INTERIM REPORT

ON THE

TULLY TOWNSHIP PROJECT

PORCUPINE MINING DISTRICT, ONTARIO

OF

CYPRUS GOLD (CANADA) LIMITED

OMIP FILE NO. OM90-196

NTS 42A\11

Report No. 647
A.C.A. Howe International Limited
Kenneth W. Johnson
February 14, 1991

TABLE OF CONTENTS

List of Figures

Appendicies

1. Diamond Drill Logs
2. Assay Certificates
3. Petrographic Survey

Interpretation of the Geophysical Results

Prominent magnetic highs are found at the south end of the grid from 1120 E to 1840 E and from 0 to 400 E. These broad highs represent thick ultramafic flow sequences. Magnetic lows to the north of the highs are the result of talc-serpentine alteration of the ultramafics which destroyed the magnetite content. A northeast trending magnetic high from 400 E; B.L. to 720 E; 200 N represents an ultramafic flow unit with a magnetic low representing talc-serpentine altered material to the north. Irregular magnetic highs from 0 to 520 E and 300 N to 500 N probably represent a mixed volcanic sequence with significant ultramafic flows and/or pyrrhotite-bearing graphite units. Another area of irregular magnetic highs from 1440 E to 1680 E and 300 N to 450 N is the result of a mixed sequence of mafic to intermediate flows with local pyrrhotite - bearing graphitic horizons.

A strong, east-west trending, electromagnetic conductor with a steep northerly dip occurs at 80 N to 100 N on lines 1520 E to 1840 E. Both in-phase and out-of-phase responses are good. Drill hole logs indicate a graphitic horizon to be the source. Local, coincident magnetic highs reflect pyrrhotite-rich portions of the horizon. Another good conductor was found to trend from 1640 E; 175 N to 1840; 275 N, increasing in amplitude to the northeast. Drill hole logs show a graphitic horizon as the source with local coincident magnetic highs reflecting pyrrhotite enrichment. A weaker, east-west trending conductor is indicated by both in-phase and out-of-phase responses from 1200 E to 1280 E at 50 S and can be traced by weak out-of-phase responses to about 1600 E. A weak graphite horizon is the source of the anomaly. A steeply dipping, east-northeast trending anomaly which displays in-phase and out-of phase responses can be traced from 0 to 320 E at 50 N to 100 N. Drill hole results indicate a graphitic horizon to be the source with a local magnetic high associated with a pyrrhotite concentration.

SUMMARY

Cyprus Gold (Canada) Limited ("Cyprus") is currently completing the first phase of exploration on its Tully Township property. The program consists of linecutting, surface geophysical and topographic surveying, combined with diamond drilling.

The Cyprus Gold property is located in Tully township and is divided into two separate claim blocks which are controlled by two junior companies, Gowest Amalgamated Resources ("Gowest") and New Texmont Resources ("New Texmont"). Previous drilling by both companies has outlined significant gold mineralization associated with the upper contact of peridotite flows of Archean age.

INTRODUCTION

On February 1, 1991, Mr. Alvin Jackson, Manager-Exploration of Cyprus Gold (Canada) Limited, 1810-1055 West Hastings Street, Vancouver, British Columbia V6E 2E9, commissioned Kenneth W, Johnson of A.C.A. Howe International Limited ("Howe") to prepare an interim report summarizing the on-going exploration of Cyprus' Tully Township property, Porcupine Mining District, Ontario.

The scope of this report is to document the work completed to date within this initial phase of exploration for submittal as supporting documentation with an Application for Grant (OMIP File No. OM90-196) with the Provincial Government's OMIP program.

CYPRUS GOLD (CANADA) LTD.	
Location Map - Tully Township (Texmont) Property	
02/15/91	Figure 647-1
A.C.A. HOWE INTERNATIONAL LTD.	

PROPERTY DESCRIPTION, LOCATION, ACCESS AND TOPOGRAPHY

The property is located in the SW corner of Tully Township, 40 kilometres NE of Timmins, Ontario. Access to the west end of the property is by weather gravel road, 14.2 kilometres long which was constructed by New Texmont in 1988. This road branches off highway 655 at a point 32 kilometres north of Timmins. The east end of the property is accessible via a 29 kilometres long timber road from highway 610 at Connaught.

The Tully Township property is comprised of two claim groupings which are numbered as follows:

GOWEST CLAIM GROUP:

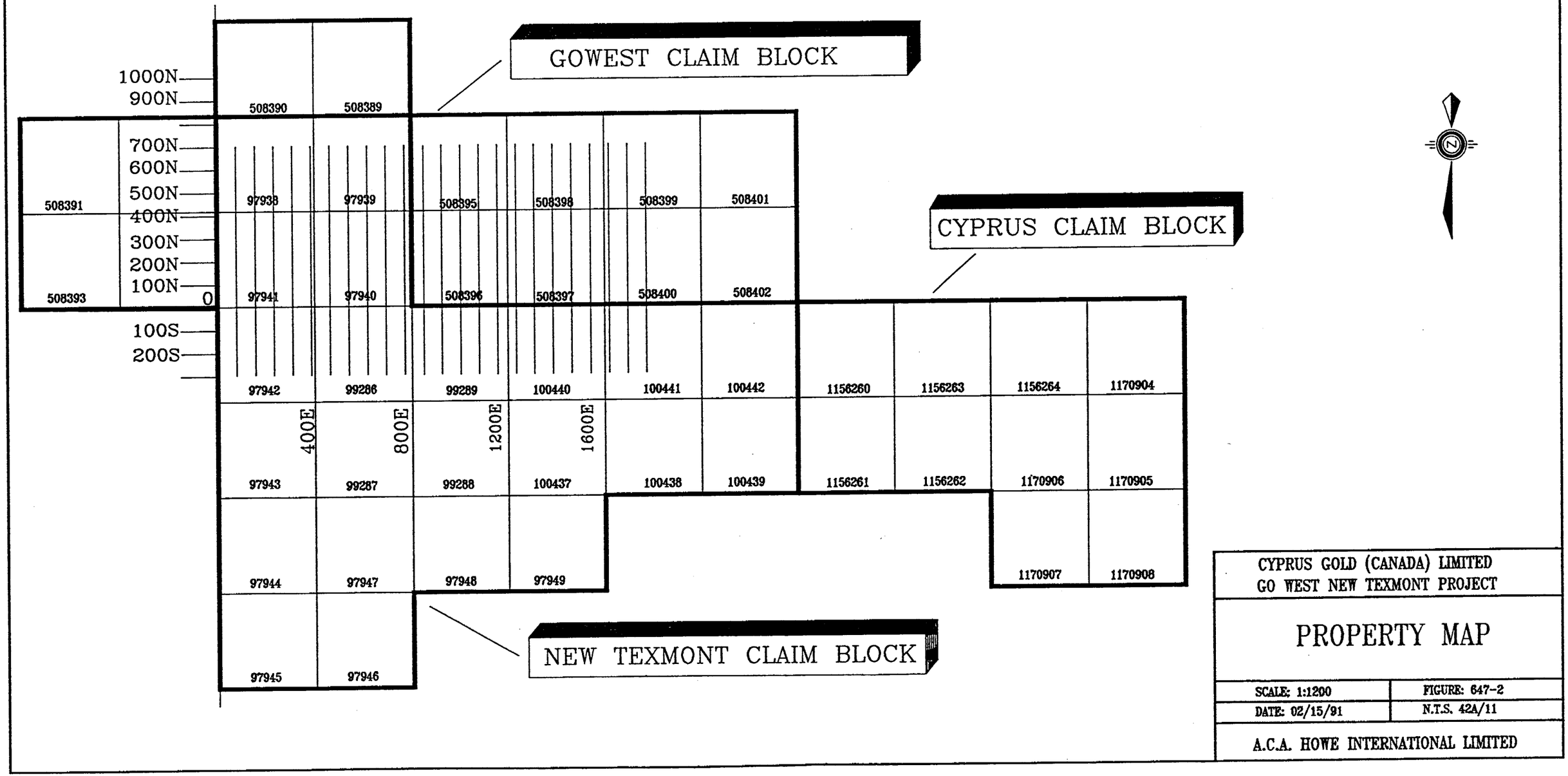
Claim No's	Number	Title
P.508389-508402	14	41.5% Gowest Amalgamated Resources 50.1% New Texmont Exploration 8.5% Romex Resources Ltd.

NEW TEXMONT CLAIM GROUP:

Claim No's	Number	Title
P.97938-97949 incl.	12	63.6% Intex Mining Company
P.99286-99289 incl.	4	36.4% Frankfield Explorations
P.100437-100442 incl.	6	(New Texmont owns 50% of Intex Mining Co.)

CYPRUS GOLD'S CLAIM GROUP:

Claim No's	Number	Title
P.1156260-1156264 incl.	5	Cyprus Gold (Canada) Ltd.
P.1170904-1170908 incl.	5	



CYPRUS GOLD (CANADA) LIMITED
GO WEST NEW TEXMONT PROJECT

PROPERTY MAP

SCALE: 1:1200	FIGURE: 647-2
DATE: 02/15/91	N.T.S. 42A/11

A.C.A. HOWE INTERNATIONAL LIMITED

Topographically, the area consists of flat, swampy muskeg which is typical of the Timmins area. Relief rarely varies over the entire property area, and ranges between 1 to 5 metres over a lateral distance of approximately 2,000 metres. The West Buskeau Creek represents the only natural source of water in the immediate property area, and lies approximately 500 metres west of the western property boundary.

PREVIOUS HISTORY

Originally staked during the Kidd Creek discovery era to cover airborne electromagnetic conductors, the property was first drilled in 1968-69 by Intex Mining Company ("Intex") who discovered a zone of gold mineralization now known as the Texmont zone. Further drilling 1974-76 by Intex and Frankfield Explorations Ltd. ("Frankfield") of a ground EM conductor resulted in the discovery of a second zone of gold mineralization known as the Frankfield zone. Drilling in 1980 and 1982 on the Gowest ground intersected the downdip extension of this zone. In 1987, New Texmont optioned the Gowest property and conducted further drilling, mostly in 1988-89, with 2 deep holes completed in early 1990.

GEOLOGY AND MINERALIZATION

The property covers a series of Abitibi belt peridotite flows and overlying mafic flows and pyroclastic rocks with interflow graphitic sediments adjacent to a major ultramafic plug. These units are moderately folded about west-northwest plunging fold axes, but are otherwise apparently undeformed.

Mineralization identified so far is of two types; firstly stratabound disseminated semi massive pyrite-arsenopyrite mineralization associated with silicified graphitic mudstones and tuffaceous rocks immediately above a peridotite flow; secondly , quartz-arsenopyrite-pyrite stringer and vein zones, structurally controlled, occurring in the overlying volcano-sedimentary package. The first type is more important and typifies the Frankfield Mine Zone while the second type forms the Texmont and the Frankfield hangingwall zones, as well as several other less well defined zones occurring above these.

Appraisal of all three principal zones demonstrates a consistent westerly plunge to the mineralization. The Canhorn-Nickel offsets property, another gold prospect, occurs in an identical setting 1.6 kilometres south of the Frankfield zone.

DESCRIPTION OF THE CURRENT PROGRAM

A total of 42.79 line-kilometres of grid-lines have been established over the northern section of the Tully Township property. The grid consists of a 1.84 metre-long baseline which has been placed along the east-west survey boundary between Concessions I and II. The baseline extends in an east-west direction through Lots 10, 11 and 12, a distance of 1,840 metres. Approximately 40.90 line-kilometres of grid lines were cut with the western and eastern portions of the property covered in grid lines at 40 metre spacings along the baseline. Lines were established at 80 metre intervals over the central portion of the property.

Total field and gradient magnetic surveys were completed over the entire grid area utilizing a OMNI-IV Plus proton precession magnetometer. A total of 3,420 total field and gradient readings were taken at a sample interval of 12.5 metres. All readings were corrected for diurnal variations using a OMNI-IV base-station recorder. Both the gradient and total field magnetic data was processed using the GEOSOFT system which presents the readings in a bi-directional gridding algorithm resulting in pronounced lineations in both the down-line and across-line directions. The total field magnetic data has been contoured utilizing a contour interval of 25 gammas. The vertical gradient data has also been contoured using an interval of 2 gammas.

A total of 42.31 line-kilometres of horizontal-loop electromagnetic surveying was completed over the grid-area utilizing a Max-Min I electromagnetic unit coupled with a APEX M.M.C. datalogger. Three frequencies (222 Hz., 444 Hz. and 888 Hz) were recorded at at 25 metre station intervals along all of the grid lines. This data has been plotted on stacked profile maps (1:2,000 scale) each of which displays one frequency illustrating both the in-phase and quadrature profiles.

Approximately 2,408 metres of diamond drilling has been completed thus far in the program, with all of the holes designed to test the down-plunge extension of the Frankfield gold zone.

The drill hole locations and results can be summarized as follows:

Hole 91-1

Location:		1479.53 E; 251.75 N (surveyed)
Azimuth:		180°
Dip:		-66°
0 -	14.6	Overburden
14.6 -	132.95	Andesite flows; pervasive calcite alteration, local, sericite alteration; local, minor argillite and graphitic argillite units.
132.95 -	135.15	Andesite ash tuff; pervasive calcite alteration.
135.15 -	292.2	Andesite flows; similar to 14.6-132.95 description; local iron carbonate alteration.
292.2 -	295.75	Andesite ash tuff; pervasive calcite alteration.
295.75 -	298.0	Graphitic sedimentary horizon.
298.0 -	319.6	Intermediate flows, similar to 14.6-132.95 description; pervasive calcite alteration; local iron carbonate alteration.
319.6 -	325.1	Intermediate ash tuff; pervasive calcite alteration.
325.1 -	371.0	Intermediate flows; similar to previous descriptions; pervasive calcite alteration; local iron carbonate alteration.
		351.9 - 371.0 Strongly foliated deformation zone with 5-10% quartz veining.
	Assays	351.9 - 371.0 Trace
371.0 -	379.8	Talc-carbonate altered ultramafic rock.
379.8 -	460.6	Intermediate flows; similar to previous descriptions.

H.Z.	431.0 - 435.35	Pervasive iron carbonate alteration; 2- locally 40 sulfides including .5% up to locally 30 arsenopyrite (average 3-5%), common quartz veining.
Assays	430.7 - 435.7	4.46 gms/tonne over 5.0m

460.6 - 495.6 Talc-carbonate altered ultramafic rock.

495.6 End of hole

Hole T-91-2

Location: 1560 E; 170 N (not surveyed)
Azimuth: 180°
Dip: -60°

0 - 8.2 Overburden

8.2 - 92.35 Intermediate flows; pervasive calcite alteration; local iron carbonate alteration; local graphitic sedimentary units.

92.35 - 99.3 Mixed graphitic sedimentary-intermediate flow unit.

99.3 - 170.4 Intermediate flows; pervasive calcite alteration; local iron carb. alteration; local graphitic sedimentary lenses.

131.0 - 139.5	2-30% grey and purple quartz veining with silicification.
147.3 - 154.4	Minor deformation zone.

170.4 - 171.85 Intermediate ash tuff, pervasive iron carb. alteration.

171.85 - 176.1 Intermediate flows; common calcite alteration; local iron carb. alteration.

176.1 - 184.2 Ultramafic flow; totally altered to talc-carbonate; interflow graphitic horizons.

184.2	- 184.75	Graphitic sedimentary horizon.	
184.75	- 301.75	Intermediate flows; pervasive calcite alteration, local iron carbonate alteration.	
		255.7 - 272.95	Pervasive iron carb. alteration, common, grey quartz veining, 2-30% pyrite (py) and arsenopyrite (asp); 259.75-261.9 average 5-10% asp
			264.7 - 265.75 average 5-10% asp.
		281.7 - 288.55	Iron carb. alteration; common, grey quartz veining;
		285.85 - 287.15	average 3-5% asp;
		287.9 - 288.55	average 5% asp.
301.75	- 321.85	Ultramafic flows; totally altered to talc-carbonate; rare, remnant spinifex texture.	
321.85		End of Hole	

Hole T-91-3

Location: L 1560 E; 250 N
Azmiuth: 180°
Dip: -60°

0	- 8.55	Overburden	
8.55	- 170.8	Intermediate flows (2d,2e); medium grey, fine grained (</mm), massive to weakly foliated at 45° to core axis, intermediate composition, weak-strong, pervasive calcite alteration, common calcite-filled amygdules, common (1-10%), random and irregular calcite veinlets, generally 1-2%, random and irregular calcite veinlets, generally 1-2%, random and irregular, white-grey quartz veining, locally higher, occasional to common lenses, patches and interbeds of graphitic-carbonaceous sediment, generally ≤.5% disseminated (dissem.) pyrite (py) pyrrhotite (po), commonly up to 10% po-py with graphitic material, local Fe carbonate alteration.	

170.8	-	174.05	Graphitic sedimentary unit (2g); black, fine grained (<.5 mm), generally massive, soft, composed of graphite and 5-70% dissem.,blebbed and modular pyrite, 2-3%, random, grey and pink quartz veining.
			Gradational contact.
174.05	-	201.45	Intermediate flows (2d, 2e); similar to 8.55 - 170.8 description; pervasive calcite alteration, local to common graphitic lenses, common (1-5%) calcite veinlets, common (1-2%) quartz veinlets, generally ≤1% dissem. py.
201.45	-	209.3	Ultramafic rock, probable flow (6c); totally altered to talc and minor carbonate; dark grey, very fine grained, very soft, local foliation at 60° to c.a., no original texture or mineralogy, occasional, white quartz vein.
209.3	-	262.0	Intermediate ash tuff (2a); medium grey, fine grained (≤1 mm), massive intermediate composition; weak, pervasive, calcite alteration, 1-2%, random, quartz veinlets.
212.0	-	214.5	Intermediate flows (2d,2e); same as 174.05 - 201.45 description.
214.5	-	217.85	Intermediate ash tuff (2a); similar to 209.3 - 212.0 description; moderate, pervasive Fe carb. alt.
			Sharp contact.
217.85	-	258.2	Intermediate flows (2d, 2e); similar to 174.05 - 201.45 description; weak-strong, pervasive calcite alt., local Fe carb. alt. common, random, white-grey quartz veining.
258.2	-	260.2	Ultramafic rock, probable flow (6c); totally altered to talc-carbonate; similar to 201.45-209.3; local foliation at 60°-65° to c.a.
260.2	-	361.6	Intermediate flows (2d, 2e); similar to 174.05-201.45 description; general, weak-strong, pervasive calcite alteration, generally 1-2%,random quartz veins, common (1-5%) lenses and patches of graphitic sediment, local Fe carbonate alteration.

361.6	-	381.9	Ultramafic rock, probable flow (6c); totally altered to talc-carbonate; medium-dark grey, fine grained, soft, massive, no original textures or mineralogy.
			End of Hole 38.10 meters.

Hole 91-4

Location:	L 13+20 E; 1 + 90 N
Azimuth:	180°
Dip:	-60°

21.3	-	318.6	Intermediate flows (2d,2e); medium greenish-grey, fine-grained (≤ 1mm), massive, intermediate composition, generally ≤ .5% disseminated (dissem.) pyrite (py), 1-3%, random and irregular calcite veinlets, generally 1%, random and irregular, white-l. grey quartz veinlets, greenish coloration due to probable fine-gr. chlorite, common, dark green chlorite stringers, local-common, calcite-filled amygdule, weak, local foliation at 50° to core axis.
318.6	-	320.65	Ultramafic rock, probable flow; (6c); totally altered to talc and minor carbonate, d. grey, fine-grained (<1 mm), soft, massive.
			Sharp contact at 45° to c.a.
320.65	-	407.65	Intermediate flows (2d,2e); similar description to 21.3-318.6; local foliation at 50° to c.a.
407.65	-	410.2	Intermediate ash tuff (2a); medium grey, very fine grained (≤.5 mm), massive, intermediate composition.
			Sharp contact.
410.2	-	489.75	Intermediate flows (2d,2e); similar to previous general descriptions; generally unaltered, except common to extensive fine grained chlorite,common, random calcite veinlets, common (1-3%), random, white-grey-purple quartz veinlets, generally ≤ 1% dissem. py-po, locally to 2-3% with quartz veins.

489.75	-	502.85	Interbedded sequence of graphitic sedimentary rocks (5f) and argillites (5d); graphitic argillites black, fine grained (<.5 mm), well developed foliation at 55° to c.a., composed of graphite and 2-50%, dissem., blebbed and nodular py, interbedded with medium-dark grey argillite, fine grained (<.5 mm);pervasive calcite alteration, local buff-coloured pervasive Fe carb. alt. in argillite locally, very common, light grey quartz veining locally, particularly in graphitic sections.
502.85	-	541.5	Ultramafic flows (6c); totally altered to talc and minor carbonate; l. green-d.grey, fine grained (<.5 mm), massive, very little remnant texture except rare spinifex, no original mineralogy, common, random calcite veinlets.
			End of Hole 541.5 meters.

Hole 91-5

Location: 1560 E; 300 E
Azimuth: 180°
Dip: -65

Drilling of this hole is currently in progress. The hole is designed to test the down-plunge extension of the Frankfield Zone.

Hole 91-6

Location: 1480 E; 400 N
Azimuth: 180°
Dip: -65°

Drilling of this hole is currently in progress.

Exploration of the property is continuing, with two drilling rigs testing the Frankfield and Texmont gold zones. Final evaluation and reporting of the results of Cyprus' exploration program will be completed by March 20, 1991.

Respectfully submitted,

A.C.A. HOWE INTERNATIONAL LIMITED

Kenneth W. Johnson
Senior Geologist

CERTIFICATE

I, Kenneth W. Johnson of 111 Eagle Avenue, Brantford, Ontario, hereby certify that:

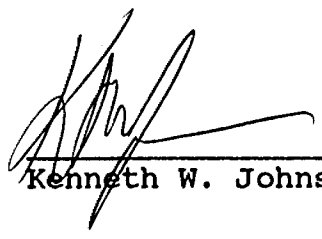
1. I am Senior Geologist with A.C.A. Howe International Limited, Mining and Geological Consultants with offices at 22 Front Street West, Suite 1400, Toronto, Ontario, M5J 1C4.

2. I am a graduate of the University of Windsor, Windsor, Ontario with an Honours, Bachelor of Science (1981) degree in geology.

3. I have practiced my profession in excess of ten years.

4. This report is derived from data of the current exploration program.

5. I have not received, nor do I expect to receive, any interest, directly or indirectly in the properties or securities of Cyprus Gold (Canada) Limited or any related companies.



Kenneth W. Johnson, H,B.Sc.

Toronto, Ontario
February 14, 1991

APPENDIX 1

DIAMOND DRILL LOG

CLIENT:	Cyprus Gold	SHEET NO:	1
NAME OF PROPERTY:	Tully Twp - Frankfield Zone	REMARKS:	Casing left hole
HOLE NO:	T-91-1	LOGGED BY:	M. Rogers
LENGTH:	495.6 metres	STARTED:	Jan. 16/91
CLAIM NO:		FINISHED:	Jan. 26/91
LOCATION:	14+79.53 E; 2 + 51.75 N	COORDINATES:	
ELEVATION:	2.08 M		
AZIMUTH:	180°		
DIP:	-66		

FROM	TO	DESCRIPTION
0	14.6	Overburden
14.6	132.95	**Andesite Flows** (2d, 2e); medium green, fine grained ($\leq$.5 mm), hardness 3-4, massive to locally pillowed, mafic-intermediate composition, local weakly developed schistosity at 45° to core axis, generally $\leq$.5% disseminated (dissem.) pyrite (py), common (1-5%), oval to elongate calcite-filled amydules, pervasive calcite alteration (2h), common (1-10%), random and irregular calcite veinlets, local, 1-5%, irregular and random quartz veinlets with .5-5% py commonly, local, minor argillite lenses and interbeds.
	33.3	38.15 Variably bleached section due to sericite (?) alteration.
	47.0	47.6 10-30% lenses of argillite; local calcite veining to 50%
	49.3	53.6 Lighter coloured section; bleached due to sericite (?) alteration.
		Local weak schistosity at 55.0 metres at 30° - 35° to c.a.
	53.9	59.25 5-20% lenses and fragments of argillite; locally common (up to 50%) calcite veining; local, 1-2% blebs of py.

FROM	TO	DESCRIPTION
57.8	59.25	10-30% calcite veining generally parallel to foliation, local 1-5% quartz veinlets; .5-2% dissem. and blebbed py.
59.25	62.35	Lighter coloured, "bleached" section due to sericite (?) alteration.
62.35	64.3	20-100%, grey quartz - calcite veining, generally irregular, random to foliation parallel, .5-1% dissem. pyrrhotite (po).
64.3	79.25	1-20% argillite lenses and interbeds; common (1-10%) calcite veining; local graphitic lenses (2g).
75.1	77.3	Extensive quartz and calcite veining; local graphitic lenses with 1-3% blebbed py. (2g).
84.2	88.0	Common (1-25%) graphite lenses (2g); extensive quartz and calcite veining - generally random; calcite and silica alteration (2g).
87.3	88.0	5-50% po and py as dissem, stringers and blebs.
88.0	131.3	Generally massive andesite flows with 1-10% carbonaceous and graphitic sediments (2g) lenses, stringers and fragments, commonly with .5-5% py-po associated; pervasive calcite alteration; common veining, local alongate calcite-filled amygdules, local, weak schistosity at 35°-45° to c.a., local flow breccia.
110.8	111.1	White-grey quartz vein.
111.7	111.9	White quartz vein at 30° to c.a.
114.4	117.25	Lighter coloured section probably due to sericite (?) alteration.
120.5	122.8	Lighter coloured section due to sericite (?) alteration.

FROM	TO	DESCRIPTION
		123.4 131.3 Extensive (5-30%) grey quartz and calcite veining, irregular and random to foliation parallel, local .5-3% dissem and stringer po-py, local bleaching - sericite (?), common in-situ brecciation; possible very fine (<<.5mm) asp. up to 1%. Sharp contact at 45° to c.a.
132.95	135.15	**Andesite Ash Tuff** (2a); medium grey-green, fine-grained (≤ 1mm), schistosity at 45° to c.a., hardness 3-4, intermediate composition, pervasive calcite alteration, ≤.5% py as dissem. and stringers, local, blebs of po, 1-10% calcite veinlets - irregular, random to foliation parallel. Sharp contact at 45° to c.a.
135.15	215.2	**Andesite Flows** (2d,2e); similar description to 14.6- 132.95; generally massive, locally amygdaloidal (calcite-filled), rare pillows, pervasive calcite alteration, common irregular and random quartz and calcite veining, minor (≤ 1%) py-po, local carbonaceous-graphitic lenses. 160.0-161.4 Barren, white quartz veining (50%) subparallel to c.a. 173.3-188.5 Common (1-10%) stringers, lenses and fragments of carbonaceous and graphitic sediment in the volcanic rock generally with py and po (2g). 180.9-183.6 5-20% graphitic lenses with 1-10% po-py locally as dissem., stringers and blebs; 182.7-183.2 grey quartz veining with 1-3% py (2g). Weak schistosity at 40°-45° to c.a. throughout this part of the section. 214.2-215.2 Lighter coloured section - minor bleaching; contact zone. Sharp contact

FROM	TO	DESCRIPTION
215.2	244.9	**Andesite Flows** (2d); medium green, fine grained (1mm), massive, hardness 3-4 intermediate composition, weak to locally strong, pervasive calcite alteration, generally $\leq$.5% dissem. py-po, common (1-5%), irregular and random calcite and quartz veinlets, local, 1-5% graphitic lenses, rare, calcite-filled amygdules, distinct in appearance from previous flows, slightly coarser and more mafic; epidote present. 236.2-236.55 50% calcite veining. Gradational contact
244.9	292.2	**Intermediate flows** (2d); medium grey, fine grained (<1 mm), hardness 3-4, massive, intermediate composition, more felsic in appearance than previous unit, local, 1-5%, calcite-filled amygdules, no apparent foliation, common, pervasive, weak-strong calcite alteration, generally $\leq$ .5% dissem. po-py, common 1-10%, irregular and random calcite veinlets, local, minor quartz veining. 245.65 - 246.15 70% barren calcite veining. 257.9 - 258.1 Grey quartz vein with .5% dissem. py. 263.1 - 263.7 Interbed of carbonaceous argillite; 35% irregular and random calcite veinlets brecciation. 272.9 - 273.6 Extensive (30-80%) white and grey quartz veining with 1% dissem. py. 273.6 - 274.9 5-10% irregular and random quartz veinlets; almost total carbonization (calcite) of host rock; brecciation. 274.9 - 299.0 Strong pervasive calcite alteration. 278.85 - 285.65 Well developed section of local, small pillows, flow top breccias and irregular, light coloured chilled material; extensive calcite alteration.

FROM	TO	DESCRIPTION
		285.1 - 289.7 Fe carbonate alteration; medium to dark brown carbonate initially along quartz veinlets and as irregular blebs from 285.1 - 286.6; then as large patches and zones of weak to strong intensity from 286.6 - 288.4 and as blebs and along veinlets to 289.7; section contains 5-10% quartz veinlets with 1% py.
		Indistinct contact.
292.2	295.75	**Andesite Ash Tuff** (2a); very similar to 132.95 - 135.15; weak schistosity at 60° to c.a., pervasive calcite alteration. Sharp contact
295.75	298.0	**Graphitic Sedimentary Horizon** (2g); dark grey - black, fine grained (<.5 mm), well developed schistosity at 50°-60° to c.a., mainly graphitic sediments with minor andesitic material, common (1-10%) py-po as dissem., stringers and blebs, local, extensive quartz veining, common (1-5%), random and irregular calcite veinlets, bleached chill zones at both contacts. Gradational contact over 30 cm.
298.0	319.6	**Intermediate Flows** (2d,2e); very similar to 244.9 - 292.2; generally massive with common, calcite-filled amygdules, local, small pillows, local flow top breccia, common, random, quartz and calcite veining, common, weak-strong, pervasive calcite alteration, local Fe carbonate alteration, weak foliation locally at 55° to c.a.
		299.85 - 300.35 Extensive, medium brown Fe carb. alteration.
		300.35 - 309.5 Common Fe carb. alteration, buff - medium brown colour, weak - strong, occurs pervasively, as infilling of amygdules and as stringers and veinlets.
		311.85 - 312.95 70% grey quartz veining with 10% Fe carbonate as stringers and veinlets; 1% py, local silicification.
		315.5 - 315.7 Graphitic sedimentary interbed.
		319.1 - 319.6 Sharp contact with .5 meter chill margin

FROM	TO	DESCRIPTION
319.6	325.1	**Intermediate Ash Tuff** (2a); very similar to 132.95 - 135.15 description; fine grained (≤ 1 mm), weak foliation at 50°-55° to c.a., pervasive calcite alteration. Sharp contact with altered chill margin from 325.1 - 325.8.
325.1	371.0	**Intermediate Flows** (2d, 2e); similar to 298.0 - 319.6; medium grey, fine grained (< 1 mm), massive to weakly foliated at 55° to c.a., intermediate composition, common calcite-filled and local Fe carb.-filled amygdules, local small pillows, weak-strong, pervasive calcite alteration, local Fe carbonate alteration, 1-5% calcite veinlets, 1-5% quartz veinlets, low flow breccia.
		325.1 - 325.6 Pervasive, strong, light brown Fe carbonate alteration.
		325.6 - 327.7 Fe carbonate alteration as veinlets and as filling for amygdules.
		339.1 - 343.55 1-10% graphitic lenses, patches and fragments with minor (.5-1%) dissem. po-py. 333.85 - 334.855% quartz veining. 343.55 - 348.75 - 20% graphitic lenses; 1-5% quartz veinlets, .5-5% po-py as dissem. blebs and stringers, pervasive calcite alteration.
		348.0 - 348.15 Graphitic interflow sedimentary horizon with 40% py.; bleached chill zone 347.8 - 348.0.
		348.7 - 349.2 Weak - moderate pervasive Fe carbonate alteration.
	D.Z.	351.9 - 371.0 Common (5-10%), irregular, random to foliation parallel white and grey quartz veining, .5-2% dissem py-po locally, rare chalcopyrite (cp), pervasive calcite alteration, local Fe carbonate alteration mod.- well developed schistosity at 45°-55° to c.a., common brecciation, deformation zone (D.Z.).
		354.9 - 359.6 Fe carbonate alteration - pervasive, lenses and patches.
		361.3 - 363.7 Fe carb. alteration - pervasive, lenses and patches.

FROM	TO	DESCRIPTION
		363.7 - 364.7 Completely talc-carbonate altered rock, probably ultramafic unit (6c). 364.7 - 371.0 Fe carb. alteration - pervasive, lenses and patches; local graphite lenses. 366.1 - 367.2 10-50% graphitic sediment. Sharp contact.
371.0	379.8	**Ultramafic Rock:** totally altered to d. grey - black talc and minor carbonate, extremely soft, mod.-well developed foliation at 45°-60° to c.a. but locally highly variable due to deformation, local white quartz veining. (6c). F.Z. 378.0 - 378.5Badly broken core; fault zone. F.Z. 379.6 - 381.2Badly broken core; fault zone. Contact in fault zone
379.8	460.6	**Intermediate Flows** (2d,2e); very similar to 325.1-371.0 description, generally mafic, local carbonate-filled amydules, common, weak-strong pervasive calcite alteration, local Fe carbonate alteration, common, (1-20%) white - grey, irregular, random quartz veining, common calcite veinlets, generally $\leq$.5% dissem. po-py. 379.8 - 389.8 Fe carbonate alteration as pervasively and as dissem. 395.9 - 396.4 50% grey quartz veining. 402.2 - 424.95 1-5% white-grey quartz veins with < 1% py; host contains generally $\leq$.5% very fine, dissem. py, locally to 1-2%, possible very fine asp (<.5%) rarely. 424.95 - 431.0 Weak-mod. dissem. gradually to pervasive, buff Fe carbonate alteration, weak reaction to acid, generally .5-1% dissem. py, rare, <.5%, very fine (<<.5mm) asp. 427.0 - 427.7 5-15% grey, random quartz veining.

FROM	TO	DESCRIPTION
		428.15 - 428.510% grey, random quartz veining
		429.0 - 429.780% grey, quartz veining.
		431.0 - 435.35 Pervasive, buff Fe carbonate; 2-40% sulfides locally-py and asp as dissem. and masses, very fine grained (<.5mm), local, random grey quartz veining.
		431.0 - 431.65 2-3% py, .5-1% asp.
		431.65 - 432.05 5% py, 10-30% asp, 25% grey quartz veining.
		432.05 - 432.6 2-3% py, 2-3% asp.
		432.6 - 433.45 50% grey quartz veining; 2-3% py, 5% asp on average.
		433.45 - 434.3 1% py, .5-1% asp.
		434.3 - 435.35 1% py, 1-20% asp, average 2-3%.
		435.35 - 444.85 Weak - moderate, buff Fe carb. alteration, 1-3% fine dissem. py, rare, <.5%, very fine asp, common, 1-10% grey, random quartz veining, rare hematite along veins.
		444.85 - 448.35 2-10%, random, grey quartz veining.
		448.35 - 451.4 Weak, buff, pervasive Fe carb. alteration, $\leq$ 1% dissem. py, 1-3%, random, grey quartz veinlets. 451.4 - 460.6. Generally 1-5%, random, grey quartz veining, $\leq$ 1%, very fine dissem. to blebs of py, rare malachite stain along fractures, rare hematite in quartz veins, weak pervasive calcite alteration.
		Sharp contact

FROM	TO	DESCRIPTION
460.6	495.6	**Totally Talc-Carbonate Altered Ultramafic** (6c); medium grey-green, very soft, fine grained, massive,composed almost totally of talc with common veinlets and infillings of carbonate, rare quartz veining, no appreciable magnetite.
	495.60	End of Hole.

** BORSURV **

SURVEY DATA AND CALCULATED CO-ORDINATES (metres)

PROPERTY: TULLY
HOLE NO: 91-1
GRID: TULLY

DATE:
SURVEY BY:
INSTRUMENT:

DEPTH	INCLINATION	BEARING	EASTINGS	NORTHINGS	ELEVATION
0.00	-66.00	180.00	1479.530	251.750	2.080
65.00	-63.00	180.00	1479.530	223.767	-56.588
127.50<--	-60.00	180.50	1479.400	193.945	-111.514
190.00	-57.00	181.00	1478.972	161.291	-164.804
296.00	-54.00	180.00	1478.448	101.255	-252.162
435.00	-51.00	180.00	1478.448	16.637	-362.438
485.00	-50.00	180.00	1478.448	-15.167	-401.019
495.60	-50.00	180.00	1478.448	-21.981	-409.139

** BORSURV **

SUMMARY LITHO LOG
PROPERTY: TULLY
HOLE No.: 91-1

==========

LITHO UNIT	DEPTH	EASTINGS	NORTHINGS	ELEVATION	CORE ANGLE
OVB	14.60	1479.53	245.46	-11.10	none
2D,G	132.95	1479.36	191.10	-116.16	none
2A	135.15	1479.35	189.95	-118.04	none
2A	292.20	1478.47	103.41	-249.03	none
2A	295.75	1478.45	101.40	-251.96	none
2G	298.00	1478.45	100.04	-253.75	none
2D	319.60	1478.45	86.89	-270.88	none
2A	325.10	1478.45	83.54	-275.25	none
2D	351.90	1478.45	67.22	-296.51	none
QTZ (2H?)	371.00	1478.45	55.60	-311.66	none
6C	379.80	1478.45	50.24	-318.64	none
2D	431.00	1478.45	19.07	-359.26	none
2H, ASP	435.35	1478.45	16.41	-362.71	none
2D	460.60	1478.45	0.35	-382.19	none
6C	495.60	1478.45	-21.98	-409.14	none

‡ ** BORSURV **

ASSAY LOG

PROPERTY: TULLY

HOLE No.: 91-1

FROM	TO	WIDTH	Au oz/T	AU (GMS)	AU (OZ)
57.75	59.25	1.50	NIL	NIL	NIL
59.25	60.75	1.50	NIL	NIL	NIL
60.75	62.25	1.50	NIL	NIL	NIL
62.25	63.25	1.00	NIL	NIL	NIL
63.25	64.25	1.00	0.000	0.010	NIL
75.10	76.60	1.50	0.001	0.040	NIL
76.60	77.60	1.00	NIL	NIL	NIL
84.20	85.70	1.50	NIL	NIL	NIL
85.70	87.20	1.50	NIL	NIL	NIL
87.20	88.00	0.80	NIL	NIL	NIL
101.30	102.80	1.50	NIL	NIL	NIL
102.80	104.30	1.50	NIL	NIL	NIL
110.80	112.30	1.50	0.005	0.170	NIL
123.40	124.90	1.50	0.006	0.190	NIL
124.90	126.40	1.50	0.008	0.270	NIL
126.40	127.90	1.50	0.005	0.160	NIL
127.90	129.40	1.50	0.002	0.070	NIL
129.40	130.90	1.50	0.010	0.330	NIL
130.90	132.40	1.50	0.002	0.070	NIL
160.00	161.50	1.50	0.001	0.020	NIL
180.90	182.40	1.50	0.028	0.950	NIL
182.40	183.60	1.20	0.101	3.470	0.100
262.60	263.70	1.10	0.001	0.020	NIL
272.90	273.60	0.70	0.001	0.030	NIL
273.60	275.10	1.50	0.001	0.040	NIL
285.00	286.50	1.50	NIL	NIL	NIL
286.50	288.00	1.50	NIL	NIL	NIL
288.00	289.70	1.70	NIL	NIL	NIL
292.20	293.70	1.50	NIL	NIL	NIL
293.70	295.20	1.50	NIL	NIL	NIL
295.20	296.70	1.50	0.000	0.010	NIL
296.70	298.20	1.50	0.031	1.070	NIL
298.20	299.80	1.60	NIL	NIL	NIL
299.80	301.30	1.50	NIL	NIL	NIL
301.30	302.80	1.50	NIL	NIL	NIL
302.80	304.30	1.50	0.004	0.140	NIL
304.30	305.80	1.50	0.001	0.020	NIL
305.80	307.30	1.50	NIL	NIL	NIL
307.30	308.80	1.50	NIL	NIL	NIL
308.80	309.50	0.70	0.000	0.010	NIL
311.85	312.95	1.10	0.002	0.060	NIL
325.10	326.10	1.00	0.000	0.010	NIL
326.10	327.70	1.60	0.000	0.010	NIL
333.85	334.85	1.00	NIL	NIL	NIL
343.55	345.00	1.45	NIL	NIL	NIL
345.00	346.50	1.50	0.018	0.620	NIL
346.50	348.00	1.50	0.000	0.010	NIL
348.00	349.50	1.50	0.002	0.070	NIL
351.90	353.40	1.50	NIL	NIL	NIL
353.40	354.90	1.50	0.000	0.010	NIL

ASSAY LOG
PROPERTY: TULLY
HOLE No.: 91-1

FROM	TO	WIDTH	Au oz/T	AU (GMS)	AU (OZ)
354.90	356.40	1.50	NIL	NIL	NIL
356.40	357.90	1.50	0.000	0.010	NIL
357.90	359.40	1.50	0.001	0.030	NIL
359.40	360.90	1.50	0.001	0.040	NIL
360.90	362.40	1.50	0.001	0.040	NIL
362.40	363.90	1.50	0.000	0.010	NIL
363.90	365.40	1.50	0.001	0.020	NIL
365.40	366.90	1.50	0.000	0.010	NIL
366.90	368.40	1.50	0.000	0.010	NIL
368.40	369.90	1.50	0.000	0.010	NIL
369.90	371.10	1.20	0.000	0.010	NIL
376.75	377.75	1.00	0.000	0.010	NIL
380.95	382.50	1.55	0.000	0.010	NIL
382.50	384.00	1.50	0.000	0.010	NIL
384.00	385.50	1.50	0.000	0.010	NIL
385.50	387.00	1.50	0.000	0.010	NIL
387.00	388.50	1.50	0.000	0.010	NIL
388.50	390.00	1.50	0.001	0.020	NIL
390.00	391.00	1.00	0.000	0.010	NIL
395.40	396.40	1.00	0.001	0.020	NIL
402.20	403.70	1.50	0.000	0.010	NIL
403.70	405.20	1.50	NIL	NIL	NIL
405.20	406.70	1.50	NIL	NIL	NIL
406.70	408.20	1.50	NIL	NIL	NIL
408.20	409.70	1.50	NIL	NIL	NIL
409.70	411.20	1.50	NIL	NIL	NIL
411.20	412.70	1.50	NIL	NIL	NIL
412.70	414.20	1.50	NIL	NIL	NIL
414.20	415.70	1.50	NIL	NIL	NIL
415.70	417.20	1.50	NIL	NIL	NIL
417.20	418.70	1.50	NIL	NIL	NIL
418.70	420.20	1.50	NIL	NIL	NIL
420.20	421.70	1.50	0.000	0.010	NIL
421.70	423.20	1.50	NIL	NIL	NIL
423.20	424.70	1.50	NIL	NIL	NIL
424.70	426.20	1.50	0.002	0.060	NIL
426.20	427.70	1.50	0.001	0.040	NIL
427.70	429.20	1.50	0.002	0.070	NIL
429.20	430.70	1.50	0.006	0.200	NIL
430.70	431.70	1.00	0.108	3.700	NIL
431.70	432.70	1.00	0.242	8.300	0.132
432.70	433.70	1.00	0.130	4.470	NIL
433.70	434.70	1.00	0.021	0.710	NIL
434.70	435.70	1.00	0.162	5.550	NIL
435.70	437.20	1.50	0.000	0.010	NIL
437.20	438.70	1.50	NIL	NIL	NIL
438.70	440.20	1.50	0.002	0.070	NIL
440.20	441.70	1.50	0.000	0.010	NIL
441.70	443.20	1.50	0.004	0.130	NIL
443.20	444.70	1.50	NIL	NIL	NIL

** BORSURV **

AVERAGED ASSAY INTERVALS
PROPERTY: TULLY
HOLE No: 91-1

==========

1. MZ (5.00 d.t. Core Angle: 90 5.00 t.t.)

		EASTINGS:	1478.45
FROM:	430.70 ----------	NORTHINGS:	19.25
		ELEVATION:	-359.03

0.133 Au oz/T
4.546 AU (GMS)
0.000 AU (OZ) (Cut to: 0.000)

		EASTINGS:	1478.45
TO:	435.70 ----------	NORTHINGS:	16.19
		ELEVATION:	-362.98

2. HW (19.20 d.t. Core Angle: 90 19.20 t.t.)

		EASTINGS:	1478.45
FROM:	351.90 ----------	NORTHINGS:	67.22
		ELEVATION:	-296.51

0.000 Au oz/T
0.015 AU (GMS)
0.000 AU (OZ) (Cut to: 0.000)

		EASTINGS:	1478.45
TO:	371.10 ----------	NORTHINGS:	55.54
		ELEVATION:	-311.74

DIAMOND DRILL LOG

CLIENT:	Cyprus Gold	SHEET NO:	1
NAME OF PROPERTY:	Tully Twp - Frankfield	REMARKS:	Casing left in hole
HOLE NO:	T-91-2	LOGGED BY:	M. Rogers
LENGTH:	321.85 metres	STARTED:	Jan. 26/91
CLAIM NO:		FINISHED:	Jan. 31/91
LOCATION:	15+60 E; 1 + 70 N (not surveyed)	COORDINATES:	
ELEVATION:	2.08 M		
AZIMUTH:	180°		
DIP:	-60°		

FROM	TO	DESCRIPTION
0	8.2	Overburden
8.2	92.35	Intermediate flows (2d, 2e); medium green-greenish-grey, fine grained (≤1 mm), massive, common, silica and calcite-filled amygdules, local pillows, rare schistosity at 55° to core axis, intermediate composition, epidote in local sections, rare, black talc along fractures, weak-strong, pervasive calcite alteration, common (1-5%), irregular and random calcite veinlets, common (1-5%), grey white, random and irregular quartz veinlets, generally ≤.5% disseminated (dissem.) pyrite (py) - pyrrhotite (po), common, lenses, stringers and patches of carbonaceous-graphitic sediment with 1-3% po-py, rarely to 10% as stringers.

8.2	-	16.6	Variable epidote alteration.
65.85	-	70.5	Moderate, buff Fe carbonate alteration occurring pervasively, and as patches and lenses; ≤ 1% dissem. py, local quartz veining.
77.3	-	78.25	20% - 50% graphitic sediment, foliation at 45° to c.a. (2g).
81.6	-	82.6	50% graphitic sediment, foliation at 45% to c.a., 80.4 - 82.6 2-20% po as stringers and blebs, 10 - 30% calcite veining, 1-2% quartz veining.
85.1	-	87.2	Moderate, pervasive, buff Fe carb. alteration.
88.85	-	92.35	5-10% graphitic sediment as lenses and patches with 1-5% py-po.

FROM	TO	DESCRIPTION
		Gradational contact.
92.35	99.3	Graphitic - carbonaceous sedimentary rock (2g) - Intermediate flow (2d); dark grey - black, fine grained (≤ 1mm), weak - strong foliation at 45°-60° to c.a., 50-100% graphitic and carbonaceous sediment with the remainder as intermixed and interbedded flow material of intermediate composition, 2-25% py as dissems., blebs and stringers with graphitic material, extensive (2-30%), random and foliation parallel calcite veining, 1-5%, random and foliation parallel, grey quartz veining, common brecciation.
		Gradational contact.
99.3	170.4	Intermediate flows (2d,2e); very similar to 8.2 - 92.35 description; generally massive with common, calcite-filled and silica-filled amygdules, weak-strong, pervasive calcite alteration, local Fe carb. alteration, common calcite and quartz veining, generally ≤.5% dissem. py., local lenses of carbonaceous and graphitic sediments, local foliation at 55° to c.a., local epidote.
		99.3 - 100.6 5-10% graphitic lenses with 1-2% py.
		111.6 - 112.6 Average 10% grey quartz veins, Fe carb. alteration.
		114.6 - 115.9 Weak epidote alteration.
		120.5 - 121.15 Extensive silicification with 2-3% dissem. py.
		121.75 - 126.55 3-10% irregular and random quartz veining.
		131.0 - 139.5 Variably bleached due to weak-moderate silicification associated with 2% locally 30% grey and purple quartz veining, minor epidote, .5-1% dissem. po on average local chlorite, weak.
		139.5 - 147.3 Weak, pervasive silica alteration; associated bleaching occasional quartz veins.
		141.0 - 142.9 5% grey quartz veining.
		147.3 - 151.75 Weak-strong Fe carbonate alteration; buff -d. brown, occurs pervasively and as blebs and stringers, foliation at 45°-55° to c.a., minor (1-2%), grey quartz veinlets.
		151.75 - 152.5 Strong calcite alteration; foliation at 50° to c.a.

FROM	TO	DESCRIPTION
		152.5 - 154.4 Fe carbonate alteration; same as 147.3-151.75 description, 5% calcite veinlets, foliation at 50°-55° to c.a.
		147.3 - 154.4 Probable, minor deformation zone (D.Z.).
		154.4 - 163.4 Weak-strong, pervasive calcite alteration; Fe carb. alteration as stringers, blebs and amygdule fillings, 5% calcite veinlets, 1-2% quartz veinlets, local foliation at about 50° to c.a., generally ≤ 1% dissem. and stringer py-po, very common amygdules, local flow-top breccia, local, minor sericite, rare am tryst veins.
		163.4 - 165.3 Mod. - strong, pervasive calcite alteration.
		165.3 - 166.2 Weak, pervasive Fe carb. alt. with local blebs and stringers.
		169.9 - 170.4 Mod. - strong silicification; 5%, random, white quartz veining.
		Sharp contact.
170.4	171.85	Intermediate ash tuff (2a); buff, fine grained (≤ 1 mm), massive, moderate-strong pervasive Fe carbonate alteration, 1-2% quartz veinlets, contains broken sections.
		Sharp contact.
171.85	176.1	Intermediate flows (2d, 2c); same as 99.3-170.4 description; generally massive with common amygdules, rare pillows and flow-top breccia, local graphitic-carbonaceous interflow units, common calcite alteration, local Fe carbonate alteration, generally 1-3% calcite veinlets and 1% quartz veinlets, generally ≤.5% dissem. py-po.
		172.5 - 172.75 Extensively talc altered ultramafic unit (6c)
		173.75 - 176.1 Weak-moderate, pervasive Fe carb. alt., local silicification with quartz veining of 5% overall.
		Sharp contact at 45° to c.a.

FROM	TO	DESCRIPTION
176.1	184.2	Ultramafic unit (6c), probable flow; dark grey-black, fine grained (< 1 mm), massive-foliated at 45° to c.a., totally altered to talc and minor carbonate, minor remnant magnetite, common (1-5%) calcite veinlets, common (1-2%) quartz veinlets generally parallel to foliation, local interflow graphitic sediment horizons.
		176.9 - 177.4 Interflow unit of 20-100% graphitic sediment with 1-10% py.
		183.7 - 184.2 Fine grained "chilled" margin.
		Sharp contact at 45° to c.a.
184.2	184.75	Graphitic sedimentary unit (2g); black, fine grained, well developed foliation at 45° - 60° to c.a., composed of graphite and 3-10% po.
		Sharp contact at 50° to c.a.
184.75	301.75	Intermediate flows (2d, 2e); similar to previous descriptions; medium grey, fine grained (< 1mm), generally massive, common, calcite-filled amygdules, intermediate composition, local graphitic sedimentary lenses-interbeds, general weak-strong, pervasive calcite alteration, 1-2% on average, random calcite veinlets, local, random quartz veinlets, general ≤.5% dissem. py-po, local, weak foliation at 50°-55° to c.a., local Fe carbonate alteration.
		197.9 - 206.5 Variable weak-moderate, pervasive Fe carb. alt., generally ≤ 1% dissem. py, 1% to locally 5% grey quartz veining, local, minor silicification.
		255.7 - 272.95 Moderate-strong, pervasive Fe carbonate alteration, bleached buff colour; local weak foliation at 50°-55° to c.a., common (1% to locally 50%), random, grey quartz veining, 2-30% sulfides-py and asp, py as dissem. and stringers and blebs, asp (.5-30%) as very fine (<.5mm) dissems.

FROM	TO	DESCRIPTION
255.7	259.75	1-2% dissem. py, trace (<.5%) dissem. asp.
259.75	261.9	2-30% asp, average 5-10%, 1-20% py; 10-50%, random, grey quartz veining.
261.9	263.5	1-3% py, < 1% asp.
263.5	264.7	1-5% py, ≤ 1% asp.
264.7	265.75	1-5% py, 2-25% asp, average 5-10%, 5%, grey quartz veining.
265.75	273.0	1-2% py, ≤ 1% asp.
271.2	275.2	5% average, grey, random quartz veining, locally to 80%.
273.0	281.7	1-2% dissem. py, local, <.5% asp.
281.7	288.55	Fe carbonate alteration as weak-strong pervasive, stringers, blebs and patches.
281.7	285.85	1-2% dissem. py, ≤ 1% asp.
285.85	287.15	25% - 50%, random, dark grey quartz veining, extensive Fe carb. alt., 1-3% py, 2-25% asp (average 3-5%).
287.15	287.9	1% py, < 1% asp.
287.9	288.55	50%, dark grey quartz veining with Fe carb. alt., 1-2% py, average 5% asp.
288.5	297.4	Pervasive calcite alteration; average .5-1% dissem. py, rare, trace (<.5%) asp., local chlorite stringers.
297.4	300.85	Moderate, pervasive talc-chlorite alteration.
300.85	301.75	Interflow carbonaceous-graphitic sedimentary horizon with local 1-10% blebs and stringers of py; common black talc along fractures. (2g).

Sharp contact.

FROM	TO	DESCRIPTION
301.75	321.85	Ultramafic flow (6c); totally talc-carbonate altered; little original texture or mineralogy, light-medium greenish-grey, very soft, very fine grained (<.5 mm), local brecciation, common calcite veinlets, massive, no remnant magnetite, rare remnant spinifex texture. 320.25 - 321.05 75% white calcite veining. End of Hole 321.85 metres.

** BORSURV **

SURVEY DATA AND CALCULATED CO-ORDINATES (metres)

PROPERTY: TULLY
HOLE NO: 91-2
GRID: TULLY

DATE:
SURVEY BY:
INSTRUMENT: TROP

DEPTH	INCLINATION	BEARING	EASTINGS	NORTHINGS	ELEVATION
0.00	-60.00	180.00	1560.000	170.000	0.000
75.00	-57.00	179.00	1560.342	130.814	-63.948
174.00	-56.00	179.00	1561.296	76.181	-146.503
231.00<--	-54.00	178.75	1561.938	43.493	-193.194
288.00	-52.00	178.50	1562.761	9.200	-238.717
321.85	-52.00	178.00	1563.397	-11.631	-265.391

** BORSURV **

SUMMARY LITHO LOG
PROPERTY: TULLY
HOLE No.: 91-2

LITHO UNIT	DEPTH	EASTINGS	NORTHINGS	ELEVATION	CORE ANGLE
OVB	8.20	1560.04	165.72	-6.99	none
2D	92.35	1560.51	121.24	-78.42	none
2G,D	99.30	1560.58	117.40	-84.21	none
2D	131.00	1560.88	99.91	-110.65	none
QTZ	139.50	1560.96	95.22	-117.73	none
2D	147.30	1561.04	90.92	-124.24	none
DZ	154.40	1561.11	87.00	-130.16	none
2D	170.40	1561.26	78.17	-143.50	none
2A	171.85	1561.27	77.37	-144.71	none
2D	176.10	1561.32	74.98	-148.22	none
6C	184.20	1561.41	70.33	-154.86	none
2G	184.75	1561.42	70.02	-155.31	none
2D	255.70	1562.29	28.63	-212.92	none
2H, ASP	272.95	1562.54	18.25	-226.70	none
2D	281.70	1562.67	12.99	-233.69	none
2H, QTZ	288.55	1562.77	8.86	-239.15	none
2D	289.00	1562.78	8.58	-239.50	none
5% ASP	290.00	1562.80	7.97	-240.29	none
2D	301.75	1563.02	0.74	-249.55	none
6C	321.85	1563.40	-11.63	-265.39	none

‡ ** BORSURV **

ASSAY LOG

PROPERTY: TULLY

HOLE No.: 91-2

FROM	TO	WIDTH	Au oz/T	Au(gms)	Au(oz)
197.90	199.40	1.50	0.001	0.030	NIL
203.90	205.40	1.50	0.001	0.050	NIL
205.40	206.90	1.50	0.010	0.330	NIL
226.80	228.30	1.50	NIL	NIL	NIL
228.30	229.80	1.50	NIL	NIL	NIL
233.00	234.50	1.50	NIL	NIL	NIL
238.00	239.50	1.50	NIL	NIL	NIL
254.20	255.70	1.50	NIL	NIL	NIL
255.70	258.70	3.00	NIL	NIL	NIL
258.70	259.70	1.00	0.001	0.030	NIL
308.20	309.70	1.50	NIL	NIL	NIL
11.50	13.00	1.50	NIL	NIL	NIL
14.00	15.50	1.50	NIL	NIL	NIL
23.20	24.70	1.50	NIL	NIL	NIL
31.80	33.30	1.50	NIL	NIL	NIL
49.10	50.60	1.50	0.000	0.010	NIL
52.20	53.70	1.50	NIL	NIL	NIL
65.85	67.35	1.50	NIL	NIL	NIL
67.35	68.85	1.50	NIL	NIL	NIL
68.85	70.35	1.50	NIL	NIL	NIL
77.30	78.30	1.00	0.000	0.010	NIL
80.40	81.40	1.00	NIL	NIL	NIL
81.40	82.70	1.30	NIL	NIL	NIL
85.10	86.10	1.00	NIL	NIL	NIL
86.10	87.20	1.10	NIL	NIL	NIL
92.30	93.80	1.50	0.003	0.090	NIL
93.80	95.30	1.50	0.001	0.050	NIL
95.30	96.80	1.50	NIL	NIL	NIL
96.80	98.30	1.50	NIL	NIL	NIL
98.30	99.80	1.50	0.007	0.250	NIL
102.40	103.90	1.50	NIL	NIL	NIL
108.50	110.00	1.50	NIL	NIL	NIL
111.55	113.05	1.50	NIL	NIL	NIL
120.30	121.30	1.00	NIL	NIL	NIL
121.30	122.80	1.50	NIL	NIL	NIL
122.80	124.30	1.50	NIL	NIL	NIL
124.30	125.80	1.50	NIL	NIL	NIL
133.15	134.65	1.50	NIL	NIL	NIL
134.65	136.15	1.50	NIL	NIL	NIL
136.15	137.65	1.50	NIL	NIL	NIL
140.50	142.00	1.50	NIL	NIL	NIL
142.00	143.50	1.50	NIL	NIL	NIL
147.30	148.80	1.50	NIL	NIL	NIL
148.80	150.30	1.50	NIL	NIL	NIL
150.30	151.80	1.50	0.001	0.020	NIL
151.80	153.30	1.50	NIL	NIL	NIL
153.30	154.80	1.50	NIL	NIL	NIL
159.10	160.60	1.50	NIL	NIL	NIL
160.60	162.10	1.50	NIL	NIL	NIL
169.90	170.90	1.00	0.003	0.090	NIL

PROPERTY: TULLY
HOLE No.: 91-2

FROM	TO	WIDTH	Au oz/T	Au(gms)	Au(oz)
170.90	171.90	1.00	0.001	0.040	NIL
173.75	175.00	1.25	0.002	0.080	NIL
175.00	176.20	1.20	NIL	NIL	NIL
176.20	177.70	1.50	NIL	NIL	NIL
182.65	184.20	1.55	NIL	NIL	NIL
184.20	184.75	0.55	0.001	0.050	NIL
184.75	186.25	1.50	NIL	NIL	NIL
199.40	200.90	1.50	0.002	0.070	NIL
200.90	202.40	1.50	0.009	0.320	NIL
202.40	203.90	1.50	0.010	0.330	NIL
216.70	218.20	1.50	0.001	0.020	NIL
243.75	245.25	1.50	NIL	NIL	NIL
255.70	257.20	1.50	NIL	NIL	NIL
259.70	260.70	1.00	0.110	3.770	NIL
260.70	261.90	1.20	0.292	10.010	NIL
261.90	263.50	1.60	0.017	0.570	NIL
263.50	264.70	1.20	0.016	0.550	NIL
264.70	265.75	1.05	0.320	10.970	NIL
265.75	267.25	1.50	0.001	0.020	NIL
267.25	268.75	1.50	NIL	NIL	NIL
268.75	270.25	1.50	0.001	0.020	NIL
270.25	271.75	1.50	NIL	NIL	NIL
271.75	273.25	1.50	0.001	0.040	NIL
273.25	274.75	1.50	0.001	0.040	NIL
274.75	276.25	1.50	NIL	NIL	NIL
276.25	277.75	1.50	NIL	NIL	NIL
277.75	279.25	1.50	NIL	NIL	NIL
279.25	280.75	1.50	NIL	NIL	NIL
280.75	282.25	1.50	NIL	NIL	NIL
282.25	283.75	1.50	NIL	NIL	NIL
283.75	285.00	1.25	0.007	0.250	NIL
285.00	285.85	0.85	0.001	0.040	NIL
285.85	287.15	1.30	0.044	1.510	NIL
287.15	288.55	1.40	0.088	3.020	NIL
288.55	290.00	1.45	0.003	0.110	NIL
290.00	291.50	1.50	0.001	0.030	NIL
291.50	293.00	1.50	NIL	NIL	NIL
293.00	294.50	1.50	NIL	NIL	NIL
294.50	296.00	1.50	NIL	NIL	NIL
296.00	297.50	1.50	NIL	NIL	NIL
297.50	299.00	1.50	NIL	NIL	NIL
299.00	300.50	1.50	NIL	NIL	NIL
300.50	301.75	1.25	NIL	NIL	NIL
301.75	303.25	1.50	NIL	NIL	NIL
303.25	304.75	1.50	NIL	NIL	NIL
312.75	314.25	1.50	NIL	NIL	NIL
320.00	321.50	1.50	NIL	NIL	NIL

** BORSURV **

AVERAGED ASSAY INTERVALS
PROPERTY: TULLY
HOLE No: 91-2

==========

1. HW (4.50 d.t. Core Angle: 90 4.50 t.t.)

		EASTINGS:	1560.90
FROM:	133.15	NORTHINGS:	98.72
		ELEVATION:	-112.44

0.008 Au oz/T
0.279 Au(gms)
0.000 Au(oz)

		EASTINGS:	1560.95
TO:	137.65	NORTHINGS:	96.24
		ELEVATION:	-116.19

2. HW (7.50 d.t. Core Angle: 90 7.50 t.t.)

		EASTINGS:	1561.04
FROM:	147.30	NORTHINGS:	90.92
		ELEVATION:	-124.24

0.005 Au oz/T
0.171 Au(gms)
0.000 Au(oz)

		EASTINGS:	1561.11
TO:	154.80	NORTHINGS:	86.78
		ELEVATION:	-130.49

3. MZ (6.05 d.t. Core Angle: 90 6.05 t.t.)

		EASTINGS:	1562.35
FROM:	259.70	NORTHINGS:	26.23
		ELEVATION:	-216.12

0.149 Au oz/T
5.104 Au(gms)
0.000 Au(oz)

		EASTINGS:	1562.44
TO:	265.75	NORTHINGS:	22.59
		ELEVATION:	-220.95

DIAMOND DRILL LOG

CLIENT:	Cyprus Gold	SHEET NO:	1
NAME OF PROPERTY:	Tully Twp.	REMARKS:	Casing left in hole
HOLE NO:	T-91-3		
LENGTH:	381.9 M	DRILLED BY:	
CLAIM NO:		LOGGED BY:	M.Rogers
LOCATION:	L 1560 E; 250 N	STARTED:	Jan. 31/91
COORDINATES:		FINISHED:	Feb. 6/91
ELEVATION:			
AZIMUTH:	180°		
DIP:	-60°		

FROM	TO	DESCRIPTION
0	8.55	Overburden
8.55	170.8	Intermediate flows (2d,2e); medium grey, fine grained (</mm), massive to weakly foliated at 45° to core axis, intermediate composition, weak-strong, pervasive calcite alteration, common calcite-filled amygdules, common (1-10%), random and irregular calcite veinlets, generally 1-2%, random and irregular calcite veinlets, generally 1-2%, random and irregular, white-grey quartz veining, locally higher, occasional to common lenses, patches and interbeds of graphitic-carbonaceous sediment, generally ≤.5% disseminated (dissem.) pyrite (py) pyrrhotite (po), commonly up to 10% po-py with graphitic material, local Fe carbonate alteration.

15.9	-	19.2	3-10% white-grey quartz veining.
27.35	-	28.9	3-5% white quartz veining.
36.5	-	93.25	Moderate - strong, pervasive, calcite alteration; light green, bleached appearance; occasional, buff section with minor Fe carbonate alteration.
93.25	-	96.5	Pervasive calcite alteration; medium grey colour, not bleached in appearance.
96.5	-	137.8	Moderate - strong, pervasive calcite alteration; local intervals with buff coloured, pervasive Fe carb. alteration; bleached in appearance.
116.75	-	117.55	60%, light grey, quartz veining at low angle to c.a., 1% dissem. py.

FROM	TO	DESCRIPTION
		129.6 - 134.6 5% overall graphitic sedimentary lenses and 5% quartz-carb. veinlets.
		137.8 - 145.35 Pervasive calcite alteration; lacks bleached appearance.
		145.35 - 148.0 L. grey, bleached section due to pervasive calcite alt.
		148.0 - 170.8 Pervasive calcite alteration.
		164.1 - 170.8 5% to 30% graphitic sedimentary lenses and beds, increasing in content towards lower contact; 1-10% py as dissem., stringers and blebs; 2-3%, random, grey quartz veins.
		Gradational contact.
170.8	174.05	Graphitic sedimentary unit (2g); black, fine grained (<.5 mm), generally massive, soft, composed of graphite and 5-70% dissem., blebbed and modular pyrite, 2-3%, random, grey and pink quartz veining.
		Gradational contact.
174.05	201.45	Intermediate flows (2d, 2e); similar to 8.55 - 170.8 description; pervasive calcite alteration, local to common graphitic lenses, common (1-5%) calcite veinlets, common (1-2%) quartz veinlets, generally ≤1% dissem. py.
		174.05 - 175.5 5-10% graphitic lenses, 1-5% py.
		177.1 - 184.4 Slightly bleached appearance due to calcite alteration.
		184.4 - 194.0 Strongly bleached due to strong, pervasive calcite alt.
		189.9 - 193.9 5-10%, random, white-grey, quartz veining.
		200.4 - 201.45 20-50%, white-grey, quartz veining; common breccia; occasional lenses of talc-carbonate.
		Sharp veined contact.

FROM	TO	DESCRIPTION
201.45	209.3	Ultramafic rock, probable flow (6c); totally altered to talc and minor carbonate; dark grey, very fine grained, very soft, local foliation at 60° to c.a., no original texture or mineralogy, occasional, white quartz vein. Sharp contact at 60° to c.a.; breccia at contact.
209.3	262.0	Intermediate ash tuff (2a); medium grey, fine grained (≤1 mm), massive intermediate composition; weak, pervasive, calcite alteration, 1-2%, random, quartz veinlets. Sharp contact.
212.0	214.5	Intermediate flows (2d,2e); same as 174.05 - 201.45 description. 212.45 - 213.55 25-50%, random, grey quartz veining with 5-15% Fe carb. stringers, extensive silicification, 2-5% dissem py; common silicification to 215.0. Sharp contact.
214.5	217.85	Intermediate ash tuff (2a); similar to 209.3 - 212.0 description; moderate, pervasive Fe carb. alt. Sharp contact.
217.85	258.2	Intermediate flows (2d, 2e); similar to 174.05 - 201.45 description; weak-strong, pervasive calcite alt., local Fe carb. alt. common, random, white-grey quartz veining. 220.8 - 231.1 2-10%, grey quartz veining; local, 1-3% py, associated silicification, minor, brown, Fe carb. along veins. 231.1 - 237.2 5% up to 100% locally, light grey to dark grey, random quartz veining, extensive, local silicification, common chlorite, common, pervasive, carbonate alt., generally 2-10%, blebs and veinlets of Fe carbonate, generally 1-3% py, common in situ breccia.

FROM	TO	DESCRIPTION	
		237.2 - 242.6	Very strong, pervasive calcite alteration; extensive bleaching.
		242.6 - 250.05	Chlorite altered amygdaloidal and pillowed flows; Fe carb. filled amygdules; local, extensive calcite veinlets; local, extensive silica veinlets with Fe carbonate stringers; local silicification with quartz veining.
		250.05 - 258.2	Common Fe carbonate alt. occurring locally pervasively, also as med.- dark brown blebs and stringers; common, white - grey quartz veining, local, 1-2% dissem. py., common silicification with veining.
		252.35 - 252.7	White quartz vein at low angle to c.a.
		Sharp contact	
258.2	260.2	Ultramafic rock, probable flow (6c); totally altered to talc-carbonate; similar to 201.45-209.3; local foliation at 60°-65° to c.a.	
		Sharp contact at 60° to c.a.	
260.2	361.6	Intermediate flows (2d, 2e); similar to 174.05-201.45 description; general, weak-strong, pervasive calcite alteration, generally 1-2%, random quartz veins, common (1-5%) lenses and patches of graphitic sediment, local Fe carbonate alteration.	
		260.2 - 260.5	Graphitic sedimentary interflow horizon (2g).
		271.2 - 280.8	Variable 10% to locally 90% silicification; 2-3%, grey quartz veins, 5-30%, d.brown Fe carb. alt as veinlets directly related to degree of silicification; ≤1% dissem. py; local breccia; local quartz veining up to 50%; local po as blebs and dissem. of 1-3%.
		280.8 - 298.5	Weak-strong, pervasive calcite alt.; generally 2-5%, locally higher, random, white-l.grey quartz veins; generally ≤ 1% py.
		287.65 - 290.4	3 - 20%, white - l. grey quartz veining.

FROM	TO	DESCRIPTION
	298.5 - 306.0	Weak - strong, pervasive carb. alteration, mainly calcite but with significant sections of buff coloured Fe carb.; general bleached appearance; generally 1-3%, random, white-l. grey quartz veins; ≤ 1% dissem py, local silicification with quartz veins.
	306.0 - 326.2	Pervasive, buff-coloured Fe carb. alteration; 2% - locally 50% grey quartz veining with sulfides.
	311.1 - 311.4	30%, l. grey quartz veining with 1-5% py and 15%, fine grained masses of arsenopyrite (asp).
	311.85 - 312.5	20%, grey quartz veining; silicification; 2-5% py.
	321.35 - 325.0	5 - 50%, l. grey quartz veining.
	326.2 - 352.4	Weak-strong, pervasive calcite alt; local, buff, pervasive Fe carb. alt. generally assoc. with quartz veining; common (2-20%), random, l. grey quartz veining.
	332.85 - 333.7	20%-50%, d. grey, random quartz veining with 1-5% py and .5 to locally 10% asp.
	333.7 - 335.75	≤1% py, ≤.5% asp.
	335.75 - 336.05	20% quartz veining; silicification; 1-5% py, 2-3% asp.
	336.05 - 342.95	≤1% py, ≤.5% asp.
	342.95 - 344.55	10%, d. grey quartz veining; 1-5% py, 2-5% asp; common graphitic lenses.
	344.55 - 345.65	≤1% py, <.5% asp.
	345.65 - 346.25	3-20% asp and 1-5% py with grey quartz veining.
	346.25 - 348.3	≤1% py, <.5% asp.

FROM	TO	DESCRIPTION	
		348.3 - 348.85	3-5% asp on average, 1-5% py; minor, d. grey quartz veining.
		348.85 - 350.05	1% py, ≤.5% asp; common graphite.
		350.05 - 351.0	3-5% asp average, locally to 30%, 1-3% py, 10-50% grey quartz veining; common graphite lenses.
		352.4 - 361.6	L. green colour due to fine grained chlorite; common chlorite lenses and veinlets; 352.4 - 352.7: flow-top breccia.
		Sharp, broken contact	
361.6	381.9	Ultramafic rock, probable flow (6c); totally altered to talc-carbonate; medium-dark grey, fine grained, soft, massive, no original textures or mineralogy.	
		End of Hole 381.9 meters.	

** BORSURV **

SURVEY DATA AND CALCULATED CO-ORDINATES (metres)

PROPERTY: TULLY
HOLE NO: 91-3
GRID: tully

DATE: 01/31/91-02/06/91
SURVEY BY: MCR
INSTRUMENT:

DEPTH	INCLINATION	BEARING	EASTINGS	NORTHINGS	ELEVATION
0.00	-60.00	180.00	1560.000	250.000	0.000
99.00	-56.00	175.50	1562.060	197.578	-83.957
121.00<--	-54.25	131.62	1567.660	186.315	-102.006
143.00<--	-52.50	87.75	1580.018	181.893	-119.662
165.00<--	-50.75	43.87	1592.476	187.489	-136.909
187.00	-49.00	175.50	1605.826	182.713	-153.731
214.25<--	-47.25	42.25	1623.037	176.828	-174.022
241.50<--	-45.50	84.50	1639.844	185.254	-193.747
296.00	-42.00	169.00	1671.389	161.698	-231.435
381.90	-42.00	169.00	1683.569	99.035	-288.913

** BORSURV **

SUMMARY LITHO LOG
PROPERTY: TULLY
HOLE No.: 91-3

LITHO UNIT	DEPTH	EASTINGS	NORTHINGS	ELEVATION	CORE ANGLE
OVB	8.55	1560.18	245.47	-7.25	none
2D,2E	93.25	1561.94	200.62	-79.08	45.0
2D,2E,CARB	137.80	1577.10	182.94	-115.49	none
2D,2E	164.10	1591.97	187.26	-136.20	45.0
2D,2G,PY,QV	170.00	1595.51	186.40	-140.73	none
2D,2E	170.80	1596.00	186.23	-141.34	45.0
2G,PY,QV	174.05	1597.97	185.52	-143.83	none
2D,2E,QV,PY	201.45	1614.95	179.59	-164.49	none
6C,TALC	209.30	1619.91	177.90	-170.34	60.0
2A,QV,CARB	212.00	1621.62	177.31	-172.35	none
2D,2E,CARB	214.50	1623.19	176.91	-174.20	none
2A,FE-CARB	217.85	1625.26	177.94	-176.63	none
2D,2E	220.80	1627.08	178.85	-178.76	none
QV,PY,CARB	237.20	1637.19	183.92	-190.63	none
2D,2E,CARB	258.20	1649.51	178.04	-205.30	none
6C,TALC	260.20	1650.67	177.17	-206.68	62.5
2D,2E,CARB	361.60	1680.69	113.84	-275.33	none
6C,TALC	381.90	1683.57	99.04	-288.91	none

‡ ** BORSURV **

ASSA[redacted]LOG

PROPERTY: TULLY

HOLE No.: 91-3

FROM	TO	WIDTH	AU OZ/T	AU G/T
8.55	10.05	1.50	NIL	NIL
15.90	17.40	1.50	NIL	NIL
17.40	18.90	1.50	NIL	NIL
24.35	25.85	1.50	NIL	NIL
27.35	28.85	1.50	NIL	NIL
37.70	39.25	1.55	NIL	NIL
42.00	43.50	1.50	NIL	NIL
50.60	52.10	1.50	NIL	NIL
52.75	54.25	1.50	NIL	NIL
59.25	60.75	1.50	NIL	NIL
61.55	63.05	1.50	NIL	NIL
67.10	68.60	1.50	NIL	0.010
71.45	72.95	1.50	NIL	NIL
75.10	76.60	1.50	NIL	NIL
80.90	82.40	1.50	NIL	NIL
83.90	85.40	1.50	NIL	NIL
87.20	88.70	1.50	NIL	NIL
93.25	94.75	1.50	NIL	NIL
98.60	100.10	1.50	NIL	NIL
104.45	105.95	1.50	NIL	NIL
110.25	111.75	1.50	NIL	NIL
116.75	118.25	1.50	NIL	0.010
120.70	122.20	1.50	NIL	NIL
129.60	131.10	1.50	NIL	0.010
131.10	132.60	1.50	NIL	NIL
132.60	134.10	1.50	NIL	NIL
138.75	140.25	1.50	NIL	NIL
146.60	148.10	1.50	NIL	0.315
156.05	157.55	1.50	NIL	NIL
164.10	165.60	1.50	NIL	0.065
165.60	167.10	1.50	NIL	NIL
167.10	168.60	1.50	NIL	0.034
168.60	170.10	1.50	NIL	0.048
170.10	171.60	1.50	NIL	0.864
171.60	173.10	1.50	NIL	1.395
173.10	174.60	1.50	NIL	1.272
179.60	181.10	1.50	NIL	NIL
183.40	184.90	1.50	NIL	NIL
189.90	191.40	1.50	NIL	NIL
191.40	192.90	1.50	NIL	NIL
192.90	194.40	1.50	NIL	NIL
200.25	201.75	1.50	NIL	0.041
209.00	210.50	1.50	NIL	NIL
210.50	211.50	1.00	NIL	NIL
211.50	212.50	1.00	NIL	NIL
212.50	214.00	1.50	NIL	0.243
215.20	216.70	1.50	NIL	NIL
220.80	222.30	1.50	NIL	NIL
222.30	223.80	1.50	NIL	NIL
223.80	225.30	1.50	NIL	NIL

‡ ** BORSURV **

ASSAY LOG

PROPERTY: TULLY

HOLE No.: 91-3

FROM	TO	WIDTH	AU OZ/T	AU G/T
225.30	226.80	1.50	NIL	NIL
226.80	228.30	1.50	NIL	NIL
228.30	229.80	1.50	NIL	NIL
229.80	231.30	1.50	NIL	NIL
231.30	232.80	1.50	NIL	0.034
232.80	234.30	1.50	NIL	0.147
234.30	235.80	1.50	NIL	0.137
235.80	237.30	1.50	NIL	NIL
0.00	245.35	245.35	NIL	0.103
245.35	246.85	1.50	NIL	NIL
246.85	248.35	1.50	NIL	NIL
248.35	249.85	1.50	NIL	NIL
249.85	251.35	1.50	NIL	NIL
251.35	252.85	1.50	NIL	0.254
252.85	254.35	1.50	NIL	0.190
254.35	255.85	1.50	NIL	0.130
260.20	261.70	1.50	NIL	NIL
263.40	264.90	1.50	NIL	NIL
271.20	272.70	1.50	NIL	NIL
272.70	274.20	1.50	NIL	0.024
274.20	275.70	1.50	NIL	NIL
275.70	277.20	1.50	NIL	0.010
277.20	278.70	1.50	NIL	0.219
278.70	280.20	1.50	NIL	0.099
280.20	281.70	1.50	NIL	NIL
286.85	288.35	1.50	NIL	NIL
288.35	289.85	1.50	NIL	NIL
289.85	291.35	1.50	NIL	NIL
299.10	300.60	1.50	NIL	NIL
300.60	302.10	1.50	NIL	NIL
308.50	310.00	1.50	NIL	0.041
310.00	311.00	1.00	NIL	0.744
311.00	312.00	1.00	NIL	1.330
312.00	313.50	1.50	NIL	0.780
313.50	315.00	1.50	NIL	0.031
315.00	316.50	1.50	NIL	NIL
316.50	318.00	1.50	NIL	NIL
318.00	319.50	1.50	NIL	NIL
319.50	321.00	1.50	NIL	NIL
321.00	322.50	1.50	NIL	0.014
322.50	324.00	1.50	NIL	NIL
324.00	325.50	1.50	NIL	NIL
325.50	327.00	1.50	NIL	NIL
327.00	328.50	1.50	NIL	0.062
328.50	330.00	1.50	NIL	NIL
330.00	331.50	1.50	NIL	NIL
331.50	332.75	1.25	NIL	0.017
332.75	333.75	1.00	NIL	1.865
333.75	334.75	1.00	NIL	0.819
334.75	335.75	1.00	NIL	0.730

ASSAY [redacted]G
PROPERTY: TULLY
HOLE No.: 91-3

FROM	TO	WIDTH	AU OZ/T	AU G/T
335.75	336.75	1.00	NIL	1.474
336.75	338.25	1.50	NIL	0.038
338.25	339.75	1.50	NIL	NIL
339.75	341.25	1.50	NIL	NIL
341.25	342.25	1.00	NIL	NIL
342.25	343.75	1.50	NIL	7.337
343.75	344.75	1.00	NIL	0.823
344.75	345.75	1.00	NIL	0.127
345.75	346.75	1.00	NIL	3.158
346.75	347.75	1.00	NIL	NIL
347.75	348.75	1.00	NIL	0.600
348.75	349.75	1.00	NIL	0.213
349.75	350.75	1.00	NIL	0.874
350.75	351.75	1.00	NIL	1.920
351.75	353.25	1.50	NIL	NIL
353.25	354.75	1.50	NIL	NIL
354.75	356.25	1.50	NIL	NIL

** BORSURV **

AVERAGED ASSAY INTERVALS

PROPERTY: TULLY

HOLE No: 91-3

==========

1. MZ (4.50 d.t. Core Angle: 90 4.50 t.t.)

		EASTINGS:	1677.95
FROM:	342.25	NORTHINGS:	127.96
		ELEVATION:	-262.38
	0.000 AU OZ/T		
	3.359 AU G/T		
		EASTINGS:	1678.58
TO:	346.75	NORTHINGS:	124.68
		ELEVATION:	-265.39

DIAMOND DRILL LOG

CLIENT:	Cyprus Gold	SHEET NO:	1
NAME OF PROPERTY:	Tully Twp.	REMARKS:	Casing left in hole
HOLE NO:	T-91-4		
LENGTH:	541.5 M	DRILLED BY:	
CLAIM NO:		LOGGED BY:	M.Rogers
LOCATION:	L 13+20 E; 1 + 90 N	STARTED:	Feb 1/91
COORDINATES:		FINISHED:	Feb 9/91
ELEVATION:			
AZIMUTH:	180°		
DIP:	-60°		

FROM	TO	DESCRIPTION
21.3	318.6	Intermediate flows (2d,2e); medium greenish-grey, fine-grained (≤ 1mm), massive, intermediate composition, generally ≤ .5% disseminated (dissem.) pyrite (py), 1-3%, random and irregular calcite veinlets, generally 1%, random and irregular, white-l. grey quartz veinlets, greenish coloration due to probable fine-gr. chlorite, common, dark green chlorite stringers, local-common, calcite-filled amygdule, weak, local foliation at 50° to core axis. 36.2 - 39.0 1-2%, l. grey quartz veining with 1-2% py. 39.0 - 43.0 5-50%, l. grey quartz veining. Gradual change in colour at about 44.0 meters from medium greenish-grey to medium grey due to disappearance of chlorite. 43.0 - 49.0 2-5%, l. grey quartz veining with ≤1% py. From about 440 meters the gradual appearance of local, pervasive calcite alteration; bleaching commonly associated. Rare pillow development and flow top breccia. Gradual reappearance at about 55.0 meters of fine grained chlorite. 62.5 - 66.0 Common pillow development. Beginning of occasional lenses and narrow beds of graphitic sediment at 73.0 meters; generally with py.

FROM	TO	DESCRIPTION
75.0	86.1	Generally 2-5%, locally up to 75%, grey quartz veining; commonly with graphite lenses and minor py.
83.55	83.95	75%, grey quartz veining with 1-2% py.
86.1	113.0	Generally 1-3%, random, grey quartz veining with minor (1-2%)py.
		Pervasive calcite alteration appears to be more common downhole.
102.95	103.55	50%, grey quartz veining with 1% py.
108.5	139.7	Mod. bleaching due to pervasive calcite alt., moderate-strong intensity.
118.6	121.7	5% average, random, grey quartz veins.
126.4	139.7	Local, weak, pervasive, buff-coloured Fe carbonate alt.
139.7	147.7	5-50%, random, l. grey and minor purple quartz veining with pervasive Fe carbonate alteration and generally ≤ 1% py-po, common, minor, graphitic lenses.
147.7	152.95	Weak-moderate, pervasive, buff Fe carb. alt with 1-2% quartz veining, locally higher; minor graphite.
152.95	156.1	2-10%, random, grey quartz veining; moderate, buff Fe carb. alt. occurring pervasively; minor graphite.
156.1	156.8	Moderate, pervasive Fe carb. alt., 1-2% quartz veinlets; minor graphite.

FROM	TO	DESCRIPTION
156.8	204.15	Moderate-strong, pervasive, calcite alteration; 1-2% grey quartz veinlets; common, mild bleaching; local weak foliation at 45° to c.a., common (1-5%) graphite lenses.
171.25	174.1	20-75% graphitic sediment (2g) with 1% to locally 10% po, common soft-sediment breccia; 1-2% quartz veinlets.
174.7	181.4	Mod.-strong bleaching due to calcite alteration.
182.2	183.1	10-20% graphitic sedimentary lenses.
181.4	204.15	Weak-mod. bleaching due to calcite alt.
183.95	185.1	10-50%, grey quartz veining locally.
194.2	194.8	50%, grey quartz veining.
203.95	204.35	30%, white quartz veining.
204.15	207.55	Fine-grained chlorite.
207.55	208.35	Moderate, pervasive, Fe carbonate alteration.
208.35	216.4	Fine grained chlorite; local white quartz veining.
216.4	230.1	Weak-strong, pervasive calcite alteration; generally 1-3% quartz veining; local, pervasive Fe carb. alt.
230.1	233.45	Fine grained chlorite alt.
233.45	242.3	Weak-strong, pervasive calcite alt; 1-2% quartz veining; local Fe carb. alt., local, minor chlorite.
242.3	243.1	Mod. pervasive Fe carb. alt. with 3-5%, grey quartz veining.

FROM	TO	DESCRIPTION			
		244.9	-	247.5	Weak-mod., pervasive Fe carb. alteration.
		248.8	-	249.5	10-80% white quartz veining.247.5-289.7Weak-strong, pervasive calcite alteration; local bleaching; common, weak-moderate pervasive, buff Fe carb. alteration; 1-3%, random, grey quartz veining.
		289.7	-	291.25	20 - 100% graphitic sedimentary interflow (2g); 2-10% blebs, dissems. and lenses of po. foliation at 50° to c.a.
		291.25	-	305.25	Mod.-strong, pervasive calcite alteration; common bleaching local sections with weak-moderate, pervasive, buff Fe carb. alteration; common lenses, patches and narrow beds of graphitic sediment with 1-10% po.
		294.35	-	318.6	Bleached section due to carb. alteration.
		295.9	-	296.7	25%-100% graphitic sediment; 1-10% po (2g).
		299.5	-	300.45	20%-100% graphitic sediment, 1-5% po.
		304.4	-	305.25	Calcite veinlet stockwork.
		305.25	-	318.6	L. greenish-grey, bleached appearance; variable, pervasive calcite alteration; common, minor silicification; common, fine-grained chlorite; 3-20%, random calcite veinlets; 1-2%, random, white-grey-purple quartz veinlets.
		Indistinct Contact			
318.6	320.65	Ultramafic rock, probable flow; (6c); totally altered to talc and minor carbonate, d. grey, fine-grained (<1 mm), soft, massive.			
		Sharp contact at 45° to c.a.			

FROM	TO	DESCRIPTION
320.65	407.65	Intermediate flows (2d,2e); similar description to 21.3-318.6; local foliation at 50° to c.a.
		320.65 - 354.9 Weak-strong, pervasive carbonate alteration; generally calcite but locally Fe carb. especially associated with quartz veining; local white-grey quartz veining.
		323.5 - 332.5 Mod.-well developed foliation at 50° to c.a., deformation zone (D.Z.); 326.4 - 331.0: 10-60%, random, white-l.grey quartz veining with extensive, strong, pervasive, Fe carb. alt.; epidote in veins; 2-5% graphitic lenses; local, 1-2% py.; Fe carb. alt. continues as blebs to 335.5.
		340.1 - 342.2 5-20% Fe carb. alt. as d. brown blebs and patches; 2-3% quartz veins.
		340.1 - 354.9 Common, l. green colour due to fine gr. chlorite-epidote-carbonate.
		347.1 - 349.85 Minor deformation zone (D.Z.); well dev. foliation at 55° to c.a.; sericite and calcite alteration; local sedimentary lenses; 2-3% quartz veining.
		354.9 - 407.65 Generally unaltered; local, white-pink, random, silica veinlets; common calcite veinlets; common, fine gr., chlorite alt.; local, 1-2% po as stringers; 354.9-361.3: 5-10%, pinkish-white quartz veinlets.
		377.6 - 407.65 Occasional, random amethyst veinlets commonly with 1-3% py-po; commonly associated chlorite veinlets.
		Sharp contact at 45° to c.a.
407.65	410.2	Intermediate ash tuff (2a); medium grey, very fine grained (≤.5 mm), massive, intermediate composition.
		Sharp contact.

FROM	TO	DESCRIPTION
410.2	489.75	Intermediate flows (2d,2e); similar to previous general descriptions; generally unaltered, except common to extensive fine grained chlorite,common, random calcite veinlets, common (1-3%), random, white-grey-purple quartz veinlets, generally ≤ 1% dissem. py-po, locally to 2-3% with quartz veins.
	411.7	-413.555-10%, white-grey quartz veining with 2-3% po; local silicification.
	416.0	-419.65-20%, white-purple quartz veining with 1-3% po; common silicification.
	419.6	-429.153-10% white-purple-grey quartz veining with 1-3% po; local silicification; po locally to 10% as stringers, ≤ 1% py, occasional .5-2% chalcopyrite (cp) with po.
	434.6	-437.62-10%, random, white-purple quartz veins with 1-3% po, ≤1% py, <1% cp.
	440.2	-444.05-10%, l.-d. grey quartz veining with po and minor py and rare cp; veining generally subparallel to foliation at about 30°-45° to c.a.
	444.0	-447.2Extensive purple quartz veining and silicification with chl., epidote and 1-3% po. <1% py, local .5-1% cp.
	447.2	-479.2Relatively unaltered except very common fine-gr. chlorite; generally 1-2%, locally to 30% purple-white-l.grey quartz veining with 1-2% po., ≤ 1% py and occasional ≤ 1% cp; local, pervasive calcite alt; local silicification.
	451.7	-452.0530% purple quartz veining.
	479.2	-489.75Mod.-strong, pervasive calcite alt.; common, fine grained chlorite alt.; 1-10%, veinlets and stringers of d. brown, fibrous actindite; 1-2% quartz veins.

FROM	TO	DESCRIPTION
		Sharp contact at 60° to c.a.
489.75	502.85	Interbedded sequence of graphitic sedimentary rocks (5f) and argillites (5d); graphitic argillites black, fine grained (<.5 mm), well developed foliation at 55° to c.a., composed of graphite and 2-50%, dissem., blebbed and nodular py, interbedded with medium-dark grey argillite, fine grained (<.5 mm); pervasive calcite alteration, local buff-coloured pervasive Fe carb. alt. in argillite locally, very common, light grey quartz veining locally, particularly in graphitic sections.
		489.75 - 492.0 Argillite section.
		492.0 - 492.55 Graphitic argillite; 25%-50% py.
		492.55 - 494.4 Interbedded graphitic arg. and argillite with 5-70%, l. grey, quartz veining; 1-5% py.
		494.4 - 495.7 Mainly argillite with 5% quartz veining and 1-3% py.
		495.7 - 496.8 Graphitic argillite with 5-30% py and 20%, grey quartz veining.
		496. 8 - 497.6 Argillite with pervasive Fe carb. alt.
		497.6 - 502.85 Graphitic argillite with 2-10% py; 2-5%, grey, quartz veining.
		499.85 - 501.35 Fault Zone; badly broken core.
		Broken contact

FROM	TO	DESCRIPTION
502.85	541.5	Ultramafic flows (6c); totally altered to talc and minor carbonate; l. green-d.grey, fine grained (<.5 mm), massive, very little remnant texture except rare spinifex, no original mineralogy, common, random calcite veinlets.

503.6 - 506.4 Extremely broken section with local gouge; Fault Zone (F.Z.).

525.0 - 533.2 Common broken sections; Fault Zone (F.Z.).

Progressively less altered downsection. Some sections with some original mineralogy and spinifex texture near bottom of hole.

End of Hole 541.5 meters.

** BORSURV **

SURVEY DATA AND CALCULATED CO-ORDINATES (metres)

PROPERTY: TULLY
HOLE NO: 91-4
GRID: tully

DATE: 02/01/91-02/09/91
SURVEY BY: MCR
INSTRUMENT:

DEPTH	INCLINATION	BEARING	EASTINGS	NORTHINGS	ELEVATION
0.00	-60.00	180.00	1320.000	190.000	0.000
105.00	-60.00	182.50	1318.855	137.512	-90.933
162.25<--	-58.50	182.00	1317.706	108.264	-140.134
219.50	-57.00	181.50	1316.773	77.728	-188.552
317.60	-56.00	180.00	1316.064	23.588	-270.356
434.60	-55.00	177.50	1317.510	-42.666	-366.779
541.50	-54.00	177.00	1320.488	-104.671	-453.808

SUMMA LITHO LOG
PROPERTY: TULLY
HOLE No.: 91-4

LITHO UNIT	DEPTH	EASTINGS	NORTHINGS	ELEVATION	CORE ANGLE
OVB	21.30	1319.77	179.35	-18.45	none
2D,2E	36.20	1319.61	171.90	-31.35	50.0
QV,PY	43.00	1319.53	168.51	-37.24	none
2D,2E	75.00	1319.18	152.51	-64.95	50.0
QV,PY	86.10	1319.06	146.96	-74.56	none
2D,2E	102.95	1318.88	138.54	-89.16	50.0
QV,PY	103.55	1318.87	138.24	-89.68	none
2D,2E	156.80	1317.81	111.05	-135.45	50.0
CARB,QTZ	171.25	1317.56	103.46	-147.75	none
2G,PO	174.10	1317.51	101.94	-150.16	none
CARB,QTZ	204.15	1317.02	85.92	-175.57	none
2D,2E	247.50	1316.57	62.28	-211.90	50.0
2D,2E,CARB	289.70	1316.27	38.99	-247.09	none
2D,2E	295.90	1316.22	35.56	-252.26	50.0
2G,PO	296.70	1316.21	35.12	-252.93	none
2D,2E	299.50	1316.19	33.58	-255.26	50.0
2G,PO	300.45	1316.19	33.05	-256.05	none
2D,2E	318.60	1316.08	23.02	-271.18	50.0
6C,TALC	320.65	1316.10	21.86	-272.87	none
2D,2E	323.50	1316.14	20.25	-275.22	50.0
2D,2E,QV	332.50	1316.25	15.15	-282.64	none
2D,2E	347.10	1316.43	6.88	-294.67	50.0
2D,2E,D.Z.	349.85	1316.46	5.33	-296.93	none
2D,2E	354.90	1316.52	2.47	-301.10	50.0
2D,QV,PY,PO	407.00	1317.17	-27.04	-344.03	none

SUMMA[redacted] LITHO LOG
PROPERTY: TULLY
HOLE No.: 91-4

LITHO UNIT	DEPTH	EASTINGS	NORTHINGS	ELEVATION	CORE ANGLE
2D,2E	407.65	1317.18	-27.40	-344.57	50.0
2A	410.20	1317.21	-28.85	-346.67	none
2D,2E	411.70	1317.23	-29.70	-347.91	none
2D,2E,QV,PO	413.55	1317.25	-30.75	-349.43	none
2D,2E	416.00	1317.28	-32.13	-351.45	none
2D,2E,QV,PO	419.60	1317.32	-34.17	-354.42	none
2D,2E	434.60	1317.51	-42.67	-366.78	none
QV,PO,PY,CP	437.60	1317.59	-44.41	-369.22	none
2D,2E	444.00	1317.77	-48.12	-374.43	none
QV,PO,PY,CP	447.20	1317.86	-49.97	-377.04	none
2D,2E,PY	489.75	1319.05	-74.65	-411.68	none
2G,5D	492.00	1319.11	-75.96	-413.51	55.0
2G,5D,PY	494.40	1319.18	-77.35	-415.46	none
2G,5D	495.70	1319.21	-78.11	-416.52	55.0
2G,5D,QV,PY	496.80	1319.24	-78.74	-417.42	none
2G,5D	499.85	1319.33	-80.51	-419.90	55.0
2G,5D,F.Z.	501.35	1319.37	-81.38	-421.12	none
2G,5D	502.85	1319.41	-82.25	-422.34	55.0
6C,TALC	503.60	1319.43	-82.69	-422.95	none
6C,F.Z.	506.40	1319.51	-84.31	-425.23	none
6C,TALC	525.00	1320.03	-95.10	-440.37	none
6C,F.Z.	533.20	1320.26	-99.86	-447.05	none
6C,TALC	541.50	1320.49	-104.67	-453.81	none

‡ ** BORSURV **

ASSAY LOG

PROPERTY: TULLY

HOLE No.: 91-4

FROM	TO	WIDTH	AU OZ/T	AU G/T
27.75	29.25	1.50	NIL	NIL
36.20	37.70	1.50	NIL	NIL
37.70	39.20	1.50	NIL	NIL
39.20	40.70	1.50	NIL	NIL
40.70	42.20	1.50	NIL	NIL
42.20	43.70	1.50	NIL	NIL
43.70	45.20	1.50	NIL	NIL
45.20	46.70	1.50	NIL	NIL
46.70	48.20	1.50	NIL	0.010
48.20	49.70	1.50	NIL	NIL
53.10	54.60	1.50	NIL	NIL
56.70	58.20	1.50	NIL	NIL
62.80	64.30	1.50	NIL	NIL
67.30	68.80	1.50	NIL	NIL
75.00	76.50	1.50	NIL	NIL
76.50	78.00	1.50	NIL	NIL
78.00	79.50	1.50	NIL	NIL
79.50	81.00	1.50	NIL	NIL
81.00	82.50	1.50	NIL	NIL
82.50	84.00	1.50	NIL	NIL
84.00	85.50	1.50	NIL	0.010
85.50	87.00	1.50	NIL	NIL
89.25	90.75	1.50	NIL	NIL
97.95	99.45	1.50	NIL	NIL
102.40	103.90	1.50	NIL	0.020
105.85	107.35	1.50	NIL	NIL
109.70	111.20	1.50	NIL	NIL
118.80	120.30	1.50	NIL	NIL
129.15	130.65	1.50	NIL	NIL
136.05	137.55	1.50	NIL	NIL
139.70	141.20	1.50	NIL	NIL
141.20	142.70	1.50	NIL	NIL
142.70	144.20	1.50	NIL	NIL
144.20	145.70	1.50	NIL	NIL
145.70	147.20	1.50	NIL	NIL
147.20	148.70	1.50	NIL	NIL
148.70	150.00	1.30	NIL	NIL
150.00	151.30	1.30	NIL	NIL
151.30	152.80	1.50	NIL	NIL
152.80	154.30	1.50	NIL	NIL
154.30	155.80	1.50	NIL	NIL
158.70	160.20	1.50	NIL	NIL
160.20	161.70	1.50	NIL	NIL
161.70	163.20	1.50	NIL	NIL
171.25	172.75	1.50	NIL	0.010
172.75	174.25	1.50	NIL	0.010
182.00	183.50	1.50	NIL	NIL
183.50	185.00	1.50	NIL	NIL
185.00	186.50	1.50	NIL	NIL
189.10	190.60	1.50	NIL	NIL

PROPERTY: TULLY
HOLE No.: 91-4

FROM	TO	WIDTH	AU OZ/T	AU G/T
193.50	195.00	1.50	NIL	NIL
195.00	196.50	1.50	NIL	NIL
203.95	205.45	1.50	NIL	NIL
207.50	208.50	1.00	NIL	NIL
209.30	210.90	1.60	NIL	NIL
218.60	220.10	1.50	NIL	NIL
222.20	223.70	1.50	NIL	NIL

** BORSURV **

SURVEY DATA AND CALCULATED CO-ORDINATES (metres)

PROPERTY: TULLY
HOLE NO: 91-5
GRID: TULLY

DATE:
SURVEY BY:
INSTRUMENT: TROPO

DEPTH	INCLINATION	BEARING	EASTINGS	NORTHINGS	ELEVATION
0.00	-65.00	180.00	1560.000	300.000	0.000
100.00	-63.00	180.00	1560.000	256.163	-89.879
200.00	-61.00	180.00	1560.000	209.216	-178.174
300.00	-59.00	180.00	1560.000	159.216	-264.777
400.00	-57.00	180.00	1560.000	106.224	-349.582
500.00	-55.00	180.00	1560.000	50.305	-432.485
550.00	-55.00	180.00	1560.000	21.626	-473.443

SUMMARY LITHO LOG
PROPERTY: TULLY
HOLE No.: 91-5

LITHO UNIT	DEPTH	EASTINGS	NORTHINGS	ELEVATION	CORE ANGLE
O.B.	12.00	1560.00	294.74	-10.79	none
2D	273.00	1560.00	172.72	-241.39	none
2G	278.00	1560.00	170.22	-245.72	none
2D,A	385.00	1560.00	114.17	-336.86	none
2G	388.00	1560.00	112.58	-339.40	none
2D,A	475.00	1560.00	64.28	-411.76	none
2H	480.00	1560.00	61.49	-415.90	none
2D	492.00	1560.00	54.78	-425.85	none
6C	550.00	1560.00	21.63	-473.44	none

** BORSURV **

SURVEY DATA AND CALCULATED CO-ORDINATES (metres)

PROPERTY: TULLY
HOLE NO: 91-6
GRID: TULLY

DATE: FEB 1991
SURVEY BY:
INSTRUMENT: TROPARI

DEPTH	INCLINATION	BEARING	EASTINGS	NORTHINGS	ELEVATION
0.00	-65.00	180.00	1480.000	400.000	0.000
100.00	-64.00	180.00	1480.000	356.949	-90.259
200.00	-63.00	180.00	1480.000	312.329	-179.752
300.00	-62.00	180.00	1480.000	266.154	-268.453
400.00	-60.00	180.00	1480.000	217.673	-355.915
500.00	-58.00	180.00	1480.000	166.169	-441.632
600.00	-56.00	180.00	1480.000	111.706	-525.499
700.00	-54.00	180.00	1480.000	54.348	-607.414
800.00	-52.00	180.00	1480.000	-5.834	-687.278

SUMMARY LITHO LOG
PROPERTY: TULLY
HOLE No.: 91-6

LITHO UNIT	DEPTH	EASTINGS	NORTHINGS	ELEVATION	CORE ANGLE
O.B.	30.00	1480.00	387.08	-27.08	none
6A,C	129.00	1480.00	344.01	-116.21	none
2A,D	385.00	1480.00	224.95	-342.80	none
2A,G	387.00	1480.00	223.98	-344.54	none
2A,D	572.00	1480.00	126.96	-502.02	none
2A,G	577.00	1480.00	124.23	-506.21	none
2A,D	655.00	1480.00	80.16	-570.55	none
2H	659.00	1480.00	77.86	-573.83	none
2D,E	715.00	1480.00	45.32	-619.39	none
2H	730.00	1480.00	36.29	-631.37	none
2D	745.00	1480.00	27.27	-643.35	none
6C	800.00	1480.00	-5.83	-687.28	none

APPENDIX 2

Swastika Laboratories

A Division of Assayers Corporation Ltd.

Assaying - Consulting - Representation

Established 1928

1W-2132-RA1

Assay Certificate

Date: JAN-25-91

Company: A.C.A. HOWE INTERNATIONAL
Project: CYPRUS GOLD
Attn: MR. A. JACKSON/MR. K. JOHNSON

Copy 1. 1810-1055 W.HASTINGS ST.VANCOUVER B.C.
2. VGE 2E9 FAX 604-685-3635 & 416-368-2579
3. 1400-22 FRONT ST.W. TORONTO ONT.M5J 1C4

We hereby certify the following Assay of 38 CORE samples submitted JAN-23-91 by MURRAY C. ROGERS.

Sample Number	Au g/tonne	Au oz/ton	Au check g/tonne	Au check oz/ton	Au 2nd g/tonne	Au 2nd oz/ton
7001	Nil					
7002	Nil					
7003	Nil					
7004	Nil					
7005	0.01	.001				
7006	0.04	.001	0.05	.001		
7007	Nil					
7008	Nil					
7009	Nil					
7010	Nil					
7011	Nil					
7012	Nil					
7013	0.17	.005				
7014	0.19	.006				
7015	0.27	.008	0.47	.014		
7016	0.16	.005				
7017	0.07	.002				
7018	0.33	.010				
7019	0.07	.002				
7020	0.02	.001				
7021	0.95	.028				
7022	3.47	.101	3.35	.098	3.60	.105
7023	0.02	.001				
7024	0.03	.001				
7025	0.04	.001				
7026	Nil					
7027	Nil					
7028	Nil					
9814	0.13	.004				
9815	Nil					

Certified by Donna Gardner

P.O. Box 10, Swastika, Ontario P0K 1T0
Telephone (705) 642-3244. FAX (705)642-3300

Swastika Laboratories

A Division of Assayers Corporation Ltd.

Assaying - Consulting - Representation

Established 1928

1W-2132-RA1

Assay Certificate

Company: A.C.A. HOWE INTERNATIONAL
Project: CYPRUS GOLD
Attn: MR. A. JACKSON/MR. K. JOHNSON

Date: JAN-25-91

Copy 1. 1810-1055 W.HASTINGS ST.VANCOUVER B.C.
2. VGE 2E9 FAX 604-685-3635 & 416-368-2579
3. 1400-22 FRONT ST.W. TORONTO ONT.M5J 1C4

We hereby certify the following Assay of 38 CORE samples submitted JAN-23-91 by MURRAY C. ROGERS.

Sample Number	Au g/tonne	Au oz/ton	Au check g/tonne	Au check oz/ton	Au 2nd g/tonne	Au 2nd oz/ton
9816	0.15	.004				
9817	0.73	.021				
9818	0.04	.001				
9819	Nil					
9820	Nil					
9821	0.62	.018	0.42	.012		
9822	0.03	.001				
9823	Nil					

Certified by Donna Gardner

P.O. Box 10, Swastika, Ontario P0K 1T0
Telephone (705) 642-3244. FAX (705) 642-3300

Swastika Laboratories

A Division of Assayers Corporation Ltd.

Assaying - Consulting - Representation

Established 1928

Assay Certificate

1W-2154-RA1

Company: A.C.A. HOWE INTERNATIONAL
Project: CYPRUS GOLD
Attn: MR. A. JACKSON/MR. K. JOHNSON

Date: JAN-31-91

Copy 1. 1810-1055 W.HASTINGS ST.VANCOUVER B.C.
2. VGE 2E9 FAX 604-685-3635 & 416-368-2579
3. 1400-22 FRONT ST.W.TORONTO ONT M5J 1C4

We hereby certify the following Assay of 53 ROCK samples submitted JAN-25-91 by MURRAY ROGERS.

Sample Number	Au g/tonne	Au check g/tonne
7029	Nil	
7030	Nil	
7031	0.01	
7032	1.07	1.15
7033	Nil	
7034	Nil	
7035	Nil	
7036	0.14	
7037	0.02	
7038	Nil	
7039	Nil	
7040	0.01	
7041	0.06	
7042	0.01	
7043	0.01	
7044	Nil	
7045	Nil	
7046	0.62	0.50
7047	0.01	
7048	0.07	
7049	Nil	
7050	0.01	
7051	Nil	
7052	0.01	
7053	0.03	
7054	0.04	
7055	0.04	
7056	0.01	
7057	0.02	0.03
7058	0.01	

Certified by R Landin

P.O. Box 10, Swastika, Ontario P0K 1T0
Telephone (705) 642-3244. FAX (705) 642-3300

Swastika Laboratories

A Division of Assayers Corporation Ltd.

Assaying - Consulting - Representation

Established 1928

Assay Certificate

1W-2154-RA1

Company: A.C.A. HOWE INTERNATIONAL
Project: CYPRUS GOLD
Attn: MR. A. JACKSON/MR. K. JOHNSON

Date: JAN-31-91

Copy 1. 1810-1055 W.HASTINGS ST.VANCOUVER B.C.
2. VGE 2E9 FAX 604-685-3635 & 416-368-2579
3. 1400-22 FRONT ST.W.TORONTO ONT M5J 1C4

We hereby certify the following Assay of 53 ROCK samples submitted JAN-25-91 by MURRAY ROGERS.

Sample Number	Au g/tonne	Au check g/tonne
7059	0.01	
7060	0.01	
7061	0.01	
7062	0.01	
7063	0.01	
7064	0.01	
7065	0.01	
7066	0.01	
7067	0.01	
7068	0.02	
7069	0.01	0.01
7070	0.02	
7071	0.01	
7072	Nil	
7073	Nil	
7074	Nil	
7075	Nil	
7076	Nil	
7077	Nil	
7078	Nil	
7079	Nil	
7080	Nil	
7081	Nil	Nil

Certified by R Candini

P.O. Box 10, Swastika, Ontario P0K 1T0
Telephone (705) 642-3244. FAX (705) 642-3300

Swastika Laboratories

A Division of Assayers Corporation Ltd.

Assaying - Consulting - Representation

Established 1928

Assay Certificate

1W-2170-RA1

Company: A.C.A. HOWE INTERNATIONAL
Project: CYPRUS GOLD
Attn: MR. A. JACKSON/ MR. K. JOHNSON

Date: FEB-01-91

Copy 1. 1810-1055 W.HASTINGS ST.VANCOUVER, B.C.
2. VGE 2E9 FAX 604-685-3635 & 416-368-2579
3. 1400-22 FRONT ST.W.TORONTO,ONT M5J 1C4

We hereby certify the following Assay of 35 ROCK samples submitted JAN-28-91 by MURRAY ROGERS.

Sample Number	Au g/tonne	Au check g/tonne	Au 2nd g/tonne	Au check g/tonne	As ppm
7082	Nil				
7083	0.01				
7084	Nil				
7085	Nil				
7086	0.06	0.07			
7087	0.04				
7088	0.07				
7089	0.20				
7090	3.70				
7091	8.30	8.23	7.47	7.34	
7092	4.47				
7093	0.71				
7094	5.55	5.42			
7095	0.01				
7096	Nil				
7097	0.07				
7098	0.01				
7099	0.13				
7100	Nil				
7101	Nil				
7102	Nil				
7103	Nil				
7104	Nil				
7105	0.01				
7106	0.01				
7107	0.37	0.36			
7108	0.25				
7109	0.01				
7110	Nil				
7111	Nil				

Arsenic results to follow.

Certified by R Landa

P.O. Box 10, Swastika, Ontario P0K 1T0
Telephone (705) 642-3244. FAX (705) 642-3300

Established 1928

Swastika Laboratories

A Division of Assayers Corporation Ltd.

Assaying - Consulting - Representation

Assay Certificate

1W-2170-RA1

Company: A.C.A. HOWE INTERNATIONAL
Project: CYPRUS GOLD
Attn: MR. A. JACKSON/ MR. K. JOHNSON

Date: FEB-01-91

Copy 1. 1810-1055 W.HASTINGS ST.VANCOUVER, B.C.
2. VGE 2E9 FAX 604-685-3635 & 416-368-2579
3. 1400-22 FRONT ST.W.TORONTO,ONT M5J 1C4

We hereby certify the following Assay of 35 ROCK samples submitted JAN-28-91 by MURRAY ROGERS.

Sample Number	Au g/tonne	Au check g/tonne	Au 2nd g/tonne	Au check g/tonne	As ppm
7112	Nil				
7113	Nil				
7114	Nil				
7115	Nil				
7116 not rec'd					

Arsenic results to follow.

Certified by R Clarke

P.O. Box 10, Swastika, Ontario P0K 1T0
Telephone (705) 642-3244. FAX (705)642-3300

Swastika Laboratories

A Division of Assayers Corporation Ltd.

Assaying - Consulting - Representation

Established 1928

Assay Certificate

1W-2213-RA1

Company: A.C.A. HOWE INTERNATIONAL
Project: CYPRUS GOLD
Attn: K. JOHNSON/A. JACKSON

Date: FEB-06-91

Copy 1. 1810-1055 W. HASTINGS ST.VANCOUVER B.C.
2. FAX 604-685-3635 & 416-368-2579
3. 1400-22 FRONT ST.W.TORONTO, ONT.

We hereby certify the following Assay of 97 ROCK samples submitted FEB-04-91 by MURRAY ROGERS.

Sample Number	Au g/tonne	Au oz/ton	Au check g/tonne	Au check oz/ton	Au 2nd g/tonne	Au 2nd oz/ton	As ppm
7117	Nil						
7118	Nil						
7119	Nil						
7120	Nil						
7121	0.01	.001					
7122	Nil						
7123	Nil						
7124	Nil						
7125	Nil						
7126	0.01	.001					
7127	Nil						
7128	Nil						
7129	Nil						
7130	Nil						
7131	0.09	.003	0.13	.004			
7132	0.05	.001					
7133	Nil						
7134	Nil						
7135	0.25	.007	0.24	.007			
7136	Nil						
7137	Nil						
7138	Nil						
7139	Nil						
7140	Nil						
7141	Nil						
7142	Nil						
7143	Nil						
7144	Nil						
7145	Nil						
7146	Nil						

Certified by Donna Gardiner

P.O. Box 10, Swastika, Ontario P0K 1T0
Telephone (705) 642-3244, FAX (705)642-3300

Swastika Laboratories
A Division of Assayers Corporation Ltd.
Established 1928
· Assaying - Consulting - Representation

Assay Certificate

1W-2213-RA1

Company: A.C.A. HOWE INTERNATIONAL
Project: CYPRUS GOLD
Attn: K. JOHNSON/A. JACKSON

Date: FEB-06-91
Copy 1. 1810-1055 W. HASTINGS ST.VANCOUVER B.C.
2. FAX 604-685-3635 & 416-368-2579
3. 1400-22 FRONT ST.W.TORONTO, ONT.

We hereby certify the following Assay of 97 ROCK samples submitted FEB-04-91 by MURRAY ROGERS.

Sample Number	Au g/tonne	Au oz/ton	Au check g/tonne	Au check oz/ton	Au 2nd g/tonne	Au 2nd oz/ton	As ppm
7147	Nil						
7148	Nil						
7149	Nil						
7150	0.02	.001					
7151	Nil						
7152	Nil						
7153	Nil						
7154	Nil						
7155	0.09	.003	0.07	.002			
7156	0.04	.001					
7157	0.08	.002					
7158	Nil						
7159	Nil						
7160	Nil						
7161	0.05	.001					
7162	Nil						
7163	0.03	.001					
7164	0.07	.002					
7165	0.32	.009					
7166	0.33	.010					
7167	0.05	.001					
7168	0.33	.010	0.41	.012			
7169	0.02	.001					
7170	Nil						
7171	Nil						
7172	Nil						
7173	Nil						
7174	Nil						
7175	Nil						
7176	Nil						

Certified by Donna Gardner

P.O. Box 10, Swastika, Ontario P0K 1T0
Telephone (705) 642-3244. FAX (705) 642-3300

Swastika Laboratories

Established 1928

A Division of Assayers Corporation Ltd.

Assaying - Consulting - Representation

Assay Certificate

1W-2213-RA1

Company: A.C.A. HOWE INTERNATIONAL
Project: CYPRUS GOLD
Attn: K. JOHNSON/A. JACKSON

Date: FEB-06-91

Copy 1. 1810-1055 W. HASTINGS ST.VANCOUVER B.C.
2. FAX 604-685-3635 & 416-368-2579
3. 1400-22 FRONT ST.W.TORONTO, ONT.

We hereby certify the following Assay of 97 ROCK samples submitted FEB-04-91 by MURRAY ROGERS.

Sample Number	Au g/tonne	Au oz/ton	Au check g/tonne	Au check oz/ton	Au 2nd g/tonne	Au 2nd oz/ton	As ppm
7177	Nil						
7178	0.03	.001					
7179	3.77	.110					
7180	10.01	.292	9.74	.284			
7181	0.57	.017					
7182	0.55	.016					
7183	10.97	.320	10.63	.310	10.77	.314	
7184	0.02	.001					
7185	Nil						
7186	0.02	.001					
7187	Nil						
7188	0.04	.001					
7189	0.04	.001					
7190	Nil						
7191	Nil						
7192	Nil						
7193	Nil						
7194	Nil						
7195	Nil						
7196	0.25	.007					
7197	0.04	.001					
7198	1.51	.044					
7199	3.02	.088	2.95	.086			
7200	0.11	.003					
7201	0.03	.001					
7202	Nil						
7203	Nil						
7204	Nil						
7205	Nil						
7206	Nil						

Certified by Donna Gardner

P.O. Box 10, Swastika, Ontario P0K 1T0
Telephone (705) 642-3244 FAX (705) 642-3300

Established 1928

Swastika Laboratories

A Division of Assayers Corporation Ltd.

Assaying - Consulting - Representation

Assay Certificate

1W-2213-RA1

Company: A.C.A. HOWE INTERNATIONAL
Project: CYPRUS GOLD
Attn: K. JOHNSON/A. JACKSON

Date: FEB-06-91

Copy 1. 1810-1055 W. HASTINGS ST.VANCOUVER B.C.
2. FAX 604-685-3635 & 416-368-2579
3. 1400-22 FRONT ST.W.TORONTO, ONT.

We hereby certify the following Assay of 97 ROCK samples submitted FEB-04-91 by MURRAY ROGERS.

Sample Number	Au g/tonne	Au oz/ton	Au check g/tonne	Au check oz/ton	Au 2nd g/tonne	Au 2nd oz/ton	As ppm
7207	Nil						
7208	Nil		Nil				
7209	Nil						
7210	Nil						
7211	Nil						
7212	Nil						
7213	Nil						

Certified by Donna Gardner

P.O. Box 10, Swastika, Ontario P0K 1T0
Telephone (705) 642-3244. FAX (705) 642-3300

Swastika Laboratories

A Division of Assayers Corporation Ltd.

Assaying - Consulting - Representation

Established 1928

Assay Certificate

1W-2245-RA1

Company: A.C.A. HOWE INTERNATIONAL

Date: FEB-12-91

Project:

Attn:

Copy 1. VANCOUVER
2. TORONTO

We hereby certify the following Assay of 59 ROCK samples submitted FEB-06-91 by ,

Sample Number	Au ppb	Au check ppb
07214	Nil	Nil
07215	Nil	
07216	Nil	
07217	Nil	
07218	Nil	
07219	Nil	
07220	Nil	
07221	Nil	
07222	Nil	
07223	Nil	
07224	Nil	
07225	10	Nil
07226	Nil	
07227	Nil	
07228	Nil	
07229	Nil	
07230	Nil	
07231	Nil	
07232	Nil	
07233	Nil	
07234	Nil	
07235	10	
07236	Nil	
07237	10	
07238	Nil	
07239	Nil	
07240	Nil	
07241	315	278
07242	Nil	
07243	65	

Certified by Donna Gardner

P.O. Box 10, Swastika, Ontario P0K 1T0
Telephone (705) 642-3244, FAX (705) 642-3300

Established 1928

Swastika Laboratories

A Division of Assayers Corporation Ltd.

Assaying - Consulting - Representation

Assay Certificate

1W-2245-RA1

Company: A.C.A. HOWE INTERNATIONAL

Project:

Attn:

Date: FEB-12-91

Copy 1. VANCOUVER
2. TORONTO

We hereby certify the following Assay of 59 ROCK samples submitted FEB-06-91 by .

Sample Number	Au ppb	Au check ppb
07244	Nil	
07245	34	
07246	48	
07247	864	
07248	1395	1378
07249	1272	1347
07250	Nil	
07251	Nil	
07252	Nil	
07253	Nil	
07254	Nil	
07255	41	
07256	Nil	
07257	Nil	
07258	Nil	
07259	243	257
07260	Nil	
07261	Nil	
07262	Nil	
07263	Nil	
07264	Nil	
07265	Nil	
07266	Nil	
07267	Nil	
07268	34	
07269	147	117
07270	137	
07272	103	
07273	Nil	

Certified by Donna Gardner

P.O. Box 10, Swastika, Ontario P0K 1T0
Telephone (705) 642-3244. FAX (705) 642-3300

Telephone (705) 642-3244. FAX (705) 642-3300

A Division of Assayers Corporation Ltd.

Established 1928

Assaying - Consulting - Representation

Assay Certificate

1W-2265-RA1

Company: A.C.A. HOWE INTERNATIONAL
Project: CYPRUS GOLD
Attn: K. JOHNSON/A. JACKSON

Date: FEB-13-91

Copy 1. 1810-1055 W. HASTINGS ST.VANCOUVER B.C.
2. FAX 604-685-3635 & 416-368-2579
3. 1400-22 FRONT ST.W. TORONTO, ONT.

We hereby certify the following Assay of 75 SPLIT CORE samples submitted FEB-07-91 by .

Sample Number	Au ppb	Au check ppb	As ppm
7274	Nil		
7275	Nil		
7276	Nil		
7277	254	206	
7278	190		
7279	130		
7280	Nil		
7281	Nil		
7282	Nil		
7283	24		
7284	Nil		
7285	10		
7286	219	240	
7287	99		
7288	Nil		
7289	Nil		
7290	Nil		
7291	Nil		
7292	Nil		
7293	Nil		
7294	41		
7295	744		
7296	1330	1029	
7297	780		
7298	31		
7299	Nil		
7300	Nil		
7558	Nil		
7559	Nil		
7560	Nil		

Certified by Donna Gardner

P.O. Box 10, Swastika, Ontario P0K 1T0
Telephone (705) 642-3244. FAX (705) 642-3300

Swastika Laboratories

Established 1928

A Division of Assayers Corporation Ltd.

Assaying - Consulting - Representation

Assay Certificate

1W-2265-RA1

Company: A.C.A. HOWE INTERNATIONAL
Project: CYPRUS GOLD
Attn: K. JOHNSON/A. JACKSON

Date: FEB-13-91

Copy 1. 1810-1055 W. HASTINGS ST.VANCOUVER B.C.
2. FAX 604-685-3635 & 416-368-2579
3. 1400-22 FRONT ST.W. TORONTO, ONT.

We hereby certify the following Assay of 75 SPLIT CORE samples submitted FEB-07-91 by .

Sample Number	Au ppb	Au check ppb	As ppm
7561	Nil		
7562	Nil		
7563	Nil		
7564	Nil		
7565	Nil		
7566	Nil		
7567	Nil		
7568	Nil		
7569	Nil		
7570	7	Nil	
7571	Nil		
7572	Nil		
7573	Nil		
7574	Nil		
7575	Nil		
7701	Nil		
7702	Nil		
7703	14		
7704	Nil		
7705	Nil		
7706	Nil		
7707	62		
7708	Nil		
7709	Nil		
7710	17		
7711	1865	1875	
7712	819		
7713	730		
7714	1474		
7715	38		

Certified by Donna Gardner

P.O. Box 10, Swastika, Ontario P0K 1T0
Telephone (705) 642-3244. FAX (705) 642-3300

Swastika Laboratories

A Division of Assayers Corporation Ltd.

Assaying - Consulting - Representation

Established 1928

Assay Certificate

1W-2265-RA1

Company: A.C.A. HOWE INTERNATIONAL
Project: CYPRUS GOLD
Attn: K. JOHNSON/A. JACKSON

Date: FEB-13-91

Copy 1. 1810-1055 W. HASTINGS ST.VANCOUVER B.C.
2. FAX 604-685-3635 & 416-368-2579
3. 1400-22 FRONT ST.W. TORONTO, ONT.

We hereby certify the following Assay of 75 SPLIT CORE samples submitted FEB-07-91 by .

Sample Number	Au ppb	Au check ppb	As ppm
7716	Nil		
7717	Nil		
7718	Nil		
7719	7337	7543	6789
7720	823		
7721	127		
7722	3158	2949	
7723	Nil		
7724	600		
7725	213		
7726	874		
7727	1920	2191	
7728	Nil		
7729	Nil		
7730	Nil		

Certified by Donna Gardner

P.O. Box 10, Swastika, Ontario P0K 1T0
Telephone (705) 642-3244, FAX (705) 642-3300

Swastika Laboratories

A Division of Assayers Corporation Ltd.

Assaying - Consulting - Representation

Established 1928

Assay Certificate

1W-2246-RA1

Company: A.C.A HOWE INTERNATIONAL

Date: FEB-11-91

Project:

Attn:

Copy 1. VANCOUVER
2. TORONTO

We hereby certify the following Assay of 58 ROCK samples submitted FEB-06-91 by .

Sample Number	Au g/tonne	Au oz/ton	Au check g/tonne	Au check oz/ton
07501	Nil			
07502	Nil			
07503	Nil			
07504	Nil			
07505	Nil			
07506	Nil		Nil	
07507	Nil			
07508	Nil			
07509	0.01	.001		
07510	Nil			
07511	Nil			
07512	Nil			
07513	Nil			
07514	Nil			
07515	Nil			
07516	Nil			
07517	Nil			
07518	Nil			
07519	Nil			
07520	Nil			
07521	0.01	.001	0.01	.001
07522	Nil			
07523	Nil			
07524	Nil			
07525	0.02	.001		
07526	Nil			
07527	Nil			
07528	Nil			
07529	Nil			
07530	Nil			

Certified by Donna Gardner

P.O. Box 10, Swastika, Ontario P0K 1T0
Telephone (705) 642-3244. FAX (705) 642-3300

Swastika Laboratories

A Division of Assayers Corporation Ltd.

Assaying - Consulting - Representation

Established 1928

Assay Certificate

1W-2246-RA1

Company: A.C.A HOWE INTERNATIONAL

Date: FEB-11-91

Project:

Attn:

Copy 1. VANCOUVER
2. TORONTO

We hereby certify the following Assay of 58 ROCK samples submitted FEB-06-91 by .

Sample Number	Au g/tonne	Au oz/ton	Au check g/tonne	Au check oz/ton
07531	Nil			
07532	Nil			
07533	Nil			
07534	Nil		Nil	
07535	Nil			
07536	Nil			
07537	Nil			
07538	Nil			
07539	Nil			
07540	Nil			
07541	Nil			
07542	Nil			
07543	Nil			
07544	Nil			
07545	0.01	.001		
07546	0.01	.001	0.01	.001
07547	Nil			
07548	Nil			
07549	Nil			
07550	Nil			
07551	Nil			
07552	Nil			
07553	Nil			
07554	Nil			
07555	Nil			
07556	Nil			
07557	Nil			
07271	Nil			

Certified by Donna Gardner

P.O. Box 10, Swastika, Ontario P0K 1T0
Telephone (705) 642-3244. FAX (705)642-3300

APPENDIX 3

PETROGRAPHIC DESCRIPTIONS

Submitted by: Geoplastech, Inc.
Petrography by: Barbara Murck

Client: Ken Johnson
A.C.A. Howe International, Ltd.

Locality:
Project:

Date Completed: Feb. 11, 1991

PETROGRAPHIC SUMMARY

SAMPLE No. TU-1 (core sample & polished thin section)

SUMMARY & TEXTURAL DESCRIPTION

This sample is so heavily altered - mainly sericitized and pyritized - that there is almost nothing recognizable remaining from the protolith. It could be an intensely altered intermediate volcanic or volcanic breccia, or possibly a tuffaceous or volcanogenic sediment, although the evidence is sketchy. The protolith was probably dominated by felsic minerals - there is only a small amount of chlorite and essentially no other mafic minerals in the alteration assemblage. Feldspar was definitely an important component of the protolith. Some of the relict feldspars are reasonably coarse-grained, sometimes almost euhedral, and ranging up to 1.5 mm or more, possibly remnants of original phenocrysts. There are suggestions of relict angular fragments, which could be a texture inherited from a brecciose or tuffaceous protolith, although alternatively it could be a deformational texture. The remainder of the sample is extremely fine-grained and intensely sericitized, sometimes with suggestions of layering or banding.

The sulphide assemblage is overwhelmingly dominated by pyrite, with only minor sphalerite. The pyrite occurs as masses of fine, predominantly idiomorphic cubes, which coalesce into coarser, rounded masses. Some of the coarsest masses have a nodular to almost framboidal appearance, with suggestions of concentric and radial growth zonations, speckled textures, and sawtooth overgrowth rims of fine, euhedral pyrite grains. Minor graphite was also observed, mainly concentrated in one intensely sericitized zone or band which cuts across the thin section. It is possible that this is a remnant of a band of interlayered graphitic sedimentary material, although again the evidence for this is sketchy.

The coarsest pyrite masses are typically fractured, with well-developed chalcedonic fringes developed in pressure shadows around the edges and within pulled-apart fractures. Also associated with chalcedonic material in the pressure shadows is some carbonate, and fibrous chlorite forming micaceous "beards" on the pyrite masses. The fibrous grains in the pressure shadow fringes are typically curved, indicating continued deformation.

Aside from the heavy pyritization and associated pressure shadows, the alteration assemblage is mainly characterized by intense, pervasive sericitization. In the graphitic band, this material is so fine-grained that it is more properly referred to as "micaceous" because it is very difficult to identify; it tends to be stained reddish buff-coloured, with suggestions of colloform textures. Sericite in this band is also concentrated into fine, criss-crossing, stringer-like veinlets. Carbonate is also present throughout the sample, typically in irregular masses associated with remobilized quartz. There may also have been minor recrystallization of feldspar associated with the alteration.

MINERALOGY

≈50% Opaques, consisting (in order of decreasing abundance) of:

Pyrite: overwhelmingly the dominant opaque mineral; idiomorphic to subidiomorphic grains (mostly cubes), ranging from extremely fine to 1 mm, and coalescing into much coarser, blocky to rounded masses of several mm to cm; some of the coarser masses are clearly composed of finer grains which have coalesced, sometimes creating a slightly framboidal-looking texture; other coarse pyrite masses look nodular, with concentric and/or radiating growth zonations, and sometimes a rim or corona of euhedral grains around the edge; some of the coarsest masses have been fractured and pulled apart, with pressure shadow fringes of chalcedonic-textured quartz, carbonate and chlorite, and later growth of euhedral crystals around the outer edges.

Oxide: minor; probably ilmenite; noticeably lighter and less brown in colour than the sphalerite, with distinct anisotropy; occurs in small (0.2 mm and much less), irregular masses or clusters of finer grains, does not tend to show the platy habit typical of graphite, nor the characteristic very strong bireflectance, although it is possible that minor graphite is present.

Sphalerite: accessory; very easy to miss; similar to the graphite but distinctly browner, and isotropic, with internal reflections; occurs as fine (0.1 mm and much less), irregular inclusions in pyrite; mainly honey-coloured internal reflections (rather than red) indicate a relatively iron-poor composition.

≈30% Sericite: ranges from very fine (0.2 mm), platy grains, to masses of extremely fine (e.g. 10 μ or less), essentially unidentifiable micaceous material (probably mainly sericite); some concentration of sericite into fine, stringer-type veinlets, and minor occurrence of platy sericite in micaceous pressure shadow "beards" around coarse pyrite masses; otherwise it is predominantly a heavily pervasive alteration; the sericitic material in the graphitic band mentioned above is typically stained reddish-buff, and displays a colloform-type banding.

≈7% Quartz & Quartzofeldspathic Material: occurs mainly as fibrous, chalcedonic-textured material forming well-developed pressure shadow fringes around the coarsest pyrite masses, and in pulled-apart fractures cutting these masses; some of these pressure shadow fringes are very well-developed; the fibrous grains are typically strongly curved, indicating continued deformation; associated with carbonate + chlorite; some quartz also occurs in irregular, vein-like masses, associated with carbonate and minor recrystallized feldspar; finally, there is some extremely fine-grained, essentially unidentifiable felsic material in some of the heavily sericitized portions of the sample; this is probably a mixture of very fine-grained feldspar ± quartz, inherited from the protolith.

≈5% Carbonate: clear and colourless; effervesces in cold HCl, hence at least some calcite is present; occurs in pressure shadows around coarse pyrite masses, associated with chalcedonic quartz and chlorite; carbonate also occurs as coarse (e.g. 1-1.5 mm), irregular masses, typically associated with quartz + recrystallized feldspar.

≈5% Feldspar: probably much more abundant prior to alteration; occurs as fragments of grains, and occasionally as preserved subhedral to almost euhedral grains up to 1.5 mm; only plagioclase (no alkali feldspar) was definitely identified; there also appears to have been some vein-type recrystallization of feldspar associated with the alteration, i.e. minor recrystallized albitic feldspar occurring in irregular masses with quartz and carbonate.

2-3% Chlorite: occurs mainly or exclusively as micaceous "beards", associated with fibrous quartz and carbonate, in pressure shadows around coarse, fractured pyrite masses; elongated, almost fibrous grains, with long dimensions oriented perpendicular to grain boundaries; weak to moderate pleochroism, colourless to pale green, with low, slightly anomalous interference colours.

PETROGRAPHIC SUMMARY

SAMPLE No. TU-2 (core sample & polished thin section)

SUMMARY & TEXTURAL DESCRIPTION

This is an intensely altered sample, with clear indications of pressure solution (refer to Photos 1 & 2). The alteration assemblage is dominated by a carbonate which does not effervesce in cold HCl, hence probably an iron carbonate. Extremely fine-grained sericitic material is also moderately to heavily pervasive. Veinlets and stringers criss-cross the sample. Some of the stringers are typical of pressure solution residue, marked by extremely fine-grained opaque material, with sericite and/or carbonate and/or traces of tourmaline associated.

There is very little that can be said with confidence about the protolith, except that it contained predominantly felsic minerals (e.g. feldspar and/or quartz), and was probably reasonably fine-grained.

MINERALOGY

≈40% Carbonate: no sign of effervescence in cold HCl, so it is most likely an iron carbonate; heavily pervasive, and also concentrated into cross-cutting veinlets; irregular masses, up to 0.5 mm, mostly much finer.

≈30% Quartz, Feldspar & Quartzofeldspathic Material: much of this is very fine-grained, and heavily overprinted by the carbonate-sericite alteration, therefore very difficult to identify; however, both quartz and feldspar (plagioclase) are definitely present; some identifiable quartz occurs as part of the alteration assemblage, in lenses and veinlets associated with carbonate and/or sericite and/or opaque stringers and/or pyrrhotite.

≈25% Sericite: very fine to extremely fine (0.1 mm and much less), platy, flaky and needle-like grains; moderately to heavily pervasive, and also concentrated into veinlets and stringers, associated with opaque material.

≈5% Opaques, consisting (in order of decreasing abundance) of:

Pyrite: occurs mainly as slightly poikilitic, subidiomorphic to idiomorphic cubes and siz-sided grains, sometimes with rough or jagged grain boundaries; ranges from 1 mm or slightly coarser, down to very fine, ave. ≈0.5 mm.

Pyrrhotite: slightly less abundant than pyrite; occurs as very fine, irregular inclusions in pyrite, and as coarser (0.3 mm, up to 1 mm), irregular, poikilitic masses.

Oxide: minor; tends to be extremely fine-grained (e.g. 20 μ and less), fairly evenly distributed throughout, and concentrated into trails and stringers associated with pressure solution; irregular grains (generally not platy or needle-like); grey, low reflectivity, with distinct anisotropy; internal reflections are present, which is not consistent with graphite, although it could be the result of the extremely fine grain size (i.e. an anomalous optical effect).

Chalcopyrite: trace to accessory; very fine, irregular inclusions in pyrrhotite, and as free grains.

Acc. Chlorite: very pale and weakly pleochroic, colourless to pale green, with low, slightly anomalous interference colours; small, irregular clusters of fine, platy to almsot fibrous grains; associated with sericite.

Tr. Tourmaline: very fine (e.g. 0.1 mm and less), stubby prismatic grains, closely associated with trails of opaque material marking pressure solution; strongly pleochroic, clear to brown; there may also be some cryptocrystalline (i.e. sub-microscopic) tourmaline associated with the pressure solution stringers.

PETROGRAPHIC SUMMARY

SAMPLE No. TU-3 (core sample & polished thin section)

SUMMARY & TEXTURAL DESCRIPTION

This sample, described as andesitic footwall material, is completely unlike sample TU-9 (the other footwall sample), but it is similar in many respects to the preceding sample TU-2 (refer to Photos 3 & 4). It is an intensely carbonatized sample, but with no sign of effervescence in cold HCl (hence probably an iron carbonate). The protolith, which is almost completely obscured by the alteration, appears to have been feldspathic or quartzofeldspathic, and probably relatively fine-grained. There are some discrete carbonate masses which may be pseudomorphs after originally coarser (e.g. 0.5 mm) feldspar grains. There are also some patches with an unusual texture, of reddish-brown iron carbonate apparently pseudomorphing an originally fine-grained, needle-like, felty-textured mineral, probably also feldspar.

The evidence, which is very sketchy, therefore points towards an intermediate (or possibly felsic?) volcanic rock with intense iron carbonate-dominated alteration.

MINERALOGY

≈60% Carbonate: heavily pervasive; does not effervesce in cold HCl, which suggests an iron carbonate; many grains display a reddish-brown colour in plane polarized light, which is also consistent with iron carbonate; the carbonate occurs in a number of forms: (1) heavily pervasive, fine, irregular masses; (2) discrete masses with straight edges, which could be pseudomorphs after original feldspars; (3) dark, reddish-brown, needle-like forms, which appear to be carbonate pseudomorphs after an originally acicular, fine-grained mineral, probably also feldspar; (4) cross-cutting veinlets, often associated with chlorite ± quartz.

≈35% Quartz, Feldspar & Quartzofeldspathic Material: both quartz and feldspar are present, although much of the felsic material is so fine-grained and/or so heavily altered that it is impossible to identify with certainty; the protolith appears to have been fine-grained, although there are suggestions that some coarser feldspars may once have been present; quartz in the alteration assemblage occurs in lenses and veinlets, usually associated with carbonate ± chlorite; there also may have been minor recrystallization of feldspar associated with the alteration.

2-3% Chlorite: weakly pleochroic, colourless to pale green, with very low, slightly anomalous interference colours; very fine, flaky grains; usually associated with carbonate veining.

Acc. Opaques, consisting (in order of decreasing abundance) of:

Pyrite: the occurrence of a single relatively coarse grain (1.5 mm) immediately makes this the most abundant sulphide; the coarse grain is subidiomorphic, finely poikilitic, associated with quartz veining; there are other extremely fine (e.g. 5 μ) pyrite grains scattered throughout the sample.

Sphalerite: only a few fine (e.g. 0.2 mm), irregular grains; strong red internal reflections indicates an Fe-rich composition; associated with carbonate veining; in one case, chalcopyrite, pyrite and sphalerite occur in a small cluster together.

Oxide: grey, low reflectivity, extremely fine (e.g. 5 μ), lightly scattered throughout; some grains show internal reflections, although this could be an artifact of the extremely fine grain size.

Chalcopyrite: trace; extremely fine.

Pyrrhotite(?): trace; extremely fine.

Arsenopyrite(?): trace; extremely fine.

Acc. Sericite: very fine (0.1 mm), flaky grains; associated with clusters of carbonate.

PETROGRAPHIC SUMMARY

SAMPLE No. TU-4 (core sample & polished thin section)

SUMMARY & TEXTURAL DESCRIPTION

Of the samples described so far, this one is most similar to TU-1, although there are noticeable differences between the two samples (refer to Photos 5 - 8). This sample is intensely altered, with essentially no convincing evidence as to the nature of the protolith. The thin section is dominated by roughly alternating bands of pyritic and graphitic material. The pyritic material varies from masses of very fine grains, to very coarse, blocky, fractured masses. Where it is fractured, the pyrite is associated with well-developed chalcedonic-textured quartz and carbonate in gashes and pressure shadows. The interbanded graphitic material ranges from strongly foliated but extremely fine-grained, almost sub-microscopic material, to coarser (e.g. 0.4 mm), discrete platy grains of graphite.

Aside from the chalcedonic quartz associated with fractured pyrite masses, there is clear evidence of silicification, in the form of fine criss-crossing quartz veinlets, and possibly even quartz flooding. Iron carbonate is also abundant.

MINERALOGY

≈50% Opaques, consisting (in order of decreasing abundance) of:

Graphite: in strongly foliated bands; ranges from extremely fine, almost sub-microscopic but heavily graphitic material, to discrete, relatively coarse, platy grains (individual, platy grains of 0.4 mm or more); shows the strong bireflectance and anisotropy which are characteristic of graphite; (note: this is distinctly browner, less grey than the "oxides" described in other samples, clearly identifiable as graphite; also distinctly brown by comparison with the much greyer sphalerite).

Pyrite: almost as abundant as the graphitic material; the pyrite varies from masses and clusters of extremely fine (0.05 mm and less), subidiomorphic grains, to very coarse, blocky, fractured masses; pyritic bands alternate with graphitic bands, and sometimes they are closely intergrown.

Sphalerite: accessory; slightly reddish to golden internal reflections; irregular masses.

≈35% Quartz, Feldspar & Quartzofeldspathic Material: only traces of feldspar were definitely identified, but there is quite a lot of very fine-grained to extremely fine-grained felsic material, which could include appreciable feldspar; a few very fine feldspar grains were observed in association with quartz-carbonate veining; quartz is definitely the dominant felsic mineral (occurring mainly in the

alteration assemblage), and there is clear evidence of silicification; quartz occurs in very fine, criss-crossing veinlets throughout the sample; in coarser-grained masses associated with carbonate; and in well-developed, chalcedonic-textured pressure shadows and pulled-apart gashes associated with coarse, fractured pyrite masses.

≈15% Carbonate: the lack of effervescence in cold HCl suggests an iron carbonate; heavily but unevenly pervasive; associated with pyrite masses; in gashes and veinlets, associated with graphitic material, and with chalcedonic-textured quartz.

Acc. Sericite.

Tr. Chlorite: in very fine stringers; iron-stained.

PETROGRAPHIC SUMMARY

SAMPLE No. TU-5 (core sample & polished thin section)

SUMMARY & TEXTURAL DESCRIPTION

This thin section does not contain any of the graphitic material described in TU-4, but instead is dominated by a strongly foliated alteration assemblage consisting of iron carbonate + sericite + chlorite + quartz. Aside from a few augen of relict fractured feldspar grains, there is essentially no indication as to the nature of the protolith. The foliation is strong but rough, defined mainly by anastomosing stringers of chlorite and, to a lesser extent, by sericitic stringers and lenses.

MINERALOGY

≈35% Carbonate: lack of effervescence in cold HCl suggests an iron carbonate; heavily pervasive throughout; relatively even grain size, ≈0.2-0.4 mm, with a few slightly coarser-grained lenses and bands.

≈35% Chlorite: very fine, almost fibrous, in anastomosing stringers and lenses, defining the foliation; weak pleochroism, colourless to pale green, with very low, slightly anomalous greyish-green interference colours.

≈20% Sericite: occurs in clumps, clusters and lenses of platy grains; not as strongly foliated as the chlorite; ave. grain size ≈0.3 mm and less; much of the sericite is iron-stained.

≈10% Quartz, Feldspar & Quartzofeldspathic Material: there are some augen up to 0.8 mm in length, which appear to be relict fractured feldspar grains; there are also a few lenses of quartz, and minor quartz occurs in association with carbonate lenses.

Acc. Opaques, consisting (in order of decreasing abundance) of:

Pyrite: fine subidiomorphic to irregular grains; ave. ≈0.2-0.3 mm.

Pyrrhotite: approximately the same abundance as pyrite; irregular masses, elongated parallel to foliation; ave. ≈0.2 mm, occasionally coarser.

Sphalerite: accessory; strong red internal reflections indicate an iron-rich composition; 0.3 mm and less, roughly equant grains.

Chalcopyrite: accessory to trace.

Arsenopyrite: accessory to trace; very fine, irregular grains; can be closely intergrown with pyrite ± pyrrhotite ± sphalerite.

Oxide: trace; extremely fine grain size; very lightly disseminated; low reflectivity, grey.

Pentlandite(?): trace; flame-like exsolution within pyrrhotite grains.

Tr.-Acc. Tourmaline: clusters of fine (e.g. 0.2 mm), euhedral prismatic hexagonal grains; strong colour and pleochroism, colourless to yellowish-brown, with strong colour zonation (colourless core, brown rim); the colour suggests elbaite to dravite composition, although colour in tourmalines can be quite variable and is not always a reliable indicator of composition; seems to be associated with chloritic stringers.

PETROGRAPHIC SUMMARY

SAMPLE No. TU-6 (core sample & polished thin section)

SUMMARY & TEXTURAL DESCRIPTION

This is another sample which is so intensely altered that nothing convincing remains of the protolith. The sample is dominated by an alteration assemblage consisting of an iron carbonate + an (apparently) iron-rich sericite, with less abundant chlorite. Patches of very fine-grained quartzofeldspathic material may be the only thing left of the protolith; remobilized and recrystallized quartz in veins and irregular masses also forms part of the alteration assemblage. The alteration overall is patchy and complex, with pervasively carbonatized, strongly foliated sericitic and chloritic material cut by later carbonate veins, which are in turn cut by foliated sericitic material. The carbonate veins, which range from semi-conformable to cross-cutting, show open-space-filling textures, such as comb structure with quartz running along the centerline. The intensely sericitized and chloritized material shows evidence of pressure solution.

The sulphide assemblage in this sample differs from those previously described, in the lack of pyrite, the dominance of pyrrhotite, and the presence of appreciable arsenopyrite. The pyrrhotite, which is by far the dominant sulphide, occurs as irregular, poikilitic lenses, elongated parallel to the banding or foliation. Arsenopyrite typically occurs as euhedral, rhomb-shaped grains, included in pyrrhotite masses.

MINERALOGY

≈45% Carbonate: no effervescence in cold HCl, suggests an iron carbonate; finely and intensely pervasive, closely associated with sericitic and chloritic material; also occurs in coarser-grained, semi-conformable to cross-cutting masses and veinlets; the largest vein (≈1 mm wide) shows open-space-filling textures, with quartz down the centerline; this vein cross-cuts intensely carbonatized and sericitized material, but is in turn cut off by foliated sericitized material.

≈25% Quartz, Feldspar & Quartzofeldspathic Material: mostly extremely fine-grained (e.g. 20 μ and less), essentially unidentifiable quartzofeldspathic material; this may be inherited from the protolith, but there are no convincing relict textures; coarser-grained quartz occurs in irregular, obviously recrystallized masses, and in veinlets associated with carbonate; the only clearly identifiable feldspar appears to be minor recrystallized albitic feldspar, associated with masses of quartz in the alteration assemblage.

≈≈15% Sericite: very pale buff colour suggests an iron-rich composition; strongly foliated, pervasive and in bands and stringers; very fine, needle-like to fibrous grains.

≈≈10% Chlorite: (difficult to distinguish from sericite, because the section is cut a bit too thin); occurs in very fine stringers of fibrous material; pale, weakly pleochroic, with very low, slightly anomalous interference colours; associated with sericite stringers.

≈5% Opaques, consisting (in order of decreasing abundance) of:

Pyrrhotite: overwhelmingly the dominant sulphide; relatively coarse (1 mm and more), very irregular, poikilitic masses, elongated parallel to foliation or banding.

Arsenopyrite: distinctly less abundant than pyrrhotite; fine (0.1-0.2 mm), euhedral rhomb-shaped grains; often occurs as inclusions in pyrrhotite.

Chalcopyrite: minor to accessory; irregular masses, often associated with pyrrhotite.

Oxide: minor to accessory; extremely fine grain size (e.g. 10 μ and less); strong anisotropy, strong internal reflections (which is not typical of graphite); irregular grains, lightly disseminated and confined to certain bands, trails and stringers; there is one surface on the hand sample which is graphitic-looking, suggesting that there may be thin bands of graphitic material throughout the sample (which would appear as thin trails or stringers in the thin section), although there is nothing that strikes me as looking graphitic in the thin section.

Pyrite: trace; irregular masses, closely associated with pyrrhotite.

PETROGRAPHIC SUMMARY

SAMPLE No. TU-7 (core sample & polished thin section)

SUMMARY & TEXTURAL DESCRIPTION

Although it is similar mineralogically to the preceding sample (TU-6), this sample differs from TU-6 in being coarser-grained overall, and dominated by vein quartz. The sample could almost be described as a breccia, with small, angular fragments of intensely carbonatized and sericitized quartzofeldspathic material, floating in a matrix of coarse-grained vein quartz (this texture is easily observed by holding the thin section up to the light).

The carbonate, which does not effervesce in cold HCl and is thus probably an iron carbonate, seems to belong predominantly to a relatively early stage of alteration. That is, the angular fragments represent material which was intensely carbonatized, then subsequently overprinted and engulfed by the vein quartz. However, there appears to have been some later sparry-textured recrystallization of carbonate, forming sawtooth-like rims along the edges of some of the vein quartz material. Much of the carbonate is rather dark, reddish-brown in colour, which is also consistent with iron carbonate.

The sulphides and other opaque material are concentrated within the angular carbonatized fragments; the vein quartz is essentially free of sulphides, although the quartz is cloudy due to abundant fluid inclusions. Pyrite and arsenopyrite are the two most abundant sulphides.

MINERALOGY

≈75% Quartz, Feldspar & Quartzofeldspathic Material: coarse-grained (e.g. several mm) vein quartz accounts for at least 70% of the thin section; good-sized (e.g. 10-30 μ) fluid inclusions are abundant in the vein quartz, and it would definitely be feasible to do a fluid inclusion study on this quartz if desired; the fluid inclusions, some of which are "dirty", define concentric growth zonations in many of the quartz grains, and cause the cloudy appearance of the quartz; aside from the vein quartz, there is some very fine-grained (e.g. 0.2 mm and less) felsic material which contains a small amount of identifiable feldspar (plagioclase); this material, which apparently represents what little is left of the protolith, has been intensely carbonatized, and broken into angular fragments as described above.

≈15% Carbonate: intense, pervasive, fine-grained carbonatization of quartzofeldspathic material in the angular fragments; much of this is a relatively dark, cloudy, reddish-brown colour in plane polarized light; no effervescence in cold HCl, suggests an iron carbonate; there is also some coarser-grained (e.g. 0.3-0.4 mm),

sparry-textured carbonate which forms rims along the edges of some of the vein quartz.

≈5% Sericite: tends to occur as discrete masses or clusters of fine (e.g. 0.2 mm and less), platy to flaky grains; occasionally as stringers.

3-5% Opaques, consisting (in order of decreasing abundance) of:

Pyrite: fine (e.g. 0.2-0.3 mm), irregular to subidiomorphic grains, often closely associated with arsenopyrite.

Arsenopyrite: almost as abundant as pyrite (difficult to judge, because they are very unevenly distributed); clusters of fine (e.g. 0.2 mm), idiomorphic, rhomb-shaped grains.

Oxide: and/or possibly minor graphite; minor to accessory; fine (0.1 mm and much less), irregular grains, with strong anisotropy; grey, low reflectivity; associated with angular fragments of material with dark banding and sericitic stringers.

Sphalerite: trace to accessory; fine (0.1 mm), irregular grains, usually adjacent to pyrite; honey-coloured internal reflections suggests a relatively iron-poor composition.

Chalcopyrite: trace; very fine, irregular grains, as inclusions in pyrite.

Pyrrhotite: trace; very fine, irregular inclusions in pyrite.

PETROGRAPHIC SUMMARY

SAMPLE No. TU-8 (core sample & polished thin section)

SUMMARY & TEXTURAL DESCRIPTION

This sample consists of relatively fine-grained quartzofeldspathic material (both minerals are present, but not always distinguishable), with a heavily overprinted alteration assemblage that is dominated by iron carbonate and sulphides (refer to Photos 9 & 10). Textures in the protolith are obscured, but there are suggestions of relict feldspar grains up to almost 1 mm; could this suggest an intrusive protolith? The iron carbonate is fairly evenly disseminated throughout the sample, along with abundant fine-grained arsenopyrite. Pyrite is also abundant, but coarser-grained and less evenly disseminated than the arsenopyrite, tending to occur in clusters and coarse masses. Sericite and chlorite occur mainly or exclusively in pressure shadows around the coarse pyrite masses.

MINERALOGY

≈35% Quartz, Feldspar & Quartzofeldspathic Material: although both quartz and feldspar are definitely present, much of the felsic material is difficult to identify because of heavy alteration overprinting and fine grain size (typically 0.2 mm and less); relict feldspar grains up to almost 1 mm are discernible; some quartz occurs in pressure shadows around coarse pyrite grains, sometimes with chalcedonic or fibrous texture.

≈30% Opaques, consisting (in order of decreasing abundance) of:

Pyrite: medium-sized (ave. ≈0.2-0.5 mm) subidiomorphic to idiomorphic grains (cubes), ranging up to very coarse (several mm) masses; the coarsest masses are not conformable to the foliation; inclusions of arsenopyrite are common, suggesting pyrite crystallized later than the arsenopyrite.

Arsenopyrite: almost as abundant as pyrite, but much finer-grained, relatively evenly disseminated; can occur as inclusions in pyrite, but more commonly occurs as "free" grains (i.e. in gangue); fine (ave. ≈0.2, but up to 0.8 mm or more in length), elongated idiomorphic rhomb-shaped and needle-like grains.

Oxides: and/or possibly some graphite(?); masses or clusters of extremely fine-grained, almost flocky-textured material; low grey, with internal reflections; I strongly suspect this is an iron oxide associated with the iron carbonate, but difficult to identify because of the very fine grain size.

Sphalerite: trace to accessory; strong red internal reflections suggest an iron-rich composition; very fine, irregular grains as inclusions in pyrite.

Chalcopyrite: trace to accessory; very fine, irregular inclusions in pyrite.

Pyrrhotite: trace; very fine, irregular inclusions in pyrite.

≈30% Carbonate: evenly and heavily pervasive; mostly fine-grained (0.2 mm); some concentration into coarser-grained conformable lenses and veinlets; no sign of effervescence in cold HCl, suggests an iron carbonate; some of the carbonate is reddish-brown in colour, other grains are associated with clusters of extremely fine-grained iron oxide; both of these features are typical of iron carbonates.

3-5% Sericite: occurs mainly as flaky to platy grains, up to 0.5 mm or more, in pressure shadows around coarse pyrite grains; associated with chlorite.

2-3% Chlorite: weak pleochroism, colourless to pale green, with low, slightly anomalous interference colours; platy and flaky grains up to 0.4 mm occur with sericite, in pressure shadows around coarse pyrite grains.

Tr. Biotite: or possibly iron-stained chlorite.

PETROGRAPHIC SUMMARY

SAMPLE No. TU-9 (core sample & polished thin section)

SUMMARY & TEXTURAL DESCRIPTION

Although logged as a medium-grained andesitic flow, I would be inclined to describe this as an intrusive rock, and possibly closer to gabbro (or diabase) than to diorite (andesite) in composition (refer to Photos 11 - 14). The rock consists of tabular subhedral plagioclase grains (ave. ≈1 mm, ranging up to 2 mm in length), with a relatively coarse-grained (1-3 mm) mafic mineral. The composition of the plagioclase cannot be reliably determined because of its alteration (mainly epidotization, which indicates that it was a relatively calcic plagioclase to begin with). The mafic mineral is green with moderate pleochroism; it appears to be an amphibole now (probably actinolite), but judging by its occurrence and relict crystal outlines the amphibole may be pseudomorphous after an original calcic clinopyroxene. The relict actinolite-pyroxenes sometimes partially to totally enclose plagioclase laths, in what is referred to as subophitic to ophitic texture.

The alteration assemblage is characteristic of greenschist facies metamorphism of a mafic protolith. In addition to the apparent actinolite pseudomorphism of clinopyroxenes, the alteration assemblage includes chlorite + epidote + leucoxene + minor carbonate. Both chlorite and carbonate occur as patchy alteration of the actinolite-pyroxenes. The "leucoxene" is typical of rutile-dominated alteration pseudomorphous after skeletal ilmenite. Epidote occurs throughout the sample, and causes the cloudiness that is characteristic of altered calcic plagioclases.

MINERALOGY

≈40% Feldspar: exclusively plagioclase; ranges from fine (e.g. 0.3 mm) to 2 mm or more in length (ave. length ≈1 mm); elongated, tabular, subhedral grains; cloudy due to epidote-dominated alteration; composition not determined, but the predominance of epidote in the alteration assemblage indicates an originally calcic composition.

≈30% Amphibole/Pyroxene: as discussed above, the dominant mafic mineral now appears to be an amphibole, but may have originated as pseudomorphous alteration of pyroxene; occurs as relatively coarse (1-3 mm) grains, interstitial to and partially or totally enclosing plagioclase laths; original crystal outlines are mostly either irregular against feldspars, or obscured by alteration, so it is difficult to tell whether the original mineral was an amphibole or a pyroxene (although this mode of occurrence is more typical of pyroxene); now shows moderate pleochroism, almost colourless to yellowish-green, and I suspect actinolite; needle-like to fibrous crystals growing out of the ends of many of the grains would also be consistent with actinolite.

≈10% Chlorite: patchily intergrown with actinolite + carbonate, in what appear to be pseudomorphs after pyroxene; chlorite also occurs alone, in very fine-grained, interstitial masses; the chlorite is slightly paler in colour than the amphibole, with weak to moderate pleochroism, pale yellow to light green, with distinctly anomalous purple interference colours.

≈10% Epidote: (more abundant than it looks at first glance); occurs as extremely fine-grained alteration of plagioclase, causing the characteristic cloudiness; also occurs throughout as fine (e.g. 0.2-0.3 mm), prismatic grains; most of the prismatic grains show the pale greenish-yellow pleochroism typical of epidote.

≈5% Opaques, consisting (in order of decreasing abundance) of:

"Leucoxene": actually semi-transparent, rather than opaque; occurs as medium-grained (e.g. 0.5-0.8 mm), irregular grains and masses, typically with well-developed skeletal internal structures; reddish-brown colour in plane polarized light; in reflected light, a mixture of low reflevtivity grays, with variable anisotropy and abundant internal reflections; this is almost certainly a rutile-dominated, "leucoxene"-type alteration pseudomorphous after ilmenite, probably with minor ilmenite remaining.

Chalcopyrite: accessory; extremely fine-grained (e.g. 20 μ and less).

Pyrrhotite: trace.

2-3% Carbonate: the sample shows minor effervescence in cold HCl, indicating that at least some calcite is present; occurs as patchy alteration of amphibole/pyroxene; clear and colourless; also alters feldspars; some discontinuous carbonate veinlets.

Acc. Quartz(?) and/or Apatite(?): colourless mineral filling interstices between plagioclase and amphibole grains; looks like quartz, except that most grains display one or more of the following features: (1) slightly anomalous bluish interference colours, (2) biaxial, off-centered and/or optically negative interference figures, (3) twinning, (4) zonation; all of these features are uncharacteristic and, in fact, probably contraindicative of quartz; however, I cannot get a good uniaxial negative interference figure on any of the grains in order to confirm an alternative identification, the most likely of which would be apatite.

Tr.-Acc. Sericite(?): extremely fine-grained as alteration of feldspars.

PETROGRAPHIC SUMMARY

SAMPLE No. TU-10 (core sample & polished thin section)

SUMMARY & TEXTURAL DESCRIPTION

This sample is similar in some respects to samples TU-8 and TU-7 (refer to Photo 15). It resembles TU-7 in that relatively coarse-grained vein quartz is an important part of the assemblage, although not as dominant as it is in TU-7. In terms of mineralogy, this sample is probably most similar to TU-8, but the alteration is much more patchy and unevenly distributed than in that sample. The texture of the protolith has been almost entirely obscured by the alteration assemblage, although it is clear that felsic minerals (feldspar and/or quartz) were the major components of the protolith. For the first time in this group of samples, both plagioclase and alkali feldspar were tentatively identified, which may suggest a felsic (rather than intermediate) protolith.

The alteration is dominated by a heavily pervasive iron carbonate. There may be more than one generation of carbonatization represented; for example, reddish-brown, cloudy, coarse-grained iron carbonate is often cut by veinlets of a clear, colourless carbonate. There also appears to have been some sparry-textured recrystallization of clear carbonate along the edges of the vein quartz masses, as described in sample TU-7. Cloudy quartz with abundant fluid inclusions occurs in irregular, coarse-grained masses and veinlets, which appear to post-date most (but not all) of the carbonatization.

Both carbonate and quartz masses are cut by stringers and foliated lenses of heavily sericitized material, also associated with minor chloritic stringers and with trails and anastomosing stringers of extremely fine-grained oxide material. The occurrence of sericitic and chloritic stringers in association with irregular, anastomosing opaque stringers clearly suggests pressure solution. This also happens to be the main sulphide environment in this sample; very fine, idiomorphic arsenopyrite rhombs, as well as coarse, subidiomorphic pyrite grains are both closely associated with, and concentrated in, the heavily sericitized material.

MINERALOGY

≈35% Quartz, Feldspar & Quartzofeldspathic Material: fine-grained, heavily overprinted, essentially unidentifiable felsic material is quite abundant; some of the felsic material is identifiable as feldspar; at least one grain of alkali feldspar was tentatively identified, which may suggest a relatively felsic protolith composition; there has clearly been minor recrystallization of (albitic) feldspar in association with alteration; recognizable quartz occurs mainly in irregular, relatively coarse-grained masses and veinlets; as in TU-7, this quartz tends to be cloudy due to the presence of abundant fluid inclusions.

≈30% Carbonate: heavily pervasive in certain parts of the sample, but at least partially overprinted by vein quartz alteration, and also overprinted by intense sericitization; the carbonate does not effervesce in cold HCl; much of it is quite reddish-brown in colour, which also suggests an iron carbonate; there is apparently some later carbonate as well, since veinlets of clear carbonate cut some of the reddish-brown masses; there is also some relatively clear, sparry-textured carbonate associated with some of the quartz veins.

≈20% Sericite: concentrated into heavily foliated masses and stringers; very fine (0.1 mm and much less), flaky to fibrous grains; close association with arsenopyrite and pyrite.

≈10% Opaques, consisting (in order of decreasing abundance) of:

Pyrite: relatively coarse, subidiomorphic cubes, e.g. 0.5-1.0 mm, coalescing into very coarse (several mm), blocky, irregular masses; usually slightly poikilitic, especially at the centers of grains; fine inclusions of chalcopyrite, pyrrhotite and arsenopyrite.

Arsenopyrite: distinctly less abundant, also much finer-grained than the pyrite; fine (e.g. 0.1-0.2 mm), idiomorphic, rhomb-shaped grains; can occur as inclusions in pyrite; with pyrite, concentrated within heavily sericitized material and in association with chloritic stringers.

Oxides: minor to accessory; extremely fine grain size; disseminated and in trails and stringers, closely associated with heavy sericitization; this is almost certainly an oxide residue related to pressure solution.

Pyrrhotite: trace; fine, irregular inclusions in pyrite.

Chalcopyrite: trace; fine, irregular inclusions in pyrite; occasional free grains.

3-5% Chlorite: occurs in very fine, irregular, anastomosing stringers, associated with sericitization and with very fine stringers of oxide and other opaque material; the chlorite is very fine-grained, essentially fibrous; weakly pleochroic, colourless to very pale green, with very low, slightly anomalous interference colours; also forms pressure shadow fringes around some coarse pyrite grains; there is quite a close association of chlorite stringers with arsenopyrite.

PETROGRAPHIC SUMMARY

SAMPLE No. TU-11 (core sample & polished thin section)

SUMMARY & TEXTURAL DESCRIPTION

This sample is similar in many respects to the preceding sample, **TU-10** (refer to Photos **16 - 21**). It consists of fine-grained quartzofeldspathic material (apparently all that remains of the protolith, largely obscured), with heavy but patchy carbonatization. The carbonate is probably mainly an iron carbonate, but signs of minor effervescence in HCl suggest at least a small amount of (possibly late-stage) calcite. Cross-cutting this fine-grained material are irregular masses and veinlets of relatively coarse-grained, cloudy vein quartz, associated with a coarse-grained carbonate.

As in **TU-10**, the quartz-carbonate masses and veinlets are abruptly cut by masses of foliated and stringer-type material, which in this case are mainly concentrations of blade-like arsenopyrite grains, associated with irregular, anastomosing stringers of chlorite. The intense sericitization observed in sample **TU-10** is not present in this sample; in fact, no sericite at all was observed in this sample. A minor but possibly interesting note is that some of the chlorite in this sample has a distinctly buff-brown colour, which may be transitional to the more intense, unusual pink colour observed in samples **TU-13** and particularly **TU-14**.

MINERALOGY

≈40% Quartz, Feldspar & Quartzofeldspathic Material: (1) very fine-grained (e.g. 0.1 mm and less), heavily overprinted felsic material, essentially unidentifiable (although probably both quartz and feldspar are present); (2) coarse-grained, cloudy vein quartz with abundant (but mostly small) fluid inclusions, occurring in irregular masses and veinlets, associated with iron carbonate; (3) minor occurrences of recrystallized (alibitic) feldspar in association with quartz-carbonate masses and veinlets; (4) minor chalcedonic-textured quartz, forming in pressure shadows around coarse pyrite grains.

≈40% Carbonate: fine-grained, heavily pervasive (in what appears to be a relatively early stage of alteration); cut by masses and veinlets of quartz + coarse-grained carbonate (grain sizes up to 1 mm or more); much of the coarser-grained carbonate, in particular, is distinctly reddish-brown in colour, which (along with the general lack of effervescence in HCl) suggests that an iron carbonate is dominant; there may be a small amount of calcite present.

≈15% Opaques, consisting (in order of decreasing abundance) of:

Arsenopyrite: mostly fine (e.g. 0.2 mm), idiomorphic rhombs and blade-like grains, ranging up to 0.6 mm or more; concentrated in foliated bands, often (but

not always) associated with chloritic stringers; can occur as inclusions in pyrite; in some areas, the fine arsenopyrite grains coalesce into coarser, elongated, blocky masses.

Pyrite: slightly less abundant, but much coarser-grained than the arsenopyrite; clusters of coarse (up to several mm), subidiomorphic cubes; a number of the finer pyrite grains (e.g. 0.2-0.3 mm) display atoll structures (i.e. hollow cores) with carbonate at the core, which may suggest carbonatization of the pyrite.

Oxides: minor to accessory; grain sizes are extremely fine (on the order of a couple of microns and less, almost sub-microscopic); associated with stringer-type material, in this case mainly arsenopyrite and chlorite; this is almost certainly an oxide residue related to pressure solution.

Chalcopyrite: trace; very fine, irregular inclusions in pyrite; occasional free grains.

≈≈5% Chlorite: mostly very pale green, weakly pleochroic, with very low, slightly anomalous interference colours ranging from bluish to greyish-green; essentially fibrous grains, occurring mainly in fine, irregular, anastomosing stringers, closely associated with arsenopyrite; some of the chlorite occurs as platy grains forming pressure shadow fringes around coarse pyrite grains; this chlorite tends to have a distinctly buff-brown to pinkish-brown colour, with very low birefringence (almost isotropic; compare to the unusual pink chlorite(?) described in **TU-13** and **TU-14**.

Tr. Tourmaline: small clusters of very fine, prismatic grains, associated with stringers of chlorite and arsenopyrite; brownish colour.

PETROGRAPHIC SUMMARY

SAMPLE No. TU-12 (core sample & polished thin section)

SUMMARY & TEXTURAL DESCRIPTION

This sample is very similar in most respects to the preceding (**TU-11**), except that the chloritic stringers associated with arsenopyrite are much more fully developed in this sample. Another difference is that the occurrence of recrystallized (albitic) feldspar in association with quartz-carbonate lenses and veinlets is much more common in this sample than in any of the previously described samples (refer to Photos 22 & 23). The sample consists of fine-grained, heavily carbonatized quartzofeldpathic material (much of which is identifiable as feldspar in this case). Veins and lenses of coarser-grained quartz, carbonate and feldspar criss-cross the sample. Some of these are rimmed by thin bands or coronae of fibrous chlorite. As in **TU-11**, sericite is almost totally absent from the assemblage, except for a small piece of sericitized material in one corner of the thin section.

MINERALOGY

≈50% Quartz, Feldspar & Quartzofeldspathic Material: more feldspar is identifiable in this sample than in any others of this group (except for **TU-9**, which is different); feldspar was clearly a major component of the fine-grained quartzofeldspathic material which is the only relict from the protolith; the texture of the protolith is unclear, due to heavy overprinting and some deformation; recrystallized (albitic) feldspar is quite common in the alteration assemblage, occurring as tabular grains, mainly in coarse-grained lenses associated with carbonate + quartz; quartz occurs in relatively coarse-grained, irregular veinlets, masses and lenses, mainly associated with carbonate.

≈35% Carbonate: minor, localized effervescence in cold HCl suggests the presence of at least some calcite, but the majority of the carbonate appears to be an iron carbonate (non-effervescent, distinctly reddish-brown in plane polarized light); occurs as moderately to heavily pervasive, fine-grained carbonatization, and also in coarser-grained lenses, associated with quartz and feldspar, and rimmed by fibrous chlorite; the coarser-grained, later-stage carbonate may be the calcite (it is clear and colourless).

≈10% Chlorite: occurs mainly in fibrous stringers, associated with arsenopyrite and with irregular oxide trails and stringers (pressure solution); platy grains also form rims and pressure shadows around coarse pyrite grains; chlorite is pale green, weakly pleochroic, with low, slightly anomalous interference colours; there is also an occurrence of fibrous chlorite forming a rim or corona around some of the coarse-grained carbonate-quartz-feldspar lenses (see photos).

2-3% Opaques, consisting (in order of decreasing abundance) of:

Pyrite: mainly concentrated in one clusters of coarse, subidiomorphic cubes and fractured, blocky masses; slight growth zonations are suggested in some grains.

Arsenopyrite: minor; clusters of fine (0.2 mm and less), idiomorphic, rhomb-shaped and bladed grains.

Sphalerite: accessory; fine, roughly equant grains; honey-coloured internal reflections suggest a relatively iron-poor composition.

Oxides: accessory; extremely fine grain size; in trails and stringers; this is clearly an oxide residue related to pressure solution.

Chalcopyrite: trace.

Pyrrhotite: trace.

Acc. Sericite: mostly confined to one corner of the thin section; very fine, almost fibrous, in stringers and foliated bands.

PETROGRAPHIC SUMMARY

SAMPLE No. TU-13 (core sample & polished thin section)

SUMMARY & TEXTURAL DESCRIPTION

The style and mineralogy of alteration in this sample is somewhat different than in preceding samples, more like that in **TU-14**, described below (refer to Photos **24 - 28**). The sample (i.e. what is left of the protolith) consists of very fine-grained rather intensely strained quartzofeldspathic material. Moderate to heavy carbonate alteration is unevenly distributed, in irregular masses and veinlets. As in **TU-12**, recrystallized (albitic) feldspar is common in this sample, occurring mainly in irregular lenses, masses and veinlets associated with quartz + carbonate. In fact, the albitic feldspar is probably more important than quartz in the alteration assemblage.

Associated with, and partially superimposed on the carbonate-feldspar-quartz alteration is a network of fine, very irregular, anastomosing stringers of what appears to be a very green biotite (probably the Fe^{3+}-rich biotite, called annite; refer particularly to Photos **27** & **28**). The annite is very fine-grained, needle-like to almost fibrous. A network of fibrous to almost colloform-textured annite is also characteristic of the alteration in sample **TU-14**. In some cases it forms rims around carbonate-feldspar masses, in what may be an extension or variation of the chlorite-rimming texture described in **TU-12**.

Fine-grained arsenopyrite is heavily disseminated throughout much of the sample, usually concentrated in bands. Although some of the arsenopyrite is associated with chloritic stringers as in preceding samples, much of it is superimposed directly on the quartzofeldspathic material. Subidiomorphic pyrite cubes, typically much coarser-grained than the arsenopyrite, are also disseminated throughout the sample, often concentrated in bands with arsenopyrite. Many of the pyrite cubes display well-developed atoll textures (i.e. hollow cubes). This is usually interpreted as a replacement texture, although in this case it is not clear what is replacing the pyrite, and it could be a growth texture instead (refer particularly to Photos **24 - 26**).

Another point of similarity between this sample and **TU-14** is the presence in both samples of a pink mineral, which may be an unusual composition of chlorite. In this sample, the mineral is platy to fibrous, occurring in small, irregular masses and stringers. It resembles chlorite in every way, including the slightly anomalous interference colours, except that it ranges from buff-coloured to distinctly pink, instead of green. Note that chromian chlorite is typically pink in colour. A green chlorite is also present, mainly in stringers associated with arsenopyrite.

MINERALOGY

≈40% Quartz, Feldspar & Quartzofeldspathic Material: at least 10% of the sample consists of recrystallized feldspar, i.e. albitic feldspar which is clearly part of

the alteration assemblage; it occurs in irregular, relatively coarse-grained masses, closely associated with carbonate and (to a lesser extent) quartz; the albitic feldspar is typically tabular, subhedral, ranging up to 1 mm or more in length; the only part of the "protolith" that is still visible is a very fine-grained, quite strongly strained quartzofeldspathic material, with heavy alteration, particularly arsenopyrite, obscuring the original textures and mineralogy; quartz also occurs in irregular masses and veinlets, but in this sample it is not as abundant as the feldspar.

≈25% Carbonate: no effervescence in cold HCl, indicates that an iron carbonate is probably dominant; concentrated in relatively coarse-grained, irregular masses, bands and veinlets, mainly associated with recrystallized (albitic) feldspar and, to a lesser extent, with quartz; carbonate masses are often rimmed by fibrous or needle-like annite; most of the carbonate is clear, some is distinctly reddish-brown in plane polarized light.

≈25% Opaques, consisting (in order of decreasing abundance) of:

Arsenopyrite: heavily disseminated throughout the sample, typically concentrated in bands; elongate rhomb-shaped to blade-like idiomorphic grains, ave. ≈0.1-0.4 mm.

Pyrite: slightly less abundant than arsenopyrite; subidiomorphic grains, typically coarser-grained than the arsenopyrite (ave. pyrite ≈0.4-1.0 mm); many grains show atoll structures, i.e. hollow cores; it is not clear whether it is a growth texture or a replacement texture in this case.

Oxide: minor; extremely fine grain size; occurs in trails, associated with chloritic stringers and with arsenopyrite; probably a sign of pressure solution; also associated with iron carbonate, possibly a replacement feature.

Sphalerite: trace; predominantly honey-coloured internal reflections indicates a relatively iron-poor composition; fine, roughly equant grains; minor chalcopyrite "disease".

Chalcopyrite: trace; mainly as very fine, irregular inclusions in pyrite.

≈5% Chlorite: there may be a range of compositions of chlorite present; the "normal" chlorite is very fine-grained, essentially fibrous, weakly pleochroic, pale green, occurring in fine, anastomosing stringers closely associated with arsenopyrite, and forming pressurre shadow fringes on pyrite grains; there appears to be a colour gradation into a more buff-coloured chlorite, ranging into a mineral which is distinctly pink, with moderate pleochroism; this mineral looks like a chlorite, but the colour is unusual and may indicate high chromium content; the pink mineral is slightly more abundant than the "normal" chlorite.

3-5% Biotite: looks like the Fe^{3+}-bearing biotite endmember, called annite; very fine (e.g. 0.1 mm and much less), needle-like to fibrous grains, in a network of very irregular, anastomosing stringers; sometimes forms rims around carbonate-feldspar masses; moderate to strong pleochroism, typical of biotite but very green; can also be closely intergrown with the pink chlorite (see below); the only other possible interpretation of this mineral would be a green sericite, but even the most strongly coloured sericites would not normally be this dark in plane polarized light.

Tr. Allanite or Piedmontite(?): looks like an orange-coloured epidote mineral.

PETROGRAPHIC SUMMARY

SAMPLE No. TU-14 (core sample & polished thin section)

SUMMARY & TEXTURAL DESCRIPTION

The style and mineralogy of the alteration in this sample is quite similar to that described in sample **TU-13** above, except that coarse-grained vein quart is more important in this sample (refer to Photos **29 - 32**). The sample consists of a very fine-grained, quite strongly strained quartzofeldspathic material (the last remnants of the protolith), with heavy, patchy but roughly banded alteration superimposed. The alteration in this sample is dominated by coarse-grained bands and irregular masses of cloudy vein quartz. The vein quartz, as well as the fine-grained quartzofeldspathic material, exhibits signs of strain, such as kink banding and strong undulatory extinction. The carbonate in this sample, some of which is iron carbonate (although minor localized effervescence in cold HCl indicates that some calcite must also be present), is typically associated with a network of green biotite stringers (see below). Also as in **TU-13**, sericite is almost totally absent from the alteration assemblage. Recrystallized (albitic) feldspar was also not observed, which distinguishes this sample from **TU-13**, in which albite is an important part of the alteration assemblage.

Associated with and/or superimposed on the carbonate-quartz alteration is an irregular, interconnected network of stringers, of the green biotite (annite) discussed in the description of **TU-13**. In this sample, the annite network is quite well-developed, to the extent that some of the stringers exhibit almost colloform banding. Carbonate, some of which is quite coarse-grained, is quite closely associated with this annite banding. Also associated with the network of annite stringers are very fine, irregular opaque stringers, which seem to be composed of extremely fine-grained oxide material, clearly suggesting pressure solution.

Fine-grained arsenopyrite is heavily disseminated throughout the sample, typically as irregular patches and bands. In much of the sample it is closely associated with the annite-carbonate network, but in some cases it is superimposed directly on the strained quartzofeldspathic material (as in **TU-13**). Pyrite, typically slightly coarser-grained, is also associated with the arsenopyrite.

A final point of similarity between this and **TU-13** is the presence of the pink chromian chlorite(?) described above. In this case, the pink colour and pleochroism are even stronger than in **TU-13**.

MINERALOGY

≈50% Quartz, Feldspar & Quartzofeldspathic Material: unlike sample **TU-13**, only a very small amount of feldspar was definitely identified in this sample, although feldspar may be a major component of the strained, fine-grained quartzofeldspathic material which seems to be the only remnant of the protolith;

as much as 25% of the sample or more consists of relatively coarse-grained, cloudy vein-type quartz, in irregular masses and bands; as in other samples with coarse-grained vein quartz, the quartz itself is essentially free of opaque material, although it is very cloudy due to the presence of fluid inclusions; the quartz exhibits signs of strain (strong undulatory extinction, kink banding).

≈20% Opaques, consisting (in order of decreasing abundance) of:

Arsenopyrite: masses and clusters of fine (e.g. 0.1-0.2 mm) rhomb-shaped and bladed idiomorphic grains.

Pyrite: distinctly less abundant than the arsenopyrite, but coarser-grained; idiomorphic to subidiomorphic cubes and hexagonal grains, some coarse, irregular, blocky masses; minor occurrence of atoll texture, as described in **TU-13**; the pyrite is sometimes localized along the edges of coarse-grained quartz masses.

Oxide: minor to accessory; extremely fine grain sizes; in trails and bands, associated with annite stringers; this is almost certainly an oxide residue associated with pressure solution.

Graphite: accessory; much browner than the oxide material, clearly distinct from it (in my opinion); extremely fine, almost sub-microscopic, in anastomosing bands and stringers.

Chalcopyrite: trace.

≈≈15% (or more?) Carbonate: localized effervescence in cold HCl suggests the presence of at least some calcite; most abundant is a carbonate which occurs in very close association with the colloform-banded, stringer-type network of annite; otherwise, the carbonate occurs mainly in veinlets, often rimmed by the fibrous or needle-like annite.

≈10% Biotite: looks like the green Fe^{3+}-bearing variety annite, as described in **TU-13**; very fine to extremely fine needles and fibres, often with a colloform-type banding; irregular network of stringers, can occur as a rim around coarse carbonate-quartz masses; moderately strong pleochroism, almost colourless to deep green;

2-3% (or more?) Chlorite: as described in sample **TU-13**, although in this sample the colour of the mineral is stronger, distinctly pink to pinkish-orange, with moderate pleochroism; looks exactly like a chlorite except for the colour, possibly a chromium-bearing chlorite; a "normal" chlorite is also present, pale green, weakly pleochroic, with low, slightly anomalous interference colours, associated with stringers of annite, and occasionally in late-stage veinlets; all of the chlorite is very fine-grained, essentially fibrous.

Tr.-Acc. Tourmaline: clusters of very fine, prismatic grains; brownish to deep reddish-brown colour; associated with the annite-carbonate-opaque network; also indicative of pressure solution.

Tr. Sericite: extremely fine needles, closely intergrown with the annite (which strengthens the identification of this mineral as a biotite and not a green muscovite).

PETROGRAPHIC SUMMARY

SAMPLE No. TU-15 (core sample & polished thin section)

SUMMARY & TEXTURAL DESCRIPTION

This sample is distinctly different from the others described in this group of samples (refer to Photos 33 & 34). This is a medium-fine-grained ultramafic intrusive which has undergone hydrous alteration. The mineral assemblage now is dominated by serpentine + talc + carbonate. There may be some sericite intergrown with the talc; when fibrous and fine-grained the two minerals are essentially impossible to distinguish optically. There could also be minor chlorite intergrown with the serpentine; a magnesian chlorite would be colourless with low anomalous bluish interference colours and, if fibrous, would be difficult to distinguish from the serpentine. However, the serpentine-talc assemblage is typical of hydrous metamorphism of an ultramafic protolith.

Nicely preserved relict olivine grain outlines are clearly visible within the fibrous serpentine (although the olivine itself has been totally serpentinized). The relict texture indicates an original grain size for the olivines of ≈0.3 mm, with subhedral to euhedral, equant to slightly elongated habit and cumulate texture. The material interstitial to the relict olivines (now mostly talc) was probably originally a coarse-grained pyroxene.

A magnesian carbonate (magnesite) would be expected in an assemblage like this if there was some CO_2 in the metamorphic fluid. However, the carbonate in this sample tends to be concentrated in lenses and veinlets, and effervesces in cold HCl, suggesting instead late-stage calcite alteration.

MINERALOGY

≈50% Talc: very fine-grained, fibrous; essentially impossible to distinguish from sericite.

≈30% Serpentine: colourless, fibrous, with low, slightly anomalous bluish interference colours; forms pseudomorphs after equant to slightly elongated, euhedral to subhedral olivines.

≈20% Carbonate: effervesces in cold HCl, probably indicating calcite rather than magnesite or an iron carbonate; occurs in irregular lenses, gashes and veinlets; clear and colourless.

Acc. Opaques, consisting (in order of decreasing abundance) of:

Pyrite: fine, irregular to subidiomorphic masses.

Ilmenite(?): approximately the same abundance as pyrite; a brownish-grey oxide with moderate anisotropy; elongated, very fine tabular to needle-like grains; chromite would be more typical in a rock of this composition, but chromite would be isotropic, and most likely equant rather than needle-like.

Pyrrhotite: trace; fine, irregular, elongated masses.

Chalcopyrite: trace; fine, irregular masses.

PHOTOMICROGRAPHS
(All photos taken in transmitted light unless reflected light is specifically indicated.)

1. Sample TU-2: intense carbonate-sericite alteration, associated with extremely fine, irregular opaque stringers, which are probably a sign of pressure solution; dimensions ≈2.35 x 1.61 mm; plane polarized light.

2. Sample TU-2: same as **1**, with crossed polarizers; the carbonate (which takes up most of the field of view) shows light pinkish-beige interference colours.

3. Sample TU-3: unusual texture which seems to represent brownish iron carbonate pseudomorphous after an original fine-grained, acicular mineral (possibly feldspar needles?); upper right corner, part of a carbonate-chlorite veinlet; dimensions ≈2.35 x 1.61 mm; plane polarized light.

4. Sample TU-3: same as **3**, with crossed polarizers.

5. Sample TU-4: typical coarse pyrite masses, with well-developed fibrous chalcedonic pressure shadows (see texture under crossed polarizers, in **6**); the opaque material is essentially all pyrite, the colourless material is a mixture of chalcedonic quartz + iron carbonate; dimensions ≈2.35 x 1.61 mm; plane polarized light.

6. Sample TU-4: same as **5**, with crossed polarizers; carbonate appears light pinkish-beige, the rest of the translucent material (with various grey interference colours) is chalcedonic-textured quartz.

7. Sample TU-4: same as **5**, in reflected light, showing coarse, blocky, fractured pyrite masses composed of much finer, coalescing grains; dimensions ≈2.35 x 1.61 mm.

8. Sample TU-4: fractured mass of pyrite (bright, upper right), and foliated band of extremely fine-grained graphitic material (brownish, low reflectivity, diagonal band across the middle of the photo); dimensions ≈2.35 x 1.61 mm; reflected light.

9. Sample TU-8: abundant fine arsenopyrite grains (opaque euhedral rhombs, scattered across the middle of the photo), with much coarser, subidiomorphic pyrite grains (the coarse opaque grains, upper right and lower left), in heavily carbonatized quartzofeldspathic material; the coarse pyrite grains show quartz-sericite pressure shadows; dimensions ≈2.35 x 1.61 mm; plane polarized light.

10. Sample TU-8: same as **9**, with crossed polarizers; the heavy carbonatization shows light pinkish-beige interference colours; the platy grains with bright interference colours in the pyrite pressure shadows are sericite.

11. Sample TU-9: part of a coarse, subhedral to euhedral prismatic grain, which appears to be a pyroxene (relict crystal boundaries are outlined with dashed lines), now pseudomorphed by amphibole (probably actinolite) + chlorite (note patchy green colour); the very fine curved needles or fibres growing out of the end of the grain are probably also actinolite; the tabular grains outlined in black are examples of

heavily altered feldspar (plagioclase) grains which were partially to totally enclosed by the pyroxene (ophitic to subophitic texture); dimensions ≈2.35 x 1.61 mm; plane polarized light.

12. Sample TU-9: same as **11**, with crossed polarizers.

13. Sample TU-9: heavily altered tabular subhedral plagioclase grains (cloudy due to epidotization), and part of a subhedral relict pyroxene grain, now actinolite-chlorite; mass of chlorite (lower right corner); the "opaque" grain (top center) is actually semi-transparent leucoxene-type material, with skeletal internal structure; dimensions ≈2.35 x 1.61 mm; plane polarized light.

14. Sample TU-9: same as **13**, with crossed polarizers.

15. Sample TU-10: arsenopyrite (fine, white, euhedral elongate rhomb-shaped grains) and pyrite (much coarser, yellower mass, upper left) in heavily sericitized gangue; dimensions ≈1.0 x 0.7 mm; reflected light.

16. Sample TU-11: bottom right corner is a quartz-carbonate veinlet, which trends diagonally from lower right to upper left, and is abruptly cut off at a high angle by chloritic stringers (pale green) associated with abundant, fine-grained arsenopyrite (fine, euhedral opaque rhombs); dimensions ≈2.35 x 1.61 mm; plane polarized light.

17. Sample TU-11: same as **16**, with crossed polarizers.

18. Sample TU-11: a folded band of arsenopyrite associated with some chloritic stringers, in heavily carbonatized material; dimensions ≈2.35 x 1.61 mm; plane polarized light.

19. Sample TU-11: same as **18**, in reflected light; dimensions ≈2.35 x 1.61 mm.

20. Sample TU-11: similar to **16**, showing arsenopyrite stringers cutting coarse-grained iron carbonate (note distinctly reddish-brown colour) and quartz (cloudy); dimensions ≈2.35 x 1.61 mm; plane polarized light.

21. Sample TU-11: same as **20**, with crossed polarizers.

22. Sample TU-12: lens of coarse-grained carbonate (colourless) with tabular recrystallized (albitic) feldspars, rimmed by fibrous chlorite, cutting across finer-grained, heavily carbonatized material; dimensions ≈2.35 x 1.61 mm; plane polarized light.

23. Sample TU-12: same as **22**, with crossed polarizers.

24. Sample TU-13: atoll (hollow) texture in pyrite cubes; see text for discussion; dimensions ≈2.35 x 1.61 mm; reflected light.

25. Sample TU-13: same as **24**, in transmitted light; gangue is lightly carbonatized, very fine-grained, strained quartzofeldspathic material; dimensions ≈2.35 x 1.61 mm; plane polarized light.

26. Sample TU-13: same as **25**, with crossed polarizers; some feldspar is discernible by the presence of lamellar twinning.

27. Sample TU-13: irregular network of very green, needle-like to fibrous biotite (annite variety); large, cloudy tabular grain is albitic feldspar, an important part of the alteration assemblage in this sample; the pink mineral in irregular masses just below center is the chromian chlorite(?) discussed in the text; cf. also Photos **29 - 32**, which show a similar style of alteration in sample **TU-14**; dimensions ≈2.35 x 1.61 mm; plane polarized light.

28. Sample TU-13: same as **27**, with crossed polarizers; lamellar twinning is visible in the albitic feldspar; "background" is very fine-grained quartzofeldspathic material.

29. Sample TU-14: network of irregular stringers of green biotite (annite), as in **TU-13** (see Photos **27** & **28**); the pink mineral in the irregular mass towards upper left is the chromian chlorite(?) discussed in the text; some paler-green chlorite rims the carbonate lens, bottom right; dimensions ≈2.35 x 1.61 mm; plane polarized light.

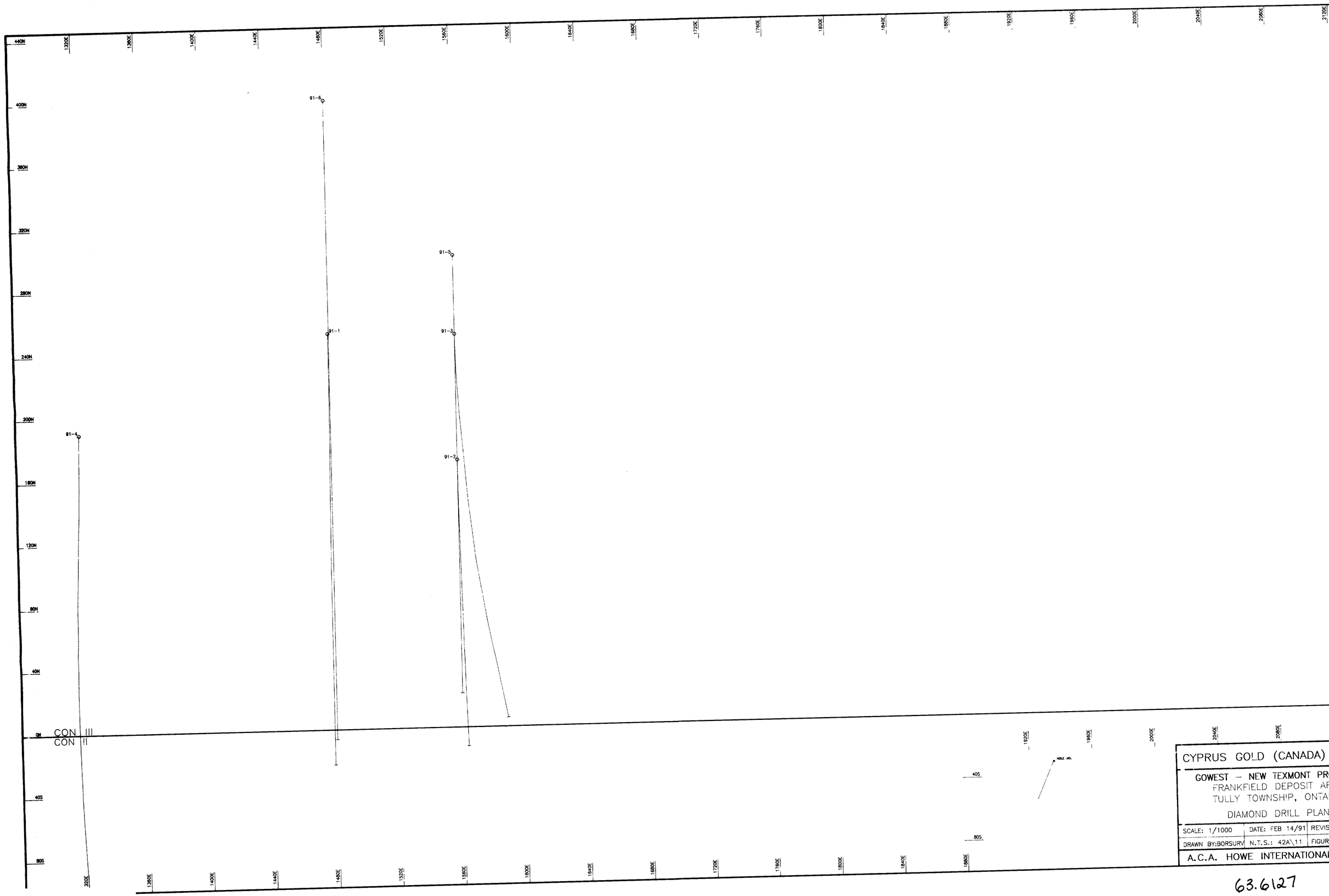
30. Sample TU-14: same as **29**, with crossed polarizers.

31. Sample TU-14: shows the almost colloform texture of some of the annite banding; cloudy, colourless material is coarse-grained vein quartz; dimensions ≈2.35 x 1.61 mm; plane polarized light.

32. Sample TU-14: same as **31**, with crossed polarizers.

33. Sample TU-15: shows well-preserved relict cumulate texture, consisting of equant, subhedral to euhedral olivine grains (now totally serpentinized), in a talc-carbonate matrix; dimensions ≈2.35 x 1.61 mm; plane polarized light.

34. Sample TU-15: same as **33**, with crossed polarizers.



CYPRUS GOLD (CANADA) LIMITED

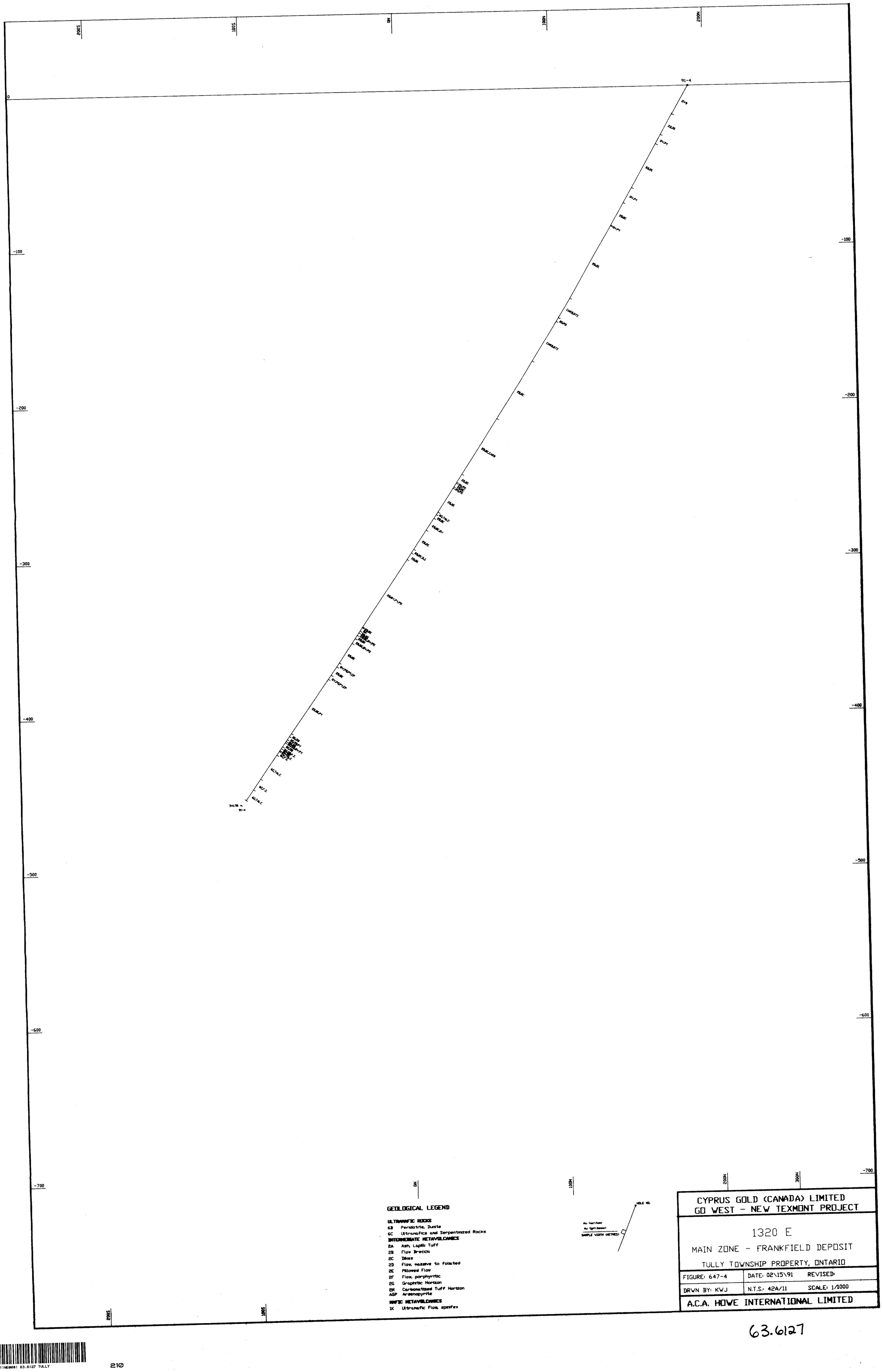
GOWEST – NEW TEXMONT PROPERTY
FRANKFIELD DEPOSIT AREA
TULLY TOWNSHIP, ONTARIO

DIAMOND DRILL PLAN

SCALE: 1/1000	DATE: FEB 14/91	REVISED:
DRAWN BY:BORSURV	N.T.S.: 42A\11	FIGURE: 647-3

A.C.A. HOWE INTERNATIONAL LIMITED

63.6127



GEOLOGICAL LEGEND

ULTRAMAFIC ROCKS
- 6B Peridotite, Dunite
- 6C Ultramafics and Serpentinized Rocks

INTERMEDIATE METAVOLCANICS
- 2A Ash, Lapilli Tuff
- 2B Flow Breccia
- 2C Dikes
- 2D Flow, massive to foliated
- 2E Pillowed Flow
- 2F Flow, porphyritic
- 2G Graphitic Horizon
- 2M Carbonatized Tuff Horizon
- ASP Arsenopyrite

MAFIC METAVOLCANICS
- 1K Ultramafic Flow, spinifex

Au (oz\ton)
Au (gm\tonne)
SAMPLE WIDTH (METRES)
HOLE NO.

CYPRUS GOLD (CANADA) LIMITED
GO WEST - NEW TEXMONT PROJECT

1320 E

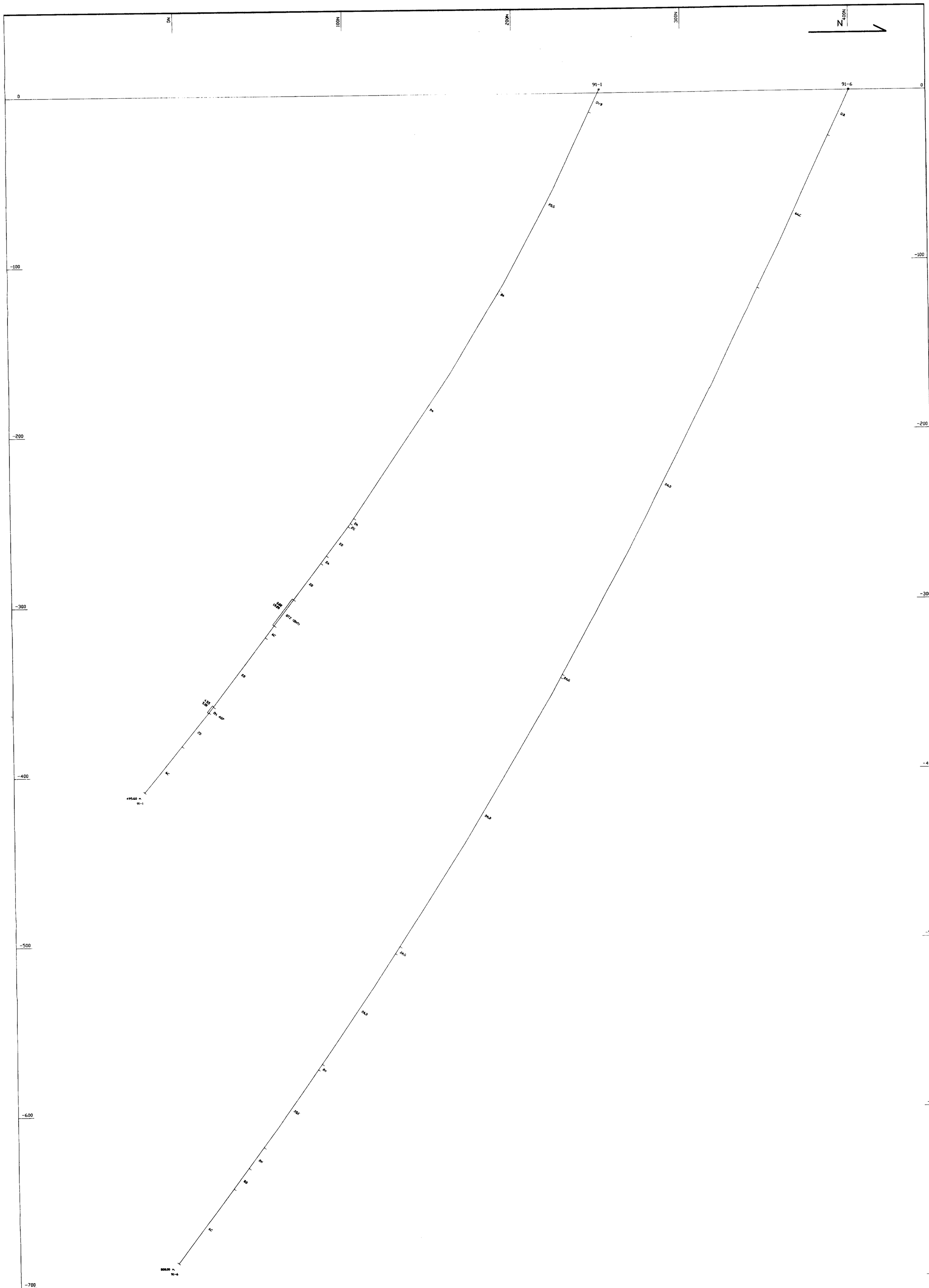
MAIN ZONE - FRANKFIELD DEPOSIT

TULLY TOWNSHIP PROPERTY, ONTARIO

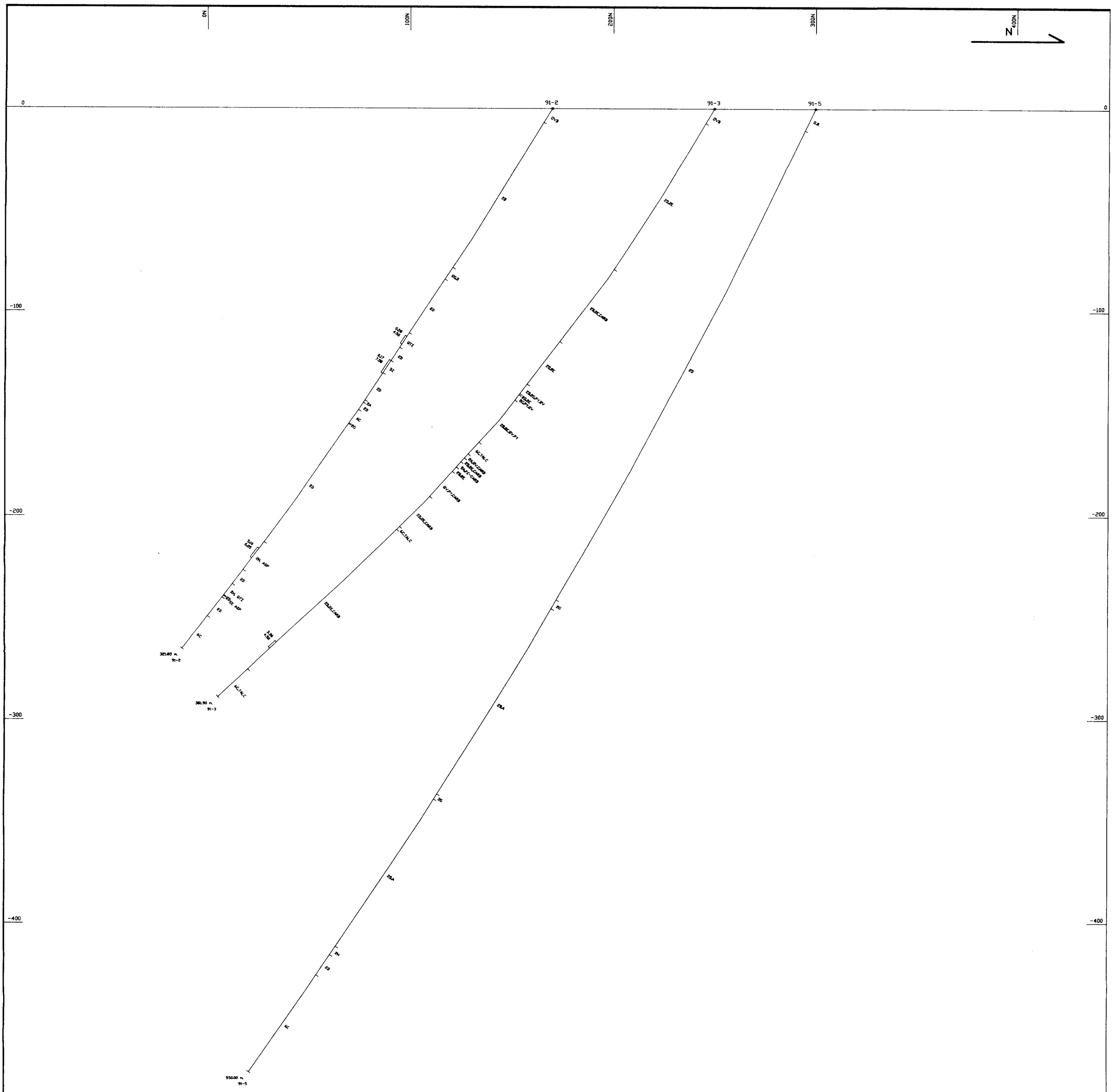
FIGURE: 647-4	DATE: 02\15\91	REVISED:
DRWN BY: KWJ	N.T.S.: 42A/11	SCALE: 1/1000

A.C.A. HOWE INTERNATIONAL LIMITED

63.6127



63.6127



63.6127

PRELIMINARY

CYPRUS GOLD (CANADA) LIMITED

MAX-MIN HORIZONTAL LOOP EM SURVEY
STACKED PROFILES - FREQUENCY 222 Hz

TULLY TOWNSHIP PROPERTY
GOWEST - FRANKFIELD OPTION
PORCUPINE MINING DISTRICT, ONTARIO

PLOTTED BY PATERSON, GRANT & WATSON LIMITED

FIGURE 647-8

63.6127

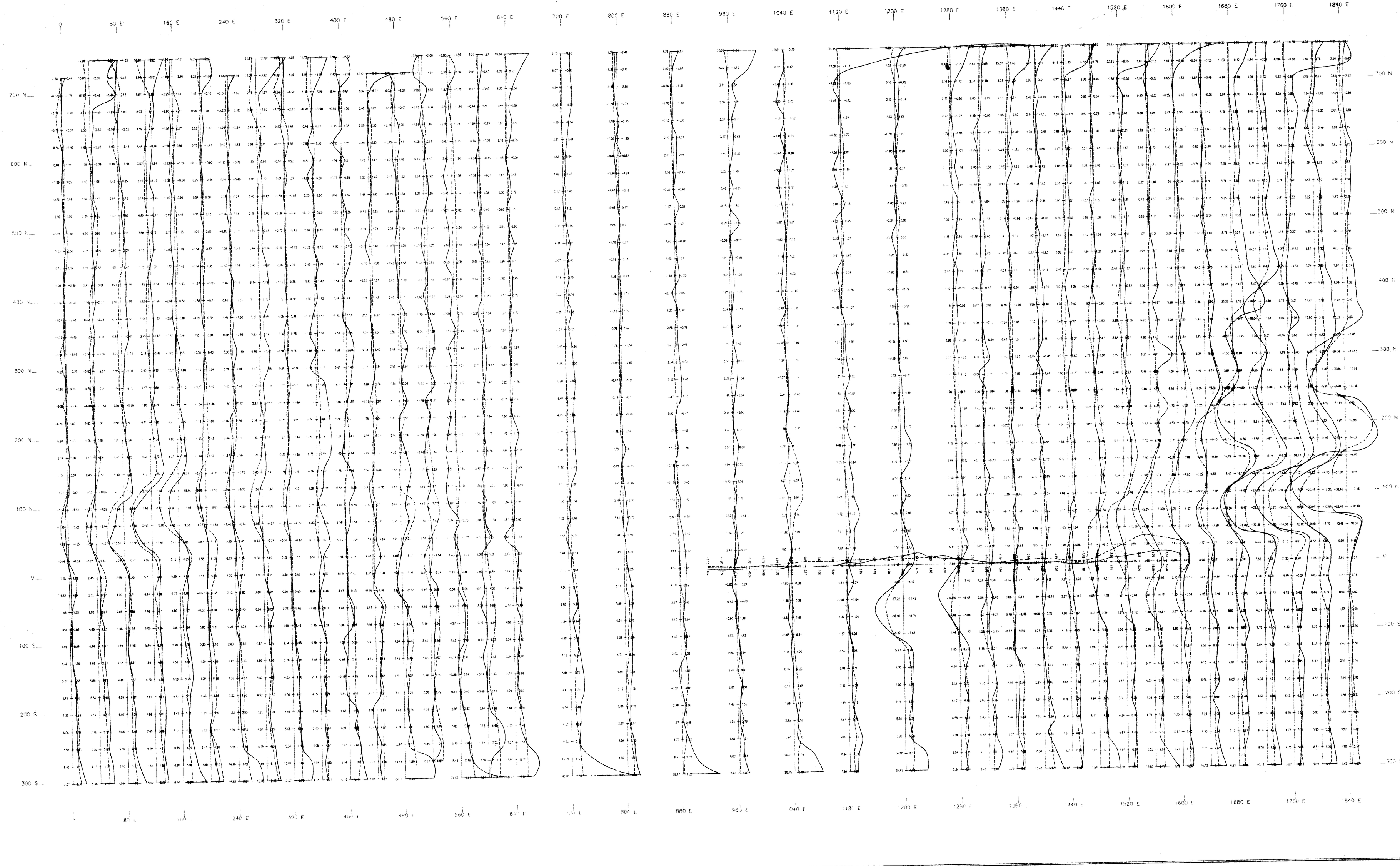


FIGURE 647-10

CYPRUS GOLD (CANADA) LIMITED

MAX-MIN HORIZONTAL LOOP EM SURVEY
STACKED PROFILES - REDUCED SCALE

TULEY TOWNSHIP PROJECT
COMPILED - BOUNDARIES OTTAWA
PORCUPINE MINING DISTRICT, ONTARIO

PLOTTED BY PATERSON, GRANT & WATSON, LIMITED

PRELIMINARY

Scale 1:2000

N

In - Phase
Out of Phase

-20% -10% 0% +10% +20%

0 E 100 E 200 E 300 E 400 E 500 E 600 E 700 E 800 E 900 E 1000 E 1100 E 1200 E 1300 E 1400 E 1500 E 1600 E 1700 E 1800 E

240 S 160 S 80 S 0 80 N 160 N 240 N 320 N 400 N 480 N 560 N 640 N 720 N

FIGURE 647-9

CYPRUS GOLD (CANADA) LTD.

TOTAL MAGNETIC FIELD

TULLY TOWNSHIP PROPERTY

GOMEX - HUMBOLDT ONTARIO
PROSPECTING MINING CONSULTANTS
DATA BY A.C.K. HOWE INTERNATIONAL LIMITED

SURVEY/PROCESS BY MEMOREX, GOMEX & WESTOR LABORS

PRELIMINARY

Scale 1:2000

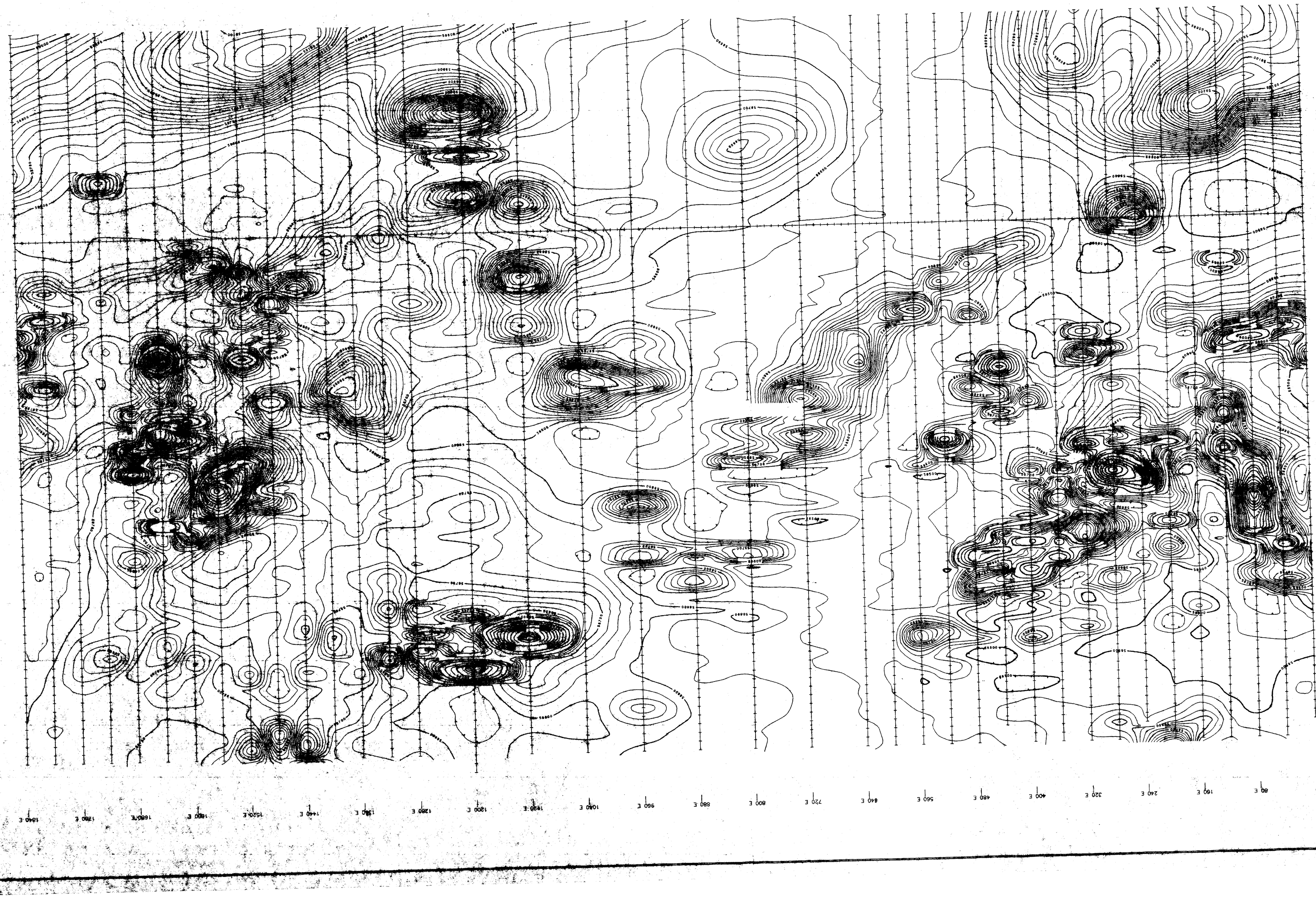
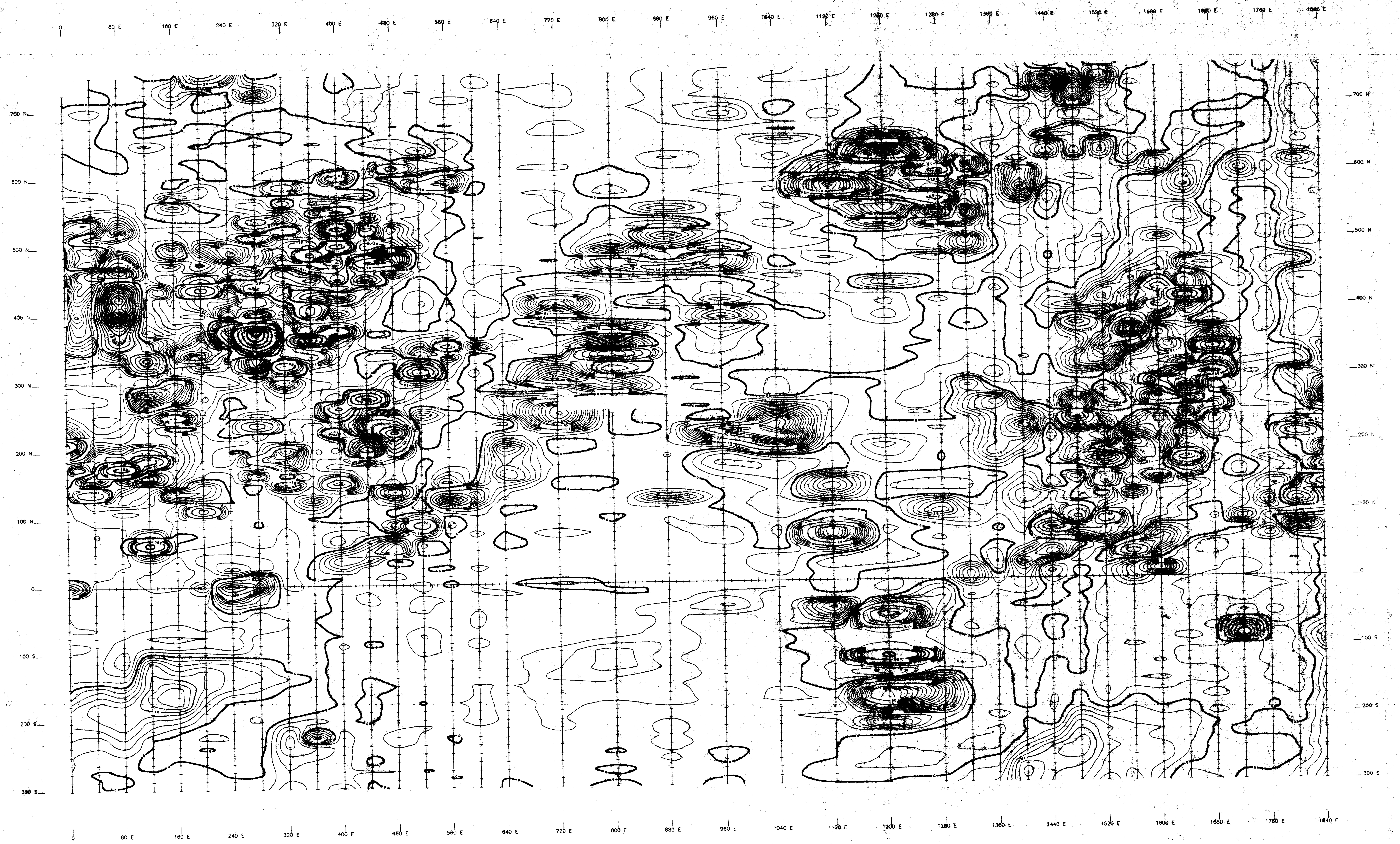


FIGURE 647-7



CYPRUS GOLD (CANADA) LTD.

MEASURED VERTICAL MAGNETIC GRADIENT
TULLY TOWNSHIP PROPERTY

GOWEST - FRANKFIELD OPTION
PORCUPINE MINING DISTRICT, ONTARIO
DATA BY A.C.A. HOWE INTERNATIONAL LIMITED

PLOTTED/PROCESSED BY PATERSON, GRANT & WATSON LIMITED

FIGURE 647-11