

MEMO

VANCOUVER OFFICE

DATE January 27/76TO: Glen HoggFROM: Bill SirolaSUBJECT: Gravel Project. Polished Sections

McIvor's Summary indicates usual problem of spears of galena in Sphalerite but somewhat coarser grain size than Swin or Vanguard (based on comparison with previous work by Sinclair at V.B.C.)

Galena particularly has remained, or become, mobile after pyrite was fractured.

Banding is persistent suggesting original deposition during sedimentation  
W.A.

118  
121

Y.9  
2A

To: MR. G. HOGG

019613

I.D.B.
T.M.B.
J.C.C.
D.M.B.
G.M.B. ✓
<u>E.C.I.</u>
V.J.
B.M.B.
S.P.
G.R.
<del>M.B.</del>
J.P.S.
C.K.W.
✓ E.E.

Rough Study of  
Thin + Polished Section  
from Gum Joint Valve

M. de Quads

6?  
15 Jan 1975.

12402

## QUARTZ-SERICITE PHYLLITE

- Minerals: quartz: very fine, cemented, and very anhedral  
with a mosaic like texture, edges very uneven 60%
- sericite a) thin laminae of rather large x ab with little quartz,  
then tend to occur in large flakes 5-10%
- b) thin, intergrown bands, with about equal amounts  
of quartz + sericite, very fine 20%
- Both slightly pleochroic
- chlorite: small flakes, greenish 2-4%
- biotite? : granular, black, with need to be RI and low  
interference colours; at extinction 2-4%
- Graphite: trace; ~~Trace~~ <sup>Phlogopite</sup> Trace - brown flakes

Texture: finely laminated, and banded, slightly schistose. Appears to be  
two generations of sericite, possibly that of quartz as well.  
Very fine grained.

12403

## SILICIFIED QUARTZ-SERICITE PHYLLITE

- Minerals: quartz: a) fine anhedral intergrown mosaic, unstrained  
b) coarse x ab, anhedral, unstrained, tending to be  
prismatic, parallel to foliation 65%
- sericite a fine grained, parallel to ~~sericite~~ foliation  
minor sericite in crosscutting fractures 15%
- chlorite as above, but extremely fine 10
- opaque magnetite, graphite, pyrite 5%

Texture: well foliated and banded, slightly schistose. Numerous small  
fractures.

12404

QUARTZ - Biotite - Sericite - Phyllite

Minerals Quartz: finely interlocking mosaic; well cemented 40%  
 biotite: fine grains, generally folded around quartz grains 20%  
 Biotite; biotitic, as above, intergrown with sericite 25%

Accessories

Opaque pyrite, usually in the biotite rich bands 5-8%  
 Halobite radiating, bright stars  
 Olivine anomalous bls, rounded  
 Calcite 5%

~~12405~~ Texture: fine interlocking and banded, well foliated

12406

Sericite - Quartz - Phyllite

Minerals Sericite: small crystals in parallel growth, bent xab, intergrown closely with quartz 50%  
 Quartz: very fine grained, both intergrown in quartz sericite and also in bands; rounded, anhedral mosaic  
 Olivine trace  
 Opaque pyrite

Texture: fine grained, banded, shows two foliations, the inconsistent, folded in isoclinal fashion and visible in the flexing of sericite xab.  
 gross banding

12407:

QUARTZ - SERICITE PHYLLITE

Minerals: Quartz: fine interlocking grains. Grain size variable, parallel to both F<sub>1</sub> and F<sub>2</sub> foliations 65%

Sericite: very fine, generally in the finer quartz bands; 25%

Opaque: pyrite, large xals, generally parallel to both foliations; trace Graphite 10%

Texture: fine grained interlocking, well banded and foliated in two directions, F<sub>1</sub> and F<sub>2</sub>, F<sub>2</sub> dominant.

12414

QUARTZ - SERICITE PHYLLITE

Minerals Quartz: fine interlocking crystals; alternating very fine and fine bands parallel to both foliations 65

Note: Hand specimen is bleached & Ser. phyllite. L.H.

Sericite: very fine, generally intergrown in the finer quartz bands 25

Opaque: trace grains

Texture: as above, no obvious signs of bleaching.

12415

QUARTZ - SERICITE - BIOTITE - PHYLLITE

Minerals Quartz: fine interlocking grains; alternating bands of fine and extremely fine xals. 50

Sericite: extremely fine, shows tendency to ~~parallel~~ F<sub>1</sub>, 20

Albite: trace, very fine

Biotite: larger flakes, following F<sub>2</sub> 20

Opaque 5

Fracture: infilled with fine albite; slight offsets.

Texture: well banded and foliated fine grained rock.

12416

Recemented Quartz-Sericite-Sulphide Beccia

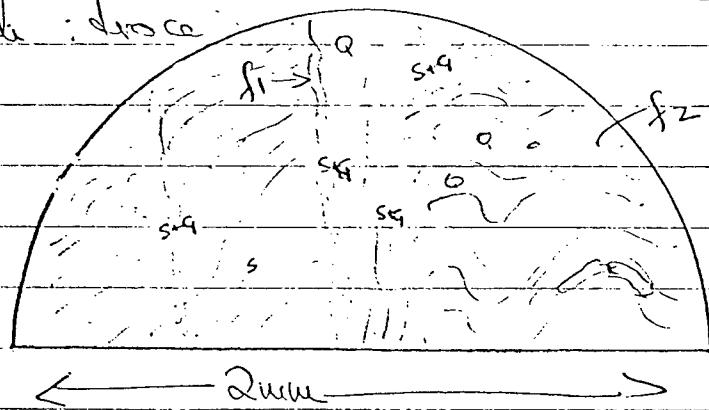
- Minerals: Quartz: a) coarse rounded fractured xab, dusty appearance due to inclusion of sericite; brownish 30  
 b) fine white color mosaic 25
- Sericite: fine grained, in fractures in (a) and integrated with (b) above. ~~Also~~ Also as dusty particles in (a) above. 10
- Opacities (pyrite, chalcopyrite) 15

Texture: very uneven: suggests a beccia. Silicified and recemented. No obvious foliation.

12417

Calcareous Quartz-Sericite-Graphite Phyllite

- MINERALS: Quartz: very fine grained, interstitial, with tendency of elongation parallel to  $F_1$  foliation 30
- Calcite: long laths, up to 3mm; elongation parallel to  $F_1$  and rarely along  $F_2$  foliation 35
- Sericite: very fine, parallel to  $F_1$  foliation; also  $F_2$  foliation but crystals 25
- Graphite: generally parallel to  $F_2$ ; but rarely  $F_1$  10 25
- Chert: trace



TEXTURE: Banded, the two foliation shown by orientation of minerals. very fine, intergranular texture. Overall a silicified texture. Foliation also shown by segregation of minerals.

12419

QUARTZ - CALCITE - SERICITE - CHLORITE - PHYLLITE

Quartz	: fine, intergranular, rounded to irregular anhedral	30
Calcite	: large, irregular anhedral xab; obs in fractures	40
Sericite	: fine ground, elongated parallel to $F_1$ ; slightly ducty	30
Chlorite	: <del>fine</del> platy, interstitial fine	15
Opacques		2%

Texture: banded, well foliated with generally good mineral segregation.

12422

QUARTZ - SERICITE - CALCITE - CHLORITE PHYLLITE

MINERALS

Quartz	: fine, interstitial, irregular anhedral grains, groundmass	30
Calcite	: large, rounded, irregular anhedral	20
Sericite	: bent laths, following $F_1$ and $F_2$	30
Chlorite	: platy, very fine	20
Opacques	: trace	

Texture very swirling  $F_1$ , cut by  $F_2$  foliation well indicated by bent chlorite and sericite laths. Rock well banded and foliated; denoted by segregation of minerals in both  $F_1$  and  $F_2$ .

12425

## MINERALS QUARTZ - SERICITE CHLORITE PHYLLITE

Quartz: very fine, interstitial, irregular anhedral ~~20~~ 40Sericite: thick bands of fine but wavy laths, in F<sub>1</sub> ~~40~~ 40obs across quartz bands in F<sub>1</sub>

Calcite: larger x obs, irregular, possibly non-streaked 5-10

Chlorite: large flakes, full of inclusions, brownish 10

in part

Phlogopite: large brown flakes, pleochroic

Opacities: trace

Texture: Banded, well foliated. Banding caused by segregation of mineral. F<sub>1</sub> folds very contorted and refolded. F<sub>2</sub> irregular p but persistent. Minor lenses of slightly coarser quartz.

12426

## Fuchsite - calcite - zeolite? - phyllite

## MINERALS

Fuchsite: green, irregular, swirling texture 40

Quartz: extremely fine, interstitial, barely visible ~~20~~ 5-10

Calcite: larger grains, anhedral, banded 20

Opacities: 10

Zeolite? dull, if very fine; possibly laumontite? 20

Texture:

Banding present due to calcite and fuchsite; ~~textural~~ grain microscopic, barely visible

12428

MINERALS GRAPHITE-SERICITE-CHLORITE-QUARTZ PHYLLITE

Graphite	parallel to $F_1 + F_2$	} very fine	35
Sericite	" " "		<del>30</del> 30
Chlorite	" " "		20
Quartz	very fine, interstitial		15
Opagres	trace		

TEXTURE: swirring; shows both  $F_1$  and  $F_2$ ; both of which are folded. Foliation shown by orientation of folky mineral and by segregation of minerals.

12434

MINERALS

Quartz	very fine, anhedral, interstitial, tends to be elongated parallel to $F_2$	40
Sericite	very fine, shows both $F_1$ (rare) and $F_2$	40
Sulphide	opagres.	20

Texture: as above.

Thickness uneven —

12437:

QUARTZ - BIOTITE - CHLORITE - GARNET PHYLLITE

MINERALS

Quartz	: very fine, anhedral, <u>isotaxial</u>	30
Biotite	: brown, in optical continuity with chlorite; large flakes; full of inclusions:	<del>20</del> 25
Chlorite	: large ground flakes, in optical continuity with biotite; large amt of inclusions	<del>20</del> 25
Garnet	: porphyroblasts; very broken; with inclusions of chlorite and quartz, rarely biotite pinkish	10
Sericite	: trace	5
Opacities		5
Calcite	: trace	

TEXTURE: swirling texture, controlled by flakes of Biot + Chlorite.  
disseminated porphyroblasts of garnet. Slightly  
schistose

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# OBJECTIVES

1-3mm

M.P. DIAMETER 2mm

H.P. 4 0.2mm

11

## 12408 BANNED MASSIVE SULPHIDE

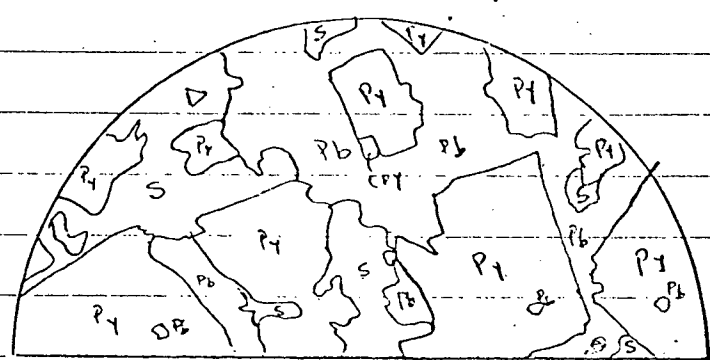
Pyrite average size 0.2-0.4mm

generally euhedral to subhedral to anhedral

minor inclusions of PbZn (mostly Pb)

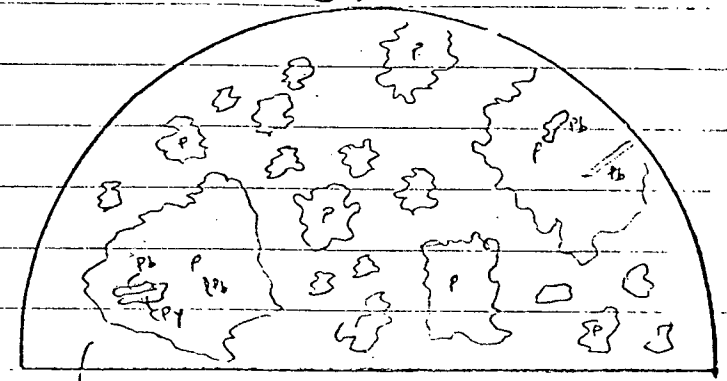
PbZn interstitial, totally anhedral, cementing Py grains.

CPy rare, fine xals up to 0.05mm long.



DIAMETER 1MM

(a)



DIAMETER 2MM

fine interstitial Gn/Sp less than 0.02mm, average grain size

### TEXTURE

BANNED; ALT. BANDS SHOWN IN ABOVE TWO DIAGRAMS

a) PYRITIC BANDS TEND TO BE COARSER, WITH EUHEDRAL PYRITE WITH SLIGHTLY 'CORRODED' EDGES, THESE BANDS CONTAIN LARGE PLATES OF ANHEDRAL GN + SP

b) THE RICHER BANDS CONSIST OF DEEPLY CORRODED AND EMBAYED ROUNDED ANHEDRAL PYRITE CEMENTED IN A MATRIX OF VERY FINE DEEPLY EMBAYED AND INTERGROWN PSP AND GN

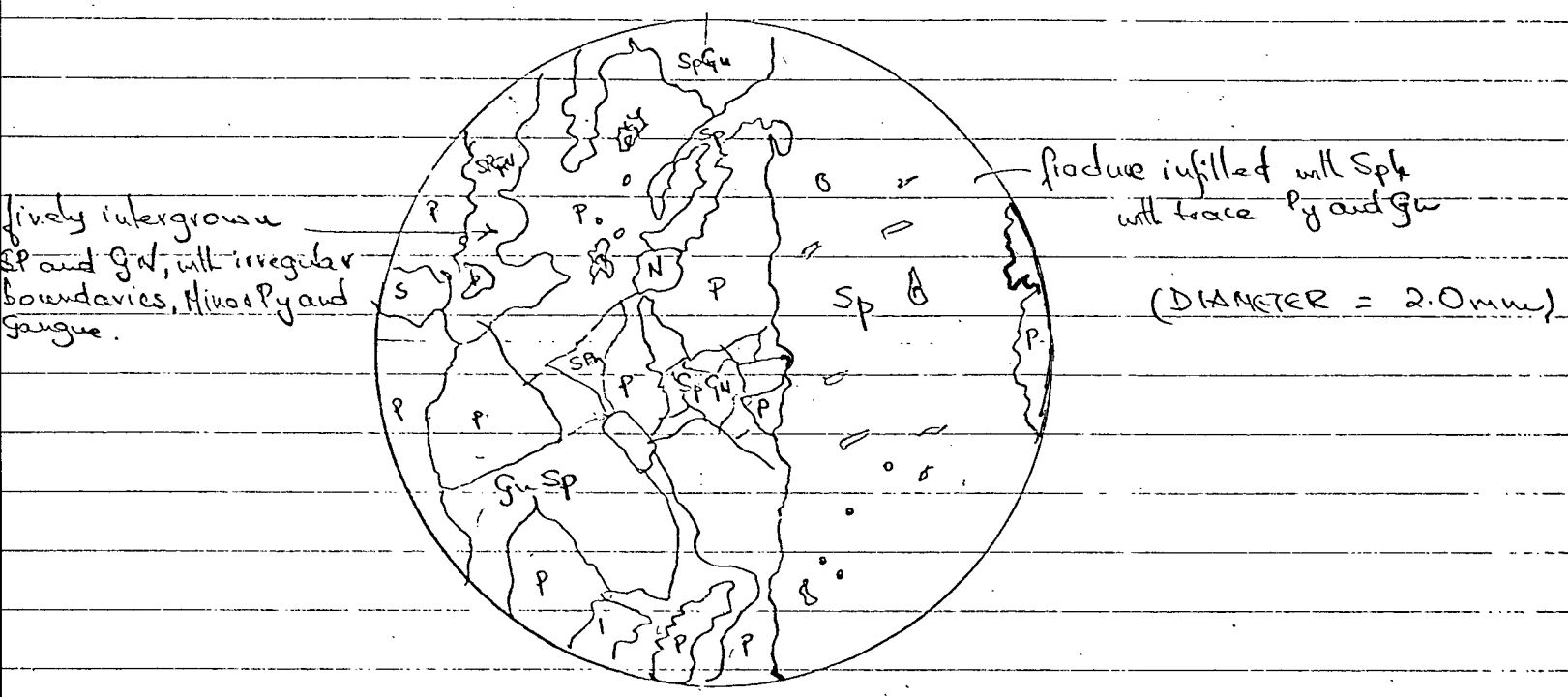
c) <sup>VERY</sup> MINOR NON-OPAQUE GANGUE WHICH IS GENERALLY AS INCLUSIONS IN SPHALERITE.

12410

# MASSIVE SULPHIDE

Pyrite : rounded anhedral grains, averaging 0.5 - 0.8 mm  
 with embayments of Gu and Sp  
 ± minor inclusions of Gu and Sp, less than 0.05 mm  
 generally rounded.

Galena + Sphalerite : interstitial and intergrown, anhedral, grains rarely  
 larger than 0.2 mm, averaging 0.05 - 0.04  
 ± inclusions of py and minor nonopagues.

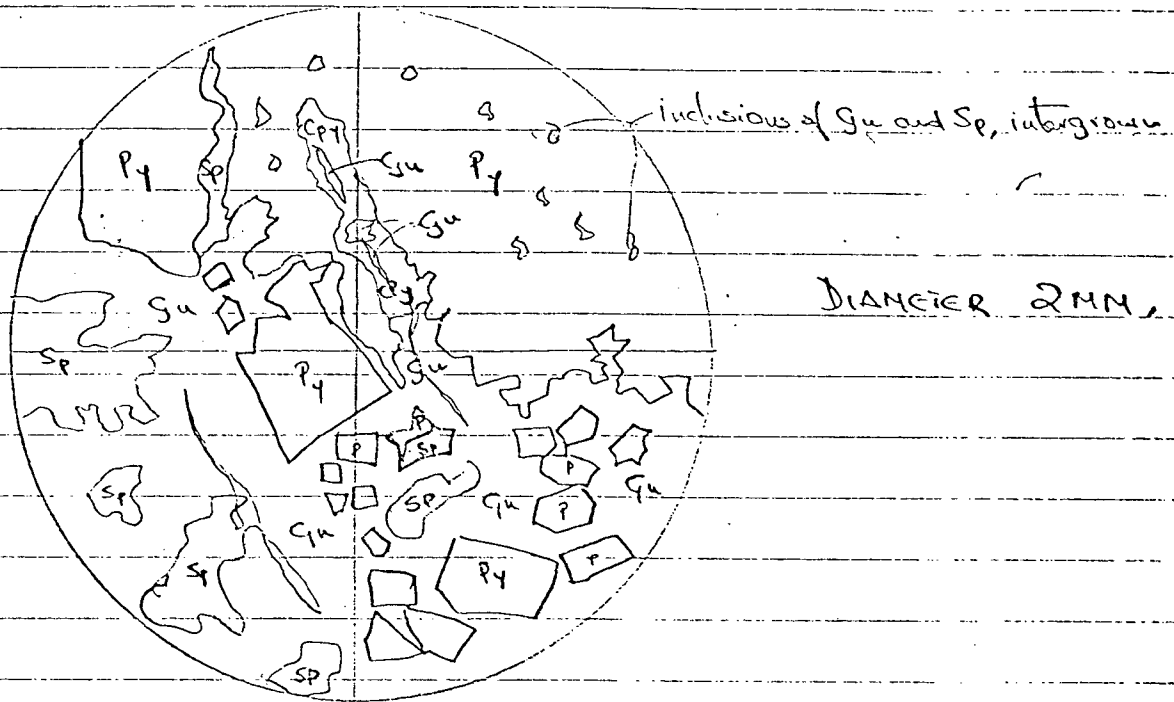


Texture: Essentially larger anhedral Py cemented by a fine matrix of intergrown Gu and Sp with minor Py. The Gu/Sp often growing into embayments in Py. Minor Gu/Sp also present in very small inclusions in Py.

12411

BANDED MASSIVE SULFIDE

MINERALS: Pyrite; large rounded xls up to 10mm. across; deeply 'corroded' and anhedral, with inclusions of Gu, Sp, generally less than 0.2mm. Numerous fractures infilled with Gu; rather dusty, large fracture filling 2 small euhedral crystals, 0.05 - 0.5mm, generally clean except for rounded Gu inclusions (up to 0.01mm)



Galena: interstitial to pyrite, with inclusions of Sp's and Py.

Sphalerite: interstitial with galena, generally as inclusions within galena; very irregular edges

Chalcopyrite: minor, as inclusions within pyrite

Non-opaque: rare, very small (less than 0.01mm)

TEXTURE: Very uneven grain size; consisting essentially of Py grains cemented by Gu with inclusions of Sp and Py. Large Py grain edges show composite crystal edges, the reentrant surface being infilled by galena. Overall interlocking,

12412

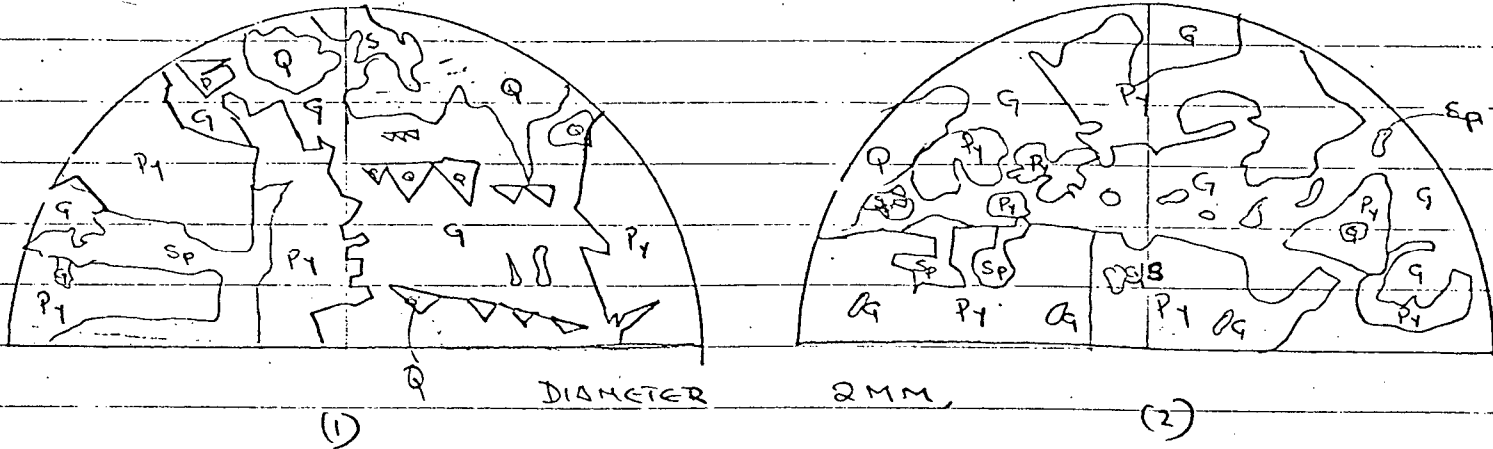
# QUARTZ - SULPHIDES

MINERALS: Pyrite; euhedral to anhedral, often deeply 'corroded' and embayed.  
grainsize very variable.

Galena; large xab, often a euhedral to anhedral

Sphalerite; irregular edges, interstitial also.

Quartz; anhedral, with inclusions; intergrown with Sp + Gu



TEXTURE: Fine heavily intergrown with deep embayments into the pyrite by both quartz and galena. In (1) quartz has apparently grown under crystallographic control of galena. In (2) deep 'corrosion' is seen in pyrite. Galena generally appears to form the interstitial matter, except rarely as in (1) where it forms a distinct crystal. Sphalerite is included within galena. Trace Chalcopyrite in the quartz.

12413

# QUARTZ - BARITE - SULPHIDES

MINERALS QUARTZ

40%

BARITE

15%

PYRITE

irregular, corroded & embayed, intergrown with q + ba + cpy 40%

Galena

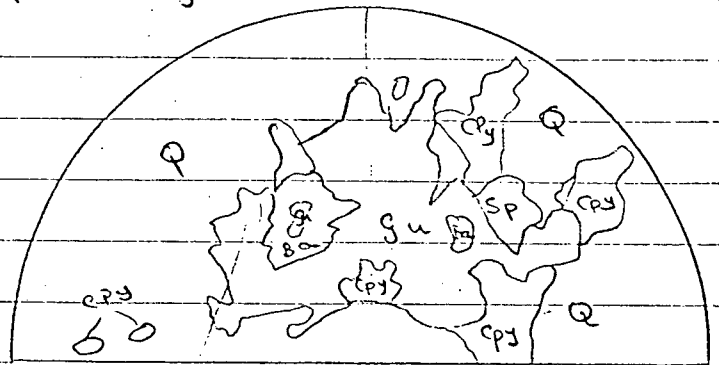
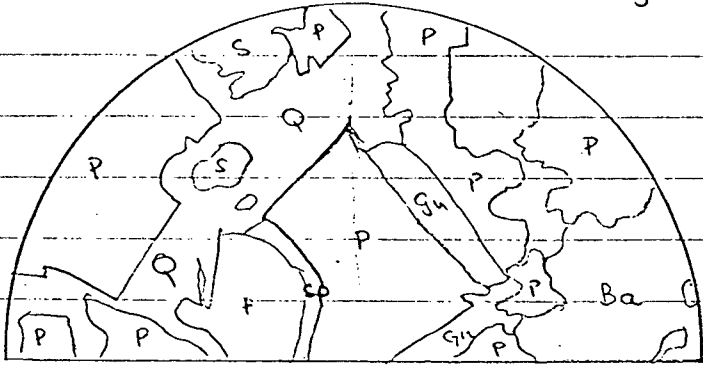
irregular, as above

Sphalerite,

irregular, as above

Chalcopyrite

irregular, often with galena



TEXTURE: very fine, intergrown, rarely xab subhedral (esp. pyrite)  
 generally totally anhedral with embayed or 'csundered' edges.  
 Cpy generally above in quartz but rarely intergrown with  
 galena and sphalerite.  
 Banding (F<sub>2</sub>) obvious under low power due to  
 grain size and PbZn distribution.

12430

# QUARTZ - SULPHIDES

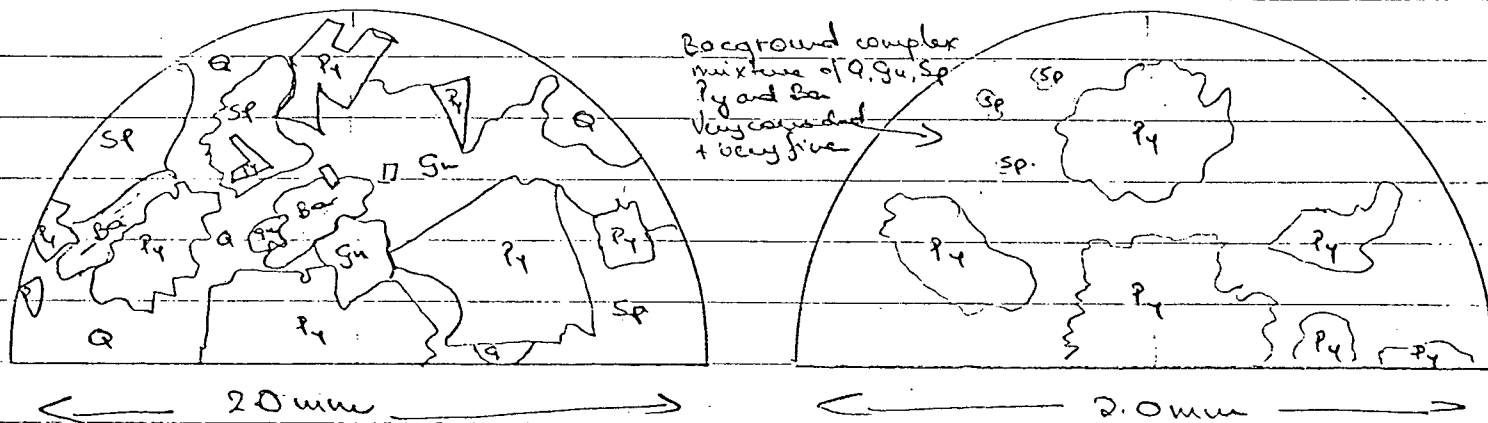
MINERALS : Quartz : euhedral, irregular

Pyrite : euhedral to subhedral, alt. layers of  
of euhedral and corroded subhedral tabs  
usually above 0.5 mm, two generations.

Sphalerite : interstitial, with inclusions of Py and ~~Sp~~, Zn  
very irregular

Galena : very irregular, abraded, in sph.

Barite rare, irregular



TEXTURE : Alternate bands of relatively subhedral pyrite and highly corroded pyrite. Grain size generally very fine, often less than 0.1-0.3 mm, with exception of Py which may go up to 0.5 mm. Crystals interlocking, and embayed.

12432

# MASSIVE SULPHIDE

MINERALS : Pyrite : a) euhedral, slightly rounded edges, with inclusions of  
Gn and Sph ; xab 0.5-1mm

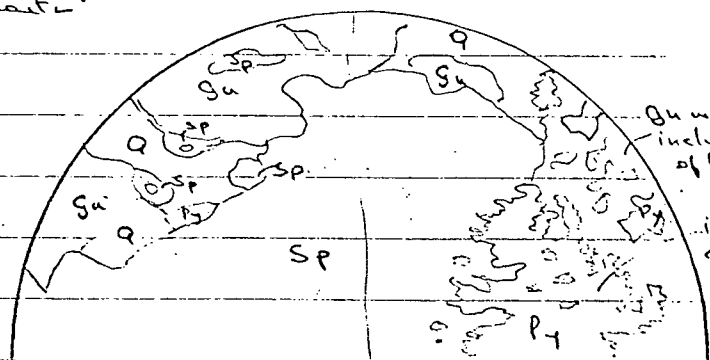
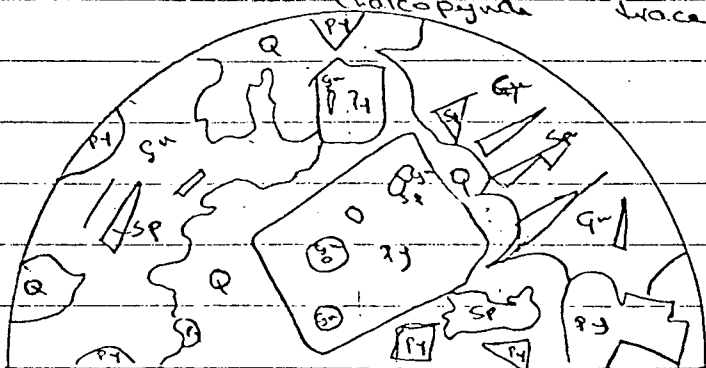
b) very corroded and broken ; xab up to 3mm

Quartz : interstitial, with inclusions

Sphalerite : anhedral, often rounded ; also as inclusions in Py (up to 3mm)

Galena : anhedral to subhedral ;

Tetrahedrite ? two small specks less than 0.01mm,  
trace, in quartz

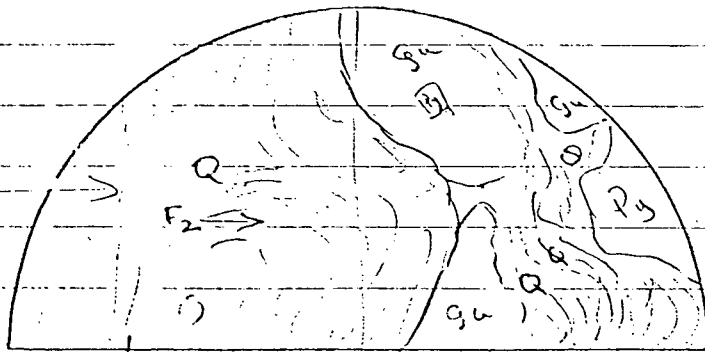


← 2mm →

← 2mm →

TEXTURE : very fine ; banded, Alternate bands consisting of euhedral and subhedral pyrite. Pyrite and Galena commonly intergrow. Pyrite especially when euhedral contains inclusions of both Galena and Sphalerite. Non opaques (graphite?) in quartz show both foliations

quartz with very fine inclusions of py-ga oriented along F<sub>1</sub> and F<sub>2</sub>



← F<sub>1</sub> 2mm →

12433

# MASSIVE SULPHIDE

## MINERALS

Quartz: dusty, numerous in tiny inclusions

Baryte? : as inclusions in Gu; also as interstitial

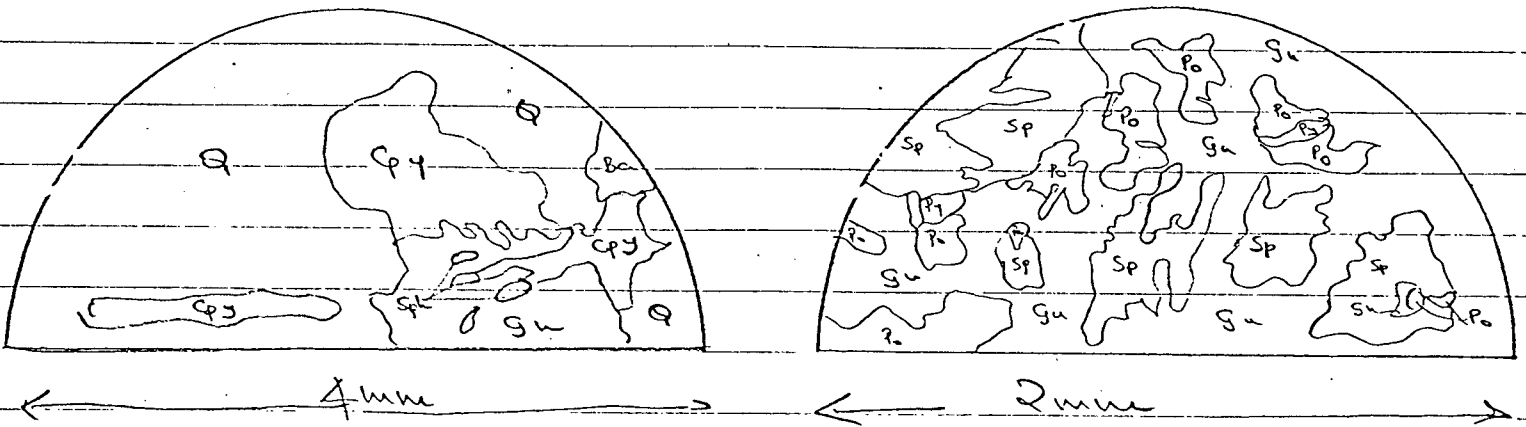
Galenite: large xals up to 3-4mm; also interstitial

Sphalerite: large xals up to 3-4mm; " "

Pyrite: generally euhedral, 2-3mm

Pyrrhotite: very fine, disseminated

Chalcopyrite: large xals, up to 1mm. 1-0.5%



TEXTURE: Overall, grain of Gu, Py and <sup>Po</sup>Sp and Ppy cemented in a Gu matrix. Grain size averaging 0.1 - 0.5mm, larger grain size in more quartz/baryte rich bands.

Note: This is a very high grade band specimen

43C

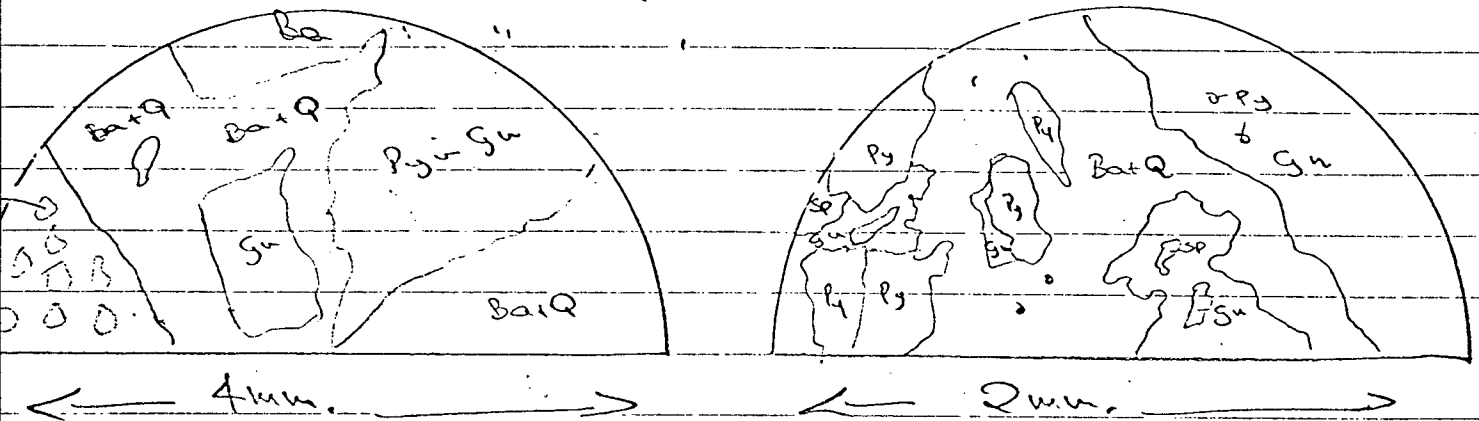
# SULPHIDE BRECCIA.

Minerals: Pyrite: large xab up to  $\approx$  30mm, intergrown with Gu

Gu: intergrown with Py; also in fractures

Sp: trace

Quartz: cementing



Texture: The pyrite xab highly fractured and recemented by galena with minor sphalerite. These plates in turn cemented together by a matrix of Ba+Q and also Gu