#1

195 Ge
11

# TRANSIT

NOTEBOOK NO. 301

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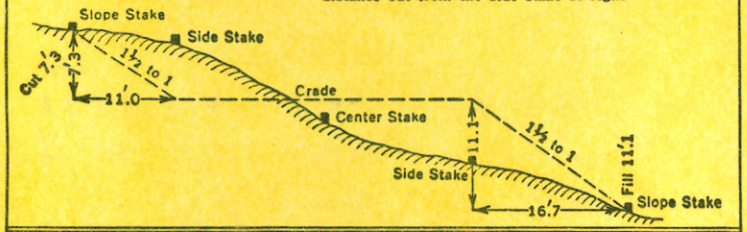
Butte, MT 59701
1975
2579 - 2715

## DISTANCES FROM SIDE STAKES FOR CROSS-SECTIONING
### Roadway of any Width. Side Slopes 1½ to 1.

In the figure below: opposite 7 under "Cut or Fill" and under .3 read 11.0, the distance out from the side stake at left. Also, opposite 11 under "Cut or Fill" and under .1 read 16.7. the distance out from the side stake at right.




| Cut or Fill | 0 | .1 | .2 | .3 | .4 | .5 | .6 | .7 | .8 | .9 | Cut or Fill |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Distance out from Side or Shoulder Stake | | | | | | | | | | |
| 0 | 0.0 | 0.2 | 0.3 | 0.5 | 0.6 | 0.8 | 0.9 | 1.1 | 1.2 | 1.4 | 0 |
| 1 | 1.5 | 1.7 | 1.8 | 2.0 | 2.1 | 2.3 | 2.4 | 2.6 | 2.7 | 2.9 | 1 |
| 2 | 3.0 | 3.2 | 3.3 | 3.5 | 3.6 | 3.8 | 3.9 | 4.1 | 4.2 | 4.4 | 2 |
| 3 | 4.5 | 4.7 | 4.8 | 5.0 | 5.1 | 5.3 | 5.4 | 5.6 | 5.7 | 5.9 | 3 |
| 4 | 6.0 | 6.2 | 6.3 | 6.5 | 6.6 | 6.8 | 6.9 | 7.1 | 7.2 | 7.4 | 4 |
| 5 | 7.5 | 7.7 | 7.8 | 8.0 | 8.1 | 8.3 | 8.4 | 8.6 | 8.7 | 8.9 | 5 |
| 6 | 9.0 | 9.2 | 9.3 | 9.5 | 9.6 | 9.8 | 9.9 | 10.1 | 10.2 | 10.4 | 6 |
| 7 | 10.5 | 10.7 | 10.8 | 11.0 | 11.1 | 11.3 | 11.4 | 11.6 | 11.7 | 11.9 | 7 |
| 8 | 12.0 | 12.2 | 12.3 | 12.5 | 12.6 | 12.8 | 12.9 | 13.1 | 13.2 | 13.4 | 8 |
| 9 | 13.5 | 13.7 | 13.8 | 14.0 | 14.1 | 14.3 | 14.4 | 14.6 | 14.7 | 14.9 | 9 |
| 10 | 15.0 | 15.2 | 15.3 | 15.5 | 15.6 | 15.8 | 15.9 | 16.1 | 16.2 | 16.4 | 10 |
| 11 | 16.5 | 16.7 | 16.8 | 17.0 | 17.1 | 17.3 | 17.4 | 17.6 | 17.7 | 17.9 | 11 |
| 12 | 18.0 | 18.2 | 18.3 | 18.5 | 18.6 | 18.8 | 18.9 | 19.1 | 19.2 | 19.4 | 12 |
| 13 | 19.5 | 19.7 | 19.8 | 20.0 | 20.1 | 20.3 | 20.4 | 20.6 | 20.7 | 20.9 | 13 |
| 14 | 21.0 | 21.2 | 21.3 | 21.5 | 21.6 | 21.8 | 21.9 | 22.1 | 22.2 | 22.4 | 14 |
| 15 | 22.5 | 22.7 | 22.8 | 23.0 | 23.1 | 23.3 | 23.4 | 23.6 | 23.7 | 23.9 | 15 |
| 16 | 24.0 | 24.2 | 24.3 | 24.5 | 24.6 | 24.8 | 24.9 | 25.1 | 25.2 | 25.4 | 16 |
| 17 | 25.5 | 25.7 | 25.8 | 26.0 | 26.1 | 26.3 | 26.4 | 26.6 | 26.7 | 26.9 | 17 |
| 18 | 27.0 | 27.2 | 27.3 | 27.5 | 27.6 | 27.8 | 27.9 | 28.1 | 28.2 | 28.4 | 18 |
| 19 | 28.5 | 28.7 | 28.8 | 29.0 | 29.1 | 29.3 | 29.4 | 29.6 | 29.7 | 29.9 | 19 |
| 20 | 30.0 | 30.2 | 30.3 | 30.5 | 30.6 | 30.8 | 30.9 | 31.1 | 31.2 | 31.4 | 20 |
| 21 | 31.5 | 31.7 | 31.8 | 32.0 | 32.1 | 32.3 | 32.4 | 32.6 | 32.7 | 32.9 | 21 |
| 22 | 33.0 | 33.2 | 33.3 | 33.5 | 33.6 | 33.8 | 33.9 | 34.1 | 34.2 | 34.4 | 22 |
| 23 | 34.5 | 34.7 | 34.8 | 35.0 | 35.1 | 35.3 | 35.4 | 35.6 | 35.7 | 35.9 | 23 |
| 24 | 36.0 | 36.2 | 36.3 | 36.5 | 36.6 | 36.8 | 36.9 | 37.1 | 37.2 | 37.4 | 24 |
| 25 | 37.5 | 37.7 | 37.8 | 38.0 | 38.1 | 38.3 | 38.4 | 38.6 | 38.7 | 38.9 | 25 |
| 26 | 39.0 | 39.2 | 39.3 | 39.5 | 39.6 | 39.8 | 39.9 | 40.1 | 40.2 | 40.4 | 26 |
| 27 | 40.5 | 40.7 | 40.8 | 41.0 | 41.1 | 41.3 | 41.4 | 41.6 | 41.7 | 41.9 | 27 |
| 28 | 42.0 | 42.2 | 42.3 | 42.5 | 42.6 | 42.8 | 42.9 | 43.1 | 43.2 | 43.4 | 28 |
| 29 | 43.5 | 43.7 | 43.8 | 44.0 | 44.1 | 44.3 | 44.4 | 44.6 | 44.7 | 44.9 | 29 |
| 30 | 45.0 | 45.2 | 45.3 | 45.5 | 45.6 | 45.8 | 45.9 | 46.1 | 46.2 | 46.4 | 30 |
| 31 | 46.5 | 46.7 | 46.8 | 47.0 | 47.1 | 47.3 | 47.4 | 47.6 | 47.7 | 47.9 | 31 |
| 32 | 48.0 | 48.2 | 48.3 | 48.5 | 48.6 | 48.8 | 48.9 | 49.1 | 49.2 | 49.4 | 32 |
| 33 | 49.5 | 49.7 | 49.8 | 50.0 | 50.1 | 50.3 | 50.4 | 50.6 | 50.7 | 50.9 | 33 |
| 34 | 51.0 | 51.2 | 51.3 | 51.5 | 51.6 | 51.8 | 51.9 | 52.1 | 52.2 | 52.4 | 34 |
| 35 | 52.5 | 52.7 | 52.8 | 53.0 | 53.1 | 53.3 | 53.4 | 53.6 | 53.7 | 53.9 | 35 |
| 36 | 54.0 | 54.2 | 54.3 | 54.5 | 54.6 | 54.8 | 54.9 | 55.1 | 55.2 | 55.4 | 36 |
| 37 | 55.5 | 55.7 | 55.8 | 56.0 | 56.1 | 56.3 | 56.4 | 56.6 | 56.7 | 56.9 | 37 |
| 38 | 57.0 | 57.2 | 57.3 | 57.5 | 57.6 | 57.8 | 57.9 | 58.1 | 58.2 | 58.4 | 38 |
| 39 | 58.5 | 58.7 | 58.8 | 59.0 | 59.1 | 59.3 | 59.4 | 59.6 | 59.7 | 59.9 | 39 |
| 40 | 60.0 | 60.2 | 60.3 | 60.5 | 60.6 | 60.8 | 60.9 | 61.1 | 61.2 | 61.4 | 40 |



July 9 hills between Barton Gulch and Davey Gulch. Garnet schists, amphibolites and meta peridotite knobs. Some fuchite in pegmatites

FOR MAPS

COLOUR – Key

PURPLE – AMPHIBOLITE

ORANGE – PEGMATITE

Red (or pink) – SHEAR ZONE

BLACK – META PERIDOTITE

BLUE – Marble

LT. Green – BANDED GNEISS

DK. Green – QRT. Feld. GNEISS

CROSSHATCH – Quartz Feld. Gneiss within MARBLE or PURPLE } Amphibolite, Generally Garnetiferous

BROWN – meta GABBRO

purple spotted – hornblende GNEISS (Garnetiferous)

July 10

[1343] BIOTITE Quartz feldspathic Gneiss. Banded
lineation (variable) N.31°E DIP of S surface 56° W.N.W
Bad reading N.43°E 74° W.NW
The banding is irregular from 1 up to 3-4 cm.
best seen because of Biotite alignment
Pink & swell banding. hornblend makes
up several areas. Jointing also (bad recorded).
Some magnetic pull.
The folds present are mostly open folds.
The Gneiss bands appear to have some
tight folding (only a hint).

[2579] very weathered west of S.W. Slopes because
of a sheared zone more than 5 jointing and shearing
planes. maximum principle stress direction ≈ N.S.
STRIKE of FOLIATION ≈ 1343
300 feet UP (N) onto the unsheared zone
show some gently folded bands. coarsely
crystalline feldspar & Quartz General
absence of biotite and/or hornblend.
magnitude of folds 3-5 cm.
biotite appears in minor amounts between
the feldspar & Quartz.
up 25 feet from this biotite and hornblend
again appear in the rock. hornblend is



coarse (~2-3 mm or greater) Quartz & feldspar
equally as coarse.

[2580] Traversing Right (NE) to fresh exposed
face blebs of hornblend with ends strung
out 10 x 20 cm (only one) does not effect compass
JOINTING: N69°E DIP 75° NW
N.16°E DIP 72.5° E

[2581] large open fold amplitude undetermined but
about 2 feet exposed. Rock-Banded hornblend Gneiss
feldspar & Quartz present all in ≈ equal amts.
coarse grained QRTZ & feldspar (PINK & white)
form Pods 2-3 cm x 20-40 cm, the long
axis being parallel to foliation & fold flanks
Plunge of fold 45° ~~being~~ of axis 63° E
walking up towards peak (Generally E.) isoclinally
folded blocks (a few ft²) show up in float on talus
folds outlined by hornblend (appears streached)
• certain layers are more uniform in grain size
(smaller) (looks more like flow & partial melting).
Some funny red staining between some of the grains
it doesn't look like iron (Garnet???)

[2582] excellent fresh outcrop. Sample
Garnets! intermittent 1m-1mm or > some fine
Grain beds mostly of hornblende. →

2582 cont. many Good sized Sharp crested folds on flanks are Thick Thin almost Bouden Type pinch & swell structure of The feldspars (Rarely QRTZ (which as decreased in abundance but still form porphoblasts also 1mm in diameter). Some of the QRTZ are obviously streached and defaned, No melting - plastic def

The Quartz Grains are coarse Generally Throughout the sequence. The banding is astonishingly continuous and (same for plastic flow) uniform. IT LOOKS like a meta sedimentary sequence.

CONTINUING Towards The peak. Some of The Gneiss Grades into a granite Texture Type Rock. grain size is smaller (some having a sugary texture This then Grades back into The coarser Types Garnets persistant (not abundant) in apalitic (sugary) Type Rock. Some areas look like local melting (or remelting). The banding continues Throughout The sequence

2583 pegmatite(?) in FLOAT, cross cutting relationships. The pegmatite is coarser Grained (considerably) BIOTITE more abundant in Gneiss Than hornblend.

Garnetiferous QRTZ feld. layers between one hornblend layers Some cross cutting "Granitic Dikes" large one at top E W Trend



crossing saddle to other knob or peak

same pegmatite. Thin shearing(?) Zone / weathered The sheared Zone weathers rusty orange on top The feldspars are highly altered to clays

Sheared area Ends as one passes up by The saddle. Sugary textured Gneiss picked up again (QRTZ feld.)

2584 good out crop way up off saddle (1000 ft) banded QRTZ feld. Gneiss BIOTITE, some Garnets 45° E strike vertical DIP. (Banding)

2584 out crop S.W part of peak

The banding is still present some areas contain larger hornblend cuptate (up to 7mm) Garnets present but very small.

2585 hornblend Rich bleks & Stringers up to 30 cm long banding & lineation N.47°E

2586 The DIP is variable BUT ≈ 87° NW(??)

* Lineation N.50°E 66° N.W. DIP * Good S surface Folds - orientation (Plunge) of axis -

bearing: N.58E Plunge 18° SW

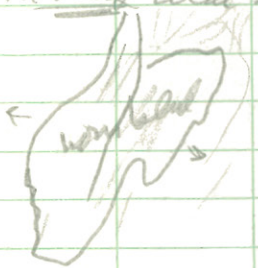
bearing: N.58E plunge 20° SW

elongation of hornblend parallel to fold AXIS

No parallelling TO Axial plane.

over

2586 cont. hornblend bleb appears to have Parasitic folds possibly drag folds on a very local scale




This has caused "pushing apart" of the banded Gneiss layers
almost Boudans (Boudans Cauchdorn)

Pegmatite N 83° W DIP 40° N about 1.3 ft wide

Transverse Knob - Red (iron stained QRTZ, Biotite, Feld. Gneiss (limited extent) 2100 ft
hornblend layers appear more abundant

2587 N. 33° E Banding DIP ≈ vertical but variable (local folding)
area at E end of Knob more folded and orientation difficult to get much more Biotitic layers
Fold N 82° E. Bearing No Plunge (= 0°)
from Saddle to next peak Boudens type
hornblend in pod shape { } } } } } folding folds

2589 refolded folds (almost Tygmatic
incharactic smaller parasitic folds on larger ones
Biotite Qrtz feldspathic gneiss, some banded



2590 N 54° W DIP 25° SW
Fold N. 73° W Bearing plunge 38° W
many folds amplitude a few feet

2591 N 65 W 35.5 S.
Good foliation surface
crossing saddle to next Knob (east)
few dark minerals (Biotite, hornblend)
coarse grain QRTZ & feldspar
Some Fe staining, Banding slight
several pegmatites as you go up to Knob out of saddle. OUT crop non existant.
FLOAT indicates Granitic composition Gneiss
Banding faint or absent

2592 Peak 7886
2892 - A Sample Garnitiferous amphibolite
minerals are Garnet (almandine) & hornblend.
This is IN FLOAT, NOT OUT crop.
2892 - B Garnitiferous hornblend Gneiss
hornblend & Feldspar give it a coarse salt & pepper appearance a few "veins" or bands of feldspar with 1 mm garnets very strained. This crops out on the North side of the Peak. Bull quartz also present - pegmatite? unseen but probably

MOVING DOWN hill (2592)
The Garnet hornblend Gneiss continues, some Quartz veins appear. The pegmatite from above seems to follow down the hill, no outcrop just float.
Gneiss float picked up intermittently down the hill.
every big tree has a fire scar, a few bear sign
The pegmatite float also continues down hill
Some of the hornblend Gneiss acquires more Quartz (1-1.2mm) coarse grain.
Float - a few good sized 3×3 or >
chunks of QRTZ feld. gneiss
These units continue across to the creek, all in FLOAT.. but the hornblend gneiss is most abundant. mapping it as such some approaches amphibolite especially wind down

July 11
[2593] outcrop 60 ft above Idaho creek
weathered, mineralogy: QRTZ, feldspar mica?.
The mica is biotite foliation very faint, but present.
N. 85° E DIPING 25° SW (?) poor reading



Some very slight shearing in area
[2594] Sheared (slightly) QRTZ feldspar Gneiss, not banded, biotite present in thin laminae
foliation N. 8° W DIP: 28° W
The rock is white to tan in color.
[2595] Foliation surface N. 28° W 14° SW
Rock is not to badly sheared
moving west on cliff, no other way to get up, steep moss covered talus slopes
intercept sheared zones, foliation seen but distorted and faint much hematite stain

Moving west from cliffs toward Peak (el. 7547)
FLOAT is encountered continuously. It is sheared QRTZ feld. Gneiss as well as some unsheared rock (the same Gneiss) but weathered badly. hematite stains all the FLOAT debris.
[2596] outcrop. here the QRTZ feld. Gneiss is so highly sheared and altered that in some areas it looks like chert (tan in color). Sample 2596-A is an example of this Sample 2596-B is the same rock but QRTZS grains are visible. highly silicified.
Noticeing the degree of weathering on each side of creek much more intense (more altered.)

Continuing west from 2596 towards peak.
Intersect Brecciated zone, Rock consisting of
1-2 cm chert fragments, smoky quartz with a
Siliceous matrix. Up 40 ft from this occurs
sheared and brecciated QRTZ feld. Gneiss outcrop
The like to the peak (on my traverse) reveals
scattered FLOAT, QRTZ feld. Gneiss all
sheared and altered.

2597 peak - outcrops poorly exposed
Faint foliation present, mostly silicified
and sheared, on western slope two (2)
small tallus runs - same rock type.
Foliation (approx) N.5°E 9°W CDIP
This measurement is NOT to good
On the North side of the peak are some float
fragments composed largely of QRTZ but contain
some feldspar. Heavily iron stained

2598 area of concentrated float of hornblend
Gneiss foliation N.30°W 22°W
Somewhat banded with feldspar (Sample Taken)

2599 meta peridotite (sample taken)
concentrated float or poor outcrop (& small)
Farther east the plagioclase hornblend
Gneiss become QUITE garnitiferous
(some 2 cm across) The plagioclase



also tends to form stringers as does Quartz
Some of the garnets are embeded in the
QRTZ pods.

Quartz Rich pegmatite [illegible] feet wide, poorly
outcropping (orientation on map is approx).
It may be a Quartzite (contains Biotite oriented
along some plane intermittently) No feldspar
obvious. Some very massive pale-buff
to rosy Quartz. Iron stain is varied
* Feldspar (orthoclase) found in large chunks
of tan QRTZ. Orthoclase grains large (2-3 cm).
Must be a Pegmatite.
FLOAT of hornblend Gneiss (Garnitiferous with good
pods of Feldspar & Quartz) shows up on other
side of pegmatite
a few chunks of Amphibolite in Float

2600 FLOAT of a quartz feldspathic Gneiss
containing traces of hornblend and Biotite
1-2 mm grain size of Quartz
In the saddle a weathered Biotite Quartz feldspathic
schist - Garnitiferous FLOAT

2601 Same UNIT in outcrop Foliation well
seen, NOT much banding (some in garnetiferous
layers other than that fairly UNIFORM

2601 continued Foliation N.59°E 19° N.E
many loose garnets laying on surface (2-3 cm diameter)

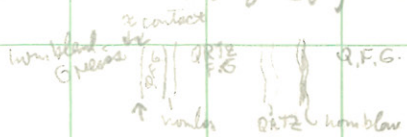
Same UNIT moving SOUTH up and out of saddle.
IT has a more sugary texture (less weathered) FLOAT.

2602 Out crop of the same Rock contains hornblend & BIOTITE
Foliation N.8°W DIP 65° N.E.
pegmatite small exposure N.59°W ≈66° N (maybe)

2603 foliation N.15°W DIP 33.5° NE
Sample collected
pegmatite (large) possibly continuation from other side.

The Quartz feldspathic Gneiss Gradually increases in hornblend composition until IT becomes a feldsp. hornblend Gneiss.

2604 Last good out crop on the TOP East part of the ridge that is QRTZ feld. Gneiss
Foliation: N.34°W DIP S.W. 54°
IN this area bands of hornblend and Quartz become more prominent (UP TO 5 cm IN thickness
Possible contact of QRTZ Feld. Gneiss and Feld. hornblend gneiss in that area (good within 35 feet)






some very Garnitiferous layers in the hornblend Gneiss

2605 Amazing layer of Amphibolite several feet thick IT then Grades INTO a very hornblend Rich Gneiss between this Gradation occur another pyroxene (enstatite?) in Bouden TYPE array. (Sample is taken of this 2605-A and the Amphibolite 2605-B)
Bearing of the Amphibolite - hornblend Gneiss layers - N.72° E
61.5° W
Coarse Grained pegmatite cross cutting the Amphibolites Poor out crop, but massive Quartz (chunks several feet accross in size) feldspar and muscovite. No orientation gotten only APPROX

2606 Apophosy of the Pegmatite (sample taken) shows contact and inclusions of hornblende crystals from the Amphibolite.
Foliation of Amphibolite: N.4°W 68° W

2607 Foliation of Hornblend Gneiss
N.43°E 64° E

2608 Foliation of hornblend Gneiss/amphibolite
N.80° W 64° S

2609 Foliation of Hornblend Gneiss
Tight Folds (small scale)
{N.11° W
{73° W

2610 pick up the unbanded QRTZ Feld. Gneiss
Foliation (roughly) N.25°W 76°W (SW)
hornblend in minor amounts
Small pegmatite or QRTZ vein. No Resistivity
Roughly ≈N.S probably vein
The QRTZ Feld. Gneiss increases in QRTZ %
Some slickensides begin to show up and hematite
stain
Biotite & Garnet show up in great
abundance in soil & talluss
all FLOAT — turns into a Garnitiferous (small)
Biotite Quartz Feldspathic Gneiss.
FLOAT — small & few fragments of schist
bearing some anthophyllite
2611 FLOAT — Sillimanite schist. also
contains Biotite QRTZ & feldspar
2612 by Jack creek
U.S. General Land office Survey
Plug (Benchmark) 1918

July 12
2613 beginning Traverse moss covered Talluss
slope with much timber large boulders
of (Biotite/hornblend) QRTZ feld. gneiss — not Banded
Some garnets, surgery texture



2614 (40 feet above 2613)
Poor outcrop with Fold
Foliation: ≈ N.30°W 84° SW measured on lower flank of Recumbent fold
Fold Bearing N 30°W Plunge 33° SE.
Recumbent fold amplitude ≈ 3 feet (very rough)
Fold (10 ft above the last)
bearing N.40°W Plunge 17° SE
Amplitude ≈10 cm open fold
2615 Foliation N.25°W 65° SW
2616 Foliation N.37°W 85° SW
becomes a bit banded
2617 slickensides and shearing evident
made error in Traverse (went up to
early) correcting it by following ridge
west till pick up section desired
2618 Back on planned Traverse
2619 Banded Quartz feld. Gneiss
Foliation N.70°E 68° NW
2620 Foliation N.70°E 69° NW
Joints (shearing on these faces. ~~[illegible]~~
N 58°W 77° NE
N.70°E 69° NW Parallel to Foliation
and parallel to lineation.
Fold N.88°W 62° SW Plunge
bearing

Pest creek moving SSE up the next slope all FLOAT QRTZ feld. Gneiss, banding is NOT prominent, but visible

2621 Outcrop

Foliation N. 75°E 30°SE

(may be anticlinal fold plunge SW or SO across the valley?)

2622 between 2621 and 2622 there are zones of the Gneiss IN FLOAT that have larger porphyroblasts of PINK feldspar. The BIOTITE content also varies sometimes making distinct bands attention very faint 2622 is an outcrop

FOLIATION: N. 34°E 60°SW

2623 crossed contact between the QRTZ feld. BIOTITE gneiss and a plagic hornblend Gneiss Good outcrop ~30% plagioclase 5% garnet the rest generally hornblend (a little quartz. NO Gradation is seen between the QRTZ feld. Gneiss and the plagic hornblend Gneiss IN FLOAT (as was seen at 2604

FOLIATION N. 40°E 82°SE

JOINTS N. 70°W 60°NE

N. 30°E 10°W

No apparent folding



2624 hornblend gneiss foliation

N 30°E 70°SE

2625 Foliation of hornblend Gneiss

N. 38°E 74°E

Folds in hornblend Gneiss (same locality)

Broad open fold amp. undetected Beams N. 30E Plunge 15°NE

open fold amp. 40-50cm Beams N. 37°E vertical plunge

There is a contact here and the QRTZ feld. Gneiss has same orientation N. 38°E 74°E

SE of the contact the two formations seen to intermingle!

2626 QRTZ feld. Gneiss

N. 33°E 75°ESE

Walking toward top, hornblend Gneiss intercepted again mostly float (concentrated).

2627 This area (the ridge) consists of alternating Bands of hornblend Gneiss and QRTZ feld. gneiss.

Foliation of hornblend Gneiss

N. 16E 54°NW

These alternating beds of the two rock types are roughly parallel.

2628 - amphibolite layer N. 60°E vertical dip

Next to this is a quartz rich white banded sequence (depletion?)

— incorrect location GOTO 2658

2629 Very large pegmatite cross cutting hornblend Gneiss / amphibolite. MANY apophyses, large phenocrysts of Quartz & ORTHOclase

Pegmatite ≈ N.82°W 48° N.E

Gneiss N.46°E Vertical Dip.

at the contact between the two there is very little alteration or assimilation.

The QRTZ in the peg. is finer grain, and shows some foliation or lines

apophyses from this pegmatite show up continuously for the next several hundred feet

2630 Layered Amphibolite, hornble full of garnets FOLIATION N.44°E E

Fold: Tight Fold Lying on its side, it has doubled over the beds in the Gneiss

Bearing N.48°E Plunge 71° S.W

Continuing, (looks like Rain), some of the hornblend Gneisses are so rich in garnets that it is difficult to see much else, they are almost a Garnet Rock

2631 Garnitiferous BIOTITS QRTZ Feld. Gneiss Rich in Quartz Veins

N.70 W. 68°S — FOLIATION



2632 concentrated float — muscovite and sillimanite Quartz schists no orientation gotten lots of Quartzite Rock, slightly foliated, all over

Pegmatite (?) FLOAT large laths of muscovite (10 cm) Quartz & feldspar some intermingled with the QRTZ Gneiss

2633 N.E portion of Ridge — coarse grain Amphibolite banded with finer Grain hornblend and feldspar Gneiss (Garnitiferous

Foliation N.60°E 82° W. NW

Much folding and Discordant Quartz Vein (8 cm wide)

Folds

N.65°W Bearing 64°W Plunge open ← 40 cm Amp

N.2° E " 79° NE (3 ft Amp)

(QRTZ Vein) Some what open fold

much deformation and some shearing (discordant to FOLIATION) seen here the sheared blocks are NOT in place.

Fold: bearing N.45°W Plunge 71°W

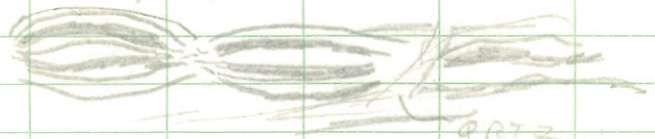
Shearing (in place): N.S. — Bearing

27°S — Plunge

2634 hornblend Gneiss / amphibolite
almost a crumpling of the layers.

FOLIATION N. 80° E 61° SE
LINEATION Bearing N. 20° E Plunge 53° SW
Some QUARTZ/feldspar "Boudens"
and stringers of garnets

also in a boudenlike fashion
FOLD: Bearing Plunge
N.S. 53° S
Pinch & Swell structures boarding
on boudanage Formation:




2635 Concentrated FLOAT of
pearl white Quartz - Quartzite?
Some Grain seen, NO ASSOCIATED
feldspars Some feldspars found
in association with QRTZ feld.
Gneiss FLOAT - almost only large (5-10 cm).
2636 QRT feld - Gneiss, Banded
contains biotite, no hornblend
FOLIATION N.S. DIP 51° W
The Gneiss has a QRTZ Rich N. Boarder



OUTCROP of the "Quartzite" near 2635
shows NO obvious or apparent structure
There does appear to be some shearing
in some of the FLOAT. Garnets (small ones)
are also present (sporatically) in the QRTZ

2637 going down N. end of beach
Quartz feld. Garnitiferous Gneiss,
Quartz rich Gneiss and plagic
hornblend (Garnitiferous) Gneisses in float
a subcrop apparently all layered,
FOLIATION ≈ N. 80° E 95° NW
2638 QRTZ feld. Gneiss (BIOTITE) Banded
FOLIATION N. 45° E vertical DIP
2639 med. to coarse Grain marble.
Beds seen to trend: N. 25° W 65° SW
2640 Subcrop of QRTZ feld Gneiss
and hornblend Gneiss intermingles. This
is flanked top & bottom by the marble
FOLIATION (approx) ≈ N. 45° W
sample taken DIP (really approx) 80° SW
Marble (better outcrop) N. 45° W 80° SW
Some areas seem dolomitic, some not.
Quartz lenses or veins show signs of
shearing

2641 ~~marble~~ OUT continued across saddle
2641-A
(Sample Taken) MANY cross cutting quartz veins indicating severe fracturing. Green mineral looks like ACTINOLITE or ENSTATITE (IT IS IN sample). Many areas are calcareous marble (FIZZ readily in HCl) other areas appear DOLOMITIC apparent bedding: N.25°W 62°SW (very unshore)

Sample Taken 2641-B directly above this marble outcrop occurs a coarsely crystalline quartz gneiss some biotite and feldspars

Lineation: identical to the marble N.25°W 62°SW

2642 Quartz Feldspathic Gneiss containing hornblend NOT very well banded has many folds Parallel TO STRIKE & DIP of FOLIATION: N.77°W 75°N (Poor outcrop, poor reading)

Traversing north on slope - concentrated FLOAT of a fine grain qrtz feld. Gneiss some biotite some hornblend, much iron stain (hematite) almost IN Leisigang array in places.



FLOAT continues as such some garnetiferous chunks also light colored bands of hornblend gneiss show up from time to time

2643 Concentrated float and POOR SUBCROP. FOLIATION (approx)

Foliation E.W. 73°S

2644 upon reaching the next Downgoing Ridge hornblend Gneiss bearing on Amphibolite is intersected.

SUBCROP FOLIATION ~~[illegible]~~

EW DIP 69°S

2645 The fine grain Garnetiferous hornblend Gneiss outcrops on a large scale. Some is iron stained.

FOLIATION EW 70°S DIP

2646 hornblend Gneiss Greater feldspar %

FOLIATION N.85°W 66°S

Fold AXIS bearing N.10°W plunge 66°SW

open fold amp. ~~[illegible]~~ 40cm

tight fold to the west of it same orientation

further down the ridge find Granite
Iron stain ~~[illegible]~~ BIOTITE QRTZ feldspathic
Gneiss is seen — FLOAT only

2647 Garnitiferous hornblend Gneiss
low cut crops and FLOAT
FOLIATION N.35°E DIPS vertical
FLOAT around side of hill QRT. feld. Gneiss
some sheared zones in saddle
connect up with old Traverse 2590

2648 New Traverse (The one I missed
this morning) starting at 2618 old traverse
Moving N.W. down slope
Followed Float (QRTZ feld. Gneiss)
to the creek



July 13

Moving East on Ridge

2649 BIOTITE Quartz feld. Gneiss
Not banded FOLIATION N.30°E 63° W
Just east of this OCCURS coarse
Grained QRTZ feld. Gneiss, some
areas look like QUARTZITE others
more like Pegmatic material

2650 Marble (calcareous) coarse grained
Volumes of calcite grey to white, a bed about
10 feet wide Beds (Poor) N.15°E 60° W

2651 garnitiferous BIOTITE QRTZ feld. Gneiss
FOLIATION N.15°E 72° W
This is directly above the marble, signs
of folding evident (10 feet thick)

2652 Garnitiferous (in areas) QRTZ feld. hornblend
Gneiss. much deformation.
FOLIATION N.3°E 76° W (12-15 feet thick)
above this is a BIOTITE QRTZ feld. Gneiss
This is about 6 feet thick and follows by
Garnitiferous QRTZ feldspathic hornblend
Gneiss (12 feet thick) This is follow
by a coarse Grained pure QRTZ feld.
Gneiss, This almost looks pegmatitic
Sample taken → 2653 Some areas contain
BIOTITE

This Grades into a finer Grained Biotite QRTZ feld Gneiss which in turn become more rich in hornblend and less in Biotite and becomes a hornblend Gneiss. This is quite thick and contains layers of QRTZ feld Gneiss and Amphibolite

FOLIATION: N.5°E 73°W

2654 ↑

This is Followed by a coarse grained QRTZ feldspathic Gneiss — Subcrop & Float

2655 marble Following the QRTZ feld. Gneiss. Bedding of marble

N.13° W 88° E

very calcareous, this bed is about 15 ft thick

Followed by a coarse grained QRTZ feldspathic Gneiss There is some local deformation in the marble

The QRTZ feld. Gneiss is Followed by a Garnitferous hornblend Gneiss — FLOAT and Subcrop.

2656 FOLIATION: N.7°W vertical dip

There are a few zones of coarse grained Pods of QRTZ in the hornblend Gneiss

This is a thick zone within which porphyroblasts of untwinned feldspar (white) occur also several areas are concentrated with biotite patterns



Than hornblend Garnets occur generally throughout the sequence. Quartz stringers and pods can be seen throughout the sequence (zebra rock) as well. Some zones of coarse Grained Amphibolite occur.

Some large boulders display coarse grained Quartz within which very coarse grains of hornblend occur (up to 2 cm long)

2657 Quartzite and Garnitferous Bands within a feldspar Quartzite (Banded), good "beds" or layers can be seen in this nearly white rock. It is between Quartz rich hornblend Gneiss layers

Following this Amphibolites are seen intermingled hornblend Gneiss

Some epidote appear to exist on some of the more weathered fragments

This is Followed by Float of a red to white Quartzite

Following this occurs biotite to hornblend rich QRTZ feld Gneiss. These also contain at least one zone of very coarsely crystalline white untwinned feldspar. Laths of muscovite in some of the Float

FLOAT of a pegmatite

2658 Top of knob with fence [illegible] large ≈ N.82°W 48°NE Trending pegmatite very coarse grained feldspar QRTZ and some muscovite. Many apophyses coming off it, some concordant with the plagic hornblend Gneiss it intrudes. Hornblend Gneiss

Foliation varies from N.46°E - 90° DIP

TO: N.35°E 74°E

Folds (Tight Fold) (Amp. 4 ft)

bearing N.45°E Plunge ≈ 30°S (?)

Much small scale folds a rippling

No alteration or assimilation noticed where pegmatite contacts the hornblend gneiss.

The pegmatite has finer grains (rapid cooling) at the contacts.

The hornblend gneiss grades in and out of a Amphibolite, hornblend Gneiss, QRTZ feld. Gneiss sequence.

The QRTZ feld. Gneiss is uniform in grain size (that of 1-2 mm) white to grey with traces of biotite and/or hornblend

2659 Marble small outcrop (Calcareous)

Beds: N.55°W 45°S



2660 Biotite QRTZ feldspathic Gneiss

Foliation: N.85°E 72°S

2661 Calcareous Marble

bedding: N 50°E 80°SE

at the contact between the marble and the QRTZ feld. Gneiss there are fine to med. sized biotite "mats" in the coarse grain calcite of the marble

2662 Coarse to med. Grained Amphibolite

Some [illegible] Dark rock

Foliation: N 50°E vertical DIP

2663 Pegmatite FLOAT coarse Phenocrysts of QRTZ and feldspar. Garnets, muscovite and light Green Fuchsite

FLOAT only no outcrop

It looks concordant ≈ NW-SE

where it is QRTZ feld. Gneiss

2664 Amphibolite N.53°E 90° DIP

Pegmatite - displays Graphic texture in some areas strike ≈ N.55°W based on Float and subcrop

where this is a garnetiferous QRTZ feldspathic Gneiss, subcrop

2665 Foliation N.45°E 80°SE

2666 hornblend Gneiss / amphibolite
FOLIATION N.72° E 76° SE
(continue with 2630 to finish case traverse)

South traverse from 2666 down ridge towards Jack creek
QRTZ feld Gneiss - FLOAT & subcrop
mostly amphibolite or hornblend Gneiss
LOAT

Pegmatite, contact relations seen in FLOAT & sub crop. Large perthite granitic and quartz crystals. The pegmatite is discordant to the hornblend Gneiss
Pegmatite ~ N.15° W 22° N.E
Foliation of Gneiss N 60° E 73° SE

2667 ↗

2668 Amphibolite - outcrop
coarse grained FOLIATION
N 50° E 85° SE

2669 marble outcrop mostly calcareous
This outcrop is small 40 ft up from a Tr ail and about 100 yards from the Fence

2670 marble outcrop
N 60° E 60° NW continued ↗



2670 cont.

This "Folds (?) to the orientation:
N.20° W 65° NE
Just above the last Reading, if so it is a broad fold, not very well defined

The QRTZ feld Gneiss directly below the marble seems to conform to it.

2671
above this is a very much disturbed Lichen covered sub crop QRTZ feld Gneiss
POSSIBLE FOLIATION:
N.74° E 82° E
below the marble there is also QRTZ feld Gneiss
Some of the marble (particularly the outcrop at 2669) contains Tremolite.

Following the strike of the marble beds and moving west only QRTZ feld Gneiss and Amphibolite are encountered. Nothing in the ravine west of fence

2672) White Quartzite forming a small hogback bedding
N. 4° W 80° W

2673) Amphibolite
FOLIATION N. 4° W 80° W

2674) marble outcrop calcareous
N. 16° W 57° SW
passed over a hornblend outcrop
most all the way down hill

2675) marble outcrop calcareous
N 15° E 73° W
outcrop has slumped or folded slightly

2676) hornblend gneiss — amphibolite
good outcrops
N 55° E 66° W

2677) QRTZ feld gneiss
FOLIATION N 65 E, 65 NW.

2678) fine grained BIOTITE QRTZ feld. Gneiss. good cliff
FOLIATION N. 75 E ≈ 22° NW (?)
Lineation bearing N. 75 E plunge 12° SW

2679) QRT. feld. Gneiss
FOLIATION N 65° W 86° SW
This is sheared poor reading



2680) QRTZ feld gneiss
This is fairly well sheared and many parts are iron stained. Many slickensides planes can be seen, all of which are iron stained
approx FOLIATION
N. 70° E 79° NW
14 Major shear plane
N 4° E 80° SW
many smaller ones

2681) unsheared BIOTITE QRTZ feldspathic gneiss
FOLIATION: N. 35° E 58° W
a few slickenside surfaces
There are minor folds, but cannot get orientation of AXIS.

2682) Sheared and highly iron stained QRTZ feld Gneiss
FOLIATION: N. 62° E 58° W (uncertain)

FLOAT — mostly QRT Feld. Gneiss
some hornblend Gneiss (garnitiferous

2683) Subcrop of garnitiferous plagioclase hornblend Gneiss FOLIATION:
N. 55° E 62° N.W
JOINING UP WITH OLD TRAVERSE 2601

JULY 14

2684 biotite hornblend plagic Gneiss, somewhat banded. This can be clearly seen on the N. side of Jack creek - outcropping FOLIATION and cleavage parallel to Foliation are easily seen.

FOLIATION. N.10° W 56.5° SW

FLOAT and Tallus moving East upcreek on the S. side. QRTZ feld. Gneiss float intercepted

2685 unsheared fine to med. Granius QRTZ feld. Gneiss, NOT Banded OUTCROP IS on N. side of Jack creek

FOLIATION N.5W 58° SW

Traversing back to S. bank QRTZ feld Gneiss FLOAT continue large tallus piles of the same above on the slope, accross JACK creek on the S. facing slope (N. side) The characteristic rust color of the iron stained sheared QRTZ feld. Gneiss exists. Some sheared fragments seen in FLOAT on this side.



hornblend gneiss encountered again all of Float, still some QRTZ feld. Gneiss

2686 Subcrop and concentrated Float of unsheared QRTZ feld. Gneiss heavily Forested area (good bearings on outcrop 2681 to the N.N.W.)

POSSIBLE FOLIATION

N.82° W (?) 60° N

going back west down stream Traverse

2687 outcrop hornblend Gneiss / Amphibolite

FOLIATION: N.3° W 66° W

mostly QRTZ feld. Gneiss float followed by hornblend Gneiss to coarse grained Amphibolite FLOAT. OUTCROPS higher UP. POSSIBLE pegmatite

2688 Amphibolite, By fence) coarse grained to fine Granule

FOLIATION: N.10° E 73° W

July 15 FLOAT - Quartzose feldspathic SILIMANITE Schist
Some garnet is present.
There is much QRTZ feldspathic Gneiss with this Float
moving up slope - some hornblend gneiss (all Float) encountered still
much more QRTZ feld. Gneiss encounter
BIOTITE Rich QRTZ feld Gneiss
Float only

Farther uphill concentrated float and possibly subcrop (looks like it has been moved) of hornblend Gneiss This FLOAT carries for quite a ways, some small QRTZITE fragments (?) and an occasional garnet rich porphyroblast - some huge (1 foot Dia
The hornblend gneiss has some garnetiferous rich zones

2689 Subcrop BIOTITE QRTZ feld. Gneiss Somewhat broken, NOT a reliable reading,
FOLIATION N.50°E 35° SE



2670 Subcrop (also poor) of hornblend Gneiss
FOLIATION: N.44°E 33° SE

2671 Sub-outcrop of hornblend Gneiss, Garnetiferous - fractured by frost action and has been moved (NO orientation gotten)
above this is mixed FLOAT of QRTZ feld. Gneiss and hornblend Gneiss
This looks like an intermingling, Gradational type segregation of the to main chemically differing beds
above the mixed float (which is ≈ 50-50%) occurs float of just the QRTZ feld. Gneiss. Some fragments contain Garnets, BUT not nearly to the extent the hornblend Gneiss does
There occurs here float from a pegmatite, sparse & no idea of its orientation.

2672 Pegmatite contact found against outcrop of BIOTITE QRTZ feld. Gneiss
approx orientation of pegmatite:
N.40° W 47° N
The pegmatite contains coarse grained Quartz and perthites.

2672 Cont.

QRTZ feld Gneiss contains hornblend and biotite, somewhat banded in areas
FOLIATION: ≈ N. 8°W 77° SW

The pegmatite has many apophases coming off it. At the contact there is no noticable megascopic change in the Gneiss, only crystallin size in the pegmatite (finer) as expected. Some garnets in the pegmatite

2673 BIOTITE QRTZ feld Gneiss
FOLIATION N 22°E 66°W
Poor reading

2674 BIOTITE QRTZ feld Gneiss
good outcrop out on point.
FOLIATION: N.S. 63°W

2675 FOLIATION of QRTZ feld. Gneiss, contains biotite, somewhat banded. N.5°E 69°W

Pass through a small sheared zone, the QRTZ feld Gneiss is sheared (slickensides) and stained red by iron (hematite



Following this is a very thin layer of fresh Gneiss followed by Garnetfer hornblend Gneiss.

2676 hornblend Gneiss
FOLIATION N.17°W 73° SW
Many cross cutting white QRTZ dikes

2677 Banded QRTZ feld. BIOTITE/hornblend Gneiss
FOLIATION: N 6°E 72° W

2678 QRTZ feld. (BIOTITE (hornblend) Gneiss FOLIATION: N.6°E 70° W

2679 QRTZ feld. Gneiss
FOLIATION N.30°E 70° W
Large white QRTZ veins here - all in FLOAT (saddle).
The banded Gneiss only comprises a short zone
moving S. down ridge to gully
Float of sheared QRTZ feld. Gneiss, some also fresh
hornblend gneiss intercepted

2680 QRTZ feld gneiss & hornblend Gneiss ≈ interbanded
Foliation: N.39°E vertical DIP

Continuing down creek intercept more altered float of Qrtz field gneiss and hornblend gneiss some pegmatite FLOAT

2681 hornblend gneiss subcrop
Oliation ≈ N.4°W 78° W

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Same Malonies Talc prospect
Coarse grained of white calcite, brown green to grey stratite

## July 16

2682 begin Traverse across fence just North of Jasmine creek (Near ROAD)
IMEDIATLY INTERSECT limestone marble FLOAT. Can see cliff on other side of Tributary creek leading to Jack creek.
It looks like the marble UNIT.

2683 marble outcrop contains chert also exhibits slicken sides surfaces.
N 5°E 55° W



2684 cherty calcareous marble fine to medium crystallinity possibly some Graphite contained within.
(Sample taken)
bedding cannot be seen but several discontinuous jointing systems can be seen, little amt. of lineation cannot get reading.
30 feet above this is a possible Fold excentuated by thin stringy bands of chert - this may be bedding.
FOLD AXIS: Bearing: N.55°E
(unsure) plunge: ≈ Near vertical
Possible bedding. N 84°W 72° SE
The Fold is an open fold, Amp. ≈ 3 ft (?)
The bedding is measured off the E. limb of the Fold because it seems to be the Dominant Trend

2685 bedding (marble)
N. 75° W 80° S
Possible Fold: Bearing: N. 34°E
Axis: vertical DIP
open Fold AMP: 1½ feet goes into another similar fold same amp.
Bearing. N.35°E
Plunge: 78° SSW

2686 IF the cleavage is related to the bedding then the bedding can be measured. The marble is highly fractured and in many places silicified w/ chert masses, calcedony seams and drusy quartz. most of the marble is calcareous in this area.

Cleavage (Bedding?): N.55°W 88°SW

Moving up slope crisscrossing it the marble coarser in grain size. It is also whiter, does not contain as many impurities in the way of dark bands (graphite etc)

2687 Coarsely crystalline calcareous marble bedding is obscured.

Jointing: N.16°W 60°SW
N.20°W 80°NE
N 25°W 50°NE

2688 Same crystalline marble

Jointing: N.18°W 48°W
N 13°W 70°NE

bedding cannot be seen.



2689 Good bedded coarsely crystalline calcareous marble

Bedding: N.40°E 55°SE

Jointing: N.40°W 79°SW ⊥ to well developed
N.15°E 71°E (poorly developed).

The beds are distinguishable by various thicknesses of coarsely crystalline calcite interrupted by a cleavage along the bedding. Some of the thin beds are QRTZ (crystalline).

2690 Coarsely crystalline calc marble

N.10°E 67°E Bedding

Folding associated here

Fold Bearing: N 50°W, Plunge 81°SE

Overturned intermediate fold amp several ft

Some folds have QRTZ pods in their crests where the marble pulled apart or flowed apart during folding.

Cutting up float of garnitiferous gneiss is intercepted still out crops of marble although more weathered and less prominent. Some areas are fine crystalline and others almost entirely silicified.

Druses and veins of quartz are more prominent. Some areas display slickensides

2691 (Top of 1st mob) Calc marble coarse grained displaying bedding and JOINTING. Bedding is based on QRTZ lineation and bedding/cleavage relation
bedding: ~N.45° W ~ 76° SW
JOINTING: N.10° E ~84° W (strong set)
E.W. ~72° S (weaker set)

2692 S. side of mob shows different orientation of bedding: E.W. 65° S based on the same criteria
Jointing is poor and is NOT measured here.

Traveling N & Down slope only marble and highly silicified beds of marble are encountered. The SW facing slope accroth the creek shows little FLOAT and no outcrop from here. Sheared QRTZ feld-gneiss (?) can be seen forming red-rust cliffs to the north. Traversing S back up to saddle
Subcrops & FLOAT of calc marble in saddle, (a few pieces) Some float of QRTZ feld gneiss, [illegible], no outcrop
The marble here is highly fractured and highly silicified.



Just out of the trough of the saddle (SE) occurs concentrated float of Qrtzose Gneiss, slightly sheared QRTZ feld. Gneiss. A little above this occurs an amphibolite, hornblende Gneiss sequence. This may be a FAULT zone (looking at the bedding of the marble Someone did some digging in the Amphibolite (why?)

probably due to folding [illegible] fault [illegible]

2693 Possible foliation of fine Grain Amphibolite
N.31° W 1.1° NE

2694 Quartzite containing BIOTITE (DIRTY) meta Quartz S.S. Sample taken
bedding ≈ N.15° W ≈ vertical DIP
QRTZITE contact, 2 pieces float of SILLIMANITE schist marble

2695 calcareous medium Grained marble Bedding N.14° E Vertical DIP

2696 marble, Bedding
N.30° E 76° SE

2697 marble bed
N 30° E 75° SE

2698 calc marble coarse grained.
JOIN up. N 25°W 90° DIP
N 40°E ~52° NW (?) Pre
Bedding N 70°E 49° SE

2699 FOLD in marble, large one
Bearing: N 18°W, Plunge 73° SE
Intercept float of amphibolite and
ORTZ fold Gneiss in saddle, all
mixed, NO OUTCROPS.
Pick up calc marble upon inbrung
co of saddle. Generally everything
scovered/covered down the slopes

2700 bedding of calc marble
N 35 E. 69° NW

2701 open Folds in marble
Amp. 1 foot
bearing: N 50°W. Plunge. 68° SE

2702 large fold in marble
many feet in amp.
bearing N 50°W Plunge 58° SW
Passing from marble through covered
ded to concentrated flas of Qrtz fold
Gneiss

2703 sub crop of Qrtz fold Gneiss
orientation not able to be gotten



2704 Subcrop of calc marble
Bedding: N 60°W 78° S

2705 subcrop marble
approx bedding ~N 18° E 74° ESE

2706 OUTCROP on top ridge of calc
marble. Bedding: N 4° E 90° DIP

2707 marble co [illegible] OUTCROP
bedding N 5°W 71° E
FOLD bearing EW plunge 64° E
MINOR open fold. Amp 40cm

2708 marble outcrop
bedding N 4° E 55° E
FLOAT IN saddle of a micaceous
calcium marble, once a very dirty
limestone, also found at subcrop

2709, This has been showing very
infrequently now and then.

2710 Top of knob. calc marble
OUTCROP bedding ≈
N 25°W 80° SW

2711 calc marble weathered with a
slight iron stain, bedding all folded.
FOLD: Bearing N 5°W Plunge: 90°
Possible Bedding N 32°W 65° SW

2712 marble outcrop (calc)
bedding: N 80° W 63° S

walking down slope N30° E towards lower knob only FLOAT IS ENCOUNTERED. Some FLOAT IS QRTZ feld. gneiss, IT IS scarce. all the other Float is marble on the chert and calcedony which comes from it, below the 7200' contour QRTZ feld. Gneiss FLOAT Dominates, some hornblend Gneiss

The back of the knob is calc marble forming steep cliffs:

2713 Beds N60° E 80° SE

2714 MARBLE Beds calc coarsely crystalline

Bed N75° E 65° SE

minor open Fold Bearing: N.75° E

(Recumbant) plunge: 33° NE

Shortly after cliffs of marble (to overside North) I intercept float exclusively of QRTZ Feld. gneiss and hornblend, Gneiss

2715 QRTZ feld Gneiss

Sub crop possible Foliation:

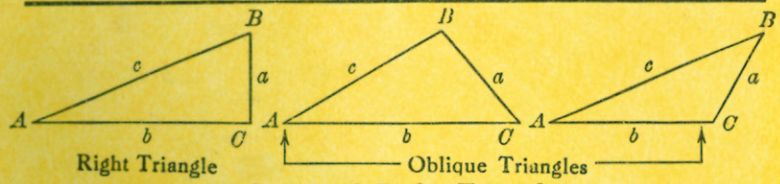
N.70° E, 65° SE.

The last Ridge before the creek moving North is subcrop of Garnet QRT Gneiss, Feldspar present

No orientation could be gotten

The creek is the contact between this and the marble

## TRIGONOMETRIC FORMULÆ




### Solution of Right Triangles

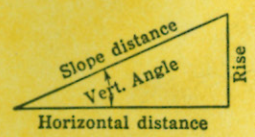
For Angle $A$. $\sin = \frac{a}{c}$, $\cos = \frac{b}{c}$, $\tan = \frac{a}{b}$, $\cot = \frac{b}{a}$, $\sec = \frac{c}{b}$, $\operatorname{cosec} = \frac{c}{a}$

| Given | Required | |
|---|---|---|
| $a, b$ | $A, B, c$ | $\tan A = \frac{a}{b} = \cot B,\ c = \sqrt{a^2+b^2} = a\sqrt{1+\frac{b^2}{a^2}}$ |
| $a, c$ | $A, B, b$ | $\sin A = \frac{a}{c} = \cos B,\ b = \sqrt{(c+a)(c-a)} = c\sqrt{1-\frac{a^2}{c^2}}$ |
| $A, a$ | $B, b, c$ | $B = 90° - A,\ b = a \cot A,\ c = \frac{a}{\sin A}.$ |
| $A, b$ | $B, a, c$ | $B = 90° - A,\ a = b \tan A,\ c = \frac{b}{\cos A}.$ |
| $A, c$ | $B, a, b$ | $B = 90° - A,\ a = c \sin A,\ b = c \cos A,$ |

### Solution of Oblique Triangles

| Given | Required | |
|---|---|---|
| $A, B, a$ | $b, c, C$ | $b = \frac{a \sin B}{\sin A},\ C = 180° - (A+B),\ c = \frac{a \sin C}{\sin A}$ |
| $A, a, b$ | $B, c, C$ | $\sin B = \frac{b \sin A}{a},\ C = 180° - (A+B),\ c = \frac{a \sin C}{\sin A}$ |
| $a, b, C$ | $A, B, c$ | $A+B = 180° - C,\ \tan \frac{1}{2}(A-B) = \frac{(a-b)\tan\frac{1}{2}(A+B)}{a+b},$ $c = \frac{a \sin C}{\sin A}$ |
| $a, b, c$ | $A, B, C$ | $s = \frac{a+b+c}{2},\ \sin\frac{1}{2}A = \sqrt{\frac{(s-b)(s-c)}{bc}},$ $\sin\frac{1}{2}B = \sqrt{\frac{(s-a)(s-c)}{ac}},\ C = 180° - (A+B)$ |
| $a, b, c$ | Area | $s = \frac{a+b+c}{2},\ \text{area} = \sqrt{s(s-a)(s-b)(s-c)}$ |
| $A, b, c$ | Area | $\text{area} = \frac{bc \sin A}{2}$ |
| $A, B, C, a$ | Area | $\text{area} = \frac{a^2 \sin B \sin C}{2 \sin A}$ |

### REDUCTION TO HORIZONTAL




Horizontal distance = Slope distance multiplied by the cosine of the vertical angle. Thus: slope distance = 319.4 ft. Vert. angle = 5° 10′. From Table, Page IX. cos 5° 10′ = .9959. Horizontal distance = 319.4 × .9959 = 318.09 ft. Horizontal distance also = Slope distance minus slope distance times (1 − cosine of vertical angle). With the same figures as in the preceding example, the following result is obtained. Cosine 5° 10′ = .9959. 1 − .9959 = .0041. 319.4 × .0041 = 1.31. 319.4 − 1.31 = 318.09 ft.

When the rise is known, the horizontal distance is approximately:—the slope distance less the square of the rise divided by twice the slope distance. Thus: rise = 14 ft., slope distance = 302.6 ft. Horizontal distance $= 302.6 - \frac{14 \times 14}{2 \times 302.6} = 302.6 - 0.32 = 302.28$ ft.

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