

August 3, 1988; Espirazo Fm; Arroyo del Tuerto Section
with Luana Markers

(12) is a generally c-u, k-u sequence of largely (if not wholly) volcaniclastic sand. Most units are massive or plane laminated. Some units are massive at base and stratified at top. Bed at 21m has 1.5th pebbles in lower half and fine to coarse lapilli concentrated near top. Pebbles become abundant above 20m and lapilli are also coarser and more abundant. Erosion processes and dipos setting not clear.

SFP8809: fine ss concretion, unit (12)

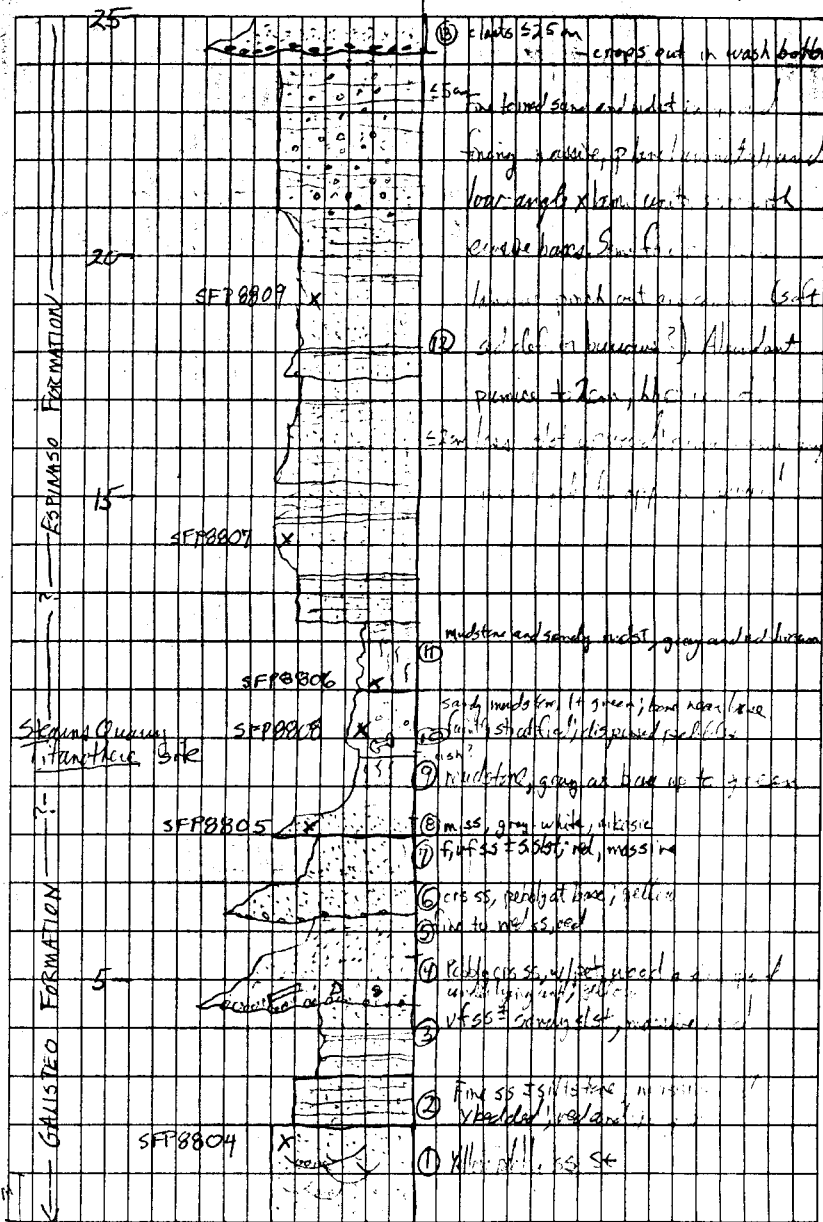
(1) grades down to (2) and contains green mudst like (1) with minor red brown mudst with purple to 3mm and more biotite and hb.

(1) to (2) is gradational

SFP8808: sandy siltstone. Straggling unit

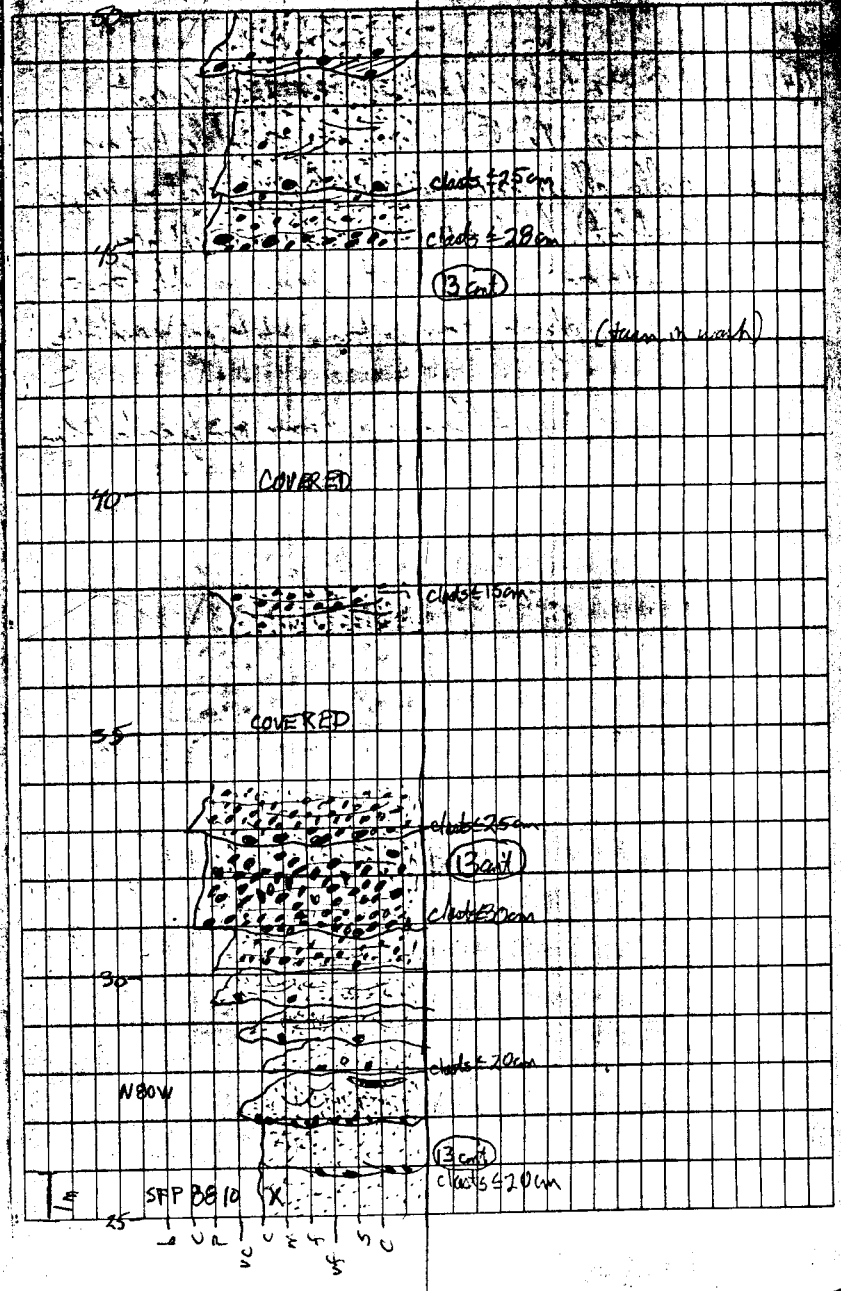
*PHOTO: Tilted face site in (2) is not ash (2) was hammer in upper (1)

(1) through (2) and into Galisteo Fm (1) is not (1). Just a few cm above 7m the ledge is an apparent white ash; ~1cm thick.



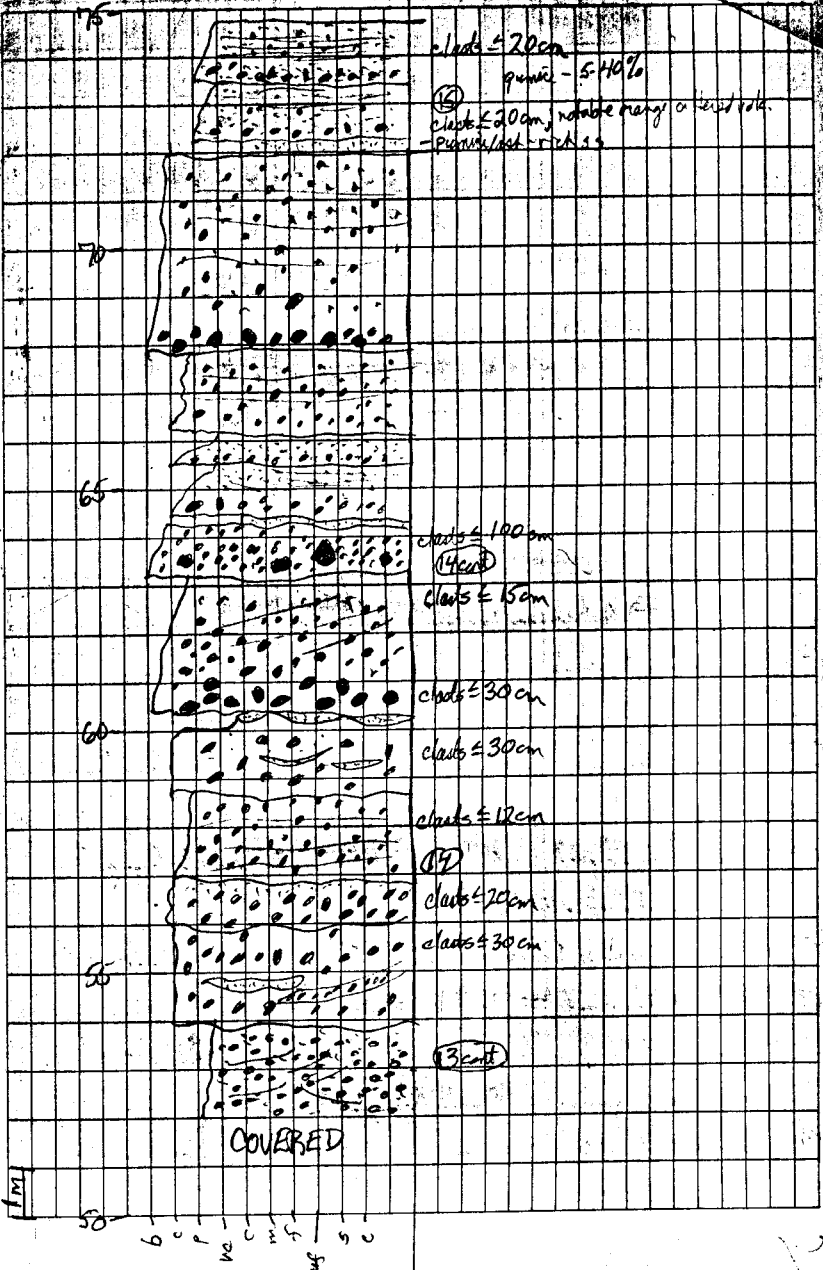
③ is a pebbly ss at its base and coarse up to sand pebbly sgl with small cobbles. Some trough crossbedding and relatively planar stratification. Clasts are all volcanic and are subrounded to rounded. This unit appears to be a braided stream deposit.

SFP 8810 is pebbly ss unit ③

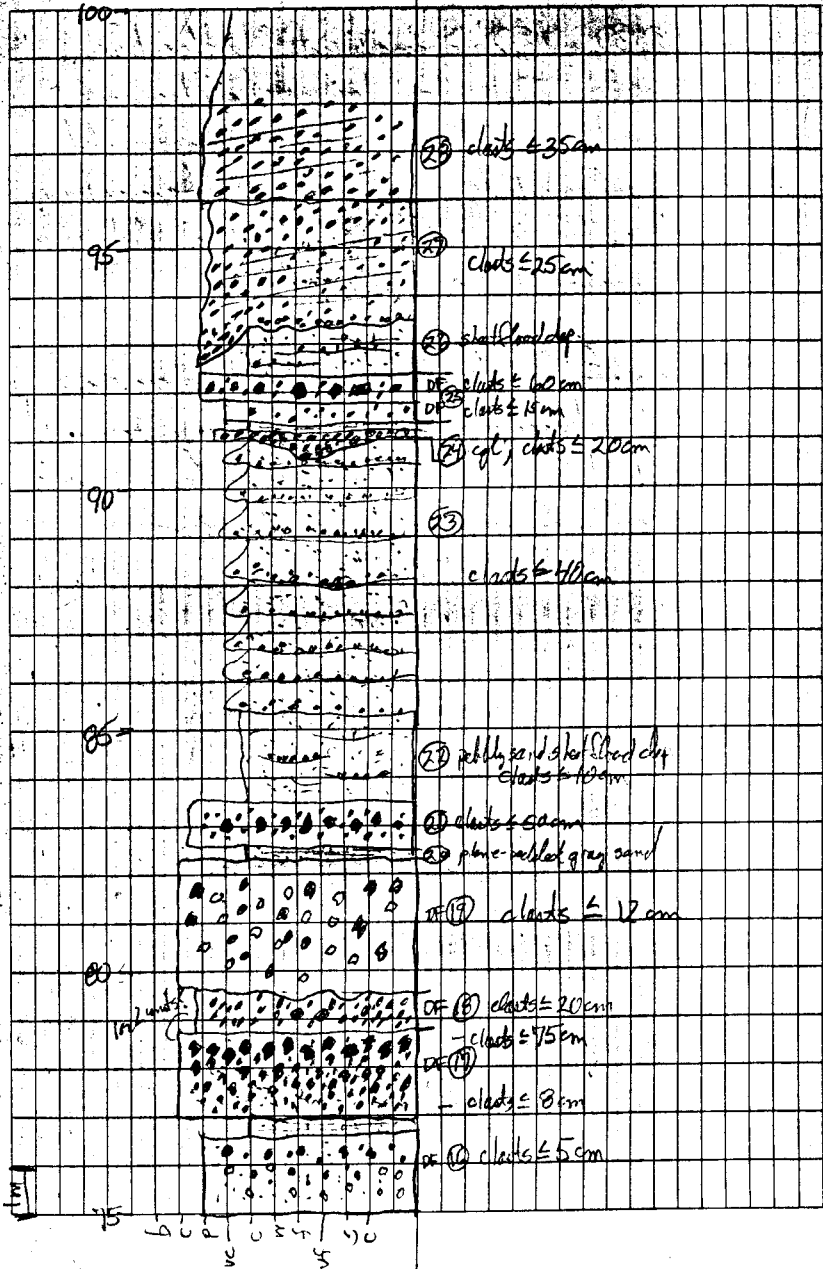


(14) is crudely stratified, chert supported sandy conglomerate that is coarser than (3). Plants are variable but are essentially all volcanic (see one petrified wood chert in place, one stone in chert). Chert colors are dark gray, light gray, brown and green; phanerocysts + abundance variable (30-50%) all are hb-phytic, some contain barite; rare xenolithic chert.

(15) is finer grained, more tabular and more poorly sorted than (14)

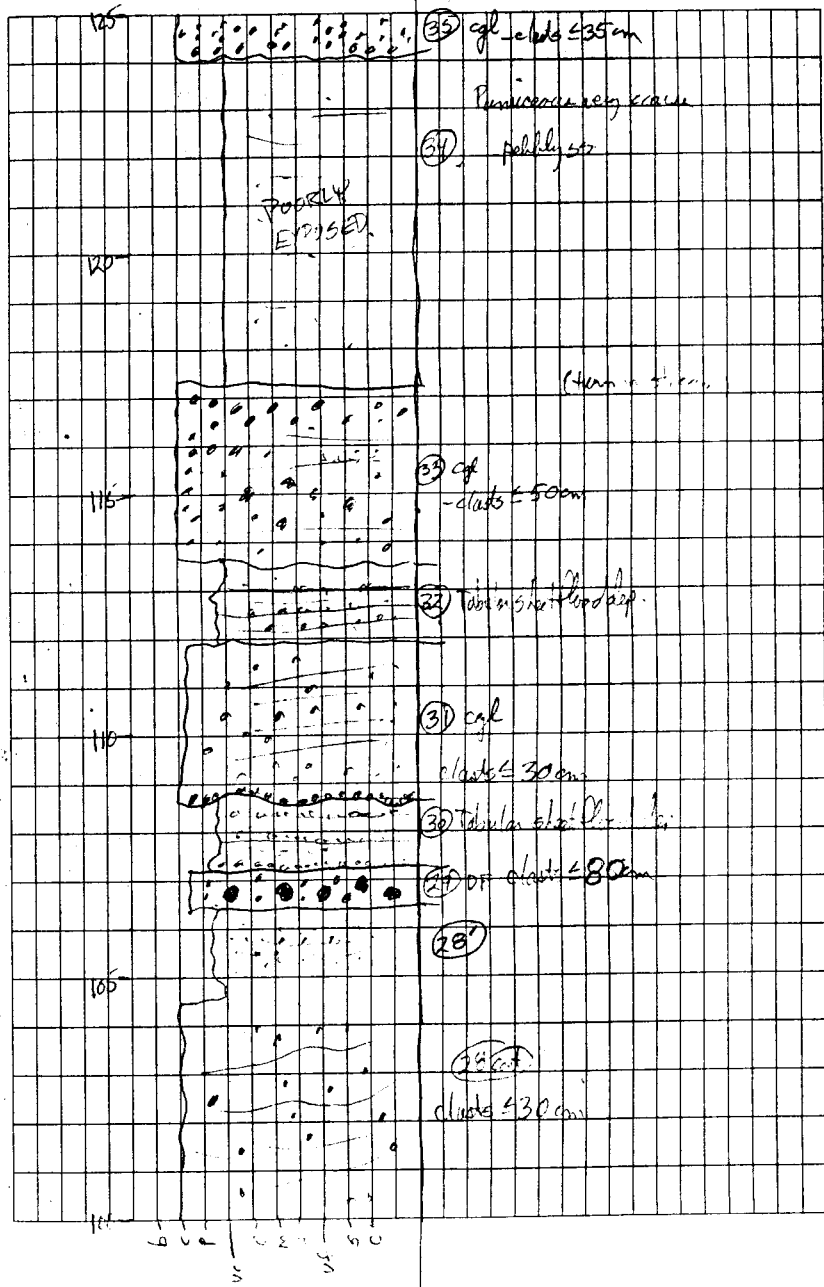


- (28) is similar to (27) but (ca. sea), capped by pebbly ss
- (27) Clast supported sgl, sandy, subangular to subrounded clasts
- (23) Probable steep flow deposits; tabular beds 0.3-0.5 m thick, complete of sandy of and pebbly sand
- (2) DF, massive normal grading, ~50% clasts, little porosity except for large soft lit. green clasts up to 50 cm
- (19) DF, tabular matrix, 1-3% porosity - 20-25% lit, mostly lit gray lit
- (9) Clast-rich (40%) ungraded DF; about 10% porosity
- (11) Clast-rich (50-60%) lit. is flow deposit, mostly dense lit. local clast support, coarse-tail, normal grading, mostly med lit gray lit
- (16) Fine-rich DF, dense lit. is largely rounded and ungraded; matrix supported, clasts are 20-30%, capped by plane bedded ss



units (28), (31), and (33) are conglomerate like those lower in the section. They contain horizontal and low angle stratification. Clasts are subangular to subrounded. Sorting and angularity are not quite as much as lower section. The intervals (28'-30), (32), (34) are distinctly fine grained and are more tuffaceous.

The significance of alternating relatively coarse and fine packages is not clear. The coarse units are probably longitudinal bar and braid-channel deposits. Poor sorting and angularity implies little reworking.



(15) 2 cgl beds separated by a coarse-grained pumice-rich sand

SFP8811: hb and Sclerom rich ss from (49)

(44) massive to lumpy ≤ 1 cm pebbly coarse sand with some tabular ss and ss by all hb and Sclerom

(42) thin massive lumpy about the same as tabular sand beds & the thickness of conglts (30-20 cm)

(41) Sandy pebbly to cherty cgl

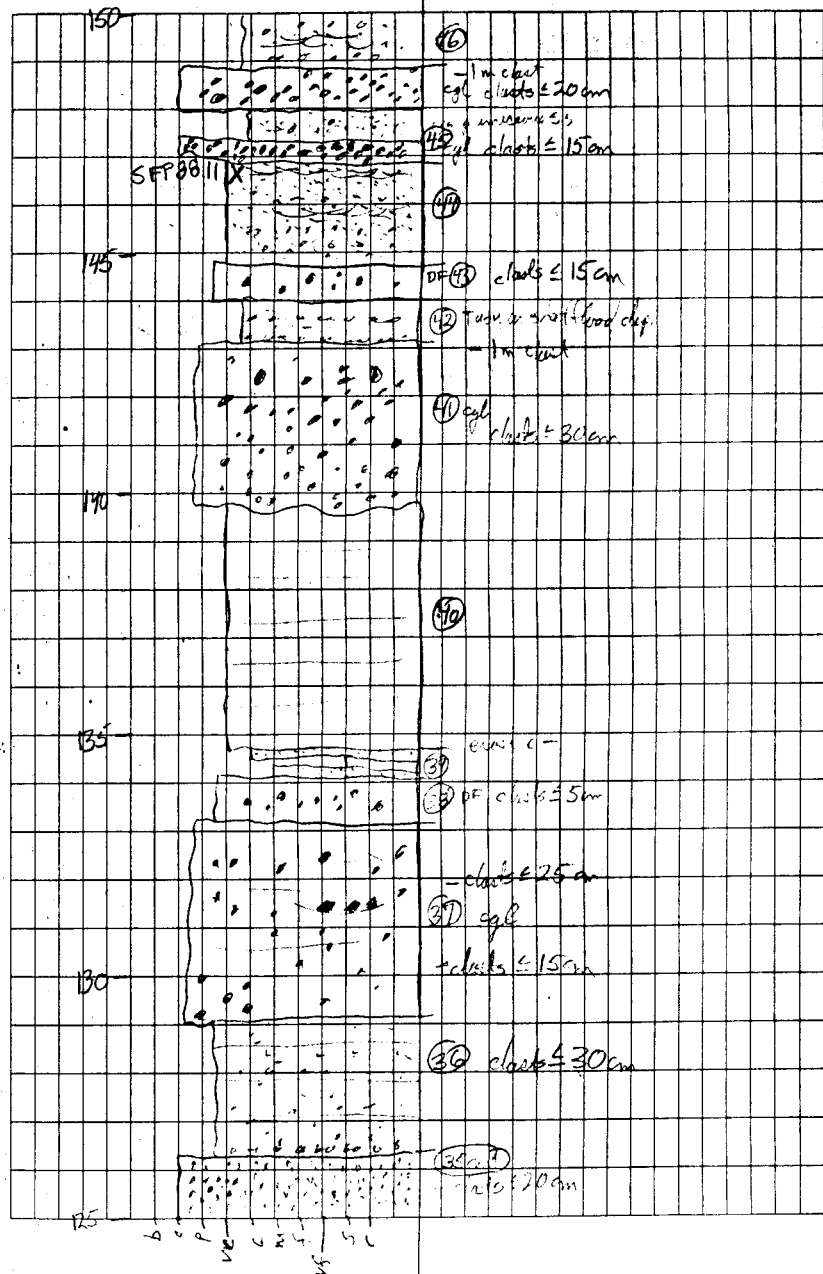
(40) Partly sandy sandy gravel and pebbly sand and thin gravelly into alternating coarse fine conglts. Probably tabular sand flood slope; may include some DF's

(39) Stratified sand with thin silty tone beds; abundant pumice.

(38) Fine gr. massive DF, clasts $\approx 30\%$

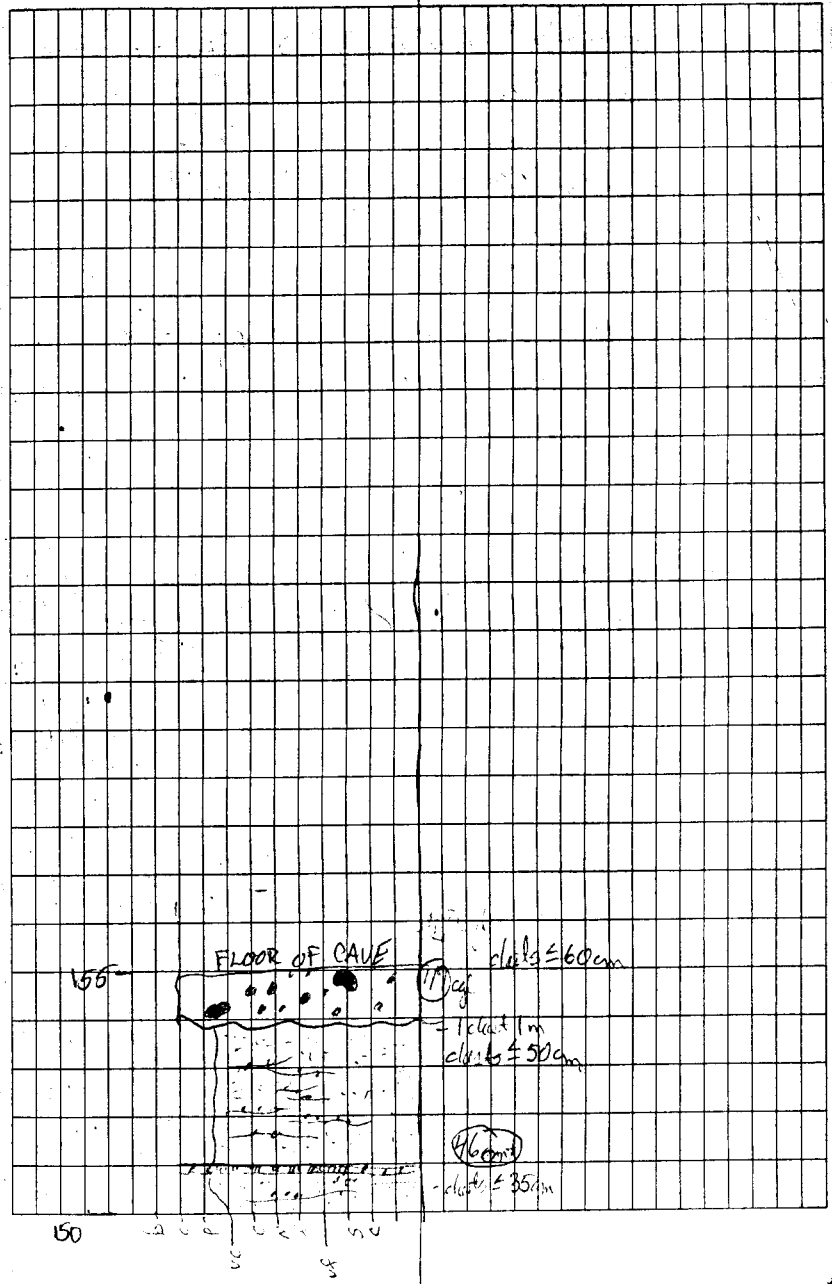
(37) sandy cgl; coarse hbr. bottom; one boulder hb

(6) coarse conglts of sandy gravel pebbly ss; tabular sand



The coarsening upward character of the section from 10m to 72m is very interesting. Above this are alternating sandy conglomerates and conglomeratic sands that are not as well sorted or as well rounded as unit (14). (14) looks like typical gravel-bedded braided stream deposits, but higher conglomerates do not show as much evidence of reworking.

(16) is more lenticular than tabular. It is not as abundant as (14) and has a more irregular texture.



SFP8906a,b,c,d,e → a collection of
cyl. cobbles.

(4) - Kautz's Santa Fe basalt is probably the
imbungite. Exposure is poor but it does
appear to have a conformable lower contact
suggesting that it is flow, not dike.

The rock is everywhere vesicular & amygdaloidal
with some greenish copper alt. vesicle fill.
How could they date this?!

SFP8907 - Imbungite?

SFP8908 - Espinosa (?) on lower contact
of flow

27027

July 17, 1989 - resumption of the Rio del Tuerto section from p. 105.

Except for minor debris-flow deposits these appear to be
braided stream facies. Cgl. are channel and long bar deposits
and ss are bar top and subsidizing channel. Cgl. not as
well sorted or clasts as well rounded as in (17)

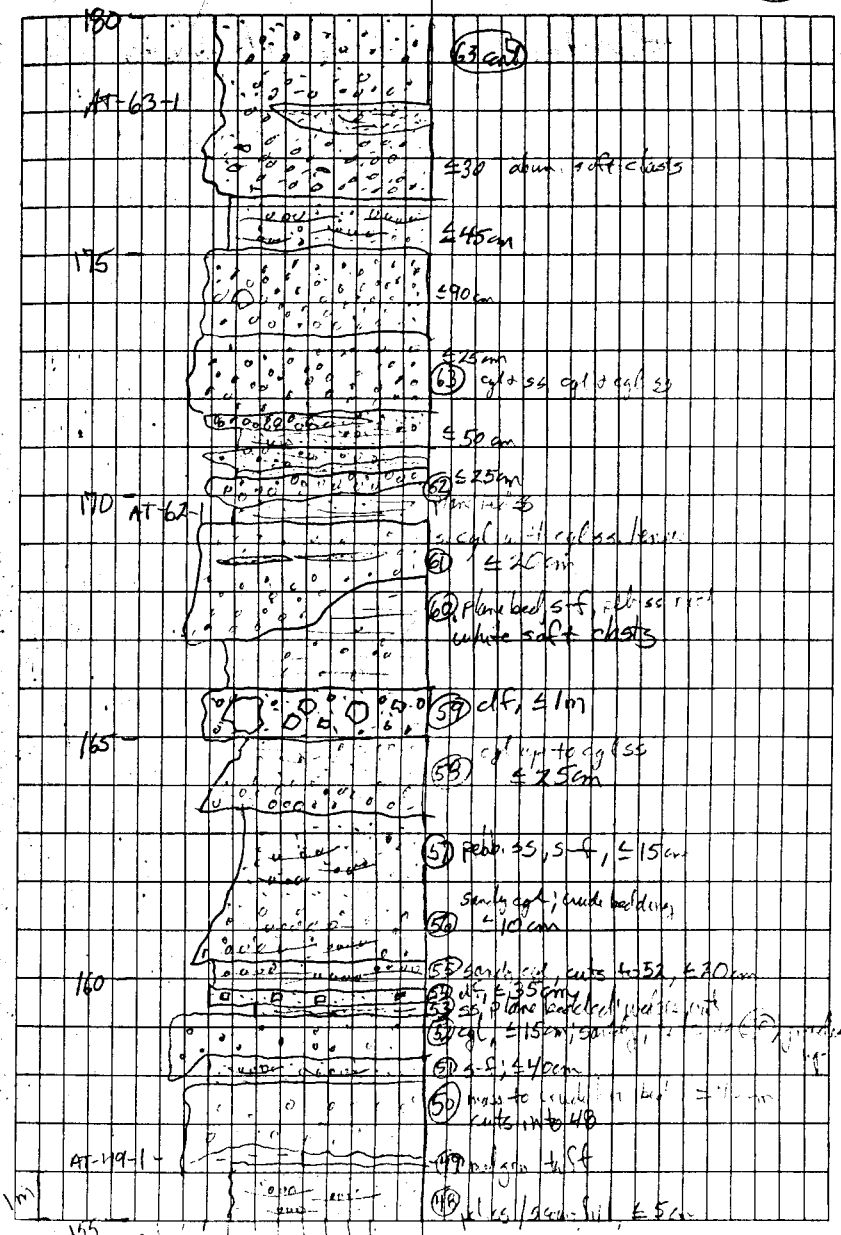
Imbrications N50-80W

GS-AT-63-1 - a prominent chert ^{TYPE} (59) (63)

GS-AT-62-1 - sandstone

(4) - apparent residual remnant of Collected

GS-AT-49-1 - tuff



US

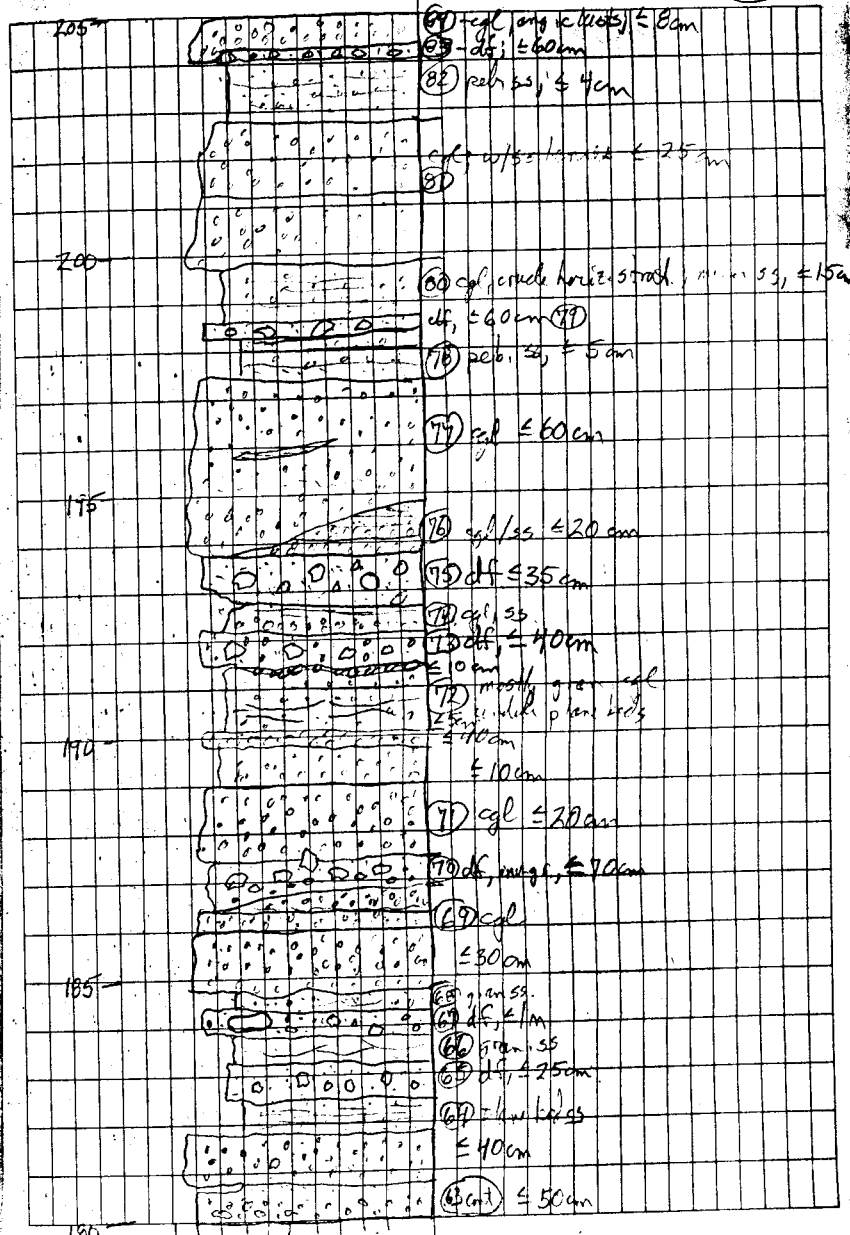
b c p v c

- section heads N/E up hill starting at (63) rather than following wash.
 - most prominent erosion surfaces are at top of relatively fine-grained packages (e.g. base of (49), (60), (77), (85)).
 Does this represent normal scour or base-level re-equilibration?

- except for (10), debris-flow units tend to occur with finer grained units. This seems to apply to section measured last summer, also. Debris flow deposits are very polyhedral perhaps because of bulking with distance.

- some suggestion of rounding of top of (10): local lag horizon explained by laminated silt/f. ss. bedded by overlying cgl.
 - recognition of dt not always straightforward. (10) recog. on basis of more v. matrix, rel. large clasts, less preferred orientation than over and underlying units. This is instructive outcrop near east edge of exposure ^{with some} near prism pyramid, ~75m east of cave.
 * PHTO to emphasize lateral dt. between dt(10) and adjacent fluid cgl.

(67-68) - notably no cgl in this interval

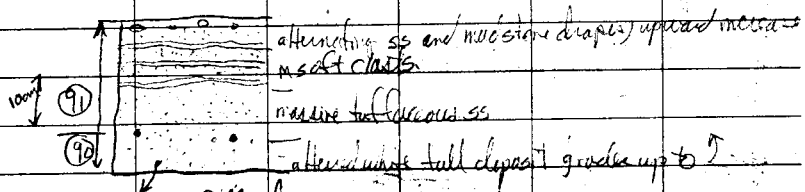


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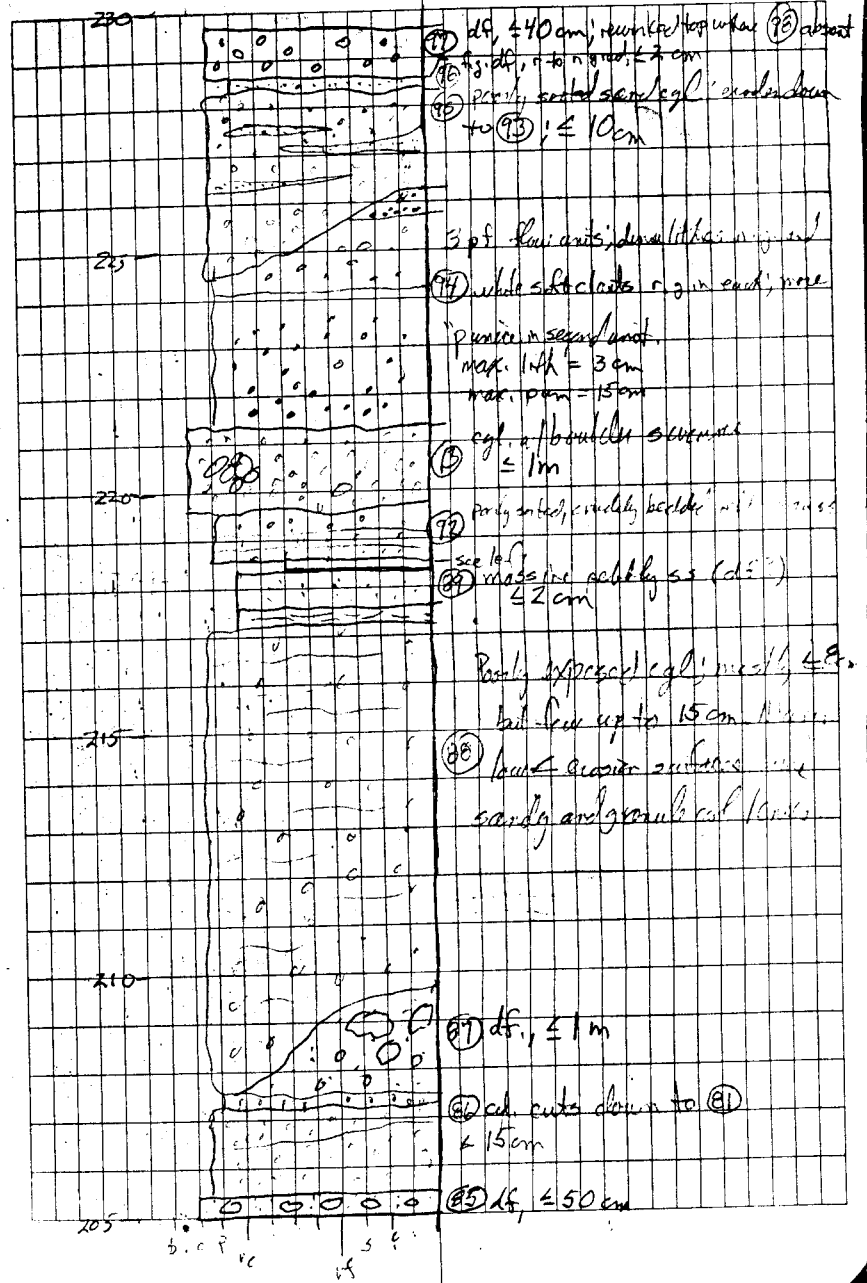
(104) - refer to pgs 59/unit 1 but bedding is only → rework on surge unit 2-4 have good dip & structure see underlying boulders → Sed
 * PHOTO of (104) GS-AT-104-14 through → samples of each layer
 * PHOTO of top of (103) showing upward reclining and "pavement" layer of pebbles under pyroclastics

- sample from pyroclastic flows (94):
 GS-AT-94-1 - sample of second flow unit
 GS-AT-94-2,3 - soft clast & detrital lithic lithology class from first flow unit

* PHOTO (94) - flow unit break at bottom of lens over handle
 Detail (90) - (91):

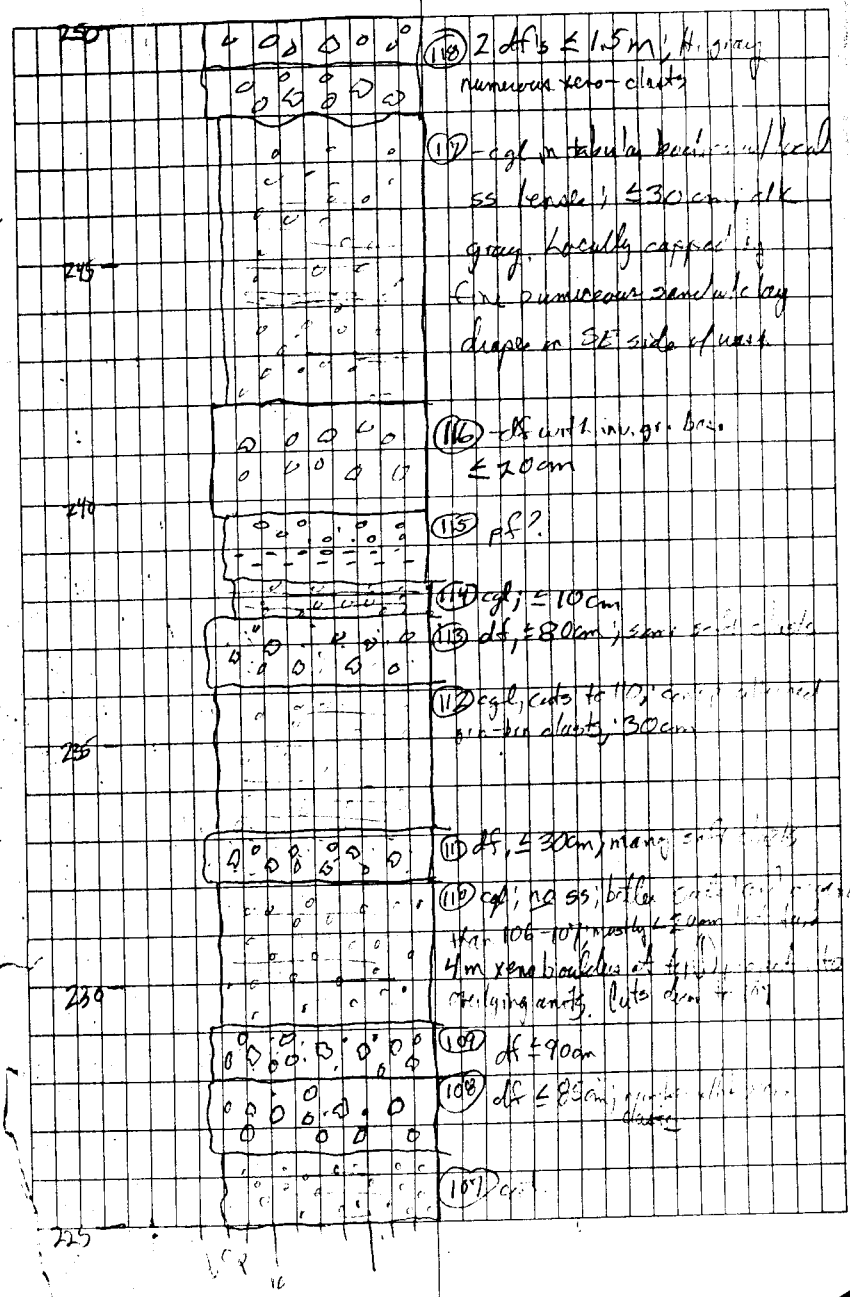


GS-AT-90-1: fall out ash
 (90) is Hazy; many soft clasts
 (91) appears to be occasional remnant of debris flow deposit



GS-AT-118 - most abundant clast-type in
poly mixt unit

(115) - possible pyro. flow deposit; lower half has "stringers"
of lithics and pumice
GS-AT-115-



July 18, 1989 - resumption of Espirasa Fm section in
Arroyo del Tuerto, Espirasa Ridge

(122) - this is a remarkable unit, monolithic, pink to fuscous
matrix and rare pis. clast suggest a black and ash flow. No
evidence of flow unit contacts suggesting that it became
dense, segregated during transport concentrating and
lower density (canopus?) clasts upward. Notable that all
clasts are rounded to some extent

PHOTO of band-ash deposit

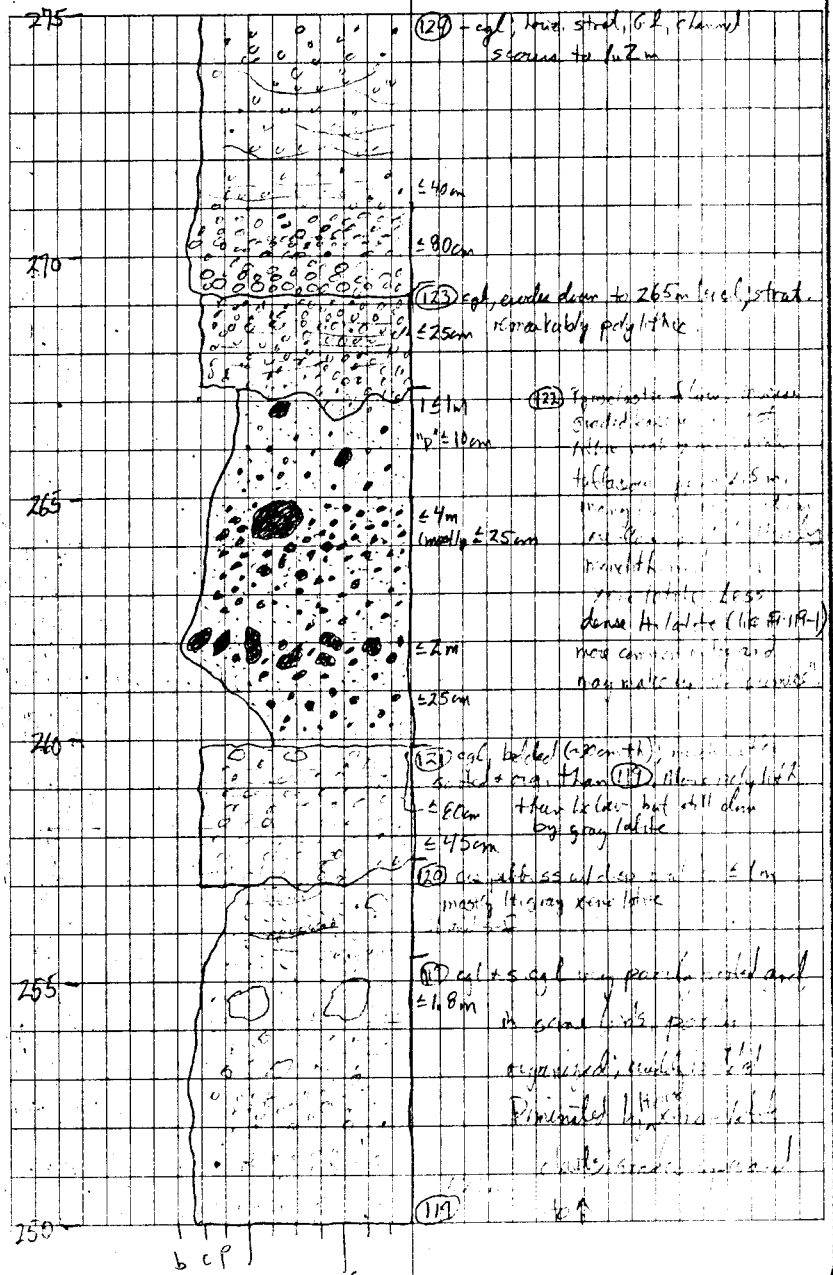
GS-AT-122-1: sample of dominant labile clast

GS-AT-122-2: sample of cognate xenolith

- cognate xenos contain monolithic cavities

(119) units like this are troublesome. Texturally, the poor sorting and
organization resemble debris-flow deposits. Good bedding and
medium gravel lenses suggest fluid. Maybe these are hypersonic
gravel or partly rounded dls.

GS-AT-119-1: dominant clast



(126) - shielded deposited sediment. Most dense
 clasts appear to be hb-lathite. Nearly all soft
 clasts, however, have some biotite and also cpx
 phenos. Some dense clasts also have biot.
 GS-AT-126-2,3 → biot-bearing clasts

GS-AT-126-1 ss at base of unit

(124) - best organized, thickest fluvial of since unit (14)

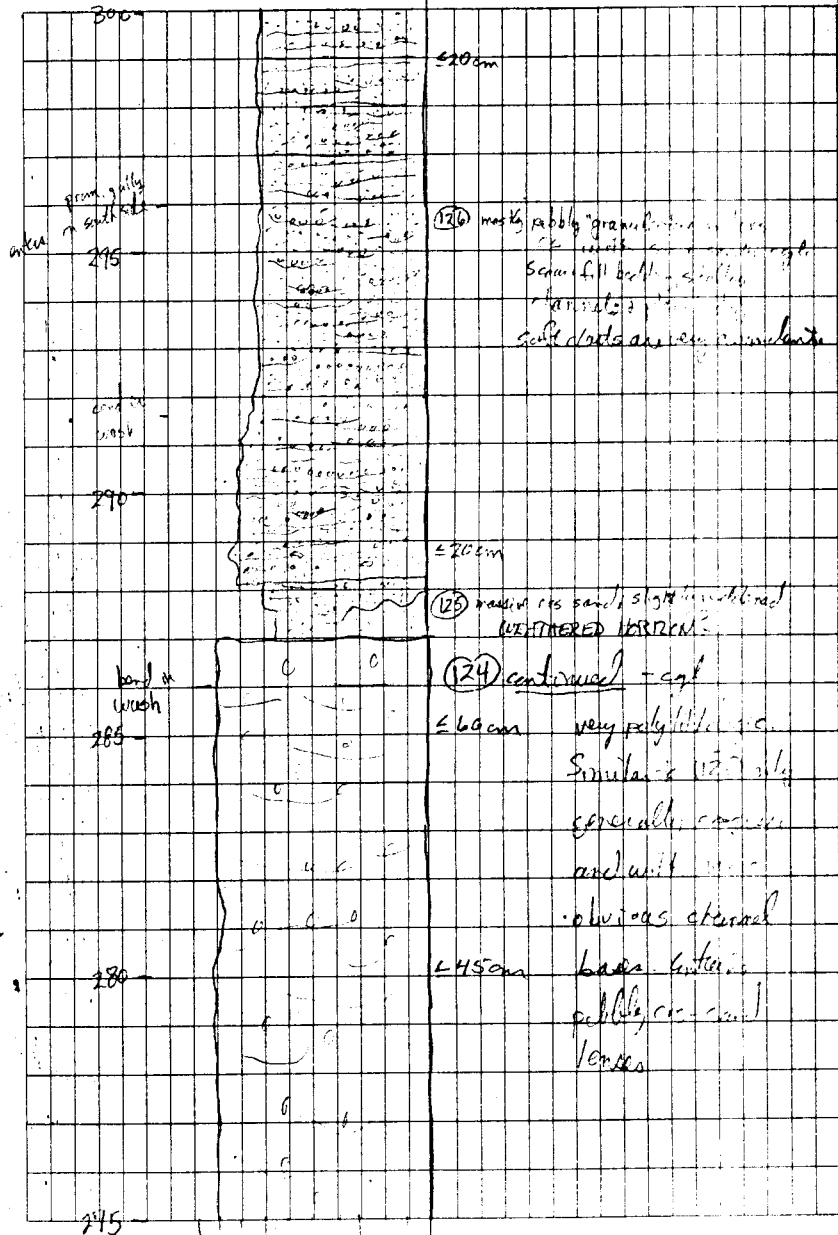
Very polyolithic but all appear to be hb-lathite

GS-AT-124-12 common clast type that I have not
 noted before. Only moderately porphyritic with
 fine grained, possibly glassy, groundmass

GS-AT-124-3 ss from near top

Notably not any obvious xenolithic lathite within

(124-125) are overlain by biotite-bearing clast deposits. (124)
 probably represents prolonged period of reworking at end of
 calc-alkaline activity

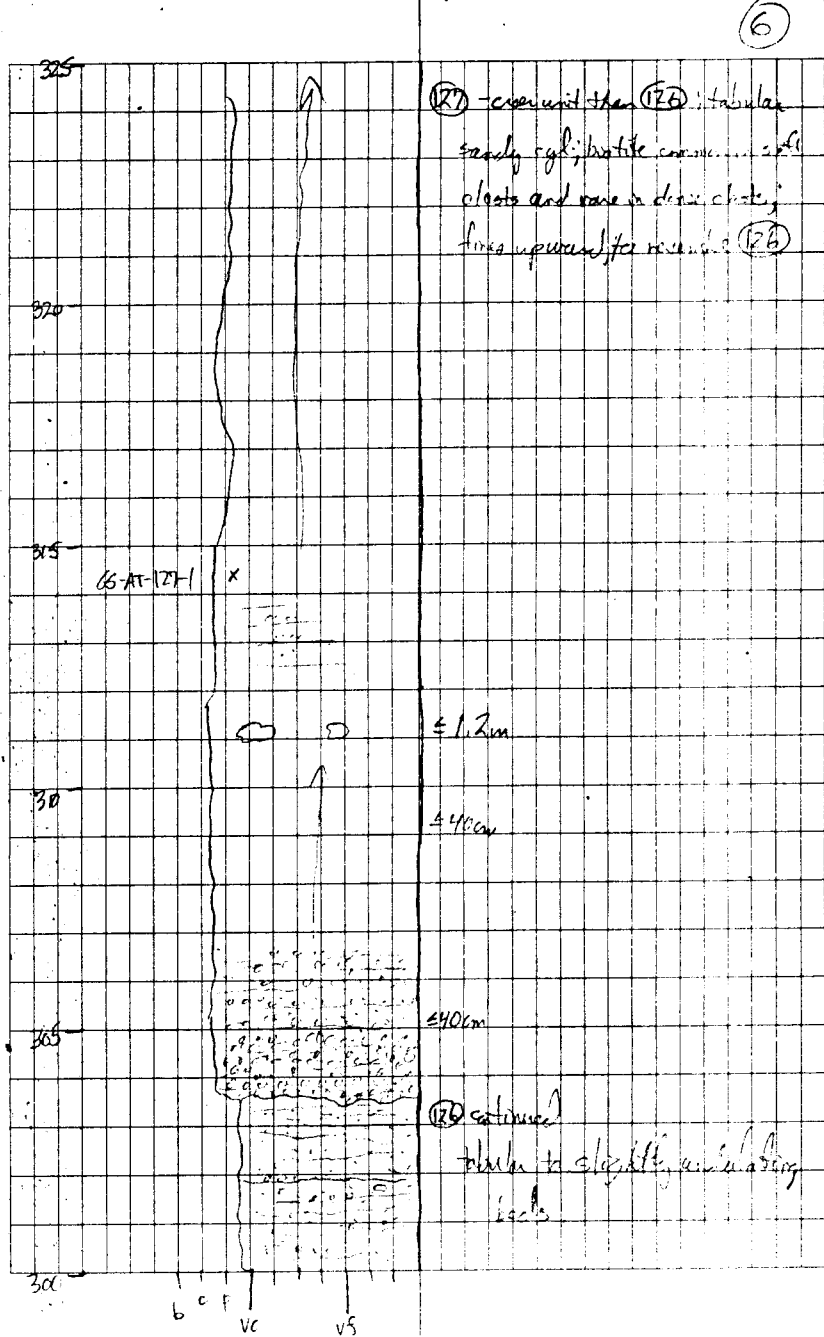


Also conspicuous in (127), but not sampled, are
small pebbles of bleached white, hydrotherm altered
lithology

GS-AT-127-1: peculiar white clast; only one seen

GS-AT-127-2: clast from sgl

data like AT-124-1 remain conspicuous in (126) & (127)



(135)

(134) this is prob. soil in top of Espinosa. All in place clasts appear to be volcanic although stufe, meta, & gran occur in float

"(131) contains many biot-bearing or pyx-rich clasts as float to 1.2m across

GS-AT-131-1: clast

GS-AT-130-1: dark hb-pyx clast

GS-AT-129-1: ss w/ pyx & biot

(128) - dense clasts with biotite are very rare

Top of unit is a sand with many biot-pyx silt clasts (one to 15cm) with vertical cracks filled with slicked clay; looks like remnants of a vertisol.

GS-AT-128-1: sand near top of unit

GS-AT-128-2: A pink hb-px-biot latite. These clasts are fairly common in (127) and (128) but are difficult to sample because they are typically weathered through.

Sand Fe & quartz sands with volcanic pebbles

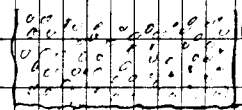


(137) sandy silt; some CO2 cementation; many cgs under clasts

(133) - pink ss, possible to scrub - 1st CO2 accretion

(132) - cgs sand with cobbles & pebbles (pyx); 400cm

370 - 340: E. steadily covered; scattered cross of sandy gravel and pebbly sand similar to (129); clasts 4 30cm 31.5m (131)



(130) massive silt, clast - 4 200cm

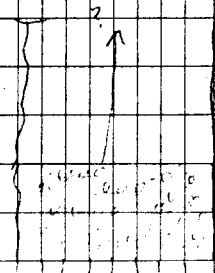
(129) plane bedded granules 4 15m very heterogeneous

(128) pebbly granule sand, somewhat poorly exposed 4 15m

375

covered

330



(127) continuous

325
Pumped out of hole
325