5/3/89 start section measure in Canyon de la Cuevas on SE exposure, 1st notable outcrop of strata — above base of Espinaso Section will be used to correlate resistant debris flow — laterally, then catch lower part of section toward northwest — behind residential section max clast = max diam.

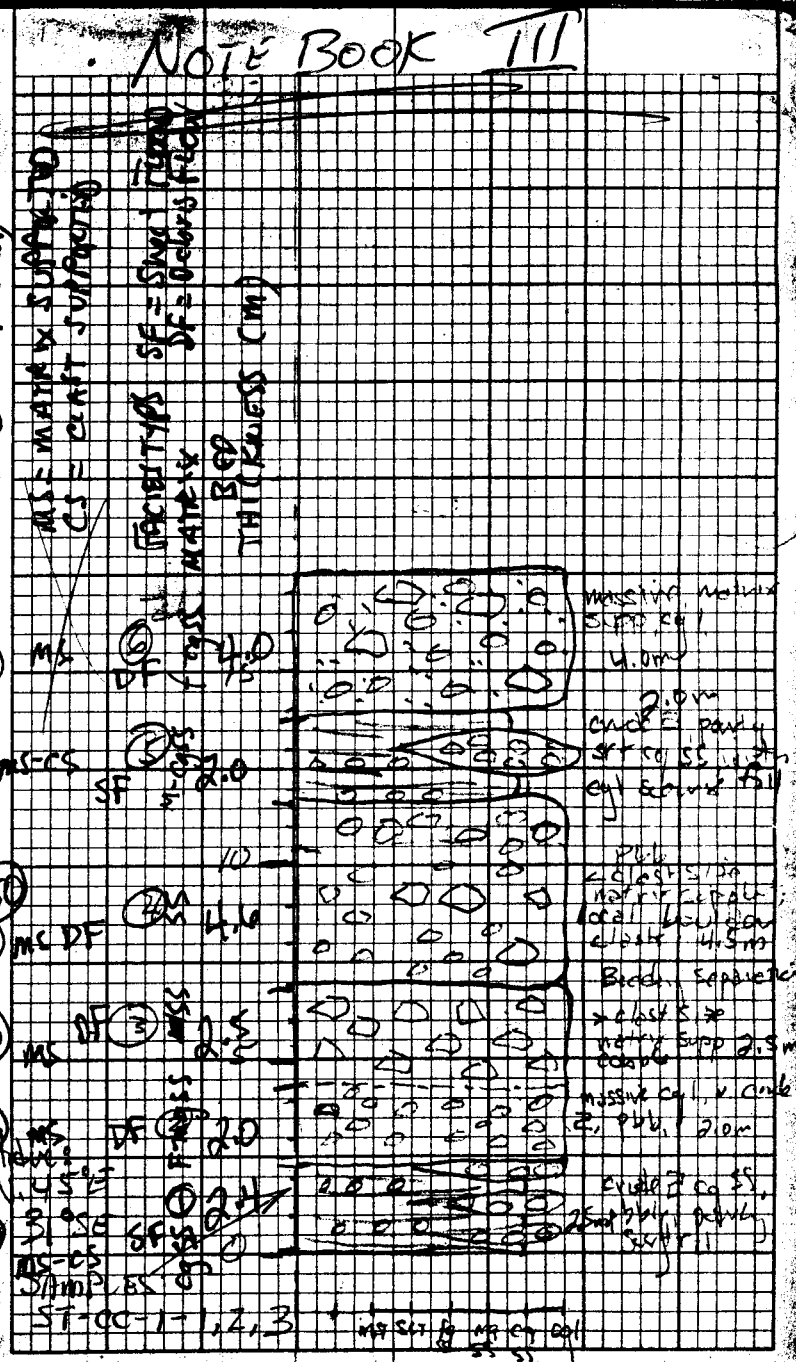
Grain size, cross-strat, clast support, matrix support, lateral continuity / scour / pinchout, internal grain size Δ, max clast size, clast angularity, dominant clast composition, phenocryst mineralogy, Flow banding, cooling structures minor / Auxillary Clasts composition, paleocurrents?

(6) angular clasts, matrix f-cg pebbly sst sand dom = 10, 5cm max clast 25, 25, 25, 15, 40, clast dom = grey plag-amph
(5) Massive matrix sup pbly in sand in pebbly m-cg ss crude to mod. Σ, max clast 7 Avg = 3, clast comp = grey plag-amph vole,
(4) massive, matrix supp. cgl, max clast = 10cm, local large boulder
(3) matrix supp. cgl. max clast = 40-60cm, massive, angular clasts. Poorly exposed

(2) v crude strat. pbly dominated, max clast: 7, 7, 8, 10, 12: matrix supported matrix f-mass laterally continuous, clasts x-subrd dom. clast = grey, plag-amph. vole, stacking etc

(1) crudely to low Δ x-strat pebbly cg ss with lenticular scour & fill matrix supp. cgl, clasts x to subrounded, local clast support, max clast 30, 60, 30, 40, 30

clast/lith: grey vol. dominant plag phenocrysts, amphibole, mafics, biotite occasional pyroxene
minor soft green clasts + amphibole stero up to 0.35 cm
minor plutonic, minor bedrd mudst., local amphibole xenolith



(24)

>64mm = boul

2-4 granules 4-8mm pebbly 8-64/cobbles

SAMPLES ST-CC-10-1,2

First Appearance of flow-banded, compositionally banded grey vole (aph-plag)

(10) Debris flow, no notable internal bedding

Cross drainage to (10) near (5) on Ridge top map

(9) upper portion of (9), fine clast size, clast composition similar

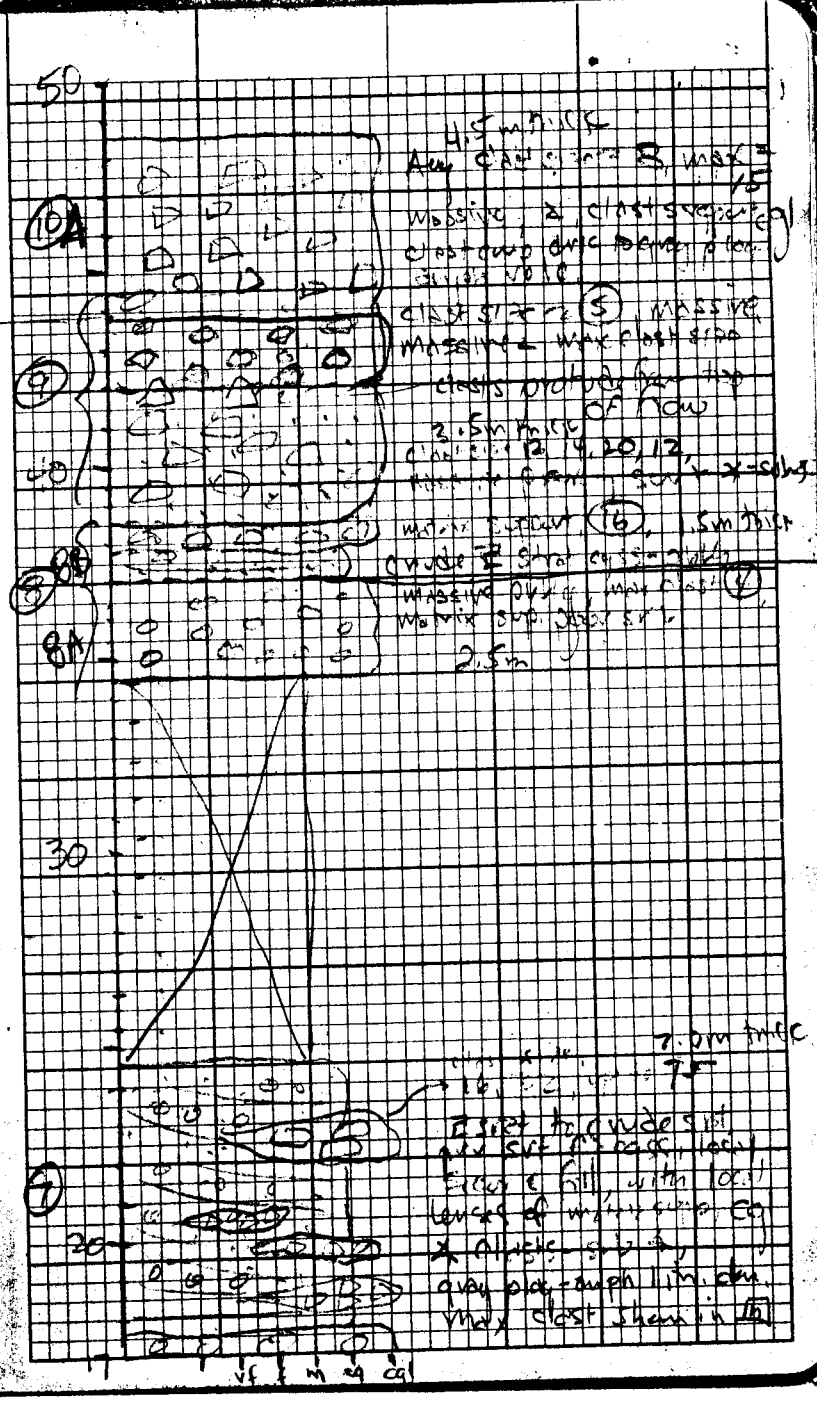
< sub < clasts Debris flow

(9) sampled ST-CC-9-1,2

(8) plag-aph phen vole - dk grey - grey, occasional reddish, distinctive Steel Head horizon

Coreek

(7) local large aph. phens, up to 1cm
local dk grey - green fr stained clast - aph-plag phenocrysts.
Some grey clasts oxidized pinkish tinged
int bdd, scour fill pur srt ss ?
cgl debris flow, boulders absent in the upper most unit, & lower clasts - subrnd
rounded, grey vole. some locally red plag-aph phenocrysts
Some brown volc clasts up to 3mm, locally



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SAMPLE ST-CC-14-1 lt gray volc

SAMPLE ST-CC-11-1
SS sample

Sample ⑨ Top of ⑩ ST-CC-10-3 subordinate but noticeable fcw bearded- lt grey volc. clast

⑭ Dif. * - subΔ, light gray - pinkish volc, amphibole plates, done away, local fcw banded clasts

⑬ intbdd d.f., massive, m-f lapilli supp ash & fcw svt F. eq SS intbdd - crudely stat Z, gray-drk gray volc

crudely Z eql - ykb - SS, poorly sorted, *-

⑫ sub* clasts, some clast ith., intbdd - strat SS sheet flood?

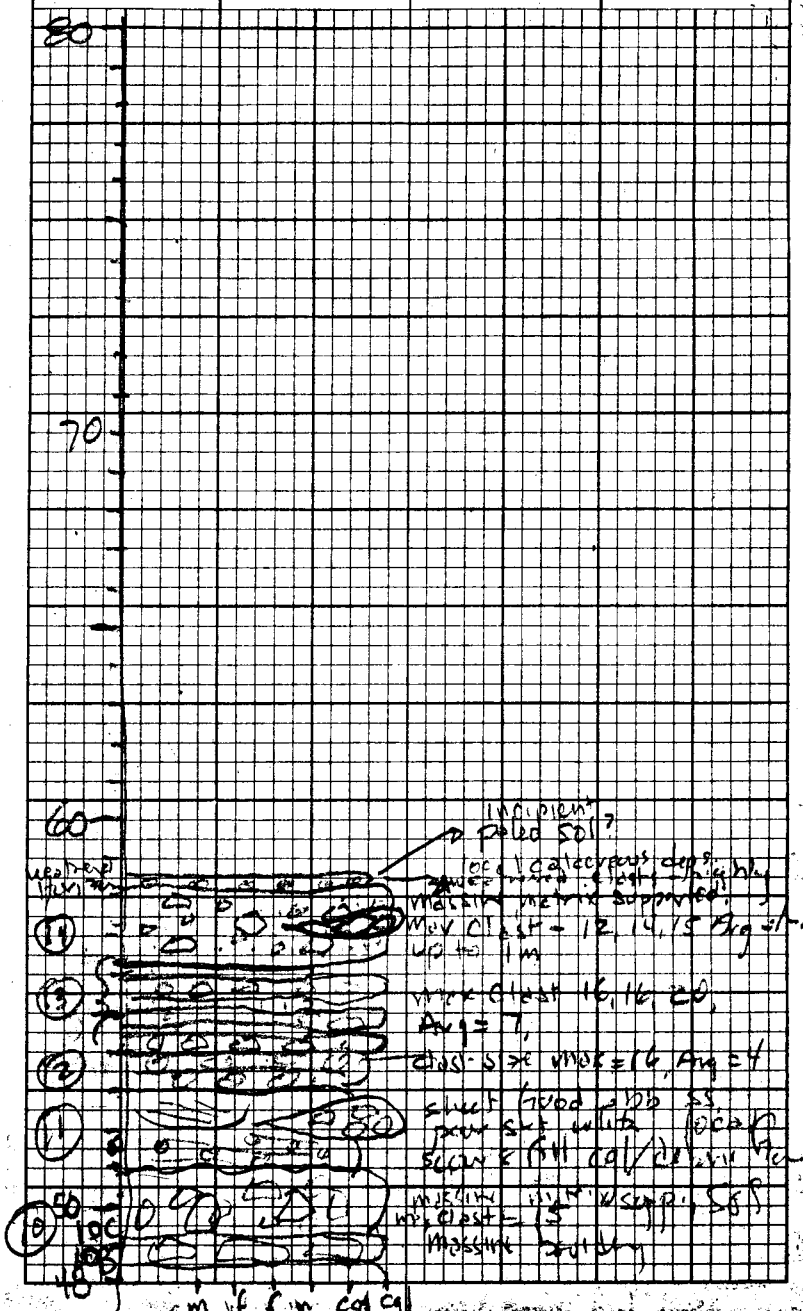
interbedded explosive/ scour deposits local (local reverse gradation)

⑪ * to subΔ, max clast = ⑨, ~~SS~~ fcw banded clasts, scour & fill with local d.f., massive poor sort.

⑩ — laterally correlates to ⑫ (pinky clasts)

⑮ pnt. Explosive with weathered clasts/ weathers pits with boulders up to 1m

⑯ deposition (reflective), max clast size 40-50 cm, notice fcw banding in grey volcanics



6/1/89 Continue section in Canyon to Ice Cave - Start new section of weathered clasts & "pyroclastic" deposit

[stopped @ an Volcaniclastic f.T.]

Scour & fill / sheet flood dep

(21) intbdd prob eq ss, horiz strat, with crudely strat eql, scour & fill, sand & f-eq per strt, eql = crude ≅ strat,

(20) sheet flood, Scour & fill, intbdd clast comp = drk grey, lt grey, volc clasts, angh phenos clasts angular to sub ⌀, crude horiz strat, to good horiz strat in sandy matrix, Still poorly sorted

max clast = (30) Avg = (8)

intbdd sheet flood / Scour & fill dep, Scour & fill crude strat

(19) m-eq ss & pbl ss, with crudely strat matrix sup. eql,

(18) D.f., massive, poorly srt, max clast (16) Avg = (8).

Strike N 3°E Dip 17°E poorly sorted sandy matrix, local flow banded

erosive / Scour & fill clast comp: arg-siph-plag volc., local flow banded tuff,

(17) Sheet flood dep. crudely strat, poorly srt, pebbly sandstone

erosive base, Avg clast's size = 1-2 cm, max cl = (60)

angular clasts, local greenish-altered clasts

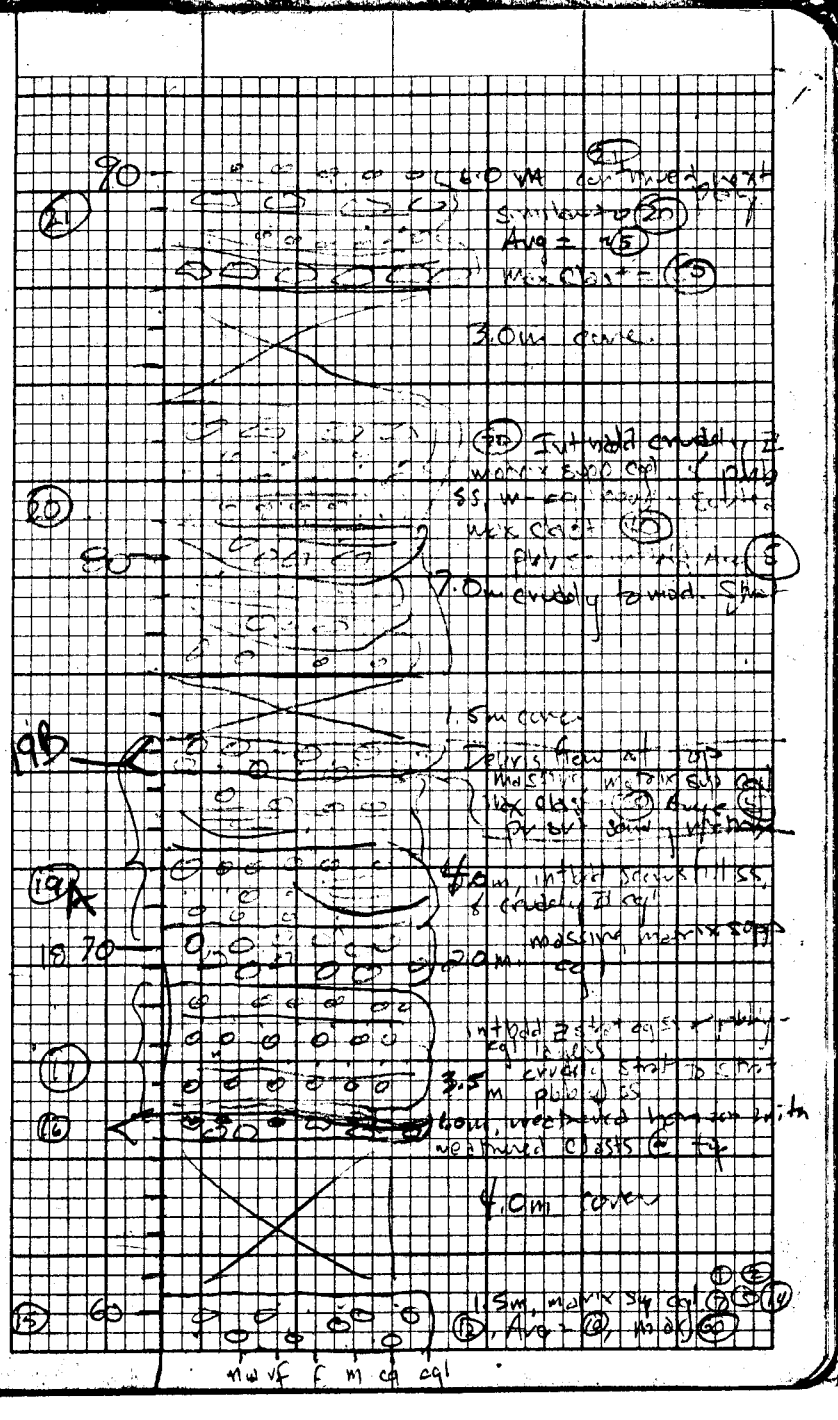
poorly sorted sandy matrix, pinkish matrix flow banded

(16) poorly srt, massive, matrix supported, eql with weathered clasts @ top of bed, looped @ on field trip, max cl (18), Avg = (5) range (-14) (15) weathered cl, "crust" on top, members vs. pumice??

dk = grey volc.

Note occurrence of more coarsely X'ln, dark grey clasts

(15) crudely normal graded, debris flow, poor srt sandy matrix, massive, abrupt contact, grey volc. clasts, local flow banded volc - amp-plag phenos



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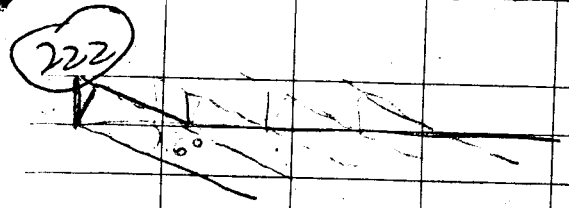
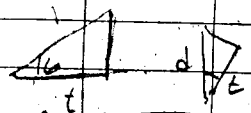




$\cos 16° = t/d$ — measured ± 2 m

28 x d

(24) Strike & Dip @24 N20W 12°E crudely bedded, heavy poorly srt m–cgl & pblss with matrix supported cgl ~~clasts~~ (5 strat., interbed, localized scree-debris from massive matrix supported clast dom. ppltc; gray volc, amph. phenos local strks grey marn coarsely xln "plutonic clasts"

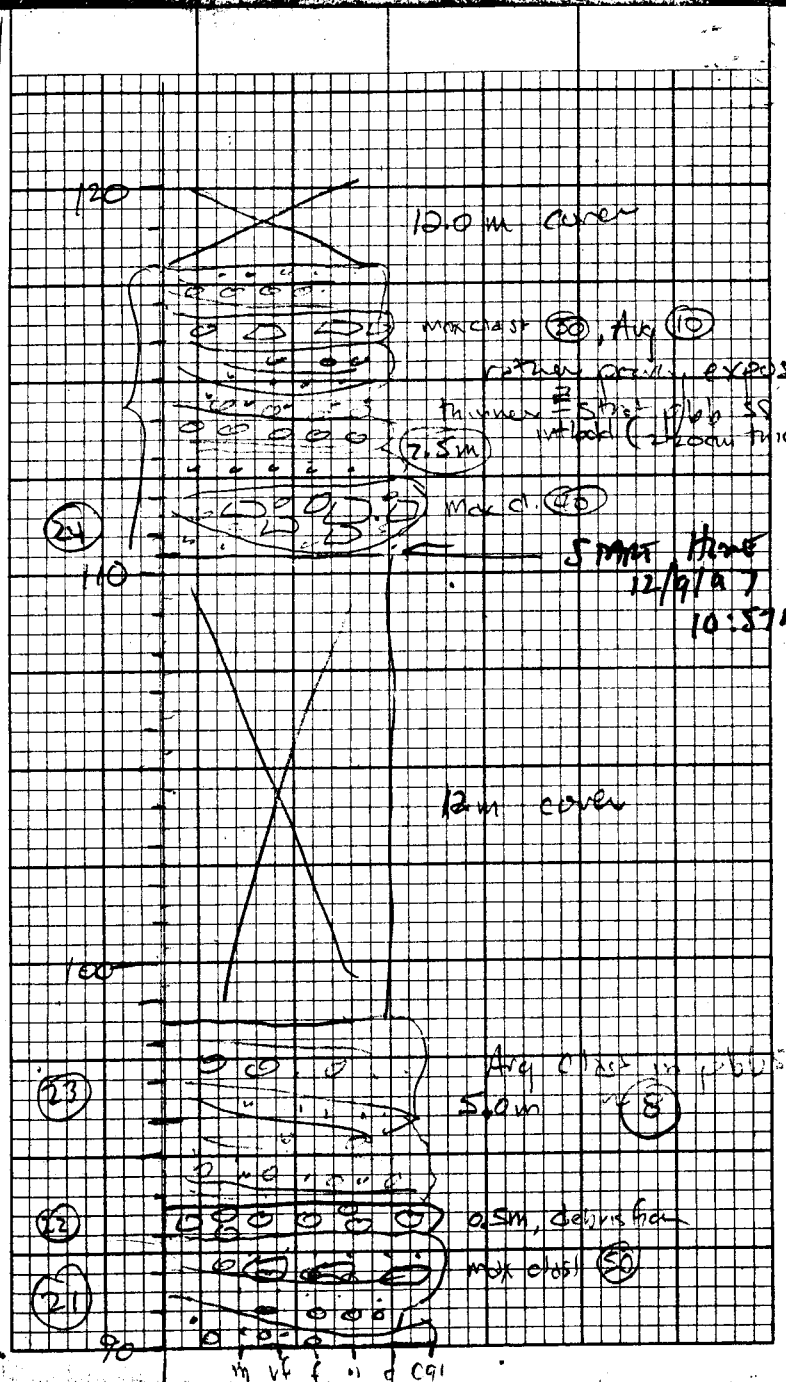
SRD @ (23) N15°W 16°E (Class Dike orientation N, 22°W 90°)

~~Not really~~ Matrix poorly srt nothing from bedded lithologies

(23) max clast (16) interbd crudely strat cgl-pblss, Scree & fill, max clast (16-28) max clast (25) local strk amphibolite xenoliths, local red volc lt gray volc and more dark gray xl rich - almost phaneritic

(22) massive, poorly srt, matrix supp, clasts 4. to sub B

(21) Clast dom. gray volc - amph - plag phenos, some clasts X view with phenos up to 1mm, low grnl mass.



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14

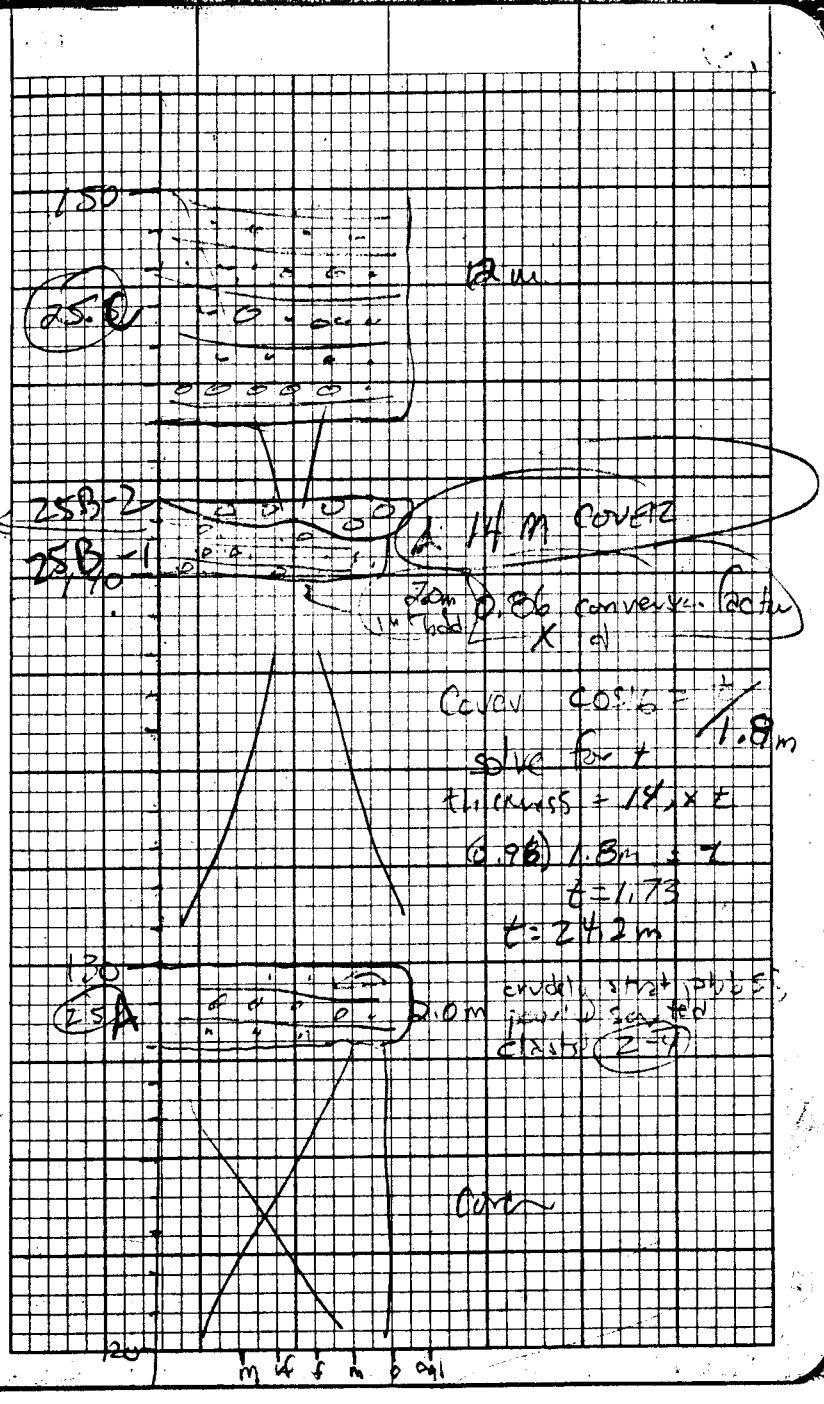
Dark punky-looking – highly weathered lt. clasts, seem to be weathered version of grey volc presence of highly fissile red – lt grey clasts

max cl (25) Avg = (5)

25B poorly srt, crud 2 strat. m-cg phlys with exclusively banded tuff – massive d. flows

25.C crudely strat to horiz. strat m-cg phlby ss, fairly well X bdd, diff. horizontal phlb strongly xcav – mod sorted, max clast size (8) dvk – lgt grey volc clasts

25A sheet flood dep, lt & dvk grey volc lithic



(224)

(28-B)

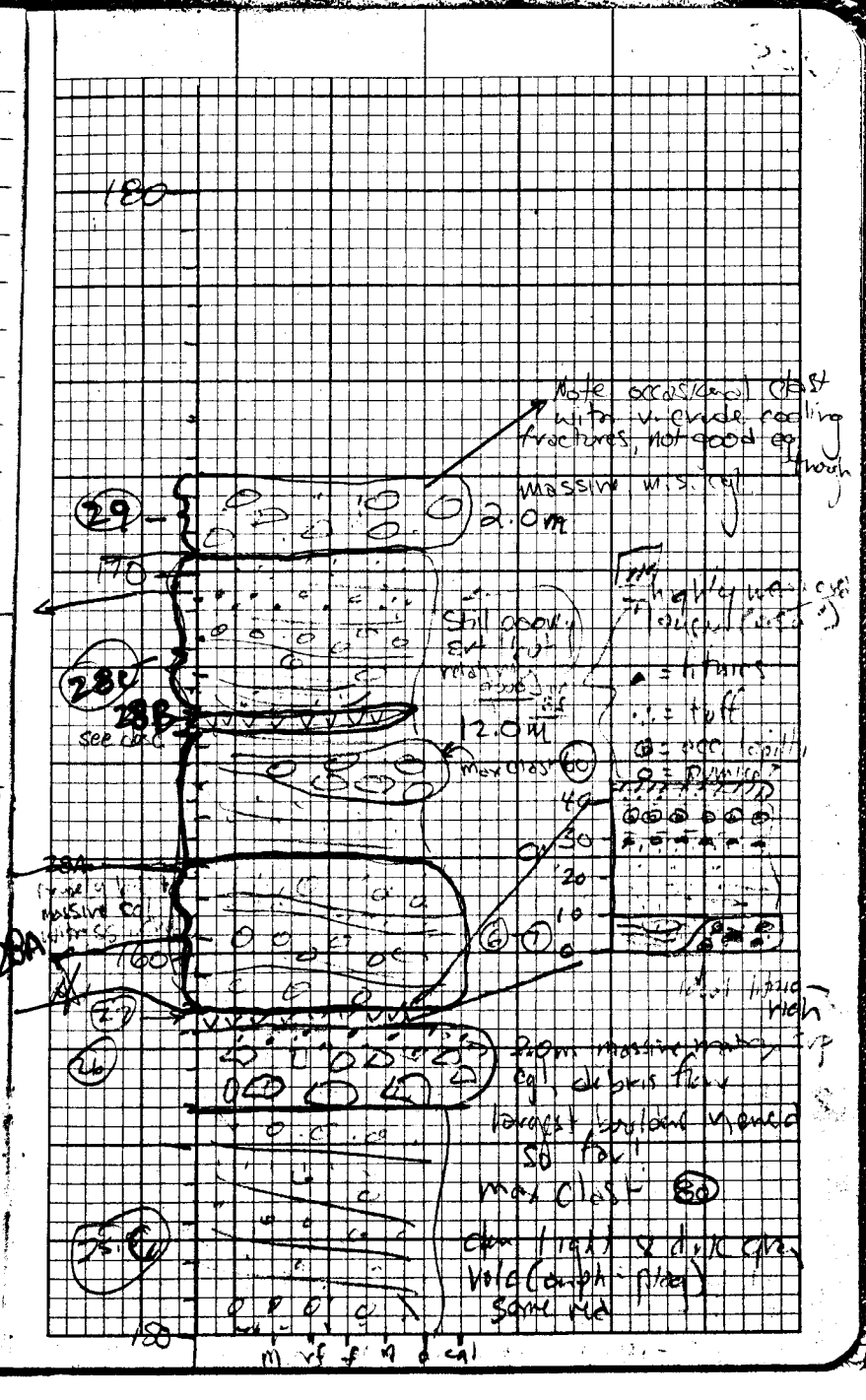
SAMPLE ST-89-1 = SAMPLE ST-CC-28B-1 =
~~end~~ graded mod. well srt, 10-cm thick, pink, indurated "tuff" = fall deposit? laterally discontinuous & scoured out, this unit is pieced in section from MU-1

@ "MU-1" = "map unit-1"

@ top of ridge above this drainage — "pyroclastic flow" — Sample ST-89-2

Recon to next drainage (to NE), above (29), strata "correlative" to (28) (which is poorly exposed), contains "tuff" pinkish-red — sampled as ST-89-1

(29) poor srt massive matrix supp. cgl / d.f.
Avg clast (8)
Sample of indurated, pinkish, granular SS, fairly well but relatively good srt ST-CC-28I
Clast lithology, same as below
local channelized debris
(28) poorly exposed, max clast @ base (15) flows present
interbdd m-cg pebbly SS & localized massive mass. cgl, local channelized d.f., fairly well srt SS & crudely stratified cgl; some sands show best sorting seen but mod. @ best
pyroclastic ~~flow~~ ~~overall well sorted ash bed~~, wavy strat @ base in vit. ash = ~~flow~~ fall dep.
locally thins & thickens, top controlled?
(27) accretionary lapilli, local pumice/lithic conc. @ base
primary thin pyroclastic fall dep. see up, highly indurated, pink color
(26) Debris flow, massive poor srt crudely-normally graded; sandy @ top
v. large clasts, max up to 50-80 cm
Avg clast size = 20 cm



6/3/99 SATURDAY

Collecting samples in portion of Section measured on 5/31 & 6/1

"BED UNIT No." keyed to measured section

ST-CC-1-1

ST = STEVE TAYLOR

CC = SECTION NAME: CANYON De la CUEVA

1 = SAMPLE No

* ST-CC-1-1: dominant clast lithology most commonly seen so far
lt. grey volcanic with hornblende/plag. phenocrysts, other clasts, show variable degree of discoloration PINKISH tinge

* ST-CC-1-2: subordinate lithology minor %, darker grey volc. — more fresh looking, same as ST-CC-1-1 only less weathered?? Hnbl. phenos as well

* ST-CC-1-3 - m-cg SS sample

* ST-CC-9-1 dom. clast, lt grey volc

* ST-CC-9-1 isolated lithology, v. minor metamorphic??

ST-CC-10-1 lt grey volc

ST-CC-10-2 drk grey volc

ST-CC-10-3 Flow banded, lt grey volc.

ST-CC-11-1 SS sample

-14-1 lt grey volc.

ST-CC-17-1 med gray volc. = minor constituent within red volc. lithic clast

ST-CC-21-1 pink SS (rotated rounded)

Recon: ① debris flow on top of Acc. Isp Tuff (unit 27) [stratig. interval to bottom of wash below MU-1 (south of)

② Tuff represented by ST-89-1 located above that debris flow - [illegible] above the Acc. Isp (i.e. Cuevas Tuff)

③ DFANS (ST-89-2) "P.C. flow" is laterally traceable to position 2 where well exposed "Debris Flow" is all in la Cueva Wash — clasts lithologies to be sorted

④ Dan's "P.C. flow" traced out to MU-2, 3, 4 as lithologic components more lithic-rich East of MU-1 (MU-2, 3, 4)

ST-MU-3-1 correlates to ST-89-2 (Base of MU-1)

(3) Seems that "Debris flow wall" Strata should then contain the 2 tuffs unit 21 & ST-89-1, but they do not show, although may be locally truncated by Scarp & D.F. fill, look @ wall closely, may see tuff" - looking layers @ west end

(4) Seems that D.F. wall strata correlate to prominent exposures in side drainage to North of MV-1, & across Cuenca trace these out.

★ Dan's P.C. Flow is definitely 2-4m above D.F. WALL!! See MV-3 & ST-MV-3-1

I Think MV-2 is actually Strat. above Dan's P.C. flow (i.e. ST-89-2, & MV-3, MV-1.

MV-4 = located Fall deposit ST-CC-27-1 along wash, where bedrock constricts drainage Collected Sample ST-MV-4-1

All outcrops in MV-4 wash are mostly Colluvium within D.F. Wall & underlie Pleist. P.C. Flow Dep.

ST-89-2

This Fall-deposit is locally Colluvium by Pleist. debris flow unit

6/7/89 Wed

Continue section measure @ 172 m, @ bed/marker (29) will fill in Section to MV-1 & more laterally to north side of Canyon de la Cuenca to Steep-walled side-drain @ MV-4

(227)

SAMPLE ST-cc-34-1, dominant clast matrix support clasts subx - subround

(34) basal bed: massive, no internal arrangement, cgl clasts floating in matrix of lt gray m-cg ss, poorly sorted ∪ more fine grained, crudely stat pbb ss @ top. poorly sorted, no occurrence of cryst cooling structures not seen through lt gray hnb volc dominant, some show variable degrees of mafic oxidation some dk gray volc, ccs wt %

lt gray, hnb - volc. dominant clasts crudely stat pbb ss @ base, massive d.b.

(33) dep @ top, poorly exposed

Found stat correlative to 32? (p.c. flow?)

MOVE TO MU-5 SAMPLE ST-MU-5 = ST-CC-32-2?

LATERAL MOVE TO NORTH ACROSS CANYON (CUEVA)

DAN'S Pyrocl. flow - SAMPLED AS ST-89-2 = ST-CC-32-1

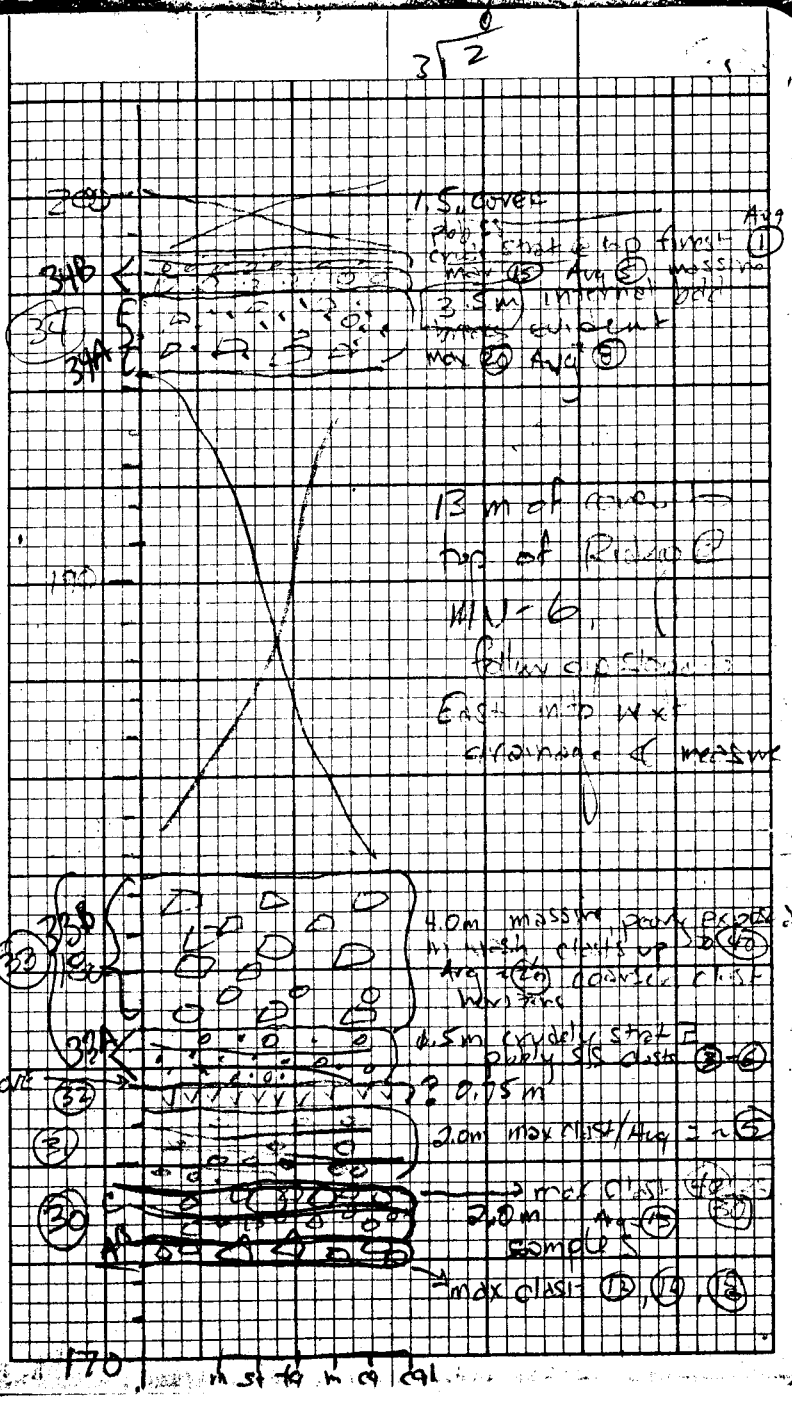
(32) Highly indurated, pink, subconchoidal cryst frac. H & dk gray volc limics floating in uniform v. fine pink matrix Pyroclastic flow dep ??, limics 2-10mm diameter laterally traceable

SAMPLE ST-CC-31-1 = sampled near dike, highly altered lt gray volc? ?

turbulent sheet flow, clasts subx, lt gray volc dom.

(31) crudely stat ≥ cgl to pbb ss, clasts Avg (7), more uniform clast size than (39)

(30) stacked debris flow dep, massive, poor srt, m-vcg sandy matrix, dom. clast = lt gray volc, SAMPLE ST-CC-30-1, hb-pbly lt gray volc dom. clasts sub x - subrounded



(228)

1.0 m thick

Dike N 25°W @ MU-8

Sample ST-MU-8-1 = Dike Lithology

11
1.7
77
1
(5.7)
S
(S16' =
8.7
.96
2
1.2 3 0
9 3
S 2
29

STRIKE & DIP @ map pt. 36: N 1°E 14° E

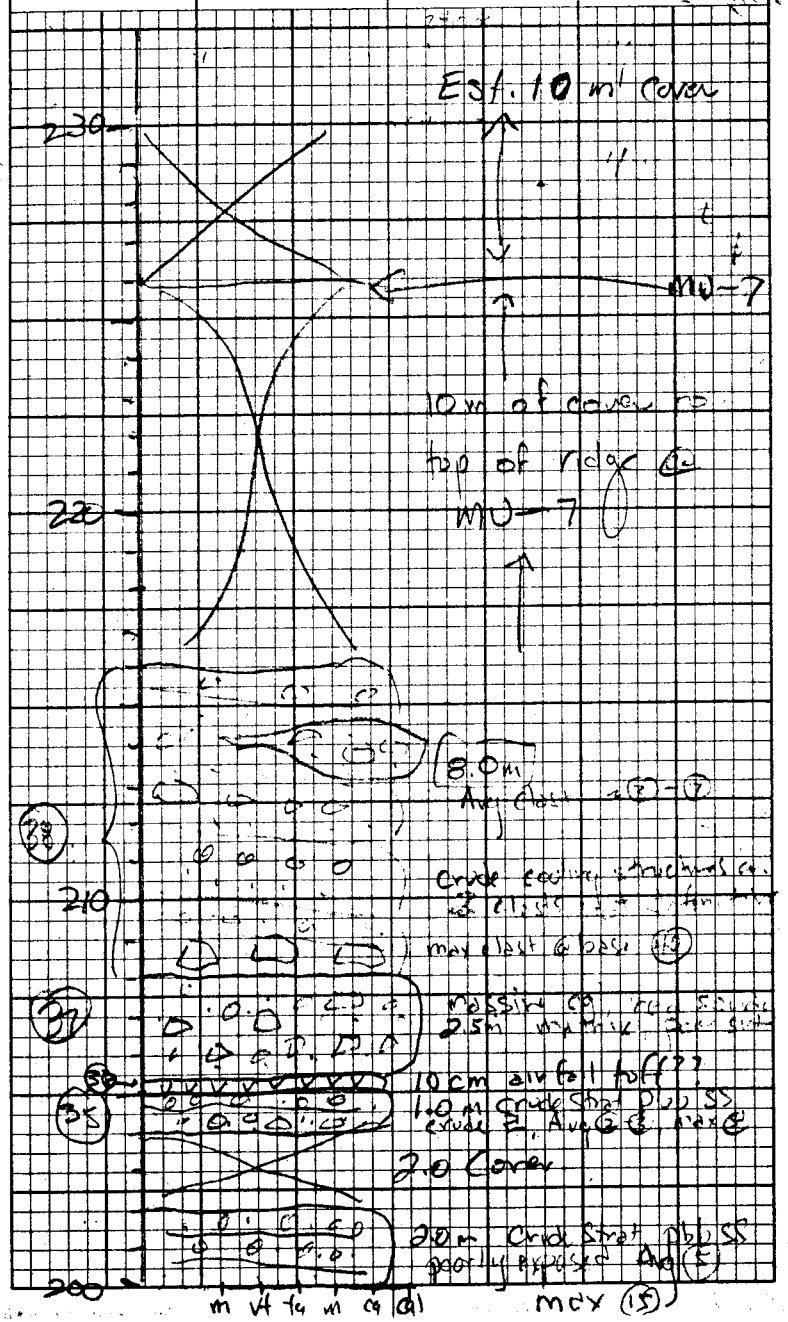
turbidite? Sharp fcm) largest clasts @ base
(38) Crudely to moderately stratified pbb ss, poorly sorted (but relatively good) clast comp dominated by typical lt gray vole lithics (mnb rich) clasts sub & to sub rnd.

(37) Debris Flow - note red appearance to matrix, Avg clast (5) max (7.5)

(36) Another, well sorted, f. grained, pink, indurated "tuff" (airfall) horizon 10 cm thick, graded(?) @ base, upper parting surface of bed shows small circular leaf/woody remains = rooting?? Sample ST-CC-36-1

Samples ST-CC-35-1 (weathered interval) capped by ST-CC-35-2 overlies

(35) highly weathered, white clastic (dominant) & dark gray vole clasts floating in uniform, very poorly indurated, weathered matrix is this pyroclastic or just weathered? Capped by 5 cm indurated horizon (poorly sorted, crude bed)



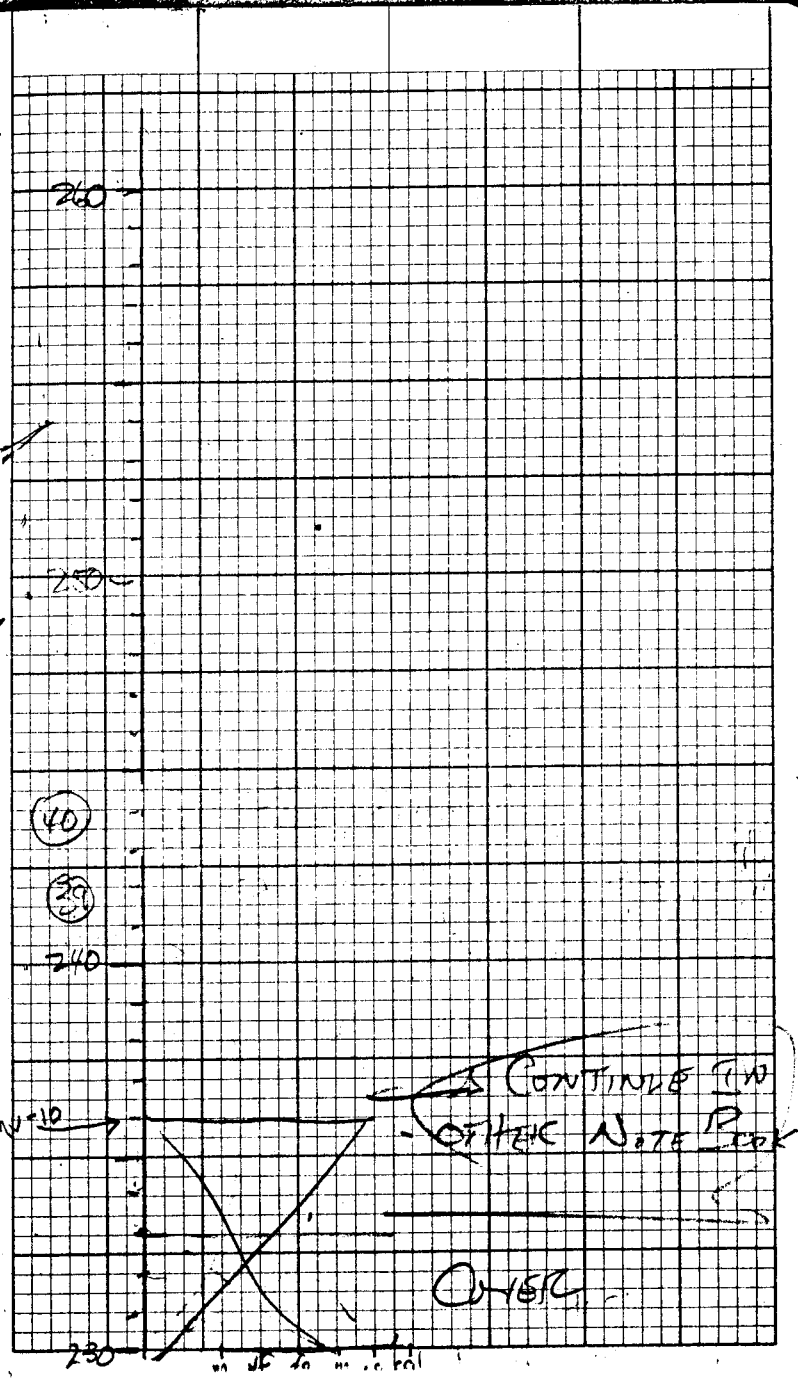
(229)

6/8/89 Thursday

Continue section measuring. Starting @ entrance where Gary, Dan, & I saw the clastic with cooling structures well developed & I looked at light gray "tuff" — Much of Dike wall on Canyon de la Cueva

Color area I stood more up section to MV-10 STRIKE? Dip @ MV-10 N. 29°W 14°E

MV-9 Dike wall along South side of Canyon de la Cueva Dike orientation N. 55°E



(1)

6/8/89 Continued

(43) on west Dam

Base of N 20°W 14°E* PALEOCURRENT/Scour dirs: N. 90°E, 11°NE, N 70°W 13°NE

local Channelized Debris flow

(42) ⇄ to C, dk-gy shale m-cobble cgl ss, scour & fill, pbb

large, laterally extensive, SAMPLE ST-CC-42-1, 2

locally well stratified

SAMPLE ST-CC-41-1

(41) Dark-gy mas. (water sup.) cgl max (30) Avg (5) - (6) clasts from sandy matrix, lt-gray rhy volc dominant clasts with variable dominance of wht rhy, carbonate, marble, sub & clasts

sample ST-CC-40-1, 25 sandstone - volcanic?

(46) Recessive sheetflow/scour & fill

clast tags/"reverse" with max up to (35)

smaller clasts Avg = (11)

Clast:

SAMPLES ST-CC-39-1, 2, 3, 4, 5, 6, 7,

notes: several comp. bonded lithic-volc,

Clasts: gy/brn-gray volc with variable degree of discoloration to rusty pinks, clasts with rock struc = brown/oxidized occasional "amphibolite" clasts

HOT DEPOSIT: HOT DEBRIS FLOW

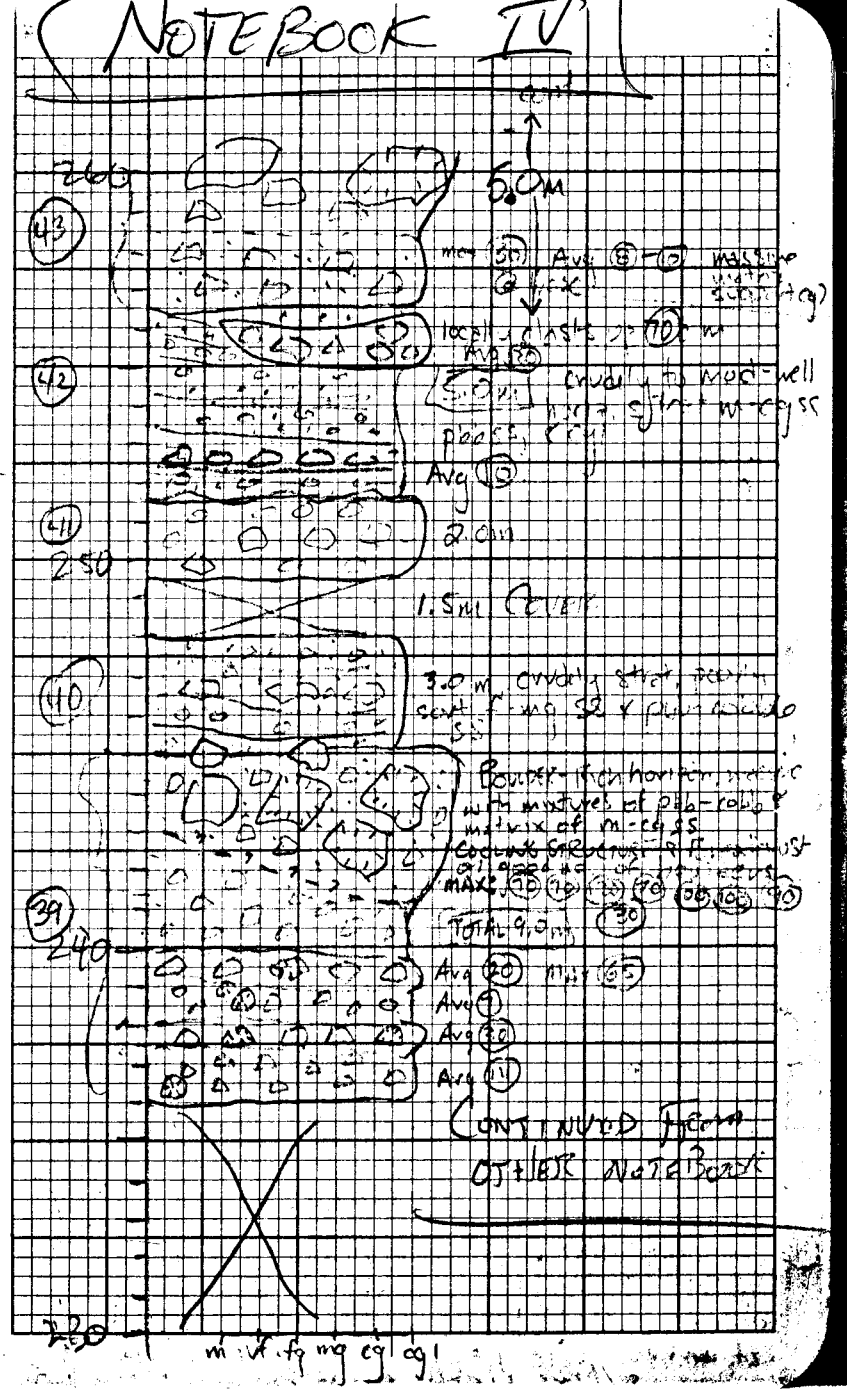
Massive cgl, m-cg sandy pebbly matrix supported,

(39) Amalgamated pbbly to cobble to boulder horizons, no noticeable bedding breaks, but overall crude stratification (defined by horizons) otherwise massive within thicker zones

Matrix: noticeable no. of clasts display margin-cooling structures & some with breadcrusts, clasts ± to sub ± b.

sub-rnd Boulder horizon laterally thickens = Channelized debris flow?

NOTEBOOK IV



(42)

(47) crudely bdd, poorly exposed in wash, max clast up to (25) Avg ~ (10) lt gray to drk gray, blk - volc common clast
NOTABLE OCCURRENCE OF FLOW-BANDED CLASTS, lt gray hnbl volc still prevalent
clast samples ST-CC-47-1
ST-CC-47-2

AH: N.47°W 20°E.
PALEOCURRENT Structures N, ST(W) in bdl

(46) massive cgl, debris flow

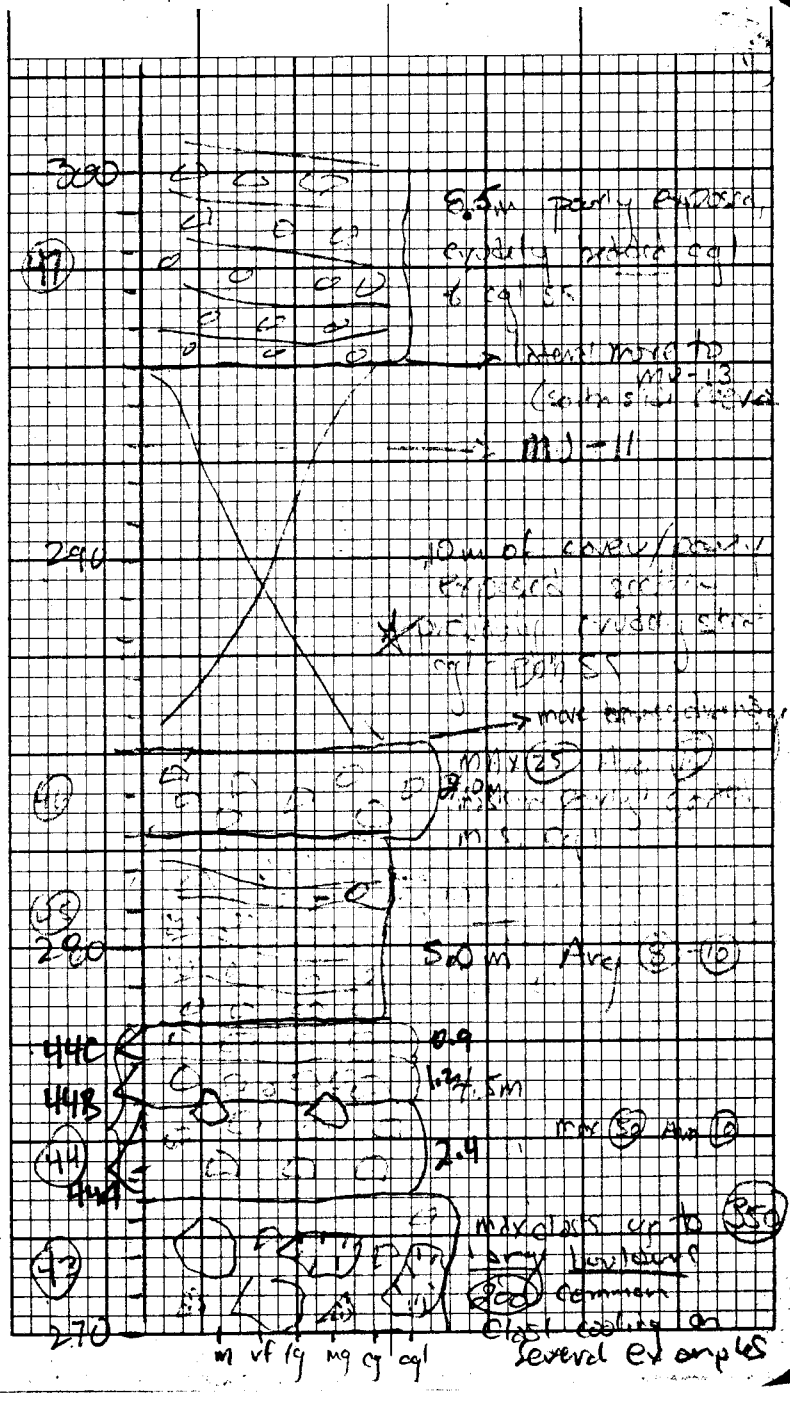
(45) crudely strat ss & pbl-cgl ss, poorly

stacked debris flow deposits

(44) massive cgl clasts floating in f-mg ss matrix. lt & drk gray volc. clasts, amph phenos, some flow-banded
red-purple matrix color

SAMPLES ST-43-1, 2, 3
several eg. of reworked volcanic clasts noted on 1811

(43) BOULDER-Rich @ top Debris flow Dep. clasts 4 to sub 4, finer d.f. @ base with obscured contacts, clasts consist dominantly of lt-mbl-volc & finer clasts, matrix of m-cgss Avg (20)



(3)

6/10/89 Recon. to establish best route to measure upper most portion of Canyon de la Cueva Section

MU-12 conglomeratic bedrock @ base of drainage is equivalent to bed 46

will measure ~ 5m of poorly exposed crudely bdd strata here above 46 & piece in to previous measured interval

MU-13, MU-14, MU-15, MU-16 are correlative strata corresponding more or less to top of (45)-(46) pack age

Exposure @ MU-14 correlative to Debris flow (46) & top of MU-11

(4) ★ SAMPLE ST-CC-53-1 — Any chance this is a lithic-rich Pyroclastic deposit?

(53) Dk ons flow, lt-dk gray volc-lithic occ dsnel flow-banded

(52) dk gray & lt gray volc clasts, hnb phenos, lt gray, pebble, lesser pinkish, rare granitic clast SAMPLE ST-CC-52-1 comma clast lithology

(50) crude F, SS & pebbly Avg (1)-(8) relatively sig sort, but still poor, MAX up to (50) ± - subrd lt-dk gray volc, minor red volcanic sedimentary for most part turbulent chaotic flow deposits

Clasts are ± tabular, thin dk

SANDSTONE SAMPLE ST-CC-49-1

(49) thin sandy int bdd crude bdd cg/sd. m-lcg matrix, lt-dk gray hnb volc max (40) Avg (10)-(15)

(48) rare clast (2-5mm volc lithics floating in fine/v fine sd matrix, similar in appearance to bed (52) Den's pyroclastic flow" Sample ST-CC-48-1 f.g. ash@ base (2cm thick)

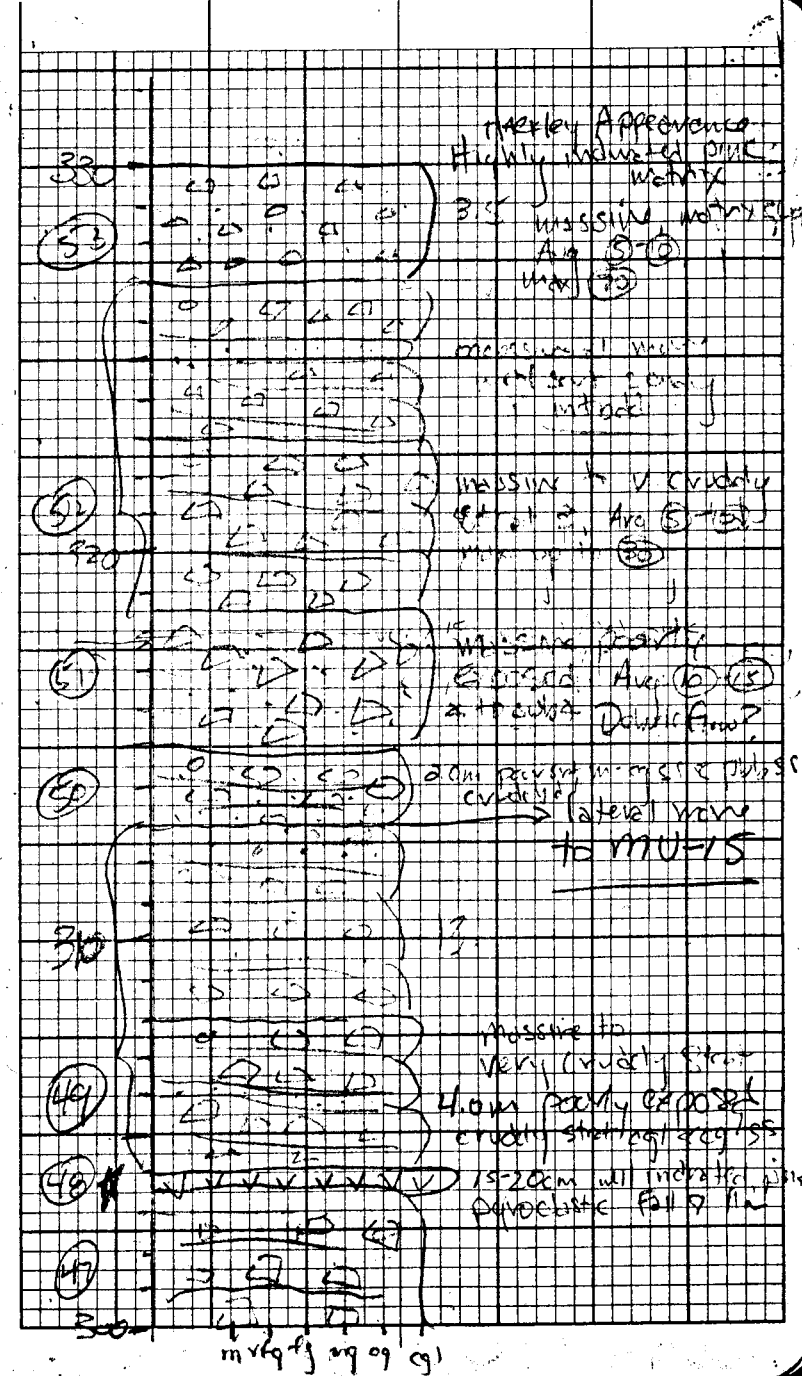
Deposit of variable thickness 10-30cm

30cm

Flow? Ash?

(48) cont. - locally thins & thickens - locally cut thins/cut out by topography on underlying surface upper contact is diffuse & not well defined with overlying unit.

Strike & Dip N. 3° W 12° E.

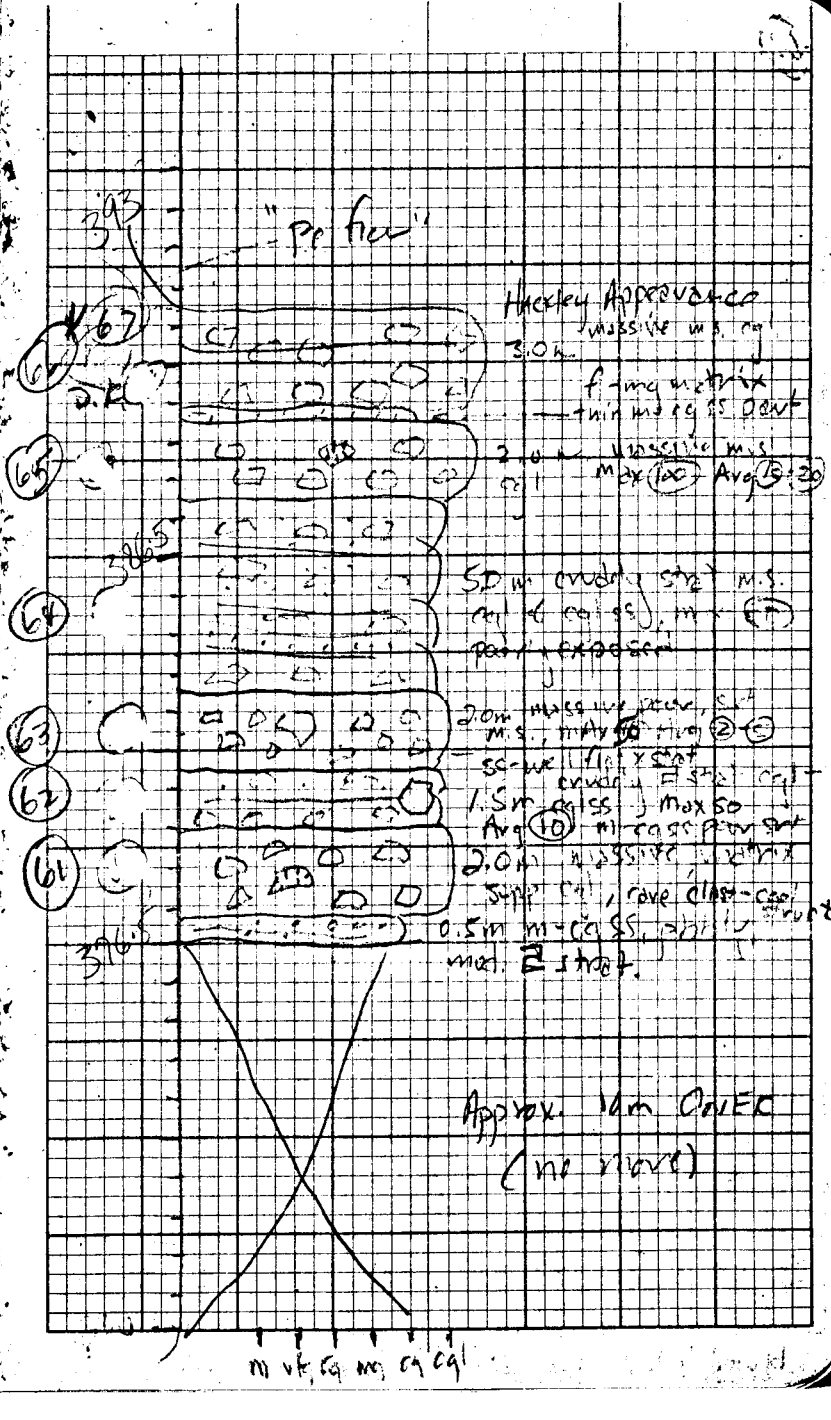


This page of section belongs to p. 9

rewrite sample nos.

(60) - d ST-CC-66-1 looks awful
similar to ST-CC-53-1?
potential for wipe?
In any case (59) is definitely correlated w/ MU-17

(58) → HOT clast SAMPLED AS ST-CC-65-1
58-59 = Debris flow clasts & to sub
lt gray vole = dom. clast lithology
isolated occ. of flow-banded clast
(61) lt gray amph-vole dom. clast
(55) ss sample ST-cc-55-1, rare "amphibolite"
ST-CC-61-2 clast cooling structure
dom. clast sample ST-cc-64-1
(54) pmr srt, massive, lt gray hnb-vole
clasts dom., *-sub *,
Avg (10) max (60) f-mg matrix



6

6/13/89 TUESDAY

Top of Conyon de la Cueva Section — measure

Am picking up @ MU-17

I've decided that that section is a repeat of the 300-330m interval measured from MU-15 (After lateral tracing the "pyroclastic"-looking deposit of bed 53)

It appears as though the MU-17 section is correlatable to the North to MU-18 exposures

will double-check. Entering area from the North @ Calistoga Road — drainage intersection (MU-19)

STRIKE & DIP MU-19 N.26°W 9°SW
Espinoso Fm: bdd ss & d.f. lithofacies
exfoliated clast-cool structure Gray-brnd. volc.

PALEOCURRENT Scour Axis @ N.90°E, 10°W
MU-20 Att/Bdd: N.21°W 7°SW / Scour Axis N90°E in bdd
Mod. well-bdd m-cg ppb ss

MU-21 Att N.46°W 10°SW / N.70°W 15°S
massive cgl — d.f. — rude pool surface

MU-22 just east right on fold axis
@ MU-22 Att N.70E. 8°N — crude estimate
N83E 4°W
± 30 yds to North on NE side of drainage — crude bdd dip to SW
isolated clast with cooling structure SAMPLE ST-MU-22-1
Fold axis ??
SAMPLE ST-MU-22-1 Hot clast
MU-23 N.85°W 6°N.

Paleocurrent Scour Axes = N1°W, 8°S.
Bdd Att: Not much
Scour Axes N.20°W
N.5°W
N.35°W

MU-24 Scour Axis N32°W, in bdd
Bdd N45°E 8°N

MU-25 Scour Axis N.25°W Not much bdd crud

MU-26 Strike & Dip N.31°E 15°N

(7)

Aff Bdd
MV-27: N 50°W 15°N
MV-28: Aff Bdd N 3°E 16°E

Date pt. (58) just east of MV-14
Channel Scour axis N. 36° E in Bdd
Aff bdd = N. 32°W 14°N.

O.K.!! After EXTENSIVE Reconnaissance, the last page of the 6/10/89 work (Beds (54-59) were totally mislocated and one indeed will UPSECTION from bed (53)

My plan is to start from (53) measure/more across drainage to North to ridge @ MV-29, then measure/more across E-W drainage to north to ridge adjacent/east of MV-18 (wall outcrop along curve) measure along side-washes — there is a "pyroclastic flow" looking deposit that can be traced laterally around nose —

to ridge where "bed 59" outcrops, but "this" P.C. flow" is below 59 — strata — measure up through "59" to ridge SE of MV-26,

then piece rest of section together from Curve overlook up into axis of syncline

MV-30 PALEOCURRENT Scour Axis @ N. 85°E in bdd
N. 38°W in bdd

6/15/18 Thursday / work with Dan
Parked on Getsteo Road
finishing top of Curve Section

MV-31 new K6098
rubbly outcrops, poorly exposed, not pedogenic gravels, looks like could be lava flow?

MV-31 "lower Tuff/Flow"
At Bdl: N 13°W, 9°NE.

Avg (4)
MAX (25)

58

(57) poorly exposed debris flow

Debris flow, massive, poor sort
(54) max (25) Avg (10) clast lithology = SOS
sub Δ to sub rnd.

Paleocurrent Scour Axis: N. 75°W in bdl

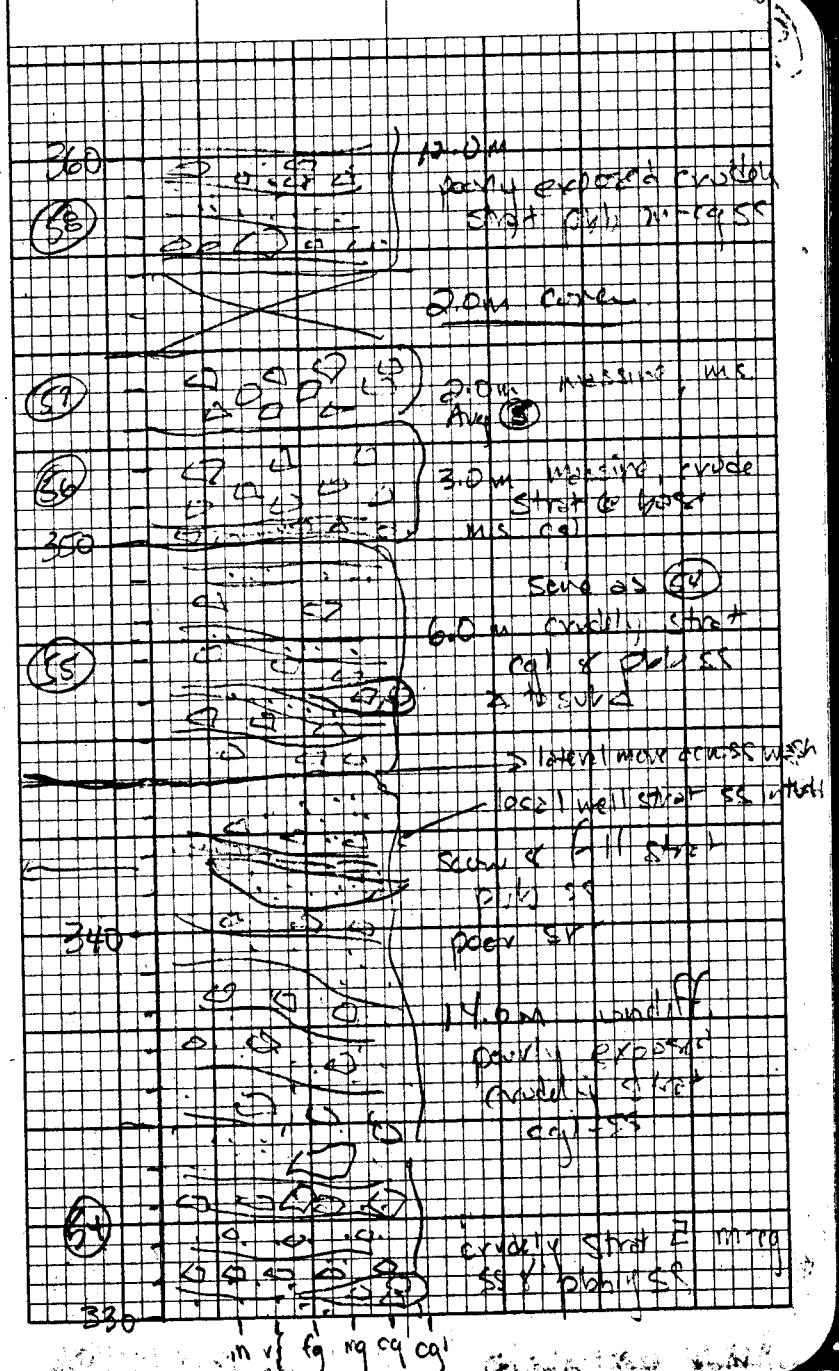
Dom. clast SAMPLE ST-CC-54-1

Avg (4)

Clast composition SOS
plag-amph grey volc.

max (60)
Avg (5)
max (25)

(54) Poorly exposed, crudely stat m-cg SS, poorly SS x localized cgl, MAX (10) Avg (3)
lt & drk grey volc clasts, sub Δ - sub rnd



(60) massive, m.s. cgl, P.C., max (40) Avg (8), poorly srt, crudely strat @ top poorly exposed

LATERAL MOVE

Can Trace (59) laterally to MU-32, with SAMPLES ST-CC-59-5 = (59) with carbon

(59) - laterally variable in thickness, locally only ash present

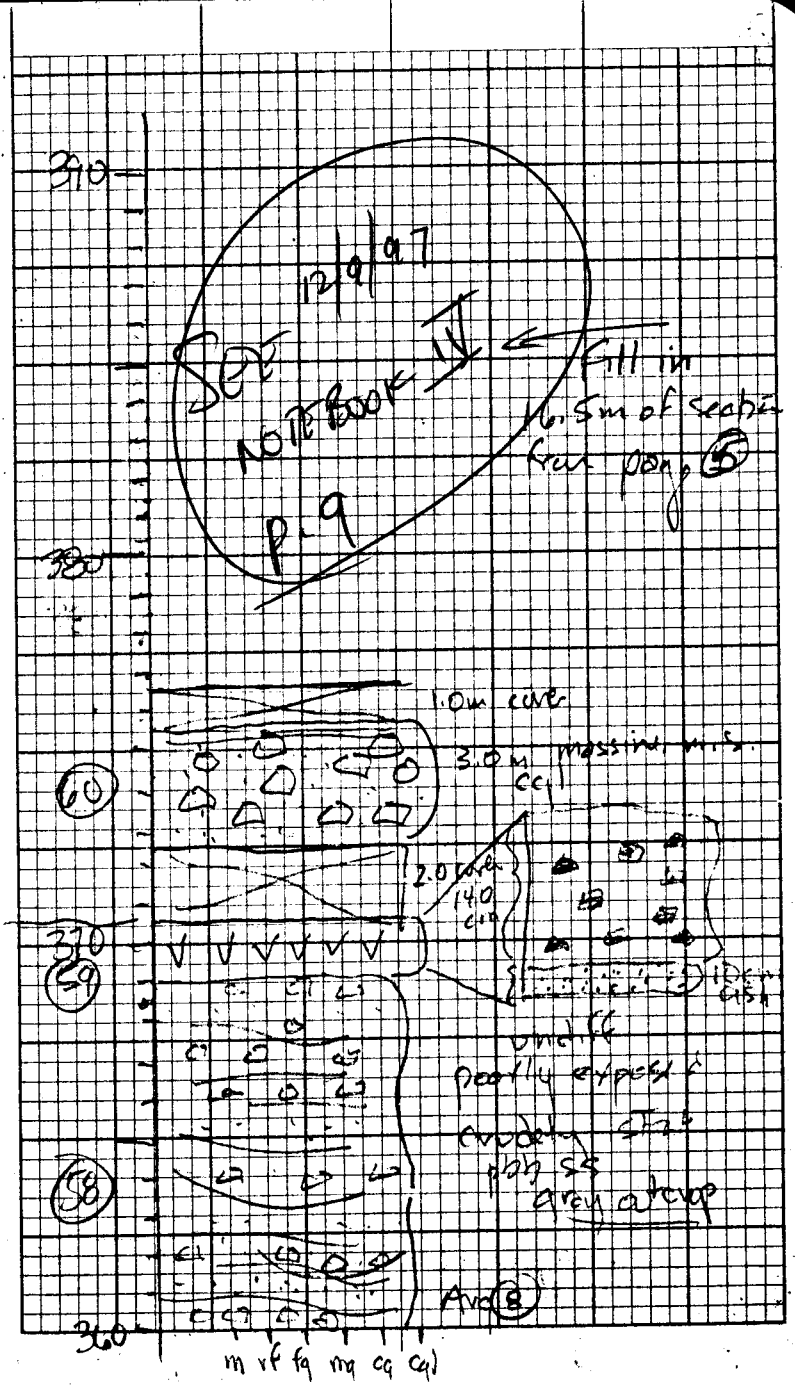
ST-CC-59-3,4 = "pc. flow with oxidized woody debris"

Pink indurated, hackly exposure

Sample ST-CC-59-1 = basal ash

ST-CC-59-2 overlying "flow".

(59) volcanic interbed - air fall tuff overlain by 140cm (10cm) "pc. flow" - massive with lt. gray vc clasts (20) Avg (5) floating in pink indurated matrix



(10)

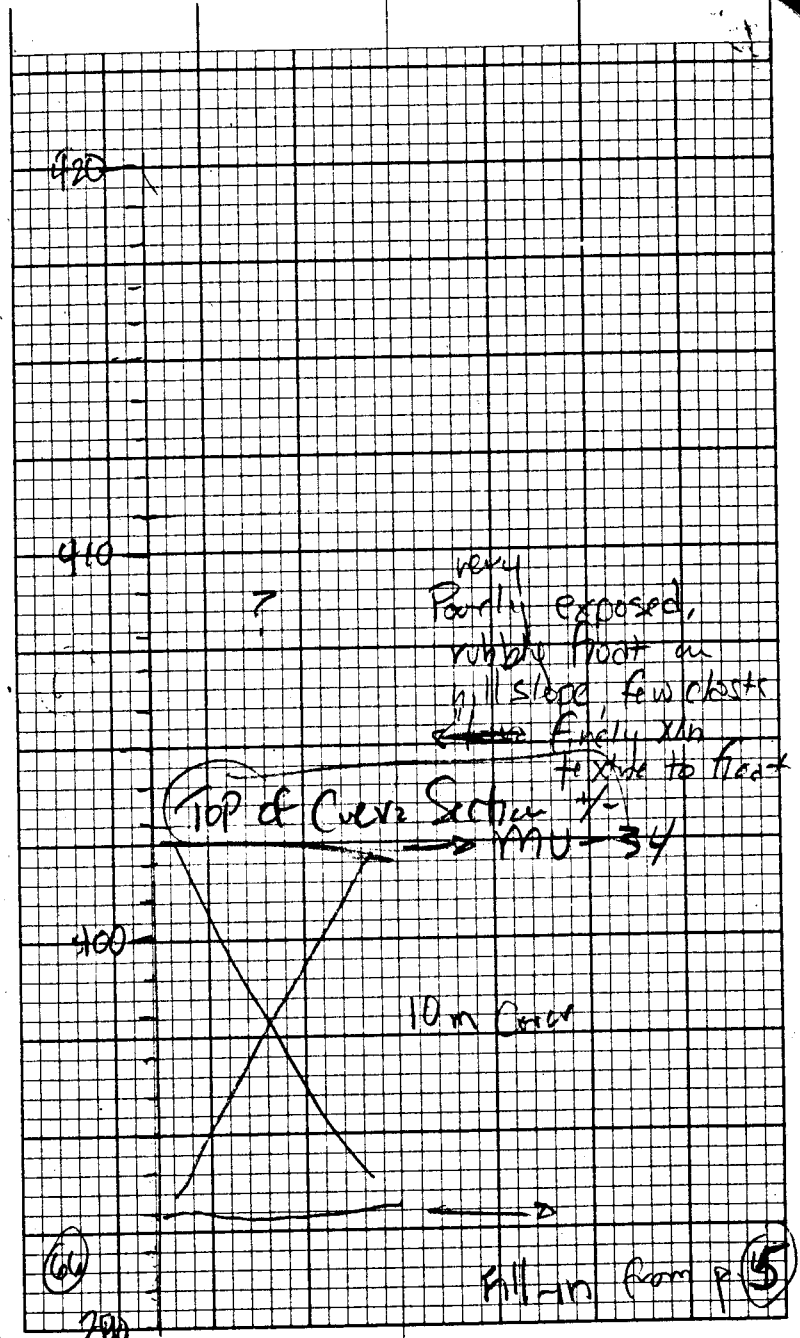
MV-33 Att Bdd: N55°W 7NE
Scow Axis: N. 35W forest's dip to SE

MV-34

LAVA Flow?? Poorly exposed
rubbly hillslope
Float Sample ST-CC ~~67~~ MV-34

Dike intrusive exposed poorly
@ ridge top

Sample ST-CC-66 ~ 2 p.c. Flow??
(66) is @ top of ledge-forming intrusion
in canyon to NE of map pt 66.



(11)

6/15/89 Recon with Gary

MV-35 - Dike Sample

(12)

6/20/89 Recon with Don in Calisteo – Espinoso Transition zone MV-36

major fault ~ N. 26°E separating Calisteo to SW from Espinoso to NE.

MV-37 S&D of Espinoso fm immed. East of fault N85 E. 25°SW

poorly exposed crudely stat with intbdd debris flows

MV-38 N. 39°W 7° NE.

Good prominent debris flow trace laterally along hillslope to NE.

Following contact along hillside, follow prominent debris flow to NE along with yellow pebbles of Calisteo → section between thickens & thins until pebbles cut out by espinoso below debris flow

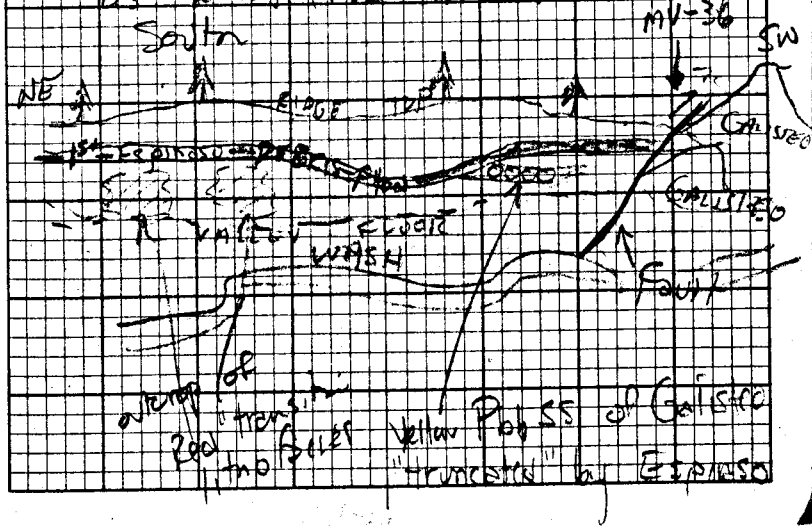
MV-40 SS – Sample Transition Zone??

well sorted, xbdd ss with accessory Espinoso clast (30cm diam) mostly red ss with vole component. In valley center = Fault Breccia??

ST-MV-40-1, 2

Att Bdd @ MV-40 = N. 50W 7°NE

Schematic Section along E-NE ridge in vicinity of MV-39 as seen from MV-40 looking South



MU-41 Paleocurrent + scour axis
N. 61°W. in bdd.
Bdd Att N. 85°E 15°N

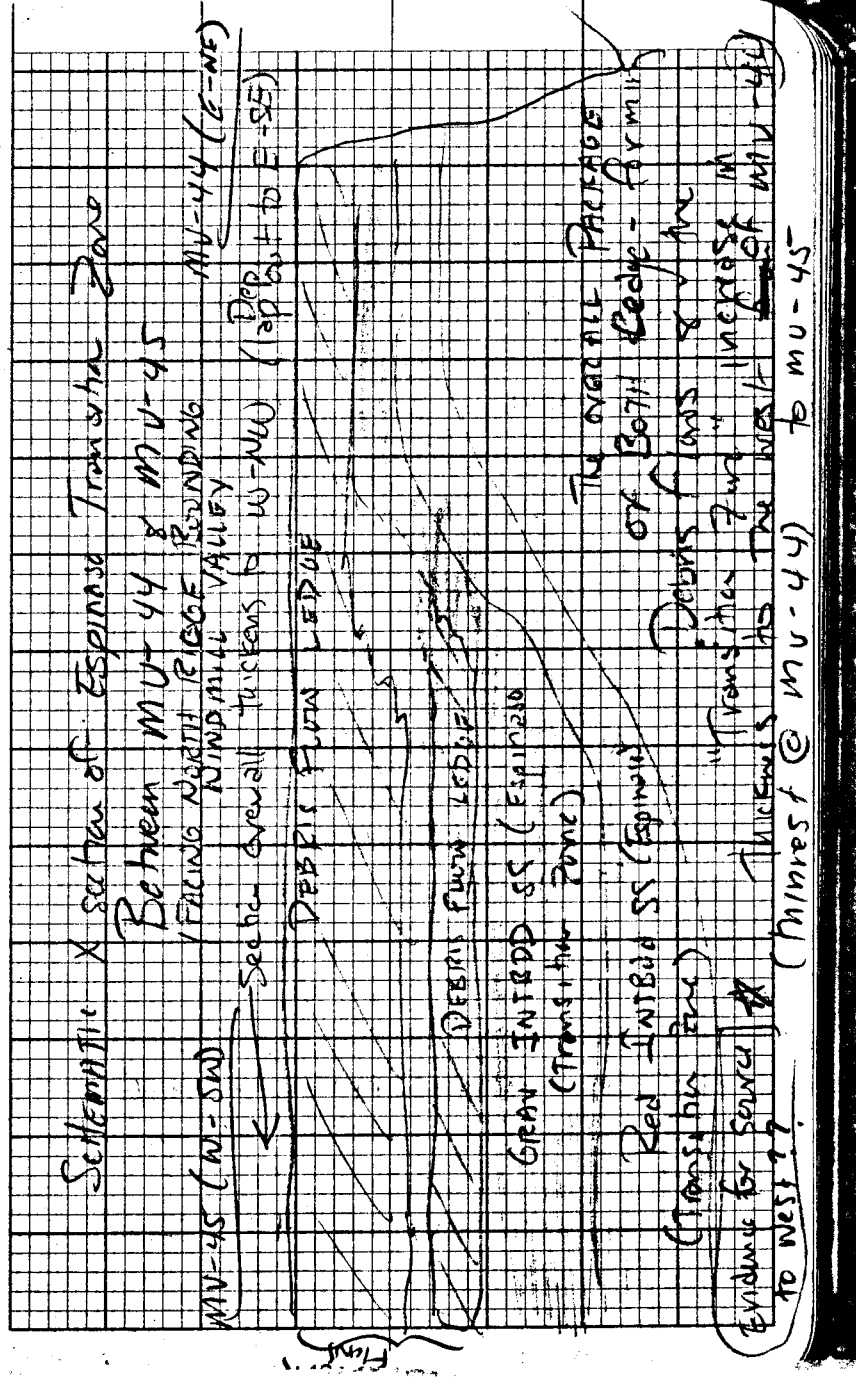
MU-42 Fault Contact Espinaso/Espinoso

Bdd to west side N. 50°E 20°NW
Bdd to East N. 75°W 11°NE.

Samples @ MU-43 from
Large intrusive
ST-MU-43-1

Measure Transition Zone —
Espinoso Section @ ≈ MU-45

Can trace ledge former over to
MU-44 → measure transition
zone plus section up draw
to the North "Windmill Valley
Section"


Schematic X Section of Espinoso Transition Zone
Between MU-44 & MU-45
(Facing North Ridge Bounding
Windmill Valley
Section overall thickens to W-NW)

The overall Package
of Both Ledge-forming
Debris flows & the
"Transition Zone" increase in
thickness to the West of MU-44
(thinnest @ MU-44) to MU-45

Evidence for source
to West ??

(14) 1497 1155 0850 1005

6/27/89 Tuesday

Finish Recon. Along Windmill Valley Start with leucocratic Dike zone excluyd by Gary & Myself, will try to continue track of "brown marker" bed across that side drainage — tie in to Windmill Valley Section from Canyon de la Cuevs

Dike
Orientation Leucocratic Dike —
N. 66°E. = MV-46 —
Sampled by Gary — Get sample No. 1 & resumbers to ST-MV-46
Dike mapped in →

10 x 1.65 m = 16.5m (cos 15°) = 16.5m (0.97) =
= 16m + 24m = approximately 40 m

≈40m of section between top of D.F. ledgeformer @ North side of windmill valley and base of "brown marker horizon" that ties into cc section

Measured 40m between MV-47 & MV-48,

FAULT N. 45°E. Immediately West of MV-48 in drainage, up to east small scale, on order of several m of displacement

MV-48 marks brown marker horizon traced by Gary & Myself on 6/15/89 includes interbed of laminated, bedded horizon that we picked up

My feelings are that from upper reaches of windmill Valley to canyon de la Cuevs (near MV-44) Section (to west/NW) the whole section thickens with lap out to East — seems that thickness between markers & that Debris flows become more abundant with ? no.

Transition Zone in MV also ? to west along the North Slope of valley

Strike + Dip @ MU-49 = N. 57°W 17 N.

Short Section Measured from MU-49

(15) Through the Golistero-Espinoso "volcaniclastic" sandy transition facies

REFER TO THIS AS "MU-49 Section"

Best exposure on North side of windmill valley to examine transition facies, will be able to trace laterally to Windmill Valley section where intrusive

(REF) NOTES CONTINUED ON Next PAGE →

Clast Samples ST-mu49-5-1, 2

Cover Axis: N. 75°W, in bdd

(5) Crudely strat Cgl ss, m+vcg sandy matrix, clasts = grey volc., max (10) Avg (4) Channel Fcg

SS Samples ST-mu49-4-1, 2, 3) Definite horizons of volc clasts

SS comp. = mixed arkosic & volc. clasts

(4) Flaggy ss, flat to low x bdd, poorly to mod well sort, thinly bdd (10-30 cm), with horizons of vcg pebss, vf-mgss, thin mud drapes

(3) Reddish ss, f-vcg, locally pbbly, poor sort, mod well strat'd, poorly exposed. volc clasts → zeolite, & mudst rip ups locally well sort, mcg ss, strat'd poor sort

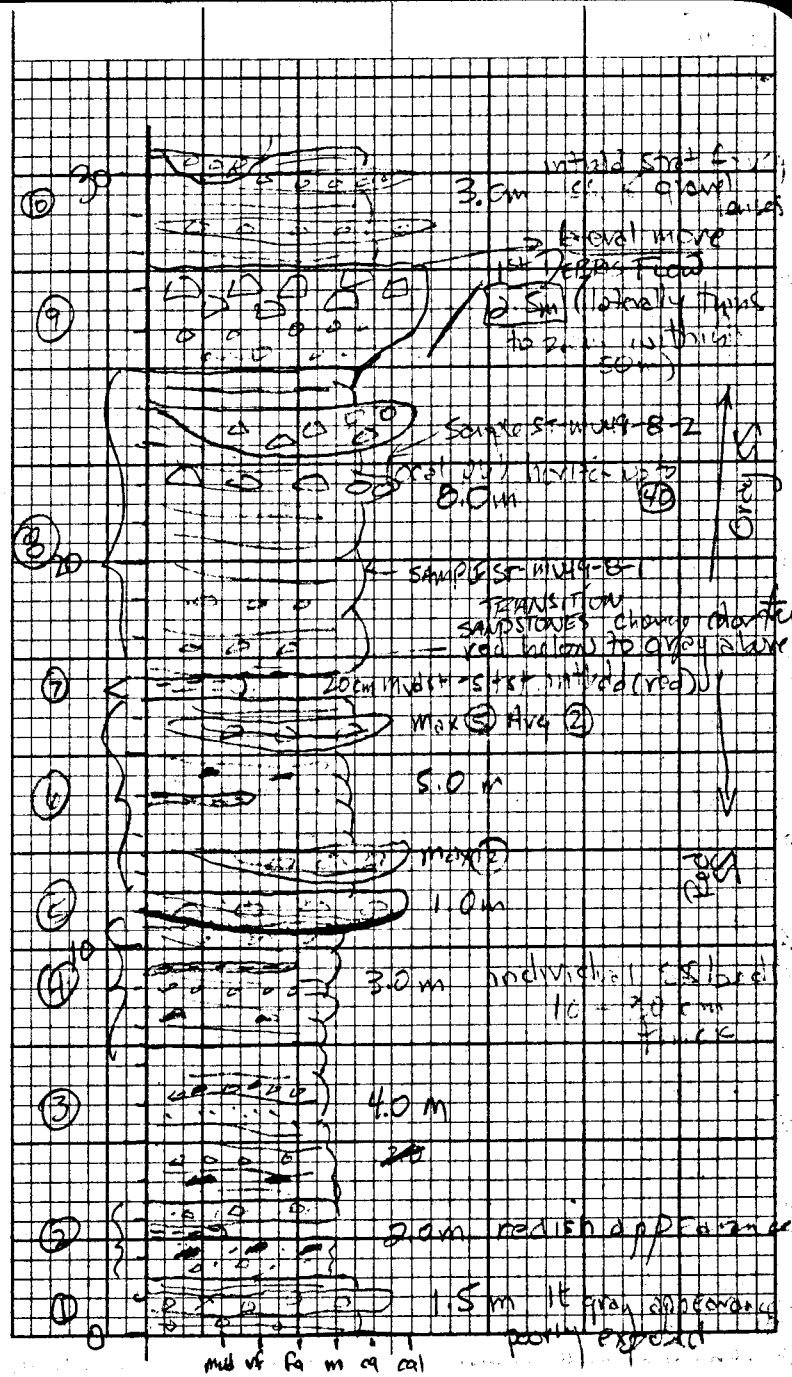
(2) SAMPLE ST-mu49-2-1 f-mcg ss with red mudst rip-ups, & thin mudst int bdd, thin strat, thin laminated, "shaly" appearance

SAMPLE ST-mu49-1-1

def volc. component, no signs of zeolite clasts composed of weathered volc & red mud chips

(1) poorly exposed, m-vcg, sl. pbb ss, zeolitic

crude horiz. strat'd, sandy, poor sit.



(16) Scour & fill channels in bed (6) show trough x-strat Scour Axis = N. 30°W. N. 1°W.

(12) Reverse from crude normal grading massive m.s. cgl/breccia clasts = 2 max (10) lt gray vole lith. Avg (30)

(11) intbdd m.s. cgl & strat g-m vcg ss, lt gray, hmb vole clast dom, note crude reverse grad

Scour Axis: N 60°W.

(12) intbdd strat gray, m-vcg ss & pebble ss, with localized lenses of gravel fill - clasts up to (30) massive to crude strat, lt grey hmb vole clasts channel-fill deposits

Dom. Clast sources

Good 2 sm mts (Hor clasts) d.f., ST-MU49-9-1,2 (dom hmb-vole

ST-MU49-9-4 = hor clast

(4) Dennis Peak - reverse graded max clasts (10) to (30) = (30) max (6) best = (8) massive, massive sandstone

SS Samples ST-MU49-8-1,2 (Clast SAMPLE ST-MU49-8-3)

clasts dom. by vole lithologies

Gregs, mod well strat, horiz to lows, local scour & fill, channel lags,

(8) grains f-vcg locally pebbly, mod scour intbdd 30-50 cm thick

(7) Thin muds-silts intbdd compare to tuffs upsection?

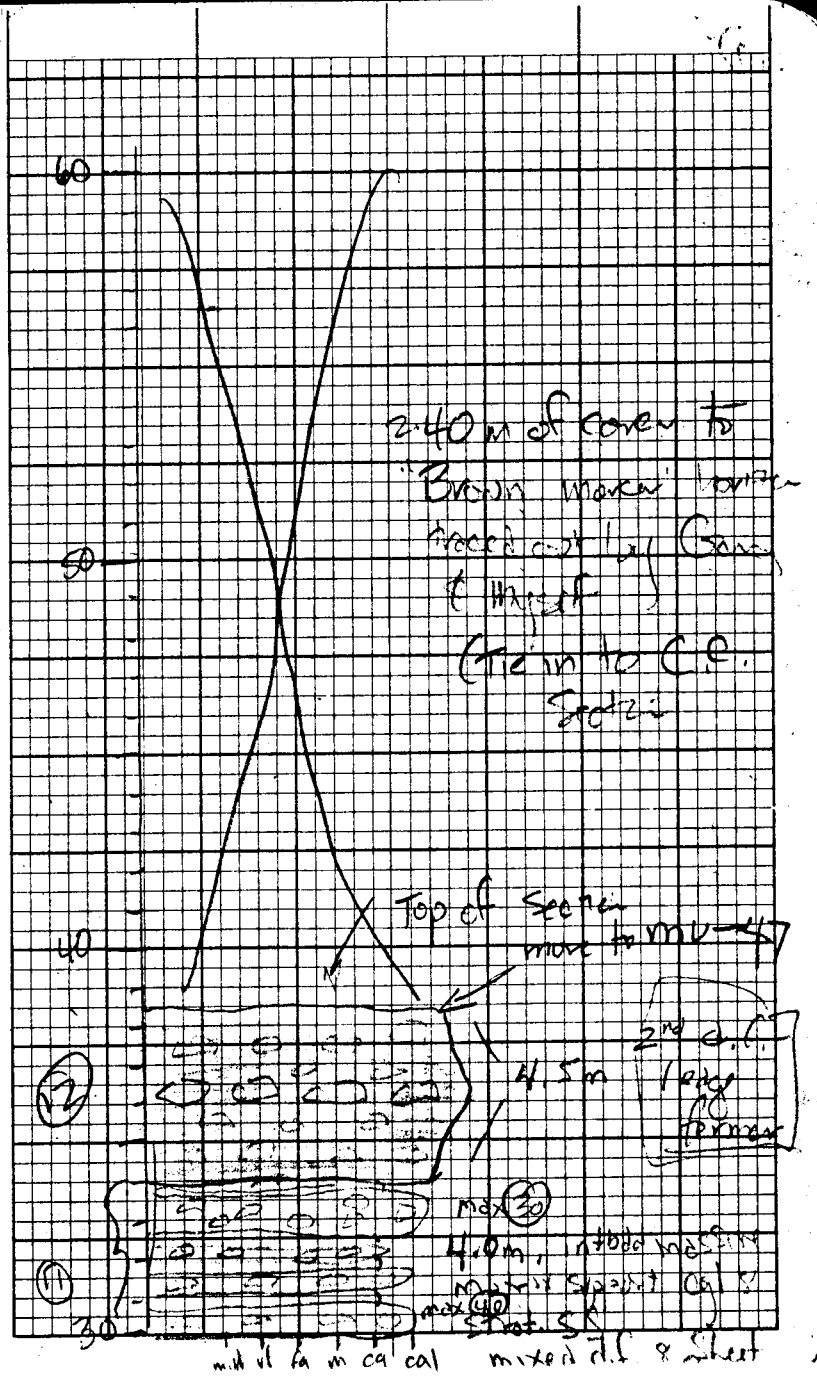
vole & qtz NOTE, Yellow qtz pebs

Clasts Sample ST-MU49-6-1, SS Sample ST-MU49-6-2

Scour Axis: (1) N. 52°W, (2) N. 62°W

AH Bdd: N 70°E 11°N (3) N. 50°W.

(6) Thin-med bdd vcd SS, intbdd 10-40 cm thick, local channel lag cgl SS, m-vcg SS, horiz-low & strat, clasts dominant vole & qtz pebs



(17)

Misc. Paleocurrent Data

Screw Axis in Gray SS -

Axis of MV49 sediment transition : N. 52° W,

To West Debris Flow MV49-9 locally thickens to 4m

Recon East down wind mill Valley

Pt. MV-50 - laterally traceny

Bed MV49-9 (1st debris flow) thining to the east @ MV-50

bed (9) is now 1.4m thick with max clast = (16) Avg (5)

still cryde reverse grade

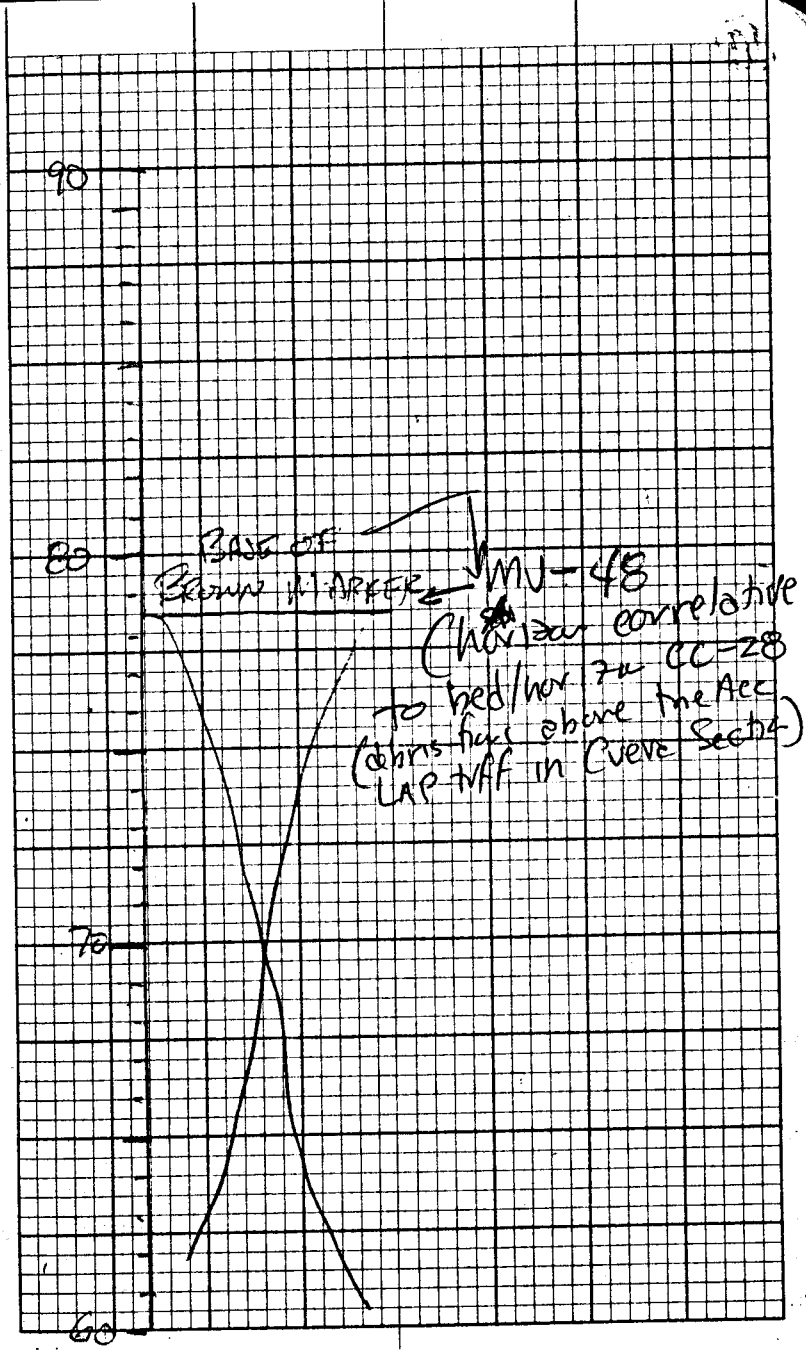
(grade transitions still above & below)

MV-51 Bed MV49-9 still 1.4m thick Max = (12)

Big Debris flow (12) thins to about 2.5 m here is curving in & out.

(a top) I think of (of debris lobe morphology) in canyon adjacent to MV-51, can see d.f. (12) thin - primary morphology. Neat

Bed (9) is now 1.5m thick



(18)

MV-52 Bed (12) ≈ 2.0 m thick
Max clast ≈ (20)
Bed (9) still locatable here

They are 2 prominent d.f. beds up section from Bed (12) here (@ MV-52) that are good candidates for the "Brown Marker Bed" (à la Gary & Steve) although considerably less section in between the 2 beds than here (Brown marker Bed (12) thick is)

MV-53 Gray transition SS between Red SS and Bed (9) ≈ 9.0 m, (same as at MV-44)
Bed (9) is ≈ 80 cm thick max = (8)
Still crude reverse graded
gray transition SS (bed (10)) is ≈ 1.0 m thick here before into d.f. interbedded of beds 11-12 complex whole pkg is thinner here (to east)

MV-54 Gray transition between Red transition & bed (10) is d.f. thinner here ≈ 3 m

Rock Cairn with Flag
just west on hill slope above Red transition SS, adjacent to MV-44 → flag sits on top of bed MV49-(9)"
near MV-44 — Bed (9) is 260 cm thick, max clast = (3), massive, mis., crude reverse

Topped Climb
To Beginning of Windmill Valley Section Bed MV49-(12) is debris flow (clast) Conglom (c. thickness of Conglom) Bed (11) exists below but it is ≈ 50 cm thick

(19)
6/28/89 (wed.)

P.C. Data Scour Axis in Red Transition Facies near MU-44
Scour N. 22°W Bdd: N. 85°E/7°N
(location in mid portion of ridge facing windmill Valley, west of MU-44
Scours N. 30°W, N55°W.
N. 23°E.

Begin Measuring MU-44 Section
~~Valley Section~~,

Starting somewhere in the Red Transition SS Intofacies

(20)

MV-44 Section

samples ~~to~~

renumber a MV44 Designation (not WMV)

↓

⑩ crude reverse graded m.s. eq l/d.f., ~~2~~ dist. EQUIV. TO Bed MV49-12

~~Scour Axis: N 50 W,~~

~~Channel eq of ~~1~~ channel-fill deposits~~

~~Scour Axis: N 17 W~~ DISTAL EQUIV TO MV49-11!!

Clast sample ~~ST-MV44-9-1~~

⑨ Intbdd thin dbrs flows, scour & fill phs m-vcgss & flat bdd SS (thin intbdd ≤ 20cm thick)

Max Clast (30), D.F. ~20cm thick

⑧ mass m.s. eq l, debris flow over reverse grading.

~~DISTAL~~ EQUIVALENT TO BED MV49-9 clasts & to sub rnd, hmr-volc clast litn.

⑤ more of scour thin pebbly stringers in ~~SS~~

④ outcrop color = ~~e~~ given SS, volc. SS

SS Sample ST-MV44-4-1

SS sample ST-MV44-2-1

SS intbdd ~30cm thick max (15)

② Flat bdd SS, f.m eq SS, intbdd with local volc-clast / granul-clast ± to sub rnd

Scour Axis: N. 45 W.

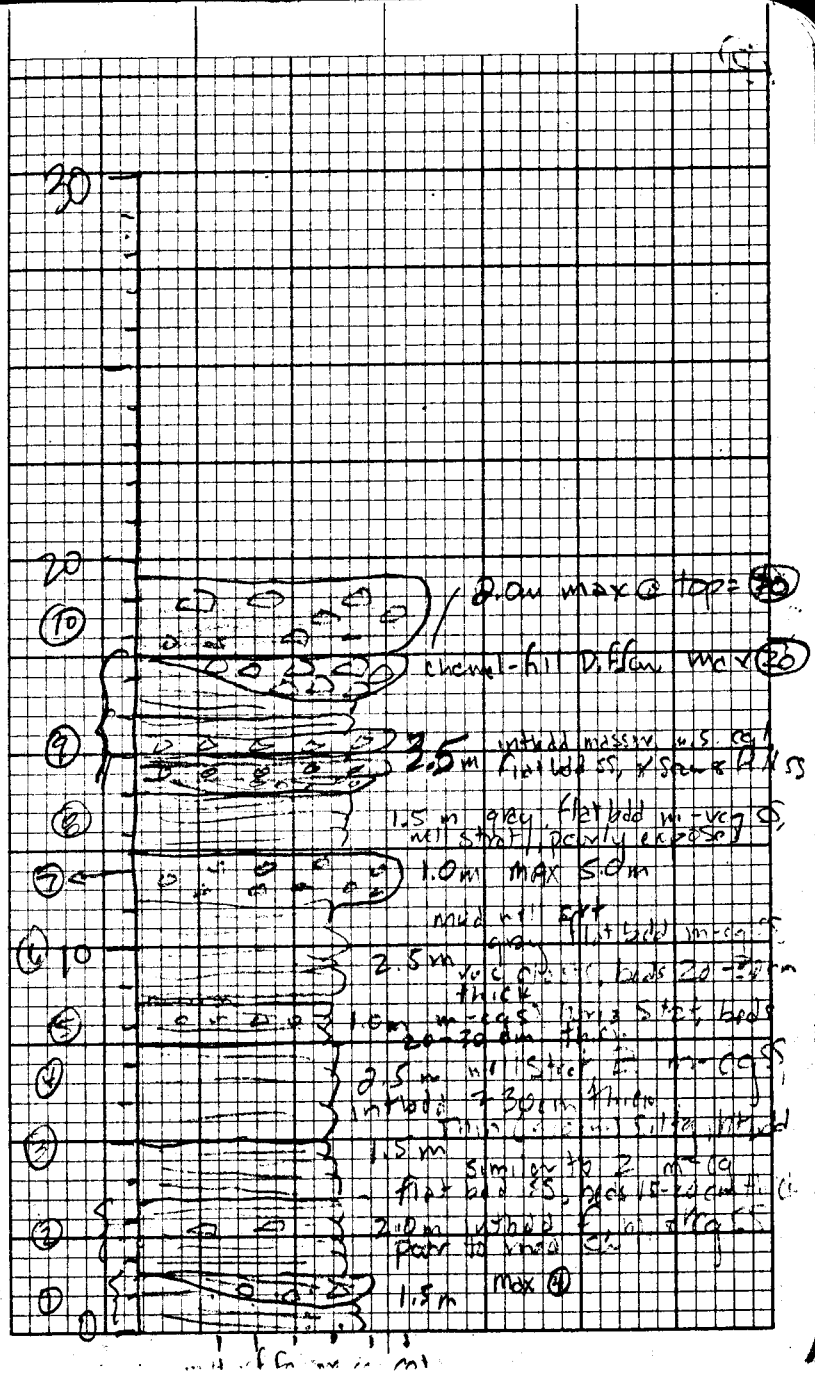
clast sample ST-MV44-1-2

SS sample ST-MV44-1-1

poss. exposed weathered lithic clasts = gray hmr volc - plagioclase, volc. - sedi

① Red trans. hr SS intbdd, poss. med. SS

f-vcg SS & pbly SS, lenses & bdd. pbly-SS log in scours



(23)

Problem #1: The drive along the windmill Valley Section may have a fault running through it. Can correlate through facies #1 along ridge from MV-45 to MV-44 but hill crossing the Section drainage, then finds mismatch of facies

1st MV-55 Strike & Dip = N60°W 18°N

Scour Axis N. 35°W

MV-56 Yes there is a fault running up this valley, discordant, fractured bedding noted here with calcite coatings visible, + find facies mismatches between MV-44 & MV-55 across mouth of canyon

Unknown displacement makes correlation of CC & proposed MMV section impossible

MV-57

Scour Axis N 1°W.

All Bdd N 76°E 17 N.

(24)

6/30/89 FRIDAY

CONTINUE RECON./Sectn Measurn in Windmill Valley
Trying to figure out structure & nature of contact between Gallisteo & Espinaso
Also determining if "Windmill Valley Sectn" should be measured - It will not be directly tied in to Canyon de los Cuevas Sectn

The Yellow Pbb SS - Gallisteo Fm is a very locally preserved occurrence on South side of Windmill Valley. It's outcrop is not structurally controlled as Espinaso Overlying can be traced continuously across top of Yellow Pbb SS, laterally the Yellow Pbb SS passes (with vague relations, poor exposure) into the Red Transition SS below Espinaso.

MV-58 - outcrop of "green to feldspathic" gallisteo(?) SS

Sample ST-MV-58-1 Gallisteo Fm
Att Bdd: N. 22°E 4°N
P.C.A.: Mean Forests: N. 75°E 22°N (north directed)

Gallisteo Fm exposed in this valley looks in part Aeolian (high sphet & well sorted)

Yellow Pbb SS outcrops along this intravalley ridge (@ MV-58)

outcrop of Yellow Pbb SS near windmill in central Valley is NOT Displaced relative to Yellow Pbb SS on South Rim of Valley
The fault bounding the block of Gallisteo apparently lie on (vertical fault) BLOCK)

(25)

Atl Rdg in Red SS transition about
Galisteo N. 72° E 15° N.
* N. 59° E 14° N.

SECTION Measure @ MU-59
up through Galisteo Arkosic -
Vallecitos Pbb SS to Red SS transition Zone into
Espinaso → Poorly Exposed but less
than is offered, correlatable, to
MU49 Section (which better documents
Red & Gray Transition Facies)

Next Page

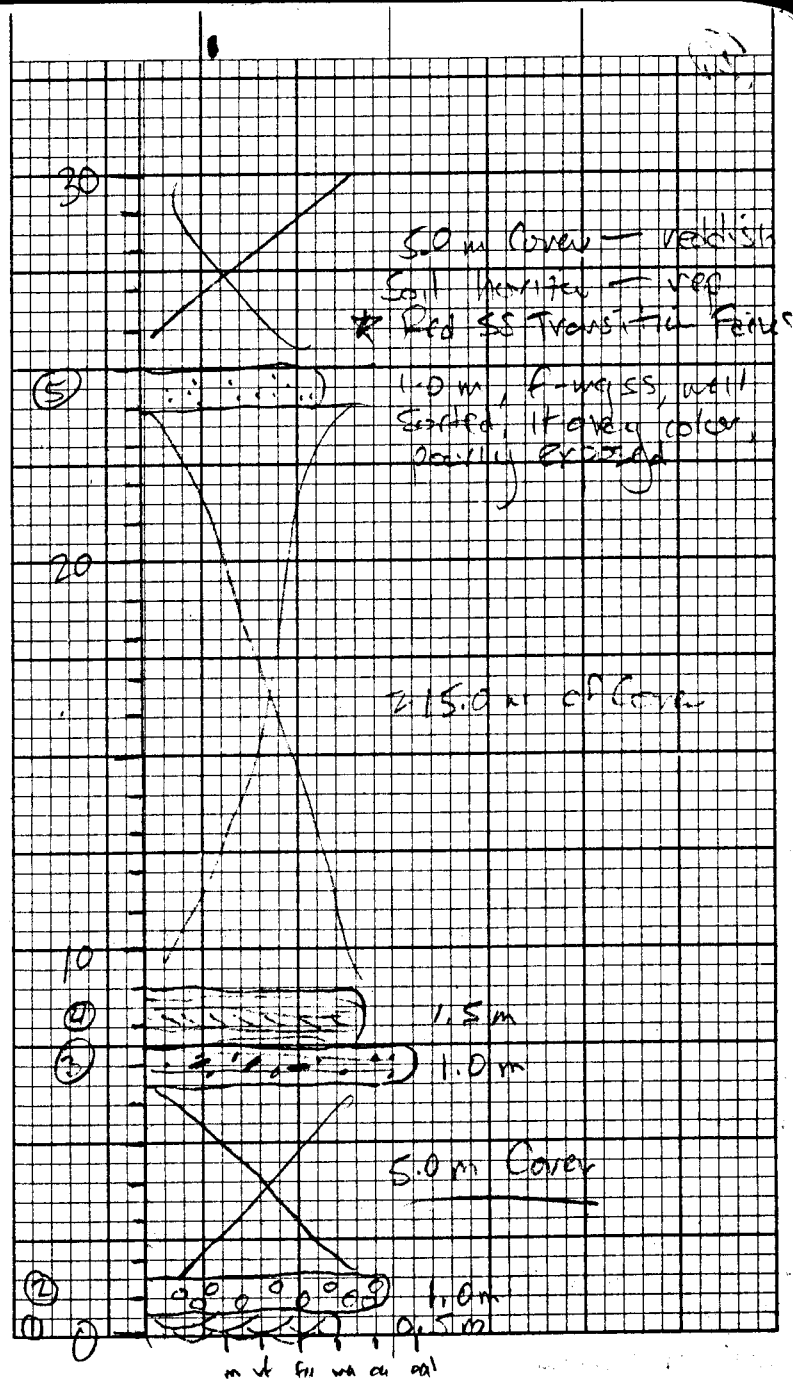
(5) Sample ST-mv59-5-1

(4) Flat to planar xbdd, mg SS, well sorted
Sample ST-mv59-4-1
~~SAMPLE ST-MV59-3-1~~

(3) Vfg, horizontally strat SS, red mud chips
& ~~[illegible]~~ and feldspar predom, quartzose
Pbb Sample ST-mv59-2-1, petrified wood

(2) Highly weathered Yellow Pbb SS (Galisteo)
well rnd pbb, gravelly appearance in outcrop
~~SAMPLE ST-MV59-1-1~~
PALEOCURRENT: Trough Axis N. 15° E To North

(1) Base of section Not Exposed, well sorted
mg trough xstrat SS Arkosic, ltgray
GALISTEO ~~Fruitland~~



(27)

See MU49 Section

EQUIVALENT OF MU49-9

Matrix supported cg, maroon top = (20)

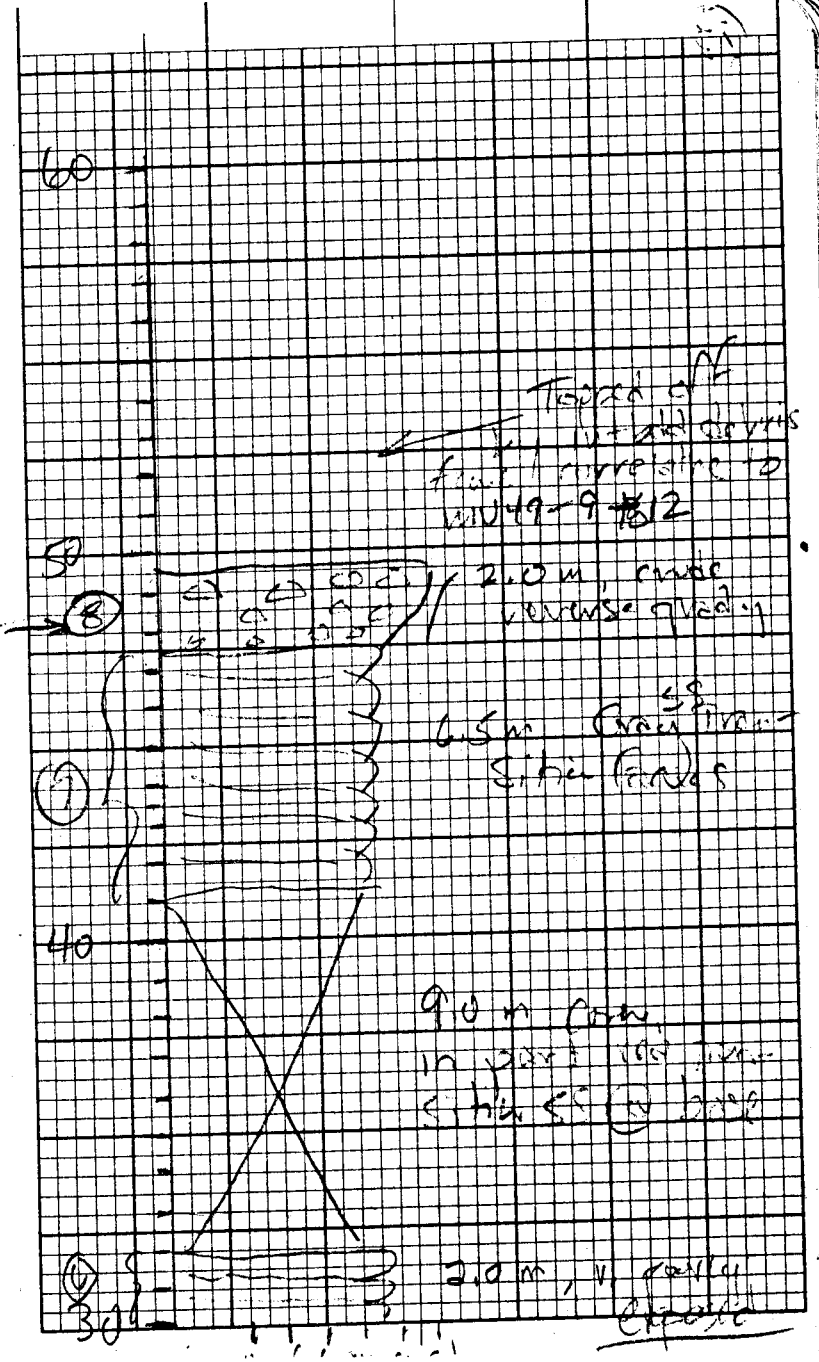
(8) 1st appearance Dakus Flat correlative to Red MU49-9 in the MU49 Section → Good Tie IN!!

SAMPLE ST-MU59-7-1

(7) Granite Transition facies, poorly exposed crudely stratified, m-vcg, ill-defined espinazo volcanic clasts

SAMPLE ST- MU59-6-1,2

(6) V. poorly exposed Redss Transition Flat strat (beds ≈ 10-20cm thick) m-cg ss



(28)

Partial Section Through Colistco-Espinoso TRANSITION measured @ MU-60 (site of Yellow Pbb SS on to south side of windmill Valley, where Gary, Dan & I first took a look at it)

Point of section near fault trace?
Area highly jointed, fractured, faulted, Nature of Ind-Sthd SS-Esp contact??
Espinoso Dkons fm, matrix supported,
① clast: grey lmbl volc, ⅔

⑥ m-vcg wel trough SS, poorly exposed Sample ST-MU60-6-1

⑤ poorly exposed silty mudst, lt gray

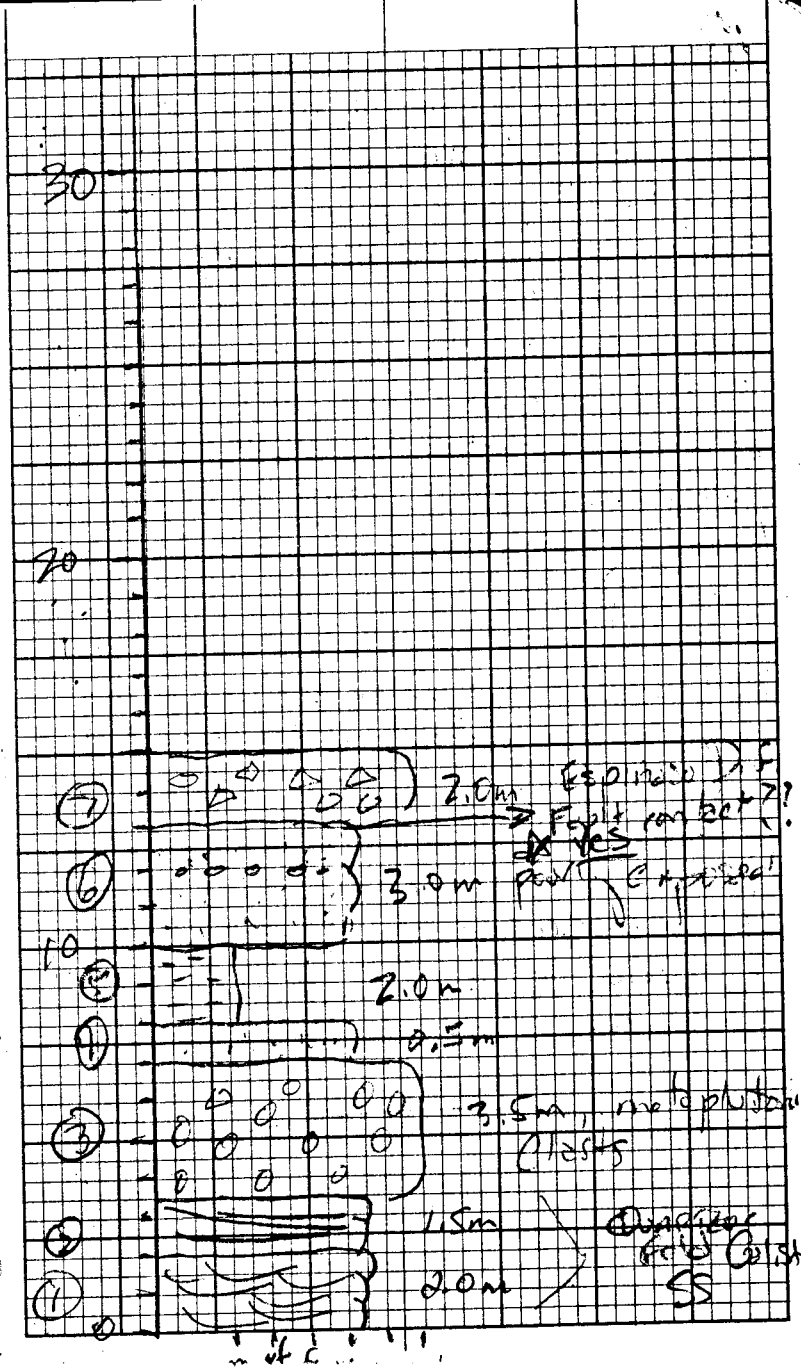
Sample ST-MU60-5-1

④ poorly exposed mg gwackose SS (Colistco?)

③ Correlative to MU49-2 (see that sample) Yellow pbb SS, poorly exposed/indurated, well rnd pbb clast silt Avg ②-①
Petrified Wood

② 1.5m low ⅔ strat m-cg SS well sorted
S.S. SAMPLE ST-MV60-2-1

① m-cg trough X strat SS, well sorted
Correlate to MV59-1



(29)
9/1/89 (Sat.)
Start measuring "Windmill Valley Section"
beginning @ MU-40 in Espinoso
transition SS across draw to MU-55
(beds Equivalent to MU49-~~89~~ to
MU49 bz (I believe) are missing
here due to modern surface erosion)
So first debris (after cover) will
be above/upsection of MU49-9
pkg (which forms prominent ledge
forming along north side of windmill
Valley)

Will measure up WMV section, along
draw to north, on the right
side & fault in that valley

Can approximate relationship
of WMV section to MU49 section
& hence to Canyon de la Cueva
Section

(30) WINDMILL Valley Section (WMV)

Clast sample - grey hmb-volc ST-WMV-4-1

★SS sample ST-WMV-4-2

(4) 4.5m of strat m-cg pbb ss, crudely strat fine ss & massive pebbly ss, somewhat poorly exposed, but some thin massive beds) may actually be debris flows much more coarser grained & crudely strat than grey ss- transition facies

(3) Crudely strat pebbly ss, m-cg ss, lt grey hmb-volc clasts & subrd

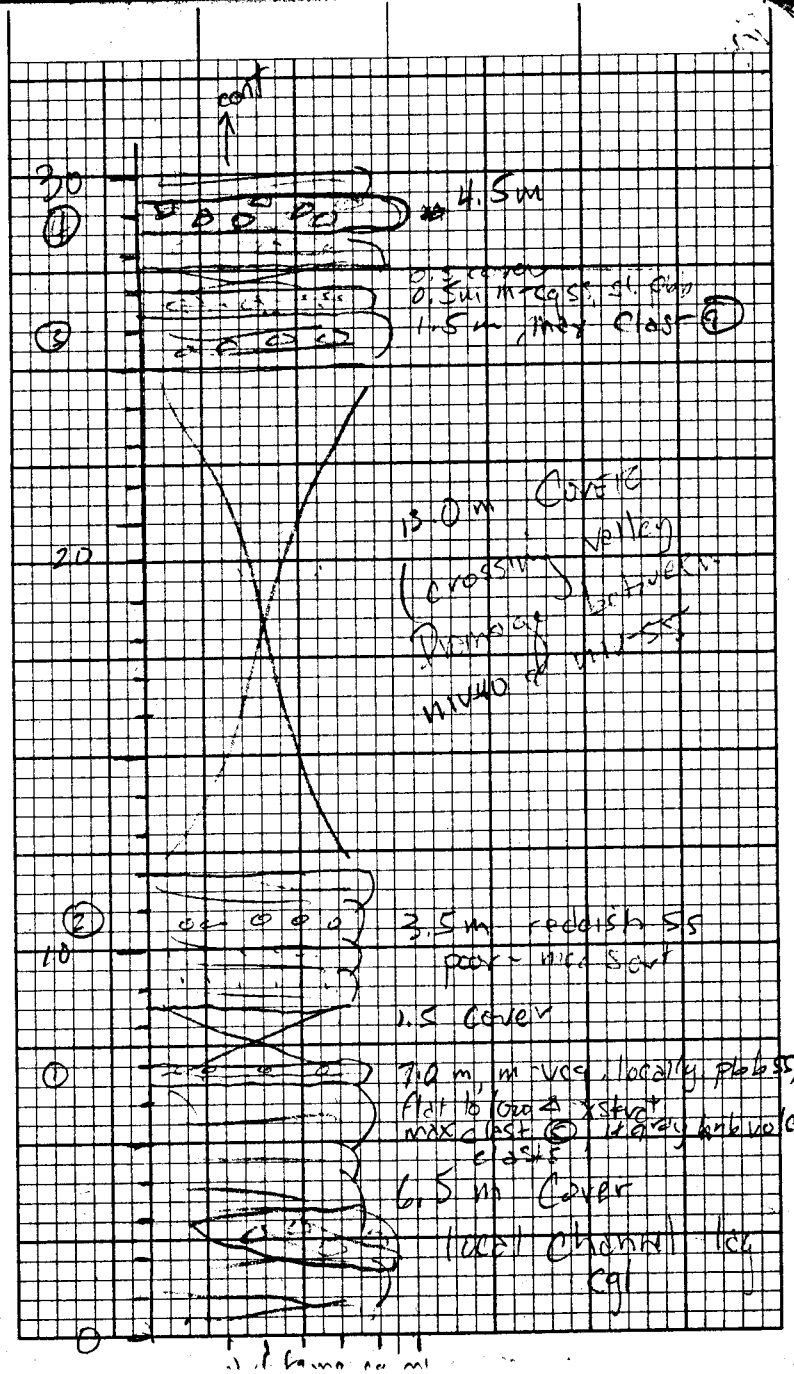
It's my guess that this covered interval is approximately correlated to the MU49-9 to MU49-12 portion of section (relative to MU49 Section)

Espresso TRANSITION SS Facies

AH Bdg N. 47°W 10°N.

★ SS Sample ST-WMV-2-1

(2) Horiz. strat m-cg ss, locally vcg & pbb stringers, beds 20-30 cm thick, contains lt grey hmb-volc (Espresso ?) thin (<5cm) vfg ss-slt layers, clasts subrd



(31)

Clast Sample ST-WMV-12-1 (lt grey volc)

(12) intbdd massive to crudely strat m.s. cgl, pbbss & m-vcg pbbss, poorly sorted clasts & to subrd perhaps fm fl debris flows

(11) massive, m.s. cgl — d.f., lt grey hnb-volc clasts Avg (3) (channel fl cgl)

(10) intbdd thin m.s. cgl, d.f., channel-fill cgl & strat m-vcg pbbly SS, poor sort

(9) reverse graded d.f.

(8) m.s., massive cgl, debris flow

7 & 8 = Amalgamated Boulder-rich debris flows

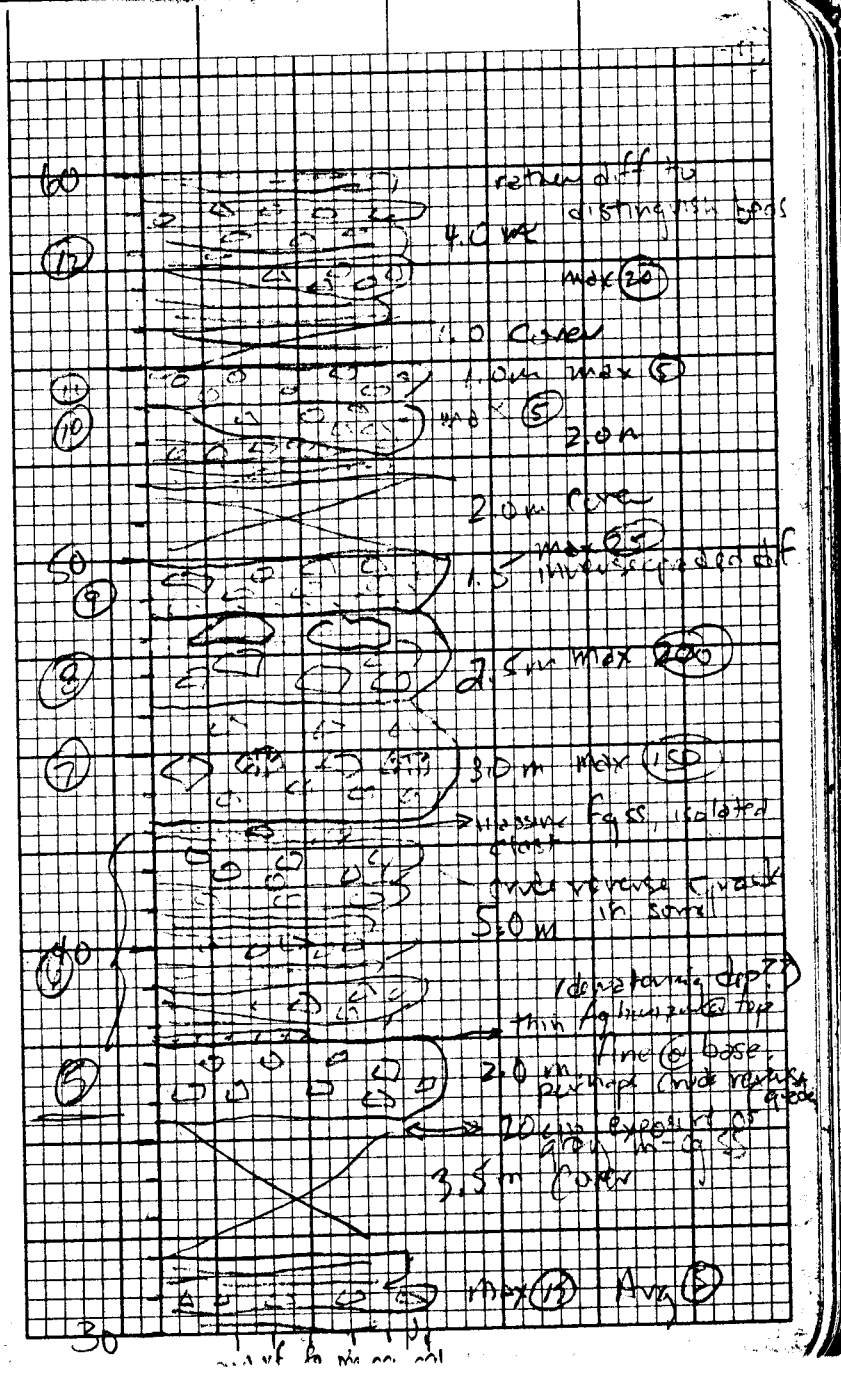
← in FIG ST-WMV-7-1 clast with red strat

(7) Boulder-rich debris flow, m.s. cgl, mod dev. clast cooling structure on exposed, poor sort, lt grey hnb-volc dom. max clast concentrated near center of flow

(6) intbdd crude strat m-cg SS & pbb crudely strat m.s. cgl, & channel-fill debris flow, Top = massive m.s. cgl (d.f.), clasts & subrd comp. lithology, reverse flow and clast

(5) 1st Good Espinoso debris flow, clasts & subrd m.s. supported, clasts lt grey hnb-plag volc, max (15)

some of massive pbly SS may be ← some of fill



(32)

(22) intbdd massive m.s. cgl, & crudely strat pbbss mdi/vcl debris flows not readily defineable order of 50-80 cm inside grey hnb-volc clast lithologies

(21) massive cgl, thin debris flow max (30)

(20) poorly exposed, massive m.s. cgl, poor cont max (95) probable amalgamated debris flows clasts & to subrd

poor strt SS sample ST-NMV-19-2

drk grey volc clast sample ST-NMV-19-1

(19) intbdd thin debris flows & crudely strat cgl ss & m-vcg ss poorly sorted lt & drk grey volc clasts

(18) massive m.s. (cgl), crude reverse grading max (18)

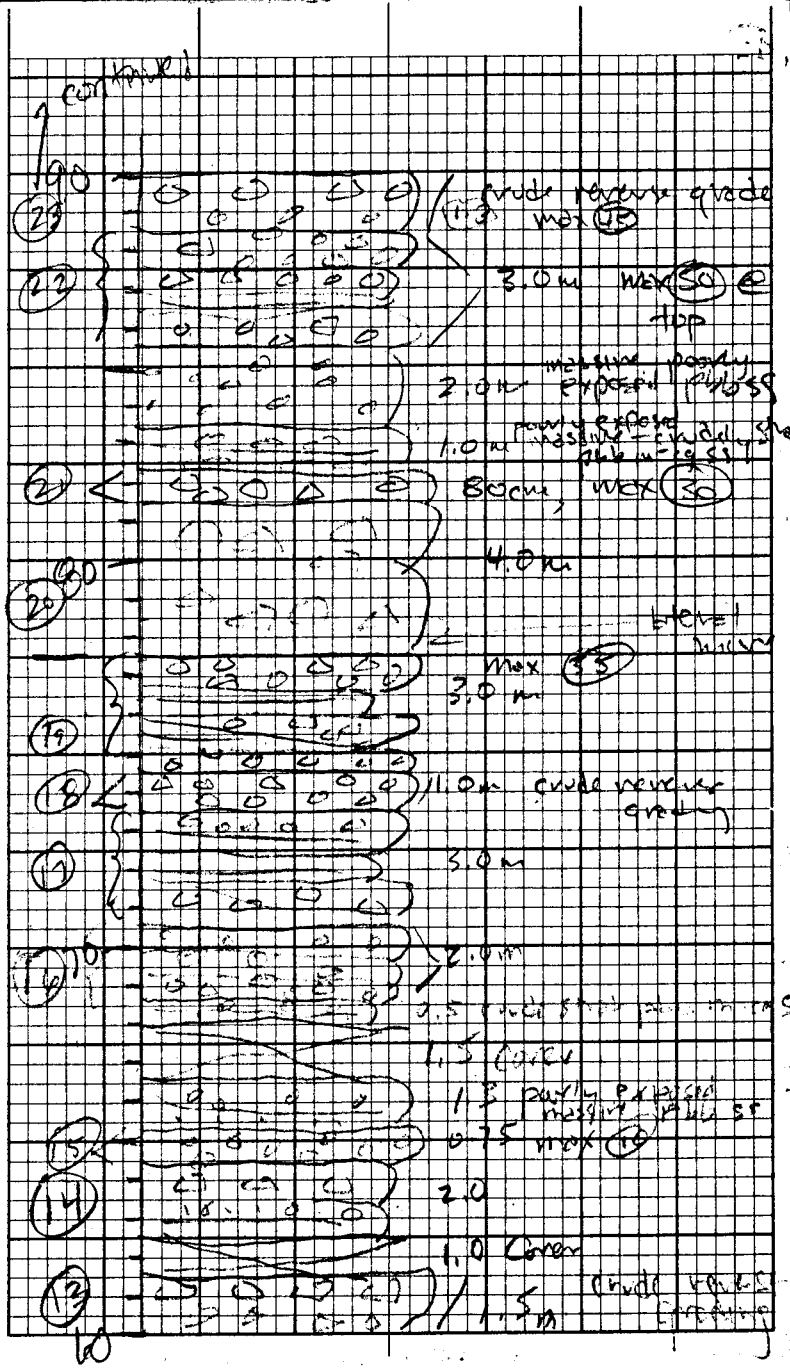
(17) crudely strat pbbss, intbdd with thin V.d.f. deposits

(16) stack of 3 massive, m.s. cgl/debris flows dep Avg (9)

(15) debris flow, clasts & f sand, lt grey hbl-volc

(14) poorly exposed massive m.s. cgl & crudely strat SS

(13) Debris Flow max observed (25) max (75)



(33)

V. Crudely strat Z cgl ss with debris flow channel-fill cutting

(29) massive m.s. cgl, d.f. max (5) Avg (2)
Stacked d.f. deposits

THIS is GETTING BORING!!

(28) Generally stacked debris flows with thin m-fg pbb ss intbdd.

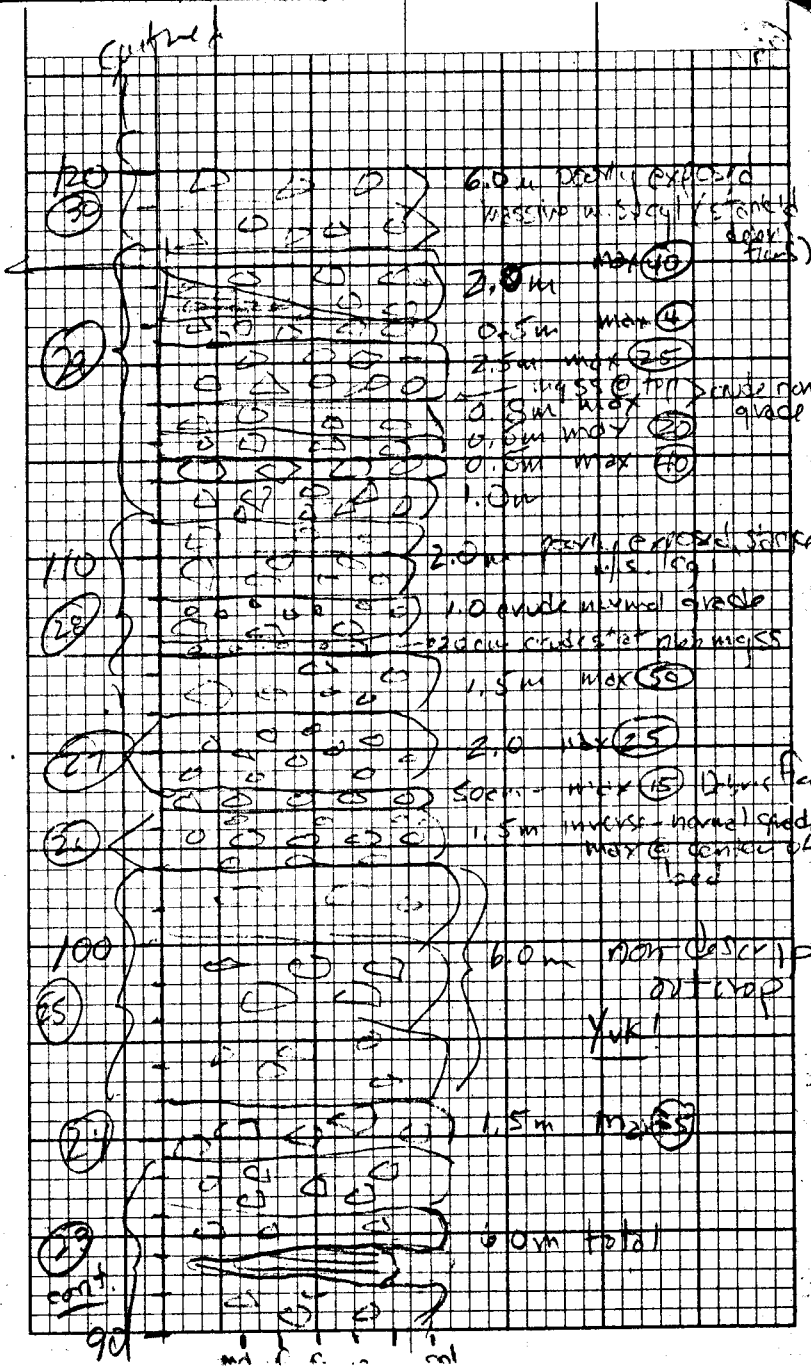
(27) debris flow, massive m.s support.

(26) Debris flow, lt grey hub-vole clast sub 4 pbb-sandy @ base
very difficult to see bdd breaks

(25) 6.0 m of poorly exposed, poorly defined bdd of apparently amalgamated debris flows locally may up to (50) Avg (10)

(24) massive poorly srt, m.s. cgl/debris flow
ss sample ST-wmV-23-2
local lenticular, well stat. (lw &) mg ss
Dr'clast sample ST-wmV-23-1

(23) Amalgamated debris flow deposits, stacked massive m.s. cgl, rather poorly exposed in part difficult to see breaks



(34)

7/4/89 (Full Circle) – Continue wmv Section

(38) cut & fill massive to crudely strat cgl. debris flows & crude strat vcg ss

(37) 0.5 m crude strat m-vcg pbly ss, ss Sample ST-WMV-37-1

Clast Sample (Rep.) ST-WMV-36-1

(36) inverse-to-normal graded debris flow, lt & drk gray hmb volc

(35) Close to clast supported cgl. clasts sub ∅, crude reverse graded (coarsest @ top)

(34) clast ∅ to sub ∅, hmb-volc clasts

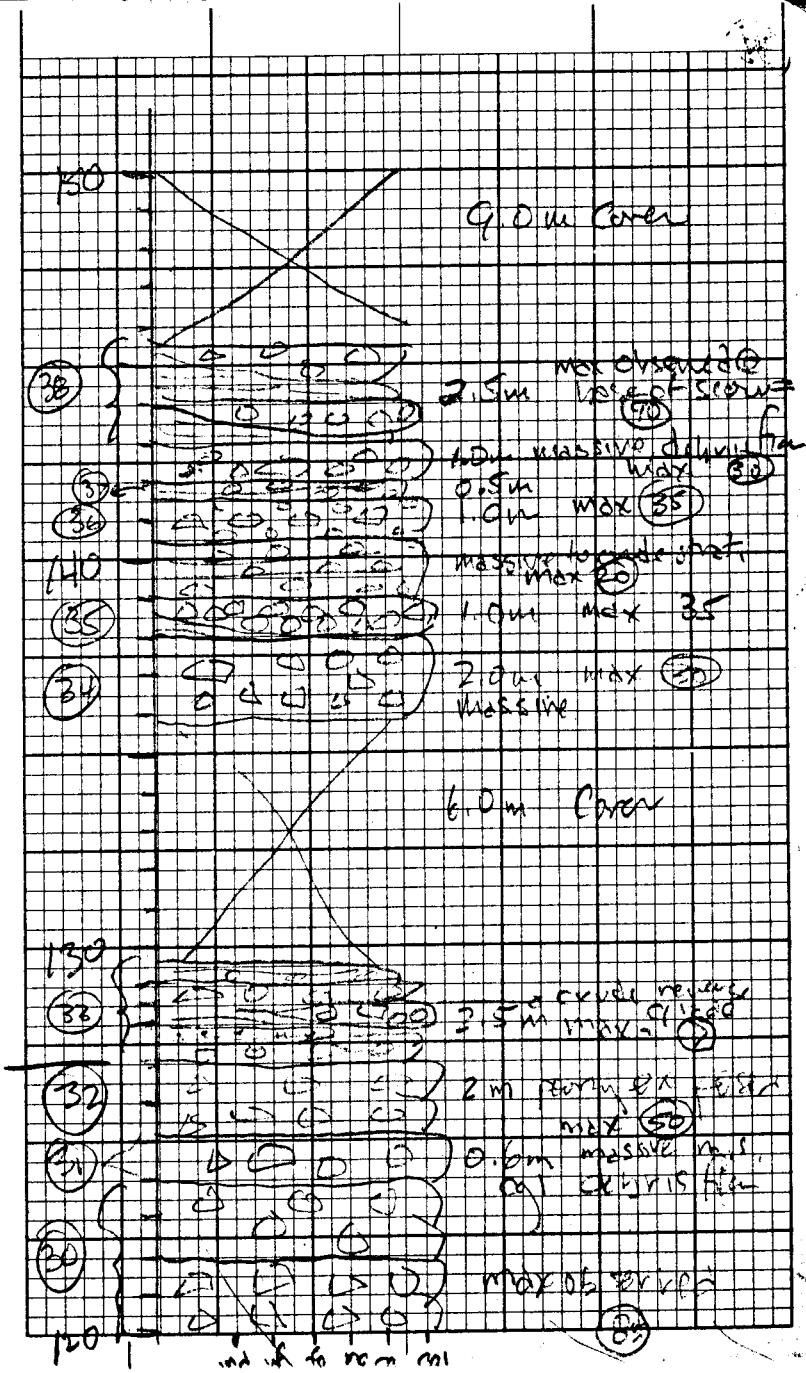
Scour Axis: N. 15°W Bed Att.: N. 70°W 10°N

(33) Scour fill: crudely strat cgl ss, & thin debris flows channelized debris flow as well

(32) Poorly exposed massive m.s. cgl max ≥ (5), some clast t.th.

(31) Rep. Clast Sample ST-WMV-31-1

(30) Rep. Clast + same as vol lt & drk gray hmbl-plag volc



(35)

Scour Axis N. 55°W Att Bdd N 60°W 20N

(43) crudely strat to ± strat m-vcg pbbl SS, scour scarred with massive m.s. agll scours fill

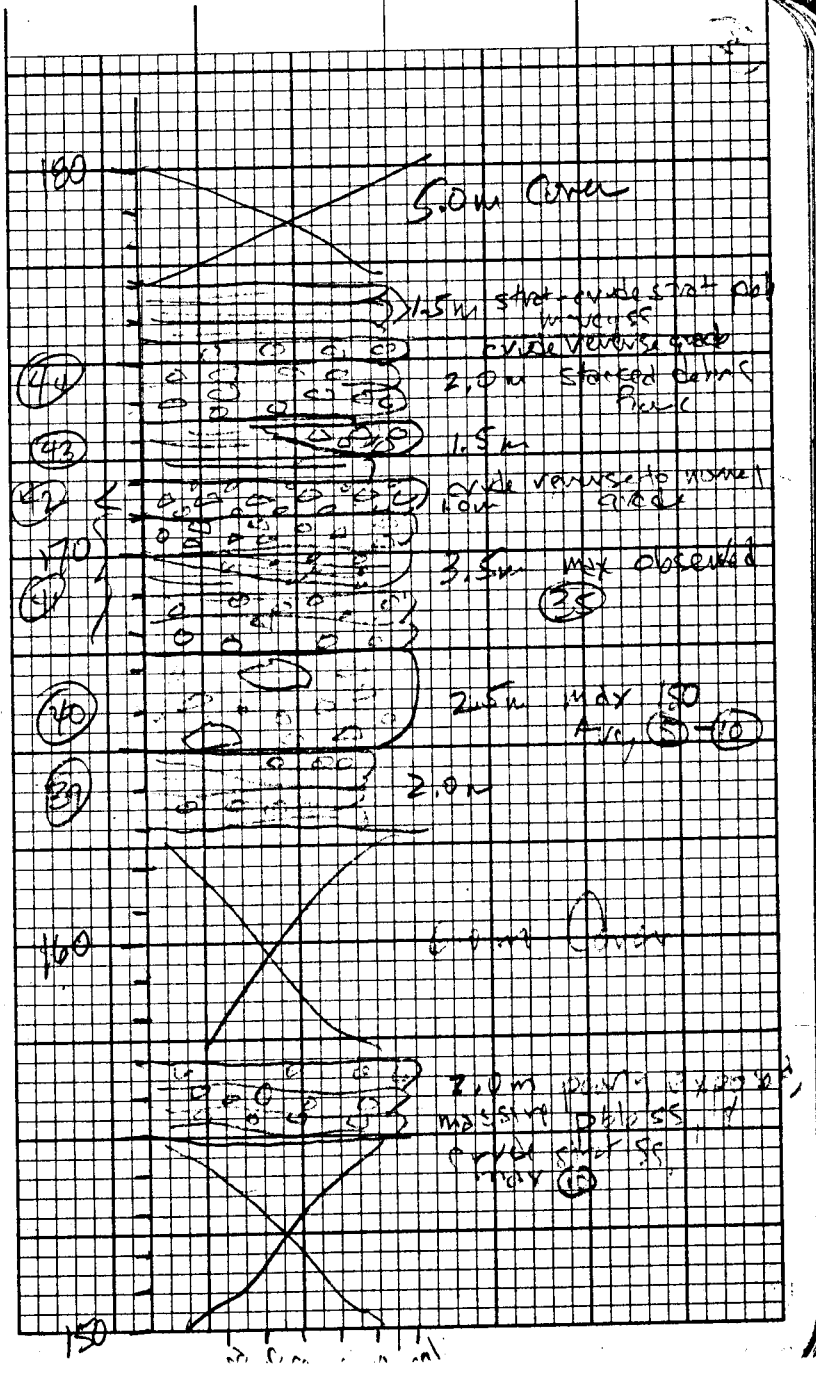
(42) unit X (6)

(41) intbdd debris flows (30-50cm thick) with scour fill crude strat pbbl SS

(40) Debris flow, perhaps very crudely stratified, lt grey bulb-vole clast = dom.

SS sample ST-wmv-39-1

(39) 2.0m crudely strat m-vcg SS & pbbl SS, interbed scour in



(36)

Clast sample Dk grey volc ST-WMV-54-2

Difficult to define bed breaks

(54) Amalgamated debris flow, parting not readily evident Max up to (120) Avg (20)

Clast sample ST-WMV-54-1

ST-WMV-53-3 Ash, w/ Dewater Dep? (Altered?) Chrysty w/ lat. debris flow

(53) incipient clast cooling structures, stacked min debris flows

Clast samples ST-WMV-53-1 (Dark) & -2 (Hot/Clast)

(52) Debris flow max (80) local fine bedded clast & clast cooling structure

(51) Debris flow max (80)

(50) massive-no/most-clast-supported debris flow, max up to 1.0m,

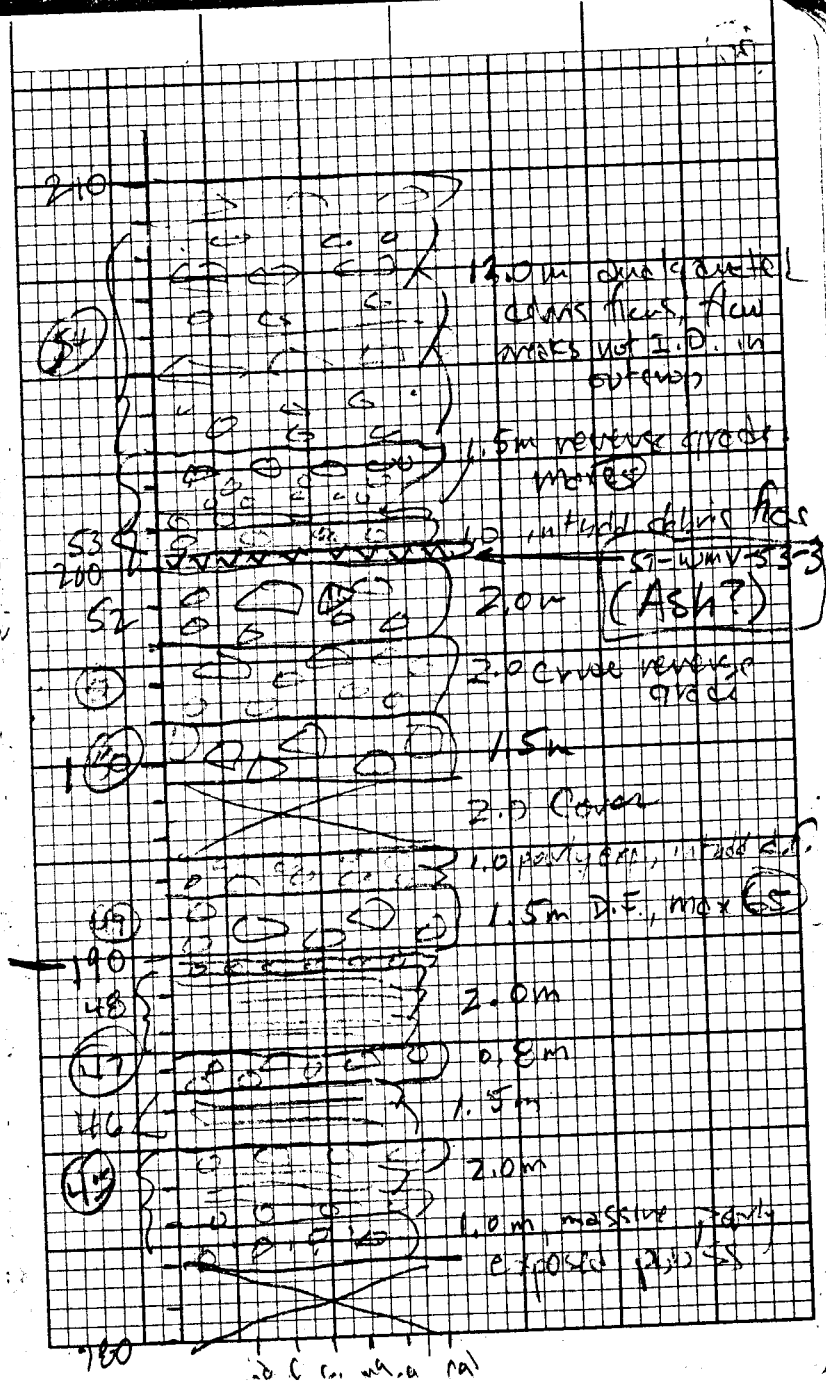
SS sample ST-WMV-48-1

(48) 2 strat m-vcg pbbly SS, (sheet flow) max (5) thin debris flow @ top

(47) massive debris flow, max (70) Avg (15)

(46) sheet flow dep, strat-w-cg SS & Pbly SS

(45) intbdd massive debris flows (max (5)) & strat pbbSS (intbdds = 50cm)



(37)

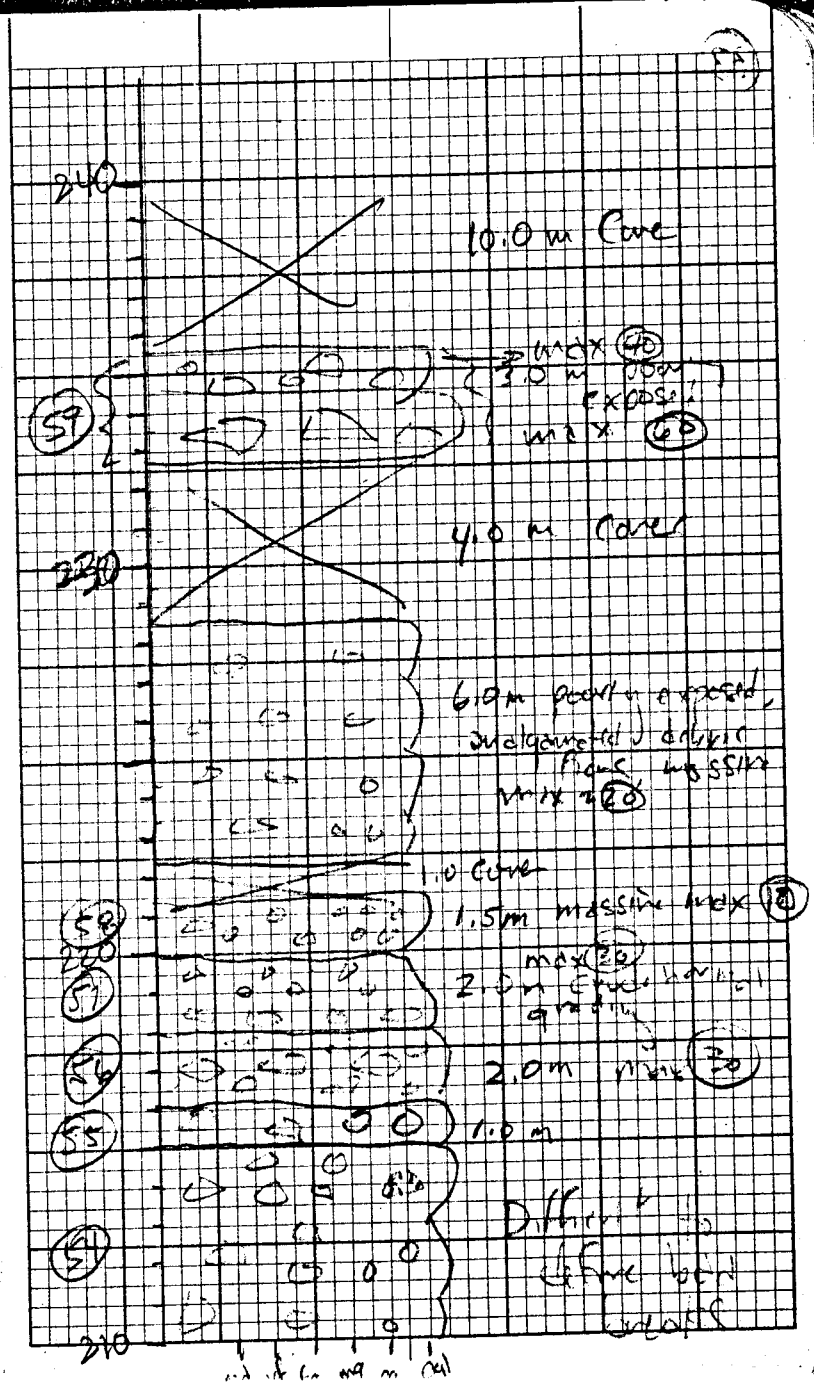
(59) poorly exposed, massive debris flow, long levee at base of outcrop

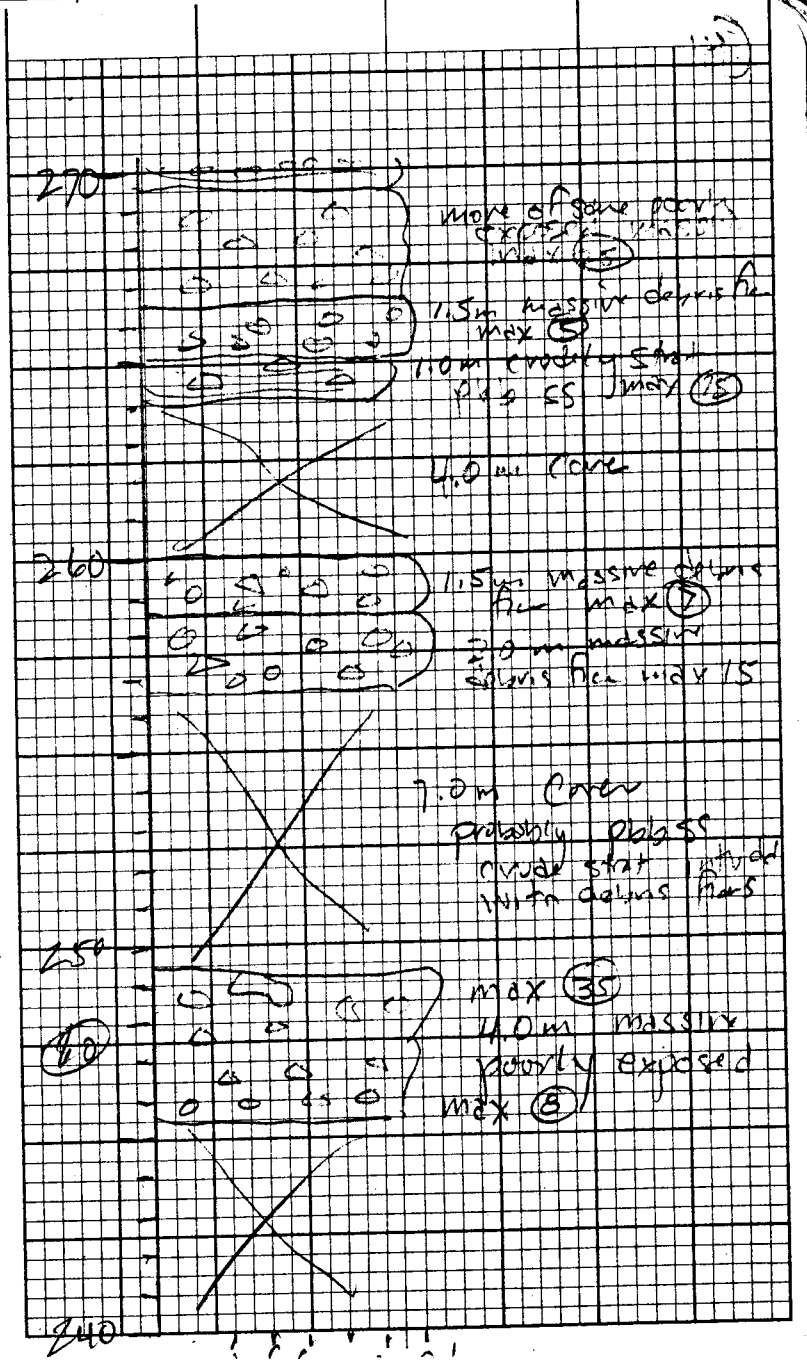
(58) perhaps very crudely strat, but mostly massive

Beds 55, 56 & 57 form pkg of debris flows that are lenticular - channel-fill — laterally pinch out

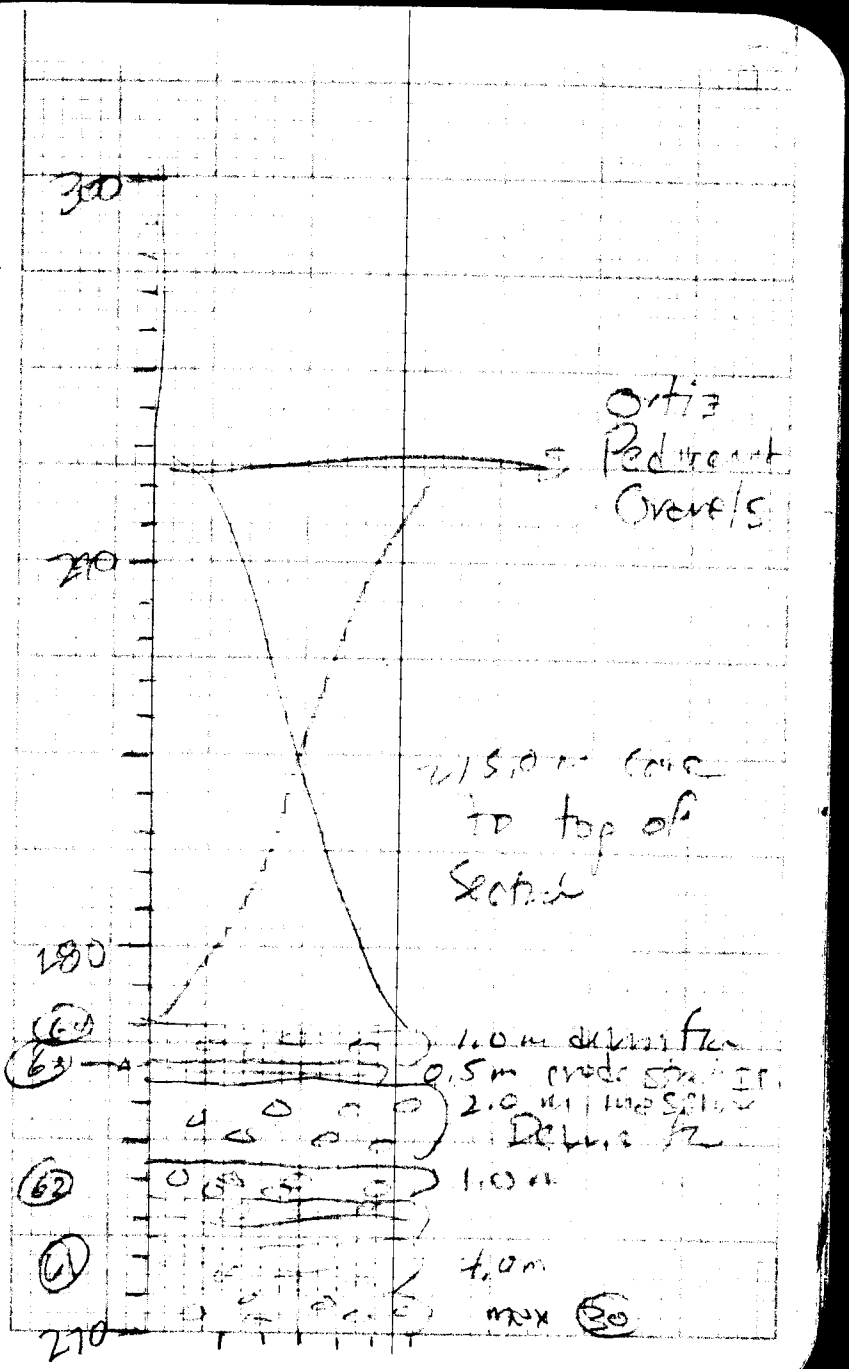
Hot clast ST-WMV-55-1

(55) debris flow max (70), rare clast with cobble & flow boulder, gray hnb-vdc




270
260
250
240
more of same poorly exposed massive
1.5m massive dolos ht max 5
1.0m crudely stratified dolos max 15
4.0 m core
1.5m massive dolos ht max 7
3.0 m massive dolos ht max 15
7.0m Core
probably dolosse
crudely stratified within dolos mass
max 35
4.0m massive poorly exposed
max 8

(39)


300
290
280
270
Ortiz Pediment Gravels
~115.0 m core to top of Scale
1.0 m drive fm
0.5m recv
2.0 m
1.0 m
4.0 m
max 30

(40)
9/5/85

RECON TO TIE in MU49/WMV section with Canyon de la Cuera

Tracing out Debris Flow MU49-9 to west where it dives beneath "MU-46 Dike Valley"

MU-61 Scour Axis N51°W plunge in both (strat Equiv. Aff Bdd: N71°W 11°N to MU49-12

(Major breach-former d.f. along PR Tracks)

The basal boulder-debris flow exposed @ MU-61, in my opinion is NOT the same horizon/deposition as (but who knows) MU49-9 but the strata underlying near MU-61 are much coarser-grained & less sandy/well stratified than the "transition ss" beneath MU49-9 There is some structure running through the valley though, as evidenced by D in bdd orientation across the valley

IDEALLY This is a toss up, MU-61 Strata may either:

① be up section from MU49-9 (+ss transition) strata & have been down faulted across "MU46 Dike Valley" on the

② There is a facies Δ at the transition between both, with much coarser grained & less well stratified (+ → debris flow) to the west across "MU46 Dike Valley" (In which case, Strata tilting is thickening to west)

I Guess I'm Indecisive on This one ??

BUT I would Favor

THEY ARE NOT SAME

HOLD EVERYTHING!

Yes the highest, most proximal ledge former in vicinity of MU-61 & MU-62 (along RR Trax) Does not seem to correlate with MU49-9, but further down section @ MU-62, there are well strat grey to reddish SS with pbb to cgl SS scour & fill ——— looks very similar to SS Transitional facies below MU49-9, includes some clasts with mafic (hnb) blocky porphs (see discription for bed MU49-9) ~~There is a reddish debris flow~~ (~1.0m thick) ~15m above the RR tracks (max clast ~(20) cm, ~(5)) (midway up slope) above the grey strat SS horizon ——— this is a good candidate for equivalent of MU49-9 strata

(1) Reason This based on

Physical Stratigraphy & well-strat nature of SS in this area

MU-63 — Dike orientation N 32°W 88°W

If so, the MU-49-9 Debris flows & fines to both the East & West off of a depositional trough axis (max thickness) near MU-49 section

If this inference is correct, then the major ledge-forming debris flow at top of hillside near MU-61 & MU-62 (along RR trax) is ~9.0m above the MU-49-9 section Debris flow horizon

MU-64 4m thick debris flow that is located below my MU49-9 equivalent horizon → if all is well, then coarse-grained debris flows are being added to the west, @ horizons equivalent to SS transitional facies in Middle Valley

(42)

MV-65 Dike orientation
N. 57°E

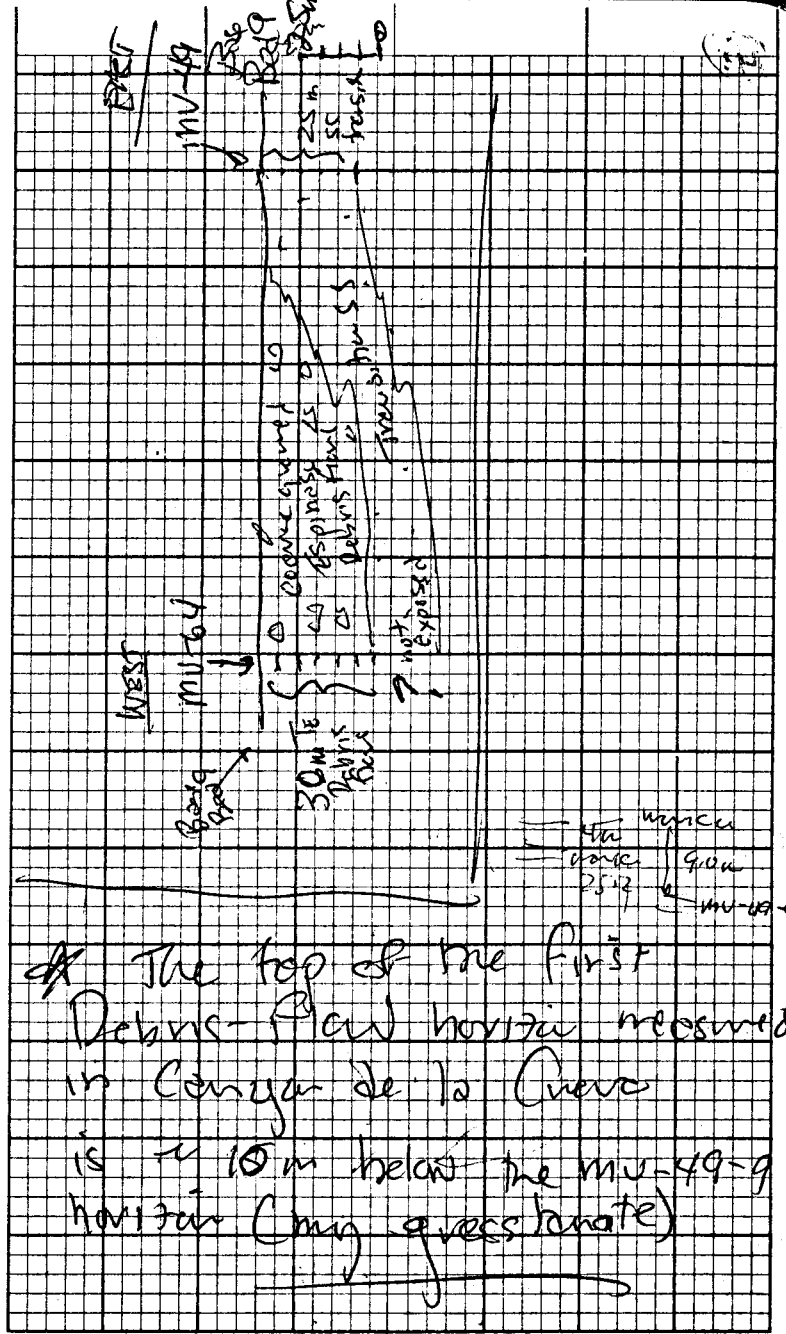
* Another leucocratic dike, with foliation similar to one sampled by Gary @ MV-46

Traced MV49-9 correlative Strat. horizon westward from MV-64 to MV-66 (next to Hooks dike)

I estimate 25-30m of Espinoso/Coarse grained-Debris flow facies is added below the base of MV49-9 horizon from MV-64 to MV-66

That 25-30m of debris flow Strata is Strat. equivalent to the SS transition facies in the windmill valley

See Sketch @ right



* The top of the first Debris-flow horizon measured in Canyon de la Cueva is ~10m below the MV-49-9 horizon (may correlate)

(43)

Therefore the 1st debris flow pkg measured in CC section really does not have a lateral equivalent in the windmill Valley section (is transitional there)

Of Course, All this business is contingent upon the interpretation that transition facies is present @ MV62 & that the MV49-9 horizon is correlatable across the "MV46 Dike Valley"

"Brown Marker" Horizon of Gary & Steve Ford is correlative to Bed CC-28, the interbed debris flow/SS pkg immediately above the acc. LAP bed CC-27 (Refer to Conejo de la Cueva Section)

Yes Good Tie-in from CC-28 across to windmill valley & MV49 Section

(See previous notes) Also note Chip sample taken from "brown marker bed" at CC-28 (bed 28, Cueva Section) traced to MV-46 (new lenticular dike/valley), to MV-48 (which ties in MV49 section to CC section, & also MV49 is tied to WMV section (via SS transition facies & MV49-9 (bed) debris flow/marker) Yay!

NOTION CONFIRMED — Espinoso Section Thickens from WMV westward to Conejo de Cueva! (Thick stack of debris flows in Cueva) with no direct correlatives in WMV, laterally pass into SS transition facies in WMV ?

Progradational? or "Trend Axis" phenomena ? (Depositional Cueva) through maximum progradational shelf edge WMV

(49)

7/6/89 Recon. with Don, tracing strata west of CC section due to Transition Facies (Big front Strata behind Private Land)

N58°E Strike Axis — rect side MV-67 of CC draw Att Bdd N.24E-15E

see noticeable properties (subord.

MV67 Strike Axis N.23°W

MV-67 - noting new clast lithologies (in debris flows below CC section)

blocky (pyroxene?) mafic phenocryst lavas as well as vesicular to phyric (well rnd) grey

Dun. clast still hub volc, but significant admixtures of new —→

Remember seeing this stuff in "Coastal strip" transition facies in Wind mill Valley

MV-68 Access top tiff

Sample St-mv-68-1

Strike Axis N 67°E

MV-69 strat Equivalent to debris flow ledge @ MV-69

Yes, re-traced horizon — prominent debris flow (ledge-forming) pkg @ MV-67 is laterally traceable to MV-69 (5-10m below which lies Acc lap @ MV-68)

NOT traceable beyond MV-69

Prominent exposures (Red beds) @ MV-70, just west of Ranch are in transition Zone

Begin section measure here, weaving up through MV-69,

then measure section @ MV-67 up through ledge-forming d.f. this lies between original C.C. section — then tie in to MV-70, section via debris flow ledge

(45) 7/7 Truck mileage 32 354 95 12 1200 91 250 190 60

7/7/89 7/

Begin measuring MV-71 section today from "Galisteo" to Espinoso transitioning up to pt. MV-70 then up to MV-68 which is correlative to base of Canada de la Cueva section (Again section thickening progressively to west) MV71 section begins on west side of draw behind Mrs. Grenfell's house, white Arkosic-looking Galisteo SS @ base

Note/Idea in Windmill Valley, the only place I've seen thin hnb-pyrox (?) glaucophane clasts in the highest transition Zone. New note occurrence of similar clast in strata below CC-1 (approximately equivalent to SS transition in WMV)!!

⑦ intbdd well (flat) strat m-vcgss & pbbsc with channel/scour fill pbb lags, hnb-volc/ ⑯ Espinoso clast dominant, less ext of yellow phyly/Galisteo ss sample MV71-7-1

Clast Samples ST-MU71-6-1, 2, 3

local reworked volc-bx c clast massive, m.s, cgl, no grading, clasts subrd ist good looking debris flow, local fragment of petrified wood, grey hnb volc dominant, locally ⑥ ss sample ST-MU71-5-1 | Hd clast ST-MU71-6-1 reverse graded

⑤ lowx to v. low x scour & xstrat m-vcg ss local channel lag pbb, mod sorted lt grey to red ss, mixed volc & arkose dom

reg vlc grey hnb-volc dom. Clast sample ST-MU71-4-1 mud chips, hnb glassy porph common but not dominant

④ 1.0m crude Σ strat cgl - m-vcgss poor sort abund pbb clasts, hnbl-volc clast dom. with subordinate well rnd yellow phyly

clast samples ST-MU71-3-1, 2, 3

ss samples ST-MU71-3-4, 5

③ more transitional ss with qtz-fld m-vcgss, low x strat to flat, mixed with volcanic detritus, v. local scour & fill cgl with rounded pebble of hnb-pyroxene? glassy porphyritic volc, also finer-xh grey volc & altered volc.

AH Bdd N. 14° W 8° E

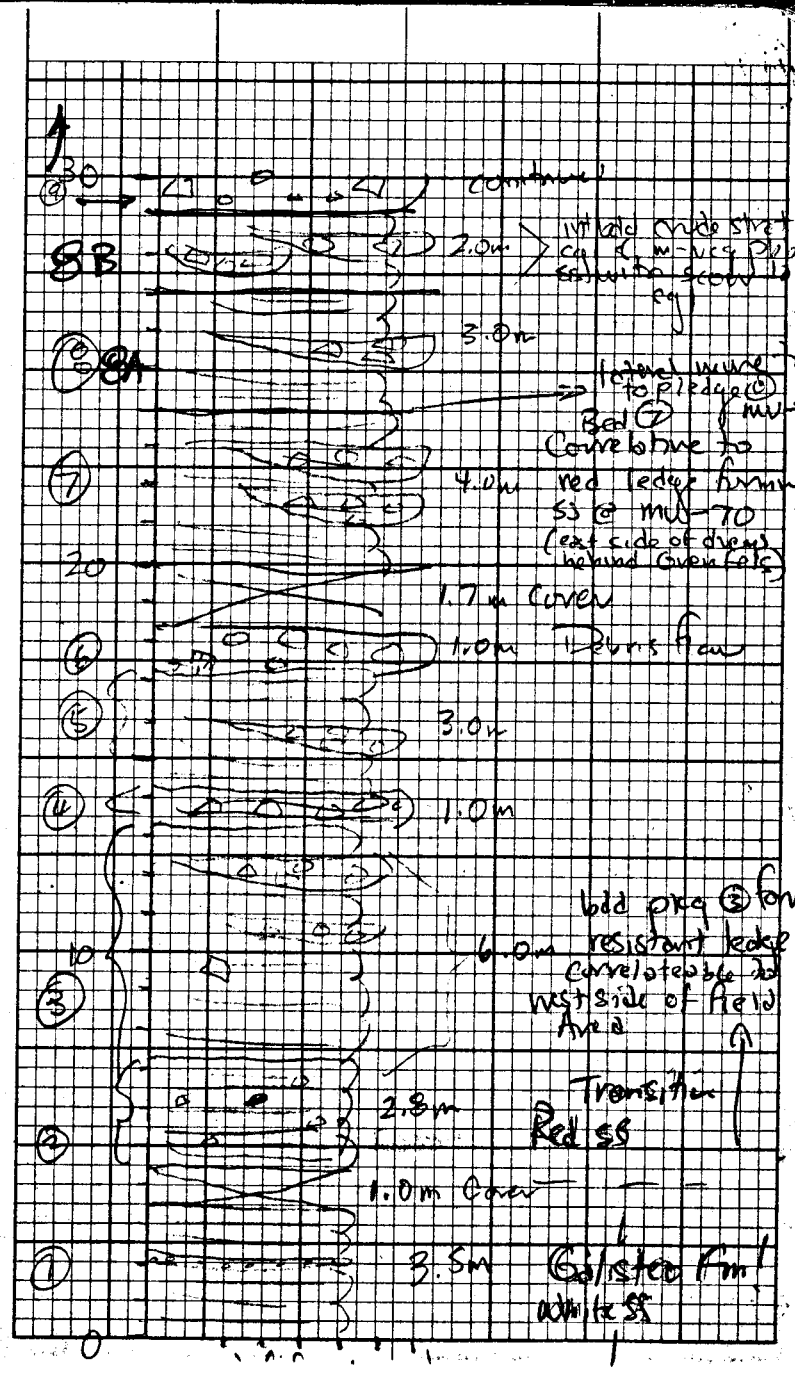
SS Samples ST-MU71-2-1, 2

medium bdd 10-50 cm ss intrbdd. local mudst

② flat to low-x scour & strat f-m-vcg ss, grdg small pbbs of weathered grey hnb-volc, mixed with arkosic sds, predom. qtz to fld ss with lower proportion of espinoso volcanics

Sample ST-MU71-1-1

① Qtz-fld-Arkosic m-cg, locally vcg ss, white appearance of white mica → Galisteo. local mudst rip ups flat to low & xstrat, reg bdg, Stringers



(14) gray volc dominant clast, with minor mainly v f sand sized g to a arkosic detritus

interbdd debris flows & crudely strat cgl

Clast samples ST-MU71-13-1,2

(13) massive to perhaps v. crudely strat cgl with thin well strat scours, fill interbdd of veg pbly ss, Clasts dom hmb-volc + glom. volc. Incipient. coal strks on some clasts

mixed Galisteo - Espinoso detritus, Espinoso dominant

(12) (>60%) ss sample ST-MU71-12-1

occassional Yellow pbble

(11) Dom Clast lithology ST-MU71-11-1

local occurrence green hydrothm. altered volc

* in these transitional ss clasts dominantly hmb-volc, Sand = dom. g to a feldspathic

flat strat m-veg pbbly ss & crude strat pbbly ss

(10) Espinoso volc, clasts glomeroporphyritic subordinate red transitional ss = mixed g to a feldspathic ss with volc

ss SAMPLE ST-MU71-10-1

max (35) Avg (10)

massive to v. crude rev. graded m, s, cgl, clasts

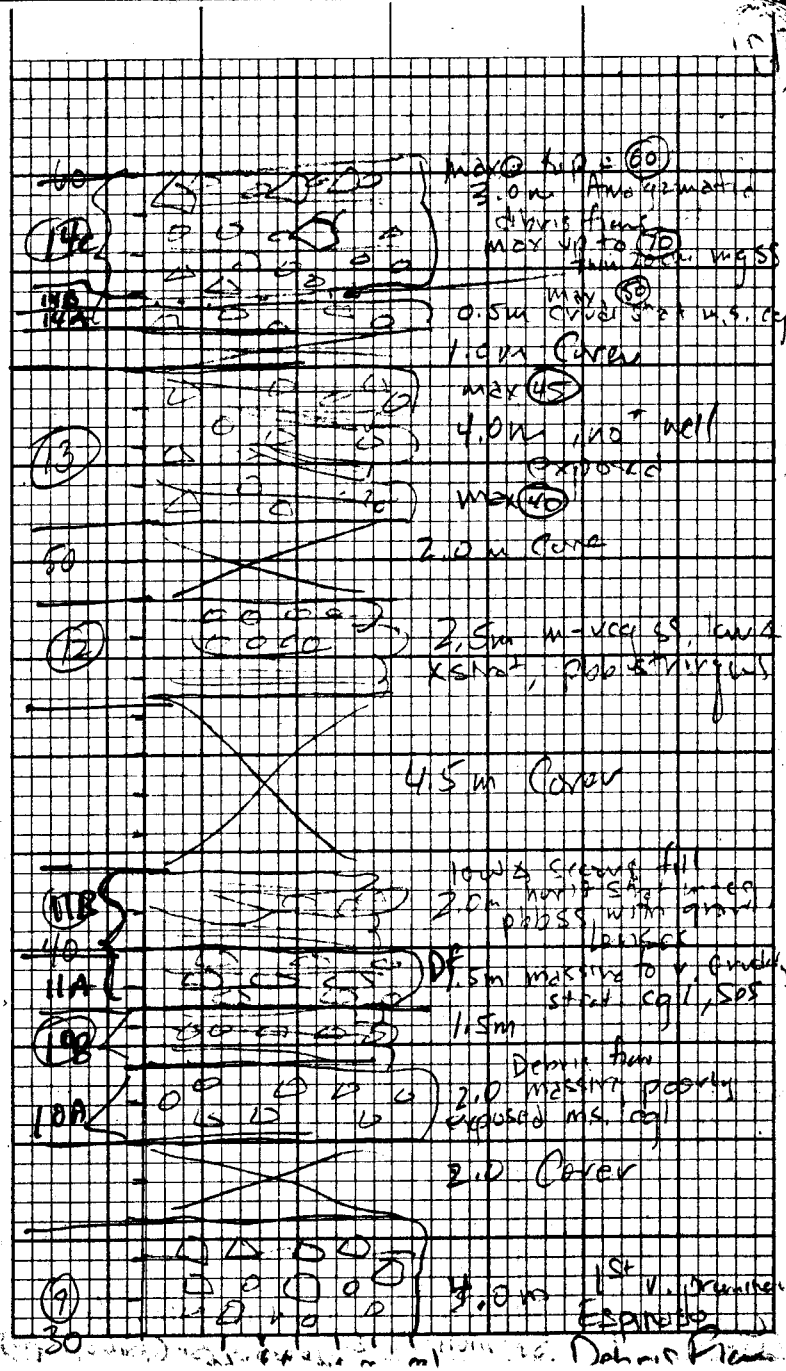
(9) ~ to sub ang, possibly 2 amalgamated debris flows. lt gray & dark gray hmb-volc & glomeroporphyritic present

same old hmb-volc dominant, hmb-glomeroporphyritic subordinate

ss sample ST-MU71-8-1

(8) well strat (flat to low ang scour) m-v fg ss & pbbly ss with gravel lenses

sands ~ a to feldspathic; Clasts ~ lt hmb-



(18) No Sign of Colristeo Detritus here

24&25 probably a localized channel-fill boulder debris flows

(Hot clast SAMPLES, ST-MU71-25-1, 2, 3 here

(25) boulder-rich debris, Abndt HOT Clasts Avg (60)

(24) cobble-boulder rich Debris flow horizon clasts up to (70) Avg (50), HOT clasts Noted

(23) 6.0 m amalgamated debris flows with per definition of partings, Avg (15) lt gdrk hnd volc clasts, some glomeroporph/lavg pheno. clasts

(22) reverse graded @ base, max (45) hn; volc dom, not noticing yellow pbb or glomeroporph clasts

(26) reverse graded debris flow max (10), rare reworked volc clast, hnb volc dom

(19) m.s. cg/debris flow, base not exposed, max (8), dom, hnb volc

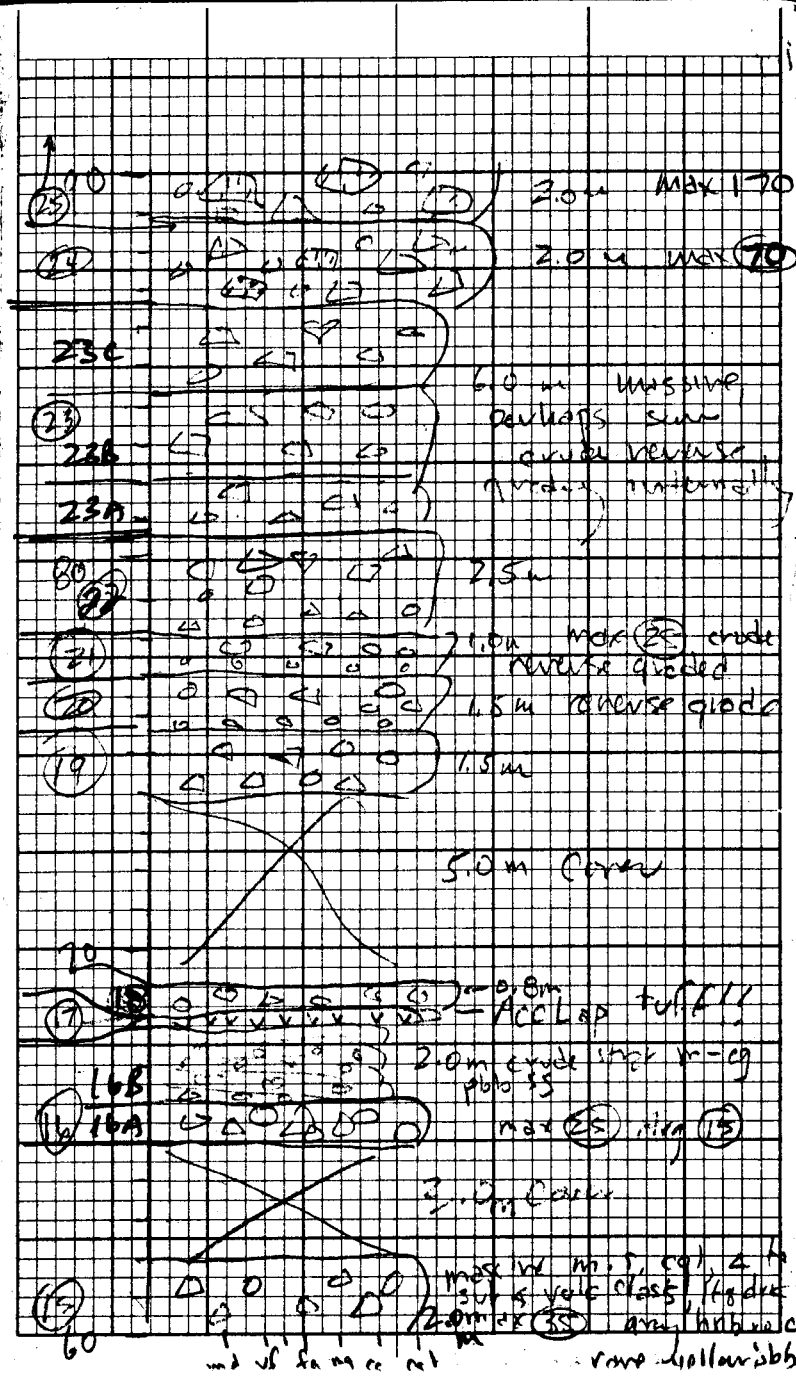
(8) m.s. debris flow, clasts same lith., inverse g'rded @ base max (20)

SAMPLE ST-MU-68-1 = ST-MU71-17-1

(17) Acc lap. Tuff ~ 2cm thick locally thicker, abruptly overlies m/ss < is abruptly overlain by debris flow

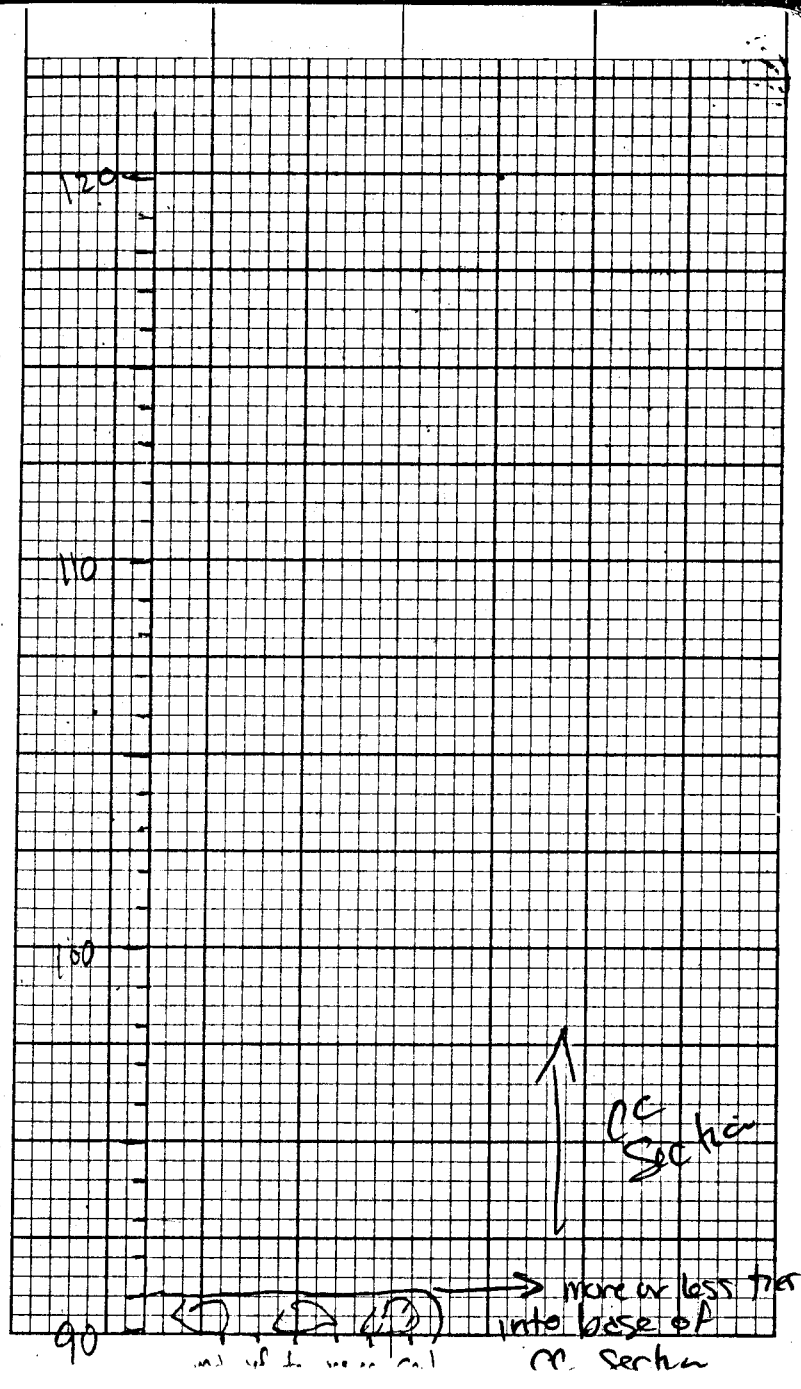
(16) m.s. debris flow; massive volc clasts dom., rare qtzite-yellow pbb.

Clast Samples ST-MU71-15-1 Dom. Clast (grey hnb volc)
ST-MU71-15-2 subord. clast (glomeroporph)
ST-MU71-15-3



MV71-23 bdd correlate.
approximately to prominent
debris flow pkg @ MV-67
(west gateway to) (onda de la
Cuesta)
Sits below where we started
measuring CC section

Sample of hnb-pyrox? glomeroporph
collected @ MV-67 Should
be renumbered to
Subordinate ST-MV71-23-1
Oest



(50) (Tues.) 499 / 354 / 145 — 1141/1450 — 12.7 mpg & 2/0 = 13 mpg

7/11/89 Begin mileage 32499 = 11.4 col.

MU72 Section

Begin measuring ~~Angle~~ Spags ~~Canyon~~ Section on Henderson Property (with Dan & Gary) short section to define Natural Log Ru (Tezf)

Start @ MU-72 in Yellow-white Arkosic Calistoga SS —

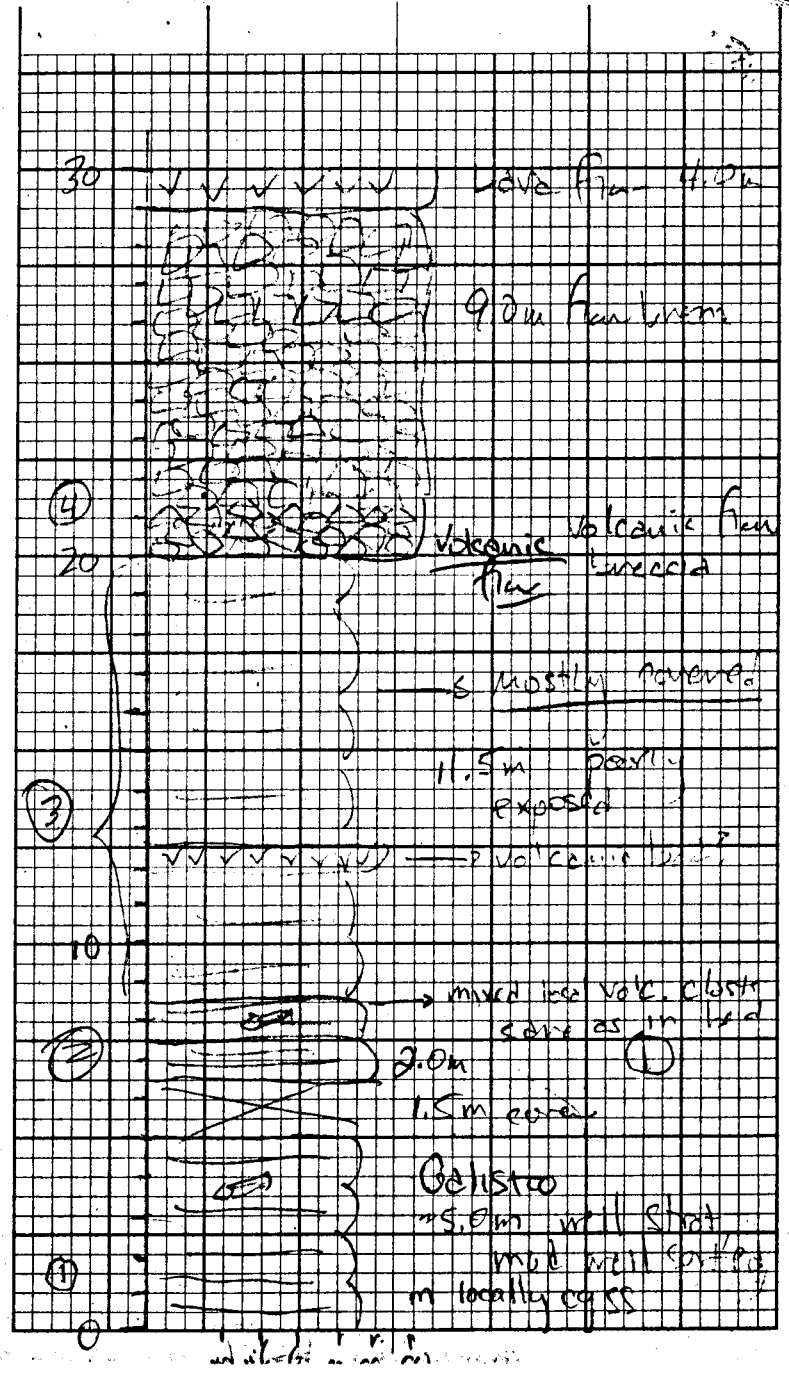
Correlative to Bed MU71-1

④ Basal Volc. flow breccia, hnb phenos, pyrox?
Sample ST-[redacted]-4+1

③ - Dominantly Colistco ~~fm~~ ~~mbr~~ ss-
Volc Sample ST-[redacted]-3-1 Lava? within ss
Sample ST-[redacted]-3-2 grantzose
③ v. poorly exposed looks like wg, strat ss, transition? facies, contains thin poorly exposed lava? flow can't trace but appears to be a bed (40 cm thick)

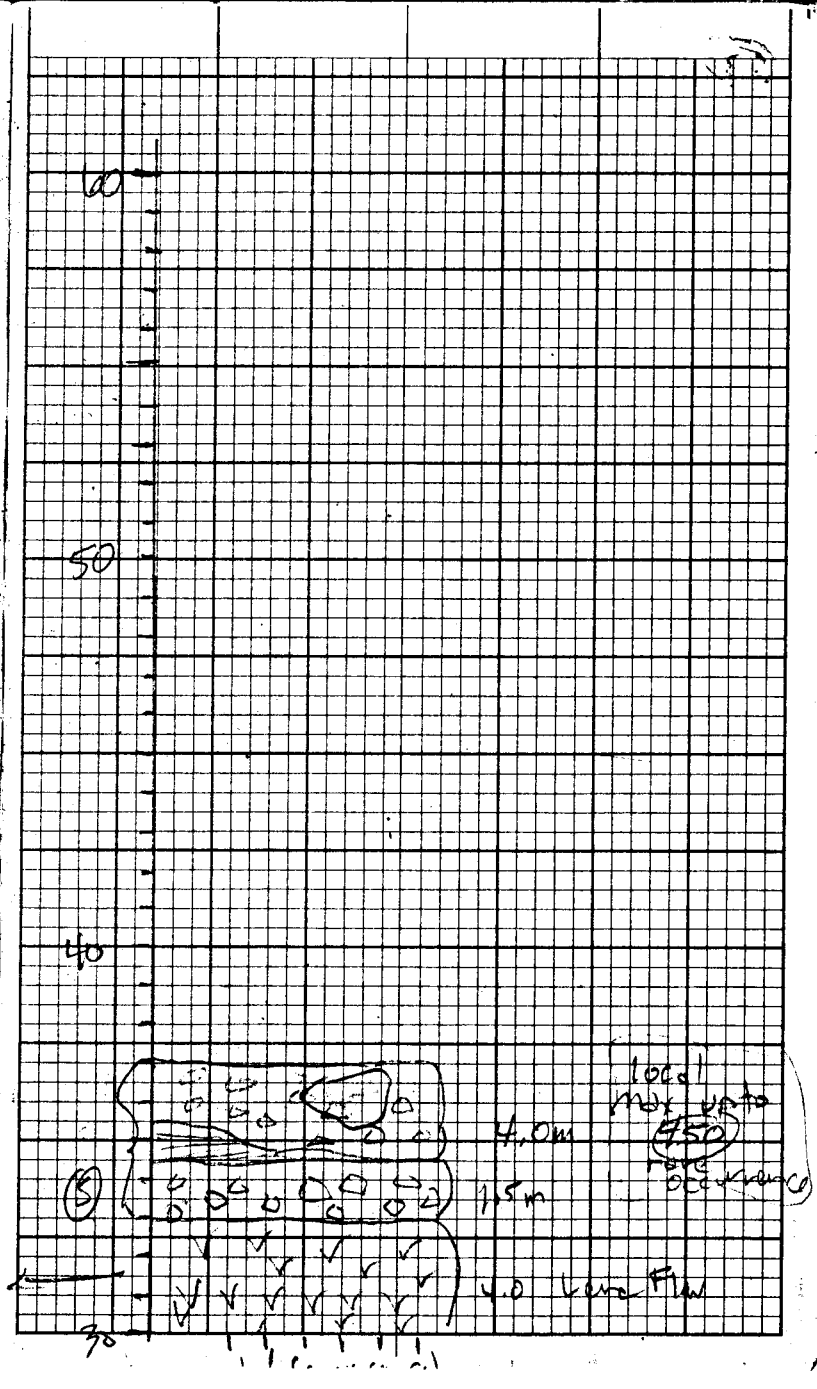
② similar to ①, pet. wood frags, top of bed has minor volc sand clasts, pyr dom, grades upsection into transition interval

① Colistco fm - yellowish-white ss, quartzose, well sorted, m-eg, flat to low x-strat, will stain, petrified wood frags AH Bdd: N 11°E 20°E
ST-[redacted]-1-1
ss sample



mixed Galisteo/Espinoso Dam clast ST-[redacted]MV12-5-2
& local Scm-c fill with strat pbly w-rg SS
Debris flows with local
2° mudst/Galisteo clasts
Sample ST-[redacted]MV12-5-1
from base of unit
@ contact with lava
⑤ 1st good espinoso debris flow Avg ① clasts
¼ to 1m mixed pbly-h m/b vol c Galisteo pbl/mudst

Lava flow corresponds to Te2f of
Disbrow & Stolls (renumbered) Lava sample by Cerro
<T-[redacted]MV12-4-7-MOD>



(53) Begin Anaya Springs Comp (ASC) Section

(9) Amalgamated debris flows, poorly exposed, boulder horizon @ top, clast sample ST-ASC-9-1 massive m.s. cgl, clasts Δ to subA
occasional Galisteo pbb

(8) intbdd thin massive debris flow & strat m-vcg pbb ss, scour & fill debris flow
Clinoziopergh? vole conglom 2% Galisteo pbb

(7) Debris flow massive to v. crude reverse grad
occasional Galiste pbb & ss rip up
Espinoso clasts Dominant, Clinopyroxene Conglom

(6) Amalgamated, poorly exposed debris flow

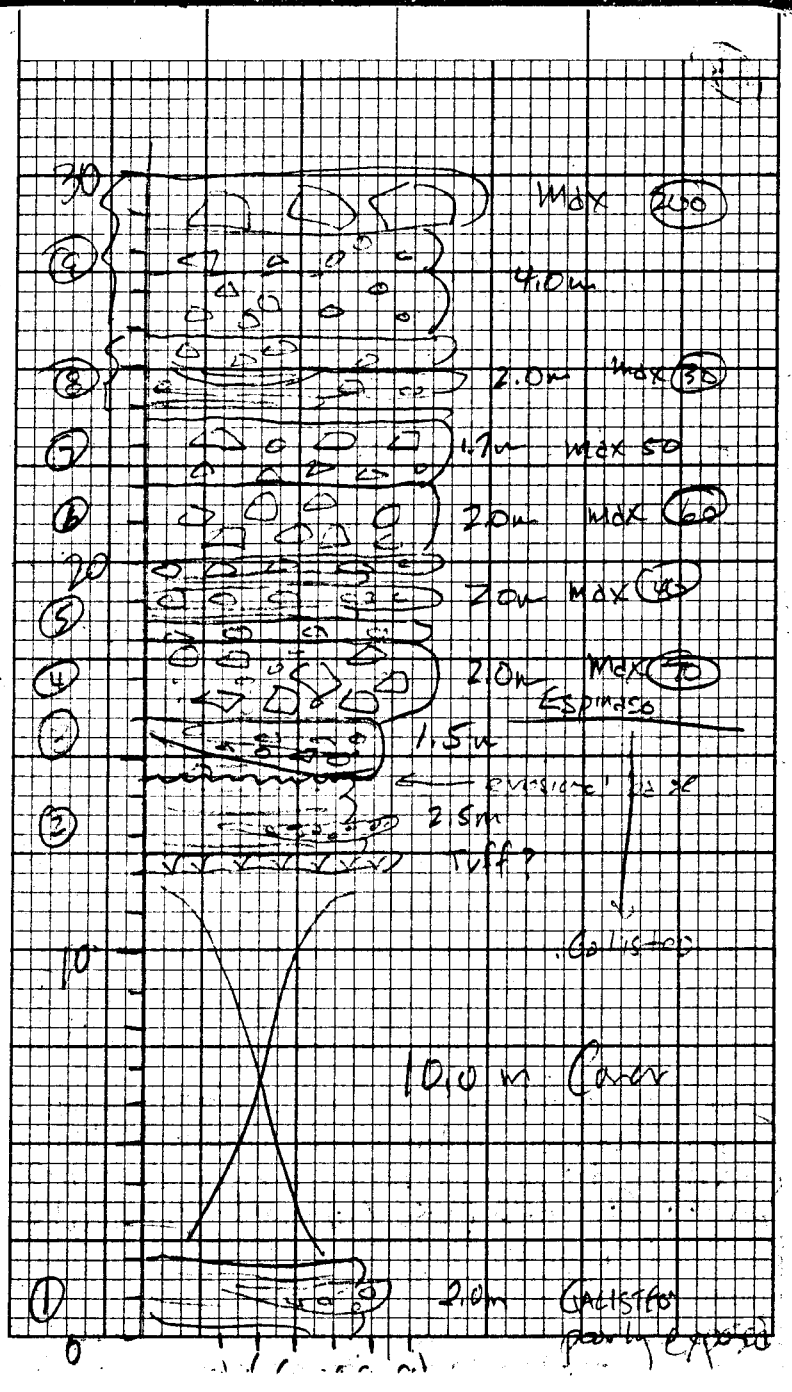
(5) intbdd debris flow & strat ss
Hot clast ST-ASC-5-2 incipient cal
clast ST-ASC-5-1 No sign of Smectite yellow pbb

(4) 1st Good Esp. Debris flow, massive, m.s. poorly exposed, large clino/clinopergh volc clast sample ST-ASC-4-1

(3) 1st volcanic clasts volc clast sample ST-ASC-3-1
Dominantly Galisteo Gravel, scour & fill
crude strat gravels, mudst rip ups

No volcanics Galisteo clasts/sand intbdd mudst/SLST @ base
mudst sample ST-ASC-2-2
pbbs = well rnd qtzite, limestone, ss sample ST-ASC-2-3 mudst rip up
(2) intbdd well strat m-cg ss with pbbs stringers
"tuff"-looking unit @ base "Tuff" Sample ST-ASC-2-1

(1) 2.0 m Galisted Quartz-feld ss
m-cg, flat to low Δ & strat locally vcg pbbss
sample ST-ASC-1-1



(54)

Scour Axis N. 15°E

Scour Axis N 55°W.

(14) thin mg ss intbdd w/ l shst, ss sample ST-Asc-14-1

(13) Partly exposed endogenetic debris flow dpst, massive, clasts up to (10), ccc grained Galiston Yellow Pbb, Dun. Volc Clast Sample ST-Asc-13-1

(12) 2.0m intbdd shst (low ×) m-cg ss & pbly ss with massive cgl/breccia lenses ∥ Scour Axis N 10°W Looks evidence for Galiston/Yellow Pbb

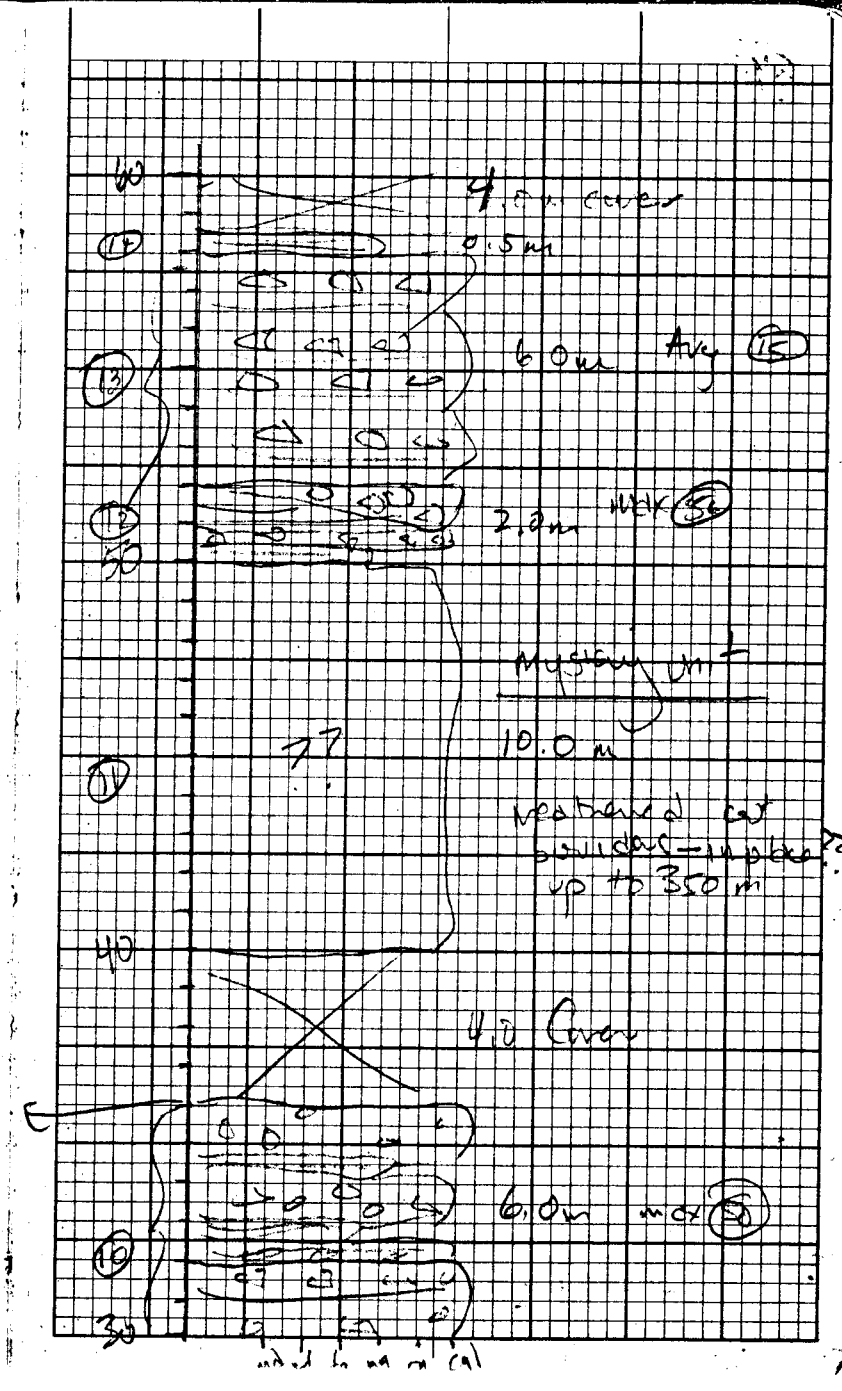
(11) Partly exposed grey weathered horizon — Sanchem related to weathered lava flow? volc clasts weathered cast Sample ST-Asc-11-1

Green grung — weathered volc limestone a volc breccia?

REDO Att N.5°E, 9°E.

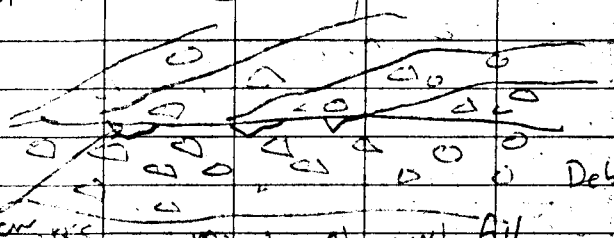
forms horizon which is thought to be correlative to top of ledge formed (Mv 71-3) behind Grenfell's place (top laps / faulted against by flow (MV72-4)

(10) Dun. Espinosa Mb volc, glomeroporph, occ grained Galiston Pbb intbdd crude shst m-vcg pbb ss & cgl intbdd/amalgamated ss lens fine



55

At Horizon (15) Depositional Relationships



(18) clast supp ST-ASC-18-1 (Clomenoph. vole Subadu.
ST-ASC-18-2 Dom. vole.

(17) horiz strat m-cg SS ~~SS~~ sample ST-ASC-17A-1.

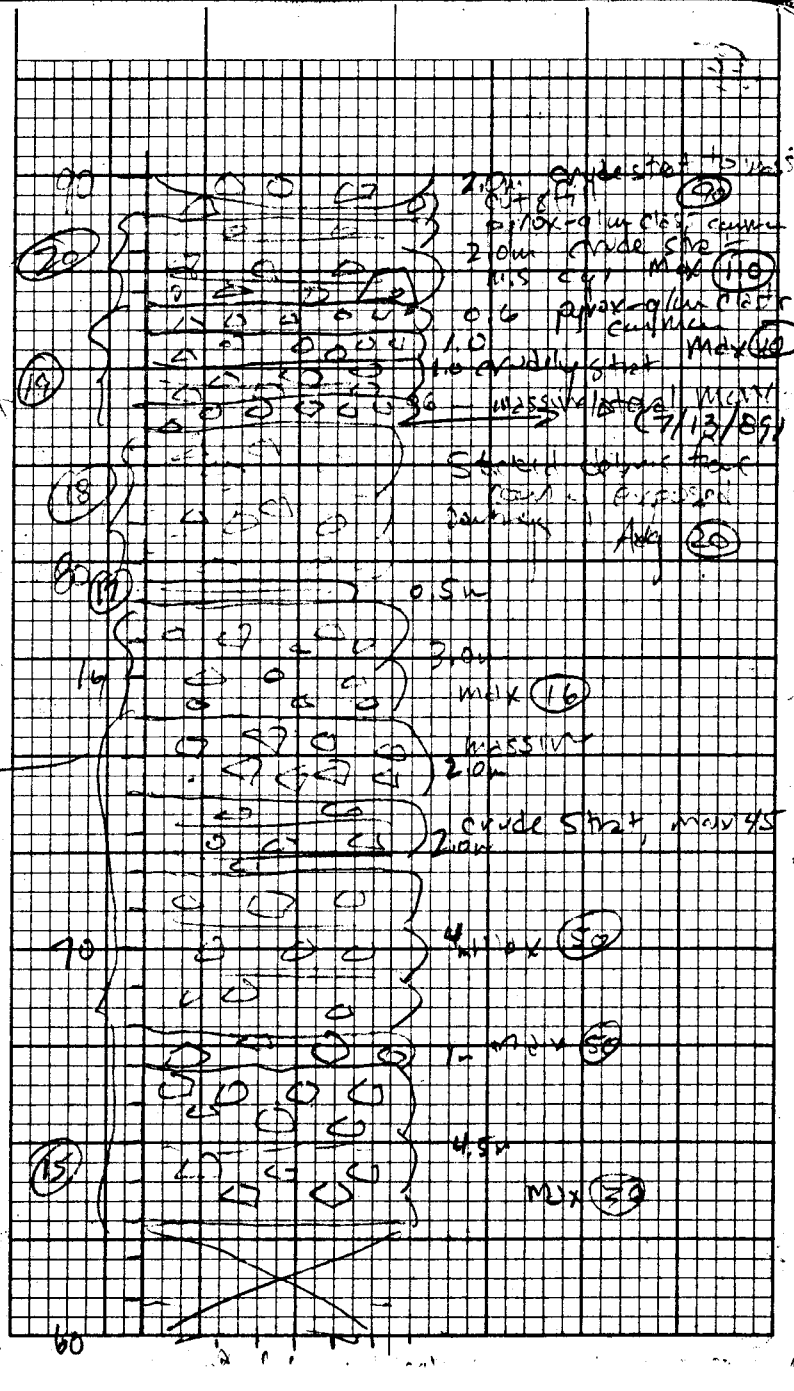
(16) Amalgamated debris flows

Colistco pbb NOT Evident

Monstrous Stacked debris flows to crudely strat cgl.

clast rich almost clast supp.

(15) Amalgamated debris flows, massive to crudely strat cgl, m.s., glaucoporph/lithic almost entirely red mud chips @ base rare Colistco pbb.



(36)

7/13/89 Measure ASC section with Don

(30) locally well strat pebble-cgl ss & crudely strat m.s. cgl/breccia any coloration? Dom clast sample ST-ASC-30-1

local SS intrd. Scour Axis N. 40°E. ST-ASC-29-3

(29) massive m.s. cgl debris flow occasional flow banded clast; ST-ASC-29-1 dom clast ST-ASC-29-2

(28) massive to v. crude strat m.s. cgl, poorly exposed/defined pebbles, channelized debris flow

ST-ASC-28-1 pyrox-glass clast/dom.

(27) Amalgamated debris flow, poorly defined pebbles massive, no description

(26) pebbles poorly defined Scour Axis N. 10°W

(25) stacked debris flow, massive, with undulatory bases/erosional

(19-24) = nested/inclined debris flow pyrox-glass clasts dominant

(24) crude reverse strat massive m.s. debris flow NOT SEEING ANY Calisto

pyrox-glass. clasts, dom.

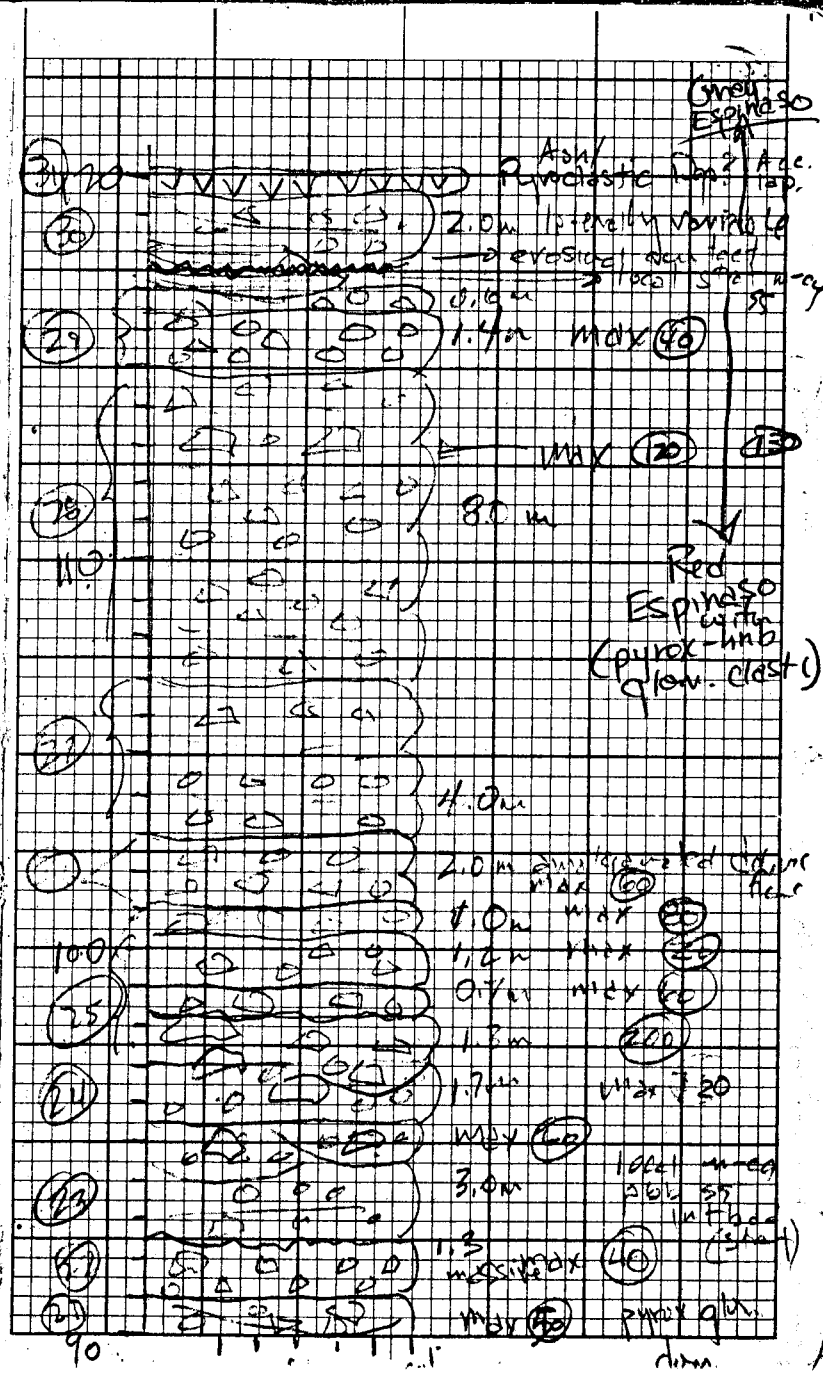
(23) 3.0 m scour/nested, massive to crude strat m.s. cgl fill mdx

Scour Axis N. 43°W. / N 120°E

(20) pyrox-glass clast ST-ASC-20-1 Dom. Clast

(19) inbedd debris flow peb cgl

Scour Axis N. 30°E



(37)

(39) Poorly exposed hot Boulder-rich, amalgamated debris flow interval

Abndt Hot Clasts = ST-ASC-39-1

(38) Bedded/amalgamated, incised debris flows Hot clast ST-ASC-38-1

(37) Bedded/amalgamated debris flow with poorly defined scoured surfaces. Hot clast sample ST-ASC-37-ST-ASC-37-2 coarse lithic -36-4 matrix sample 1-

ST-ASC-36-3(Dom) 36-2 rare pyrox glass 36-1 xenolith

Amalgamated debris flow

(36) Dom. clast poss. grey-hnb volc, rare pyrox-glass clasts with xeno lithics & fiamme banded, local mud chips, reworked espinaso ss

Dom. Clast ST-ASC-35-1 (near base) local scour & fill ss

(35) Stacked/amalgamated debris flows, massive m.s. fg, hnb-volc dom. lacks pyrox-glass/opln clasts

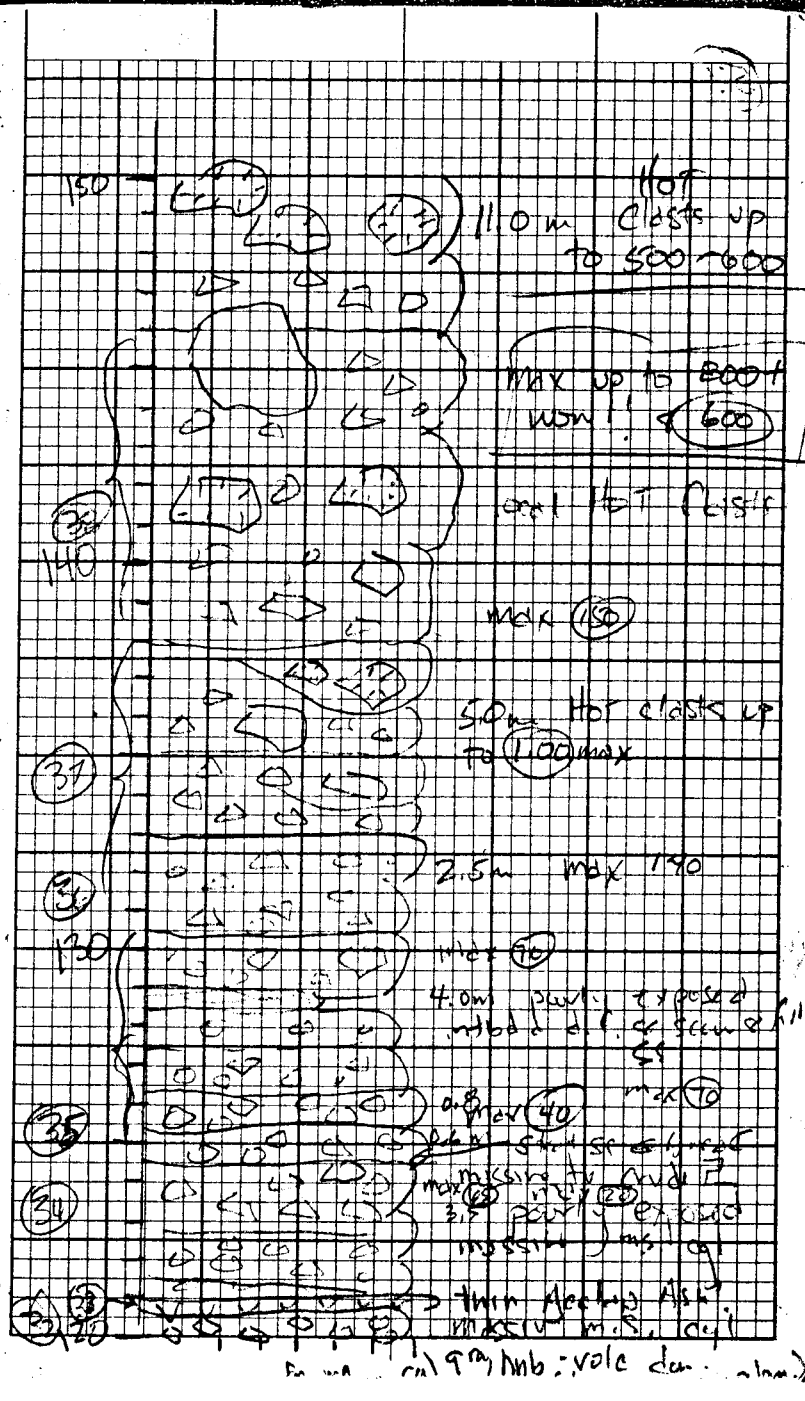
(34) 2nd Acc lap ash ST-ASC-33-1

(33) Dom. clast ST-ASC-32-1 (hnb-volc)

31-2 normally graded lithics in fm matrix with dispersed Acc lap?

Acc. lap. 31-1

(31) local acc lap Ash interbed with red normally graded lithics - in fg - layer (p.c.?) preserved in top. lobe SAMPLE ST-ASC-31-1 (Acc lap Ash) overlying lithic rich ... ST-ASC-2-...



(58)

(41) Same as (43)

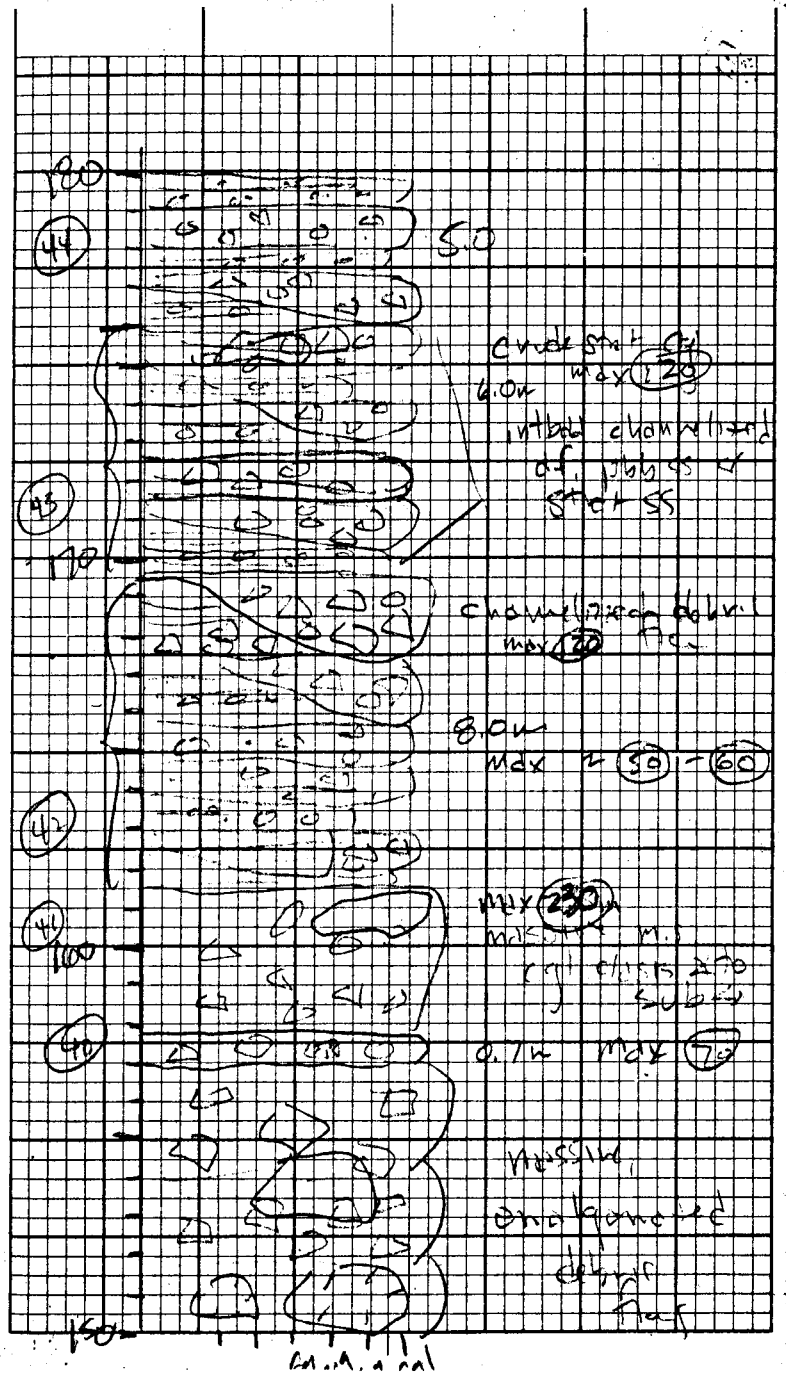
(43) Intbd pkg occurs as channel inset ← noticeable crude to good strat.
(42) occasional pyrox/glass clast-1
gray hnb-volc pervasive lithology
rare LBT clast

channelized scour
N. 25 W
Scour Axis N. 70° W

rare pyrox-glass clast
gray hnb-volc
SS sample ST-ASC-42-1 dcm

(47) intbd scour fill debris flow (massive)
crude strat pbb m-vcg SS, and
strat. m-cg SS

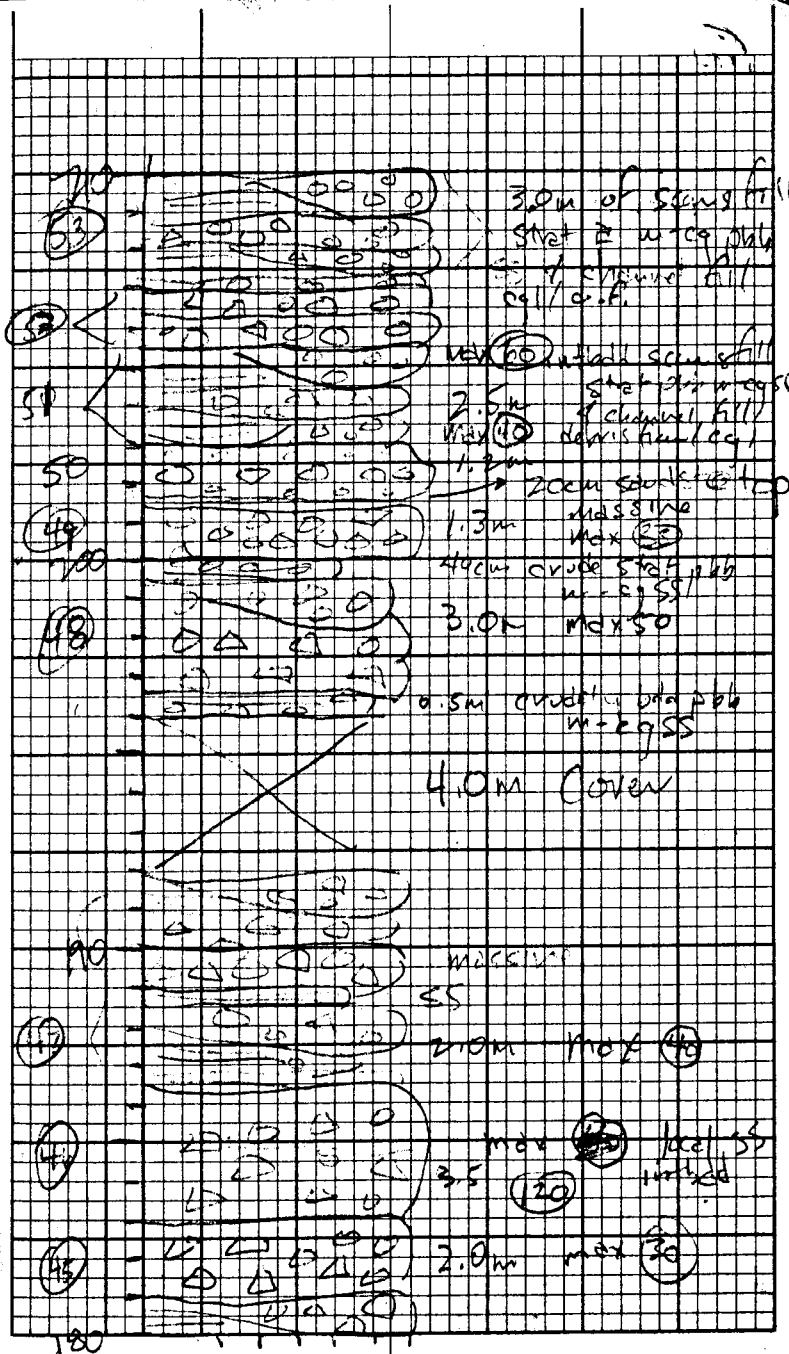
(46) Thin Debris flow cap
with some lrg clasts



(59) 7/14/87 Continue ASC Section
Look clasts on hillslope up to 200 more & isolated
(54) Scour Axis N. 52° W
cgl crude strat in max channel (59) fill
(52) Stacked massive debris flows, Avg (15)
sandy partings between flows
(51)
SS Sample ST-ASC-51-1
incipient cooling structure, occassional pyrox-glom.
(50) debris flow, crude reverse to normal
max (40)
(48) 3.0m rested/Amalgamated debris
flows, massive disorg, imbr'd, m.s. cgl
clasts x-sub x Avg (10)

7/14/87

Scour Axis (1) N. 55° E, (2) N. 71° W, (3) N. 35° W
N. 25° E.
Dike Sample ST-MV-73-1
Dike orientation N. 26° W,
(47) Sandy fill d.f. with grad to crudely
strat cgl & pbbly ss max (2.00)
(46) massive to crude strat, amalgamated
debris flows
(45) Amalgamated debris flow
occassional hot clasts & glom clast



(60)

Clast samples ST-ASC-58-1 Dom clast
ST-ASC-58-2 Rare clast

Scour Axis N 48 W.

(56) intbdd massive ? crudely strat m.s. cgl with intbdd of pbb m-vcg strat ss, clasts: Size Avg (15) overall much scour & fill locks thick l.d. debris flow

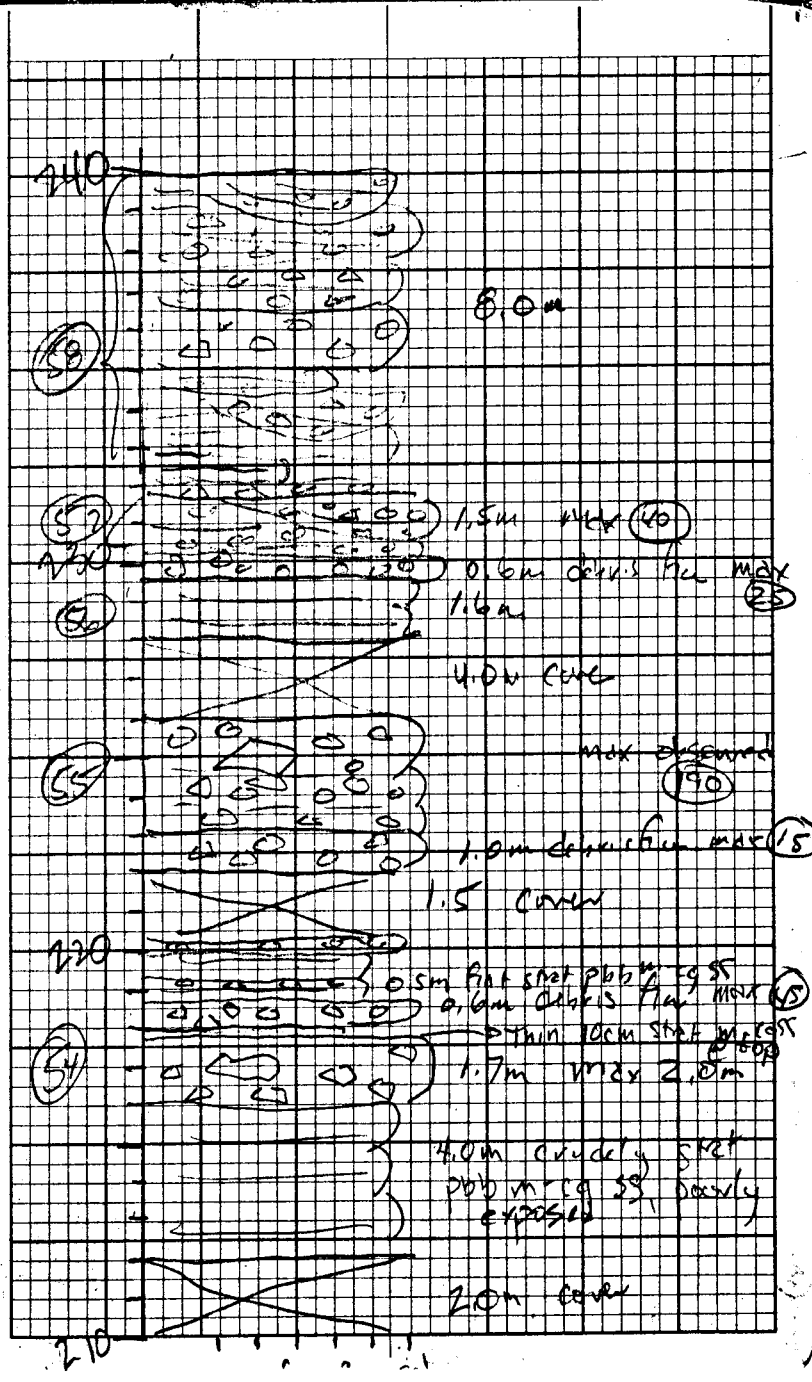
(57) strat pbb m-vcg ss/scour & fill
Scour Axis N. 80 E.

(58) 1.6m crudely strat cgl + pbb m-cg ss, scour & fill,

Scour Axis N. 15° E., N 15° W
Scour Axis N. 2° E.
Alt Bdd N 20° W 7° E.

(55) poorly exposed, analogous debris flow, some scour & fill
max clast observed = 190
clasts dom. lt gray mub-plag Volc

(54) massive debris flow, m.s.



(61)

Dun clast ST-ASC-64-1

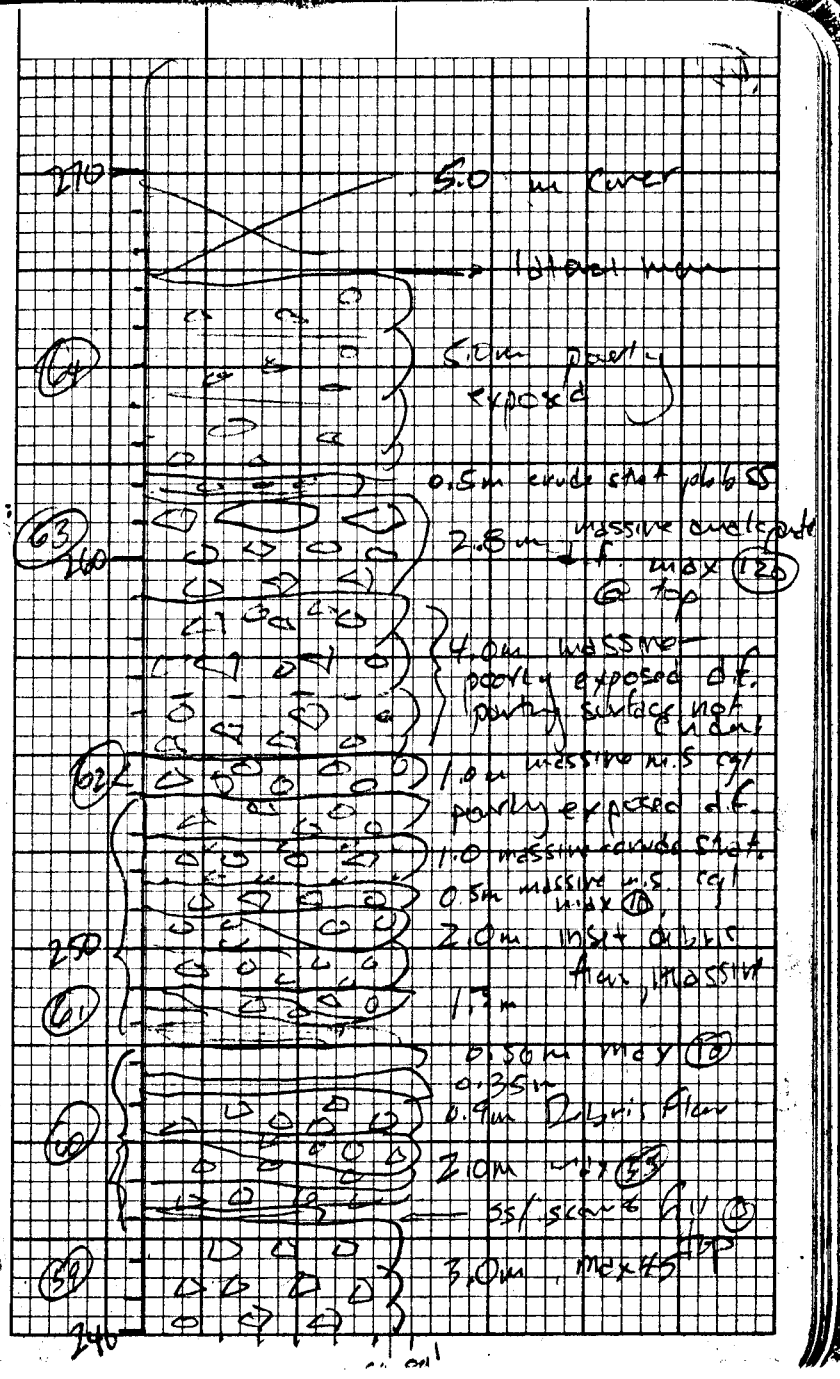
sample ST-ASC-63-1 Dun clast max (160) cm

(62) max (25)

(61) intbdd sand & fill strat w-eq pebbles & m.s. eql crude strat

(60) local sandy sand & fill partings in debris flows Grayish-dole dun. ST-ASC-60-1 Dun clast occassional glass-pyrox

(59) Amalgamated debris flows, partings not evident



(62)

max (70) →

(67) rare dark pyrox-glass clast

Sample ST-ASC-67-1

Dark clast ST-ASC-67-2 ↘

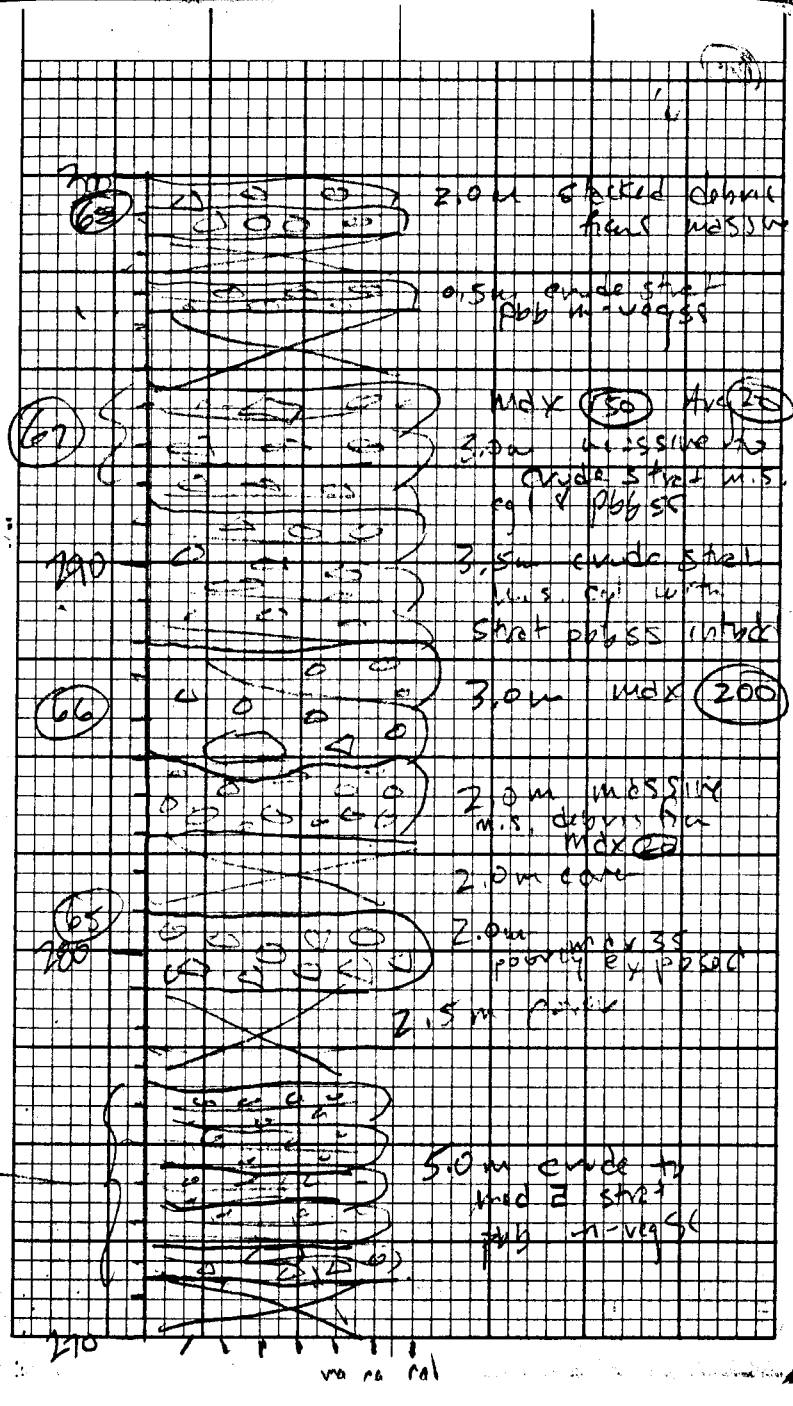
(66) 3.0 m bedded/incised debris flow massive, m.s., hmb-volc dom. locally incised with crude strat m.s. cgl

(65) 2.0 m poorly exposed debris flow massive, m.s., hmb-plag volc-dom.

Look like HCF Deposits

max (60) (75) Avg (10)

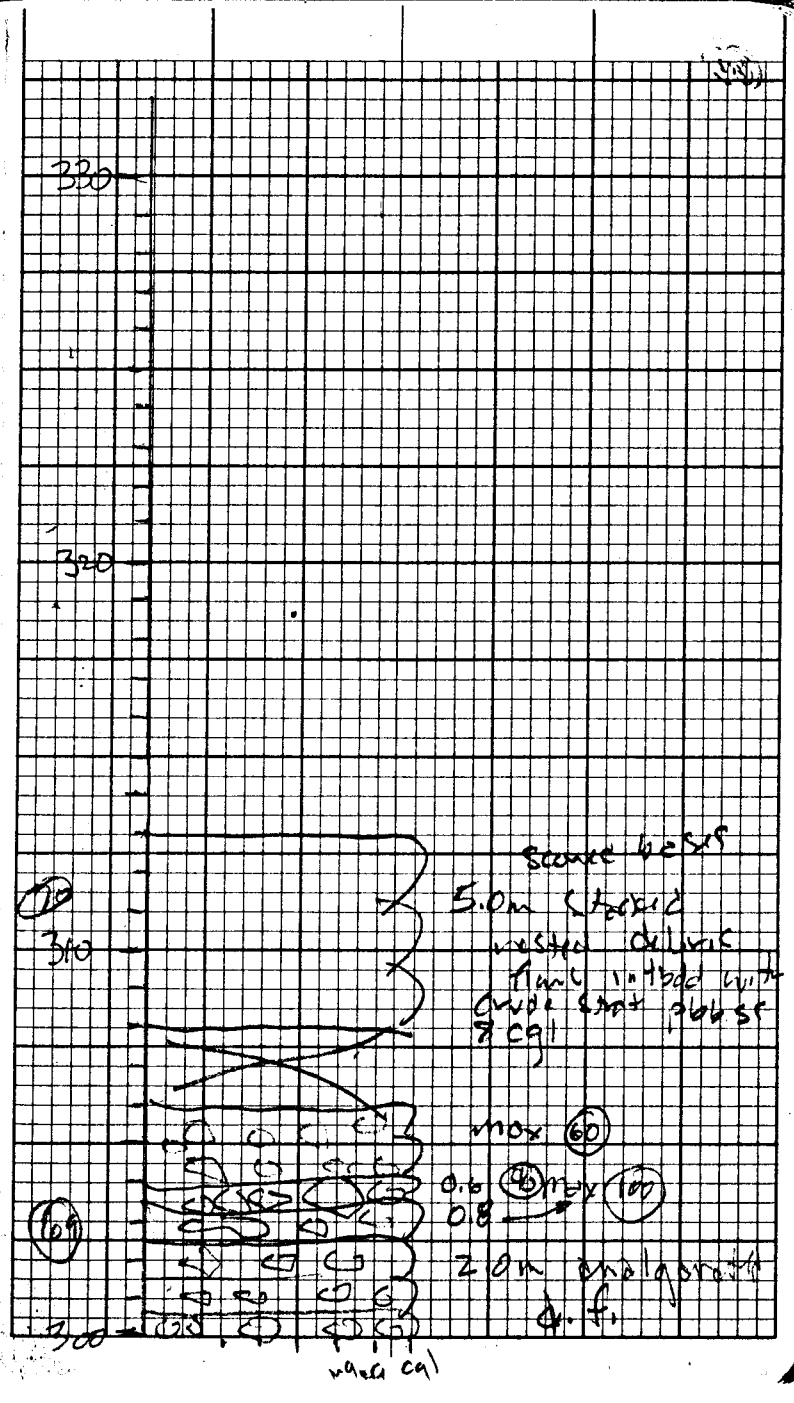
Sheet flow



(63)

(73) max up to (46)
Den Sample ST-ASC-70-1

(64) stacked deposit flows, thin crude strat pkgs of parts, some poorly defined



(65)

Pitoro Loc

ST-89-II-1 wasted photo

-2 typical exposure of amalgamated & lobed Espinaso debris flows (near ASC-18)

-3 very crudely stat, m.s. breccia (near ASC-18)

-4 Another - hnb-pyrox glom. volc. in debris near ASC-20

-5 "Debris flow city" near (ASC-22-24) field of view 2-15m, stacked, amalgamated, incised, & inset massive debris flows

-6 Scaled / irregular parting between debris flows, jac. staff for scale, parting highlighted by shadow

-7 mafic "cognate" lithic (center of photo) enclosed in larger hnb volc clast

-8 typical massive Espinaso Debris flow with large clast jac. staff for scale, top of staff defines shady parting & top of debris flow (inched ASC-28)

ST-89-II-9 - photo showing abundance of "hnb-pyrox" glom. clasts in "lower red" espinaso fm (ASC-28) (10 cm gradation on jac. staff)

-10 photo of contact between lower "red" espinaso (hnb-pyrox glom. clasts) and upper "gray" Espinaso (hnb-dom. clasts) contact @ top of ASC-29

Note boulders weathering out of "Gray" Espinaso in distance

(ASC-38 - 3. Pulled thru ASC-31 hill)

-11 10+ m volc clast/boulder weathering out of Espinaso Debris flow @ ASC-38

Clearly the largest clast viewed in the study

-12 6-7 m boulder stem on hillslope as they weather out of Espinaso Debris Flow Fm @ ASC-38

(64) 7/21/89 Field Recon — Fine tuning/photos

Dike ①

Samples needed — Class Dike

② Dike wall @ mv-9

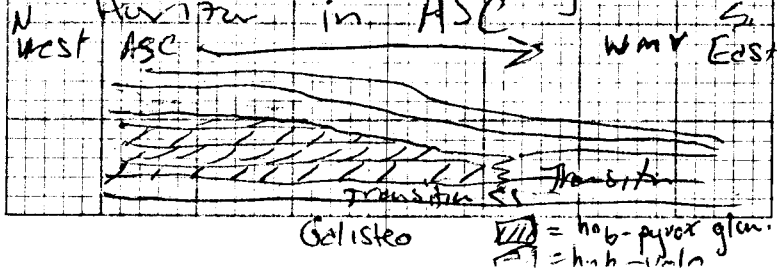
③ mafic Dike @ RR Trax mv-62

④ Leucocratic Dike @ mv-65

Tertiary Ideas - Espinoso Lava Flow (Tef_2) is localized in occurrence on west portion of field area, evidence for proximal relationship to Cerrillos Hills source. Also clast size ↑ to west, no. of clasts ↑, & also Espinoso "section thickens to west → "proximalizing" toward Cerrillos Hills!!

ASC-11 Green gray mystery unit appears to be andesitic debris flow that are reactivity funny

AGAIN, IN sections to west, seeing more debris flows with hnb-pyrox glom. clasts for considerable distance up section (in ASC - to the Red/Gray Espinoso contact) while in more distal Windmill Valley, only place you see hnb-pyrox glom. clasts is in transitional facies - the 1st WMV debris flows do not carry pyrox-glom clasts → a function of progradation into WMV — by time 1st debris flows hit WMV - your out of the pyrox-volc mode (into upper hnb-volc dom mode reflected by "gray" Espinoso Horizon in ASC



(66)

ST-89-II-13 - possible Ash Fall tuff horizon @ ASC-31, isolated Acc. top evident, pen for scale 14; Amalgamated debris flow from Gray Espinoso Horizon note 2 c.m. boulder @ upper right (ASC-35 through ASC-37) field of view ≈ 15m

-15 Dominant clast (@ ≈ ASC-36) in gray Espinoso, gray plag-hnb volc, note absence of long blocky pyrox phenos in contrast to clasts from lower "red" Espinoso

-16 3+ meter boulder @ ASC-38

ST-89-II-17, 18, 19 Hot clast city @ ASC-38 (v. proximal to Volc. Source! Bg & Hot clasts @ ASC-38!?)

-20 incised/intbdd/rested Strat ss & crudely strat pbbls ss @ ASC-42

-21 crudely strat ss intbdd between debris flow @ ASC-40-42

-22 incised & rested debris flow deposits with thin discontinuous intbdd of crudely strat cgl ss & strat ss @ debris flow pauses

-23 NW trending biotite Dike @ MV-73 (looking along strike)

-24 Another shot of Cerillos Volc. Center to NW - remnant volc. core of Source for Espinoso Here? (Seems so doesn't it?)

(67)

ST-89-III-1 photo of base of MV71 section behind Crentels Place — well stat, quartzose (white) SS of Galisteo Fm — overlain by red (mixed T_G-T_E) transitn SS facies. Day pack lower right for scale (Bed MV71-1)

III-2, 3 contact between clean (white) arkosic Galisteo SS and overlying (red) Espinaso transitn SS facies with volc. clasts (MV71-1 & MV71-2)

Backpack for scale & sits on sharp contact between white & red SS

III-4 close up of Espinaso transitn SS facies (MV71-2) well stat m-cg pbb SS with volc clasts. Hammer for scale. Note volc clasts near hammer

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III-5 well stat transitn SS facies. Shows mixed, yellow Galisteo pbb (arkosic/well rnd) with Dem gray volc. Pen for scale

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III-6 scour & fill channel cgl in transitn SS facies (MV71-2). Hammer pt - rear yellow well rnd Galisteo pbb, pen lies at base of petrified wood clast, clasts comprised predom. of volc. lith. Large yellow clast @ rt-center is remarked Galisteo SS

III-7 (Bed MV71-4) crude stat pbb SS in transitn facies, predom. Esp. volc. clasts, admixture of Galisteo pbb. Hammer for scale

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III-8 (Bed MV71-6) 1st decent looking debris flow poke in transitn facies, Hammer for scale. Sits on top of clast with incipient cooling fractures, probably several thin d.f. amalgamated

III-9 Bed MU71-9 — 1st v. thick prominent d.f. (amalgamated) pkg @ base transition facies — ledge forming breccia 4.0m thick Note 2.0m thick boulder in left-center of photo

III-10 pen for scale, (Bed MU71-6) close up of pyrox-hnb glomero-porph clasts typical of lower Espinoso Section

III-11 Scour & fill cgl in transition ss facies @ MU71-7 crudely strat, Hammer head sits @ scour contact, Hammer for scale

III-12 cut & fill, crude strat cgl ss & strat ss @ MU71-11 Horizon Hat & Hammer for scale

III-13 representative 8m of Section @ MU71-14 thru MU71-18 Acc top tuff MU71-17 @ base of uppermost bed in photo

III-14 MU71-19 thru MU71-25 Top of MU71 Section Boulder-rich Het clast Horizon @ Top (MU71-24 & 25)

7/22/88

CONTINUE PHOTOS & FINE TUNING

(On Cerro De La Cueva Section)

III-15 - Photo @ Bed CC-1, 2, 3 shot of strat ss interbed with scour & fill cgl & crude strat cgl — overlain by amalgamated debris flows (MU71-7 Section) Joe Staff for scale

III-16 - close up of debris flow @ bed CC-3, note v. crude reverse grading, common in Espinoso Debris flows

III-17 close up of gray hnb vole dominant clast @ CC-2 and upward, note in contrast to hnb-pyrox glom clasts

III-18 photo taken @ MU-67 (prominent exposures on west side of entrance to Cerro de la Cueva) strat equiv. to MU71-24&25, close up of hnb-pyrox glom. clast Joe Staff for scale

(69) Note: It's Amazing @ MV-67, equiv to MV71-24625 readily see hnb-pyrox glom. clasts, but in Strato ruined. Above (CC-1 equivalents) glomy's are rare & gray hnb vole. are dominant — 2 Bm below CC-1 @ MV-67 — the hnb-pyrox glomy's come in v. strong contrast and very rare, pyrox-glomy in Strat above CC-1

III-19 photo @ MV-67, Strat equiv to MV71-19 to MV71-25, Jac Staff for scale, interbed scour fill gravels & Strat SS, interbed with thin debris flank (Bed MV67-3)

III-20 scour & fill gravel, typical of those used to determine paleocurrents, sole marks allow oped orientation, ~~looking~~ photo looking dd Scour Dx is oriented N. 12°W (MV67-3) @ MV-67, Hammer for scale

III-21 close up of massive, thin debris flow @ MV-67, Jac Staff for scale (Bed MV67-3)

III-22 Another hnb-pyrox glom. vole clast @ MV-67 (Bed MV67-3)

Questions to Ask — where do the Colisteo clasts go out, where do pyrox-glomy's go out, where is the Red to gray matrix (Espinaso) transition? How Do HOT clast/Boulder horizons Line up? Look @ red vs. gray relation to HOT Boulders in CC vs A@

III-23 Soft gray vole clasts weathering out of Espinoso debris flow, near CC-10, stop on volcaniclastics field trip, glomy's questionable "glassy clasts"

III-24 Scour & fill, Strat SS & crude Strat pbb SS to cgl Jac Staff for scale @ Bed CC-17

ST-89-IV-1 weathered horizon of punky pumiceous clasts? Bed CC-16 Questionable "pumice" horizon viewed on volcaniclastics field trip. Hammer for scale

IV-2 close up of flow banded hnb-vole clast @ CC-17, common in this strat. vicinity. Pen for scale

IV-3 Baked, resistant Espinoso standing on end, adjacent to NW trending "Class Dike" (dark brown, on rt of outcrop, Jac staff for scale

Dike Sample Class Dike MV-75-1 (@ MV-75)
Orientation: N. 22 W.

IV-4 Dike & Slickenside @ bed boatman CC-28 Jac staff for scale

IV-5 Acc Lap Tuff @ CC-27, 16 cm rule for scale

IV-6 photo showing bdd relationships between debris flow (CC-26) and Acc lap horizon (CC-27) Jac staff for scale

IV-7 Groove cast at base of debris flow (CC-28) used in determining bidirec. paleocurrent direction) hammer for scale

~~Scour Axis @ CC-28~~
~~N. 72°W in bdd~~ Ave Bdd: N. 20°W. 12°E.

IV-8 outcrop photo of "Don's P.C. Flow", typical indurated Heerkley appearance, Jac. staff for scale @ Bed CC-32

IV-9 Generic shot of debris flow interbed with crude strat dep. Jac. staff for scale

IV-10 massive mud debris flow, Crude rev. grade @ base

IV-11 inset crude strat cgl overlying massive debris flow (MV-9) CC section near "Dike wall" Jac. staff for scale

IV-12 massive to perhaps v crudely reverse graded debris flow deposit (near "dike wall") (MV-9)

SAMPLE "Dike wall" @ MV-9 ST-MV-9-1

IV-13 modern Arroyo Scour & fill in action!

IV-14 Hot clasts @ upper portion of bed CC-39

IV-15 Hot Bowden @ CC-43

IV-16 overview of Hot Bowden horizon @ CC-41 through CC-46 Section in view is total of 35m

IV-17 "Ashy"? layer @ CC-48 (ved f.g. matrix) overlain by reddened debris flow grading up into gray debris flow, pen for scale

(71)

IV-18 Amalgamated debris flow horizons in vicinity of bed CC-46 Jac. staff for scale

NOTE large bridge detriving from top of flow adjacent-left of Jacob staff

IV-19 Strat pbb m-vcg ss with channel/scour fill cgl lag (Sheet flood) Jac. staff for scale

IV-20 crude strat cgl overlain by more massive debris flow near MV-27

IV-21, 22, 23 - @ MV-26 Equivalent to strat. horizon near top of CC section — interesting depositional topography Separating debris flow units

★ Boundary between Lower Red Espinazo & Upper Gray is between CC-24 & CC-25 @ ~120 m in the CC section (Evident in ext creek bkg wash just below Acc Exposure @ CC-27

Red to gray in CC section less pronounced than in ASC section, also do not have the pyrox. clast relationship as in ASC section

IV-24 overview shot of short Section measured @ MV-67, addition to be tacked onto base of CC section. Total section exposed in view is ~14 m thick (MV67-1 from ~3 m up) The lower 9m of (MV67-4) firmly bdd debris flows & crude strat cgl contain pyrox-glass clasts, while the upper 5m of more massive amalgamated debris flows do not interesting clast comp. relationship the into ASC section??

(71) (72) MU-67 section

ADDENDUM TO C.C. section

measured @ bold exposure to an
west side of entrance to Canada
de la Cruz @ MU-67, this is
decisive that the phase out of
pyrox-glom. clasts have base
top of this section directly
base of the CC section CC-1

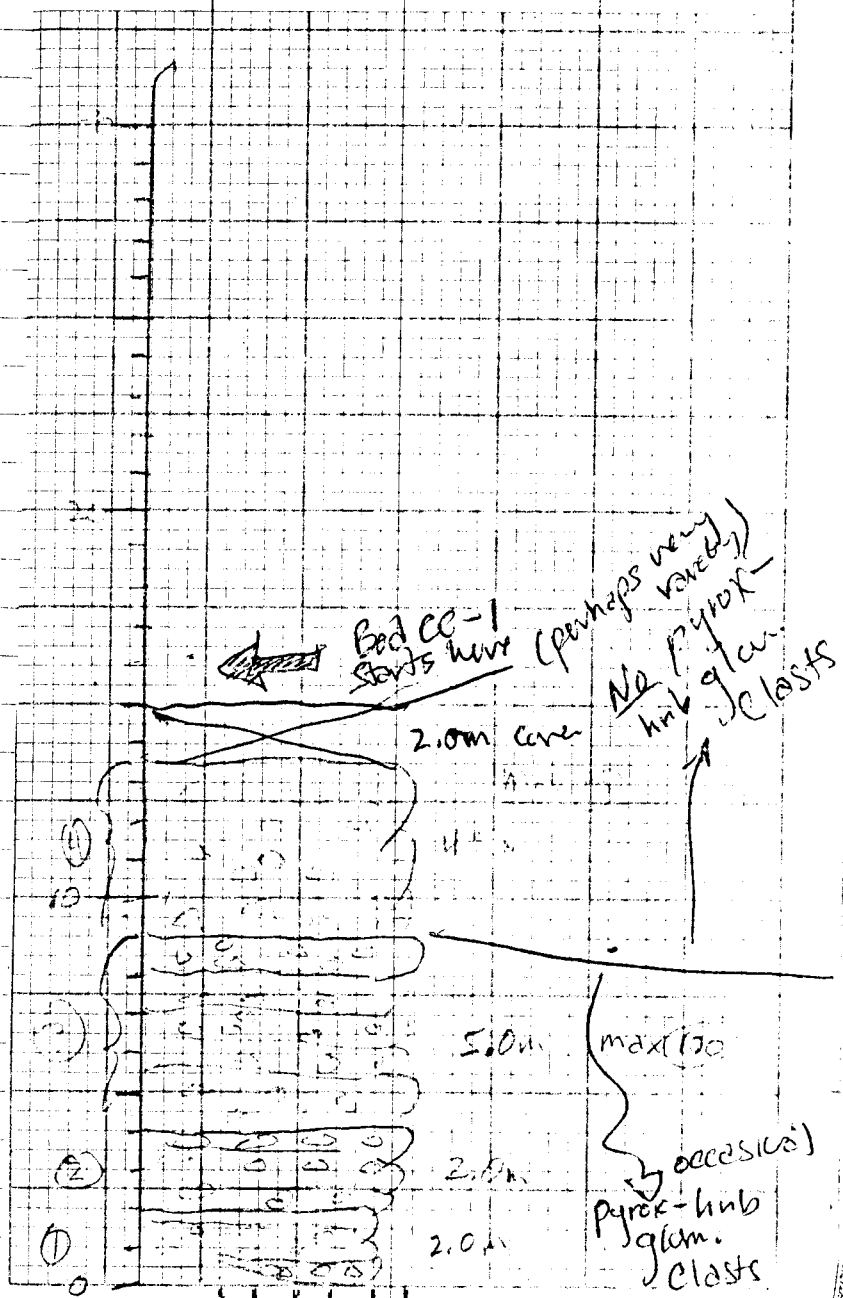
(4) 4.5m of [illegible]
6 I [illegible]
only pyrox- glom. [illegible]

Clast Sample ST-MU67-3-1 (pyrox-glom)
ST-MU67-3-2 dom. hnb volc

(3) Stacked thin dips [illegible]
thick units thin interbedded [illegible]
pebbles-gran hnb volc clasts dom., still
heavily scarce 1-2% pyrox-glom. clasts
*Clast Samples ST-MU67-3-1 subord. [illegible]
ST-MU67-3-2 Dom. [illegible]

(2) 2.5m crudely stacked m.s. cgl with thin
massive lenses grey hnb volc dom with
comment, notes 1-2% pyrox-glom. clasts

(1) x-bdd m-vcg ss with [illegible]
Channel lag cgl (max (3))
Common volc clasts



(73) 7/23/89 LAST DAY with Don

ST-

Dike Sample MV-65-1 leucocratic Dike of MV-65

Dike Sample ST-MV-63-1 NW trendy dike @ MV-63 (near RR Trax)

YES 1st Debris Flow @ MV49 (MV49-9) = NO Galisteo pebbles (approx 9 ft)

IDEA: In windmill valley see very little to no Galisteo pbb in transition zone, and no Galisteo clasts at all in overlying debris flows, whereas in the ASC & MV71 sections, we see very noticeable Galisteo clasts well up into the section — again a function of the Precursor paleo-relief

ONLY SEE Pyrite-glass in transition SS @ windmill Red (Not about gitmo) valley

ST-89-

V-1 photo of transition SS facies @ bed MV49-49, Hammer for scale

V-2 photo of gravelly scour & fill intbdd in Red SS transition facies

V-3 thinly bdd strat SS with volc gravel lenses in gray transition SS @ bed MV49-8

V-4 1st Espinaso Debris Flow @ MV49-9, Good Reverse Grading

V-5 — photo of MV49 section from transition SS facies through 1st Good Debris flow (MV49-1 thru MV49-9) Thick debris flow @ Top = MV49-9 Total section in view = 2 Bdfs

V-6 Shot of Don set up for Grading profile @ MV49-9

GRADING Profile Data on p. 4-21

V-7 petrified log from yellow pbb Galisteo @ bed MV-59-2 Hammer for scale

V-8 overview of Galisteo Section @ MV59 section, MV59-1 thru MV59-4, Don for scale

Faulted Facing South

V-9 photo of Galisteo block on South side of windmill valley (fault near MV-37), fault contact at left-center of photo between gray Espinaso (on left, east) and Greenish Galisteo (on rt, west)

V-10 Looking @ Galisteo/Espinaso contact on S. side of WMV, near MV-60 I think it's faulted, notice section thickness variation between lower white Galisteo SS and first gray Espinaso Debrit (fault is strike/bdd parallel) Don to right for scale

(21) Grading Profile Data Co mv49-9, taking clast size Co vertical increments of 12 cm, load on some clast twice, count in twice, max diam. visible

Vertical Position (base for I)	max diam clast size (cm)	vertical position (cm from base)	max diam clast size (cm)	vertical position (cm from base)	max diam clast size (cm)
I 0	[illegible]	252	matrix	204	6.0
12 (4)	coarse sand	264	matrix	216	17.4
24 (8)	coarse sand	276	matrix	228	matrix
36 (12)	coarse sand	288	8.0	240	1.2
48 (16)	1.7 cm	II 0	[illegible]	252	matrix
60	1.2	12	matrix (eqss)	264	matrix
72	(coarse sand) matrix	24	matrix	276	14
84	3.1	36	2.5	288	matrix
96	matrix	48	matrix	III 0	—
108	matrix	60	0.2	12	eqss matrix
120	2.0	72	0.3	24	0.8
132	0.2	84	1.2	36	matrix
144	0.8	96	7.2	48	matrix
156	matrix	108	matrix	60	2.2
168	matrix	120	matrix	72	2.1
180	0.4	132	matrix	84	matrix
192	7.0	144	1.2	96	1.1
204	matrix	156	20.5	108	3.5
216	0.2	168	1.5	120	matrix
228	1.5	180	matrix	132	matrix
240	matrix	192	0.4	144	matrix

vertical position (cm from base)	max diam clast size (cm)	vertical position (cm from base)	max diam clast size (cm)
156	1.2	168	1.2	168	matrix
168	3.2	180	11.0	180	matrix
180	matrix	192	0.7	192	2.2
192	matrix	204	4.5	204	matrix
204	0.8	216	1.0	216	matrix
216	3.0	228	matrix	228	0.5
228	0.2	240	7.0	240	9
240	matrix	252	matrix	252	4
252	matrix	264	3.2	264	matrix
264	matrix	276	12.4	276	2.4
276	—	288	—	288	—
288	—				
IV 0	—	V 0	—		
12	matrix eqss	12	matrix eqss		
24	matrix	24	matrix		
36	0.7	36	1.6		
48	matrix	48	matrix		
60	3.1	60	3.4		
72	matrix	72	matrix		
84	matrix	84	matrix		
96	0.6	96	matrix		
108	1.3	108	1.5		
120	matrix	120	1.6		
132	matrix	132	matrix		
144	3.7	144	0.5		
156	matrix	156	18		

(74) V-11 photo of lower reddish-white Bed Galisteo Arkosic SS (MV60-2) in contact with overlying yellow phySS (Galisteo) (MV60-3) Jac staff for scale

V-12 Near base of wmv section beds wmv-5 thru wmv-9, wmv-7? 8? HOT Boulder/ clast horizon ~ 35 m above base of section, No sign of pyrox-glom. clasts at all in wmv

~~NOTE~~

Red Espinoso to Gray Espinoso transition is @ top of wmv-9 (50 m), in wmv section, no sign of ~~pyrox glomy's~~ at all in wmv section

V-13 Debris flow typical of wmv section @ wmv-11, jac staff for scale

(76) Photo Log -

ST-89-I-1
Jay's Code yr Roll # Frame #

ST-89-I-1 - photo showing contact between Eocene Golistero Fm (lt colored rocks to rt of photo) and Darker gray Oligocene Espinoso Fm. (Forming cliff ledge to left) Shot from Henderson - Simmons Access Road

ST-89-I-2 Ortiz Mtns to SW of Study area (oligocene volcanic center)

-3 Photo of typical Eocene Golistero Fm (Arkosic - Lavenida Strata) along NM Highway 14 near "Garden of the Gods" (near Henderson - Simmons Access) Golistero underlies Espinoso

-4 Hill-capping Lava flow & flow breccia (Tef_2 of Disbrow) near base of MU-72 Section (Bed MU-72-4), Lava flow overlies Golisto - Espinoso transition facies near base of Espinoso Section

-5 Base of MU-72 Section, Golistero Fm (MU72-1), Note white color - Arkosic, pet. wood visible

Yellow Jacob staff 2.0 in. 10 cm gradations for scale

Stratified Arkosic SS

ST-89-I-6 Shot of flow breccia in bed MU72-4 (Tef_2) near base of Section (Jac staff for scale)

-7 - internal lava flow breccia overlain by lava flow / Jac. staff for scale MU72-4

-8 - Flow breccia (Tef_2 of Disbrow) near base of Espinoso Section on west side of outcrop belt (bed MU72-4)

-9 Cerrillos Hills - Oligocene Volc. Center NW of Study, Espinoso Fm becomes thicker, with > clast size, > no. & % clasts, & intbdd lava flows to the NW - proximal in direction of Cerrillos Hills (compatible with Paleocurrent data)

-10 Lava Flow breccia, Jac staff for scale, "Tef_2" Bed MU72-4

-11 photo of 1st Good Angular Espinoso Dif. pkg above transition zone (Bed ASC-10) correlative to horizon @ MU71-3

(17)

ST-89-I-12 Close up of I-11

-13 localized outcrop of well rnd Celisteo pbly SS, crude to good strat, jac staff (10cm graduations) for scale, near base of ASC Section

-14 photo of ASC-2, well strat. red transition m-cg SSa pbly SS, predom Collistco (well rnd) pbly with few Espinoso volc pbls

-15 of ASC-3, gravel lag with mixed Volc & Collistco clasts

-16 ASC-3, diff. view, well strat m-cg & pbly SS scour-gravel lags — Transition facies base of ASC section

-17 - Mnly-pgrav conglomeratic clast in section near base of Espinoso/ ASC section

-18 Base ASC-6, first good Espinoso debris flows coming into ASC section, 1-2m above transition facies of photo ST-89-I-16

-19: large clasts in Espinoso debris flow near base of ASC section (ASC-9 horizon)

-20 inset of amalgamated debris flow deposits near base of ASC section (ASC-10) note truncated lenticular well strat SS body near jac. staff @ left center of photo

-21 large boulders weathering out of Green-gray mystery unit @ ASC-11??

-22 - MU-72 Section showing mixed nature of Lava flow/breccia @ base of Espinoso

-23 Hot clast from near base of ASC-11

-24 massive cgl/breccia "pinching out" to left of photo. Apparently represents debris flow lap-out @ distal end of run or on-lap of debris flows onto sides of channel/ drainage Sketch on p. 55 (near ASC-18)

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Asc Section

Location	Pebble Size	Dry (lbs)
Asc-7	1.5m	20
Asc-15	4.0	50
-15	2.0	45
-19	0.8	40
-19	2.9	35
-19	0.6	15
-23	1.3	40
-24	1.7	150
	1.3	200
-25	1.0	6
	1.2	25
	0.7	60
-29	1.1	40
-35	0.6	50
	0.5	40
-40	0.7	70
-43	1.0	45
-49	1.3	35
-50	1.2	40
-52	.95	30
	0.75	28
-54	1.7	200
	0.6	45
-61	0.9	25

Location	Pebble Size	Dry (lbs)
	0.9	12
	0.25	12
	0.5	10
-62	1.0	20
-69	1.8	100
	0.6	40

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Location						
WMV-18	1.0	10				
WMV-19	0.4	35				
	0.35	20				
	1.0	45				
WMV-21	0.50					
WMV-22	1.3	45				
	1.0	40				
WMV-24						
WMV-26	1.5	10				
	0.50	15				
WMV-[illegible]		25				
WMV-29	1.0	5				
	0.5	40				
	0.9	10				
		25				
	0.4	4				
WMV-31	0.6	50				
	0.1	20				
34	2.0	30				
40						
41	1.0					

	44	0.50				15
		0.60				15
						(B)
		0.30				20
	46	0.8				70
	48	0.60				15
	49					(65)
						150
	51	2.0				30
	52	0.35				20
		0.80				75
	54	2.0				40
	55					70
	56					30
	57	2.0				50
	58					10
	62	1.0				15
WMV 71-	74	1.3				60
	76	1.0				25
	78	0.3				15
	80	1.5				10
	81	1.0				25
	82					40

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Data

Location	Rod Thickness	Min Class Sight
	.15	20
	0.45	25
	4.5	
9	0.15	10
	0.30	35
	1.5	20
		45
	0.6	45
	0.6	25
	3.0	150
	2.0	
	1.5	
	0.2	5
	1.0	5
	1.5	75
	0.75	
	0.70	7
	0.50	12

INDEX OF CURVE AND REDUCTION TABLES