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Mr. A. Frederick Banfield, Jr.
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Dear Fred:

As discussed on the telephone, I am writing to let you know how we would like to go about setting up a Dipper Model for the Large Faro Deposit.

The main difference when compared to a more conventional approach is to be found in taking account of the variable rock types in the deposit. In particular, the rock type specific gravities and metallurgical performances.

First of all I will be obtaining the following information from the departments concerned here at Faro:

1) $ Mining cost per cu. yd.

2) $ Milling cost per SDT (Short Dry Tons)

3) % Mine cut-off grade

4) % Mill cut-off grade (probably this will be the same as the mine cut-off, as stockpiling is not an attractive proposition in our circumstances).

5) Adjustment factors for grade and tonnage (as stored in the computer model) to allow for dilution and other systematic discrepancies of the model from mining reality. (Currently adjustment factors are for Pb: -6%, Zn: -4%, Ag: -6%, and tonnage: -5%.)

6) Average % recoveries by rock type, i.e.:

	Element		
Rock Type	Pb	Zn	Ag
7	a	b	c
8	d	e	f
9	g	h	i
10	j	k	l
11	m	n	o
12	p	q	r

7) Average amounts and $ values per unit weight of Pb, Zn and Ag in the Pb and Zn concentrates. (As of 1982 no Pb/Zn, alias bulk, concentrate will be produced - at least intentionally!)

   $ values will be discounted for transportation, smelting, etc., and so will be f.o.b. mill loadout.

Using an equivalent % Pb grade worked well for Vangorda and Grum and I do not see any need to change this approach.

By the usual procedure, 'in-pit' $ values per lb. for Pb and Zn, and g for Ag, will be calculated.

Because of the different recoveries from the various rock types, the in-pit $ values per unit weight will be different for the metals occurring in the different rock types. Therefore, each rock type will require a slightly different equivalent % Pb grade equation.

In addition, to take into account dilution and other factors, the in-block Pb, Zn and Ag grades will need to be reduced by the previously mentioned adjustment factors.

We would then end up with an adjusted equivalent % Pb grade equation for each rock type.

For example, for one rock type:

Where in-pit $ values per unit weight are:

Pb = $ x/lb.
Zn = $ y/lb.
Ag = $ z/g (Ag is stored as g/MT in the model)

Adjusted equivalent % Pb grade:

$$0.94.\ \%\ Pb + 0.96.\ \frac{(y)}{(x)}.\ \%\ Zn + 0.94.\ (C).\ \frac{(z)}{(x)}.\ g\ Ag$$

where C is an appropriate constant to allow for conversion of units.

Such an equation would be developed for each rock type with different x, y and z values reflecting different recoveries. This would then just need a sub-routine with a set of 'if' statements to assign the appropriate calculation to a block with a particular rock code.

As per normal, we would make a copy of the main model file and run M612V1 with a customized user sub-routine to calculate and store the modified equivalent grade.

Perhaps you could write the basic sub-routine, for while fairly straightforward, there is maybe a method which is more efficient than another.

We can edit in the actual values when we know what to put.

The main model would then have the two necessary data for extraction to the type of Dipper Model we would like. These are the adjusted equivalent % Pb and rock code.

The easiest way to convey the type of Dipper system envisaged is to explain how we would like M720V1 to run.

The basic parameters we would input (excluding rate of return, variable slope angles, base blocks, rows, columns, etc., as required) to M720V1 would be:

1) $ Mining cost per cu. yd.

2) $ Milling cost per SDT

3) Mine and mill cut-off grades

4) In-pit $ value Pb/lb.

Note: The % mine and mill cut-off grades would be translated into adjusted equivalent % Pb grade terms. (i.e., the cut-offs would be pre-dilution so to speak.) We would use statistics of the average Pb, Zn, Ag ratio at the chosen cut-off in the translation.

In the calculation of net value of a cone, we should like the following:

1) Mining cost to be based on block volume. (There are some 40 foot benches as well as 20 foot benches in the model.)

2) Milling cost to be based on block tonnage which would be variable according to rock type. This would also figure in the block metal part of the calculation, and is why we would like to have the rock code in the Dipper Model.

In addition, for statistical reasons to do with our block size (50' x 50' x 20') as compared with the 'mining' unit, we currently carry a -5% reduction on block tonnage.

Therefore, for each block in a cone the metal content and milling cost part of the calculations should be based on block tonnage as calculated in the following manner:

Block Volume x Tonnage Factor x 95%

Where the tonnage factor is determined by the rock code and the 95% is the adjustment factor.

If you have a copy of the earlier M612V1 sub-routine FAR612 that you wrote for us, this will give you the figures that we currently use to calculate unadjusted tonnage for the various rock types. (This sub-routine source is also on the PMG010 account, now called FAR612.FO. 'FO' for "Faro,' as opposed to Vangorda, etc. This was done as we try to keep a production program library and need to differentiate among the files.)

That more or less covers the modifications we would like to see.

I am wondering if it would not be best in writing the M612V1 and M720V1 sub-routines to keep the calculations fairly 'clear,' instead of 'short cutting' or 'mingling' them (if you follow me!).

For example, where we use a 95% tonnage adjustment factor, to keep that calculation as:

Volume x Tonnage Factor x 95%

Instead of:

Volume x Previously Calculated 95% of Tonnage Factor

This way it is evident to anyone looking at the program source to see what calculations are performed (- not just you and me!). Also, if we need to modify any of the adjustment factors, it will be easier this way.

I realize that if used in this fashion the cost of running the program will be a little more, but we could easily make another version with the 'short cuts' for actual use while keeping the original for reference.

I am endeavouring to make Mintec as easy to operate as possible for other people here and this approach would help.

I hope that gives you enough information to go on.

I shall be talking to you again on the phone before long.

Yours truly,

Peter Clarke.

Peter I. Clarke
Engineering Geologist

PIC/mm

P.S.: I am sending you output statistics from some M303V1, M420V2 and M608V2 runs this week.