14/9/82

006990

BASIC APPROACH TO MINE MODELING.

The basic approach currently taken to mine modeling is one of modeling the sulphide horizon on a block basis as best as possible, and adding an adjustment factor to grade-tonnage so modeled to take account of known discrepancies between the technique and practical recovery.

NORMAL APPROACH TO HANDLING GEOLOGY FOR MINE MODELING
(FARO AND VANGORDA)

1. DDH's are drawn onto long and cross-sections. (Strike and dip directions). Draughting is done from computer plots of lithology and structure. (Projections from DDH's to sections are horizontal only). Rock type codes are draughted.

2. Detailed geological sections for long and cross-sections are interpreted. (with or without assay results).

3. Detailed long and cross-sections are simplified. This defines the 'sulphide horizon' on section for mine modeling.

4. Simplified long and cross-section geology is transfered to bench plans. Here the bench height has been decided upon. In general a 'mid-bench' rule is followed whereby a rock type is assumed to exist on a bench where it comprises greater than ½ the bench height. Mine model geology codes for combination rock types can exist. At present codes for combined rock types exist only for certain sulphide combinations, not waste/sulphide combinations. See attached example of Faro mine model coding. Note that where waste is less than ½ the bench height it would be included in a sulphide outline.

5. Here the block size plan dimensions must have been decided upon. From the bench plans and rock type outlines the geology of the blocks are determined. Again combination rock type codes can exist as in # 4. (It should be noted that the greater the number of combination codes the greater amount of information to be transcribed.)

6. A computer file is created from the bench plan data of block geology codes. This then represents the 3-D geology on a block basis for the mine model.

FARO MODEL GEOLOGIC CODING

NO. (AS STORED IN MODEL)	LABEL		
1	UNDETERMINED		WASTE
2	O/B		WASTE
3	3D		WASTE
4	3A		WASTE
5	1D		WASTE
6	10E	(INTRUSIVE)	WASTE
7	2A		MINERALIZED
8	2BCD		MINERALIZED
9	2CE		MINERALIZED
10	2EF		MINERALIZED
11	2H		MINERALIZED
12	2G		MINERALIZED

FOR DESCRIPTION OF LABELS REFER TO LITHOSTRATIGRAPHIC CODE.

NORMAL APPROACH TO HANDLING DDH DATA FOR MINE MODELING.
(FARO AND VANGORDA)

1. DDH data, survey and assay data only, are loaded to MEDSYSTEM DDH files.

2. Statistics are performed on Pb, Zn, Ag, Cu, Au. (Without regard to rock types). (Au not available for Faro) Maximum limits are set for each element above. Maximum limit for mine modeling purposes is 95 percentile value. (i.e. 5% of assays results for the element are above the limit.) Values above the limit are reduced to it.
Very high assay values taken from core are unrepresentative of grades over block size peices of ground. Known as volume-variance relationship. Very high assay values lead to very high composite values etc.

3. Some portions of the DDH assay data are re-set for mine modeling purposes.
The limits of the 'sulphide horizons' are set by the geologist when outlining the simplified sections. Assays taken outside these limits are scratched (made equal to sub-zero numbers) as being not part of the sulphide horizons.
The exceptions are where non-sulphide horizon bands (usually waste) occur between sulphide horizons and are less than 1/2 the bench height.

3. CONT'D

If the band is less than ½ the bench height it is considered to be 'internal waste' and the assays remain unchanged if taken and/or not-assayed intervals are set to zero assay values.
If the band is greater than ½ the bench height it is considered to be 'external waste'.

4. Composites are calculated from the above modified DDH data. Weighting by sample length and specific gravity is performed. The present routine basically calculates composites for benches intersected by assay intervals (zero or above values) of at least 10'. The bench height is 20'. More details can be supplied.

5. Statistics are performed on Pb, Zn, Ag, Cu. Maximum limits are set for the composite values of each element. Maximum limit for mine modeling purposes is the 97.5 percentile value. (i.e. 2½ % of values are above). Values higher than these limits are reduced to them.

6. Each composite is assigned a simplified geology code for further purposes such as S.G. stats by rock type.

NORMAL APPROACH TO GRADE INTERPOLATION AND RESERVES CALULATION (FARO)

1. Grade Interpolation is performed on each bench separately (ie. horizontally by bench) and is based on a search area and inverse distance squared weighting of composites within that area. See attached diagram for Faro interpolation. Weighting within the area is isotropic (ie. not regard taken of direction of composite from block undergoing interpolation. This will be changed on later models.)

Elements interpolated are Pb, Zn, Ag, Cu and Au where available such as Vangorda.

At present no matching of composite geology to block geology is done other than to prevent interpolation into waste blocks. This also can be modified.

2. Statistics are peformed on the composites by rock type. These are the simplified rock types. For each rock type the average S.G. value for composites above 4.0% Pb+Zn is found. These densities are then used in calculating reserves. i.e. each rock type has a fixed density for reserves calculation purposes.

3. Tonnage and grade computed from the model are subject to adjustment before quoting as tonnage and grade deliverable to the mill in practice.

At the present time, based on production comparisons these adjustments are -5% on the grades and zero on the tonnage.

INTERPOLATION SEARCH PATTERN