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TO : Peter Ledwidge

COMPANY : Curragh Resources FAX NO: 010-1-(103)-894 2664

FROM : Dennis Brown DATE : Nov. 19, 1991

NO. OF PAGES : 1 (including this one)

MESSAGE:

Dear Peter

Greetings from dull grey London! Very likely warmer here than Faro, though.

I have a small request. Can you send me copies of the following drill logs (only lithologies and structure);

Position of 90V-67 - section 6+00E → can't seem to locate it.

- 79V-020R ✓
- 79V-035R ✓
- 79V-018R ✓
- 79V-053R ✓
- 88V-49 ✓
- 90V-108
- 79V-308 ✓

I'd like all of these if possible, but any you can send will be a help.

I have drafted a map of this summers mapping and will try to get it to you by Christmas — or shortly after. As well, I send you copies of my interpretation of sections 8+00E, 6+00E, and 4+00E which have been constructed from the detailed logs. Also, there is a paper on the Vangorda deposit in press and I will pass on reprints when they arrive.

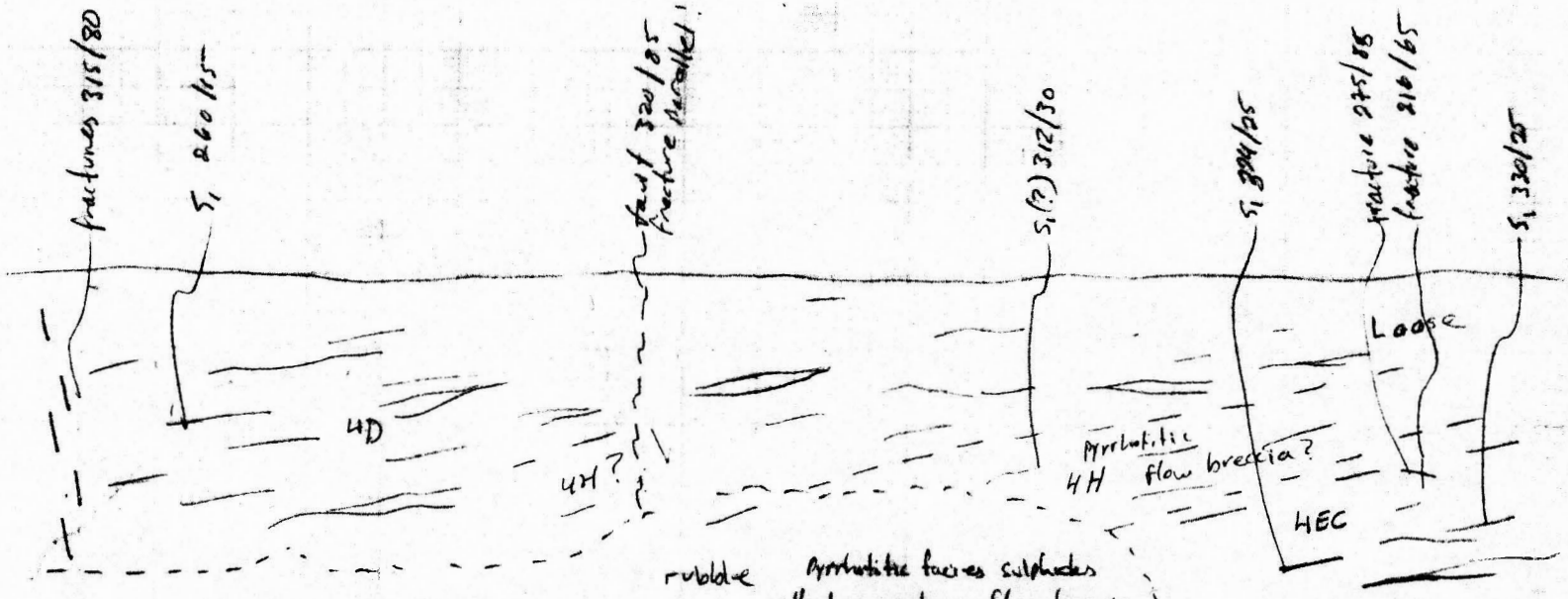
Give my regards to everyone.

Sincerely
Dennis.

PS. My address is the one on this FAX.

Scale 1:200
1138 Bench. 1991

not sure of location of 44



This is an extremely deformed area consisting almost entirely of sphalerite quartzite with variable amounts of porphyroblastic pyrite. There is quite a lot of evidence for brecciation of the more competent quartzite and incorporation of the clasts into the deforming sulphides. There is also a lot of network veining in the quartzite infilled with sphalerite and porphyroblastic Pyrite.

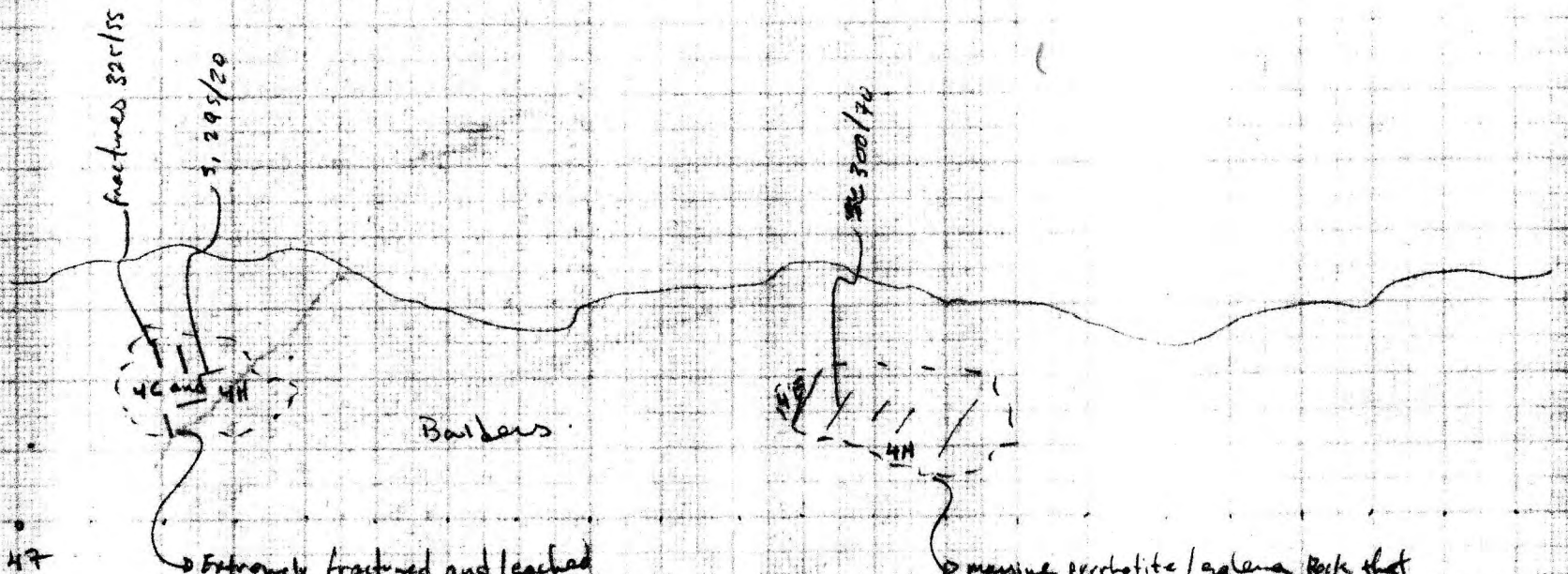
• 44

Pyrrhotitic facies sulphides that may be a flow breccia. Banding is well developed and consists of pyrrhotite bands and galena-rich bands. The zone is parallel to S1 but banding in it may be at a high angle (folded?); it may be loose. 91-P29 312/30 US
Sphalerite content in the pyritic sulphides increases near the 4H

• 43

Much evidence of recrystallisation of
Very strongly deformed. Banding ranges
several millimetres up to 10cm thick
Typically consists of porphyroblastic pyri
(grainsize is up to 2-3 mm). Banding
anastomosing and discontinuous, o
wrapping around quartz-rich zon
and clasts. Discontinuous, wispy s
bands are common, possibly an S2
small-scale vertical fractures

Scale 1:200
1134 Bench.

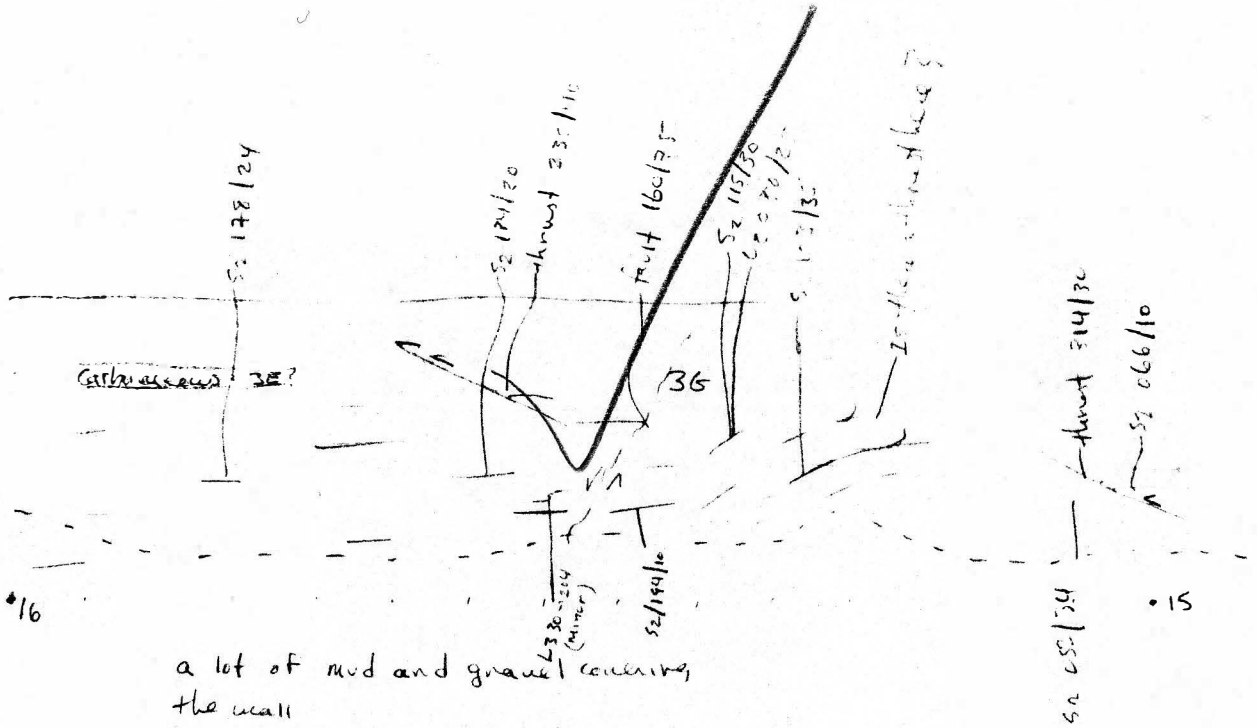


Extremely fractured and leached 4C and 4H. This looks like a serious fault but it is not well exposed.

massive pyrrhotite / galena Rock that may have replaced a 4C since bands of subvertical, west-dipping quartz occurs. There must be 4B above it but these may not be in place.

scale 1:200 08/07/91

This is a 3G → 3GQ phyllite with thin discontinuous bands of 3E running through it. There appear to be a number of minor thrusts that dip towards the SE, as do minor S_3 crenulations.

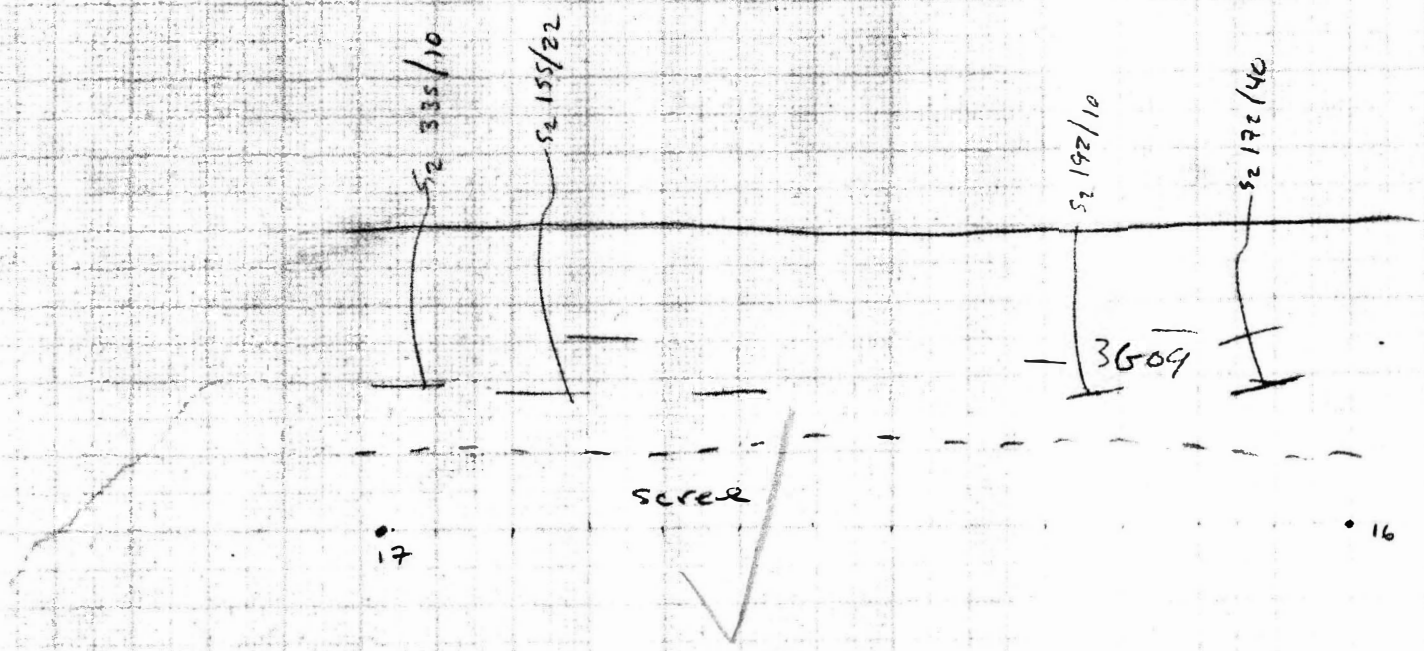


a lot of mud on the wall and only minor exposure poking through.

- quite flat lying with the S2 cleavage wobbling slightly.

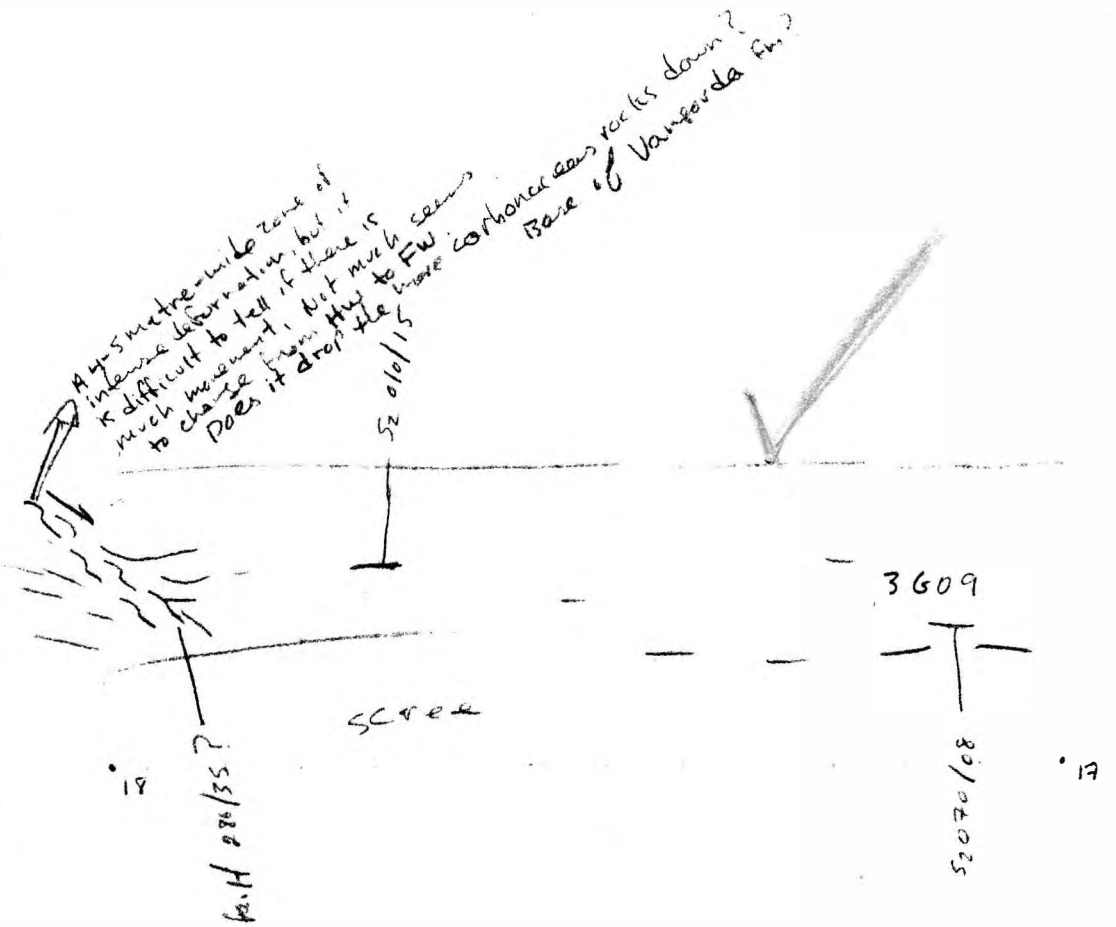
scale 1:200 looking SSW

09/07/91



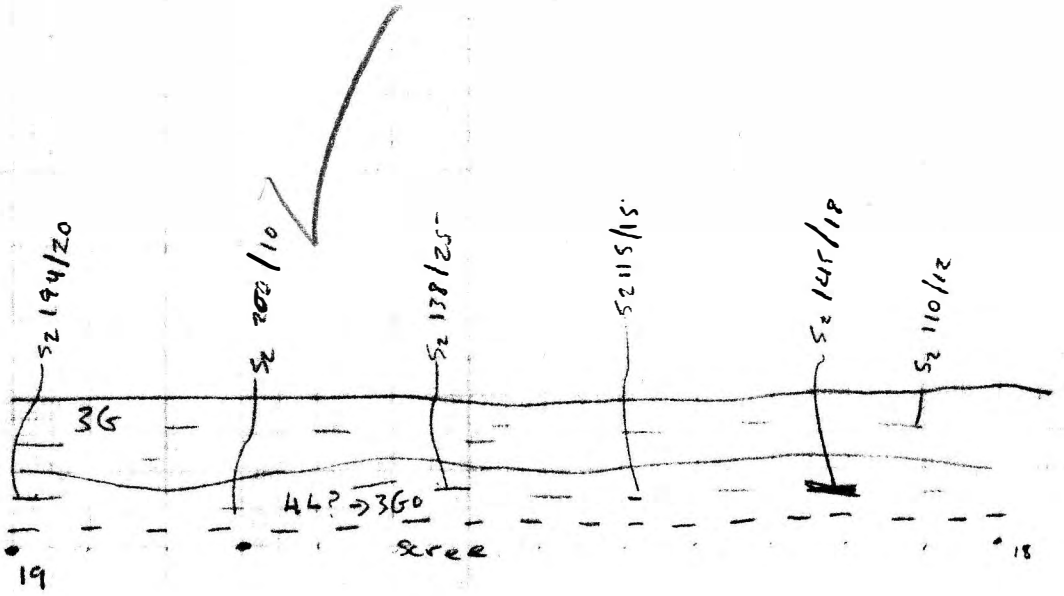
very poorly exposed.

scale 1:200 09/07/91
Looking SSW



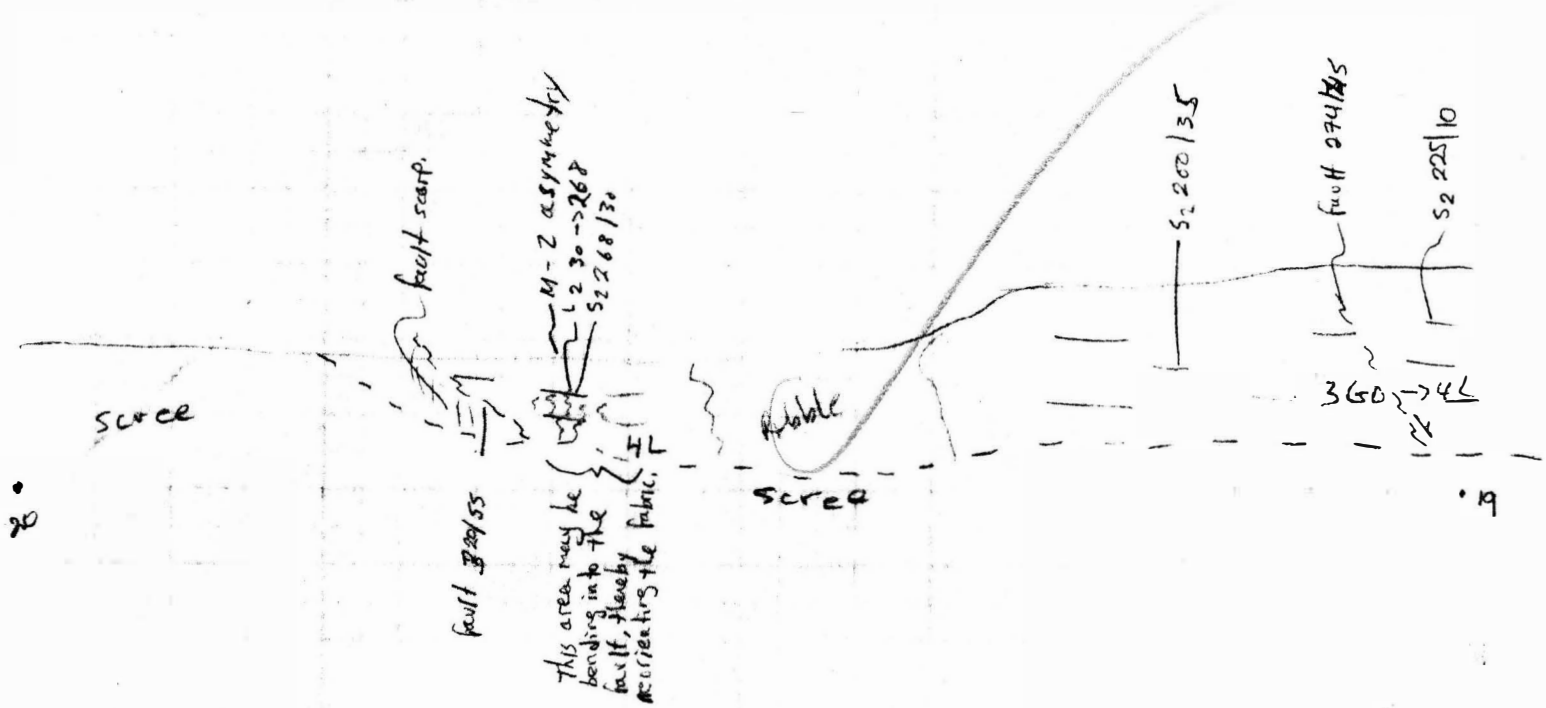
3G on top and what appears to be HL beneath. The lower unit is becoming more chloritic at any rate. Also, in the next section (19-20) it is definitely HL

Scale 1:200 09.07.91
looking SE



Scale 1:200 11/09/91
Looking SE

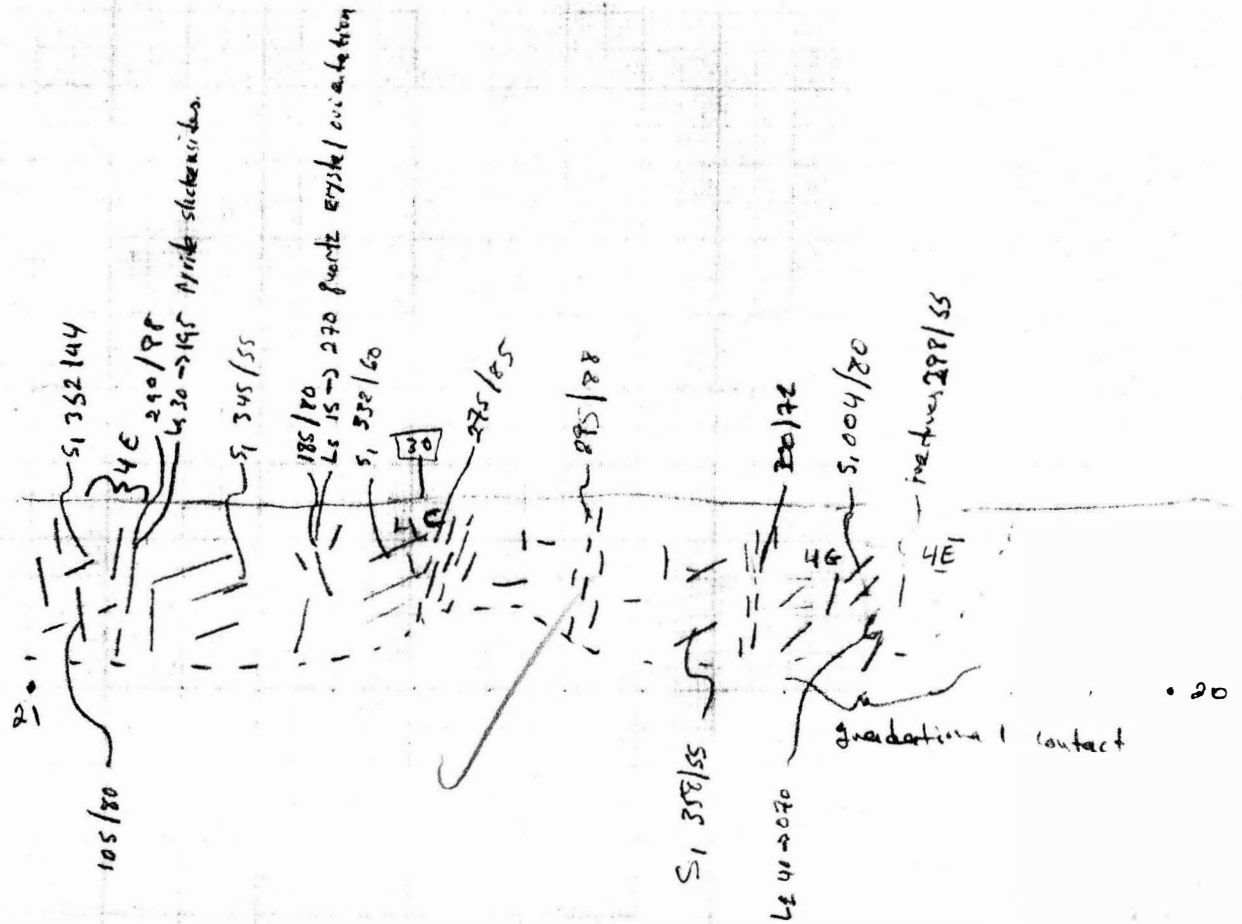
This looks pretty much like a 4L, or at least transitional from a 3G into a 4L. There is a well developed S2 cleavage and locally a lithon texture indicating a fold hinge to an overturned limb. This within a metre or two of where the Overburden fault should be. Exposure is poor and disturbed by blasting.



Scale 1:200 11/09/91
Looking east

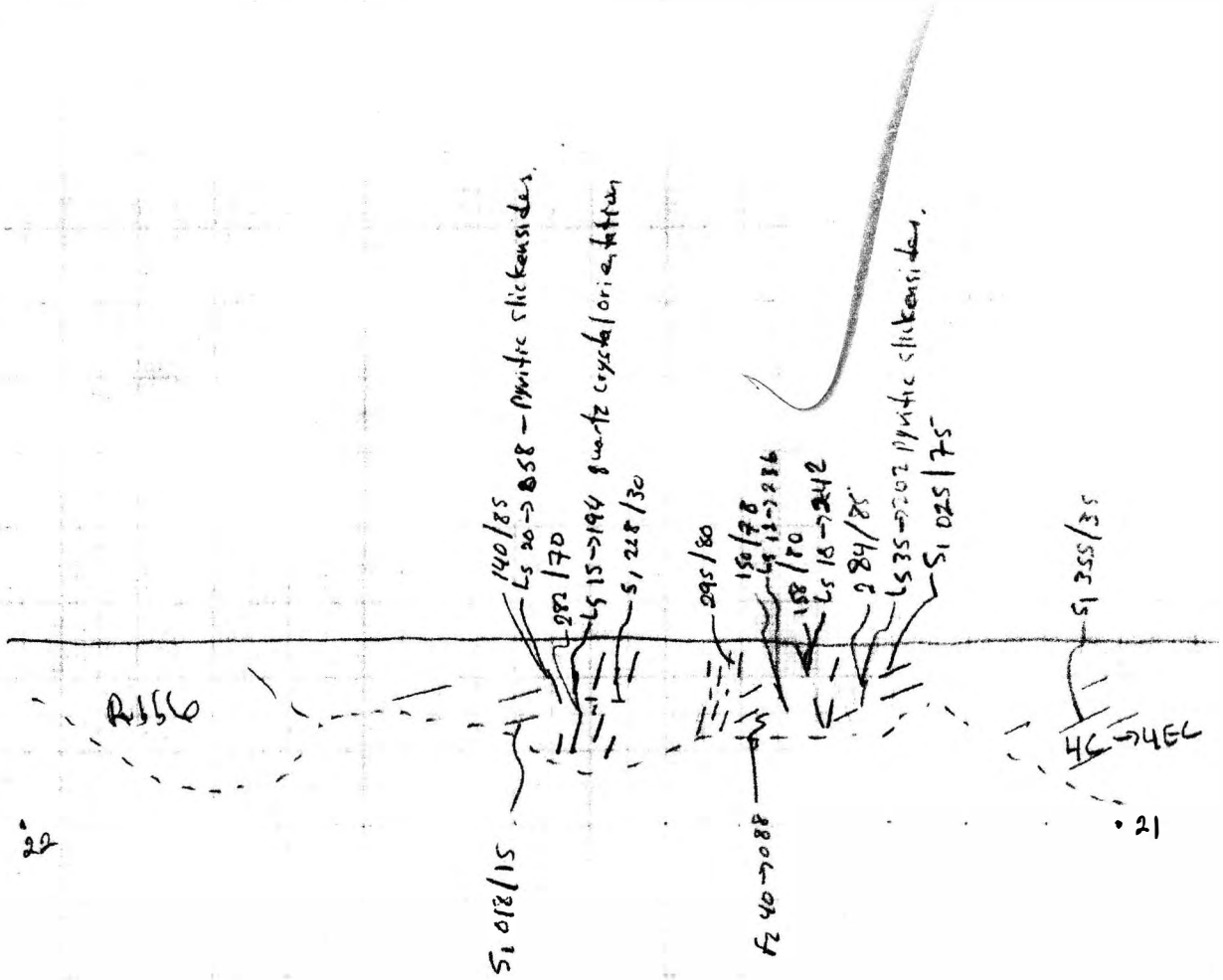
This is a zone of very intense fracture development and faulting.
It is difficult to get a good feel for the extent of faulting because of poor exposure.

However, the intensity of fracture development in localised areas indicate the presence of faults. Interestingly, pyritic slickensides on fault surfaces have a very low pitch angle indicating shallow oblique to strike-slip movement! Wadaya tink of dat?



Scale 1:200 11/09/91
Looking East

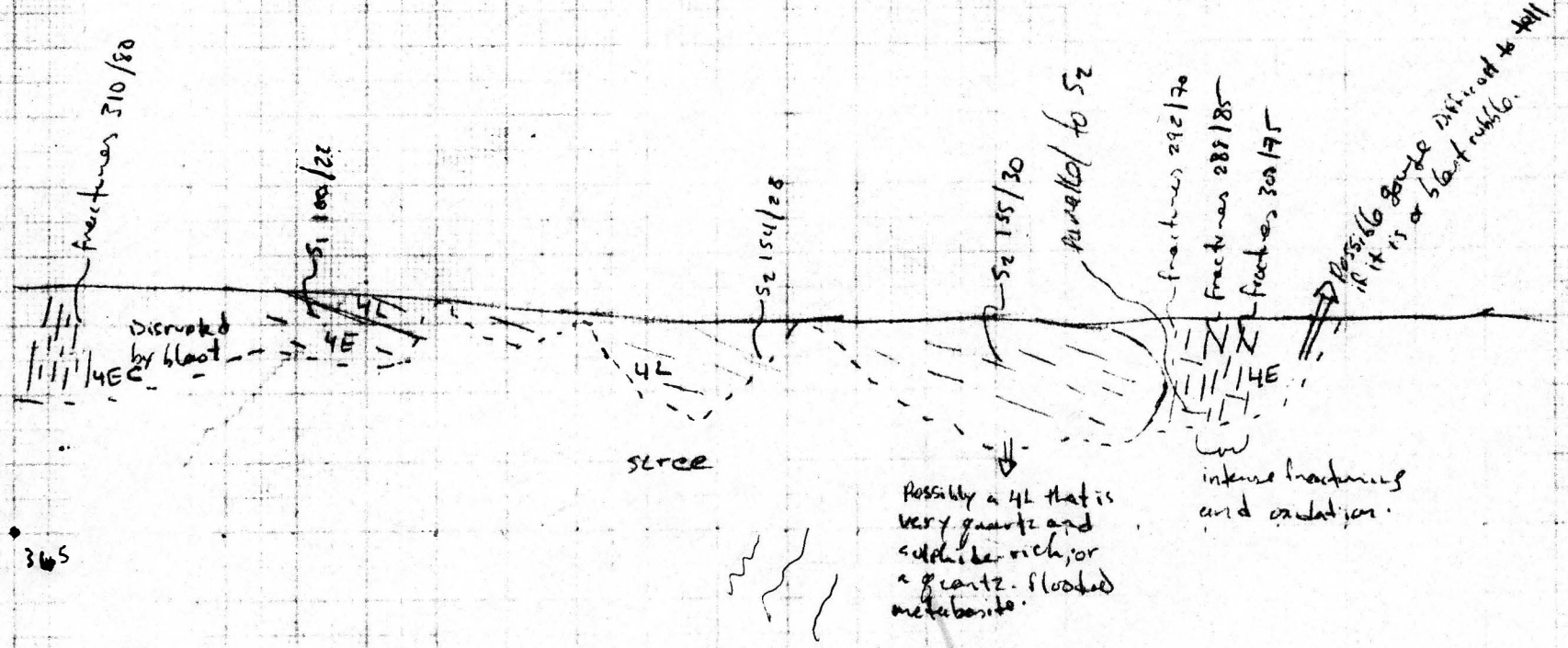
Predominantly 4C going to 4EC locally. Si dips consistently towards the north. Zones of very intense fracture development. Rock is very leached.



Scale 1:200

[redacted] Bench

1134

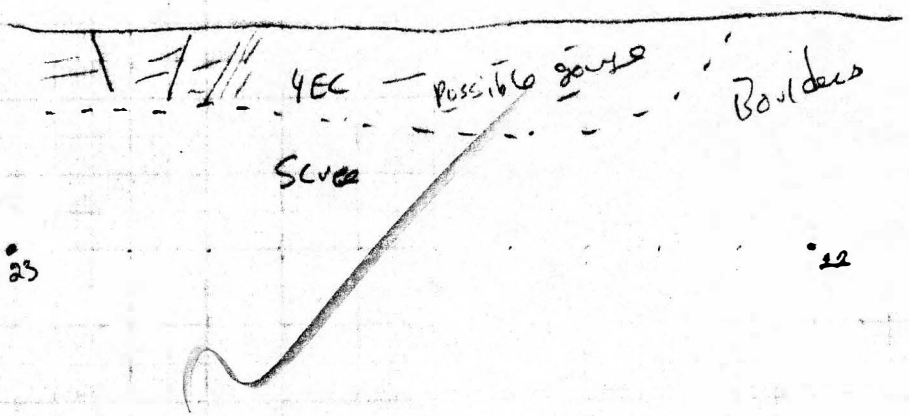


365

34

very Poorly [redacted] 4EC. There may be a gorse or is could just be oxidised.

Scale 1:200 12/07/91



scale 1:200
1134 Bench

boulders of 4EH

extremely disrupted
4A? and or 3609

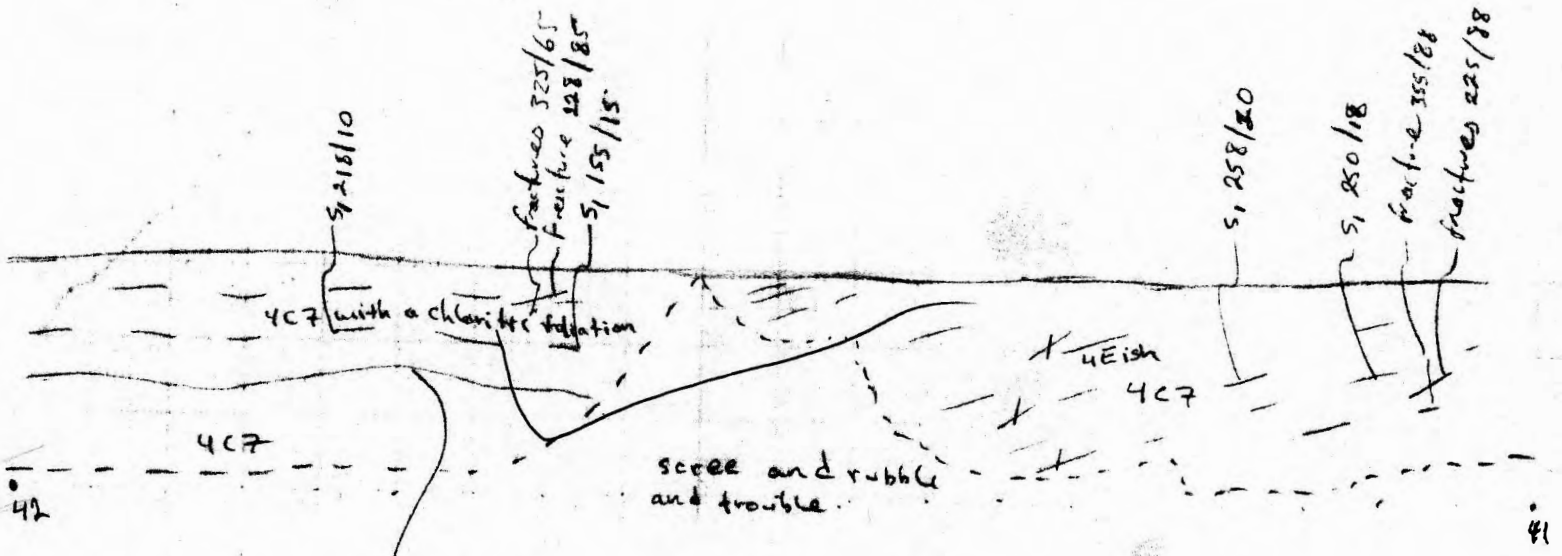
4G

45

There is nothing that can be definitely said to be in place on this face. It consists mostly of large boulders.

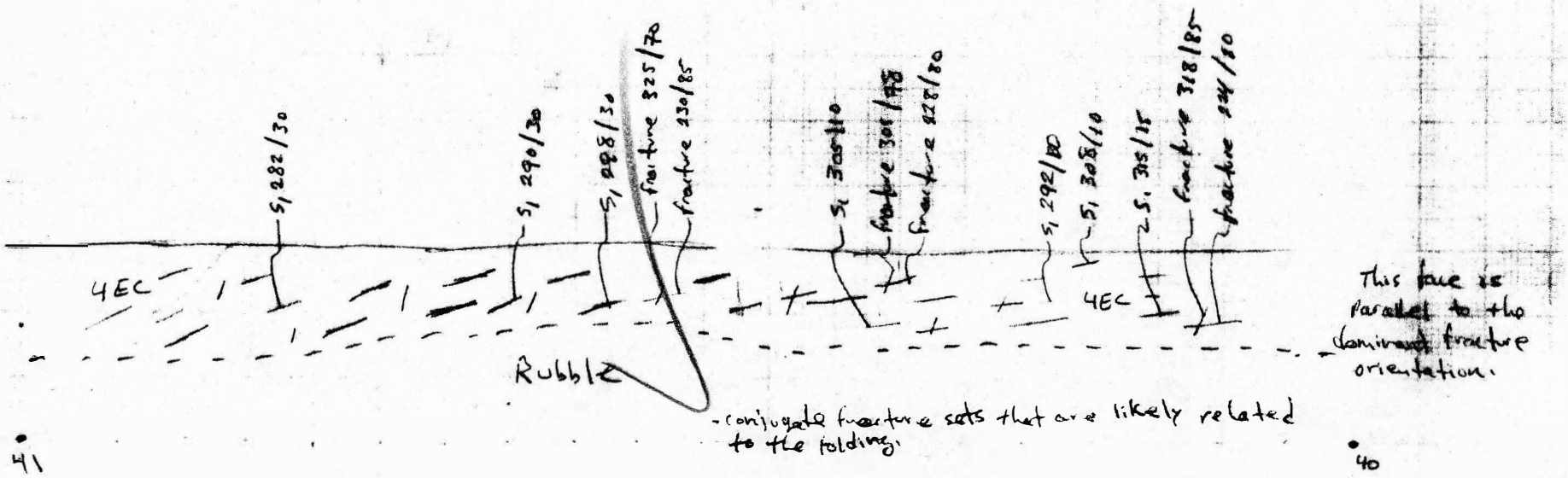
Scale 1:200
1128 Bench.

- S_1 appears to be straight with no folding visible.



boundary undulates but is parallel with S_1. There is a very distinct difference in the clearage development in the two rocks. Both are very rich in pyrrhotite and galena. High grade.

scale 1:200
1128 Bench

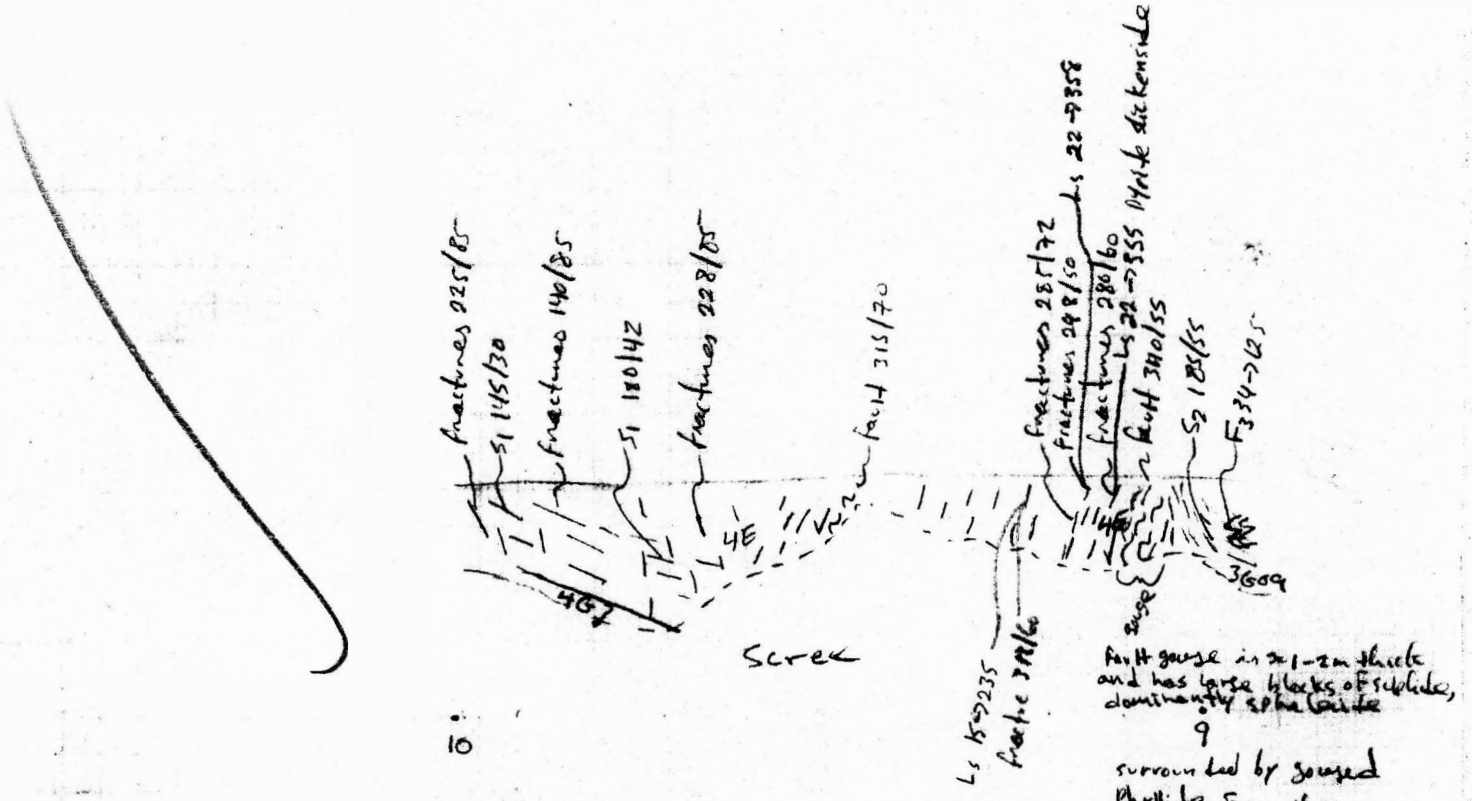


- conjugate fracture sets that are likely related to the folding.

Relatively quiet, shallowly dipping, with streeSlit S_1 that has an open warp to the north (towards 41). S_1, though overall streeSlit, is anastomosing and discontinuous on a small scale. It typically wraps around areas (clasts?) that are sphalerite and/or quartz-rich. This might be the limb of the fold hinge in stations 38-39.

Zone of intense fracturing and faulting developed in 4E. There appears to be some 4G, or at least sphalerite-rich stuff, coming in underneath. Fault Polished surfaces have pyrite slickensides that have a shallow to moderate plunge.

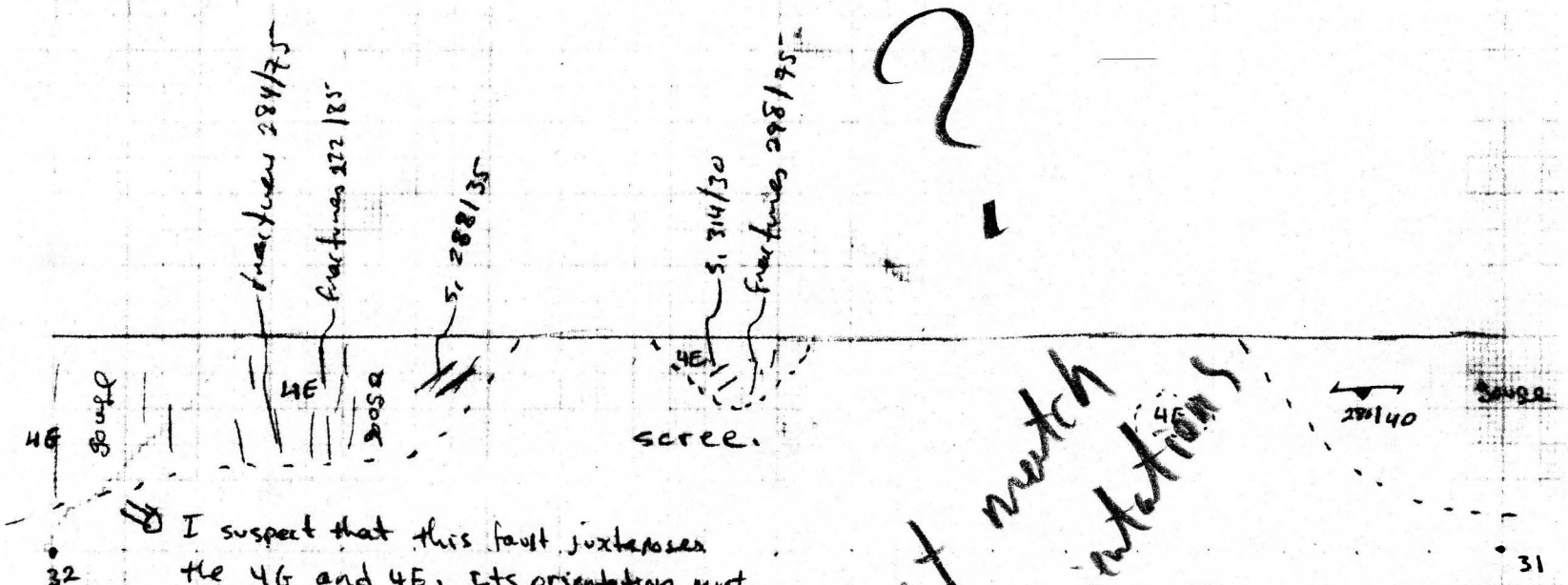
Scale 1:200
1128 Bench



Fault gouge is ≈1-2m thick and has large blocks of Fsilicide, dominantly sphalerite surrounded by gouged Phyllite. From the way the clearage bends into it I think it dips NW to west.

this section is basically parallel to the fault that touches both ends of it. the dominant feature is a penetrative, spaced fracture cleavage that must parallel the fault.

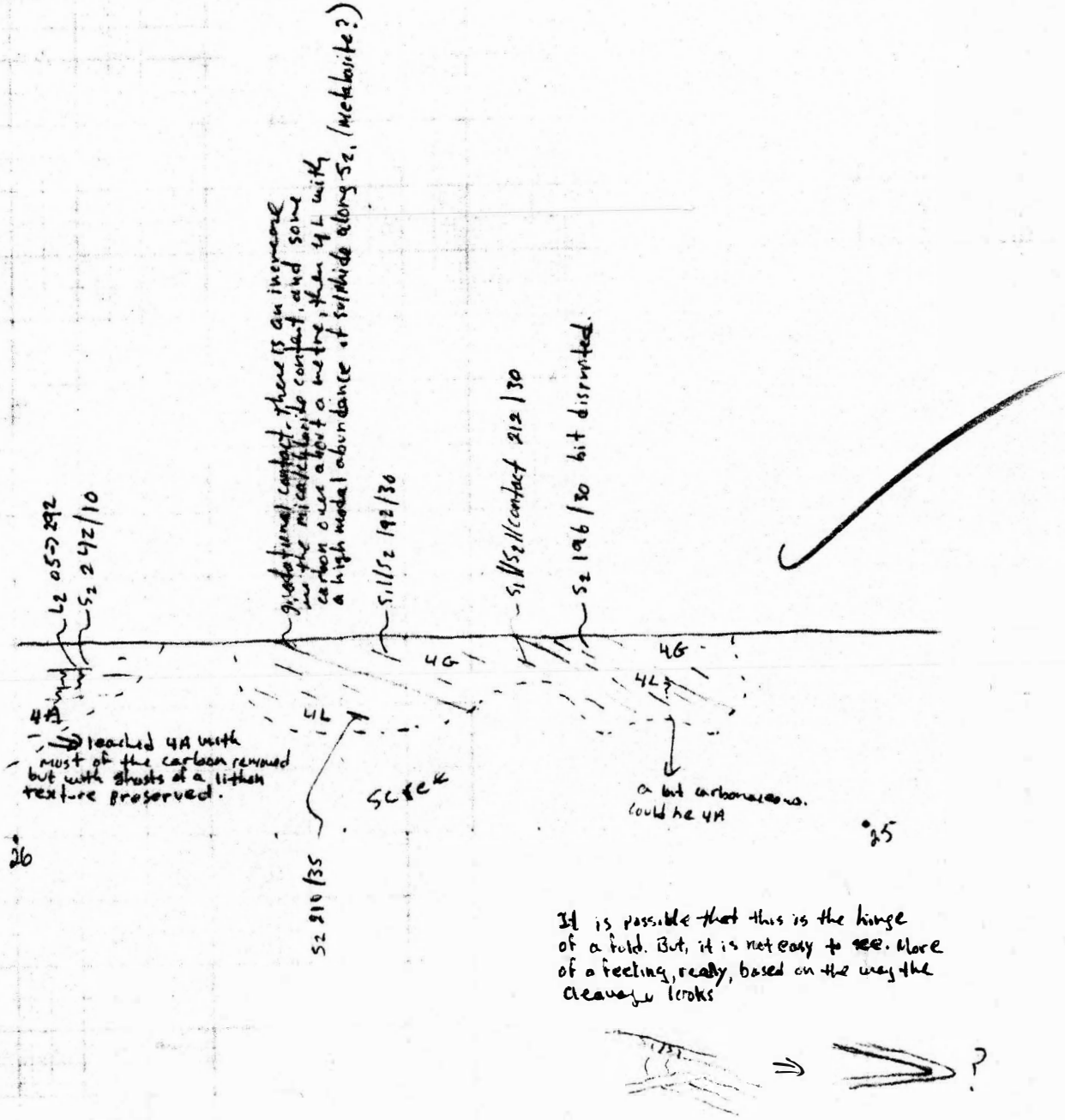
scale 1:200
4[illegible] Bench.
1134



I suspect that this fault juxtaposes the 4G and 4E. Its orientation must be parallel to the fractures that surround it.

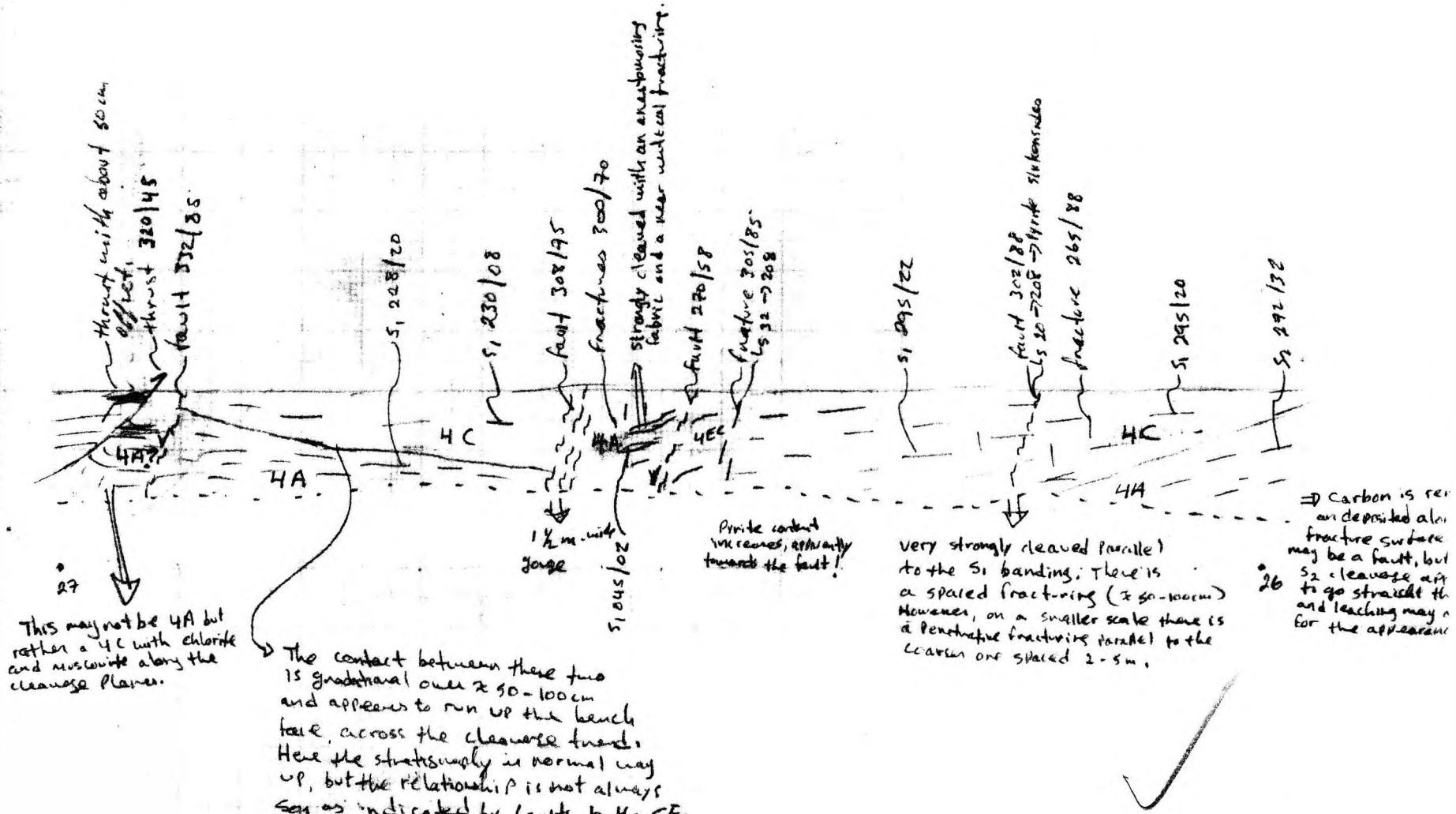
doesn't match dennis's orientations

scale 1:200
1124 Bench
1140

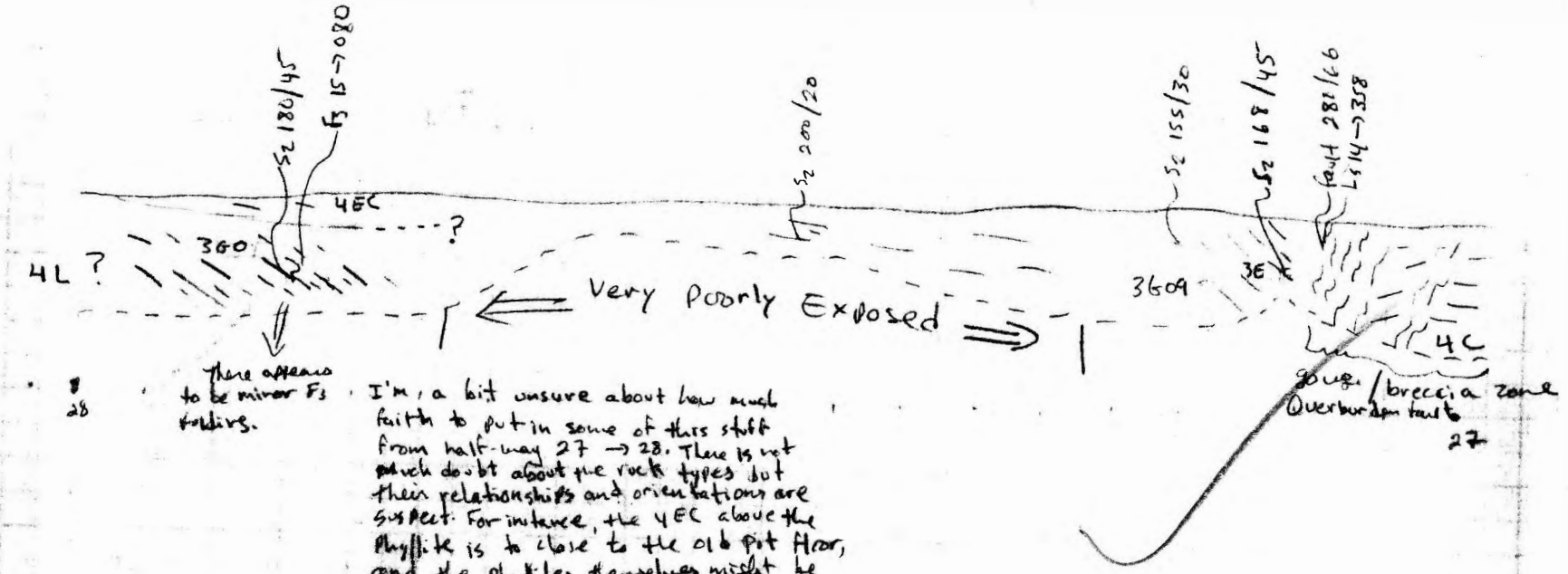


It is possible that this is the hinge of a fold. But, it is not easy to see. More of a feeling, really, based on the way the cleavage looks

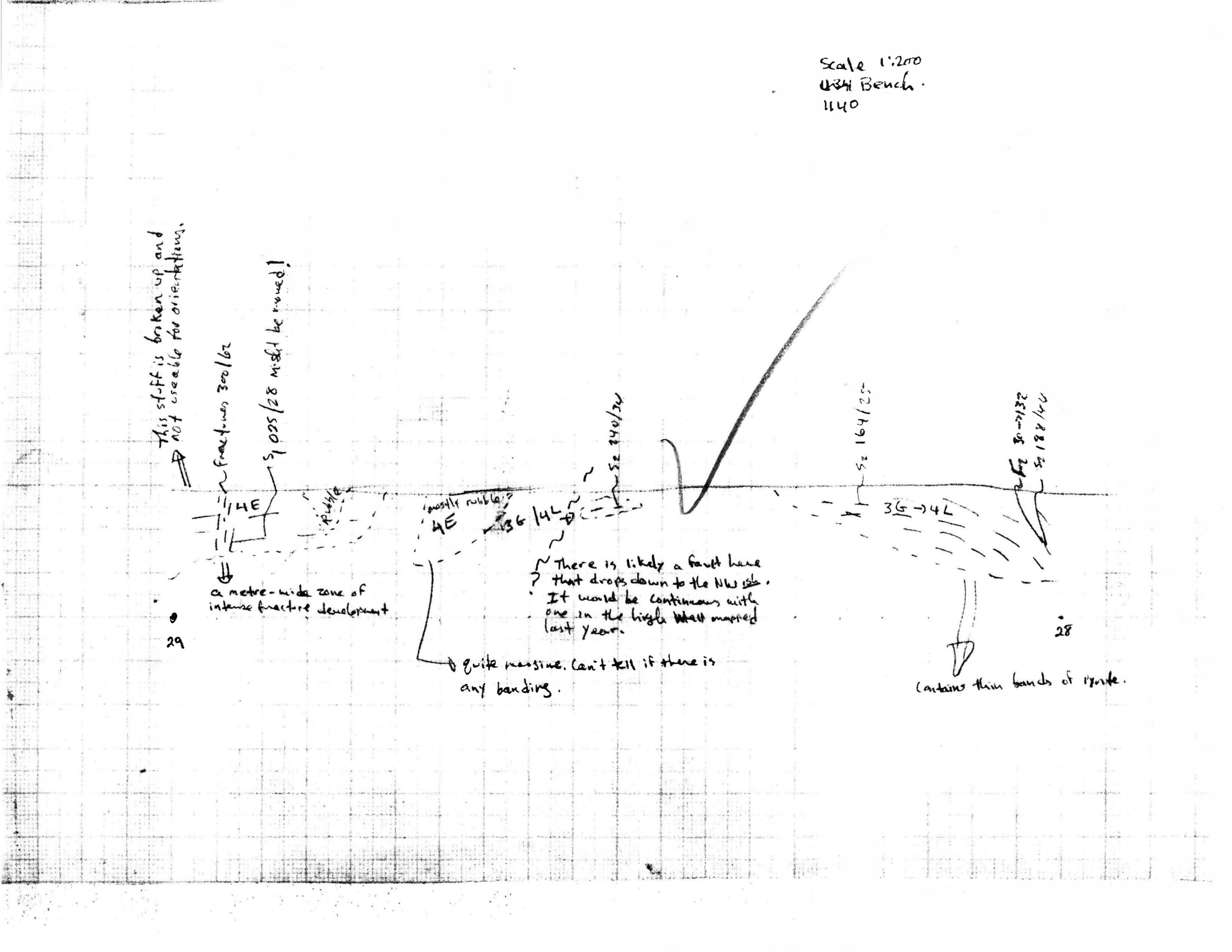
scale 1:200
N34 Bench.
1140



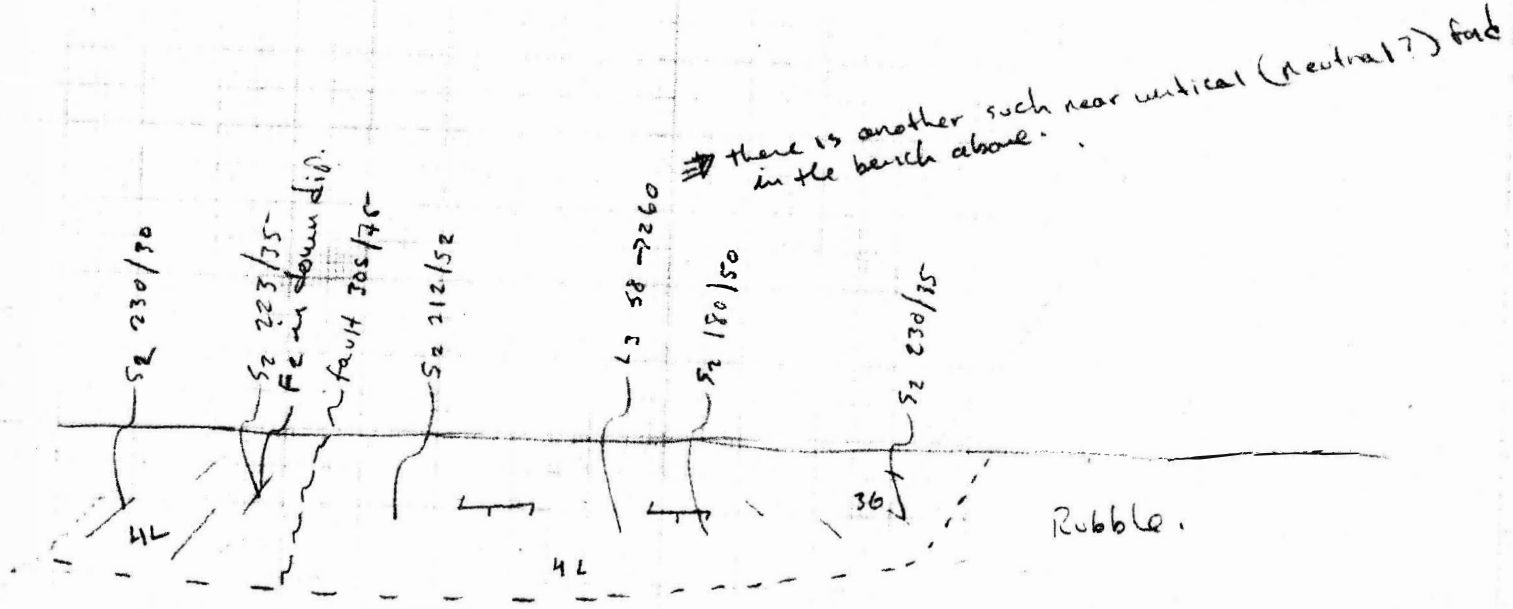
scale 1:200
4334 Bench
1140



Scale 1:200
Bench.
1140



scale 1:200
Bench.
1140



30

29

There is a F_3 fold that reorients the S_2 cleavage. It may be on a scale on 40-50 m. However, it's size and shape cannot be determined here. The 3G grades into HL. There might be 3 phases of folding!

scale 1:20 12/07/91

Mostly decomposed stuff from the floor of the overlying bench.

24

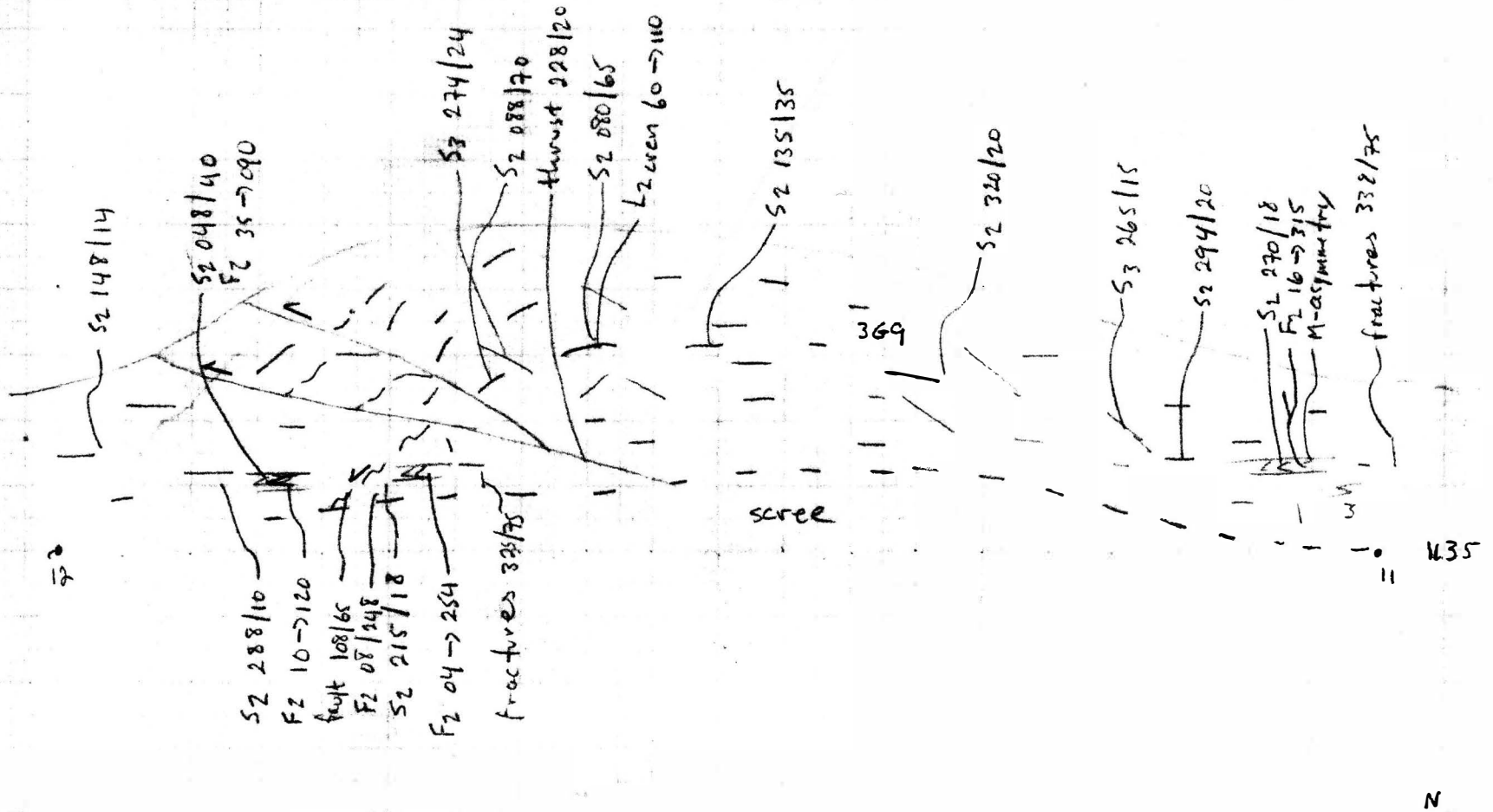
23

04/07/91

Scale 1:200
looking south

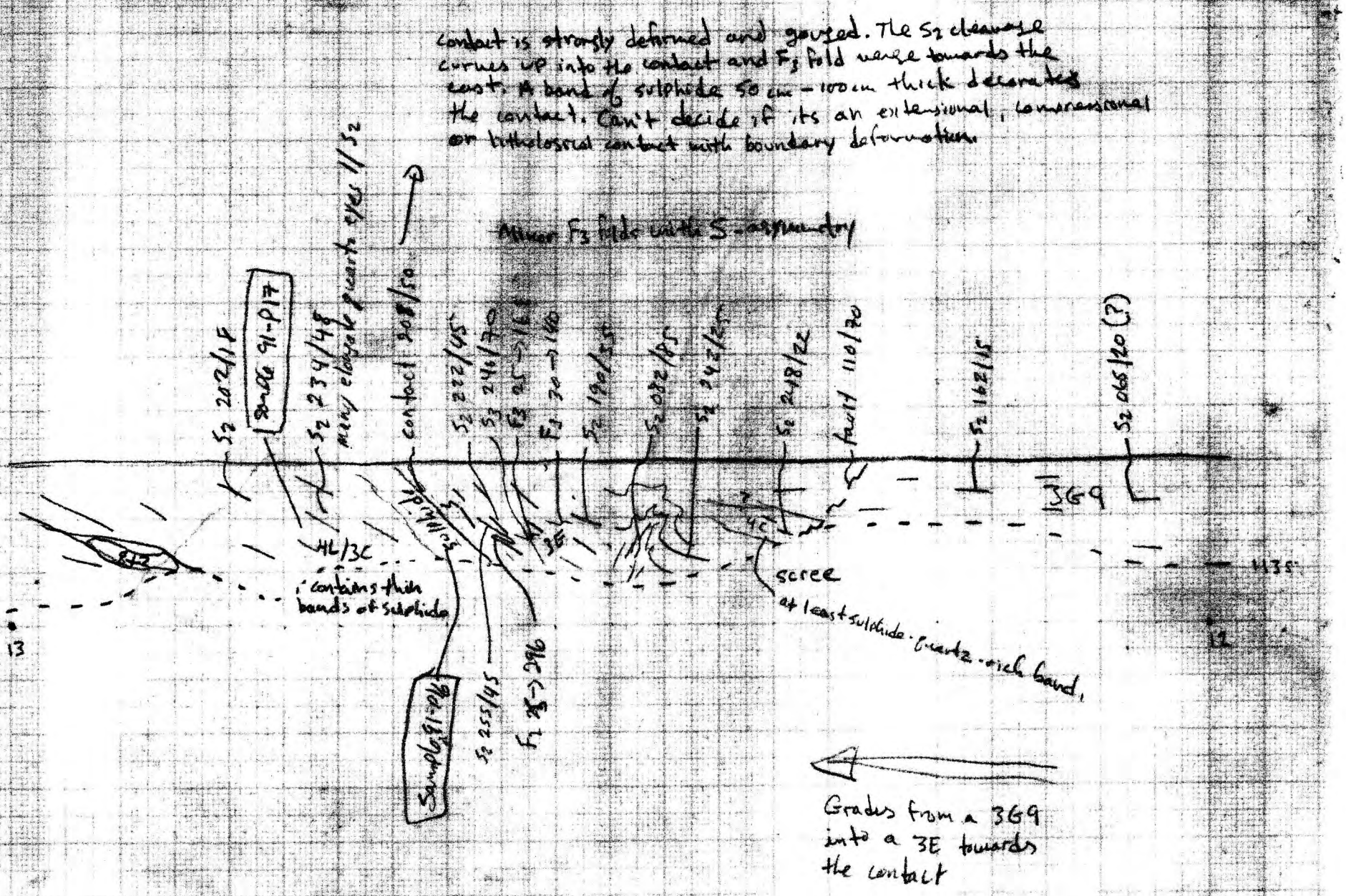
Bench 1134

northwest-dipping thrust with several minor splays. Thrust is defined by ~15 cm thick zone and cleavage cut-off. A hanging wall anticline is likely fault-bend fold. A spaced S_3 cleavage parallels the thrust. Lithon textures indicate the hinge zone of a F_2 fold. This thrust must link to these the next bench.



04/07/91

Scale 1:200
looking SE

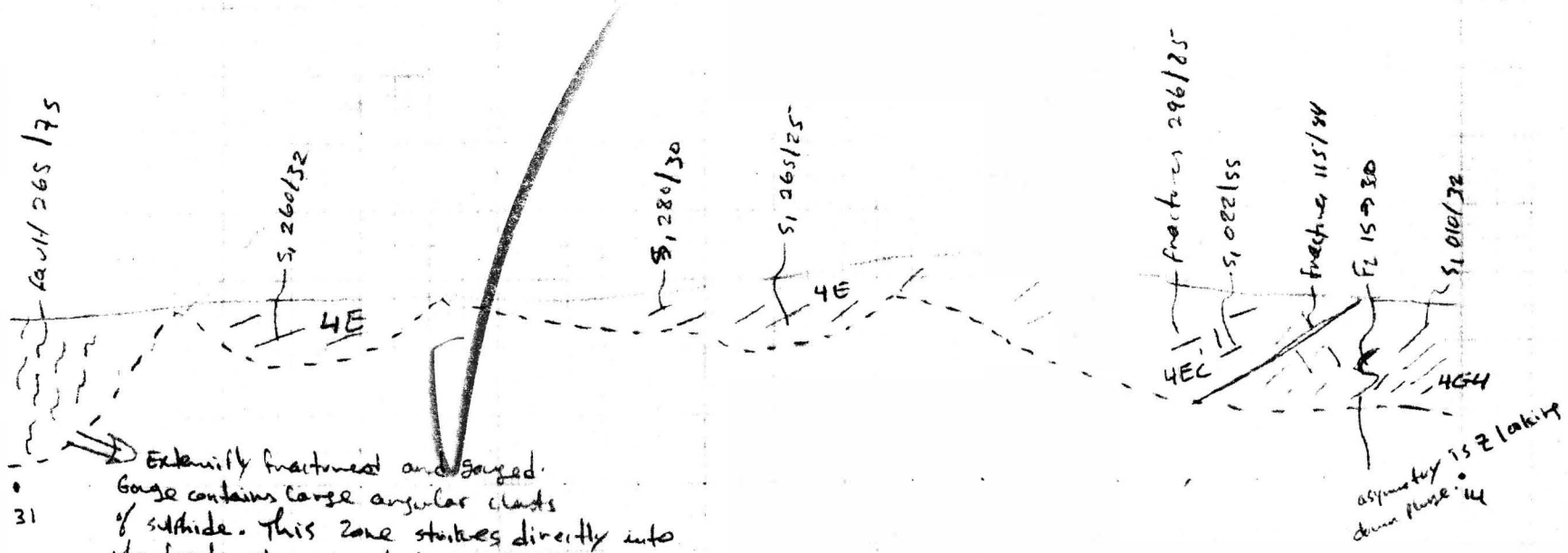


Scale 1:200
Looking E

04/07/91

This section has 4E overlying 4G, both with a roughly west-dipping S1 banding. Fits with the interpretation of a hinge zone & overturned limb of a synformal structure.

scale 1:200
~~1:50~~ Bench.
1134



A zone of intense gouge and fracture development. It is impossible to tell if there is much movement

Scale 1:200

1134 Bench.

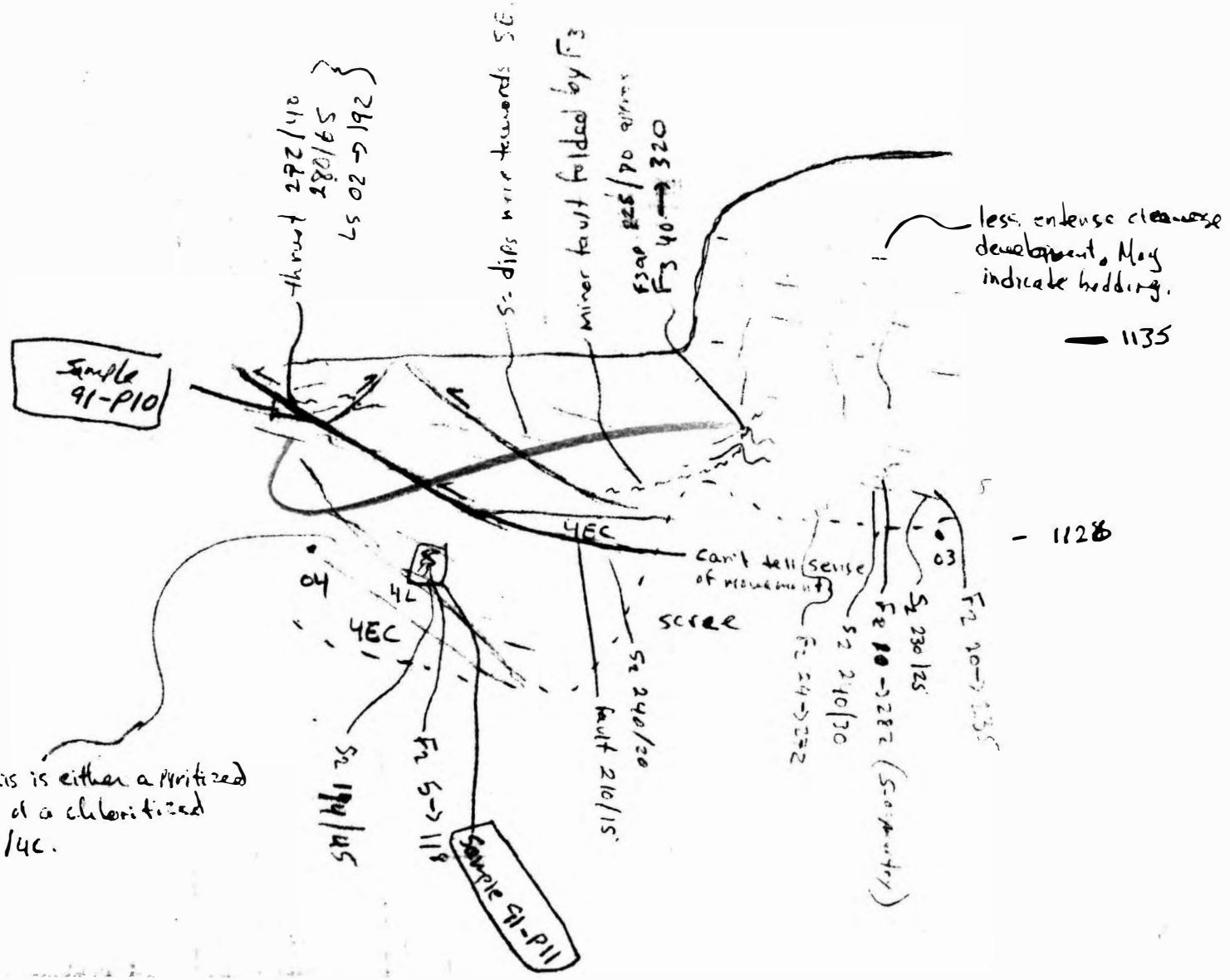
Scale 1:200

[redacted] Bench.

1134

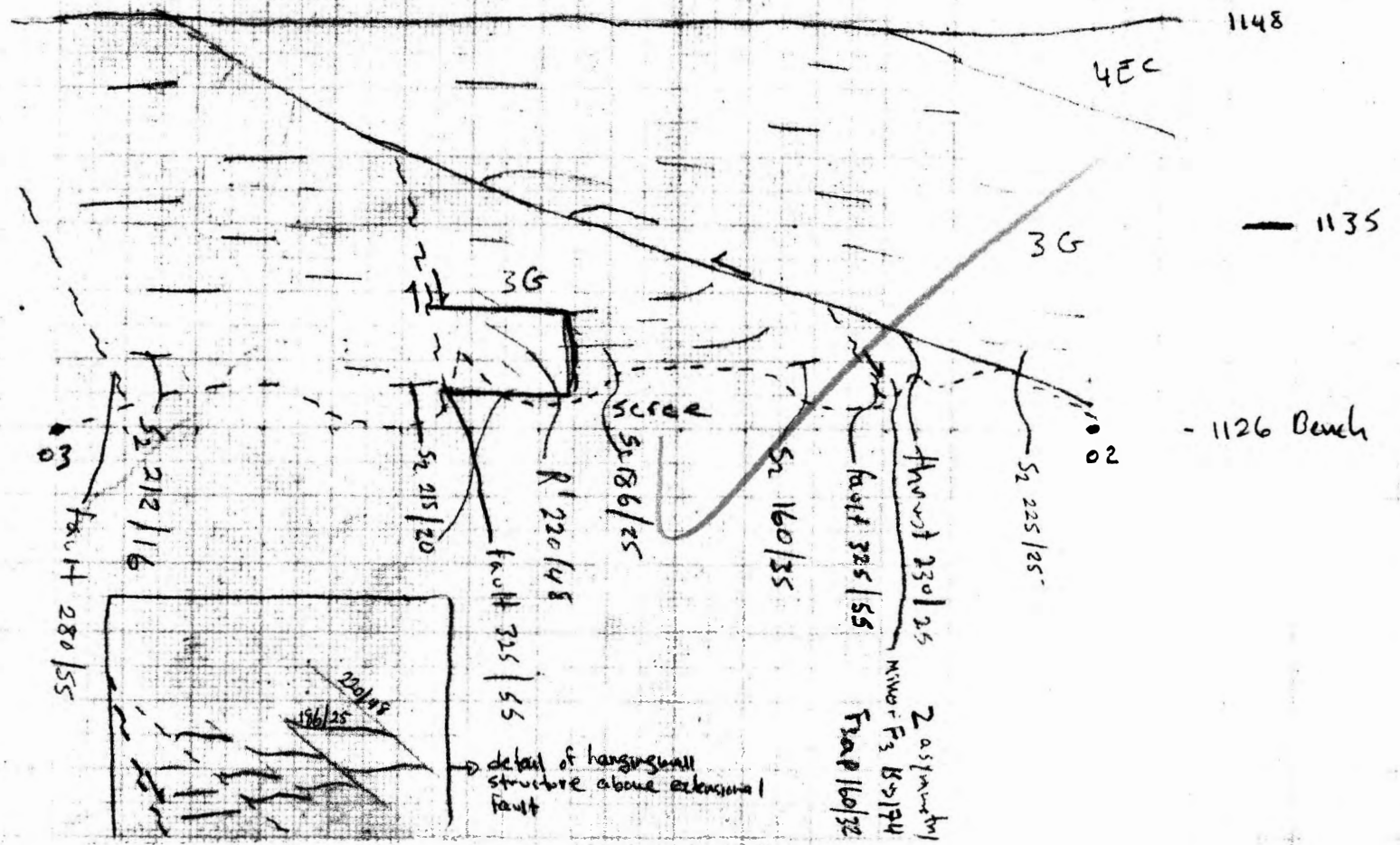
Scale 1:200

very complexly deformed zone. The major fault appears to be a thrust. In the immediate hangingwall the phyllite is folded on a broad compressional look. The band of 4EC in the hangingwall likely moved up from the 4EC in the footwall. Displacement would then be on the order of 10-15 m.



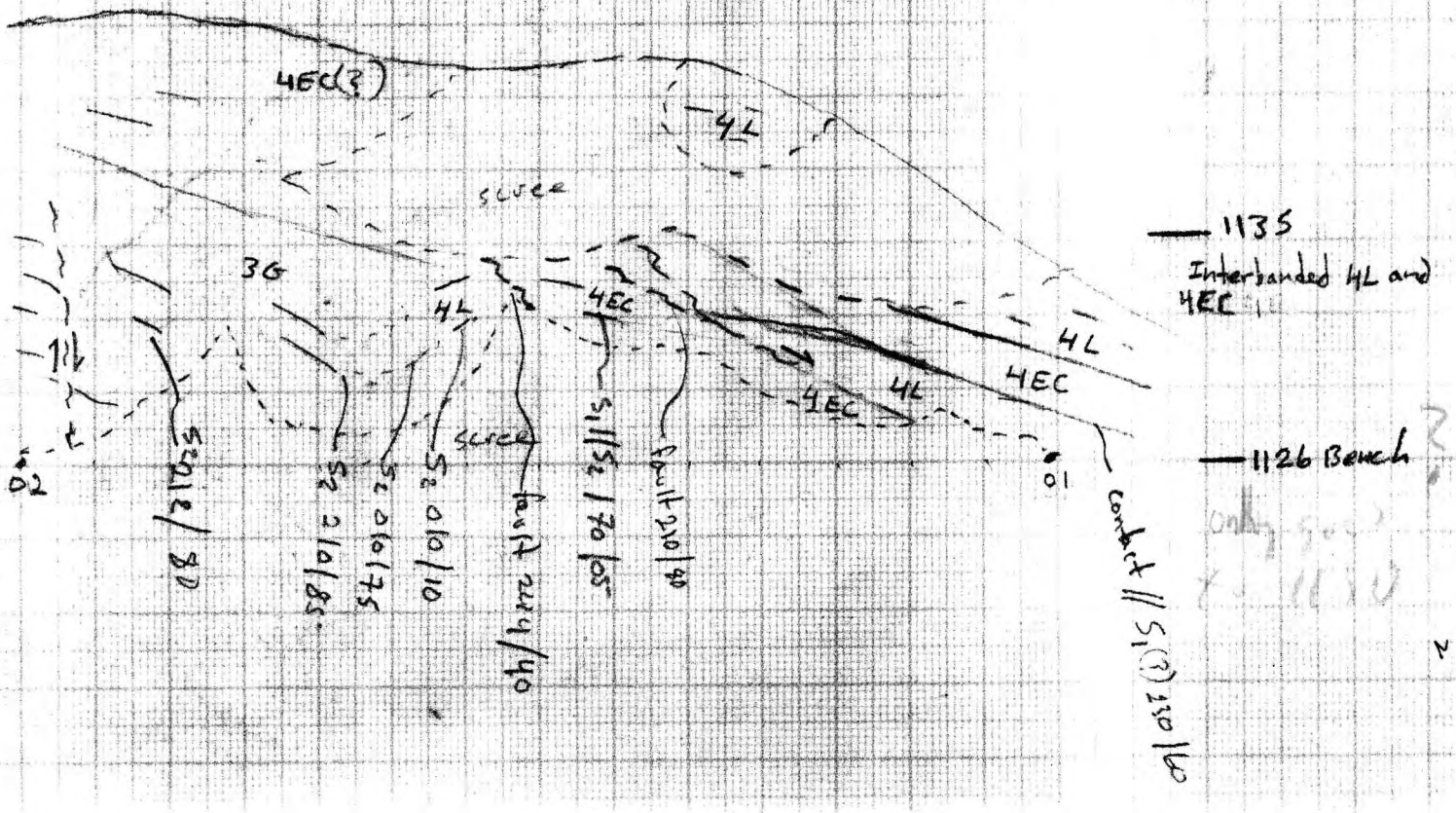
Scale 1:200

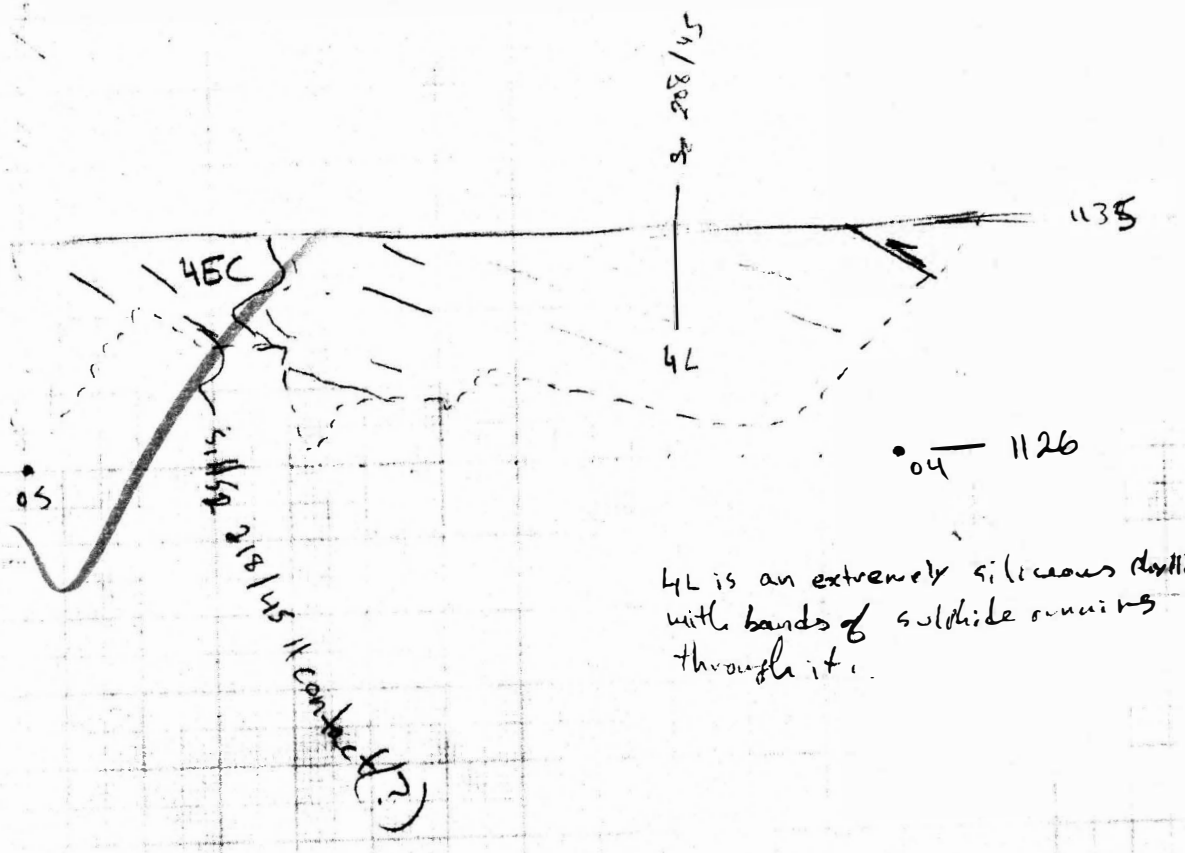
3G phyllites with well developed S_2 cleavage.
Small extensional faults cross-cut the cleavage. However, it is not possible to get amount of throw. A NE-verging thrust truncates the extensional faults. It is not possible to set the amount of movement on the thrust → the extensional faults cannot be located in the hangingwall.



Scale 1:200
looking SE

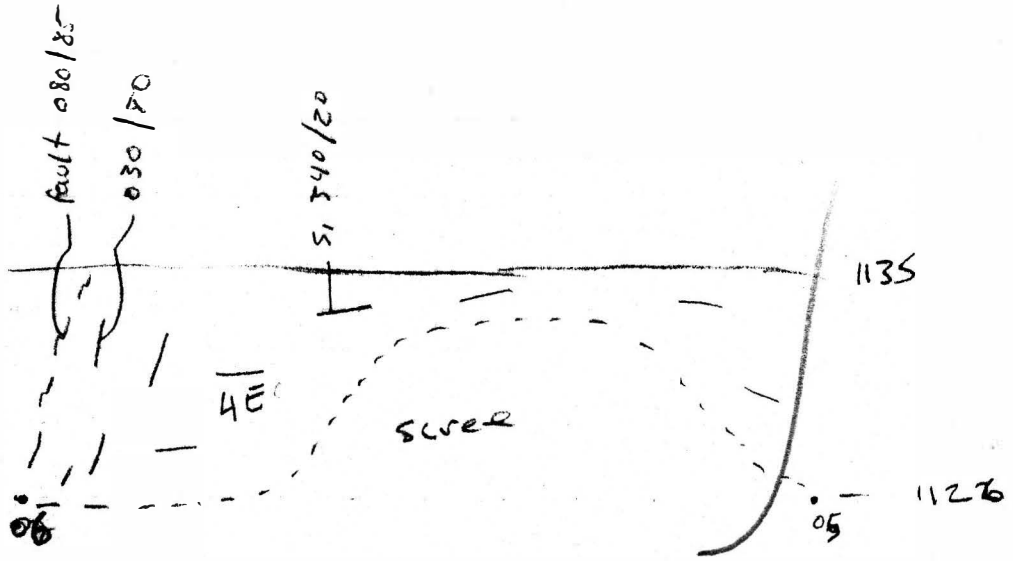
Interbedded 4L phyllite and 4EC underlain by 3G phyllites. Several faults appear but it is impossible to get the significance of them. However, it looks as if they do repeat the stratigraphy locally. S_2 is folded near station 02.



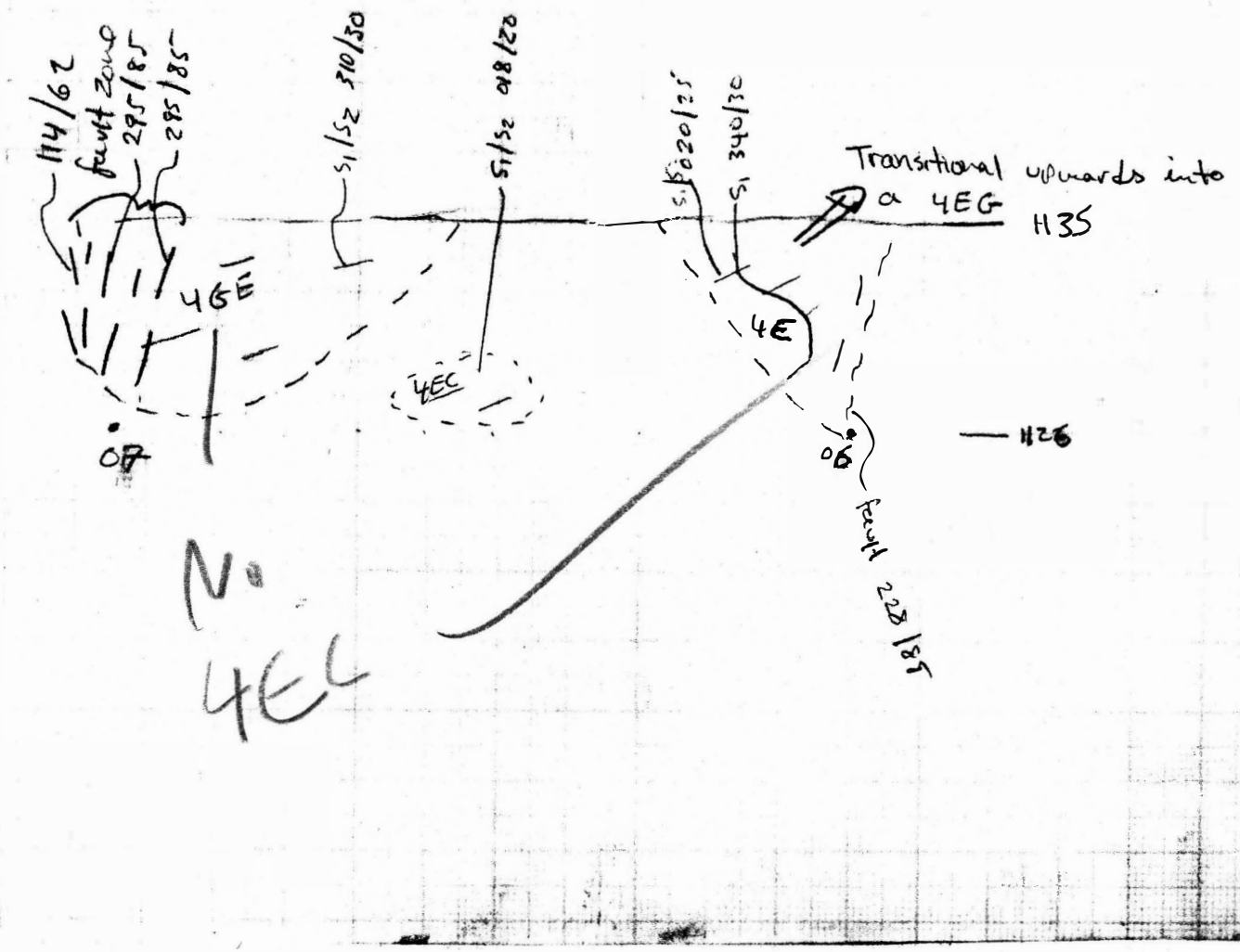


4L is an extremely siliceous chert-like with bands of sulphide running through it.

Looking SE



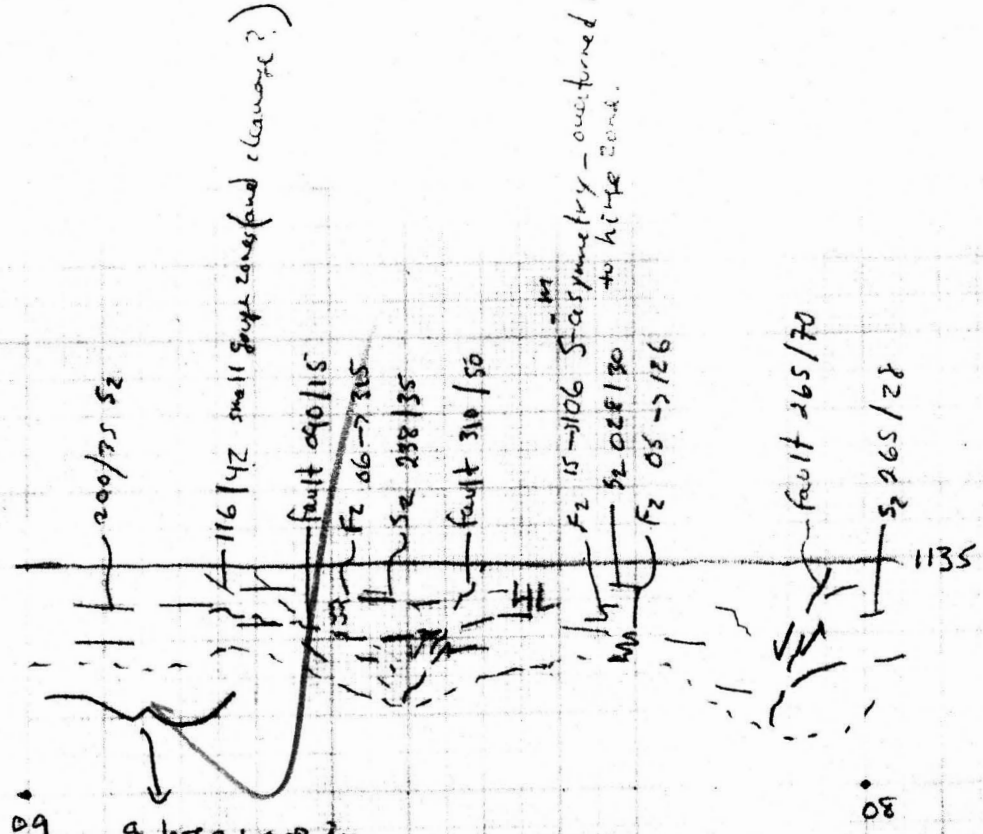
scale 1:200
looking East
1122 Ranch



scale 1:200
Looking NE
S2 290/35
S1 338/40 ⇒ gouge zones along bedding plane indicate layer-ft movement.
fractures related to fault 120/65
140/50
⇒ large subvertical breccia and gouge zone. This is the overburden fault.
fault 094/65
scree
subvertical breccia
can't decide if this is a fault or not. Extremely oxidized ⇒ MZ(?)
S1 242/35
S1 218/20
fractures 115/80
gouge 320/50 ⇒ piece of MAF caught up along fault
S1 212/55
fractures associated with fault activity
300/85
1135
4E
4E
4EC
4G
4C
08
07

scale 1:200

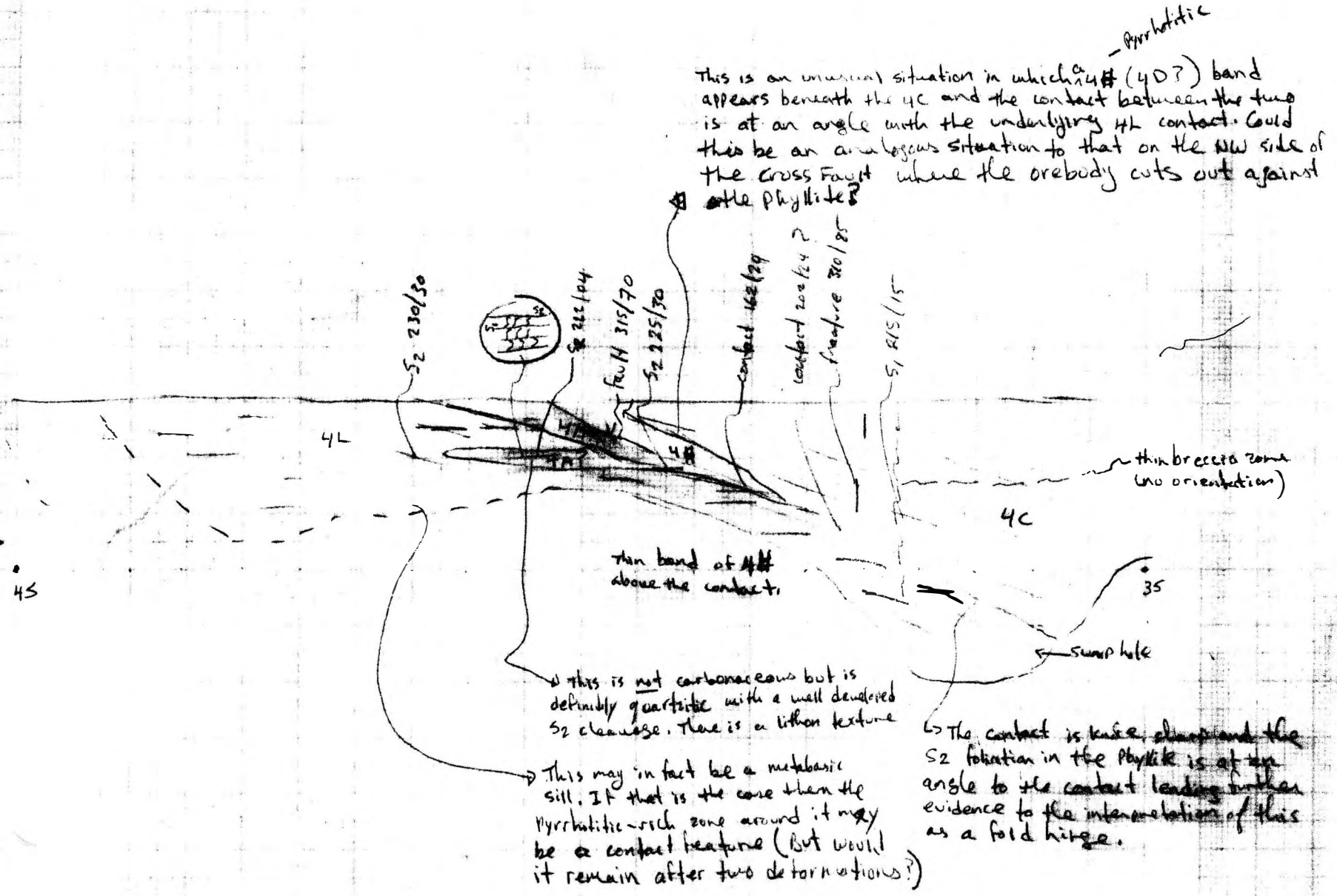
looking NE



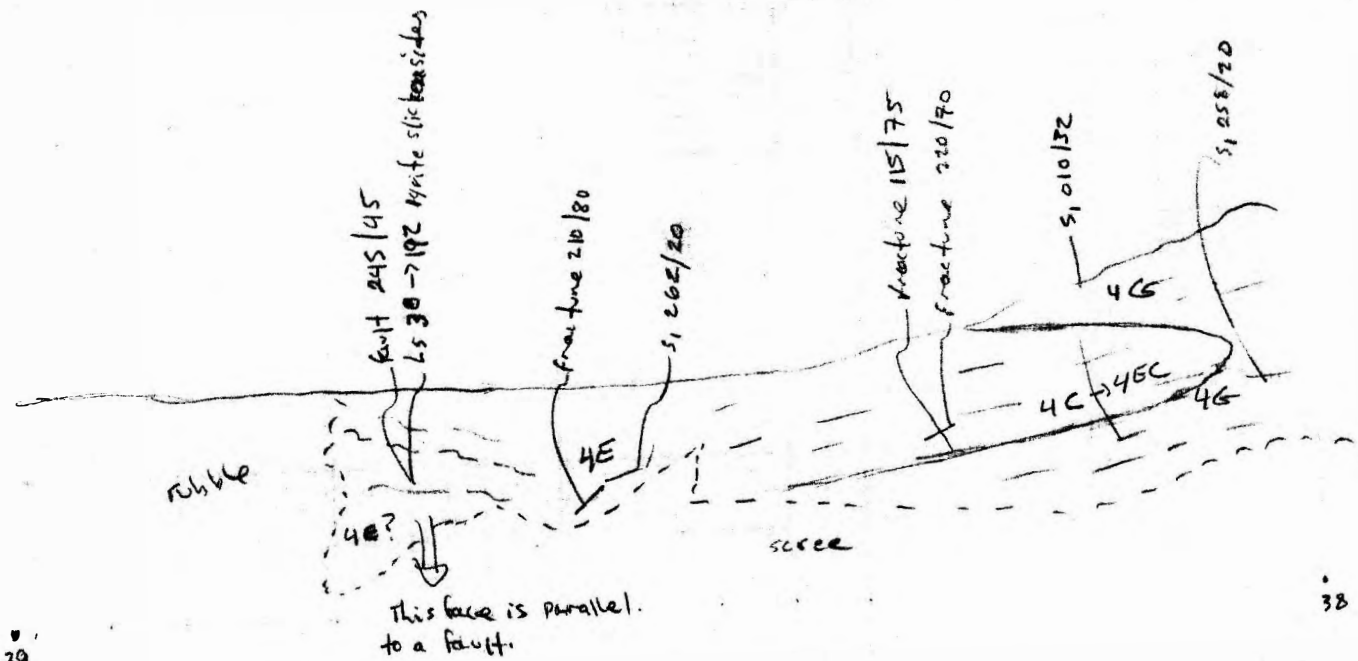
a large warp in the S2 surface here. Possible F3 folding.

Thin bands of sulphides in a 42 phyllite. Mesoscopic fold asymmetry indicates it is structurally in the hinge to overturned limb, folds are isoclinal

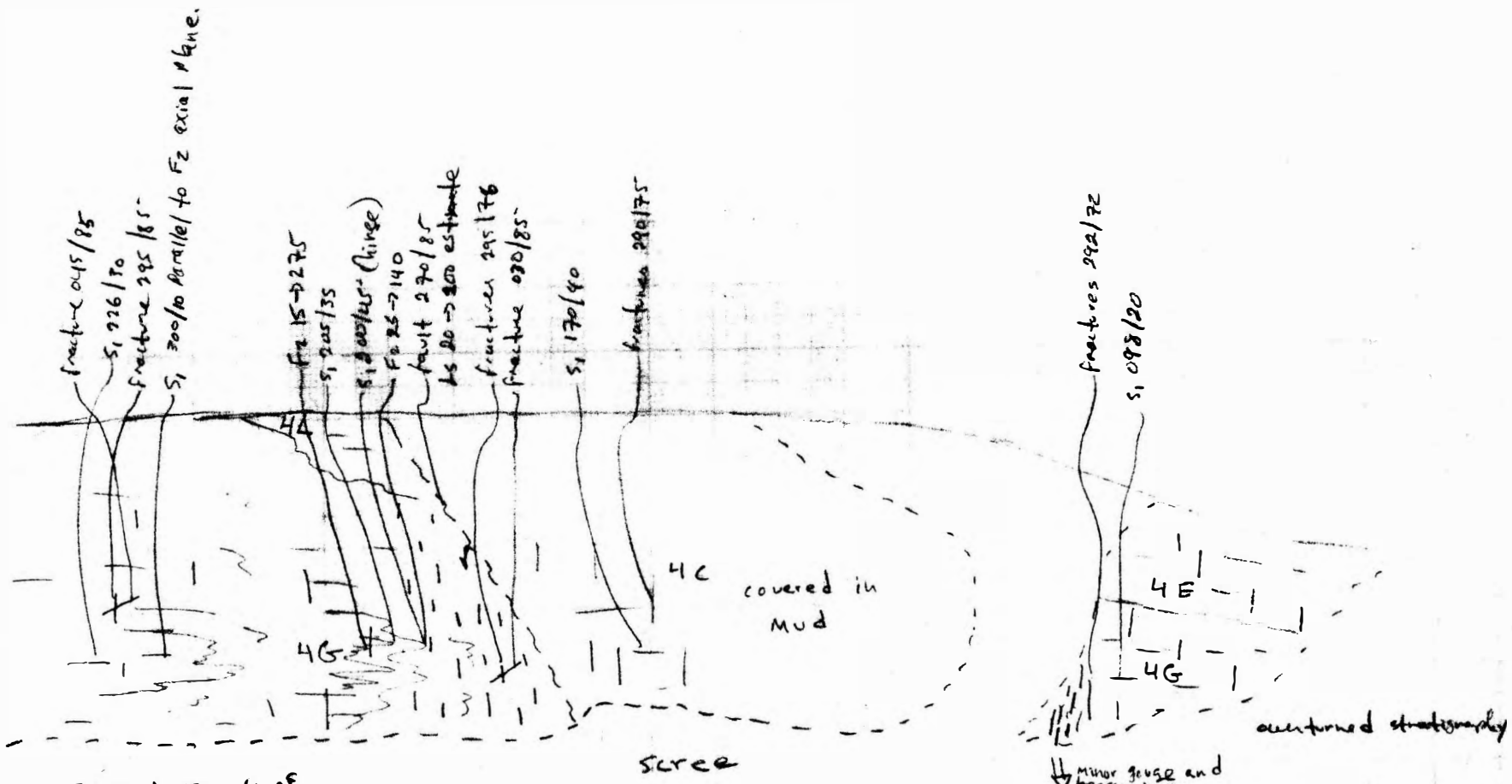
Scale 1:200
1134 Bench.



Scale 1:200
1122 Bench.



scale 1:200
1122 Bench

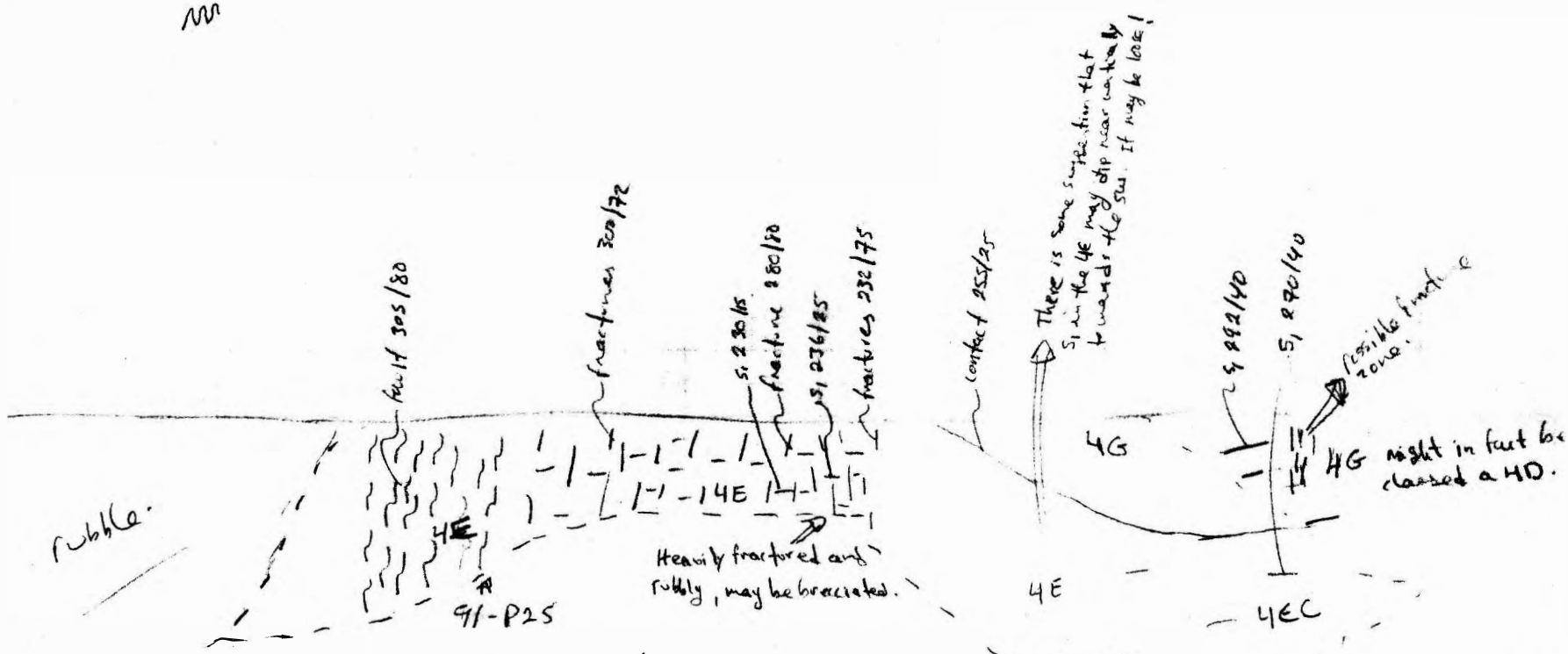


38 • Excellent example of transposition of S1 into the F2 axial plane orientation.

very tightly folded 4G in the limbs of a F2 antiform. Folding is close to isoclinal and may refold F2

39

1122 Bench
Scale 1:200



37

36

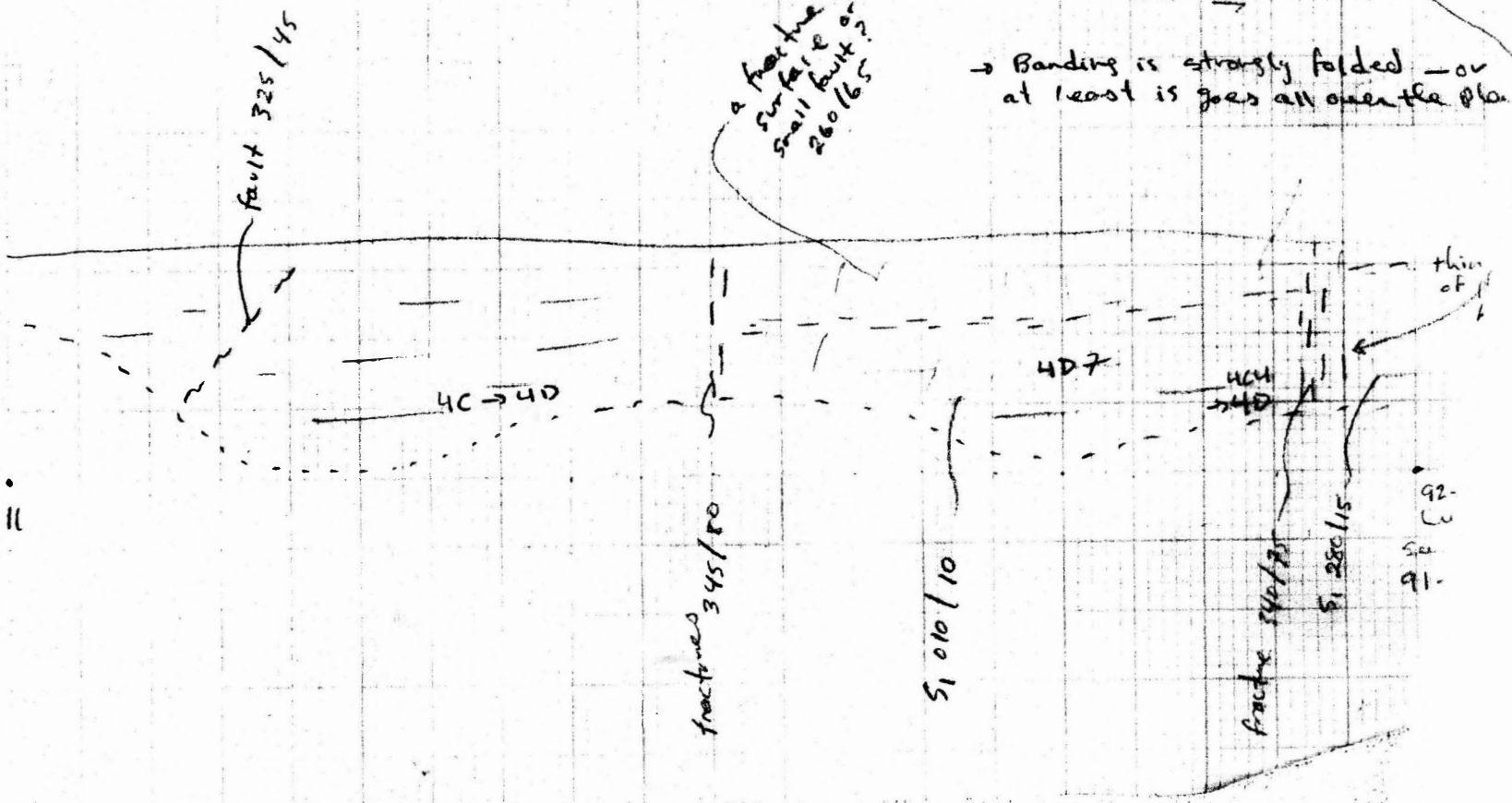
⇒ There is a weak chloritic foliation parallel to S_1

This rock looks highly sheared with a considerable amount of remobilised sphalerite and pyrrhotite. The pyrite porphyroblasts are certainly late.

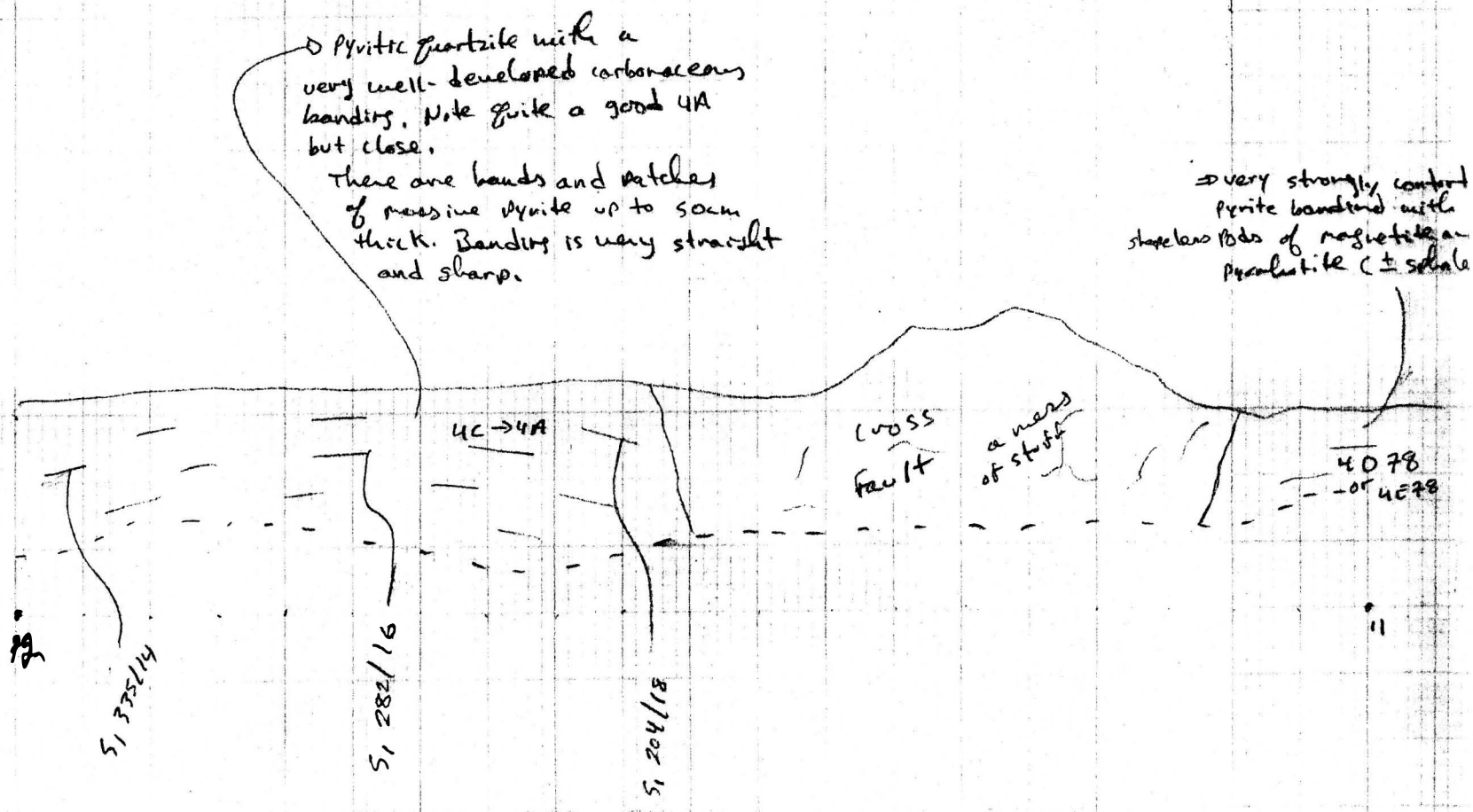
⇒ well-developed pyritic zone
Pyrite porphyroblast up to ≈ 1.5 - 2 mm.
Banding is typically wavy and contains varying amounts of sphalerite and galena. In places it is a 4D - is the dominant rock type really

* A tailed quartz clasts indicates a top to the SW - ward sense of shear

→ Banding is strongly folded — ov at least is goes all over the pla



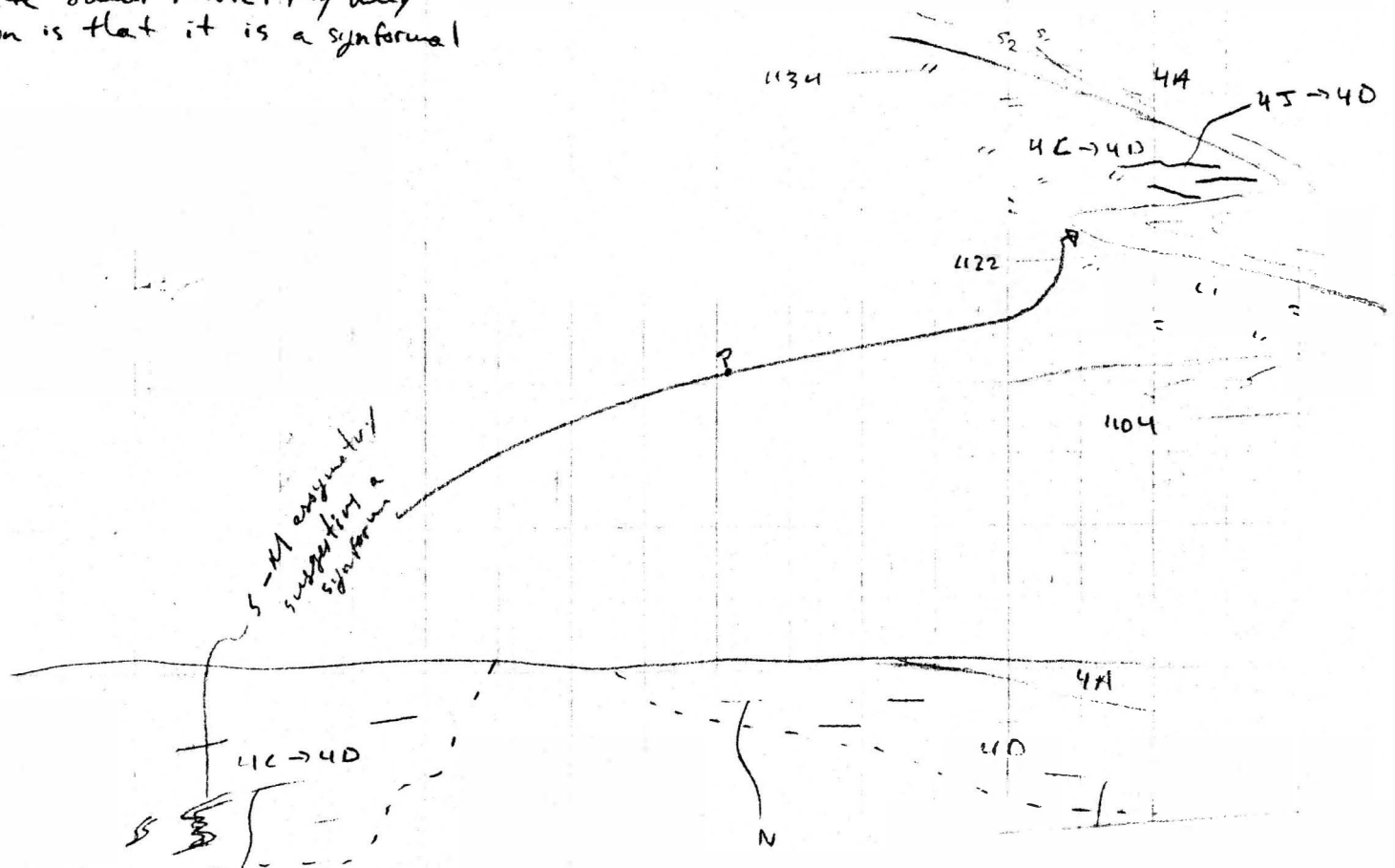
Scale 1:200


Pyritic quartzite with a very well-developed carbonaceous banding. Note quite a good 4A but close.
There are bands and patches of massive pyrite up to 50cm thick. Banding is very straight and sharp.
⇒ very strongly contorted pyrite banding with shapeless blobs of magnetite and pyrrhotite (± sphale
4C→4A
cross fault
a mess of stuff
4078
-or 4E78
S1 335/14
S1 282/16
S1 204/18

Scale 1:200

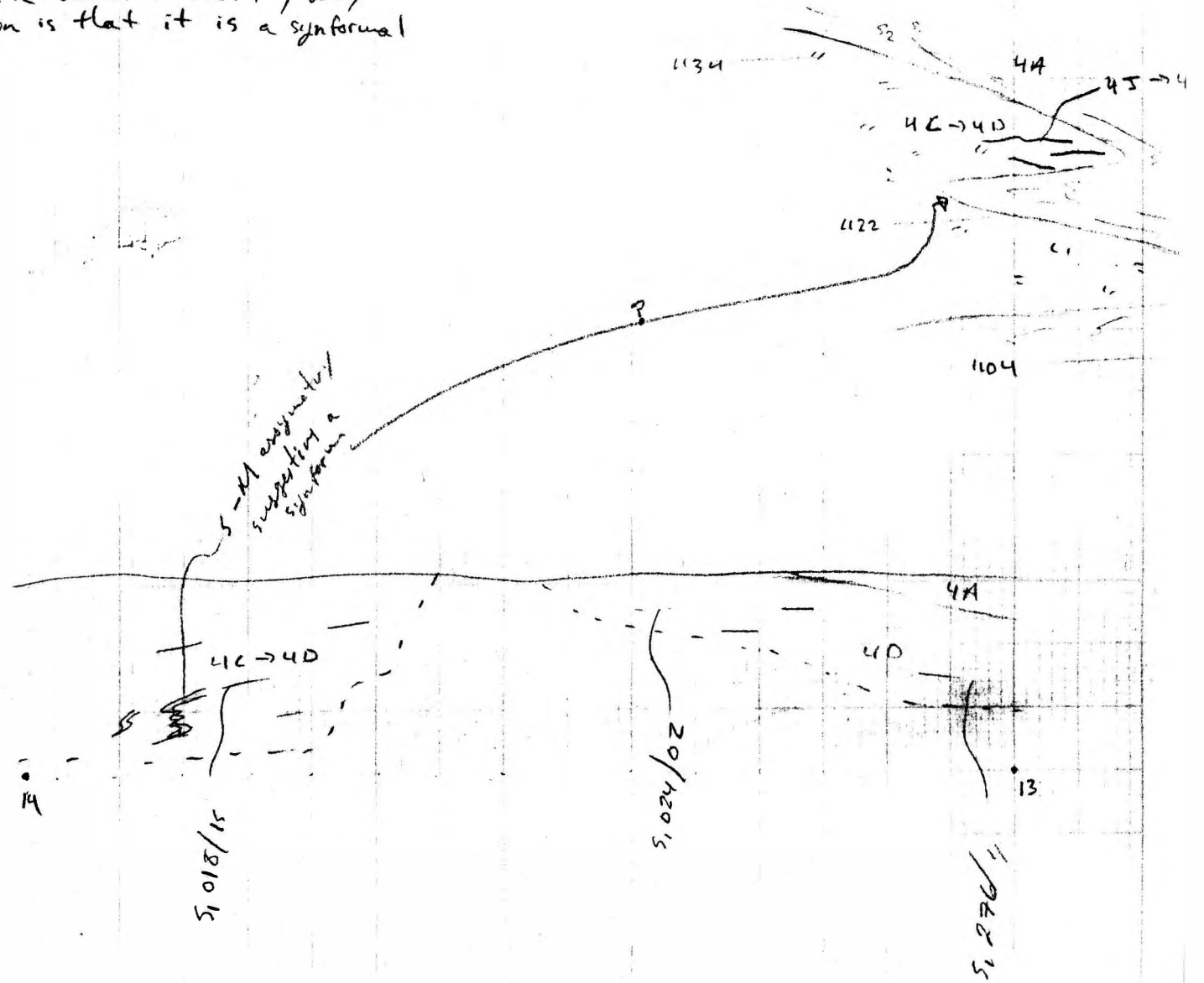
1116 Bench
Scale 1:200

⇒ Banding in the sulphides, defined by porphyroblastic pyrite, is very strongly folded and sheared with an axial planar(?) pyrrhotite/sphalerite shear fabric. My very strong impression is that it is a synformal structure.



1196 Bench
Scale 1:200

⇒ Banding in the sulphides, defined by porphyroblastic pyrite, is very strongly folded and sheared with an axial planar(?) pyrrhotite/sphalerite shear fabric. My very strong impression is that it is a synformal structure.



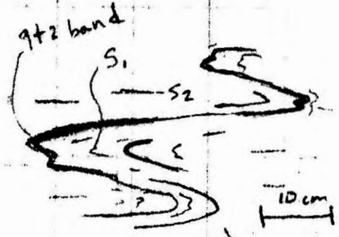
1116 Bench looking Ea

Scale 1:200

⇒ there is an open warping of the S_2 foliation in the north part of this section, near the faults. However, I think this is due to extensional faulting and fracturing and not to F_3 folding.

⇒ There is a spaced (≈1cm) SE-dipping extensional cleavage

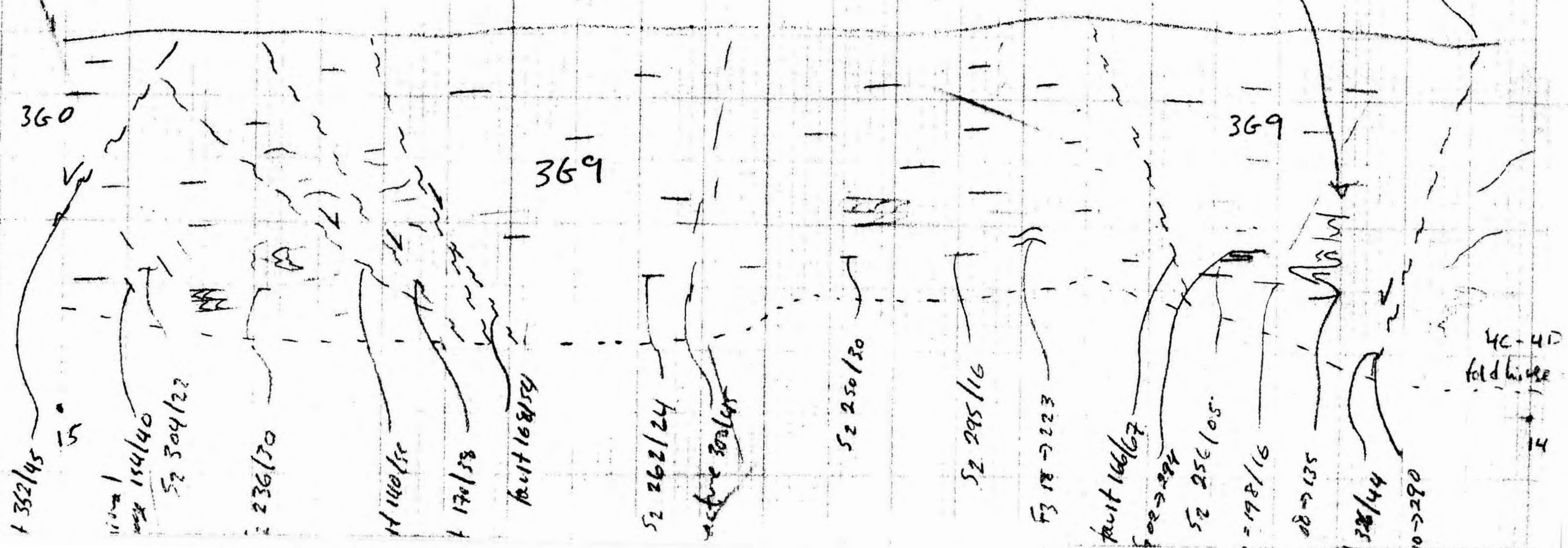
looking downplunge



⇒ The F_2 asymmetry indicates an overturned Limb — but locally there are hinge zones. These might be smaller scale folds. The plunge direction may be rotated into the fault.

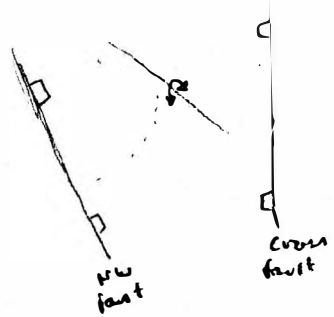
⇒ F_3 forms cm-scale open warps of S_2. There is no foliation associated with it.

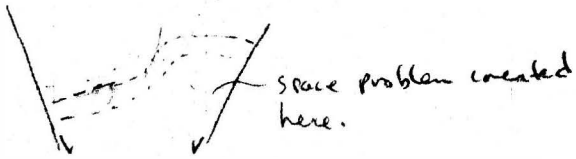
⇒ This is a major fault that drops the phyllite/qtz and sulphide contact down at least 10 to 15 meters.

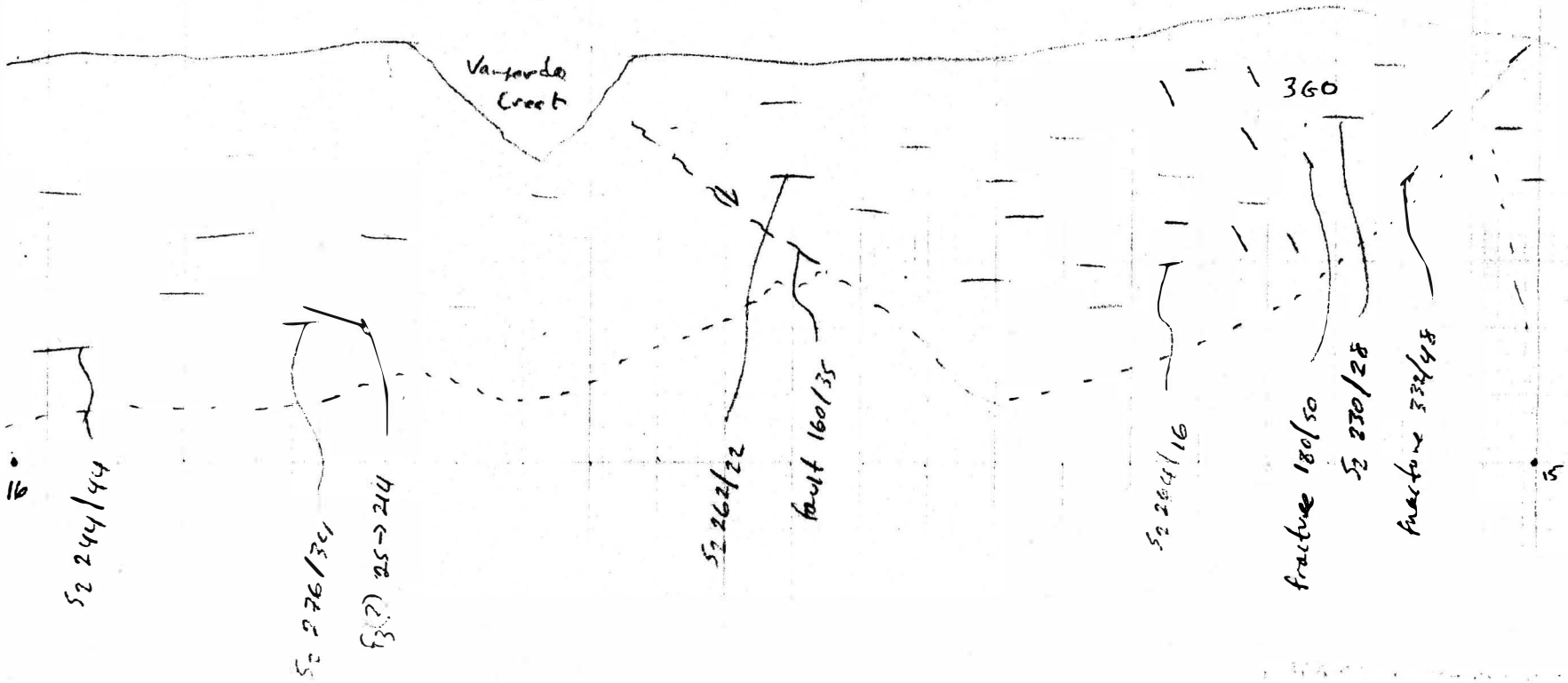


1116 Bench looking East
Scale 1:200

⇒ There is a strong warping of the S_2 foliation N of Vanjorda creek that may be due to SW-plunging F3 folds. If so they are locally developed and do not appear to affect the existing N-end of the pit. Are there due to warping because of the faults.

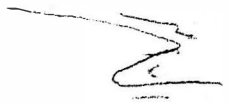




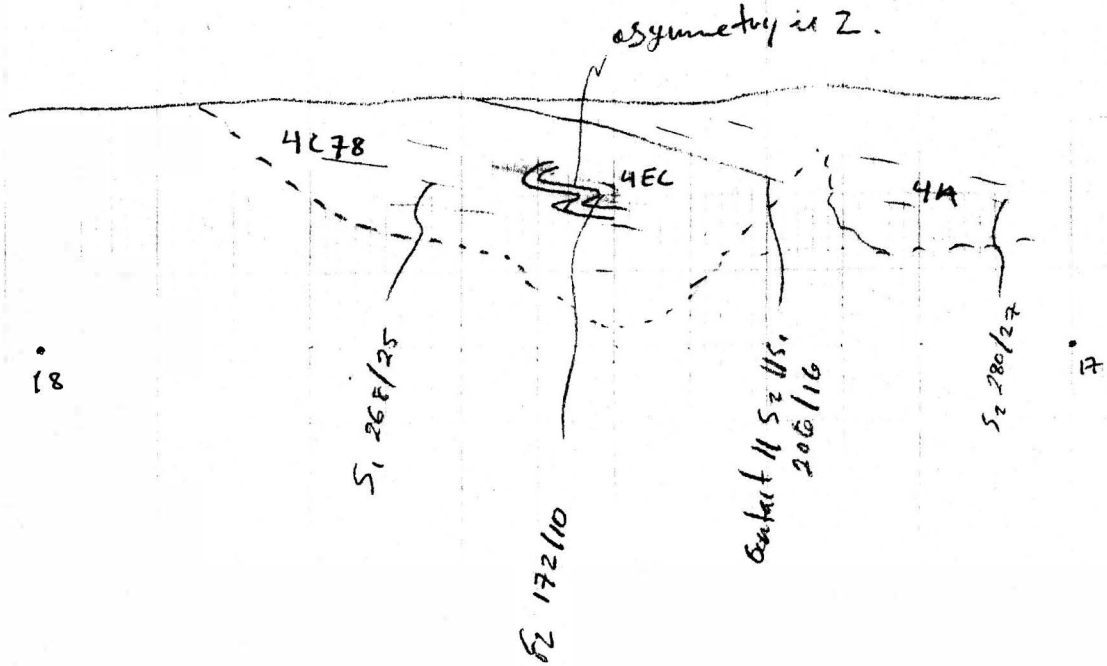


1122 Bench Look E.
Scale 1:200

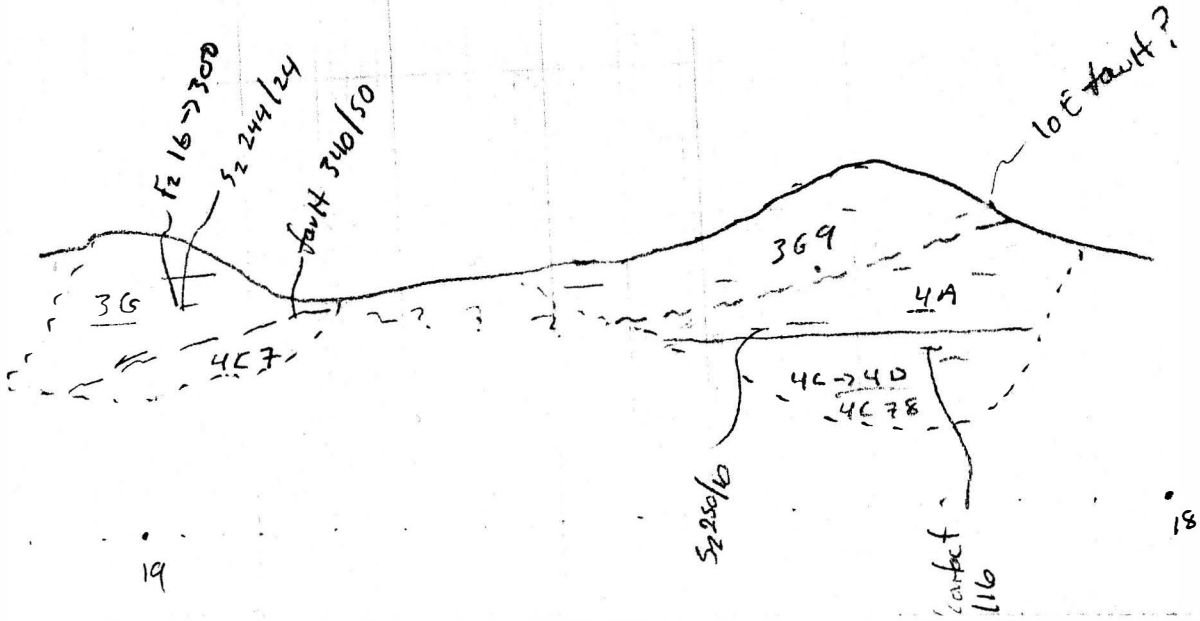
⇒ this section is in an upright limb of an F_2 fold the closes near station 17, then turns over and comes back upright on the next bench.



⇒ Very well developed F_2 folding in 4C → 4D. Pyrite bands show thickening in the hinge zone and thinning and boudinage along the limbs. F_2 is isoclinal.

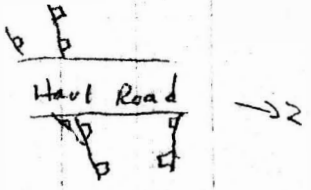


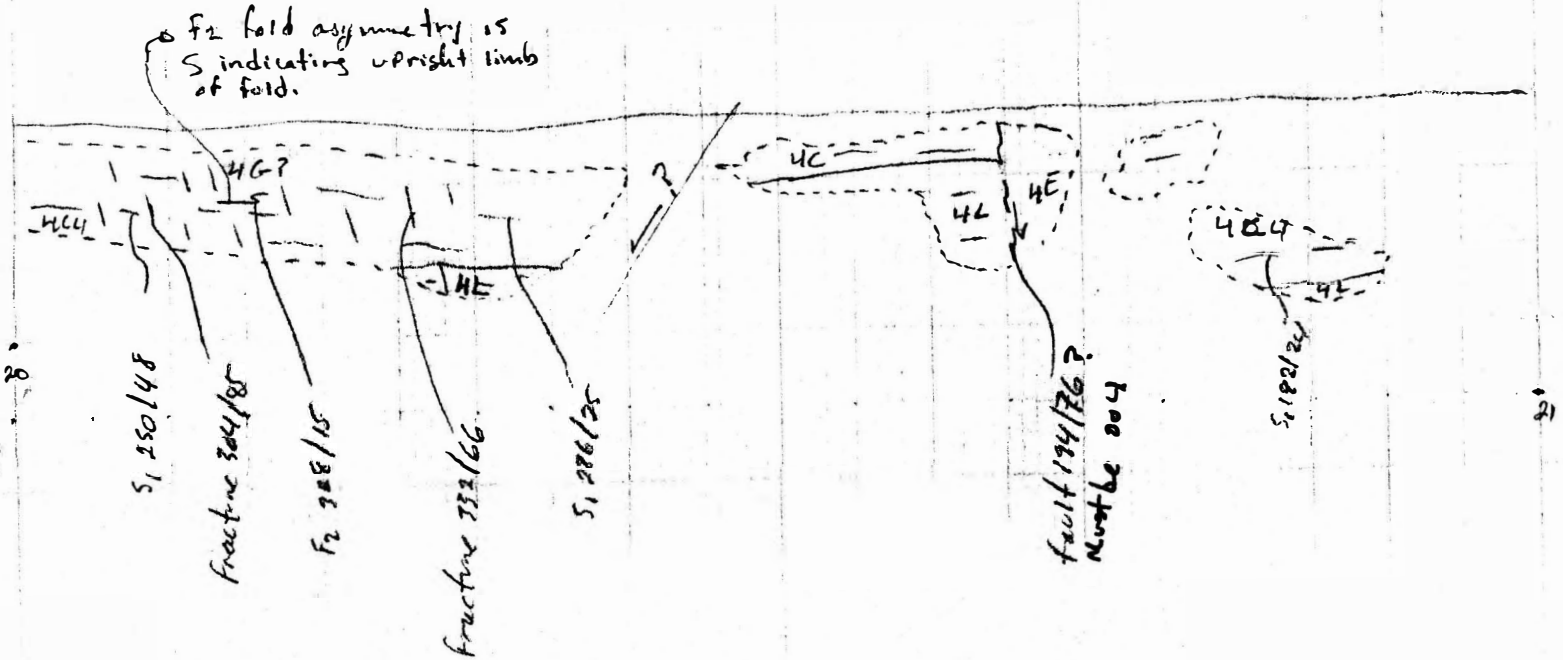
1122 Bench looking E
Scale 1:200



Ramp down to 11044 SW-side
scale 1:200

⇒ The contact with the fortuna II phyllites moves up and down quite a bit. This is related to the graben faulting across the road and to splays off of the boundary faults





Ramp down to 1104 SW - S...
Scale 1:200

⇒ This section is strongly folded and faulted by the graben structure. The folds cascade down the face repeating the sulphide lense. The fold hinge is cut by a NW-dipping fault

⇒ Note the angular relationship between S_1 and S_2 in the sulphides and phyllite

S_1 / S_2 indicates an upright limb

⇒ Lithons indicate an overturned limb, which is the opposite of F_2 asymmetries in sulphides from last panel!

3G

4EC → 4D

⇒ This is part of an upright limb to fold hinge

3G

3G

3G

4EC → 4D

4EC → 4D

21

22

S_2 238/42

fault 308/52

S_2 281/15

S_2 264/26

S_1 300/45

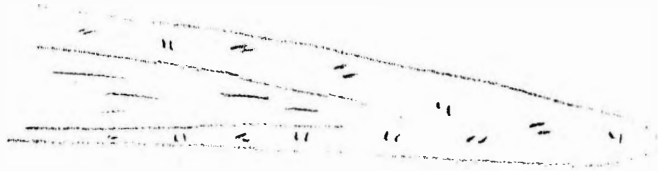
S_2 274/40

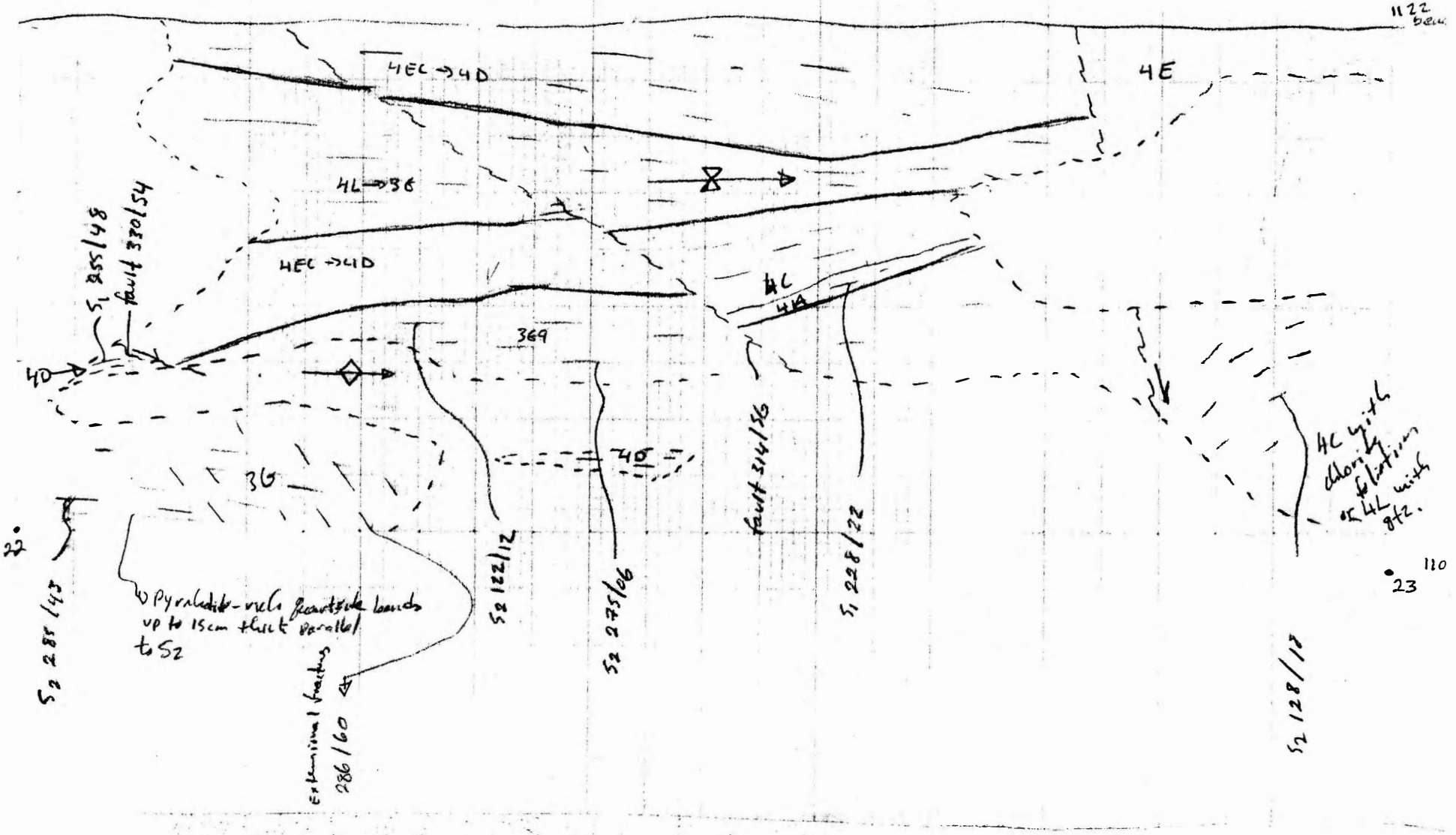
fault 164/65

S_2 217/36

S_2 242/30

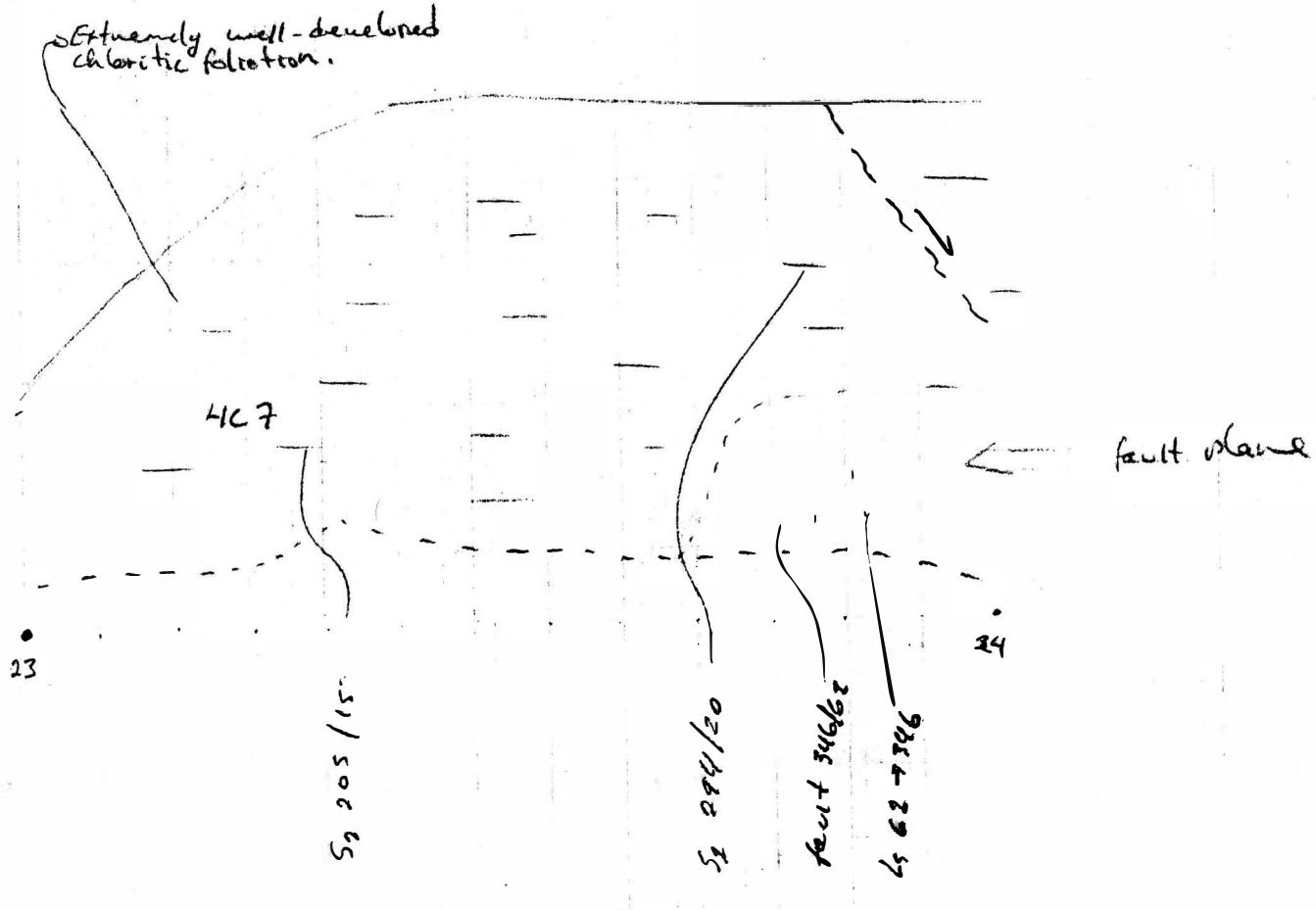
⇒ A synformal F_2 fold hinge outlined by sulphide band. There is a lower band as well but it only outcrops near the base and can't be traced. Blocks that have fallen from the wall are strongly sheared with tail clasts and foliation boudins. There is minor F_3 recirculation and S_2 moves around quite a bit because of the close proximity to the Cross Fault to the NW.





1104 Bench Looking South
Scale 1:200

- There is a thin pyrrhotitic breccia at the very top of this, extending up to the next bench.
- I'm calling this a 4C7 with a very good chlorite foliation.

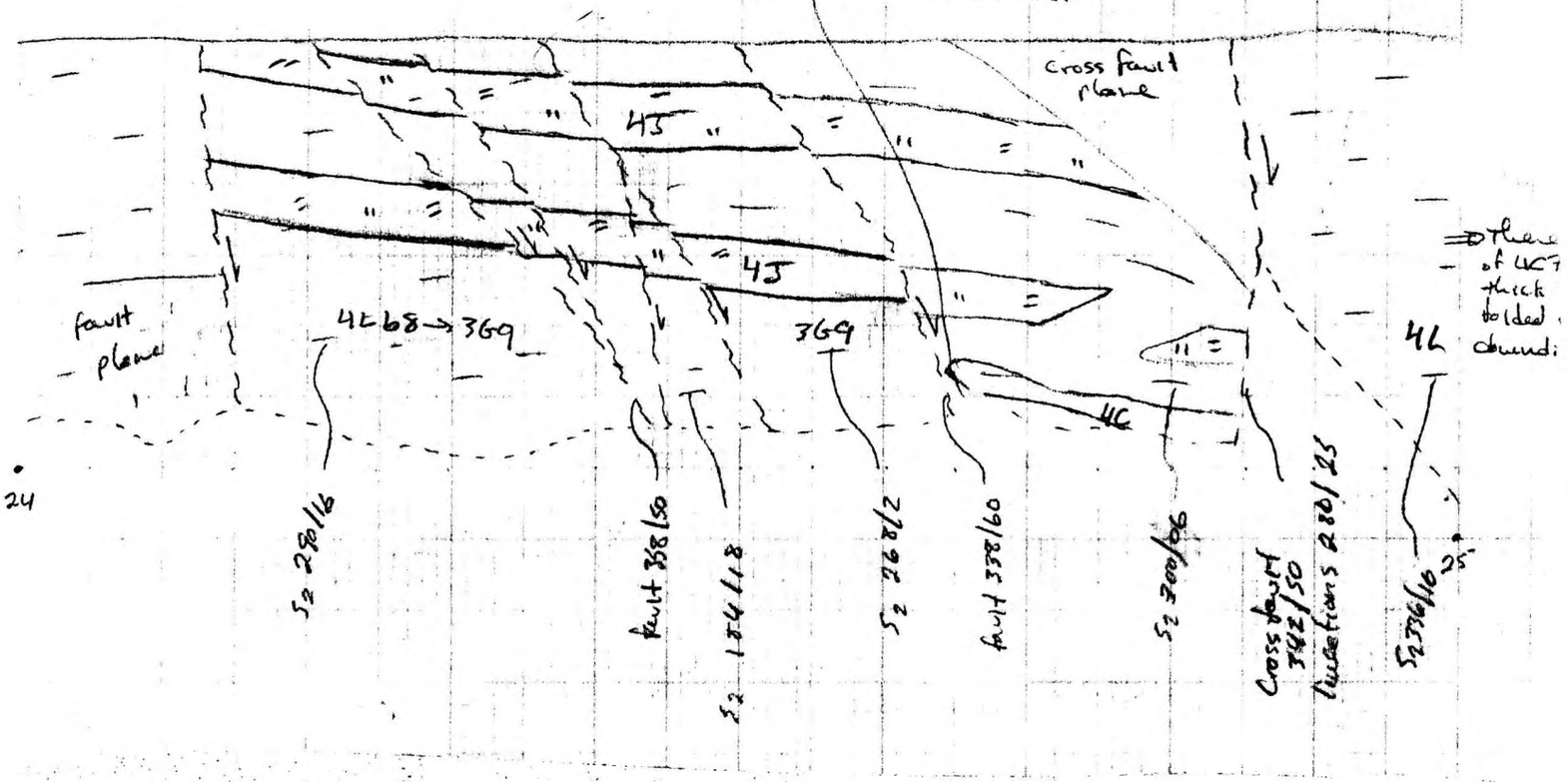


→ It is possible that the band of 4J is folded but I can't get to it to find out. If it is then it is cut by the Cross fault.

Ramp from 1604 to 1712 to
Scale 1:200

→ This is the zone of the infamous Cross fault. The fault dips NNW with a W-plunging lineation indicating oblique slip. The footwall contains several synthetic fault (footwall collapse) and may be tightly to isoclinally folded.

→ Not sure if this cuts out against the fault or it is a fold hinge. There is nothing in the footwall this minor fault to suggest it cuts out. It may be a boudin.

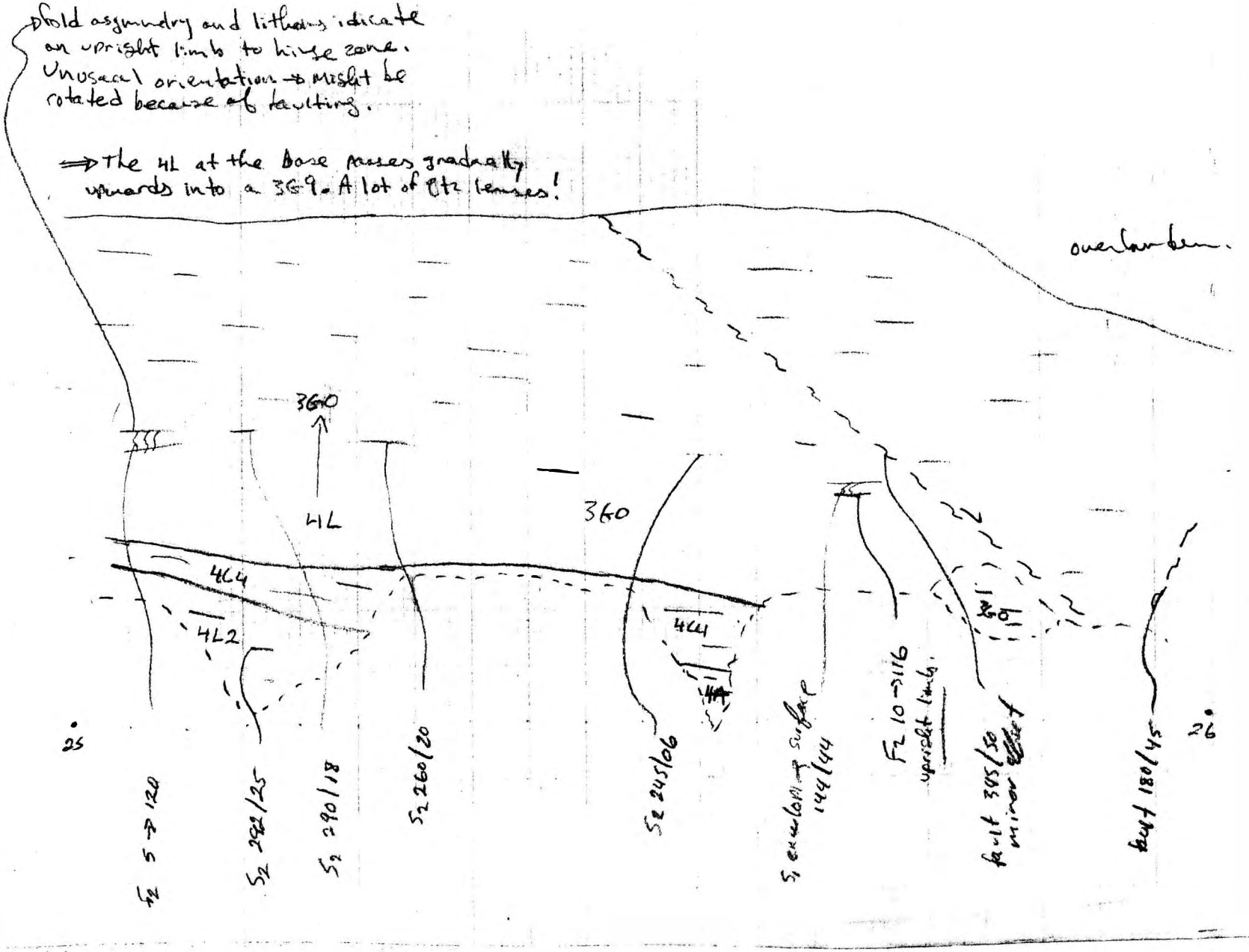


of an fz fold. This may account for the high quartz (lense) content as qtz migrated into the hinge zone. Small-scale folds plunge towards the SE, probably being rotated there by down-dropping along the Cross fault. A fold hinge might also account for the increased thickness in the sulphide band.

Scale 1:200

fold asymmetry and lithology indicate an upright limb to hinge zone. Unusual orientation → might be rotated because of faulting.

⇒ The 4L at the base passes gradually upwards into a 3G-9. A lot of Qtz lenses!

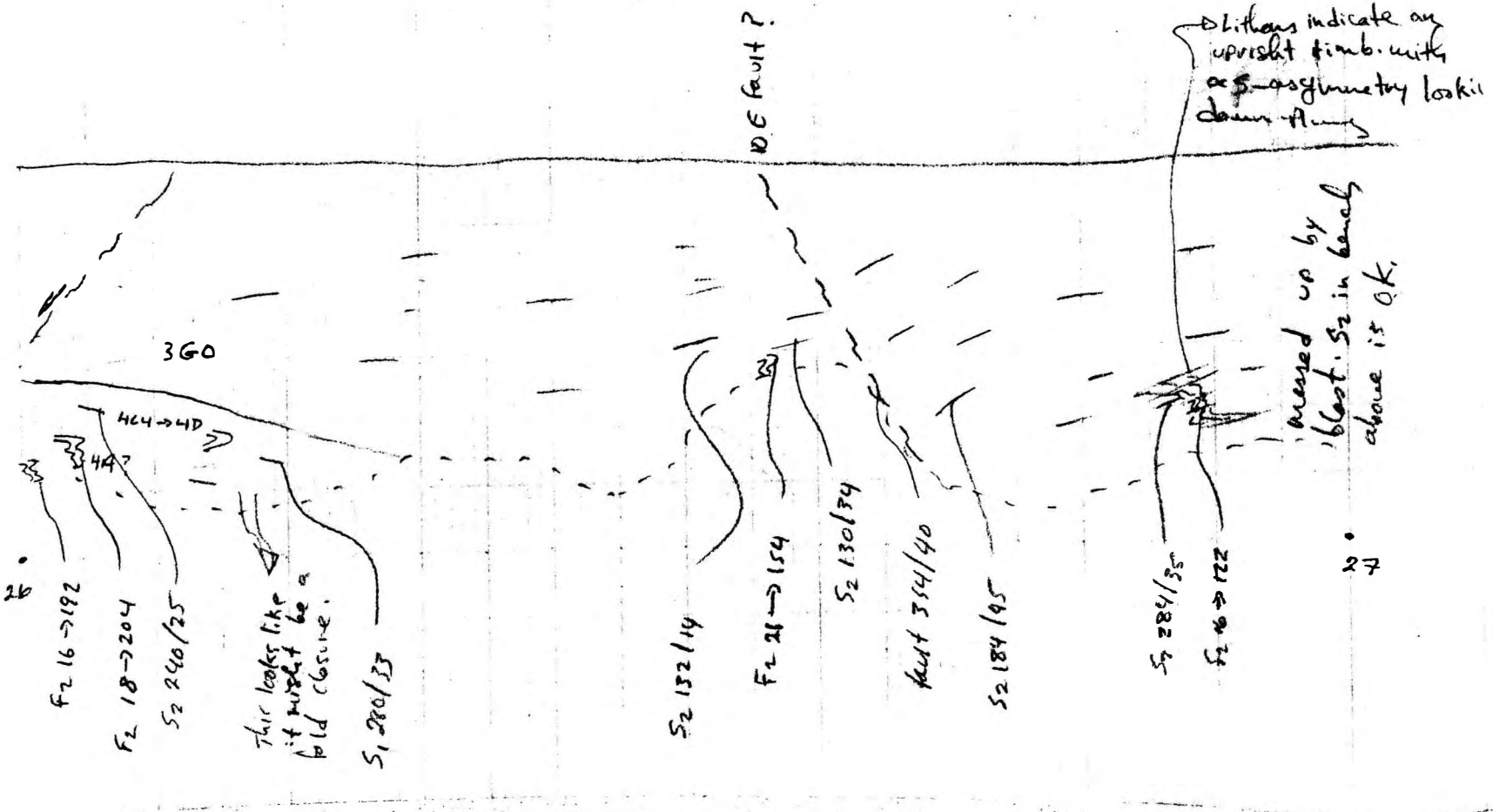


...on a mesoscale folds

are all S looking down plunge.

The 10 E fault may have an unusual kinematic history. On the N side of the pit it is definitely extensional but on this side the foliation bends into in a way that suggest compression. It may be that

it is slightly inverted as a result of compression in the collapse above the NW-fault.

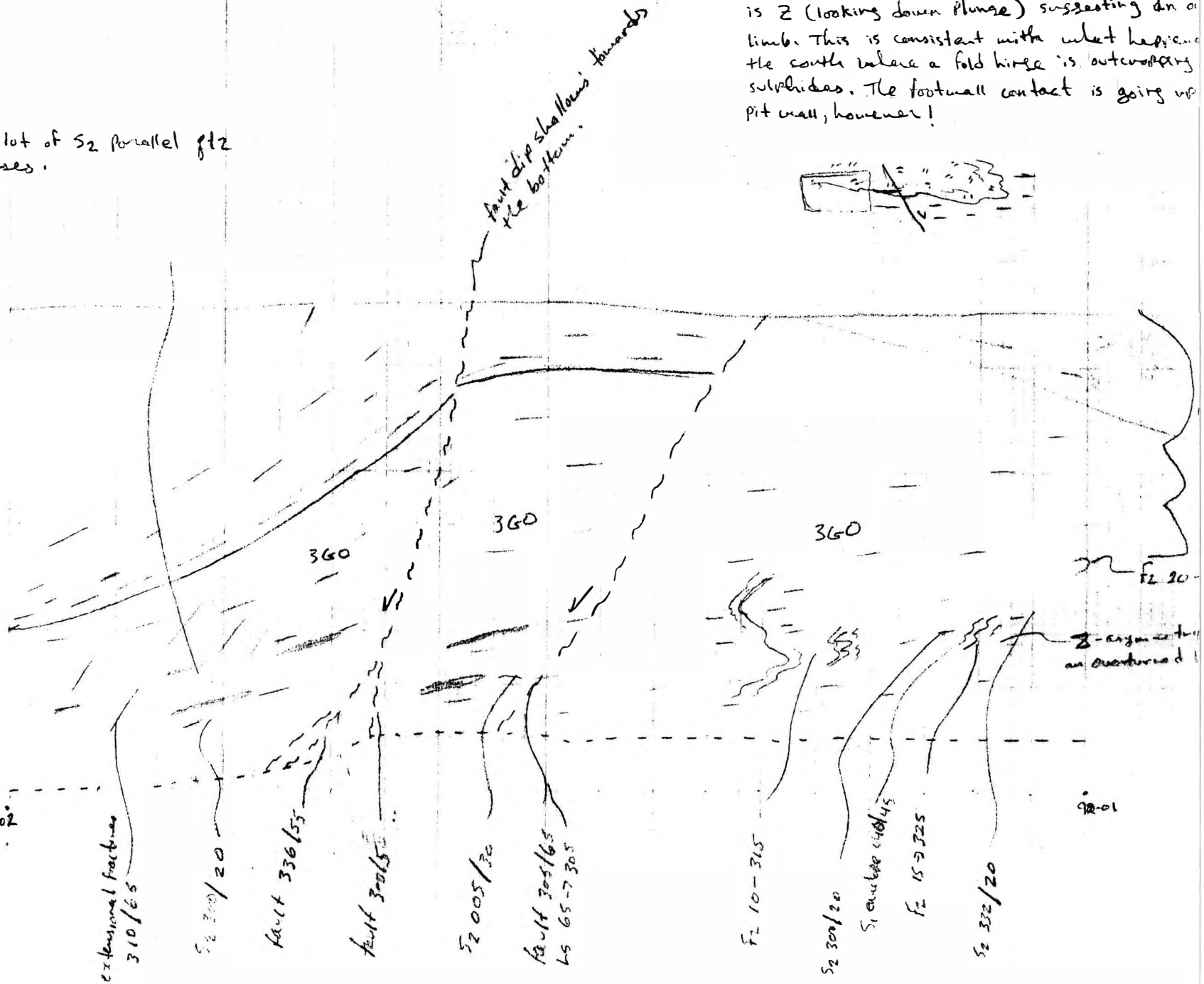


was mapped in 1991

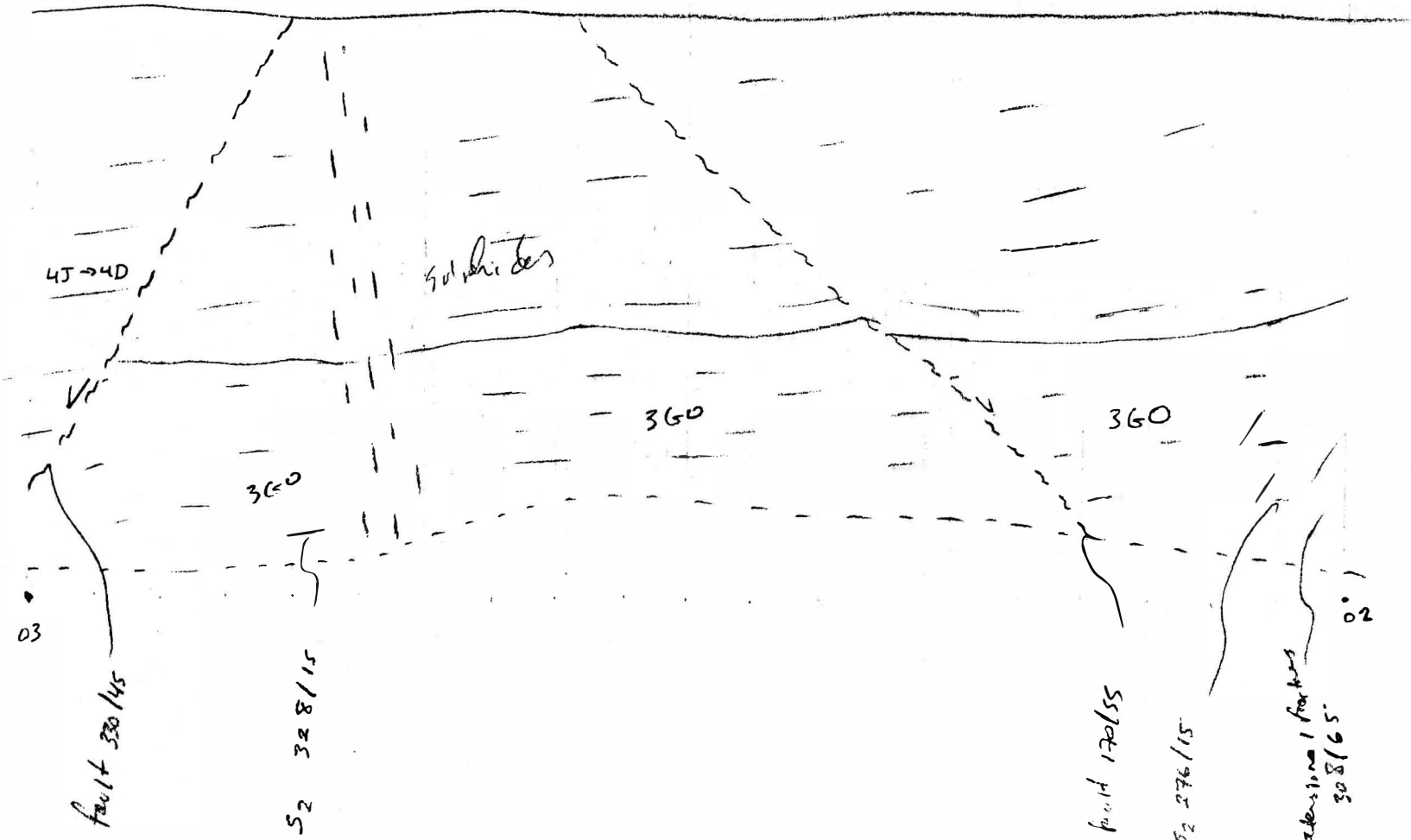
Scale 1:200

⇒ fold asymmetry near the bottom of the ba... is Z (looking down plunge) suggesting an o... limb. This is consistent with what happens... the south where a fold hinge is outcropping ... sulphides. The footwall contact is going up... pit wall, however!

A lot of S_2 parallel flz lenses.

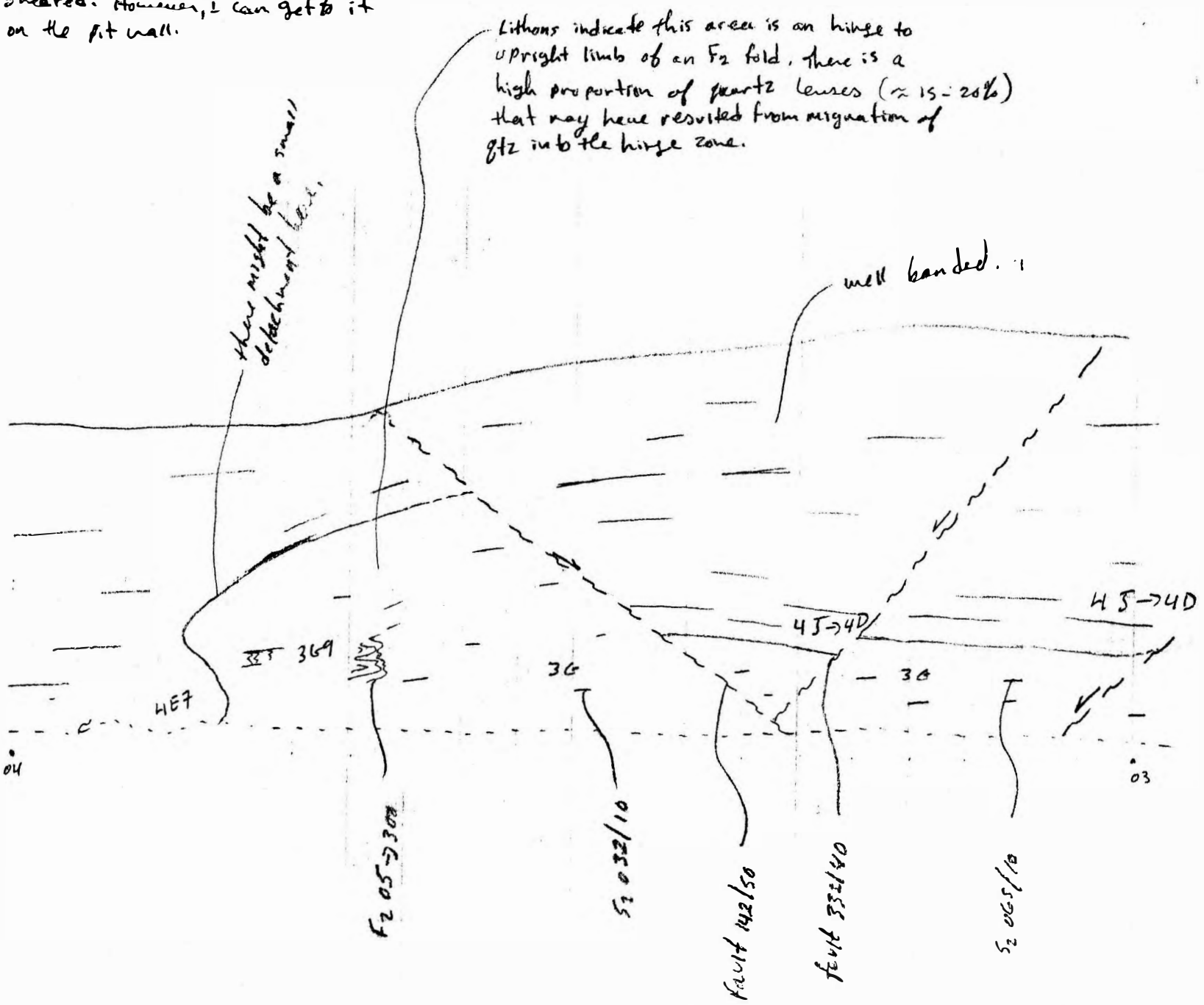


well exposed high up but not well exposed near the base.

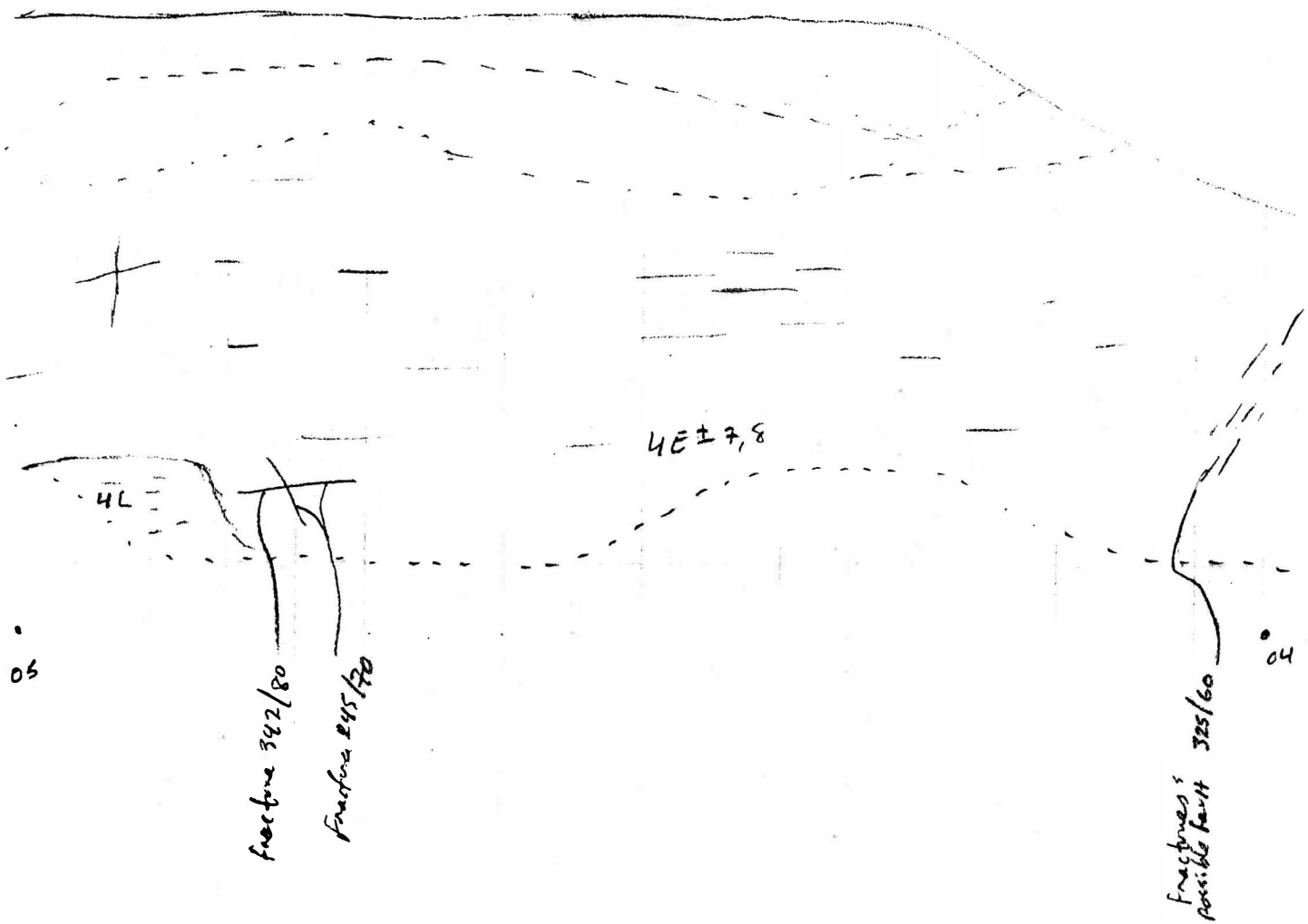


Scale 1:200

⇒ The contact between sulphides and phyllite in the graben has a very well developed foliation and may be sheared. However, I can get to it on the pit wall.

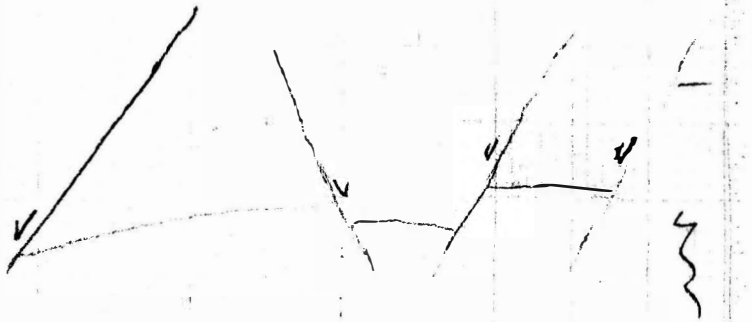


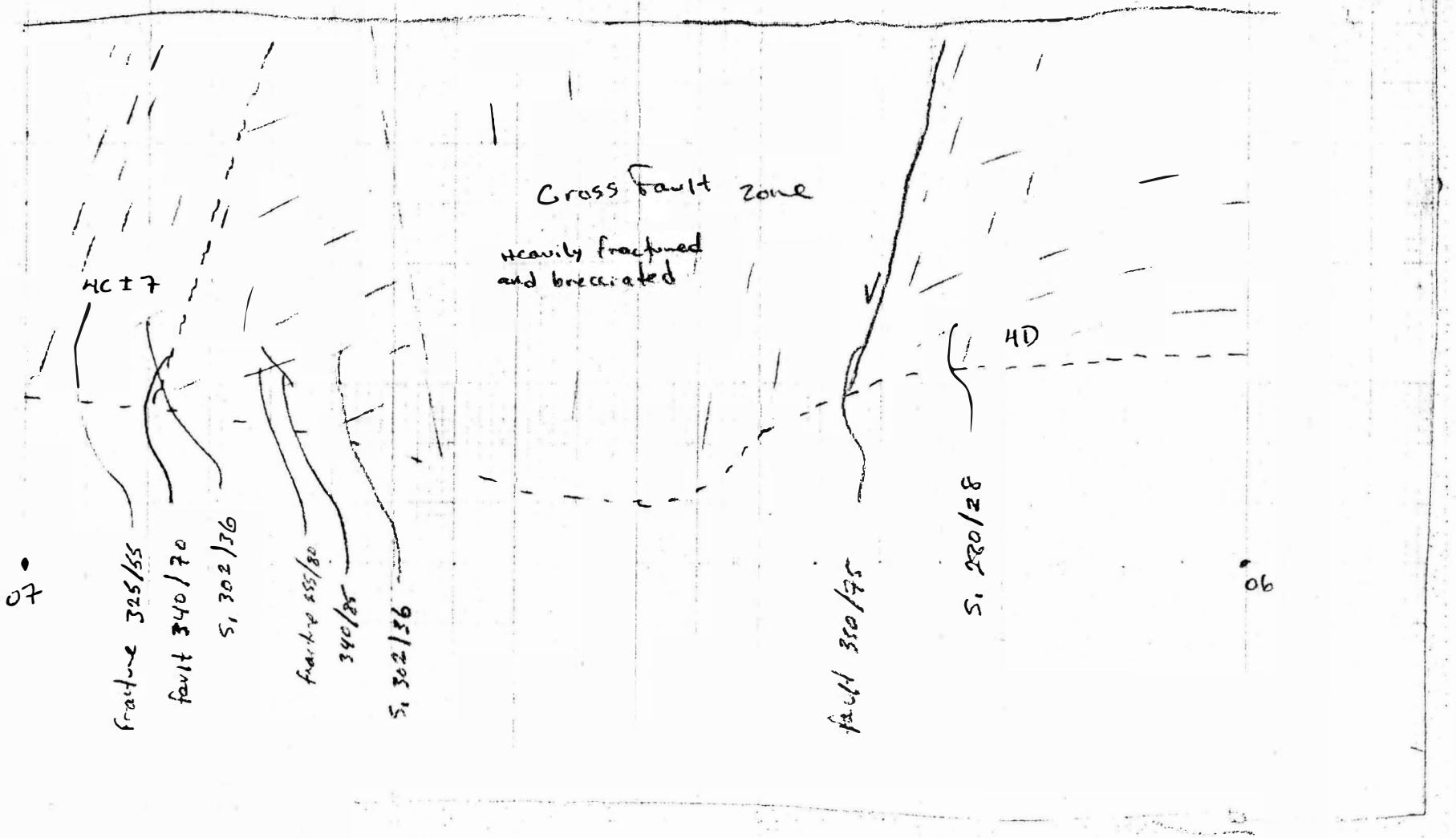
→ difficult outcrops to get to.



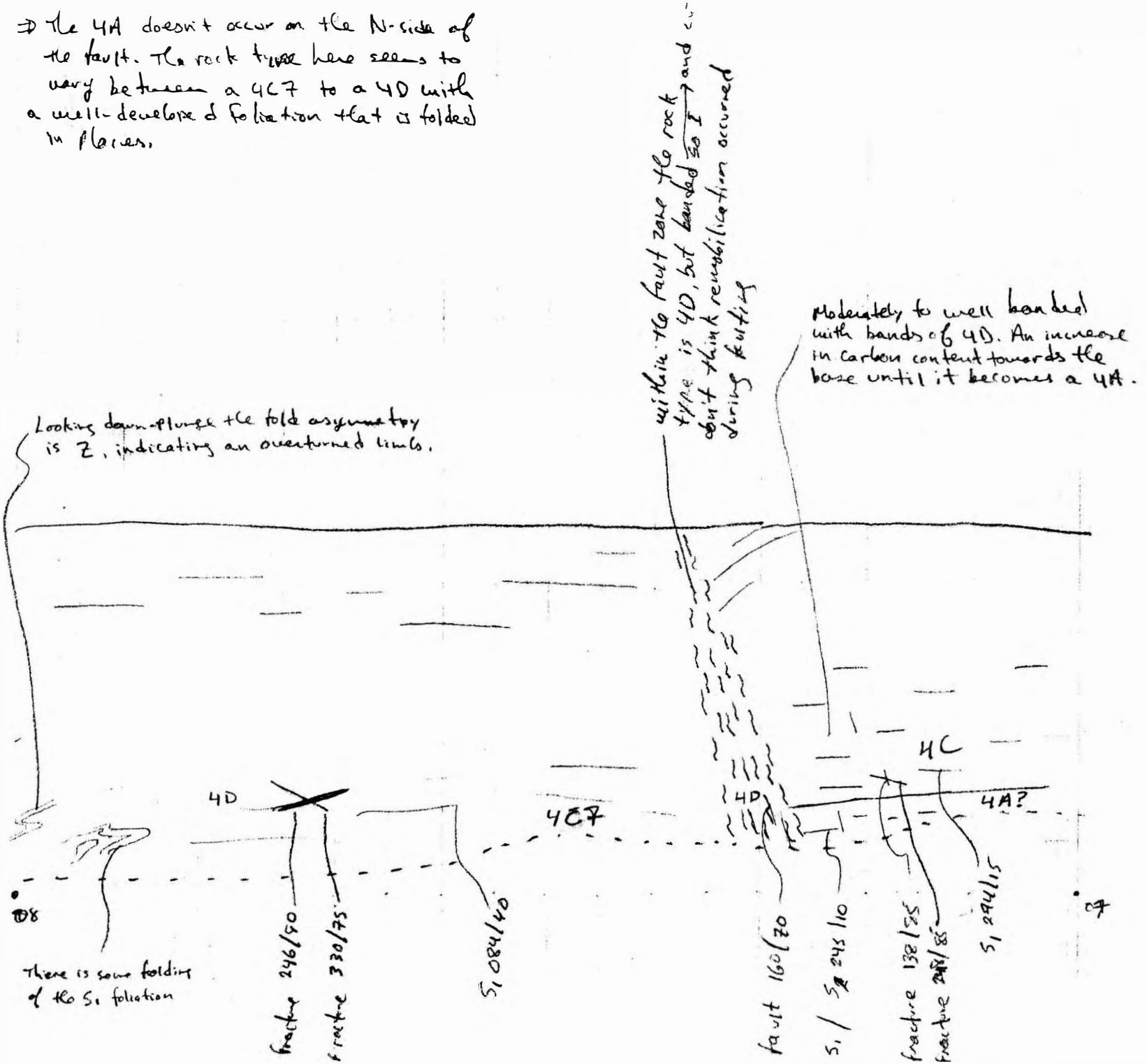
1104 Bench
scale 1:200

→ cross fault consists of ≈ 15-20 m wide zone of intense fracturing of brecciation. It dips to the NW - N with a lineation that pitches ≈ 45° SW. In the sulphide lithofacies it is quite steep but seems to flatten out in the phyllites on the far side of the pit. The fault blocks and grabens mapped in the footwall are likely synthetic to it, and link somewhere to the East





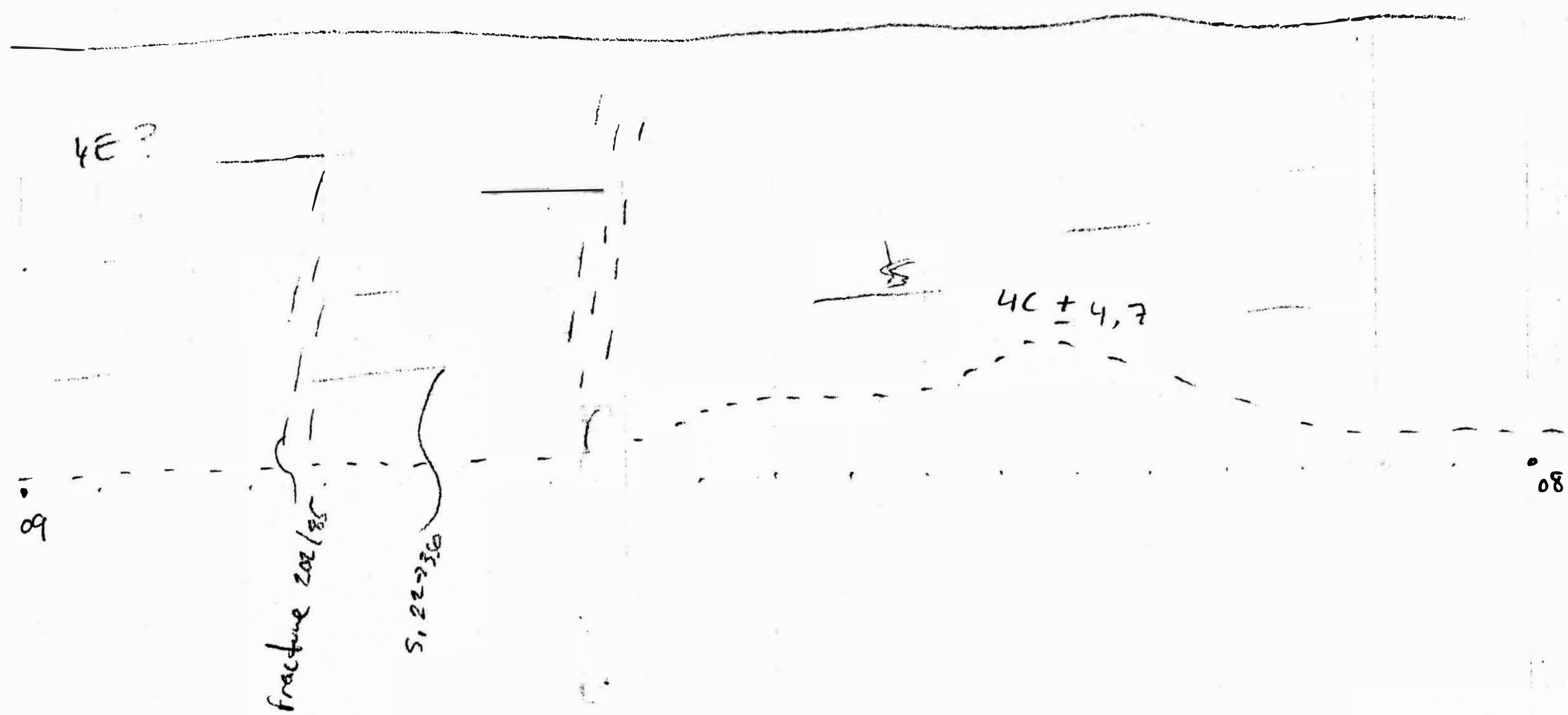
⇒ The 4A doesn't occur on the N-side of the fault. The rock type here seems to vary between a 4C? to a 4D with a well-developed foliation that is folded in places.



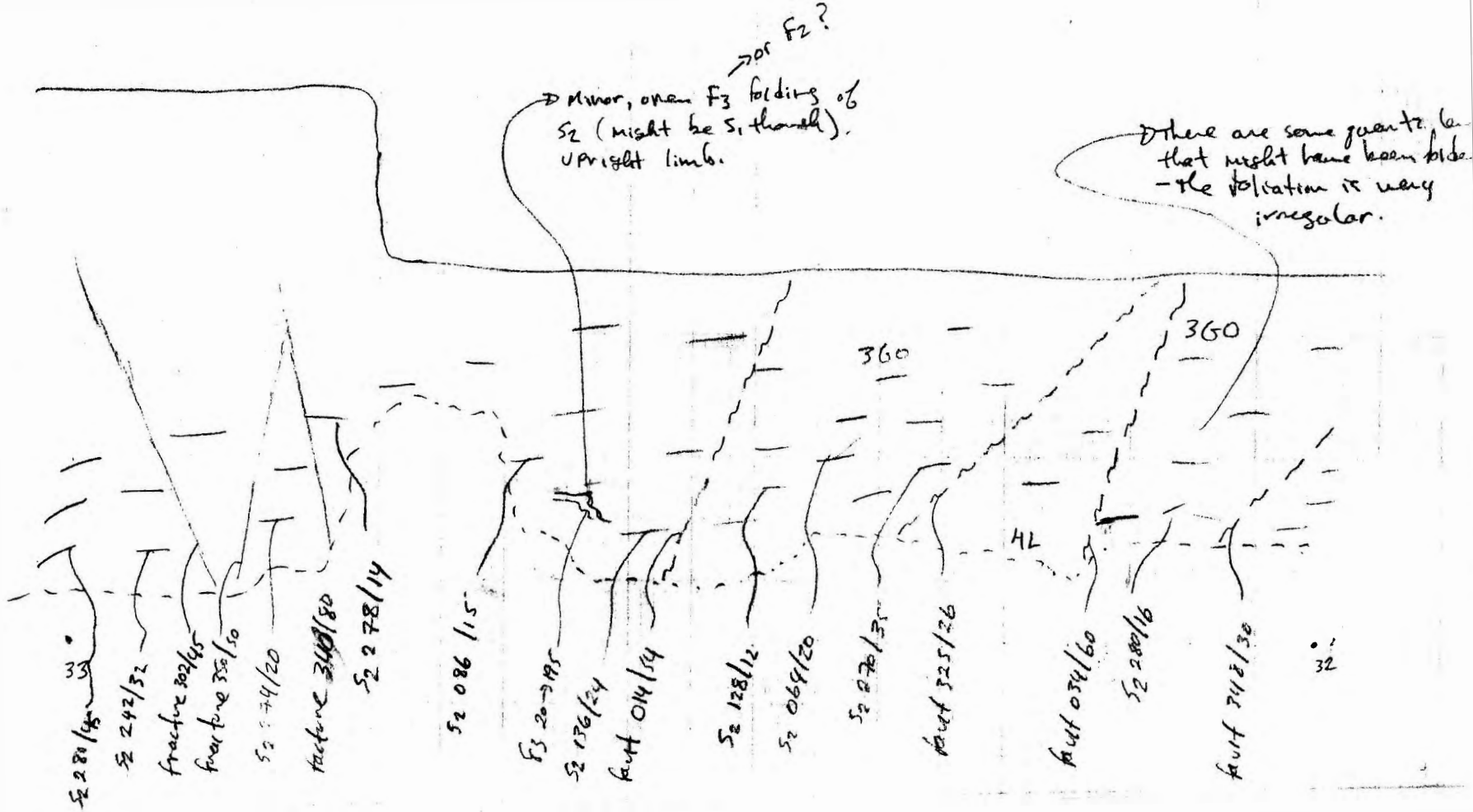
Scale 1:200

⇒ The ~~a~~ foliation (apatite) is boundinaged on has rootless folds and in general tends to be wispy and discontinuous. Sphalerite and pyrrhotite (+ magnetite?) occur locally.

⇒ the S_1 banding is defined by porphyroblastic pyrite up to 1mm in size and is strongly folded. However, the fold asymmetry is difficult to define because of the way the surfaces are cut. Still, I get the feeling it is overturned.



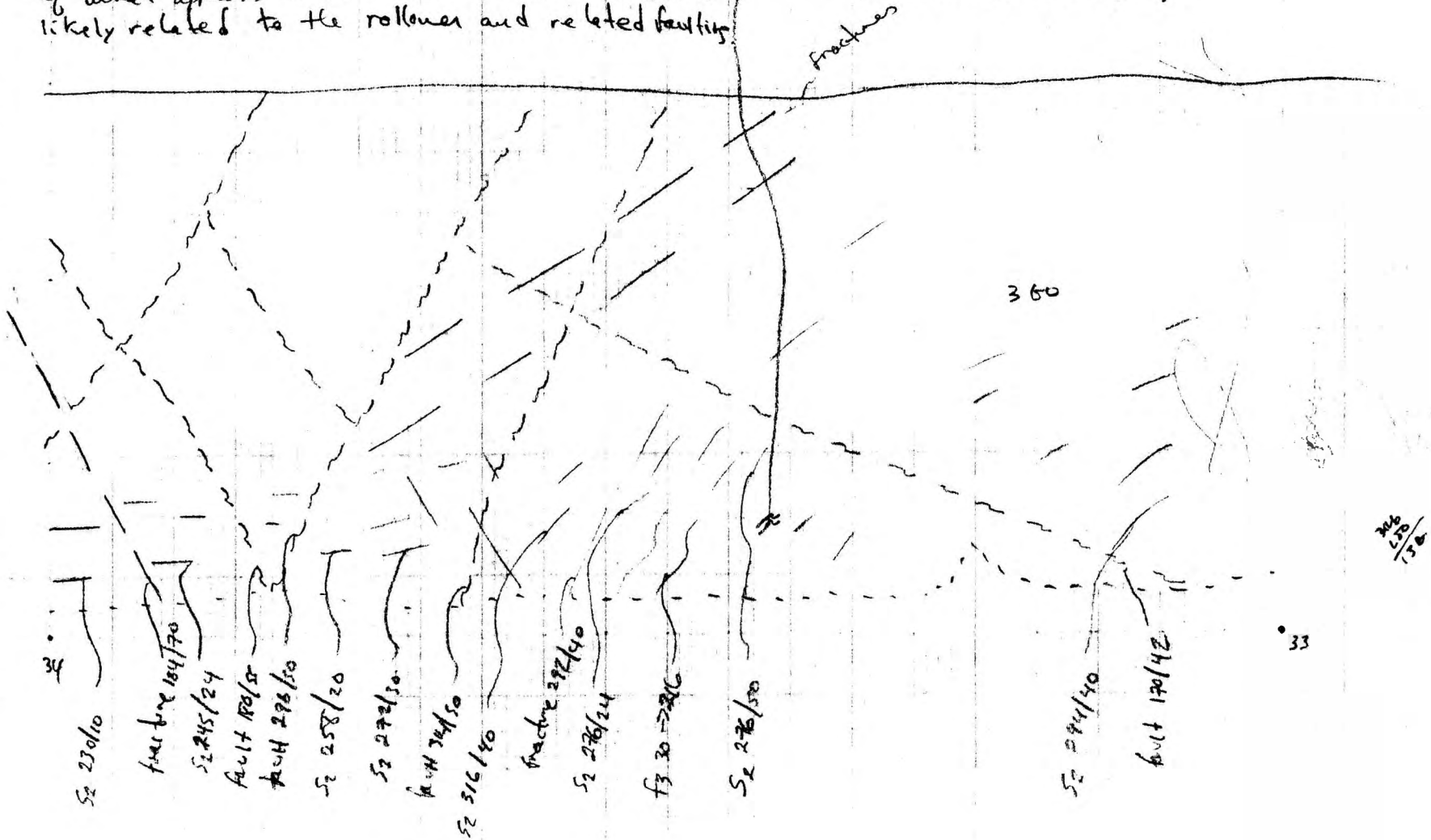
1104 Bench looking east
scale 1:200



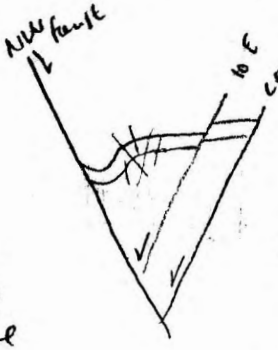
1104 Bench looking East
Scale 1:200

→ The S_2 foliation turns sharply down towards the west along an open F_3 warp. However, the shiny surface exposed along the wall is NOT S_2 but but a NW-dipping fracture surface that cuts S_2 at a shallow angle. There are several fracture orientations that are atypical of what appears elsewhere in the Pit. These are likely related to the rollover and related faulting.

→ There are a number of NE to E verging small-scale (1 cm) folds – Nothing major.

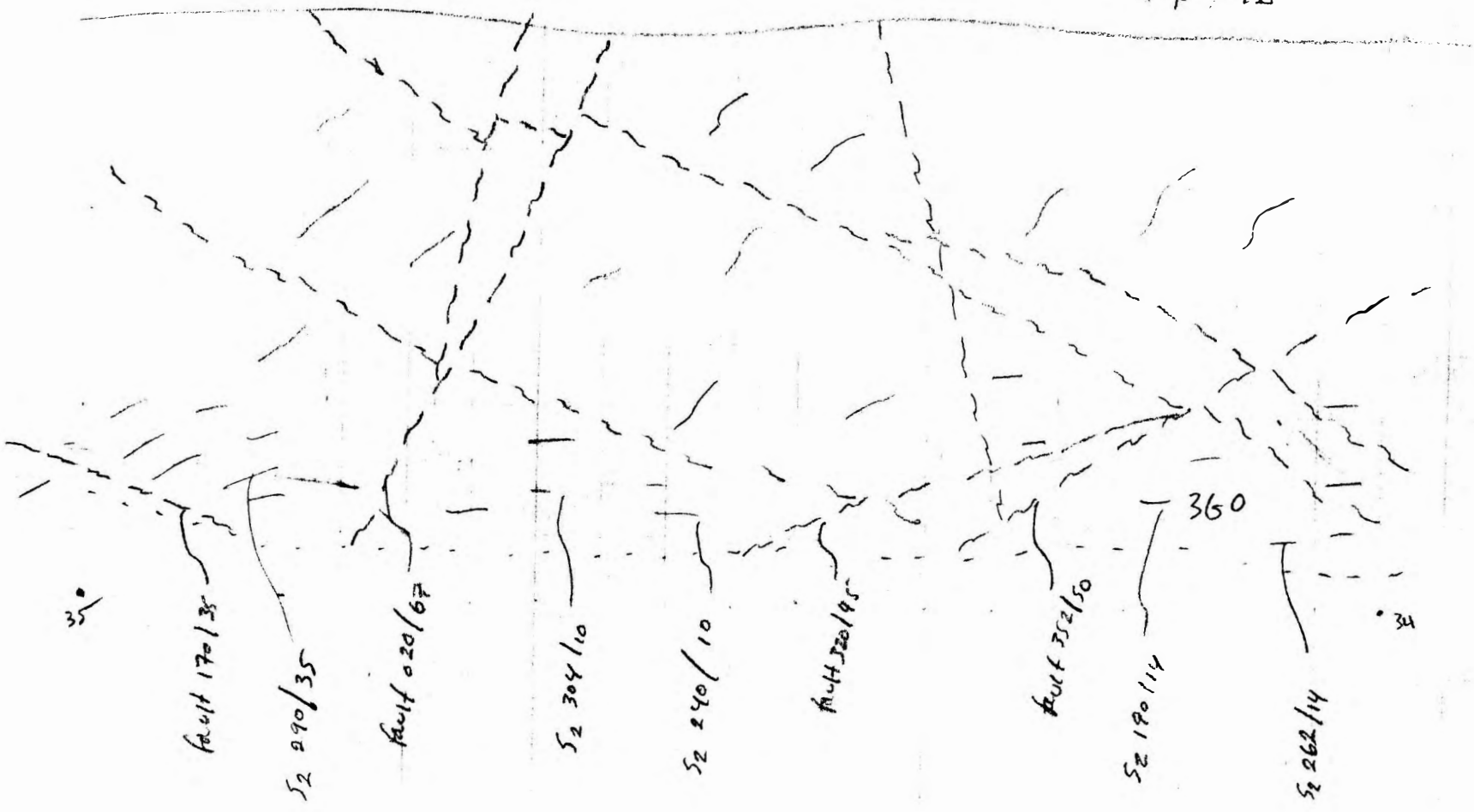


⇒ There is no F_2 folding in this section. The S_2 foliation begins to warp down the wall near Point 35 and perhaps higher up the wall. The is a complex array of faults including some the dip shallowly South. This area may be at the crest of a rollover. Bob the blaster says that energy from blasts in this area has been noted several hundred meters along strike of the faults, coming to the surface near the flume.



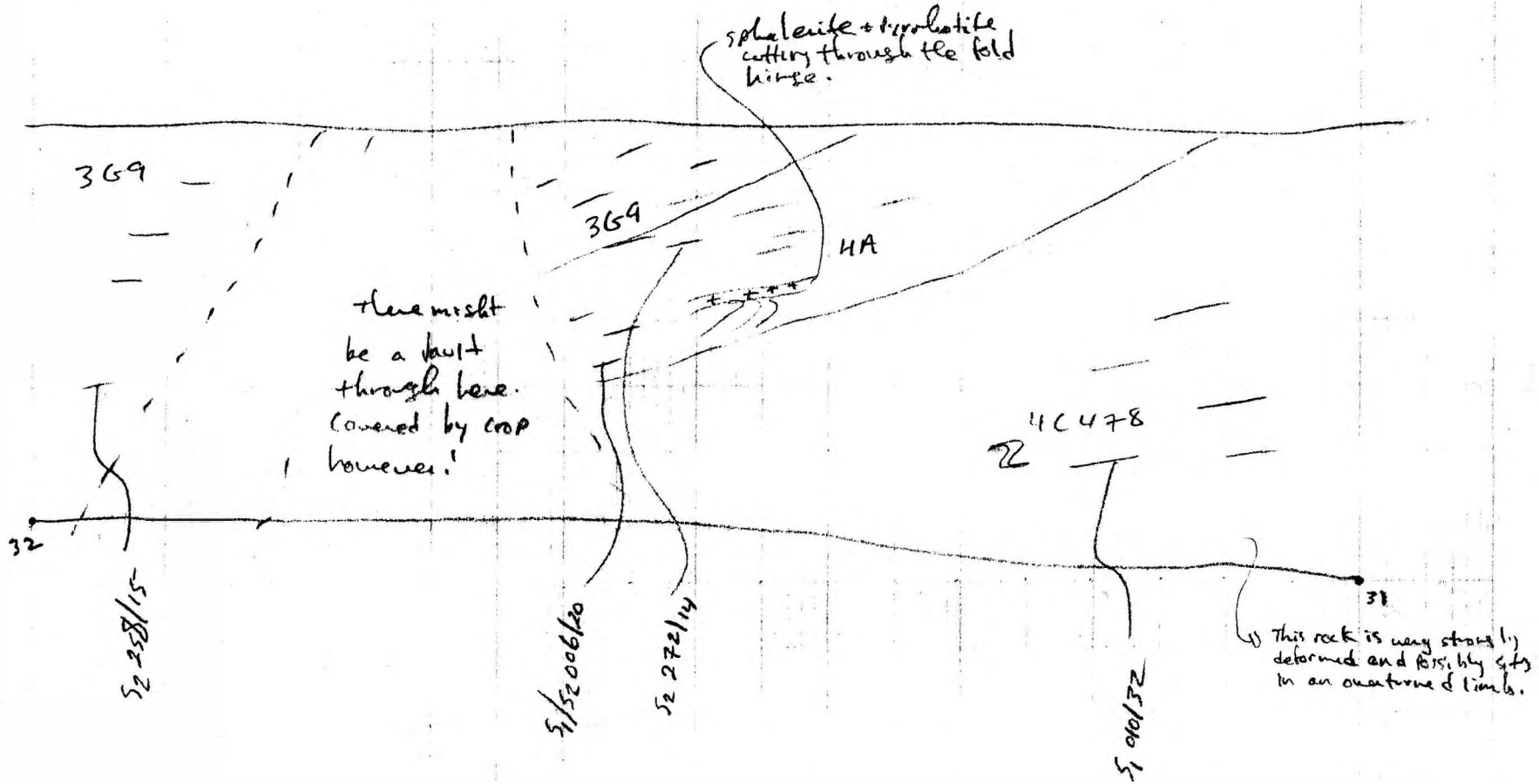
1104 Bench looking E.
scale 1:200

* The faults tend to cut
rollover at a shallow angle,
they are a-c fractures.



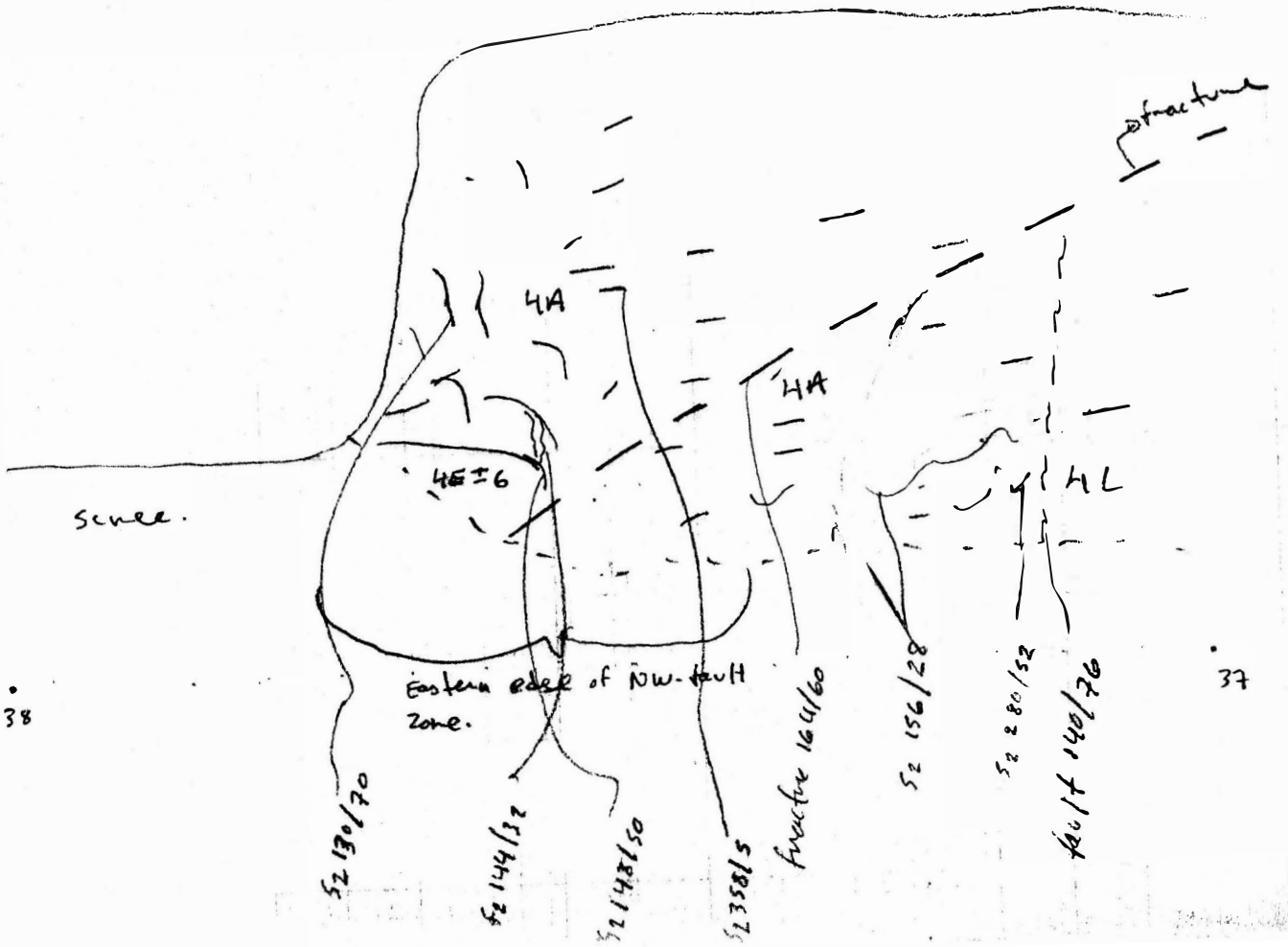
1104 Bench looking E
Scale 1:200

I get the feeling that this is very strongly folded but can't prove it. There are certainly tight folds in the UC blocks along the screen slope.



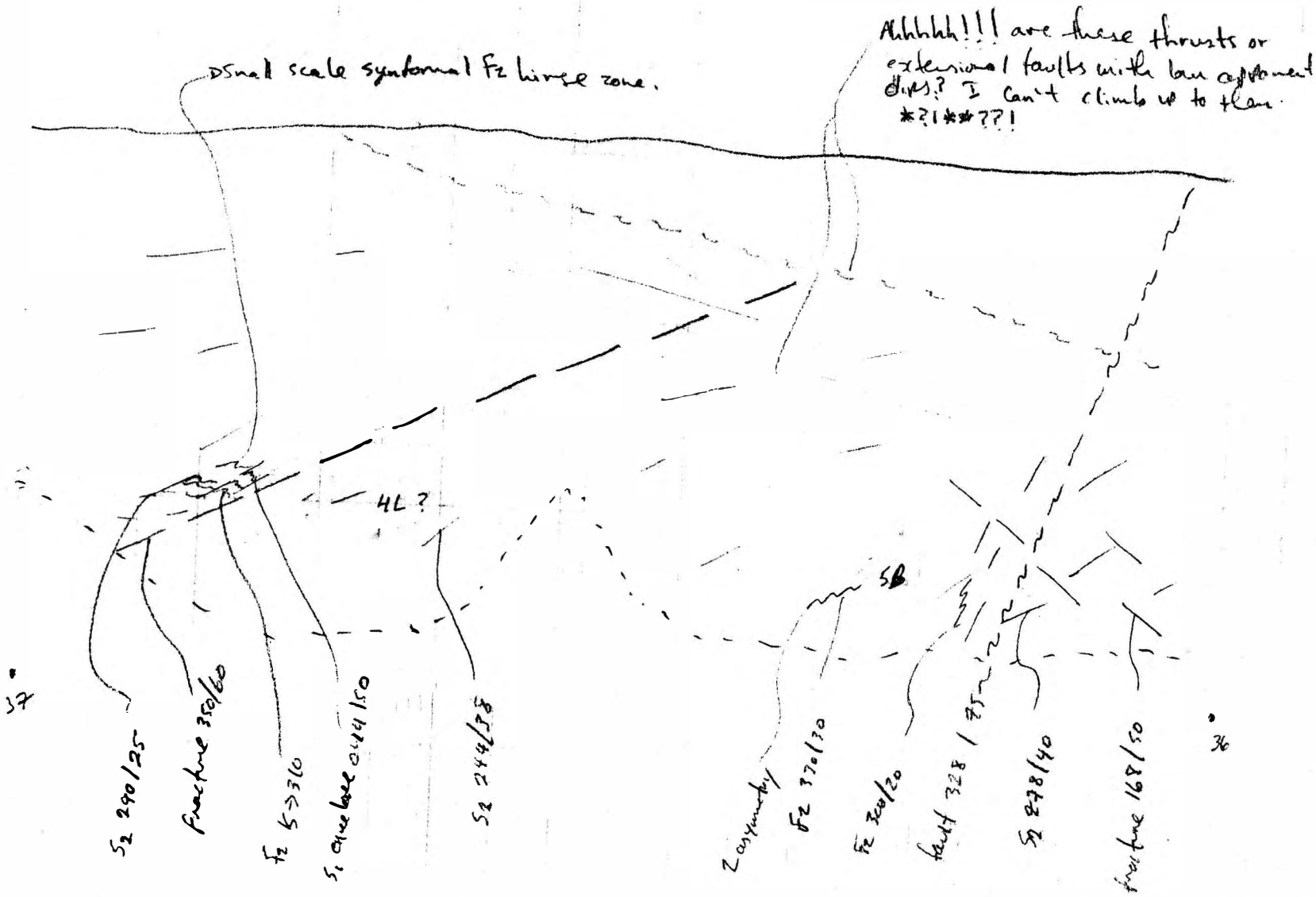
1104 Bench looking N
Scale 1:200

⇒ The eastern edge of NW-fault zone.
S_2 orientation becomes very variable
and F_2 plunges in a number of directions
but the asymmetry is Z (overturned).
the 4A is very broken and looks as suggestive
of water penetration along the fault.



⇒ Immediate hangingwall of the NW fault. There is an increase in the qtz content towards the fault, most notably near 36 where the rock becomes calcareous. Lithons indicate a change in fold asymmetry but mostly its an overturned limb plunging into the fault. There are some major fractures (faults?) developed that dip into the fault. The S_2 foliation steeps into the fault.

1104 Bench looking N.
Scale 1:200



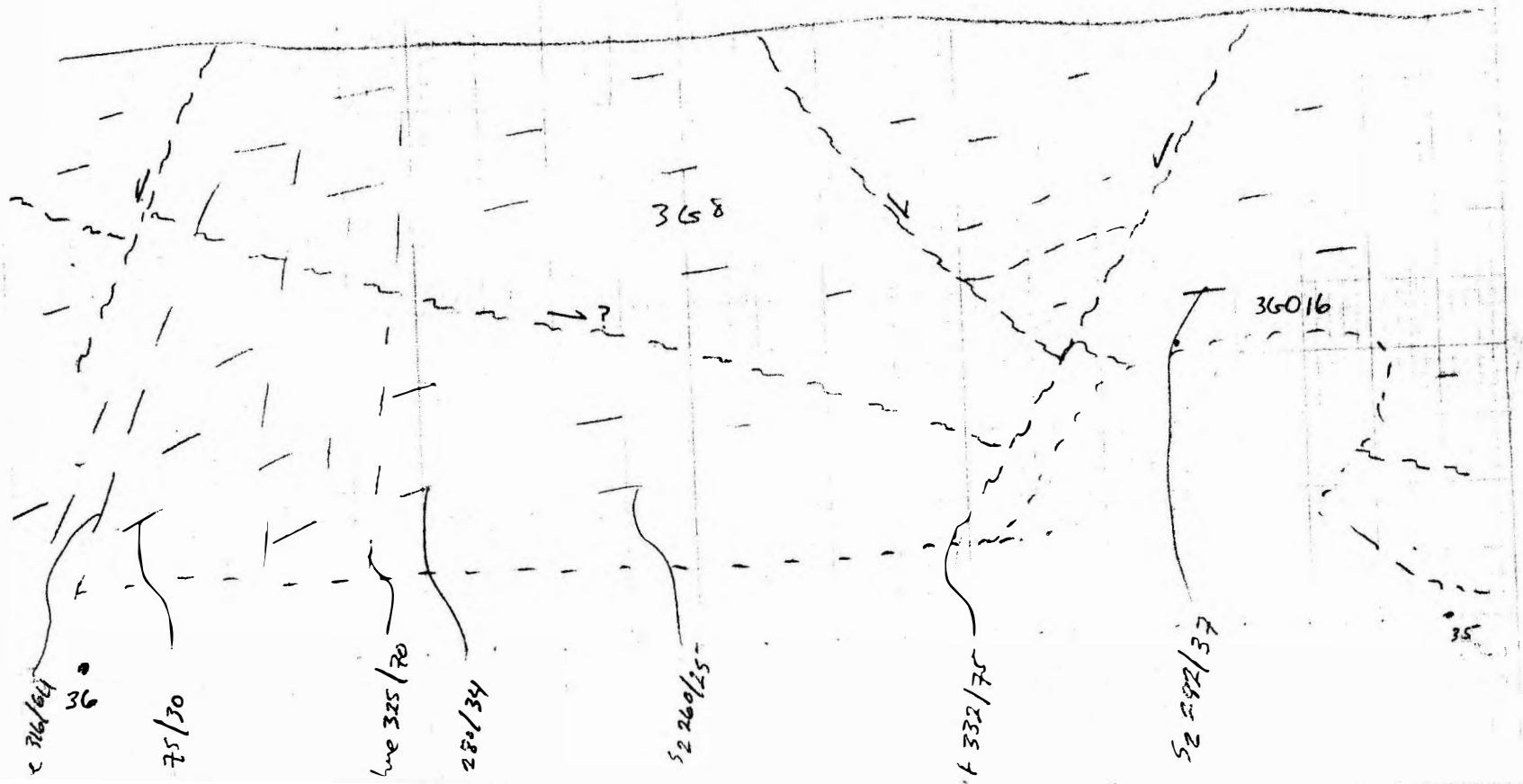
110M looking NE
scale 1:200

⇒ this rock is a very quartz-rich phyllite with remobilised Pyrrhotite. The S_2 foliation is penetrative but spaced (≈ 2-3 mm). The rock looks similar to phyllites in the hangwall in the footwall of the Cross fault (greenstone?) on South side of pit. However, there also appears to be qtz-rich, S_2 parallel bands up to 40-50cm thick interbanded with qtz-poor phyllite → Bedding? Some of the qtz, like the Pyrrhotite, appears to be remobised.

→ locally, there is a open warping of S_2.

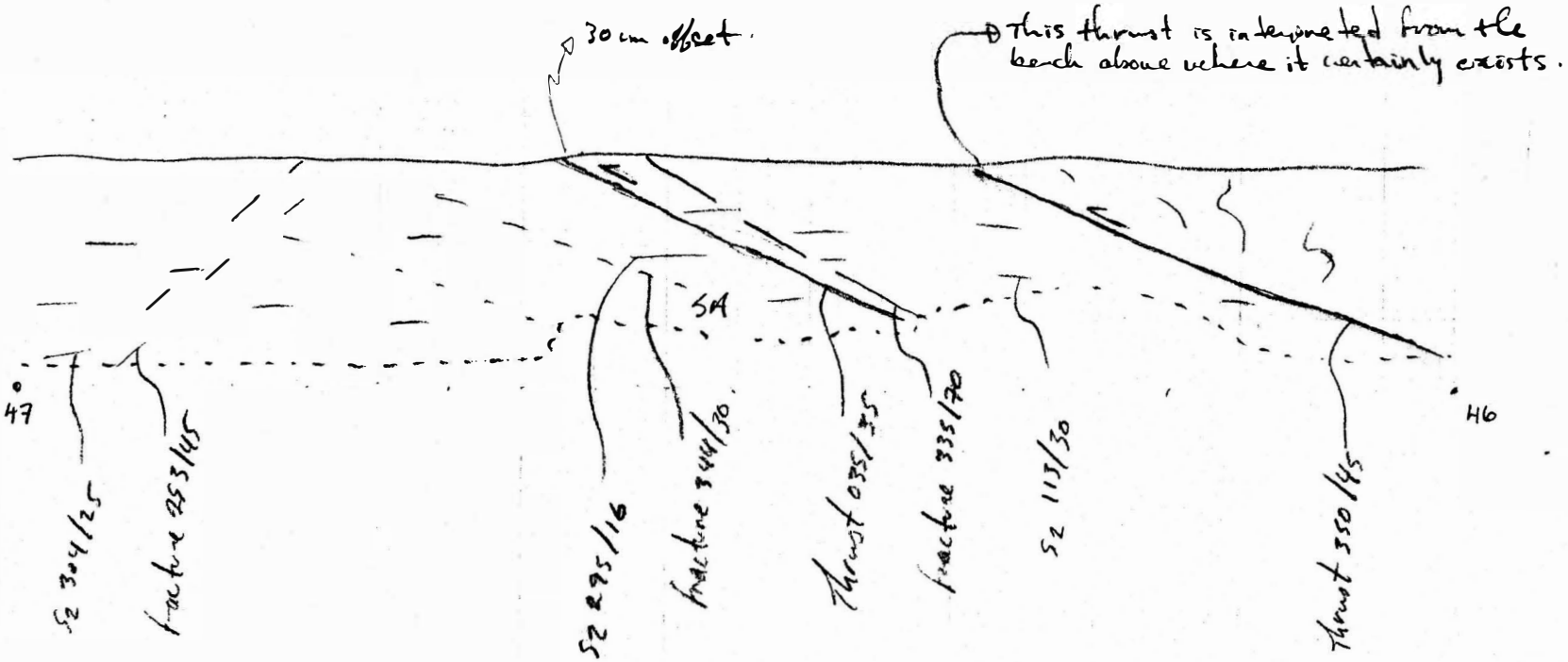
There are spaced extensional fractures ≈ 1-2cm that drop down to the SE. → up to 1m !!!

142/55



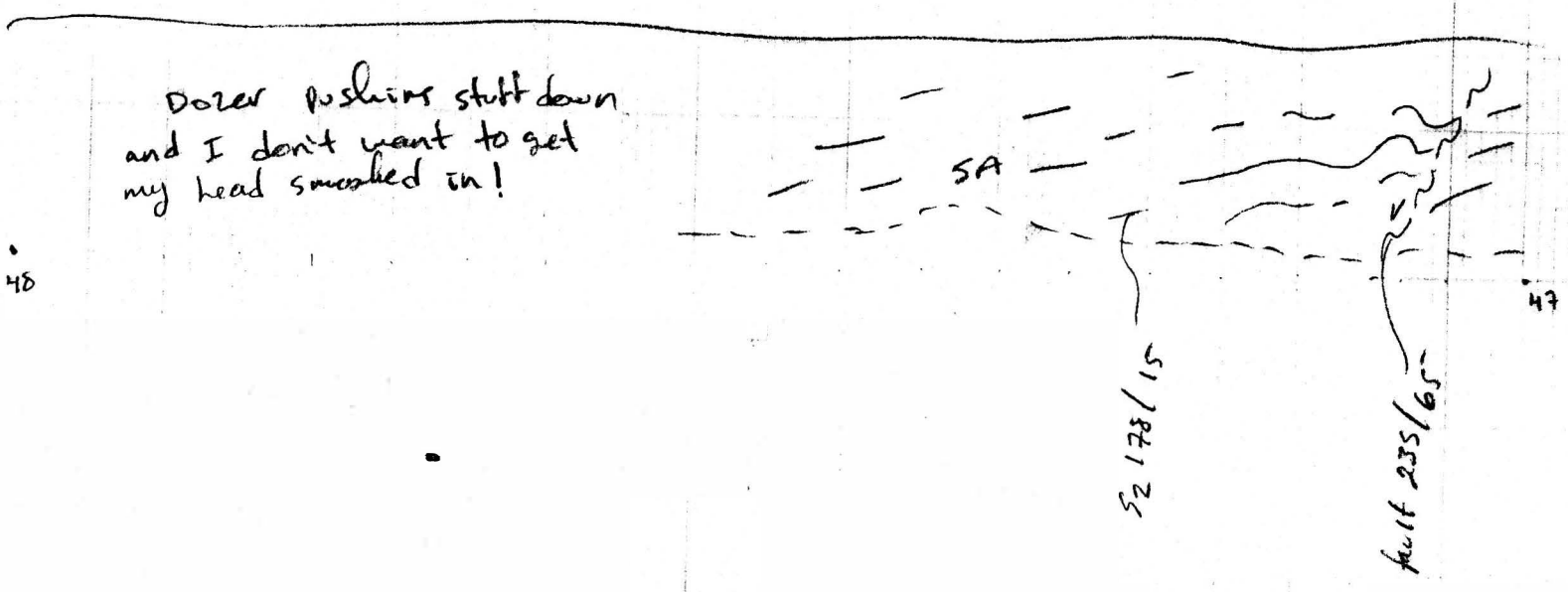
⇒ Not greatly disturbed — a few minor thrusts.
No folding apparent.

1104 Bench looking N.
Scale 1":20ft



⇒ well into the footwall of the NW-fault. these rocks aren't affected by it.

1104 Bench looking N
Scale 1:200

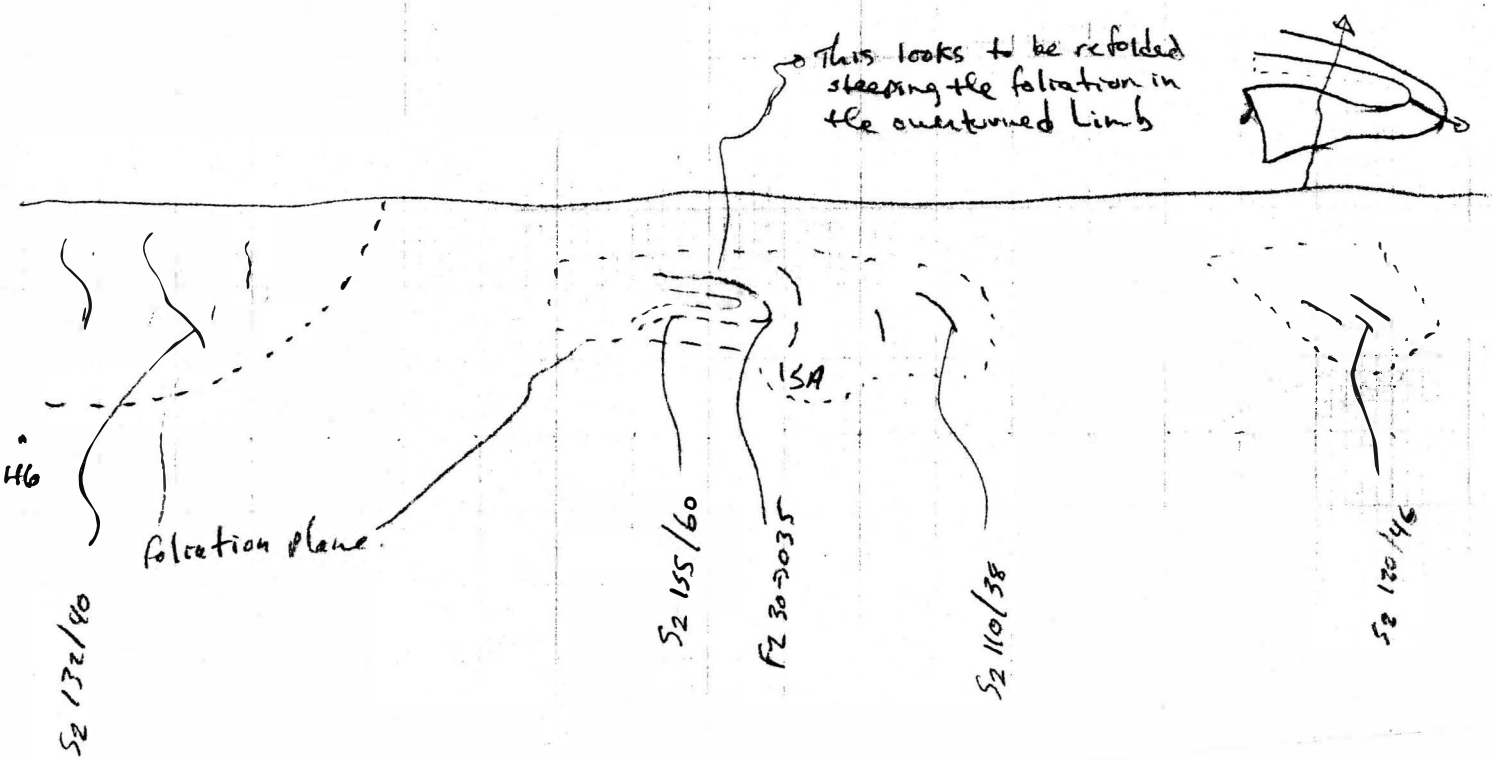


1104 Bench looking N
scale 1:200

⇒ the foliation comes steeply out of the wall, dipping into the plane of section.

⇒ I'm not 100% convinced that what happens from 45 to halfway 46 is not related to blasting. Mainly because the bench above doesn't show any of these complications. Will have to wait to see the bench below

the foliation seems to warp around but is also folded by Fz folds whose limbs are fold. This might be the result of drag along the NW-fault.

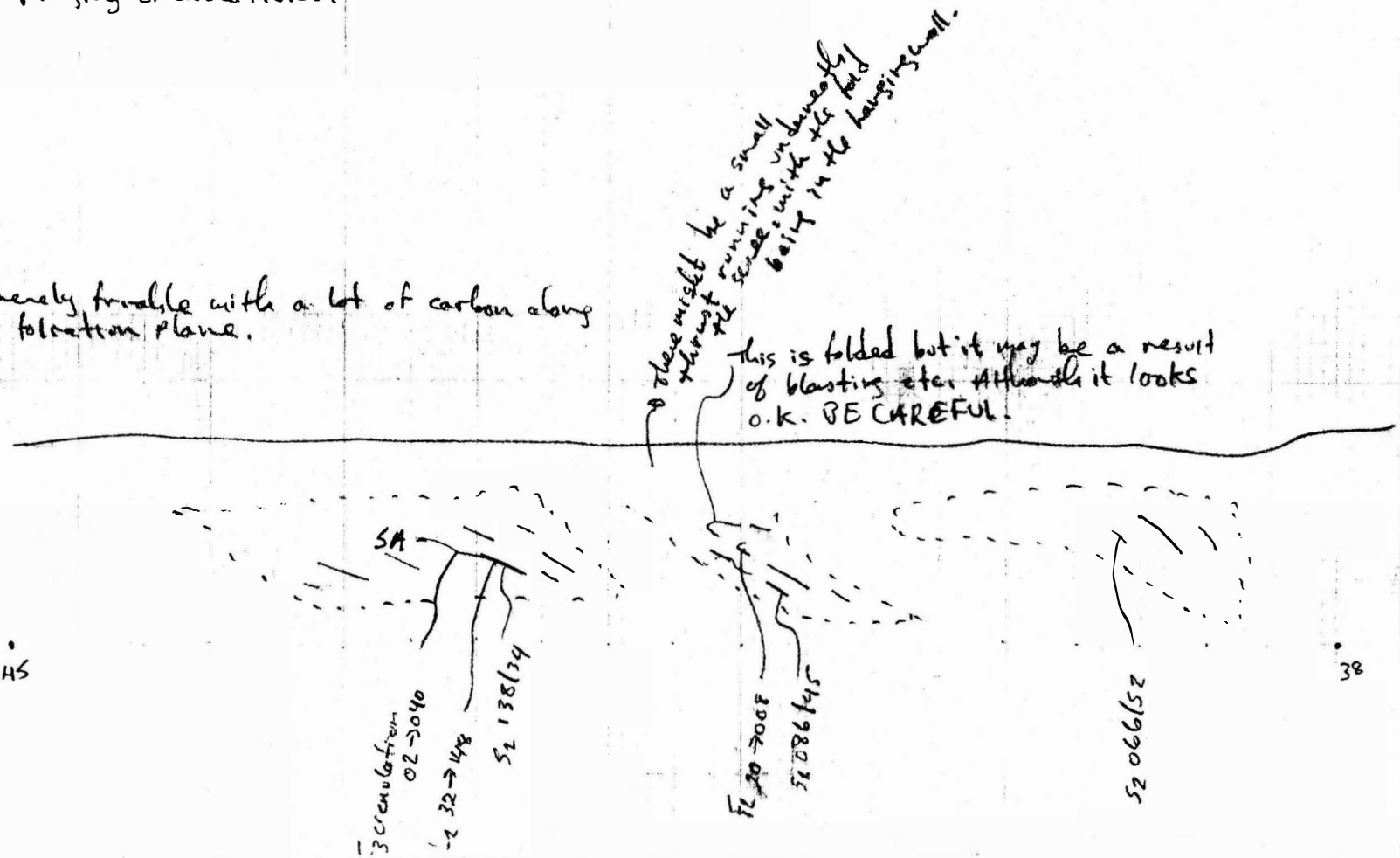


110L Bench looking N
Scale 1:200

⇒ Most of this section is probably disrupted by blasting, at least along the top. The basal part looks in situ. It appears to bend steeply into the NW fault.

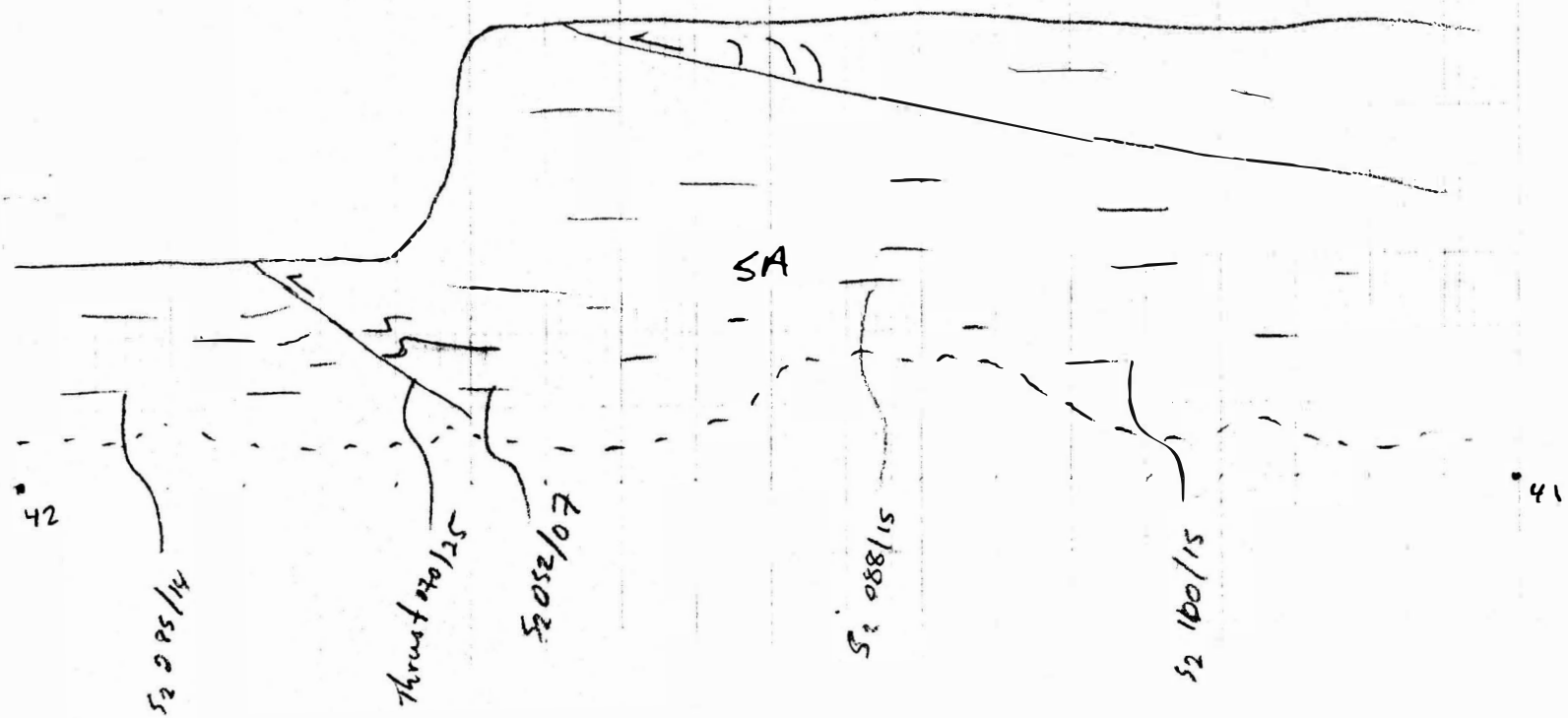
– The S_2 foliation is openly marked with local SE verging, shallowly NE-plunging crenulations.

→ Extremely friable with a lot of carbon along the foliation plane.

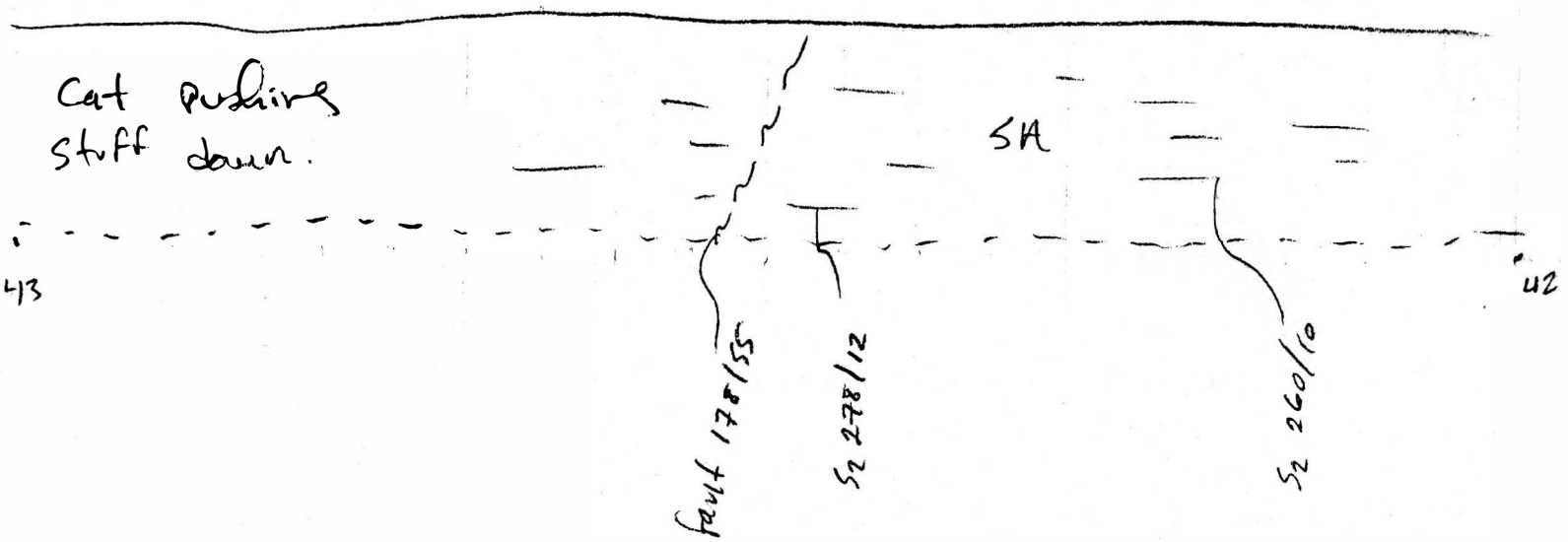


→ Still in non descript SA.
There is one definite thrust
at the base of the beach and
I think another at the top. (again, can't reach it)

410 Beach looking N
Scale 1:200

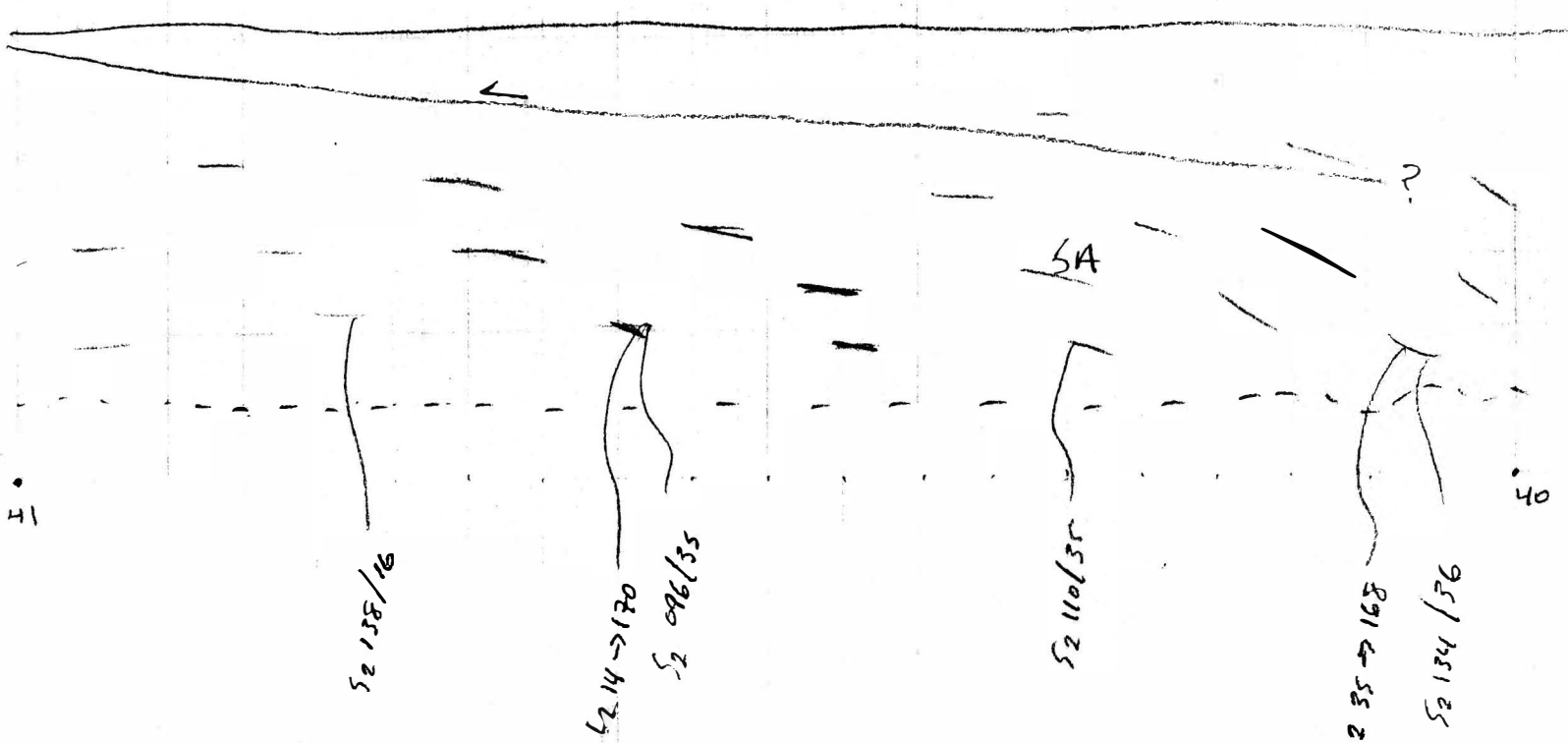


1110 Bench looking W
Scale 1:200



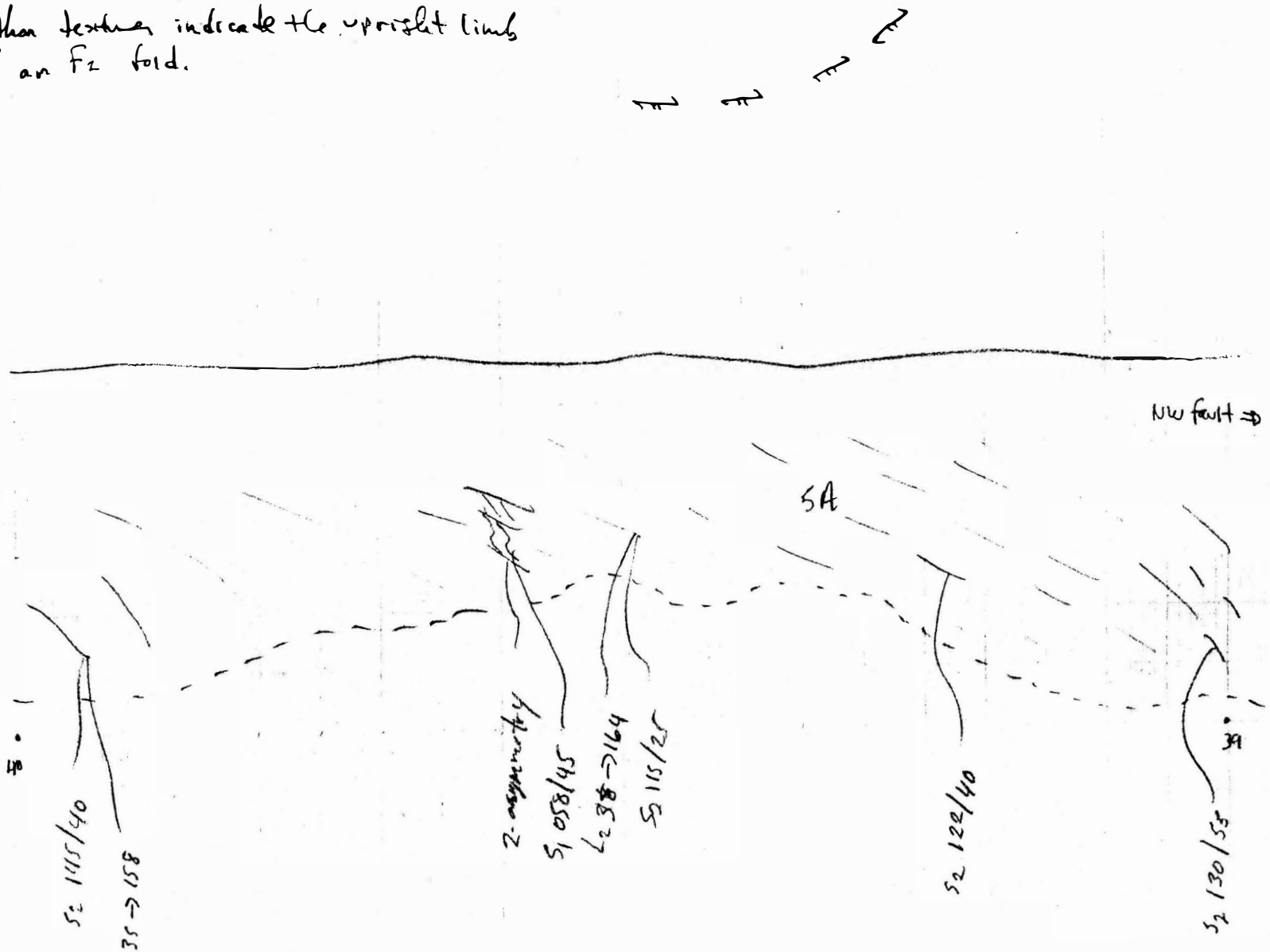
1110 Bench. Looking N
Scale 1:200

⇒ slightly carbonaceous phyllites with very little structure other than a penetrative S_2. It looks like there might be a thrust along the top but can't tell for sure (can't reach!)



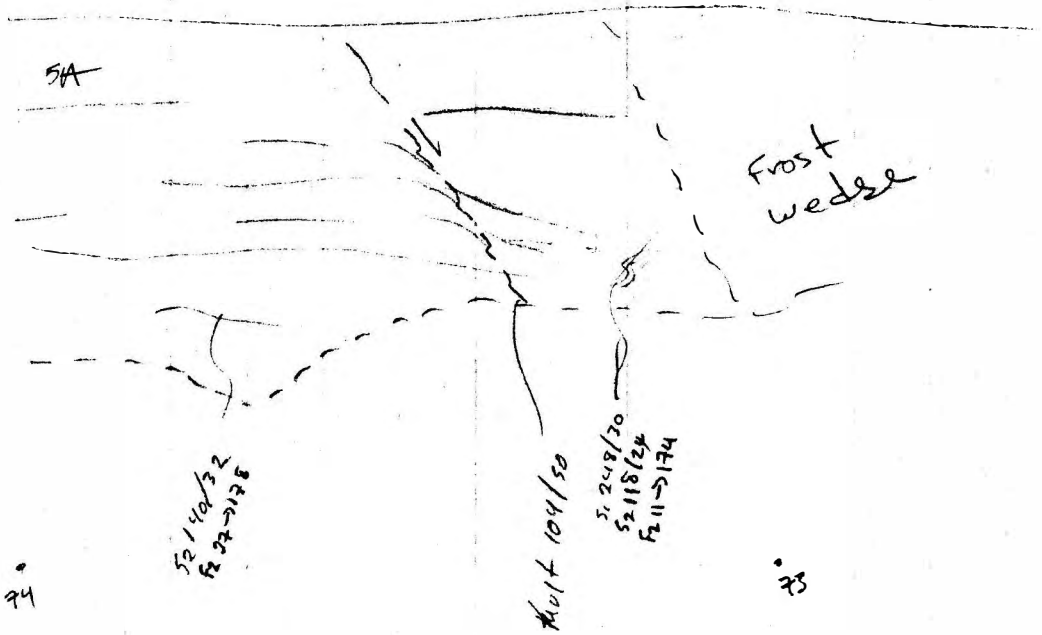
1110 Bench looking N
Scale 1: 200

⇒ In the immediate footwall of the NW-fault. The S_2 foliation seems to curve into the fault. Lithon textures indicate the upright limb of an F_2 fold.

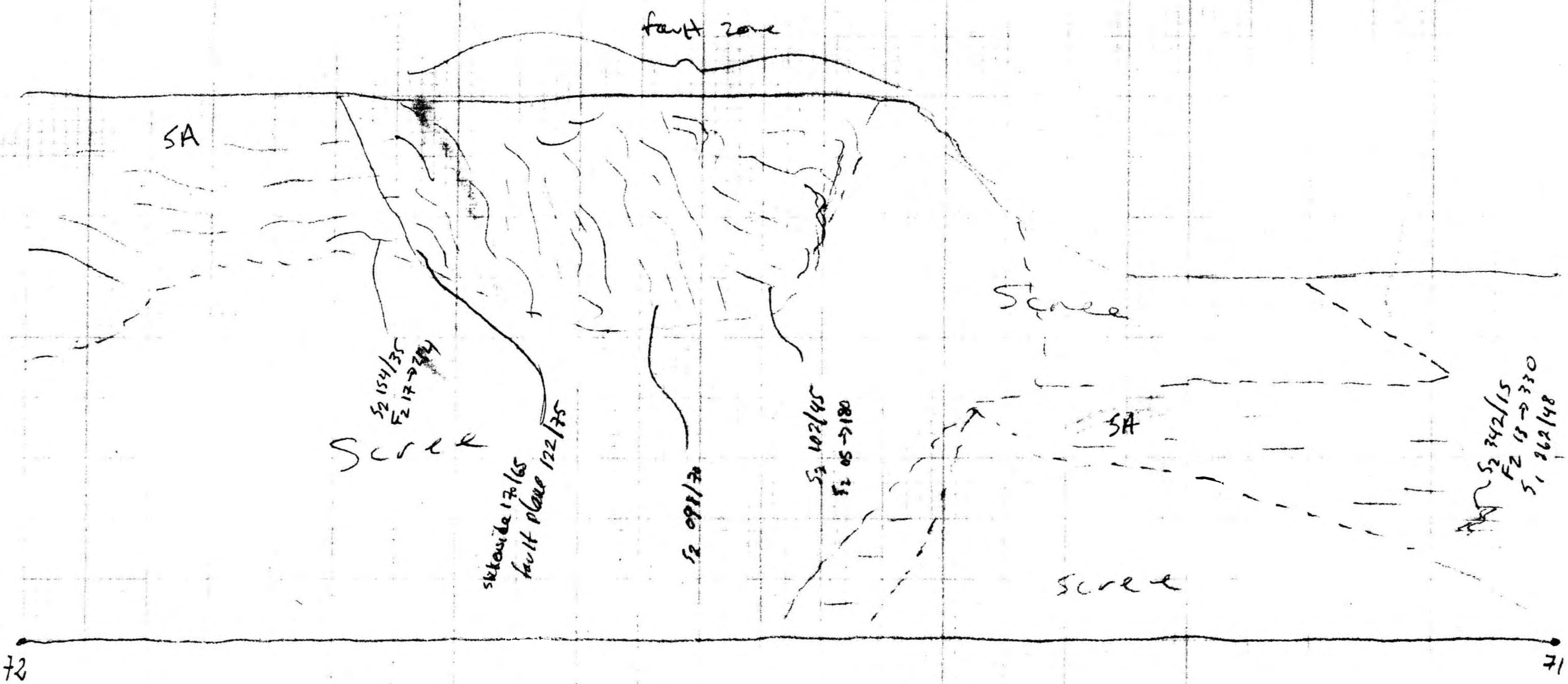


1152 looking N

Scale 1:200

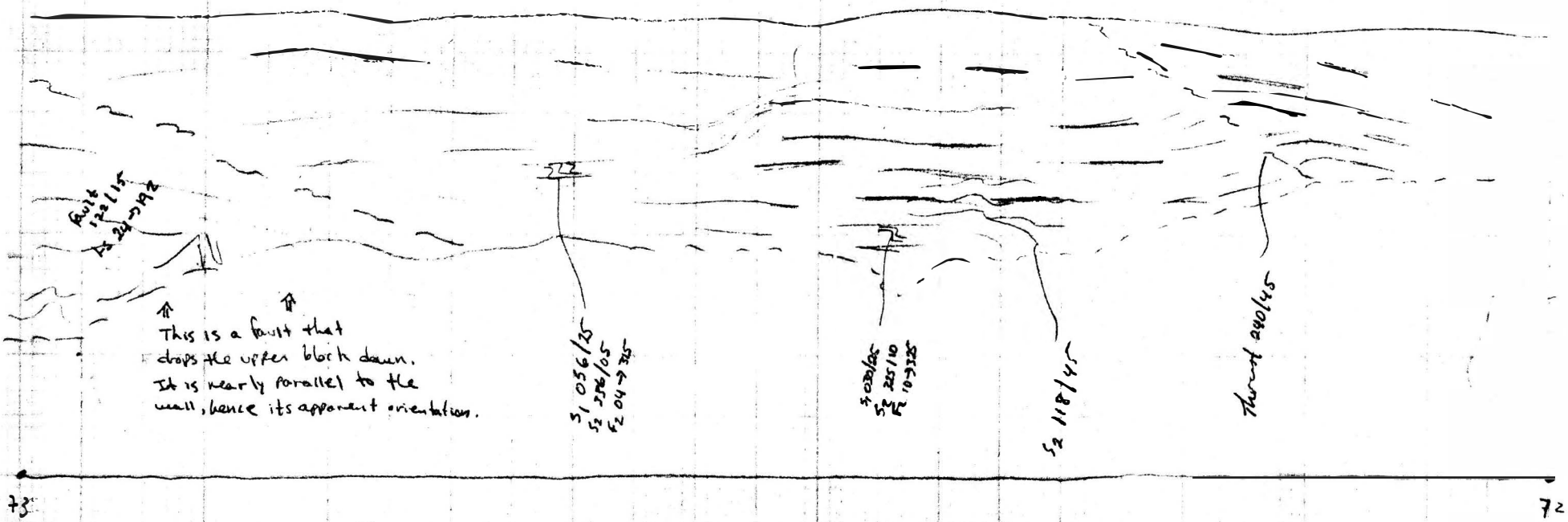


1152(?) Looking N
Scale 1:200



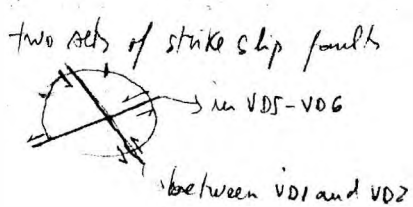
⇒ There is a fault that runs along the wall, parallel to it, and occasionally touching it. The S_2 foliation bends into the fault, showing varying orientations depending on the shape of the wall and nearness to the fault.
The F_2 fold assymetry is Z.

1152(?) looking N
Scale 1:200

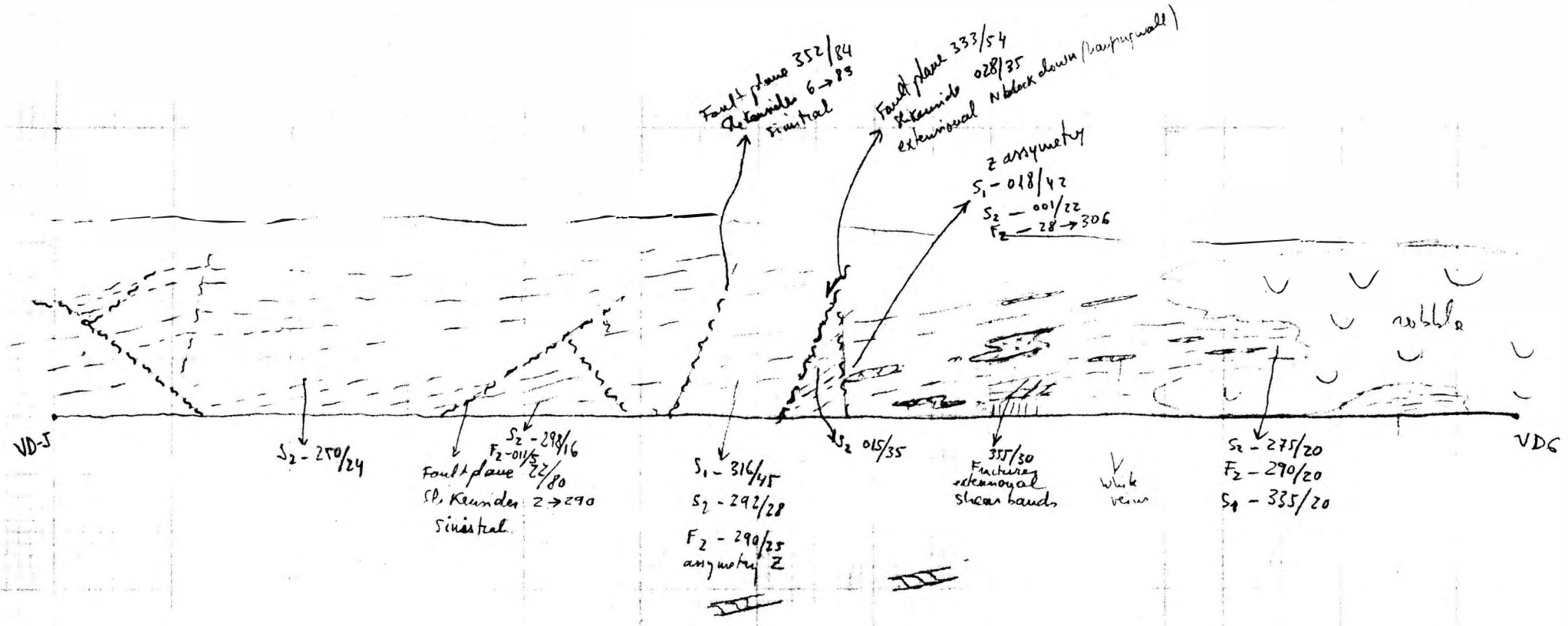


73

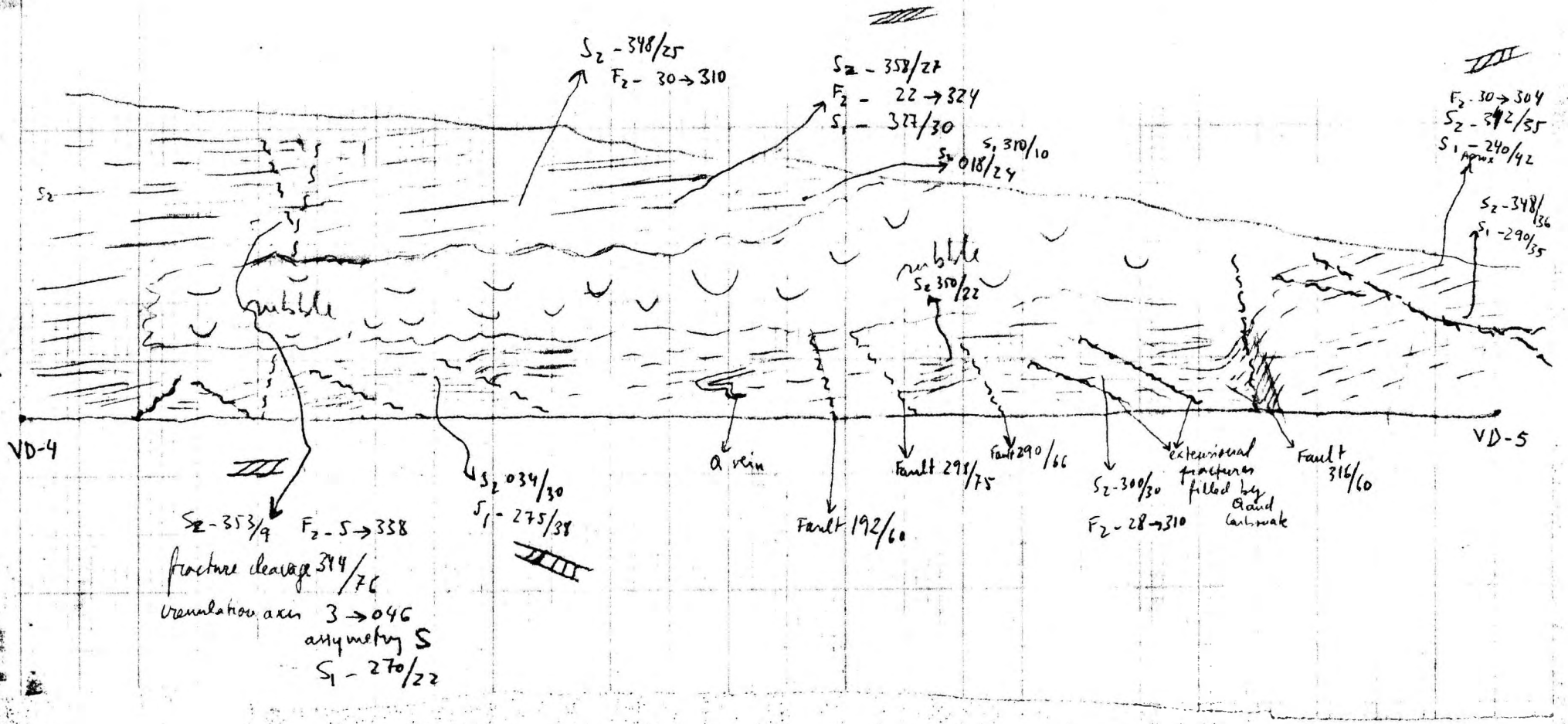
72



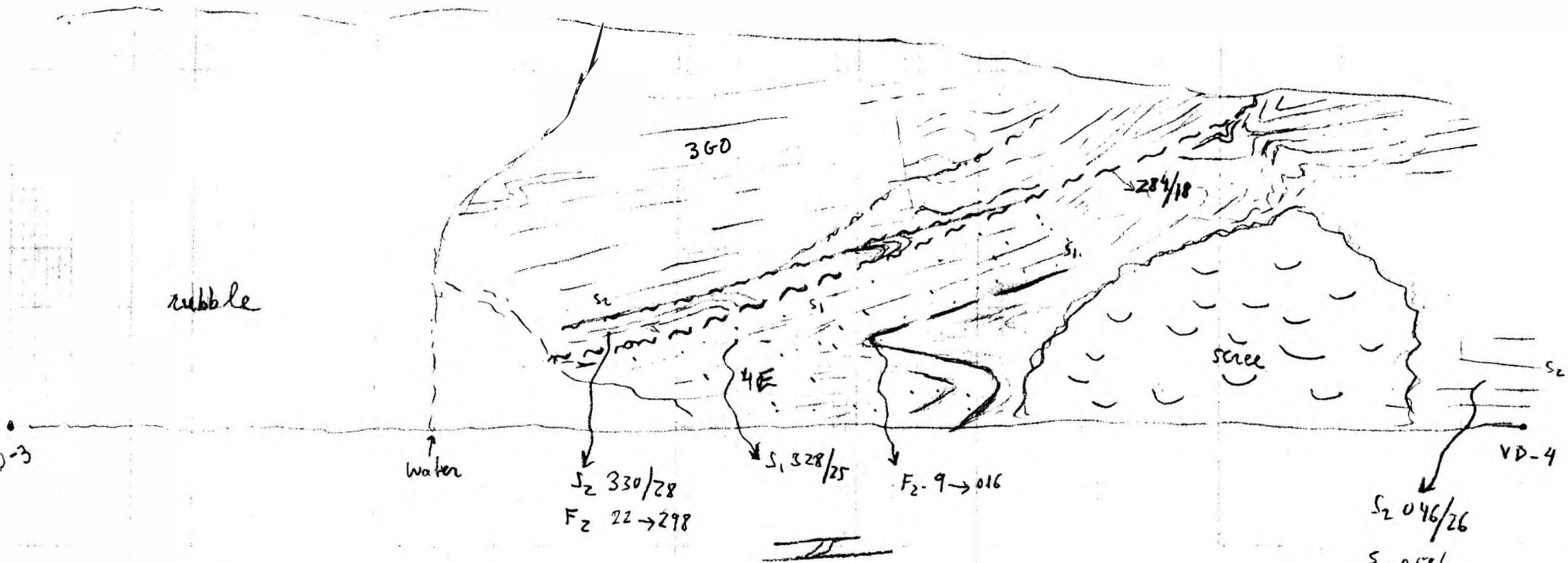
Vaujoda Diversion
1: 200



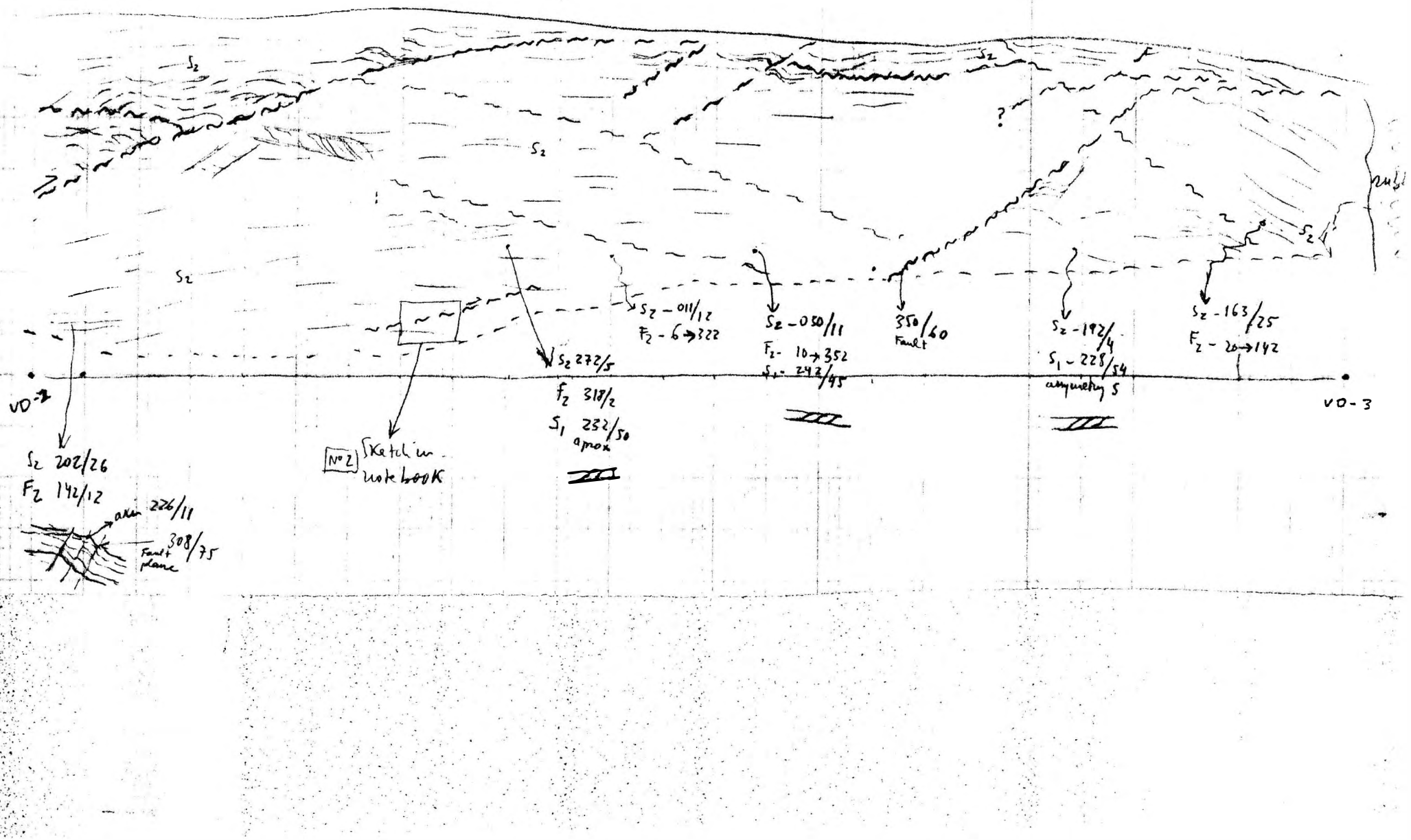
Vanjonda Diversion
Scale 1:200



Vangorda Diversion
Scale 1:200

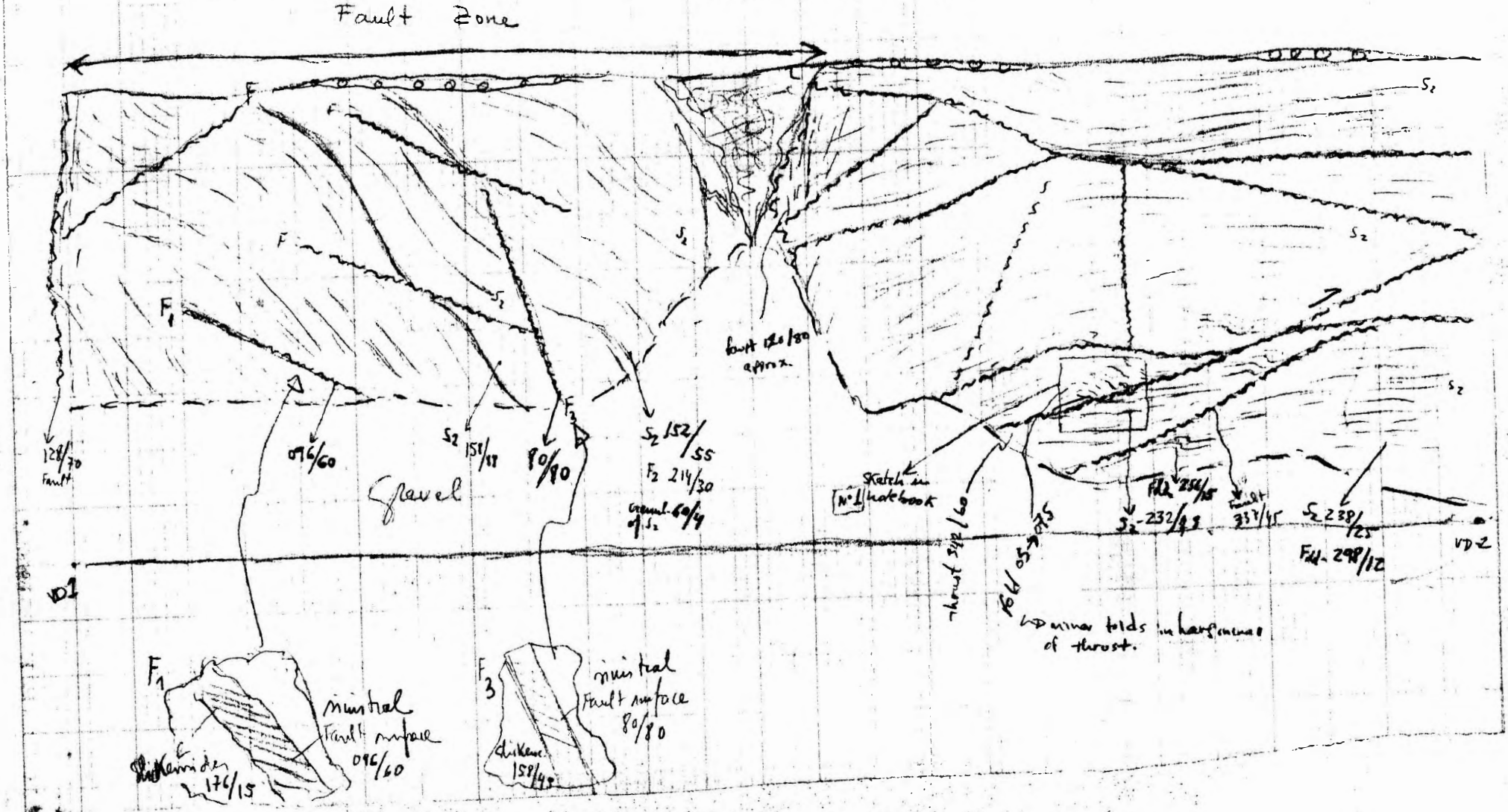


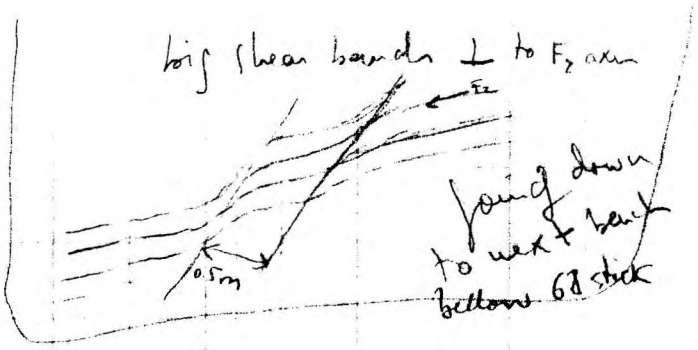
Vangorda Diversion looking N
Scale 1:200

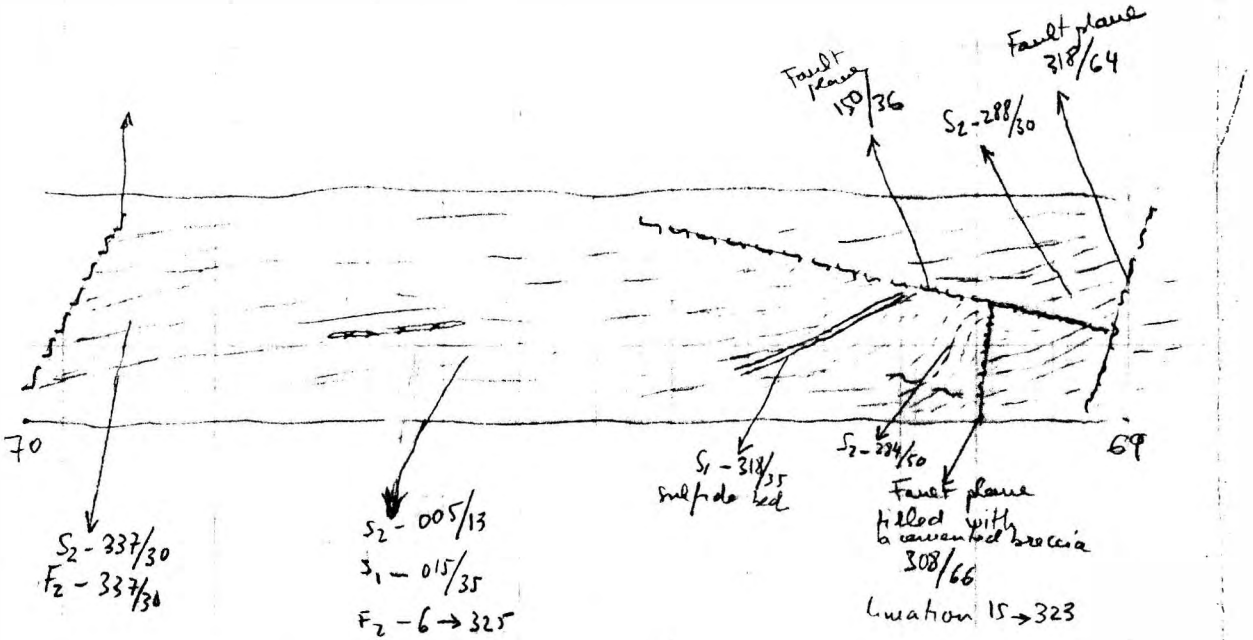


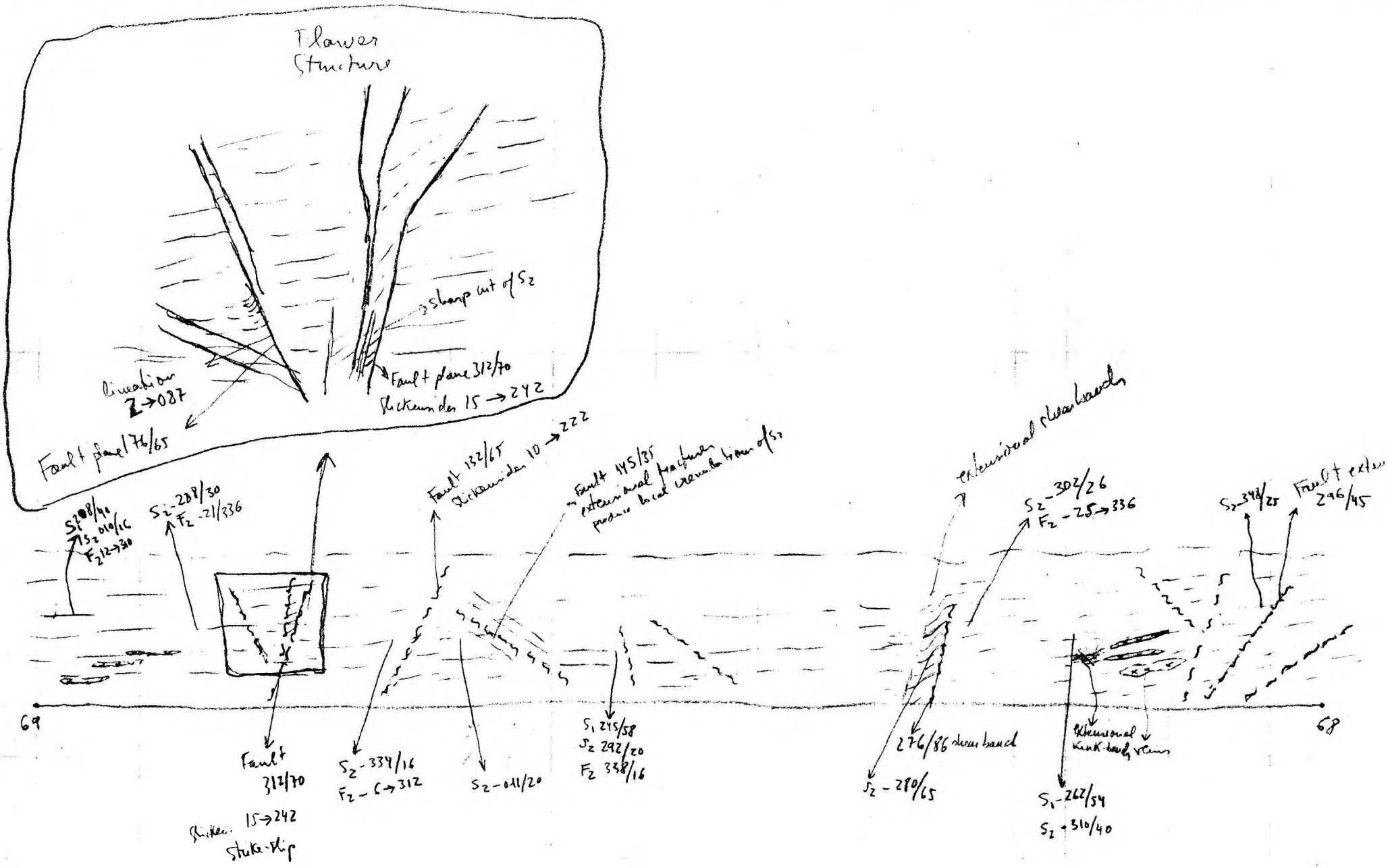
Vangorda Diversion looking N
Scale 1:200

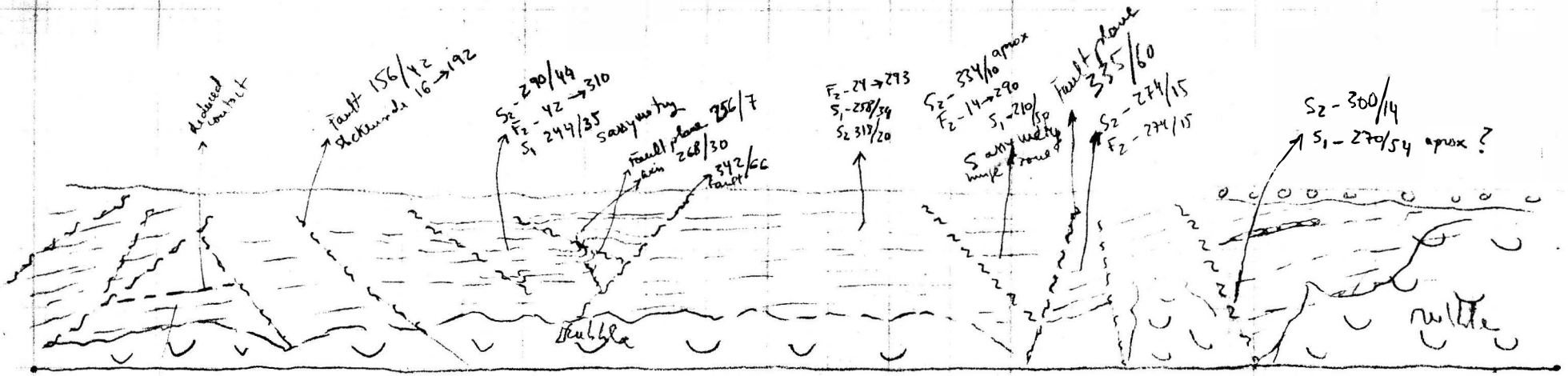
⇒ NW-fault zone. Southern edge contains blocks of subcrop in a phyllite matrix with a near vertical foliation. Late faults with shallowly plunging to sub-horizontal slickensides (strike-slip) cut across the fault zone. A SE-directed thrust in the hanging wall of the NW-fault truncates S_2 and extensional faults. I think this is clear evidence of post-extensional strike-slip and transpression → related to Tintina?




big shear bands ⊥ to F_2 axis
F_2
0.5m
joing down to next band bottom 68 stick


Fault plane 150/36
Fault plane 318/64
S_2 - 288/30
70
69
S_2 - 337/30
F_2 - 337/30
S_2 - 005/13
S_1 - 015/35
F_2 - 6 → 325
S_1 - 318/35 sulfide bed
S_2 - 334/50
Fault plane filled with brecciated 308/66
Lineation 15 → 323

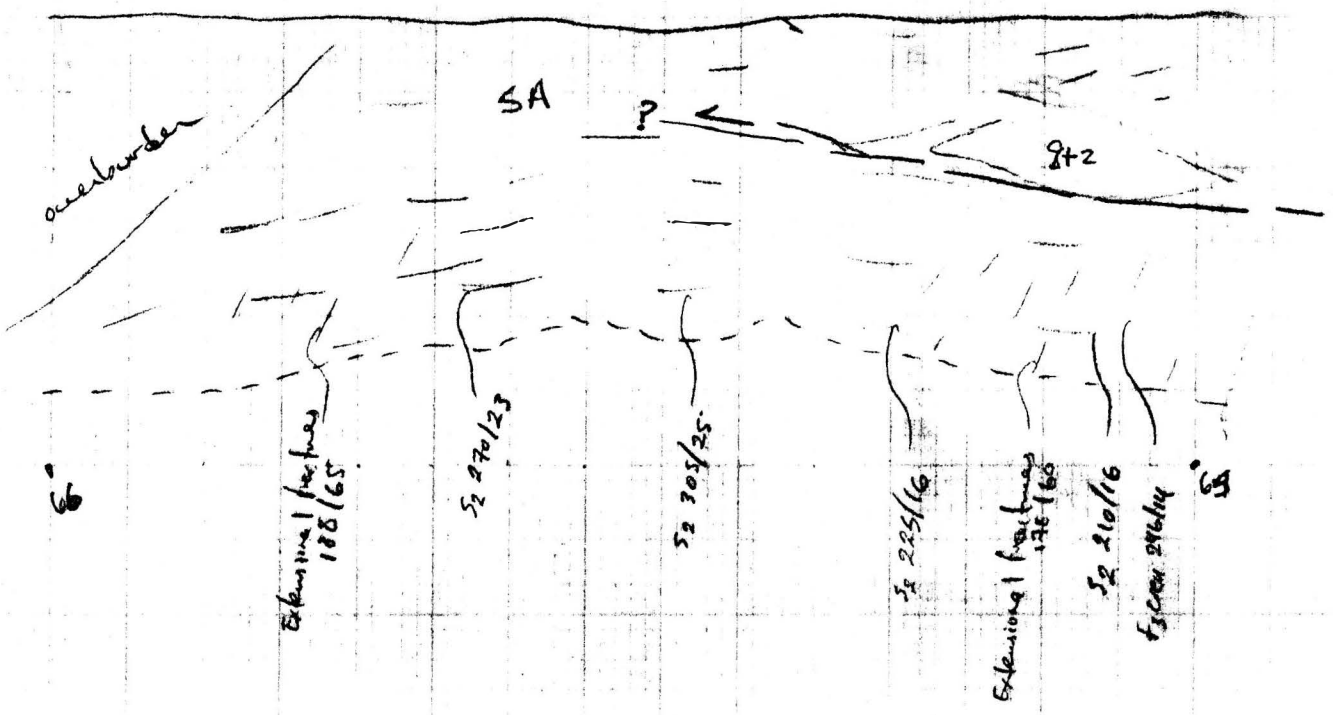

Flower Structure
sharp cut of S_2
Fault plane 312/70
Striae rake 15 → 242
Lineation 2 → 087
Fault plane 176/65
S_1 208/40
S_2 010/16
F_2 12 → 330
S_2 - 208/30
F_2 - 21/336
Fault 312/70
Striae 15 → 242
Strike-slip
Fault 132/65
Striae rake 10 → 222
Fault 145/35
extensional fracture
produce local crenulation of S_2
S_2 - 334/16
F_2 - C → 312
S_2 - 011/20
S_1 215/58
S_2 292/20
F_2 338/16
extensional shear bands
S_2 - 280/65
276/86 shear band
S_2 - 302/26
F_2 - 25 → 336
S_1 - 262/54
S_2 - 310/40
extensional kink-band veins
S_2 - 348/25
Fault extension 296/45
69
68



S1 - 310/38
S2 - 288/18
Seems different rock type, more Q rich
F2 - 3→340

⇒ Local F_3 crenulation that doesn't seem related to anything significant.
Can't see any F_2 folding or lithon textures.
Not a good exposure overall because it's partly covered by mud.

1098 Beach looking N
Scale 1:200



1098 Bench looking N
Scale 1:200

⇒ The top part of this panel, 1104 Bench, has been mapped before.

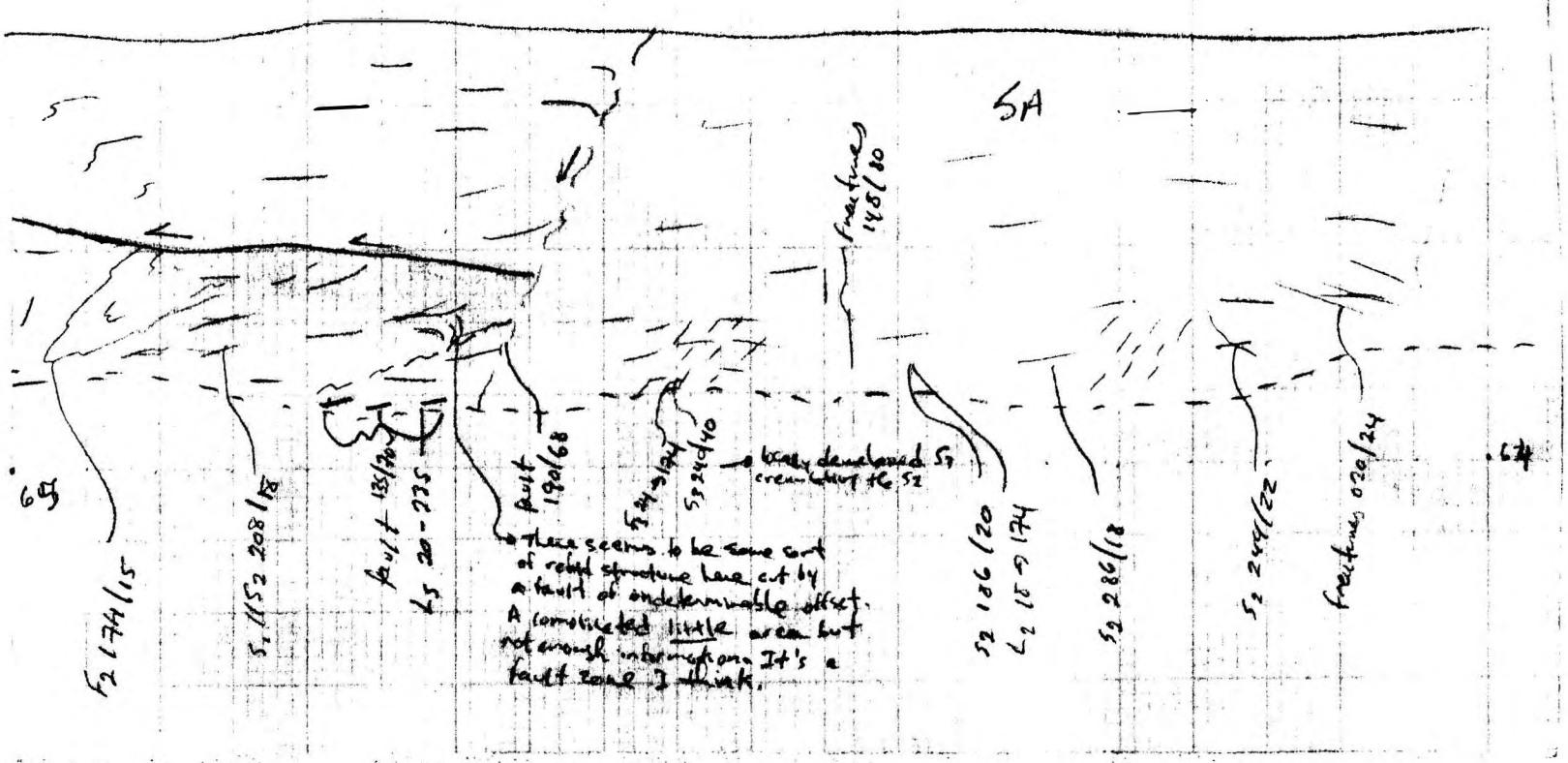
→ There is a fault striking parallel to this panel and just touching it near the extensional fault and below the thrust. There is a shallowly (20 → 235) southwest-plunging ridging and lineation indicating shallow oblique slip. I think this is a splay or strand of the NW-fault. The strand dips towards the SE.

⇒ A ~SW to S (?) directed thrust truncates a S_2 anticline.

* Big thunderstorm about to hit from East.

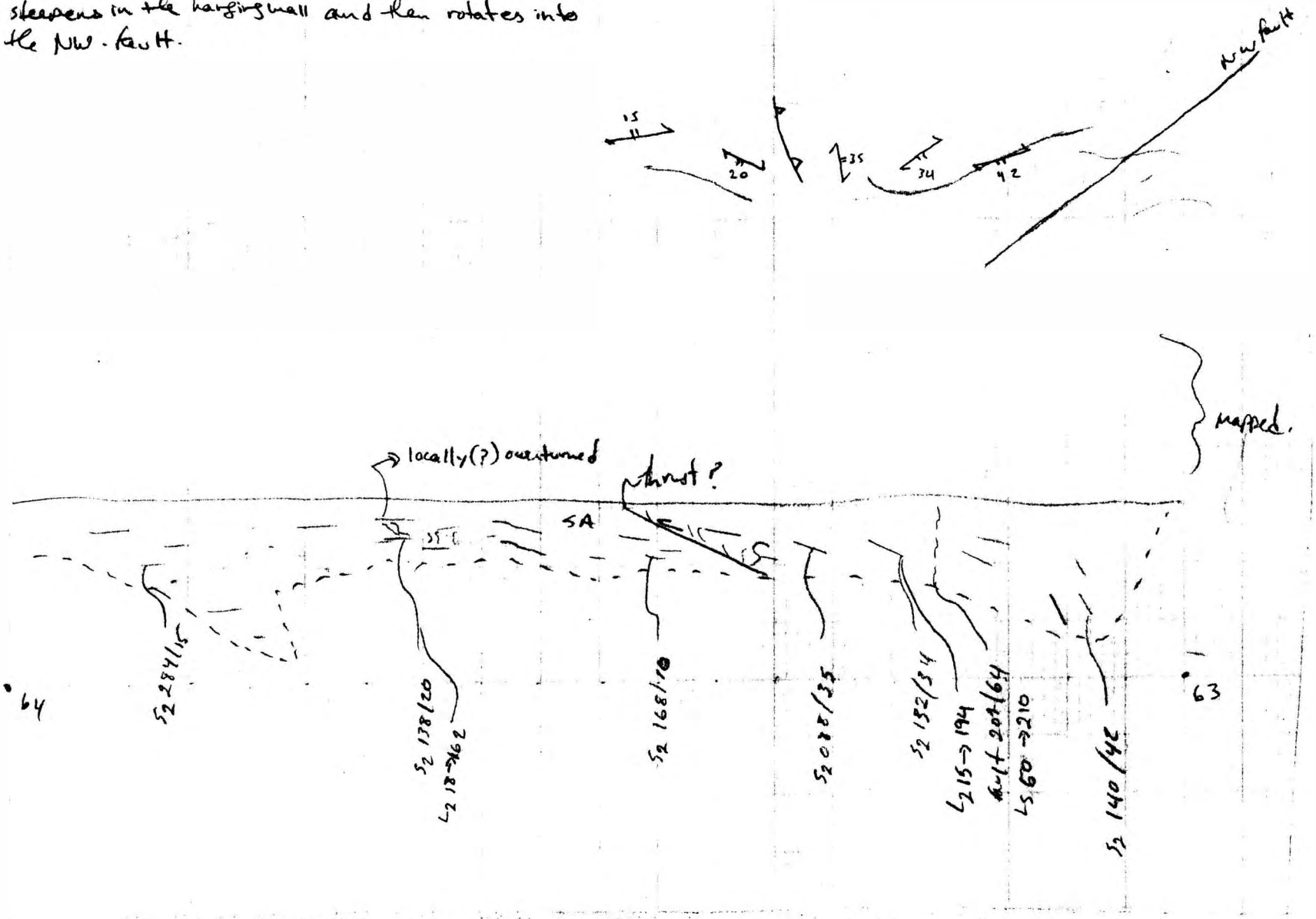
⇒ A complex bit of stuff. There may be 3 generations of folding and 3 generations of faulting, 1st - thrusting towards SW, 2nd - extensional faulting down-dropping to the S, 3rd SW-directed, dextral strike-slip faulting.

→ Pyritic qtz lenses along S_2



1098 Bench looking N
Scale 1:200

⇒ Only locally is S_1 found. there its relationship with S_2 indicates an overturned limb. There appears to be a thrust (N-dipping ?). The S_2 foliation steepens in the hanging wall and then rotates into the NW-fault.

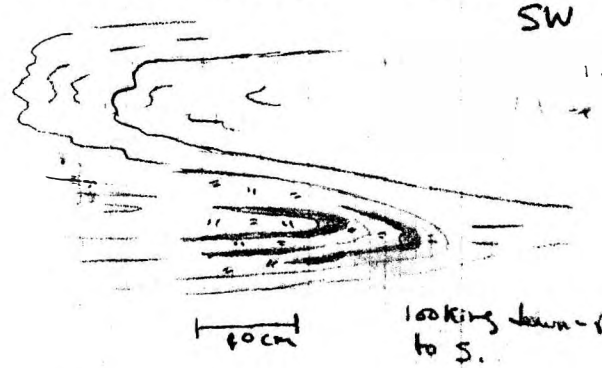


1098 Bench looking N
Scale 1:200

⇒ Immediate footwall of NW-fault. The S_2 foliation bends into the fault, but overall I think there are several strands to the fault zone. Little can be said about F_2 folding except for its sytle which is isoclinal in the drainage ditch. Asymmetries indicate both up-right and overturned.

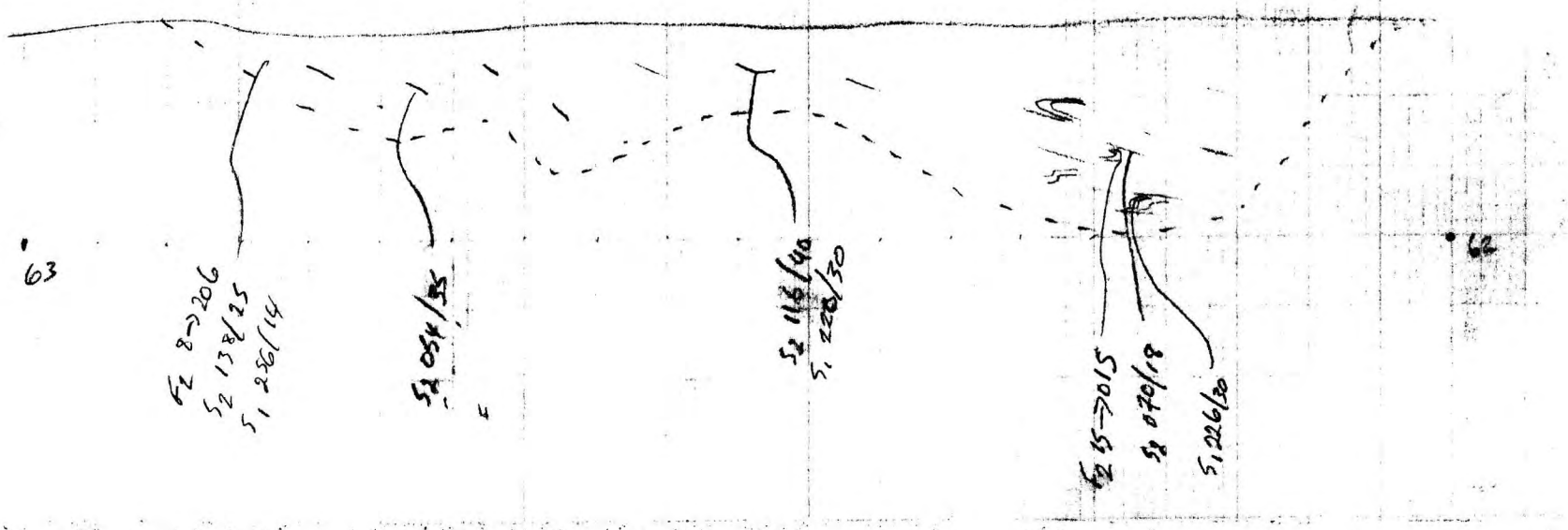
= looking down-plunge (is it rotated by) ⇒ little to overturned drilling?

NE SW



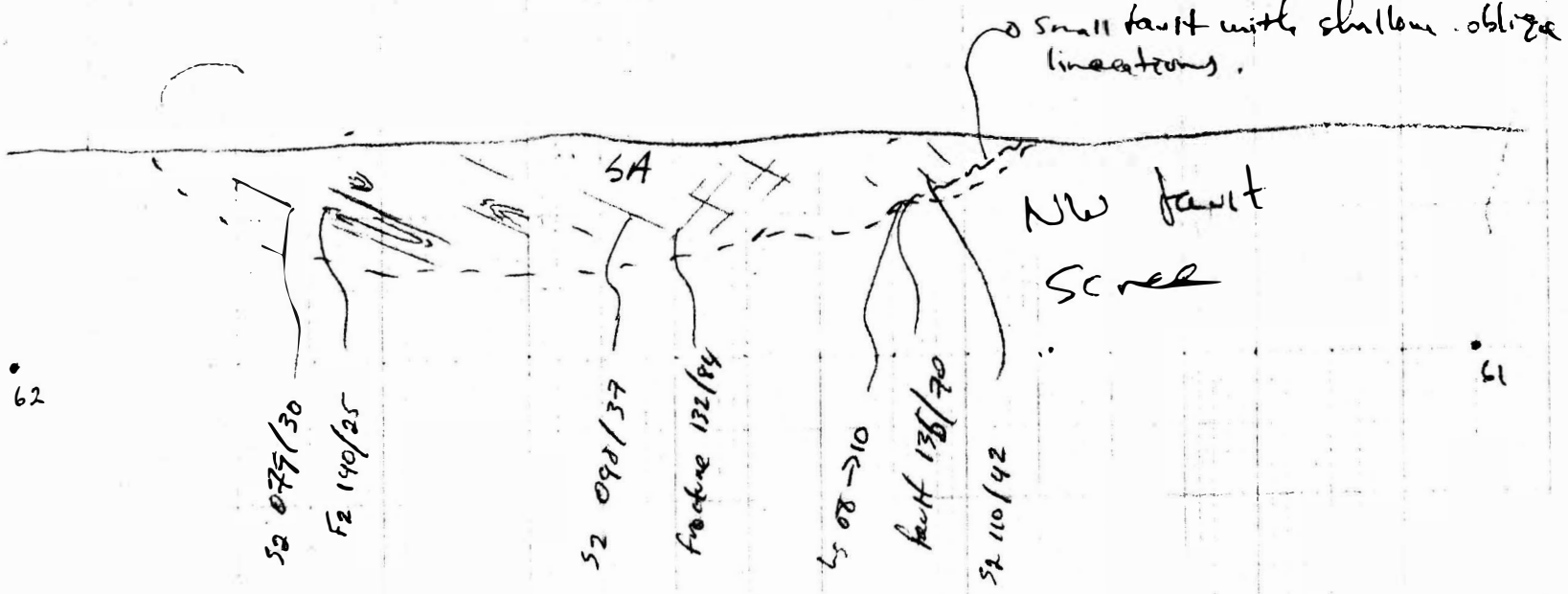
looking down-plunge to S.

- fold asymmetry along the ditch is overall that of a hinge zone of an anticlinal structure. There is very little S_2 development.



⇒ Minor fold structures — perhaps a hinge zone

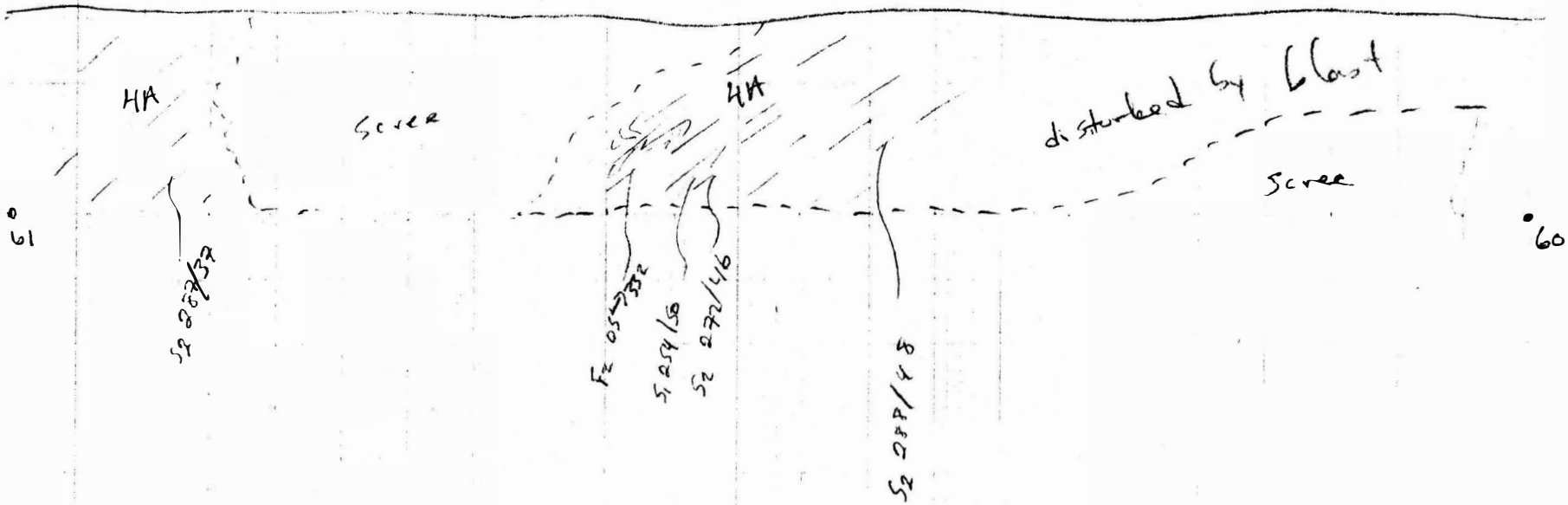
1098 Bench looking N
Scale 1:200



1098 looking N
Scale 1:200

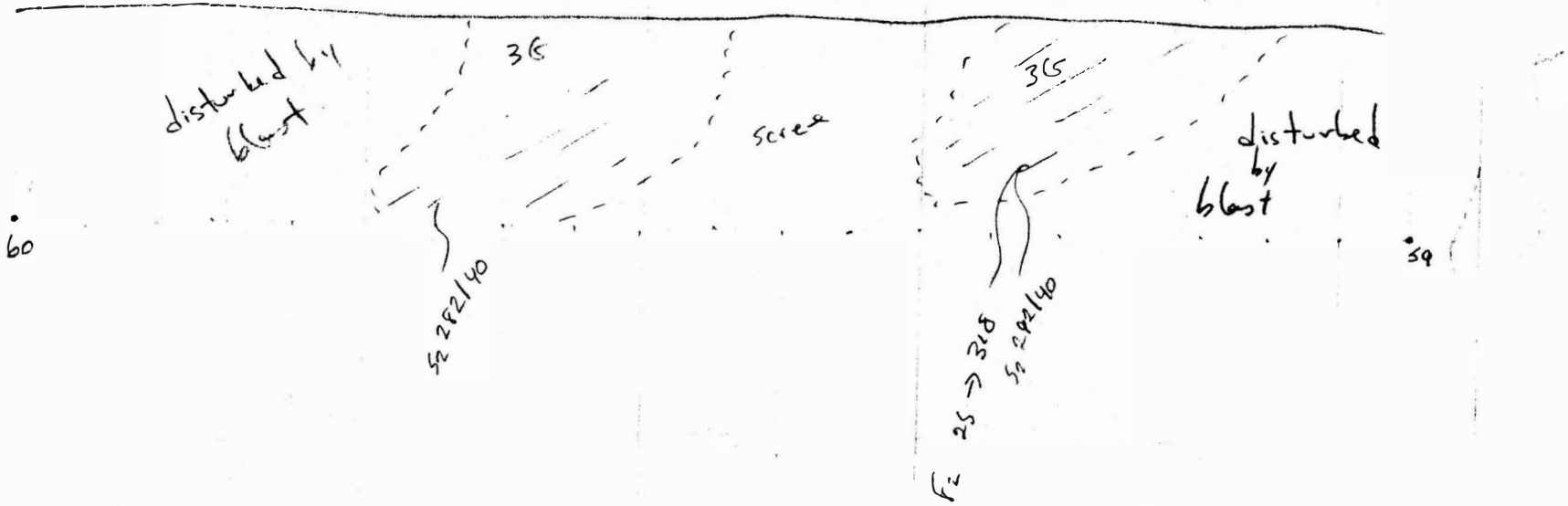
⇒ Immediate hangingwall of NW-fault. S_2 appears(?) to bend into the fault. Difficult to tell S_1 from S_2 except locally. upright limb(?)

— Much of this has been disturbed by the blast.



⇒ Can't find a definite S_1. The S_2 orientation may also be affected by the blast.

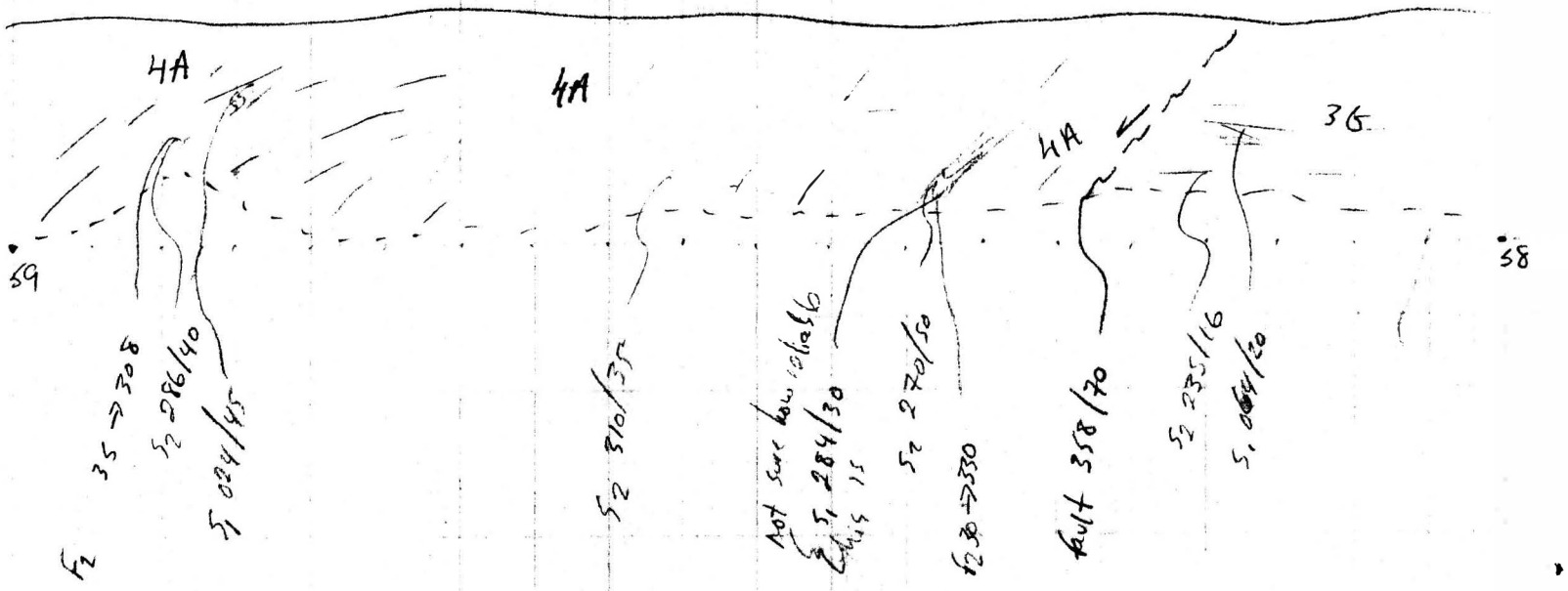
1098 Tsenchi looking E
Scale 1:200



1098 Bench looking E
Scale 1:200

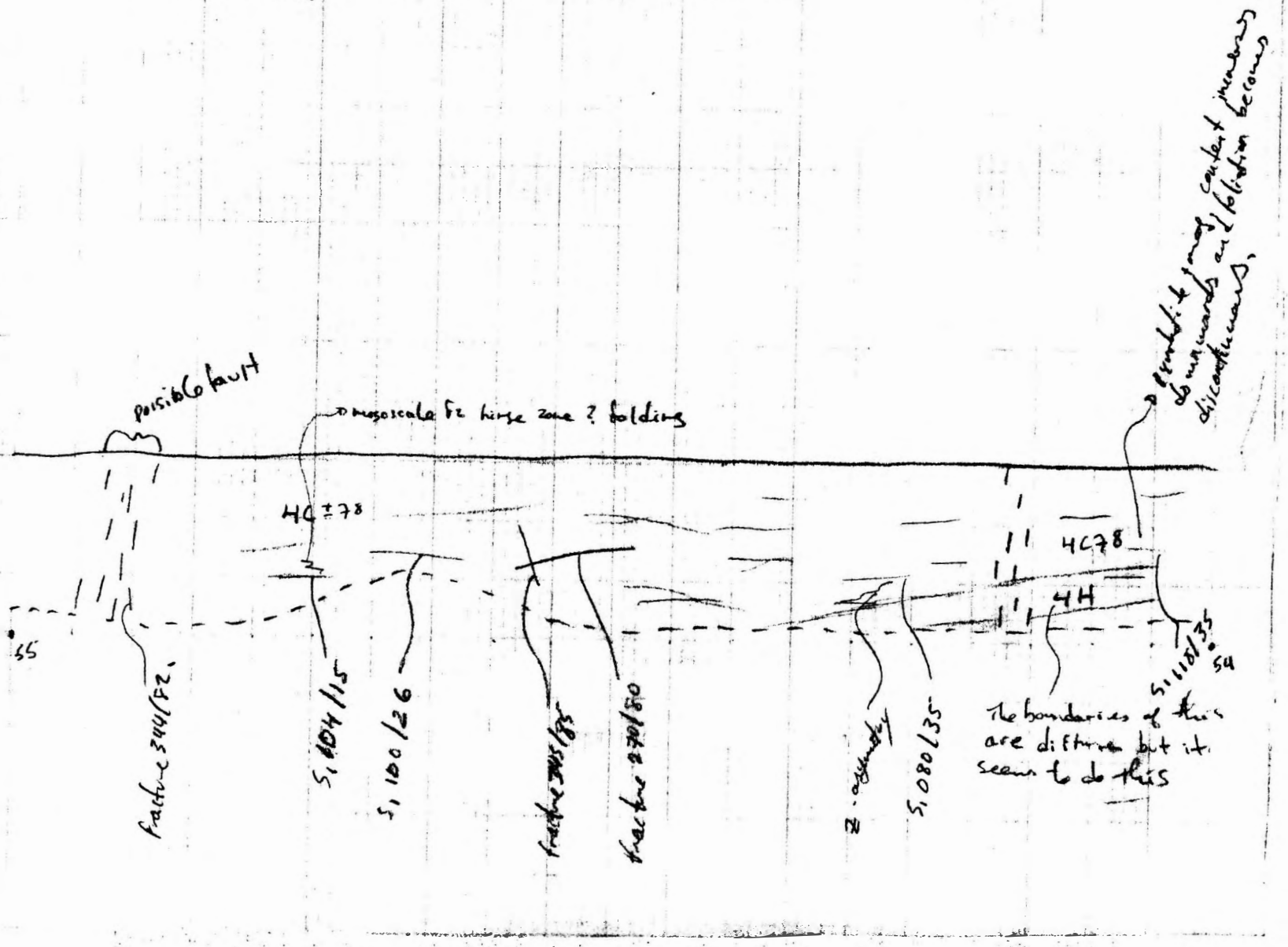
⇒ The Sz foliation very rapidly steepens and rotates towards the west. I don't completely understand why → Is it a rollover or an F_3 fold. I think its effected by the NW fault.

The rock type in 4A → 3G



1098 Bench looking E
Scale 1:200

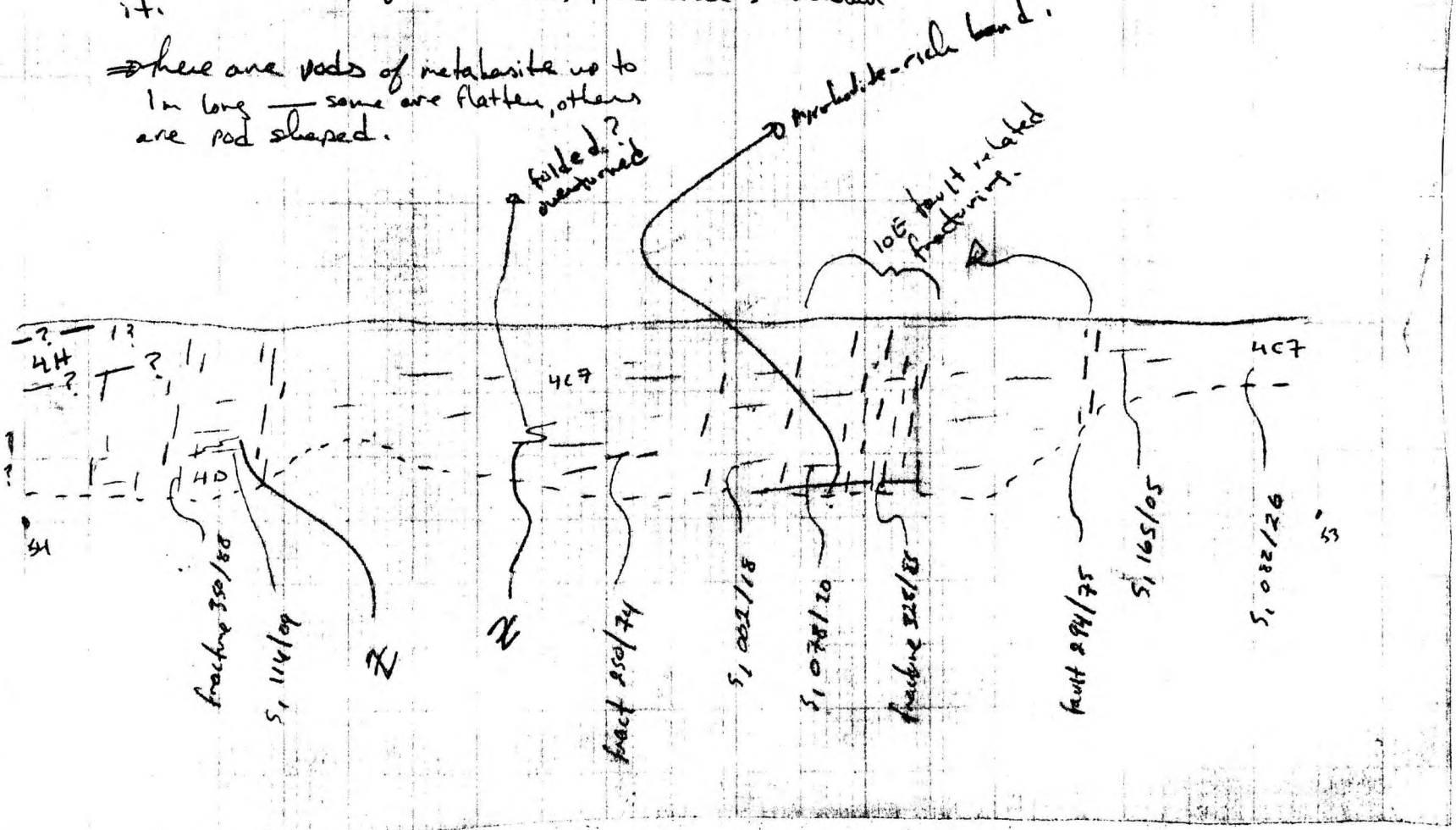
- overall S_1 dips towards the East and I think the fold asymmetry is Z which suggests an overturned limb. S_1 is very discontinuous and variable and shear and remobilization textures are common, also indicating a highly strained overturned limb.



109E Bench looking E
Scale 1:200

→ The part of this section near station 54 is overturned or nearly so. There is a marked increase in the amount of strain S_1 has undergone and it is mesoscopically folded with a Z-asymmetry. There is a high modal abundance of sphalerite and galena (4D) and pyrite forms coarse-grained porphyroblasts (1–2mm). The S_1 banding is wispy and discontinuous, and locally as patches in sphalerite/galena / pyrrhotite. These latter minerals have probably been remobilised into the hinge to overturned limb of an F_2 fold. A pyrrhotite-rich band appears in the next section and may run up this face where I've shown it.

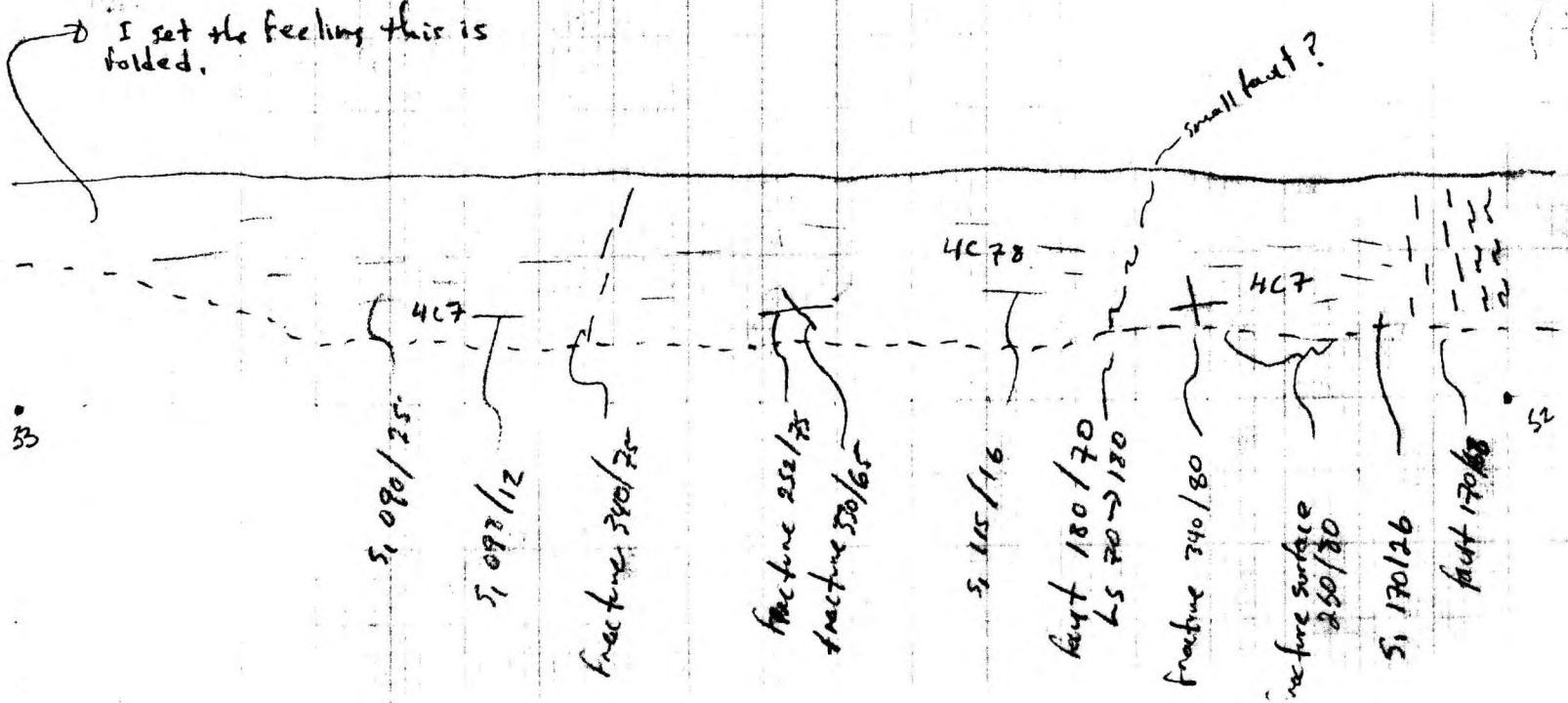
→ there are pods of metabasite up to 1m long — some are flatten, others are pod shaped.



109E Bench looking E
Scale 1:200

- A typical HC footwall quartzite with a poor to moderately developed S_1 foliation. There is patchy occurrence of pyrrhotite (± mag) throughout. There doesn't seem to be a consistent increase of decrease in pyrrhotite content vertically. There are local lenses of 4E and Pyrite is generally quite coarse-grained (up to 2mm). There might be folding near station 53 but the wall is parallel to the fold axes. However, these types of features (⊂⊃ S_1) on the wall suggest a fold. Chalcopyrite is patchy and fills in vertical fractures. Equant (commonly) clasts of milky vein quartz are common. These have S_1 flowing around them.

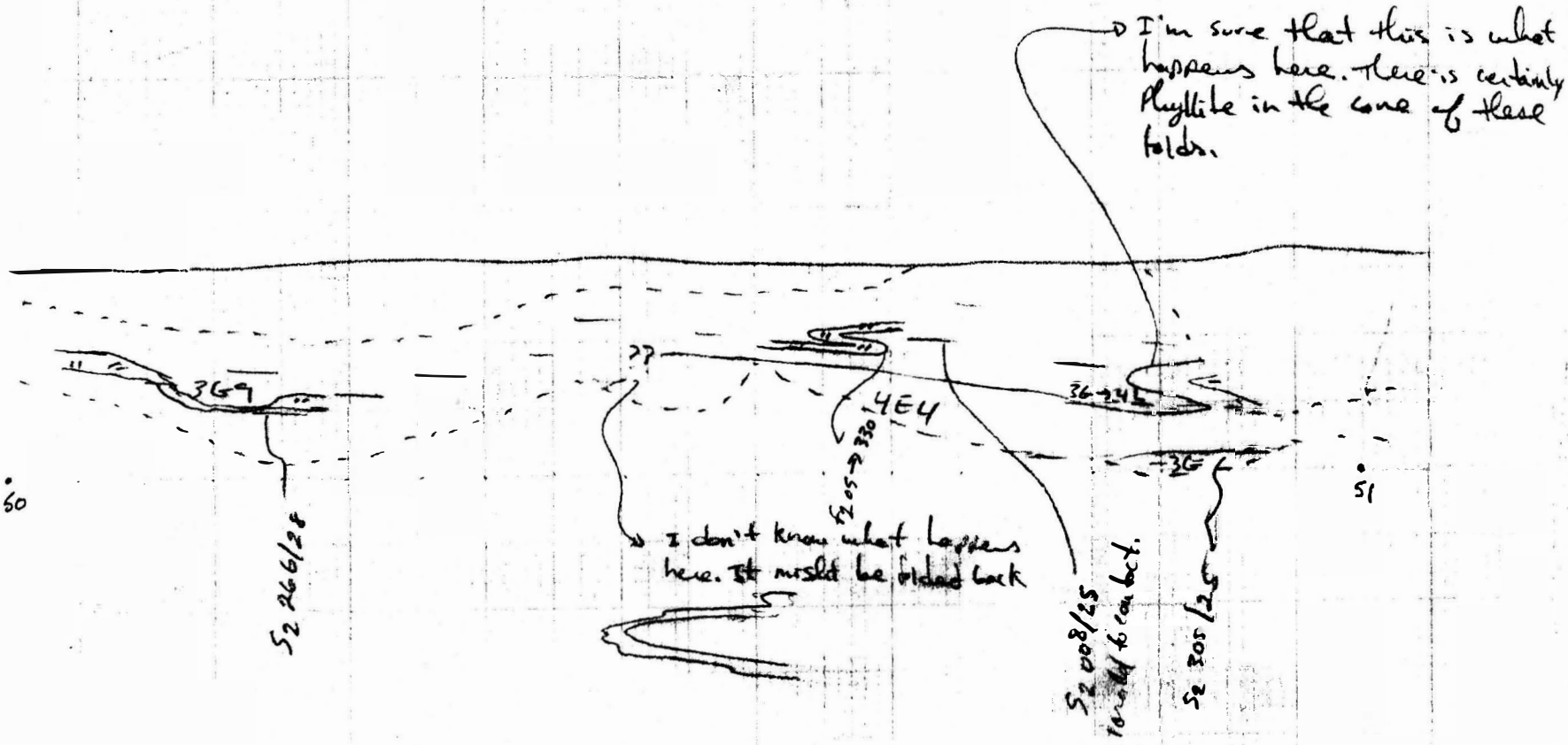
* contains patchy chalcopyrite



Near ramp down. Looking S.
Scale 1:200

⇒ This section has tightly folded (F_2) bands of 4EC4 in a matrix of 3G Phyllite. 4L is developed locally but is not everywhere, nor is it a flavor band.

⇒ This looks like an upright limb.

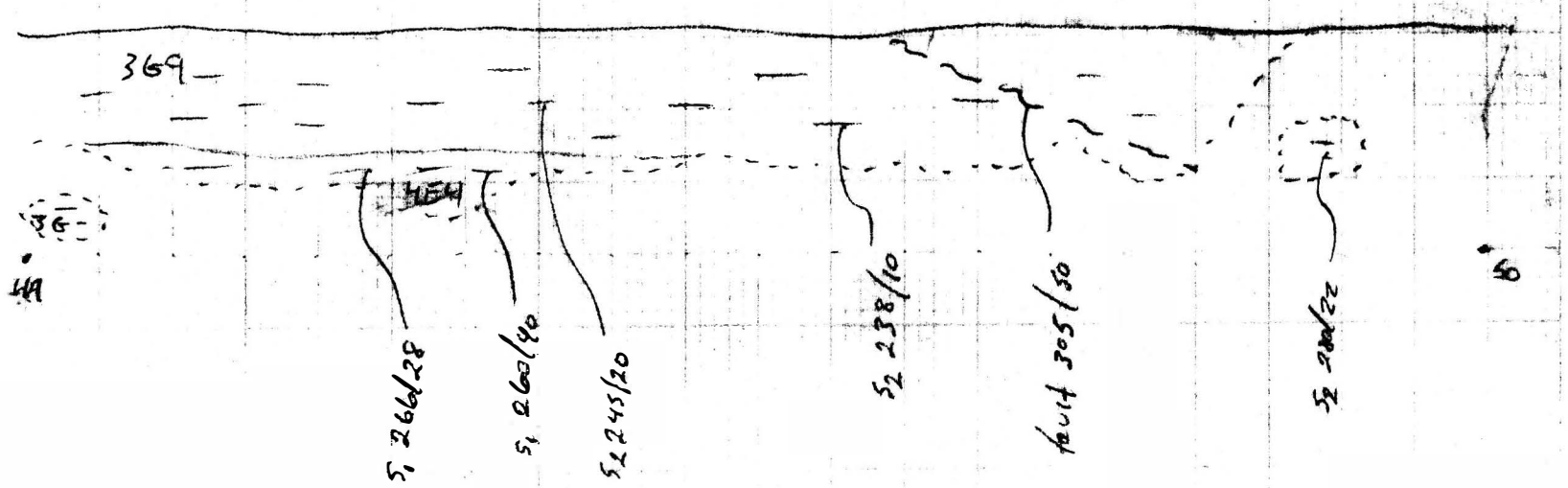


→ the sulphide band is ≈ 1m thick with a basal 4A unit ≈ .5m thick.

– the S_2 foliation is penetratively developed with no trace of S_1

near face looking S

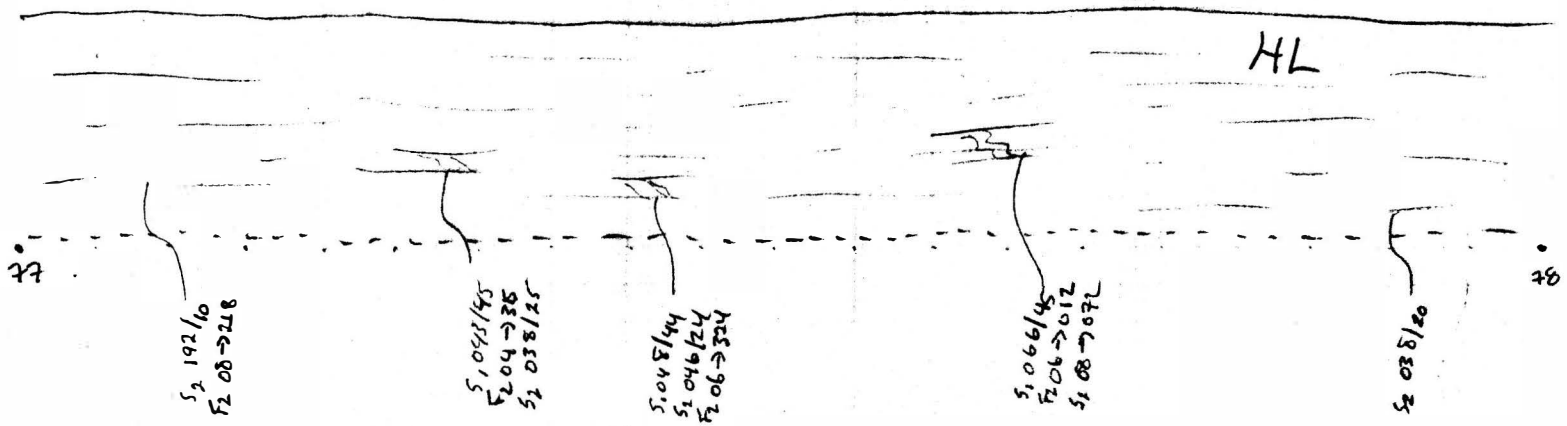
scale 1:200



⇒ sulphides along S_2

⇒ Overturned limb of an F_2 fold. There doesn't seem to be any faulting, there is a significant amount of quartz with porphyroblastic pyrite parallel to S_2 ⇒ however it may actually be S_1. S_2 is defined by chlorite. I think this is a chloritised (bleached) version of the overlying SA.

1092 Bench looking West
Scale 1:200

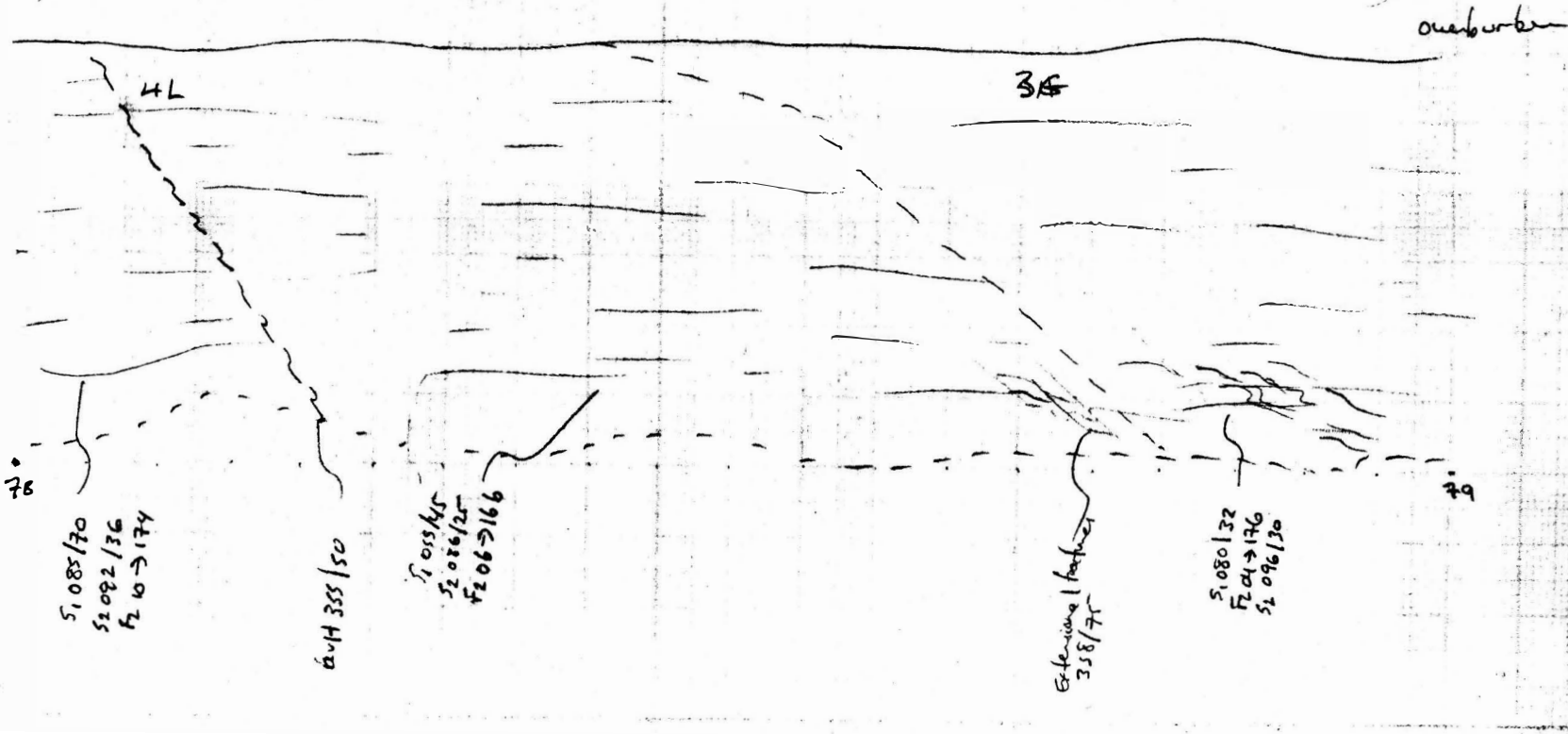


⇒ If this contact can be used to indicate folding the it dips parallel to S_1 and S_2 cuts across it.

Again, the overturned limb of an F_2 fold. The rock is more of an SG than a Sh.

Lots of good folds and lithons.

1092 Bench looking west
scale 1:200



⇒ still in an overturned limb. faults appear minor but are strike-slip to oblique-slip. Again, this rock is more of a 3G than a SA. Hanging wall of NW-fault? Yes!!!

1092 Bench looking west
Scale 1:200

1092 Bench looking W

Scale 1:200

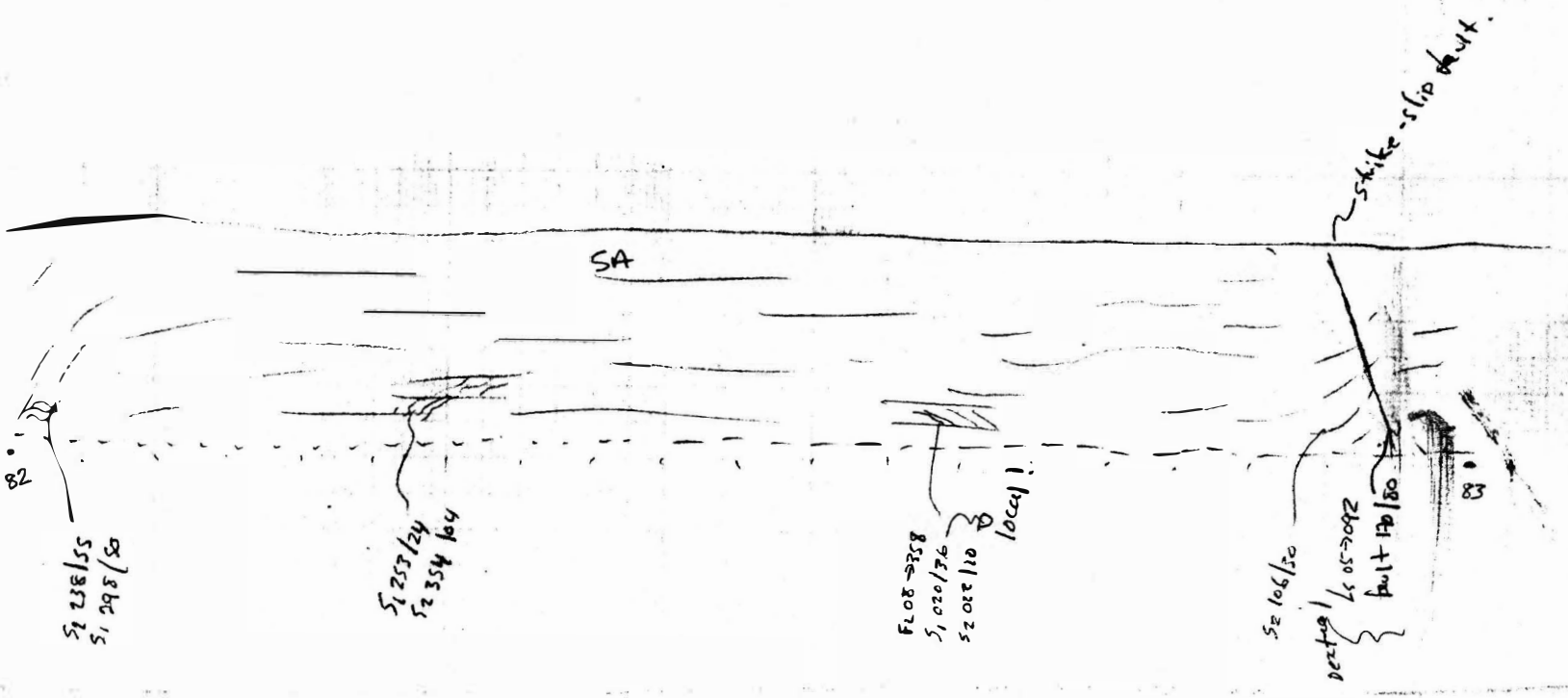
⇒ covered in mud → can't see much.

1092 Bench looking SW
Scale 1:200

⇒ section is mostly covered in mud.

Near B2, S_2 begins to bend steeply towards the SW and I think there is a fault through here.

1092 Bench looking NW
Scale 1:200

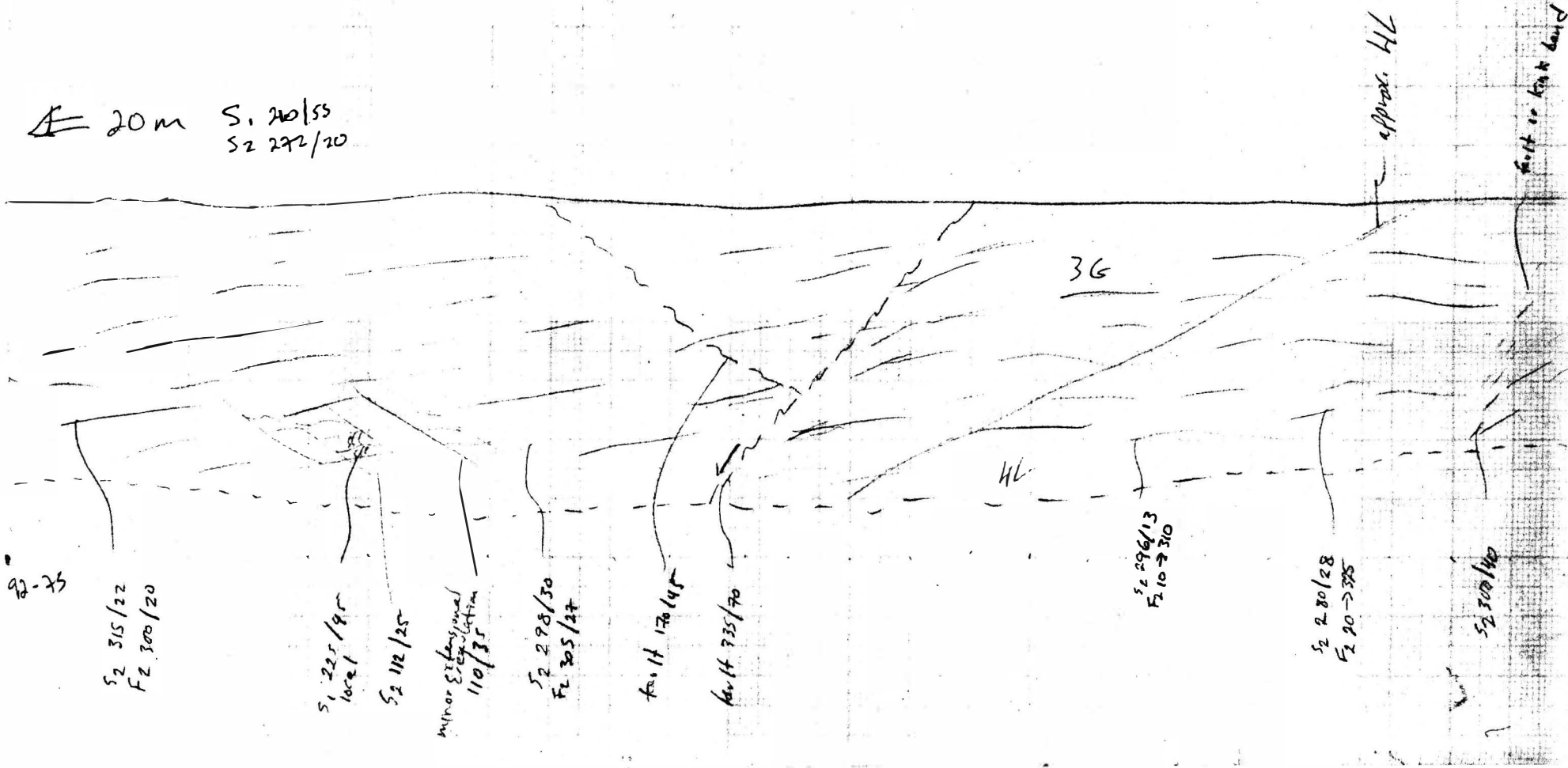


→ The Northern part of this section (near S4) begins to bend down into the NW fault.
The fold asymmetry is S, or an upright limb.

1092 Bench looking North
Scale 1:200

⇒ Very closely-spaced S2 foliation with only one localised occurrence of S1. There's a local extensional cleavage developed.
HL appears to be interbanded with the 3G.

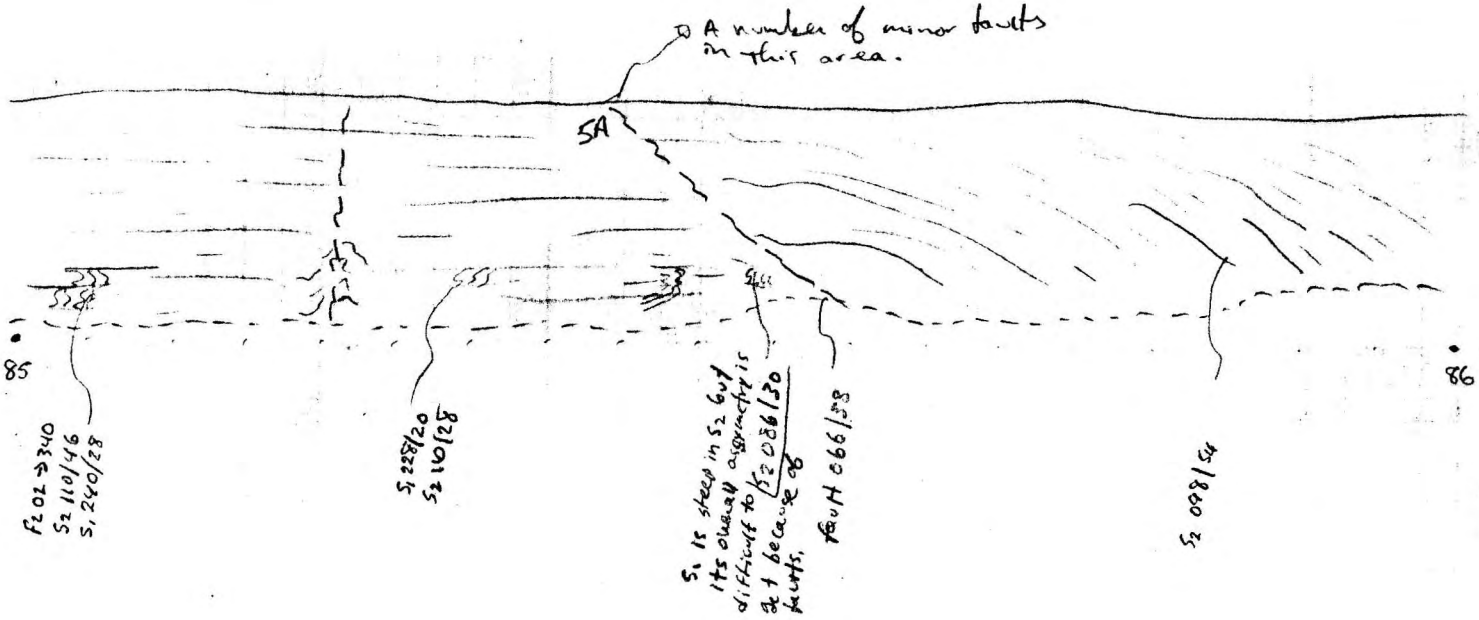
1128 Bench? looking NE
Scale 1:200



1092 Bench looking N
Scale 1:200

→ relatively quiet area with an upright, S asymmetry. Typical SA with quartz-rich bands. Quartz lenses containing pyrite, cross-cut the S_1 foliation.

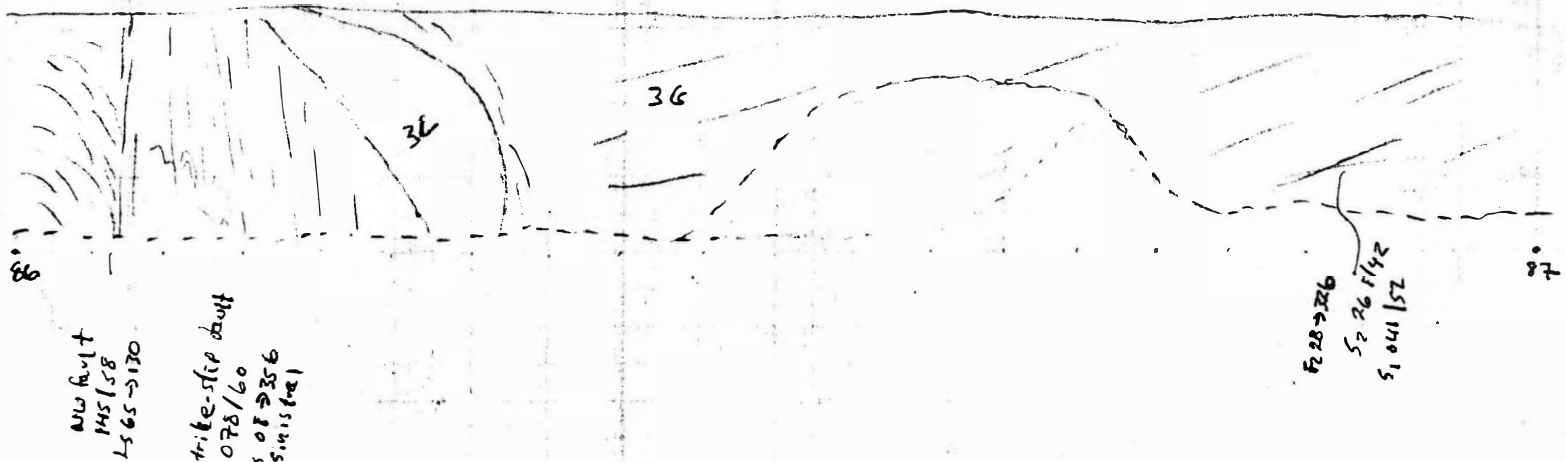
Footwall of the Mel. fault.



An overturned limb

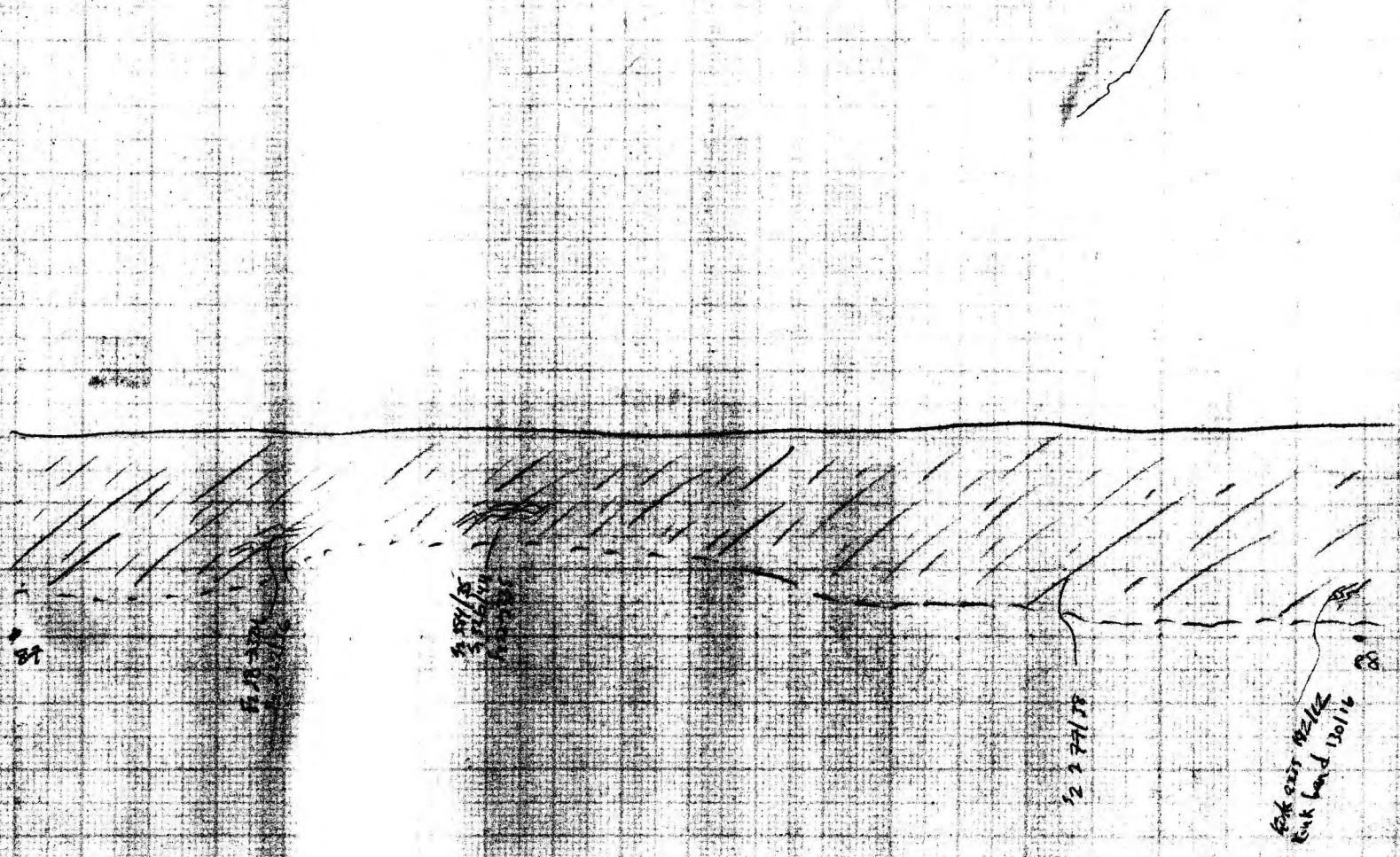
1092 Bench looking N
Scale 1:200

⇒ There are two faults here, the south east-dipping NNE-fault and the steeply NE-dipping strike-slip fault that cuts it. The S_2 foliation in the footwall of the NNE-fault dips steeply into it and in the hangingwall both S_2 and the F_2 axis are bent. The strike slip fault is sinistral and offsets the NNE-fault by ~50-100 m. This is evidenced in the hwall where flat-lying HA is surrounded by fault rock. I think the HA is in the hangingwall of the NNE-fault and has moved sinistrally along the strike-slip fault, juxtaposing it against the footwall of the NNE-fault. The NNE-fault is approximately 80 metres wide.



1092 Bench look NE
Scale 1:200

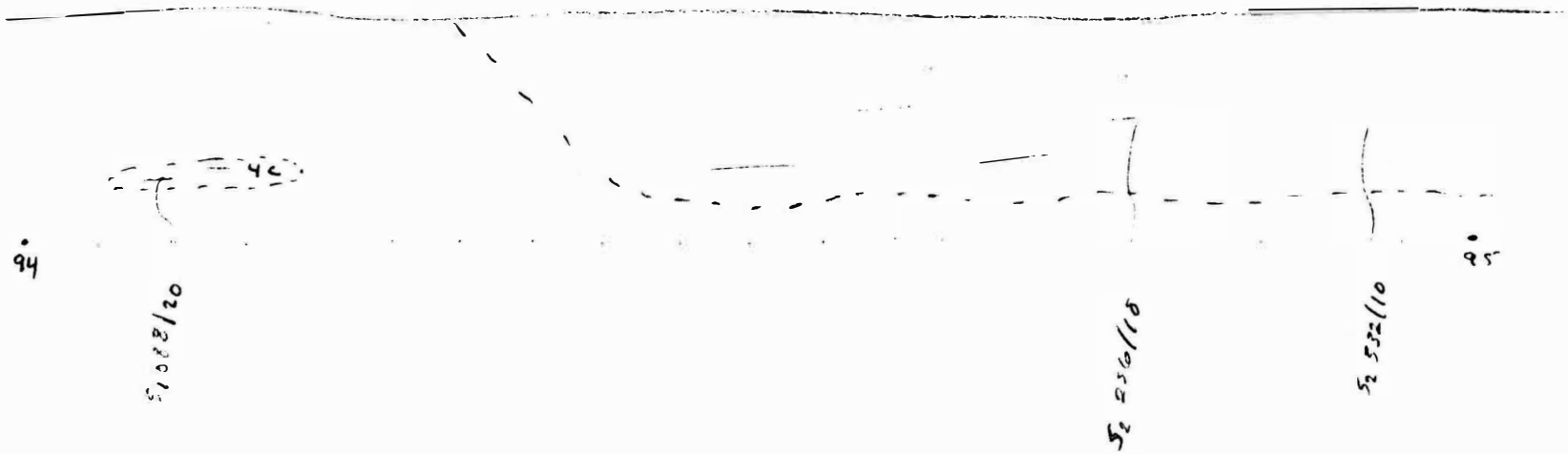
⇒ overall an overturned limb of an Fz fold. Lithons are not ~~developed~~ near station 88. Small kinks (~~about 2cm~~) kink the Sz foliation.



1992 Bench looking E
Scale 1:2000

⇒ towards 95 the rock becomes as quartzite with a well-developed muscovite S_2 foliation. S_1 banding is not developed. This looks like the transition into the footwall phyllites.

most of this panel is a fracture surface and it is difficult to see anything.

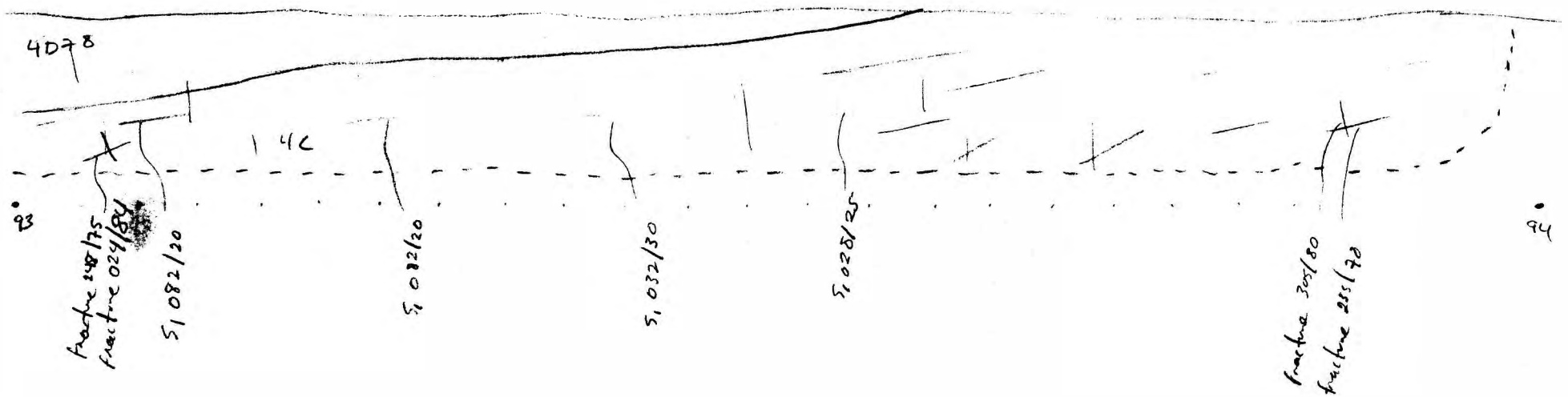


1092 Bench looking E
Scale 1:200

⇒ Very well banded 4C unit with the 4078 unit running up the pit wall at a shallow angle to S_1. Banding is less well developed near 94.
Quartz bands in 4C have vertical fractures parallel to mean NW-dipping fractures that are infilled with chalcopyrite.

Didn't see any evidence of folding.

Where is the COE fault?

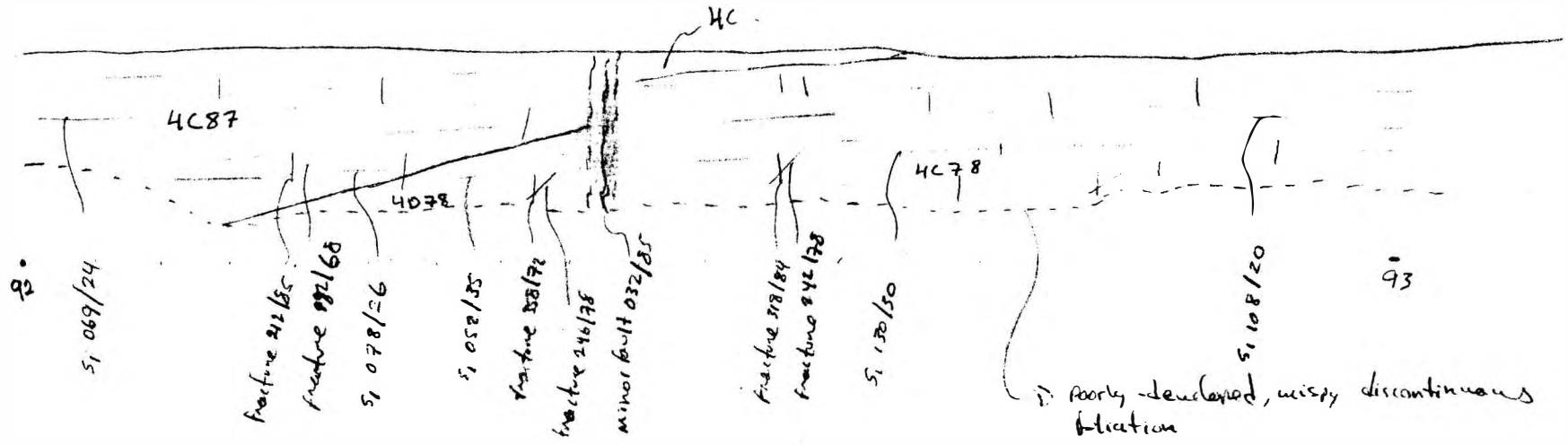


1012 Bench looking East
Scale 1:200

⇒ The very top of this bench is a well-banded 4C that grades downwards into a 4078 → 4178 with a wispy discontinuous foliation. Foliation in the 4078 locally shows indications of shearing and boudinage. The contact between the two rock types is locally sharp.

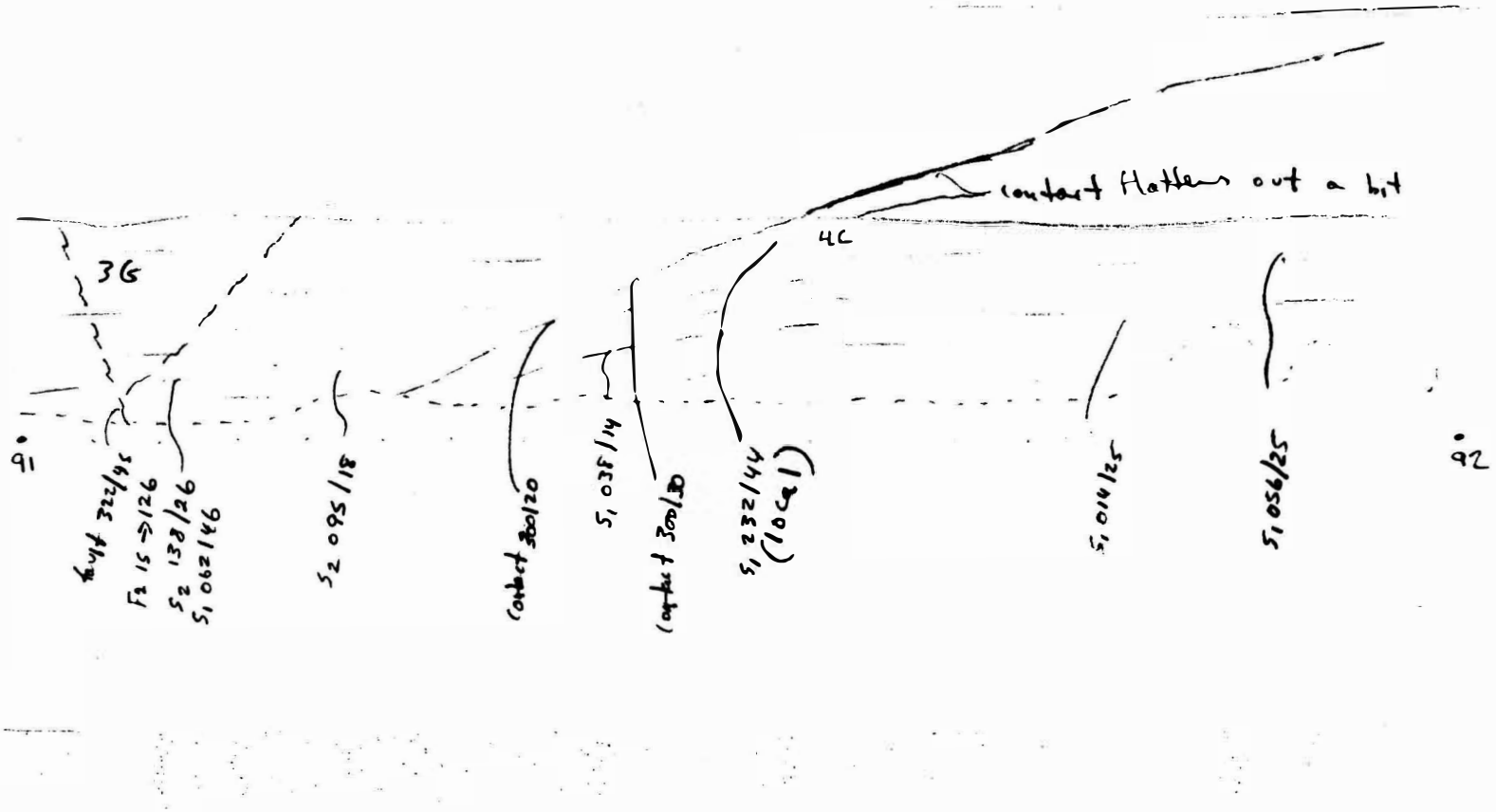
- pyrite in 4C 4078 is very coarse-grained throughout, locally reaching ≈ 1-2 mm. Sphalerite is locally coarse-grained as well and there occurs in mesomineralic (late?) patches. Fine-grained galena is disseminated throughout.

⇒ Pyrrhotite-rich band on this and next panel (i.e. 93-94) cuts shallowly across S1.



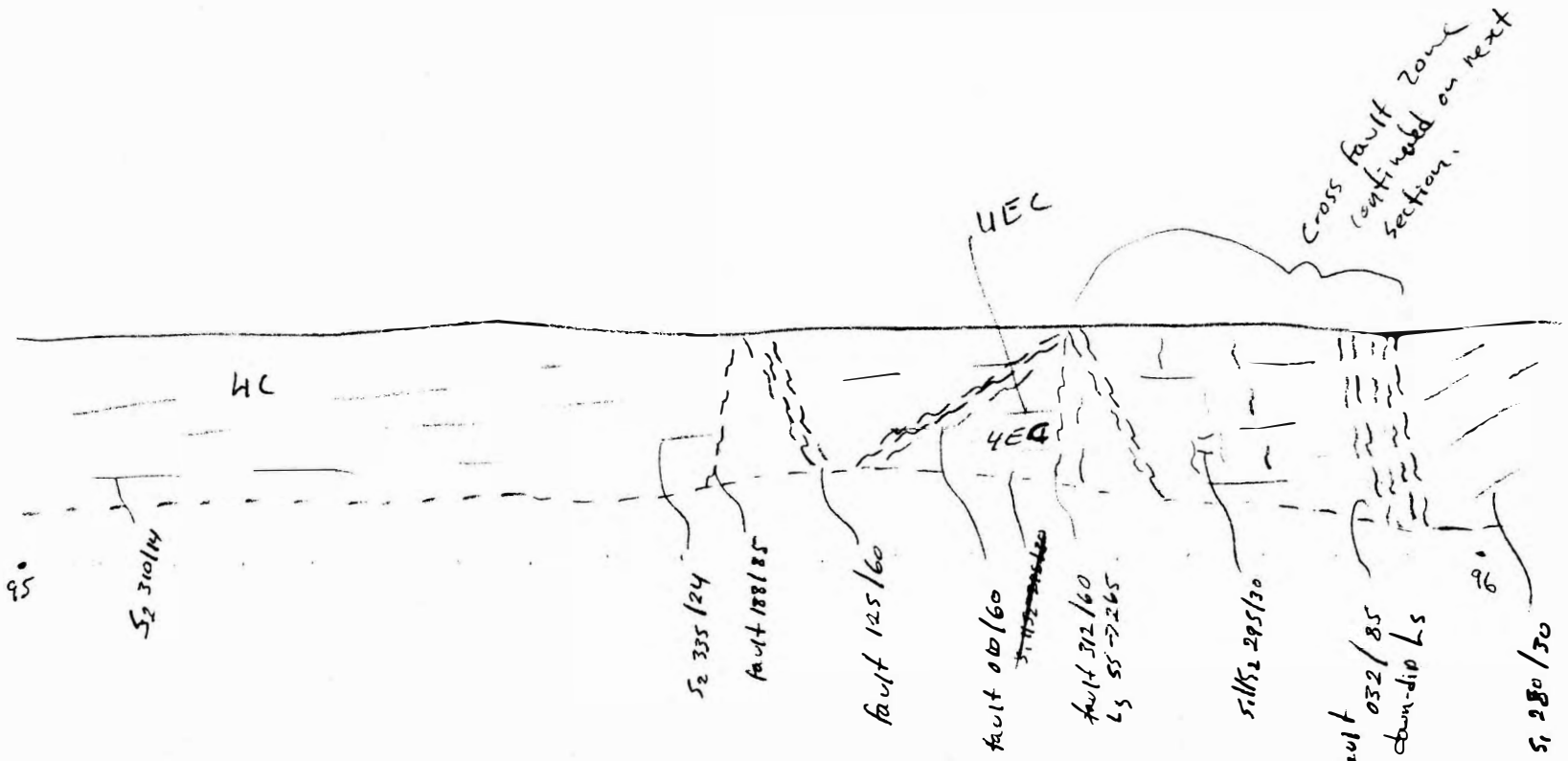
1092 Bench

⇒ contact dips approx 330/20, at an angle to both S_1 bedding and S_2. D_1 bends slightly into the contact and the rock becomes more pyrrhotite- and sphalerite-rich. The angular relationship between the different fabrics and the boundary may indicate a D_1 structure. The F_2 structure is an overturned limb.



1092 Bench looking E
Scale 1:200

⇒ again in a HC with a well-developed S_2 foliation.
The southern part of this panel is the Cross-fault zone.
the lineations are down-dip.



1092 Bench looking E
Scale 1:200

⇒ Move of the cross fault zone. I think its dip-slip.
A strike-slip fault striking in to it drops the
sulphide/Plutite contact down at least 6 m