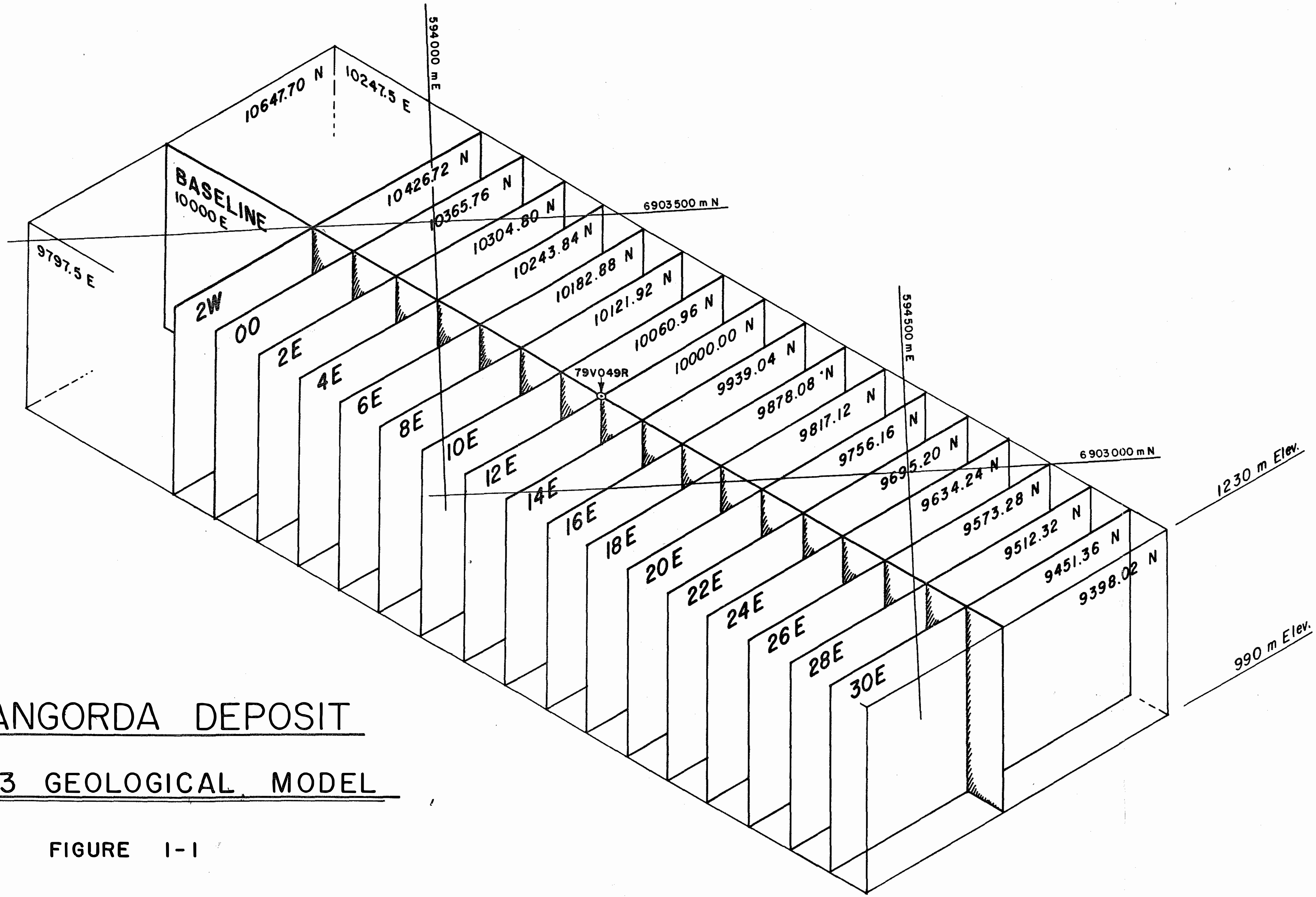
VANGORDA

8803

006731

COORDINATES



VANGORDA DEPOSIT

8803 GEOLOGICAL MODEL

FIGURE 1-1

SCALE 1:5000

C, GEMCOM \ DRIVERS \
HALOAD IC .DEV

VANGORDA MODEL 8803

1.0) COORDINATE SYSTEM

1.1) Introduction

Initial drill testing of the Vangorda deposit was undertaken by Prospectors Airways in 1953-1955. Since that time additional drill holes have been completed by Kerr Addison, AEX, Canadian Natural Resources, Cyprus Anvil Mining Corporation, and Curragh Resources Inc. Collar locations for these drill holes have been reported using several grid systems with different elevation datums.

1.2) 1979 Anvil District Survey Control

In 1979 Northwest Survey Corporation (Yukon) Ltd. completed a new control survey of the Anvil District for Cyprus Anvil Mining Corporation. The survey was undertaken to provide horizontal and vertical control for a new series of detailed orthophotos, to amalgamate all previous local control surveys to a common datum, and to provide a basis for any future control surveys.

All survey control points used in earlier local surveys in the Vangorda area were incorporated into the 1979 District survey. Consequently the area was tied into a common control grid and elevation datum internally consistent with the entire Anvil District.

The 1979 Anvil District control survey was then tied into the international UTM (Universal Transverse Mercator) grid system using Canada Geodetic Survey control points in the Faro and Ross River areas. All District surveys are now reported in UTM coordinates. Drill hole collars for the Vangorda area are reported using the UTM grid and elevation datum established during the 1979 survey. Cyprus Anvil Mining Corporation internal reports by Pigage (1984, 1985) discuss the conversion equations utilized to reduce local coordinate grid drill hole collar locations to UTM coordinates.

1.3) Vangorda 8803 Model Coordinates

The detailed drill grid for the Vangorda deposit is at a large angle to the District UTM coordinate system. Structural grain of the deposit is roughly parallel to the drill grid. The coordinate system for the Vangorda models is oriented parallel to the previously established drill grid.

The angle from the UTM grid system to the Vangorda model grid system is 41.845278° in an anticlockwise direction. The model grid system was set up so that the model coordinates for drill hole 79V049R (located on section 12E) are 10,000 N and 10,000 E. Model

North is oriented to the northwest in the UTM grid system (figure 1-1).

Conversion equations for reducing UTM coordinates to Vangorda model coordinates are as follows:

$$V(N)=((N(UTM)-No)*\cos(A)-(E(UTM)-Eo)*\sin(A))/SCALE$$

$$V(E)=((N(UTM)-No)*\sin(A)+(E(UTM)-Eo)*\cos(A))/SCALE$$

where:

A = 41.845278
SCALE = 0.99950853
No = 889,052.74
Eo = 593,397.40

These equations follow the convention established by Cyprus Anvil Mining Corporation of subtracting $6 * 10^6$ before reporting the UTM Northings.

1.4) Geological Cross Sections

In 1979, the northwest end of the deposit (sections 02W to 12E) was drilled using a drill grid spacing of 100 feet (30.48 m) along section and 200 feet (60.96 m) between sections. In the remainder of the deposit (sections 14E to 30E) the bulk of the drilling was completed in 1981 using rotary methods. Rotary drill hole spacing is similar to that used for the 1979 drilling program. More recently Curragh Resources Inc. has infilled this initial drilling grid in areas of high grade mineralization.

Even geological sections in the Vangorda 8803 model have been evenly spaced every 60.96 meters. This interval closely corresponds to the original drill grid spacing. Table 1-1 lists model coordinates for cross and long sections.

1.5) Model Parameters

Table 1-2 lists parameters for the Vangorda 8803 model. The model consists of 82 rows with a row length of 15.24 m and 100 columns with a column width of 4.5 m. The model therefore extends for 1249.68 m in the Northing direction (rows) and 450 m in the Easting direction (columns). Total area encompassed by the model is 562,356.0 m^2.

Model row lengths are designed so that row centres correspond exactly to geological cross-sections. Table 1-1 indicates row numbers for the listed cross-sections. Model column widths do not have a regular correspondance to the geological long sections.

Table 1-1. Model Coordinates for Geological Cross and Long Sections.

Cross Section	Model Northing	Model Row
02W	10426.72	15
00	10365.76	19
02E	10304.80	23
04E	10243.84	27
06E	10182.88	31
08E	10121.92	35
10E	10060.96	39
12E	10000.00	43
14E	9939.04	47
16E	9878.08	51
18E	9817.12	55
20E	9756.16	59
22E	9695.20	63
24E	9634.24	67
26E	9573.28	71
28E	9512.32	75
30E	9451.36	79
32E	9390.40	
34E	9329.44	
36E	9268.48	
38E	9207.52	
40E	9146.56	
42E	9085.6	
44E	9024.64	
46E	8963.68	
48E	8902.72	

Long Section	Model Easting
-3.0	9908.56
-2.5	9923.8
-2.0 South	9939.04
-1.0	9969.52
-0.5	9984.76
B/L	10000.00
+0.5	10015.24
+1.0 North	10030.48
+2.0	10060.96
+3.0	10091.44

10085

60.96 m

The Vangorda 8803 model contains 40 benches with a bench height of 6.0 m; this bench height corresponds to the proposed mining lift. The model extends from a lower elevation of 990 m to an upper elevation of 1230 m. Each block occupies a volume of 411.48 m^3. This corresponds to 1111 tonnes waste phyllite (SG=2.70) or 1234 tonnes ore (SG=3.00).

Table 1-3 details the correlation between the model coordinate system and the UTM coordinate system for the four corners of the model.

1.6) Model Scale Factors

Table 1-4 lists the model scale factors utilized for the Vangorda 8803 model. If the reserves calculations show major discrepancies of grade or tonnage, these factors should be checked to see that they have not been inadvertently modified.

Table 1-4 Vangorda 8803 Model Scale Factors

Model	Scale Factor
Grade Model 1	1000
Grade Model 2	1000
Grade Model 3	1000
Grade Model 4	100
Grade Model 5	1000
Density Model	1000
Economic Model	10
Variance Model	1000
Surface Grid Model	10

Table 1.2

PRINTOUT OF PROPERTY INFORMATION

Model description (max 64 characters) :	VANGORDA DEPOSIT - 8803 Geological Model
Easting co-ordinate of model bottom left hand corner :	9797.50
Northing co-ordinate of model bottom left hand corner :	9398.02
Easting co-ordinate of model top right hand corner :	10247.50
Northing co-ordinate of model top right hand corner :	10647.70
Datum elevation of top of model :	1230.00
Number of columns in model (max 128) :	100
Number of rows in model (max 128) :	82
Width of columns :	4.50
Width of rows :	15.24

Number of labels : 5 ; SG ; Pb % ; Zn % ; Ag g/t ; Au g/t

Current units are :

Linear : m
Area : m**2
Volumetric : bcm
Density : tn/bcm
Monetary : Cdn $

PRINTOUT OF PROPERTY INFORMATION

BENCH	HEIGHT [m]	CREST ELEVATION [m]	TOE ELEVATION [m]	CREST DEPTH [m]	TOE DEPTH [m]
1	6.00	1230.00	1224.00	.00	6.00
2	6.00	1224.00	1218.00	6.00	12.00
3	6.00	1218.00	1212.00	12.00	18.00
4	6.00	1212.00	1206.00	18.00	24.00
5	6.00	1206.00	1200.00	24.00	30.00
6	6.00	1200.00	1194.00	30.00	36.00
7	6.00	1194.00	1188.00	36.00	42.00
8	6.00	1188.00	1182.00	42.00	48.00
9	6.00	1182.00	1176.00	48.00	54.00
10	6.00	1176.00	1170.00	54.00	60.00
11	6.00	1170.00	1164.00	60.00	66.00
12	6.00	1164.00	1158.00	66.00	72.00
13	6.00	1158.00	1152.00	72.00	78.00
14	6.00	1152.00	1146.00	78.00	84.00
15	6.00	1146.00	1140.00	84.00	90.00
16	6.00	1140.00	1134.00	90.00	96.00
17	6.00	1134.00	1128.00	96.00	102.00
18	6.00	1128.00	1122.00	102.00	108.00
19	6.00	1122.00	1116.00	108.00	114.00
20	6.00	1116.00	1110.00	114.00	120.00
21	6.00	1110.00	1104.00	120.00	126.00
22	6.00	1104.00	1098.00	126.00	132.00
23	6.00	1098.00	1092.00	132.00	138.00
24	6.00	1092.00	1086.00	138.00	144.00
25	6.00	1086.00	1080.00	144.00	150.00
26	6.00	1080.00	1074.00	150.00	156.00
27	6.00	1074.00	1068.00	156.00	162.00
28	6.00	1068.00	1062.00	162.00	168.00
29	6.00	1062.00	1056.00	168.00	174.00
30	6.00	1056.00	1050.00	174.00	180.00
31	6.00	1050.00	1044.00	180.00	186.00
32	6.00	1044.00	1038.00	186.00	192.00
33	6.00	1038.00	1032.00	192.00	198.00
34	6.00	1032.00	1026.00	198.00	204.00
35	6.00	1026.00	1020.00	204.00	210.00
36	6.00	1020.00	1014.00	210.00	216.00
37	6.00	1014.00	1008.00	216.00	222.00
38	6.00	1008.00	1002.00	222.00	228.00
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

40	6.00	996.00	990.00	234.00	240.00

The Vangorda 8803 model contains 40 benches with a bench height of 6.0 m; this bench height corresponds to the proposed mining lift. The model extends from a lower elevation of 990 m to an upper elevation of 1230 m. Each block occupies a volume of 411.48 m^3. This corresponds to 1111 tonnes waste phyllite (SG=2.70) or 1234 tonnes ore (SG=3.00).

Table 1-3 details the correlation between the model coordinate system and the UTM coordinate system for the four corners of the model.

1.6) Model Scale Factors

Table 1-4 lists the model scale factors utilized for the Vangorda 8803 model. If the reserves calculations show major discrepancies of grade or tonnage, these factors should be checked to see that they have not been inadvertently modified.

Table 1-4 Vangorda 8803 Model Scale Factors

Model	Scale Factor
Grade Model 1	1000
Grade Model 2	1000
Grade Model 3	1000
Grade Model 4	100
Grade Model 5	1000
Density Model	1000
Economic Model	10
Variance Model	1000
Surface Grid Model	10

Table 1-3. Model and UTM Coordinates for the Corners of the Vangorda 8803 Model.

Corner	Model Northing	Model Easting	Model Northing	Model Easting
SW	9398.02	9797.50	6902583.25	594425.91
NW	10647.70	9797.50	6903513.74	593592.63
NE	10647.70	10247.50	6903813.80	593927.70
SE	9398.02	10247.50	6902883.31	594760.97

SURFACE GRIDS

2.0) SURFACE GRIDS

2.1) Introduction

Because the 8803 model has a different row length than the 8607 model, the 8607 surface grids could not be directly transferred to the 8803 model. Surface grids for the 8803 model were generated from digitized surface contours using program POLYSECT.FOR. In many instances the surface contour file used for constructing the 8607 surface grid could be used without changes to generate the 8803 surface grid.

2.2) Surface Topography

The polygon ASCII file used to create the 8607 topography surface was also used to generate the 8803 topography. The polygon file was modified slightly by appending a few additional traverse lines for surface elevation control. The 8803 surface grid was then generated using program POLYSECT.FOR. Figure 2-1 shows the new surface.

2.3) Overburden/Bedrock Surface

The 1987 drilling program created 29 new data points for the bedrock/overburden surface through the entire length of the deposit. Comparison of the 1987 drill results with the 8607 surface grid showed that only minor modifications of the 8607 grid were required northwest of geological cross section 14.0 East. More extensive changes were required southeast of section 14.0 East in the area of the 1981 rotary drilling. The 1987 drill holes consistently indicated that the overburden/bedrock surface defined by the rotary holes was at too low an elevation.

The bedrock/overburden surface was re-contoured by hand to incorporate the 1987 drill holes. Southeast of section 14.0 East much greater weighting was given to diamond drill hole data points. This resulted in the new 8803 surface being at a consistently higher elevation than the 8607 surface.

The 8803 surface was then generated by digitizing the new contours into an ASCII file and running program POLYSECT.FOR using the new contours. Figure 2.2 illustrates the resulting surface grid.

DRILL HOLES

2.0) SURFACE GRIDS

2.1) Introduction

Because the 8803 model has a different row length than the 8607 model, the 8607 surface grids could not be directly transferred to the 8803 model. Surface grids for the 8803 model were generated from digitized surface contours using program POLYSECT.FOR. In many instances the surface contour file used for constructing the 8607 surface grid could be used without changes to generate the 8803 surface grid.

2.2) Surface Topography

The polygon ASCII file used to create the 8607 topography surface was also used to generate the 8803 topography. The polygon file was modified slightly by appending a few additional traverse lines for surface elevation control. The 8803 surface grid was then generated using program POLYSECT.FOR. Figure 2-1 shows the new surface.

2.3) Overburden/Bedrock Surface

The 1987 drilling program created 29 new data points for the bedrock/overburden surface through the entire length of the deposit. Comparison of the 1987 drill results with the 8607 surface grid showed that only minor modifications of the 8607 grid were required northwest of geological cross section 14.0 East. More extensive changes were required southeast of section 14.0 East in the area of the 1981 rotary drilling. The 1987 drill holes consistently indicated that the overburden/bedrock surface defined by the rotary holes was at too low an elevation.

The bedrock/overburden surface was re-contoured by hand to incorporate the 1987 drill holes. Southeast of section 14.0 East much greater weighting was given to diamond drill hole data points. This resulted in the new 8803 surface being at a consistently higher elevation than the 8607 surface.

The 8803 surface was then generated by digitizing the new contours into an ASCII file and running program POLYSECT.FOR using the new contours. Figure 2.2 illustrates the resulting surface grid.

3.0) DRILL HOLES

3.1) Introduction

The Vangorda DDHDB (Diamond Drill Hole DataBase) located on the HP3000 computer at the Faro Minesite contains collar locations, downhole surveys, lithologies, assays, structures, and fault data for the pre-1987 Vangorda drill holes. To be accessible to

PC-MINE, this data must be transferred to an appropriately formatted personal computer ASCII file. The computer program DH204S.SOURCE.GEOLOGY was written to accomplish this data transfer to the personal computer.

Because PC-MINE has very limited storage capabilities in its drill hole database, the Vangorda DDHDB drill hole data was loaded into a PC-XPLOR drill hole database for storage and manipulation of the data. The computer program VANGDDH.FOR was written to modify the ASCII file transferred from the HP3000 to PC-XPLOR compatible format for rapid transfer of the drill hole information.

The 1987 drill hole collar and lithology information was entered directly into the PC-XPLOR Vangorda database. Assay data for the 1987 drilling was transferred from a Symphony assay spreadsheet to the PC-XPLOR Vangorda database. This database presently contains 183 drill holes.

3.2) Program DH204S (HP 3000 System)

Program DH204S is resident on the HP3000 computer at the Faro Minesite. This program creates a sequential ASCII file on the HP3000 disk and transfers the appropriate data for all drill holes in the Vangorda DDHDB to this file. Essentially the program is a formatted "dump" of the primary field log data stored in the DDHDB. Information stored in the ASCII file for each drill hole includes drill hole name, UTM collar coordinates, total depth, assays, lithologies, downhole surveys, structural measurements and fault/core status measurements. The ASCII file name on the HP3000 disk is PCMINEDH.PUB.GEOLOGY.

3.3) File Transfer (HP3000 to Personal Computer)

The sequential ASCII file PCMINEDH.PUB.GEOLOGY was transferred from the HP3000 system to an IBM-compatible personal computer system using the software package REFLECTIONS. The data transfer can be accomplished readily at 9600 baud by connecting the serial port on the personal computer directly to the HP3000 plotter port located in the Engineering computer room. Consult with the Minesite computer people (MIS) for help with completing this task.

3.4) PC-XPLOR Vangorda Databases

Vangorda drill hole information is stored in 2 PC-XPLOR databases. Database A contains the primary field log information including collar location, downhole surveys, lithologies, structures, fault features, and assays. Database B is designed primarily for calculating composites from assays using different weighting schemes.

Table 3-1 shows the structure of database A (field data). It consists of 8 separate tables. Table names and variables are generally self explanatory. Dates (for example the variable LOGGED in table 1) are stored as integers following the format YYMMDD.

The structure of database B is shown in table 3-2. Database table

1 is a subset of table 1 from database A. Tables 2 and 4 are exact duplicates of tables 2 and 4 from database A. Database table 3 (lithology) contains the from-to downhole intervals to be used for compositing. Database tables 5-8 are identically structured composite tables. Having several composite tables allows for retaining several different composites derived from the same primary assay data.

3.5) Program VANGDDH.FOR

The ASCII file transferred from the HP3000 computer containing all the Vangorda drill hole data was not structured in a format compatible with importing directly into the PC-XPLOR Vangorda database. The Fortran program VANGDDH was written to manipulate the field data contained in this ASCII file into PC-XPLOR compatible format. The output from VANGDDH consist of separate ASCII files, each containing a specific type of data (i.e. lithology, structure, collar locations, etc). Data contained in these files are in an appropriate format for importing directly into the PX-XPLOR Vangorda drillhole database. Options are included within VANGDDH 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.

3.6) Vangorda Drill Holes

Collar locations, downhole surveys, lithologies, assays, and structures for the 154 drill holes in the DDHDB were transferred from the HP3000 to the PC-XPLOR Vangorda databases. Collar locations, downhole surveys, and lithologies for the 1987 drill holes were entered directly into the PX-XPLOR database. Assays for these 29 drill holes were transferred from a SYMPHONY assay spreadsheet.

None of the assays were clipped to user-specified maximum values. If an analysis for a particular element was not completed, the analytical value was set to -1.0. Waste intervals in each drill hole were included in assay table 4 with -1.0 analyses for all elements. The original DDHDB listed Ag analyses were the averaged results of atomic absorption and fire assay analyses. In the current database, these two analyses for Ag were restored to the original status as separate elements. All assays were checked for correctness; order of magnitude problems contained in the DDHDB were corrected. Rock codes for the different assays were entered by hand using the new cross-section interpretation.

Lithologies were verified against the original log and corrected when necessary. Dip and azimuth measurements for structures and faults were set to -1 when both values were 0.

4.0) ROCK TYPE MODEL

4.1) Introduction

Rock types for the Vangorda 8803 model were interpolated from

ROCK TYPE MODEL

File: VANALLDD.WR1 - VANGORDA DRILLHOLES - PCXPLOR - April 4, 1988

Database Record Numbers

	Hole Name		Hole Name		Hole Name		Hole Name
1	79V001R	51	79V314	101	CNR7604	151	P55V146
2	79V015R	52	79V315	102	EA74X06	152	P55V155
3	79V018R	53	79V316	103	EA76X22	153	P55V157
4	79V020R	54	79V317	104	EA79VX1	154	P55V159
5	79V026R	55	79V318	105	EA79VX2	155	87V-01
6	79V027R	56	79V319	106	EA80VX1	156	87V-02
7	79V028R	57	79V320	107	EA81VX1	157	87V-03
8	79V030R	58	79V321	108	FA81AX3	158	87V-04
9	79V033R	59	79V322	109	FA81AX4	159	87V-05
10	79V035R	60	80V055RH	110	FA81AX5	160	87V-06
11	79V045R	61	80V075RH	111	KA73A02	161	87V-07
12	79V046R	62	80V118R	112	KA73A03	162	87V-08
13	79V047R	63	81VR-01	113	KA74A07	163	87V-09
14	79V049R	64	81VR-02	114	KA74A36	164	87V-10
15	79V050R	65	81VR-03	115	KA74A40	165	87V-11
16	79V053R	66	81VR-04	116	KA74A43	166	87V-12
17	79V055R	67	81VR-05	117	KA74A44	167	87V-13
18	79V057R	68	81VR-06	118	KA74A47	168	87V-14
19	79V060R	69	81VR-07	119	KA74A48	169	87V-15
20	79V063R	70	81VR-08	120	P53V005	170	87V-16
21	79V071R	71	81VR-09	121	P53V008	171	87V-17
22	79V072R	72	81VR-10	122	P53V009	172	87V-18
23	79V084R	73	81VR-11	123	P53V011	173	87V-19
24	79V094R	74	81VR-12	124	P53V012	174	87V-20
25	79V095R	75	81VR-13	125	P54V019	175	87V-21
26	79V096R	76	81VR-14	126	P54V022	176	87V-22
27	79V101R	77	81VR-15	127	P54V023	177	87V-23
28	79V110R	78	81VR-16	128	P54V024	178	87V-24
29	79V114R	79	81VR-17	129	P54V037	179	87V-25
30	79V115R	80	81VR-18	130	P54V040	180	87V-26
31	79V117R	81	81VR-19	131	P54V041	181	87V-27
32	79V119R	82	81VR-20	132	P54V044	182	87V-28
33	79V123R	83	81VR-21	133	P54V051	183	87V-29
34	79V126R	84	81VR-22	134	P54V052		
35	79V133R	85	81VR-23	135	P54V054		
36	79V143R	86	81VR-24	136	P54V059		
37	79V300	87	81VR-25	137	P54V072		
38	79V301	88	81VR-26	138	P54V076		
39	79V302	89	81VR-27	139	P54V079		
40	79V303	90	81VR-28	140	P54V080		
41	79V304	91	81VR-29	141	P54V081		
42	79V305	92	81VR-30	142	P54V082		
43	79V306	93	81VR-31	143	P55V097		
44	79V307	94	81VR-32	144	P55V098		
45	79V308	95	81VR-33	145	P55V107		
46	79V309	96	81VR-34	146	P55V109		
47	79V310	97	81VR-35	147	P55V122		
48	79V311	98	CNR7601	148	P55V124		
49	79V312	99	CNR7602	149	P55V127		
50	79V313	100	CNR7603	150	P55V131		

regularly spaced, digitized geological cross sections; each row of the model corresponds to a unique cross sectional geology interpretation. Geological interpretation extends from cross section 04W through 28E for a total of 65 cross-sections. The sections were digitized using GEO-MODEL software. The GEO-MODEL digitized polygons were then exported to an ASCII file, corrected for coordinate errors using program POLYGON.FOR, and imported into the PC-MINE Vangorda 8803 model. These 8803 polygons were used to interpolate rock types into the model blocks.

4.2) Geology Cross Section Interpretation

The most extensive drilling on the Vangorda deposit has been completed on the even cross sections which are spaced approximately 200 feet (61 meters) apart. In 1987 Curragh Resources completed fill-in drilling between these sections along the northwest-southeast axis of high grade ore.

Preparatory to constructing the 8803 model, all drill hole traces and lithologies were plotted at a scale of 1:500 on X.0 cross sections evenly spaced every 30.48 meters. Drill holes were projected horizontally onto the sections. Only the drill hole information within an offset distance of 15.24 meters was plotted on a particular section. A total of 28 cross sections contained projected drill hole information.

Drill hole traces and lithologies were also plotted at a scale of 1:1000 on all long sections containing several drill holes. Projection offsets for long setions were also restricted to a maximum distance of 15.24 meters.

Major effort was spent trying to generate an internally consistent set of cross section geological interpretations. The long sections were used dominantly to calculate between cross sections and to locate the major faults between cross sections 08E and 14E.

Initially the geology was interpreted on the even cross sections (04W, 0ZW, 00E, 0ZE, etc.) because they contained the most extensive drill hole control. Adjacent sections were compared and adjusted to insure continuity of major geologic structures and lithologic units.

Next the geology for the odd cross sections (03W, 01W, 01E, 03E, etc.) were interpolated from the completed adjacent even sections. Limited drill hole data in the northwest part of the deposit helped constrain and enhance the geological interpretation on these sections.

Finally the geology for the X.5 cross sections was interpolated from the adjacent odd and even sections. Differences between the sections were averaged in constructing these intermediate sections. These sections did not have any drill hole control to help constrain the geology.

This procedure resulted in an internally consistent set of 65 geological cross sections regularly spaced every 15.24 meters.

Each section corresponds to a separate row in the Vangorda 8803 model. The sections have incorporated all 1987 drilling results.

4.3) Rock Types

Table 4-1 lists the simplified rock types incorporated into the Vangorda 8803 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 Vangorda area. Rock codes are generally equivalent to those used for the Faro F8701 and F8805 models.

The background waste lithology immediately surrounding the Vangorda deposit is unit 100 (=3G0 or 5B6/noncalcareoues waste phyllite). At higher stratigraphic levels, units 150 (=5a basal Vangorda formation) and 160 (=5B0 Vangorda formation) are delineated on the different cross sections in the model. Locally the 5A unit contains thin horizons of subeconomic ore types; if these have not been differentiated in a section, the undifferentiated unit is designated as 155.

Several subunits have also been differentiated within the background waste lithology. Unit 110 (=5A or 5B62) represents carbonaceous phyllites. Unit 120 (=4L) refers to highly altered muscovite - quartz ± chlorite phyllites with minor sulphides. Unit 130 corresponds to metabasite-rich intervals.

Vangorda ores are logically grouped into quartzose ores and baritic massive sulphide ores. The classification indicated in Table 4-1 basically follows this scheme.

Inspection of a Vangorda cross-section illustrates that the ore deposit consists dominantly of a main baritic massive sulphides horizon underlain by footwall quartzose ores. Additional horizons of massive sulphides and/or quartzose ores from small lenses and bands at slightly higher stratigraphic levels. The stratigraphically highest ore horizons occur within the thick carbonaceous phyllites of the basal Vangorda formation.

I have attempted to reflect these different ore horizons in the Vangorda deposit by incorporating a horizon code within the ore type code. All rock types in the main horizon have a 1 in the integer's space. Intermediate ore horizons have a 2 in the integer's space. Ores within the basal Vangorda formation have a 3 in the integer's space. Unit 61, therefore, corresponds to baritic massive sulphides within the main horizon.

The massive sulphide ores have been divided into three major ore types. Units 50 (=4E) and 70 (=4EH) constitute massive pyritic and pyrrhotitic sulphides respectively. Because these units occur only in minor amounts, horizon coding was not utilized in the 8803 model for them. Units 60, 61, 62, 63 (=4EG) consist of baritic massive sulphides with abundent Pb and Zn. Actually these units are a mixture of about 50% 4E and 50% 4G ore types. Separation of these two ore types was not possible or realistic in terms of mining or geology.

I have differentiated four quartzose ore types. Stratigraphically all the quartzose ores are located in the footwall to the baritic massive sulphides. Unit 80 (=4DJ) constitutes a base metal and magnetite-rich quartzite immediately beneath the main baritic sulphides. This unit has only a limited occurrence; no horizon coding was incorporated into the 8803 model.

Units 40, 41, 42, 43 (=4EC) consist of semi-massive, highly pyritic quartzites located beneath the baritic massive sulphides. In assays this unit typically is barren in Pb & Zn but contains substantial Au. Units 30, 31, 32, 33 (=4CO) constitute the slightly pyritic, noncarbonaceous, quartzites located beneath the 4EC pyritic quartzites. The transition between 4EC and 4C0 quartzites is transitional and difficult to place confidently.

Units 20, 21, 22, 23 (=4A) consist of carbonaceous, ribbon-banded, slightly pyritic quartzites. These units tend to be low grade and peripheral to the deposit. They form the second major ore type within the Vangorda deposit.

4.4) GEO-MODEL Digitizing

All sections were digitized using the GEO-0MODEL software package. Coordinates for digitized polygons used the Vangorda 8803 model grid system. After the sections were digitized and verified, the polygons were exported to ASCII files for transferring to PC-MINE. During this polygon exporting procedure, it was discovered that the waste polygon surrounding the ore typically had to be subdivided into smaller polygons because it contained too many digitized points (>256) for acceptance by PC-MINE. PC-MINE also had problems with complex polygon shapes; these polygons also had to be further subdivided.

4.5) Fortran Program POLYGON.FOR

PC-MINE requires that digitized polygons use a special coordinate system with the left edge of the model being 0.0. Easting coordinates for all polygons exported from GEO-MODEL had to be adjusted by subtracting 9797.5 from the Easting. GEO-MODEL polygon exporting routines also contain a "bug" which causes some polygon points to be duplicated in the exported ASCII file.

The Fortran program POLYGON.FOR was written to correct these two problems in the polygons exported from GEO-MODEL. GEO-MODEL also exports all polygons for a particular section. In PC-MINE, background rock types are automatically assigned to each block, and polygons defining these areas are not required. POLYGON.FOR also eliminated all polygons containing the waste background rock type (rock code =100) from the ASCII file exported from GEO-MODEL.

4.6) PC-MINE Rock Type Model

The modified polygons exported from GEO-MODEL were then imported into PC-MINE. Rock types for blocks were assigned for each section using PC-MINE software. Printer maps of each model row was prepared and checked against the geological interpretation. In a few instances PC-MINE was not able to handle a polygon shape. For those sections, the complex polygons were re-digitized as two or more polygons and the entire procedure repeated.

4.7) Program RKSURF.FOR

Overburden and surface topygraphy were not digitized on the GEO-MODEL geological sections. Instead model blocks were modified using program RFSURF.FOR. RKSURF utilizes a user-specified surface grid as a template for selectively editing the rock-type model; all blocks above the surface grid have their rock codes changed to a user-specified value.

RKSURF was run first using the overburden-bedrock surface grid. Each model block whose centre point was at a higher elevation than the surface grid at that location was modified to rock type 300. Next RKSURF was run using the surface topography grid. Each model block whose toe elevation was greater than the surface grid at that location was modified to rock type 500.

Printer maps of each section were than prepared and compared to the original cross sections. Occassionally the surface-grid generated overburden and the cross section interpretation did not overlap. In those instances a small strip of waste rock type 100 remained between the overburden and ore; those blocks were manually altered using the block model editor.

5.0) COMPOSITES

5.1) Composite Definition

Composite intervals for each drill hole were defined on the basis of the interpreted cross section geology with an attempt to conform roughly to a 6.0 m. length. Composite breaks correspond to assay interval breaks. The strong emphasis on geology insures that composites used to interpolate grades into ore blocks exactly correspond to the rock types interpreted from the geologic cross section.

Table 5-1 lists the distribution of composite thicknesses. For the 861 ore composites the maximum and minimum thicknesses are 8.0 and 0.4 meters, respectively. The average thickness is 4.6 meters. From the distribution it can be seen that 21.5% of the composites are less than 1/2 - bench height in thickness, and 25.4% of the composites are greater than 1-bench height in thickness.

An alternative way of considering composite length is by looking at the number of assay intervals within each composite. Table 5-2 shows the distribution of number of assays in the composites for the same 861 composite intervals. The number of assays in a composite ranges from a minimum of 1 to a maximum of 8 with the average being 3. The distribution shows that over half the

5.0) COMPOSITES

5.1) Composite Definition

Composite intervals for each drill hole were defined on the basis of the interpreted cross section geology with an attempt to conform roughly to a 6.0 m. length. Composite breaks correspond to assay interval breaks. The strong emphasis on geology insures that composites used to interpolate grades into ore blocks exactly correspond to the rock types interpreted from the geologic cross section.

Table 5-1 lists the distribution of composite thicknesses. For the 861 ore composites the maximum and minimum thicknesses are 8.0 and 0.4 meters, respectively. The average thickness is 4.6 meters. From the distribution it can be seen that 21.5% of the composites are less than 1/2 - bench height in thickness, and 25.4% of the composites are greater than 1-bench height in thickness.

An alternative way of considering composite length is by looking at the number of assay intervals within each composite. Table 5-2 shows the distribution of number of assays in the composites for the same 861 composite intervals. The number of assays in a composite ranges from a minimum of 1 to a maximum of 8 with the average being 3. The distribution shows that over half the composites contain 3 or 4 assay intervals.

Table 5-1 Composite Thickness Distribution

Interval Length (m)	Number Composites	%
0-1	18	2.1
1-2	87	10.1
2-3	80	9.3
3-4	103	12.0
4-5	162	18.8
5-6	192	22.3
6-7	195	22.6
7-8	24	2.8
TOTAL	861	
Minimum	0.4	
Maximum	8.0	
Average	4.6	
Std Dev	1.6	

Table 5-2 Number of Assays in Composite Distribution

Number Assays	Frequency	%
1	105	12.2
2	132	15.3
3	235	27.3
4	285	33.1
5	76	8.8
6	23	2.7
7	2	0.2
8	3	0.4

TOTAL	861
Minimum	1
Maximum	8
Average	3

5.2) Composite Calculation

Composites were calculated using PC-XPLOR software. There was no clipping of assay values to arbitrary maxima before compositing. Non-assayed internal waste intervals were included in the composite with assay values of 0.0% and 2.7 specific gravities. Drill hole 81VR-04 was deleted from the composite database because the assay results for that particular hole do not make any sense geologically.

Several assay intervals in the database did not have measured pulp Sg values. Before the composite calculations were completed, pulp SG values were assigned to these intervals using average pulp SG's for each ore type. The average pulp SG's are listed in Table 5-3; they are simple arithmetic means of the appropriate ore type as determined from all assays in the 1979, 1980, 1981, and 1987 diamond drill holes. These mean values were also utilized in the rock type master file for the Vangorda 8803 model (PCMINE.MRT)

In the first composite calculation assay intervals in the composite were weighted only by length. Values calculated for each composite were SG, Pb + Zn, Pb, Zn, Ag, and Au. These composites are stored in table 5 in database B.

Assay intervals in the second composite calculation were weighted by length and pulp specific gravity. Values calculated for each composite were Pb + Zn, Pb, Zn, Ag, and Au. These weighted composites are contained in table 6 in database B.

Table 5-3 Average Pump Specific Gravity for each ore type 1979, 1980, 1981, 1987 diamond drill hole assays

Ore Type	Rock Code	Samples	Mean	Std. Der	Min	Max
4ACD	20,21,22	374	2.94	0.30	2.45	4.19
4CO	30,31,32	349	3.46	0.33	2.26	4.77
4EC	40,41,42	275	3.87	0.35	2.40	4.81
4E	50	50	3.92	0.51	2.83	5.00
4EFG	60,61,62	727	4.28	0.34	2.60	5.12
4H	70	26	3.94	0.40	2.70	4.60
4JD	80	27	3.77	0.23	3.40	4.30
4L	120	238	3.00	0.31	2.20	4.68

NEW VANGORDA MODEL <u>8803</u>

Comp Length

4 to 8 m avg 4.6 m 21.5% <3m 74.6%<6m

Ore Types

I5 ore types in 2 horizons (third horizon is basal CO_v)

corresponding 7 basic ore types

New 8803	Old 8606	SG	
ACD	A	2.94	21%
CO	C	3.46	19%
EC	EC	3.87	15%
EFG	EG	4.28	40%
E	E	3.92	14%
JD	included in EG	3.77	1.5%
H	H	3.94	1.4%

Waste Types

Total < =	100	5B6/3G Mt Mye fm noncalcareous phyllite
	110	5A other than basal CO_v
	120	4L
	130	metabasite
	150	basal CO_v carbonaceous phyllite (5A)
	155	basal CO_v carbonaceous phyllite incl undiff 4A, 4C, 4E
	160	Vangorda calcareous phyllite (5BO)
	300	glacial till SG 2.2 (2.1 -> 2.35 range)
	500	air SG 0.0

Blocks

6m high 15.24 m long 4.5 m wide

Eongation 090 = horizontal angle

Plunge

4E and NW 0 = vertical angle
11E to 4E -12 = vertical angle
11E and SE 0 = vertical angle

Fault Domains

none

Geology Matching

ACD to ACD)
CO to CO)
EC to EC) with horizon codes
EG E & JD to EG, E & JD)
H to H

Range

90 m

Specific Gravity results for particular ore type

# Samples			Mean	STD DEV.	MIN	MAX
374	4ACD	20-21-22	2.94	0.30	2.45	4.9
349	4CO	30-31-32	3.46	0.33	0.83	4.77
275	4EC	40-41-42	3.87	0.35	2.4	4.81
727	4EFG	60-61-62	4.28	0.34	2.60	5.12
25	4E	50	3.92	0.51	2.83	5.00
27	4JD	80	3.77	0.23	3.40	4.30
26	4H	70	3.94	0.40	2.70	4.60
238	4L	120	3.00	0.31	2.20	4.68

Ignores 4E/4A in 5A lower fold hinge - which are composited but will not be used in interpolation. These are coded 63 23.

composites contain 3 or 4 assay intervals.

Table 5-1 Composite Thickness Distribution

Interval Length (m)	Number Composites	%
0-1	18	2.1
1-2	87	10.1
2-3	80	9.3
3-4	103	12.0
4-5	162	18.8
5-6	192	22.3
6-7	195	22.6
7-8	24	2.8
TOTAL	861	
Minimum	0.4	
Maximum	8.0	
Average	4.6	
Std Dev	1.6	

Table 5-2 Number of Assays in Composite Distribution

Number Assays	Frequency	%
1	105	12.2
2	132	15.3
3	235	27.3
4	285	33.1
5	76	8.8
6	23	2.7
7	2	0.2
8	3	0.4
TOTAL	861	
Minimum	1	
Maximum	8	
Average	3	

5.2) Composite Calculation

Composites were calculated using PC-XPLOR software. There was no clipping of assay values to arbitrary maxima before compositing. Non-assayed internal waste intervals were included in the composite with assay values of 0.0% and 2.7 specific gravities. Drill hole 81VR-04 was deleted from the composite database because the assay results for that particular hole do not make any sense geologically.

Several assay intervals in the database did not have measured pulp Sg values. Before the composite calculations were completed, pulp SG values were assigned to these intervals using average pulp SG's for each ore type. The average pulp SG's are listed in Table 5-3; they are simple arithmetic means of the appropriate ore type as determined from all assays in the 1979, 1980, 1981, and 1987 diamond drill holes. These mean values were also utilized in the rock type master file for the Vangorda 8803 model (PCMINE.MRT)

In the first composite calculation assay intervals in the composite were weighted only by length. Values calculated for each composite were SG, Pb + Zn, Pb, Zn, Ag, and Au. These composites are stored in table 5 in database B.

Assay intervals in the second composite calculation were weighted by length and pulp specific gravity. Values calculated for each composite were Pb & Zn, Pb, Zn, Ag, and Au. These weighted composites are contained in table 6 in database B.

Table 5-3 Average Pump Specific Gravity for each ore type
1979, 1980, 1981, 1987 diamond drill hole assays

Ore Type	Rock Code	Samples	Mean	Std. Der	Min	Max
4ACD	20,21,22	374	2.94	0.30	2.45	4.19
4CO	30,31,32	349	3.46	0.33	2.26	4.77
4EC	40,41,42	275	3.87	0.35	2.40	4.81
4E	50	50	3.92	0.51	2.83	5.00
4EFG	60,61,62	727	4.28	0.34	2.60	5.12
4H	70	26	3.94	0.40	2.70	4.60
4JD	80	27	3.77	0.23	3.40	4.30
4L	120	238	3.00	0.31	2.20	4.68

6.0) MODEL INTERPOLATION

6.1) Interpolation

Interpolation for density, Pb, Zn, Ag, and Au was done in essentially the same manner as the Vangorda 8607 model. Composites were weighted by the inverse square of the apparent distance between the composite centre and the block centre.

The Vangorda deposit was divided into 3 separate areas for interpolation. The northwest (rows 11-27; sections 4W - 4E) and southeast (rows 42-77; sections 11E - 29E) ends of the deposit were modelled assuming a 0 degree structural plunge to all geologic units. In contrast, the central portion of the deposit (rows 28-41; sections 4E - 11E) was modelled with a -12 degree structural plunge to the northwest along the deposit trend.

A composite was used to interpolate a block only if its geologic code matched the code of the block being estimated. Rock coding in this model has incorporated both rock type and horizon parameters.

Two separate interpolations and geological/mining reserves were completed for the 8803 model. In the first interpolation all block grades were calculated using length-weighted geological composites. In the second set of calculations, blocks were interpolated using specific gravity and length weighted geological composites. Uninterpolated blocks retained an assay grade of 0.0 in all subsequent reserve calculations.

6.2) Interpolation Search Volume Parameters

Interpolation using both sets of composites was completed using the same set of search volume parameters. These parameters are similar to those used for the Vangorda 8607 model:

elongation: model 090 (i.e. along deposit trend)
plunge: varies (see section 6.1)
horizonal anisotropy: 1.41

vertical anisotropy: 1.41
maximum range: 90 m.
minimum number of composites used for a block: 2
maximum number of composites used for a block: 8

Table 6-1 lists the correlation between composite rock codes and block rock codes used during interpolation.

Table 6-1 Block and Composite Rock Code Correlation

Block Rock Code	Composite Rock Code
20	20, 22
21	21
22	22
23	23
30	30, 32
31	31
32	32
33	33
40	40, 42
41	41
42	42
43	43
50	50
60	60, 62
61	61
62	62
63	63
70	70
80	80, 50, 61

With this restriction on rock types some of the blocks were not assigned a value. Table 6-2 lists the number of unassigned blocks after the interpolation was completed. Note that

Table 6-2 Number of uninterpolated blocks

Rock Code	# Blocks
20, 21, 22, 23	54
30, 31, 32, 33	29
40, 41, 42, 43	10
50, 70, 80	4
60, 61, 62, 63	9
TOTAL	106

only a few of the high grade ore blocks were not assigned values during interpolation. Most unassigned blocks correspond to marginal ore types with typically very low grades.

6.3) Specific Gravity Interpolation

Specific gravity was treated as an assay and interpolated into blocks using the pulp SG measurements for the composite intervals. The pulp SG measurements were not reduced for void space during the interpolation. Average pulp SG values corresponding to the rock codes were inserted into all uninterpolated blocks.

6.4) Pb + Zn % Grade Model

Pb + Zn (grade model 1) was not interpolated from the (Pb+Zb)% composite values. To insure complete internal consistency with the interpolated Pb and Zn grade models, the Pb + Zn model was formed by adding the Pb and Zn interpolated values for each block. This simple addition was accomplished using program ADD.FOR.

FORTRAN PROGRAMS

10

3.0) DRILL HOLES

3.1) Introduction

The Vangorda DDHDB (Diamond Drill Hole DataBase) located on the HP3000 computer at the Faro Minesite contains collar locations, downhole surveys, lithologies, assays, structures, and fault data for the pre-1987 Vangorda drill holes. To be accessible to PC-MINE, this data must be transferred to an appropriately formatted personal computer ASCII file. The computer program DH204S.SOURCE.GEOLOGY was written to accomplish this data transfer to the personal computer.

Because PC-MINE has very limited storage capabilities in its drill hole database, the Vangorda DDHDB drill hole data was loaded into a PC-XPLOR drill hole database for storage and manipulation of the data. The computer program VANGDDH.FOR was written to modify the ASCII file transferred from the HP3000 to PC-XPLOR compatible format for rapid transfer of the drill hole information.

The 1987 drill hole collar and lithology information was entered directly into the PC-XPLOR Vangorda database. Assay data for the 1987 drilling was transferred from a Symphony assay spreadsheet to the PC-XPLOR Vangorda database. This database presently contains 183 drill holes.

3.2) Program DH204S (HP 3000 System)

Program DH204S is resident on the HP3000 computer at the Faro Minesite. This program creates a sequential ASCII file on the HP3000 disk and transfers the appropriate data for all drill holes in the Vangorda DDHDB to this file. Essentially the program is a formatted "dump" of the primary field log data stored in the DDHDB. Information stored in the ASCII file for each drill hole includes drill hole name, UTM collar coordinates, total depth, assays, lithologies, downhole surveys, structural measurements and fault/core status measurements. The ASCII file name on the HP3000 disk is PCMINEDH.PUB.GEOLOGY.

3.3) File Transfer (HP3000 to Personal Computer)

The sequential ASCII file PCMINEDH.PUB.GEOLOGY was transferred from the HP3000 system to an IBM-compatible personal computer system using the software package REFLECTIONS. The data transfer can be accomplished readily at 9600 baud by connecting the serial port on the personal computer directly to the HP3000 plotter port located in the Engineering computer room. Consult with the Minesite computer people (MIS) for help with completing this task.

3.4) PC-XPLOR Vangorda Databases

Vangorda drill hole information is stored in 2 PC-XPLOR databases. Database A contains the primary field log information including collar location, downhole surveys, lithologies, structures, fault features, and assays. Database B is designed primarily for calculating composites from assays using different weighting schemes.

Table 3-1 shows the structure of database A (field data). It consists of 8 separate tables. Table names and variables are generally self explanatory. Dates (for example the variable LOGGED in table 1) are stored as integers following the format YYMMDD.

The structure of database B is shown in table 3-2. Database table 1 is a subset of table 1 from database A. Tables 2 and 4 are exact duplicates of tables 2 and 4 from database A. Database table 3 (lithology) contains the from-to downhole intervals to be used for compositing. Database tables 5-8 are identically structured composite tables. Having several composite tables allows for retaining several different composites derived from the same primary assay data.

3.5) Program VANGDDH.FOR

The ASCII file transferred from the HP3000 computer containing all the Vangorda drill hole data was not structured in a format compatible with importing directly into the PC-XPLOR Vangorda database. The Fortran program VANGDDH was written to manipulate the field data contained in this ASCII file into PC-XPLOR compatible format. The output from VANGDDH consist of separate ASCII files, each containing a specific type of data (i.e. lithology, structure, collar locations, etc). Data contained in these files are in an appropriate format for importing directly into the PX-XPLOR Vangorda drillhole database. Options are included within VANGDDH 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.

3.6) Vangorda Drill Holes

Collar locations, downhole surveys, lithologies, assays, and structures for the 154 drill holes in the DDHDB were transferred from the HP3000 to the PC-XPLOR Vangorda databases. Collar locations, downhole surveys, and lithologies for the 1987 drill holes were entered directly into the PX-XPLOR database. Assays for these 29 drill holes were transferred from a SYMPHONY assay spreadsheet.

None of the assays were clipped to user-specified maximum values. If an analysis for a particular element was not completed, the analytical value was set to -1.0. Waste intervals in each drill hole were included in assay table 4 with -1.0 analyses for all elements. The original DDHDB listed Ag analyses were the averaged results of atomic absorption and fire assay analyses. In the current database, these two analyses for Ag were restored to the original status as separate elements. All assays were checked for correctness; order of magnitude problems contained in the DDHDB were corrected. Rock codes for the different assays were entered by hand using the new cross-section interpretation.

Lithologies were verified against the original log and corrected when necessary. Dip and azimuth measurements for structures and faults were set to -1 when both values were 0.

TABLE 3-1 VARIABLES IN DATABASE A

PRINTOUT OF DATABASE STRUCTURE INFORMATION

Database Filename : G:\VANGORDA\VANGORDA.G5A

Table Number : 1
Table Name : HEADER
Number of Fields : 10

Field name	Code	Mark	Type	Minimum	Maximum	Default
HOLE-ID	1:1	Optional	String		8	
LOCATION	1:2	Optional	Local			
(X-COORD)	1:2:1		Real	.00	20000.00	.00
(Y-COORD)	1:2:2		Real	.00	20000.00	.00
(Z-COORD)	1:2:3		Real	900.00	1350.00	.00
LENGTH	1:3	Optional	Real	.00	4000.00	.00
UTM COLLAR	1:4	Optional	UTM			
(X-COORD)	1:4:1		Real	500000.00	600000.00	.00
(Y-COORD)	1:4:2		Real	900000.00	910000.00	.00
(Z-COORD)	1:4:3		Real	900.00	1350.00	.00
TYPE	1:5	Optional	String		3	DDH
SECTION	1:6	Optional	String		15	
CORE SIZE	1:7	Optional	String		10	NQ
LOGGER	1:8	Optional	String		10	
LOGGED	1:9	Optional	Integer	0	999999	0
COMMENTS	1:10	Optional	String		100	

Table Number : 2
Table Name : SURVEYS
Number of Fields : 5

Field name	Code	Mark	Type	Minimum	Maximum	Default
DISTANCE	2:1	Optional	Real	.00	4000.00	.00
DIP	2:2	Optional	Real	-90.00	90.00	-90.00
AZIMUTH	2:3	Optional	Real	.00	360.00	.00
UTMAZIMUTH	2:4	Optional	Real	.00	360.00	.00
METHOD	2:5	Optional	String		20	

Table Number : 3
Table Name : LITHOLOGY
Number of Fields : 6

Field name	Code	Mark	Type	Minimum	Maximum	Default
FROM	3:1	Optional	Real	.00	4000.00	.00
TO	3:2	Optional	Real	.00	4000.00	.00
UNIT	3:3	Optional	String		8	
DESCRPTION	3:4	Optional	String		50	
DETAILS	3:5	Optional	String		50	
ROCK CODE	3:6	Optional	Integer	-1	999	0

Table Number : 4
Table Name : ASSAYS
Number of Fields : 30

Field name	Code	Mark	Type	Minimum	Maximum	Default
FROM	4:1	Optional	Real	.00	4000.00	.00
TO	4:2	Optional	Real	.00	4000.00	.00
INTERVAL	4:3	Optional	Real	.00	4000.00	.00
RECOVERY	4:4	Optional	Real	-1.00	4000.00	-1.00
RECOVERY %	4:5	Optional	Integer	-1	100	100
SAMPLE #	4:6	Optional	Integer	0	999999	0
ROCK TYPE	4:7	Optional	String		8	
ROCK CODE	4:8	Optional	Integer	0	999	0
HORIZON	4:9	Optional	Integer	-1	1000	-1
SG - PULP	4:10	Optional	Real	-1.00	10.00	-1.00
SG - WR	4:11	Optional	Real	-1.00	10.00	-1.00
PB + ZN %	4:12	Optional	Real	-1.00	100.00	-1.00
PB %	4:13	Optional	Real	-1.00	100.00	-1.00
ZN %	4:14	Optional	Real	-1.00	100.00	-1.00
ZN RATIO	4:15	Optional	Real	-1.00	1.00	-1.00
AG G/T(AA)	4:16	Optional	Real	-1.00	1000.00	-1.00
AG G/T(FA)	4:17	Optional	Real	-1.00	1000.00	-1.00
AU G/T	4:18	Optional	Real	-1.00	500.00	-1.00
PO + PY %	4:19	Optional	Real	-1.00	100.00	-1.00
PO %	4:20	Optional	Real	-1.00	100.00	-1.00
PY %	4:21	Optional	Real	-1.00	100.00	-1.00
BAO %	4:22	Optional	Real	-1.00	100.00	-1.00
BA %	4:23	Optional	Real	-1.00	100.00	-1.00
CU %	4:24	Optional	Real	-1.00	20.00	-1.00
HG %	4:25	Optional	Real	-1.00	10.00	-1.00
AS %	4:26	Optional	Real	-1.00	10.00	-1.00
MN %	4:27	Optional	Real	-1.00	10.00	-1.00
OXIDATION	4:28	Optional	Integer	-1	10	-1
OXIDE PB %	4:29	Optional	Real	-1.00	100.00	-1.00
OXIDE ZN %	4:30	Optional	Real	-1.00	100.00	-1.00

TABLE 3-1 VARIABLES IN DATABASE A

Table Number : 5
Table Name : STRUCTURES
Number of Fields : 12

Field name	Code	Mark	Type	Minimum	Maximum	Default
DISTANCE	5:1	Optional	Real	.00	4000.00	.00
PLOT (Y/N)	5:2	Optional	Integer	0	1	1
FEATURE	5:3	Optional	String		4	PS2
SYMMETRY	5:4	Optional	String		2	
S0 DIP	5:5	Optional	Integer	-1	90	-1
S0 DIR	5:6	Optional	Integer	-1	360	-1
S1 DIP	5:7	Optional	Integer	-1	90	-1
S1 DIR	5:8	Optional	Integer	-1	360	-1
S2 DIP	5:9	Optional	Integer	-1	90	-1
S2 DIR	5:10	Optional	Integer	-1	360	220
RFE	5:11	Optional	Integer	-1	5	2
COMMENTS	5:12	Optional	String		50	

Table Number : 6
Table Name : FAULTS
Number of Fields : 11

Field name	Code	Mark	Type	Minimum	Maximum	Default
FROM	6:1	Optional	Real	.00	4000.00	.00
TO	6:2	Optional	Real	.00	4000.00	.00
FEATURE	6:3	Optional	String		4	
RECOVERY	6:4	Optional	String		2	
UPPER DIP	6:5	Optional	Integer	-1	99	-1
UPPER DIR	6:6	Optional	Integer	-1	999	-1
INTRNL DIP	6:7	Optional	Integer	-1	99	-1
INTRNL DIR	6:8	Optional	Integer	-1	999	-1
LOWER DIP	6:9	Optional	Integer	-1	99	-1
LOWER DIR	6:10	Optional	Integer	-1	999	-1
COMMENTS	6:11	Optional	String		50	

Table Number : 7
Table Name : GEOTECH
Number of Fields : 13

Field name	Code	Mark	Type	Minimum	Maximum	Default
FROM	7:1	Optional	Real	.00	4000.00	.00
TO	7:2	Optional	Real	.00	4000.00	.00
INTERVAL	7:3	Optional	Real	.00	20.00	.00
RECOVERY	7:4	Optional	Real	-1.00	20.00	-1.00
RECOVERY %	7:5	Optional	Integer	-1	100	-1
RQD	7:6	Optional	Real	-1.00	20.00	-1.00
RQD %	7:7	Optional	Integer	-1	100	-1
BREAKAGE	7:8	Optional	Integer	-1	15	-1
WEATHERING	7:9	Optional	String		2	

TABLE 3-1 VARIABLES IN DATABASE A

Field name	Code	Mark	Type	Minimum	Maximum	Default
JOINTS #	7:10	Optional	Integer	-1	100	-1
JOINT FREQ	7:11	Optional	Real	-1.00	100.00	-1.00
CORE SIZE	7:12	Optional	String		5	NQ
COMMENTS	7:13	Optional	String		50	

Table Number : 8
Table Name : SAMPLES
Number of Fields : 7

Field name	Code	Mark	Type	Minimum	Maximum	Default
FROM	8:1	Optional	Real	.00	4000.00	.00
TO	8:2	Optional	Real	.00	4000.00	.00
UNIT	8:3	Optional	String		8	
ROCK CODE	8:4	Optional	Integer	-1	999	0
DEPT	8:5	Optional	String		20	
PURPOSE	8:6	Optional	String		100	
DATE	8:7	Optional	Integer	-1	999999	0

TABLE 3-1 VARIABLES IN DATABASE A

PRINTOUT OF DATABASE STRUCTURE INFORMATION

Database Filename : G:\VANGORDA\VANGORDA.GSB

Table Number : 1
Table Name : HEADER
Number of Fields : 8

Field name	Code	Mark	Type	Minimum	Maximum	Default
HOLE-ID	1:1	Optional	String		8	
LOCATION	1:2	Optional	Local			
(X-COORD)	1:2:1		Real	.00	20000.00	.00
(Y-COORD)	1:2:2		Real	.00	20000.00	.00
(Z-COORD)	1:2:3		Real	900.00	1350.00	.00
LENGTH	1:3	Optional	Real	.0	4000.0	.0
UTM COLLAR	1:4	Optional	UTM			
(X-COORD)	1:4:1		Real	500000.00	600000.00	.00
(Y-COORD)	1:4:2		Real	900000.00	910000.00	.00
(Z-COORD)	1:4:3		Real	900.00	1350.00	.00
TYPE	1:5	Optional	String		3	
SECTION	1:6	Optional	String		15	
COMPOSITE	1:7	Optional	String		20	
COMMENTS	1:8	Optional	String		100	

Table Number : 2
Table Name : SURVEYS
Number of Fields : 5

Field name	Code	Mark	Type	Minimum	Maximum	Default
DISTANCE	2:1	Optional	Real	.0	4000.0	.0
DIP	2:2	Optional	Real	-90.0	90.0	-90.0
AZIMUTH	2:3	Optional	Real	.0	360.0	.0
UTMAZIMUTH	2:4	Optional	Real	.0	360.0	.0
METHOD	2:5	Optional	String		20	

Table Number : 3
Table Name : LITHOLOGY
Number of Fields : 7

Field name	Code	Mark	Type	Minimum	Maximum	Default
FROM	3:1	Optional	Real	.0	4000.0	.0
TO	3:2	Optional	Real	.0	4000.0	.0
INTERVAL	3:3	Optional	Real	.0	4000.0	.0
ROCK CODE	3:4	Optional	Integer	-1	999	0
# ASSAYS	3:5	Optional	Integer	0	1000	0

TABLE 3-1 VARIABLES IN DATABASE B

UNIT	3:6	Optional	String		8	
DESCRIPTION	3:7	Optional	String		50	

Table Number : 4
Table Name : ASSAYS
Number of Fields : 30

Field name	Code	Mark	Type	Minimum	Maximum	Default
FROM	4:1	Optional	Real	.0	4000.0	.0
TO	4:2	Optional	Real	.0	4000.0	.0
INTERVAL	4:3	Optional	Real	.0	4000.0	.0
RECOVERY	4:4	Optional	Real	-1.0	4000.0	-1.0
RECOVERY %	4:5	Optional	Integer	-1	100	-1
SAMPLE #	4:6	Optional	Integer	0	999999	0
ROCK TYPE	4:7	Optional	String		8	
ROCK CODE	4:8	Optional	Integer	0	999	0
HORIZON	4:9	Optional	Integer	-1	1000	-1
SG - PULP	4:10	Optional	Real	-1.00	10.00	-1.00
SG - WR	4:11	Optional	Real	-1.00	10.00	-1.00
PB + ZN %	4:12	Optional	Real	-1.00	100.00	-1.00
PB %	4:13	Optional	Real	-1.00	100.00	-1.00
ZN %	4:14	Optional	Real	-1.00	100.00	-1.00
ZN RATIO	4:15	Optional	Real	-1.00	1.00	-1.00
AG G/T(AA)	4:16	Optional	Real	-1.0	1000.0	-1.0
AG G/T(FA)	4:17	Optional	Real	-1.0	1000.0	-1.0
AU G/T	4:18	Optional	Real	-1.00	500.00	-1.00
PO + PY %	4:19	Optional	Real	-1.00	100.00	-1.00
PO %	4:20	Optional	Real	-1.00	100.00	-1.00
PY %	4:21	Optional	Real	-1.00	100.00	-1.00
BAO %	4:22	Optional	Real	-1.00	100.00	-1.00
BA %	4:23	Optional	Real	-1.00	100.00	-1.00
CU %	4:24	Optional	Real	-1.00	20.00	-1.00
HG %	4:25	Optional	Real	-1.000	10.000	-1.000
AS %	4:26	Optional	Real	-1.00	10.00	-1.00
MN %	4:27	Optional	Real	-1.00	10.00	-1.00
OXIDATION	4:28	Optional	Integer	-1	10	-1
OXIDE PB %	4:29	Optional	Real	-1.00	100.00	-1.00
OXIDE ZN %	4:30	Optional	Real	-1.00	100.00	-1.00

Table Number : 5
Table Name : COMPOSITE1
Number of Fields : 25

Field name	Code	Mark	Type	Minimum	Maximum	Default
FROM	5:1	Optional	Real	.0	4000.0	.0
TO	5:2	Optional	Real	.0	4000.0	.0
INTERVAL	5:3	Optional	Real	.0	4000.0	.0
COMP-ID	5:4	Optional	String		10	
ROCK CODE	5:5	Optional	Integer	0	999	0
SG - PULP	5:6	Optional	Real	-1.00	10.00	-1.00

TABLE 3-2 VARIABLES IN DATABASE B

SG - WR	5:7	Optional	Real	-1.00	10.00	-1.00
PB + ZN %	5:8	Optional	Real	-1.00	100.00	-1.00
PB %	5:9	Optional	Real	-1.00	100.00	-1.00
ZN %	5:10	Optional	Real	1.00	100.00	-1.00
AG G/T(AA)	5:11	Optional	Real	-1.0	1000.0	-1.0
AG G/T(FA)	5:12	Optional	Real	-1.0	1000.0	-1.0
AU G/T	5:13	Optional	Real	-1.00	500.00	-1.00
PO + PY %	5:14	Optional	Real	-1.00	100.00	-1.00
PO %	5:15	Optional	Real	-1.00	100.00	-1.00
PY %	5:16	Optional	Real	-1.00	100.00	-1.00
BAO %	5:17	Optional	Real	-1.00	100.00	-1.00
BA %	5:18	Optional	Real	-1.00	100.00	-1.00
CU %	5:19	Optional	Real	-1.00	20.00	-1.00
HG %	5:20	Optional	Real	-1.000	10.000	-1.000
AS %	5:21	Optional	Real	-1.00	10.00	-1.00
MN %	5:22	Optional	Real	-1.00	10.00	-1.00
EL A %	5:23	Optional	Real	-1.00	100.00	-1.00
EL B %	5:24	Optional	Real	-1.00	100.00	-1.00
EL C %	5:25	Optional	Real	-1.00	100.00	-1.00

Table Number : 6
Table Name : COMPOSITE2
Number of Fields : 25

Field name	Code	Mark	Type	Minimum	Maximum	Default
FROM	6:1	Optional	Real	.0	4000.0	.0
TO	6:2	Optional	Real	.0	4000.0	.0
INTERVAL	6:3	Optional	Real	.0	4000.0	.0
COMP-ID	6:4	Optional	String		10	
ROCK CODE	6:5	Optional	Integer	0	999	0
SG - PULP	6:6	Optional	Real	-1.00	10.00	-1.00
SG - WR	6:7	Optional	Real	-1.00	10.00	-1.00
PB + ZN %	6:8	Optional	Real	-1.00	100.00	-1.00
PB %	6:9	Optional	Real	-1.00	100.00	-1.00
ZN %	6:10	Optional	Real	-1.00	100.00	-1.00
AG G/T(AA)	6:11	Optional	Real	-1.0	1000.0	-1.0
AG G/T(FA)	6:12	Optional	Real	-1.0	1000.0	-1.0
AU G/T	6:13	Optional	Real	-1.00	500.00	-1.00
PO + PY %	6:14	Optional	Real	-1.00	100.00	-1.00
PO %	6:15	Optional	Real	-1.00	100.00	-1.00
PY %	6:16	Optional	Real	-1.00	100.00	-1.00
BAO %	6:17	Optional	Real	-1.00	100.00	-1.00
BA %	6:18	Optional	Real	-1.00	100.00	-1.00
CU %	6:19	Optional	Real	-1.00	20.00	-1.00
HG %	6:20	Optional	Real	-1.000	10.000	-1.000
AS %	6:21	Optional	Real	-1.00	10.00	-1.00
MN %	6:22	Optional	Real	-1.00	10.00	-1.00
EL A %	6:23	Optional	Real	-1.00	100.00	-1.00
EL B %	6:24	Optional	Real	-1.00	100.00	-1.00
EL C %	6:25	Optional	Real	-1.00	100.00	-1.00

TABLE 3-2 VARIABLES IN DATABASE B

Table Number : 7
Table Name : COMPOSITE3
Number of Fields : 25

Field name	Code	Mark	Type	Minimum	Maximum	Default
FROM	7:1	Optional	Real	.0	4000.0	.0
TO	7:2	Optional	Real	.0	4000.0	.0
INTERVAL	7:3	Optional	Real	.0	4000.0	.0
COMP-ID	7:4	Optional	String		10	
ROCK CODE	7:5	Optional	Integer	0	999	0
SG - PULP	7:6	Optional	Real	-1.00	10.00	-1.00
SG - WR	7:7	Optional	Real	-1.00	10.00	-1.00
PB + ZN %	7:8	Optional	Real	-1.00	100.00	-1.00
PB %	7:9	Optional	Real	-1.00	100.00	-1.00
ZN %	7:10	Optional	Real	-1.00	100.00	-1.00
AG G/T(AA)	7:11	Optional	Real	-1.0	1000.0	-1.0
AG G/T(FA)	7:12	Optional	Real	-1.0	1000.0	-1.0
AU G/T	7:13	Optional	Real	-1.00	500.00	-1.00
FO + FY %	7:14	Optional	Real	-1.00	100.00	-1.00
FO %	7:15	Optional	Real	-1.00	100.00	-1.00
FY %	7:16	Optional	Real	-1.00	100.00	-1.00
BAD %	7:17	Optional	Real	-1.00	100.00	-1.00
BA %	7:18	Optional	Real	-1.00	100.00	-1.00
CU %	7:19	Optional	Real	-1.00	20.00	-1.00
HG %	7:20	Optional	Real	-1.000	10.000	-1.000
AS %	7:21	Optional	Real	-1.00	10.00	-1.00
MN %	7:22	Optional	Real	-1.00	10.00	-1.00
EL A %	7:23	Optional	Real	-1.00	100.00	-1.00
EL B %	7:24	Optional	Real	-1.00	100.00	-1.00
EL C %	7:25	Optional	Real	-1.00	100.00	-1.00

Table Number : 8
Table Name : COMPOSITE4
Number of Fields : 25

Field name	Code	Mark	Type	Minimum	Maximum	Default
FROM	8:1	Optional	Real	.0	4000.0	.0
TO	8:2	Optional	Real	.0	4000.0	.0
INTERVAL	8:3	Optional	Real	.0	4000.0	.0
COMP-ID	8:4	Optional	String		10	
ROCK CODE	8:5	Optional	Integer	0	999	0
SG - PULP	8:6	Optional	Real	-1.00	10.00	-1.00
SG - WR	8:7	Optional	Real	-1.00	10.00	-1.00
PB + ZN %	8:8	Optional	Real	-1.00	100.00	-1.00
PB %	8:9	Optional	Real	-1.00	100.00	-1.00
ZN %	8:10	Optional	Real	-1.00	100.00	-1.00
AG G/T(AA)	8:11	Optional	Real	-1.0	1000.0	-1.0
AG G/T(FA)	8:12	Optional	Real	-1.0	1000.0	-1.0
AU G/T	8:13	Optional	Real	-1.00	500.00	-1.00
FO + FY %	8:14	Optional	Real	-1.00	100.00	-1.00
FO %	8:15	Optional	Real	-1.00	100.00	-1.00

TABLE 3-2 VARIABLES IN DATABASE B

PY %	8:16	Optional	Real		-1.00	100.00	-1.00
BAO %	8:17	Optional	Real		-1.00	100.00	-1.00
BA %	8:18	Optional	Real		-1.00	100.00	-1.00
CU %	8:19	Optional	Real		-1.00	20.00	-1.00
HG %	8:20	Optional	Real		-1.000	10.000	-1.000
AS %	8:21	Optional	Real		-1.00	10.00	-1.00
MN %	8:22	Optional	Real		-1.00	10.00	-1.00
EL A %	8:23	Optional	Real		-1.00	100.00	-1.00
EL B %	8:24	Optional	Real		-1.00	100.00	-1.00
EL C %	8:25	Optional	Real		-1.00	100.00	-1.00

TABLE 3-2 VARIABLES IN DATABASE B