JUNO REMNANTS RESOURCE ESTIMATES

Introduction

These resource calculations and estimates were conducted by Mr P.A. Jones, B.App.Sc(Geology), MAIG, MAusIMM who has over twenty five years experience as a geologist in open pit and underground mining, project development, prospect evaluation and exploration as well as various management roles in a wide variety of commodities including gold, copper, lead, zinc, silver, nickel, phosphate, iron ore and silica in Australia, Indonesia, New Zealand, Malaysia, China, Papua New Guinea and Zimbabwe.

Geology and Mineralisation Summary

The Juno mine is recorded as producing 820,000 ounces of gold from 450,000 tonnes of ore averaging 56.1 g/t gold.

The mineralisation at Juno is believed to be a result of mineralised hydrothermal fluids, probably passing along a shear zone, reacting with Proterozoic iron oxide rich sediments and precipitating out Au-Cu-Bi sulphide mineralisation. The main characteristics of this style of mineralisation in the Tennant Creek mining field is a compact ore body within a magnetite host with distinct mineralogical zoning. This zoning is generally shown as a high grade gold core with a copper/bismuth capping. Later tectonic movements may modify the structure.

The main orebody approximately 150-175m below the surface is called Juno, however down-dip is a second known mineralised pod defined by limited drilling known as the M10 deposit. Both orebodies were modelled and resources estimated.

Drilling is sparse and irregular immediately above and below the mine workings. An important exploration target not yet properly tested by drilling is the possible supergene zone up-dip from the main workings.

Other mineralised intercepts occur off the main mineralised shear but there is not enough information about these areas to make resource estimates.

Data

Extensive drilling from both the surface and underground has been completed over many years at the Juno Gold Mine, near Tennant Creek in the Northern Territory. Unfortunately over this period the drilling and assay data has become confused, incomplete and full of inconsistencies in quality and style as the project passed between various new owners.

The drilling data supplied for this estimate was contained in various spreadsheets with hole collar coordinates, down hole surveys and assays. Many holes in the different series were missing from the database and there was also significant duplication. There were many holes shown on old printed maps and sections that either were not available digitally or plotted differently, either with different coordinates, orientation or different grades. Table 1 summarises the drill holes in the database used in these calculations.

Hole Series	Hole Numbers*	Holes	Total Metres
800	159A,196A	2	157.89
J700	100-249	146	5,850.47
J800	101-222	118	5,112.81
JD1W	1-15	10	3,112.05
JD2W	1,2	2	452.2
JD3W	1	1	429.5
JD400	24-42	15	666.12
JD500	1-13	7	457.49
JD600	1-96	88	3,207.53
JD700	1-99	79	3,769.51
JD719	1-6	6	58.52
JD730	1,2	2	24.39
JD800	1-99	85	4,723.79
JD825	1-11	12	118.72
JD900	1-94	85	9,997.77
JDH	1-29	29	8,912.40
JNPH	1-4	4	249.00
JNRB	1-53	49	3,057.00
JNRC	1-16	14	981.00
JW1A	17,18	2	819.80
JW900	14	1	275.54
NLDH	1,2	2	455.70
PRB	1-8	8	242.00
Total		**767**	**53,131.20**

* series only, hole numbers may be missing in series

Table 1. Drill hole listing in database.

No information was available on sampling or analytical techniques and procedures or on sample recoveries. No assessment on the quality of the assays is therefore possible. In these estimates it has been assumed that the assays were of high quality and unbiased however this assumption cannot be guaranteed.

Many corrections were required to the data to allow proper loading into the MineMap drill hole database. Numerous repeats and overlapping sample intervals had to be sorted out and corrected.

A complete dataset of holes called the "Q" series, because they were in "csv" files ending in "q", were rejected from the database used to calculate these resources. These holes had the same hole numbers as the J700, J800, JD600, JD700 and JD800 series without the JD prefix however the assay intervals and assays were different. The best guess is that the series used were re-samples of the same "Q" series core. The JD series used was selected as they correspond with the Nomandy plots and they were generally sampled over 1.2m intervals while the "Q" series were generally sampled over longer 2.1m intervals. Generally the two duplicate holes had similar grades but were never identical.

Almost all the holes are believed to be diamond drill holes collared from underground drill cuddies at 7.5m (25') intervals from where they were fanned out both vertically and laterally. There is no information available to on sample recoveries or core diameters of these holes.

Bulk Density

A bulk density of 3.5 was used to calculate tonnes from cubic metres. This figure was supplied by the owners and was based on figures found in Normandy reports that were in turn based on an unknown number of measurements of core and other samples.

The value of 3.5 may be conservative as the host rock for the mineralisation contains significant quantities of magnetite and sulphides. Another possible clue to the conservativeness of the bulk density is that the modelling done by the author came up with very similar grades for the stoped out volume recorded by the earlier miners however the calculated tonnes was only 76%. This may indicate that the bulk density may be approximately 4.5 in the stoped areas.

As the remnant mineralisation is likely to contain less magnetite and sulphides than the stoped out volume indicated by its lower grade, the average bulk density can be expected to be less than the volume already mined.

Past Production

A series of cross sections of the mined out stopes at 10m intervals were used from the Normandy digital database to produce wireframes of the stopes. These wireframes were used to estimate the mined out volume from the total resource.

After the wireframes were compared with old Peko long sections it was found that the Normandy data was probably based on 1972 stope outlines. Mining ceased in 1976 so four years of production was not included in the digital stopes. The "missing" stope production for the period 1972 - 1976 in the digital data was in part offset by rib pillars that were in place in 1972 being accidentally wireframed as stoped by me and thse pillars were actually mined out by 1976. In all a "guesstimated" 20,000 tonnes is unaccounted for in the wireframed stopes.

The stoped wireframes cannot be properly updated without further 3D information. Unfortunately the printed long sections cannot provide the stope widths so are inadequate. A search is underway for up-to-date 3D stope information.

Juno Modelling

The Juno resources were modelled using MineMap software.

The copper and gold mineralisation were modelled as two separate models.

The copper model was produced by wireframing intercepts on cross-sections using a lower cut-off of 0.5% Cu then calculating grades for blocks within the wireframe using only the drillhole intercepts within the wireframe using an inverse distance weighted algorithm. Copper, gold and bismuth grades were all modelled in this way.

The gold model was constructed from wireframes constructed by snapping strings to drillhole intercepts using a 1.0 g/t Au lower cut-off displayed on plans. Problems correctly snapping to drill hole intercepts caused by the vertically fanned holes superimposing on each other on the main levels was overcome by using only the horizontal holes for snapping strings to. This wireframing was then checked on sections to correct any mis-snapped strings. Both copper and gold grades within the gold wireframe were modelled in this manner. Due to the lack of regularly spaced holes with bismuth grades in the lower levels, bismuth was not modelled.

After the gold model was completed, the copper model was re-run for copper only to overwrite the copper grades in the gold model that overlapped with the copper wireframe. This resulted in all the copper grades in the copper model coming holes from within the copper wireframe, and all the gold grades in the gold model came from holes within the gold wireframe where they overlap.

The parameters used in the modelling are outlined in Table 3.

Parameter	Juno
East/West limits	1135E -1375E
North/South limits	300N - 420N
Block dimensions (metres) X (strike), Y (across strike), Z (depth)	2.0m x 2.0m x2.0m
Algorithm	3D Ellipsoidal
Inverse Weighting Power	3
Upper RL	880m RL
Base RL	688m RL
Search Ellipse X	20m
Search Ellipse Y	20m
Search Ellipse Z	20m
Rotation Z (dip off vertical)	0
Rotation Y (strike)	0
Rotation X (plunge)	0

Table 3. Modelling parameters used to model the Juno deposit.

Juno Resource Estimate

Table 4 below summarises the resources calculated from the modelling.

	Tonnes	Au g/t	Cu %	Bi	Distance (m)*
Copper Orebody (unstoped)	249,000	1.77	0.85	0.24	3.5
Gold Orebody (unstoped)	703,000	13.54	0.41	N/a	3.8
Sub Total Unstoped	**952,000**	**10.46**	**0.52**	**N/a**	**3.7**
Previously Stoped#	**341,000	59.16	0.30	N/a	3.0
Grand Total	**1,293,000**	**23.3**	**0.47**		**3.5**

* Average minimum distance from nearest drill intercept in search ellipse to block model cell
** Quoted as 540,000 tonnes at 56.1 g/t Au in historical records.
# Based on wireframed Normandy digital data. A "guesstimated" 20,000t extra may need to be taken off the unstoped total and added to the stoped out figure.

Table 4. Juno resource estimate.

Considering the close spacing of the drilling, with the average minimum distance from the nearest drill intercept within the search ellipse to the block model cell being less than 5m, this resource could normally be considered as Measured according to the JORC code for reporting mineral resource estimates. However, due to a lack of information on sample and assay quality, bulk density and the complex structure of the mineralisation making modelling difficult it is classified by the author as (very high) Indicated.

Appendices showing more details of the Juno resources are attached.

M10 Modelling

The gold and copper mineralisation in the M10 orebody were modelled as only one model. Although it would be expected to have similar mineralogical zoning as at Juno, there is insufficient drilling (9 holes) to outline the two zones separately.

The model was produced by wireframing intercepts on cross-sections with a lower cut-off of 1.0 g/t Au on sections, then calculating grades for blocks within the wireframe using only the drillhole intercepts within the wireframe using an inverse distance weighted algorithm. Only gold and copper grades were modelled.

The parameters used in the modelling of the M10 deposit are outlined in Table 5.

Parameter	M10
East/West limits	1250E - 1405E
North/South limits	340N – 440N
Block dimensions (metres) X (strike), Y (across strike), Z (depth)	2.5m x 2.5m x2.0m
Algorithm	3D Ellipsoidal
Inverse Weighting Power	2
Upper RL	620m RL
Base RL	450m RL
Search Ellipse X	50m
Search Ellipse Y	50m
Search Ellipse Z	75m
Rotation Z (dip off vertical)	0
Rotation Y (strike)	0
Rotation X (plunge)	0

Table 5. Modelling parameters used to model the M10 deposit.

M10 Resource Estimate

Table 6 below summarises the resources calculated by the modelling.

	Tonnes	Au g/t	Cu %
M10 Orebody	1.2 million	5.04	0.02

* Average minimum distance from nearest drill intercept in search ellipse to block model cell

Table 6. M10 resource estimate.

Considering the wide spacing of the drilling with no proper delimiting holes along strike or down dip, this total resource can only be considered as Inferred according to the JORC code for reporting mineral resource estimates. This estimate has a high level of unreliability and so is only suitable for defining an exploration target but is not suitable for mine planning purposes.

Appendices showing more details of the M10 resources are attached.

Yours faithfully,

Phil Jones

Disclaimer

Appendix 1 – Juno Resource Details

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MODEL USED : NEWPLAN2

EASTINGS : 1135 TO 1375
NORTHINGS : 300 TO 420

CELL RANGE OF THE REGION :
IN THE X DIRN : 1 TO 120
IN THE Y DIRN : 1 TO 60

RELAT. DENSITY ORE : 3.50

ORE TONNAGES ABOVE : 0.0 METRES ELEV.
RANGE FOR AU : 10.00 TO 999999
RANGE FOR STOPE : 3 = **Copper Model**

	Volume (m^3)	Tonnes	Au	Cu	Bi	STOPE	D1
TOTAL/AVG	1,680	5,880	28.44	0.64	0.32	3	3.04

ORE TONNAGES ABOVE : 0.0 METRES ELEV.
RANGE FOR AU : 5.00 TO 10.00
RANGE FOR STOPE : 3 = **Copper Model**

	Volume (m^3)	Tonnes	Au	Cu	Bi	STOPE	D1
TOTAL/AVG	2,544	8,904	6.81	1.11	0.5	3	3.45

ORE TONNAGES ABOVE : 0.0 METRES ELEV.
RANGE FOR AU : 1.00 TO
5.00
RANGE FOR STOPE : 3 = **Copper Model**

	Volume (m^3)	Tonnes	Au	Cu	Bi	STOPE	D1
TOTAL/AVG	20,272	70,952	2.04	0.89	0.21	3	3.95

ORE TONNAGES ABOVE : 0.0 METRES ELEV.
RANGE FOR AU : 0.00 TO
1.00
RANGE FOR STOPE : 3 = **Copper Model**

	Volume (m^3)	Tonnes	Au	Cu	Bi	STOPE	D1
TOTAL/AVG	46,248	161,868	0.42	0.84	0.24	3	3.29

ORE TONNAGES ABOVE : 0.0 METRES ELEV.
RANGE FOR AU : -10.00 TO 0.00

RANGE FOR STOPE : 3 = **Copper Model**

	Volume (m^3)	Tonnes	Au	Cu	Bi	STOPE	D1
TOTAL/AVG	376	1,316	0	0	0	3	0

	Volume (m^3)	Tonnes	Au	Cu	Bi	STOPE	D1
Total Unstoped Copper Orebody	71,120	248,920	1.77	0.85	0.24	3.00	3.46

ORE TONNAGES ABOVE : 0.0 METRES ELEV.
RANGE FOR AU : 10.00 TO 999999
RANGE FOR STOPE : 2 = **Gold Model**

	Volume (m^3)	Tonnes	Au	Cu	Bi	STOPE	D1
TOTAL/AVG	59,328	207,648	38.17	0.32		2	3.86

ORE TONNAGES ABOVE : 0.0 METRES ELEV.
RANGE FOR AU : 5.00 TO 10.00
RANGE FOR STOPE : 2 = **Gold Model**

	Volume (m^3)	Tonnes	Au	Cu	Bi	STOPE	D1
TOTAL/AVG	34,040	119,140	7.13	0.34		2	3.87

ORE TONNAGES ABOVE : 0.0 METRES ELEV.
RANGE FOR AU : 1.00 TO
5.00
RANGE FOR STOPE : 2 = **Gold Model**

	Volume (m^3)	Tonnes	Au	Cu	Bi	STOPE	D1
TOTAL/AVG	75,456	264,096	2.56	0.43		2	3.66

ORE TONNAGES ABOVE : 0.0 METRES ELEV.
RANGE FOR AU : 0.00 TO
1.00
RANGE FOR STOPE : 2 = **Gold Model**

	Volume (m^3)	Tonnes	Au	Cu	Bi	STOPE	D1
TOTAL/AVG	31,640	110,740	0.62	0.6		2	3.52

ORE TONNAGES ABOVE : 0.0 METRES ELEV.
RANGE FOR AU : -10.00 TO 0.00
RANGE FOR STOPE : 2 = **Gold Model**

	Volume (m^3)	Tonnes	Au	Cu	Bi	STOPE	D1
TOTAL/AVG	376	1,316				2	

	Volume (m^3)	Tonnes	Au	Cu	Bi	STOPE	D1

Total Unstoped Gold Orebody	200,840	702,940	13.54	0.41	0.00	2	3.73
Sub Total Unstoped	271,960	951,860	10.46	0.52	0.06		3.66

ORE TONNAGES ABOVE : 0.0 METRES ELEV.
RANGE FOR AU : 10.00 TO 999999
RANGE FOR STOPE : 1 = **Already Stoped**

	Volume (m^3)	**Tonnes**	**Au**	**Cu**	**Bi**	**STOPE**	**D1**
TOTAL/AVG	74,000	259,000	76.51	0.26		1	3.12

ORE TONNAGES ABOVE : 0.0 METRES ELEV.
RANGE FOR AU : 5.00 TO 10.00
RANGE FOR STOPE : 1 = **Already Stoped**

	Volume (m^3)	**Tonnes**	**Au**	**Cu**	**Bi**	**STOPE**	**D1**
TOTAL/AVG	9,680	33,880	7.33	0.46		1	2.79

ORE TONNAGES ABOVE : 0.0 METRES ELEV.
RANGE FOR AU : 1.00 TO
5.00
RANGE FOR STOPE : 1 = **Already Stoped**

	Volume (m^3)	**Tonnes**	**Au**	**Cu**	**Bi**	**STOPE**	**D1**
TOTAL/AVG	9,408	32,928	2.96	0.52		1	2.67

ORE TONNAGES ABOVE : 0.0 METRES ELEV.
RANGE FOR AU : 0.00 TO
1.00
RANGE FOR STOPE : 1 = **Already Stoped**

	Volume (m^3)	**Tonnes**	**Au**	**Cu**	**Bi**	**STOPE**	**D1**
TOTAL/AVG	944	3,304	0.74	0.43		1	1.88

ORE TONNAGES ABOVE : 0.0 METRES ELEV.
RANGE FOR AU : -10.00 TO 0.00
RANGE FOR STOPE : 1 = **Already Stoped**

	Volume (m^3)	**Tonnes**	**Au**	**Cu**	**Bi**	**STOPE**	**D1**
TOTAL/AVG	3,344	11,704				1	

	Volume (m^3)	**Tonnes**	**Au**	**Cu**	**Bi**	**STOPE**	**D1**
Total Stoped	97,376	340,816	59.16	0.30	0	1	2.92
Grand Total Juno Resource		**1,292,676**	**23.30**	**0.47**			**3.46**

Appendix 2 – M10 Resource Details

Grade Range	Tonnes	Au g/t	Cu %
>10g/t Au	35,219	11.94	0.03
5.0 - 10.0g/t Au	441,831	6.92	0.03
1.0 - 5.0g/t Au	709,669	3.54	0.02
0.0 - 1.0g/t Au	1,881	0.83	0.02
Grand Total	**1,188,600**	**5.04**	**0.02**