1.0 INTRODUCTION

Geostat Services (GS) was commissioned by Harmony Gold Operations Ltd (Harmony) to undertake a geostatistical resource estimate of the North Point deposit in December 2002 - January 2003. This deposit comprises part of the Burnside Project area, located approximately 180km south of Darwin in the Northern Territory, Australia. The aim of this work was to provide a geostatistical gold resource of the North Point orebody, using the latest available drilling assays and the greater understanding of the deposit geology.

2.0 DATA

A total of 277 exploration drillholes were used for the resource estimate, representing 12,360m. Validation of the drillhole database was not performed, as this was considered to be completed by Harmony prior to receiving the data. Drillhole data spacing is variable, with an average spacing of 10m along-strike and 8m across-strike. Larger drillhole spacings along-strike up to 50m are located on the margins of the deposit, with across-strike spacings up to 25m. All holes defining the North Point resource are oriented grid east, with holes dipping at an average of -60°.

A topography surface constructed from drillhole collars, and a surface representing the base of weathering were supplied by Harmony. Densities applied were 2.4 t/m^3 from the topography surface to the base of weathering, with 2.6 t/m^3 applied to blocks below this weathering surface.

3.0 WIREFRAMING

Four grade envelopes were delineated for the North Point deposit by Harmony, corresponding to an approximate 0.7g/t Au cutoff. The main lode (NP001) comprises a steeply dipping, continuous zone of mineralisation with an average downhole thickness of 3.4m. The second lode, NP002 has a similar geometry to that of NP001, with most of the 3.2m thick lode located in the northern half of the deposit. NP003 comprises a series of small, thin discontinuous solids based on singular sections only and lacking in strike continuity, averaging 3.7m in total downhole thickness. A fourth solid, NP004 was interpreted to represent alluvial cover above the other lodes, with a thin, flat spreading geometry of 1.4m average thickness. Sectional interpretations were made using vertical east-west sections, linked to form solids and validated by Harmony.

4.0 STATISTICS

4.1 Descriptive Statistics – Exploration and Grade Control Data

Sample intervals within the exploration database were examined to determine the dominant sample length. Nearly all sample intervals were 1m in length, and compositing was performed on the dataset to 1m to ensure all composites within solids were of equal length. Statistics were run within the exploration drillhole database for all constrained composite data by lode, and are presented in Table 4.1, for both cut and uncut data. Only uncut statistics for the NP004 lode are presented, as the maximum composite grade within this lode is lower than that of the 10 g/t Au topcut grade. No other mineralisation indicators were used, as data was extracted from within wireframes.

Parameter	NP001		NP002		NP003		NP004
	Cut (10g/t)	Uncut	Cut (10g/t)	Uncut	Cut (10g/t)	Uncut	Uncut
No composites	584	584	244	244	55	55	156
Minimum	0.03	0.03	0.02	0.02	0.1	0.1	0.04
Maximum	10	109	10	96.3	10	39.3	6.11
Mean	2.46	3.48	2.80	4.49	2.98	4.41	0.76
Median	1.4	1.4	1.53	1.53	1.60	1.60	0.43
Standard deviation	2.74	8.17	2.94	10.23	3.06	7.76	0.96
Variance	7.49	66.78	8.62	104.56	9.34	60.27	0.93
Coeff Variation	1.11	2.35	1.05	2.28	1.03	1.76	1.27

Table 4.1 Exploration composite statistics within solids (g/t Au)

The coefficient of variation (CV) describes the variability of data relative to the raw average grade, and in general, values above 1.0 will indicate that problems may be caused by extreme values. CV values also provide an indication of the need for top-cutting prior to interpolation. However, the coefficient of variation assumes an underlying normal distribution, thus its application is limited. All lodes at North Point show very high coefficient of variation values within the uncut dataset, indicating that extreme values are likely to be problematic during interpolation of gold grades.

Exploration composites for all lodes suggest a lognormal distribution, as shown by statistical plots in Figures 4.1 to 4.4. Mixed mineralisation populations are evident for all lodes, with multiple peaks present on the lognormal histograms. Several prominent inflexions are present on the lognormal probability plots at various grades, which indicate the presence of other populations distinct from the mainstream population.

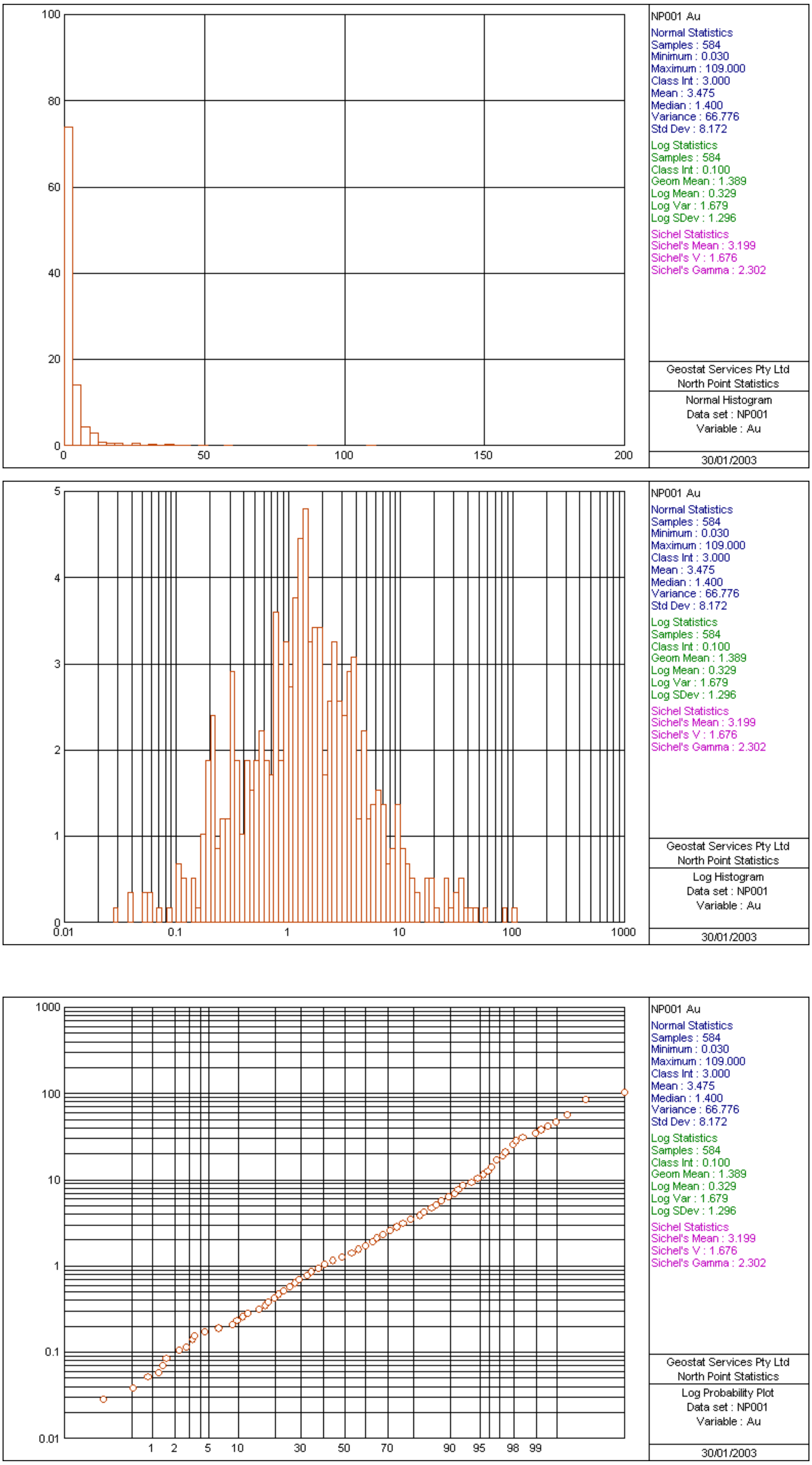


Figure 4.1 **Normal and log histograms, and lognormal probability plots – NP001 Lode**

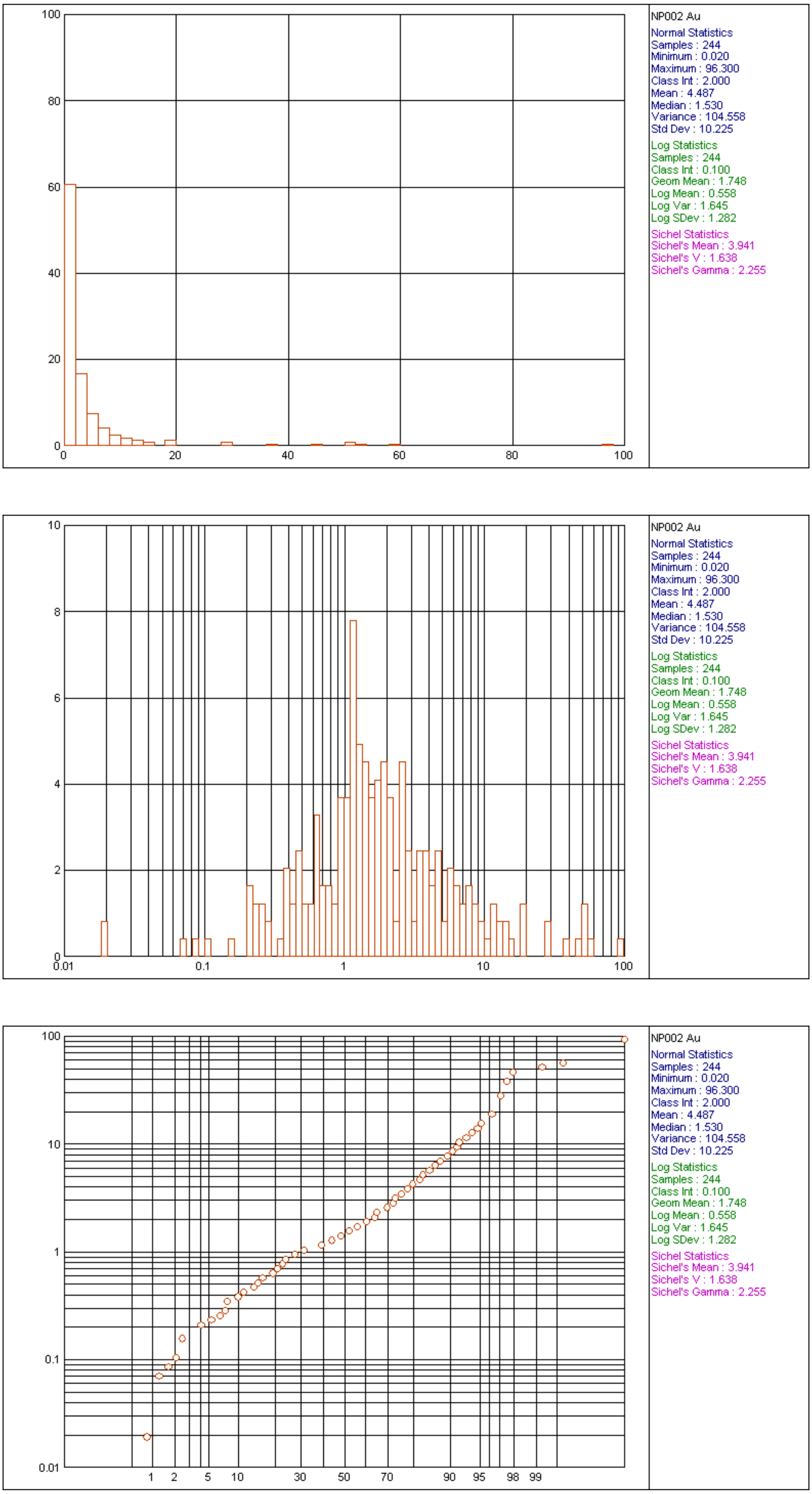


Figure 4.2 Normal and log histograms, and lognormal probability plots – NP002 Lode

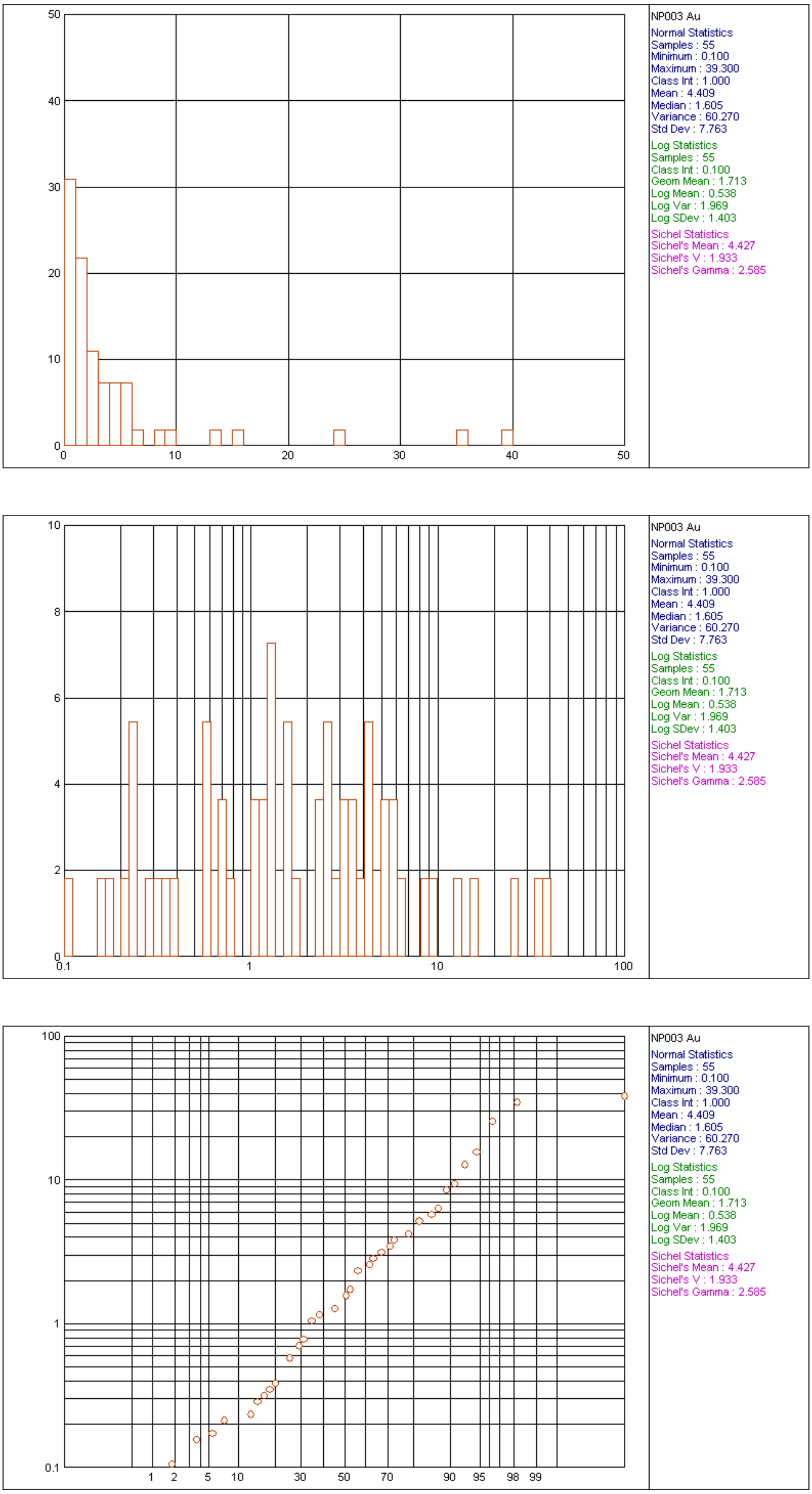
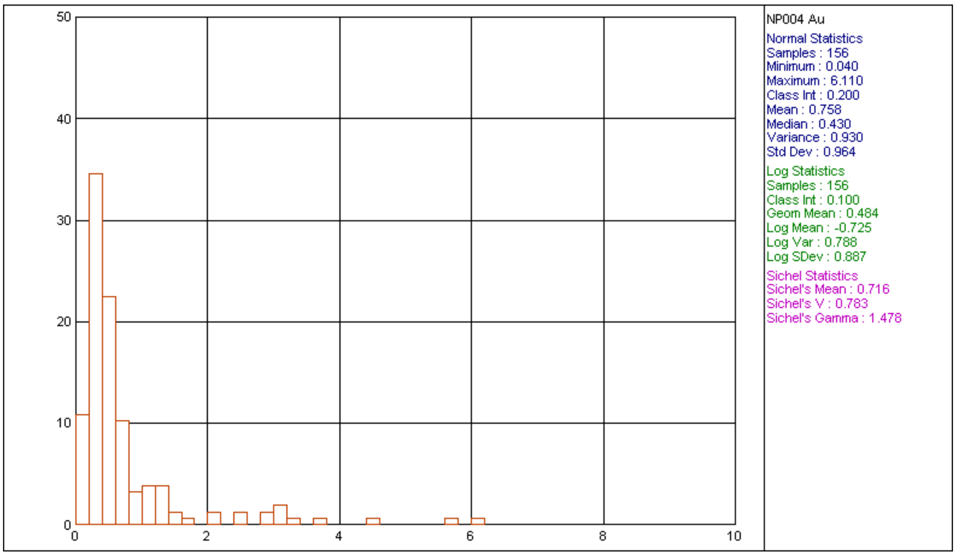
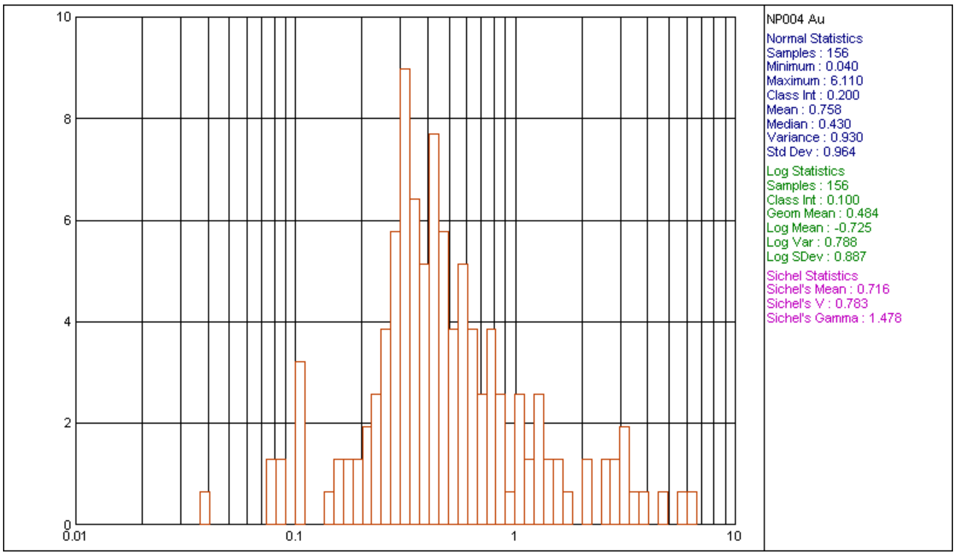


Figure 4.3 **Normal and log histograms, and lognormal probability plots – NP003 Lode**





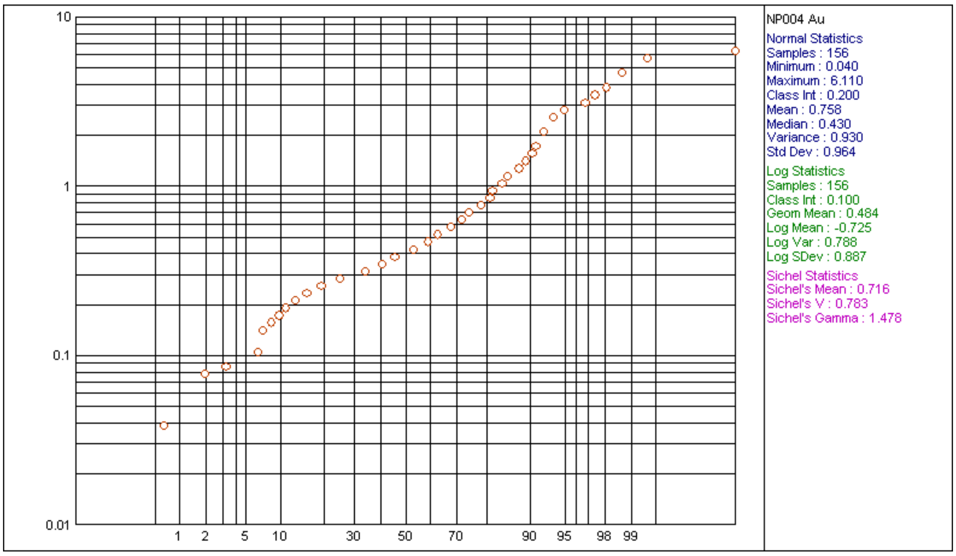


Figure 4.4 **Normal and log histograms, and lognormal probability plots – NP004 Lode**

4.2 Top-cutting of exploration composite data

Composite data within the exploration database was assessed for the need of a top-cut to be applied to data prior to grade estimation. The determination of a high-grade cut is made on the basis of probability plots, with the general criteria for the top-cuts being a marked change, a kink, or pronounced disintegration at the higher end of the probability distribution.

Since Au composites exhibit several high-grade extreme values, with the mean grade low relative to the spread of data, and are characterised by very high coefficients of variation, top-cutting of Au data is necessary to reduce the impact of extreme values on estimation of Au grades. It is recommended that a top-cut of 10g/t Au is used for all lodes at North Point. This top cut value coincides with the inflexion present on the probability plot for the NP001 lode, and also represents the start of the curve disintegration at the higher end of the probability distribution. A top-cut of 10g/t Au lowers the CV for all lodes close to 1.0, thus providing a more representative dataset for accurate interpolation of grades.

5.0 VARIOGRAPHY

Variography analysis using traditional and log variograms was performed on composite data for the resource model. Exploration composites within the NP001, NP002 and NP003 lodes were combined together in order to provide sufficient data for reliable variography analysis. NP004 lode data was not included in this dataset for variography, due to its alluvial cover nature and distinct geology. Fan interpretation of variograms in the horizontal plane show a 0° strike, with across-strike plane interpretations showing a dip of -60° towards 270°.

Variograms with two spherical structures were modelled, with results in Table 5.1. The quality of variograms was reasonable, with a more robust variogram structure present than those for other Burnside Project deposits. Low data levels have prevented better quality variograms, particularly in the down-dip direction. Lode solids are relatively uninformed at depth, with most composite data located in the first 20m below the surface, thus contributing to the lack of spatial continuity down-dip.

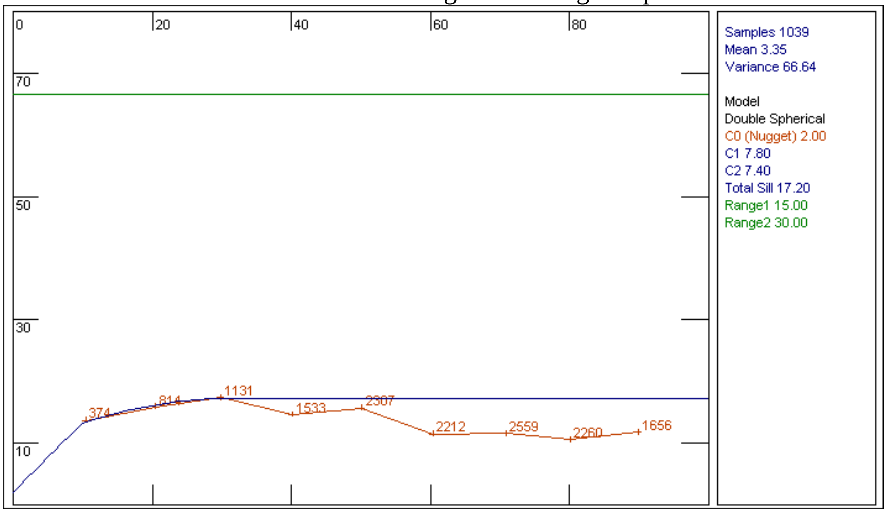
Lode	Nugget Effect	Sill 1	Range 1*	Sill 2	Range 2*
NP001, 002, 003	0.15	0.49	15 x 2.5 x 1.5	0.36	30 x 17 x 4

*Note: Ranges are expressed in metres as strike x down-dip x downhole

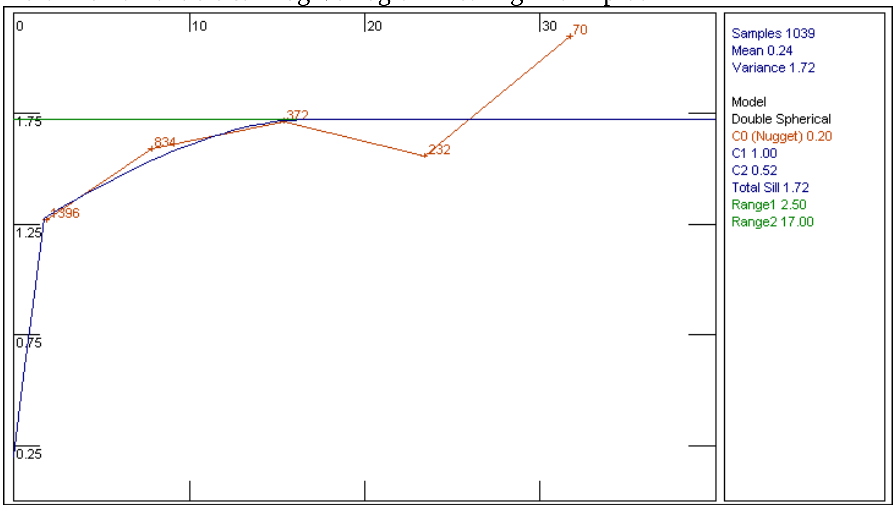
Table 5.1 Model variogram parameters for North Point deposit

Maximum continuity ranges indicate that grade continuity along strike (30m) is approximately twice that in the down-dip direction (17m). More drillhole data is needed to increase confidence in the variograms obtained, particularly infill drilling in the down-dip and across-lode directions. Variogram model plots are included as Figure 5.1.

North Point Au Horizontal Normal Variogram Bearing 0 Dip 0



North Point Au Vertical Log Variogram Bearing 270 Dip 60



North Point Au Downhole Normal Variogram Downhole

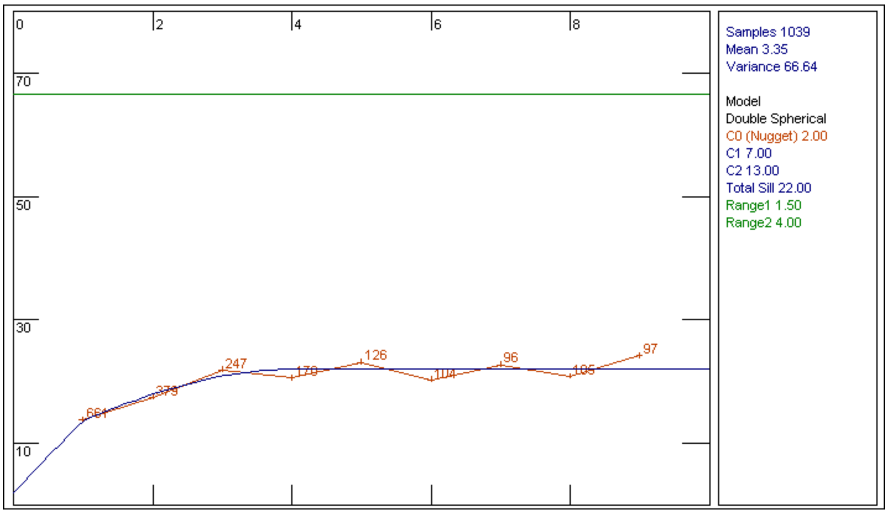


Figure 5.1 Variogram models for NP001, NP002 and NP003 lodes – North Point deposit

6.0 BLOCK MODELLING AND GRADE INTERPOLATION

6.1 Block sizes and modelling parameters

Block size dimensions were considered for the North Point deposit, taking into account drilling density and distribution of assay data within wireframes. A block size of 5m x 2m x 2.5m (along-strike x across-strike x RL) is recommended as being the optimum overall block size for all lodes, given the average drill spacing of 10m x 8m.

Block model origin and extents are defined below in Table 6.1.

Model Limits	Extent of Model	No of Blocks	Block Size
9380-9740N	360m	72	5m
9900-10094E	194m	97	2m
1127.5-1032.5mRL	95m	38	2.5m

Table 6.1 North Point Resource Model Extents

A standard block model method was used, which considers a whole block to be ore if a minimum of 50% of the block is interpreted as ore. The solid wireframes were used to constrain the blocks available for grade interpolation. Wireframe volumes were compared to block model volumes to validate the standard block model methodology, with results in Table 6.2. The NP004 lode reports a very poor filling of the wireframe by the rock model, with only 83% of the wireframe filled by the rock model. The alluvial cover has an average downhole thickness of 1m, which is considerably less than the block height of 2.5m, hence the poor reconciliation between the wireframe and rock model. For the other lodes, the difference between the two volumes is within adequate margins for JORC classification of the resource model.

Lode	Wireframe Volume	No of Model Blocks	Model Volume	% difference
NP001	66,541	2,551	63,775	-4.2%
NP002	31,888	1,252	31,300	-1.8%
NP003	3,296	127	3,175	-3.7%
NP004	18,172	601	15,025	-17.3%
TOTAL	**119,897**	**4,531**	**113,275**	**-5.5%**

Table 6.2 Validation of block model volumes against wireframe volumes

Ordinary kriging, using parameters derived from the traditional variograms was chosen to interpolate grades into blocks for all lodes. The skewed nature of the data distribution makes this technique ideal, whereas other techniques such as inverse distance interpolation assume a normal distribution, which can lead to errors if the data is not cut appropriately. Inverse distance techniques also do not utilise the information obtained from the variogram in interpolation of blocks, and thus the spatial correlation between composites is not taken into account.

Inverse distance interpolation using a power weighting of 2 was also used to interpolate grades into blocks as a validation of the kriged model, and for comparison of final model grades. An octant search was utilised for inverse distance interpolation, with a maximum of three composites per octant. All other inverse distance model parameters are identical to those used for ordinary kriging.

Each lode was treated as a separate hard boundary, restricting the Au grade interpolation to drillhole data located within each solid. All lodes used a minimum of 2 composites to interpolate each block grade, with NP002 and NP004 using a maximum of 20 composites, NP001 a maximum of 12 composites, and NP003 a maximum of 8 composites to interpolate block grades. A discretisation array of 5 (north) by 2 (east) by 2 (RL) was used to refine the kriging weights for each model block.

A search ellipse was used to select the composites to estimate a particular block. Generally, this is less than or equal to the maximum range parameters for the three principal directions modelled in the variography. Search ellipses for the NP001 and NP003 lodes are virtually identical to variography maximum ranges, with NP002 expanded to allow for blocks located at depth, and NP004 expanded to account for its alluvial cover nature and flat geometry. Table 6.3 lists the search ellipses employed for each lode.

Orientation	NP001	NP002	NP003	NP004
Along-strike search ellipse	30m	40m	30m	50m
Down-dip search ellipse	15m	20m	15m	50m
Across-lode search ellipse	5m	4m	5m	5m

Table 6.3 Search ellipses for interpolation of Au grades – North Point deposit

The search ellipse orientations are usually based on strike and dip directions determined from fan contours and variograms during variography analysis of the dataset. However, since the variography is based on combined lode datasets, set directional increments and low data levels, with the resulting interpretations not always reflecting local variations in geometry, some fine-tuning of the search ellipse orientations is often required to best fit the actual geometry of the individual lodes. Table 6.4 below lists the strike and dip orientations employed for each lode.

NP001		NP002		NP003		NP004	
Strike	Dip	Strike	Dip	Strike	Dip	Strike	Dip
358	-65/268	358	-60/268	358	-60/268	358	0/268

Table 6.4 Strike and dip orientations for all lodes – North Point deposit

All lodes are characterised by a common strike of 358°, with the NP001 lode comprising the steepest dip of -65° towards the west. NP002 and NP003 lodes both show a common dip of -60° towards the west, whereas NP004 was allocated a horizontal dip to accommodate its alluvial nature.

A high-grade search ellipse was also used for the NP001, NP002 and NP003 lodes to control smearing of high grades into adjacent areas. The cut-off grade for application of this high-grade search ellipse was established at 8 g/t Au, with ellipse dimensions of 20m x 10m x 4m (N x E x RL).

A second kriging pass was conducted for the NP001 and NP002 lodes, with the search extents expanded in an attempt to fill any remaining unfilled blocks. Only those blocks unfilled were kriged by this second pass, and grades estimated from the first kriging pass were left unchanged. A total of 3 blocks were left unfilled after this second kriging pass, and were filled manually using model grades from adjacent blocks.

6.2 Block model validation

The North Point block model was validated by several methods, including visual validations on-screen, global statistical comparisons of input and block grades, and local grade/depth and grade/northing relationships. The model was validated visually by viewing vertical sections and plans of the block model, with spatial comparison of kriged block grades against input composite grades to ensure grade trends were represented correctly.

Input average composite grades were also statistically compared with mean block grades by lode, with results tabulated in Table 6.5 below. Ordinary kriging interpolation clearly gives a closer reconciliation with sample input grades for the NP001 and NP003 lodes. For the NP002 lode, inverse distance interpolation gives a closer global mean grade to the average composite grade compared with that for the ordinary kriged model. This is a function of the large spacing present between composites, particularly at depth, with inverse distance interpolation extrapolating higher composite grades as opposed to the smoothing effect of ordinary kriging, giving lower grades.

Lode	Number of Composites	Number of Blocks	Method	Block mean grade	Composite mean grade	% difference
NP001	584	2551	OK	2.374	2.456	-3.3%
			ID	2.351	2.456	-4.3%
NP002	244	1252	OK	2.695	2.797	-3.6%
			ID	2.773	2.797	-0.9%
NP003	55	127	OK	3.087	2.98	3.6%
			ID	3.284	2.98	10.2%
NP004	156	601	OK	0.743	0.758	-2.0%
			ID	0.772	0.758	1.8%

Table 6.5 Statistical validation of Au interpolated grades – North Point deposit

Figures 6.1 to 6.3 illustrate the grade/depth relationship averaged within 5m RL increments for both input data and model grade data, together with the number of composites for the NP001, NP002 and

NP003 lodes within the North Point deposit. A grade/depth relationship plot was not compiled for the NP004 lode, as this lode has an average 1m downhole thickness. Figures 6.4 to 6.7 illustrate the grade/northing relationship averaged within 10m northing increments for input composite data and 5m northing increments for model grade data, together with the number of composites for all lodes.

A smoothing of grades for the NP001 lode with respect to depth is present, with model grades averaging out the high variability of sample input grades (Figure 6.1). The slight underestimation of composite grades by the block model from 1090mRL to 1080mRL is coincident with a kink in the geometry of the lode, which has prevented the linking of successive high grades. These high grades are thus not interpolated over the block model interval between drill intercepts, resulting in a drop in average model grade. Comparison of model grades with composite grades with respect to northing illustrates a very close reconciliation, with model grades reproducing the fluctuations in composite grades (Figure 6.4). The only real deviation from this reconciliation occurs between 9470N to 9500N, where very low numbers of composites are present, together with large across-lode grade variability, contributing to the underestimation of composite grades by the block model within this area.

The grade/depth relationship for NP002 shows a very similar trend to that for NP001, with model grades showing a slight smoothing of composite grades (Figure 6.2). Composite grades are very variable from bench to bench, with large distances between drillhole intercepts with respect to depth. Hence, an information and edge effect is present in the bottom section of the model below 1065mRL, with sparse data density and high composite grade variability causing large differences between composite grades and block model grades in this area. The grade/northing relationship plot illustrates a close reconciliation of model grades with composite grades, with local composite grade fluctuations reproduced by those of the resource model (Figure 6.5). A slight underestimation of composite grades exists between 9630N to 9650N, which is attributable to the presence of high-grade composites at the top of the lode, and the restricted search ellipse preventing the interpolation of these grades into blocks at depth.

The NP003 lode shows a reasonable reconciliation of model grades with composite grades with respect to depth (Figure 6.3), with model grade trends smoothing out the composite grade fluctuations. Validation of composite grades with respect to northing shows a close reconciliation of model grades with composite grades, over the three main solid locations (Figure 6.6). The validations are closer than expected, given the discontinuous nature of the solids comprising the lode and high composite grade variability.

A good validation of composite grades by block model grades with respect to northing is present for the alluvial cover lode (Figure 6.7). This is predominantly a low-grade lode, with composite grades well reproduced by model grades, given the thin nature of the cover and its flat geometry.

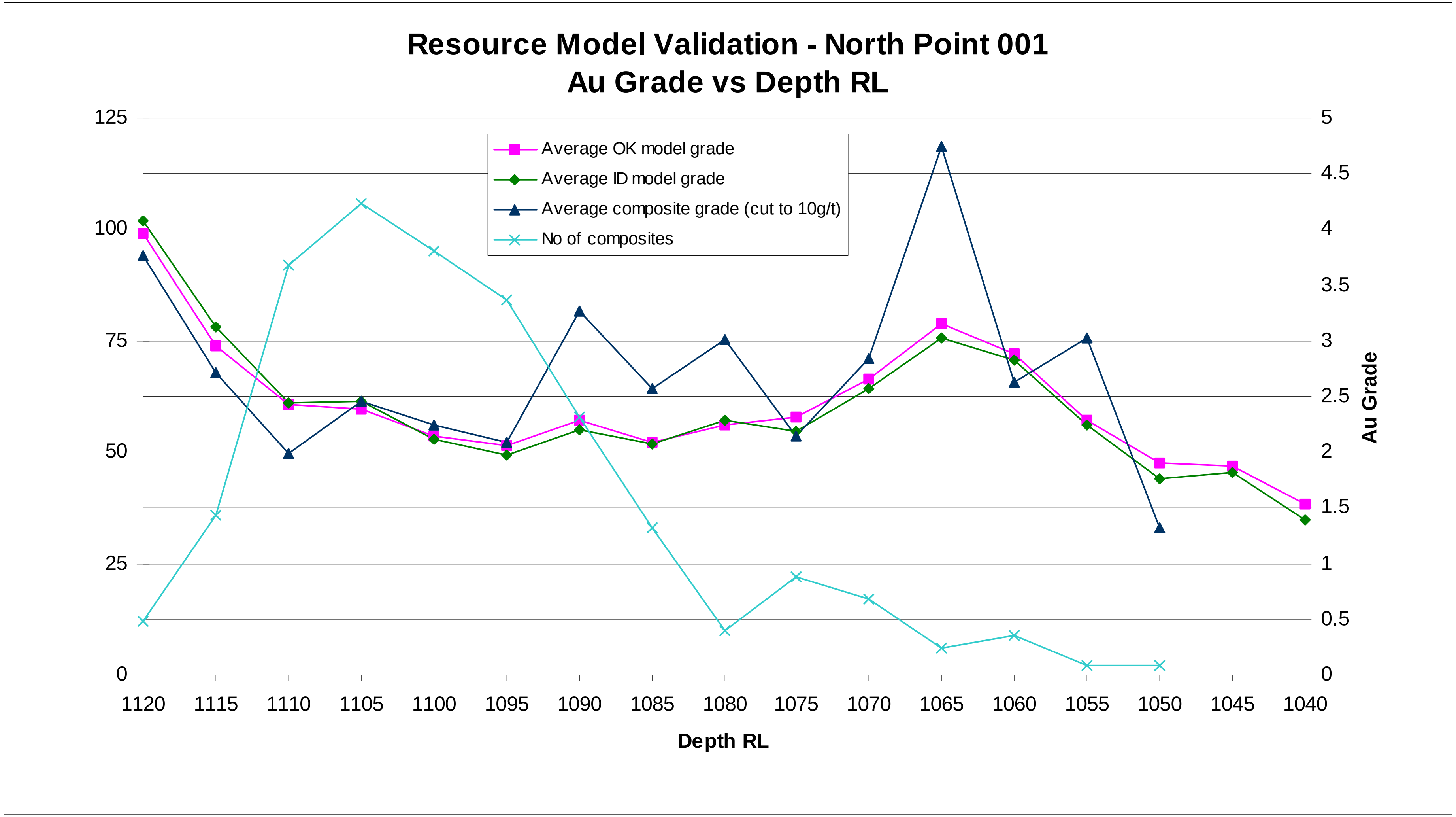


Figure 6.1 Au Grade vs Depth validation plot – NP001 lode, North Point deposit

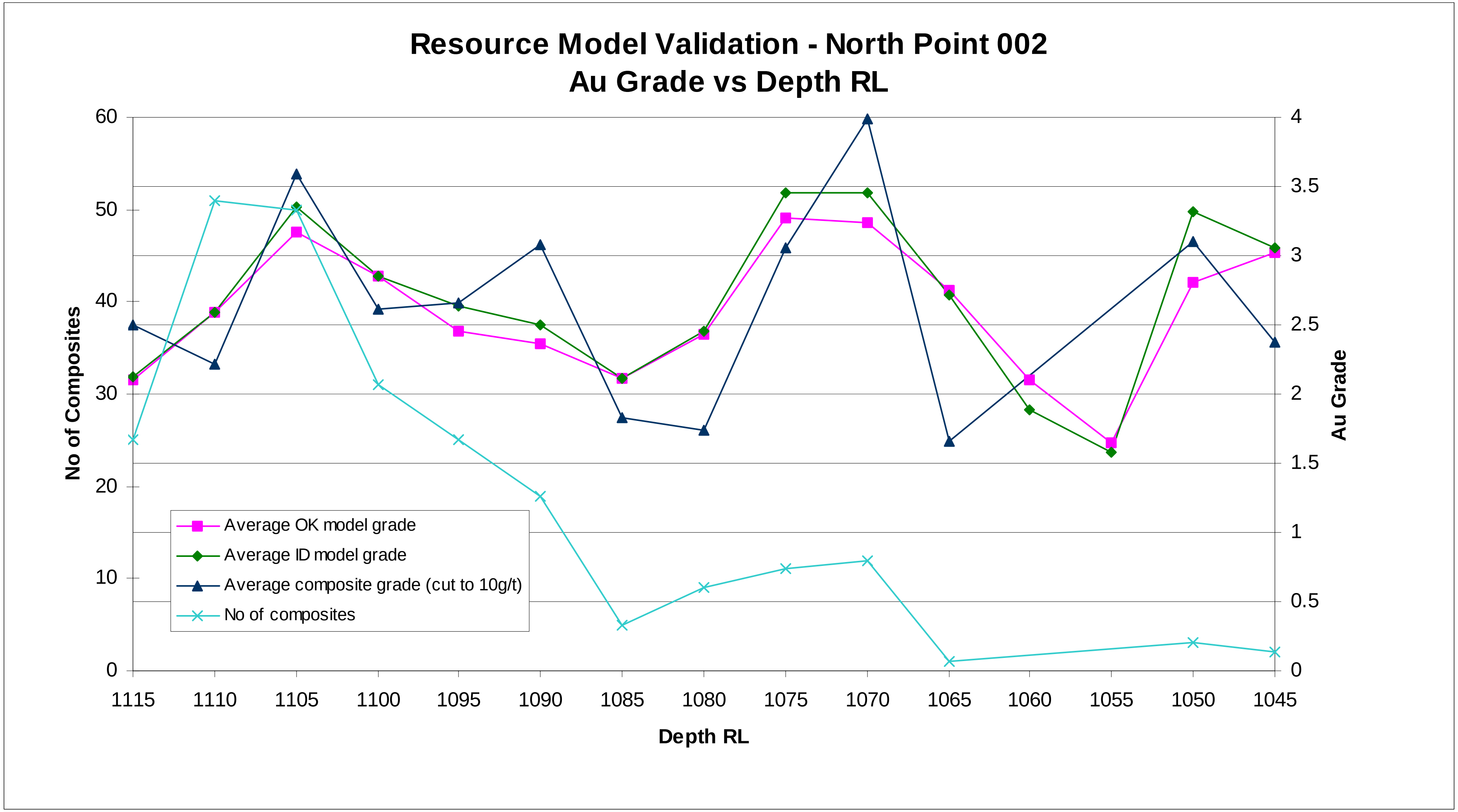


Figure 6.2 Au Grade vs Depth validation plot – NP002 lode, North Point deposit

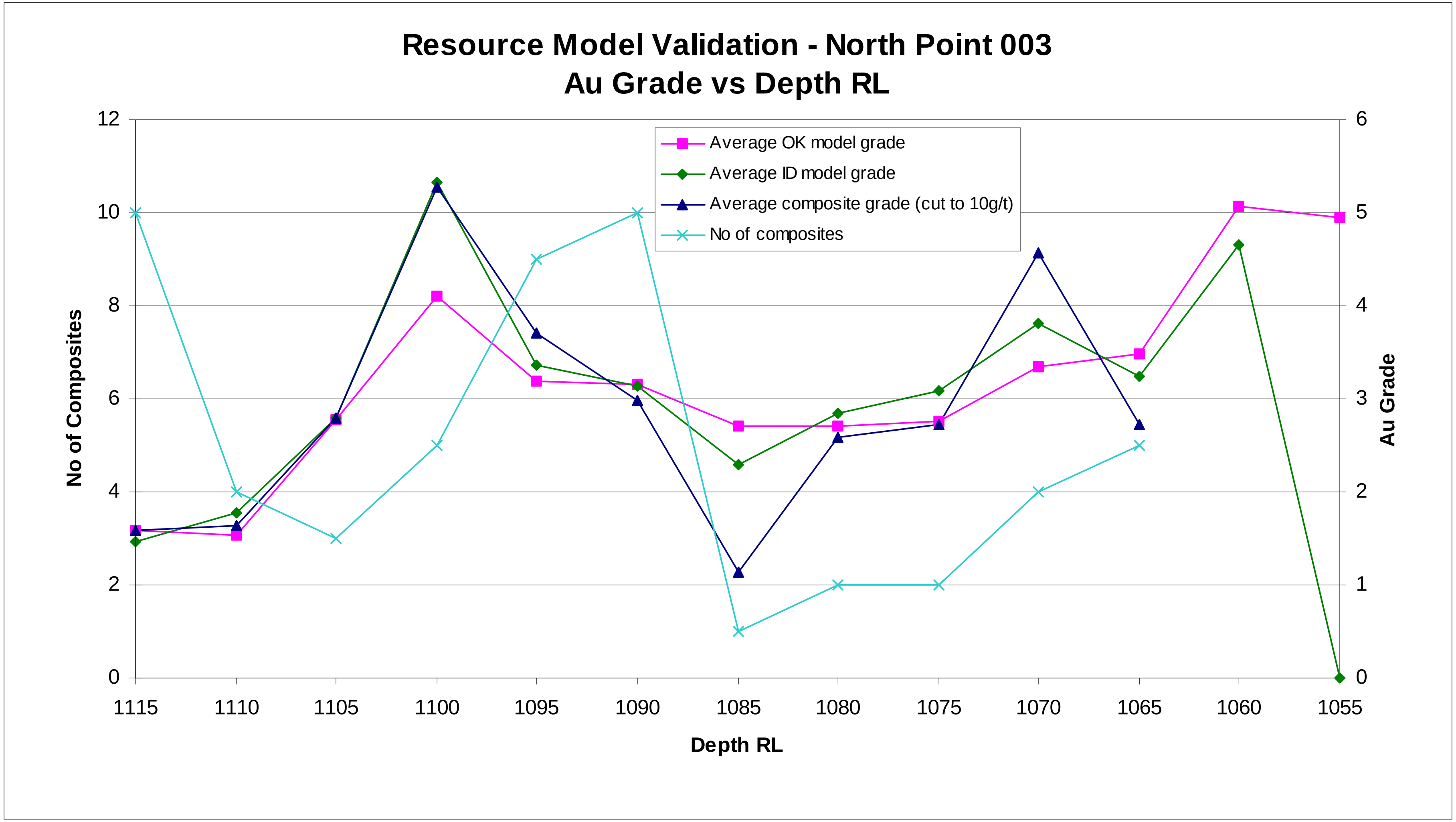


Figure 6.3 Au Grade vs Depth validation plot – NP003 lode, North Point deposit

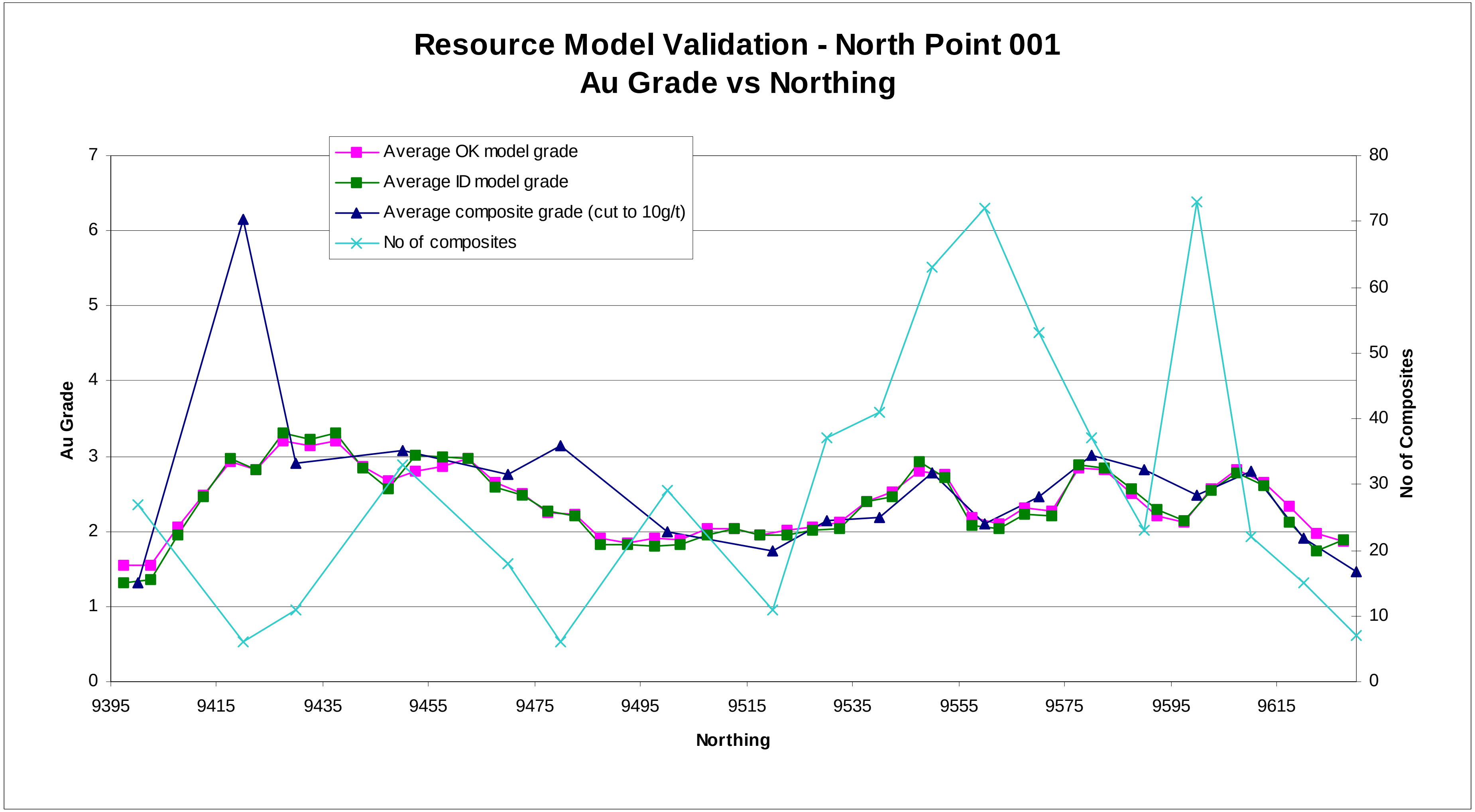


Figure 6.4 Au Grade vs Northing validation plot – NP001 lode, North Point deposit

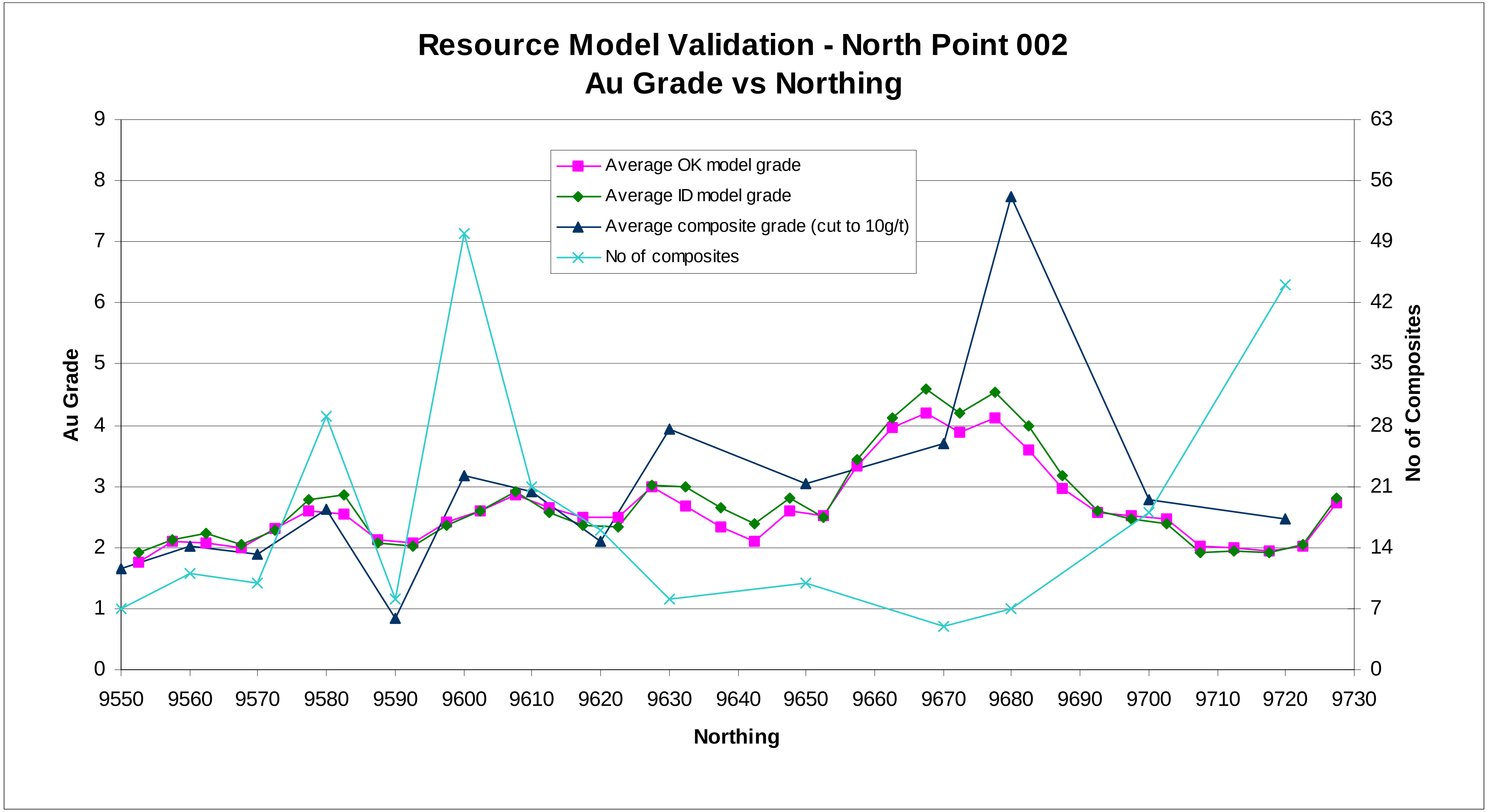


Figure 6.5 Au Grade vs Northing validation plot – NP002 lode, North Point deposit

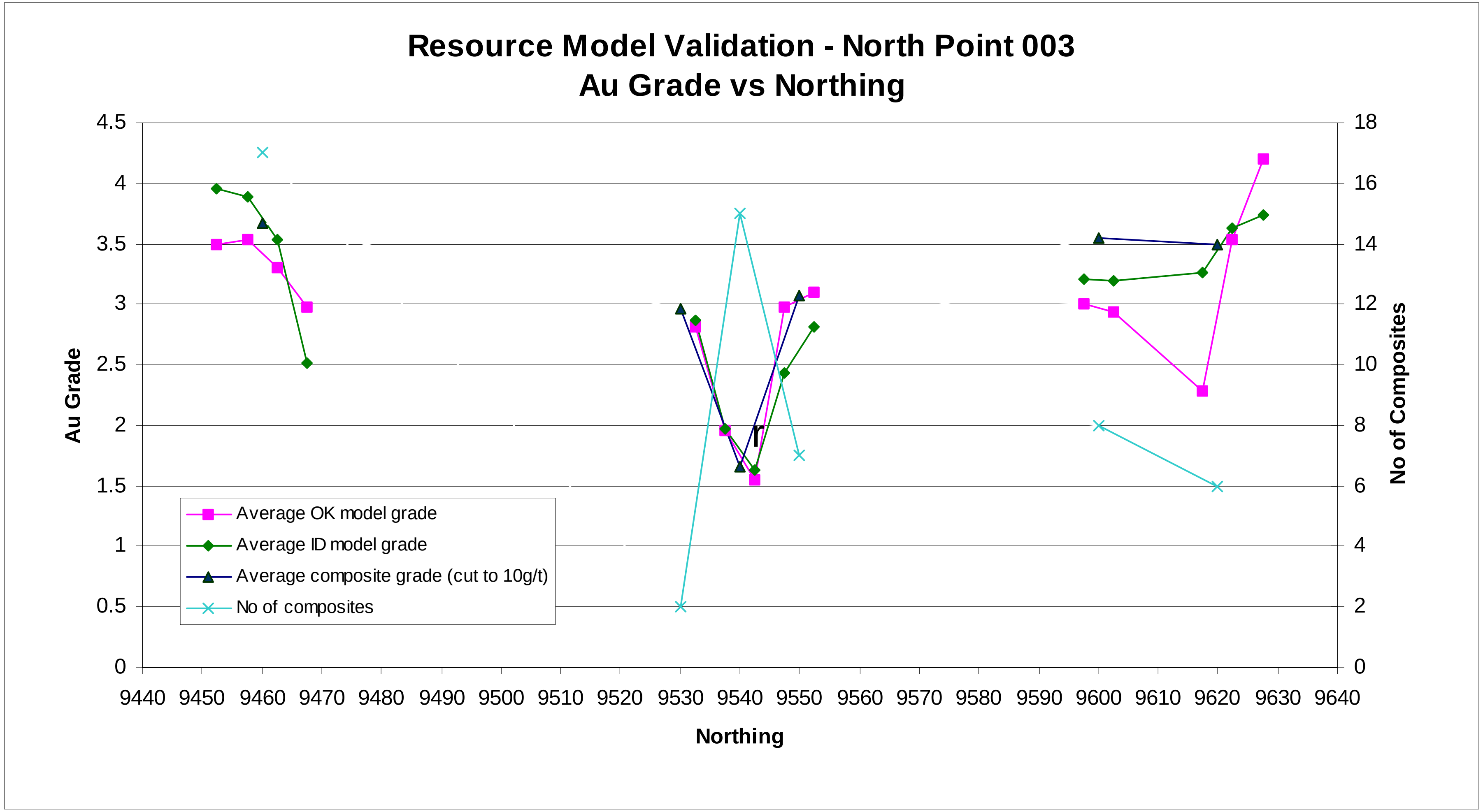


Figure 6.6 Au Grade vs Northing validation plot – NP003 lode, North Point deposit

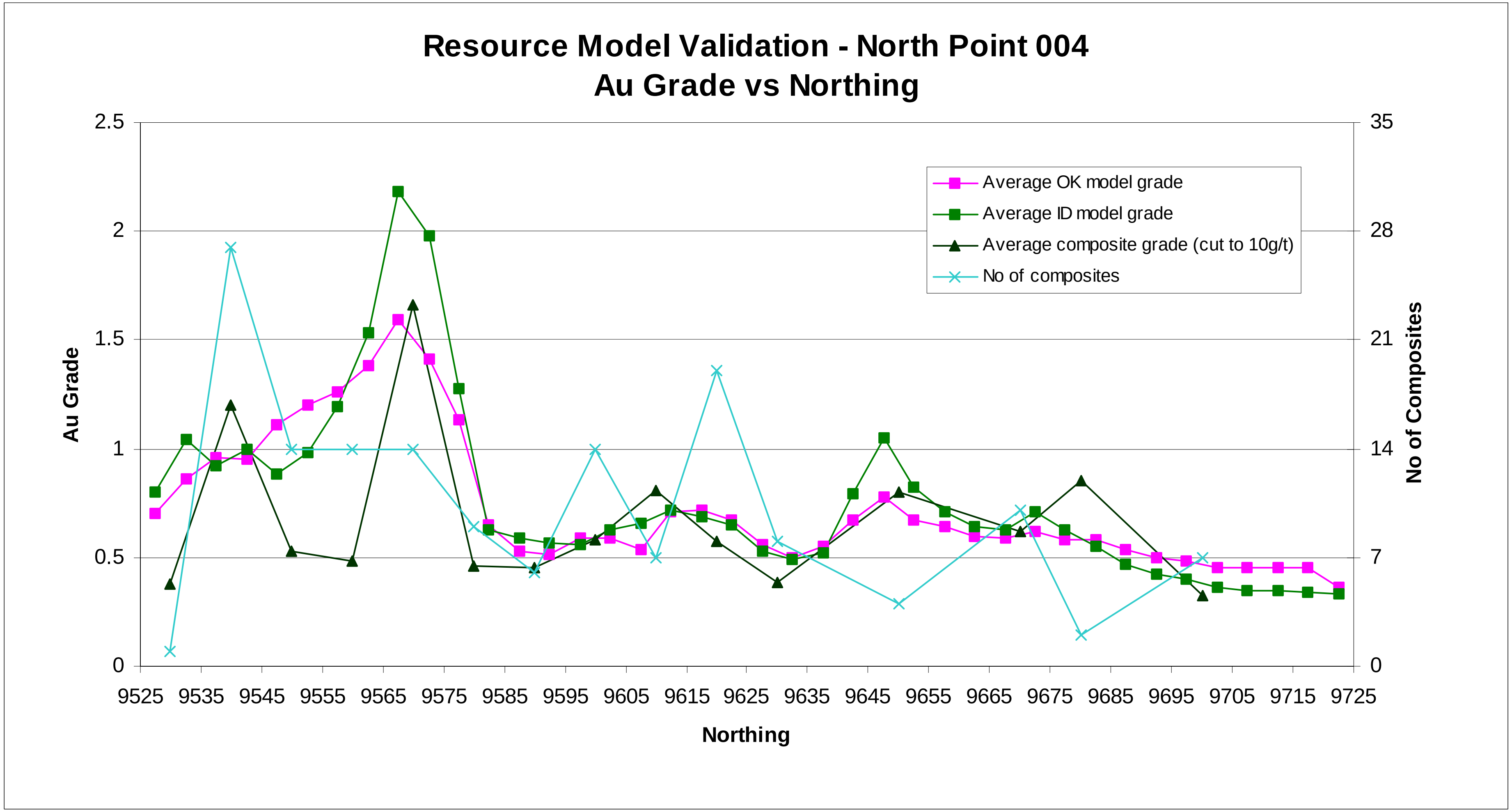


Figure 6.7 Au Grade vs Northing validation plot – NP004 lode, North Point deposit

7 RESOURCE CLASSIFICATION AND REPORTING

The North Point model resource has been classified into Indicated and Inferred categories according to the JORC code, using a combination of kriging variance, drilling density and confidence in grade continuity between drill sections. An Inferred category was applied to all blocks within the NP003 lode, as few drillhole intercepts are located within this lode, and there is uncertainty in lode continuity with poor definition by drilling. Blocks within these wireframes were interpolated by sparse drillhole data without supporting composite data along strike, and given the small, discontinuous nature of these lodes, an Inferred category was considered appropriate for these blocks. All other lodes were classified on the basis of kriging variance.

The kriging variance is used as an objective measure of the geostatistical confidence in a given block, and represents the value of the squared error between the actual grade and the estimated grade generated by the kriging process. It is dependent on a number of criteria, including block size, internal block discretisation, sample numbers and the variogram parameters but is independent of the actual grade. Thus, using the North Point variography as a guide, blocks for the North Point deposit were suitable to be classified as Indicated if they were spaced approximately within 10m along-strike from drillholes, and 5m down-dip between drillholes. An Inferred classification is appropriate for those blocks located more than 10m along-strike from drillholes, and greater than 5m down-dip between drillholes. The ranges above represent a guideline only for the classifications, and actual ranges used to determine the threshold between Indicated and Inferred blocks were applied to modified distances from those above, using the spatial distribution of composite data as an additional guideline.

The classified Mineral Resource is reported in Table 7.1 above a 0.7g/t Au cutoff as at 22nd January 2003. The topography and weathering surfaces were used to construct a density model, which was used in reporting of model tonnage and grades. Both ordinary kriged grades and inverse distance grades are reported for comparison.

Category	Volume	Tonnage	OK Au g/t	ID Au g/t
Indicated	95,650	233,360	2.28	2.30
Inferred	17,625	44,860	2.25	2.21
Total	**113,275**	**278,220**	**2.27**	**2.29**

Table 7.1 North Point Classified Mineral Resource above 0.7 g/t Au – as at 22nd January 2003

A breakdown of this model resource by bench, and also by Au grade and classification category within each bench is included as Appendix 1.

Figure 7.1 illustrates the grade-tonnage relationship for all combined lodes for North Point at a range of cut-off grades, to test the sensitivity of the model to the cut-off grade applied. Cutoff grades are bracketed next to points representing the tonnage and average grade applicable at these cut-off grades.

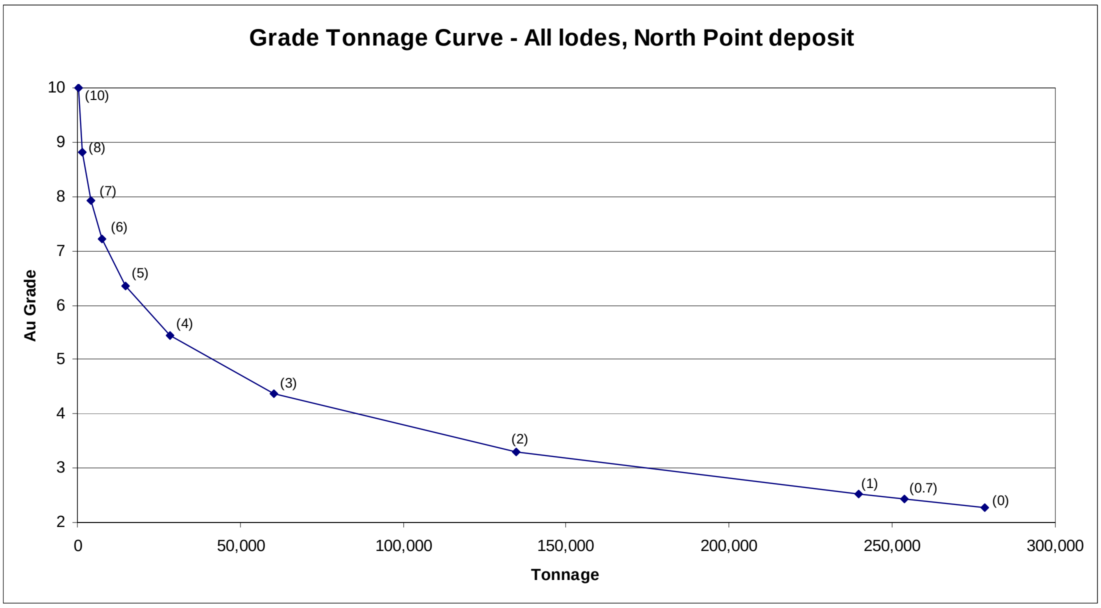


Figure 7.1 Grade Tonnage Curve for all lodes, North Point deposit

Fleur Dyer

Consultant Resource Geologist

APPENDIX 1

NORTH POINT
RESOURCE MODEL DETAILED REPORTS