Bruhan type lower become regional metamorphism, all related to Anvil Batholith

Can get Montana, and carbonate

1D2 is carbonaceous phyllite

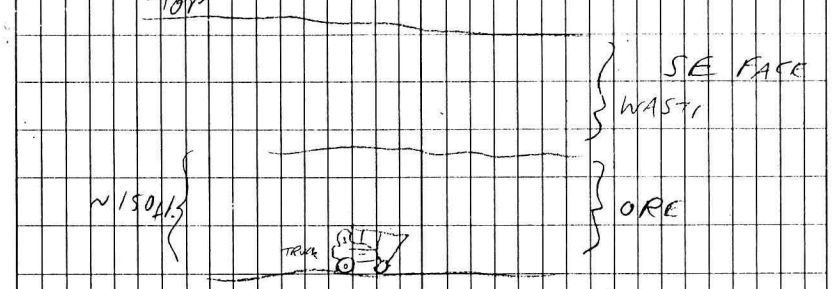
Alteration at Faro produces silica pitted phyllite. Surrounds sulphides at Faro, but rare in footwall at Grum and Vangorda.

Near D10E dyke, alteration has made there is high T effect on pyrite-rich ore. Converts pyrite to pyrrhotite and releasing S to produce sulphuric acid and magnetite.

Two types of ore.
Sulphide-silica, and massive sulphide.
Silica-sulphide does have lenses

or zones of altered phyllite in it, down to a very fine scale.

In Faro pit, siliceous sulphide and muck carbonaceous material is 4a. Black to dark grey.



At lower grade (B58) has fine pelitic microlithons and a carbonate-bearing siliceous microlithons. With increased grade these transform to the grey and green banded calc-silicate called 3D. Metamorphic reaction of Silica-CO_2 begins to diopside epidote. So it's primary compositional variations, but enhanced by metamorphism. FIELD

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Initial [illegible] morning.

3c is ada basite in Mt. Mye.

3G - low grade Mt Mye phyllite. No good [illegible] development, mostly surface weathering. Very pervasive S_2. Can see S_{0-1} cremulations, Hough. Can get carbonaceous bands (3e?) and these can have black calcareous zones.

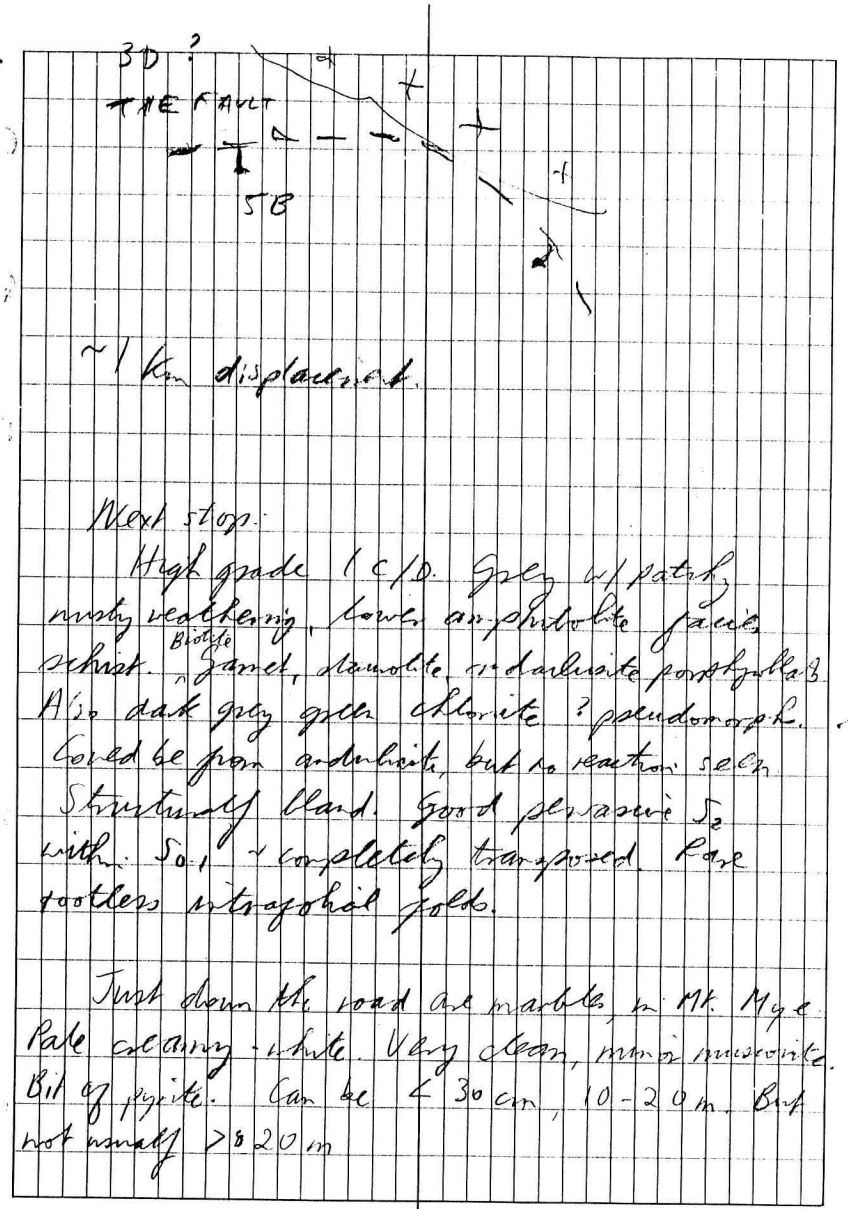
Also have thin laminae of altered ash, but these are rare.

Very homogeneous shaly stuff. Grey and minty brown in contrast to the silvery grey-green of low grade Vargoda of 5B.

Also get ada basites (3c) here. 3c4. may be carbonaceous. Concordant with S_2.

No cordierite pseudomorphs in the 3G.

Basically a sea of phyllite. Hard to do anything with. Try to trace out the black carbonaceous/carbonate outcrops (geophysics may help).



Next stop.

High grade 1 c/o. Grey w/ patchy rusty weathering, have amphibolite facies schist. Biotite, garnet, staurolite, ± andalusite porphyroblasts. Also dark grey green chlorite ? pseudomorph. Could be from andalusite, but no reaction seen.

Structurally bland. Good pervasive S_2 with S_{0-1} completely transposed. Rare tootless intrafolial folds.

Just down the road are marbles in Mt. Mye. Pale creamy-white. Very clean, minor microvein. Bit of pyrite. Can be < 30 cm, 10-20 m. But not usually > 20 m.

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In creek, good exposure of contact between clean creamy-white marble (3F) and f c/D schist w/ garnet & staurolite (or 1G)
Consistent and concordant foliation in each. S_2. No folding obs. Some calc silicate reaction at margin, but otherwise sharp.

So this is lower part of Mt. Mye. Go degals (NE) and see Vangorda-like calc silicate (3D?) but don't know if genuine Vangorda vs. deep calc silicate in Mt. Mye.

Next stop:

Black or dark grey graphitic schist/phyllite. Since it's in Mt. Mye it is 3e (or unit 1 equivalent). If it were in Vangorda it would be 5a.

Also saw some 10F dike here. Pale Creamy buff, 1-2mm quartz phenocrysts characteristic. Some ≤ 1 cm feldspar phenocrysts. Has strong earthy weathering.

FRIDAY, JUNE 9, 1989

Sunny morning. First day mapping independently.

Start at old clearing ('camp?') on road at 1145 m. Going 200 m on 090° to 1165 m contour.

No exp. on this leg.

Now going on 209° for about 550 m, to hit road.

Found a line post, illegible at 1148 m. Can't see line, though. Yes, I can - 200° (20 m)

Got to road without seeing any outcrop.

Walked down on road to 1065 m. (lunch)

Going 625 m on 033° from here.

89-1

1080 m. Small o/c, dislodged but native. Buff-brown weathering, green, fine to medium grained foliated metabasite. 5C.

More at 1085 m

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89-2

1170m. Small bench here I was aiming for. Probable o/c, but not good enough to measure.

Same SC metabasite. As before, slightly (~10%) carbonatized with rusty brown spots. Dominantly green though.

Heading back to ATV. 500m on 286°.

Drive up road to el. 1225m. Go 525m on 252°. Target elevation 1150m.

Crossed a cut line at 1178m, trending 200°.

No o/c on leg. From end (just W of trench) go on 032° for 650m.

Crossed a cut line trending 290° at 1187m. N.B. Trench was on a cut line I think.

Crossed a line trending 020° at 1220m. Hit another cut line at 1270m but can't see line. Think they drilled here, actually.

Hit road 60m west of target corner.

Next box. From corner in road at 1265m go on 212m to 1200m el.

At 1260m hit cutline trending 290°.

No o/c. From destination go on 320° for 225m.

At 127m, 1200m el., found cut line trending 200°.

No o/c. Head back to road on 064° for 350m. Hit road at 1265m.

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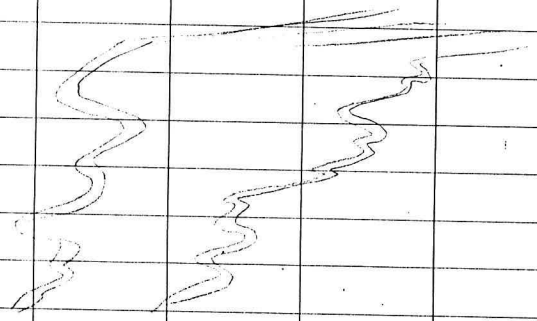
FIELD

SUNDAY, JUNE 11

Nice o/c of SD at drill. This stuff could be meta tuff or de-carbonated SB. Mud to pale green, fine grained. Finely banded (1mm) and foliated. Full of F_2 folds.



Folds of S_{0-1}. S_2 axial planar.

Not a strong asymmetry bias. Looks very symm. If anything ESE to NW

TUESDAY, JUNE 13

With Gerald

89-3

Small o/c amid vegetated talus on NW side of creek.

Pale buff, speckled. 10E diorite. hornblende phenocrysts ≤ 1 cm. biotite phenocrysts 1-3 mm. Medium grained feldspathic groundmass, some quartz, < 10%. Massive.

89-4 Same massive 10E dioritic rock. Quite deeply weathered. Apparently not much hornblende or biotite phenocrysts here.

89-5 = Lee's 88-412

3D calc-silicate. Finely banded, harmonish-grey and pale green. Well but somewhat irregularly foliated.

Can see pinch and swell of calc-silicate

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bands ; faces looking NW and SW

So-1-2

34 = 175

Intruded by 4m wide dike, trending ca. 82 / 120

— probably IOE marginal phase

Dike may be 10d quartz-feldspar porphyry. Minor quartz (1%) phenocrysts. Only small mafic minerals in groundmass, no phenocrysts

Lunch here.

89-6

This little knob. Small outcrops of massive 10c in brush.

Medium grained, speckled. Small biotite and larger hornblende phenocrysts

89-7 Small o/c in gully. 3D calc-silicate. Finely layered and foliated.

So-1-2 21 / 165

89-8 3D calc-silicate. Well foliated. Well developed ? tension fractures on So-1-2 surface.

creamy white rim

green interior

ACTUAL SIZE

247 / 20

26 / 131

So-1-2

89-9 1273'

White area on photo. End of road. No o/c but 90% of gravel is angular 3D calc-silicate. Subcrop.

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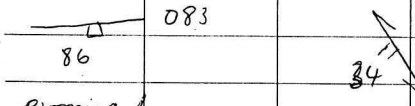
89-10 1325 m

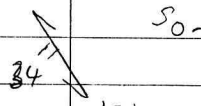
Probable sub-crop of 10E

89-11 1350 m.

White patch on photo.

3D calc-silicate, with apparently abundant calc-silicate over pelite





S_{0-1-2}

prominent fracturing

89-12 1395 m.

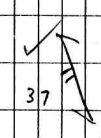
Another white patch. Same 3-D calc-silicate

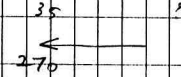
89-13 1445 m

Top of ridge. Same 3D calc-silicate. Pale creamy buff, pale green weathering with thinly flaggy parting but still hard due to predominance of pale green calc-silicate.

SAMPLE 89-13

Fine S_{0-1-2} foliation / layering.





plag/epidote segregations

Small o/c of 10E on N side of ridge

89-14 1430 m.

Same 3D calc-silicate but more pelite here - like typical 3D.

Heading E to road from here.

89-15 1345 m

Possible sub-crop of 10E

Almost certainly bedrock

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89-16 1305m

Definite rubbly o/c of 10r

WEDNESDAY, JUNE 21

Sheet 6, SW km.

89-17

Small ridge through stratigraphy.

60m

S

N

3,5,4.0m thick

1) 3D calc-silicate

2) well bedded marble and argillaceous carbonate

3) well foliated marble 3r

4) impure argillaceous calc silicate

5) 1m carbonate 1c/D pelite - probably 3/1D

bedded

1) Finely (1-3mm) pelite and calc-silicate. Pelite is purplish grey with crenulated surface. Pitted weathering in pale creamy green calc-silicate suggests free carbonate but negligible HCl reaction. Minor banding of pelite.

Circulation on So-1-2

28 107 ✓ So-1-2

23 164 ✓

FIELD

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(2) Well bedded calc-silicate (5cm thick) and argillaceous foliated impure carbonate (3-5 cm thick).
Calc-silicate is pale creamy-buff.

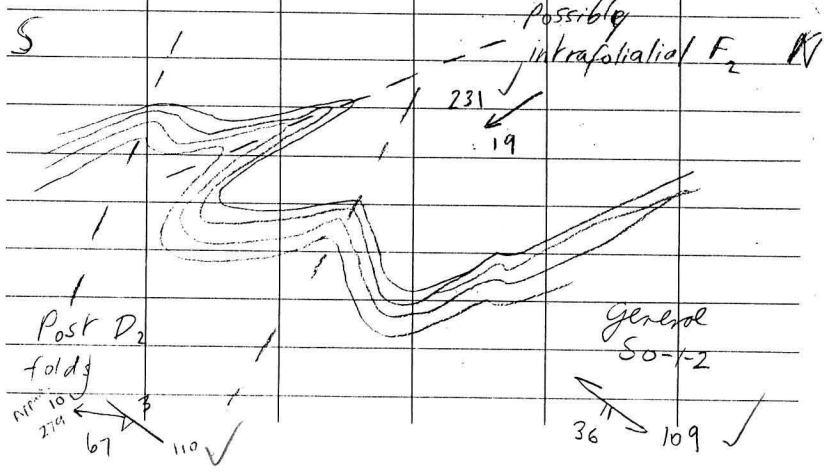
Argillaceous carbonate has notable knobby weathering. (skarn?)

29 → 106 ✓

66 (292) 112 ✓

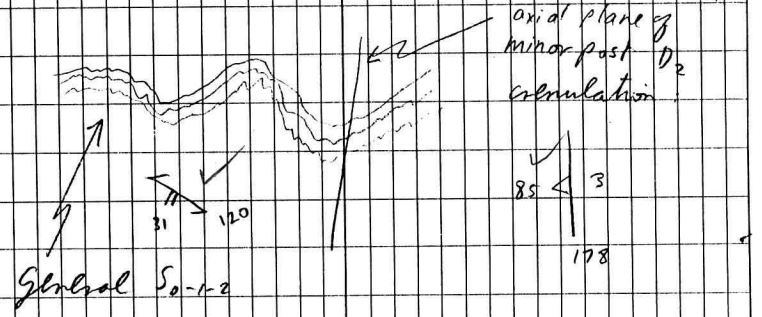
Small but common fractures in calc-silicate

(3) Well foliated marble is grey, medium grained, with local bands of 20 to 40 cm thick pure calc-silicate.



(4) 3D calc-silicate, as (1). Some marble.

(5) Grey-brown, well foliated pelitic schist, l/c/a — no, → 3D
Thick and thin concordant, syn-metamorphic quartz veins.
Non-calcareous. Small porphyroblasts of garnet or staurolite or both.



89-18
Walked along scarp of this bluff. Predominantly 3D calc-silicate with 1G impure marble with knobby texture, at base of bluff. But this clearly pinches out to be replaced by creamy-buff calc-silicate. Orientation of upper surface of pinch out may be good

FIELD

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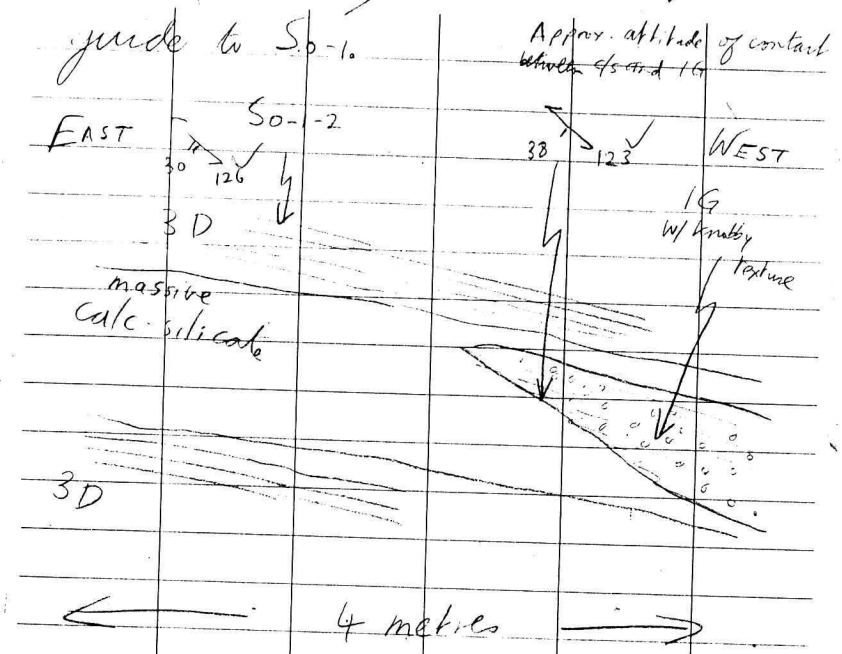
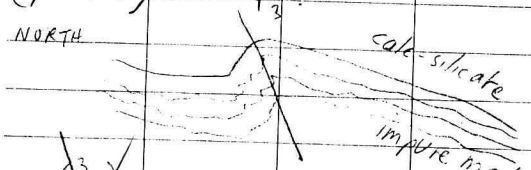
" dancing" / took photo, July 17

guide to S_0-1.



Small layers of metabasite (1F) locally. Green, medium grained, mottled, foliated amphibolite.

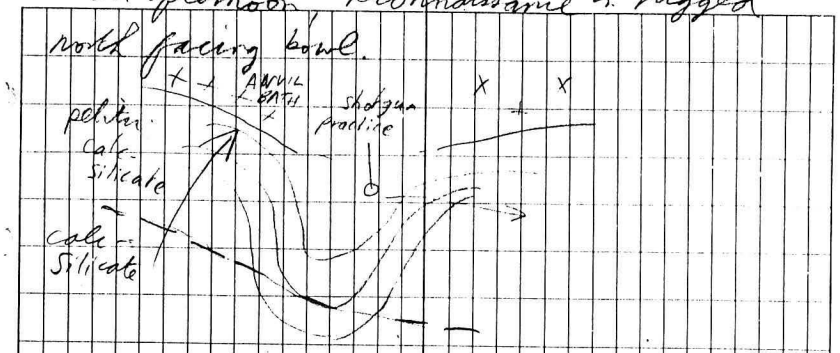
Also at 89-18 is possible F_3 fold (photo)



56 A^3 ✓

168

In afternoon reconnaissance is rugged north facing bowl.



After shotgun practice, walked along up NE corner of bowl. Nearly all calc-silicate, with minor amphibolite. Some excellent intrafolial minor fold. F_2. Predominantly Z to SE. Quite definite. Very fine, well defined foliation. Looks sheared locally.

Local radiating splays of pale greenish mineral - tremolite ??, contact effect?

Also some very coarse biotite and hornblende or tourmaline in fold hinge zones.

Looking Southwards at main cliff in bowl, can see pale coloured impure limestone above the predominating calc-silicate.

pelitic calc-silicate

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FIELD

THURSDAY, JUNE 22

East and northeast of camp. Clear, sunny.

89-19.

Series of small outcrops on SE side of road. Mainly 3D calc-silicate with 1mm (~ 1m) band of marble (1G).

3D calc-silicates are thinly banded, pale green and purplish grey, well foliated in pelite. Pelite predominates of calc-silicate below marble (1N). Fissile, flaggy weathering.

Rusty patch in one place.

89-20

Other side of the road, deeper in strata, another ~2.0 m thick band of marble. Sandwiched between 3D.

Marble is grey, with rough grooved surfaces due to disseminated calc-silicate.

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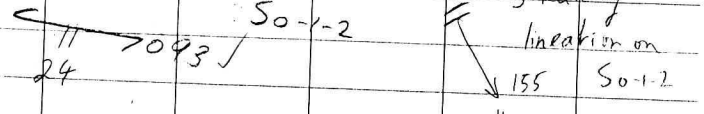
Latter is only 10% foliated in the carbonate.

Well foliated, fissile. Not knobby - isoclinal type.

Lineation on S_{0-1-2}, or S_{0-1}, defined by fine trails of calc-silicate. Don't know what it represents, prob. L_2



Don't know if this marble forms one limb, around a possible F_2 closure.

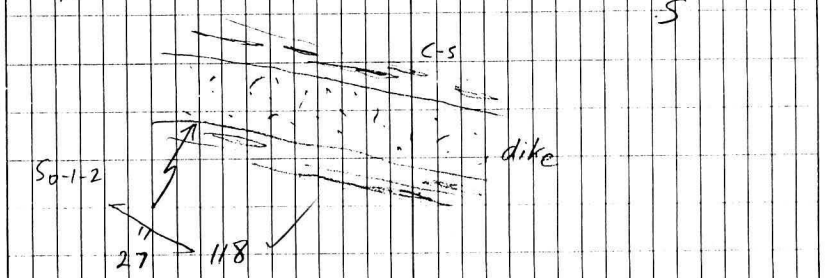
Calc-silicate below (to N) is calc-silicate rich, with small boudined lenses of maroon grey pelite.

89 21

10 E dike. Medium grained, speckled grey and black or dark green. Not particularly porphyritic, but local hornblende phenocrysts. Massive. Composition diorite or quartz diorite.

89-22

Well preserved contact zone between 10E dike and calc-silicate, showing tongues of 10E concordantly infiltrating layering in calc-silicate.



89-23

Typical, well layered and foliated calc-silicate, 3D.

89-24

Same 10E dike, speckled grey and black, medium grained. Small biotite and hornblende

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phenocryst, but not really a porphyritic texture at all. Rare plagioclase phenocrysts, 8mm across.

Two notable fracture or joint sets

85 / 009 (189) ✓ — 083 ✓, 26

89-25 (1535m)

Small o/c on West side of dry gully

Coarse grained, speckled black and creamy white, porphyritic granite.

5-7% biotite — Quartz ca. 10%

1-2% hornblende.

Feldspar megacrysts up to 8 cm long

Must be Anvil Batholith (108?)

89-26

Large o/c of Anvil Batholith in gulley. Same coarse grained granite or adamellite, with feldspar megacryst 5-8 cm long,

about 1 cm wide.

Weak, steep foliation, with pronounced preferred alignment of megacrysts on foliation plane.

This lineation also quite nicely displayed by mafic minerals.

86 / ? 026 (196) ✓

Lineation

Pitching 71° to SW

71 ↓

(218) ✓

89-27

Bottom of exposed cliff:

3D calc-silicate with local tongues of non-porphyritic 10E.

General So-1-2

11 → 118, 26 ✓

This calc-silicate overlain by a thick marble unit, especially basally, in red garnet, and also minor pale green calc-silicate minerals in thin foliated bands. Some zones of 3D calc-silicate, but dominantly a thick marble.

So-1-2 at base

11 → 121, 34 ✓

FIELD

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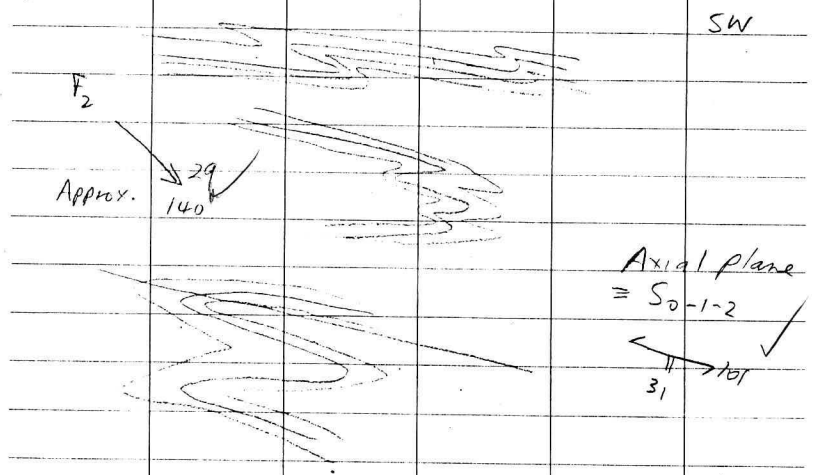
Marbles in middle of unit have well defined layering of garnet and ?diopside, which highlight internal D_2 folding.



This minor folds are as much symmetric as asymmetric. Can't decide on a bias for hegeny of asymmetric ones. - prob. because in a fold hinge area

89-28 = 89-417

Typical, finely banded 30 calc-silicate, with minor marble.

S_{0-1-2}

28 → 126 ✓

89-29 (1587m)

Chlorite-magnesite schist, or metabasite. Weathers grey and red-brown, streaky. Fresh is fine to medium grained. Grey, fine grained ?plagioclase and medium grained chlorite, commonly in lithon structure.

Much internal deformation. Seems to be slightly out of place, and has a very odd orientation.

Anyway, main microlithon fabric is:

350
63
174

SAMPLE 89-29

FIELD

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FRIDAY, JUNE 23

Mainly around camp, to west and east.
Clear, warm

89-30

Anvil Batholith, 10B Megacrystic adamellite? Coarse grained, with biotite and hornblende. Feldspar megacrysts up to 5 cm.

Exposure very limited, covered, but megacrysts may have a rough preferred orientation, at least in a plane, steeply-dipping, and striking 171°.

89-31

Good exposure on east end of ridge. Well displayed contact between Anvil Batholith (10B) and pelitic schist (D)

Batholith is coarse grained, megacrystic. Megacrysts appear generally random. Some granite-rich pegmatitic pods, especially near contact.

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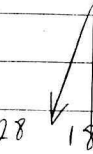
Also occurs as meter-scale lenses within 1D to west. (see map).

Pelitic schist is Staurolite-andalusite-garnet biotite schist. Medium to coarse grained. Grey, pelite to semipelite with fairly good microlithon development, though otherwise very homogeneous. Dark brown - grey weathering.

Brown staurolites up to about 5-7 mm long. Andalusites pale grey pink weathering, ≤ 1 cm long.

S_{0-1-2}

Well defined mineral lineation on S_{0-1-2} defined by staurolites and most andalusite, and also possibly is equivalent to an intersection (compositional) lineation on same surface



Walked along ridge afterwards, up stratigraphy. Quite a lot of pelite, then passed through a white ? pegmatite into 3D calc-silicate. Up-section passed through a thin marble, into more calc-silicate, alternating with pelite.

Came over ridge onto southern side and lose exposure, but isolated o/c of 1D pelite in brush on way down to road.

Walked back to camp on road. Some exposure in road mainly pelite at first, and some metabasite - amphibolite and chlorite schist.

Also hit a white medium to coarse to pegmatitic intrusive with black ? tourmaline and small garnets. Quite massive.

89-32

Small o/c of broken up highly porphyritic Anvil Batholith.

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89-33

10E hornblende-phyric diorite dike. Two prominent fracture sets

66 / 179 ✓

75 / 104 ✓

89-34

Contact between 10E dike and 3D calc-silicate.

89-35

3D calc-silicate.

So-1-2

31 / 117 ✓

8 metres to south is small exp. of metabasite.

SATURDAY, JUNE 24

Clear, windy, cooler

West of camp, mainly along ridge.

89-36

Medium to coarse grained porphyritic granitoid. Anvil Batholith, 10B.

Also some pegmatoid quartz-feldspar veins.

Quite a strong foliation locally:

74 / 024 (194) ✓

89-37 (1520 m)

Contact between Anvil Batholith to north (10B) and 1D pelite to south.

Batholith is coarse grained megacrystic.

Local fracture foliation:

80 / 102 ✓

Pelitic schist (1D) is buff-brown weathering, grey fresh. Well slightly spaced but

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pervasive So-1-2. Still rich in staurolite, andalusite and garnet.

So-1-2 ↘ 40 / 144 ✓

Intersection/compositional layering on So-2

↘ 156 / 11 ✓

89-38

In gully near ridge top. Contact between 1D pelite and 3D calc-silicate and minor metabasite.

1D pelite below is typical brown-weathering schist, with coarse (1-2 cm) staurolite and andalusite porphyroblasts. Not noticeably aligned in So-1-2 here, though.

So-1-2 ↘ 48 / 148 ✓

Contact zone with 3D generally marked by white pegmatite and micropegmatite mafic poor granitoid.

In concordant sheets, 1-2 m or less.

3D calc-silicate is unusually finely foliated and fissile. Looks sheared.

Also has dm to m-scale concordant and well foliated sheets of meta-basite amphibolite-gneiss.

So-1-2 in 3D: ↘ 37 / 153

SAMPLES 89-38

Took sample of calc-silicate and foliated metabasite. Latter has pod of coarse feldspar and amphibole, hosting sphalerite and chalcopyrite.

89-39

Nice clean bit of exposure on the northwest flanks of this ridge. Extremely well foliated and sheared calc-silicate. Microlithons generally 4 / mm. Highly transposed

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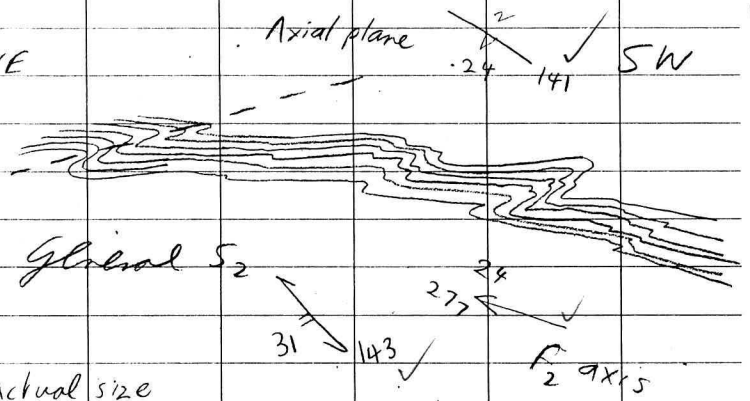
compositional layering.

Locally can see asymmetric intrafolial microfolds, as usual verging down dip, consistently



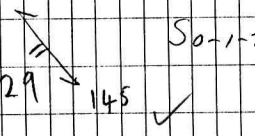
~Actual size

Good measurements.

White pegmatite/micropegmatite 50 m to north has fine tourmaline. White, coarse grained to locally pegmatitic. Foliated, but jostled. Also has 1% small pink garnet. Wouldn't want to call it 10E.

Contains pre-deformed xenoliths of pelite and calc-silicate.

This unit of metabasite overlying pegmatite is dark green fine to medium grained, lightly foliated. Same as at 89-38.



89-40 = Lee's 88-522

Good exposure in this gulley. Probable fault here, because a thick marble, forming most of north-facing scarp on west side, is not present east of gulley.

As well as marble, there is mostly 3D calc-silicate, with white micropegmatite on east and west of gulley, and some 1F metabasite, only on east side.

Thin marble on west side of gulley, above the thick marble, contains good asymmetric fold, verging down-dip, and calc-silicate beneath it also has decimetre down-dip verging minor fold.

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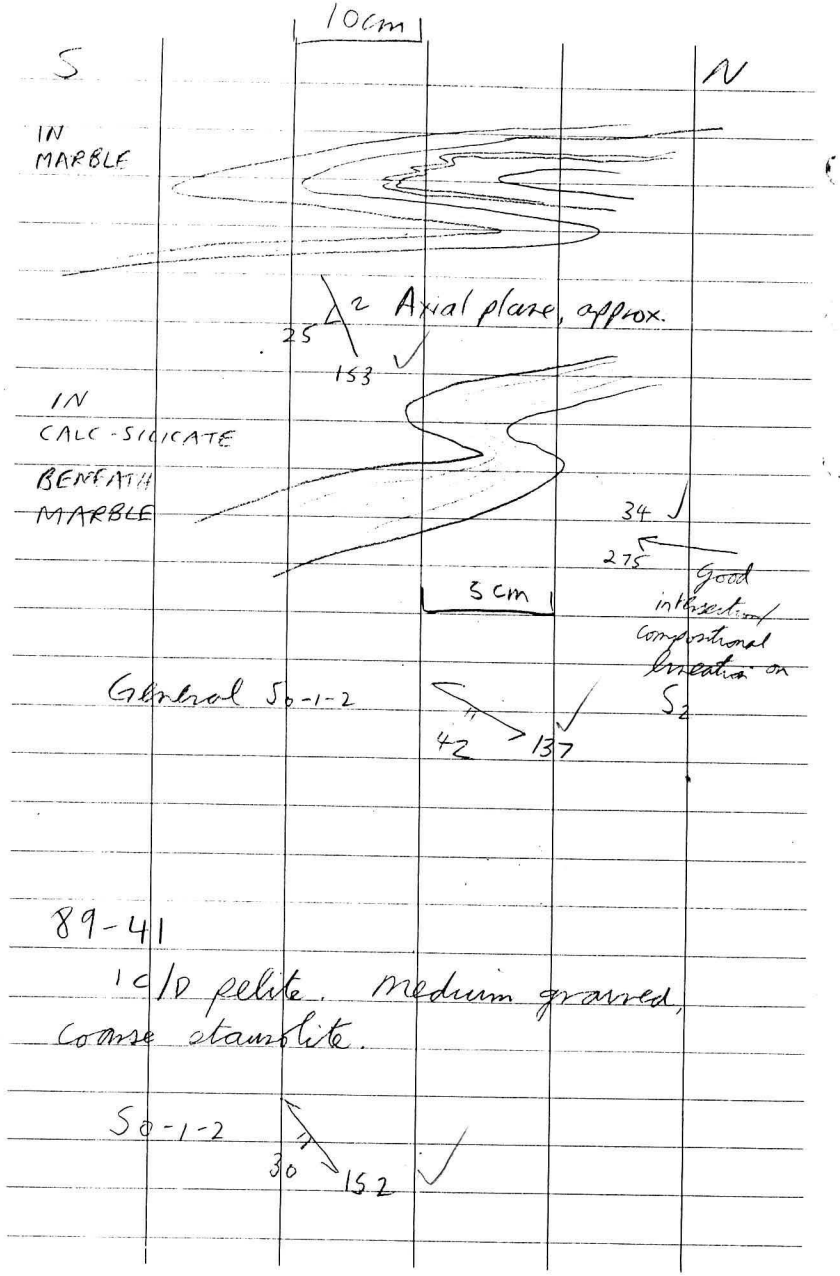

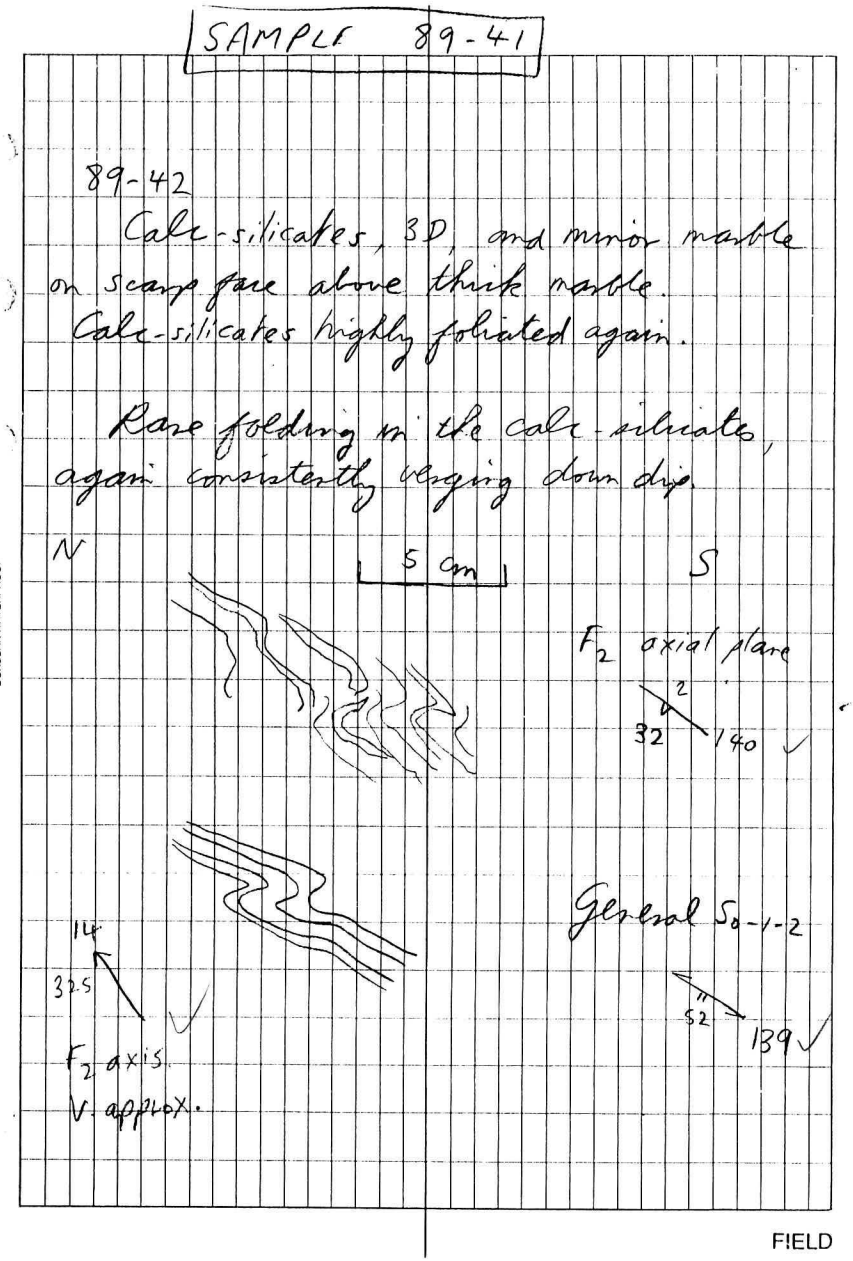

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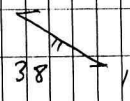
FIELD

SUNDAY, JUNE 25

Working on road west of camp.
Rainy and socked in in morning. Late start

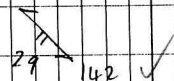
89-43

3 D calc-silicate. Calc-silicate > pelite. Pale green colour.



89-44

Typical green to mauve-grey calc-silicate.



89-45

Subcrop of rusty weathering, white medium to coarse grained muscovite-tourmaline leucogranite. Locally foliated

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89-46

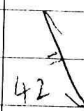
Good exposure of moderately foliated 3D calc-silicate.

To west is that white medium to coarse (~pegmatoid) granitoid rich in muscovite, tourmaline (black) and minor pinhead red garnet.

SAMPLE 89-46

89-47

Good exposure of rusty weathering, pervasively foliated pelitic schist 1C/D. Can see garnet and staurolite but no definite andalusite. Not carbonaceous.



89-48

Small o/c of amphibolitic metabasite (1f) and green, well foliated chlorite schist or phyllite. Well foliated. Jostled. Probably only a metre or so thick, as I suspect pelite carries on.

89-49

Typical 1C/D pelite. Saw some large andalusite around a quartz pod in a loose piece of rock.

o/c jostled so not measured.

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MONDAY JUNE 26

Cloudy showery morning, cool.
On road, well west of camp.

89-50

Small exposure in road. Brown-grey weathering pelitic schist 1C/D. Don't see any porphyroblasts for sure, but think dark dots could be andalusite or retrograded andalusite. Not carbonaceous. Well foliated, uniform.

26 / 144

89-51 (altimeter reads 1455 m)

Small patch of felsenmeer which looks like it could be outcrop of 3D calc-silicate. Pale green-grey, mauve-grey weathering. Quite finely foliated.

89-52

Could be contact here in this possibly

FIELD

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DUKSBAK WATERPROOF

man made gully, between good 1C/D pelite to north

31 → 134

and grey, well foliated pelite to south which is different and looks like pelite in 3D. It is dark grey, fine grained, very well foliated, with a slightly greenish grey weathering colour. Non calcareous, not carbonaceous.

SAMPLE 89-52

89-53

Two small outcrops in road. Pale to dark green banded, fine grained, well foliated metabasite and chlorite schist/phyllite. S_c, D_5

S_0-1-2

25 → 138

↓ 12
160

Fine compositional layering = S_0, that may be interesting S_0-1

68

070

Fine, sharp spaced late fractures with thin white bleaching halo. Post-metamorphic.

89-54 (1505 m)

V. small, very tentative outcrops of dark grey, very fine grained carbonaceous phyllite. Don't put too much faith in it unless it fits.

89-55

Two small very tentative outcrops of very calcareous calc-silicate. Pale to mid-grey, medium grained, with green patches of ? diopside. Some thin foliae of marine-grey phyllite so call it $3D_3$.

89-56

3D calc-silicate, as was most of road

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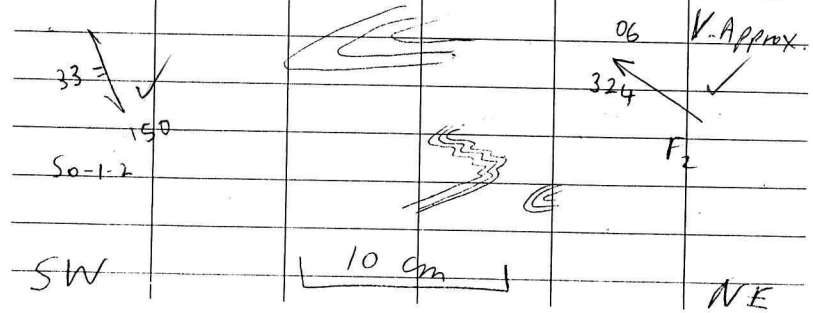
gravel for last 100m. Mainly mid-grey calc-silicate with local zones or partings of mauve-grey pelite

28 → 145 ✓ S_{0-1-2} approx.

89-57

Brownish-grey, fine grained, finely laminated, foliated phyllite. Lee calls this 5B - certainly agree it's lower grade than rocks to east. Calcareous - must be free calcite. Fine differentiation of darker pelite and paler, presumably calc-silicate.

Very local minor and micro-folds visible.



Not possible to tell F_2 vergence.

024 / 88 ✓ Late cm-scale spaced fractures.

SAMPLE 89-57

89-58

Fine to medium grained, foliated green, somewhat amphibolite meta basite. Slight speckled texture. 5c

89-59 = Lee's 88-513

Rusty-grey weathering, grey, fine grained slaty pelite. Non-calcareous, no greenish-tint. Very fine, minor microlithon development. Homogeneous. 3C, Mt. Mye

Contact with meta-basite not exposed but apparently sharp.

Why does Lee call meta-basite 5c instead of 3c, since this is Mt. Mye.?

Not Mt Mye!

FIELD

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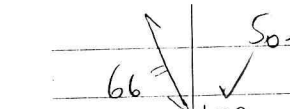
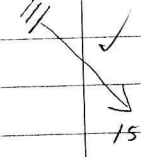


Note steep dips



Very fine undulation on S_2, subparallel to compositional banding

89-60

Walked along this bald finger. 3G in northeast. Contact with pyroxenite appears southwestwards, subparallel with ridge.

Pyroxenite weathers rusty brown and pale green. Fresh, it is dark grey green medium to coarse grained and massive.

Towards contact it becomes more chloritized and foliated. 006 / 78

and differential weathering of the pyroxenes and the chloritic matrix brings out the inequigranular texture. Pyroxene pseudomorphs are flattened in the foliation. They weather darker green.

Last contact zone before metasediment is fine grained, finely laminated and foliated green chloritic phyllite. Probably represents culmination of metamorphic / strain gradient between the two main units.

Lower down the hill, just beyond limit of exposure is mauve-brown slaty phyllite but calcareous here. Looks like 5B.

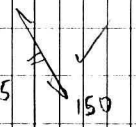
89-61

Southern end of this ridge of meta-basite. Green, medium grained, moderately foliated. Brown to green weathering. Locally sparkled. texture where feldspar shows up.

SAMPLE 89-61

Very fine sulphides - probably pyrite visible.

3C6



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TUESDAY, JUNE 27

Old drilling camp west of camp. Sunny

89-62

Subcrop. Rusty brown weathering non-calcareous pelite, with large chlorite pseudomorphs, suggesting Mt Mye. 3G? or 1D.

Locally has thin pale green calc-silicate like Lithons - non-calcareous. Could be transitional to 3D?

Also, loose pieces of pale grey granitic or impure (calcareous?) quartzite - but no HCl reaction.

89-63 (1395m)

Amphibolite metabasite. Well foliated, streaky banded mm-scale between dark green, medium to coarse grained amphibolite lithons and buff ? plagioclase lithons. Uniform.

S_{0-1-2}

48 ↘ 155

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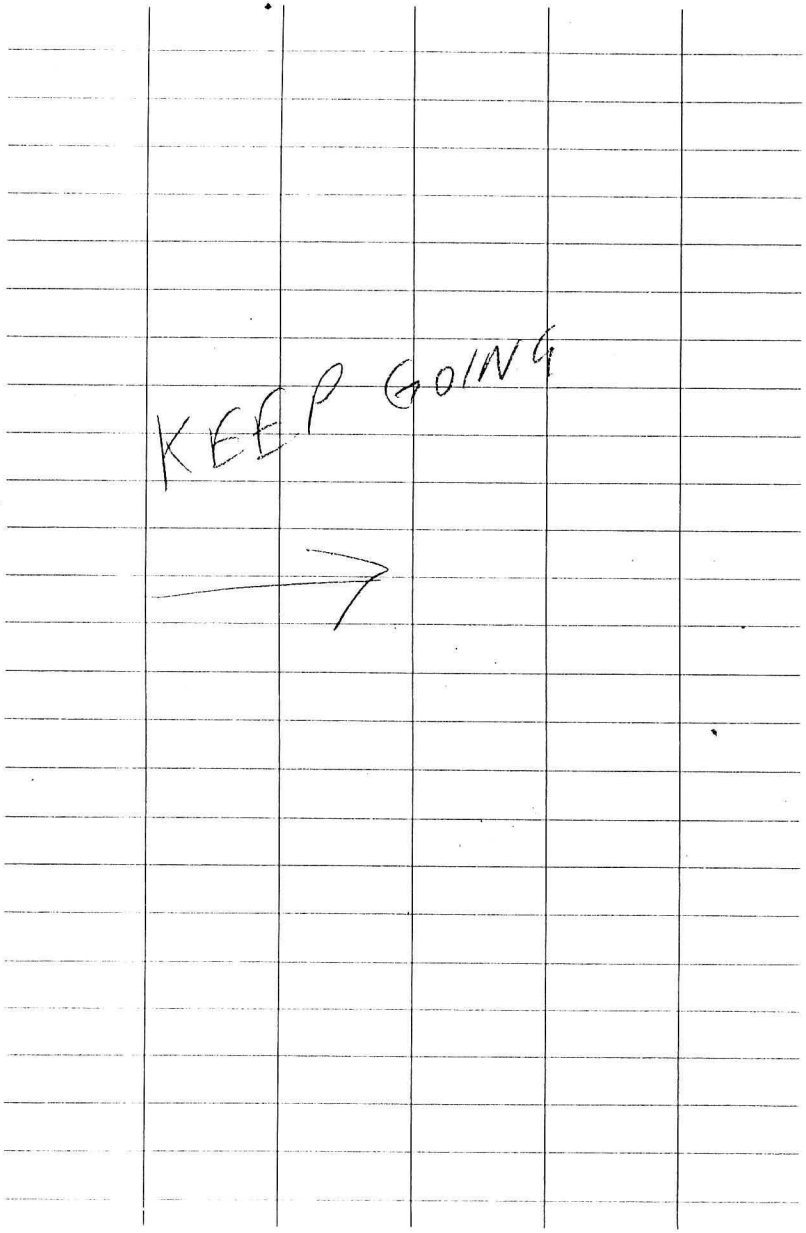
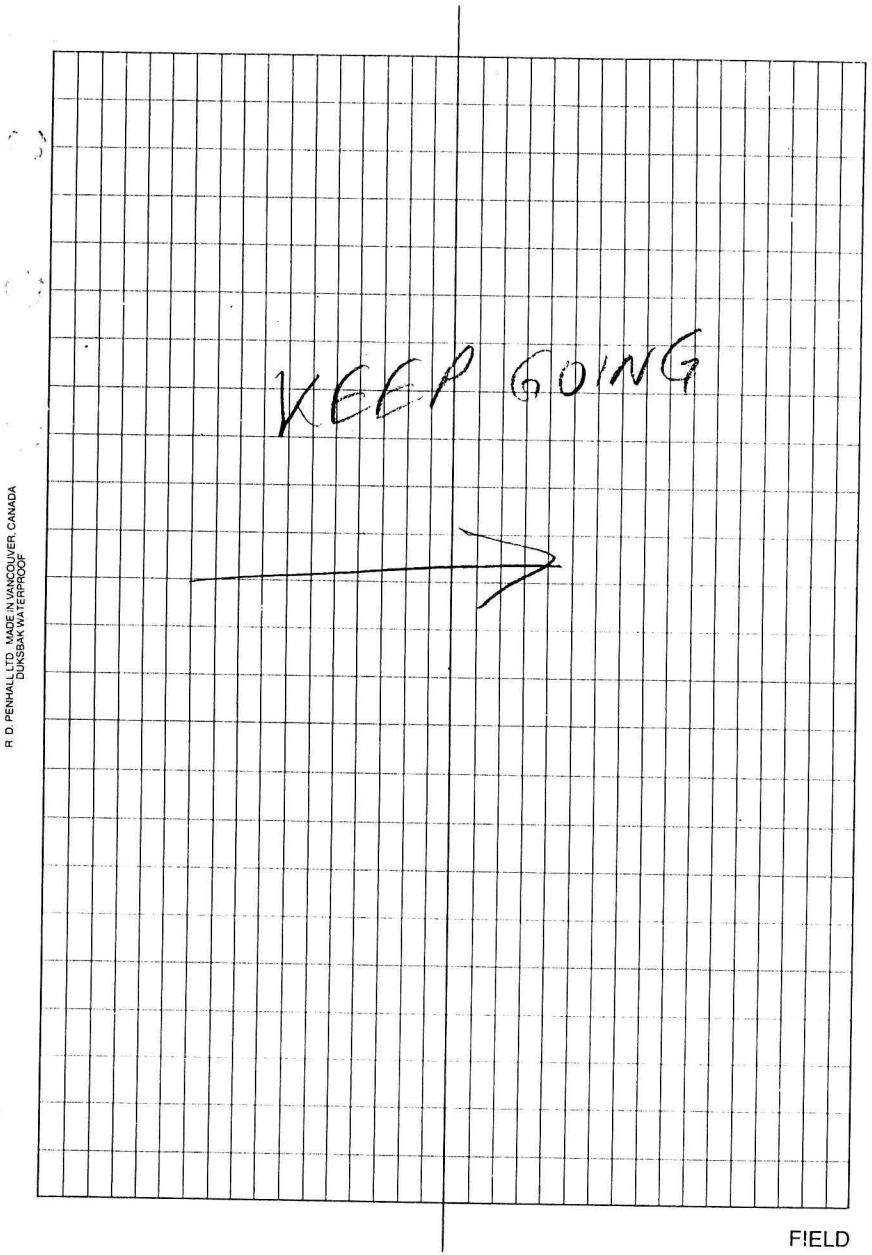

KEEP GOING


KEEP GOING
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FIELD

89-64 (1385m)

Lower part of the same bluff. Typical 3D calc-silicate. Alternating discontinuous layers of mauve-grey pelite and pale green calc-silicate. Non-calcareous. Only moderately foliated.

32 → 141 ✓ S_{0-1-2}

89-65

This whole exposed bluff is 10E dike. Medium grained buff-grey, weakly hornblende-phyric. Uniform, massive.

89-66

Contact between 10E dike, apparently above, to SW, and 3D calc-silicate, apparently below, to NE.

Very approximate contact = 019 / 31 ✓ / 199 ✓

89-67 (1410m)

Jostled outcrops of 3D calc-silicate and minor marble. Marble is creamy buff, rough weathering, well foliated. Calc-silicate is typical, layered, pale green and mauve-grey.

Approx. S_{0-1-2} 32 → 134 ✓

89-68 (1445m) - altimeter corrected.

Probably 3D calc-silicate. Finely laminated pale buff-grey to pale green to dark green, fine grained. Non-calcareous.

S_{0-1-2} ✓ 38 → 167

2 rare isoclinal rootless fold hinges. Their axes are probably approximately parallel to compositional streaking on S_2.

Roughly 03 → 162 ✓

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FIELD

89-69

Brownish weathering, moderately foliated metabasite. Fine to medium grained, possibly amphibole and epidote or even diopside - streaked pale green and mid-grey green

SAMPLE 89-69

63 → 001 / 181 ✓ Unusual $S_{0-1,2}$?

89-70

Pale to mid-grey, well foliated marble

$S_{0-1,2}$ 52 / 145 ✓

89-71 (1545 m)

Same metabasite as 89-69 Pale to mid-green in fine, well foliated colour laminations. Reddish-brown weathering locally.

28 / 154 ✓

Fine compositional streaking or S_2 may be older foliation intersection:

8 / 163 ✓

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FIELD

SATURDAY, JULY 1

Cloudy, cool. Ridge east of camp. First full day with Audrey.

89-72

Small outcrop in area of mainly 3D calc-silicate. Rough, orange-brown to creamy-buff weathering. Fresh is mottled green and reddish-brown, fine grained. Non-foliated. Green is probably diopside ± amphibole ± epidote. Red brown may be quartz and altered feldspar. Don't know what this is but may be calc-silicate skarn.

SAMPLE 89-72

89-73

Good ok of 3D calc-silicate. Quite finely layered and foliated. Alternating pelite and calc-silicate, on several scales.

Notable because rock is full of microfolds, F_2, just like 5B core.

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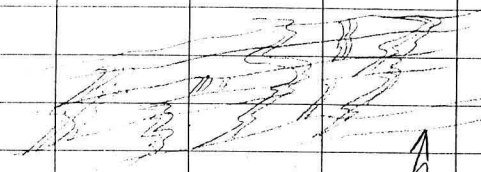
SE NW



General schematic S_{0-1}

45 → 140

S_2

22 → 117

Quite Emmy-looking, but get the impression that generally S_{0-1} is steeper than S_2, i.e. down-dip verging.

Granulation on S_2. What is this? Is it S_{0-1} or S_2 or is it late or post F_2?

Probably L_3

186 ↓ 18

Still not sure, but think it's quite possible it's actually F_2 granulation of S_{0-1}.

ORIENTED SAMPLE 89-73

T → 105

78

89-74 (1580m)

Grey-brown weathering, grey, pelitic schist of ICD. Well and pervasively foliated. Think I can see garnet / staurolite and possibly andalusite. Basically the same rock as on ridge west of camp.

S_{0-1-2}

33 → 128 ✓

89-75

More ICD pelitic schist

S_{0-1-2}

45 → 126 ✓

89-76

Dike-like intrusion of that white muscovite leucogranite migmatite with tourmaline and tiny rare garnets.

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SUNDAY JULY 2

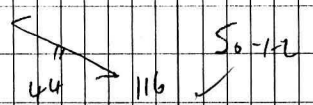
Cloudy, misty, showery, partly clear.
Mapping ridge east of camp with Andrey.

89-77

3D calc-silicate. Mostly fine grained, pale to mid-green finely laminated calc-silicate, with minor grey pelitic partings.

Also an unusual, calcareous bed possibly part dolomitic carbonate rock. Weathers cream to orange, with a rough spongy texture. Fresh is fine to medium grained pale milky coffee coloured.

SAMPLE 89-77



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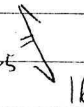
89-78 (1625 m)

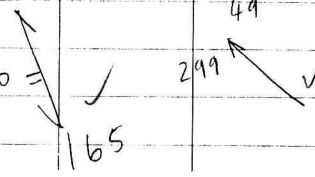
Brown grey weathering, ICD pelitic schist. Medium grained, well and uniformly foliated. Don't see any porphyroblasts.

Unusually steep dip.



89-79

Typical 3D calc-silicate, though particularly well foliated here. Alternating laminae of mauve grey fine grey pelite and pale green calc-silicate. Rare beds of marble. All very fissile, with thin flaggy partings



SAMPLE 89-79

89-80

Small jostled outcrops of highly foliated, sheared looking pelite - poor calc-silicate. Shades of pale cream to pale green, laminations mm to a few cm. Hard. Recrystallized.

89-81

Small o/c, contact between coarse to pegmatitic, cream, orange-weathering equigranular leucogranite (10°) to west, and brown weathering pelite (ICD) to east. Jostled

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FIELD

89-82

Coarse grained, creamy white pegmatitic granite. Anvil Batholith 10AB.

Moderately well foliated

68 ⇉ ↓ 165

Note similar strike to that in 1CD and 3D measured locally.

Note apparent offset of 10AB from contact mapped yesterday. Suggest fault in lineament. Trend of lineament is also similar to strike.

rock). Weathers pale greenish-grey. Fine grained. Fissile, very finely foliated and laminated i.e. more deformed than usual.

40 ⇉ ↓ 158 S_0-1-2

* NOTE: Put in CR89-82

89-85

Well foliated, finely laminated calc-silicate, 3D. Also pods of white, 10C micropegmatite.

41 ⇉ ↓ 149 S_0-1-2

rock). Weathers pale greenish-grey. Fine grained. Fissile, very finely foliated and laminated i.e. more deformed than usual.

40 / 158 ✓ S_0-1-2

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89-85

Well foliated, finely laminated calc-silicate, 3D. Also pods of white, 10c micropegmatite.

41 / 149 ✓ S_0-1-2

89-86

Approximately on the lowest marble, although only a bit exposed at northern tip of this exposure.

Rest is white granite micropegmatite with biotite, tourmaline and tiny rare garnet. This dike may be offsetting marble a bit. It has fractures roughly parallel to its foliation, which probably approximate its trend.

69 / 179 ✓ Approximate

89-87

Pale grey (grey to buff weathering) well-foliated, fissile marble. Quite typical. Thin, mm-scale calc-silicate laminae.

S_0-1-2

42 / 162 ✓

[PHOTO]

FIELD

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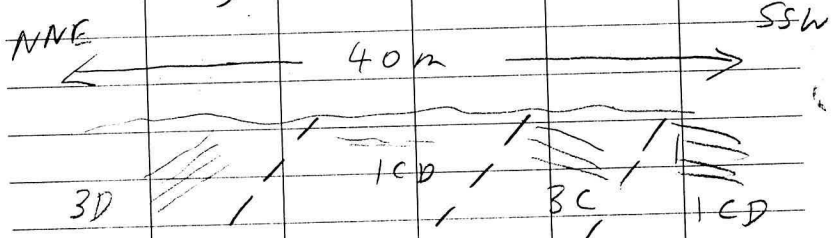
89-88 (1582m)

Basically, contact between 1CD pelitic schist to SW and 3D calc-silicate pelitic schist to NE, with thin metabasite between (actually within 1CD).

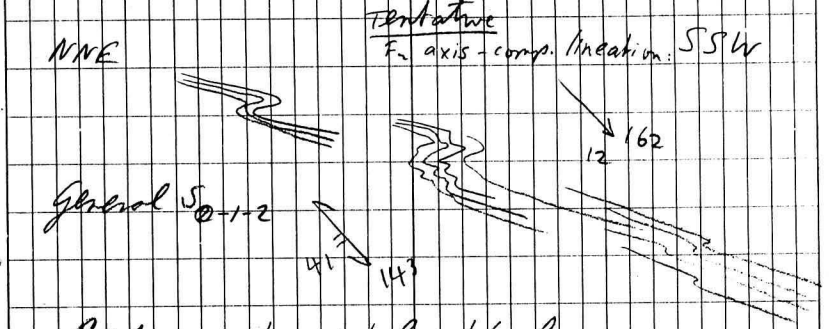


3D pelitic schist is very much like 1CD here, especially in brownish weathering colours, but it is finer grained, has a mauvish hue, smoother S_{0-1-2} planes, and lacks porphyroblasts. Also has pale green calc-silicate laminae very locally.

Note it is characterized by diverse but sporadic down-dip verging intrafolial F_2 microfolds.

See sample

SAMPLE 89-88



Best examples in talus blocks.

Metabasite 3C is fine to medium grained, green, well and pervasively foliated. Also has at least one down-dip verging fold.

SAMPLE 89-88

Pelitic schist 1CD best distinguished by its shiny yellow brown micaceous, rough surfaces and garnet porphyroblasts. Matrix medium to coarse grained here.

FIELD

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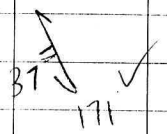
89-89 (1530 m)

Good, high grade looking KCD pelitic schist. Staurolite and garnet porphyroblasts visible.



89-90 (1495 m)

Two outcrops.

Below: white weakly porphyritic coarse grained to pegmatitic granite 10AB. Sharp igneous contact with well foliated and finely laminated 3D calc-silicate.

PHOTO

- Igneous contact relations shown in this photo suggest granite (this phase at least) was post D_2.

However some of the 'granite' is probably 10C - tourmaline - garnet micropegmatite, so it's not all 10AB - but think some of it is.

Metasediments above include finely laminated and foliated calc-silicate (phyllite) - about 50-50 pelite and S-S - and some 3F marble. All jostled so can't measure here.

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DURSBAK WATERPROOF

TUESDAY, JULY 4

Sunny, clear warm. Mapping near west and northwest end of area, on ridges, with Audrey.

89-91 (1525 m)

Meta-basite, $3C_A$. Weathers mid green to rusty brown. Fresh is mid- to dark green, fine to medium grained, well and pervasively foliated, amphibolite, with thin creamy-buff laminations of ? plagioclase, quartz.

S_0-1-2

30 ↗ ↘ 150

89-92

Series of exposure on NW facing bluff. At east end is contact between 3C and 3A, as mapped nearby. Most of

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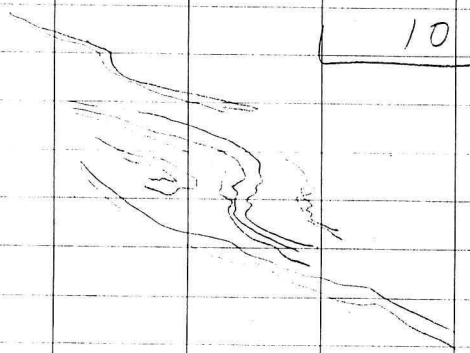
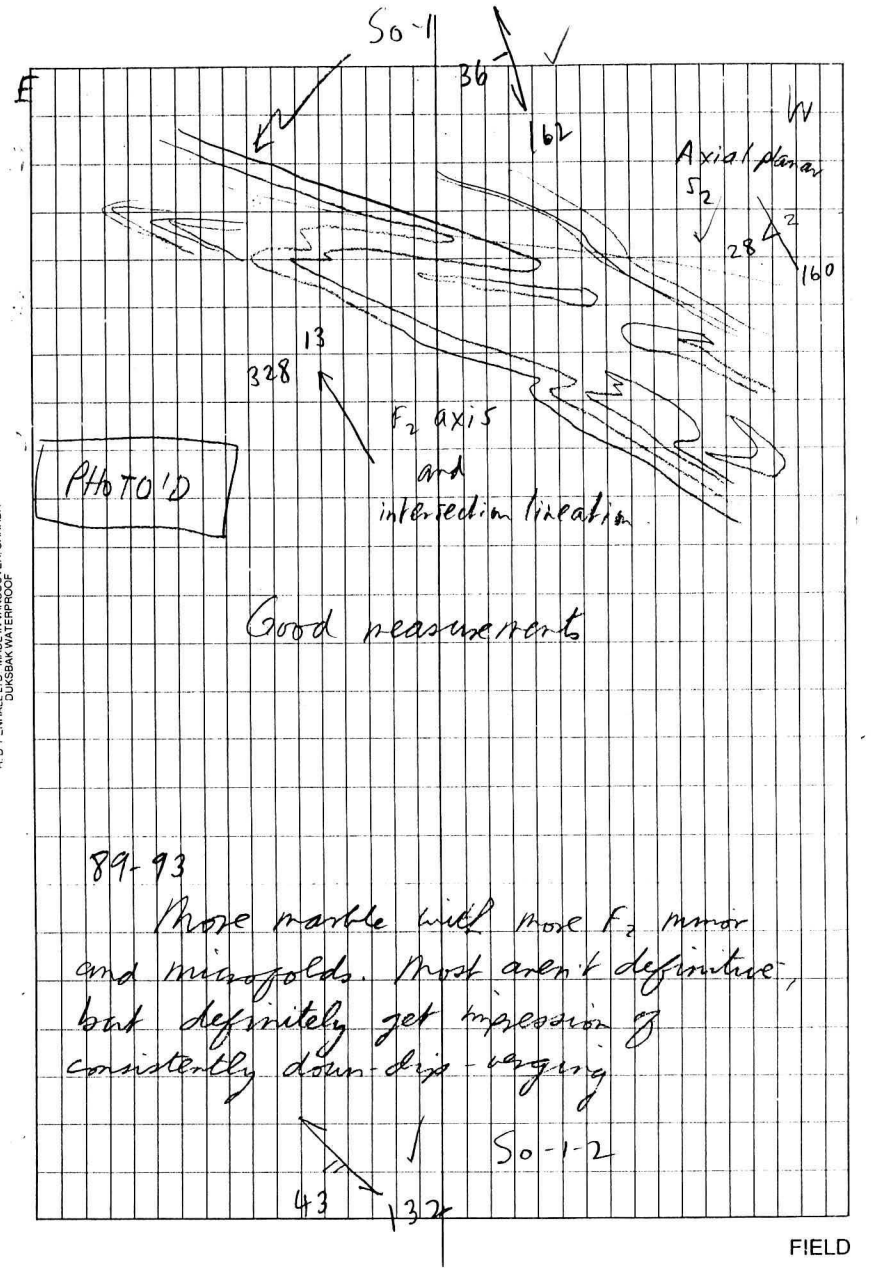
DUKSBAK WATERPROOF

exposure the most is finely interbedded (interfolded?) marble and calcareous calc-silicate. Weathers grey to pale green. Ribbed profiles due to differential weathering of carbonate. Fine to medium grained well foliated, finely laminated.

Full of F_2 minor folds, most of which - especially the convincing ones, are down-dip verging.





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DUKSBAK WATERPROOF

FIELD

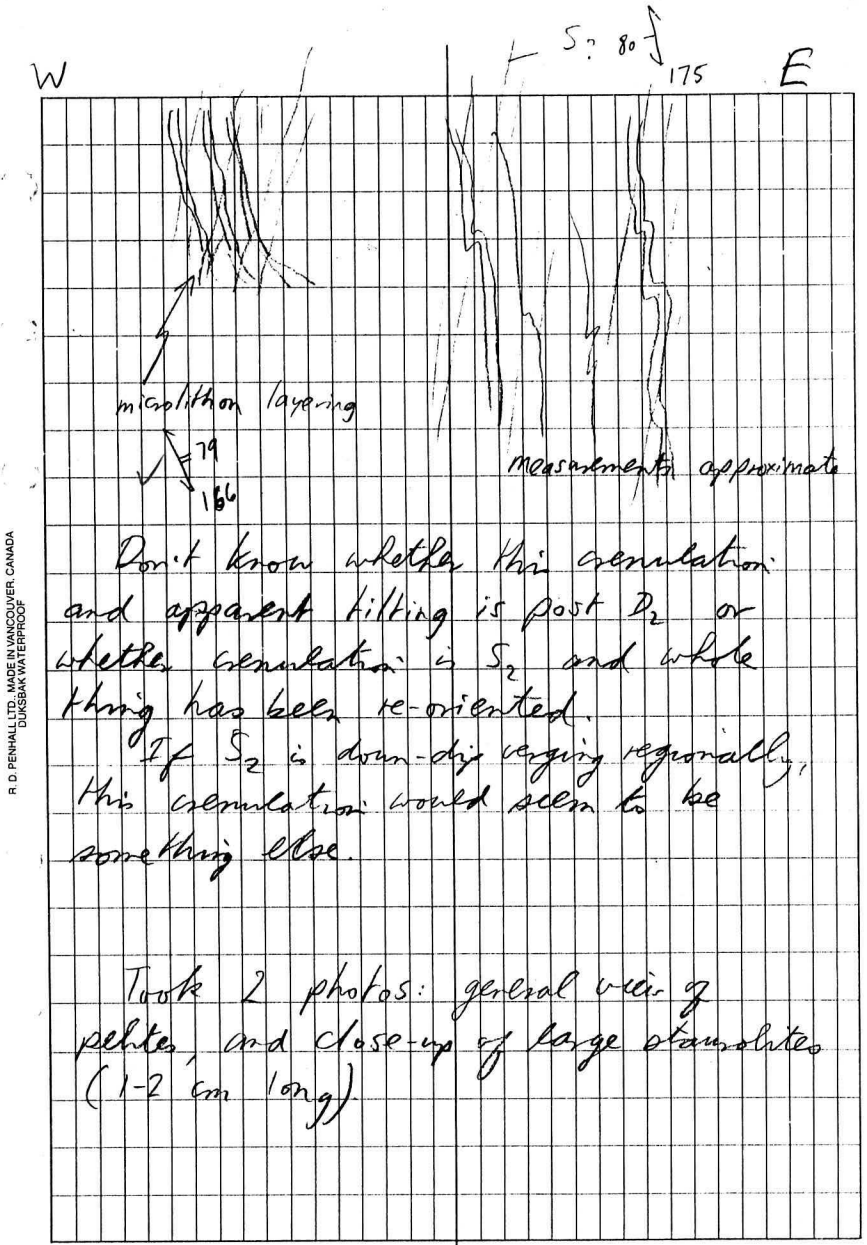
89-94

Typical high grade looking ICD pelite schist. Medium grained porphyroblastic with staurolite, garnet and andalusite. Fine, ≤ 1mm micaceous and quartzofeldspathic microlithons.

SAMPLES 89-94

S_{0-1-2} $\beta 1 = \downarrow 179$

Structural complications at northeastern edge of o/c. S_{0-1-2} (or S_{0-1}) is steep to vertical, to even east dipping. Folded and crenulated by a steep crenulation foliation. Pelite seems to be infolded with meta-basite.



Don't know whether this crenulation and apparent tilting is post D_2 or whether crenulation is S_2 and whole thing has been re-oriented.

If S_2 is down-dip verging regionally, this crenulation would seem to be something else.

Took 2 photos: general view of pelites, and close-up of large staurolites (1-2 cm long).

FIELD

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89-95 (1565)

Two outcrops: to east a possible broken up outcrop of white, moderately foliated tourmaline-garnet granite micropegmatite, 10c

To west, ICD schist

A bit more ICD outcrops to east before 3D comes in

43 ⇉ ↓ 156

89-96 (1510 m)

Fairly thick (roughly 10 m) marble - lines up well with main marble on scarp face to east.

Project structurally above station 89-90.

Surrounded above and below by monotonous, finely layered 3D calc-silicate.

This marble, weathers grey. Well defined foliation defined by fine but discontinuous calc-silicate micro-bithons, and possibly by argillaceous partings.

10 ↓ 346 ↖ Lineation may be S_{0-1} / S_2 interference.

32 ⇉ ↓ 160

S_{0-1-2}

SAMPLE 89-96

Claim post near here, at bottom of talus slope

Post #1	RV #71 NW	YB12568
Post #1	RV #70 NW	YB12567
Post #2	RV #69	YB12566
Post #2	RV #68	YB12565

Nov. 29 1987

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89-97

No outcrop, but some old claim posts.

POST #2 Claim # Y 3478

POST #2 " " Y 3477

89-98 (1450m)

Two outcrops here.

Higher one, to SE.

Green, medium grained well foliated metabasite, 3cp. Weathers reddish brown.

Typical

21 ⇉ ↓ 178

S_{0-1-2} ?

Locally has a 'spotted' texture (spots ≤ 1 cm) and knobby weathering characteristic of metapyroxenite.

Foliation at bottom of bluff (1390m)

48 ⇉ ↓ 154

Outcrops of granitoid rocks on northeast face of bluff - sharp, suggesting fault contact, but may be intrusive.

Lower granite looks like 101B.

Upper outcrop at 1440m is mainly 10c, with tourmaline, muscovite and minor biotite. But think I can see some vague feldspar phenocrysts.

89-99

10D pelitic schist with bladed chlorite pseudomorphs.

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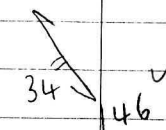
89-100

Pelitic and calc-silicate phyllite /schist and some marble. 3D, F.



20m to NW is a rusty brown weathering, more lustrous schist which I would have to call 1C D. S_0 contact goes just through here. But of a gulley locally.

CLAIMPOST near here #2 Y98919

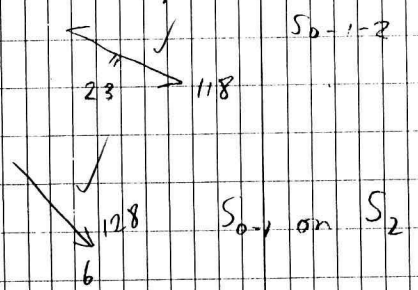
89-101 (1540 m)

Looks transitional between 3D calc-silicate schist and 5B phyllite, although dominantly former. Well foliated, finely laminated dark grey to pale green grey, fine grained. Notally carbonaceous.

Has that microfolded microlithon texture characteristic of 5B some locally. But not calcareous.

N.B. other rocks in this area seemed to have microfolding greater than normal.

Calc of 3Dq



SAMPLES 89-101

R. D. PENHALL LTD. MADE IN VANCOUVER, CANADA
DURSBAK WATERPROOF

WEDNESDAY, JULY 5

Clear but hazy. Thin high cloud.
In morning, mapping bluffs in creek SW of camp.

89-102 (1485 m)
Small, jostled o/c. Pale grey to pale green-grey, fine grained weakly layered 3D calc-silicate and minor interbedded 3F marble. Calc-silicate is calcareous locally. Not much pelite component, but a bit.
Overall looks lower grade than on the ridge to north.

89-103
Good outcrop. Low grade looking 3D calc-silicate. Finely interbedded (mm to a few cm) pale grey or pale green, fine grained calc-silicate, and

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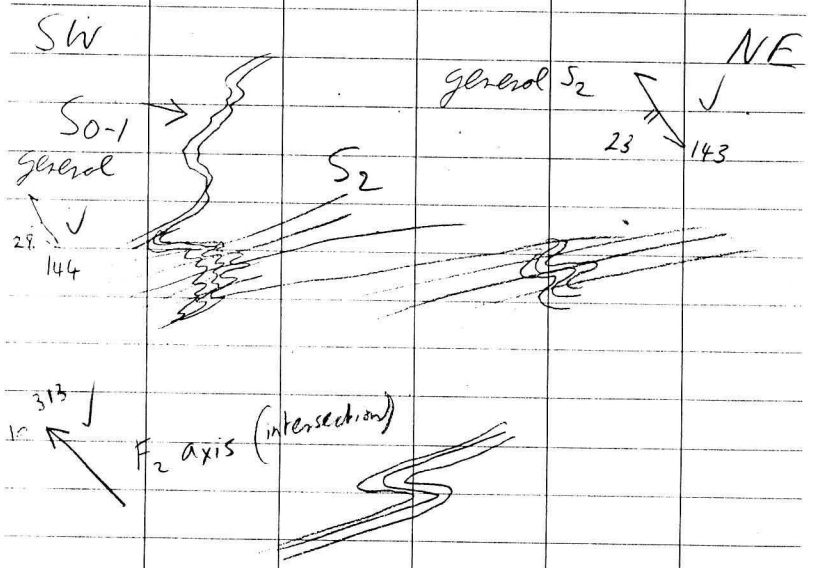
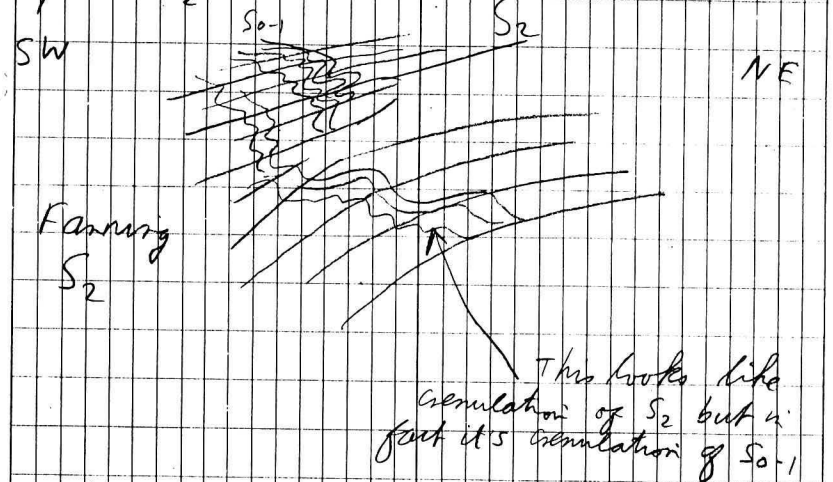
grey, slightly rusty-brown phyllitic fine grained pelite.

All moderately well foliated. Notably a lot of F_2 mm-o folding. Most folds isoclinal, intrafolial, but most asymmetric ones are down-dip verging. Also get this general impression from cleavage - bedding relations i.e. bedding (S_{0-1}) dips steeper than cleavage (S_2).



Also made a noteworthy observation that fine crenulations of an S surface are probably S_2 rather than post D_2



Hence, the fine crenulations seen on foliation surfaces could, locally at least, be S_2.

SAMPLE 89-103

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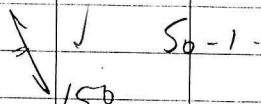
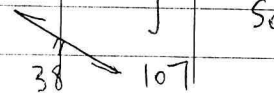
89-104 (1500m)
Very tentative subcrop of ICD schist

89-105 (1510m)
Definite o/c of ICD pelitic schist.



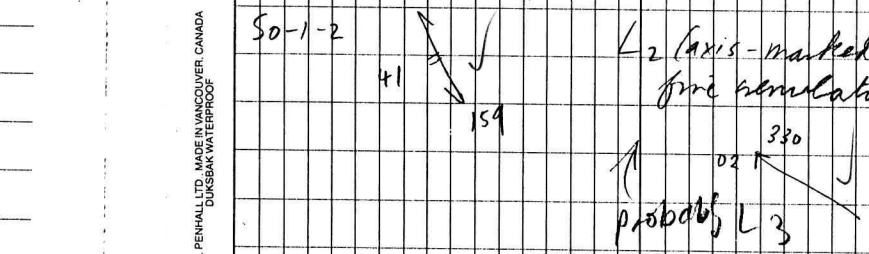
89-106 (1485m) ~~not plotted yet~~
Typical 3D calc-silicate.
Discontinuous mauve-brown pelite and pale creamy-green, fine grained calc-silicate.
Some intrafolial and minor folding but vergence unclear.



~~not plotted yet~~ ~~No 1400m measurement as same as 89-215~~

89-107
Small ridge with contact between 3C$_A$ metabasite below to northeast and 3D calc-silicate to southwest.

Metabasite is streaky dark green and cream, well foliated, fine to medium grained. Very rusty locally, suggesting disseminated sulphides.



Overlying calc-silicate is typical 3D, on the lower grade side. Some good down-dip verging microfolding locally.

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FIELD

89-108

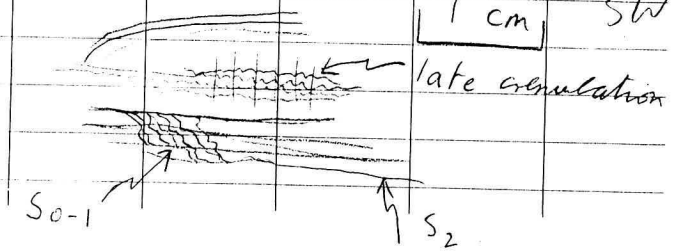
Large exposure on north facing west scarp. Interbedded 3F marble and 3D calc-silicate, in roughly equal amounts.

Both units are well foliated and finely laminated. Rock has a lot of micro- and minor folding, S_0 I suspect interbedding is structural more than sedimentary.

The numerous minor and micro-folds are usually rootless hinges. Where asymmetry is evident, both vergences are seen, with no particular bias.

One useful conclusion, is that the fine crenulation visible on cleavage planes locally is definitely, at least locally, post-S_2. This is well shown by

NE



Crenulation of axial planar S_2.

But what I said this morning at 89-103 is still valid as another source of this crenulation.

S_{0-1-2}

39 → 154

S_{0-1} on S_2

→ 161 / 03

Late crenulation (dip is steep) on S_{0-1-2}

=

03 / 158

- probably generally coaxial with F_2.

SAMPLE 89-108

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FIELD

89-109 (1495m)

well foliated and laminated 30 calc-silicate. Hints of folding but nothing definite. Vgs, Here and there, down dip varying if anything but equivocal

So-1-2

Claim Post just here

Claim Post #1	Claim #	YB12611
" " #1	Claim #	YB12610
" " 2	Claim #	YB12609
" " 2	Claim #	YB12608

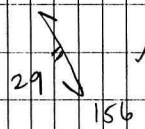
89-110

On southeast side of gully

Finely foliated and laminated grey to green to mauve brown phyllite with white non-calcareous laminae. Looks what I'd imagine a transition between 30 and 56 would look like i.e. good mineralogical development but still a bit of biotite in the pelite and no free carbonate. But perhaps too low grade for diopside and good segregation of calc-silicate minerals.

No, it's still there

[SAMPLE 89-110]



Thunderstorm

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THURSDAY, JULY 6

Sunny, warm, hazy in SW. First day mapping ridge SE of camp.

89-111 (1630m)

Fairly typical, moderately high grade looking 3D calc-silicate. Interlayered and intermixed greenish-grey fine grained calc-silicate, locally with ≤ 1cm long prismatic green crystals of ?hornblende or ?actinolite, non-calcareous and dark brownish / rusty grey biotite pelite

Weakly to moderately foliated. Can see a couple of possible mit. a folial down-dip verging folds, but not all that convincing.

S_{0-1-2} 38 / 153

F_2 intersection / compo. lineation 03 / 154

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Above that is more well foliated $3C_A$ metabasite, and then a several-metre thick, grey-white bull quartz vein. Not very rusty, suspect it's not particularly mineralized.

This is overlain by metabasite.

Quartz vein does not crop out on west side of gully, although there is no fault in gully because contacts match up on each side.

Took some pictures:

Camera #27: Non-vergent (leaning) F_2 folds in $3C_A$, looking SE, between stations 89-114 and 89-115

#28: Looking west at down-dip vergent F_2 folds in $3C_A$ at 89-115

#29: Looking SE at down-dip vergent F_2 folds in 3D at Station 89-115

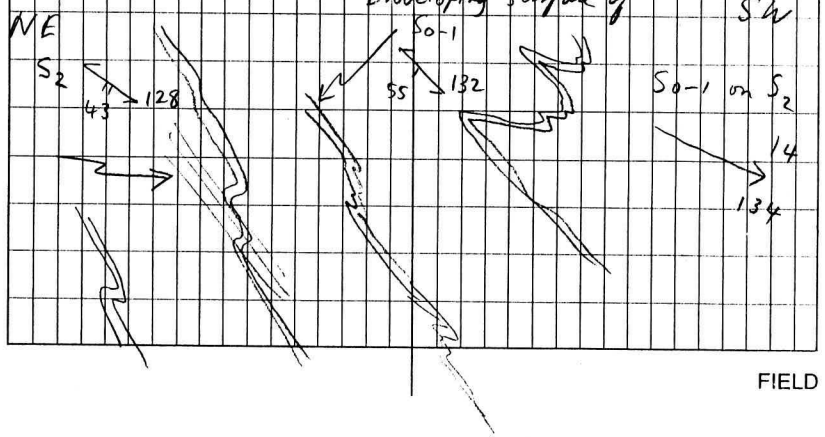
#30: Larger view of same locality showing more down-dip vergent folds.

89-115

Contact between well foliated, laminated and internally folded $3C_A$ metabasite to northeast, and 3D calc-silicate to southwest.

Folding in metabasite outlined by softer, paler, rustier, ?more carbonatized segregation laminae.

3D calc-silicate has the pelite / greenish-grey calc-silicate bedding and lamination, but it is generally more greenish, with amphibole-rich mineral seams (also folded) and green ?meta-basite layers. Looks almost transitional between the two lithologies. See photographs (28, 29)



FIELD

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Some of the calc-silicates very hard, looks annealed

SAMPLE 89-115

89-116

3D calc-silicate adjacent to 3E metabasite

Approx. S_0-1-2

89-117

Pale creamy-green, massive diopside rich calc-silicate. Not interbedded with pelite as is normal 3D, except near margins with 3D

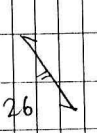
weathers rough or spongy, creamy buff to reddish-brown.

Labelled 3D π on field map

89-118 (1618m)

Seems to be a band of 3E phyllite, flanked above and below by 3D calc-silicate with a darker, grey, more carbonaceous phyllite, i.e. 3Dg.

This carbonaceous phyllite, 3E, is grey, to dark grey to almost black, fine to very fine grained, very finely cleaved with lustrous cleavage surfaces. Some siliceous microlithons. Non-calcareous.



S_0-1-2

Don't think we need a fault in the gully to southwest, 3E runs through

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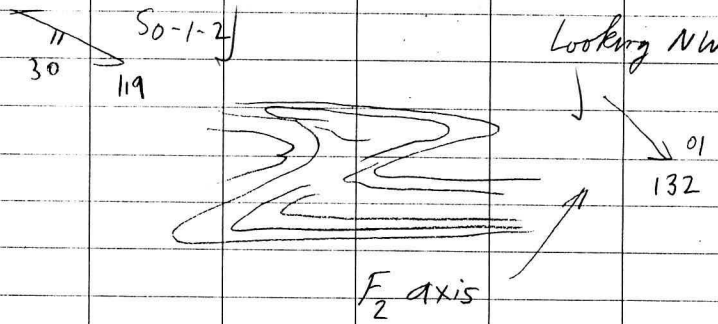
without significant apparent offset

SAMPLE 89-118

89-119

Something between 5B and 3D well foliated, finely laminated, alternately dark grey, carbonaceous phyllite and grey-white, weakly calcareous calc-silicate. Looks sheared, but no good stretching lineation. Also some nice mm-scale folds. Axes measurable, but vergence ambiguous.

SAMPLE 89-119



Below this particular rock however 10 m to the west, is more typical 3D calc-silicate, although quite greenish-looking, and weakly calcareous.

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FRIDAY, JULY 7

Mapping around steep bluffs in creek SW of camp. with Audrey. Sunny and hot. Leaving for base camp later today.

89-120 (1380 m)

Rather weathered, but good exposure of 3D calc-silicate, with pelite seeming to predominate over calc-silicate, unless latter is merely more disseminated. Weathers brown-buff-grey. Fresh is dark brownish-grey pelitic phyllite with thin, mm- to cm-scale calc-silicate beds and laminae.

Notable for some good S_1-S_2 microlithon laminae and some good F_2 folds, the biggest and best of which are down-dip vergent.

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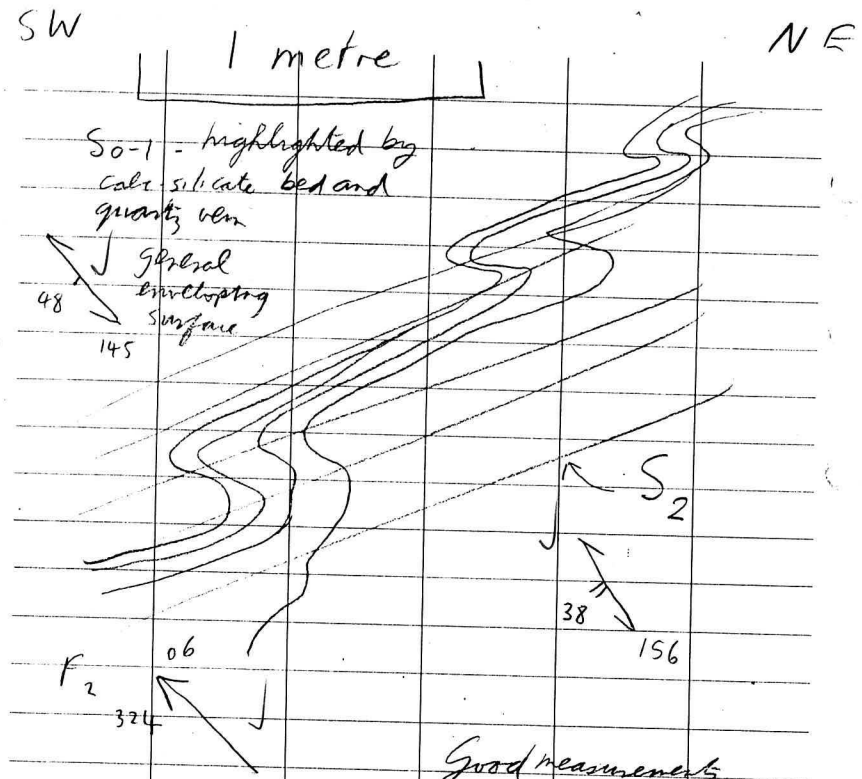

Good measurements.

Took photo with PRINT film, looking NW.

89-121 (1355m)

At top of this steep bluff. 3D calc-silicate. Quite finely laminated, flaggy weathering but not strongly foliated.

S_{0-1-2}

11

39

128

89-122 (1365m)

Big diff exposure. Still all 3D calc-silicate. Fine grained moderately foliated and laminated.

Full of tight to isoclinal F_2 minor and micro-folds. Vast majority of asymmetric ones are clearly down-dip-verging.

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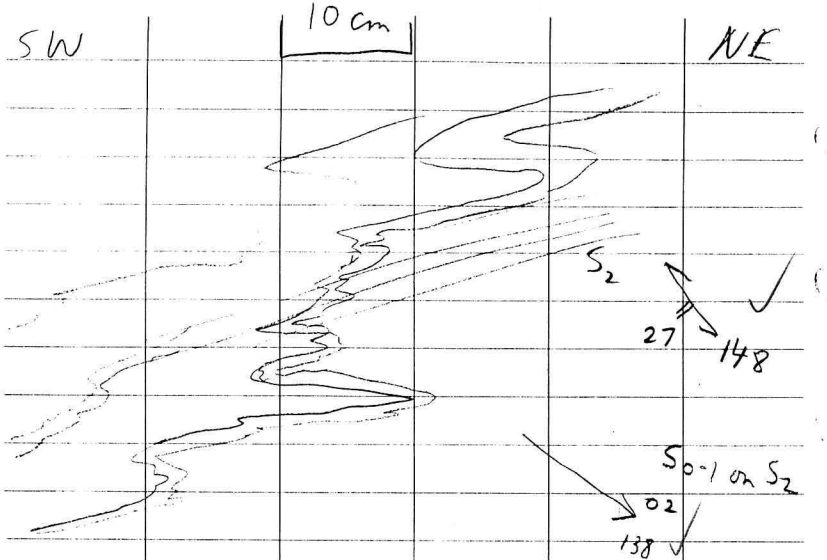

Composite sketch of fold styles

ORIENTED SAMPLE
89-122

24
130

89-123 (1470 m)

Definite outcrops in bush. Typical 3D calc-silicate. Perhaps a bit higher grade looking than stuff on bluffs this morning, and a little less pelitic.

S_{0-1-2}
33
152

Plagioclase-amphibole/epidote tension cracks

038
81

89-124 (1490 m)

3D calc-silicate. Fresh colour is mid to dark greenish-grey, i.e. calc-silicate isn't quite as pale green as normal.

S_{0-1-2}
28
164

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FIELD

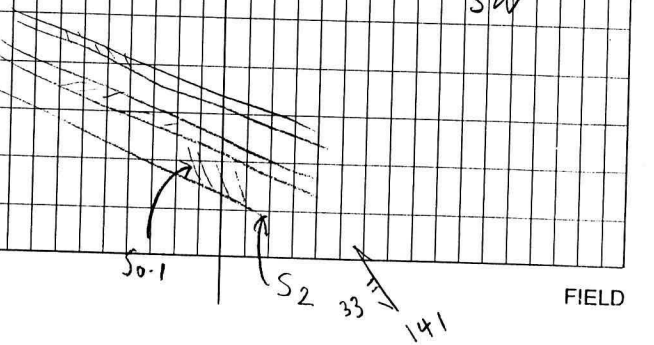
MONDAY, JULY 10

Sunny, hot and hazy. Calm. First day with Teresa. Mapping around gullies on ridge SE of camp.

89-125 (1620m)

Been mapping 3D, 3C contact. Thin little outcrops above contact between 3C amphibolite and 3D calc-silicate. Very sharp. Doesn't look like there is much of a transition as in 3B. (Saw some 3B nearby though.

Think this must be in little F_2 fold closure. Can't see any good M-folds here, but S_{0-1} / S_2 angle in 3C is very variable.



FIELD

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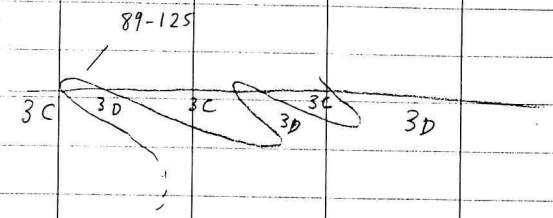
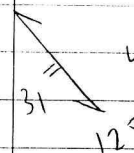
Plunge, if anything, is southeasterly 5-10° which puts 3D into an antiform



Schematic cross-section through 89-125, explaining outcrop pattern. Suggests much tight folding, which agrees with observation of numerous minor structures in rocks in gully to SE.

89-126 (1600m)
Typical 3D cale-silicate



Claim post 20m from here to the NE

Post # 1	Claim #	YB12552
Post # 1	Claim #	YB12551
Post # 2	Claim #	YB12550
Post # 2	Claim #	YB12549

89-127

Brown, spongy weathering calc-silicate rock, 3D. No significant pelite here. Looks high grade in terms of it having porphyroblastic amphibole or diopside, or both and possibly greenish-brown garnet. Also has pyrite. Similar to what I've been calling 30m

SAMPLE 89-127

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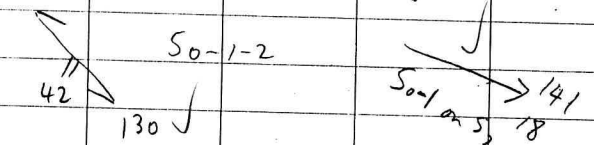
89-128 (1615 m)

Mainly typical thinly bedded, weakly to moderately foliated 3D calc-silicate.

Mixed in with this is orange-cream-brown, spongy-weathering, recrystallized calc-silicate. Basically similar to what I've been calling 3DT, informally



89-129

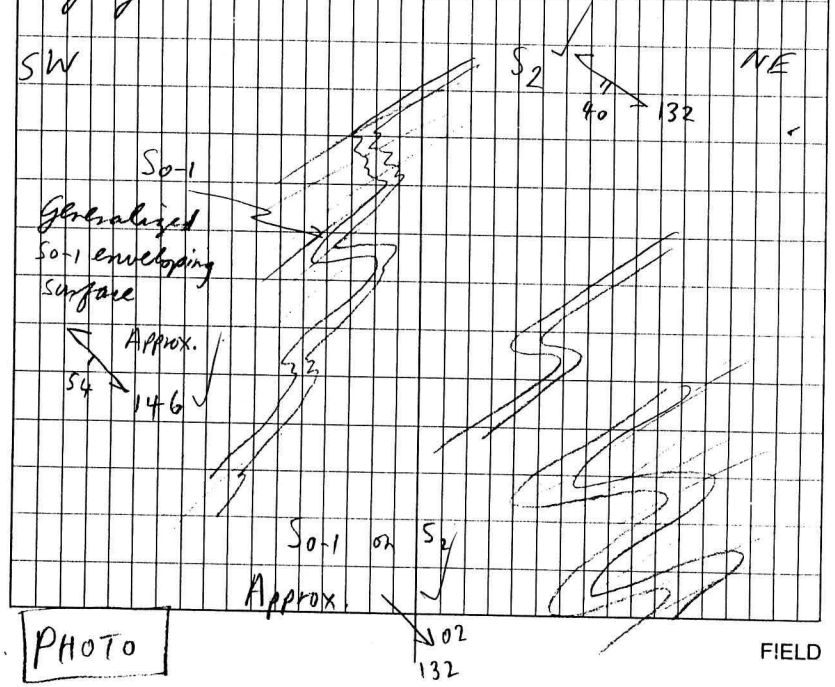
Shaley outcrop in road bed that's something between 3Dq and 3E.

Grey to dark grey, shiny very fine grained carbonaceous phyllite with only minor siltstone. Perhaps not black enough to be 3E, but close.

89-130

3D calc-silicate to 3Dq. Moderately well banded, alternating between fine grained green to pale green calc-silicate and fine grained grey to dark grey pelitic phyllite. Quite typical.

Full of F_2 minor folds. Tight to moderate. Looks very wingy. Bias of asymmetric folds is definitely down-dip verging.



PHOTO

FIELD

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Some very good F_2 structures to see here.

Cut by 15 cm thick 10E dikelet.

Dike trends: 84 / 074 ✓

Very similar trend to late brittle fractures (non-mineralized).

TUESDAY, JULY 11

Sunny, hot hazy. Same area as yesterday.

89-131 (1610 m)

All basically 3D calc-silicate, bordering on 3Dq i.e. with a carbonaceous component to the pelite.

Finely to moderately banded and mixed green-grey fine grained calc-silicate, weakly pyrite bearing, and dark grey fine grained pelitic phyllite to schist. Somewhat more rusty weathering than usual 3D. So it's 3Dq, D_2.

Full of tight to close F_2 minor folds. About 50-50 asymmetric and symmetric folds. Asymmetric ones are predominantly down-dip verging.

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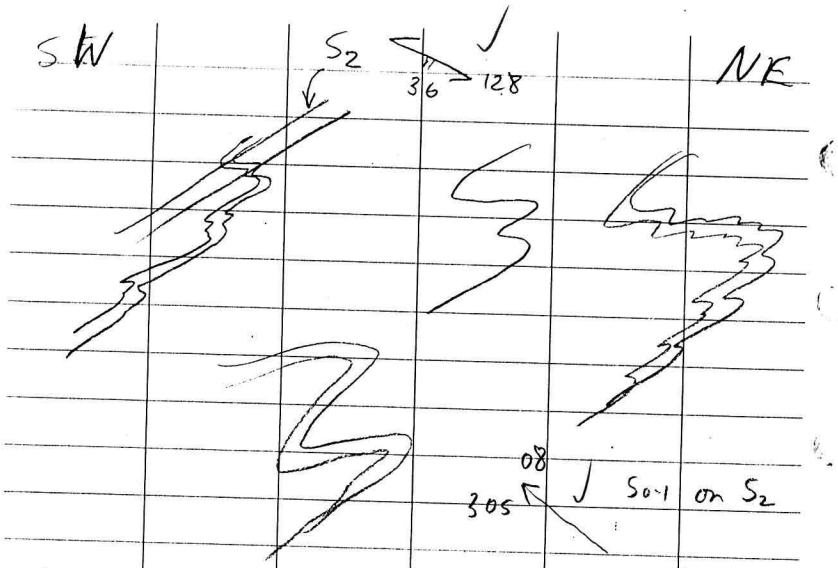

Photo

89-132 (1570 m)

Subcrop of definite dark grey to black, limonitic, fine grained graphitic phyllite. Think it's slightly above the 3C, B

SAMPLE 89-132

89-133

Green, fine to medium grained, well foliated and laminated, 3C metabasite.

S_0 - 1-2

26 → 129

Still can't tell for sure if the 3E on the road below is above or below this 3C, as it's not very thick, and it's a dip slope.

89-134

Contact between 3B chloritic phyllite (related to 3C, B upslope), and dark grey phyllite with minor calc-silicate which is something between 3E and 3Dq.

Very hard to tell what these contacts are doing as dip is more or less equal to topographic slope. Still think the phyllite is above the 3B.

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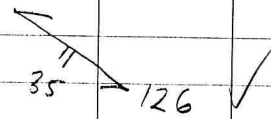
89-135

Partly typical 3D calc-silicate but with a definite carbonaceous, dark grey component to the pelite.

3Dg



89-136

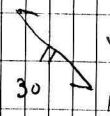
Mostly 3D calc-silicate, with a bed of very rusty brown-weathering, green, massive diopside-epidote rich calc-silicate rich in sulphides. Probably only 1-2 m thick. Think I can see galena, pyrrhotite, sphalerite and pyrite.

This must be the skarn they were drilling in the area.

SAMPLE 89-136

89-137 (1600 m)

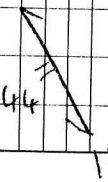
Typical 3D calc-silicate. Finely laminated and bedded in shades of pale to mid-grey. Fine to very fine grained. Pale creamy, silvery lustrous weathering surfaces. Not carbonaceous here. Pelite not massive either.



89-138

Typical 3D calc-silicate. Finely bedded and foliated, pale to dark grey-green, fine grained.

Several small symmetric to asymmetric F_2 minor folds.



R. D. PENHALL LTD. MADE IN VANCOUVER, CANADA
DUKSBACK WATERPROOF

89-139

3D calc-silicate. Calc-silicate is pale green fine to medium grained, weakly calcareous (skarn?). White weathering. Relatively minor pyrite here.

Claim post 30m due north of here.

Post # 2	Claim no.	YB 12551
Post # 2	Claim #	YB 12552
Post # 1	Claim #	YB 12553
Post # 1	Claim #	YB 12554

89-140

3D calc-silicate, though it has an unusual orange-brown streaky weathering appearance. Possibly due to minor sulphides.

Otherwise it is typical finely banded and foliated, green to marvish-grey brown calc-silicate except that it's hard and annealed (by 10E dike in vicinity?).

Some good down-dip verging F_2 folds locally.

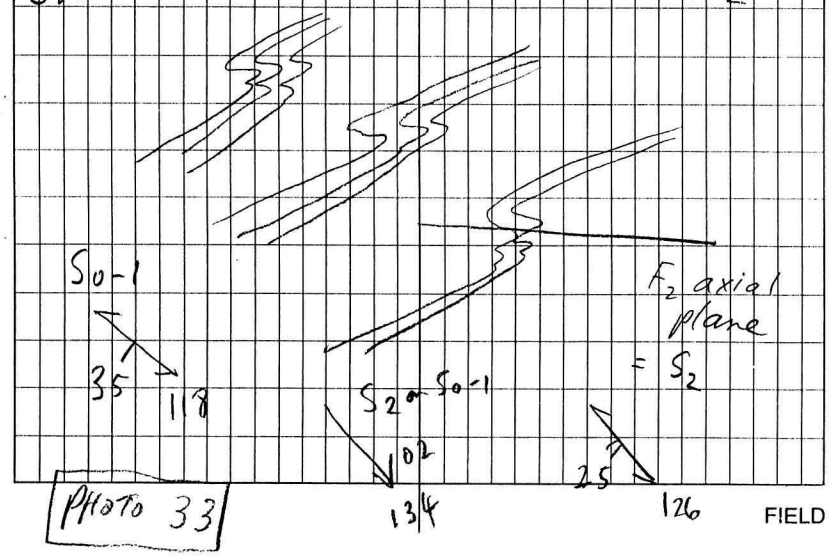


PHOTO 33

FIELD

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Locally a dikelet of 20 cm thick concordant 10E this might produce annealing?

WEDNESDAY, JULY 12

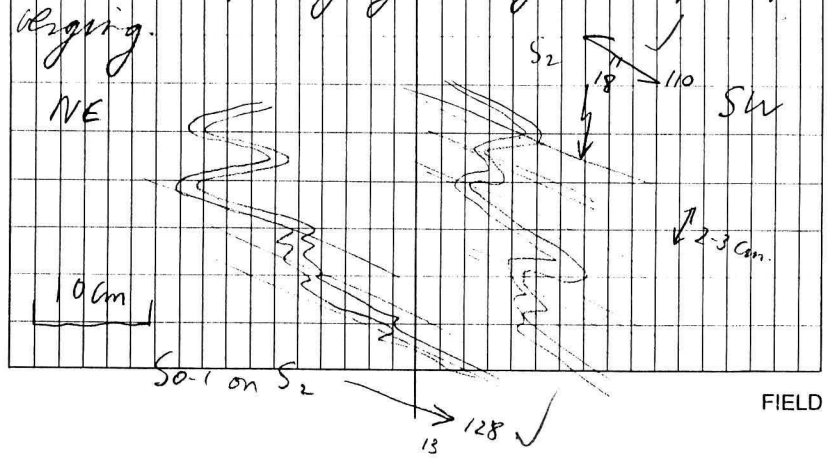
Sunny, hot. Same area as yesterday, continuing from where we finished.

89-141

Still 3D calc-silicate. Slightly low-grade looking. Banded on the mm- to cm-scale between brownish-grey pelite and pale to mid-green calc-silicate. Fine grained. Nearly exposure was rich in pyrite.

Quite finely foliated

Full of F$_2$ minor folds. Hinges to down-dip verging. Very rare up-dip verging.



FIELD

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Photo shows some large lithons of S_0 - hinge between S_2 planes.

89-142 (1590m)

3D calc-silicate. Looking kind of low grade here, in that the pelite is very fine grained, grey, slightly carbonaceous, shiny, finely cleaved.

Calc-silicate forms laminae, rarely >1cm. Pale grey green to mid-grey. Non- or weakly calcareous.

General appearance of rock is more greenish than usual (ie to NE). Could reflect greenschist facies, chlorite dominated mineralogy. Biotite gone? Carbonaceous material more evident in the shiny grey phyllite

SAMPLE 89-142

Some microlithon development, but sample shows well transposed, perhaps sheared S_{0-1-2}. A $1/5_0$ sample seems annealed, but in all other respects it is representative.

S_{0-1-2}

35 → 129

89-143 (1515m)

Most of this knot is 3D & 3Dg. Fine grained, finely laminated dark grey chlorite ± graphite phyllite, with thin calc-silicate laminae. Dominantly a pelite, well cleaved rock. Colour dark grey in colour.

Part of rock is very close to 3E, where it not for thin calc-silicate laminae (non-calcareous).

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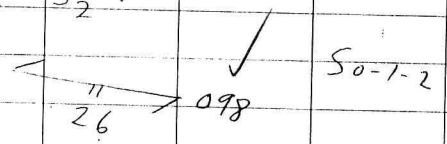
Rock has perhaps more in common with 5B than 3D.

SAMPLE 89-143

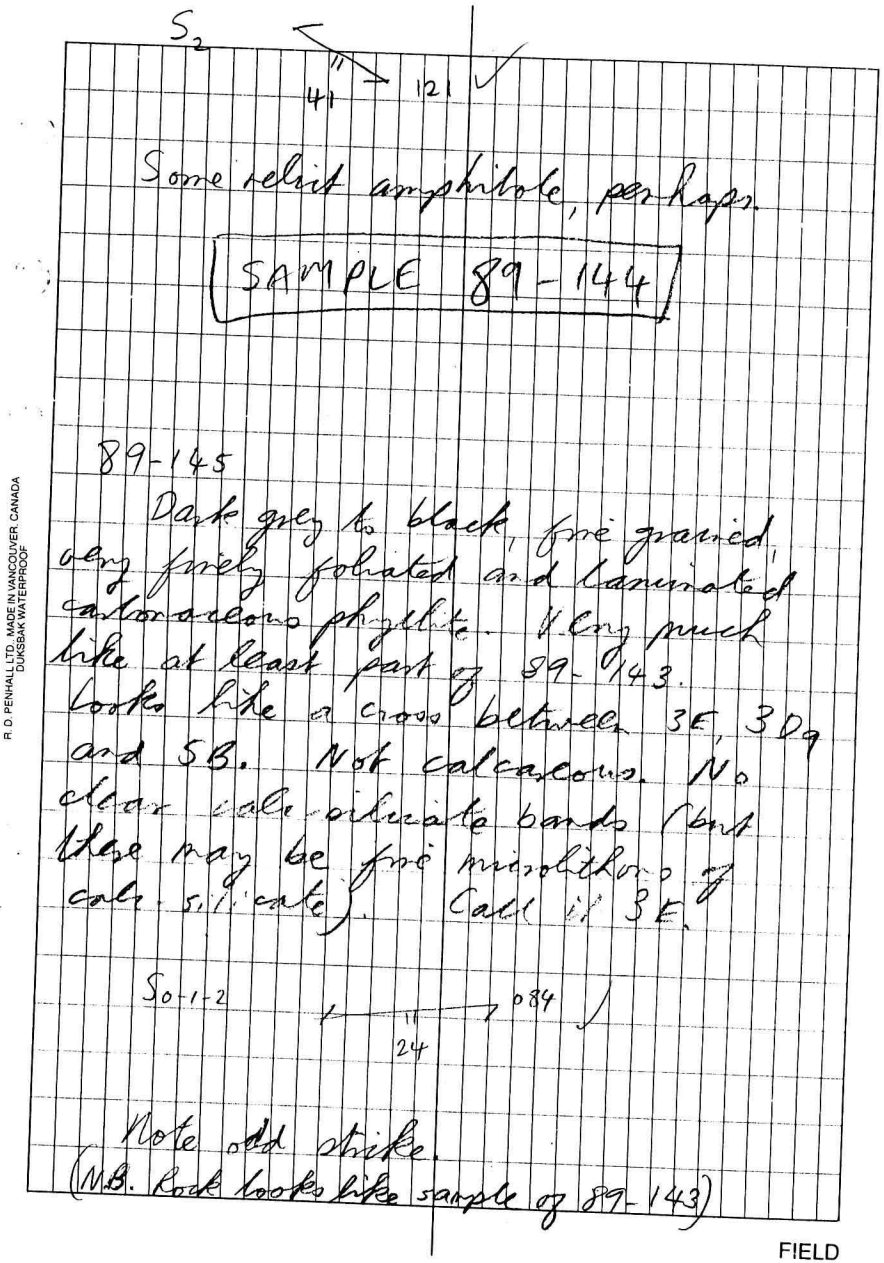
is from the most carbonaceous - 3E like - facies. Not entirely representative.

Unusual S_2:



89-144

Greenish-brown weathering pale to mid-green medium grained chlorite schist with spaced, interfering fabrics. Can't see any definite amphibole. Looks dominantly chlorite. Homogeneous. Hard to call it 5C.



Some relict amphibole, perhaps.

SAMPLE 89-144

89-145

Dark grey to black, fine grained, very finely foliated and laminated carbonaceous phyllite. V. very much like at least part of 89-143. Looks like a cross between 3E, 3D and 5B. Not calcareous. No clear calc-silicate bands (but these may be fine microlithons of calc-silicate). Call it 3E.

Note odd strike.

(N.B. Rock looks like sample of 89-143)

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Claim post 35 m west of 89-145

Post # 2	Claim #	YB125598
Post # 2	Claim #	YB125599
Post # 1	Claim #	YB125600
Post # 1	Claim #	YB125601

89-146

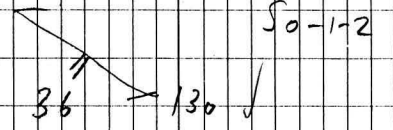
Meta-pyroxenite, 3Cp

Dark green, coarse grained pyroxene pseudomorphs 5 to 8 mm. Spotted weathering texture. Massive. Several veins 5mm to 2cm filled with asbestform chrysotile or ? amphibole.

SAMPLE 89-146

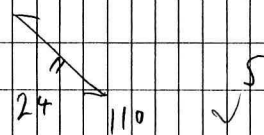
89-147 (1400m)

Green, medium grained, well foliated mafic schist/phyllite. Looks like it could have come from 3Cp but can't see any relict pyroxenes for sure, so call it 3C.



89-148 (1445m)

Finely laminated and foliated very fine grained mid- to dark grey, flaggy 3D to 3Dq. Quite dark looking cleavage planes. Not 3E though. Not calcareous.



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DUKSBAK WATERPROOF

FIELD

THURSDAY, JULY 13

Sunny, clear, less hot and muggy.
Mapping in northeast, west of big bowl.

89-149 (1720 m)

3D calc-silicates. Well differentiated bands, 0.5 to 3.0 cm thick of pale creamy green fine to medium grained calc-silicate and mauve-grey-brown medium grained pelitic phyllite. Weakly to moderately foliated here. Transposition weak

In vicinity is coarse grained grey marble, intimately associated with spongy weathering calcareous calc-silicate. Marble and this calc-silicate may interdigitate laterally. Only the thicker marbles may be mappable at this scale.

No appreciable F2 minor folding.

So-1-2 ← 096 ✓
21

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DURABAK WATERPROOF

FIELD

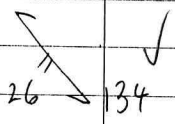
89-150 (1715m)

A roughly 5m thick well foliated, banded grey impure marble, overlain by thinly slightly limey calc-silicates, and underlain by massive spongy, calcareous calc-silicate which grades into the marble.

Marbles weathers grey-buff. Fresh is medium to coarse grained, grey-white, sugary texture. Foliation defined by disseminated calc-silicate minerals.

Spongy calc-silicate below is medium to coarse grained, vaguely streaky in shades of creamy-buff, pale green, and grey. Weak reaction to HCl indicating some free calcite.

So-1-2



Underlain by 3C - green, medium grained well foliated metabasite -

amphibolite, with biotite on some partings.

[SAMPLE 89-150]

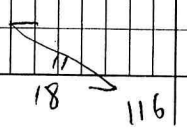
89-151 (1685m)

At very bottom of exposed cliff, calc-silicate changes. It becomes dark greenish-grey, fine grained, carbonaceous looking with lustrous phyllitic partings, rusty, presumably from disseminated sulphides, and very finely foliated. Calc-silicate lithons are still present but are darker green than usual.

Pelitic partings have those 2-3cm long chloritic pseudomorphs.

So this rock could be somewhere between 3Dg and 1D. I would incline to the latter.

So-1-2



FIELD

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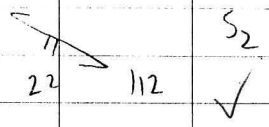
DUKSBAK WATERPROOF

89-152

Metabasalte, essentially the same as 89-29.

Greenish to streaky-rusty brown weathering. Fresh mid-green, medium grained. Chlorite-rich, amphibole present but looks like anthophyllite more than hornblende – it is pale brownish-green, fibrous looking, in short prismatic crystals. Suggests protolith was ultramafic (pyroxenite?). Call it $3C_A$, because relict pyroxenes evident.

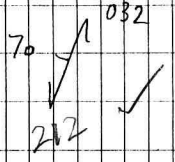
S_2 is clearly very spaced, with some quite open F_2 folds.



89-153

Anvil Batholith, 10AB. Speckled grey-white coarse grained, megacrystic granite. Megacrysts up to 8cm long.

Weak steep foliation. May be related to late ductile (semi-ductile) fault, offsetting granite contact.



89-154

Approximately 4 or 5m thick marble surrounded by 3D calc-silicate. Marble is typical, creamy-buff-grey, medium grained, with disseminated green calc-silicate minerals defining moderate to strong foliation. No distinct F_2 minor folds. No – there are some good ones in loose blocks.

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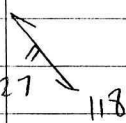
Contacts with calc-silicate above and below are not sharp, in that the 3D has beds of variable thickness of marble within it. Calc-silicate bands look porous, calcareous. Don't think the intercalation is tectonic, as there's not much minor folding present.



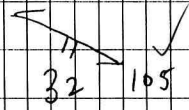
Can't see a good intersection lineation to measure for S_2.

FRIDAY, JULY 14

Cloudy, showery, early morning. Cloudy, cool. Working in same area as yesterday.

89-155

Green, medium grained, well and pervasively foliated, homogeneous amphibolite – metabasite 3C.



SAMPLE 89-155

89-156

Contact between 3C below to north, and 3D above to south.

3D is partly layered mauve-grey

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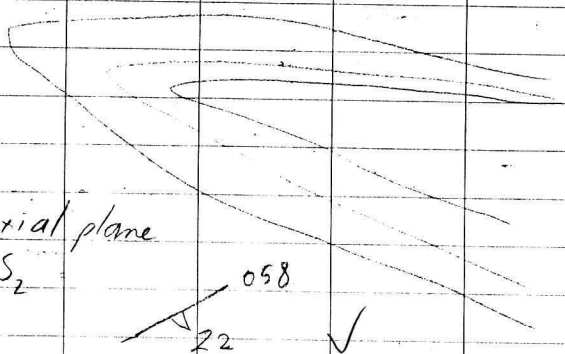
pelite and pale creamy-green calc-silicate, and partly massive, slightly orange-weathering calc-silicate.

Metabasite ± below comprises entirely a nice F_2 fold hinge. See photo. Vergence indeterminate



Axial plane
$= S_2$ 058
22 ✓

Odd orientation!

89-157

3D calc-silicate

S_{0-1-2} ✓
31 → 121

Most outcrop in immediate area of this station was calc-silicate rich 3D, typically a creamy-green buff, medium grained, rather porous weathering calc-silicate. I've been calling this kind of rock 3D II. Also bits and pieces lying around of calc-silicate marble, so it's definitely a calcareous facies of 3D.

But note this is also roughly a dip slope so area of $3D_3$ and 3D II may be misleading.

89-158

Post # 2	Claim #	YB12532
Post # 2	Claim #	YB12533
Post # 1	Claim #	YB12534
Post # 1	Claim #	YB12535

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SATURDAY, JULY 15

Sun and cloud. Met two old-timers on trail, on way to big bluffs on creek

89-159

Two almost coincident stations one on top of the other

1335 m:

Fairly typical 3D calc-silicate. Thinly, mm- to cm-scale, interlayered dark grey-brown pelite and green-grey fine to medium grained calc-silicate. Quite regular layering. Get impression of pelite being dominant.

Not much in the way of F_2 folds, unlike some of the other cliffs to NE.

S_0-1-2

27

147

S_0-1 on S_2

322

03

SAMPLE 89-159

FIELD

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1315 m

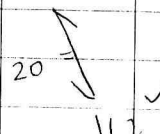
At base of bluff. Same 3D calc-silicate. Perhaps about equal pelite and c/s here. Still no significant folding.

No carbonaceous looking phyllite component.

89-160 (1320 m)

(Other side of little gulley)

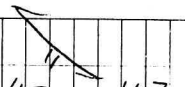
Same 3D calc-silicate.



89-161 (1332 m)

Still same 3D calc-silicate. Fairly finely bedded. Weak to moderate foliation.

So-1-2

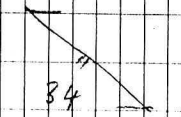


No folding or carbonaceous variants seen.

89-162

3D calc-silicate. Pale green calc-silicate and lustrous mauve-grey pelite.

So-1-2



89-163

All mid to dark green, medium grained well foliated and laminated (calcsilicate)

FIELD

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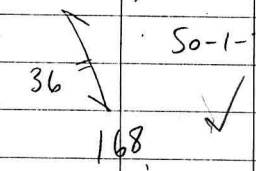
creamy-orange-white) amphibolite.
meta-basite 3CA.



MONDAY JULY 17

Sunny, warm. First day of week with Ivan. Mapping on ridge south of big bowl in northeast.

89-164 (1780m)

Contact between 3C below to N and 3D above to south.

3C is typical, dark-green, medium to coarse grained, well foliated amphibolite meta-basite.

3D is pale creamy-green calc-silicate rock, with discontinuous mauve-grey patches and lenses of pelite. All rocks jostled so not measured.

About 60 m to SE as more sparse outcrop, this time 3C above and to S of 3D.

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89-165

3D calc-silicate. Moderately bedded and foliated. Shades of pale grey-green and mauve-grey-brown.

S_{0-1-2} 21 → 125

89-166 (1770m)

Near eastern end of cliffs exposed in bowl. Vaigorda

Typical ~~Mt Angs~~ 3D calc-silicates. Moderately to finely banded and foliated in shades of pale creamy-green and mauve-brown-grey. Fine to medium grained. Microlithon. S_{0-1-2} texture although commonly S_{0-1} not distinguishable.

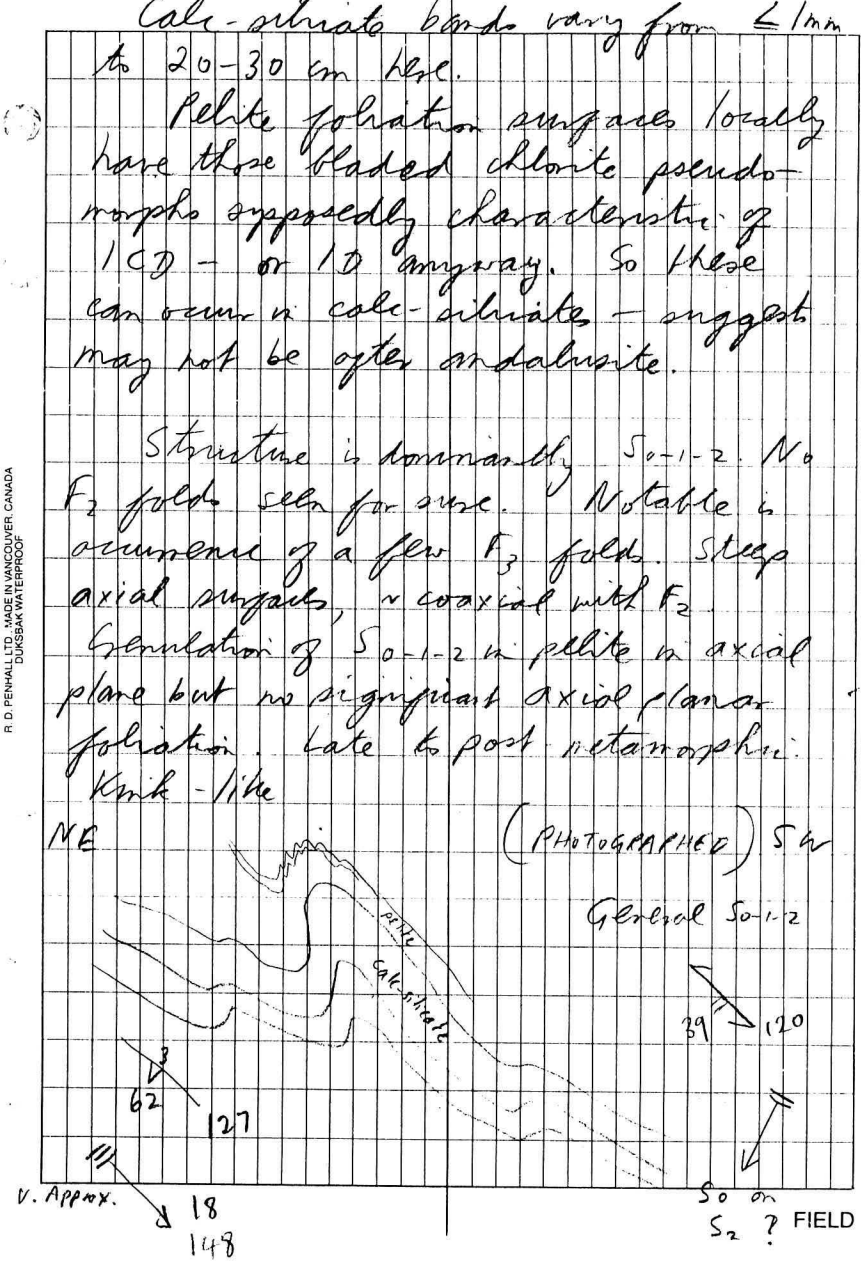
Took photo of general appearance.

Calc-silicate bands vary from ≤ 1mm to 20-30 cm here.

Pelite foliation surfaces locally have these bladed chlorite pseudomorphs supposedly characteristic of ICD - or 1D anyway. So these can occur in calc-silicate - suggest may not be after andalusite.

Structure is dominated by S_{0-1-2}. No F_2 folds seen for sure. Notable is occurrence of a few F_3 folds. Steep axial surfaces, ~ coaxial with F_2.

Granulation of S_{0-1-2} in pelite in axial plane but no significant axial planar foliation. Late to post metamorphic. Kink-like



FIELD

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89-167 (1770 m)

Think these rocks are 1D pelitic schist/phyllite. Mauvish-grey-brown rusty weathering, well foliated fine to medium grained. No significant calc-silicate component, although it doesn't look very unlike the pelitic component of 3D.

Haven't seen any chloritic pseudomorphs, but looks like the appropriate lithology.

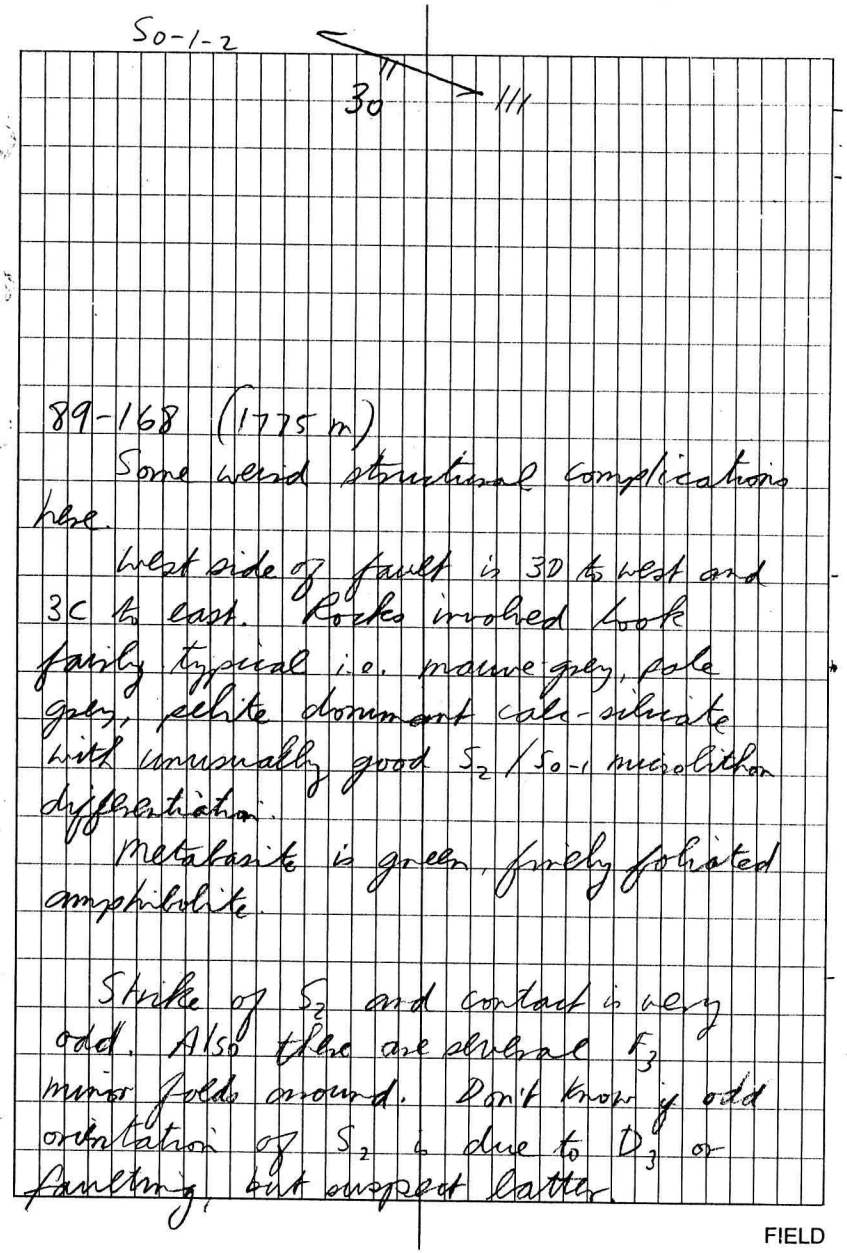
Most of this station area is subcrop or felsenmeer, but some frost-heaved outcrop.

Locally has zones of deep green, well foliated and chevron crenulated chlorite schist, 3B

SAMPLES 89-167

of pelite and chlorite schist.

Pelite sample has good F_2 microfolds. Loose piece.



89-168 (1775 m)

Some weird structural complications here.

West side of fault is 3D to west and 3C to east. Rocks involved look fairly typical i.e. mauve-grey, pale grey, pelite dominant calc-silicate with unusually good S_2 / S_{0-1} microlithon differentiation.

Metabasite is green, finely foliated amphibolite.

Strike of S_2 and contact is very odd. Also there are several F_3 minor folds around. Don't know if odd orientation of S_2 is due to D_3 or faulting, but suspect latter.

FIELD

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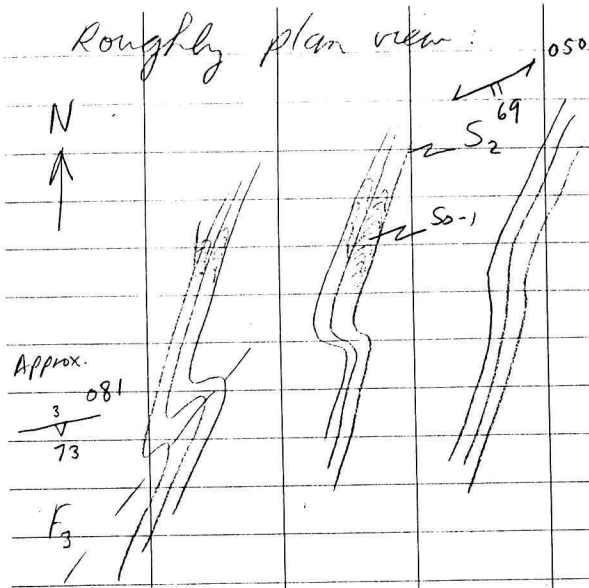
DUKSBAK WATERPROOF

Roughly plan view:



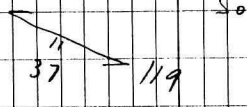
Pitch of S_{0-1} on S_2: 80° to SW

East side of fault, north end, South of road.

3D overlain by 3C. Transition zone marked by an orange-brown-pale green weathering, non-descript calc-silicate rock with bits of amphibolite within. Think it's a remobilized calc-silicate, perhaps syn-metamorphic hydrothermal thing.

SEE PHOTO. (Amphibolite pre-foliated.)

This zone overlain to south by typical green, medium to coarse grained (locally rusty-sulphide bearing) well foliated amphibolite metabasite $3C_A$.



This overlain by a very thin (~2 m) marble. Usual, grey, medium to coarse grained, well foliated with disseminated calc-silicate minerals. Platy weathering, due to differential solution.

This overlain by 3D calc-silicate

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TUESDAY, JULY 18

Sunny, clear, not hot. Can see smoke in low-lying areas to east towards Dy camp, from fire north of Mt. Mye. Very hazy to east and southwest.

Working in Mt. South of bowl.

89-169 (1750m)

3D calc-silicate. Mostly massive creamy weathering weakly foliated calc-silicate, but some pelite beds.

Measurement may not be accurate because of indiscernible jostling. In particular, dips seems a bit high but strike is probably o.k.

S_0 - 1 - 2

11 / 48 → 132

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FIELD

89-170

Area of definite, tipped 3D outcrop. Measurement may not be perfect, due to slumping

S_{0-1-2} → 090 (26)

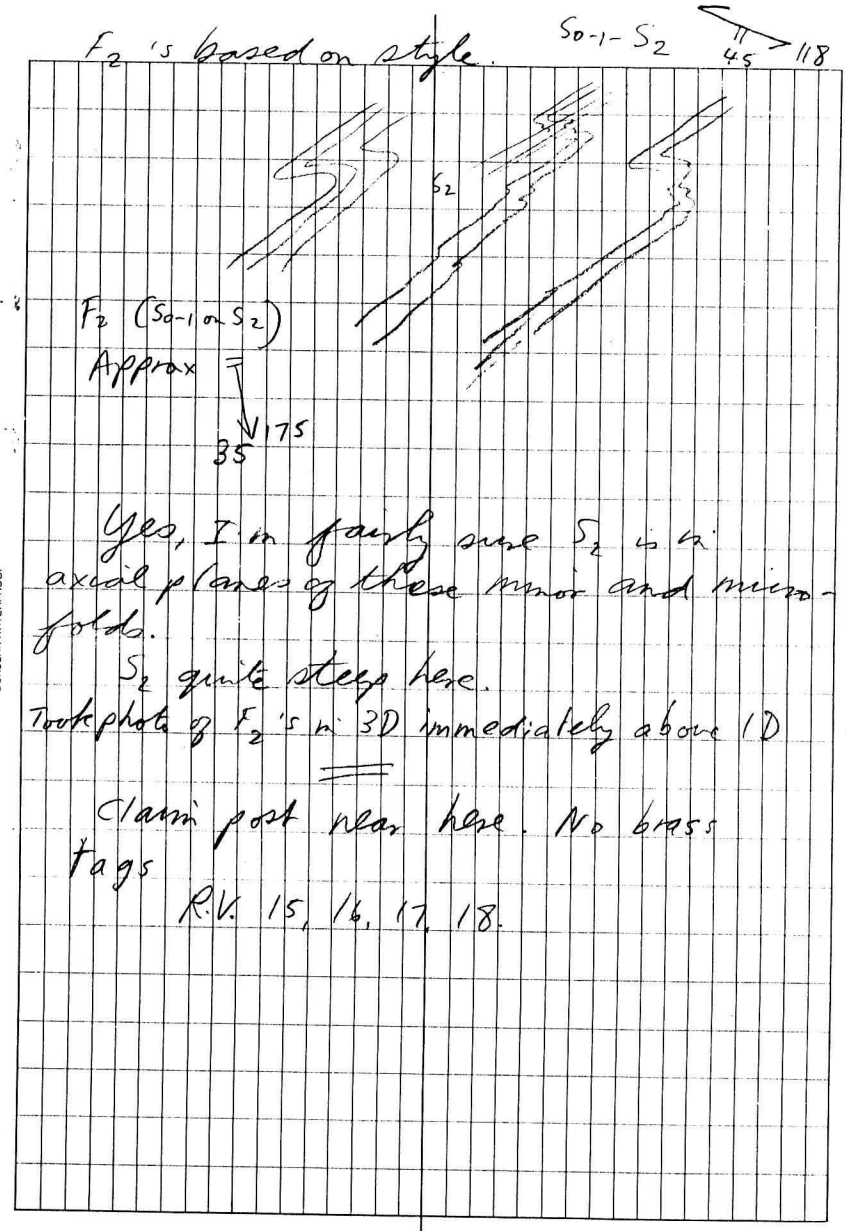
89-171

Several metre thick unit of 1D pelitic schist within 3D.

Contact a bit vague as the two lithologies can look very similar where 3D is calc-silicate poor. Contact based on darker brownish-grey and rusty weathering of 1D, and lack of drusy coating or carbonate weathering.

Both 1D and the 3D below it to north of this station have numerous down-dip verging folds, presumably

F_2 's based on style. $S_{0-1}-S_2$ → 118 (45)



F_2 (S_{0-1} on S_2)
Approx = ↓ 175
35

Yes, I'm fairly sure S_2 is $\parallel$ axial planes of these minor and micro-folds.

S_2 quite steep here.

Took photo of F_2's in 3D immediately above 1D

Claim post near here. No brass tags

R.V. 15, 16, 17, 18.

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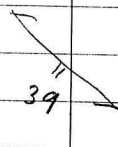
FIELD

89-172 (1740m)

Halfway down cliff. All very regularly, fine to moderately bedded typical 3D calc-silicate. Bedded from 5mm to ~15 cm. Flaggy appearance. No folding here, for a change.

So-1-2



Took a photo.

SAMPLE 89-172

Old claim post at base of cliff.

Some ID at bottom of exposed cliff.

89-173

Pretty well defined contact between megacrystic granite, 10AB to northeast and brown-rusty weathering 1cD pelitic schist to southwest.

Granite is creamy white, speckled with 5-8% biotite. About 3-5% K-feldspar megacrysts. Various sizes and shapes. Longest one seen = 14 cm by 1.8 cm.

Generally massive but locally megacrysts appear to be aligned, but not strongly, and may not be structural here anyway.

No 10c (tourmaline-garnet muscovegmatite) seen.

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WEDNESDAY JULY 19

Clear, sunny but smoky and hazy.
Working in map sheet 4, NW corner mainly.

89-174

Typical 3D calc-silicate with minor thin interbedded marble.

Calc-silicate is thinly flaggy bedded, weakly to moderately foliated. Pale green-gray calc-silicate and minor dark brown pelite, probably containing biotite.

Marbles are thin, usually < 1m, platy, thinly foliated, dolomitic. Rocks look like they line up exactly with those 3D and 3F mapped at 89-92.

S_{0-1-2}

29 → 154

S_{0-1} on S_2

176 12

FIELD

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89-175 (1500m) REVISITED, AUG. 27

Two outcrops, to SE and NW of this little gulley in which there is probably a minor fault.

To SE is dark green-grey, mainly pelitic but slightly amphibolitic schist. Similar to rocks up slope at 89-100 in that they are somewhat transitional between 3D and 1D.

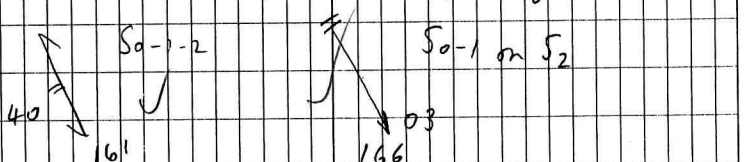
To NW is fine to medium grained pelitic schist, dominantly 1D. Subtle 3D colouring locally.

Has syn-metamorphic white quartz segregations with coarse (≤ 1cm) biotite flakes.

89-176 (1450m)

Been walking more or less along strike and obliquely down dip of 3B calc-silicates with minor thin intercalated marble. Except for the marble, the calc-silicates have exactly the same look about them as the calc-silicates on the bluffs on the NW side of the creek SW of camp.

This station is contact between 3D to NE and $3C_A$ metabasite to SW. Amphibolite is green to dark green fine to medium grained, finely foliated.



Amphibolite appears to be only a few metres thick, but outcrop area is exaggerated because of dip slope.

89-177 (1425m)

Excellent exposures of calc-silicate - rich 3D. Moderately bedded,

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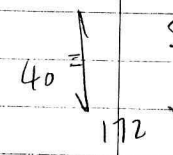
Some massive 30-40 cm thick calc-silicate beds. Took photo

Surprisingly, no significant folding, but note apparently strong NW-ly plunge i.e. dip



89-178 (1400m)

Indefinite but probable outcrop of 3C A. Speckled green and pale grey, inequigranular well foliated augen meta-gabbro. Porphyroclasts of hornblende 2-4mm in anastomosing pale grey felsic foliation. Can't find anything that looks like relict pyroxene texture. Think protolith was more gabbro than ultramafic.

SAMPLE 89-178A

Definitely in place nearby. Tentative measurement, as somewhat jostled

Has radiating rosettes of ? anthophyllite on some, presumably more retrograded or metamorphosed foliation surfaces.

SAMPLE 89-178B

89-179 (1390m)

Typical ICD pelitic schist. Rusty-brown, flaggy weathering. Fresh is dark brownish-grey, fine to medium grained pervasively foliated pelitic biotite schist. Quite high grade looking. Can see

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probable staurolite porphyroblast, and definite rare andalusite porphyroblasts (up to 1 cm long).

S_0-1-2 39 = ↓ 170

SAMPLE 89-179

89-180 (1390m)

Still all 1CD basically, but some minor 3C lenses, and some zones of shiny dark grey phyllite, possibly carbonaceous 1CD2

89-181 (1380m)

Very possible but not definite subcrop. Definite 3D.

Definite outcrop of 3D nearby,

37 = ↓ 180 S_0-1-2

and can nail contact a bit higher up, with some 1CD

89-182 (1360m)

As I expected to find, this 3D has thin beds of 3F marble. All finely foliated. Marble only cm to dm thick.

89-183 (1320m)

Same, thinly bedded, flaky well but not strongly foliated 3D calc-silicate with minor intercalated 3F marble. (not much down here).

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40 → 009

189

Strong northwesterly plunge evident again

89-184 (1345m)

Pelitic schist of 1CD or something very close to it, as in transition between 3D and 1CD.

Brown-rusty weathering. Some pale greenish lithons and microlithons but these may be more quartzofeldspathic than calc-silicate. Lacks the dressy weathering and chalk green-cream veinlets of 3D, so call it 1CD

31 → 168

Some thin ? calcareous zones very locally. Definite 1CD nearby, so this is it.

No sign of any more in situ outcrop or granite further down this slope.

89-185 (1460m) - and 3B

Dip slope of 3C, though some 3D pops through due to late tectonic warping.

Betty mush lose outcrops lower down.

58 → 020 S_0-1-2

20

I suppose odd orientation could be due to large scale slumping // S_0-1-2 surfaces, undetected. Alternatively it could reflect plunge.

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89-186 (1560m) ? REVISITED AUG. 27

Fine to medium grained, rusty-brown weathering (ICD) pelitic schist. Slightly shiny, calcareous-looking foliation surfaces, but not excessively so.

So-1-2

090 / 22

V. Tentative as quite possibly jostled.

THURSDAY, JULY 20

Overcast, cool, dry in morning.

Map sheet 5, NE

89-187

Claim posts

Post # 2	Claim #	YB12536
Post # 2	Claim #	YB12537
Post # 1	Claim #	YB12538
Post # 1	Claim #	YB12539

89-188 (1595m)

ICD pelitic schist, rusty-orange-brown weathering. Fresh: medium to coarse grained, speckled grey. Visible biotite

So-1-2

49 / 143

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89-189 (1595m)

Just across gulley. 3D calc-silicate. Pale green-grey to mauve-grey. Fine grained. Finely and strongly foliated - possibly a somewhat sheared contact with 1CD to SE.

S_{0-1-2} 49 → 136

89-190 (1540m)

Definite o/c of pale creamy white coarse grained 10AB granite with minor feldspar megacryst.

89-191 (1560m)

Typical 3D, here with calcareous 3D, impure marble and minor marble.

3D calc-silicate is finely bedded, 1mm to ~4cm (structural thickness), between dark grey-mauve pelite and pale creamy-green calc-silicate. Well foliated.

Marble and impure marble vary from a few cm to 1.5m thick. Seem to be intercalated in the 3D.

Some tight F_2 minor and microfolding

NE SW

8cm

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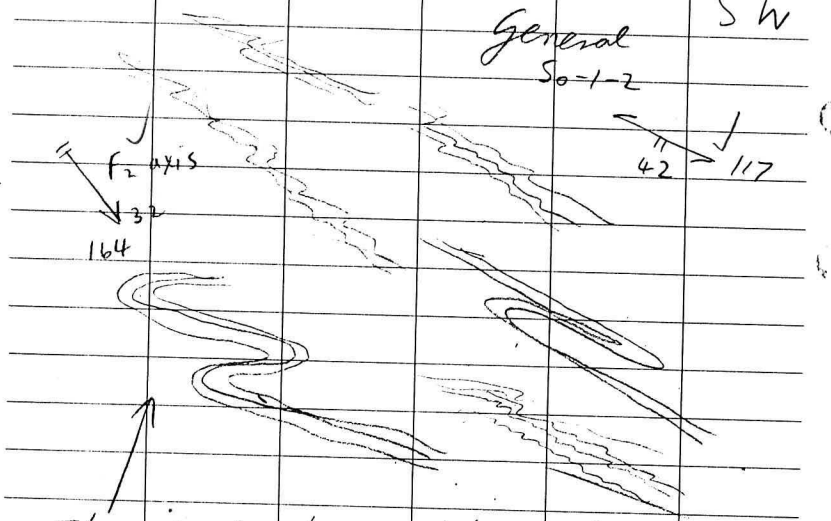
Folds consistently downward verging.

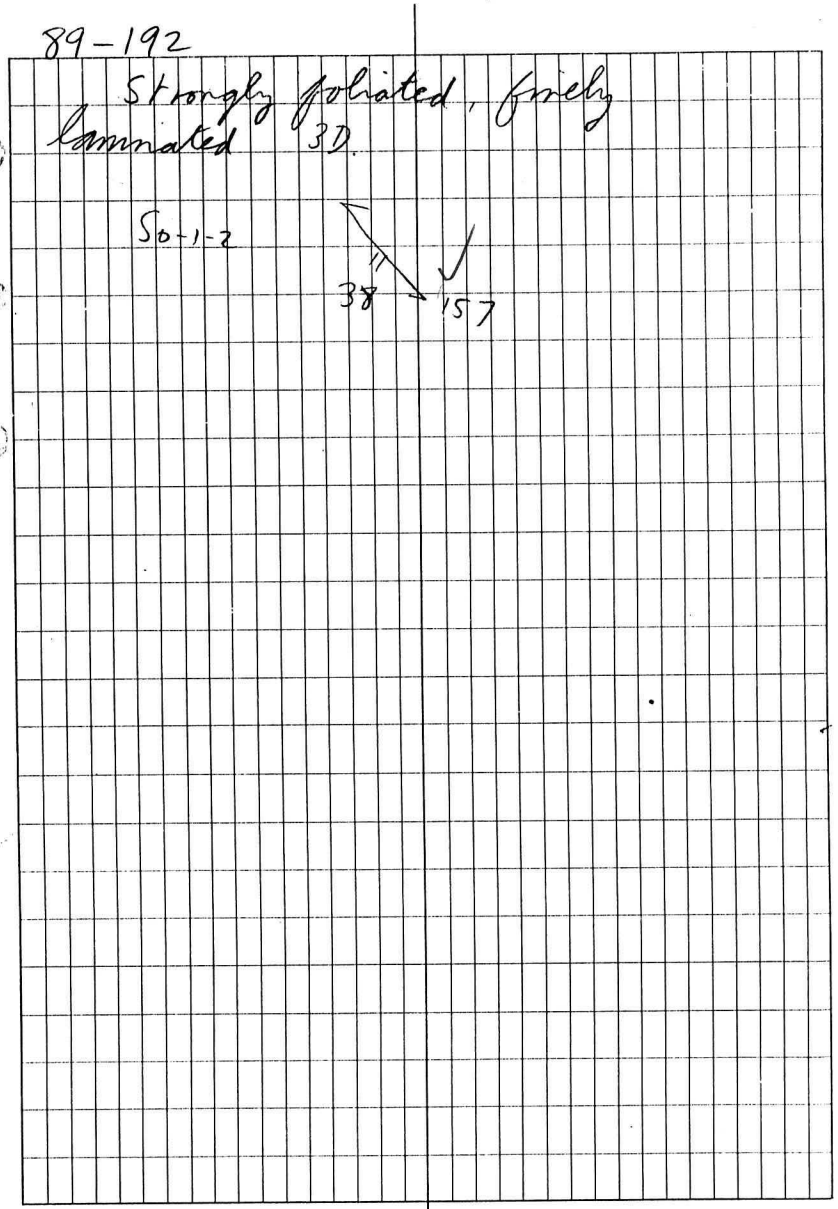


This fold photographed. Good measurement

Really consistent downward verging folds in thin little impure marble bed. All rather strongly flattened due to fairly high D_2 strain here.

89-192

Strongly foliated, finely laminated 3D.



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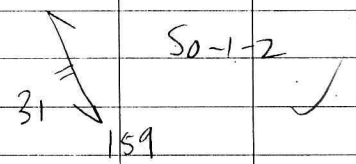
FIELD

89-196 (1634m)

Contact between 3F impure marble, below to NE, and 3D calc-silicate, above to SW.

Marble weathers beige-cream grey, fresh is grey-white, medium to coarse grained. Well foliated.

3D is mainly pale creamy green calc-silicate with minor pelite. Well foliated, flaggy.



SATURDAY, JULY 22

Partly clear, cloudy, dry

Continuing where left off yesterday, Map sheet 5, SE

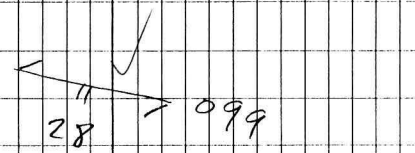
89-197 (1655m)

Contact between 3C, below to N, and 3D, above to S.

3C is green to dark green, medium grained, amphibolite, well foliated with regularly spaced 2-5 mm thick creamy brown felsic laminae.

Outcrop jostled so dips may be a bit shallow.

So-1-2



3D above is moderately foliated, banded pale green calc-silicate and mauve-brown pelite.

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FIELD

FRIDAY, JULY 21

Cloudy, overcast, intermittent light rain. Late start.
Same area as yesterday

89-193
Possible but probable subcrops of 3D calc-silicate. Pretty certain.

89-194
Coarse grained granite of 10AB, generally massive, but megacryst poor. Seems to be a shoot within 3D or close to 3D/1CD contact.

89-195 (1605m)
Two tentative but quite possible subcrops, to the NE 10AB granite, to the SW 1CD pelite.

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SAMPLE 89-199

89-198 REVISITED

This definitely 1D pelite, although parts do resemble 3D.

Dark brownish-grey, fine to medium grained with mid-grey siltstone interbeds. Silvery cleavage surfaces have fine, ≤1 cm long chlorite pseudomorphs.

(May be transitional to 3D)

89-200

Very tight call but I think I'd call this 1CD. Dark grey micaceous schist with pervasive foliation. Has pale creamy-grey beds and lithons in it which could be calc-silicate or quartzofeldspathic.

Don't see any chlorite pseudomorphs or rusty brown weathering characteristic of 1CD or 1D, so could still incline towards 3D. Rock #1 does have 1mm pale grey spots in foliation which might be cordierite. See

SAMPLE 89-200

S_{0-1-2} 37 → 106

S_{0-1} on S_2 10 → 146

Reconsider this 3D

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Claim post here

POST # 2	Claim #	YB12534
POST # 2	Claim #	YB12535
POST # 1	Claim #	YB12536
POST # 1	Claim #	YB12537

89-198 (1675m)

3D calc-silicate. Rather darkish grey appearance due to being pelite rich here. Quite thinly bedded with mid-grey calc-silicate weakly to moderately foliated. Upper part (to S) is calcareous, suggestive of transition to marble.

S_0-1-2 ⟍ 30 → 103

Solitary ? F_3 fold, dm-scale

3 ⟍ 69 142 ; // 146 21

SAMPLE 89-198

89-199 (1695m) 1m. pelitic 3D

This outcrop formerly mapped as 3D but it's really 1CD or 1D.

Grey to dark grey to almost black (but don't think it's very carbonaceous) medium grained, well and penetratively foliated biotite schist. Flaggy, platy parting. Some 1-3 cm paler grey silt/fine beds. Rusty brown or dark silvery grey weathering.

This pelite must match up with that on other side of the marshland, to northwest.

S_0-1-2 ↓ 082 ← 31

May have skimped a bit

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FIELD

89-202

Small little o/c, showing contact between 3C marble above and 3D calc-silicate below. A bit slumped-looking, so not measured.

Don't know how significant the marble unit is, might be just a thin band.

89-203

Protolith of this rock is probably 3D or 3DT, but it is here thoroughly altered to creamy or rusty-brown, massive, irregularly fractured calc-silicate / quartzose rock. Zones or patches of 3DT. Generally a non-descript ?hydrothermally altered rock. Rusty weathering probably reflect sulphides, though no fresh sulphides seen. May mark a fault.

A lot of rusty gravel around in gullies. The marbles nearby also have an undecorative rusty alteration.

Took photo.

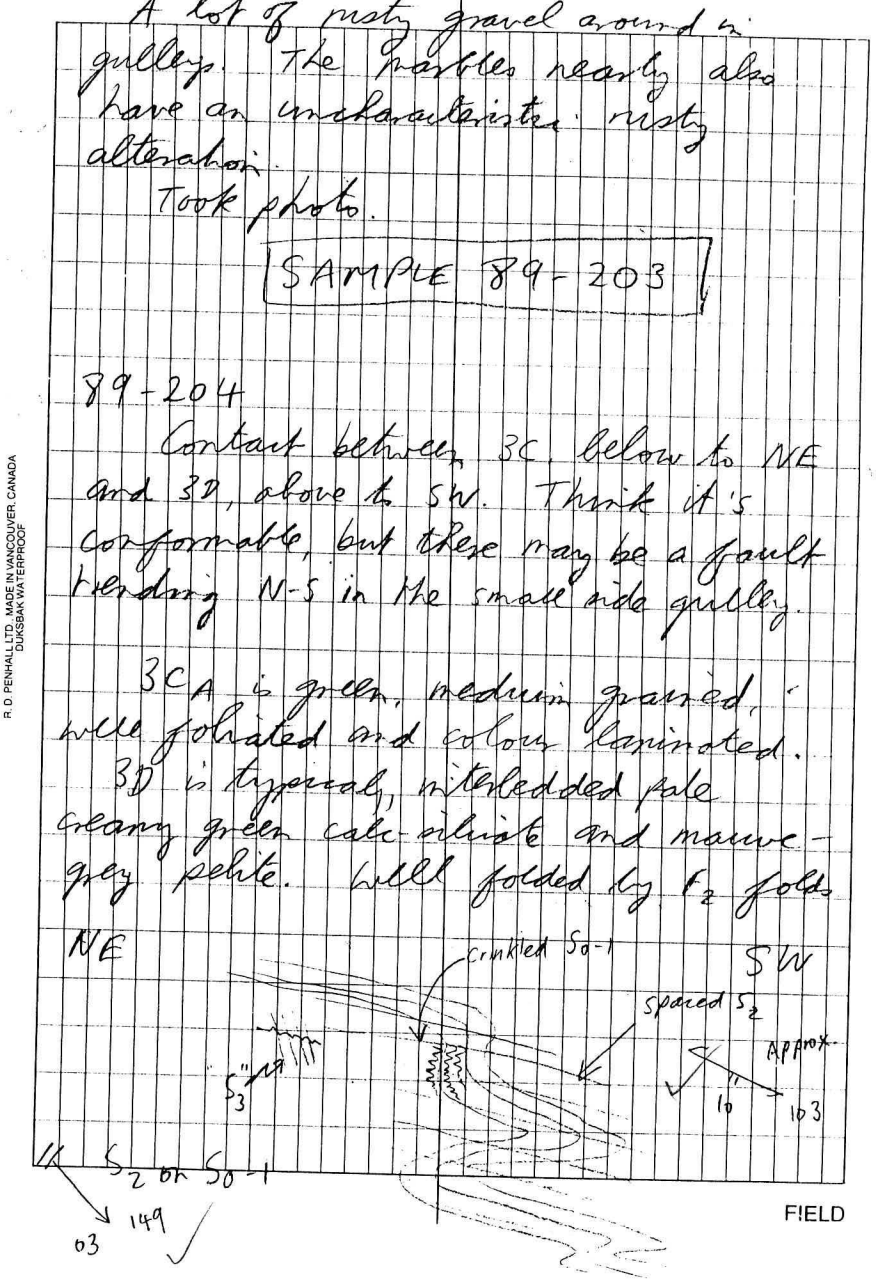
SAMPLE 89-203

89-204

Contact between 3C, below to NE and 3D, above to SW. Think it's conformable, but there may be a fault trending N-S in the small side gully.

3C$_A$ is green, medium grained, well foliated and colour laminated.

3D is typically interbedded pale creamy green calc-silicate and mauve-grey pelite. Well folded by F_2 folds



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SUNDAY, JULY 23

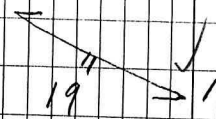
Sun & cloud. dry, mild

Continuing from same place as yesterday, map sheet 5, SE

89-201

North of gully is 3D calc-silicate, south is 3E A metabasite

3C is streaky dark green and pale grey-green (weathers creamy orange-brown). Latter is probably plagioclase ± calc-silicate (S.I.) segregation. AN fine to medium grained, well laminated and foliated. Lies above the 3D to N



N.B. NW tip of this exposure, the deepest rock, is 3D, S. contact swings around a bit.

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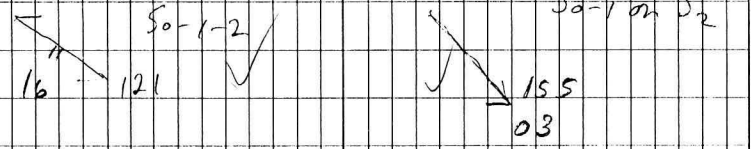
SATURDAY, JULY 29

Sunny, clear. First day with Teresa, beginning afternoon. Mapping area and creek valley south and southeast of camp.

89-208 (1520 m)

Typical grey-green, fine to medium grained amphibolite, meta-basite, SC. Well foliated with thin creamy-white laminae. Good L_2 lineation, presumed to be S_{0-1} / S_2 intersection.



89-209

30 calc-silicate. Looser, a bit darker and rustier, as if transitional

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This exposure gives an insight into how these disorientations lenses of pelite, typically 15 cm by 2-3 cm. could be dismembered and transposed fold parts.
Took photo. – Think I discarded it because it was so bad.
Can't get a good handle on orogeny.

89-205

Most of this is massive 3D π or weakly bedded, calc-silicate rich 3D. Northern tip of outcrop at old road is extensively red-brown rusty pyrite rich 3C metabasalt with minor lenticular 3B chloritic phyllite.

The fresh 3C is dark green, medium grained, moderately foliated. Visible pyrite, but most of it is weathered out.

SAMPLE 89-204

* Should be labelled 205 *

89-206

Somewhat silicified looking 3C A G. Fine to medium grained, green-grey, with locally about 5% fine pyrite.

So-1-2 11 23 111

89-207

Southerly of these two bumps is definitely typical 3D calc-silicate. Northerly one could well be 3D but not so much calc-silicate, and is more brown-grey, more pervasively foliated. Think it might just be transitional to 1D but overall I'd call it 3D.

So-1-2 22 138 1/3 Granulation 12 155

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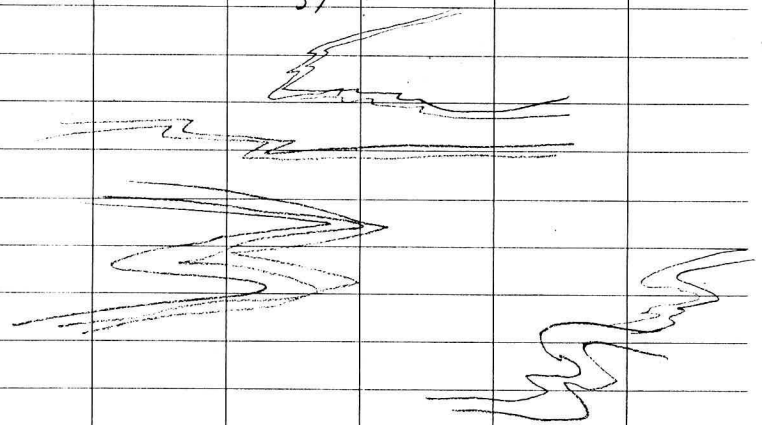
FIELD

for [illegible] silicate mineral
[illegible] in foliation.

Folds of F_2 minor folds, and
[illegible] Folds
are dominantly symmetrical, i.e. hingy
or EMMY, with asymmetrical folds
verging SW and NE, with a bias
towards SW.

Overall looks like a fold hinge
area with some high strain, sheared
zones. The hinginess may explain the
unusual thickness of marble in this
local area.

S S_{0-1-2} 37 → 115 N



Can positively see that the axial
planar foliation is a second.
These are not F_1 folds.

The unusual thickness of
marble in this area, and minor
folding within it is suggestive of
an F_2 structure passing through
here.

Took a couple of photos.

Can't find a good location or
fold axis to measure.

89-213

Decent part of this bluff, to its
SE is 3D calc-silicate with some
F_2 folds, but has thin, cm-scale
interbedded marble.

S_{0-1-2} 32 → 136

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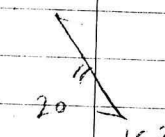
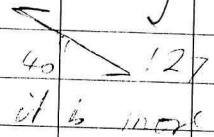
to pelite, but still definitely 3D
Think it's above 3c at last
station, though steeper dips here.



89-210 (1535 m)

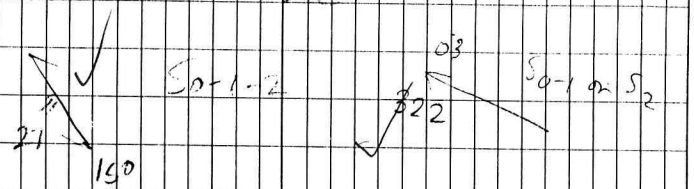
Lowest of this group of exposures,
to NE is 3D calcsilicate.



Above it is more 3D but with
thin beds of 3f marble. Maybe
marble is dominant.

89-211

Most of this bluff is composed of
3f marble. Medium grained, finely
foliated with alternating minoliths
of pale grey calcite and mid-
grey, slightly more micaceous foliae.
Not more than 15% calc silicate
matrix minerals here.
Or to a thick unit of marble.
Should be traceable



Can see minoliths torturing locally,
with apical S_2 and steeply
SW-dipping So-1

89-212

Large exposure again of all
3f marble. Some grey-white marble,
weathering dull buff-grey, with a

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Claim Post here

Post # 2	Claim #	YB12555
Post # 2	Claim #	YB12556
Post # 1	Claim #	YB12557
Post # 1	Claim #	YB12558

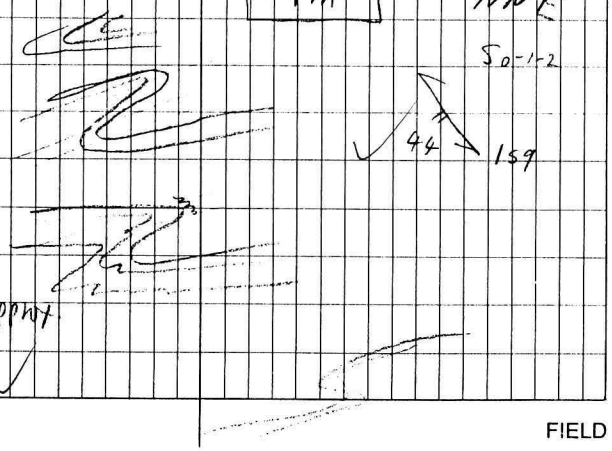
SUNDAY JULY 30

Sunny but cool and cloudy to SW. Working in map sheet 4 NW, big black cliff.

89-215 (1515m)

3D calc-silicate. Typical. Moderately well foliated, pale green-grey calc-silicate with thin, mm- to cm-scale pelite laminae and beds.

Several good and large F_2 folds. Took photo, and close-up.



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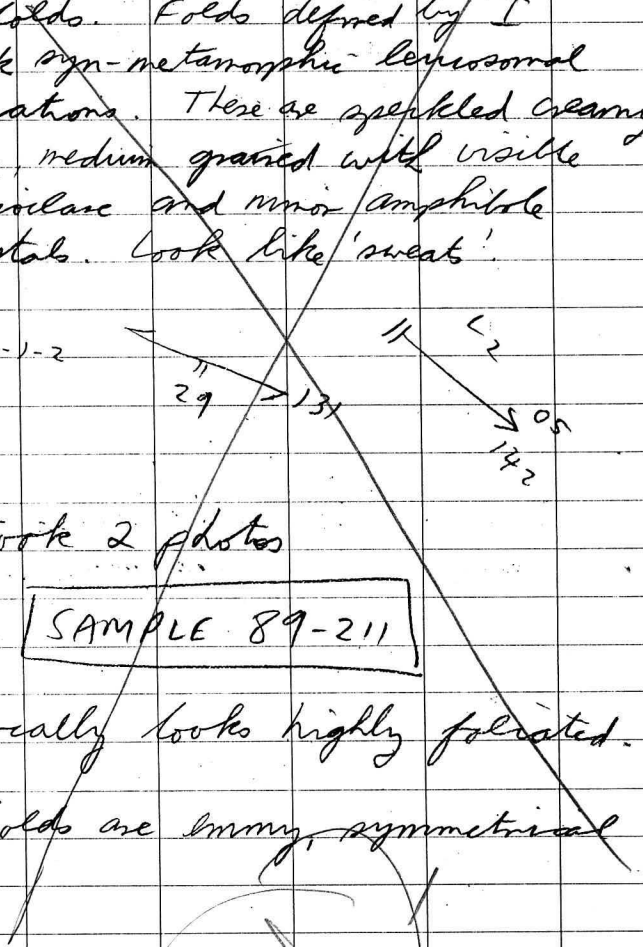
DUKSBAK WATERPROOF

FIELD

89-211

Eastern side of bluff, lower part of cliff. $3C_A$ amphibolite with spectacular F_2 folds. Folds defined by I think syn-metamorphic leucosomal segregations. These are speckled creamy grey, medium grained with visible plagioclase and minor amphibole crystals. Look like 'sweat'.



Took 2 photos

SAMPLE 89-211

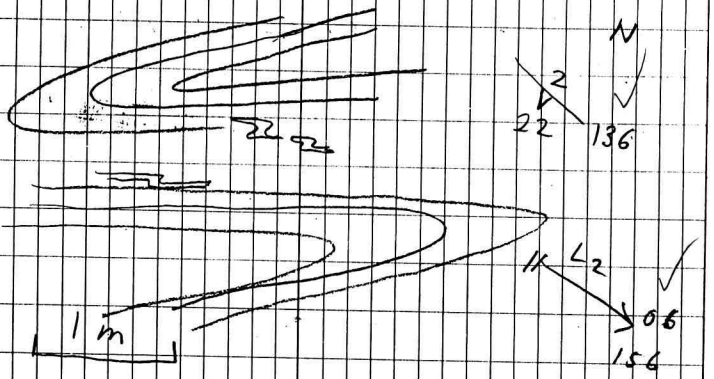
Locally looks highly foliated.

Folds are many, symmetrical

Copied twice

89-214

$3C_A$ amphibolite identical to that in lower part of 89-211. Dark green, well foliated medium grained. Some very large F_2 folds



The smaller folds reflect the m-scale ones, so can't really get a vergence for the outcrop as a whole.

Marble to east at 211 is definitely below this $3C_A$, as it appears by projecting it straight. If I find 3F above 3C (214), good chance of a fault, E-side down, between 214 and 211

OVER

FIELD

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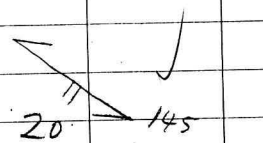
definitely 3D. Weathers finely streaky brownish-grey and pale buff. Fresh is grey to dark grey with thin olive-greenish calc-silicate beds, usually no thicker than 1-2 cm. Pelite is not mauve-grey but grey and dark grey, somewhat carbonaceous, shiny. No visible biotite. Finely foliated but not sheared looking.



May still be biotite here.

SAMPLE 89-218

89-219 (1315 m)
3D calc-silicate. Higher grade looking here, with thicker pelite/cs

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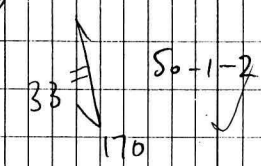
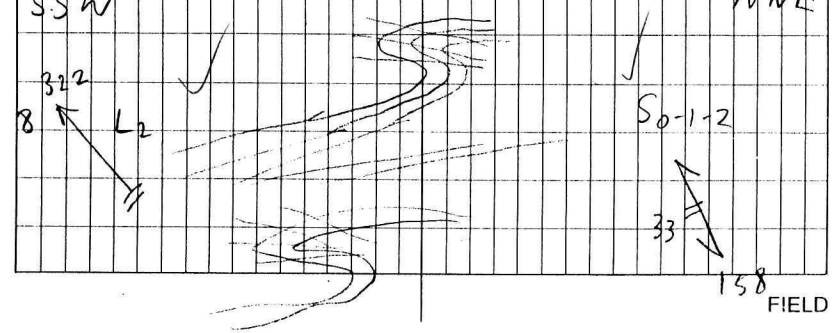
bedding.



89-220 (1338 m)
3D calc-silicate. Finely bedded and foliated here. Seems that appearance is compositionally controlled i.e. where pelite is dominant and carbonaceous rock is finer grained, finer foliated and bedded (more strained). Where calc-silicate is stronger, rock is paler, more thickly bedded and pelite is more of a mauve-grey.



FIELD

Dominantly hinges to NE verging. Folds definitely F_2. Can see So-1 being emulated in hinge zones.

89-216 (1425 m)

Walked all along this NE facing edge of the cliff. All 3D calc-silicate. No metabasite, so that metabasite at the top probably veers off into the valley and joins up with the 3c on the ridge to the NE. (Same interbedded 3D and 3c below that as well.)

This station, typical 3D with thin (cm-scale) beds of marble. Saw several folds on way down, several SW-verging. Overall, F_2's might balance out. Would seem there's no major F_2 structure here if 3c just shoots across valley.

So-1-2

38

158

89-217 (1435 m)

Still all 3D calc-silicate. Greenish grey weathering. Quite pebbly here, but green calc-silicate minerals showing up a paler, more massive bed. Overall, finely layered and foliated.

So-1-2

11
25
146

Seen some small F_2 folds, mostly SW-verging.

These calc-silicates have a very similar appearance in terms of bedding, colour, grain size and weathering, as the calc-silicates comprising the bluffs in the big creek SW of camp.

89-218 (1380 m)

3D calc-silicate. Lower grade looking here, but non-calcareous. Still

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FIELD

TUESDAY, AUGUST

Mapping NE for northeast arming for big round hill. Sunny with some puffy clouds. Big frontal system that arrived Sunday afternoon passed through last night.

89-223 (1615 m)

Possible outcrop of 10AB granite. Large boulders of megacrystic granite. May just be talus, but granite likely represents bedrock. No other lithology present.

89-224 (1575 m)

Definite outcrop of 10AB granite. Not megacrystic here but definitely granite: sparkled grey white, 5% biotite, 5-10% grey quartz. Weakly foliated here, defined by oriented biotite. Only weak,

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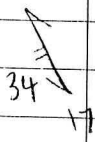
A few small tight SW-verging F_2 mirror folds here. Can see S_2 fanning and very spaced around hinges.

89-221 (1560m)

Calc-silicate rich 3D. Pale to mid-green-grey, fine grained. Foliated but thickly layered Not much pelite just here.

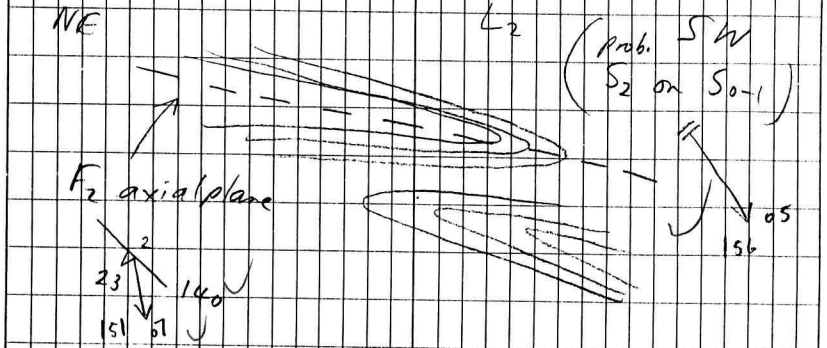


89-222 (1435 m)

One of a series of contacts between $3C_A$ and 3D.

3D calc-silicates are quite pelitic around here, weathering slightly rusty brown-grey. Moderately foliated.

$3C_A$ amphibolite is green, medium grained, well foliated and bi-axiated. This amphibolite has very tight and quite large F_2 folds.



Can't get asymmetry. Possible that these metabasites are a single unit that is tightly folded within 3D.

Good test of agreement between lineation (L_2) on S_{0-1} (probably S_2 intersection), and measured F_2 fold axis

Took photo of this

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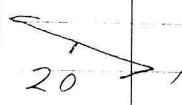
DURABAK WATERPROOF

FIELD

through.

Very approx.



89-225 (1755m)

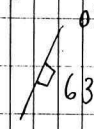
Summit of hill. All 10AB granite outcrop and felsenmeer.

89-226 (1650m)

All 10AB granite. Rich in megacryst here. Coarse grained matrix. Rusty-orangey brown weathering but basically fresh interior.

Generally massive, with feldspar megacrysts up to 10-12 cm long, 2 cm wide.

Steep fracturing / fracture cleavage:



There is a weak, sub-penetrative anastomosing foliation, which aligns feldspars, and is enhanced by weathering. Gulley here seems to be parallel to it.

Photographed

89-227 (1500m)

Pretty big outcrop of 10AB granite in stream gulley. Several % feldspar megacrysts. Most are flattened into the weak to moderate foliation, and some may be disaggregated, but

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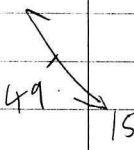
I'm not sure about that. Much more deformed than seen earlier today, but still nowhere near as S-C protomylonite.

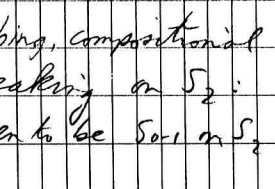


89-228 (1468 m)
No outcrop, but still lots of YOAB talus, no metasediments. Probably still granite bedrock.

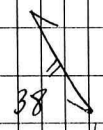
89-229 (1470 m)
Old claim post
Post #2 Claim # YB12509
Post #1 Claim # YB12511

89-230 (1530 m)
3D calc-silicate. Moderately to finely and strongly foliated. Well banded, accordingly, between dark mauve-grey pelite and pale creamy-green-grey calc-silicate. Banding/foliae varies between ≤1 mm and 2 cm. Certainly locally looks like a highly stained rock. No folds seen.

Ribbing, compositional streaking on S_2: taken to be S_{0-1} on S_2



S_{0-1-2}



89-231 (1582 m)
Same 3D calc-silicate, here with perhaps calc-silicate dominant, and with thin (cm-scale) beds of marble

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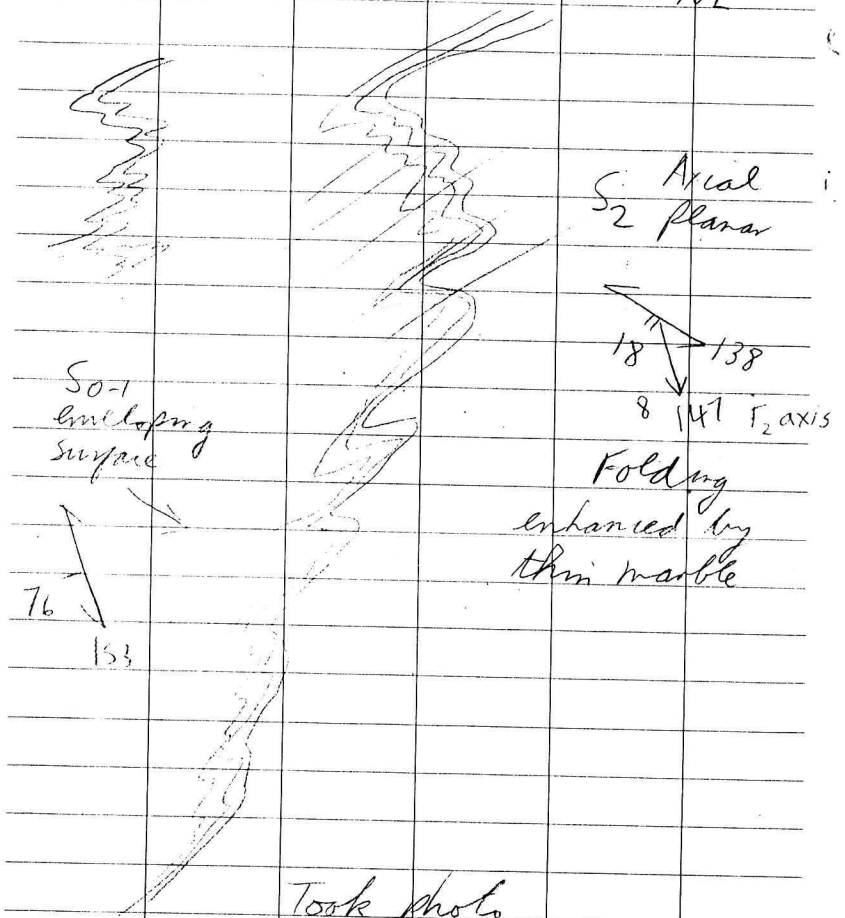
or impure marble.
Lots of F_2 folds. Hingy to SW-verging.

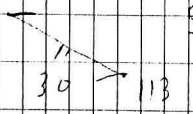


WEDNESDAY, AUGUST 2

Partly cloudy, slightly cooler.
Looking in creek south of camp

89-232 (1452 m)

Seems to be all 3D calc-silicate. Moderately to thinly bedded, rusty-grey pelite and mid-green calc-silicate. Foliation and bedding here is quite undulose and irregular, unlike the very platy fabrics you sometimes get. Don't think it's due to F_2 folding. I think it's just a rather weak S_2. Pelite is rather dark but not really carbonaceous.



SAMPLE 89-232

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89-233 (1430m)

3D calc-silicate. Quite pelite rock here (but definitely not ICD). Better foliated than last station. Thinly bedded and foliated. Generally grey to dark grey.

S_0 1-2

27 → 113

Very good, unusually good, S_3 here.

82 → 138

89-234 (1378m)

3D calc-silicate. Moderately foliated, quite hard and greenish-grey, but not meta-basite

S_0-1-2

28 → 117

89-235 (1400m)

Large o/c eg typical 3D calc-silicate. Relatively thickly bedded here (cm-scale) and weakly to moderately foliated

057 → 38

S_0-1-2

Extremely unusual strike of S_0-1-2 / Large o/c so unlikely to have shifted down slope. Could be rotated in a brittle fault.

N.B 89-236, not far below in creek has typical orientation.

89-236 (1365)

3D calc-silicate

S_0-1-2 ✓

27 → 138

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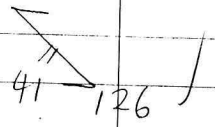
89-237 (1365 m)

3D calc-silicate grey to pale greenish-grey, well foliated, finely bedded. About 50-50 pelite and calc-silicate. Quite platy habit.

Various parts of outcrop seem slightly differently oriented so may be some minor shifting.

So-1-2



Bit of metabasite at deepest part of outcrop.

89-238 (1360 m):

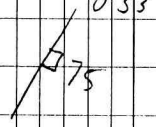
10 E dike. Probable o/c, but not 100% definite. Medium grained, speckled white and grey or black (biotite). 2% brownish weathering hornblende

phenocrysts. Massive.

89-239 (1385 m)

Same massive 10 E dike

Possible fracture set



89-240 (1520 m)

Small, possible but probable outcrop of 3D.

10 m to east are some loose pieces of 3F, but certainly not definite o/c.

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89-241 (1570m)

Mostly 3C, metabasite, fine to medium grained, green, amphibolite. Part are grey-green fine grained chlorite phyllite similar to that noted at (I think) 89-53. (SD field??)

S_0-1-2 ⟍ 26 ⟋ 124 ✓

Good streaky compositional lineation on S_2 = ⟍ 20 ⟋ 169 L_2 ✓

N.B. This 3C and ?3B is below the 3D at 89-242.

The abundance of 3C, B in this area is probably due to its being ~ coplanar with dope.

89-242 (1570m)

Marginal outcrop/subcrop, but definitely in place. Typical 3D calc-silicate. Pale mauve-grey weathering phyllite with minor calc-silicate.

This lies above 3C to SE.

=

Old claim post here. Think Lee misplaced this in his mapping.

Post # 2	Claim # Y 98916
Post # 2	Claim # Y 98917
Post # 1	Claim # Y 98918
Post # 1	Claim # Y 98919

89-243 (1580m)

Rusty brown grey, pelitic phyllite. Fine grained, finely foliated. Not ICD. Looks like the pelitic 3D that adjoins transition to ICD. So I'd

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definately all this 30.

89-244 (1565m)

Definite large outcrop of ICD pelitic schist. Rusty brown-grey weathering, histrous micaceous surfaces, anastomosing foliaceous texture. Large porphyroblasts of staurolite and andalusite

89-245 (1530m)

Small o/c of 3CA. Speckled green and white, medium to coarse grained well foliated

THURSDAY, AUGUST 3

Rain all morning, afternoon cloudy but relatively dry

Working around old drill rigs in creek valley in east of area. Teresa staying in camp, nursing a cold.

89-246 (1530m)

Small, possible but probable outcrop. Buff brown weathering, medium grained buff to pale green calc-silicate that is the skarn they were drilling here. Quite massive. Don't see any sulphides in this one.

[SAMPLE 89-246]

I'm calling it 3π

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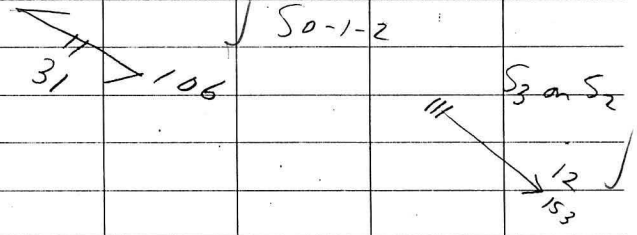
FIELD

89-247

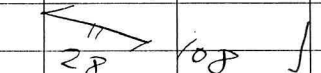
Fairly typical, calc-silicate rich 3D. Pale creamy white weathering, thinly bedded, weakly to moderately foliated.

Slight skarnification alteration locally in the form of patchy buff-brown colouration. No 3π or 3Dπ though.

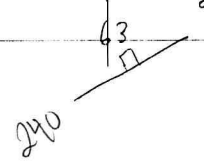


89-248

All same 3D calc-silicate, mainly because this is virtually a dip slope.



Strongly developed zoned tension cracks:

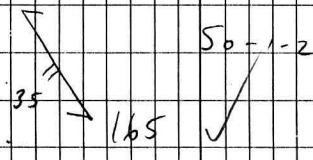


89-249 (1520 m)

Contact between 3D calc-silicate, above to WSW, and 3c metabasite, below to ENE.

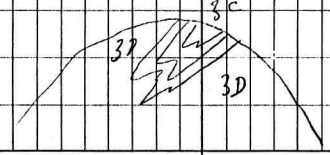
Calc-silicate is grey-buff, fine grained, well foliated.

Metabasite is fine to medium grained, green, amphibole-bearing, well foliated. Very dark brown-rusty weathering locally.



Meta-basite pinches out to SE. This is due to its being in an NE-ly overturned F_2 synform, and to the SE-ly dip of the ridge slope.

Sketch



FIELD

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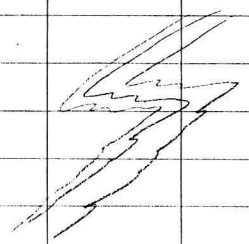
Can see two well-developed F_2 mirror folds. one of 2 limbs (i.e. indeterminate vergence) and the other SW-verging

W E

(in 3c)



10cm

Approx.

8
163

Although I can't use folds to corroborate fold geometry, outcrop pattern indicates a synform of 3c within 3D.

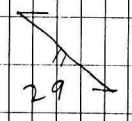
89-250 (1470m)

All typical 3D calc-silicate

Pale creamy grey to mid-grey weathering fresh is pale green-grey fine to medium grey calc-silicate hosting discrete pelite lammae, typically a few cm by 0.5 to 1 cm. Pelite is silvery grey rather than mauve grey, but not carbonaceous.

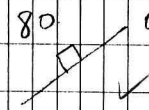
SAMPLE 89-250

All uniformly dipping



S_0-1-2

29 → 139

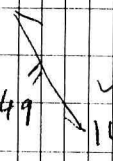


80 053

Zoned tension cracks.

89-251 (1430m)

3D calc-silicate.



S_0-1-2

49 → 146

Quite steep dip here.

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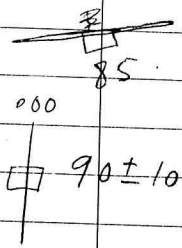
89-252

Unexposed contact between normal 3D calc-silicate and 3-5% hornblende-phyric 10E dike. This calc-silicate is not skarnified but there is skarn alteration (3π) in 3D 20 m down slope.

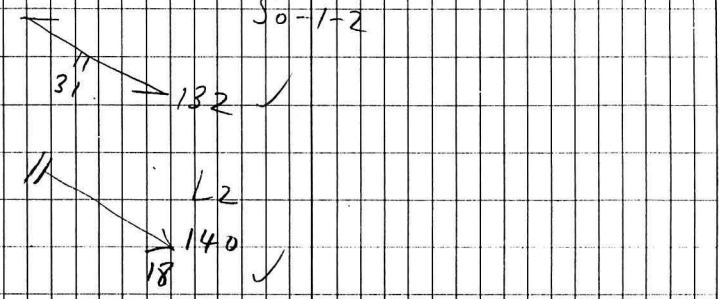
Fractures in dike:



89-253

All typical 3D calc-silicate, perhaps 60%-40% C-S over pelite. Pelite is usually in discontinuous lenses on cm-scale. Greyish-brown

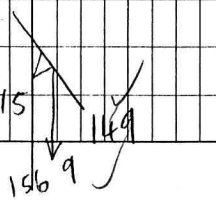
All quite finely foliated moderately to thinly bedded. Has a somewhat orange-brown weathering hue, but no definite skarnification seen. No folding seen.



89-254

Probable o/c. Green chloritic schist that showed probably be called 3C but not $3C_A$ to SW and apparently below it some highly contorted 3D calc-silicate See PHOTO

F_2 axial plane



FIELD

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FRIDAY, AUGUST 4

Mapping in map sheet 6, NW, filling in gaps in detailed mapping. Cloudy but dry, cool.

89-255

Been following the marble to the east around to this area. Not much outcrop here, but found a thin marble within the calc-silicate here which could be its continuation, although it is much thinner here.

3D calc-silicate is typical, thinly bedded, pale green-grey calc-silicate and mauve-grey brown biotite schist.

Marble (3F) weathers grey to darkish grey, finely foliated, locally some minor folds.

Don't see any 3C underneath, unfortunately; that would have confirmed the correlation.

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So-1-2

Some of the pelite in the calc-silicate is medium to coarse grained brown schist, brown and rusty weathering and resembles ICD schist (but not fully). Also it has lots spots which may be cordierite or andalusite. May be

SAMPLE 89-255

hornfelsing effect from batholith.

89-256

All boulders of 10AB megacrystic granite. Looks very much like frost-heaved outcrop. Highly likely it represents bedrock.

89-151 Revisited.

At very bottom of exposed cliff. This is that grey-brown pelite with minimal calc-silicate if any, and chlorite pseudomorphs, that I was calling 1D.

I now agree with Lee it is probably a facies within 3D, or below it. It is not like the true ICD schist which is more amber-brown, much more foliaceous and coarse grained and has the characteristic anastomosing So-1-2 foliation. The foliation in the present pelite is much more planar and platy, like that in the 3D pelites.

89-257

Massive to weakly foliated, mocoles homogeneous calc-silicate rock that I have been calling 3D or $3D_{\pi}$ or sometimes $3D_3$. No pelite. Creamy buff weathering. Fresh is creamy grey-green buff.

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Coarse grained, plagioclase, hornblende ?epidote, ?garnet.

What is it? Afraid it might be marble which has been replaced in total by calc-silicate by skarnification.

If so, this could be the thick marble from 100 m to the east, and the thin marble down the slope (89-255) is another, minor marble within 3D.

Texturally I could believe this rock is skarnified marble. If it isn't it must just be a massive sedimentary calc-silicate within 3D.

SAMPLE 89-257

Now inclined to think this rock is skarnified 3I and/or 3D

See photo

50-1-2 ⟵ π ⟶ 091 ✓

25

SUNDAY, AUGUST 6

With Karen. Helicopter set out and pick-up from base camp. Outcrops spotty, too

89-258 (1370m)

On cut line

Green, fine to medium grained moderately foliated meta-basite. Not particularly amphibolitic. Protolith could be pyroxenite, but no definite relict texture.

A bit to dislodged to get a measurement?

SAMPLE 89-258

One calcite coated fracture surface has much pyrite ± ? chalcopyrite.

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89-259 (1330m)

On SW side of knob, just to SE of outline trending 215°.

Same rock as at 89-258. Green, fine to medium grained chlorite meta-basite. Think there is amphibole in it. Yes. 3C$_A$

Varies from almost massive to quite well foliated, perhaps depending on chlorite content.

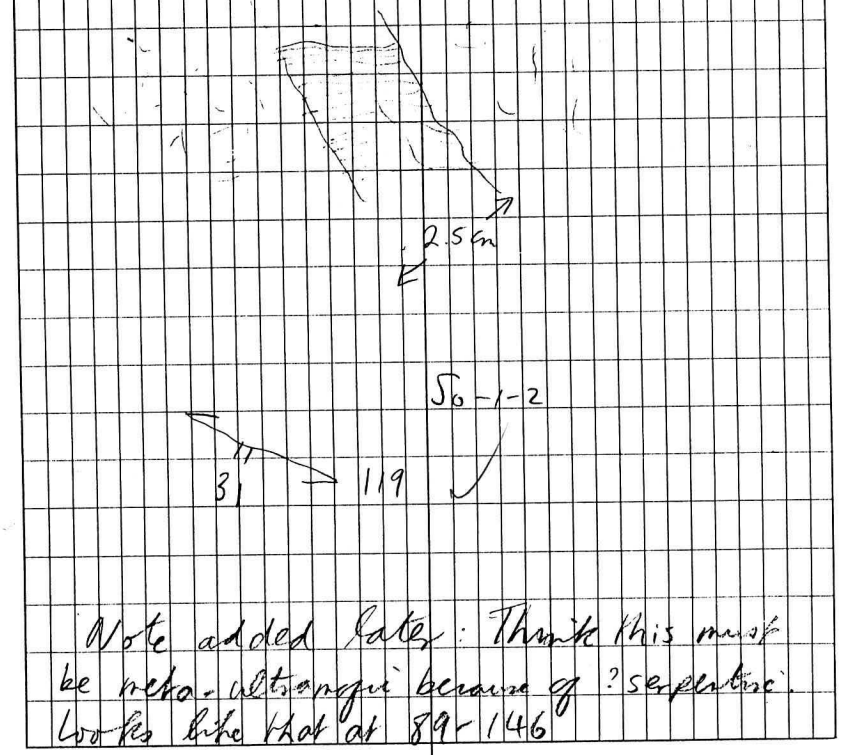
Still bloojostled to get a measurement.

89-260 (1250m). *

* Altimeter appears to be correct.

Still metabasite 3C$_A$. Green. (pale to mid green). fine to medium grained. Locally has a relict coarse and very coarse texture, resembling metagabbro (not pyroxenite). These parts are massive. Fine grained parts are weakly to moderately foliated.

2.5 cm wide vein of chrysotile or fibrous amphibole — maybe more likely latter.



Note added later: Think this must be meta-ultramafic because of ? serpentine. Looks like that at 89-146

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After return to top of hill

279° to 1390 m. should be o/c.

89-261 (1420 m)

Moreover the same, mid-green, fine to medium grained meta-basite mainly chlorite, no definite amphibole cells but these may be some in matrix. Trace of a relict coarser texture, but wouldn't call this meta pyroxenite.

Intruded by a thin dike of grey, intermediate weakly plagio-phyric ? granodiorite. Inequigranular fine groundmass, feldspars and hornblende up to 1-2 mm.

SAMPLE 89-261

10 F or ~~10 F~~

10 Si ?

89-262 (1390 m)

Large outcrops and frost-heaved boulder field. All 10 F dike. Weathers pale creamy orange. Fresh is grey, medium to coarse grained, massive. 3% somewhat rounded and altered hornblende phenocrysts. Felsic matrix also looks a bit altered - as in silicified, but may be weathering.

Has about 1% pyrite. Mislaid it

SAMPLE 89-262

No ~~B~~ metabasite around.

89-263 (1300 m)

Meta-basite or meta-ultramafic. Dark green, coarse grained amphibolite. Weak non-penetrative fracture cleavage, but otherwise fairly massive.

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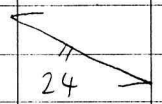
On weathered surface has coarse speckled texture that looks like meta-gabbro, but fresh matrix appears to be mafic, not plagioclase

89-264 (1290 m)

A bit further on, at the target cliff. Same as 263. Dark green, coarse grained completely mafic metabasalt. Quite probably 3C p, but lacks the definitive weathering texture.

SAMPLE 89-264



S_0-1-2

N.B. After going back to helicopter pick-up at 89-146 and seeing this pyroxenite, I can now say the 3C at Stations 263 & 264 are meta-pyroxenite. — Fresh appearances are identical, though weathering is not quite the same.

89-260 may also be 3Cp, because of fibrous amphibole/clinopyroxene.

Think all these meta-basites are probably members of the same assemblage, probably one coherent body. No signs of any calc-silicate or metasediments anywhere, not even float or outcrop.

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FIELD

TUESDAY, AUGUST 8

Left base camp in morning, drove up to fly camp in ATV with Audrey. Started mapping at noon.

Cloudy with clear breaks. Mild. Working grid 93, Map Sheet 11 NW

89-265 (1585m)

Finely layered and foliated 30 calc-silicate, with highly graphitic pelite and ?siltstone.

Finely layered in shades of buff grey and dark grey to black. Fine grained. Feels somewhat annealed.

Most of outcrop is broken up and jostled, but loose pieces show well developed minor and mineral folds which could be F_2 or F_3.

S_0-1-2

L_2 (probably)

L_3 (S_3 on S_0-1-2)

Changed my mind about taking measurements — orientations are weird, whole o/c may have slumped.

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SAMPLE 89-265

Some loose pieces have lenses (~15 cm by 1-2 cm) of black highly carbonaceous marble, and a possible outcrop 20m to NE is actually this black marble

SAMPLE 89-265

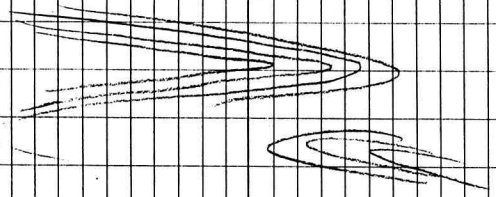
It is black, fine to medium grained, thinly layered with silty or calc-silicate laminae. Subcrop, actually.

89-266

Similar to 89-265, finely foliated and laminated 3Dg, but not quite as carbonaceous as 265.

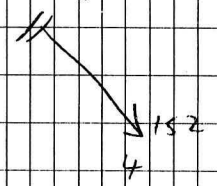
S0-1-2 ← ⊤ → 093
18

NNE 5cm SSW



One good SW-verging F_2.

Approx.



89-267

Basically, fairly normal 3D calc-silicate but with more interbedded (not infolded) marble and some skarn.

Calc-silicate is finely layered and foliated, fine grained pale green-grey calc-silicate and brownish-grey pelitic phyllite, tending to dark grey due to carbonaceous content. All

FIELD

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WEDNESDAY, AUGUST 9

Clear morning but v. cold. Good frost last night. Mapping pyroxenite knobs in far west.

89-270

Most of this long outcrop is SCp. Green, medium to coarse grained. Massive to weakly foliated. Mostly amphibole, but with a relict coarse texture, knobbly, brownish weathering which might be meta-pyroxenite.

Foliation is steep. Steeps to vary between west dipping and east-dipping

So-1-2 Approx.

81 → 158

Near southern end of outcrop is an apparent subtle change to a finer grained green amphibolite, lacking the SCp texture. Call this SCA, but may just be local.

FIELD

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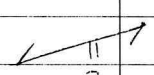
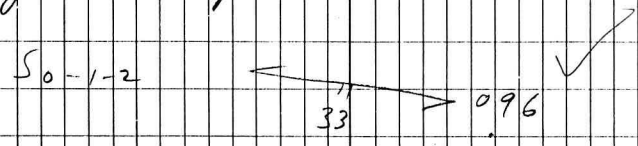
finely foliated with a spaced-looking S_2.
Beds and lenses of impure marble
weathr. carbonaty, brown-buff. Almost
positive they are primary facies
changes - no evidence they are
infolded. Vary from a few cm thick
to ~3 m.
Call it 3D(F)
Part of calc-silicate and marble
looks skarnified to 3D??.



S_0-1-2 ✓

Don't know reason for odd
orientation faulting?
Not sure, but think the 3C
(which is more like a tuffaceous looking
3D) to the east is below this 3D(F)

89-268 (1570m)
3CA Green, medium grained,
well foliated meta-basite. Amphibolite.
Looks like part of the metabasites
south of the gully, but not clear how
to join them up. Must be more than one?



✓

89-269
Typical 3CA, medium grained
green, finely foliated amphibolite.

Approx. S_0-1-2

✓

RAIN (3:30 pm)

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FIELD

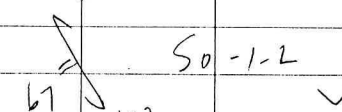
The apparent transition is marked by a 10cm thick, white plagioclase vein. Looks syn-metamorphic rather than primary. Trend 132°; dip unknown.

SAMPLE 89-270 gSCp

89-271

Nice SC_A that looks like metagabbro. Coarse grained, speckled green and creamy white. Green is amphibole, white = presumably plagioclase. Weathers quite differently from SCp. This is mafic versus ultramafic. Looks like a meta-gabbro texture.

Generally massive but locally has a good foliation.



SAMPLE 89-271

Agree with Lee that probably we have a large zoned mafic-ultramafic pluton, with pyroxenite in the core and gabbro outside it, and perhaps diabase outside that.

Stn. 271 is definitely distinct from 270, though contact may be gradational.

89-272

SC_A. Green, medium to coarse grained. Weathers speckled green and creamy white. Probably meta-gabbro again, although one zone ? chlorite on a fracture surface.

Contains a 8-10 cm thick vein of felsic plutonic rock - monzonite perhaps: loosely plagiogranite. Not metamorphic, almost definitely primary.

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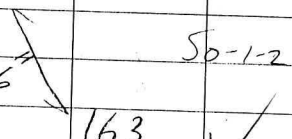
89-273 (1475m)

Still same medium to coarse grained, green SCA amphibolite. Weathering texture is still speckled green and creamy white, indicating not metapyroxenite. Still pretty massive.

Locally a good foliation, here red brown weathering, suggesting sulphides



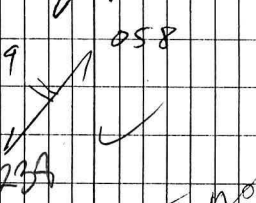
89-274

Now this is different. This is SE, marble, impure marble and calcareous calc-silicate.

Weathers pale in shades of creamy green, grey, buff and off-white. Fresh is creamy white to pale green. Finely bedded and laminated from ≤ 1mm to beds ~10 cm thick. Varies from soft almost pure carbonate to harder calcareous very fine grained homogeneous pale creamy green calc-silicate.

See local boudinage and minor faulting, but no minor folds.

Took 2 photographs.



Must be fault-bounded, in order to explain juxtaposition of SCA to SE, and help account for odd orientation.

SAMPLE 89-274

Overall, rock certainly looks like it could be a low grade version of 3F

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89-275 (1385 m)

Dark grey to black SB

Non- or very weakly calcareous lustrous phyllite. Fine grained. Shiny phyllitic foliation surfaces usually well crenulated with S_3.

Quite homogeneous.

Measurement not reliable, but looks similar to 89-274.

SAMPLE 89-275

89-276

Definite o/c, though may have slumped a bit.

386, non-calcareous pelitic phyllite. Dark grey to black, fine grained, finely laminated with white laminae of ?quartz-siltstone?

Non-calcareous.

354 / 15 / 154

Tentative S_0-1-2

Can see many small tight F_2 microfolds in loose piece.

89-277 (1355 m)

Definite outcrop, and probably not moved. Same non-calcareous dark grey phyllite siltstone. Semi-pervasive S_2 overprinting S_{0-1}. Much microfolding, esp. SB core.

Rock has a weak brownish hue on fresh surface, suggesting that biotite is still stable.

Thin grey ?calc-siltstone beds (but not any HCl reaction) 1-3 mm thick.

355 / 13 / 175 — S_2 ✓

353 / 83 / 173 — S_3 ✓

SAMPLE 89-277

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Doesn't look like there's much more outcrop further on down the hill.

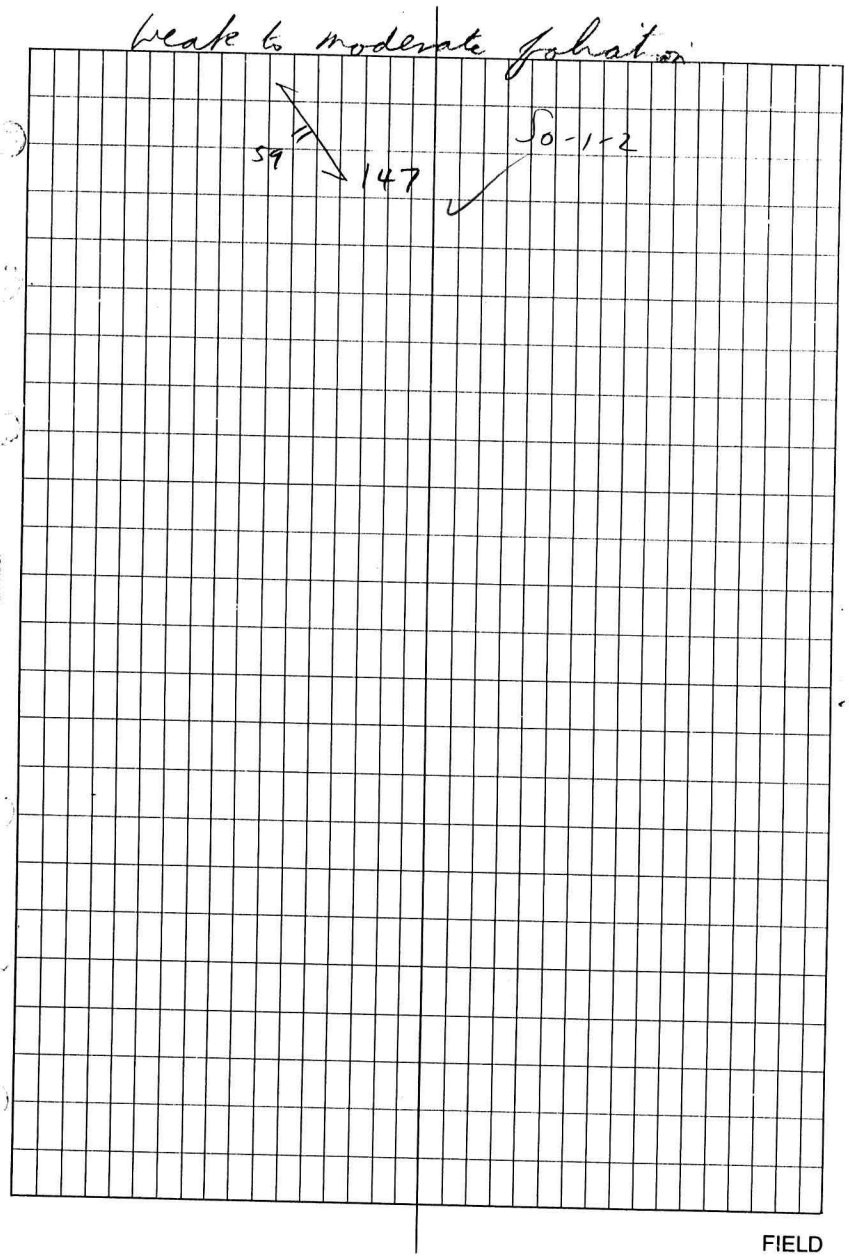
89-278 (1350m)

Typical SC_A Green medium grained massive, quite uniform, amphibolite

89-279 (1485m)

Approximate contact between SC_A to west and SC_P to east.

Not sharp, subtle. Mainly a change in texture from medium to coarse grained green and white speckled SC_A to green, coarse grained, inequigranular, knobby, locally brown weathering SC_P. Latter doesn't have the creamy white 'groundmass' amongst the amphiboles



R. D. PENHALL LTD. MADE IN VANCOUVER, CANADA
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THURSDAY, AUGUST 10

Clear sunny, warm. Same areas as yesterday, pyroxenite knobs in far west. Visit Audrey.

89-280

Typical meta pyroxenite. Gets to dirty brown weathering. Fresh is green v. equigranular medium to coarse grained. Knobby surface cuts which pyroxene pseudomorphs. Serpentine coated fracture surfaces locally. Magnetic.

Fairly strongly foliated here, by pond. Somewhat spaced, anastomosing foliation. Steeps too.

So-1-2 ?

62

93

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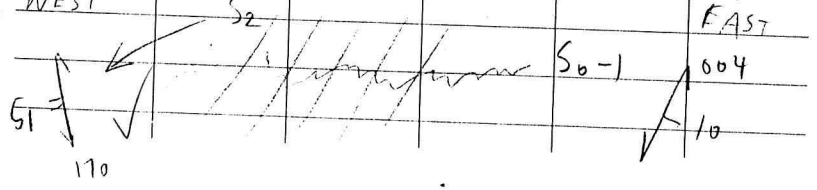
89-281

Just north of lake, behind pyroxenite. 30/50/5B

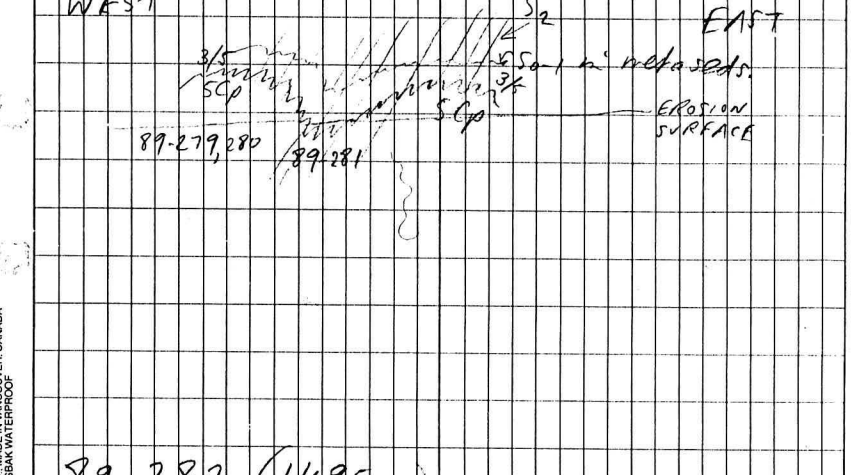
Weathers grey to pale green-grey. Fine grained, finely foliated and finely to moderately banded. Biotite to chlorite phyllite. Parts, such as hand sample, resemble low grade 3D. Other parts which are darker grey and appear more carbonaceous resemble 5B. Other parts are greenish, which perhaps led Lee to call this rock 5D field.

SAMPLE 89-281

All well foliated. Steeply foliation, presumed S_2 is ~ parallel to that in pyroxenite. S_{0-1} appears shallow.



Think this rock may be an infolded sheet of Vangorda country rock, probably above the pyroxenite



89-282 (1495 m)

Don't know what to call this except 5E, F

Weathers pale grey-green. Well and finely bedded on scale of cm. Fine grained. Varies between marble and pale calc-silicate, with some 5D like chlorite phyllite. But it is very calcareous and looks like 5E at 89-274.

078 S_{0-1-2}

20

R. D. PENHALL LTD., MADE IN VANCOUVER, CANADA
DURASBAK WATERPROOF

FIELD

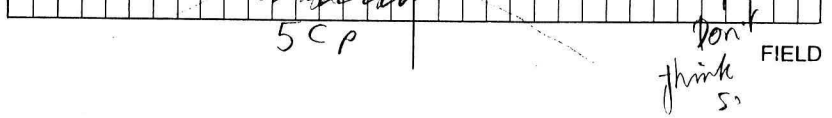
2X | Sample 89-282 |

89-283 (1435m)
Massive, green, medium grained SCA.

89-284 (1450m)
Still SCp, green, megagranular medium to coarse grained, no significant plagioclase component. Minor chrysotile veinlets. Pretty massive. But not as knobby and coarse as SCp to SE. But not ~~SCp~~ SCA

89-285 (1420m)
Somewhat on the borderline between SCp and SCA. Green, medium grained, locally weathers buff that green/creamy buff speckled texture characteristic of SCA. Lacks the coarse texture and knobby weathering of good SCp. But still quite a mafic rock. Definitely in place, incidentally.
Going to call it SCA, provisionally

Note added on 89-282
Metased. extend only a few metres down slope to N before SCp appears. So-1 is quite flat, as it was at 89-283 and 89-281, so think these metased. (S6/30 above; SE/SD below) form a quasi-flat lying cap or pendant on the pyroxenite. The steeper cleavage is probably S_2 (but could even be S_3).



Don't think so.

FIELD

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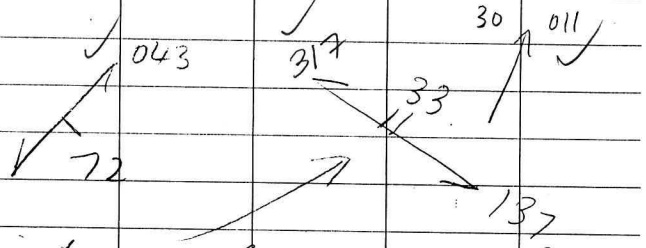
89-286 (1495m)
Foliated SCp metapyroxenite.

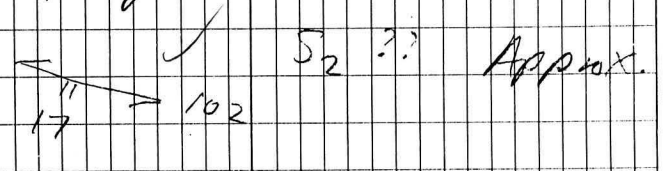
There's a steep foliation and a shallow foliation, not sure what generation either is.



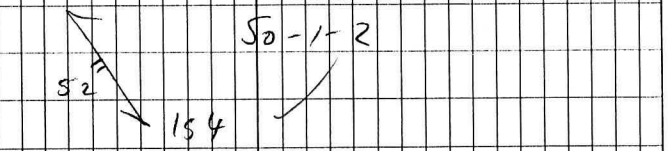
Lineation is slip vector on sheared foliation, defined by long axes of stretched crystals coating the foliation surface.

89-287 (1475m)
SCp Metapyroxenite. Weathers green to brown with a slightly knobby surface. Inequigranular, medium to coarse grained. Relict pyroxenes up to 5mm, usually 3-4mm.

locally areas of speckled weathering reminiscent of SCp, but this is definitely SCp.
Weak foliation, spaced and anastomosing



89-288
Small outcrop of finely layered and foliated, dark grey, fine grained phyllite/schist. Could be called SB6 or pelitic 3D.



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FIELD

89-289

Very tentative o/c of dark grey carbonaceous phyllite, SB6. Regolith suggests this is bedrock. Probably use it.

89-290 (1425 m)

Definite outcrop of SB to phyllite low grade SB. Grey, dark grey, brownish-grey. Finely foliated and laminated. Beds, microlithons 1-5 mm. All to a platy, moderately carbonaceous phyllite, fine grained schist. Paler grey siltier lithons react to HCl, so guess we have to call this SB

S_0-1-2

05 / 343

L_2

38 / 176

89-291 (1415 m)

Green, fine to medium grained, homogeneous, finely and penetratively foliated S_2

S_0-1-2

44 / 137

Speckled texture, visible through the strong foliation, indicates S_2 versus S_p.

89-292 (150 m)

Mostly coarse grained, green meta-pyroxenite S_p

Here a zone where it is fine to medium grained and well and finely foliated.

S_2?

72 / 46

R. D. PENHALL LTD., MADE IN VANCOUVER, CANADA
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FRIDAY, AUGUST 11

Sunny, clear, hot. Near same areas as yesterday, bit farther east towards north dipping slopes and bluffs. Wolf Audrey

89-293 (1360m)

Grey, dark grey, brownish-grey fine grained brittle-looking, finely laminated and foliated pelitic phyllite siltstone. Non-calcareous. Dark shiny cleavage surfaces, moderately carbonaceous. Flaggy weathering.

Could be SB6 or pelite. 3D. These designations are I think meaningless equivalent.

So-1-2

42 → 150

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DURABAK WATERPROOF

FIELD

89-294 (1340 m)

3D. Grey - brown weathering. Fresh varies from dark bownish grey to mid greenish grey. Fine grained, finely bedded and laminated, pervasive foliation but wavy.

Looks very much like 3D in bluffs to creek south of camp, and in the bluffs and cliffs to the SE across the valley.

Doesn't really warrant SB6 designation - bit too high grade, and the pelite / calc-silicate differentiation weakly apparent here.

Locally calcareous.

So-1-2

38 → 170

SAMPLE 89-294

Took 2 photos

89-295 (1325 m)

3D calc-silicate. Finely foliated and laminated. Lithons and microlithons of mousse-grey-brown pelite and green or creamy white calc-silicate. Green amphibole characteristic of the calc-silicate. Usually 1-2 mm thick, suggesting quite a lot of flattening, but rock doesn't look particularly sheared. Basically similar to 89-295 but more greenish here.

So-1-2

40 → 159

Took photo

89-296 (1270 m)

About as far down slope as outcrop goes.

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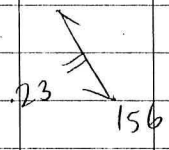
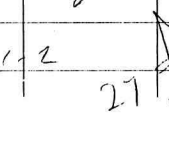
DUKSBAK WATERPROOF

Basically the same rock. Finely foliated and laminated cale-silicate 3D, with green amphibole associated with the cale-silicate lithons.



89-297 (1275 m)

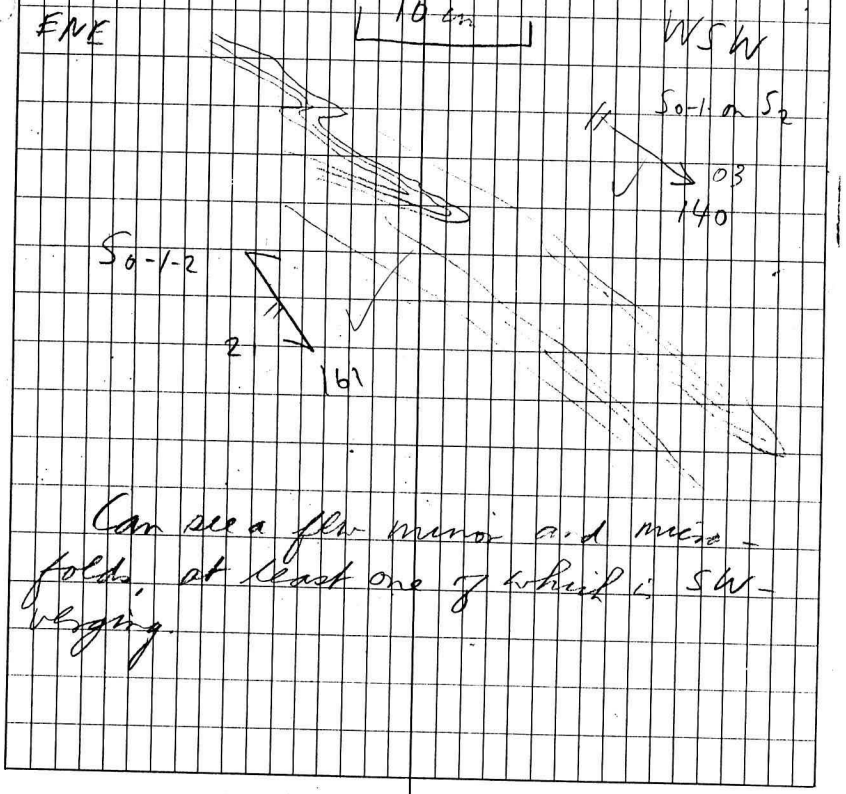
3D cale-silicate. Looks more like typical, though lower grade 3D. Finely bedded and foliated, 1 mm to 1 cm lithons of dark brownish-grey pelite and pale creamy grey cale-silicate, commonly with dark green amphibole margins and selvages. Some kind of metamorphic differentiation. Some boudinage and rare microfolding. Competency contrast between lithologies.



Having a hard time finding L_2 lineations

89-298 (1300 m)

Same 3D, finely layered and foliated



Can see a few minor and micro-folds, at least one of which is SW-verging.

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FIELD

89-299 (1320 m)

Same finely bedded and foliated, grey brown weathering 3D calc-silicate.

S_{0-1-2}

39 / 156 ✓

89-300

Same location as Lee's 88-509.

Agree with Lee's mapping of this as transition between SC_A to east, a thin interval of SD field, into SB_3.

SC_A is speckled green and creamy white, coarse grained, massive. Looks like meta-gabbro.

Sharp transition to SD (FIELD). This is a green, fine grained, finely laminated chlorite schist which is calcareous. Weathers in shades of green and brown. Basically a greenish version of next

S_{0-1} on S_2

S_{0-1-2} 347 / 28 ✓ 167

12 / 162

Unit to west:

SB_3 Grey - buff - brown weathering calcareous biotite - bearing phyllite / schist. Fine grained, finely foliated and laminated. Zones of impure carbonate suggestive of SE. Not very pale here though - a grey-brown, buff, rough weathering impure carbonate.

Can certainly perceive a textural relationship between this rock and SD. has that pelite / carbonate banding.

EAST

Calc-silicated S_{0-1}

WEST

F_2

10 cm

PHOTOGRAPHED FIELD

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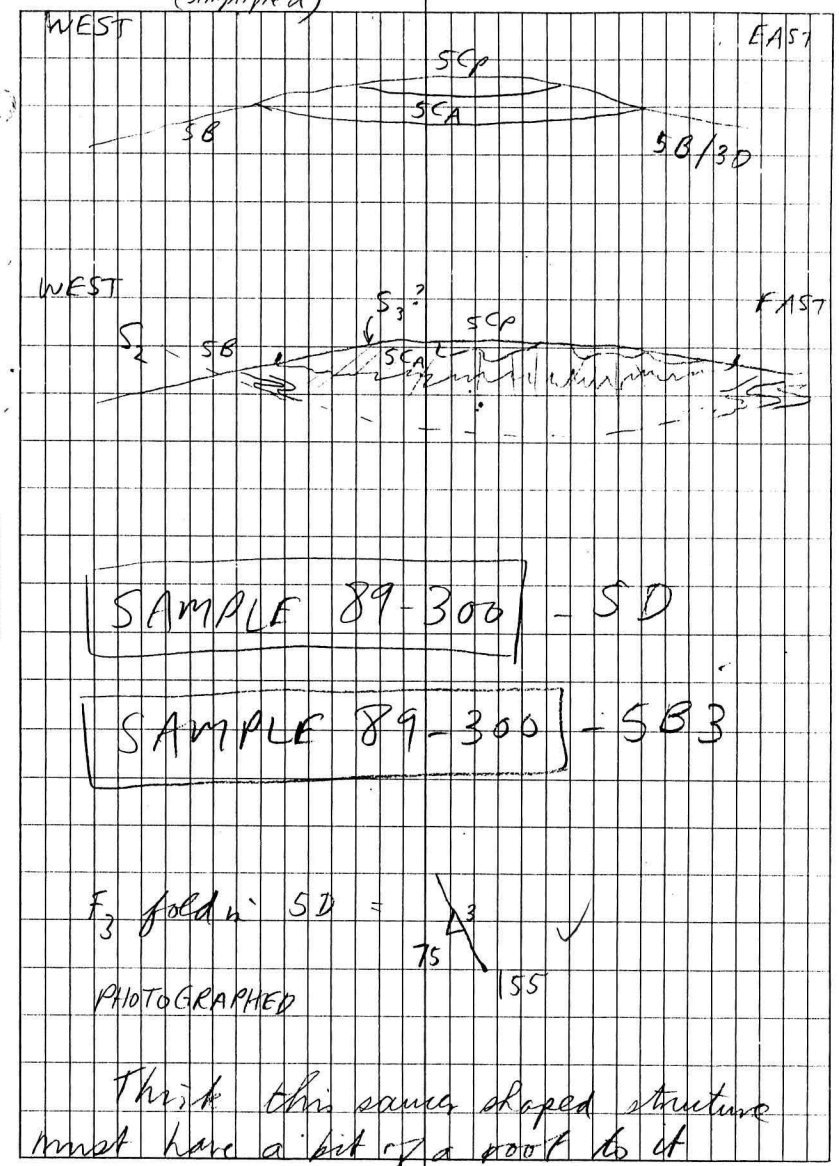
Main foliation and compositional layering is gently dipping. This is definitely S_2 not S_{0-1} - see sketch on previous page. This shallow fabric is apparently parallel to basal contact of SC_A, and curls around the hill to the NE to join up with basal contact at 89-274, which itself had a similar orientation geometry.

Some open folds here as well, with steep axial surfaces. These I think are F_3. The steep foliation measured in SC_A and SC_P on top of ridge to East may have been S_3, or a folded S_2.

Seems like the mafic/ultramafic rocks on the ridge are in a synformal Disk-shape structure which is probably a large F_3 - very unlikely to be an F_2 synform because S_2 is parallel to basal contact.

(simplified)



Think this canoe shaped structure must have a bit of a roof to it

FIELD

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because of the way SCA shoots off down slope to the north, to the east of here.

89-301 (1395m)

Definite outcrop of dark grey, fine grained, finely foliated and laminated carbonaceous phyllite. Non calcareous. SB_6.

066
S_0-1-2
22

Foliation is defining geometry of the saucer.

89-302 (1375m)

Mid-green, fine to medium grained, SCA, and some SCp.

Trace of a gently dipping foliation.

Just to NW is another outcrop of SB_6. S_0 maybe the SC is just a thin unit.

028
23
S_0-1-2

89-303 (1375m)

Speckled green and creamy-white, coarse grained SCA, foliated, and intimately related (but dominantly above) SD fine grained pale to mid-green foliated chloritic phyllite.

V. Approx. foliation, presumed S_2

072
28

FIELD

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DURABAK WATERPROOF

89-304 (1355 m)

Large outcrop of SC_A. Speckled green and creamy white, medium to coarse grained, well foliated.

Traces of v. tight F_2 mirror folds.

023 / 25 — S_2 ?

Glacial striae: 341 / 161

* Immediately overlain by SB phyllite, outcropping 50 m to NW, outside map area *

89-305 (1362 m)

Small o/c of dark grey, well foliated, finely laminated phyllite. SB.

001 / 34 / 181 — S_{0-1-2}

Note that dip has changed to westerly.

89-306A (1375 m)

Dark grey to black, fine grained, finely foliated and laminated calcareous SB phyllite. SB_3.

32 / 161

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SATURDAY, AUGUST 12

Clear, hot, dry. Working to east, around map sheets 11, 12. With Audrey.

89-306B (1655 m)

3C$_A$ metabasite. Speckled green and creamy white medium grained, well foliated. Moderately laminated with creamy orange weathering ? feldspathic segregations.

So-1-2

33 / 142

89-307

Medium grained, speckled green and white, well foliated 3C$_A$ dark amphibolite.

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SUNDAY, AUGUST 13

Clear, warm. Hazy with forest fire smoke. Map sheet 6 NE (SE ?) with Audrey

89-313 (1755 m)

3C$_A$ metabasite. Well foliated, strongly foliated, medium to coarse grained, speckled dark green and white amphibolite. Some coarser hornblende from small augen in foliation. Some thin pale feldspathic segregations. // foliation.

S_0-1-2

33 // 108

Can't get a good location.

Took photo.

[Mistakenly used 89-314 twice, so changed this one to 89-321]

89-321 (1740 m)

3D calc-silicate. Moderately

FIELD

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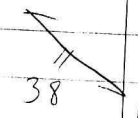
banded pale calc-silicate gray calc-silicate and grey-brown pelite.

Some more folding. Looks hmg, to NE verging, but not all that clear or well developed



S_0-1-2

S1, 1 can't get a good L_2

~~Tent~~

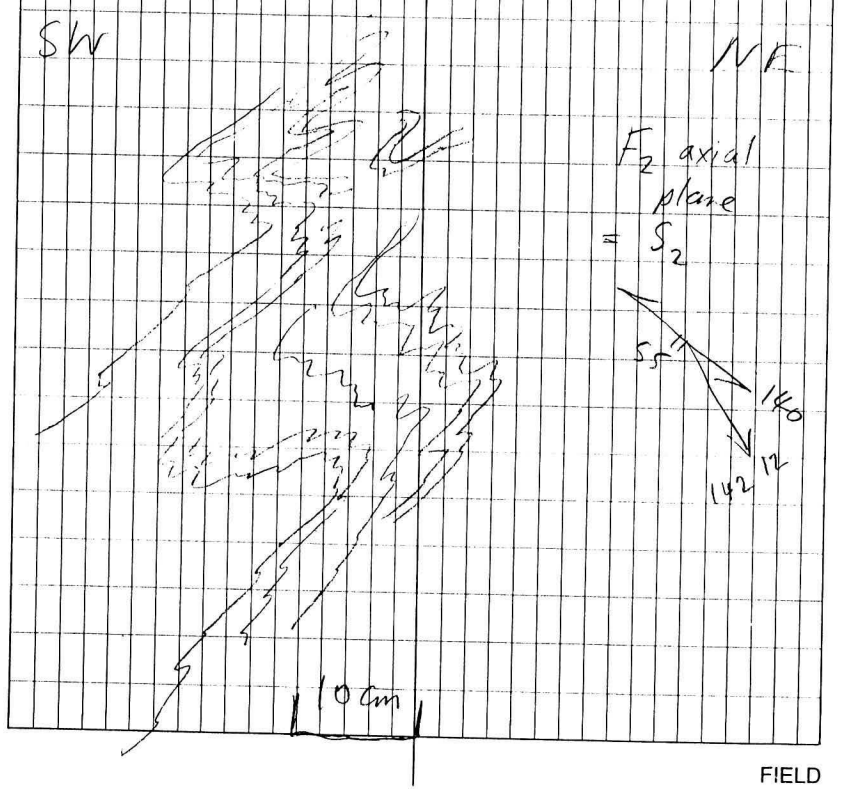
89-314 (1735 m)

SW 2m NE

3Y / 3CA / 3F / 3D

Little sequence of 3D underlain by 3CA, underlain by 3F, underlain by 3D. Amphibolite and marble are only 1-2 m thick each. Maybe 3-4 m.

Marble is impure, disseminated calc-silicated minerals and common. Full of folds. Mostly asymmetrical, SW-verging, some symmetrical



FIELD

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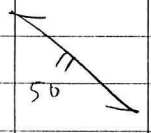
89-315 (1715m)

Sedimentary outcrop showing 3ft marble sandwiched between 3D calc silicate.

Calc-silicate above and below is moderately to thinly bedded, moderately to well foliated. Pale grey, green grey fine to medium grained calc-silicate and massive grey brown pelite.

No folds seen.

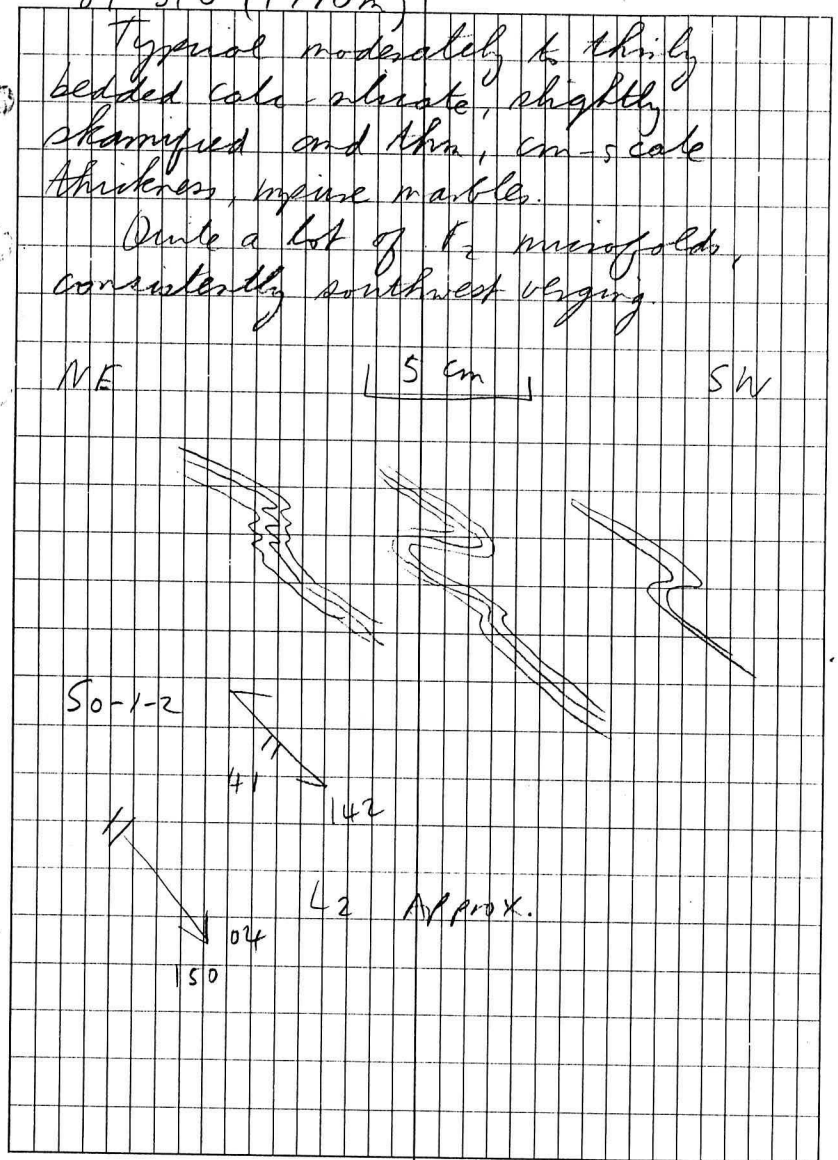
Marble is thinly bedded with mm scale calc-silicate laminae, ribbed weathering appearance. Fresh is medium grained, pale creamy green-grey, saccrosic crystalline. No folds here, but rare tiny S-shaped (looking NW) F_2 microfolds.



89-316 (1770m)

Typical moderately to thinly bedded calc-silicate, slightly skarnified and 1km, cm-scale thickness, impure marble.

Quite a lot of F_2 microfolds, consistently southwest verging.



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FIELD

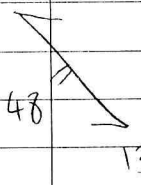
89-317 (1715 m)

At or near base of the cliff which is a thick pile of monotonous thinly to moderately bedded 3D calc-silicate. Moderately to well foliated.

This station itself is at contact between typical C-S-rich 3D and dark brown-grey pelite-rich 3D which I used to think was 1C but which definitely isn't.

Thinly bedded, alternating pelite and thin (mm to a few cm thick) calc-silicate. Platy, flaggy. See photograph.

Can see a few SW-verging mesoscopic folds, but they are virtually non-existent in this whole interval.

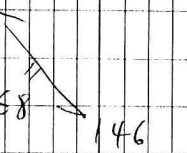


89-318 (1715 m)

Big change from pelite other side of saddle. This is definite Mt. Wye 1C biotite schist. Rusty brown weathering, wavy anastomosing biotite-rich foliation, medium grained. Small (1-2 mm) porphyroblasts of ?garnet (looks a bit retrograded).

Granite is 100-200 m to north. After much searching, found some sillimanite, though almost had to leave the map area.

SAMPLE 89-318



89-319 (1720 m)

Pale grey, creamy green, medium grained, calc-silicate rich 3D. Minor grey-brown pelite. Minor

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tremolite in C-5. Moderately foliated.

S_0-1-2

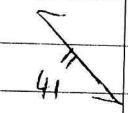
40 → 123

89-320

Contact between top of upper marble and calc silicate. Can trace it well by intermittent exposure eastwards in this cliff. Definitely the upper marble.

Has a dark or mid-bluish-grey appearance suggesting much internal strain. Can see a few good SW-verging F_2's.

S_0-1-2



41 → 132

SAMPLE 89-320

MONDAY, AUGUST 14

Same area as yesterday

89-158 REVISITED

Claim posts. Applied tags.

	Claim #	Post #
RV 35	YB24620	2
RV 36	YB24621	2
RV 37	YB24622	1
RV 38	YB24623	1

89-171 REVISITED

Applied Claim post tags

OVER

R. D. PENHALL LTD. MADE IN VANCOUVER, CANADA
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	Claim #	Post #	
RV 15		2	
RV 16		2	
RV 17	YB 24614	1	✓
RV 18	YB 24615	1	✓

No tags for RV 15, 16

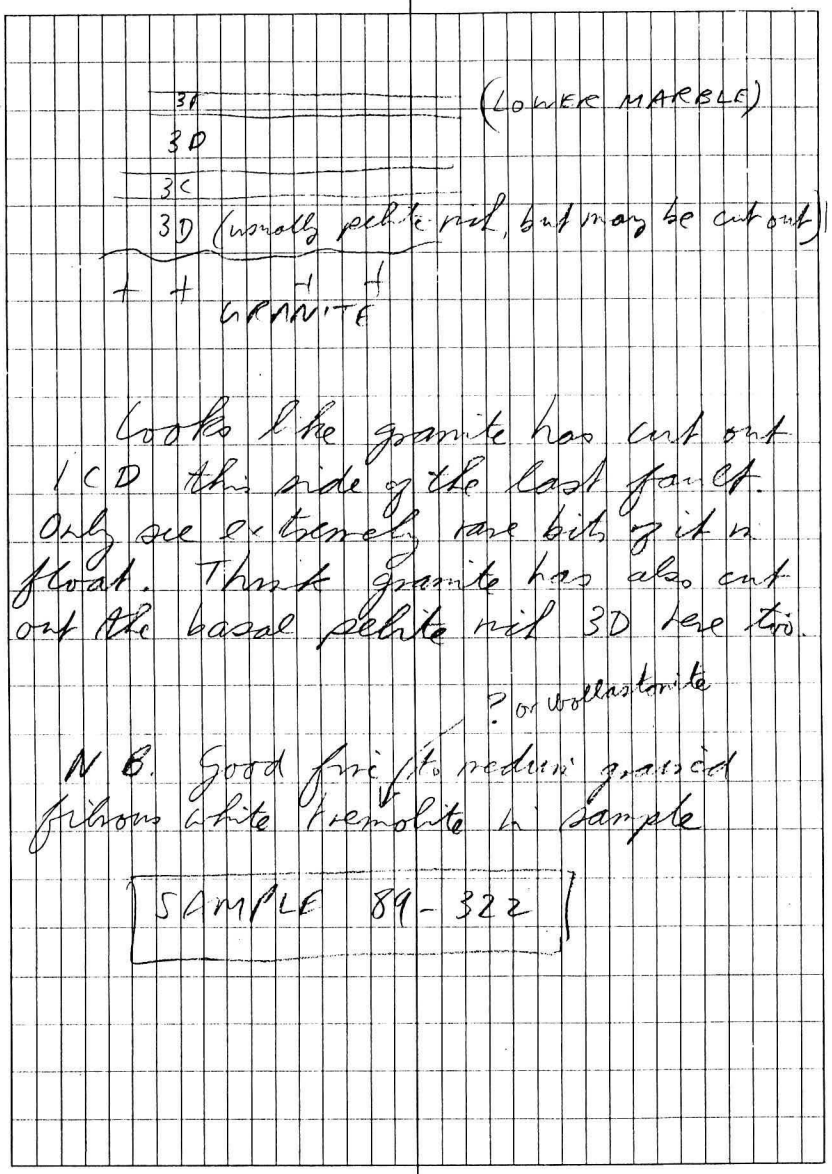
89-322 (1710 m)

Calc-silicate rock 3D, at base of cliff. Finely bedded and foliated, pale creamy grey calc-silicate and brown-grey spotted (? cordierite, ? andalusite, ? albite) pelite.

Has a reddish-brown mineral — looks a bit like garnet, but has long prismatic habit. Axinite? Poss vesuvianite

Granite is not far below. Can see bits of the tourmaline-garnet micropegmatite in the scree, and a few cm thick sheets in 3D

STRATIGRAPHY IN THESE CLIFFS



Looks like granite has cut out 1 CD this side of the last gangt. Only see extremely rare bits of it in float. Think granite has also cut out the basal pelite rock 3D here too.

N.B. Good fine-grained reddish-grey fibrous white tremolite in sample

[SAMPLE 89-322]

R. D. PENHALL LTD., MADE IN VANCOUVER, CANADA
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89-323

Finely bedded and foliated 3D calc-silicate. Has 20-30cm thick, mainly discordant sheets of leucogranite.

89-324 (1745m)

Claim post

	Claim #	Post #
RV 15		2
RV 16		2
RV 17	NW	1
RV 18	NW	1

Dec 2 1988

Think there's a mistake. Should be

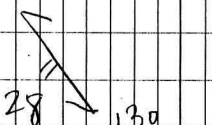
	Claim #	Post #
RV 17	YB24614	2
RV 18	YB24615	2
RV 19	YB24616	1
RV 20	YB24617	1

89-325 (1690m)

Contact between 3D calc-silicate below to north, and 3CA above, to south.

3D is typical, thinly bedded pale green-grey calc-silicate and thin mauve-grey-brown discontinuous pelite laminae. Moderately well foliated.

3CA is dark green, very finely foliated, fine to medium grained amphibolite metabasite. 3-5mm thick feldspathic laminae and ribbons in foliation.



R. D. PENHALL LTD., MADE IN VANCOUVER, CANADA
DUKSBAK WATERPROOF

FIELD

89-197 REVISITED
Attaching Post tags.

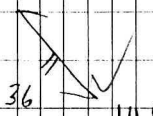
	Claim #	Post #	
RV 37	YB24622	2	
RV 38	YB24623	2	
RV 39	YB12536	1	(already tagged)
RV 40	YB12537	1	(already tagged)

TUESDAY, AUGUST 15.

working in cut lines and slopes NW of creek SW of camp. with Audrey.
clear, sunny, not hot.

89-326 (1430 m)
3D calc-silicate and 10 f dike.

Calc-silicate is moderately bedded (5 mm to 2 cm), moderately foliated, about 60% grey-brown fine-grained biotite-bearing pelite, and 40% pale green-grey fine to medium grained calc-silicate. Typical



Rock is intruded mainly concordantly a.t.o. So-1-2, by 10 to 40 cm thick sheets of 10 f dike, amounting to about 15% of 8x pavement.

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Dike - medium grained, speckled pale grey and black with 10-15% biotite. No significant hornblende pleroxpt. Massive.

89-327 (1440m)

Very tentative outcrop. Might just be half buried boulders.

Anyway, ICD pelitic schist. Use it if it fits, ignore it if it doesn't.

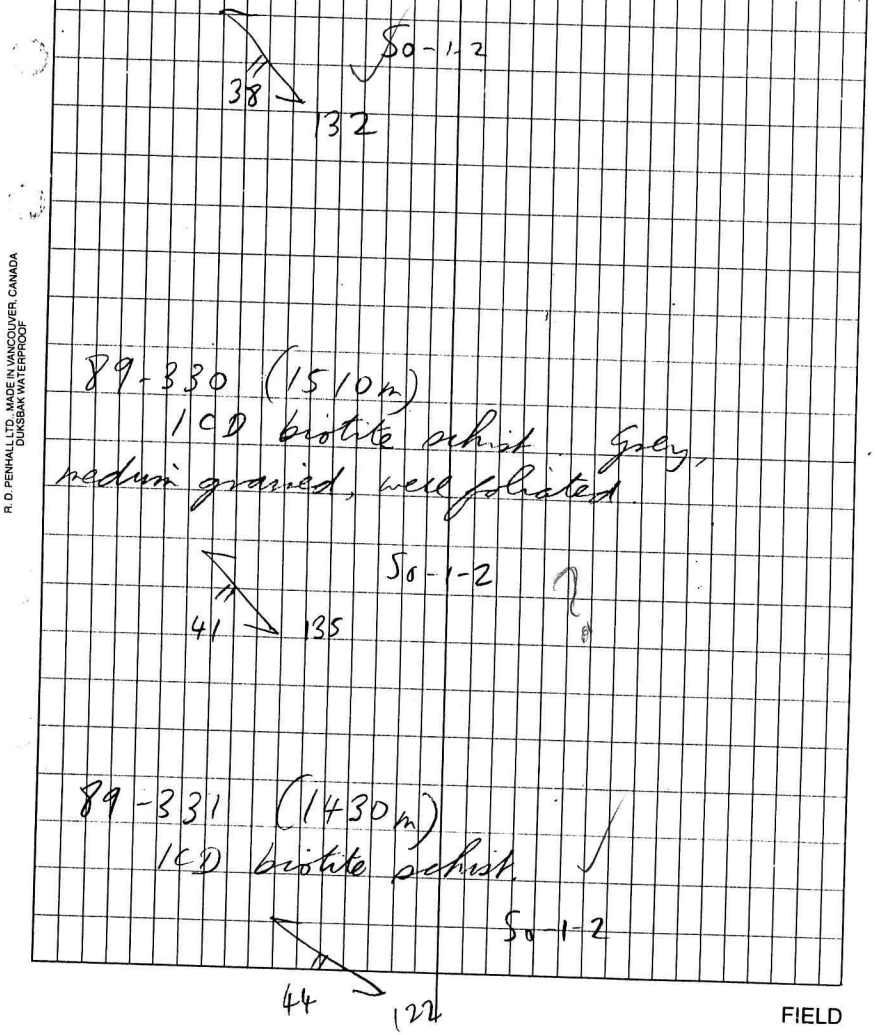
89-328 (1375m)

Very tentative outcrop. Mainly boulders half buried in vegetation. Some are calc-silicate but most are 10E dike.

Rather desperate to be used as outcrop, but it's possible.

89-329 (1375m)

Definite o/c of 3D calc-silicate (a few metres to SE was definite o/c of 10E dike.



89-330 (1510m)

ICD biotite schist. Grey, medium grained, well foliated.

So-1-2

41 → 135

89-331 (1430m)

ICD biotite schist.

So-1-2

44 → 122

R. D. PENHALL LTD., MADE IN VANCOUVER, CANADA
DUKSBAK WATERPROOF

FIELD

89-332 (1510m)

Definite s/c. Pale to mid green very well foliated chlorite phyllite fine grained foliaceous. 38.

Probably closer to SD-like than SC-like. Shifted as not measured.

THURSDAY, AUGUST 17

Drove into camp in morning, with Ivan. In afternoon, working around gulleys SW of crossroads. Mapsheet 11, NE.

Sunny but very smoky.

89-333 (1540m)

3D calc silicate, weakly steamyfied.

Finely bedded, finely (but not strongly) foliated, mm-scale. Alternating olive grey, silvery very fine grained phyllite and pale green grey calc-silicate. Non-calcareous. Steamyfication takes form of an overprinting, slightly coarser grained and greener calc-silicate alteration/re-crystallization that transgresses the bedding/foliation. Weathers orangey-brown.

Good representative sample

SAMPLE 89-333

R. D. PENHALL LTD. MADE IN VANCOUVER, CANADA
DUKSBAK WATERPROOF

Very gentle dip.

S_0-1-2 // 099
18

89-334

Finely bedded and finely foliated, slate grey to pale grey-green, fine grained 3D calc-silicate. Silvery foliation surfaces.

Weak skarnification.

S_0-1-2 // 112
23

89-335 (1485 m)

Long series of exposure in this shallow gully. Basically all 3D calc-silicate. Finely bedded, fine to sub-medium grained grey

pelite and green to pale green calc-silicate. Some of it is quite greenish and amphibolitic, but don't think there much metabasite here, but there is some.

S_0-1-2 // 156
37

89-336

Small outcrop containing contact between 3c metabasite to west and 3D calc-silicate to east.

Metabasite is full of semi-asymmetrical F_2 folds, with some asymmetrical Shr-verging folds.

048
25
S_0-1-2

Better
079
24

R. D. PENHALL LTD., MADE IN VANCOUVER, CANADA
DUKSBAK WATERPROOF

89-337

3D calc-silicate

So-1-2

057

22

FRIDAY, AUGUST 18

Sunny, dry. Not too hazy yet. Going down into creek valley, SW of camp. With Ivan.

Going down dry creek bed from old camp. At 1378 m, 5-10 m below metabasite on SW ridge gully, is 3D. May already have this. Yes, I do

89-338 (1315 m)

Quite a large outcrop. Lower half, exposed lower down towards creek is 3D calc-silicate.

Upper half is 3CA metabasite. Green-grey, fine to medium grained, moderately foliated. Finely banded with 1-5 mm thick feldspathic segregations // foliation.

So-1-2

11

099

20

FIELD

R. D. PENHALL LTD., MADE IN VANCOUVER, CANADA
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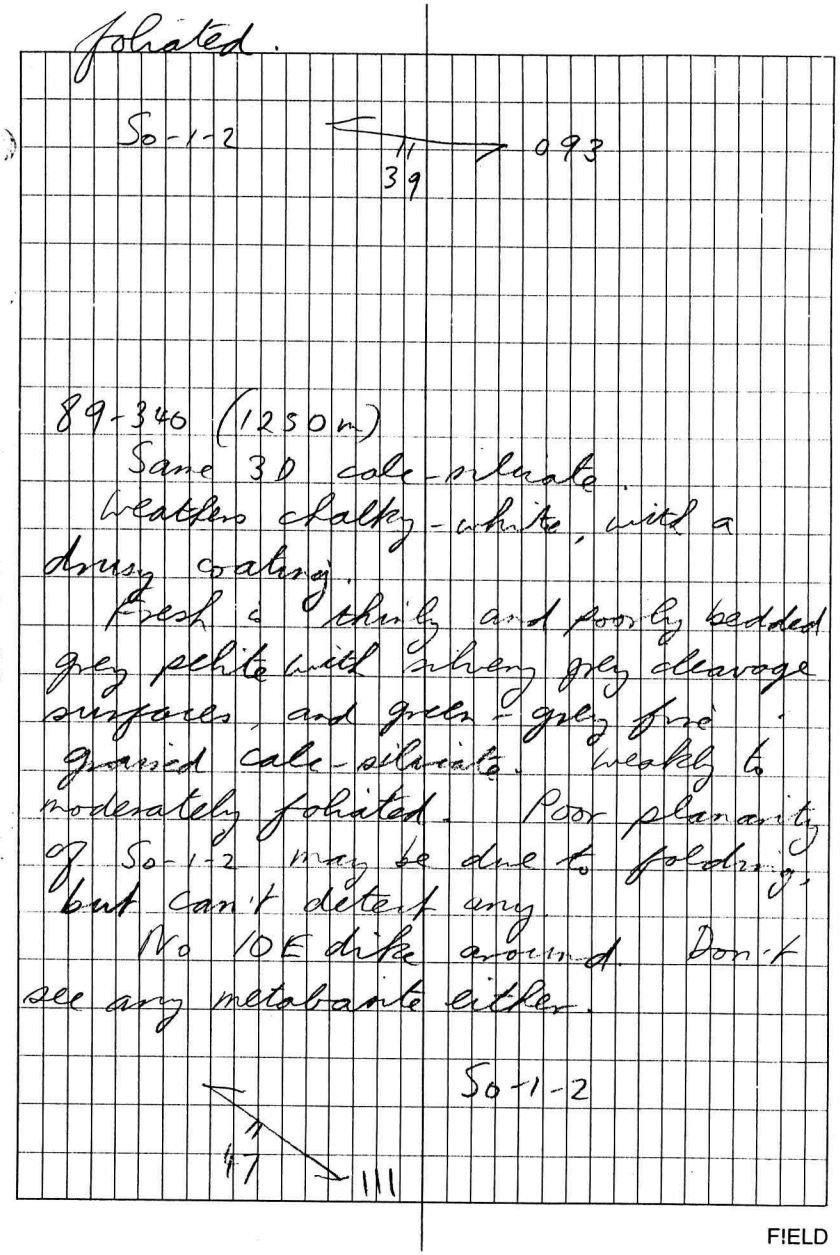
3D calc-silicate below is finely banded, weakly to moderately foliated. Brownish-grey medium grained biotite-bearing pelitic schist and fine grained pale green calc-silicate. Dressy weathering.

Big question is: is there a fault in valley between these rocks and the calc silicates on the bluffs on the SW side? They look much the same.

Don't see any 10E in this outcrop, unfortunately.

89-339 (1285m)

3D calc-silicate same as in the bluffs higher up. Finely bedded brownish-grey pelite phyllite and pale green-grey calc-silicate. Fine grained. (Weakly) to moderately foliated.



89-340 (1250m)

Same 3D calc-silicate. Weathers chalky-white, with a dressy coating.

Fresh is thinly and poorly bedded grey pelite with silvery grey cleavage surfaces, and green-grey fine grained calc-silicate. Weakly to moderately foliated. Poor planarity of So-1-2 may be due to folding, but can't detect any.

No 10E dike around. Don't see any metabasite either.

R. D. PENHALL LTD. MADE IN VANCOUVER, CANADA
DUKSBAK WATERPROOF

FIELD

Don't see a good L_2 I could find.

89-341 (1245m)

3C metabasalt. Whole bluff looks the same.

Grey-green, fine to medium grained with small visible amphiboles. Penetratively well foliated. Some concordant, orange-brown weathering feldspathic segregations.

SAMPLE 89-341

S_0-1-2

11
43 107

89-342 (1245m)

3C$_A$. Mid-green fresh and weathered. Inequigranular fine to medium grained, quite massive. Moderately speckled texture.

Perhaps not quite as meta-gabbro like as the 5C$_A$ at the far west of map area, but has a massive homogeneous look about it.

89-343 (1200m)

Large outcrop of 5C$_{A/P}$ or 3C$_{A/P}$ weathers speckled dark green and green-grey with a knobby texture. Fresh is inequigranular, very coarse to fine grained. Dark green hornblende porphyroblast/porphyroclasts in a grey fine grained matrix which may be meta-mafic or ultramafic. Pale feldspathic weathering colour suggests this is not a pure ultramafic, despite knobby

FIELD

R. D. PENHALL LTD., MADE IN VANCOUVER, CANADA
DUKSBAK WATERPROOF

negligible relative diminishment of SCp. So I'm calling it SCAp.

Mostly massive, but a weak to moderate foliation present locally.

15 040 V. Approx.

220 ?

[SAMPLE 89-343]

SATURDAY, AUGUST 19

Cloudy, cold. Working around old drill sites, Map sheet 12. With Ivan.

89-344

3C meta-basite. Mid to dark green, moderately well foliated, fine grained. Orange-brown weathering feldspathic segregations.

Full of F_2 minor folds, but can't detect overall symmetry.

S_0-1-2

27 → 156

3D calc-silicate like a few metres to SW, above this 3D.

89-345 (1598m)

Fairly thick unit (~7-8m) of marble sandwiched between skarn (37T)

FIELD

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Marble weathers buff-brown, Fresh is mid-grey with rough ribbed texture due to disseminated and foliated calc-silicates.

S_0-1-2 26 → 143

L_2 Approx. 04 → 159

Skarn weathers buff-olive (milky coffee) colour. Fresh is pale grey-green, relatively massive homogeneous calc-silicate. Suspect protolith was 3D rather than 3F.

89-346

Virtually all o/c from here northwards to end of this cul-de-sac.

This is 3CA. Well and finely foliated, medium grained, speckled green and white meta-basite.

S_0-1-2 32 → 148

Has a lineation on S_0-1-2 which is probably L_2, but also some post-kinematic small prismatic amphibole randomly distributed on S_0-1-2

One good SW-verging F_2 minor fold.

SW NE

89-347

All 3D and skarnified 3D (3DT)

Relatively unaltered 3D is moderately bedded pumpkin-grey, biotite-bearing recrystallized looking, fine to medium grained pelitic schist, and green grey laminated calc-silicate.

S_0-1-2 Approx. 19 → 176

FIELD

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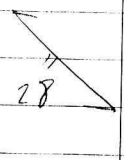
Where skarnified it is replaced by fine to medium grained, to locally coarsely recrystallized, massive calc-silicate. Not complete replacement here though, as bedding and F_2 folds still clearly visible. Folds appear quite symmetrical here. Hard to measure axis.

SAMPLE 89-347

Took 2 photos.

89-348

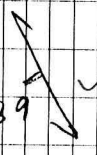
3D calc-silicate. Not strongly foliated at all.



A better measurement than previous station.

89-349

Thinly bedded, 3D# - skarnified calc-silicate, underlain by slightly skarnified-looking 3C metabasite. Latter has pale grey green calc-silicate bands in it. Well foliated.

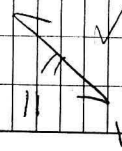


Don't think the metabasite is very thick or significant.

89-350

As was most of this area, 3D and 3DT. Thinly bedded, weakly to moderately foliated.

More gentle dip here than at 89-349.



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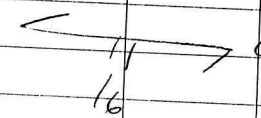
89-351 (1475m)

3D calc-silicate

So-1-2



89-352

Old core racks.

Had a quick look through here. Mostly 3D calc-silicate, lesser 3C metabasite and some 10E dike.

Some minor sulphide mineralization usually pyrite, but some ? copper sulphides in skarnified 3D locally. Some has bornite-like blue tarnish.

Some very oxidized zones, probably pyrite-mineralized fractures.

Don't see a lot of good skarn overall.

Core angles very consistent — about 60°. Probably drilled vertical holes.

One or two good carbonate hosted fault breccias, quite hematitic.

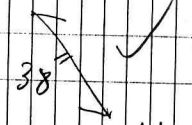
DDH J1, J2, J3, J4 here.

89-353 (1450m)

Some of that funny meta-basalt. Not amphibolitic or hornblendic at least. Fine grained, equigranular, mid-grey-green. Quite chloritic. Foliated.

Has radiating clots of unidentified mineral on foliation surface.

SAMPLE 89-353



Magnetic. Could be from pyrrhotite

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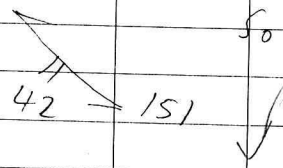
y that's what the dull bronzy sulphide mineral present (0.5%) is.

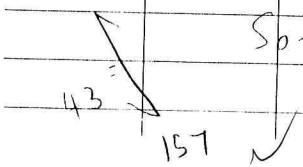
89-354 (1455m)

3D calc-silicate. Calc-silicate -rich.



89-355 (1275m)

Definite o/c of 3D calc-silicate. Pelite here is lustrous, fine to very fine grained silvery grey. Calc-silicate is pale green-grey. Moderately bedded and foliated.



89-356 (1232m)

End of the road. No o/c. A few pieces of 3C (3Cp?) around, but can't tell anything from that.

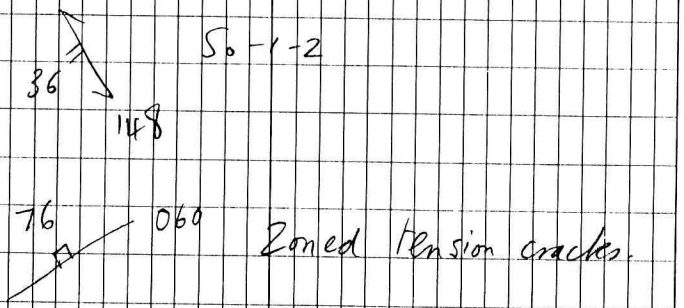
Going back up hill, hit some possible 3D outcrops at 1253m.

89-357 (1260m)

3D calc-silicate and partly skarnified 3D.

Thinly to moderately bedded, weakly to moderately foliated. Silvery grey weathering pelitic laminae.

Dip slope.



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SUNDAY, AUGUST 20

Cloudy, cool, dry.
working in Map sheet 4NW

89-358 (1450m)
3D calc-silicate. Lower grade looking than 3D to the east, but I wouldn't call it 5B.
Weathers grey-brown. Rock is fine grained, moderately thinly and irregularly bedded, brown grey pelite and green-grey calc-silicate. Non-calcareous pelites locally have silvery grey cleavage surfaces. Looks like strong weathering of higher grade 3D.

S_0-1-2

31 → 123

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FIELD

89-359 (1420m)

3D calc-silicate, notably with green amphibole.

This is that facies of 3D which has mid- to dark green, fine amphibole, as fine segregations, usually, particularly as selvages between the maroon-grey-brown pelite and the green calc-silicate. Non-calcareous. Fine to medium grained. Finely to thinly bedded. Moderately, irregularly foliated.

SAMPLE 89-359

So-1-2

40 → 165

89-360 (1470m)

More or less at the base of this cliff exposure. Mostly 3D calc-silicate. Thinly bedded, moderately foliated. Same as to the NW across the big gully.

So-1-2

32 → 154

Below it is a metabasite, probably only a few metres thick, which I might be able to join up with one of those bands higher up the slope.

89-361 (1390m)

3D calc-silicate. Thinly bedded, moderately foliated, grey-brown, slightly amphibolitic. Some rusty quartz veins right here.

So-1-2

37 → 149

Nearby, some prominent fractures

FIELD

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spaced 10 - 15 cm apart

79
□
096

89-362

Pervasively cleaved, very fine grained, slightly rusty weathering grey to green-grey Chlorite Phyllite. Non-calcareous. Call it 5B to 5D. 50 is probably close

SAMPLE 89-362

S0 ~ 1-2

40 / 148

MONDAY, AUGUST 21

Cloudy rainy morning. Still cloudy after lunch and threatening but went out to area just east of Camp.

89-363

Amphibolitized calc-silicate. Protolith is probably 3D. Now a finely banded calc-silicate rock, between pale green calc-silicate and grey green calc-silicate. All dotted with about 10% very dark green well formed (post-kinematic) hornblende porphyroblasts. Think I can identify relict pebble lenses.

Think this must be a steam recrystallization effect. Never seen it anywhere else. 10E contact is just a few metres away, and there are dikelets of 10E within this rock.

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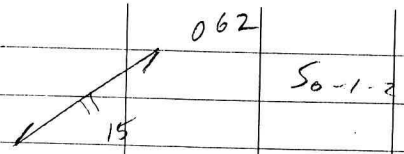


Approx. S_{0-1-2}

(TUESDAY, AUG. 22)

89-364

Claim post

	Claim #	Post #
(RV 33	YB 12530	2
RV 34)	YB 12531	2
RV 35	YB 24620	1
RV 36	YB 24621	1

Attached letter 2.

Not plotted on any maps. Can't locate it precisely.

TUESDAY AUGUST 22

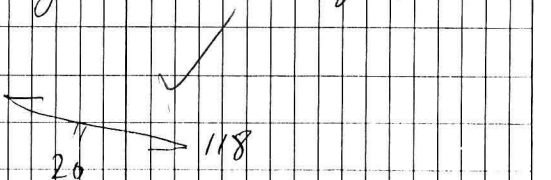
Cloudy, drizzly morning. Working around crossroads, east of camp, with Ivan, his last day.

Did a claim post tagging (see previous page).

89-365

3D calc-silicate. Thinly to moderately bedded, irregularly, moderately foliated. Purplish grey fine to medium grained pelite and mid-green calc-silicate. Not particularly skarnified here.

S_{0-1-2} very close to topographic slope.



One tight F_2 minor fold closure

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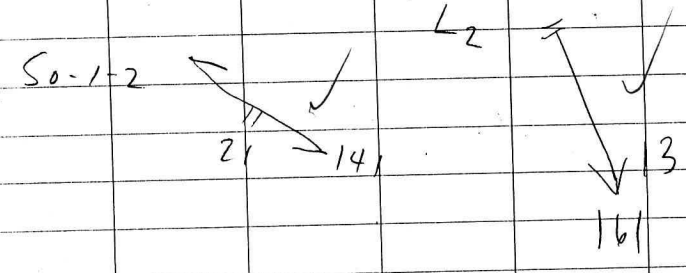
89-366

Fairly long stretch along road of marble with intermittent skarn.

Marble 3F is pale to mid-bluish grey, medium to coarse grained, thinly bedded and moderately to well foliated/laminated. 'Foliation' highlighted by significant amount of calc-silicate laminae and minerals, producing very rough weathering texture. Some looks skarnified.

SAMPLE 89-366



L_2, probably an intersection lineation, defined by alignment of calc-silicate minerals on S_0-1-2

Skarn is cream coloured, friable and weathered. Porous, spongy looking texture, medium to coarse grained. Weakly laminated.

Most of this skarn looks like it is skarnified 3D within the marble, usually 1-2 m thick. There are good F_2 minor folds in marble, so possible these 3Ft (D) units are fold closures. The whole area may be folded, producing the rather non-systematic outcrop pattern, this side and other side of cross-roads.

SAMPLE 89-366

89-367

Came back down here to check if these really are ICD and not pelitic 3D. They are ICD

SAMPLE 89-367

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Had a fairly good look but couldn't see any sillimanite. Not measured because rocks all disrupted.

FRIDAY, AUGUST 25

Drove into camp with Audrey in morning. Clear, sunny.

Working just east of camp, Stelt 5 SW, SE.

89-368

Marble, roughly 6-8 m thick within 3D calc-silicate.

Marble is notable for having red-brown garnet. Marble is pale to mid-bluish grey, medium grained, moderately laminated with varying amounts of calc silicate mineral. Garnet locally amount to 40%, generally 10-20%. Red-brown, up to 15 mm across, some well formed. Locally very garnet rich clots and bands. Suspect the garnet is a skarning effect of the 10E intrusion just to west, just as the 3D calc-silicate is locally (89-363) peppered with

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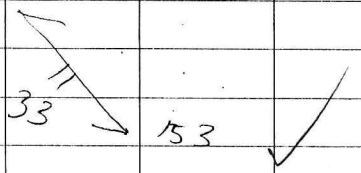
Brownish-grey, finely laminated phyllite/schist with highly transposed laminae, generally < 1cm thick, attenuated calc-silicate. Looks like a porphyroclastic texture locally with tiny (1mm) angular which might be feldspathic remnants of veins or porphyroblasts. Syn-metamorphic quartz veins drawn-out and sheared. Relict isoclinal microfolds common.

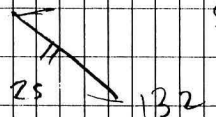


SAMPLE 89-377

89-378 (1640 m)

Contact between pelite: highly and strongly foliated 3D and more typical calc-silicate-rich 3D.

Upper 0-5 m of 3D is banded, cm-scale with pale creamy green-grey calc-silicate lenses and laminae & mauve-grey pelite. Apparently not as well foliated as lower, pelitic 3D.



Contact is cut by discordant, 40 cm thick tourmaline-bearing granitoid pegmatite. Photo.

Just below this station is a claim post. Think it's not in the exactly correct place, but it's the right set of posts, anyway.

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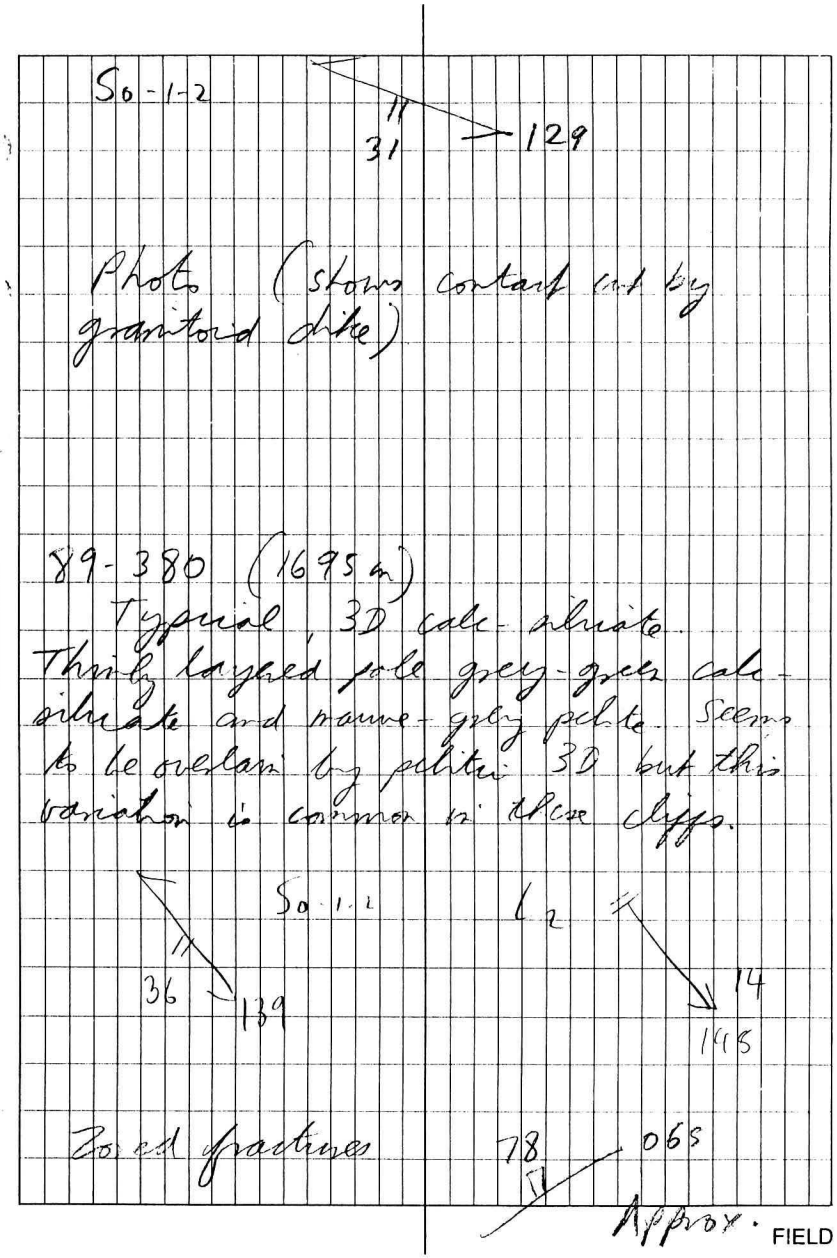
	Claim #	Post #
RV 19	YB24616	2
RV 20	YB24617	2
RV 21	YB24618	1
RV 22	YB24619	1

89-379 (1650m)

Contact between a fairly thin metabasite, 3C, below, and 3D calc-silicate above. By my reckoning this is the same 3C as underlies the two marbles in the cliffs to the east. i.e. these should be marble above this.

Metabasite is dark green, very finely and strongly foliated, fine to medium grained. 10-15% creamy-orange feldspathic laminae parallel to foliation. Looks pretty sheared.



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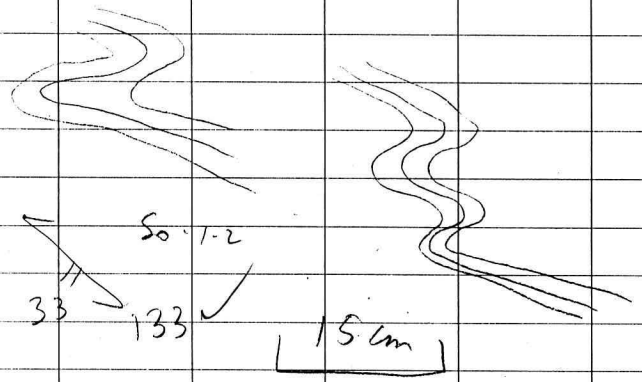
FIELD

89-381 (1650m)

Still all mainly thinly bedded 3D calc-silicate.

Have some SW-verging F_2 folds in calcareous 3D here.

NE SW



—

Walking SW-wards along base of cliff. Nearly all 3D. Some thin, non-mappable marbles and very thin metabasites. Marbles show good F_2 — consistently SW-verging.

89-382 (1625m)

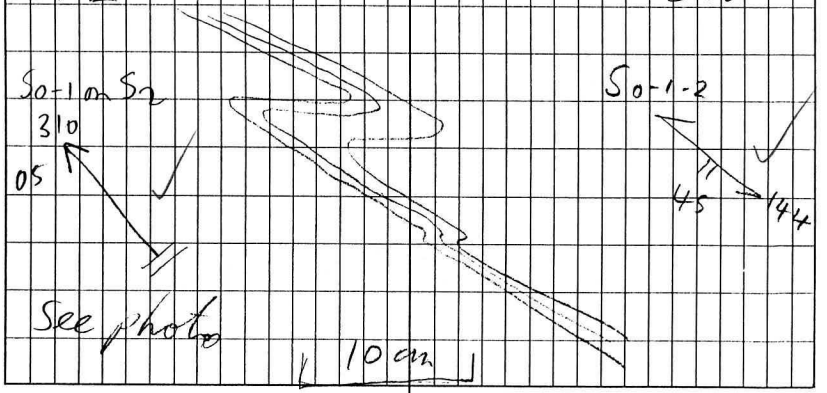
Finely banded and foliated 3D calc-silicate and minor metabasite.

This rock looks identical, in lithology and the structures it contains, to 89-374, with which it seems to line up.

Calc-silicate varies between dark maroonish-grey medium grained well foliated biotite schist, and pale grey-green medium grained calc-silicate.

Quite a lot of F_2 folds, either SW-verging or non-verging.

NE SW



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2 ORIENTED SAMPLES 89-382

35 → 130

Looks quite sheared, but perhaps not as much as the stations

SUNDAY, AUGUST 27

Clear, warm, sunny. Working on ridge west of camp, starting at western end. Want to check Mt. Arye and basal Vangorda stratigraphy with Audrey.

89-383

Checked these two outcrops, & yes they're ICO schist versus basal Vangorda pelite 3D.

They are both ICO schist. Can see some retrograded garnet.

89-175 REVISITED

Definitely 3D, slightly pelitic.

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89-384 (1505 m)

Definitely ICD schist. Brown lustrous weathering. Medium to coarse grained. Anastomosing foliation.

SAMPLE 89-384

89-186 REVISITED

Called this ICD first time but came back to check, as it doesn't fit.

It is definitely 3D. Rusty - dark brown-grey weathering. Finely layered and foliated. Thin q/f and calc-silicate laminae 1-10 mm thick. Pelite-rich 3D but definitely 3D. ? could well be basal Vangorda 3D. ✓

So-1-2 085 Not plotted — same as previous measurement

89-385 (1570 m)

Position ~~approximate~~ accurate.

Definite outcrops of ICD biotite schist. Orange-brown weathering, lustrous foliation. Medium to coarse grained. Fine pelitic and q-f microlithon laminations. Fine but anastomosing foliation. Looks like schist pseudomorphs of ? staurolite in foliation.

So-1-2 ✓

42 → 145

89-88 REVISITED

Contact between ICD, above to SW, and 3D, below to NE.

Quite a sharp transition. 3D is slightly pelitic but not particularly so. Nothing notably different about 3D here. It does have a strong foliation though, suggesting shearing.

FIELD

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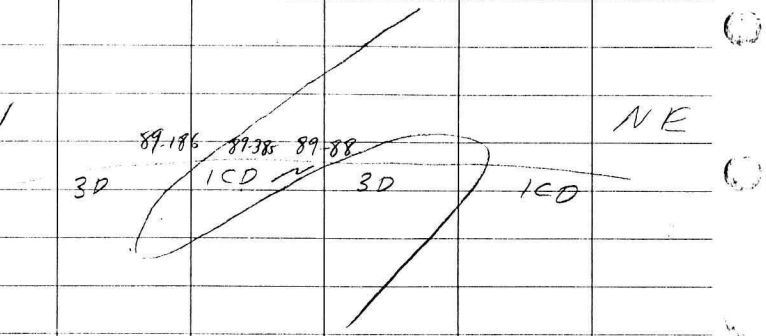
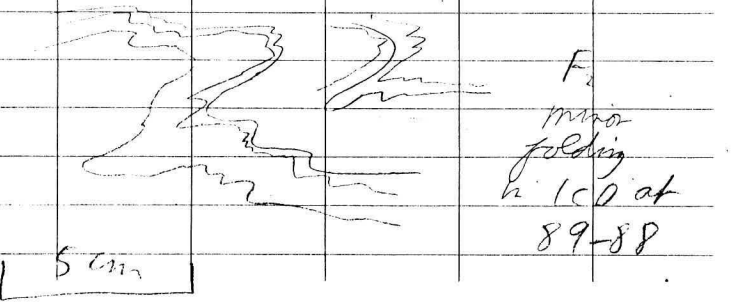
If this 3D is in a large F_2 fold it should be:



I would expect NE-verging F_2 folds here. There is some minor folding in pelites (1CD) at this contact, in a loose piece of rock. The most likely reconstruction is that the folding is NE-verging, so as for folding



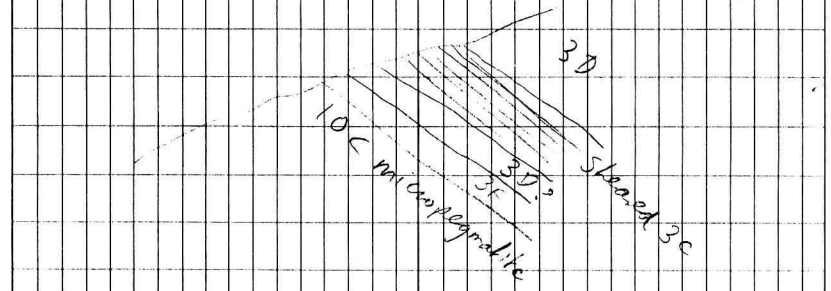
idea is supported. But far from demonstrated

Can't see any F_2's in underlying 3D.

89-386 (1568m)

Been walking down (NE-ward) gully through typical moderately banded 3D calc-silicates. No folding obs.

This station has a thin unit of



sheared metabasite 3C overlying a thin layer of marble, in turn overlying a fairly thick pile of 1C metapegmatite. Metabasite is dark grey-ish-green, fine to medium grained, very finely

FIELD

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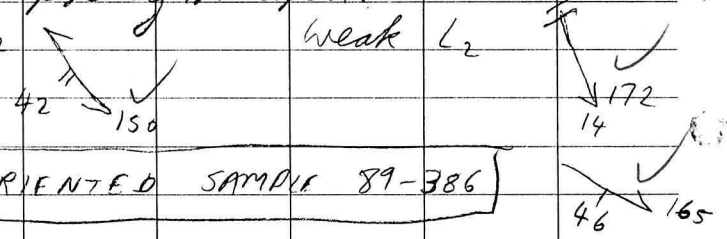
DUKSBAK WATERPROOF

foliated with thin transposed pale grey feldspathic laminae. Looks pretty sheared.



ORIENTED SAMPLE 89-386

Marble below it is only 50 cm thick before contact with 10c. It is mid-grey, foliated by disseminated calc-silicate mineral. Medium grained. Think I can trace it SE-wards to a thin marble higher up slope, ~~repeated~~ earlier. Complicated by interrupted and sparse exposure and by 10c sill. Only a thin marble anyway. Didn't see any fold.

89-387 (1555m)

West side of gulley, exposure of impure marble 3F, about 8-10m thick. Has a 1-2m thick band of 3G in the middle of it. 10ABc at the base of it, followed by 3G near base of slope.

Marble is mid-greenish-grey, well foliated and laminated because of 10% biotite, which also gives it a mauvish-tinge. Medium grained

SAMPLE 89-387

Perhaps different from lower Vangorda marbles in being more 'pelitic' (checked later - not really)

89-388 (1552m)

Calc-silicate between base of 10ABc sill and top of main marble below.

Moderately to very finely banded and foliated. Most notable for being full of F_2 minor and micro-folds. Consistently SW-verging

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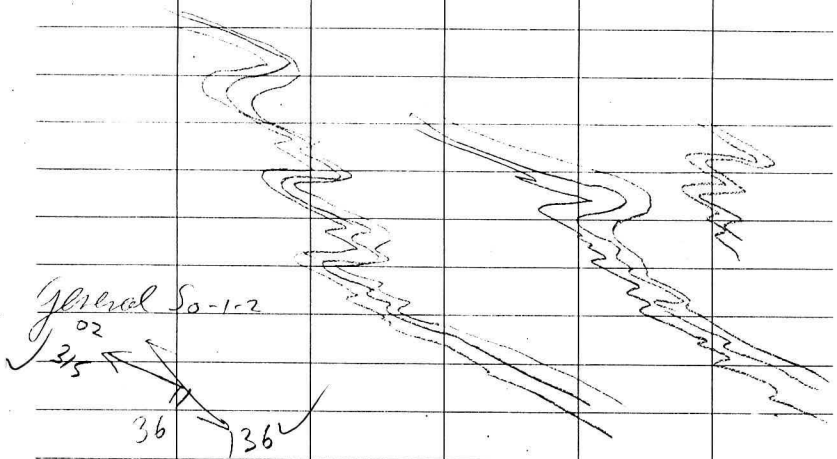
to non-verging. Several excellent faces.

NE SW



See photographs.

The marble unit I've mapped in between el. 1552 m and 1538 m (upper contact of 10A8c at base of gully) is shown as a solid unit. It is not. There are zones upto 2-3 m of marble but the rest is 3D calc-silicate. Maybe only 50% of the band is marble. And the marble is very impure. It is mid-grey-brown weathering, well foliated with biotite and calc-silicates, and is not as homogeneous as 3E in lower Vangorda to the east. Contacts with 3D are quite subtle, i.e. don't think the 3D is incorporated structurally, think it's a primary relationship.

SAMPLE 89-388

is typical. Shows general difference between this marble and those in lower Vangorda.

Implication of all this is that this 3D map unit containing this

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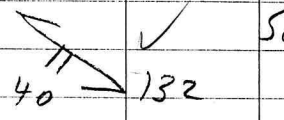
'different' marble is Mt. Mye, and not Vangorda, repeated by a fold or fault.

89-389 (1565 m)

Typical looking 3D. layered in variable thickness from dm to cm to mm. Generally moderately bedded and foliated. Not any significant carbonate here. Grey brown



pelite and pale grey calc-silicate.

89-390 (1548 m)

Near base of gully, first encounter with marble. Like cliff to west it is in the form of 1-2 or 3 m thick units separated by 3D. and is half quite biotite and calc-silicate rich. So, same unit, displaced downwards across fault in gully i.e. east side down, as is usual for the map area.

A bit lower down the marble is a bit cleaner but still has mauvish biotite.

Walked down to 1525 m to base of exposure, although not much definite outcrop down here. Anyway, it's all 3D and 1C talus or jostled bedrock. No 1CD biotite schist.

89-391 (1575 m)

Top of marble zone. As before, a buff-grey weathering impure, well foliated marble with abundant cm-

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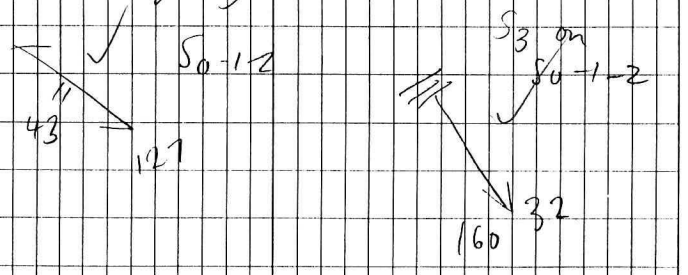
MONDAY, AUGUST 28

Clear, sunny, warm. With Andrew. Doing traverse into bush from pyrrhotite hills to far west, southward to outcrops at top of bluffs of creek.

89-392 (1385 m)
3D calc-silicate. Not particularly low grade looking. Weathers pale chalky grey. Fresh is thinly layered, moderately foliated pale green calc-silicate and mauve-grey schist. Fine to medium grained. Thin dark green amphibole selvages between the lithos. Foliation surfaces slightly lustrous.



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chunk beds of 3D within it, and disseminated calc-silicate. Not a single or even two homogeneous marbles.

50-1-2

43 ↗ 142 ✓

Has about 10% biotite, in well defined foliations microlithons

89-38 REVISITED

Wanted to check this 3D/ICD transition to see if it resembles the Vangorda/Mt. Mye transition.

The 3D calc-silicates immediately above the contact are indeed finely foliated, pelite-rich calc-silicates similar to that seen in basal Vangorda. However they lack any chloritic pseudomorphs, and they are not quite so rusty brown weathering. Overall, microclinic. They're similar pelites, but not identical. Anyway, there isn't a sharp change from typical 3D to ICD.

—

Now walking back westwards up through this 3D into upper ICD schist. Here the upper 3D/ICD contact is also marked by several metres of pure pelite rich 3D, marginal-grey, flaggy, platy, but again not quite as rusty brown and pelitic as I've seen basal Vangorda. Could be just a lithofacies transitional lithology on top and bottom of a Mt. Mye 3D package.

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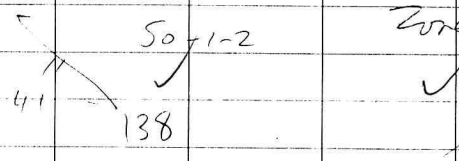
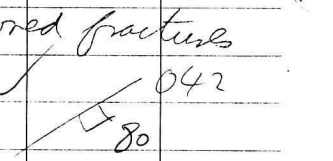
89-393 (1360m)

3D calc-silicate ± finely layered, moderately foliated. Green medium grained calc-silicate ± amphibole alveoles, and shiny grey pelitic laminae, fine grained. A bit more greenish, overall, than last station.



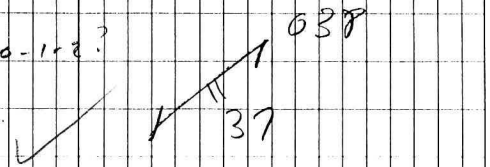


[SAMPLE 89-393]

89-394 (1310m)

Typical 5CA or 3CA. Irregular very coarse to fine grained, speckled dark green and medium grained grey. Relict coarse texture ? obscured

amphibole, dark green, comprising 40% of rock in medium grained grey ? feldspathic groundmass. Same as the coarse speckled 5CA on the hills to the northwest. Pretty massive, but can see a foliation.



89-395 (1300m)

Large outcrop but all jointed up blocks.

Foliated amphibolite with (probably not galena) green, well foliated, fine to medium grained amphibole + chlorite schist. Metabasite 5CA?

Penetrative foliation. Probably some mid-grey fine grained feldspar present, but dominantly mafic

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rock. Has a speckled weathering texture on some surfaces, but not really typical of the SCA meta-gabbro lithology. Neither does it closely resemble SCP either. It could be either.

Heavy, due to 5% (may be overestimated) od locally 10% fine disseminated sulphides, mainly in foliation, but locally in aggregates. Phi feldspar + epidote veinlets (see sample)

SAMPLES 89-395

Now going on 270° for 350 m, then turning on 180° for 400 m.

Reset hip chain at 1295 m to 0

89-396 (1245 m)

Subcrop exposure. Almost definitely bedrock.

Weathers chalky white to pale green. Fresh is creamy white to pale grey, very fine to locally medium grained. Mostly calcareous - strong reaction to HCl, but some parts are harder and non-calcareous.

Bedded but irregularly. Seems to be low grade marble and calc-silicate. Looks very similar to Station 89-274 at base of SCA on north side of main ridge to north.

Have to call it SF, although it is not at all phyllitic or even significantly foliated.

SAMPLES 89-396

Took photograph

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89-397 (1215 m) end of leg.
Typical speckled, metagabbro - like SC_A.

Irregularly, weakly foliated. Speckled coarse dark green amphibole in pale to mid-green grey feldspathic matrix. Mafic rather than ultramafic.

Foliation is weak to moderate, difficult to measure.

SAMPLE 89-397

Don't see any sulphide, and don't see any of that SC from last slab.

Heading due north for 100 m
Target El. 1475 m. At 1450 m.
a.v.f.

TUESDAY, AUGUST 29

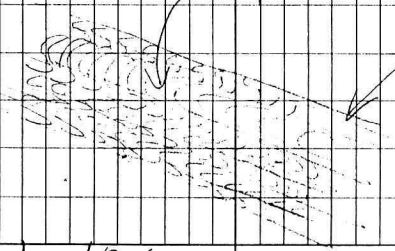
Clear sunny. Working around camp in morning.

89-398 (1530 m)

Think this complicated area of 3D, 3F and skarn is distinguished by very tight F_2, possibly complicated by F_3 folds.

Contact between 3F (below) and skarnified 3D (above) in this immediate area is zig-zagged due to tight to isoclinal F_2 folds. These folds are visible in the marble and S_{0-1} is nearly at a high angle to southwest dipping S_2

N S



see photo FIELD

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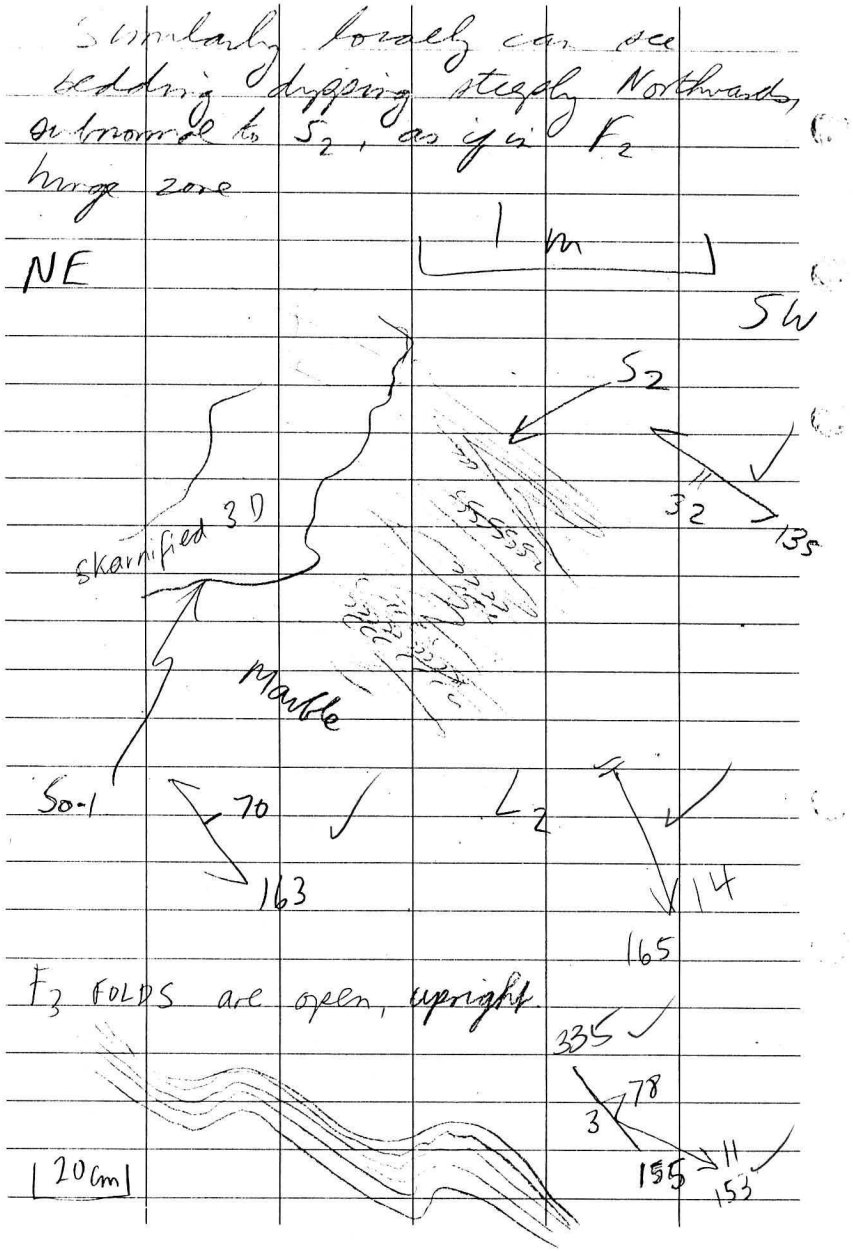
Similarly locally can see bedding dipping steeply Northwards, or ironically to S_2, as in F_2 hinge zone



Lithologie:

Marble is mid-grey weathering. Fresh is pale to mid-grey, medium to coarse grained, well foliated and laminated with some calc-silicate laminae and thin micaceous laminae. Overall a phyllitic-like texture.

SAMPLE 89-398

Skarnified 3D (3DM) is creamy-buff-brown weathering, creamy-buff fresh, medium to coarse grained. Faintly laminated, weakly foliated. Protolith may marble rather than calc-silicate, but locally remnants of 3D-like calc-silicate imply latter. Calcareous

SAMPLE 89-398

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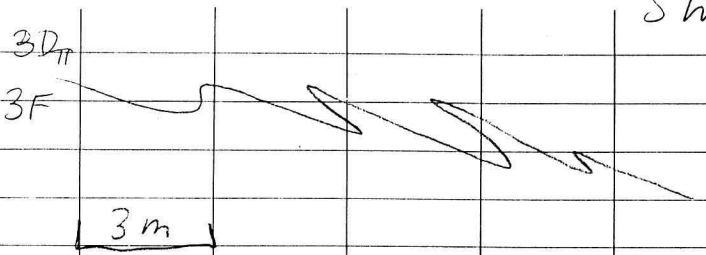
NE

SW

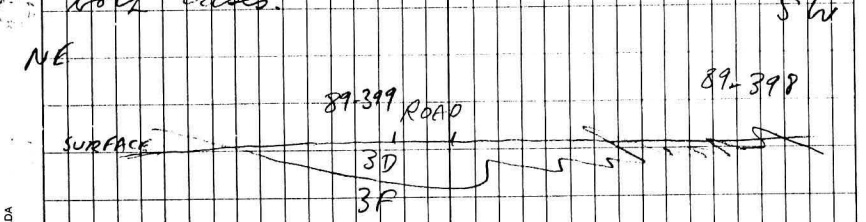


Interpretative cross-section through this area to show inferred structural style of F_2 (F_1+F_3) folding.

89-399

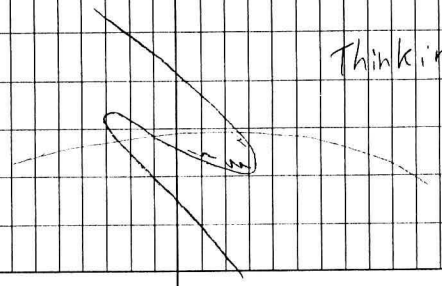
3D calc-silicate finely bedded and foliated. Looks like there's tight F_2 minor folding in it.

I've provisionally put this 3D that outcrops NE and SW of the road cut on F_2 fold because the marble that occurs on either side of it appears to be structurally below the 3D, in both cases.



Sort of fits with outcrop pattern to East.

89-400



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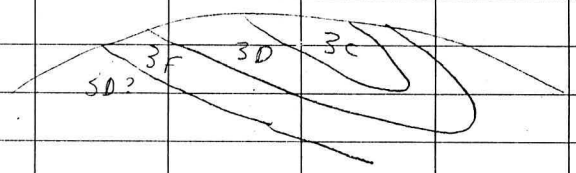
FIELD

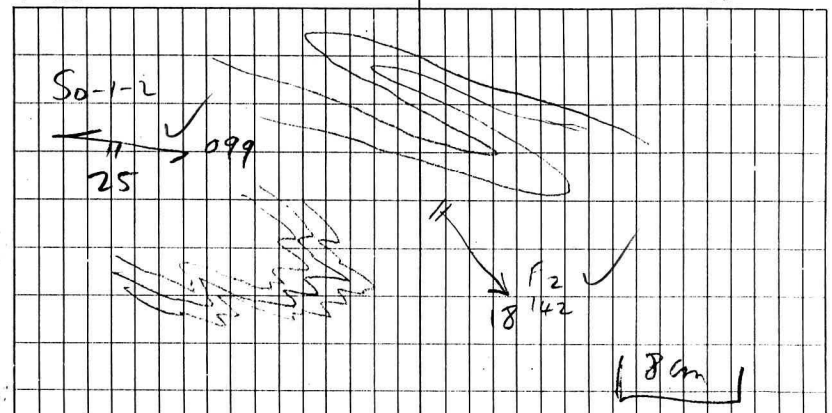
NE SW



This station nonetheless in hinge zone of postulated fold. Fold would be a synformal anticline, if SW-verging, with SW dipping axial surface.
(3C in core, 'overlain' by 3D, 3F and probably 3D beneath that.)

Certainly a lot of tight to isoclinal F_2 folds at this station in 3C, 3D and higher up slope in 3C. Most folds are symmetrical. Of asymmetric F_2's, at least as many are NE-verging as SW-verging, which is important because NE-verging F_2 are rare. So this fits with this station being in hinge or on overturned limb of postulated fold.

NE SW



Hinge to NE-verging F_2 folds in calc-silicate

89-401

Grey to dark grey well foliated biotite schist that I'd think is a homfelsed version of a pelite-rich 3D. It seems to form a tongue within 3C so I presume it's in the hinge zone.

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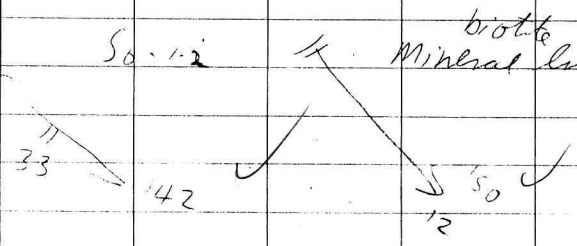
FIELD

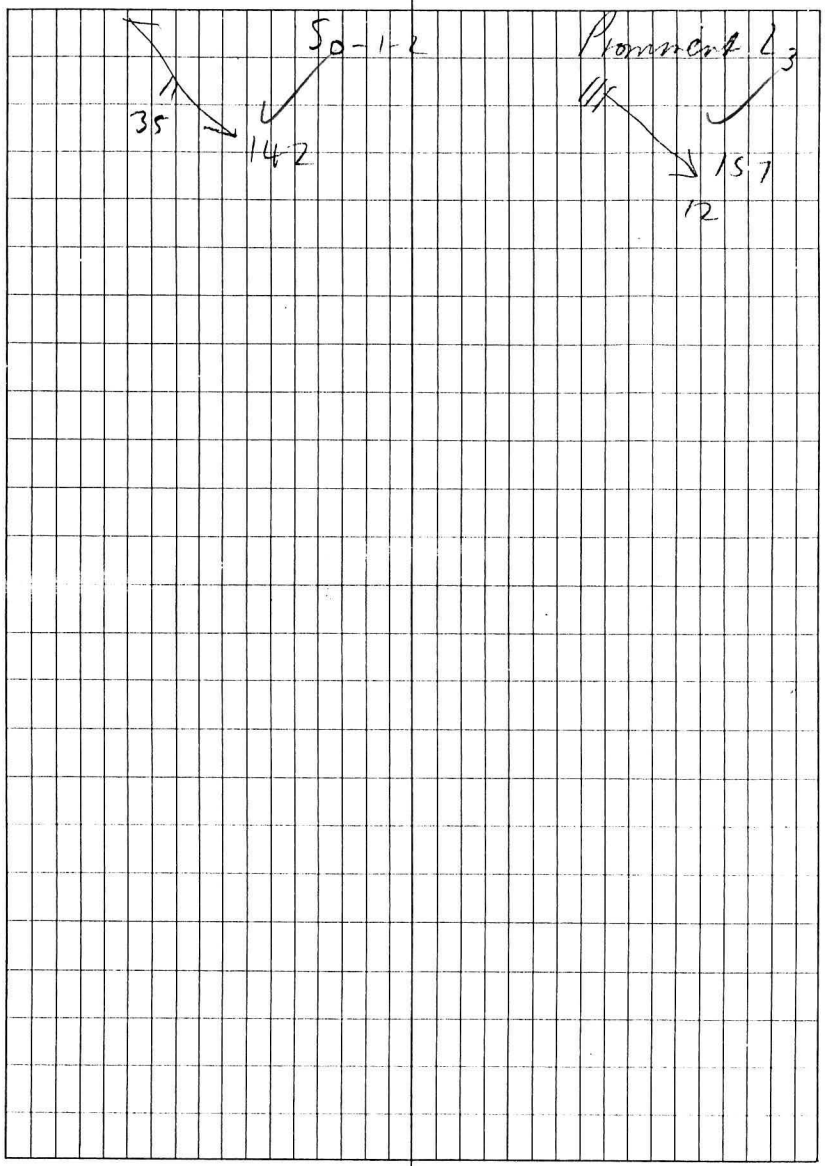
Grey to dark grey, fine to medium grained, with coarse dark brown biotite porphyroblasts which define a good mineral lineation. Well foliated in a pale greenish-grey matrix which looks like it might contain calc-silicates.

SAMPLE 89-401



89-402

A relatively thin marble, 2-3m thick sandwiched between 3D. Marble is quite skarnified, 3D not very skarnified.



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FIELD

WEDNESDAY, AUGUST 30

Clear, sunny, cool. Working in morning on ridge à Stelk 6 Mt. with Audrey.

89-403 (1750 m)

Thin marble, 2-3 m thick, sandwiched between variably skarnified 3D.

3DTT is grey to buff medium to coarse grained weakly layered skarn calc-silicate. Relict zones of 3D visible - thinly layered pale grey calc-silicate and grey fine grained pelitic phyllite/schist.

Marble is mid- to pale grey, weathering buff-grey. Medium to coarse grained, well foliated and laminated with thin biotite laminae and thin (1-2 mm) calc-silicate microlithons.

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S_0-1-2

L_2

20 → 097

15 → 127

89-404 (1725m)

Definite o/c. 3C$_A$

S_0-1-2

21 → 092

89-405

Strongly foliated, fine to medium grained 3C$_A$ with 1-2mm hornblende augen in foliation. Looks identical texture to metabasite at 89-313, so they may be the same

metabasite

S_0-1-2

24 → 133

89-406 (1640m)

Definite o/c

Weakly to moderately skarnified 3D. Thinly and finely layered, moderately foliated. Weathers creamy-orange, buff grey. Fresh: pale to mid-green, fine grained calc-silicate with minor laminae of maroon-grey fine grained more pelitic material. No IOF around.

S_0-1-2

32 → 110

SAMPLE 89-406

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89-407 (1750 m)

Typical 3D calc-silicate. Thinly to moderately bedded, moderately foliated. Pale green-grey calc-silicate alternating with equal amount of dark rusty-grey biotite phyllite / schist. Relict F_2 hinges recognizable, but bedding has been ~ completely transposed. Some calc-silicate beds up to 30 cm thick but most are much thinner.

So-1-2

40 → 093

89-408 (1770m)

Typical 3D calc-silicate. Calc-silicate rich here, just 5m from contact with grey-brown rusty pelite rich 3D that comprises the lower levels of this whole cliff face.

So-1-2

36 → 107

89-409 (1740m)

Outcrop almost certainly in place. Medium to coarse grained biotite schist. Anastomosing foliation, fine microlithons, no longer scale bedding visible. Weathers mid to dark grey/red-brown. Fresh colour is pale to dark grey, only slightly greenish.

Looks very similar to 1C0 schist. In another outcrop I would be happy to call it that. But doesn't fit here, so have to call it an unusually pelitic and coarse grained facies of 3D. A bit worrying though.

SAMPLE 89-409

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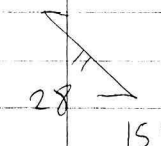
89-410 (1650m)

Same rock as last station, only even more like ICD schist here. Slightly rusty brown weathering, anastomosing, not very platy, foliation, brittle-ish and quartzo-feldspathic. No calc-silicate. Only thing differs from good ICD is it lacks garnet and staurolite and isn't quite as rusty weathering. But looks much coarser and brittler than pelite 3D.

SAMPLE 89-410

Tentative So-1-2
-may have shifted



N.B. This rock doesn't have the chloritic prismatic pseudomorphs that Pelite 3D has.

89-150 (REVISITED)

Marble. Took a sample.

N.B. If that really was ICD down there, this is the lower of the two lower Vangorda marbles. The metabasite is immediately beneath it here, instead of being central in deeper, as to the east.
(Transgressive sill?)

89-17 REVISITED

Could the two marbles in this little block be the two lower Vangorda marbles? It could fit. Problems are

1. It would have to be a quite displaced block
2. Lower marble is very thin (2-3m)
3. The marbles are too close together. (20m) or less)

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THURSDAY, AUGUST 31

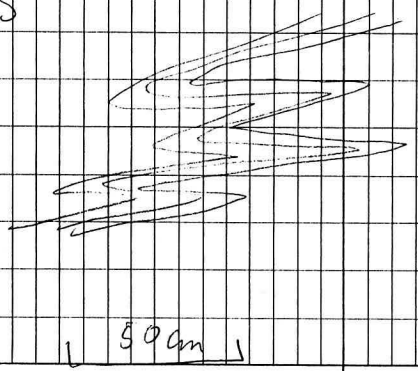
Clear, sunny. Frosty night.
Working east of camp, folding area.
Last day with Audrey.

89-211 REVISITED

Checking this area again because of the new folding model that came about 2 days ago. Certainly a lot of folds in these rocks. Anomalous thickness of marbles is thus explained.

Really nice F_2 folds in this marble. Very tight, basically

S N



50cm

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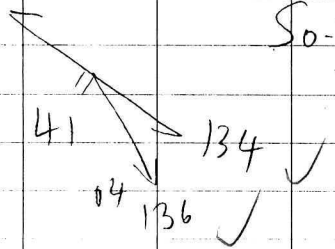
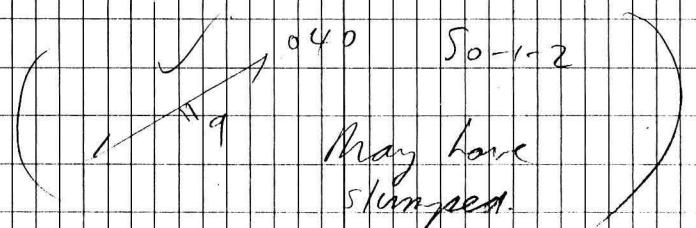
symmetrical, hinge, with a tendency towards SW-verging (which is wrong - should tend toward NE-verging because 3c is below and is supposedly structurally deeper, but it's not a big deal). - Can see some small NE-verging folds up close.
Took photo.

In upper part of 211 the marble

S_{0-1-2} and F_2.



89-411 (1545m)
3D calc-silicate. Clear differentiation between pale green grey calc-silicate (dominant) and dark mauve-grey pelite on mm to 2-3 cm scale. Pelite is lamminae of lenses up to 15 cm long, disembedded in S_2.
Can see some boudinage, and a few F_2 mm-scale folds, most of which are NE-verging, unfortunately - they showed vergence SW.



Not plotted

89-412 (1560m)
Same 3D calc-silicate. Not particularly many F_2 structures in this o/c.

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So-1-2

11
27 → 128

(upper part of exposure - highest - no ~~t~~ have a capping of 3C, - but not at all clear)

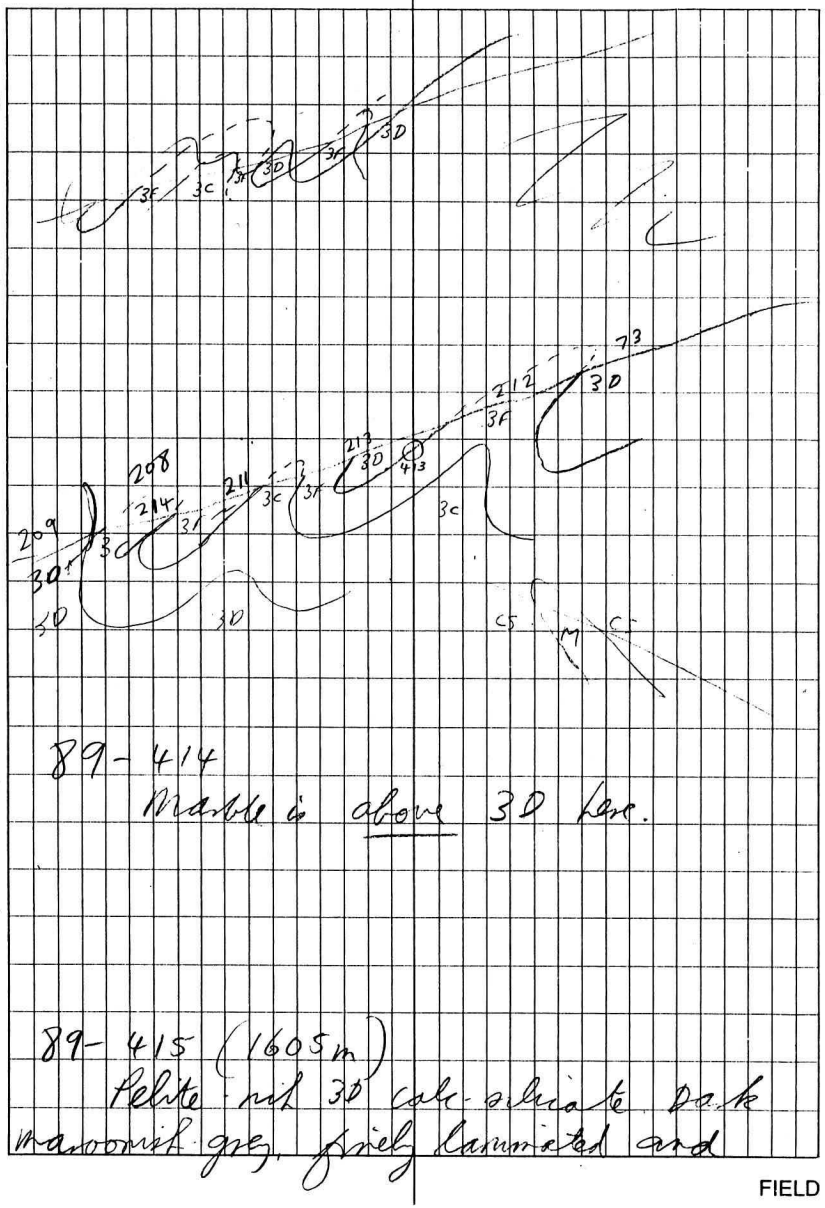
89-413 (1530m)

Contact between marble, below and 3D calc-silicate above. This must be the upper contact of the marble antiform while 3D at 89-411 and 412, the 3D was below the marble.

See several minor folds, some seem to be SW-verging unfortunately, with one possible NE-verging. But nothing very clear.

So-1+2

11
31 → 116



89-414

Marble is above 3D here.

89-415 (1605m)

Pelite - mil 3D calc-silicate. Dark maroonish grey, finely laminated and

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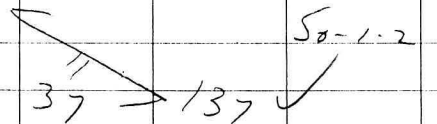
foliated. Medium grained with shiny sparkles of biotite — has a homfelsed look and feel about it. Could be skarning effect.



SAMPLE 89-415

89-416 (1560m)

Consulted this marble to see if it looks like the very impure marble mapped in 3D in Mt. Mye west of camp.

Unfortunately, while it is not a very clean marble, it is quite homogeneous and not riddled with 3D as the other marble is. Couldn't

really differentiate it from Vangorda marbles.

SAMPLE 89-416

Station 89-191 to west has 3A until 4m to 1m thick marbles in it, and this looks more like the marble west of camp.

Overall, still inconclusive.

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FIELD

SUNDAY, SEPTEMBER 3

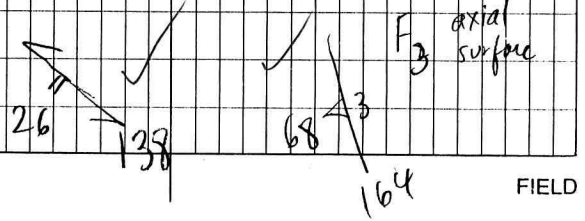
Drove in alone to complete mapping and pack up camp.

Cloudy, cool, a bit threatening. Rain later.

89-417 (1605 m)

Approximate contact between typical calc-silicate 3D above and more pelitic calc-silicate below. Latter weathers slightly rusty, grey-brown. Fresh is dark maroon grey, fine to medium grained biotite schist. Much too fine grained for 1C0. Moderately foliated, thinly to finely bedded and laminated. Probable chloritic pseudomorphs on cleavage faces.

SAMPLE 89-417



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FIELD

Rain

TUESDAY, SEPTEMBER 5

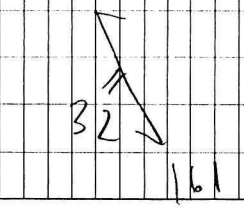
Cloudy but basically dry. Taking down camp today and driving out to mine.

Doing some last minute mapping, to west end and around camp. First west end.

89-418

Pale to mid-grey-green weathering rusty in very fine grained pale green to mauve-grey non to moderately foliated, siltstone / phyllite. Could be a low grade SD. Not pelitic enough for SG or SG. Quite chloritic

SAMPLES 89-418



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89-419

Grey, neutral-grey, pale to mid-greenish-grey, moderately and thinly bedded phyllite and siltstone. Parts are very fine grained and finely foliated and look just like SB ↘

SAMPLE 89-419

And parts look like 89-418 which looks like it could be low grade 3D. This lithology is much more poorly foliated, probably because it has more calc-silicate minerals in it.

CAMP AREA

89-420

Locally skarnified 3D. Non-skarnified 3D is notable for being rich in those porphyroblastic ? chloritic crystals, normally found in more pelitic 3D.

Also has common ovoid porphyroblast, usually 1 cm diameter, flattened obliquely to S_{0-1-2}.

SAMPLES 89-420

Don't know what they are.

S_{0-1-2}

32 → 146

SOUTH of Kitchen

89-421

Typical 3D calc-silicate.

S_{0-1-2}

39 → 139

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feldspathic lammae. Staurolite, chiastolite-looking garnet usually visible. At least in outcrops. Some samples e.g. 89-31 have sillimanite.

VANC. PET. SAMPLES: 89-94, 318, 409 (3)

B. 3D Calc-silicate

89-401	119	232	393
103	38	368	300
79	101 x2	347	172
250	294	198	218
312	110	159	

This group is the typical thinly to finely banded calc silicate, with alternating pale grey-green very fine to medium grained calc-silicate and dark to mid-grey, or purplish-mauve-grey, well foliated, fine to medium grained (biotite) pelite psyllite/schist. Lithons vary from (sub-)mm thick in well and finely foliated examples (e.g. 119, 101) to several mm thick. Pelitic lammae are usually laminated, discontinuous.

N.B. 101 pelite is dark grey, graphitic.
89-110 has green amphibole segregations.
89-312 has incipient skarnification.

VANC. PET. SAMPLES: 89-38, 101, 119, 250, 110 (5)

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89-422

From Dy area, from traverse with John Bosford, Ken McClay and students. Seems to be coarse grained igneous granitoid protolith. Relict white feldspar and grey quartz. Now strongly foliated and transposed into quartz and feldspar ribbons and feldspathic augen shaped porphyroclasts. Also black very fine grained bands tentatively identified as cataclasite — brittle to semi-ductile mechanical breakdown of quartz and feldspar at very high strain rates resulting in cataclastic flow and extreme reduction in grainsize.

THURSDAY, SEPTEMBER 7

At Grum camp, going through samples to pick out sample suite.

Divided samples up according to basic lithologies, in no order.

A. ICD MA Mye pelitic schists.

89-31 409
41 410
94 ×2
179
318
367
384

Rusty-brown-weathering, medium to coarse grained, well foliated with anastomosing S_0-1-2. Fine microlithon layering, irregular, between dark brown rich micaceous foliae and pale buff-grey to dark blueish-grey quartzo-

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C. 3D calc-silicate.

89-115
142
333
122
265
359

Basically same unit as B, but separated these six samples because calc-silicate part is darker and more greenish. Pelite tends to be more grey and carbonaceous looking, too e.g. 89-142, 265, 333

General description:

Finely banded and foliated fine grained mid to dark grey-green calc-silicate — (graphitic) pelite. Main difference from B. is lower amount of calc-silicate and C-S is less pale and 'pure'.

VANC. PET. SAMPLES: 89-142, 359 (2)

D. 3D calc-silicate-nil calc-silicate

89-406
282 x2
322
89-13

These are medley samples, probably from within a normal 3D succession, which happen to be almost entirely calc-silicate as opposed to C-S plus pelite.

Pale creamy-green-grey, fine to medium grained. Faint colour banding, very weakly foliated from disseminated ?mica, amphibole. Generally massive

89-282 has pyrite and sulphides.
89-322 has unknown pinkish-brown prismatic mineral and unknown white fibrous mineral (wollastonite or tremolite).

VANCOUVER PET. SAMPLES: 89-282, 322 (2)

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E. Pelite-rich 3D 'calc-silicate'

89-38	88	374
89-382 x 2	52	420A, B
167	362	
377	73	

All these rocks look very much the same. May have called them 1D in the field. Basically a pelite schist/phyllite of the type associated with calc-silicate, but here lacking significant calc-silicate lithons or microlithons on the 'outcrop' scale.

Grey to slightly rusty-brown weathering. Fresh is mid- to dark maroon-grey. Fine to medium grained. Characterised by fine mm to sub-mm microlithons and penetrative foliation, alternating between biotite pelite microlithons and a mid-grey quartzofeldspathic microlithons. All very well foliated and laminated. Similar lithology to 1C but here foliation is flat and parallel rather than undulating and anastomosing like 1C. Don't know yet whether the q/f microlithons have a C-S component.

Also characteristic is good F_2 microfolds, mic chevrons, moderate to tight. Several oriented samples.

N.B. 420 has unknown blotchy minerals and prismatic crystals (420-B)

EE.

89-199	255	417
200	415	

Still basically pelite-rich 3D, probably the same lithology as E. Difference is these rocks are more recrystallized, perhaps an annealing at high grade or hornfelsing. Distinguished by 'sparkly' biotite blastesis on top of the So-1-2 fine to medium grade psammites, and by a spotting by a pale blue-grey spotted mineral in 1mm oval spots. Looks like cordierite but may be wrong

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Calc-silicate is darker and finer than normal 3D. Poorly foliated. Perhaps not very dissimilar from Unit C.

Variety of low grade 3D which is very pure, clean, pelite poor and usually has significant carbonate (and which I called 3E):

89-396
274

Very pale grey-creamy-green. Fine to very fine grained. Usually bedded on cm-scale, very poorly foliated. Hard, except calcareous parts. Seems to be calc-silicate ± marble. I think it's low grade calc-silicate not 3D because of its finer grain-size and poor metamorphic differentiation.

VANC. PET. SAMPLES: 89-274, 418 (2)

H. Marbles 3F

89-96	265	366	388
108	300	387	416
150	320	368	398

Usually pale to mid-blueish or greenish-grey, fine to coarse grained. Usually thinly laminated with carbonate alternating with dark mauve-grey pelite (very thin ≤ 1 mm) or pale grey-green calc-silicate as in 3D. In both As a result of the pelite or c-s bands, marble has a ribbed grooved rough weathered surface.

89-368 is marble from near 10E

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composition for that. Spotted samples are 200 and 255.

VANC. PET. SAMPLES: 89-167, 382, 377, 420 x2, 255, 417 (7)

F. Low grade pelite 3D, perhaps transitional between 3B and 3D

89-57	118	419
143	277	
132	275	

Grey to rusty-brown weathering. Fresh is fine to very fine grained, finely foliated, mid- to dark carbonaceous phyllite. Shiny very dark foliaceous phyllite surfaces, very fine grained are characteristics. Usually good S_2 / S_{0-1} spacing and resolution but not much of a compositional mesolithon differentiation.

Very close to 3B phyllite, but a bit more recrystallized. Could well be a low grade equivalent of unit E. Shows up S_3 crenulations on S_{0-1-2} surfaces.

VANC. PET. SAMPLES: 89-132, 143 (2)

G. ? Low-grade calc-silicate mid 3D

89-418 x2

-281

Mid-grey-green fine to medium grained with ill-defined definition of calc-silicate and pelite.

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Metabasite

- Includes mafic and ultramafic rocks. Can break these up into

J. i. meta-pyroxenite (3Cp, 5Cp)

K. ii. meta-gabbro (3CA, 5CA)

L. iii. Amphibolite, greenstone (3C, 5C)

M. iv. Fine fibrous ?amphibolite (3C)

N. V. Miscellaneous meta-basites

J. Meta-pyroxenite (3Cp, 5Cp)

89-146 X 3 89- ? (west end)

264

Dark green, inequigranular, generally massive. Relict pyroxenes or pyroxene replaced by hornblende forms ~40% of rock in dark green fine to medium grained matrix. Fresher px weathers pale and turquoise green with fine magnetite segregations visible. Magnetic. Phenocrysts usually altered to nearly black hornblende. Typical size 3-4 mm across. Weak foliation locally.

Chrysotile asbestos forms veins and veinlets up to several cm thick, commonly 1-10 mm.

VANC. PET. SAMPLE 89-146 (1)

K. Meta-gabbros (3CA, 5CA)

89-178-A 343

-271 397

Distinguished from J by a paler green-grey presumably plagioclase bearing matrix indicating mafic rather than ultramafic.

Weakly to strongly foliated, inequigranular, with dark green hornblendes (30-40% of rock) up to 6 mm, usually 2-3 mm. Usually equant or augen shaped in well foliated examples. Matrix is fine to medium grained, pale to mid-green grey, weathering pale orange white or grey. Speckled texture characteristic.

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dike. Pale bluish-grey coarse grained marble with epidote-rich calc-silicate. Rich in brown red garnet in bands or disseminated in marble.

Another, unique variety is black or dark bluish-grey, fine grained thinly bedded carbonaceous marble (89-265)

VANC. PET. SAMPLES: 89-108 ✓ 265 ✓ 388 ✓ (3)

I. Skarn	3Dπ, 3Fπ or 3π	
89-72	127	366
77	246	398
136x2	257	

Variety of lithologies and textures. Weathers creamy buff, pale creamy-green. Typical is medium to coarse grained, poorly to non-foliated and layered, sparkly crystalline texture of pale grey to pale green calc-silicate or plagioclase and a pale orangey-brown mineral (equant? or prismatic or both). Some green amphibole.

Another variety is green calc-silicate, probably most or all diopside (89-72, and 89-136). 136 has galena, sphalerite and pyrite and pyrrhotite. Brown mineral in 89-72 -?

89-366 is a marble skarn (3Fπ) whereas others are probably all from 3D. 366 has clean marble and a thick band of pale creamy brown calc-silicate.

VANC. PET. SAMPLES: 89-246 ✓, 257 ✓, 136 ✓ (3)

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89-178 is strongly foliated and has local biotite foliae.

89-271 has 1% mid-bluish grey non-magnetic sulphide.

89-271 and 397 are virtually identical

VANC. PET. SAMPLES: 89-271, 178-A (2)

L. Amphibolite, greenstone (3C, 5C)

89-38	113	258	395 x2
61	144	270	
69	155	341	
88	211	386	

Some variety here, but not really worth dividing up. All are probably meta diabase. Some are well foliated and banded (38, 155, 211, 386) while others are weakly to well foliated and more homogeneous.

Typically, mid to pale green, greyish-green, medium grained. Usually has a moderate to good foliation, defined by finely spaced chlorite foliae with or without well aligned hornblende. All probably have significant amphibole. None are very chloritic really. Paler green samples may have epidote.

Banded samples have 1-10 mm thick bands of pale to mid green phenocrysts ± epidote rich bands parallel to foliation.

89-395 has ? 2-3% fine to medium grained galena strung out in foliation.

VANC. PET. SAMPLES: 89-211, 270, 395 (3)
plus blind thin

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M. Fine fibrous ?amphibolite
89-29, 353.

These two samples are virtually identical. Except 353 has a coarser amphibole on weathered surface.

Fels, medium grained, composed almost entirely of a mat of fine fibrous looking ?amphibole or possibly serpentine. Has a crenulated texture though there is a spaced planar foliation. All mafic, no plagioclase detectable.

VANC. PET SAMPLE: 89-353 (1)

N. Miscellaneous meta-basites
89-167,
178-B
204 should be 205

89-167 is strongly chevron-crenulated chlorite phyllite. Pale to mid-green, fine grained. Rather unique lithology.

89-178-B is amphibolite rich in mid-brown-weathering green amphibole, in coarse radiating rosettes. Spaced chlorite fine grained foliation.

89-204 (205) is unusual, dark green medium grained, ?amphibolite meta-basite with several % sulphides.

VANC. PET. SAMPLES: 89-178-B, 204 (2)

O. Ultramafic
89-422
See description.

VANC. PET SAMPLE. 89-422 (1) FIELD

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Special in Blanchard.

89-101 - section line marked. $\parallel L_2$

89-409, 318, 94. Prob. contain andalusite and/or sillimanite

89-322 Please try to identify white fibrous mineral on foliation surface, and partial brown mineral

89-382 has section line. Orientation mark is aligned NW to SE Please indicate whether section faces NW or SE

89-167. Section line marked.

89-420A Section line marked. Identify blotchy-porphyritic mineral in foliation

89-420B Section line marked. Identify coarse prismatic porphyroblasts

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89-417. Identify prominent porphyroblasts

89-255. Identify small pale grey ovoid porphyroblasts

89-132, 143, Section lines marked

89-274. Section line marked

89-265. Section line marked

89-136. Section line marked Polished thin section required

89-178 A Section line marked

89-271 Polished thin section

89-395 Polished thin section

89-353 Identify dark prominent porphyroblasts on foliation surface.

89-178 B. Identify mineral(s) in rosettes.

89-204 Section line indicated. Polished section required.

89-422. Section line indicated. Try to choose section area by sampling as many of fabric textures as possible, including black lenses.

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FIELD

MISSING STATIONS:

1) CR 89-53 (?) - ON MAP - i.e. ACAD file

2) * NOTE: missing page of CR's notes containing information from stations # 89-83 and # 89-84

3) CR 89-88 (?) - ON MAP

4) Missing - CR 89-112, -113, -114 in CR's notes; these stations are on map.

5) ON MAP - 89-115

6) ON MAP - 89-125

7) ON MAP - 89-140

8) ON MAP - 89-161

9) ON MAP. - 89-194

10) ON-MAP. - 89-235

11) ON-MAP - 89-239

12) ON MAP - 89-265 + 89-266.

13) " " - 89-304

14) " " - 89-330

15) " " - 89-339, 340, 341

16) " " - 89-348 (on adjacent map?)

MISSING STATIONS

17) 89-351 (on adjacent map?)

18) 89-357 (" " ")

19) 89-378 and 89-379 (on adjacent map?) + 89-380.

20) ~~IN NOTES: Missing CR89-383. But shows later that this station is revisited? Found it on map.~~
↳ NO. - O.K.

NOTE: ended @ CR89-421