GRUM PCMINE G8705 BOREHOLE DATA

1.0) INTRODUCTION

Drill hole data for boreholes from geological cross-sections 62W - 86W were transferred from the earlier G8606 model. Drill holes occurring on sections 88W, 60W, 58W, 56W, and 52W were entered directly into the G8705 model from ASCII files using PCMINE module 8.

2.0) DRILL HOLES from SECTIONS 62W - 86W

2.1) Header Data

Collar locations were converted from G8606 to G8705 coordinates using equations outlined by Pigage (July 9 memo). In addition to the conversion, G8705 Northings were adjusted by -1.52 and G8705 Eastings by -1.23 to correct for an error in the original J. M-L conversion equations for changing UTM coordinates to G8606 coordinates. These corrections and transfer of the header data was completed using a variant of program CONDH.FOR written by Kevin Atherton.

2.2) Downhole Surveys

Azimuths were converted from G8606 to G8705 by adding 90 degrees to account for the model rotations. In addition the azimuths were further adjusted by -3.14 degrees to correct for an original error in the Grum DDHDB when converting from True North to UTM North. Corrections were completed using program CONDH.FOR.

2.3) Geology, Assay, Composite Data

Geology intersections, assays, and composite from all drill holes in G8606 were transferred to G8705 simply by copying G8606 files PCMINE.MBG, PCMINE.MBA, and PCMINE.MBC to the G8705 model.

3.0) DRILL HOLES from SECTIONS 52W - 60W

3.1) Introduction

Boreholes from Section 52W-60W were entered directly from ASCII files using PCMINE module 8. The ASCII files were prepared manually from DDHDB printed data using the VEDIT text editor.

3.2) Header Data

Collar coordinates for all drill holes were converted from UTM coordinates to G8705 coordinates using conversion equations derived by Pigage (July 9 memo).

3.3) Downhole Surveys

Azimuths were converted from UTM coordinates by adding 47.8 degrees to the DDHDB azimuths. An additional correction of -3.14 degrees was completed to account for an earlier DDHDB error in converting azimuths from True North to UTM North.

Dips were converted from DDHDB to G8705 convention by subtracting 90 degrees from the DDHDB zenith value.

3.4) Geological Intersections

Borehole geological units were simplified from the original field log using the interpreted cross-section geology as the guiding template for the simplified geology codes. Downhole distances were checked so that they corresponded primarily to assay breaks and secondarily to lithology breaks. All geology rock type coding was consistent with coding used in the G8606 rock type model.

3.5) Assays

Assay data for pulp S.G., Pb, Zn, Ag, and Au were entered into the G8705 model. Average pulp S.G. values consistent with the ore type indicated in the original field log were entered if measured values were missing. These average pulp S.G. values were consistent with those documented for the G8606 model. If assays were not completed for any of the other elements in a sample (typically Au), a value of -1.0 was entered.

External waste assays were not entered into the G8705 model. Small internal waste bands were entered as "calculated" assays with a pulp S.G. of 2.70, assays for Pb, Zn, Ag of 0.00, (trace amount) and assay for Au of -1.0. (not assayed). This format is consistent with assays and composites in the G8606 model.

3.6) Composites

Bench elevation composites were calculated for all drill holes on sections 52W-60W. Because boreholes were nearly vertical, composite lengths were roughly 4.5 metres. Short composite lengths were used for margins of the ore intersections because external waste was not included in calculating the composites.

4.0 DRILL HOLES from SECTION 88W

4.1) Introduction

Boreholes collared on Section 88W were entered directly into the G8705 model from an ASCII file using PCMINE module 8. The ASCII file was prepared manually from DDHDB printed data using the VEDIT text editor.

4.2) Header, Downhole Surveys, Geological Intersections, Assays

All conventions for transferring this information to the G8705 model were exactly as described for drill holes on Sections 52W-60W.

4.3) Composites

Composites were not calculated for these drill holes.

1987 06 08

MEMORANDUM

TO: Gregg Jilson
Kevin Atherton

FROM: Lee Pigage

SUBJECT: Grum 8606 (=G2) Drill Hole Collar Coordinates

Coordinate conversion equations from the UTM grid to 8606 (=G2) grid were derived by J. Marlon-Lambert and incorporated into program DH202. This program was used for all Grum drill holes to download the drill hole data from DDHDB to MINTEC 8606 mine model.

In deriving the conversion equations J.M-L inadvertently made an arithmetic error. Consequently all Grum drill hole collar locations in the 8606 model are slightly in error. The following spread sheet indicates the extent of the error.

All drill holes in the Grum 8606 model are displaced 2 metres from their proper location. This displacement is in the general east direction (true compass direction). The spreadsheet also indicates the correction that should be made to the drill hole collar coordinates during the conversion to the 8705 model.

Lee Pigage

DRILL HOLE COLLAR COORDINATE COMPARISION
GRUM 8606 (=G2) COORDINATES

DATA "A"	DATA "B"
J. MARLON-LAMBERT (1982)	L. PIGAGE (1984)
THETA = -42.225833	THETA = -42.225833
No = 6902768.58	No = 6902768.47
Eo = 580968.94	Eo = 580970.89
SH = 0.99950853	SH = 0.99950853

DRILL HOLE NAME	UTM COORDINATES DATA "A"		GRUM 8606 COORDINATES DATA "A"		GRUM 8606 COORDINATES DATA "B"		DIFFERENCES IN 8606 ("B" - "A")		DISTANCE
	NORTHING	EASTING	NORTHING	EASTING	NORTHING	EASTING	NORTHING	EASTING	
	m	m	m	m	m	m	m	m	m
FAGA017	6904691.10	592269.00	9022.32	7079.15	9021.09	7077.64	-1.23	-1.52	1.95
FAGA018	6905312.80	591855.90	9205.15	6355.08	9203.92	6353.56	-1.23	-1.52	1.95
FAGA031	6904617.20	592533.00	9145.08	7324.43	9143.85	7322.91	-1.23	-1.52	1.95
FAGA041	6904887.50	591961.50	8961.07	6719.28	8959.84	6717.76	-1.23	-1.52	1.95
FAGA053	6905019.20	592243.30	9248.12	6839.50	9246.89	6837.99	-1.23	-1.52	1.95
FAGA061	6905274.80	591988.30	9266.02	6478.72	9264.80	6477.20	-1.23	-1.52	1.95
FAGA100	6905000.00	592473.40	9388.61	7022.89	9387.38	7021.37	-1.23	-1.52	1.95
FAGA116	6904961.00	592599.30	9444.37	7142.39	9443.14	7140.87	-1.23	-1.52	1.95
FAGA119	6904659.60	592573.50	9203.72	7325.93	9202.49	7324.41	-1.23	-1.52	1.95
FAGA126	6905185.50	591905.80	9144.39	6477.64	9143.16	6476.13	-1.23	-1.52	1.95
FAGA131	6904704.60	592614.70	9264.77	7326.19	9263.54	7324.68	-1.23	-1.52	1.95
FAGA137	6904898.90	592628.00	9417.66	7205.40	9416.43	7203.88	-1.23	-1.52	1.95

DRILL HOLE COLLAR COORDINATE COMPARISION
GRUM 8606 (=G2) COORDINATES

DATA "A" J. MARLON-LAMBERT (1982)		DATA "B" L. PIGAGE (1984)	
THETA	= -42.225833	THETA	= -42.225833
No	= 6902768.58	No	= 6902768.47
Eo	= 580968.94	Eo	= 580970.89
SH	= 0.99950853	SH	= 0.99950853

DRILL HOLE NAME	UTM COORDINATES DATA "A"		GRUM 8606 COORDINATES DATA "A"		GRUM 8606 COORDINATES DATA "B"		DIFFERENCES IN 8606 ("B" - "A")		DISTANCE
	NORTHING m	EASTING m	NORTHING m	EASTING m	NORTHING m	EASTING m	NORTHING m	EASTING m	m
FAGA017	6904691.10	592269.00	9022.32	7079.15	9021.09	7077.64	-1.23	-1.52	1.95
FAGA018	6905312.80	591855.90	9205.15	6355.08	9203.92	6353.56	-1.23	-1.52	1.95
FAGA031	6904617.20	592533.00	9145.08	7324.43	9143.85	7322.91	-1.23	-1.52	1.95
FAGA041	6904887.50	591961.50	8961.07	6719.28	8959.84	6717.76	-1.23	-1.52	1.95
FAGA053	6905019.20	592243.30	9248.12	6839.50	9246.89	6837.99	-1.23	-1.52	1.95
FAGA061	6905274.80	591988.30	9266.02	6478.72	9264.80	6477.20	-1.23	-1.52	1.95
FAGA100	6905000.00	592473.40	9388.61	7022.89	9387.38	7021.37	-1.23	-1.52	1.95
FAGA116	6904961.00	592599.30	9444.37	7142.39	9443.14	7140.87	-1.23	-1.52	1.95
FAGA119	6904659.60	592573.50	9203.72	7325.93	9202.49	7324.41	-1.23	-1.52	1.95
FAGA126	6905185.50	591905.80	9144.39	6477.64	9143.16	6476.13	-1.23	-1.52	1.95
FAGA131	6904704.60	592614.70	9264.77	7326.19	9263.54	7324.68	-1.23	-1.52	1.95
FAGA137	6904898.90	592628.00	9417.66	7205.40	9416.43	7203.88	-1.23	-1.52	1.95

Gregg

AMENDMENT February 14, 1985

To: Pigage, L.C. 1984 GRUM Data Base - T & R Data

INTRODUCTION

During the course of processing structural S2 measurements for underground (FAGU) drill holes of constant orientation, it was noted that the drill hole azimuth orientation was systematically +1.6^{o} different from the original azimuth direction (for example +45.6^{o} instead of 44^{o}). An investigation of source programs in DDHDB (Diamond Drill Hole Data Base) system was undertaken to clarify the reasons for this difference. This amendment/appendix reports the results of that study.

GRID NORTH (UTM NORTH) vs TRUE NORTH

All downhole displacement calculations, cross-section calculations, projection calculations and structural calculations in DDHDB use the UTM coordinate system as the reference grid system. All azimuth (i.e. angular orientation) directions are reported as angles (degrees) relative to Grid North = UTM North.

The R-data subfile in the GRUM data base contains all downhole survey measurements for the drill holes in the data base. Azimuth readings for the surveys are all referenced to True North. True North differs from Grid North by 1.57^{o} with True North being rotated in a counter-clockwise sense from Grid North.

The Property Master in DDHDB contains the variable UTMTRN which is reserved for the angular difference between True North and Grid North. For the GRUM data base this constant was set to the value +1.57^{o} to correct for the angular difference between the two reference systems.

Inspection of the DDHDB source programs indicates that UTMTRN is utilized only during the downhole spline calculation. Immediately before the spline calculation is done, all azimuth readings are corrected to a Grid North reference by adding UTMTRN to the azimuth reading in the data base. With all subsequent calculations and reports, azimuth orientations are with reference to Grid North.

GRUM DATA BASE

Because of the actual correction procedure used by DDHDB, the variable UTMTRN for the GRUM data base should have been -1.57^{o} instead of +1.57^{o}. The result of this inadvertant error is that all drill hole deviations for each drill hole have been rotated 3.14^{o} in a clockwise sense around a vertical axis through the drill hole collar.

The effect of this angular rotation was ascertained by comparing downhole displacements for the drill holes collared on cross sections 52W using correct and incorrect UTMTRN values. For FA81AX1 (303 metres deep) the two displacements differ by about 1.5 metres in both the UTM-North and UTM-East coordinates at the bottom of the hole. For FAGA050

(200 metres deep) the difference between old and new UTM-North and UTM-East coordinates at the bottom of the hole was about 0.5 metres.

Therefore it is considered that the 3^{0} angular rotation has a negligible effect on cross and long section projections and calculations in most instances. Certainly these differences are well withing the error cone for drill hole deviation caused by errors in measuring and reading the downhole surveys.

The incorrect value of $+1.57^{0}$ (UTMTRN) has not been changed in the GRUM data base. It was considered most appropriate to maintain a totally internally consistent data set. Because the cros-section plots have already been completed. UTMTRN should not be changed. Results from Section 52W indicate that the accuracy of the plots is not significantly affected.

RECOMMENDATIONS

Corrections between True North and Grid North (UTM North) coordinate systems will continue to create confusion and problems in the Anvil District as long as both systems remain in use. All CAMC survey information, orthophotos and topographic base maps have now been referenced to the Grid North coordinates. Therfore, it is recommended that all future field work should be reported using only the Grid North system. Geologists would set their compasses for a magnetic declination of 31.5^{0} (instead of 33^{0}). all downhole surveys should use the same (31.5^{0}) magnetic declination. UTMTRN in data bases on the Vangorda Plateau should be set to 0.0 and downhole survey azimuths edited to a Grid North reference.

Copies to: Dick Hogan
Robin Tolbert
Ron Buckley
Gregg Jilson
Lee Pigage

GRUM PCMINE G8705 SURFACE ELEVATION GRIDS

1.) SURFACE TOPOGRAPHY

The topographic surface for the Grum G8705 area was digitized from the 1:2000 scale 1979 Anvil District orthophoto topographic map. Surface contours at elevation intervals of 2.5 metres were digitized as open and closed polygons. The margins of Doal Lake and the sewage lagoon were digitized as closed polygons. These polygons were extracted from PCMINE to the formatted ASCII file GRUMTOPO.DAT.

In addition the west and east margins of the model (model directions) and each of the streams were digitized as a series of points. These digitized points were extracted to an ASCII file and manually edited to correspond to open polygons with each model margin and each stream representing a separate polygon. These polygons were then appended to the GRUMTOPO.DAT file.

The program POLYSECT.FOR was then run using GRUMTOPO.DAT as the input file. POLYSECT generated east-west (model coordinate) cross-sectional profiles for each model row from the digitized contours, lakes, model margins, and streams. The cross-sections were used to linearly interpolate a surface elevation grid consisting of the elevation of the centre point of each block in the model. The surface grid was written to the formatted ASCII file GRUMTOPO.SUR. GRUMTOPO.SUR was then imported into PCMINE using module 8.

2.) OVERBURDEN/BEDROCK INTERFACE

Diamond drill holes in the Grum area triconed through the overburden and only began coring once bedrock had been reached. The Grum ledge surface therefore corresponds approximately to drill hole depths where coring was initiated. Elevations of the bedrock surface were digitized from diamond drill hole data and plotted at 1:2000 scale.

The ledge surface was then manually contoured using a 5 metre contour interval. Three drill holes (FAGA 218, FAGA 208, FAGA 085) recorded anomalously thick overburden from the drill hole records. These drill holes were ignored during contouring. The northwest corner of the model contains moderate amounts of outcrop and bulldozer scruffings with abundant phyllite chips. Obviously overburden is extremely thin in this area. A southwest-northeast trending line was drawn through the model area outlining the area containing outcrops. Northwest of this line the ledge surface was considered equivalent to the surface topography.

The resulting contour map was then digitized as open and closed polygons. As with the surface topographic map, the west and east margins of the model were digitized as points and manually edited to correspond to individual open polyons. These polygons were all extracted to the formatted ASCII file GRUMOVBD.DAT.

The Grum ledge surface grid was then generated from file

GRUMOVBD.DAT using program POLYSECT.FOR. The resulting surface grid was written to ASCII file GRUMOVBD.SUR. The Surface was then imported to the G8705 model using module 8.

3.) PIT SURFACES

Five separate pit surfaces were transferred from the G8606 to the G8705 model. This transfer was completed using a variant of the program CONMOD.FOR written by Kevin Atherton. A background elevation of 1336.0 was used for all G8705 blocks which were outside the area of the G8606 model and therefore not previously defined.

After the pit surfaces were transferred to the G8705 model, they were each merged with the G8705 surface topography grid. This union resulted in all blocks with a 1336.0 elevation being assigned the elevation corresponding to the surface topography. The surface grids containing the 1336 elevation blocks were then deleted from the G8705 model.

GRUM PCMINE G8705 ROCK-TYPE MODEL

1.) INTRODUCTION

The Grum G8705 model was enlarged from the G8606 model to incorporate additional reserves from the Champ zone. The Champ zone corresponds to geological cross-sections 52W-60W; geology for these sections was interpreted and added to the model. The geology for sections 62W-86W was transferred from the G8606 model. Overburden and air were incorporated into the G8705 model from the surface elevation grids corresponding to the overburden-bedrock interface and the surface topography, respectively. Details for these various stages are described further in the next sections.

2.) GEOLOGICAL SECTIONS 52W-60W (MODEL ROWS 72-91)

Geology was interpreted for cross-sections 52W, 54W, 56W, 58W, and 60W. These sections were digitized as polygons. Overburden was not digitized.

The geology for each of these sections corresponds to four rows in the G8705 model. Because of the overall northwest plunge of the deposit, however, the ore polyons for the external rows for each section (rows 1 and 4) actually occur one bench lower (northwest) or higher (southeast) than the digitized polygons. This elevation difference was incorporated into the model by downloading the digitized polygons to an ASCII file and running program POLYVERT.FOR. POLYVERT reads the ASCII file of polygons and creates two additional files, one with elevations for the polygons lowered by 4.5 metres and one with polygon elevations raised 4.5 metres. These new polygons were then loaded into the G8705 model.

Rock types for geological cross sections 52W-60W were then interpolated into the G8705 model from the polygons. All model rows were printed and compared to the original sections. The few required changes were completed manually. Table 1 delineates the pertinent information used in the Champ zone rock type model interpolation.

TABLE 1. Polygon data for Cross-Sections 52W-60W

Model Row	Polygon Code	Elevation Difference	Cross-Section
72	60WA	-4.5	60W
73	60WB	0	60W
74	60WB	0	60W
75	60WC	+4.5	60W
76	58WA	-4.5	58W
77	58WB	0	58W
78	58WB	0	58W
79	58WC	+4.5	58W
80	56WA	-4.5	56W
81	56WB	0	56W
82	56WB	0	56W
83	56WC	+4.5	56W
84	54WA	-4.5	54W
85	54WB	0	54W
86	54WB	0	54W
87	54WC	+4.5	54W
88	52WA	-4.5	52W
89	52WB	0	52W
90	52WB	0	52W
91	52WC	+4.5	52W

3.) GEOLOGICAL SECTIONS 62W-86W (MODEL ROWS 6-71)

Rock types for G8705 rows 6-71 were transferred directly from the G8606 rock-type model. This transfer was completed using a variant of the program CONMOD.FOR written by Kevin Atherton. Rock codes 11 (overburden) and 12 (air) were not transferred from the G8606 model to the G8705 model. Instead, G8705 blocks for these areas were defined as consisting of rock type 10 (waste phyllite).

Blocks in all remaining rows in the G8705 model (rows 1-5 and 92-110) were initialized to rock unit 10 (waste phyllite).

4.) OVERBURDEN (ROCK-TYPE 11)

Rock type 11 (overburden) was not transferred from the G8606 model because the overburden data in this model contained known errors. Instead overburden was loaded to the G8705 model from the G8705 overburden/bedrock surface elevation grid. This transfer was completed using program RKSURF.FOR.

RKSURF was written to modify the rock-type model using a specified surface elevation grid as the template for the changes. It operates on a bench-by-bench basis. Each block in the bench is compared to the elevation for that block in the specified surface elevation grid. If the bench mid-point elevation is higher than the surface grid elevation, the rock code for that block is modified to a user-specified value. Otherwise the rock code for that block remains unchanged.

RKSURF was run on the G8705 model using the overburden/bedrock surface elevation grid as the guideline. All model blocks with centre points at elevations higher than this grid were modified so that the new rock type code for those blocks was unit 11 (overburden).

5.) AIR (ROCK-TYPE 12)

As with rock-type 11, rock-type 12 (air) was not transferred from the G8606 model to the G8705 model. Air was entered into the rock-type model using Program RKSURF.FOR with the topographic surface elevation grid. All model blocks with toe elevations higher than this grid elevation were modified so that the new rock type code for those blocks was unit 12 (air). Note that by specifying toe elevations, only those blocks entirely above the topographic surface were reclassified as air. If the block was only partially above topography, it's rock-type code was not modified.