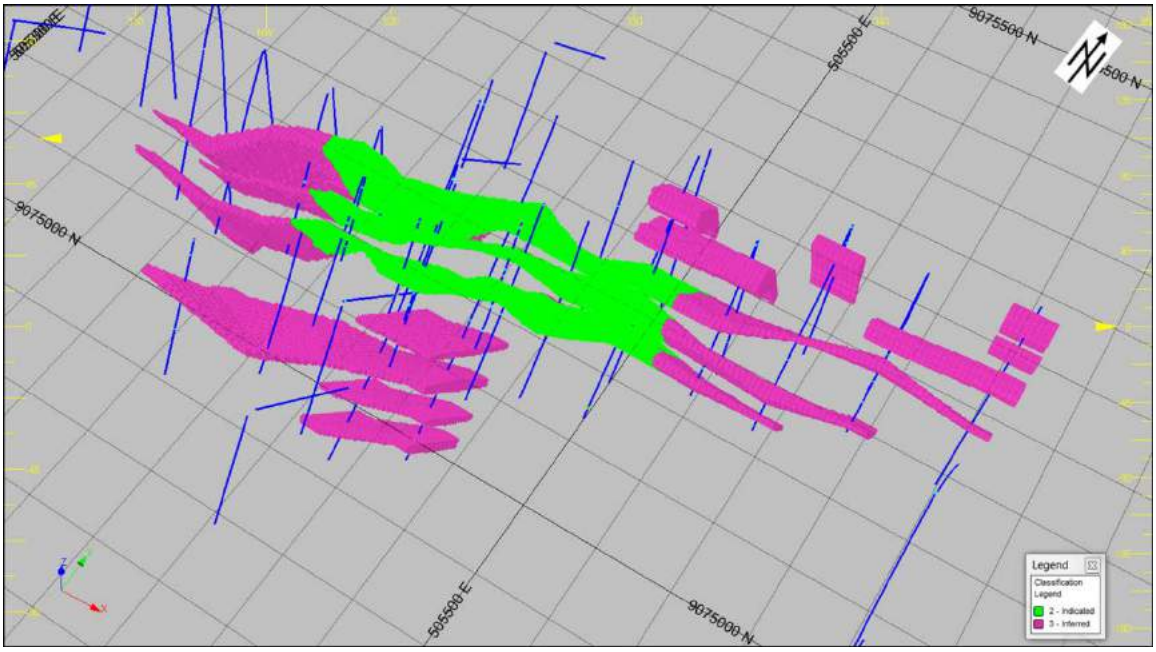


Figure 14.99 Section view through the Konokono deposit, coloured on Mineral Resource classification

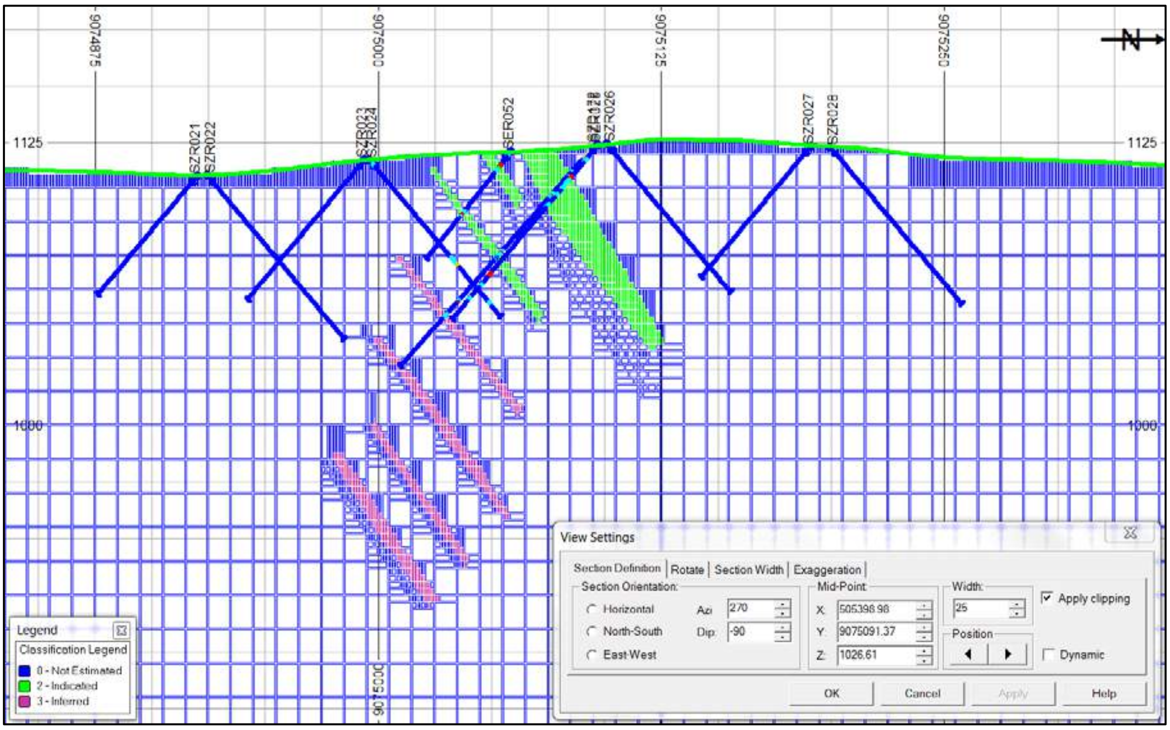


Figure 14.100 3D view showing the Porcupine Main deposit, coloured on Mineral Resource classification

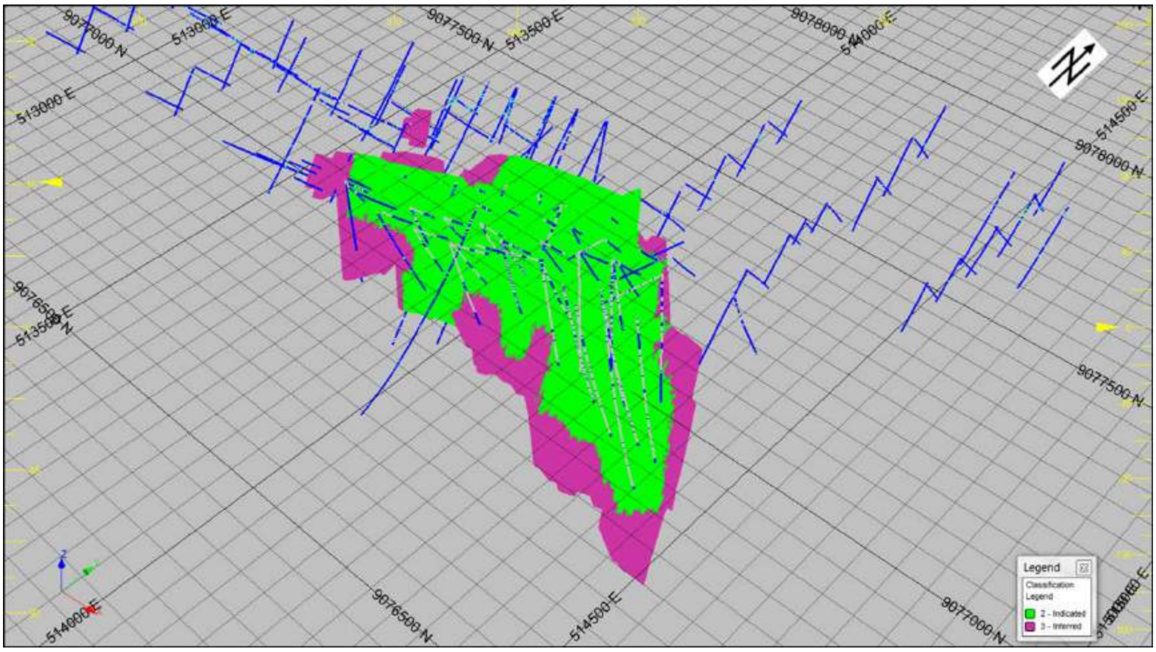
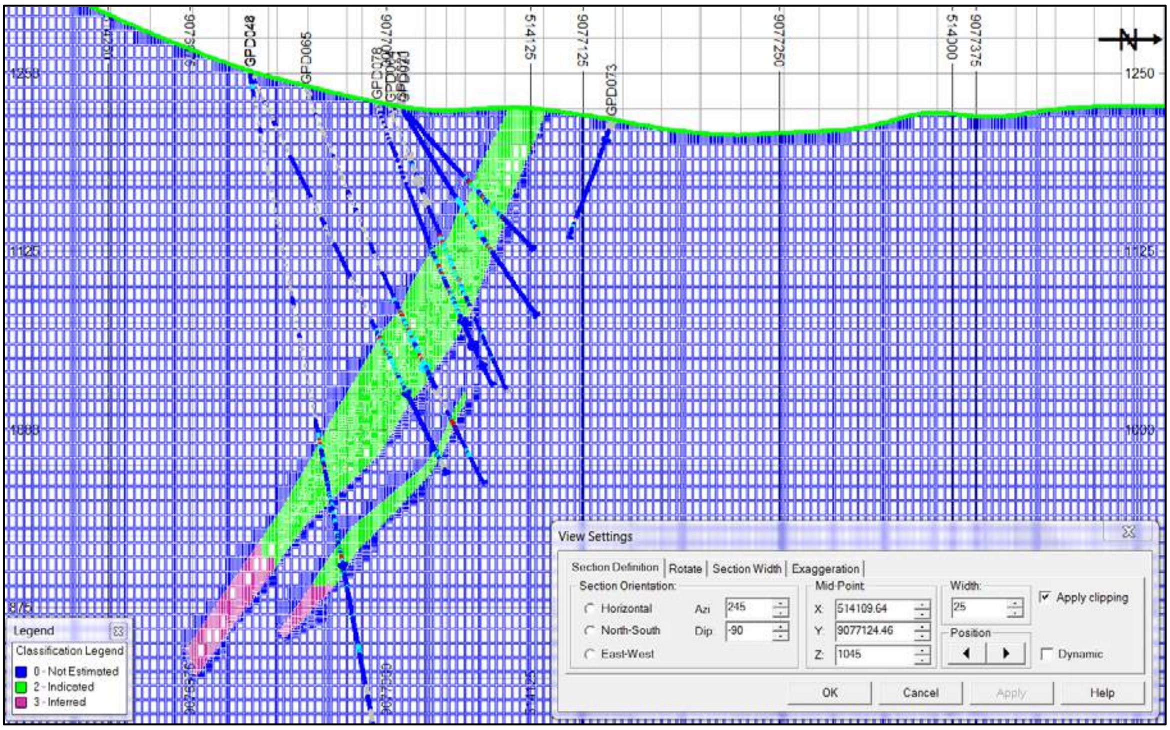


Figure 14.101 Section view through the Porcupine Main deposit, coloured on Mineral Resource classification



14.7 Mineral Resource reporting

Table 14.1 and Table 14.2 summarise the Mineral Resources by category and area. The classification categories of Indicated and Inferred reported here are according the CIM Definition Standards (CIM, 2014).

Mineral Resources that form part of this update (Kenge Main, Mbenge, Snakebite, Porcupine Main, Gap and Konokono) that have reasonable prospects of economic extraction by open pit mining are stated at a 0.5 g/t Au cut-off within US$1,400 pit shells. The Mineral Resources for these deposits that have reasonable prospects of economic extraction by underground mining are stated at a 2.5 g/t Au cut-off and fall outside the US$1,400 pit shells. Pit shells are discussed in Section 14.9.

For pit envelope constrained, the total Indicated Mineral Resource for all six deposits, the subject of this Report, is estimated at 5.9 Mt, grading at 1.8 g/t Au, with an additional Inferred Mineral Resource of 0.3 Mt, grading at 1.6 g/t Au. For the underground potential, the total Indicated Mineral Resource for all six deposits is estimated at 1.6 Mt, grading at 4.9 g/t Au, with an additional Inferred Mineral Resource of 0.2 Mt, grading at 3.8 g/t Au.

The total Indicated Mineral Resource for potential open pit and underground for the SMP sums to 7.5 Mt, grading at 2.4 g/t Au, for an equivalent of 590,000 oz Au. The sum of the total Inferred Mineral Resource for potential open pit and underground for the SMP is 0.6 Mt, grading at 2.5 g/t Au, for an equivalent of 45,000 oz Au.

14.8 Previous resource estimates

The current resource estimate is the fourth published for the SMP, with previous estimates being done by Golder in November 2010, SRK in February 2012 and CCIC in February 2014. The previous three Mineral Resource statements are provided in Table 14.31 to Table 14.33 below.

Table 14.31 Mineral Resource statement – Golder, November 2010

Category	Area	Tonnage (kt)	Grade (g/t Au)	Contained gold (koz)
Measured	Kenge Main	-	-	-
	Kenge SE	-	-	-
	Mbenge	-	-	-
Kenge Measured		**-**	**-**	**-**
Measured	Porcupine Main	5,882	1.5	274
	Porcupine NW	-	-	-
	Porcupine Quill	-	-	-
Porcupine Measured		**5,882**	**1.5**	**274**
Total Measured		**5,882**	**1.5**	**274**
Indicated	Kenge Main	2,224	1.4	100
	Kenge SE	205	1.7	11
	Mbenge	665	1.8	38
Kenge Indicated		**3,094**	**1.5**	**149**
Indicated	Porcupine Main	1,810	1.3	74
	Porcupine NW	-	-	-
	Porcupine Quill	-	-	-
Porcupine Indicated		**1,810**	**1.3**	**74**
Total Indicated		**4,904**	**1.4**	**223**
Inferred	Kenge Main	2,562	1.1	91
	Kenge SE	445	1.5	21
	Mbenge	1,124	1.4	49
Kenge Inferred		**4,131**	**1.2**	**161**
Inferred	Porcupine Main	2,315	1.3	96
	Porcupine NW	340	0.7	7
	Porcupine Quill	318	0.8	8
Porcupine Inferred		**2,973**	**1.2**	**111**
Total Inferred		**7,104**	**1.2**	**272**

Notes: Tonnage is reported in metric tonnes (t), grade as grams per tonne gold (g/t Au) and contained gold in troy ounces (oz Au). Tonnages rounded to the nearest 1,000 t. Ounces rounded to the nearest 1,000 oz Au. Figures may not compute exactly due to rounding.

Pit envelope constrained, the domained Mineral Resources are reported at a cut-off grade of 0.5 g/t Au.

Table 14.32 Mineral Resource statement – SRK, February 2012

Category	Area	Tonnage (kt)	Grade (g/t Au)	Contained gold (koz)
Measured	Kenge Main /Mbenge/Snakebite	2,600	1.5	120
	Porcupine	12,300	1.4	530
	Konokono	-	-	-
	Tumbili	-	-	-
Total Measured		**14,800**	**1.4**	**660**
Indicated	Kenge Main /Mbenge/Snakebite	6,100	1.3	250
	Porcupine	3,100	1.2	120
	Konokono	-	-	-
	Tumbili	-	-	-
Total Indicated		**9,200**	**1.2**	**360**
Inferred	Kenge Main /Mbenge/Snakebite	2,500	1.3	100
	Porcupine	3,300	0.9	90
	Konokono	1,000	1.1	30
	Tumbili	500	1.0	10
Total Inferred		**7,300**	**1.1**	**250**

Notes: Tonnage is reported in metric tonnes (t), grade as grams per tonne gold (g/t Au) and contained gold in troy ounces (oz Au). Tonnages rounded to the nearest 100,000 t. Ounces rounded to the nearest 10,000 oz Au. Figures may not compute exactly due to rounding.

Pit envelope constrained, the undomained Mineral Resources are reported at a cut-off grade of 0.5 g/t Au.

Table 14.33 Mineral Resource statement – CCIC, February 2014

Category	Area	Tonnage (kt)	Grade (g/t Au)	Contained gold (koz)
Indicated	Kenge Main	2,410	2.55	197
	Mbenge	1,180	1.6	62
Kenge Indicated		**3,590**	**2.2**	**259**
Indicated	Porcupine Main	5,850	2.0	369
Porcupine Indicated		**5,850**	**2.0**	**369**
Total Indicated		**9,440**	**2.1**	**628**
Inferred	Kenge Main	650	1.6	33
	Mbenge	380	1.6	20
Kenge Inferred		**1,030**	**1.6**	**53**
Inferred	Porcupine Main	2,590	1.5	127
Porcupine Inferred		**2,590**	**1.5**	**127**
Total Inferred		**3,620**	**1.5**	**180**
GRAND TOTAL (Indicated + Inferred)		**13,060**	**1.9**	**807**

Notes: Tonnage is reported in metric tonnes (t), grade as grams per tonne gold (g/t Au) and contained gold in troy ounces (oz Au). Tonnages rounded to the nearest 10,000 t. Ounces rounded to the nearest 1,000 oz Au. Figures may not compute exactly due to rounding.

Pit envelope constrained, the undomained Mineral Resources are reported at a cut-off grade of 1.0 g/t Au.

Changes from the Golder (2010) to the SRK (2012) estimates are summarised below:

- Golder used 0.5 g/t Au as a guideline for the Kenge domaining and applied a 3D estimation methodology. SRK used 0.3 g/t Au as well as lithology as a domaining guideline and applied a 2D estimation methodology
  - The result was that SRK reported a higher tonnage at a lower grade
- Additional drilling was done at Porcupine between the Golder and the SRK estimates. This additional drilling was for lateral extensions and for infill, resulting in an increase in tonnage and a decrease in grade.

Changes from the SRK (2012) to the CCIC (2014) estimates are summarised below:

- A 3D estimation methodology was used by CCIC instead of the 2D method used by SRK, since it was considered more appropriate for narrow, shear hosted gold deposits
- Three additional drillholes were drilled in Kenge Main between the SRK and CCIC estimates, which confirmed the interpretation of a plunge in the mineralisation towards the northwest
  - This led to the inclusion of a high grade core within the mineralised domain. CCIC are quoted as using a 1.0 g/t Au cut-off as opposed to 0.5 g/t Au for SRK
  - These changes resulted in a decrease in tonnage but increase in grade
- There was no additional drilling at either Mbenge or Porcupine Main
  - At Porcupine Main, the mineralised domain was more tightly constrained at depths and in areas with lesser data, resulting in a decrease in volume
  - CCIC are stated as using a 1.0 g/t Au cut-off compared to the 0.5 g/t Au by SRK
  - These have resulted in a decrease in tonnage and increase in grades.

Changes from the SRK (2012) and CCIC (2014) to the Snowden (2015) estimates are discussed below. Snowden rebuilt and updated the Kenge Main, Mbenge, Snakebite, Porcupine Main, Gap and Konokono resource models, based on the reinterpretation of the geostatistical data, additional drilling and a better understanding of the geology and structure.

14.8.1 Kenge Main

CCIC constructed a domained model based on a 0.3 g/t Au cut-off for the low-grade mineralisation and a 3.0 g/t Au cut-off for the internal high-grade mineralisation. There was no additional drilling at Kenge Main. Snowden re-analysed the data and changed the cut-off Au grade for the internal high-grade mineralisation modelling to 2.5 g/t Au. Wireframe volume extensions were extrapolated to half of the drillhole spacing, both laterally and with depth, following the mineralisation trend. The combined effect of these changes resulted in a decrease in tonnage but an increase in grade (Table 14.34).

The current Mineral Resource is quoted using a 0.5 g/t Au cut-off for open pit potential and a 2.5 g/t Au cut-off for underground potential, applying economic parameters in the form of a US$1,400 pit shell. CCIC used a 1.0 g/t Au cut-off for reporting the pit envelope constrained. This resulted in a decrease in total ounces.

14.8.2 Mbenge

CCIC constructed two models for Mbenge, a domained model based on a 0.3 g/t Au cut-off for the low-grade mineralisation and a 3.0 g/t Au cut-off for the internal high-grade mineralisation, and an undomained model based only on a 0.3 g/t Au cut-off for the total mineralisation. There was no additional drilling at Mbenge. Snowden re-analysed the data and changed the cut-off Au grade for the internal high-grade mineralisation modelling to 2.5 g/t Au. Based on the analyses and drillhole logging, an internal high-grade domain can be separated out and modelled from section to section and as such, Snowden constructed only one model, which was domained. Wireframe volume extensions were extrapolated to half of the drillhole spacing, both laterally and with depth, following the mineralisation trend. The combined effect of these changes resulted in an increase in tonnage and a small decrease in grade (Table 14.34).

The current Mineral Resource is quoted using a 0.5 g/t Au cut-off for open pit potential and a 2.5 g/t Au cut-off for underground potential, applying economic parameters in the form of a US$1,400 pit shell. CCIC used a 1.0 g/t Au cut-off for reporting the pit envelope constrained. This resulted in a decrease in total ounces reported.

14.8.3 Snakebite

SRK constructed a single, undomained model for Mbenge South (Snakebite) on 2 m composited data, at a 0.3 g/t Au cut-off. There was no additional drilling at Snakebite. Snowden constructed only one model, which was undomained, on 1 m composited data, also at a 0.3 g/t Au cut-off. Wireframe volume extensions were extrapolated to half of the drillhole spacing, both laterally and with depth, following the mineralisation trend. The effect of the changes in the wireframe volumes resulted in a decrease in tonnage and an increase in grade (Table 14.34).

The current Mineral Resource is quoted using a 0.5 g/t Au cut-off for open pit potential and a 2.5 g/t Au cut-off for underground potential, applying economic parameters in the form of a US$1,400 pit shell. SRK used a 0.5 g/t Au cut-off for reporting the pit envelope constrained. This resulted in a decrease in total ounces reported.

14.8.4 Porcupine Main

Two models for Porcupine Main were constructed by CCIC, an undomained model based only on a 0.3 g/t Au cut-off for the total mineralisation, and a domained model based on a 0.3 g/t Au cut-off for the low-grade mineralisation and a 3.0 g/t Au cut-off for the internal high-grade mineralisation. There were six additional diamond drillholes in Porcupine Main to confirm the interpretation and extension of the plunge in the mineralisation towards the southeast. Snowden re-analysed the data and changed the cut-off Au grade for the internal high-grade mineralisation modelling to 2.5 g/t Au. Based on the analyses and drillhole logging, an internal high-grade domain can be separated out and modelled as high-grade veins from section to section and as such, Snowden constructed only one model, which was domained. Wireframe volume extensions were extrapolated to half of the drillhole spacing, both laterally and with depth, following the mineralisation trend. The combined effect of these changes resulted in an increase in both tonnage and grade (Table 14.34).

The current Mineral Resource is quoted using a 0.5 g/t Au cut-off for potential open pittable material and a 2.5 g/t Au cut-off for potential underground mineable material, applying economic parameters in the form of a US$1,400 pit shell. CCIC used a 1.0 g/t Au cut-off for reporting the open pit potential. This resulted in a decrease in total ounces reported.

14.8.5 Gap

No previous Mineral Resource model is available for Gap. During 2014, an additional 25 RC drillholes were drilled at Gap to confirm the structural controls and the extension of the mineralisation along strike and across dip.

The current Mineral Resource is quoted using a 0.5 g/t Au cut-off for pit envelope constrained and a 2.5 g/t Au cut-off for underground potential, applying economic parameters in the form of a US$1,400 pit shell. This resulted in additional ounces for the reported SMP Mineral Resource.

14.8.6 Konokono

A single, undomained model for Konokono on 2 m composited data, at a 0.3 g/t Au cut-off was constructed by SRK. There were subsequently 24 additional RC drillholes in Konokono to confirm the interpretation and extension of the mineralisation along strike and across dip, as well as infill drilling. Snowden constructed only one model, which was undomained, on 1 m composited data, also at a 0.3 g/t Au cut-off. Wireframe volume extensions were extrapolated to half of the drillhole spacing, both laterally and with depth, following the mineralisation trend. The effect of the changes in the wireframe volumes resulted in an increase in both tonnage and grade (Table 14.34).

The current Mineral Resource is quoted using a 0.5 g/t Au cut-off for open cut potential and a 2.5 g/t Au cut-off for underground potential, applying economic parameters in the form of a US$1,400 pit shell. SRK used a 0.5 g/t Au cut-off for reporting the pit envelope constrained. This has resulted in an increase in total ounces reported.

The difference percentage between the previous and the updated 2015 numbers, for total Mineral Resources (Indicated and Inferred) with a 1.0 g/t Au cut-off and no economic constraints applied, is shown in Table 14.34.

Table 14.34 Summary table of percentage difference of the SMP deposit Mineral Resources, at a 1.0 g/t Au cut-off and no economic constraints applied, CCIC (2014) vs. Snowden (2015) and SRK (2012) vs. Snowden (2015) for deposits excluded in the CCIC (2014) estimates

Estimates	Volume	Tonnes (Mt)	Density (g/cm^3)	Grade (g/t Au)	Ounces (koz)
Kenge Main – Indicated and Inferred					
CCIC (2014)	1,214,000	3,327	2.74	2.3	244
Snowden (2015)	982,000	2,704	2.75	2.4	212
Difference	**-19%**	**-19%**	**+1%**	**+7%**	**-13%**
Mbenge – Indicated and Inferred					
CCIC (2014)	188,000	510	2.71	3.1	51
Snowden (2015)	234,000	634	2.71	3.0	62
Difference	**+24%**	**+24%**	**0%**	**-2%**	**+22%**
Snakebite – Indicated and Inferred					
SRK (2012)	229,000	620	2.71	1.8	35
Snowden (2015)	101,000	278	2.76	2.2	20
Difference	**-56%**	**-55%**	**+2%**	**+23%**	**-45%**
Porcupine Main – Indicated and Inferred					
CCIC (2014)	1,327,000	3,490	2.63	2.5	283
Snowden (2015)	1,764,000	4,657	2.64	2.6	383
Difference	**+33%**	**+33%**	**0%**	**+1%**	**+35%**
Konokono – Indicated and Inferred					
SRK (2012)	190,000	501	2.63	1.3	21
Snowden (2015)	412,000	1,087	2.64	1.7	59
Difference	**+116%**	**+117%**	**0%**	**+29%**	**+180%**

Volume is reported in metric cubes (m^3). Tonnage is reported in Million metric tonnes (Mt), grade as gram per tonne gold (g/t Au) and contained gold in troy ounces (oz Au). Volume and tonnages rounded to the nearest 1,000. Ounces rounded to the nearest 1,000 oz Au. Figures may not compute exactly due to rounding.

The tonnages reported are on a like for like basis, but are not the current Mineral Resource that is constrained by pit shells and a cut-off grade outside of the pit shells.

The grade-tonnage curves for the Mineral Resource models, with no cut-off or economic parameters applied are shown in Figure 14.102 to Figure 14.107. The previous Mineral Resource models were regularised to the block sizes used for the Mineral Resource models in the current update, to enable direct comparison between the Mineral Resource models.

Figure 14.102 Kenge Main deposit grade-tonnage curves – CCIC (2014) vs. Snowden (2015)

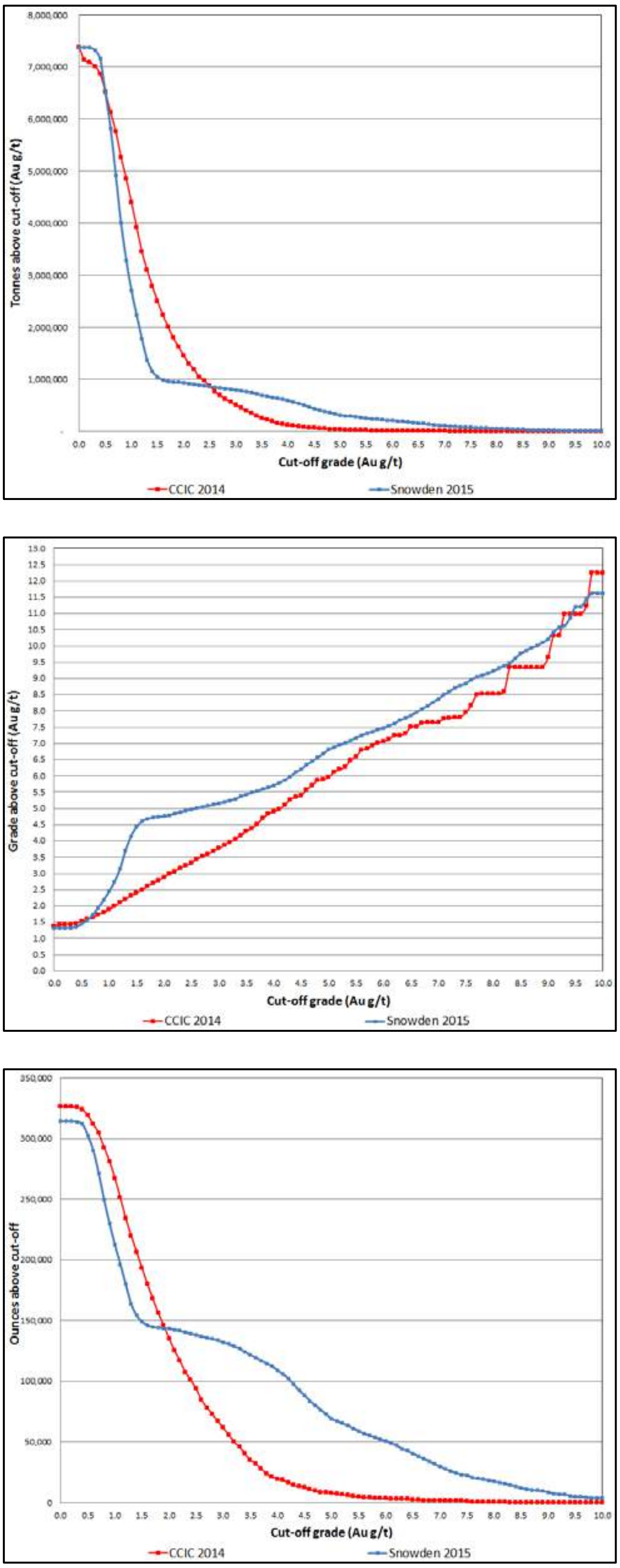


Figure 14.103 Mbenge deposit grade-tonnage curves – CCIC (2014) vs. Snowden (2015)

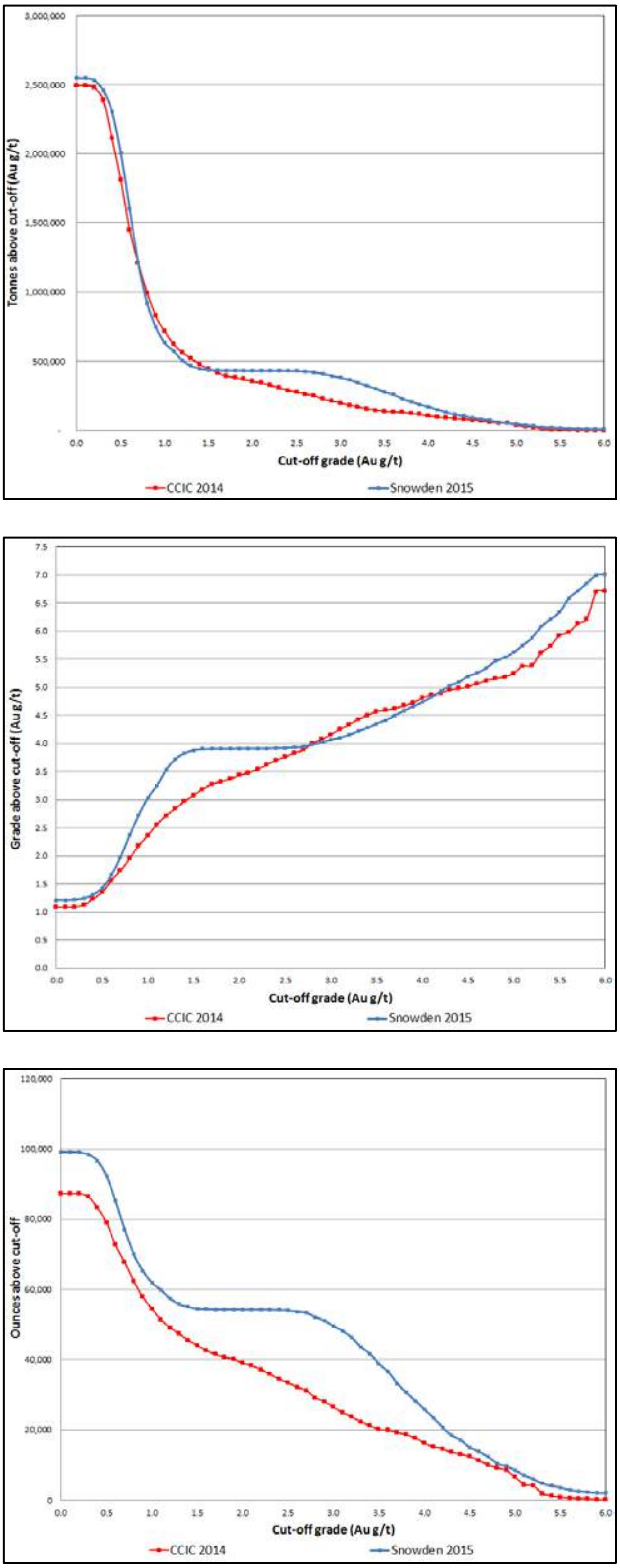
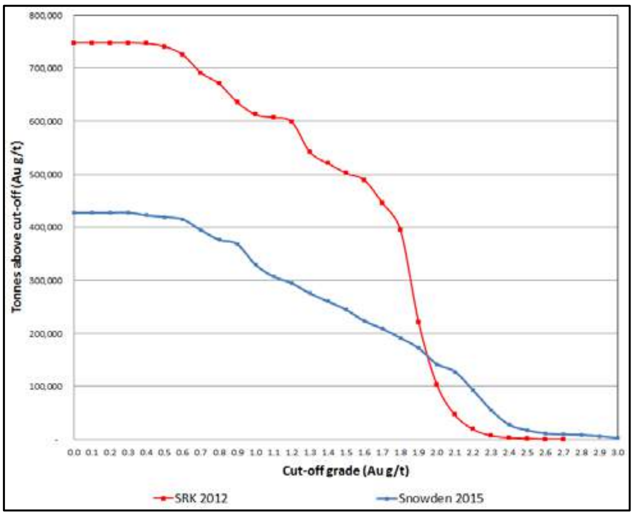
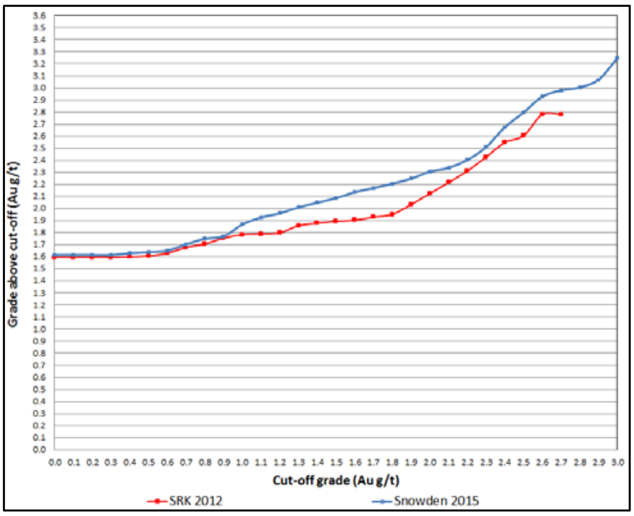


Figure 14.104 Snakebite deposit grade-tonnage curves – SRK (2012) vs. Snowden (2015)





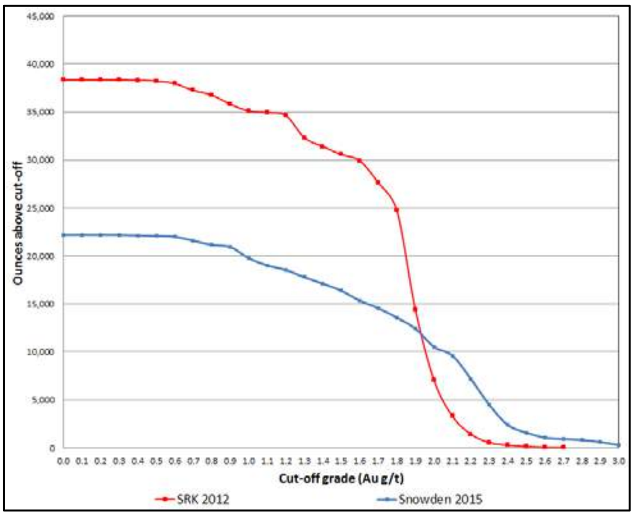


Figure 14.105 Porcupine Main deposit grade-tonnage curves – CCIC (2014) vs. Snowden (2015)

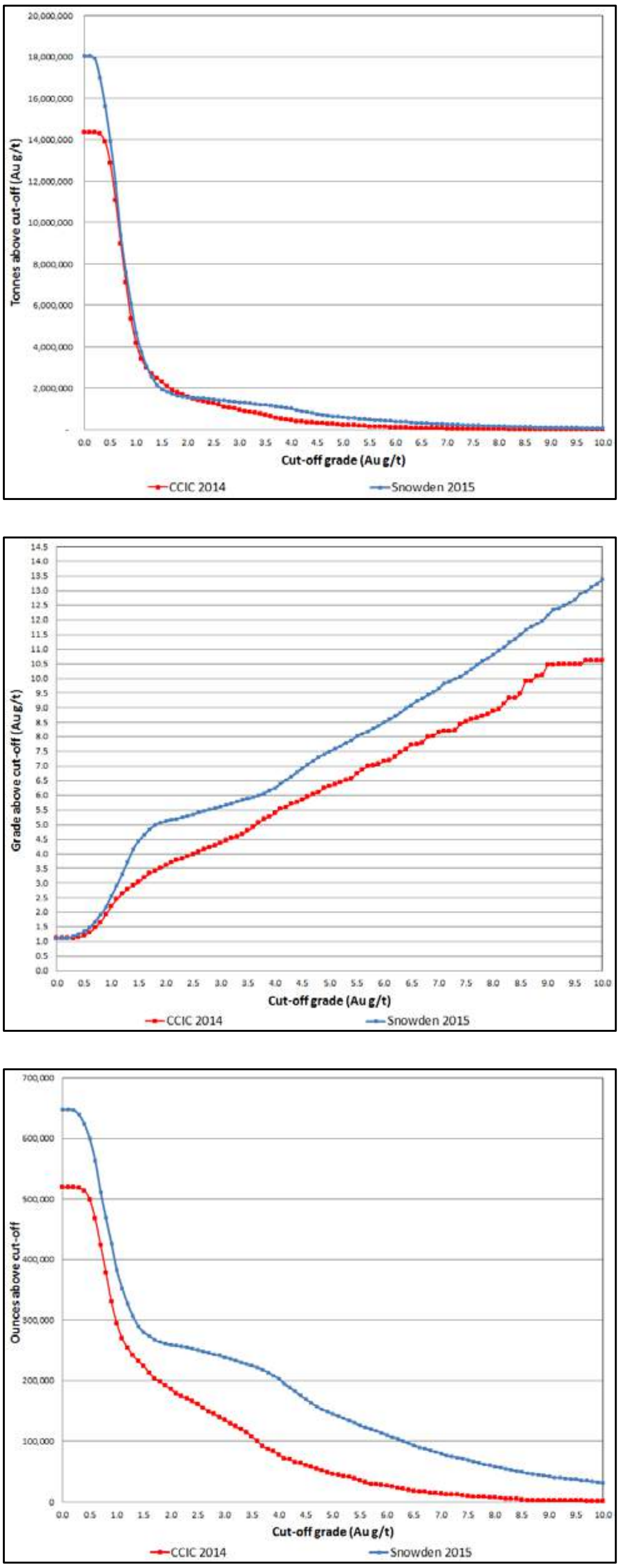
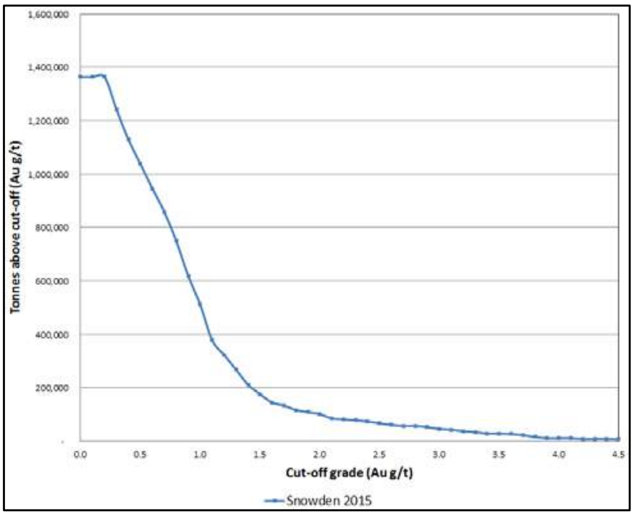
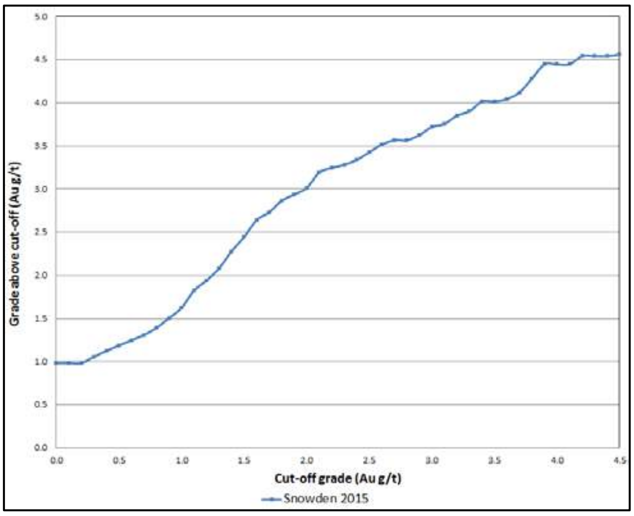


Figure 14.106 Gap deposit grade-tonnage curves – Snowden (2015)





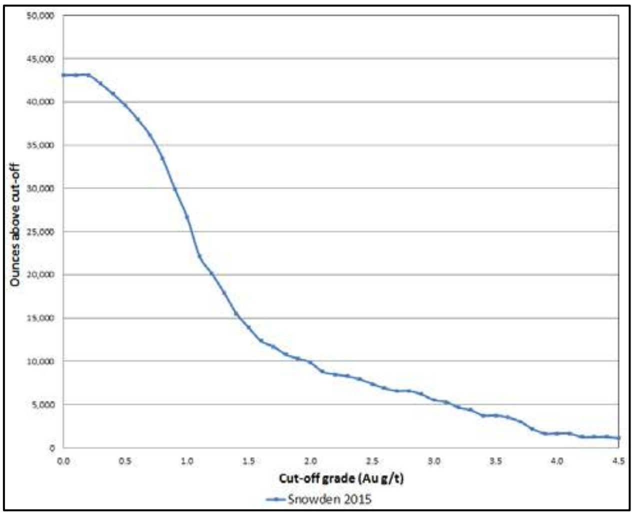
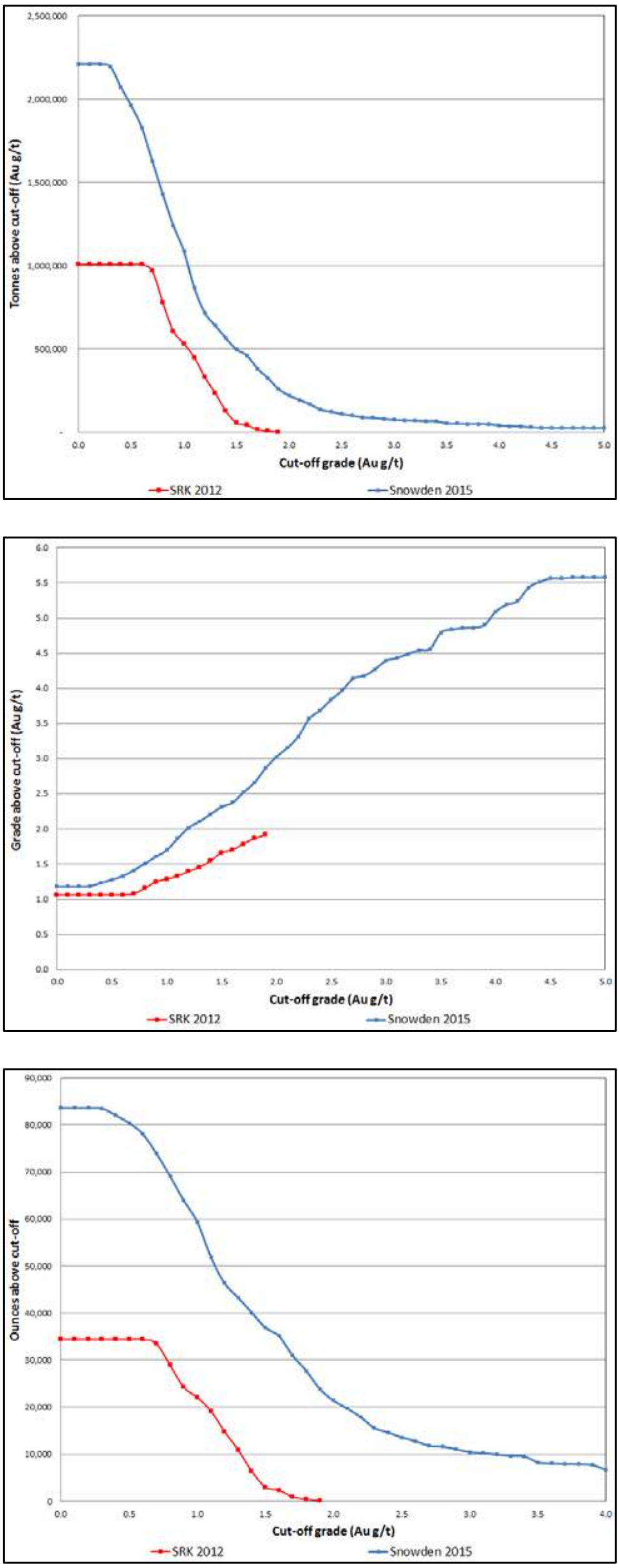


Figure 14.107 Konokono deposit grade-tonnage curves – SRK (2012) vs. Snowden (2015)



14.9 Pit shells

Any Mineral Resource reported in accordance with CIM (2014) is required to have reasonable prospects for eventual economic extraction. This reasonableness test covers both mining and processing aspects, and anything else material that might be considered during the evaluation of a Resource.

This was determined through a pit shell study of the Mineral Resources estimated for the SMP during 2015. Also taken into consideration were the high grade domains at depth beyond the open pit limits to assess the potential for underground mining.

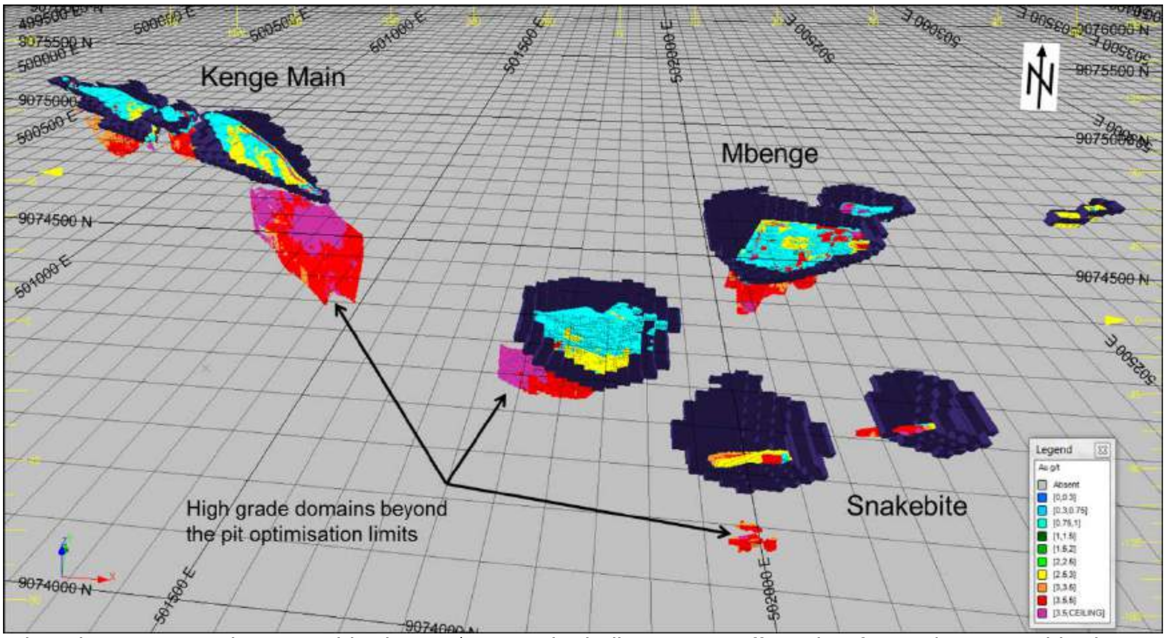
The block models were imported into Whittle™ software, and pit shells determined according to parameters agreed by Helio and Snowden as being reasonable. These are summarised in Table 14.35 below. Figure 14.108 to Figure 14.111 below illustrate 3D views of the Kenge Main, Mbenge, Snakebite, Porcupine Main, Gap and Konokono deposits. The US$1,400 per ounce pit shells are superimposed on top of the deposits. For Kenge Main, Mbenge and Porcupine Main, substantial high-grade mineralisation occurs below the pit limits and presents an opportunity for underground mining.

Table 14.1 contains a summary of the Mineral Resources inside the US$1,400 per ounce pit shells, stated at a 0.5 g/t Au cut-off. Indicated Mineral Resources are 5.9 Mt, grading at 1.8 g/t Au, with an additional Inferred Mineral Resource of 0.3 Mt, grading at 1.6 g/t Au. Further Mineral Resources that lie below the pit shells and are potentially mineable by underground methods are shown in Table 14.2. Indicated Mineral Resources are 1.6 Mt, grading at 4.9 g/t Au and Inferred Mineral Resources are 0.2 Mt, grading at 3.8 g/t Au, at a 2.5 g/t Au cut-off grade.

Table 14.35 Input parameters for pit optimisation

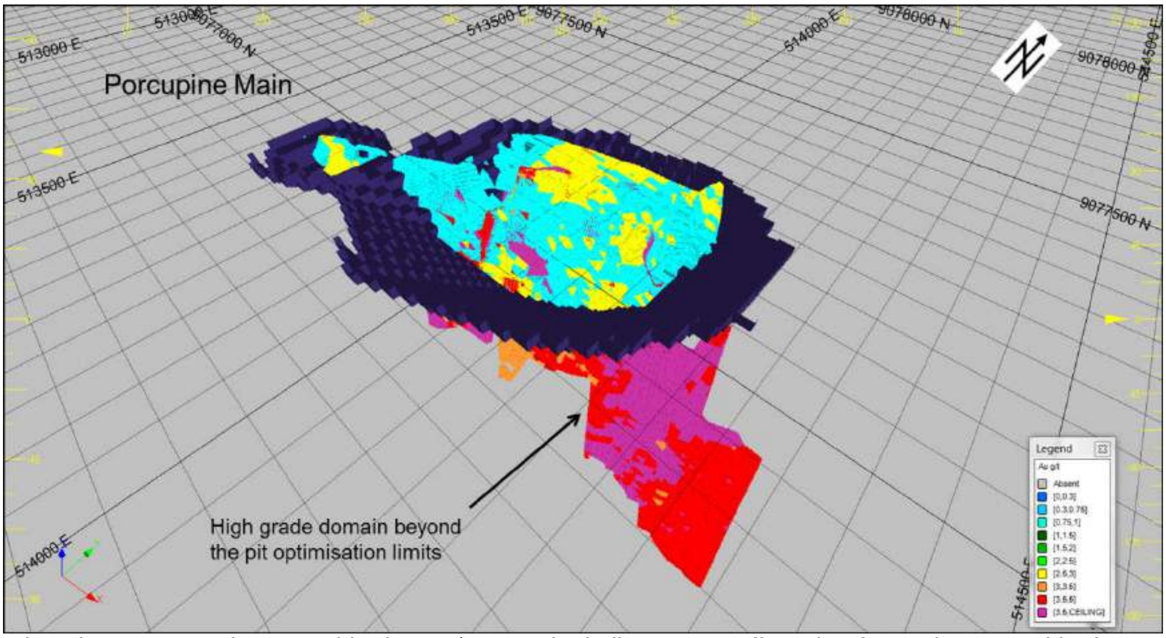
Item	Porcupine	Kenge	Mbenge	Gap	Konokono	Snakebite
Open pit mining						
Overall slope angles (degrees)	47	47	47	47	47	47
Mining cost (USD/t rock)	3 + 0.005 x Depth (m)	3 + 0.005d	3 + 0.005d	3 + 0.005d	3 + 0.005d	3 + 0.005d
Dilution (%)	5	5	5	5	5	5
Loss (%)	5	5	5	5	5	5
Underground Mining						
Mining cost (USD/t)	65	75	70	75	75	75
Dilution (%)	10	10	10	10	10	10
Loss (%)	10	10	10	10	10	10
Processing						
Processing cost (USD/t ore)	22.5	22.5	22.5	22.5	22.5	22.5
Admin cost (USD/t ore)	6.3	6.3	6.3	6.3	6.3	6.3
Gold recovery (%)	89	94	94	89	94	94
Sales						
Gold price (USD/oz)	1,400	1,400	1,400	1,400	1,400	1,400
Royalty (%)	5	5	5	5	5	5
Gold selling cost (USD/oz)	7	7	7	7	7	7

Figure 14.108 3D view showing pit shells for Kenge Main, Mbenge and Snakebite, using a US$1,400 gold price and potential underground mineable material



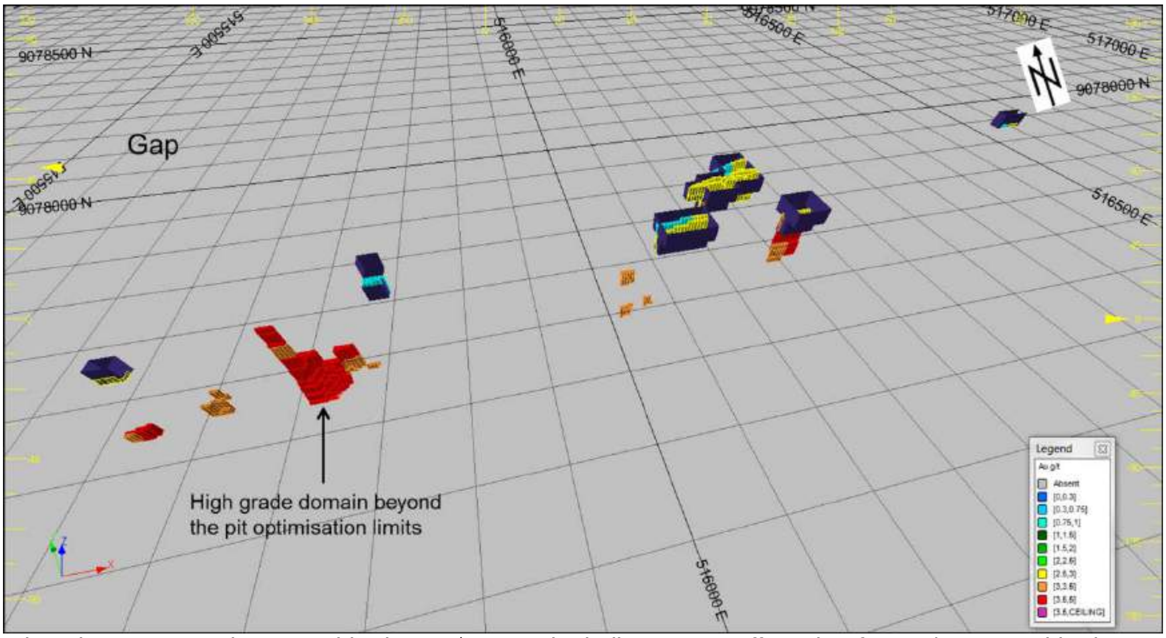
Mineral Resources shown: Inside the US$1,400 pit shells at a cut-off grade of 0.5 g/t Au; outside the US$1,400 pit shells at a cut-off grade of 2.5 g/t Au.

Figure 14.109 3D view showing pit shells for Porcupine Main, using a US$1,400 gold price and potential underground mineable material



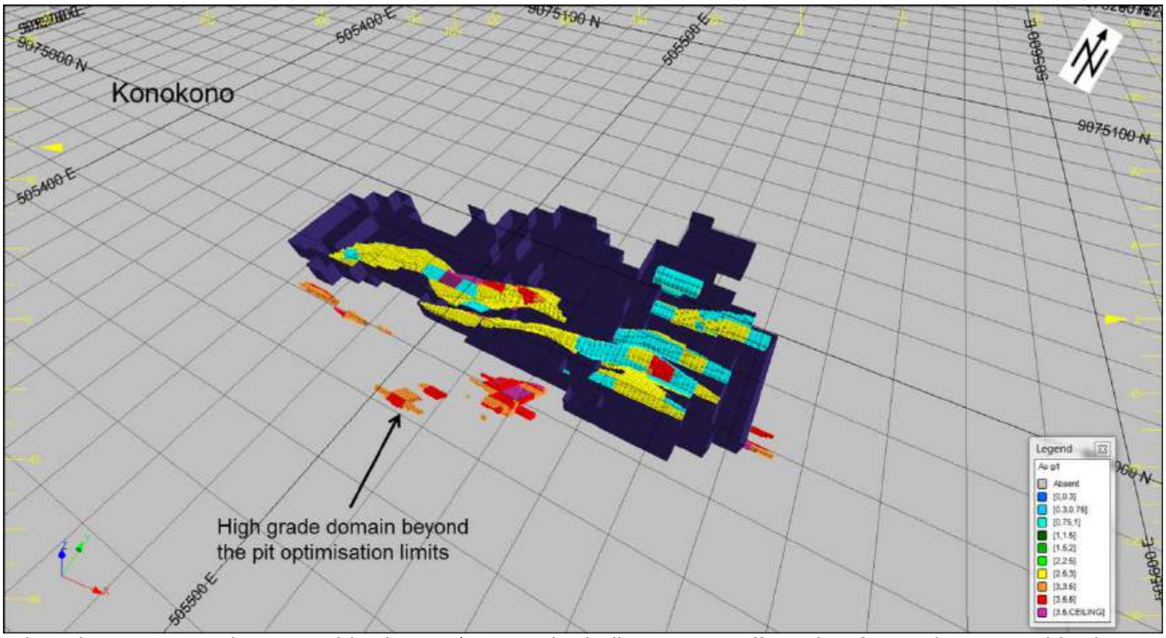
Mineral Resources shown: Inside the US$1,400 pit shells at a cut-off grade of 0.5 g/t Au; outside the US$1,400 pit shells at a cut-off grade of 2.5 g/t Au.

Figure 14.110 3D view showing pit shells for Gap, using a US$1,400 gold price and potential underground mineable material



Mineral Resources shown: Inside the US$1,400 pit shells at a cut-off grade of 0.5 g/t Au; outside the US$1,400 pit shells at a cut-off grade of 2.5 g/t Au.

Figure 14.111 3D view showing pit shells for Konokono, using a US$1,400 gold price and potential underground mineable material



Mineral Resources shown: Inside the US$1,400 pit shells at a cut-off grade of 0.5 g/t Au; outside the US$1,400 pit shells at a cut-off grade of 2.5 g/t Au.

15 Mineral Reserve estimates

No information to report on this section.

16 Mining methods

No information to report on this section.

17 Recovery methods

No information to report on this section.

18 Project infrastructure

No information to report on this section.

19 Market studies and contracts

No information to report on this section.

20 Environmental studies, permitting, and social or community impact

No information to report on this section.

21 Capital and operating costs

No information to report on this section.

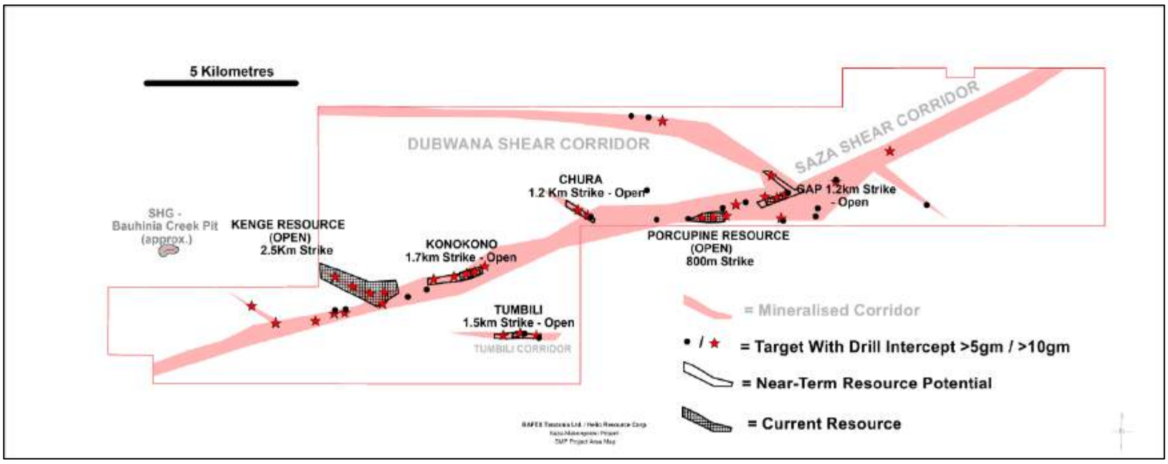
22 Economic analysis

No information to report on this section.

23 Adjacent properties

Shanta Gold's New Luika Mine is located 5 km west of Helio's Kenge Target area. The New Luika Mine produced 64,000 oz of gold in 2013, 84,000 oz of gold in 2014 and is projected to produce 85,000 oz of gold in 2015 (Shanta Gold, 2015). Figure 23.1 below illustrates the proximity of the New Luika Mine's Bauhinia Creek open pit to the Kenge, Konokono/Tumbili and Porcupine Target areas. There is no guarantee that similar tonnes or gold grade and ounces will be found within the SMP tenure.

Figure 23.1 Map showing the location of the Kenge and Porcupine Resource Areas and proximity to Shanta Gold's Bauhinia Creek Pit, New Luika Gold Mine



The SMP is surrounded on all other sides by prospecting licences which are held by Tanzanian registered companies and individuals.

24 Other relevant data and information

There is no other relevant data or information concerning the SMP to disclose.

25 Interpretation and conclusions

The Kenge Main, Mbenge, Snakebite, Porcupine Main, Gap and Konokono deposits are located within the SMP licence, to which Helio holds the prospecting rights. It is located in the Mbeya Region of Tanzania, approximately 800 km southwest of the city of Dar es Salaam, and covers an area of 200 km^2. The SMP is part of the Lupa Goldfield, which lies along the eastern edge of the Western Rift Valley close to Lake Rukwa. Mbeya, the capital of the Mbeya Region, is approximately 100 km southeast by road from the SMP.

Since acquiring the prospecting licences for the SMP in 2006, Helio has carried out a number of exploration activities, including a number of drilling programs. A total of 565 RC and 375 diamond holes have been drilled. For RC drilling, a total of 25,193 primary samples have been generated. For diamond drilling, the number of primary samples generated is 39,484. These numbers exclude CRM, blank and duplicate samples, as well as samples which have been resubmitted to laboratories for umpiring.

The SMP regional geology comprises granitic, intermediate and mafic intrusive lithologies. The igneous suite is dominated by granite and granodiorite. Two distinct granites are present, namely the Saza Granite and the Ilunga Granite. Several prominent structural trends are observed in the Lupa Goldfield. The Saza Shear Zone is one of the well-known east-northeast to west-southwest trending structures. It is over 35 km long and hosts most of the known significant gold mineralisation in the western part of the goldfield. The gold has been deposited by shear zone mineralisation and is structurally controlled. Whether this mineralisation style is orogenic or intrusion-related is still unclear. Mineralisation is widespread across the SMP and varies substantially in size.

The main objective of Snowden's work was to update the Mineral Resource estimate for the SMP. The Au (g/t) was estimated using ordinary kriging with a top cut. Based on lithological, statistical and spatial analysis, both low-grade and high-grade domains were defined for Kenge Main, Mbenge and Porcupine Main, whereas a single mineralised domain was defined for Snakebite, Gap and Konokono.

The Snowden Qualified Person visited the project site between 2 November 2014 and 6 November 2014 and personally inspected the property. During the site visit, the Qualified Person confirmed that all the regulatory requirements for an NI 43-101 Resource update were met. These included:

- Ensuring that the ongoing RC and DD programs, together with their associated core collection, core logging, sample collection and QAQC procedures, were appropriate
- Personally verifying the location of pre-2014 holes with respect to their stated location in previous reports
- Reviewing core from pre-2014 holes to ensure it is consistent with previous reports
- Obtaining a first-hand understanding of site geology with respect to the topography and the infrastructure.

Snowden was given full access to relevant data and conducted interviews of Helio personnel to obtain information on the past exploration work, to understand procedures used to collect, record, store and analyse historic and current exploration data.

The sampling collection, preparation, security and analytical procedures used by Helio meet generally accepted industry best practices. These procedures are therefore consistent with generating data of a quality suitable for resource estimation.

Based on drill spacing and geological continuity, the Mineral Resource has been classified in both the Indicated and Inferred categories. This reflects the higher level of confidence of the estimated blocks with tighter drill spacing. Geological continuity is verified through logging of drill core, taking into account lithology and mineralogy. The Mineral Resources are classified in accordance with CIM guidelines (2014).

Mineral Resources that form part of this update that have reasonable prospects for eventual economic extraction by open pit mining are stated at a 0.5 g/t Au cut-off within US$1,400 pit shells. The Mineral Resources for these deposits that have reasonable prospects for eventual economic extraction by underground mining are stated at a 2.5 g/t Au cut-off and fall outside the US$1,400 pit shells.

For pit envelope constrained, the total Indicated Mineral Resource for all six updated deposits is estimated at 5.9 Mt, grading at 1.8 g/t Au, with an additional Inferred Mineral Resource of 0.3 Mt, grading at 1.6 g/t Au. For the underground potential, the total Indicated Mineral Resource for all six updated deposits is estimated at 1.6 Mt, grading at 4.9 g/t Au, with an additional Inferred Mineral Resource of 0.2 Mt, grading at 3.8 g/t Au.

The total Indicated Mineral Resource for open pit and underground potential for the SMP sums to 7.5 Mt, grading at 2.4 g/t Au, for an equivalent of 590,000 oz Au. The sum of the total Inferred Mineral Resource for open pit and underground potential for the SMP is 0.6 Mt, grading at 2.5 g/t Au, for an equivalent of 45,000 oz Au.

The previous Mineral Resource was prepared by CCIC. CCIC used a 1.0 g/t Au cut-off without a high-grade mineralisation wireframe constraint for reporting within the pit envelope bounded Mineral Resource. This Technical Report reports fewer ounces due to the high-grade constraint impact.

Snowden has been informed by Helio that there are no known litigations potentially affecting the SMP, and furthermore that there are no known environmental, socio-political, marketing or taxation issues that may materially affect the project.

Mineralisation at Kenge Main, Mbenge, Snakebite. Tumbili, Porcupine Main, Gap and Konokono is open at depth, with additional mineralisation being open along strike at Mbenge, Porcupine Main, Porcupine Quill, Gap, Konokono, Tumbili and Snakebite. A second high grade zone in the footwall of Porcupine Main, in the southwest, should also be investigated further. These all offer exploration potential, which, given sufficient drilling, may be included in future mineral resource estimates. Additionally, there are 20 or so targets at SMP where there is as yet insufficient information for estimating mineral resources.

26 Recommendations

The recommendations for the SMP are:

- Further infill drilling to improve the geological confidence of the Mineral Resources and to upgrade Inferred to Indicated Mineral Resources to support a feasibility study
- Drilling along and across strike has the potential to add to the Mineral Resource base; this includes the high grade mineralisation zones that are open at the Kenge Main, Mbenge, Snakebite, Gap, Konokono and Porcupine Main deposits, with the aim of adding Mineral Resources for underground mining
- All additional drilling should include geotechnical data collection, geohydrological testing and metallurgical samples from deposits expected to be included in a future mine plan for further test work to enable a more definitive process design to support a feasibility study
- On-going structural and geological studies to further refine the geological model for mineralisation, and in particular to assist in targeting additional ore
- Digitising RQD information for application in future geotechnical studies.

A proposed budget for further work is summarised in Table 26.1 below.

Table 26.1 Proposed budget for further work on the SMP

Category	Cost (US$)
Resource expansion drilling	750,000
New target exploration drilling	750,000
Mineral Resource update	70,000
General and administrative expenses	157,000
Subtotal	1,727,000
Contingency (10%)	172,700
Total	**1,899,700**

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28 Dates and signatures

NI 43-101 Report for the Saza-Makongolosi Gold Project, Tanzania

February 2015

Issued by:

Helio Resource Corporation

R Carlson

23 April 2015

Roderick Carlson

29 Certificates

29.1 Certificate of Qualified Person

I, Roderick David Carlson, Senior Principal Consultant of Snowden Mining Industry Consultants Pty Ltd, 181 Adelaide Terrace, East Perth, Western Australia, do hereby certify that:

(a) I am the co-author of the technical report titled Mineral Resource Estimate for the SMP Gold Project and dated 28 February 2015 (the "Technical Report") prepared for Helio Resource Corporation (the "Issuer").

(b) I graduated with a Bachelor of Science in Geology from Canberra College of Advanced Education (now University of Canberra) in 1986. In 1998 I graduated with a Master of Science (Ore deposit geology and evaluation) from the University of Western Australia.

(c) I am a Member of the Australian Institute of Geoscientists and a Registered Professional Geologist (Mining and Exploration). I am a member of the Australasian Institute of Mining and Metallurgy.

(d) I have worked as a geologist continuously for a total of 28 years since my graduation. I have been involved in mining and resource estimation for 17 years and consulting for five years, including resource estimation of primary gold deposits for at least five years. I have been involved with gold exploration and mining operations for at least five years.

(e) I have read the definition of 'qualified person' set out in National Instrument 43-101 (the "Instrument") and certify that by reason of my education, affiliation with a professional association and past relevant work experience, I fulfil the requirements of a 'qualified person' for the purposes of the Instrument.

(f) I have made a current visit to the Saza-Makongolosi Project on 3 November 2014 to 6 November 2014.

(g) I am responsible for the preparation of all sections of the Technical Report.

(h) I am independent of the Issuer as defined in section 1.5 of the Instrument.

(i) I have not had prior involvement with the property that is the subject of the Technical Report.

(j) I have read the Instrument and Form 43-101F1, and the Technical Report has been prepared in compliance with that instrument and form.

(k) As of the effective date of this Technical Report, to the best of my knowledge, information and belief, the Technical Report contains all the scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Dated at Perth WA this 23 April 2015.

Roderick Carlson, BSc, MSc, MAIG (RPGeo), MAusIMM