GIBRALTAR FIELD NOTES – 1998

677003

D. Lefebure

Δ3 o/c of okiocrystic tonalite, cut by two thin aplitic dykes – < 5cm parallel to NW trending, SW dipping

Discussed agenda for next 3 days and outline for fieldwork article.

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Brenda Occurrence - Okiocrystic

Aug. 31, 1998 hot, sunny

Chris Ash

Δ1 stopped on road to dump, new bulldozed gulley with occurrence of sericitized-qtz intrusive in contact with sheared mineralized zone with minor malachite on ½ white and black coarse-qtz-plagioclase with sericite on shear planes – black mineral on foliation surfaces – ? chalcocite ??

~15m across foliation

Photo-1 – Chris on Brenda occurrence

Photo 2 – coloured pencil on sheared copper-rich rock

Δ2 large o/c north-east of mill in large clearcut

– okiocrystic quartz-plag-chlorite "tonalite"

– C.I. – 10-20% – pistachio epidote pervasive

Photo 3

1

METRIC FIELD(S)

- precious metal values increase in Gib North
- [illegible] particularly, but also [illegible]

[illegible] – started on stripping for the setback of [illegible] pit – [illegible]
- can start mining there if get set back done
- are making money at today's copper price
- leach operation to shut down – not making $
- Mo significant – $200 per tonne – shipped 550,000 lbs in [illegible] & July
- new circuit in mill
- also negotiating on power costs, with workers, service contractors and co-owners of [illegible] ground

Paced off NW wall at bench at level of access, one or two benches down

METRIC FIELD(S)

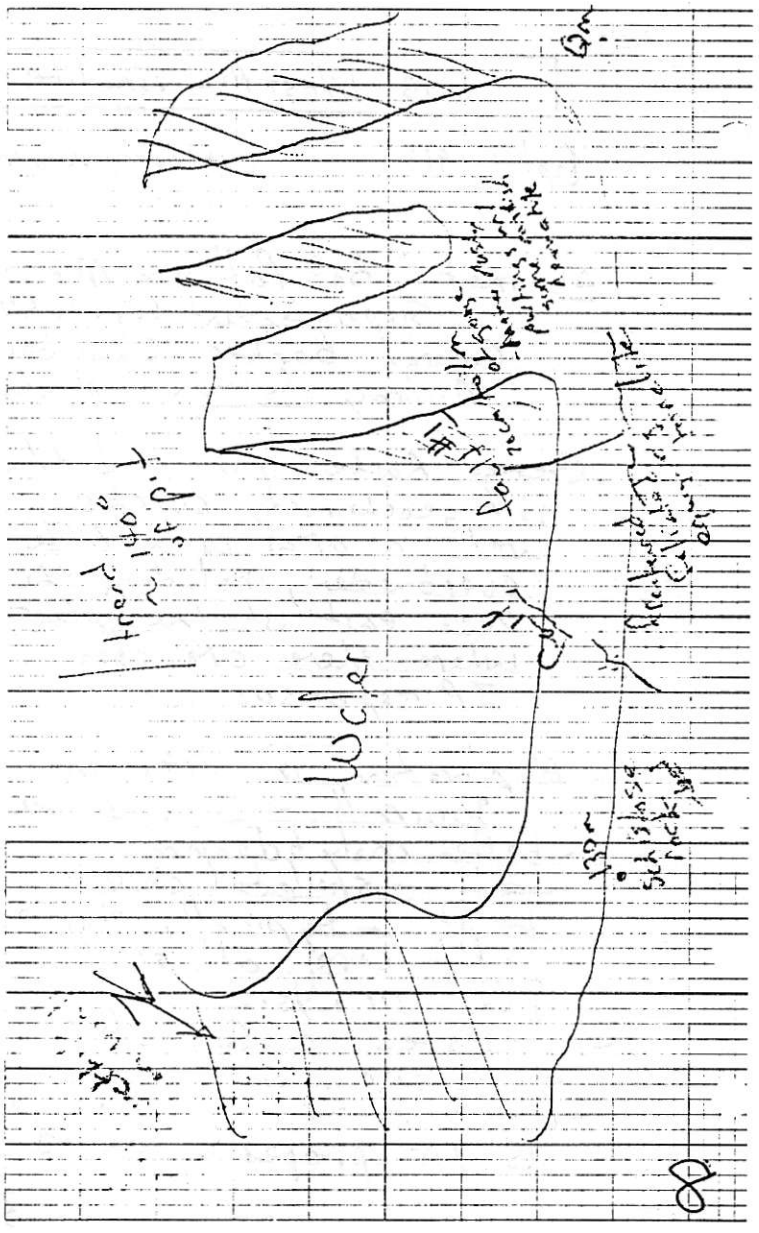
GIB WEST PIT – Tonalite

Sept 1, 1998 overcast, warm

Al met Bob Patterson Mine Superintendent (Equity Silver)
George Barker – Senior Geo
Murray Rydman – Expl. Geo

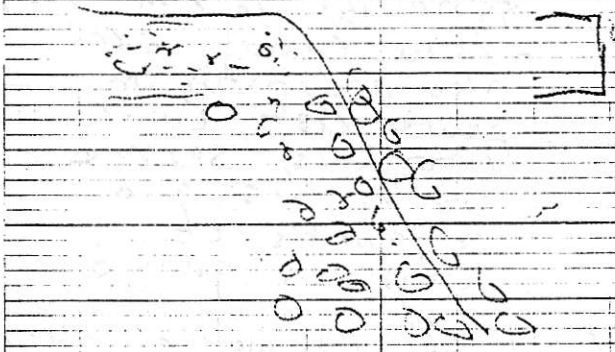
George Barker mentioned the soil geochemistry works well in areas with little overburden, including the area east of the plant where there are also IP responses

Exploration in 1996 on Sawmill – a resource
- better molybdenum
- all – skeletal core kept – typically don't split core, all sent for analysis
- interested in Gib West extension
- [illegible] as not properly tested



Bob Patterson

- mentioned that copper reported in the fines when placed on the waste dump
- large boulders rolled down dump and fines collected on top
- start 0.16% Cu and can get up to 0.25 to 0.3%
- mine top 50m at 150m pile



~2950m bench

Δ1 25m

- greenish spotted intrusive - m.g., 1 to 6mm, ~10% qtz, 30-40% chlorite patches, remainder is wkly sericitized plagioclase, trace glassy brown mineral (garnet?)
- patchy malachite obvious on planar fractures, but also occurs along foliation plane throughout rock
- fractures also can have rusty stain

DM-98-110 - malachite flecked greenish m.g. tonalite

also thin fracture (<3mm) with minor malachite, hematite/limonite? after pyrite and qtz that roughly parallels foliation

Δ2 30m

still foliated m.g. tonalite, some malachite and manganese stain on fractures - much less than Δ1

- numerous epidote veinlets, 3 to 10mm generally, paralleling & at moderate angles to foliation
- cut by chlorite seams??, very thin
- trace diss. py? in rock
- epidote also cut by rusty fracture (thin) with malachite

Δ3 35m

m.g. tonalite with epidote veinlets, very minor malachite, plagioclase more altered?, clay-white colour in fracture-controlled rusty zones, wtr epidote?

- also a 2 to 3mm qtz veinlet with oxidized py-cp? - sphal?, Crosscuts foliation
- within 4m of fault #1

Δ4 36m

Fault #1

- exposure of fully massive green chlorite with coarsely crystalline white quartz in hanging wall of fault, some manganese stain in immediately adjacent wall rock

- along fault chl-qtz veinlet with cavities on weathered surface cuts epidote veinlets

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Pollyanna Pit with Murray

Δ5 Pushback Area near shovel shut down – low grade mineralization outside orebody

Photo 5
qtz - felty chlorite - carbonate with chalcopyrite blebs
coarse
- hammer

Photo 6
Mine Phase – "barren" Murray's example
- saucerisitized, 10-20% micas
- trace diss cp

DVL-98-111

- some rusty foliated zones cut walls of bench
- contained pyrite
- can see hornblende in granodiorites (mk) at Sawmill
- doesn't appear to alter or mineralize tonalite

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Photo 7 – looking back at shovel roughly north
- last mineralization this side of shovel at boulder point not obviously related to a shear zone

Photo 8 flare on hematite altered tonalite near white tonalite
- hard purple hematite adjacent to rusty shear zone, but not necessarily an envelope
- hematite irregular, ~1m width

9,10

Δ6
Granite Lake Pit
- exposures along access road – near bottom (filled with water)

Photo 9 – qtz - molybdenite vein - minor chl. + carbonate

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Conclusions

- styles of veinlets

Ep - epidote - replacement
usually epidote interlocking
with breccia grains
< 5cm? - ~~sometimes~~ (rarely) can see qtz
pale green grains (remnants of equigranular
generally, thin qtz?) in epidote
Cl... - not seen to crosscut any
veins yet,
- not associated with sulphides

Cl/Sil - chlorite selvages on tight
< 8mm wide
fractures ± qtz ± py ± cp?
in fractures (< 2mm?)
- crosscut epidote veinlets
- Murray says density of
fractures corr. relate
to mineralization
- can be "conjugate"
- often cut foliation

Mag - saw a few examples
of magnetite veinlets,
and patches - with
qtz - chl ± cp ± py
- in mafic tonalite
- only noted in Granite
Lake pit and near
Immonite zone in Polly area
- ? relationships

Photo 12 - pencil on foliation
- hammer
- foliated tonalite cut by chlorite - pyrite - qtz veinlets at different angles - appears with chloritic selvedges - tight but occassionally qtz - pyrite appear to fill an open space
- rock saussesitized
- some patchy hematite

DVL-98.112 - better qtz veinlet
- not same as photo

Photo 13 - A Chris & B Murray on O/C
- Chris on foliated sheared zone with sericite - diss py - iron-carbonate
- Murray in chlorite-rich tonalite high grade

Photo 14 (A) qtz - iron carbonate vein with shiny sericite

Photo 15 (A) qtz - carbonate vein cuts foliation and pyrite-qtz veinlet above black pencil up

17

(B) - should run well Murray
- more chloritized
- some magnetite - qtz - c veinlets

(B) Photo 17 chlorite-rich tonalite with abundant fracture controlled pyrite

(B) Photo 18 magnetite - chl. - qtz pyrite

Δ7 ~~to~~ decline into Pollyanna - NW wall

Photo 19 - pyrite stockwork in wkly oxidized acid leached rock

Photo 20 brassy grey pyrite veinlets with qtz near pencil and chloritic-pyrite

Δ8 overview - Gib East Photo 21

Δ9 Connector Zone - phase 1 p between Gib East 4 Pollyanna

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Conclusions cont.

Qtz-Chl Open Space
- coarse grained white quartz veins, sometimes by themselves, often with felty chlorite and minor white carbonate (weathers out), can have splashy chalcopy ([illegible] in ore zones only?)
- can have associated epidote away from ore zones

- cut epidote & chlorite selvedge veinlets

Moly-qtz veinlets - one stage of moly mineral.

Pyrite-Qtz
- <1cm pyrite veinlets seen in Gib West, Pollyanna
- associated qtz chlorite?
- fill fractures, - no selvedge in Gib West, selvedges in Pollyanna?
- cut epidote
- not seen with chlorite selvedges

Conclusions Cont.

- diss. mineralization is weak, rarely ~~[illegible]~~ seen so far
- in SW Pollyanna pit was some ~1to2% diss. cp along with veinlets
- IP anomalies related to 1-3% pyrite
- less pyrite than normal for a porphyry?

Alteration
- epidote as pervasive altn widespread - [illegible] it in shear zones
- where else,
- sericite or plag: [illegible] in places
- some possible calcite (clay) altn of plag.
- ferromagnesians converted to chlorite in mine area
- pyrite often converted to hematite

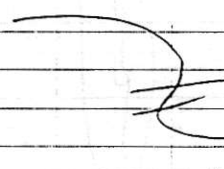
Structures
- gouge along narrow faults (<1m)
- phyllitic paper schist along [illegible] up to 3m.
- major [illegible] fault in Gib West

Photo 22 – part of zone has extensive acanthite and black, thick tenorite (Cu)

A10 Ross Lake shear zone

Photo 27 – sheared diorite – called Cache Ck

Photo 28 – phyllitic sheared "mylonite" tonalite – called Cache Ck



? assays along bench into Gib West

? more vein relationships

? any primary igneous foliation? how could you tell

? metals zonation in Gibraltar

POSSIBLE SEQUENCE OF EVENTS – Chris

① constructional arc volcanism + plutonism 205 m.A. + Early Jurassic volcanics
– sit on tuffaceous cherts Upper Triassic
– with differentiation of intrusion

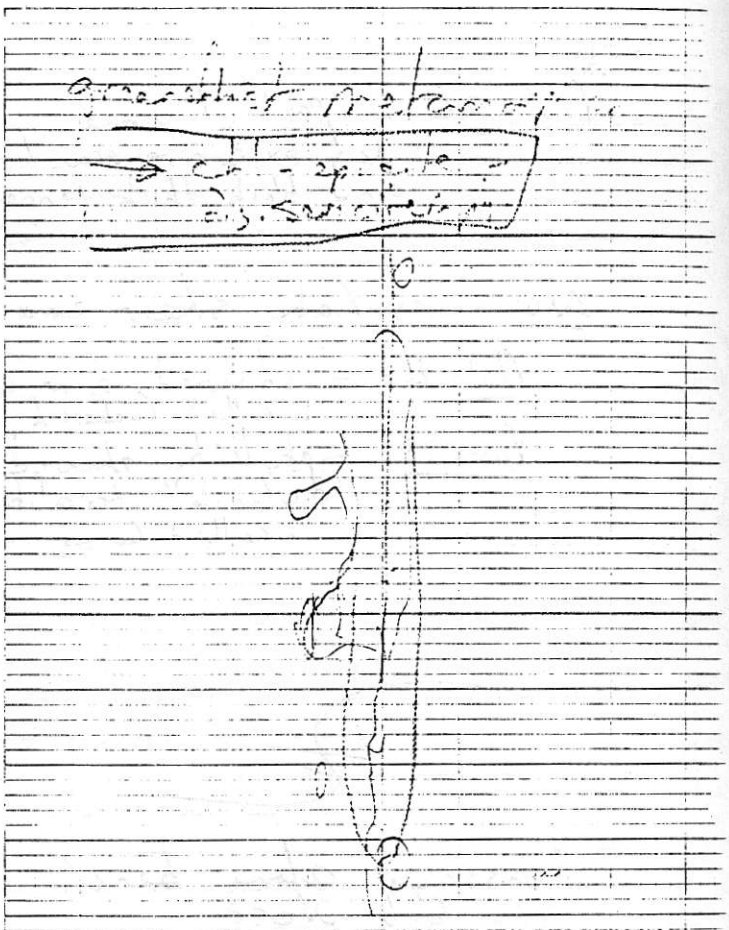
② accretion / collision obduction onto Cache Ck

(shear zones krenulated) a/ii – fabric produced in all rocks – [illegible] folding

a/iii, ongoing deformation – cru

b) [illegible] [illegible] regional metamorphism

c) [illegible]



How many dates on hydrothermal minerals.

Gibraltar East Pit - FOLIATION

Sept 2, 1998 Murray Chris
sunny, hot
2695
Δ1 ~~2755~~ bench, shovel shut down
- high grade Skarnset Zone ≈ 3
310 - 315
- cut off is 0.18% Cu?

- host is a m-g plag-qtz-chlorite tonalite - pervasive epidote and some weak veins
- abundant cpy, but only minor pyrite
- should run better 0.20% Cu (MR)
- strong linear foliation, stretching ratio of 5:1, x-section shows lots of chlorite, but breaks along foliation look more sericitic (shiny)
- MP - darker colour indication of good grade
- sulphides mainly as 5cm and thinner fractures, also hairline distance fractures and some diss.
- mineralized veins appear to be ~ foliation

25a

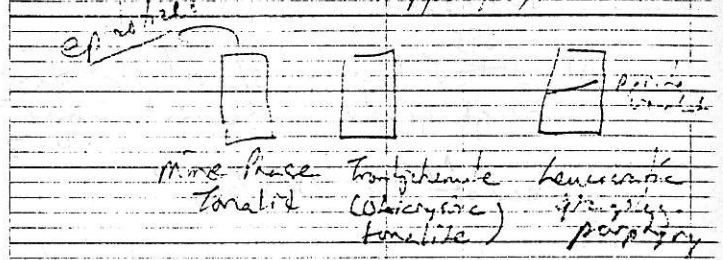
(3) late faults
NE trending
- offset plutons + veins
- high angle
- no penetrative fabrics

25

(5th)
- if it darkens up, it is higher grade
"Good rule of thumb"
- fabric in rock would control fluids
- can overwhelm rock and leave qtz
- poly cores - ∅ environment
- hot fluids saturating rock and following fabrics, deep ductile environment
- changes = typical
Cib West - higher regional
- more dumping
- lower grade at more depth
Sawmill Zone - border phase hot
- core zone of tonalite
- leucocratic phase

26c

Photo 29 - three pieces of core photographed in hyperspectral unit



Photos 30, 31, 32 core samples

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-epidote veinlets foliation and sulphide veinlets - no selvedges noted on sulphide veinlets

Photo 33 - spectacular chalcopyrite with small piece with molybdenite on top
- contains chlorite
- like Gem qtz veins north of mine which carry higher Mo and less Cu
- in Trondhjemite

- qtz-cp-mo-chl veinlet possibly associated with north-dipping granulated shear with rusty-brown staining

Photo 34 - qtz vein cutting roughly N/S irregular foliation
- cp in veinlet
- red pencil

Photo 35 - regular foliated high grade with veinlets parallel to foliation
- cp rich, very minor py

Photo 36 - smeared cp N/S to foliation in sericite and chlorite (green sericite?)
- red pencil

- can see epidote veinlet cutting foliation and sulphide veinlets

Photo 37 - leucocratic 'patch' of tonalite? - only brassy, stringer pyrite, sericite - no mafics

- from large ~~in place~~ boulder, in ore zone tonalite

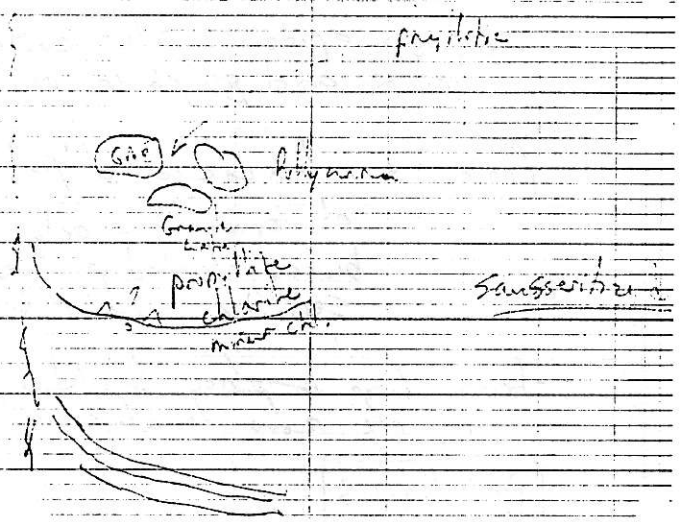
DVL-98-113

a) good cp in foliated tonalite
b) similar, good veinlet
c) leucocratic pyrite only patch in tonalite
d) photo 36

lunch in core shack

DDH 98-15 Box 30 - split core

- sericite = carbonate can produce poker-chip core



Common focused on graphitic zone - good IP anomaly

METRIC FIELD (S)

Photo 1,2 - Gib North core

- unmineralized foliated, epidotized tonalite
- darker tonalite with diss. pyrite, plagioclase altered to sericite (gray) = "chlorite darkened" tonalite
- gray intensely sericite altered (tonalite?) with quartz grains cut by thin quartz veinlets with loads of cp and pyrite in veinlets and matrix
  - "qtz-pyrite-sericite"
  - some qtz (patches) with sulphides
  - in core looks a little vein-like

Δ3

North of Tailings Lake

- trondjhemite - altered
- pervasive epidote - cut by chlorite - qtz vein

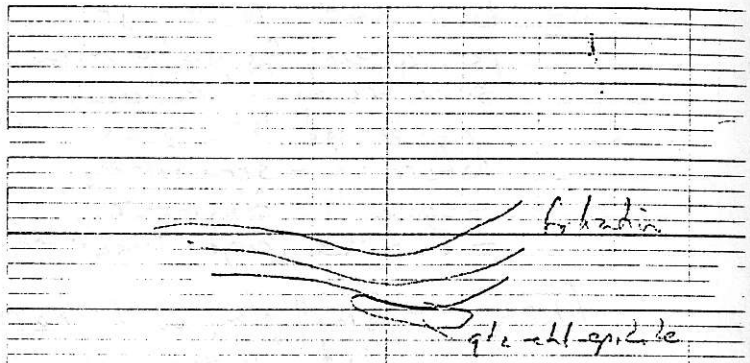
Photo 3

METRIC FIELD (S)

Δ4 drive north to o/c of pale green, fg. mafic volcanic, some fragmental material, interbedded lst rocks deformed - some folding - some lst fragments - Jurassic age suggested

Photo 4 - small plant with hairs and a few rain drops

Photo 5 - qtz-chlorite veins (quartz abundant) cutting mafic volcanic



see bench plan grade map for sample locations

DVL 98 115 - parallel veinlets with qtz-pyrite cutting m.g. tonalite

low grade? - tonalite mostly epidotized but some small zones roughly parallel to foliation

"seeing things"? → are ~~more~~ whitish with less epidote

- veinlets possibly thicker
- wk to mod. foliation
- didn't notice any cp
- veinlets on average thicker (up to 1½ cm) and more widely spaced than (114) (4 to 30 cm)

DVL.98.116 chalcopyrite - quartz veinlets following contorted foliation in variably bleached tonalite - some epidote in bands - moderate foliation

high grade

Photos 9, 10, 11 hammer & pencil

- mineralization in foliation but not all parallel laminae

Gibraltar East -- DETAILED SAMPLING

Sept. 3, 1998 Clear, hot
Murray, Chris

Δ1 examining changes in mineralization across sunset shear trend down ramp off 2690 bench on northwest wall

- see epidote with qtz-chlorite-pyrite veins (patches) - larger (20 cm to ½ m wide - 1st time seeing epidote - also cp - coarsely crystalline qtz - some "vugs" cavities noted in one sample (? carbonate)

Δ2 on face across from truck

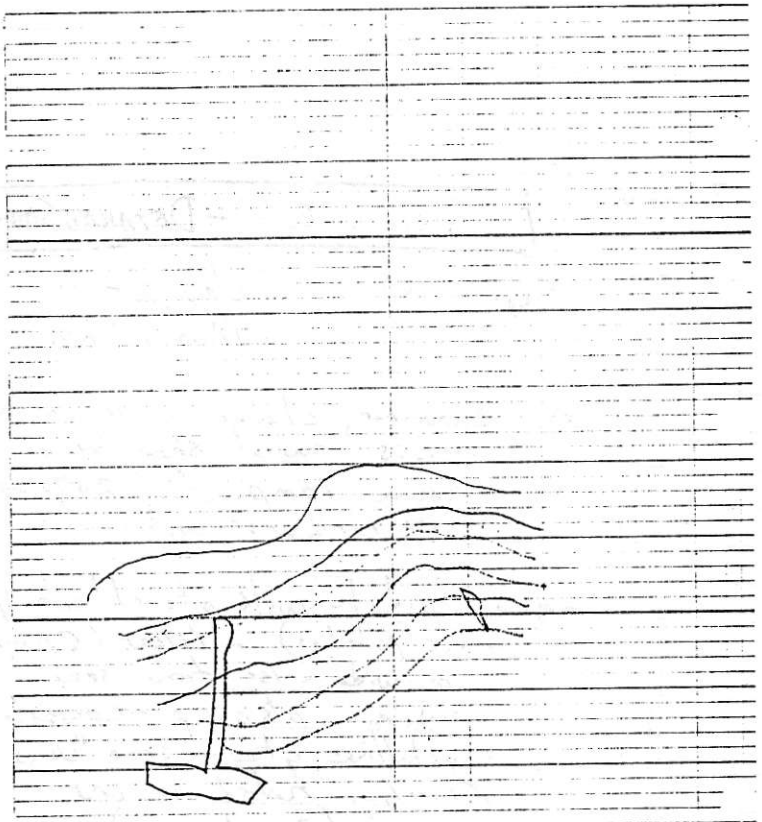
DVL.98.114 - closely spaced, sheeted pyrite-quartz veinlets cutting ~~smooth~~ epidotized m.g. tonalite, noticeable wkly foliation, 3 to 15 cm spacing of veins

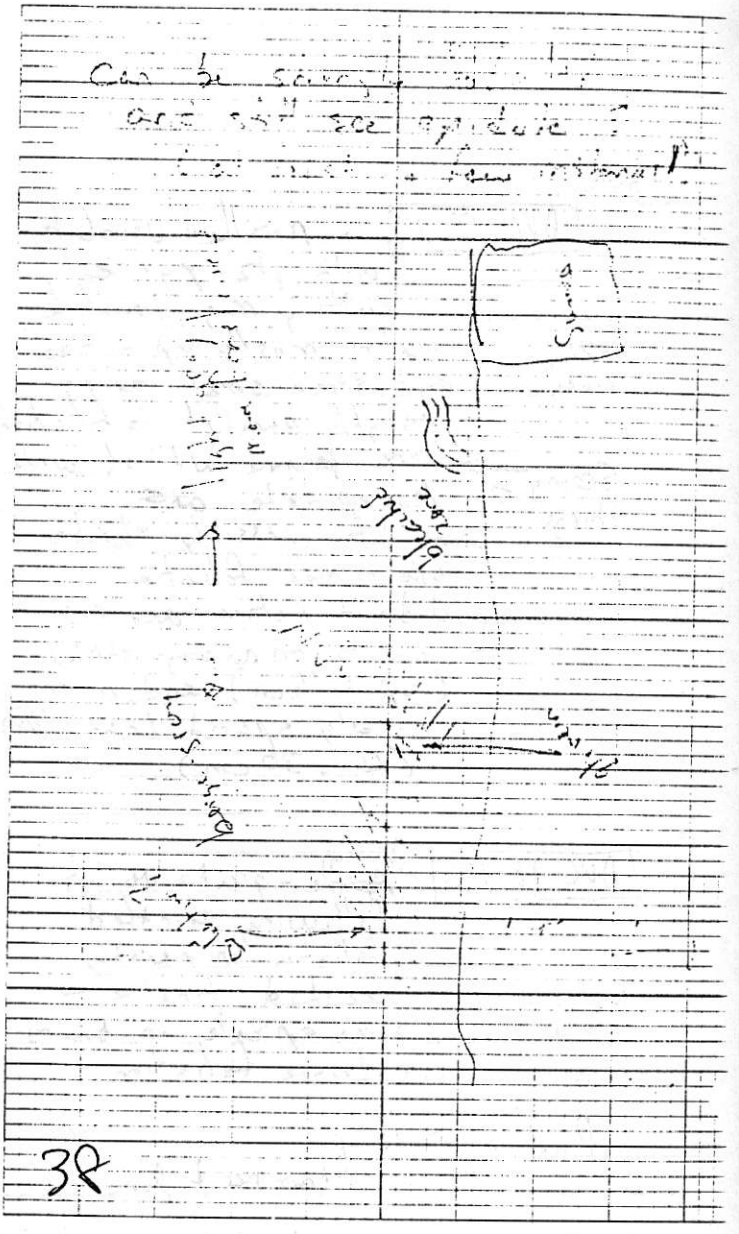
low grade to waste?

veinlets 50°SW 120

Photo 7 8 - parallel veinlets hammer pencil

40 5 100 ([illegible]) [illegible] dip





METRIC
FIELD(S)

DVL-98-119 — moderately foliated, epidotized m.g. tonalite cut by thin sulphide veinlets on hairline fractures
- chloritized mafics appear "normal" — not bleached

△2 overview — NW areas of Gib East Pit

Photos 12, 13, 14

(12) — looking east to limonite zone overlying supergene enrichment

(13) — looking southeast with 2695 bench at bottom (sampled on Wednesday)
- [illegible] trend (310°)
- [illegible] into wall
- [illegible]
- [illegible] problems with failures in walls;

can see sloughing along wall along [illegible] structure

(14) looking east [illegible] Pollyanna
- can see sediment-filled lake bottom and oxide-weathering

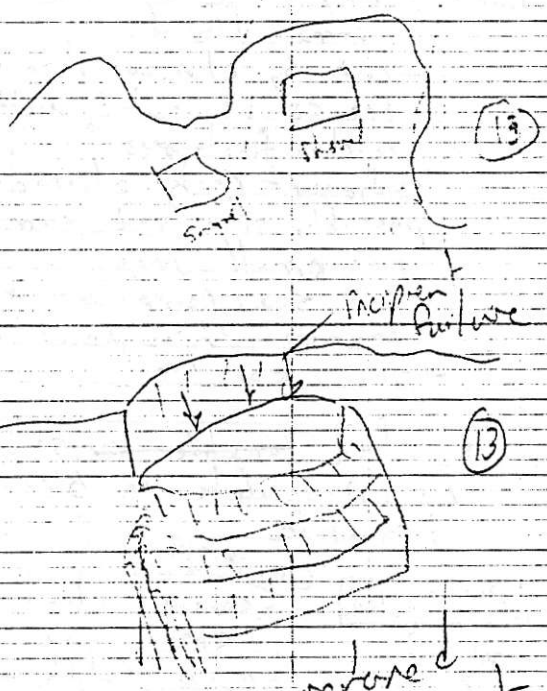
METRIC
FIELD(S)

DVL 98-117 — hard, largely white-coloured area of wall
- would be termed high grade? brecciated, m.g. tonalite
- very little epidote
- some chlorite
- cut by chalcopyrite grain trends associated with hairline fractures?
- adjacent rocks altered, possibly silicified, sometimes has small vugs
- can see remnant m.g. texture throughout rock
- some sericite

silicified ~~tonalite~~ as selvages to cp-veinlets in bleached tonalite

DVL 98-118 (CAS-98-214)
- sericite-chlorite shear zone
- minor sulphides
- [illegible]
- some gouge
- hematite colouration in part?
- well east of camp new top of camp

70N dip
shear zone
minor structure



being + twice a week

METRIC FIELD (S)

Δ3 qtz veinlet with minor chl cutting white m.g. tonalite
- no foliation or very weak
- chlorite - pl ± sericite shears on fractures with pyrite - epidote on adjacent fracture

photo 16
photo 17 - qtz-chlorite stockwork cuts chloritic ~~sho~~ fractures with py
photo 18 - aplite qtz eye f.g. dyke/ot - very sharp - cut by grey qtz veinlets and quartz veins with cp ± mo
Photo 19 ~ possible slight fold in aplite dyke 8½ cm wide red pencil

DVT-98-120 leucocratic qtz-rich veit cutting tonalite
- ~ 14 m wide
- sharp upper contact with saussuritized m.g. tonalite trends 350° and dips steeply to east

43

METRIC FIELD (S)

has green sericite and white sericite on shears (<5% of rock b stands ou
- cut by white qtz veins pyrite veinlets ± minor cm contact
- in places looks like remnant tonalite texture with m.g. qtz and possible plag.

Photo 20 - abandoned pit and flooded drilled bench

Photo 21 hammer on upper contact of altered tonalite zone

Photo 22 trend up walls of altered zone

Photo 23 zu closeups of altered less bleached tonalite texture (red pencil)

basal contact less clear, over ½ m, possibly gradual
- note only see green chl on ~~steeply out~~ fractures in tonalite - no sericite

45

<u>Gibraltar Discussions</u>

- analyses of 1 & 2 (Figuner's porphyry) leucocratic rocks contain high SiO2, K2O and low CaO, Na in porphyry volume
- leucocratic rocks from North Gibraltar have high normative Orthoclase which is ~~very unusual~~ inconsistent with other intrusive rocks [illegible]
- So, can assume some of leucocratic rocks are altered

Why are they not [illegible] ore? found adjacent to ore! G Basin

Are some [illegible]

Saw [illegible]

Polygone fit

- how to explain mineral zoning from SE to NW
  - depth
  - [illegible]
  - [illegible]
  - porphyry
  - [illegible]

DVL.98.121 aplite dyke

photo 18 - not a fold

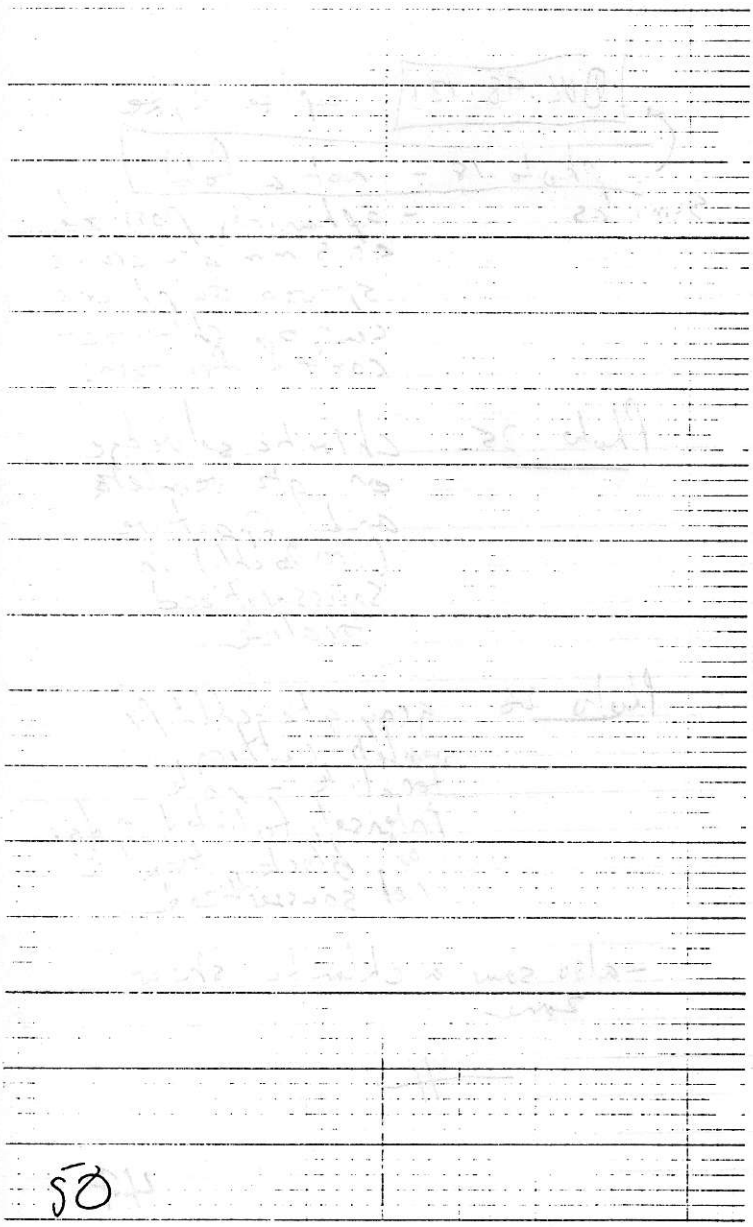
Similar as

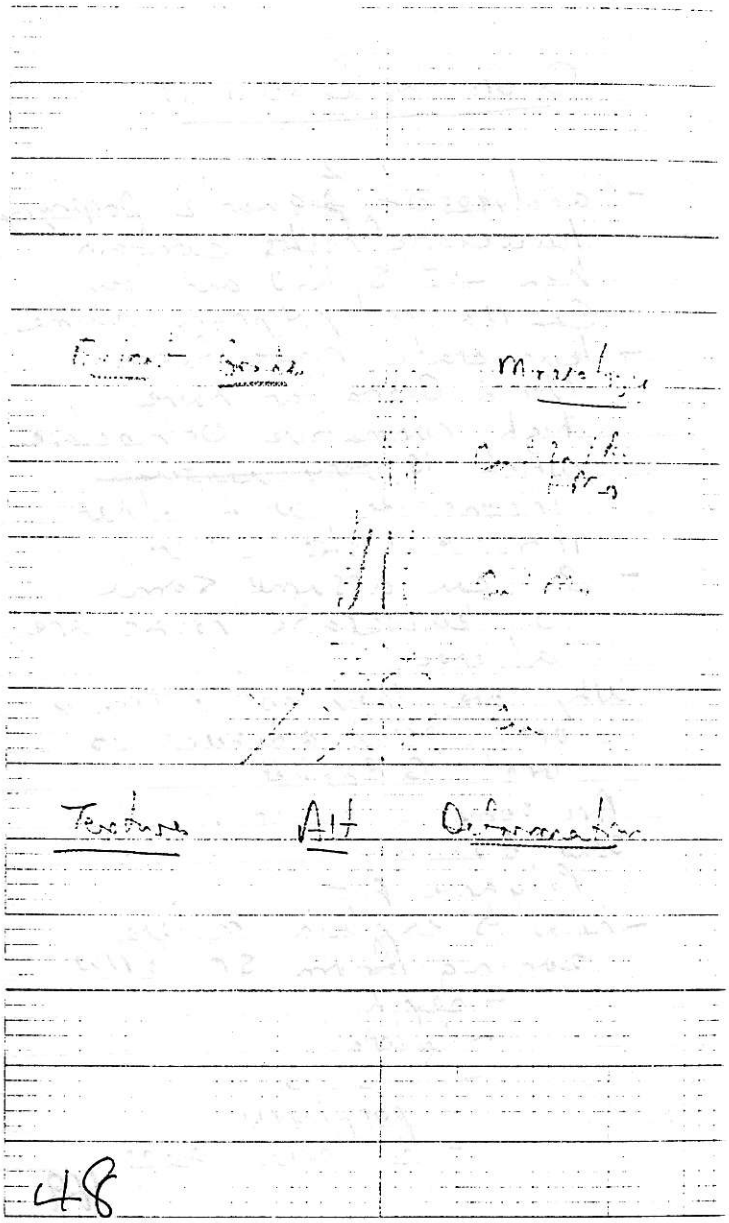
- aphanitic possible
  <0.5 mm qtz grains
  sparse sulphides
  cut by chlorite-coated fractures

<u>Photo 25</u> chlorite selvedge on qtz veinlets and fracture (100% chl.) in saussuritized tonalite

<u>Photo 26</u> gray qtz-chl± py veinlets cutting tonalite - note intensely foliated edge of block tonalite not saussuritized

- also saw a chlorite shear zone

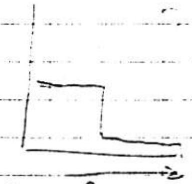




- Andre P. comments
  Fraser Fault ages - 80 Ma
- **NB** - Tertiary QFP in Pollymaa pit sericitized and pyritic (K-Ar 40-45 Ma)

- Gibraltar has less Cu because deeper (GB)
- definitely need to look at similarities [illegible] Valley
- good [illegible]
  [illegible]
  [illegible]
  high [illegible]
- [illegible]
  [illegible]
- higher Mo
- where's the centre of the intrusion
- is this similar to Highland Valley [illegible] core
- possibility of a similarities with [illegible] Newberry cases
- [illegible]

Cu



[illegible]

64 C.I. Fl