6 THE KANTIENPAN MASSIVE SULPHIDE BODIES

6.1 MODELLING

The deposit was modelled using the Lynx computer programme, and a representation of the model can be seen in Figure 12. Looking in a westwardly direction, the green represents the surface, blue the main sulphide body, yellow the second sulphide lens and the drill holes are represented by the black lines.

The dimensions of the sulphide body are a length of 800 meters, a width of 300 meters and an average true thickness of 6.01 meters. These dimensions, when multiplied with a relative density of 3.47 g/cm^3, amounts to a resource of 5 Mt.

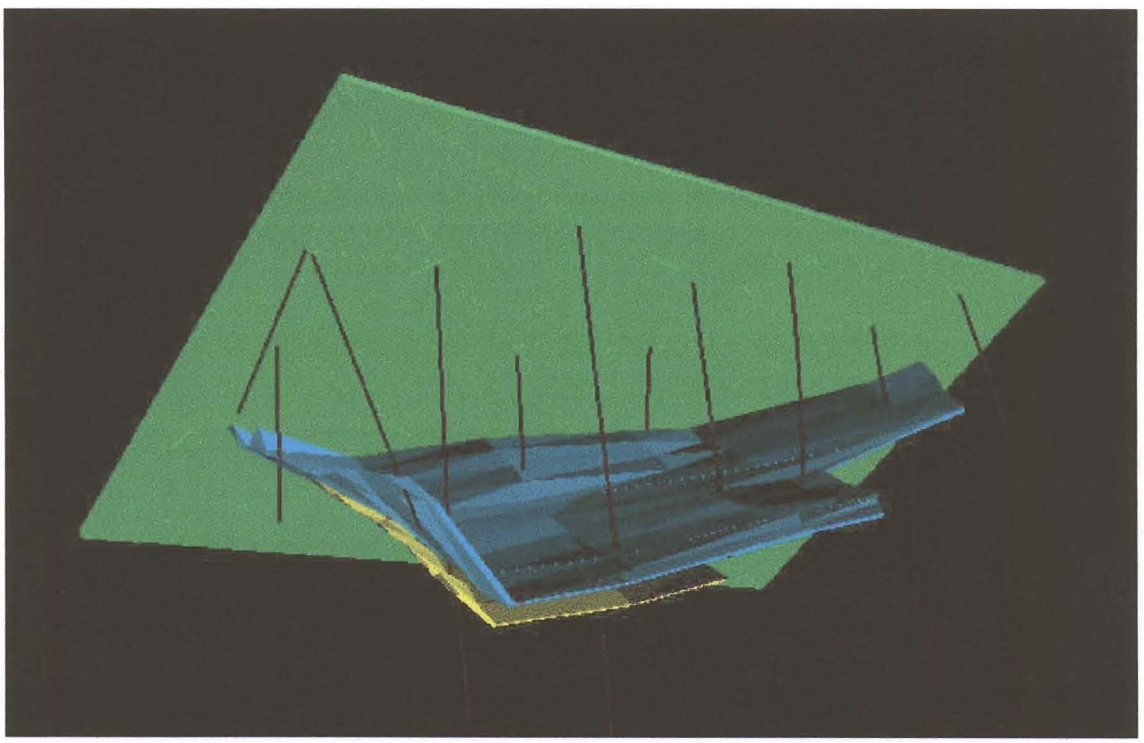

Figure 12. Lynx 3D model.

The Zn, Cu values and the ratio of Zn/Cu were contoured and can be seen in Figure 13, with the highest values to the south of the deposit.

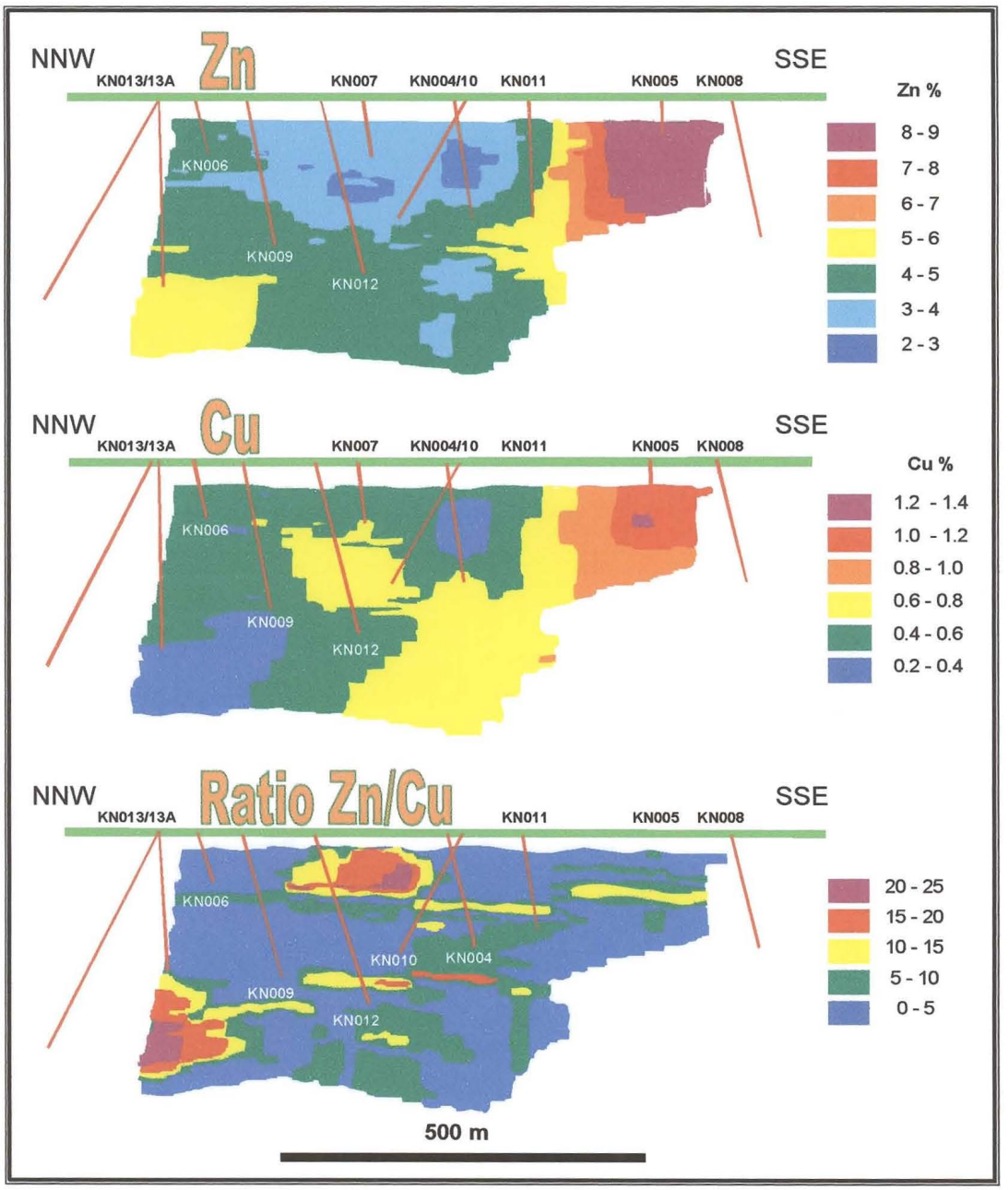

Figure 13. Longitudinal sections with chemical contours.

6.2 GEOSTATISTICAL EVALUATION

The drilling results from the Kantienpan Grid KNP/C were used to evaluate the massive sulphide body found on the farm Kantienpan. A cut-off of 1% Zn was used so as only to take the massive sulphide into account, and not the stringer and disseminated zones. The drilling results are shown in Table 6.

Table 6. Drilling results with a cut-off of 1% Zn.

Borehole no.	Final Depth (m)	CUT-OFF 1% Zn				
		From (m)	To (m)	True Width (m)	Zn%	Cu%
KN001	309.33	No intersection				
KN002	234.03	No intersection				
KN003	302.80	192.00	205.00	13.00	3.96	0.36
KN004	154.89	106.89	115.89	9.00	1.27	0.14
		106.89	109.89	3.00	2.21	0.06
KN005	151.32	82.05	90.89	8.84	6.32	1.02
KN006	140.00	103.69	104.69	1.00	4.59	0.24
KN007	140.00	105.96	112.96	7.00	3.15	0.57
KN008	155.30	No intersection				
KN009	280.80	241.37	243.87	2.50	4.50	0.56
KN010	242.20	190.02	196.17	6.15	4.74	0.49
KN011	239.50	204.07	206.70	2.63	6.59	0.35
KN012	307.15	278.34	281.31	2.97	5.09	0.30
		291.82	292.70	0.88	7.42	0.26
KN013	256.60	Rods stuck – borehole abandoned				
KN013A	284.95	255.21	256.68	1.47	2.57	0.09
		259.00	259.83	0.83	1.29	0.23

All the holes with no massive sulphide intersections were removed and the second body, intersected in boreholes KN012 and KN013, were not taken into account. The intersections in KN004 were used as a whole, thus including some of the waste in the massive sulphide unit. The intersection of KN003 was reduced to give the true thickness, because it was drilled along the dip.

Table 7. Drilling results of only the sulphide intersecting zones.

Borehole no.	Final Depth (m)	CUT-OFF 1% Zn				
		From (m)	To (m)	True Width (m)	Zn%	Cu%
KN003	302.80	192.00	205.00	5.50	3.96	0.36
KN004	154.89	106.89	115.89	9.00	1.27	0.14
KN005	151.32	82.05	90.89	8.84	6.32	1.02
KN006	140.00	103.69	104.69	1.00	4.59	0.24
KN007	140.00	105.96	112.96	7.00	3.15	0.57
KN009	280.80	241.37	243.87	2.50	4.50	0.56
KN010	242.20	190.02	196.17	6.15	4.74	0.49
KN011	239.50	204.07	206.70	2.63	6.59	0.35
KN012	307.15	278.34	281.31	2.97	5.09	0.30
KN013A	284.95	255.21	256.68	1.47	2.57	0.09

Both the Cu and Zn were weighted against the thickness of the intersection and the calculations used from here onwards are based on this assumption.

A Zn equivalent (Zn Eq) was also calculated with a Zn:Cu ratio of 1: 1.75, based on the average daily price of the two commodities from 1989 to 2000 (London Metal Exchange website: http://www.lme.co.uk). The results, including the Zn Equivalent, with a standard error of 0.4, are shown in Table 8. It may be more appropriate to use a 1% Zn Eq cut-off rather than a 1% Zn cut-off, but a 1% Zn cut-off was used during the project phase and it was decided to keep on using this.

Table 8. Width weighted averages and a Zn equivalent.

					Weighted against width		
Borehole	**Width (m)**	**Zn%**	**Cu%**	**Zn Eq %**	**Zn %**	**Cu %**	**Zn Eq %**
KN003	5.50	3.96	0.36	4.59	0.46	0.04	0.54
KN004	9.00	1.27	0.14	1.52	0.24	0.03	0.29
KN005	8.84	6.32	1.02	8.11	1.19	0.19	1.52
KN006	1.00	4.59	0.24	5.01	0.10	0.01	0.11
KN007	7.00	3.15	0.57	4.15	0.47	0.08	0.62
KN009	2.50	4.50	0.56	5.48	0.24	0.03	0.29
KN010	6.15	4.74	0.49	5.60	0.62	0.06	0.73
KN011	2.63	6.59	0.35	7.20	0.37	0.02	0.40
KN012	2.97	5.09	0.30	5.62	0.32	0.02	0.35
KN013A	1.47	2.57	0.09	2.73	0.08	0.00	0.09
Weighted averages					**4.09**	**0.49**	**4.94**

6.3 KANTIENPAN RESOURCE

The tonnage of the Kantienpan deposit was calculated at 5 Mt, using the geological block model (as presented in Paragraph 6.1). The average grade, calculated statistically (as presented in Paragraph 6.2), are 4.09% Zn and 0.49% Cu and a Zn equivalent value of 4.94% using the Student T method. In all the subsequent sections, the Zn equivalent will be used.

6.4 CLASSIFICATION OF THE KANTIENPAN RESOURCE

The Kantienpan resource could now be classified in terms of the South African Mineral Resource Committee (SAMREC) guidelines, using the method proposed by Dr F.A. Camisani (pers. comm., 2001), who is currently the chairman of this committee.

Dr F.A. Camisani (pers. comm. 2001) proposed the following resource and reserve classification:

Inferred Resource: $15\% \geq \bar{x} - 1.753\frac{s}{\sqrt{n}}$ for lower limit.

Indicated Resource: $10 - 15\% < \bar{x} - 1.753\frac{s}{\sqrt{n}}$ for lower limit.

Measured Resource: $10\% < \bar{x} - 1.753\frac{s}{\sqrt{n}}$ for lower limit.

Probable Reserve: $10 - 5\% < \bar{x} - 1.753\frac{s}{\sqrt{n}}$ for lower limit.

Proven Reserve: $5\% < \bar{x} - 1.753\frac{s}{\sqrt{n}}$ for lower limit.

The Kantienpan resource classification used the Student-t method, because there are so few samples. The standard deviation (*s*) was calculated as follows: $s = \sqrt{\frac{1}{n-1}\left(\sum_{i=1}^{k} gx_i^2 - n\bar{x}^2\right)}$ = 2.035, with n = 10 and $\bar{x}$ = 4.94. The above classification formula was then populated with the values and the calculations can be seen in the following paragraph.

From the statistics of the Kantienpan sample population the lower grade interval may be calculated at a 90% central confidence level by using the following formula: $4.94 - 1.753\frac{2.035}{\sqrt{10}}$ = 3.81

The Kantienpan deposit should be classified as an inferred resource, as the difference between the lower grade interval and the mean of the sample population exceeds 15% of the mean; (4-94-3.81)/4.94*100 = 23%.

It is suggested that further drilling is necessary to delineate the resource, especially towards the south and in depth and to increase the statistical confidence in the resource.