

NOTES ON THE F8701 COMPOSITES

1.) INTRODUCTION

Sampling procedures for assay samples of the Faro deposit have changed over the 21 year history of drilling. In the early drilling programs, core samples were split for regular 2.5 foot or 5.0 foot intervals. The rock type assigned to the interval represented the dominant ore type present. Lithology breaks commonly occurred within sampling intervals.

In later drilling programs assay intervals were restricted to single rock types. Within each lithology intersection, the drill core was subdivided into assay intervals with an approximate maximum length of 5 feet.

Consequently assay sample intervals have irregular lengths ranging from less than 1 foot to locally 10 feet or more, with most samples being approximately 5 feet in length.

For geostatistical analysis, the sample intervals should have a uniform length. The assay intervals must therefore be combined into composite intervals of the same length. Composite thicknesses should not be less than assay intervals. Different possible composite lengths range upward from 5 feet.

Great care has been taken in construction of the F8701 geology block model to clearly differentiate the ore lithologies. An optimum composite length, therefore, should be large enough to encompass more than one sample interval and yet not so large that different ore lithologies are averaged into the same composite intervals.

2.) THICKNESS OF ORE INTERSECTIONS

To help in selecting an optimum composite length, I have compiled frequency distribution information on drill hole intersection lengths for each of the ore lithologies in the F8701 borehole database. Intersection lengths for each ore type were calculated using program THICKINT. The input files for this program consist of PCMINE extraction files containing PCMINE mine model coordinates (Northing, Easting, elevation) of the top (file 7) and bottom (file 8) of all drill hole intersections for a particular lithology.

Table 7 summarizes the intersection thickness information. It is apparent that a significant proportion of intersections for most of the ore types are less than 20 feet in length. A composite length of 10 feet was therefore considered to be the best compromise between making composites larger than sample intervals and ensuring composite lengths are dominantly a single ore lithology.

3.) COMPOSITES

Elevation composites were calculated at 10 foot intervals between elevations 3830 feet and 3090 feet for each drill hole. These elevations correspond to benches 14 through 50. Because most of the drill holes are near vertical, the elevation composite lengths are approximately 10 feet. This range of benches encompasses all portions of the ore body. The maximum number of composites in any one drill hole is 74.

Each composite was assigned a rock type based on the lithology located in the drill hole at the mid-composite elevation. At the margins of the deposit, the composite must consist of ore for over half the composite length in order to be classified as an ore composite. In calculating the composites, assays were weighted by length. High assay values were not clipped or cut before being incorporated into the composite.

A separate composite file was calculated for each of the three assay databases. As with the assay files, each composite file was copied to a separate file name so that three composite files could be accessed within the same PC-MINE F8701 model. The following table indicates the correspondence between the different files:

Drill Hole File	Assay File	Composite File
FARODDH1.DAT	FARODDH1.MBA	FARODDH1.MBC
FARODDH2.DAT	FARODDH2.MBA	FARODDH1.MBC
FARODDH3.DAT	FARODDH3.MBA	FARODDH3.MBC

4.) VARIOGRAMS (GEOSTATISTICS)

Two dimensional, horizontal variograms in compass directions 045 and 315 were calculated from the composites for each of the major ore types. These compass directions are parallel to the geological cross and long sections. As such they are parallel to the major structural grain of the deposit.

Most of the variograms were extremely difficult to readily interpret. The sill values showed considerable unsystematic scatter with increasing distance between samples. The range and nugget effect were poorly constrained. In some instances the nugget effect was larger than the sill value.

On closer inspection of the calculation procedure, it was ascertained that the distances between samples were calculated using only the horizontal coordinates of the centre point for each composite; elevation differences between composites were not considered. Furthermore the search for additional samples in the specified compass direction did not include an angular restriction in the vertical direction. This resulted in composites located vertically in a drill hole being considered spatially extremely

close to each other. The small calculated distances for vertically widely separated composites is especially noticeable in inclined drill holes.

The Faro deposit is a generally horizontal, stratiform ore body with a well developed vertical anisotropy even within the same rock unit. Assay grades are generally much more continuous laterally than vertically. The above variogram distance calculations would not adequately consider this vertical anisotropy. The resulting variogram would show an extremely large nugget effect with considerable scatter with increasing distance between samples.

Because of these software limitations, further variogram and geostatistical analysis of the composites was temporarily discontinued. Without variograms, block model interpolation cannot be completed using geostatistics and kriging. Instead the F8701 model was interpolated using inverse squared distance weighting of composites.

TABLE 7
THICKNESSES FOR DRILL HOLE ORE
INTERSECTIONS
FARO DEPOSIT

DISTRIBUTION OF THICKNESSES OF ORE INTERSECTIONS
(Geological Sections 116+070 - 125+000)

ORE TYPE (Description)	NUMBER of Samples	MINIMUM VALUE	MAXIMUM VALUE	NUMBER < 2.5 ft	%	NUMBER < 5 ft	%	NUMBER < 10 ft	%	NUMBER < 20 ft	%
21 (2ACD-BASAL)	136	1.2	155.0	1	0.7%	7	5.1%	19	14.0%	53	39.0%
22 (2ACD-MIDDLE)	11	5.0	85.9	0	0.0%	0	0.0%	5	45.5%	7	63.6%
23 (2ACD-UPPER)	24	2.4	31.9	1	4.2%	3	12.5%	11	45.8%	19	79.2%
32 (2BCD-MIDDLE)	14	3.3	80.0	0	0.0%	1	7.1%	2	14.3%	8	57.1%
33 (2BCD-UPPER)	59	0.8	28.5	3	5.1%	15	25.4%	32	54.2%	52	88.1%
40 (2EC)	102	3.0	141.3	0	0.0%	7	6.9%	23	22.5%	49	48.0%
50 (2EF)	165	2.0	122.6	1	0.6%	18	10.9%	52	31.5%	86	52.1%
60 (2EF6)	102	2.5	59.7	0	0.0%	11	10.8%	35	34.3%	58	56.9%
70 (2H)	60	1.8	35.0	2	3.3%	17	28.3%	37	61.7%	53	88.3%
80 (1H + ORE)	5	15.5	37.8	0	0.0%	0	0.0%	0	0.0%	2	40.0%

Notes on the FARO F8701 Surface Elevation Grids

1.) INTRODUCTION

The Faro deposit has been divided into several progressively deeper phases for production purposes. Surface elevation grids for a particular phase contain elevations of the pit outline for the bottom of that phase. These pit outlines are useful for reporting reserves, scheduling, and planning. For the F8701 model, these surfaces have been transferred from the FI model.

Additional surface elevation grids correspond to the pit outline at several specified times. These grids may be constructed from month-end surveyed toes, crests, and mid-bench lines contained in the BSL files from the Survey Point Data Base.

2.) FI Surface Grids to F8701 Surface Grids

Six surface grids were transferred from the FI model to the F8701 model. The transfer was accomplished using programs ELEV.FOR and TRANGR.FOR.

The FI model is oriented parallel to the existing mine grid and has grid blocks of size 50 feet (Northing) by 50 feet (Easting). The F8701 model is rotated 45 degrees in an anticlockwise direction relative to the FI model. In addition grid blocks have dimensions 35.36 feet (Northing) by 25 feet (Easting). These differences mean that an exact correspondence between the two models could not be retained.

Elevations from the FI model were transferred to the F8701 model by calculating the FI model coordinates (Northing, Easting) of the centre point for each F8701 model grid block. The exact FI block containing each centre point was then determined from the FI model coordinates. The elevation for that FI block was then assigned to the F8701 grid block corresponding to that centre point. All F8701 blocks whose centre points were not located in the FI model grid were assigned an elevation of 4270 feet; this elevation is the top elevation of the F8701 model. Only 7% of the F8701 centre points were located outside the FI model grid.

Program ELEV calculates the row and column number of the FI block containing each grid block centre point in the F8701 model. This information is written to the direct access, binary file F86.GRD. F8701 centre points occurring outside the FI model are assigned row and column coordinates (0,0) Program TRANGR then reads the data contained in F86.GRD and transfers elevations from the FI surface grid file to the F8701 surface grid file.

The following elevation grid surfaces were transferred from the FI model to the F8701 model:

Figure	F8701 GRID RECORD	DESCRIPTION
1	4	Faro pit surface at start-up of mining
2	5	AY phase pit
3	6	JB phase
4	7	BY phase pit, includes JB and AY
5	8	CY phase - to AY, BY and JB phases
6	9	\$5 pit with AY, BY, CY, JB phases

Mid-bench contours for these different surfaces are shown in figures 1-6. The mismatch between the FI and F8701 models occurs in the southeast and southwest corners of the F8701 model. The surface grids have a very grainy, boxy pattern because of the different block size and rotation between the two models.

3.) BSL File to F8701 Surface Grid using BSLIMPRT.FOR

Surveyed toes, crests, and mid-bench lines in the Faro pit area for each month end are stored in the appropriate BSLyymmD file of the SPDB (Survey Point Data Base) on the HP3000 computer at the Faro Minesite. The "yymm" in the BSL file name are the year and month for the month-end surveyed pit outline.

Elevations in the BSL file are stored as traverses consisting of multiple sequential spot elevations. Each spot elevation contains a Northing, Easting, and elevation. These data strings are not consistent with importing the elevations directly into the F8701 model. The program BSLIMPRT.FOR reads each data string in the BSL file, converts the Mine grid coordinates to F8701 model coordinates, and writes each surveyed elevation to an output file. The output file is fully compatible with importing the surveyed elevations into the F8701 model as an extraction file.

The imported extraction file consists of spot elevation readings. The surface grid must be generated from these spot elevations by interpolation.

4.) November 1986 Month End Surface Grid by Interpolation

The November 1986 month end pit surface BSL file (BSL8611D) was transferred to the F8701 model by interpolation of the elevation data points created using BSLIMPRT. This particular month end was selected because it corresponds to the start of the Curragh Resources 1987 fiscal year.

The extraction file written by program BSLIMPRT contained 5429 surveyed elevation data points. Unfortunately PCMINE software only allows a maximum of 5000 data points during interpolation. Therefore I had to run program BSLIMPRT twice to create two separate elevation data files corresponding to the northern and southern portions of the F8701 surface grid. The northern data file contained all elevation data points north of F8701 Northing 37600.0, and the southern data file contained all elevations south of F8701 Northing 37900.0. With these restrictions the two data

files overlapped by 300 feet in a north-south direction.

Next I added several fudged data points to each of these two data files in the area of overlap. For the northern data file the elevation 4270 was added at 50-foot Eastings for Northing 37600. 4270 elevations at 50-foot Eastings were also added to the southern file for Northing 37900.

The spot elevations for each data file were then interpolated into the F8701 November 86 Month End surface elevation grid. The search volume used for the interpolation was isotropic (circular) with a radius of 100 feet. The minimum number of elevation points required for interpolation was 2, and the maximum accepted for interpolation was 5. The background elevation for noninterpolated blocks was set to 4270 feet. Elevation data points were weighted using inverse distance.

The addition of several 4270 elevation data points to the overlapping edges of the north and south data files forced the interpolated elevations to be higher in the interval of overlap between the two files. The two interpolated surface grids were then merged into a single surface grid. During the merge operation, PCMINE looks at elevations in both data files for each grid block and selects the lowest elevation for the single output surface grid. Because of the added elevation data points and the interval of overlap of the two files, the transition between the two surface grids was smooth and did not show any edge effects. These three grids are stored as records 1-3 in the F8701 surface elevation grid file.

Inspection of the resulting surface grid for the entire F8701 model (figure 7) indicates that inverse distance interpolation is not an ideal method for generating the grid. In several instances the background elevation (4270 feet) was inserted in the main area of the pit because the program failed to find two survey traverses within 100 feet of the point being interpolated. In addition the outermost survey traverses were extended up to 100 feet beyond their exact locations because of the 100 foot search radius used for the interpolation. Further work on improving this approach for generating a surface grid was discontinued for these reasons.

5. BSL File to F8701 Surface Grid using BSLSECT.FOR

A cross-sectional method for generating surface elevation grids from the BSL files was considered a suitable alternative for circumventing the above problems associated with inverse distance interpolation. Surface elevations can be readily calculated from the cross-sectional profiles in all areas (including those portions with only a few survey traverses). Further, elevation calculations can be restricted to include only those areas where survey traverses have been completed; the outermost survey traverses would not be extended into areas of no data.

Program BSLSECT.FOR was written to generate a surface elevation grid from the BSL month-end file using the cross-sectional method. Initially the program calculates East-West cross-section profiles

passing through the centre of each row in the F8701 model. For each profile (=row) the surface elevations are then calculated for the centre of each column in the model by linear interpolation. After calculations have been completed for each row and column, the resulting grid of elevations are written to a sequential ASCII file. This file can then be imported directly into PCMINE as a surface grid.

6. November 1986 and February 1987 files to F8701 Surface Grids

Both the November 1986 and February 1987 BSL files were transferred to the F8701 model as surface grids using program BSLSECT. Areas of the model which were located outside the area of survey traverses were assigned a background elevation of 4270 feet. This elevation corresponds to the top of the model. For each grid, the BSLSECT program run took approximately 6 hours to complete.

Figures 8 and 9 illustrate the mid-bench contours for these two surfaces. The grids have a very realistic appearance; they are a reasonable mapping of the actual surveyed pit outline. The major remaining problem with these grids is the locally irregular margins between the survey traverses and the 4270 background elevation. This irregular margin is caused by the outermost traverses locally being parallel to the orientation of the cross sectional profiles. The problems associated with the margins of the grids can be alleviated by merging the grids with a surface grid corresponding to the surface topography at the Start of Mining (January 1986).

7.) Digitized Contour Map to F8701 Surface Grid using POLYSECT.FOR

The cross-sectional algorithm provides a powerful tool for generating surface grids in PCMINE. The Fortran program POLYSECT was written to extend this calculation method to digitized contour maps. The input file for POLYSECT consists of a PCMINE extraction file containing topographic contours digitized as open or closed polygons. Calculations for generating the elevation surface grid are exactly as described for BSLSECT. POLYSECT can be used to generate surface grids from any contour maps digitized as polygons.

8.) 1986 Start of Mining Map to F8701 Surface Grid using POLYSECT

Northwest Survey Corporation recently completed a detailed topographic contour map of the Faro pit area. The data base for the map consisted of air photos taken in September 1985. This map corresponds to the topography of Start of Mining in January 1986.

The topographic map was digitized using PCMINE software as a series of open and closed polygons. These polygons were then written to an extraction file.

The coordinate base for this map consisted of UTM coordinates expressed in feet. Program TOPO85.FOR was run to convert all the digitized polygon point coordinates to F8701 Model coordinates from UTM coordinates. This conversion included both a horizontal coordinate transformation and an elevation datum shift.

Next the program POLYSECT was used to generate the surface grid from the polygon extraction file.



PLOT MENU	
1	BOREHOLE SECTIONS
2	EXTR DATA
3	MODEL GRID
4	COORD GRID
5	POLYGONS
6	BENCHES
7	P CONTOURS
8	S CONTOURS
9	PIT SECTIONS
10	PERSPEX
11	USER FILE
12	ZOOM
13	PRINT
14	QUIT

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12	ZOOM
13	PRINT
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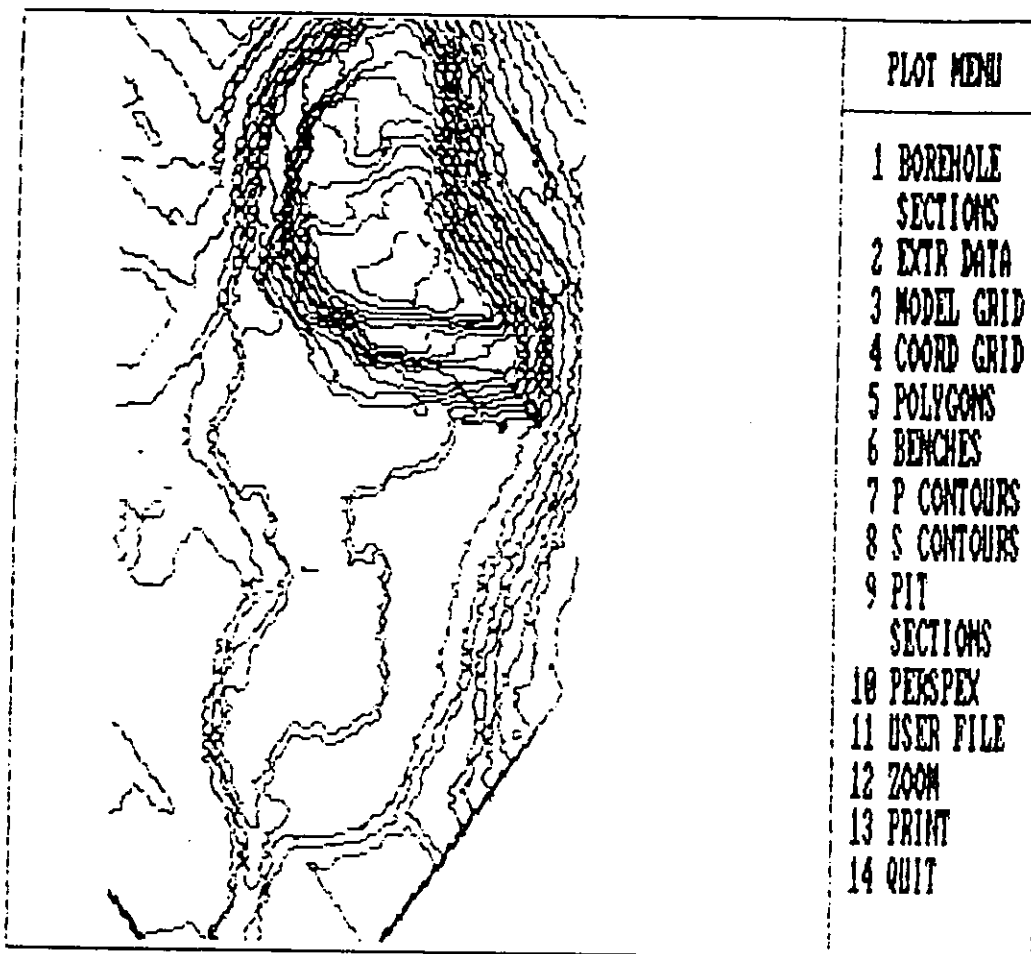
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 n extraction file
 :l only
 .bench levels

(MPRT)

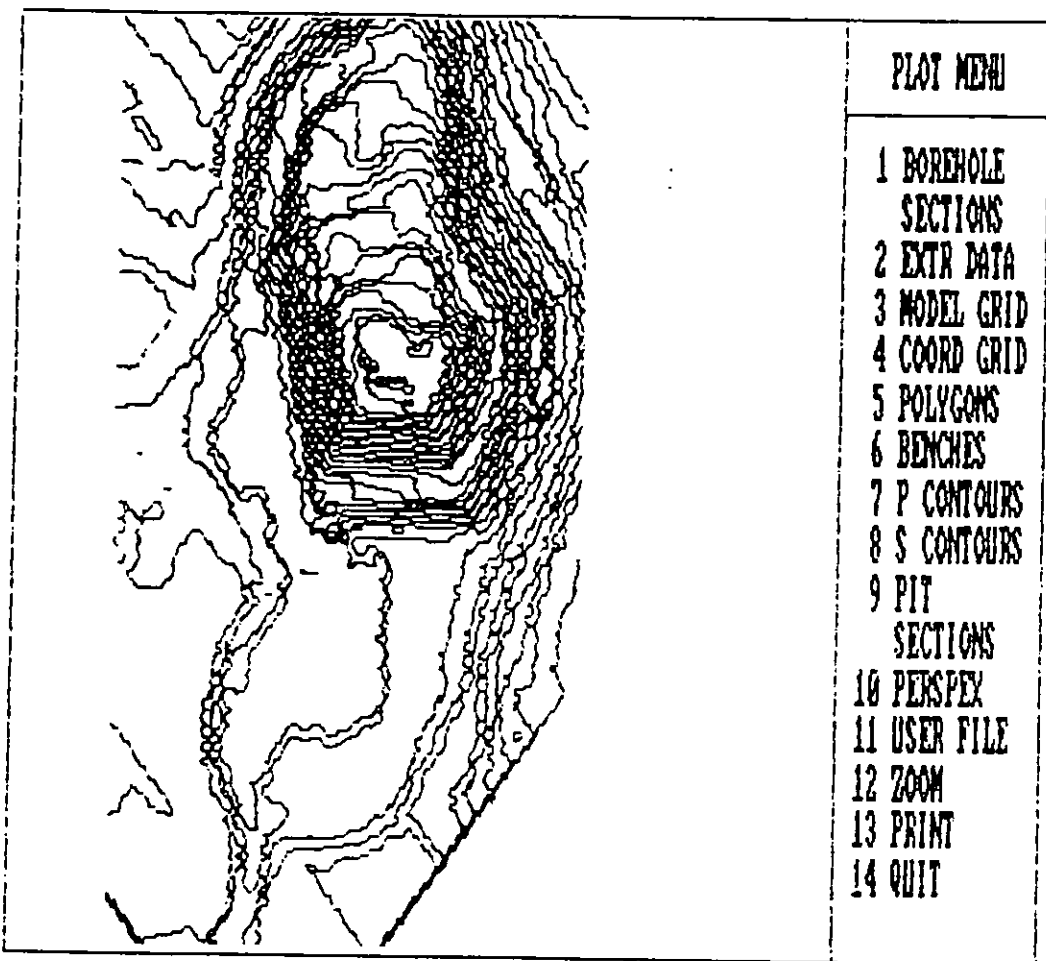
PROGRAM VERSION 1.10
NO : 20000
27 6/1987

GEMCOM SERVICES INC.
FARO DEPOSIT - F8701 MODEL

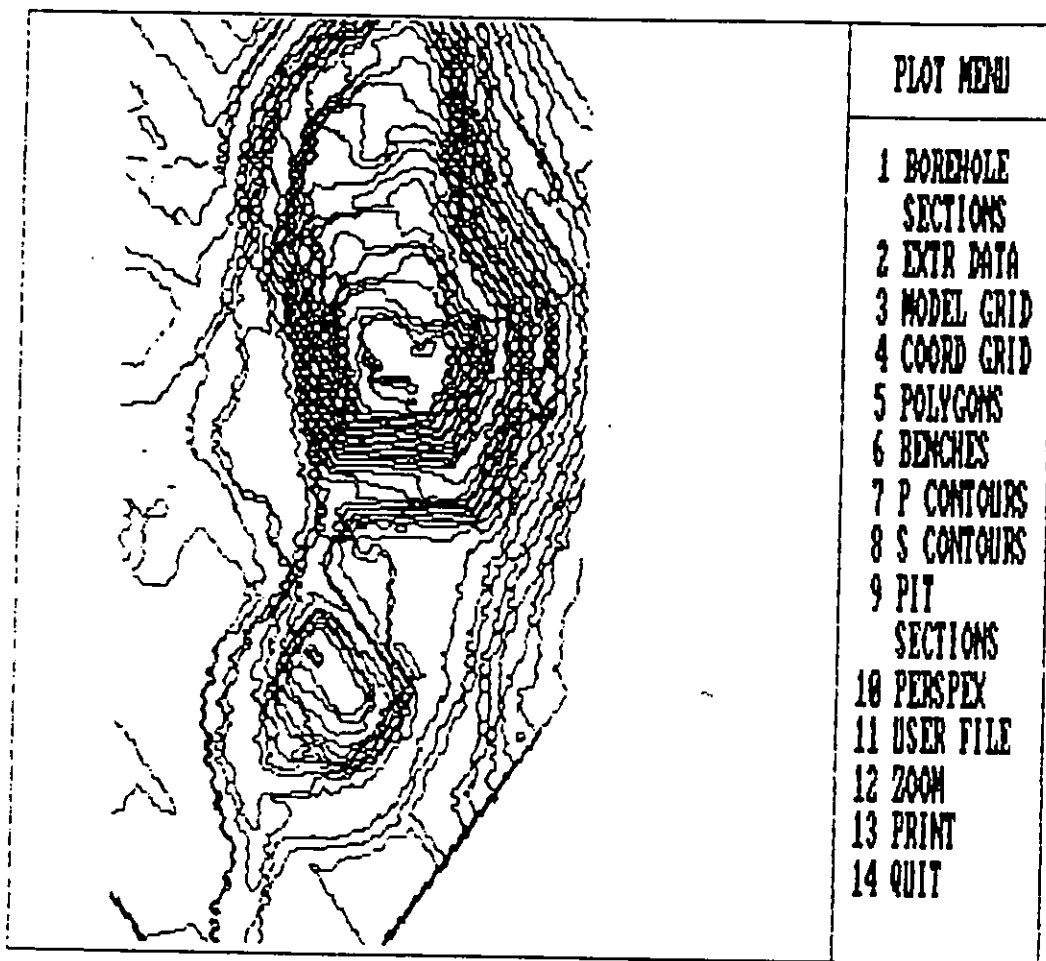
SOFTWARE BY GEMCOM SERVICES INC
MODULE 5.12
PAGE 2



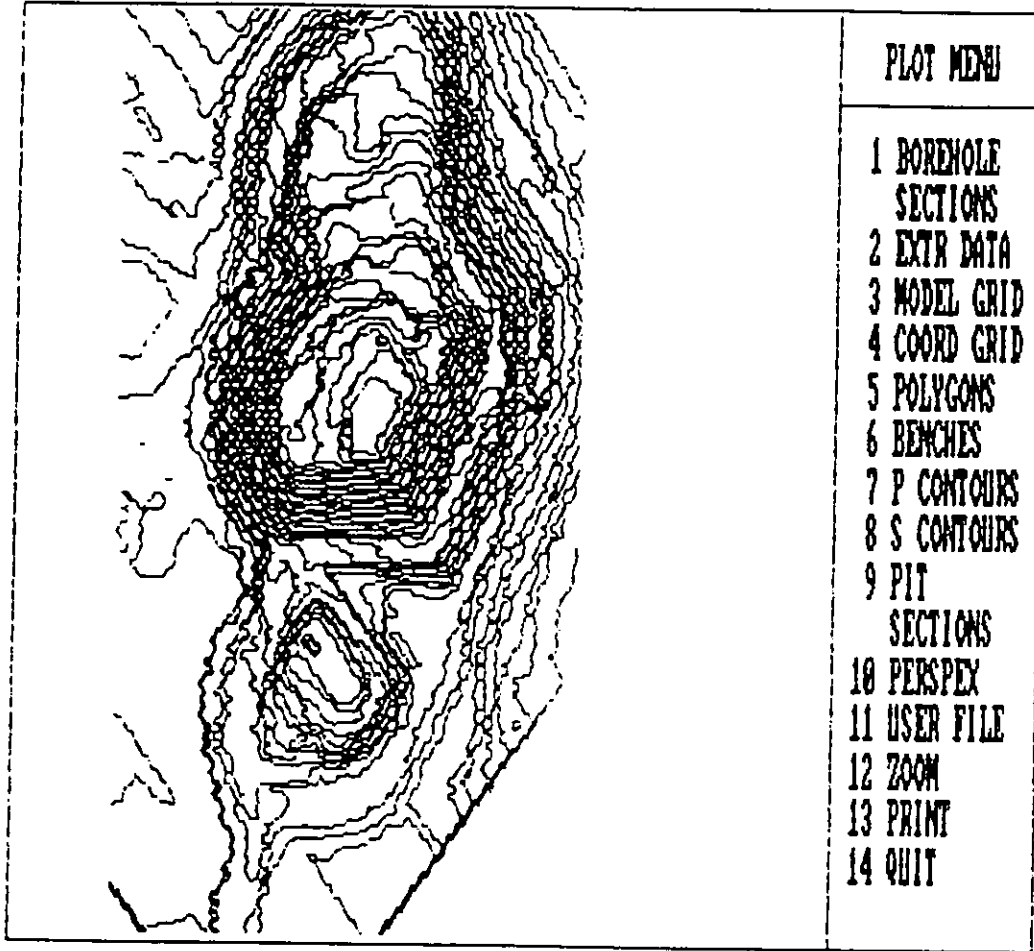
GRID #4: Faro pit surface at start-up of mining (January 1986)
Transferred from FI model
Contoured at mid-bench levels



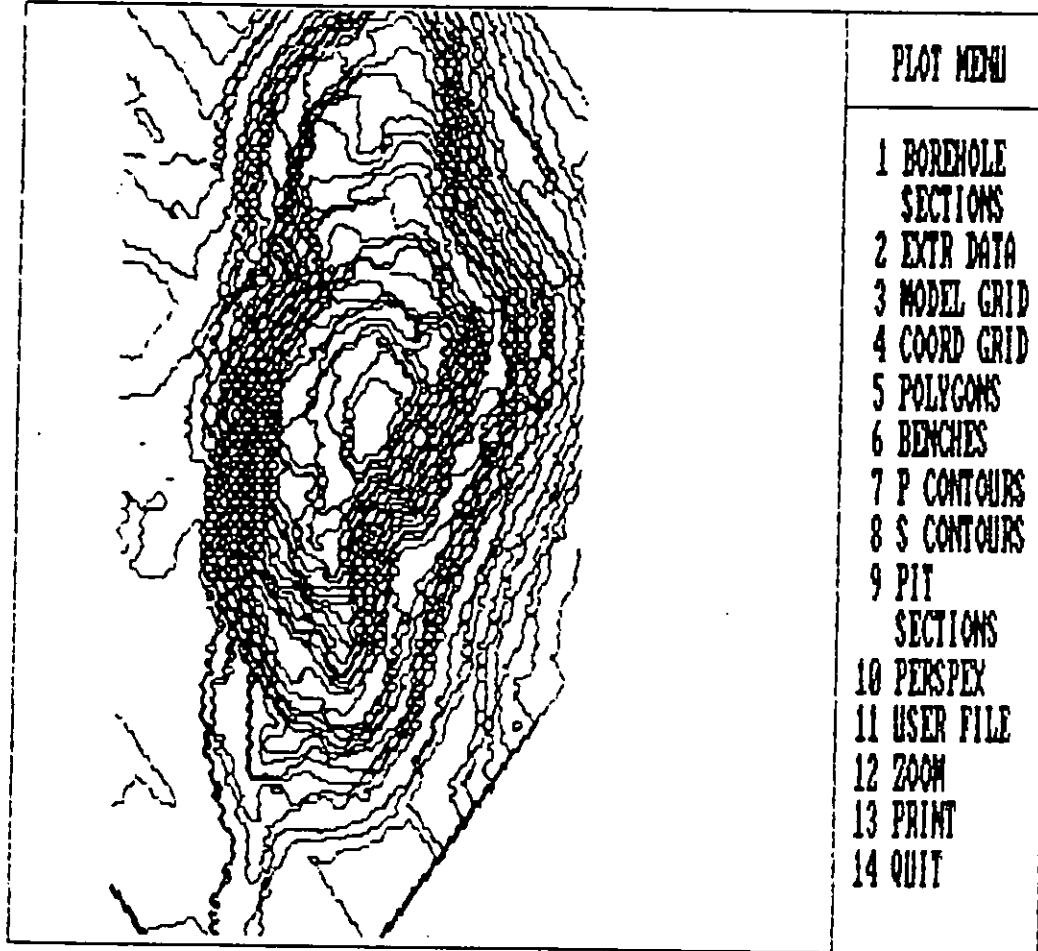
GRID 5: AY phase pit surface
Transferred from FI model
Contoured at mid-bench levels



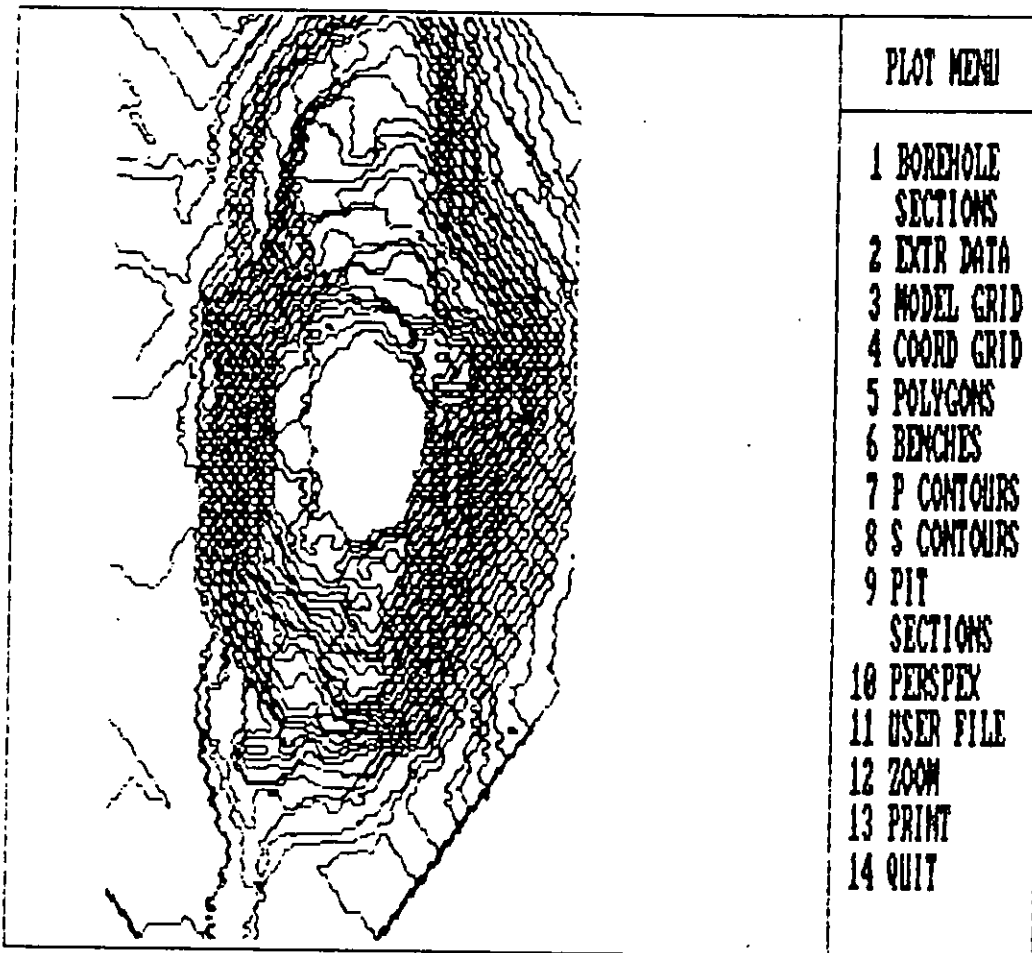
GRID 6: JB phase pit surface
 Transferred from FI model
 Contoured at mid-bench levels



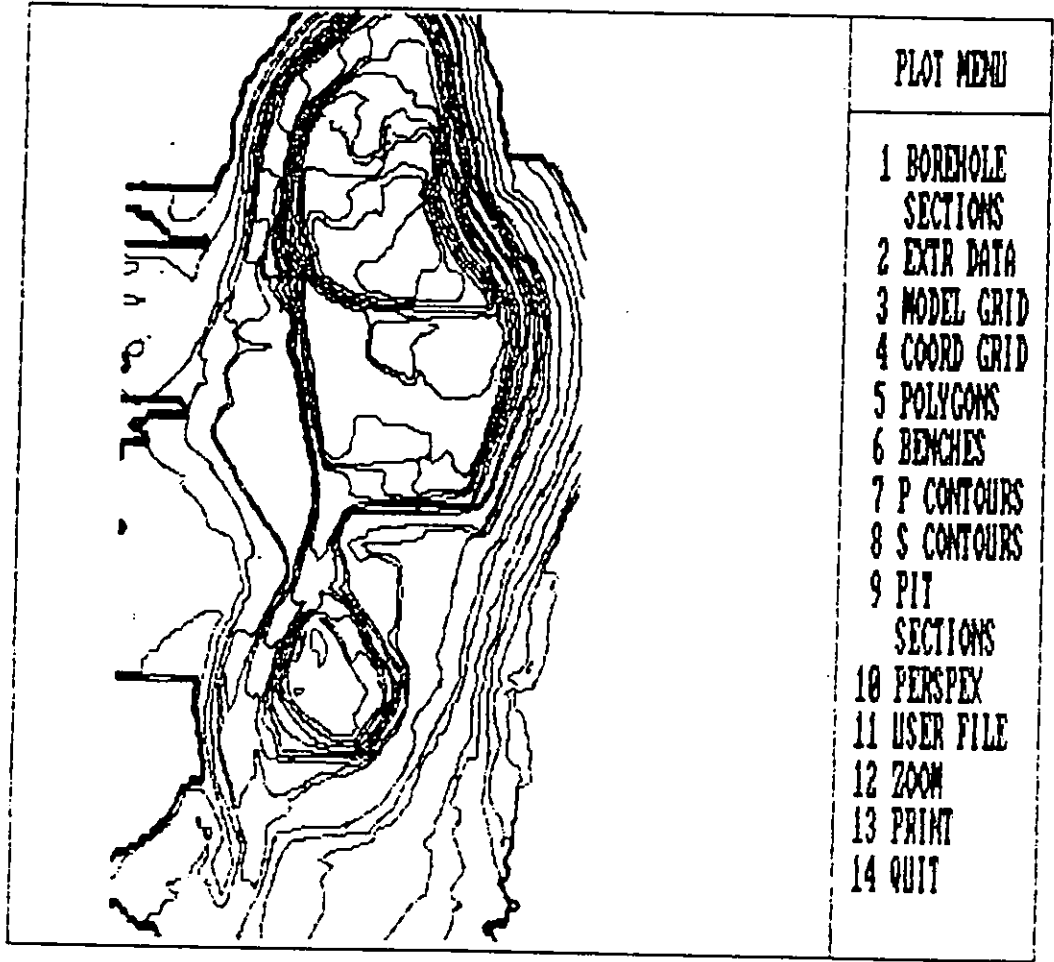
GRID 7: BY phase pit surface
 Transferred from FI model
 Contoured at mid-bench levels



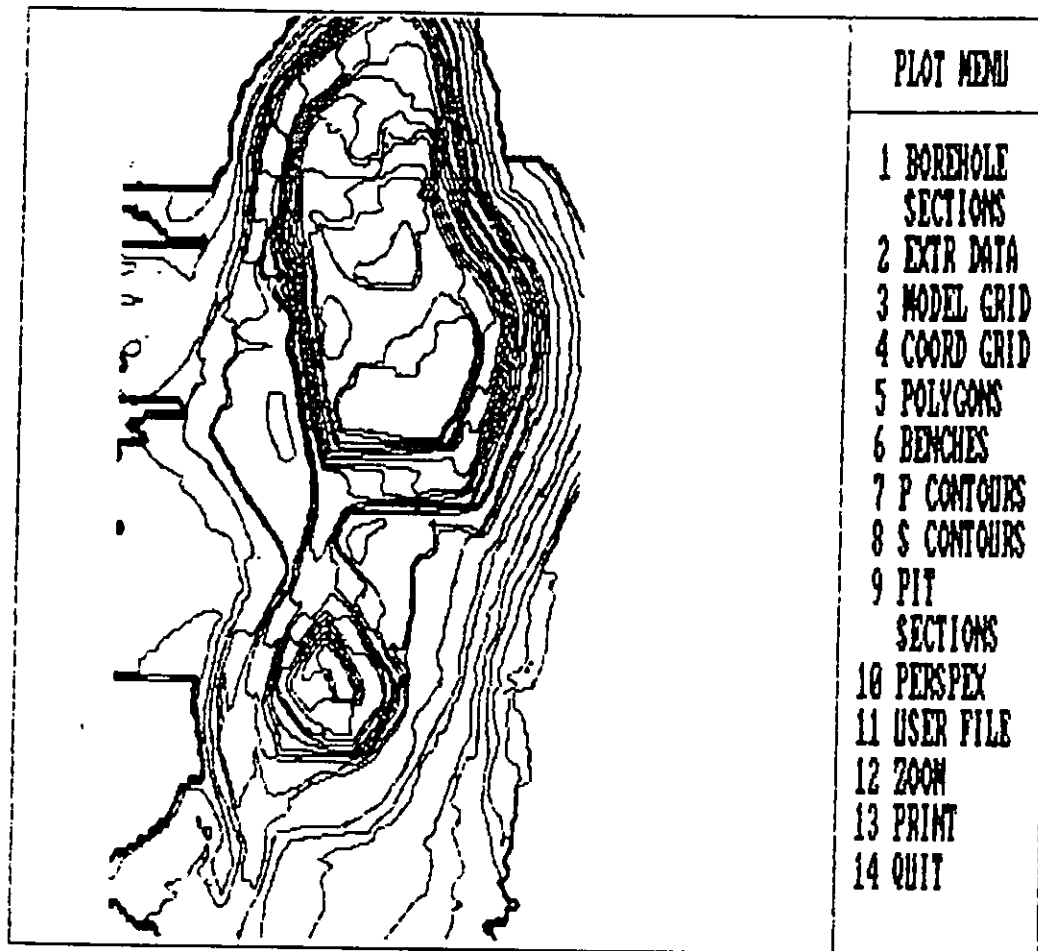
GRID 8: CY phase pit surface
Transferred from FI model
Contoured at mid-bench levels



GRID 9: \$5 ultimate pit surface
Transferred from FI model
Contoured at mid-bench levels



GRID 10: Nov/86 month-end pit surface
Cross sectional calculation (BSLSECT)
Contoured at mid-bench levels



GRID 11: Feb/87 month end pit surface (BSLSECT)
 Cross-sectional calculation
 Contoured at mid-bench levels

Notes on the FARO F8701 Rock Type Model

1.) Introduction

Rock types for the F8701 model blocks are interpolated from regularly spaced, digitized geological cross sections; each row of the model corresponds to a unique cross sectional geology interpretation. In this initial stage of the F8701 model, only the cross sections from 116+070 to 125+000 are included in the block model.

2.) Geology Cross Section Interpretation

The most extensive drilling on the Faro deposit has been completed on the +000 cross and long sections. These sections form a 43m (141 feet) rectangular grid of drill holes. Selected fill in drilling was completed in 1986 on the +000 and +070 cross and long sections.

Preparatory to constructing the F8701 model, all drill hole lithology information between cross sections 116+070 and 125+000 was plotted on the +000 and +070 cross sections. Drill hole traces and lithologies were projected horizontally onto the sections in a NW-SE direction (normal to the section orientation). For each section only the drill hole traces occurring within an offset distance of 12.2m (40 feet) from the section were plotted on that section. Because the plotted sections are regularly spaced every 21.5m (70 feet), this 12.2 m (40 feet) offset distance results in a 3m (10 foot) overlap of drill hole information between adjacent sections. A total of 18 sections were plotted in the area of interest. The 1986 drill holes are included in the appropriate cross sections.

Drill hole traces and lithologies were also plotted on all +000 long sections between sections 17+000 and 28+000. These sections are regularly spaced every 43m (141 feet). Again all drill hole data was projected horizontally normal to the section orientation. For the long sections the offset distance for including a drill hole in a particular section is 21.5m (70 feet).

Summary assay data for each drill hole was manually plotted on the cross and long sections. In addition outcrops from bench plan surface pit geology maps were compiled on all the sections. This information, although limited in extent, proved useful in the subsequent geological interpretation of the sections.

Geological interpretation for each cross section was restricted to the area between long sections 14+000 and 29+000 and elevations 2900 feet and 4030 feet. With respect to the F8701 blocks, this includes all blocks from columns 29 through 113 for all benches below (and including) bench 7. Major effort was spent trying to generate an internally consistent set of cross section interpretations. During this exercise the long sections were used dominantly as a check for fault

and intrusive dyke locations. The long sections were not interpreted and systematically incorporated into the cross section geology because of time constraints.

Initially the geology was interpreted on the +000 cross sections because they contained the most extensive drill hole control. Adjacent sections were compared and adjusted to insure continuity of major geological structures and lithologic units. Surface geology outcrops were especially useful in resolving fault and dyke locations and orientations on section.

Next the geology for the +070 cross sections were interpolated from the completed adjacent +000 sections. Limited drill hole data, especially in the northeast part of the deposit, helped constrain and enhance the geological interpretation on these sections. Adjustments were made in all the +000 and +070 sections to improve the internal consistency of the geological interpretation.

Finally the geology for the +035 and +105 cross sections was interpolated from the adjacent +000 and +070 sections. Interpolation of the geology to these sections resulted in a smoothing and averaging of the variations encountered between the adjacent +000 and +070 sections. This smoothing is especially relevant for intrusive dykes and faults because these features do not trend parallel to the major structural grain of the deposit.

This procedure resulted in a (largely) internally consistent set of 35 geological cross sections regularly spaced every 10.9m (35.36 feet). Each section corresponds to a separate row in the F8701 model. The sections have incorporated all 1986 drilling results and all recent geology pit surface mapping.

Each of the sections was digitized and interpolated into the F8701 rock type model. Each block was assigned a single rock type based on the lithology present in the digitized cross section at the centre point of the block. After the rock type interpolation was completed, printer maps were made of each section. The printer maps were visually checked for correctness; all errors were manually edited to the appropriate rock type by comparison to the original geological cross section. In several instances isolated blocks or small groups of blocks within the ore body were assigned a waste (=100) lithology because of the complex polygon shapes. These have all been corrected manually.

3.) Rock Types in Rock-Type Model

The present alphanumeric lithologic code for the Anvil District originated with regional geology completed in the early 1970's. Several changes in nomenclative and correlation of units within this classification have occurred as our understanding of the geologic framework for the Anvil District

has improved; this has resulted in some confusion in trying to decipher field logs for earlier drill holes. A thorough discussion of the alphanumeric code and descriptions of the various rock types are contained in earlier reports by Simpson et al. (1983) and Tolbert (1986)

PC Mine software requires integer rock type codes for the Faro F8701 model. Table 3 lists the simplified rock types incorporated into the F8701 model. This table also lists the correlation with the more complex and complete alphanumeric codes used in field logging of the drill core. Ore rock types in the model have integer codes less than 100; waste rock types have codes of 100 and higher. Code numbers in the waste rock types generally increase for units higher in the stratigraphic sequence in the immediate Faro area.

The background waste lithology immediately surrounding the Faro deposit is unit 100 (=1D0/1C0/1CD waste phyllite or schist). At higher structural and stratigraphic levels, units 150 (=3A basal transition zone) and 160 (=3D calc-silicate) are delineated on the different cross sections in the model. I have also differentiated the 3D calc-silicate breccia as unit 170. These units constitute the major divisions in the stratigraphic sequence in the Faro area. More complete descriptions of these units are contained in Simpson et al. (1983).

Several subunits have also been differentiated within the background waste lithology. These subunits represent marker horizons which are potentially useful during excavation of the Faro pit. Unit 110 (=1D2) represents carbonaceous phyllites. Unit 130 (=1H) corresponds to metabasite-rich intervals. Unit 120 (=1D4) refers to muscovite-quartz phyllite/schist. This latter unit generally corresponds to highly altered country rock schist immediately adjacent to the ore deposit; locally it also refers to highly altered metabasite sills and dykes.

Following the suggestion in Simpson et al. (1983), I have differentiated two major intrusive suites in the F8701 model. Unit 180 (=10E) corresponds to the hornblende-biotite granodiorite to quartz diorite intrusive suite. The smokey quartz-feldspar porphyry intrusive suite (=10F) constitutes unit 190.

In the ores the detailed lithologic variations recorded in the original field logs have been combined into fewer simplified units. These units are thick enough to form mining units and constitute most of a model block volume. They also have emphasized the basic lateral continuity of lithologies within the Faro deposit.

Faro ores are logically grouped into quartzose ores and massive sulphide ± barite ores. The classification indicated in Table 3 basically follows this scheme. Additional subdivisions are partly based on metallurgical performance. Carbonaceous quartzose ores (units 20, 21, 22, 23) and

PRINTOUT OF ROCK-TYPE INFORMATION FOR RECORDS [1] TO [28]

GEOLOGICAL AND GEOTECHNICAL DATA

REC	STAT	ROCK DESCRIPTION CODE	RELATIVE DENSITY [tn/bcf]	PEN	SLOPE ANGLES [DEGREES]							
					NW	N	NE	W	E	SW	S	SE
1	1	20 2ACD ribbon banded graphitic quartzite	.083	1	45.0	39.0	36.5	45.0	38.5	45.0	45.0	45.0
2	1	21 2ACD-ribbon banded graphitic quartzite/basal horizon	.083	1	45.0	39.0	36.5	45.0	38.5	45.0	45.0	45.0
3	1	22 2ACD ribbon banded graphitic quartzite/middle horizon	.083	1	45.0	39.0	36.5	45.0	38.5	45.0	45.0	45.0
4	1	23 2ACD ribbon banded graphitic quartzite/upper horizon	.083	1	45.0	39.0	36.5	45.0	38.5	45.0	45.0	45.0
5	1	30 2BCD pyritic quartzite	.090	2	45.0	39.0	36.5	45.0	38.5	45.0	45.0	45.0
6	1	31 2BCD pyritic quartzite/basal horizon	.090	2	45.0	39.0	36.5	45.0	38.5	45.0	45.0	45.0
7	1	32 2BCD pyritic quartzite/middle horizon	.090	2	45.0	39.0	36.5	45.0	38.5	45.0	45.0	45.0
8	1	33 2BCD pyritic quartzite/upper horizon	.090	2	45.0	39.0	36.5	45.0	38.5	45.0	45.0	45.0
9	1	40 2EC semi-massive quartzose pyritic sulphides	.099	4	45.0	39.0	36.5	45.0	38.5	45.0	45.0	45.0
10	1	50 2EF pyritic massive sulphides	.107	4	45.0	39.0	36.5	45.0	38.5	45.0	45.0	45.0
11	1	60 2EFG baritic massive sulphides	.112	4	45.0	39.0	36.5	45.0	38.5	45.0	45.0	45.0
12	1	70 2H pyrrhotitic massive sulphides	.104	5	45.0	39.0	36.5	45.0	38.5	45.0	45.0	45.0
13	1	80 1H/2ABCDEFB Altered metabasite interbanded with ore	.085	4	45.0	39.0	36.5	45.0	38.5	45.0	45.0	45.0
14	1	100 1D0/1C0/1CD schist and phyllite waste	.076	7	45.0	39.0	36.5	45.0	38.5	45.0	45.0	45.0
15	1	110 1D2/1E0 graphitic schist and phyllite	.076	7	45.0	39.0	36.5	45.0	38.5	45.0	45.0	45.0
16	1	120 2L/1D4 altered schist and phyllite (WME)	.076	7	45.0	39.0	36.5	45.0	38.5	45.0	45.0	45.0
17	1	130 1H/1F Altered metabasite	.076	7	45.0	39.0	36.5	45.0	38.5	45.0	45.0	45.0
18	1	150 3A basal graphitic unit of 3D Calc-silicate	.076	7	45.0	39.0	36.5	45.0	38.5	45.0	45.0	45.0
19	1	160 3D Calc-silicate	.076	7	45.0	39.0	36.5	45.0	38.5	45.0	45.0	45.0
20	1	170 3D B1A Calc-silicate breccia	.076	7	45.0	39.0	36.5	45.0	38.5	45.0	45.0	45.0
21	1	180 10E Biotite hornblende quartz diorite	.076	7	45.0	39.0	36.5	45.0	38.5	45.0	45.0	45.0
22	1	190 10F Smokey quartz feldspar porphyry	.076	7	45.0	39.0	36.5	45.0	38.5	45.0	45.0	45.0
23	1	300 Unconsolidated overburden	.060	7	36.5	36.5	36.5	36.5	36.5	36.5	36.5	36.5
24	1	400 Partially above topography	.076	7	45.0	39.0	36.5	45.0	38.5	45.0	45.0	45.0
25	1	500 Air	.000	0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0
26	1	1 simplified ore type "A"	.085	1	45.0	39.0	36.5	45.0	38.5	45.0	45.0	45.0
27	1	2 simplified ore-type "BG"	.104	4	45.0	39.0	36.5	45.0	38.5	45.0	45.0	45.0
28	1	3 simplified ore type "H"	.105	5	45.0	39.0	36.5	45.0	38.5	45.0	45.0	45.0

pyrrhotitic sulphides (unit 70), for example, are listed as separate rock types partly because of their possible deleterious effect on metallurgical performance during flotation.

I have divided the massive sulphide ores into four separate types. Unit 50 (=2EF) constitutes the high grade (>4% Pb + Zn) massive pyritic sulphides. Unit 60 (=2EFG) is similar to unit 50 only it also contains substantial (and essential) barite. As with unit 50, unit 60 typically has excellent Pb + Zn assays.

Unit 40 (=2EC) constitutes the massive to semimassive pyritic sulphides. In many cases this unit contains substantial quartz as matrix gangue and clasts. This unit can be recognized lithologically by abundant quartzose clasts and beads and barren pyritic appearance; in assays it typically has slightly lower S.G. than pyritic 2EF massive sulphide and barren Pb + Zn assays.

Unit 70 (=2H) has been differentiated as a district lithologic unit on the basis of major amounts of pyrrhotite. Although typically not extensive or thick, this unit is important because of its deleterious metallurgy.

I have differentiated two quartzose ore types. Units 20, 21, 22, and 23 (2ACD) constitute the carbonaceous, slightly pyritic quartzose ores, and units 30, 31, 32, and 33 (=2BCD) form the noncarbonaceous, nonpyritic or slightly pyritic quartzose ores. No attempt was made to subdivide the quartzose ores on the basis of combined Pb + Zn grade. Where carbonaceous and noncarbonaceous ores are intimately interleaved, the entire intersection is classified as a carbonaceous quartzose ore. Quartzose ores containing disseminated pyrrhotite instead of pyrite were not differentiated because of the rare occurrence of this particular ore type. Generally the pyrrhotite content is small and would probably not affect the metallurgy of the ore after blending.

Inspection of a typical Faro cross section illustrates that the ore deposit can be simplistically viewed as a massive sulphide lens sandwiched between upper and lower quartzose ore horizons. Additional small lenses of quartzose ore occur within the massive sulphide lens in the northwest portion of Zone 3; to the southeast these internal quartzose lenses form a continuous internal band of quartzose ore and waste phyllite.

I have attempted to reflect this consistent horizontal layering within the deposit by subdividing the quartzose ores into lower, middle (ie: internal) and upper horizons. Carbonaceous quartzose ores in the basal horizon are coded as 21 (=basal 2ACD). In the upper horizon quartzose ores have been coded as either 23 (=upper 2ACD) or 33 (=upper 2BCD). With this classification scheme the first number (10's place)

separates the ore into carbonaceous and noncarbonaceous variants (2 = carbonaceous, 3 = noncarbonaceous), and the second number (1's place) denotes the particular horizon (1 = basal, 2 =middle, 3 = upper).

Ore type 80 (= 1H+2ABCDEFG) consists of an intimately interbanded mixture of all ore types with highly altered metabasite (variably logged in drill core as 1H4 or 1D4). This unit occurs dominantly in the upper part of the deposit. In many drill holes Pb + Zn grade remains high for this interval. The unit is differentiated partly because the possible high talc content in the metabasite may have an adverse effect on the metallurgy of the associated ores.

Simpson, J.G., Jennings, D.S., Jilson, G.A., Adamson, T.J., May 1983. Faro Deosit Zone 3 Review, CAMC Internal Report 56 pages.

Tolbert, R.S. March 1986. Faro Zone III Project. Curragh Resources Corporation Internal Report, 58 pages.



Notes on the FARO F8701 Model Grid

The Faro F8701 Geological Model uses the same grid coordinate system as the Faro 8608 Geological Model. The grid is oriented parallel to the existing geological cross and long sections. It is rotated 45 degrees in an anticlockwise direction from the existing Mine Grid system. Model North is therefore at an azimuth orientation of 315 degrees with respect to the Mine Grid.

The F8701 model grid is superimposed on the Mine grid so that the Mine grid point 12000E, 9000N, has F8701 Model coordinates of 20000E, 40000N. Both grids are defined in units of feet. Conversion equations between the two grid systems are as follows:

Mine Grid to F8701 Model Grid

$$\begin{aligned} \text{Model E} &= 5150.758 + ((1/\text{SQRT}(2)) * (\text{Mine E} + \text{Mine N})) \\ \text{Model N} &= 42121.320 + ((1/\text{SQRT}(2)) * (\text{Mine N} - \text{Mine E})) \end{aligned}$$

F8701 Model Grid to Mine Grid

$$\begin{aligned} \text{Mine E} &= 26142.136 + ((1/\text{SQRT}(2)) * (\text{Model E} - \text{Model N})) \\ \text{Mine N} &= -33426.407 + ((1/\text{SQRT}(2)) * (\text{Model E} + \text{Model N})) \end{aligned}$$

Table 1 lists F8701 Model coordinates and Mine coordinates for selected geological cross sections on long section lines 9 + 000, 14 + 000, and 29 + 000. Geological cross section 107 + 000 corresponds to a Model Northing of 40000, and geological long section 9 + 000 corresponds to a Model Easting of 20000. Cross section numbers increase as Model Northing decreases; long section numbers increase as Model Easting increases.

Blocks for the Faro F8701 model extend from geological cross sections 107 + 000 to 138 + 105. The row width in the block model is 35.36 feet; this ensures a regular correspondence between row numbers and the geological cross sections. The southwest corner of the block model was selected so that the evenly spaced geological cross sections pass through the centres of the blocks. Cross section 107 + 000 therefore passes through the centre of Row 1 in the F8701 block model. Table 2 details the correspondence between the geological cross sections and the rows in the F8701 block model.

With a column width of 25 feet for the F8701 blocks, the block model extends between geological long sections 9 + 000 and 30 + 090. In contrast to the regular correlation between block rows and geological cross sections, the long sections and model block columns do not have an exact correspondence in the model easting direction.

Table 2. F8701 Model Rows for Cross-Section Lines

<u>Cross-Section</u>	<u>Model Row</u>
107+000	1
108+000	5
109+000	9
110+000	13
111+000	17
112+000	21
113+000	25
114+000	29
115+000	33
116+000	37
<hr/>	
116+070	39
116+105	40
117+000	41
117+035	42
117+070	43
117+105	44
118+000	45
118+035	46
118+070	47
118+105	48
119+000	49
119+035	50
119+070	51
119+105	52
120+000	53
120+035	54
120+070	55
120+105	56
121+000	57
121+035	58
121+070	59
121+105	60
122+000	61
122+035	62
122+070	63
122+105	64
123+000	65
123+035	66
123+070	67
123+105	68
124+000	69

124+035	70
124+070	71
124+105	72

125+000	73
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126+000	77
127+000	81
128+000	85
129+000	89
130+000	93
131+000	97
132+000	101
133+000	105
134+000	109
135+000	113
136+000	117
137+000	121
138+000	125
138+105	128

Notes on the Faro F8701 Borehole Files

1.) INTRODUCTION

The DDHDB (Diamond Drill Hole Data Base) located on the HP3000 computer at the Faro Minesite contains assays, lithologies, downhole surveys and collar information for all the Faro Zone 3 drill holes. PCMINE software allows for importing drill hole data from an appropriately formatted ASCII file. I have written two FORTRAN programs to create the sequential ASCII file required by PCMINE.

2.) PROGRAM DH203A (HP3000 SYSTEM)

The first program, DH203A, is resident on the HP3000 computer at the Faro Minesite. This program creates a sequential ASCII file on the HP3000 disc and transfers the appropriate data for all drill holes in the DDHDB to this file. The ASCII file is named FARODDHS.PUB.GEOLOGY. Information stored in FARODDHS for each drill hole includes DDHID, collar coordinates, total depth, lithologic units, assays, and downhole surveys.

During execution of this program, collar coordinates for each drill hole are transformed from Mine Grid coordinates to F8701 model coordinates. All non-assayed waste intervals are given identical assay intervals with all elements being assigned an assay value of -1.0 (not measured).

Calculation of downhole surveys follows a more complex procedure. PCMINE software contains a very simple straight line downhole deviation correction. In contrast DDHDB contains a spline calculation resulting in a smoothly curving drill hole trace. To closely approximate this curved trace, the following procedures are followed in calculating a sequence of "theoretical" downhole surveys for importing to PCMINE. First azimuths in the existing downhole surveys are corrected by adding 45° to the measured azimuths. This accounts for the 45 degree rotation between the Mine Grid and the F8701 Model Grid. Next the downhole spline for the drill hole is calculated using existing DDHDB software. The position of the drill hole is determined relative to the collar for each 50 foot interval down the hole. Downhole deviations are calculated for each segment so that drillhole locations correspond to calculated drill hole positions. These calculated downhole surveys are then transferred to the output ASCII file.

Using program DH203A, all Faro drillholes presently in DDHDB were downloaded to the output ASCII file. This included the 25 drill holes completed in 1986. Program DH203A is not included on the Menu System at the Faro Minesite. If further drilling necessitates the downloading of additional drill holes, this may be accomplished using program DH203. In DH203 drill holes to be downloaded are requested by DDHID; this program is included in the Menu System at the Faro Minesite.

3.) FILE TRANSFER (HP3000 to IBM-Compatible Personal Computer)

The sequential ASCII file FARODDHS.PUB.GEOLOGY was transferred from the HP3000 system to an IBM-Compatible personal computer system using the software package REFLECTIONS. Consult with Faro Minesite Computer Information Services for help with connecting the two machines and using REFLECTIONS.

4.) PROGRAM DDHIMPRT (IBM-Compatible Personal Computer)

The sequential ASCII file transferred to the personal computer is still not fully compatible with PCMINE software. Lithology units from DDHDB are too complicated and detailed for the simplified geology represented by the F8701 model. DDHDB contains analyses for up to 15 elements; in contrast PCMINE only allows assays for a maximum of 5 elements to be imported into the mine model.

DDHIMPRT is a FORTRAN77 program which reads the DDHDB ASCII file and transfers the appropriate data to an output sequential file which is fully compatible with the PCMINE software restrictions. The User selects the elements to be transferred to the output file during each program run. In addition options are included for ignoring all drill holes whose collars are located outside a user-specified rectangle of interest and clipping all assay values for each element to user-specified maximum values.

Lithology units are not transferred to the output file by DDHIMPRT. After the program run is completed, the simplified geology units need to be entered using a text editor.

5.) F8701 DRILL HOLE DATA FILE (Pass 1)

Three data files, each containing assay results for 5 elements, were created in separate DDHIMPRT runs. Elements included in these files were:

File Name	Elements	Purpose
FARODDH1.DAT	SG, Pb, Zn, Ag, Au	modelling
FARODDH2.DAT	Pb+Zn, Pb, Zn, Ag, Au	stats., plotting
FARODDH3.DAT	Pb+Zn, Cu, Po, Py, Ba	stats., plotting

With all these files only those drill holes between cross sections 116+070 and 125+000 were included. The rectangular area of interest defining this restriction was:

EASTING	Minimum: 20400.0	Maximum: 22850.0
NORTHING	Minimum: 37430.0	Maximum: 38680.0

None of the assays were clipped to user-specified maximum values. All -1.0 analyses (=not assayed) in the original input file were changed to 0.0. Waste intervals throughout each drill hole were included as assayed intervals with an SG of 2.70 and assays of 0.0.

Waste blocks were assigned a density of 0.076. Uninterpolated blocks were assigned the density of 0.096 tonnes/bcf (equals pulp SG of 3.77 for sulphide waste).

3.) %Pb, %Zn, g/t Ag, g/t Au

The above elements were interpolated using the described constraints. Uninterpolated ore blocks retained their initialized grades of 0.00. Conceptually these uninterpolated ore blocks represent unproven ore reserves.

4.) % (Pb & Zn)

Combined Pb + Zn grade was not interpolated. Instead the program ADD.FOR was used to read Pb and Zn grades previously interpolated into each block, add them together, and store the resulting sum in the appropriate file location. In this way exact correspondence between Pb, Zn, and Pb + Zn is maintained.

F8701 A

SCALE FACTORS

Water blocks were assigned a density of 0.078. Uninterpolated blocks were assigned the density of 0.088 (tonnes per cubic metre) for sulphide waste.

Pb+Zn 1000

Pb 1000

Zn 1000

Ag/t 10

Au g/t 1000

Density 10,000

Grid Elevation 1

Variance 1000

Economic 10

The above elements were interpolated using the described constants. Uninterpolated ore blocks retained their grades of 0.00. Conceptually these uninterpolated ore blocks represent unproven ore reserves.

(a) Pb & Zn

Combined Pb + Zn grade was not interpolated. ADD.FOR was used to read Pb and Zn grades, add them together, and store the sum in the appropriate file location. In this way exact values between Pb, Zn, and Pb + Zn are maintained.



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F8701 A

SCALE FACTORS

Water blocks were assigned a density of 0.078. Uninterpolated blocks were assigned the density of 0.088 (tonnes per cubic metre) for sulphide waste.

PbZn 1000

Pb 1000

Zn 1000

Ag/t 10

Au g/t 1000

Density 10,000

Grid Elevation 1

Variance 1000

Economic 10

The above elements were interpolated using the described constants. Uninterpolated ore blocks retained their grades of 0.00. Conceptually these uninterpolated ore blocks represent unproven ore reserves.

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Combined Pb + Zn grade was not interpolated. ADD.FOR was used to read Pb and Zn grades, add them together, and store the sum in the appropriate file location. In this way exact values between Pb, Zn, and Pb + Zn are maintained.