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ORE RESERVES - POPLAR

For a rapid update of Poplar reserves, a computer polygon method was employed to check results after 1980 drilling (holes PC-43 to PC-55). Once assay values had been key-punched the method was quick and handy. R.L. Sandefur made the runs, generating also Calcomp plotted bench plans and variograms to examine the geostatistics.

From the geostatistics it may be shown that a polygon method would be valid if sample density is sufficient and a maximum radius of influence of 150 m is used. R.L. Sandefur notes that histograms and variograms are more continuous in plan at Island Copper than Poplar; vertical continuity is about equal. In plan, both Island Copper and Poplar are more continuous to the N.W. than N.E; Poplar is lower grade than Island Copper.

The following assumptions are made for this calculation:

(1) No reserves were included greater than 150 m from any hole; tons have been broken down as to 0 - 15 m, 15 - 30 m and 30 - 150 m from a drill hole.

(2) A cut-off grade of 0.25% Cu has been used.

(3) A hole must penetrate 6 vertical meters of a bench to generate a polygon; 12 m benches were used.

(4) Dikes and internal waste are taken either as dilution or generating waste polygons.

To compare this method to the 1979 hand calculation, it must be remembered that in the designed pit all the plus 0.25% Cu material was taken from the 708 bench and above, but because of pit configuration, increasing amounts remain in the walls down to the 624 bench. Also, because of a previously predicted "vertical grain" to the deposit, higher grade bench intersection were given limited horizontal extent tending to lower the overall grade of the deposit relative to a polygon method.

Enclosed is a summary of results to date.

METHOD	CUMULATIVE TONS AND GRADE					
	708 Bench			624 Bench		
	Tons	% Cu,	% Mo	Tons	% Cu	% Mo
1. Hand Calculation 1979 (Holes PC-1 to PC-42)	63,617,000	.329	.016	78,696,000*	.324	.015

Polygon method; No restriction as to location of internal waste phase or dikes, or to outer boundary of deposit; not including holes PC-19, 20, 33, 34, 39, 41, 42 and 45 generating polygons in the high stripping ratio eastern extension.

METHOD	Tons	% Cu,	% Mo	Tons	% Cu	% Mo
2. All drilling to PC-55	67,315,000	.364	.013	98,832,000	.345	.013
3. All drilling up to PC-42	87,173,000	.362	.014	112,617,000	.362	.015

Polygon method; No restrictions; including holes in eastern extension.

METHOD	Tons	% Cu,	% Mo	Tons	% Cu	% Mo
4. All drilling to PC-55	79,701,000	.363	.012	135,739,000	.377	.009
5. All drilling up to PC-42	100,282,000	.363	.012	144,117,000	.368	.011

Polygon method; Restriction of ore polygons to estimated 0.25% Cu boundary; but still generating portions of waste polygons within boundary by external holes.

METHOD	Tons	% Cu,	% Mo	Tons	% Cu	% Mo
6. All drilling to PC-55	46,282,000	.367	.014	67,482,000	.363	.014
7. All drilling up to PC-42	54,287,000	.364	.014	71,055,000	.360	.014

* Not including mineralized material greater than 0.25% Cu remaining in the designed pit walls below the 708 bench.

<u>CONCLUSIONS</u>:

1. Method #2 is probably the best estimate of geological reserves.

2. In all three types of polygon estimates, 1980 drilling has
    decreased reserves (from 4 - 20 million tons).

    Therefore, sample density up to PC-42 had not been sufficient
    to estimate accurately the total reserves in the deposit, and
    still may not be up to PC-55, by polygon methods.

3. Average copper grades for the polygon methods are higher than
    for the 1979 hand contoured estimate.   By all methods, grades
    are about 0.36% copper and 0.013% Mo.   Drilling in 1980 has
    not changed the grade estimate for the deposit.

4. Cumulative copper grades increase to the 828 bendn then decrease
    with depth;   cumulative molydenum grades increase to the 660 bench
    then decrease with depth.   These trends along with, geostatistical
    evidence and fracture orientation (core orientation program)
    suggests grade variations may be treated as changing uniformly
    in all directions with no evidence of a vertical grain.

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