

HIGH MONT.

vly - filtered

896674

- excellent coinci-

dence w. geology

- two anom. might
turn up something as good
as #5 zone (High geochem area.)

Pathfinder - 5

anomalies of same

order as Stellako - but

only weak geochem.

response (weak anom.)
on two

H1H 58-55 476'

Si > 10

Al > 1.2'

Mg L

Ca L 1.0

Fe 0.1

Pb 0.05'

Cu 0.1

Zn L

Mn 0.01

V L

Ti L

Ni L

Co L

Na > 2.0

K -

①

Trace Sr, B, Ba, As Sb

Original rock

① cg qtz plag rock - qtz open interstit.

finer

as patches in 1 qtz plag rock with qtz as grains.

--- Magnetite early or primary

② Tour - ser - chlorite altn + veining

some xcutting

some tour. is with the interstit qtz + seems to belong there

③ Magnetite ^{then} = chalcopyrite introduction

T.S.

HH-HUID-279

quartz

plagioclase

sericite - in cracks

carbonate

tourmaline - brown and dk emerald green

chlorite - sheaf-like xls green plus
v. low bir ("brown")

brassy yellow - cpy

magnetite (hematite)

ilmenite (?)  lath-like

iron oxide - almost cream to reddish yellow brown
esp. in cracks.

upper part of slide

elong. laths (ilmenite? ~~magnetite~~ after tourmaline?)
with interstitial cpy

Quartz Albite porphyry - aplitic matrix

T.S.

HH-69-93-608

qtz - phenocrysts and small subhedral
xls - xl shapes suggest β -qtz inverted
to α -qtz

plagioclase - partly repl. by sericite (some
is relatively coarse) and carbonate.
 $X' \wedge 010 \left\{ \begin{matrix} 10 \\ 12 \end{matrix} \right\} 11^\circ$ relief ~ 1.54 and less

FN 09

leucoxene - after sphene

Matrix - altered gtr-feldspathic, vfg.

T. S.

HH 68-55-476'

OPEN INTERSTITIAL TEXTURE

quartz - clear, interstitial ^{to fs} \wedge but fs/qtz contacts
somewhat rounded

plagioclase - brown in plane light due to altn
(sericite?)

epidote (?) extn 15° red bir length slow
apatite

altn

chlorite - pale green ^{to yell. grn} \wedge v. low bir. (gray) length fast
+ epidote + carbonate + opaque (magnetite?)
with
most by interstitial mat'l)

chlomite - cp - carb. patches replace plag, gtz,
Kspar (?)

Kspar (?) 2v large (-) - patches in epidote (remnants?)

Plagioclase - composition uncertain

extr x'10010 $\left\langle \begin{matrix} 7 \\ 10 \end{matrix} \right\rangle 8$

-replaced by sericite chlomite

Stain Slide

T.S.

H1H 68-27-217

qtz - lots of chlorite in it

- fairly abundant

Ksp_{er} - altered) chlorite epidote carbonate
plagioclase "

apatite

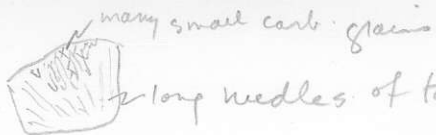
greenish needles - tremolite (?)
or v.f. taurmaline
needles?

chlorite

epidote ^{rel.} abundant

taurmaline dk brown ^(EW) to brown (NS)

preferred



many small carb. grains

long needles of tourmaline

Stain slide for Kspar

T.S.

H14 69-102-300

Plagioclase - brown in plane H because of altn
Kspar - interstitial, very altered, not prominent
(only recognized because it stains)
- in cores of, secondary after plagioclase
filling gas holes (?)

quartz - uncommon - inter. patches w. tremolite (?) opaque apatite
apatite mag. lath. cpy (?)

carbonate

leucosene - replacing ilmenite (?) + sphere 

Plagioclase

$2\Delta 010 = 77^\circ$

X' in obtuse $\&$ $\therefore An_{0-20}$

An_{07}

* plag. unaltered rims - intensely altered cores
in places

Fs. altn very intense - difficult to be

certain that any Kspar exists!

altn - carbonate, chloride

magnetite (hematite), pyrrhotite (?) light
cpy?

brassy in reflected

chlorite / apatite / mag / sericite interstitial

Large opaque patches are creamy with magnetite xls
in reflected light - leucoxene?

Pink patches not Kspar

✓ H I H ~~68-68~~

69-86-260

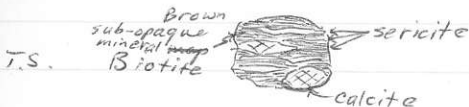
Spec + TS

Quartz - rather elongated ^{to subequant} areas with uneven borders

5% Bi - gone completely to yellow mineral

Plag - greenish, waxy-looking, sericitized

Pink areas between ^{+ enclosing} Afs xls - Kspar??



Quartz₃ - open interstit in detail

were ^{bi.} Pink areas - gray mineral crowded w. calcite and magnetite apatite
Kspar (look white by eye) brownish altn mineral

Plog xls now brown in plane (f - consist of mats
of vfg sericite (+kaolinite?))

NO KSPAN except a few small blebs ^{in Qtz} ✓ HIA 69107 300

Spec + TS

very similar to 68-68-180

Veno - Qtz chlorite - barite - chalcocite (?)
with associated bleaching

Plag - sericitized, green to yellow-brown

Qtz - open interstitial texture, some squarish xls

6% Bi → yellowish waxy-looking mineral
magnetite has assoc. leucosene at times

T.S.

Bi - gone to hematite (?) - colorless chlorite - carbonate

Kspan - possibly but altn intense

Qtz - open interstitial

Plag - gone to sericite carbonate

magnetite

apatite

Veins - qtz - carbonate - sericite - sulphides

- carbonate

- qtz.

10 span - interstit - forms quite large areas
which are ~~are~~ very poikilitic + so small blocks in gtz
Spec + T.S. Bi > Hb Mafic 8% Bethlehem G.D.

Mafic - Bi + Hb large + small xls

- chloritized? intergrn w magnetite
Hb blocky xls, or anhedral

Plag. - sericitized

Qtz - open interstitial (some bluish)
(30%)

T.S. Plag. - markedly zoned

Qtz - open interstitial texture

Hb -

Bi - brn - chloritized

magnetite
sphere
zircon

Qtz - pyrite vein on bken face

aplite 1:1 qtz : kspn crossed by kspn-rich
steeper which kspn destroyed in halo around H1H-69-121-707 ✓
qtz-ser. vein + vein cut off by qtz-ser. vein.

Bethlehem G-D cut by aplite - both cut
by qtz - apatite - bornite - minor cpq - sericite
veins. Sericite mainly in 1/4" halo on
either side of the vein. Also get carbonate-chlorite
veins

Aplite pinker at Bethlehem contact and
along branching "fractures"

Fractures + veins at $\sim 30^\circ$ and parallel
to dike contact - signif. uncertain

qtz - overall open interstit. but some ~~discrete~~

discrete grain in some areas

mafic - chloritized

Plag - pink or waxy green stain

aplite + vein cut

Kspar^{qtz} - plag - rock

with ~10% hb + bi

Bethlehem G-D.

T.S. The vein - qtz - epidote intergrown

epidote - pleo yell-grn to brownish (almost colorless)

carbonate - sulphide - chlorite

halo on vein - qtz - sericite - some sulphide

C.R. The ^{aplite} CRT is almost entirely subgraphic

qtz - feldspar intergrowths w. a few scattered

plag xls. The fs is badly altered & it is uncertain whether it is Kspar in the intergrowths

* the "bleached" zone may be spurious #69 - 124-210
(rock was sprayed)
Spec + TS

Sericitized Bethlehem G.D. cut by a pink
aplitic dike. Both cut by chlorite-sericite vein w. altn halo

Bethlehem Qtz - open interstit. 25%

Plag - greenish + cream 60%

Mafic - large + small anhedral xls

hb+bi originally (?) ~~mostly kfs~~ 15%

T.S. Aplitic 40% rounded to interstit kspar xls
Plag 30 Qtz 30
pale yellow
anhedral kspar) clouded w. altn kspar replacing plag.
Plag) cut by chlorite + epidote/qtz veins

CONTACT - sharp to the eye but diffuse + uneven on
mm scale - no chilling
Bethlehem G. D.

epidote veinlets

Very little Kspar

Plag - altn makes grains almost opaque locally -
kaolinite?

Mafic - altn so complete original character hidden.

Qtz - open interstit.

"grains" composed of many smaller grains
(broken + ~~also~~ re-crystallized?)

Clots of thin pale green prisms with extn $\sim 20^\circ$
actinolite?

" of chlorite - epidote after mafics
some sericite magnetite sphene apatite

NO Kspaw Plag - ser. alt. variable
because xls gross to no stain

H1H HU 10

Two Spec + TS

210 and 215

c.g. quartz eyes and sericitized plag c.g.
phenos in Qtz - feld. aplite matrix (reminds
one of Qtz - rich Witches Bk in texture)

Cut by Qtz - ~~chlorte~~ ^{chalcoite? (magnetite?)} - bornite veins w. green seric-
itized halos

second spec similar but more ^{parallel sulphide brg} veins + also a hematite-
epidate vein at high angles to the mineralized ones

Qtz + plag occur ^{c.g.} as phenos in a finer
intergen Qtz - plag matrix - phenos more altered than
matrix x 15

T.S. Qtz "eyes" are intergrown at their borders with smaller Qtz xls

Plag - strongly altered relief < Qtz?
esp. the borders unbedded

Matrix - intergrown Qtz and Δ Feldspar. At least some of the fs is albitic plag - all fs is dirty brown because of altn
In matrix - fs xls are "swimming" in quartz.

Scicite altn vfg away fm veins, fairly coarse in veins
accessory apatite

STAIN - slight matrix stain indicates var in intensity 68-10 ✓

TS + specimen of sericite altn I think 146
* several small patches of Ksp are present (see over)

Bi: Qtz Plagioclase Porphyry - DIKE - SILL - SMALL PLUG

Bi - fq chloritized ? ? ?

Qtz - m.-c.g. 15% matrix grayish-yellow 45%

Plag - m.-c.g. 40%

T.S - Sub-euhedral ^{to rounded} Δ Qtz phenos

" " plag phenos

complexly zoned or intensely ^{clouded by} carbonate-sericite

chlorite after bi - green pleo, ragged altn

Matrix - Qtz - felds, vfg, groundmass somewhat
altered to sericite + carbonate

Veining - sericite - Qtz - carbonate - several
directions - no age differences documented

lack of dk yellow

~~*staining of matrix could be a fn of grain size
it could be vfg Kspar - unstained areas
definitely not Kspar~~

nonsense - sericite altn takes yellow stain

STAIN - NO KSPAN

68-25-240

Spec + T.S.

Plag destroyed along qtz-ser + cpy veins

leucocratic ^{pale green} sensitized plag - qtz rock cut by
qtz - sericite - cpy veins with a halo of pinkish
altm in the plag. and hematite veins

Qtz - equant grains to open interstitial texture

T.S. 75% Plag brown in plane lt as a result of
sericite - carbonate altm

Assoc. areas have sericite xls + carbonate

5% "Bi" - completely altered - ^{former} presence inferred ^{now} carbonate

20% Qtz - open interstitial texture + sericite + opaque

acc. zircon

apatite

epi + ~~pyrite~~ as veinlets and blebs in the gtz-ser.
pyrite as lenses in the gtz-ser. veins

stain - less than 1% Kspar

↓ 68-27-468

~~Qtz - cpy - mos₂ - barite veins in Qtz -~~
~~sericite rock with dissem. cpy - barite~~

Rounded fragment Qtz, "granite" bx. Intensely
altered. Mineral MoS₂, ~~barite~~ cpy

T.S. Qtz - open interstitial texture

Plag - pseudomorphs of carbonate - sericite

Qtz - cpy - MoS₂ ~~veins~~ rounded fragments

Bxtd zones cross the Qtz veins + broken
Qtz xls show stress extinction

One side of the spec has pebble-sized frags
in a kaolinitic (?) matrix. The other is
less broken, less altered but has MoS_2 dissemin-
ated thru it in some areas + contains
cpy blebs

Kspar bright yellow 15% interstit. to pale yellow plag
and so small blebs in Qtz - ~~ser~~ chl. - berrite veins 68-27-520
Spec + TS Mineralized BETHLEHEM G-D.

Spec Qtz open interstitial
Plag zoned, sericitized
Mafic - hornblende f and c g.
- chloritized

Rock cut by Berrite - Qtz - ~~ser~~ chlorite brg fractures
sericite coats joints

T.S. The sulphide brg vein has assoc. carbonate,
zoisite, clinzoisite (epidote), chlorite (two kinds?) and
quartz and apatite (?)

Plag - zoned sericitized

Kspn - interstit perthitic

qtz - open interstitial texture, some fairly
discrete but overgrown(?) - xls
- broken and crossed by sheared areas in
which the qtz is in fine fragments

accessory
some
sphene

Mafics 12%

Hb → Bi



qtz as fine frags.

Hb - faint green pleo
or completely

partly altered to chlorite + epidote + magne-
tite(?)

Bi - golden brown to tan often partly chloritized

STAINED - NO KSPAR [x rough surface stained] ✓ 68-29-35-
Spec + TS

- Spec. - Plag - cream
- Qtz - open interstitial
- Mafic - chloritized epidote veins
- Bortite / cpy in qtz veins, in mafic clots
(w. chlorite and ^{epidote} ~~epidote~~) + apparently some disseminated grains

TS - chlorite green pleo anom. ^{br.} ~~pleo~~ intergrown
epidote

- Qtz large open interstitial grain
x's bxt'd and strained cut by sericite veins

- epidote forms clots of fine fibrous xls (greenish
non-plec) ^{localized} - talon fractures

- Plag almost entirely gone to sericite/carbonate

- some fairly coarse apatite xls - with the
sulphides

- The section is crossed by shear zones in which

qtz is reduced to small elongated frags. and
altn is (sericite-carbonate) more intense in the commin-
uted fs matrix. Bx zone crossed by sericite/carbonate
veinlets

↓ 68-37-439

NO Kspar

qtz - cpy - MoS₂ - Brevens in qtz - sericite -
rock with dissemin. cpy - bornite

T.S. a somewhat sheared carbonate - sericite
qtz₁ - veined qtz - carbonate - sericite rock.

Sulphides occur in one qtz - rich vein

cream to tan - colored areas are caused by
vf₉
sericite - carbonate "mats."

TS ONLY

carbonate - very widespread altn product + in

Venus w. qtz - 2V is 10-20°, NEGATIVE

Sericite - indiv. xls easily seen w. low power

Feldspar - altn v. intense

- some remnant plaq twinning

- some may have been kspar

- plaq relief < qtz

spec in for KRAY

NO Kspaw

✓ 68-39-152

Spec + TS

NOTE TS labelled 69-39-152

Gray rock crossed by an early Λ Λ -cpy vein
^{meandering carbonate}
in turn cut by a network of β thin qtz veins.
with occasional pods of cpy along them
One knot of qtz was seen

T.S. Veins are quartz and qtz-carbonate
Cpy occurs sparsely

The matrix is mostly untwinned feldspar
with sericitic alt. and sericite "pods" (^{fg sericite in} rounded areas)

A dike of some description

The grain size of the groundmass varies from place to place.

The etched rock is seen to contain finer gray fogs sep. by foliated (?) slightly coarser zones.

x-ray sample

Kspar interstit 10%

✓ H1H 68-52-20

T.S. + sample

cut by quartz - ^{carbonate-sericite} ~~epidote~~? veins ^{rare cpx spess in veins} mantled
by zones of rel. intense sericite
altn (fs yellow to yellow-green) ^{chalcopyrite?} ~~base~~ in myfic pods

Fs 60% Qtz 28% Mofic 12%

BETHLEHEM G.D.

T.S. Qtz - open interstitial texture

Plag - zoned, sericitized

Kspar perthitic interstitial + replacing plag.

chlorite pseudomorphous after bi. and hb
apatite opaque (magnetite)

High relief 2V mod positive many rmp's SPHENE
with opaque + apatite

Sericite - rel. c.g. patches with carbonate +
some chlorite, in ^{with secondary qtz} veins & snaking thru the rock +
~~fracture like~~ expanding & delating (one crosses the center
of the T.S.)

J 68-63-73

TS ONLY

Extensive sericite (talc?) altn - sericite xls easily
visible

Qtz - open interstix. text. bxt'd

Plag - badly altered

Chlorite - after biotite

Sericite is in veins crossing the rock + replac-
ing (often pervasively) anything in its way along
fractures

opaque - cpy, MnO₂ intergrown with sericite

X-ray brownish-yellow mineral ↓ 68.68 - 180
Ksp 1% as rounded blebs in Qtz.
Spec + T.S. Bi ≈ 89% almost all altered

Diag - green - sericitized

Bi - yellow-^{brown} factn

Qtz - rel equant areas w. uneven borders & open
interstitial texture

Veins white ~~carbonate~~^{carbonate} with yellow-brn edges.

T.S. ↗ var. of chlorite(?)

Bi - gone to interlayered white mica (low birefringence) and hematitic carbonate(?) ± quartz

gr - open interstitial texture

plag → sericite / carbonate (carbonate predominant)
- no plag twins remain altn very complete

carbonate veins

magnetite - fairly abundant ~ 1%

apatite