195 Ge
9

TRANSIT

NOTEBOOK NO. 301

R. B. Berg

Montana Bureau of Mines and Geology

Butte, MT 59701

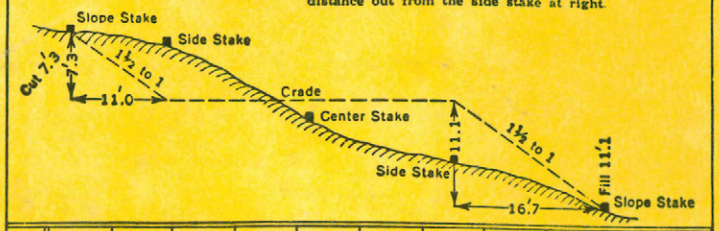
195 Ge 1974

1107 - 1339

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

Aug 15 north of Ruby Dam

1107 - brown weathering dolomitic marble - fold axis: 22° S 30° E

1108 - diopsidic calcitic marble layering, N 25 W, 27 NE fold axis: 45° N 20° E

1109 - coarse-grained white dolomitic marble - layering: N 15° W, 15° NE fold axis: 32° N 40° E - moderately abundant qtz. layers - some chalcedony - no gneiss seen in gully south of 1109 -

1110 - banded bgfgn - minor amphibolite foli: N 55° W, 40° NE

1111 - banded bgfgn + amphibolite - also garnet, alaskitic gneiss - fold axis: 15° S 70° E

1112 - banded bgfgn - foli: N 65° W, 15° NE - considerable folding in this area -

1113 - fold axes from exposures in gully - banded bgfgn + amphibolite 8° N 10° E, 80° N 65° E, 55° S 10° W foli: 200 m. west N 70° W, 30° NE migmatitic bgfgn -

1114 – band and migmatitic bqfgn – foli: N55°W, 52°SW
fold axes: 54° N15°E
pegmatite 0.3m thick: N50°W, v.
1115 banded and migmatitic bqfgn foli: N55°W, 50°NE – some amphibolite flt. – very dense and dark amphibolite with q-f layers up to 1cm thick – no garnets – foli. of banded bqfgn: N80°E, v.
some biotite schist above this – bqfgn major rock type –
1116 – vertical shaft ≥ 10m deep into sheared qtz. – some malachite on rock on dump –
1117 – banded bqfgn – some foli: N90°W, 78°N garnet. alaskitic gneiss – more massive pink qf gneiss above here – minor amphibolite
1118 – coarsely foliated salmon bqfgn – foli: N60°W, 75°NE
195 Ge-1119 garnet. granulite – fold axis: 55° N20E – mainly bqfgn here – foli: N75°W, 80°NE
some amphibolite and biotitic gneiss flt. right before marble –

195 Ge-1120 diopsidic calcitic marble – layering: N70°E, vert.
195 Ge-1121 white dolomitic graphitic marble
1122 – fine-grained dense garnet. amphibolite – foli: N30°W, 74°NE
some amphibolite biotitic and coarser-grained –
1123 medium-grained dense amphibolite – foli: N5°W, 75°NE
some garnet-tourmaline alaskitic gneiss within marble – also Mn + silica locally abundant in marble –
1124 – coarsely gneissic salmon bqfgn – foli: N20°W, v.
1125 brown weathering dolomitic marble – fold axis: 70°N40°E layering: N70°W, 85°NE
1126 – alaskitic qf gn – mappable layer in marble here – much gneiss in marble to west, but map as marble
1127 coarse-grained white qtz. layer: N60°E, 85°NW dolomitic marble

1128- coarse grained white q f gn- also

195 Ge-1129 pod (10x50m) of garnet granulite within q f gn- fol. of gneiss: N 80°E, v. - also minor amphibolite here-

1130- coarse-grained q f gneiss may be a sill within marble- aplitic q f gn to west- attitude of marble downhill: N 15°E, 80°NW.

1131- amphibolite- below marble- fol.: N20°W, vert. fold axis: vertical coarse grained q f gneiss at top 1131-

Aug. 18 - north of Ruby Dam on west side of River-

1132- slightly garnet. bg f gn- fol.: N5E 77NW - coarse-grained dolomitic marble from river uphill

1133- bg f gn- somewhat migmatitic- fol.: N 30°W, 35°NE joint: N65°W, v. - several discordant pegmatite dike <0.5 m thick-

1134- coarse-grained white dolomitic marble- layering: N10°W, 38°NE some brecciation of marble 50m west-

1135- coarse-grained white dolomitic marble- layering: N 45°E, 85°SE shearing along gully to south- fold axis (folded qtz. layers) 40°S 80°E concordant contact with bg f gn to west- fol.: gneiss: N35°E, 75°SE

1136- coarse-grained white dolomitic marble- layering: N60°E, 75°SE - minor shearing lavender garnet, sillimanitic biotite schist in contact with marble-

1137 massive garnet amphibolite- fol.: N60°E, 70°SE

1138 - same marble layering: N 20°E, 55°SE amphibolite fol.: N50°E, 78°SE (south of 1138 across gully)-

1139- veined + foliated amphibolite- fol.: N 65°E, 72°SE

195 Ge-1140 reddish brown weathering dense hb gneiss fol.: N55°E, 80°SE (amphibolite)

1141 – white coarsely crystalline dolomitic marble – layering: N 45°E, 40°NW some garnet qtzitic gneiss f/t to north – then pegmatite dike – fold axis: 75°N 70°E

[195Ce-1142] talcose? marble – f/t. – schist loaded with sillimanite in contact with marble –

1143 – cream dolomitic marble – cut by qtz pegmatitic dike –

1144 – black amphibolite and granulite – foli: N 45°E, v.

[195Ce-1145] garnetiferous biotite schist – also garnet qtz gn. foli: N 40°E, 60°SE forms massive brown igneous-looking outcrop – many pits ½ cm across –

1146 – banded amphibolite – foli: N 35°E, 82°SE – a few schistose layers – white coarsely crystalline marble – qtz. layers – no folding – pegmatite dike N 75°E, vert. 1m thick much jasper here –

1147 – amphibolite cut by several pegmatite dikes 1-3m thick trending N 90°W, foli. of amphibolite N 25°E, 60°SE marble is silicified at eastern contact

1148 – amphibolite foli: N 20°W, 50°NE – some garnetiferous biotite schist and garnet. (>80%) gneiss –

1149 – amphibolite + garnet. biotite schist with minor anthophyllite gneiss – foli: N 15°E, 65°SE

[195Ce-1150] garnet. anthophyllite schist

1151 – anthophyllitic schist schistosity: N 35°E, 50°SE much larger garnet in biotite schist –

1152 – garnet-anthophyllite gneiss – ridge along strike – foli: N 40°E 85°SE – very dense garnet-hb (minor plag) amphibolite – then more anthophyllite schist –

1153 – anthophyllite schist schistosity: N 70°E, 75°SE

1154 - garnet, anthophyllite schist -
schistosity: N 75°E, 70°SE
schistosity: 50m north: N 70°W, 65°NE

1155 coares-grained white calcitic marble -
general trend - layers: N 30°E, 30°SE
100m north: N 45E, 60SE
some dolomitic marble at north end of exposure -

1156 - calcitic dolomite -
layering: N 15°W, 80°NE

1157 - garnet, bqfgn -
fol.: N 5°W, v. - amphibolite assoc. + pegmatite to west -
fol.: * N 5°E, 65°NW
shear plane - N 40°E, 85°SE -
shear direction - nearly horizontal

1158 - hb-garnet granulite -
pegmatite trend: N 40°E
garnet, q.f gn - minor biotite -
fol.: N 80°W, v.

1159 - bqfgn
fol.: N 25°W, 33°NE

1160 - garnet, bqfgn -
fol.: N 15°E, 72°NW - really a schist - much shearing through here - some breccia -

195 Ge - 1161 sheared and brecciated Flathead Qtzite? -
gravel to north -

1162 - white - coarse-grained dolomitic marble - layers: N 30°E, 50°SE
minor mica -

1163 - marble -
layering: N 30°E, v. - 100m north
garnet bqfgn or schist exposed
also some amphibolite -
fol.: N 50°E, v. fold axis: 80°N 35°W

1164 - very garnet, bqfgn -
fol.: N 70°E, 85°SE

1165 - light colored bqfgn -
a few garnets in biotitic layers
fol.: N 30°E, 55°SE - biotite well oriented - garnet bqfgn east of 1165
fol.: N 55°E, 75°SE - minor anthophyllite
also some very dense garnet - hb granulite -

195 Ge - 1166 coarse-grained garnet bqfgn - fol.: N 55°E, 68°SE
sequence is thus:
NW marble anthophyllite schist qfgn gneiss amph. sch. marble SE

1166 (Cont.) minor amphibolite just east of qfgn, then anthophyllite schist + garnet Hb granulite, etc.

1167 - amphibolite - very dense - foli: N 70°E, 78°NW - red weathering not nearly as much anthophyllite schist on this side as on west side of gneiss - amphibolite more abundant here

1168 - dense, dark amphibolite foli: N 85°E, 83°SE - qtzite (≥ 0.5 m thick) then qtzitic gneiss, then marble

1169 - ~~calcitic~~ dolomitic marble layering: N 75°E, 80°SE ~~couldn't get fresh surface~~ - weathers brown - thinly laminated

1170 - lavender garnet, biotitic schist - schistosity: N 80°E, 60°SE amphibolite south of this, then marble - fold axis in amphibolite: 35° N 70°E (north of 1170) - folds of other orientation also -

1171 - amphibolite - foli: N 25°E, 85°SE amphibolite from marble to here with exception of 1170

1171 (Cont.) garnets minor or lacking in this amphibolite -

1172 white, coarse-grained calcitic marble - layering: N 65°E, 88°SE

Aug. 19 - north of Ruby Dam west of Ruby River + rhyolite plug north of Davey Crk.

1173 - white coarse-grained dolomitic marble - layering: N 85°W, 55°NE chalcedony veins. N 0°W, 80°E

1174 - same marble - isoclinal fold in qtz. layer - axis: 20° N 30°W granite dike ~40 m thick here -

1175 - same marble - layering: N 35°E, 75°SE - northern granite dike is about 20 m thick -

1176 - banded bqfgn - looks like that up Idaho Crk. - foli: N 10°E, 70°SE - right in contact with marble - q-f layers garnetiferous - biotite well oriented - fold axis: 30° N 30°E

1176 (cont.) 3m of banded bgfgn Then 15m of amphibolite assoc. to west then marble-amphibolite assoc. here is garnet biotitic gneiss and amphibolite-marble only 2m thick - then back into banded bgfgn-

1177- hb gneiss with minor amphibolite - foli: N40°E, 87°SE

1178- marble with layer 0.5m thick of banded bgfgn in it-
fol. of banded gneiss: N55°E, 50°NW
fold axis: 50° S40°E - a layer ≥ 0.8m thick of brown-weathering qtzite. between amphibolite and marble-

1179 dolomitic marble-
layering: N50°E, 80°SE
tr of graphite and diopside-

1180- amphibolite
foli: N75°E, 65°SE

1181- same marble
layering: N30°E, 65°SE
dolomitic- minor graphite -

1182- same marble-
layering: N30°W, v.

1183- banded bgfgn
foli: N 80°E, 70°SE
195Ge-1184 white dolomitic marble-
layering: N 60°E, 85°SE

1185 - same marble
layering: N 45°E, 70°SE - layer of white qtz.- feldspar gneiss 0.3m thick in marble-

1186- same marble-
layering: N 50°E, 65°SE
fold axes in banded bgfgn *25° N40°E
folds 0.2 x 3m - minor pegmatite in this gneiss- gneiss only ~50m thick here- marble conformable to west
pod 7x20cm of coarse grained dolomite with green amphibole in core-

1187- banded bgfgn
foli: N 20°E, 75°NW
195Ge-1188 dolomitic marble- talcose qtz. layer: N 65°E, 80°NW - check specimen for talc- qtzitic gneiss (with biotite, much with random orientation) within marble to north of gulch- some more strongly foliated gneissic portions at this

1188 (cont.) qtzitic gneiss resembles gneiss to south of gully — gneiss appears to pinch out and not be an isoclinal fold — could be an isoclinal fold with a near horizontal axis —

~~folded qtz. layer (marble) axis: 50° N10°E~~

1189 — marble — coarse-grained calcite pod (1X1 cm) —

folded qtz. layer (axis) 50° N10°E

" " " 25° N60°E

fold axis:

layering adjacent to gn.: 10° N10°E

gneiss south 10 m thick here —

1190 — white calcitic marble

layering: N15°E, 65°SE

fold axis: 55° S70°E

numerous qtz. pods a few cm in longest dimension —

1191 — typical amphibolite

foli.: N15°E, 65°SE

lacks garnets — granitic gneiss 5 m thick within amphibolite —

195 Ge — 1192 very dark massive amphibolite —

195 Ge — 1193 — banded hb gneiss

foli.: N10°E, 65°SE

dark garnetiferous biotitic gneiss to west —

1194 — amphibolite

foli.: N30°E, 60°SE

195 Ge — 1195 dolomitic marble

tr. graphite and some phlogopite

layering: N50°E, 55°SE

1196 — calcitic marble — some phlogopite

layers: N75E, v.

1197 — diopsidic calcitic marble —

qtz. layer: N60°E, 75°NW

one qtz.-feldspar gneiss layer <1 m thick could be traced for 30 m — may be longer

marble weathers brown to white —

folds generally very gentle —

most of this marble is dolomitic, but a few calcitic layers —

1198 — diopsidic calcitic marble — minor serpentine — layers: N60°E, 85°SE

1188 — comments on gneiss —

layer of biotite schist <1 m thick can be traced across gully into marble for 50 m along strike —

loc. 1187 - banded bgtgn
fold axis: 25°N65°E
1199 diopsidic calcitic marble -
layers: N35°E, 75°SE

south of Davey Crk.
1200 - calcitic marble -
much silicified next to rhyolite
plug - qtz. layers: N25°E, 80°NW
$\boxed{195Ge-1201}$ rhyolite from plug
flow banding prominent in some
of the rhyolite near top of butte -
1202 - calcitic marble -
qtz. layers: N65°E, 80°SE

Aug. 20 - south of Hinch Crk.

1203 banded garnet bgtgn -
fol.: N55°E, 60°SE
also some amphibolite -
1204 - marble -
layering: N 10°E, v.
1205 - marble
layering: N 70°W, 60°SW

1156 - marble
fold axis 35°S65°E
layering: N25°W, 50°NE - southernmost
exposure of marble - some anthophyllite
schist to west down hill from
marble - garnet (lavendar garnets) bgtgn
and very dark amphibolite
1206 garnet bgtgn
fol.: N 55°E 75°SE
1207 dolomitic marble
layering: N45°E 65°SE
$\boxed{195Ge-1208}$ Talc pods surrounded
by pale green mineral (1 x 2 x 5 cm)
tunnel 10 m long through sheared
marble - shear zone: N15°E, 65°SE
1cm thick layer along shear zone
stained with malachite - shear zone
~1m thick - some conformable
chalcedony pods 0.5 x 5cm
shear zone: * N5°E, 70°SE
banded garnet bgtgn N0°W, 55°E
diopsidic calcitic marble layering: N25°E, 55°SE
Talc here is in diopsidic calcitic
marble and in 2 cases surrounds
qtz. pod -

195Ge-1209 diopsidic calcitic marble
qtz. layers: N60°E, 55°SE - amphibolite
assoc. flt. above marble -
minor chrysotile - fold axis: 15°S40°E
minor green talc flt. -
layering: N50°E, v. 75m west
1210 - diopsidic caldol marble -
qtz. layers: N70°W, 75°NE
195Ge-1211 banded bqfgn
fol.: N80°W, 78°NE - cut by
some qtz. - k-spar veinlets a few
cm thick - some k-spar augen -
1212 finely banded bqfgn
fol.: N80°E, 60°NW
1213 qtzitic bqfgn -
fol.: N70°E, 70°NW
some garnet, biotitic gneiss below
this -
1214 - pegmatite with much
white qtz. -
1215 - banded bqfgn - (garnet.
fol.: N30°E, 57°SE - var.
some amphibolite assoc. to the west -
fold here with >45° plunge of
axis, but orientation could not be
measured - fold axis: 70°N20°E

1215 (cont.) garnet biot. schist -
fold axis: 60°N55°E) very dense -
maybe some anthophyllite -
1216 banded bqfgn
fol.: N30°E, 65°NW
dense garnet granulite between
1215 and 1216 -
1217 banded bqfgn
fol.: N55°E, 77°NW - concordant
qtzite. (0.7m) then hb-garnet
granulite -
1218 garnet biotite anthophyl. schist
schistosity: N85°W, v.
1219 - same as 1218 but
NE of dike - also gneiss with
≈80% garnet
195Ge-1220 garnet-anthophyllite schist -
schistosity: N10°E, 80°SE - biotite prominent
locally - medium-grained amphibolite
at top of knob - fol.: N85°E, 65°NW
195Ge-1221 dense hb granulite -
no recognizable foliation -
1222 - dense, red-weathering
garnet-hb granulite (some layers)
like Hal's 930 -

1222 (cont.) also garnet biotite schist – >80% garnets –
fol.: N 30°E, 65°SE
fol.: N 30°E, 85°SE
garnet banded bqfgn –
1223 garnet bqfgn –
fol.: N 70°E, 83°NW
qtz.– k-spar layers are loaded with garnets –
1224 – lavendar garnet bqf schist
fold axis 85°S 25°W – numerous isoclinal folds of qtz.–feldspar layers – in many cases has produced rodding – rods 1–2 cm across –
schistosity, N 75°E, 88°SE
finely-layered slightly garnet. amphibolite downhill –
1225 – g bqfgn –
fold axis: vertical, fol.: N 85°W, v.
1226 – garnet bqfgn
fol.: N 55°W, 77°NE
1227 – hornblende gneiss –
fol.: N 80°E, 70°NW – consists of layer of coarse-grained hb up to several cm and layers of plag. + hb of finer grain size –

1227 (cont.) dense bqf granulite
~7 m thick layer within hb gn
fold axis: 70° N 55°W in garnet-qtz-feldspar granulite –
$\boxed{195Ge-1228}$ – medium-grained amphibolite
fol.: N 70°W, 85°SW – dense meta-gabbro outcrop 5 x 20 m within basic gneisses –
1229 banded hb gneiss
fol.: N 65°E, 70°NW
1230 finely banded hb gneiss
fol.: N 35°E, 75°NW
1231 – hb gn
fol.: N 40°E, 70°NW
1232 – calcitic marble
layering: N 75°W, 25°NE
1233 biotite schist on sw side of knob
fold axis: 55° N 0°W
small q-f layer in isoclinal fold –
1234 – garnetiferous bqfgn
1235 – banded bqfgn –
fol.: N 10°E, 55°SE
$\boxed{195Ge-1236}$ – garnet. banded bqfgn
fol.: N 30°W, 55°NE

1237 - banded bgfgn

fold axis: 75° N 70° E (gentle warping)

fol.: N 10° W, 75° NE — feldspar augen prominent in a few layers — This gneiss interlayered with garnet biotitic gneiss —

1238 dense fine-grained amphibolite

fol.: N25° W, 85° NE

minor ridges 75° N35° E

on s surface — relief a few mm — some coarser-grained layers garnetiferous

1239 - banded bgfgn

fol.: N70° W, 78° NE — from Hinch Crk. to top of ridge about 50% basic gneiss assemblage and 50% banded bgfgn —

Conclusions —

in the area roughly between Hinch △ and Hinch Crk. banded bgfgn and the amphibolite assemblage are mixed ~ 50-50 This is the only area examined to date in which such a

mixture occurs over a significant distance — maybe it should be shown as a separate unit (intermediate assemblage) which has gradational contacts with the amphibolite assemblage in this case — The amphibolite assemblage in the area west of the Ruby River is > 80% amphibolite, hornblende gneiss, anthophyllite schist, biotite schist and garnet gneiss with the exception of the pegmatite which just confuse the issue — likewise the qtzofeldspathic gneiss assemblage in this same area does not contain over 20-30% of the amphibolite assemblage and generally much less —

Aug. 21 1) east end of marble north of Barton Gulch—
2) amphibolite-gneiss contact south of Barton Gulch
3) low hills south of Davey Crk.

1240- typical banded garnet amphibolite- fol.: N 85° E, 55° NW
many layers without garnets- shearing (brecciation + Mn stain) of marble ~10 m uphill from amphibolite contact- also silicification of marble- prospect pit in shear zone- some sillimanite-garnet-biotite schist flt. near contact- looks like this schist may be at contact and amphibolite is down louser-

1241- veined amphibolite- fol.: N 85° E 60° NW - because of somewhat irregular veining attitude is variable here-
fol. amphibolite 10 m NE: N 65° E 35° NW
axis of 3 x 30 cm folds: 40° N 25° W

1242- banded bhbg + gn
fol.: N 60° W 43° NE
fold axis: 10° N 80° W

1242 (cont) on basis of flt. only this gneiss appears to be in contact with marble- brecciated marble in gully to north-

1243- a few pieces of marble in flt.- mainly amphibolite (garnet) + flt. coarse-grained garnet amphibolite- fol.: N 85° E 45° NW - banded g b g + gn like 1242
fol.: N 75° W, 40° NE - note similarity in attitude to 1242- fold axis (1 x 10 cm folds) 15° N 60° W
amphibolite above and below this (in outcrop)- small pit in sheared area within amphibolite assemblage in this general area-

$\boxed{\text{195 Ge- 1244}}$ g + gn in marble gneiss layer: N 85° E, 55° NW
Tourmaline abundant in gneiss- specimen of fine-grained qtzite next to gneiss- gneiss 2 m thick qtzite, 0.5 m thick
abundant graphite in some of this- also calc-silicate-

1245 - marble -
qtz. layer N 40°W, 60°NE
suggestion of near-vertical
fold axis - qtz. layers downhill
15m - : N 15°E, 80°NW

1246 - marble - fold axis
on qtz. layer: 62°S 60°W - marble has
been sheared along this gully -
marble 50m east of 1245 along ridge
qtz. layer, N 80°E, 65°NW (v)
considerable folding at this
outcrop -

1247 - amphibolite
fol.: N 80°E, 40°NW - banded
bg f-gn is west from here -

1248 - marble in contact with
gneiss at nose of fold (or close to it)
fol.: N 0°W, 20°W
same locality as 1247 - actually
a layer of dolomitic marble
3m between gneiss (below) and
amphibolite above -

1249 - banded bg f-gn - much
amphibolite flt. to north -
fol.: N 20°W, 70°NE
fold (2x25 cm) axis: 5°S 25°E
Bull Frog mine - Tunnel in at
least 12 m - G.L. Jay OWNER
amphibolite assemblage on dump -
all sheared - minor calcitic marble
on dump - caved adit uphill 100m
amphibolite fol.: N 10°W, 55°NE
mainly schist on dump - some green
mineral in it - tr of chalcopyrite

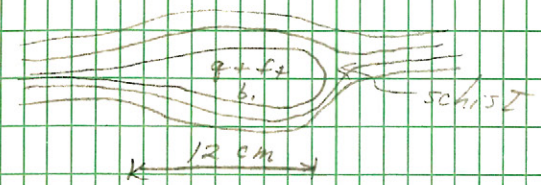
1250 - gf gn + peg. flt. only
here - very little flt. - fairly steep
grassy slope -

1251 - amphibolite flt. becomes
abundant -

Mr. Pollack of Minn. or Wyo.
(probably Minn.) has bought 19 (he
says) claims from Mr. Gay -
these include The Bull Frog -

banded
1252 - bgfgn - foli. N35°E 50°SE
pegmatite dike 1m thick
trends N40°E, v. -
1253 - pegmatite dike outcrop
long ridges that extend down from
hills are covered with angular and
slightly rounded gneiss boulders and
cobbles -
1254 banded bgfgn
foli. N55E, 50NW
fold axis 60°N30°W (gentle fold)
some gfgn also - only exposure
is right on top of knob -
1255 - gfgn
foli. N70°E, 50°NW
1256 - banded bgfgn
foli. N70°E, 70°NW
fold axis 20°N60°E many small
folds - some pegmatites - same as
gneiss north of Davey Crk. -
1257 - sandstone & calcite
cement - poorly indurated -
1258 - gravel only on
this ridge -

Aug. 22 - marble below dam on east
side of
tertiary rhyolite north
Davey Crk. & amphibolite north of Davey
Crk.
1259 - volcanic breccia composed
of rhyolite fragments -
1260 - highly weathered
sillimanite - garnet bgf schist -
also a few pieces of marble -
schistosity: N 85°E 55°NW
gneiss (banded bgfgn) breccia -
can put a fault here -
schistosity* N 50°W, 45°NE
fold axis: 55°N50°E



minor qtzite. flt. - schist loaded
with sillimanite -
1261 - dolomitic marble (with
calcite along fractures) - has been
silicified (chalcedony veinlets
and pods) probably by rhyolite
plug - some brecciation
qtz. layers: N65°E 50°NW

1262 – silicified marble – layering: N55°E, 50°NW

1263 – banded bg fgn fold axis: 20° N 0°W

1264 – medium-grained amphibolite and garnet alaskitic gneiss in flt. – many qtz. + k-spar fragments from pegmatites which must be abundant in this area – map as amphibolite assemblage –

1265 – qtzose gneiss in flt – farther to the north qtzofeldspathic gneiss flt. predominates –

1266 – some pegmatite flt. – much amphibolite flt. –

1267 – amphibolite assemblage coarse-grained garnet bg fgn, garnet alaskitic gneiss, garnet biotite schist – fol.: N35°E, 50°NW

1268 – typical coarse-grained banded garnet amphibolite – fol.: N40°E, 70°NW

[195Ge-1269] – calcitic marble ≥ 20 cm thick – layering: N 9°W, 42°W some diopside –

1269 (cont.) marble ~1.5 m thick lost in pegmatite flt. to north –

1270 – trend of pegmatites (>75% of outcrop + subcrop in ridge) N65°W – some qtz gneiss also amphibolite between pegmatites – fol.: N 0°E, 70°NW – marble can be traced for ~40 m then marble flt. is lost in abundant pegmatite flt. –

[195Ge-1271] medium grained amphibolite fol.: N 10°E, 65°NW – although pegmatites are very abundant in this area most pegmatite rock is amphibolite assemblage

1272 – amphibolite assemblage flt. + subcrop – also much pegmatite flt. – fol.: N35°E, 75°SE

[195Ge-1273] – abundant (>90%) pegmatite then banded bg fgn fol.: N 30°E, 40°NW a few garnets

N274 very black hb-only amphibolite fol.: N 50°E, 42°NW

marble etc. east of Ruby River north of dam

1275- amphibolite and sillimanitic garnet biotite schist just below marble- crumbly yellowish weathering marble with some chalcedony - qtz. layers: N 40°W, 37°NE fold axis: 30° N 45°E

[95 Ge- 1276] qtzose layer ~ 0.5 m thick- diopside and probably other calcsilicates-

1277- brown-weathering marble qtz. layers: N50°W, 15°NE - dolomitic fold axis: 15° S50°W - much more chalcedony in this brown-weathering unit-

1278 pegmatite dike trends N 30°W here- ~60 m thick here- layering in marble: N 10°W, 50°NE some biotite schist f/t within marble- a layer ~1m thick of tourmaline-bearing qtz.-feldspar gneiss-

1279- calcd marble- layering: N 60°W, 33°NE (qtz. layers also)

[95 Ge 1280]- aplite from second dike much chalcedony around it-

1281- medium-grained amphibolite- marble above this fol.: N 35°E, 30°NW

Aug. 25 Traverse from Greenhorn Creek to Table Crk.

1282- qtzofeldspathic gneiss f/t

1283- amphibolite assemblage f/t becomes abundant

1284- some marble f/t

1285- banded bgf gn fol. N 80°E, 60°NW fold axis: 25°N 85°E - numerous irregular pegmatitic zones - some hb-rich layers a few cm thick-

1286- some hb-gneiss layers fol.: N 65°E, 60°NW in bgf gn - looks more like qtzofeldspathic gneiss above 1286-

1287 - typical banded bqfgn foli: N 70°E, 60°NW

1288 - banded hb bqfgn foli: N 55°E, 50°NW hb-rich laminae < 1cm apart and ~ 3-5 mm thick in more finely layered portions of good exposure here - some amphibolite "clots" 2 x 10 cm sure look like inclusions in gneiss - might just be an amphibolite layer which has been thoroughly disrupted -

1289 - banded hb-bqfgn foli: N 60°E, 60°NW - some biotite schist layers a few cm thick -

1290 - banded bqfgn foli: N 45°E, 70°NW foli: * N 45°E, 50°NW migmatitic here - discordant qf pegmatite ~ 1 m thick -

1291 - banded bqfgn some hb-rich rich layers - hb and lesser garnets throughout gneiss - foli: N 50°E, 48°NW

1292 banded bqfgn foli: N 65°E, 60°NW

$\boxed{\text{195 Ge - 1293}}$ garnet bqfgn foli: N 45°E, 45°NW more massive than banded bqfgn to south - grove of aspen in area of gentle slope between 1292 and 1293 - abundant folds give foliation swirled appearance - some amphibolite and hb gn -

1294 - garnet-hb gneiss foli: N 60°E, 63°NW a few m thick - some gneiss biotite-rich - fold axis, 80° S 20° W 2 x 3 cm fold - numerous discordant pegmatites along ridge - reason for ridge -

1295 - massive, medium-grained pegmatite trend: N 85°E amphibolite - some qtz-feldspar veinlets, but no well defined foliation -

$\boxed{\text{195 Ge - 1296}}$ 10 x 10 m outcrop of metapedidotite - affect compass

1297- garnet, alaskitic bqtfgn
foli: N 85°E, 55°NW - from
1294-1295 about 50% amph.
assemblage and 50% bqtfgn
(excluding ever-present pegmatite
flt.) - from 1295-1297 mainly
banded bqtfgn and garnet,
alaskitic bqtfgn - amphibolite-
assemblage lithologies are
minor-

1298- medium-grained garnet
amphibolite: foli: N80°W, 55°SW
banded bqtfgn + garnet. bqtfgn
predominate from 1297- amphibolite
10m thick then back into
bqtfgn (fairly massive -

1299- amphibolite
foli: N 40°E, 53°NW - about
50% amphibolite and 50%
banded bqtfgn from 1298

1300- interlayered banded
foli: N 80°W, V
bqtfgn and amphibolite - layers
of each lithology 15-40m
thick - some amphibolite layers
only 1m thick
fold axis: 60°N20°E (4 x 20 cm fold)

1301- garnet, coarse-grained
alaskitic bqtfgn - amphibolite to sil
foli: N 65°W, 63°SW
~80% amph. assemblage from 1301-
~20% banded + garnet. bqtfgn

195 Ge-1302 coarse-grained dolomitic
marble - conformable - ≤1.5m thick -

1303- amphibolite-
foli: N 90°W, 70°N
garnet, with qtz.-feldspar layers
and crosscutting veinlets - ~80%
amphibolite flt. from 1302 - ~20%
banded bqtfgn -

1304 qtzose, dolomitic marble
qtz. layer: N70°W, 55°NE - amphibolite
flt. up to marble - exposed thickness
0.5m - max possible thickness here
~1m - amphibolite on both
sides (flt. only) -

1305- banded and veined garnet, ferous amphibolite- fol.: N 85°W, 75°NE

1306- banded bq f gn- fol.: N 80°E, 70°NW

195 Ge- 1307 calcitic marble interlayered with calcsilicate gneiss- thickest marble layer ≤ 1.2m- other layer a few cm thick- entire sequence ~ 3m thick and bounded by amphibolite-

1308 banded bq f gn- fol.: N 15°E, 45°NW some garnet.- <10% amphibolite from 1307- map as banded bq f gn-

195 Ge- 1309 garnet- magnetite granulite- no recognizable foliation- outcrop- from 1308 ~90% banded bq f gn f lt. and ~10% amphibolite f lt.-

1310- garnet. amphibolite fol.: N 75°E, 70°NW

1311- massive and pegmatitic granodeldspathic gneiss outnumbers amphibolite N lt. 20:1 - at upper end of badgepale thicket-

1312- bq f gn and banded gneiss (minor) f lt.-

1313 banded bq f gn- fol.: N 80°E, vert.
fold axis: (F, here) (10x40cm): 15° N 90°E
fold axis: (F, here) (2x10m): 85° 55°W
amphibolite assemblage from creek north to here- hornblende gneiss uphill 10m-

1314- biotitic banded bq f gn and hb gneiss- fol.: N 85°E, 70°NW
1m peg. dike: N 60°W, 50°NE

1315 hornblende gneiss fol.: N 80°W 65°NE
some biotitic gneiss also-

1316- banded bq f gn fol.: N 85°E, 75°SE
from 1315 to 1316 mainly banded bq f gn and q f gn f lt.- abundant hb in next outcrop downhill-

1316 (cont.) map as banded bqfgn locally hb-rich — not enough hb for amphibolite assemblage —

Aug. 26

1) amphibolite — banded bqfgn contact north of Idaho crk. —

2) area between Idaho and Barton along shear zone

1317 — banded bqfgn — some foli: N 80°W, 45°SW hornblende — poorly oriented biotite — a few large K-feldspar porphyroblasts —

1318 — banded bhbqfgn — attitude variable — foli: N 70°W, 35°SW

1319 banded bqfgn and qtzofeldspathic gneiss f/t. — no amphibolite f/t seen —

1320 — garnet amphibolite — only banded bqfgn f/t. from 1319 to 1320 foli: N 20°E, 30°NW pegmatite dike ≥ 1m thick: N 15°W, 80°NE

1321 — garnet amphibolite foli: N 10°E, 15°NW — banded bqfgn along strike to west 15m — no folding seen in amphibolite here —

1322 — sheared and somewhat altered qtzofeldspathic gneiss —

1323 — banded bqfgn — folded — no evidence of shearing —

1324 bqfgn — should be mapped qtzofeldspathic gneiss foli: N 20°W, 70°NE

1325 — medium-grained amphibolite foli: N 85°W, 40°NE (var.) not garnetiferous — amphibolite only 1 or 2 m thick — otherwise slightly foliated quartzofeldspathic gneiss along here — foli * N 20°E 85°SE (var.) layer 2 m thick of hb feldspar gneiss —

1326 — banded bqfgn foli: N 20°E, 65°NW — abundant pegmatite f/t. —

1327 – predominately banded bgfgn flt. – much pegmatite flt. – minor amphibolite – beginning of shear zone –

1328 – garnet alaskitic gneiss some is biotitic – fol.: N 40°E, 45°NW no significant shearing here – This lithology belongs in amphibolite assemblage because of abundant garnet? –

1329 – sheared + altered + fol.: N 85°W, 20°NE limonite stained qtzo feldspathic gneiss –

1330 – sheared banded bgfgn fol.: N 55°E, 65°NW

1331 – highly sheared altered and limonite – stained qtzo feldspathic gneiss – most prominent shear planes: N 15°E, 35°NW

1332 – altered + sheared shear plane: N 10°W, 25°SW qtzofeldspathic gneiss most prominent shear surface is parallel slope of front of range right here –

1333 – relatively unsheared sillimanitic biotite schist, banded gneiss and garnet alaskitic gneiss fol.: N 27°E, 89°SE – This patch of relatively unsheared amphibolite assemblage extends to ridge crest –

Tim Womack

Aug. 27 – Pete Womack Ennis

[195 Ge – 1334] "soil" from gopher holes below timber

[195 Ge – 1335] soil from gopher holes near fence –

[195 Ge – 1336] very talc-rich soil – near claim post –

[195 Ge – 1337] talc flt. from Pete Womack's claim

[195 Ge – 1338] Fe-rich qtzite with radiating crystals – from Johnny Chalk area

[195 Ge – 1339] dolomitic marble flt. from Womack's claims

Aug. 28 – Talc mines
Willow Creek – Resource
Processors – Jack Reimer
mine supt. – some talc
not sorted – Stewart (Sheridan)
runs operation – minor coarse-
grained talc – Joe Geier State
Mine Inspector –
stripping at Beaverhead Mine –
$600,00 contract
Jim Wilkinson – BLM
geologist – Dillon –
USForest Service – Missoula
Sweetwater Mine – now in
production – sort talc at mine –
along Sweetwater road – in
timber – probably Owen – McGovern
prospect in sec. 26, T. 8 S., R. 7 W.
Red Canyon quadrangle – p. 107
Okuma

a product of

J. L. DARLING CORPORATION

TACOMA, WASHINGTON 98421 U.S.A.