

HARDY

HL-

820945

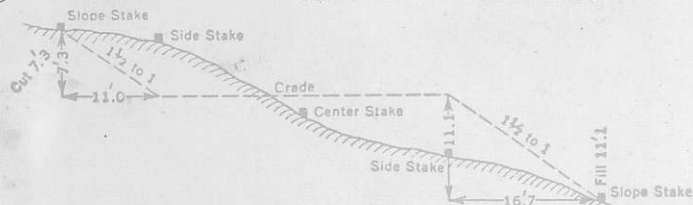
"Rite in the Rain"

WEATHERPROOF
FIELD BOOK

No. 350

DISTANCES FROM SIDE STAKES FOR CROSS-SECTIONING
 Roadway of any Width. Side Slopes 1½ to 1.

In the figure below: opposite 7 under "Cut or Fill" and under .3 read 11.0. the distance out from the side stake at left. Also, opposite 11 under "Cut or Fill" and under .1 read 16.7. the distance out from the side stake at right.



Cut or Fill	Distance out from Side or Shoulder Stake											Cut or Fill
	0	.1	.2	.3	.4	.5	.6	.7	.8	.9		
0	0.0	0.2	0.3	0.5	0.6	0.8	0.9	1.1	1.2	1.4	0	
1	1.5	1.7	1.8	2.0	2.1	2.3	2.4	2.6	2.7	2.9	1	
2	3.0	3.2	3.3	3.5	3.6	3.8	3.9	4.1	4.2	4.4	2	
3	4.5	4.7	4.8	5.0	5.1	5.3	5.4	5.6	5.7	5.9	3	
4	6.0	6.2	6.3	6.5	6.6	6.8	6.9	7.1	7.2	7.4	4	
5	7.5	7.7	7.8	8.0	8.1	8.3	8.4	8.6	8.7	8.9	5	
6	9.0	9.2	9.3	9.5	9.6	9.8	9.9	10.1	10.2	10.4	6	
7	10.5	10.7	10.8	11.0	11.1	11.3	11.4	11.6	11.7	11.9	7	
8	12.0	12.2	12.3	12.5	12.6	12.8	12.9	13.1	13.2	13.4	8	
9	13.5	13.7	13.8	14.0	14.1	14.3	14.4	14.6	14.7	14.9	9	
10	15.0	15.2	15.3	15.5	15.6	15.8	15.9	16.1	16.2	16.4	10	
11	16.5	16.7	16.8	17.0	17.1	17.3	17.4	17.6	17.7	17.9	11	
12	18.0	18.2	18.3	18.5	18.6	18.8	18.9	19.1	19.2	19.4	12	
13	19.5	19.7	19.8	20.0	20.1	20.3	20.4	20.6	20.7	20.9	13	
14	21.0	21.2	21.3	21.5	21.6	21.8	21.9	22.1	22.2	22.4	14	
15	22.5	22.7	22.8	23.0	23.1	23.3	23.4	23.6	23.7	23.9	15	
16	24.0	24.2	24.3	24.5	24.6	24.8	24.9	25.1	25.2	25.4	16	
17	25.5	25.7	25.8	26.0	26.1	26.3	26.4	26.6	26.7	26.9	17	
18	27.0	27.2	27.3	27.5	27.6	27.8	27.9	28.1	28.2	28.4	18	
19	28.5	28.7	28.8	29.0	29.1	29.3	29.4	29.6	29.7	29.9	19	
20	30.0	30.2	30.3	30.5	30.6	30.8	30.9	31.1	31.2	31.4	20	
21	31.5	31.7	31.8	32.0	32.1	32.3	32.4	32.6	32.7	32.9	21	
22	33.0	33.2	33.3	33.5	33.6	33.8	33.9	34.1	34.2	34.4	22	
23	34.5	34.7	34.8	35.0	35.1	35.3	35.4	35.6	35.7	35.9	23	
24	36.0	36.2	36.3	36.5	36.6	36.8	36.9	37.1	37.2	37.4	24	
25	37.5	37.7	37.8	38.0	38.1	38.3	38.4	38.6	38.7	38.9	25	
26	39.0	39.2	39.3	39.5	39.6	39.8	39.9	40.1	40.2	40.4	26	
27	40.5	40.7	40.8	41.0	41.1	41.3	41.4	41.6	41.7	41.9	27	
28	42.0	42.2	42.3	42.5	42.6	42.8	42.9	43.1	43.2	43.4	28	
29	43.5	43.7	43.8	44.0	44.1	44.3	44.4	44.6	44.7	44.9	29	
30	45.0	45.2	45.3	45.5	45.6	45.8	45.9	46.1	46.2	46.4	30	
31	46.5	46.7	46.8	47.0	47.1	47.3	47.4	47.6	47.7	47.9	31	
32	48.0	48.2	48.3	48.5	48.6	48.8	48.9	49.1	49.2	49.4	32	
33	49.5	49.7	49.8	50.0	50.1	50.3	50.4	50.6	50.7	50.9	33	
34	51.0	51.2	51.3	51.5	51.6	51.8	51.9	52.1	52.2	52.4	34	
35	52.5	52.7	52.8	53.0	53.1	53.3	53.4	53.6	53.7	53.9	35	
36	54.0	54.2	54.3	54.5	54.6	54.8	54.9	55.1	55.2	55.4	36	
37	55.5	55.7	55.8	56.0	56.1	56.3	56.4	56.6	56.7	56.9	37	
38	57.0	57.2	57.3	57.5	57.6	57.8	57.9	58.1	58.2	58.4	38	
39	58.5	58.7	58.8	59.0	59.1	59.3	59.4	59.6	59.7	59.9	39	
40	60.0	60.2	60.3	60.5	60.6	60.8	60.9	61.1	61.2	61.4	40	

092H/5W
 Seneca
 1983

"Rite in the Rain"
 WEATHERPROOF

a product of

J. L. DARLING CORPORATION
 TACOMA, WASHINGTON 98421 U.S.A.

Tower Road (cont'd)

June 14/83

HL 273 +450m

285m

arenaceous → limy buff,
dark grey, conchoidal fracture
- well banded

3125/30°S

- 4. py

+300m road to left

+50m → cgl + sds begin
+50m

June 16/83

Continue Tower Road

+245

+150m o/c wackes and

argillites

- bedded but too shattered

for orientation

+150 → cgl → sedimentary

debris flows

heterolithic, poorly sorted

typically fragment rich w alot
cobble sized fragments but some
matrix rich areas

- patchy red to green X cuts
- fragment-matrix borders
- massive, graded in places

+370 overgrown road to left
155m

+455 o/c massive limestone,

HL totally recrystallized, c. X line

- 274
- ellitic fragments + 10%
(argillites >>) + irregular
shaley w/ps
 - chloritic in places
 - some fragments amygdaloidal
hyalite/dacite

to thin ellitic tuff to ^{fine} agglomer
(rare fr)

-px to 3% very finely disseminated

-likely cgl w 1 tuff component

in and out of d/c → s/c

395
370

765
455

1220

- how much of this cgl, may
be sedimentary debris flow

to → subangular fragments
+ most vesicular
andesites some
with Hb
phenocrysts

tuff lacks obvious rounded
clasts visible on weathered
surface, generally softer, ⁹
chlorite

+75m andesite lapilli
tuff, slightly calcareous
to agglomerate with
somewhat rounded fragments

HL 275 +75m 135me

andesite lapilli tuff, chlorite,
weighty limy → agglut
-soft, chloritic

-heterogeneous fragments from
vesicular dacites (chlorite-filled) to
Fp porphyro

-px finely disseminated to
discrete min. cubes in both fragments
+matrix 1-2%

-locally porphyritic Fp, ?px
(green, blocky cleavage)

HL 276 +100m 125me

d/c of locally, rusty weathering
argillites and cherts

- strongly folded to near vertical,
with irregular sinulations
likely along fault plane
- was small blebs of chert several
cm size as cut up in argillite
- likely rusty-weathering areas
were pyritic argillites but too
frakes to be sure - py 1-2% as
coarsely crystalline anhedral
blebs and maybe finely disseminated
within chert tho not obviously
bedding parallel
- chert ~80% of d/c, finely
bedded with microfaults, local chert
- beds 2-5cm to ~~1~~ 20cm

→ 5°/15° E down road away

Claim post 1981 Jarvis 1+2

HL277 +150m 125m

- chert, light grey to green

Bx

from fault / good bedded cherts

small d/c in creek bed
- Ct/O veins irregular
- slightly folded, well bedded
2-5cm

- ? clasts of greenish chert
within white + tectonic chert
BX

+8m creek (large)

→ 350/70'S

+215m argillites, well bedded,
black, bedding irregular,
serrated
- average 240/60E

365

→ little wackes, well bedded
to massive

HL278 +650m 135me

basalt, dark green, weathers
yellow-brown, sandy, very friable
in exfoliated sheets

flattened vesicles filled w. chl +
ct → ? flow top in correct ↑
- matrix/ground mass is calcareous

like pillowed d/c at road
- finely vesicular, with
sparse? variolose lenses?
"flow top - too sparse to be
columnar jointed

- cover but apparently within
sequence of lithic wackes +
lesser tuffs near fault

2-5m
- 2-5% cherts, argillite, lithic

300/40E

HL279

+100m

135m

chert, green, very finely banded
w? 5% extremely finely crystalline
sulphide

- beds 2-5cm → 30cm

⇒ flat lying

- ct veinlets

- 6m sequence plus chert

+ 10m cover → sequence

wacke sequence

965

1125

of very altered rock? parent
in places remnants look
volcanic, elsewhere we describe
but too altered to provide
reasonable whole rock

- ? fault along face of d/c is
third dimension
and further along returns to
chert

with +41m

HL 280 ? [argillite + chert] or
mixed [chert with volcanic]
+ chlorite alteration; brown to black
- local jasper

+ chert above more massive,
less homogeneous with irregular
masses which may pass into
unaltered above

+ 20m . 5m dyke, dk green
finely crystalline → discrete
N/S

- no obvious anomalies in dyke

→ large exfoliating sheets

py very finely crystalline +
discrete scales along fractures
1-3%

- pink grey with mm to cm size
angular green grey fragments
- locally banded with microfaults

→ dark brown to brown green, very
finely banded chert with isolated
pink grey fragments barely visible

+ 20m major creek

+10m - o/c argillite
relatively whittened (massive?
cherts above) with basalt
flow, (does not X cut
beds)

H 281 at creek + 95m 135m

basalt, dark green, fine line
"interbedded" or vacuus ||
banding in cherts

- contact relatively sharp ||
bands but slight colour change

BASALT 1-2% py, chloritic in
places along isoclinal
surfaces, without amygdaloids

← CREEK w. hole →

HL 282 + 120m 130m

- chert, dk grey, ? chloritic
in places or with local argillite
cross axes

→ no: basalt

1225

0/50°E

1345

- typically very weathered
- py < 1% → ↓

plus sample: BASALT -
Andesite, ash tuff

py 1-2% very finely disseminated
- chaotic

HL 283 +150m 105me

- cherty andesite ← variable to andesite, variable bl to green
- weathered so difficult to unravel
- massive py 1-5%

HL 284 +210m 105me

- ? limy calcic wackes to tuff 1-2% py
- massive, chaotic in places

+108m Main Road 105me
→ continue E on that road

likely chert to dacite - ?
variable silicification ← yes
- mm → cm, very angular fragments visible in places
→ Lapoli tuff * I DP
✓ to ash tuff

→ M

+200m large o/c argillites,
lithic wacks, notably
folded on small scale
= chert interbeds

+165m - 220/60°N

4

H2285 +110m 150me

basalt / andesite flow
interbedded unsorted as above

- very folded, weathered

- py 2-5% locally 1-2%

- likely ash tuff or flow
but too weathered to tell,
could be lithic wacke

- further along less weathered

→ chl filled vesicles, some Ep

20 Mule Team D. PRICE +23m

530045M May 11/82

H2288 +140m at creek BRIDGE

basalt / andesite as before

average

→ ^{frag} lapilliferous in place

chlorite-alteration
saussureite - ? variable or apparent
differences in abundance just of
Δ weathering

but typically fresher than shell

MA waters - ? saussurite

+ siliceous tuffs → waxes,

some very fugitive to 10%,

unc very finely crystalline

along open fractures + to 20%

in breccia with ^{small clots} very angular

fragments (looks sedimentary)

↓
- very limonitic

? variably bleached

→ FDP of chert, variably colours in places appearing to be 2° pseudomorphing original template

+ 1 grey ? siliceous waxes or silicified (?) rhyolites with very fine vesicles + banding

Silicified rock parent

- py 20% + locally in chert B₁ mostly as cement and epitaxial rims

? fault across top of o/c

some specimens multi fractures with black extending ^{perpendicular} out beyond fractures → black is secondary overprint?
→ cherts (granular)

siliceous but not truly very hard

± other chert frags

could be just weathered coarse grained siliceous

① black "chert" with white Fp (?) pseudomorphs to fragments (soft, not frag); often weathers with yellow-white powdery coating

② chert B_x: very angular, homogeneous black to grey chert, in matrix py → chert w py epitaxial rims on cherts ± sparse bright green fragments + <1% ~~large~~ brown anhedral sph₂ cement almost limonite, local melanconite

③ white granular silicified rock ? parent; secondary silicification imposed; fine grey flecks to waxes

+ about folds associated with
it, too massive to be sure

HL 287 +150m 125m

very weathered
? andesite with ^{out} chlorite vesicles
(? saussurite)
less weathered → dacite
lapilli tuff
- 1-2%

June 17/83

HL 286 + noisit

- road to N, ? joins to
Tower Road

- silification white patchy
to pervasive with irregular
black areas → replacement

- ^{brown} sph as specks in light
silified rock (crs) and
as finely crystalline cement
enrich Bx to 5% of
given hand sample but generally
sparse

→ no real rusty weathering

selected samples: irregular discontinuous
sph vesicles; only observed in br areas

process seds + vc ^{IDP} in places → ^{tuffaceous} lithic wackes
with ang frog inc abundant ⊙

Sawed samples:

- breccias consist of angular
^{heterog} white + black fragments; white
appear to be bleached br varieties
as ~~are~~ ^{both} show individual grains

- many fragments abundantly fractured
BCS 0420 Pyritic Bx

Sample

- parent lapilli tuffs?
- py cement, epitaxial ring
sparse sulphide clasts, ± ⊙
- saw bright green clay clasts

- bleached individ frog + diffuse into cy
rock → pre + post py

- py as anhedral masses; intergrow
cubes

HL288 + \approx 200m 160me

andesite ash tuff, weathered
samples may resemble lithic
wacke

- very fine fragments, some
ehl. flocks

- saussurite; calcite matrix

- tr. pyrite

- in places irregular black argillite
bands to crops

- locally ^{minor} patchy silicification

HL289 + 160m 175me

andesite lapilli to ash tuff
bright green, fresh except

for some sp \rightarrow saussurite,

locally weathered with orangish

spots \leftarrow could possibly be Fe

carbonate alteration

plus interbedded black cherts

\rightarrow very chloritic? ductile to andesite
with abundant slickensided
surfaces.

\rightarrow andesite lapilli tuff 1-2% py
288+

40/20°N - near fault

py 1%

\rightarrow FeC

0/ dip ^{near} flat, weight N

2-10 cm beds very finely
crystalline & disseminated
within

→ several faults with gouge
zones the little accompanying
folding

+ 85m confused &c
with folded and discontinuous
lenses of argillite to andesites

→ andesites with bands of
argillites folded/faulted

⇒ MAJOR FAULT

(ie +35m)

H6290 +120m 190m

andesite to ~~to~~ dacite ash to
lapilli tuff, very fine
fragments

- conchoidal fracture
- sporadic CP veins as near
fault
- wide colour range from
pink to green and matrix
composition from very limy
to slightly limy

locally porphyritic

HL291 +200m (SLIDE AREA) 205 me
-opposite top chump of Echo Island

andesite ash buff to lilac
wacko

-slightly limy, chloritic, very
fine Fp alteration -? kaolinitic.

290-291: o/c vesicular andesite
alnt chloritic along slickensided
surfaces

+ argillites ← dc very
shattered

+100m major creek

HL292 +67m 205me

andesite, light grey with
alnt chlorite and g dules,
1-3% chloritized Hb phenocrysts
-ash size fragment visible
-massive cliff former

← distinctive subround to 10mm
diameter ⇒ dotted texture

→ andesite lapilli tuff
w/ saundersite + chlorite
1-2% py
- porphyritic with Fp xls to

→ X cutting diabase in cliff
above 1 1/2 m

+150m holoclastic egl t,
definitely rounded cobbles
the talus has some agglomerat

HL 293 +274m 220m

- andesite lapilli tuff (S)
relatively fresh px

→ fault

- argillite strongly shattered,
bedded + altered? w/ flow

- dark green ? dacite /
? andesite ← chlorite

→ well bedded argillites
142/10°S E side of fault

1.50m

→ → →

+ 20m road to N

HL294 +193m 230me
dacite as before, pale green,
ash tuff? to flow

interbedded w argillites

dacite < 10% sequence

contact zone diffuse across
10cm l. grey to green to black
w. apparent fragments of
black within green

→ argillites strongly folded +

→ consistent argillite → to HL
10°/30NW

HL295 +276m 250me

? silyolite massive white,
featureless but not really
hard, orchid-like w
conchoidal fracture
- more "granular"

→ calcitic dacite lapilli tuff

shattered

295

→ ? silicified

→ slightly calcareous with 5-10%
of carbonate alteration

py 1-2% very finely
disseminated

- no bedding visible

- ? silicified rock like that at
286+

- are vague bl wops but looks
general black speckles

- weathers orange pink but
does not seem to be Fe carbonate

HL296 +160m 280m

- weathered dacite, light
green → darker green
esp where weathered

- ? chlorite ± saussureite

- calcareous matrix

→ sparse granular patches
as above

HL297 +170m 270m

andesite to dacite, massive
epitaxial ← ash tuff

→ chloritic dacite tuff w
2-3% py, finely diss. +
along fractures

↓ only short interval of such
light rock, granular
→ more typically textured
dacite

o/c both sides of road

- in places → andesite

chlorite, Doussinit
- in places quite weathered
- py along Ct stringers
+ finely disseminated 1-2%

HL 298 +160m 250me
fault w. highly shattered
and weathered material

→ dacite, l. green, w. Ct
veins 2-3% py finely
disseminated
- ? silicified + abundant
- variable chlorite

→ pronounced curve in road
andesite to dacite
→ well bld lapilli tuff
showing excellent graded
beds → 25cm scale
px 2-3%

HL 299 +170m 230me
→ dacite ash tuff

- local Ep

+ discrete cubes

calcite veins

→ not Ep
+ including light ^{yellow} green ? weathering,
? alteration, much more friable

→ flat lying w. flattened
glassy fragments ? rimmed by
sericite
- very heterogeneous fragments

shed green to pink green,
maclure fracture

- well bedded, sharply folded
- \downarrow py

includes areas of yellow-green,
totally altered + weathered, fossils
- no fizz; suspect weathering

HL 300 +130m 235me

dacite, patchy light grey to
green \rightarrow column mottling only or
some silicification

- very weathered
- py \rightarrow ~~2%~~ discrete cules +
finely disseminated

- in part very shattered \rightarrow
likely fault
(^{inc} +100m \rightarrow swamp)

HL 501 +150m 220me

dacite/andesite lapilli to
ash tuff, finely banded
- variable green to darker
green w P ch
- Φ veins irregular

but why this area?

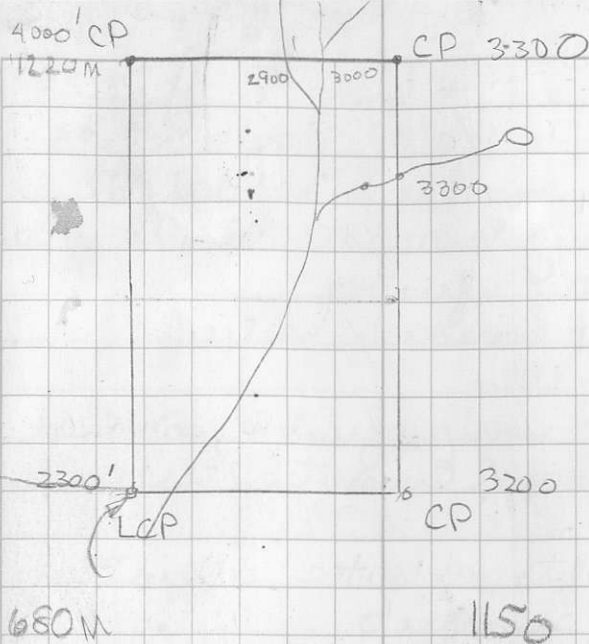
bar Ep, saussurite chl
- 2-3% locally, generally
< 1%

Pronounced Curved Road
+ 100m o/c with chevron
ford

↳ dacite lapilli tuffs
+ granular white rock
w. 1-2% pyrite

HL 502 + 50m 205 me
dacite ash tuff as
before

Return to o/c with chevron ford



FRANCES L → Weaver June 23/83
return to d/c of chert field

plus interbedded
amygdaloidal basalt, ? vario
very fusible

+ variably reliefed
dacites

- very fusible, overlaid
with very limonitic areas

- basalt chlorite alteration
w saussureite

- dacites: Fe carbonate alteration
well bdd, 5-1m scale

- py + → < 1%

- Cf vesicle fill ⇒ flow tops

- patchy silicification →
greyer patches but no white
gummy material

→ dacites → andesites → B

HL502

235 me

- dacitic ash tuffs with

like → spherulitic

variable patchy silicification but
→ gully white rock of ? parent
w. about py as at ^{the} 286+
py locally to 10% in
o/c at level of road bed
but ↓ above
- gully silica very localized

reason - Andy Robertson dump
sample .07

0416 +130m

- more massive silicified ? parent
py 1-5% very finely disseminated
- rock predominantly white
to limonitic with brighter green
specks 1-2% (i.e. not typically
ch1 green)
- may have irregular black
spots

- silicified zones are irregular
X cutting with diffuse edges
± Fe carbonate alteration

→ massive not well bdd

+62m road to E
Pb, Zn ? siliceous zone - along
strike Zn very finely dis

0416 Whole Rock

→ 124 / 20° W

pillow like weathering
or
etc

HL 503 +135m + 200m

HL 504 o/c of pillow basalt (IDP)

including discrete isolated

pillow in cherty sediments (?)

- pillows exfoliated sheets

- basalts very granular, friable
yellow brown

isolated pillow - fresh, dark green
chlorite, H₂O

S from more altered material

+ argillites, bk, faintly banded,
laminated

+ cherts, bk, conchoidal fracture,
faintly banded

275/15° SE chert bands
but slightly wavy

→ done within pillow, thin
sheets parallel to selvages

→ HL 504 - non amygdaloidal, faint
flow bands? amygdaloidal

→ HL 503
effervesces slightly

→ much steeper ^{basal} near pillows
along pillow bottom → shallower
↗ to left, on chert band
275/10° SE

? - baratts flow along oversteeped slope

A255 +150m 195m

varite, highly variable
silicification → light green to
dark green to grey

- chest-like, conchoidal to
cash tuff

- massive

- Fe carb. veins + pervasive
alteration also variable + no
necessary correspondance to
silicification tho both ↑
outward from abnt irregular
Q, Ct, Fe carb. veins

- px highly variable
from +10% very finely diss.
in conchoidal varietes to
coarsely xline aggregates, often
lens by chl. in Fe carb. rich
or gitty varietes

+ 30 m wkd road to right

- pinkish alteration? Kspar
IDP ? too altered to tell
parent → likely P^+
varite alteration % white
thaid

+ 70m Aaron Muds Rd

HL506 + 50m 180me

- above Aaron Muds

- andesite, amygdaloidal with
Ct central tocht. ? may be
size grading of amygdaloids
→ flow top, yb

to dacite, lapilli ← ash
variable patchy silicification
+ highly variable weathering

- abnt meg Ct + Q vein ± py
+ linings to Ht weathering,
also Ep BCS 0417

- py 1 to +3%

- Bx texture as described from
adit locally

HL507 + 150m 175me

dacite wash tuff with some
chert filled vesicles ± Ct

BCS 0418, 0419 from dump

massive

Adit 100' → 4 branches @ 75'

- unlikely that dacite → andesite
just variable 2° silicification
unless pervasive obliterating all
textures

- variable pink green to green,
more altered varieties →
andesite w. saussurite +
chl ← ? use of alteration
- py 1-2% as discrete lules

→ porphyritic variety

- vesicular / amygdaloidal
andesite to dacite tuff

HL508 +250m 135me

- andesite lapilli tuff,
green, relatively soft
→ dacite
- calcareous matrix; ? Ep
locally but maybe weathering
product
- py < 1-2% along irregular
discontinuous stringers + finely
disseminated matrix
- sparse chl filled
amygdulles

→ do not seem obviously
fragmented → cherts
vesicles → flow

12:30 rain

HL509

+150m

130me

- andesite: very dark green to maroon ash to fm lapilli tuff with variable pure 1-5mm fp phenocrysts \rightarrow Apgt
- Ht stained locally + limonite; locally matrix calcareous.
- impales gritty white siliceous wash $< 10\%$ of sequence, cutting w \uparrow Q + px

HL510

+170m

120me

- andesite lapilli tuff, with wide variations in amt of weathering
- chlorite, saussurite, kaolinite
- ? Ep
- px $< 1\%$ locally \rightarrow trace

HL511

+150m

120me

- mixed agglutes, lithic wacks (vc arenites) with sedimentary debris flow (sgt: heterolithic) \rightarrow

\rightarrow chloritic

1-15%

- ? K Spar alteration

- locally porphyritic to 10%

1.5mm, ^{mostly} uniform gr size
- sand size > 0.5

- vc arenites / lithic wacks in places show graded beds
- non-calcareous matrix
- ? slight X beds - darker lenses at \perp to bedding

ash to fine lapilli (Chl ± Ep)
andesite tuff with lot,
le brown-grey, total recrystallized
to ↑ volume deposit with porphyritic
matrix

- interbedded flat lying to 5° S /
→ chevron fold with some
defint ^{100°}
- highly variable alteration +
weathering

Andesite (S): Ct vesicle free,
when weathered may resemble
vc breccias

[≡ 240 m road to base L)

muscovite, ? kaolinite - earthy, ^{1/2} brown
could be weathering

- distinctive med. green ground
mass with Ksp or perno crystals
- clasts subc to subrounded
- cobble to matrix most, 5-10 cm
size
- matrix: no fizz but white,
xtine, colour very different from
matrix observed in sedimentary
debris flows

I.D.P: movement, product slumping off
sides + air fall (lophra)
- matrix: vc product
- some bedding so not true
debris flow
- vc breccia + flow

HL512 + 250m

likely cgl: poorly developed
graded beds

- heterog. mostly subrounded
fragments in matrix \rightarrow about
calc matrix

- matrix: chloritic; locally
Ep, scapolite

\rightarrow road to Gravel

HL513 + 150m 90m

weel L Recreation site

- ? calcified clasts \rightarrow chlorite,
light green, mottled in shades
of green = pink in elongate
patches

- sparse Ep kaolinitized

SF first sample June 23/83 at
Weaver L road + 150m
(JLHW)

\leftarrow shapes suggest flowage?
- sericitic
clastic lapilli tuff \rightarrow agglomerate
(+ DP)
- some sericite

? cgl + o/c - samples, need
washing, like 514 "limy chert Bx"
- very hard, variable
ultrafine

HL 514 +350m 60me
→ probable o/c → ? cgl,
agglut or debris flow
- heterog, poorly sorted, ^{subl.} ang.
to subrounded fragments
in chloritic matrix + Φ
- no visible grading
- likely debris flow or cgl
py 1-3%, variable, cubes +
cubic aggreg. in matrix + frag
- differs from previous cgl.
in loc of cobble-sized frag +
limy matrix
- locally patchy Ep

HL 515 +280m 35me
- dark, patchy light green to
grey, conchoidal fractures
- py 1% discrete cubes
- massive

↑ but elsewhere more like cgl w.
rounded fragments VC >>>
- in places overpacked w ? sericite in matrix
= sericite

IDP: "limy chert Bx"
- frag + matrix fizzes greatly
some VC fragments

VC, chert frag >>

but elsewhere some Bx does not fizzle

→ some py in cubes very finely
diss → sulphide clots

HL516 +700m after 2nd bridge
+ into gravel area of hatchery
? basalt or andesite
Lapilli tuff, very weathered
w abnt mn oxides
- v. dk green, slightly
effervescent Ep, vauquelinite?
- v. fr chlorite amygdules
- tr. py

+1.6km in → ANYONE BEYOND
THIS POINT WILL BE NO MORE
→ DLS-7

HL517 1600-250m in 40me
dacite, mottled ? fragments
shades of lighter and darker
green
- subsounded with relatively
sharp borders
- < 5% chlorite flecks
- ? sparse Fp maybe kaolinitic

HL518 1600-500m in Morris L
lookout

- silicified but weathered product
of subaerial exposure during
volcanic hiatus like HL521
- likely silicified post weathering?
(IDP)

← very weathered

andesite agglomerate: heterog,
mostly very angular and often
highly irreg, sometimes
scoriaceous fragments in a
chloritic matrix

- frag maybe greenish or purple,
from matrix to .5m size
root < 30cm.

- matrix supported
no evidence of grading this

Some diff. comp. in matrix
as a

- huge bold o/c

+ chl ? ± ct ± sericite, Ep

- patchy H⁺

HL 519 1600-750m 35m

andesite, amygdaloidal chlorite

to 5mm to 10mm + in places

- saussuritized, chloritized esp.

along shear? (slidensides)

- poor exposure

1600-770m → new road to
right

Top andesite agglut or blocky
tuff

- matrix prod Fp → Ep, saussurite
but w. some ⊙ crystals + very fine
sericite; altered → into fragments

- in places fragments merge w. matrix

- agglut : range of frag. comp
+ wide variety of sizes

very blocky? top H₆

HZ 520 1600-1025m .30me

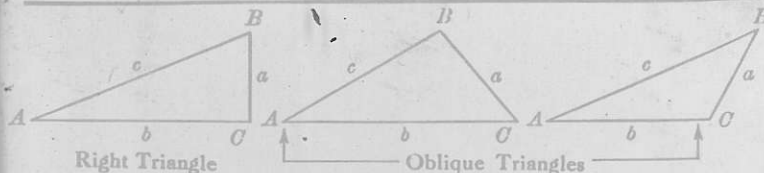
- old road to right

- very weathered w/ gneiss
appearance of andesite lapilli
tuff with saussureite + chlorite
alteration + calcite

HZ 521 1600-1425m 15me

? andesite pale white,
very altered to soft
clay-like with irregular
greenish patches ? kaolinite
? bleached

TRIGONOMETRIC FORMULÆ



Solution of Right Triangles

For Angle A. $\sin = \frac{a}{c}$, $\cos = \frac{b}{c}$, $\tan = \frac{a}{b}$, $\cot = \frac{b}{a}$, $\sec = \frac{c}{b}$, $\operatorname{cosec} = \frac{c}{a}$

Given	Required	Formulas
a, b	A, B, c	$\tan A = \frac{a}{b} = \cot B$, $c = \sqrt{a^2 + b^2} = a\sqrt{1 + \frac{b^2}{a^2}}$
a, c	A, B, b	$\sin A = \frac{a}{c} = \cos B$, $b = \sqrt{(c+a)(c-a)} = c\sqrt{1 - \frac{a^2}{c^2}}$
A, a	B, b, c	$B = 90^\circ - A$, $b = a \cot A$, $c = \frac{a}{\sin A}$
A, b	B, a, c	$B = 90^\circ - A$, $a = b \tan A$, $c = \frac{b}{\cos A}$
A, c	B, a, b	$B = 90^\circ - A$, $a = c \sin A$, $b = c \cos A$

Solution of Oblique Triangles

Given	Required	Formulas
A, B, a	b, c, C	$b = \frac{a \sin B}{\sin A}$, $C = 180^\circ - (A + B)$, $c = \frac{a \sin C}{\sin A}$
A, a, b	B, c, C	$\sin B = \frac{b \sin A}{a}$, $C = 180^\circ - (A + B)$, $c = \frac{a \sin C}{\sin A}$
a, b, C	A, B, c	$A + B = 180^\circ - C$, $\tan \frac{1}{2}(A - B) = \frac{(a - b) \tan \frac{1}{2}(A + B)}{a + b}$ $c = \frac{a \sin C}{\sin A}$
a, b, c	A, B, C	$s = \frac{a + b + c}{2}$, $\sin \frac{1}{2}A = \sqrt{\frac{(s - b)(s - c)}{bc}}$ $\sin \frac{1}{2}B = \sqrt{\frac{(s - a)(s - c)}{ac}}$, $C = 180^\circ - (A + B)$
a, b, c	Area	$s = \frac{a + b + c}{2}$, $\text{area} = \sqrt{s(s - a)(s - b)(s - c)}$
A, b, c	Area	$\text{area} = \frac{bc \sin A}{2}$
A, B, C, a	Area	$\text{area} = \frac{a^2 \sin B \sin C}{2 \sin A}$

REDUCTION TO HORIZONTAL

Horizontal distance = Slope distance multiplied by the cosine of the vertical angle. Thus: slope distance = 319.4 ft. Vert. angle = $5^\circ 10'$. From Table, Page IX, $\cos 5^\circ 10' = .9959$. Horizontal distance = $319.4 \times .9959 = 318.09$ ft.
Horizontal distance also = Slope distance minus slope distance times (1 - cosine of vertical angle). With the same figures as in the preceding example, the following result is obtained. $\text{Cosine } 5^\circ 10' = .9959$. $1 - .9959 = .0041$. $319.4 \times .0041 = 1.31$. $319.4 - 1.31 = 318.09$ ft.

When the rise is known, the horizontal distance is approximately:—the slope distance less the square of the rise divided by twice the slope distance. Thus: rise = 14 ft., slope distance = 302.6 ft. Horizontal distance = $302.6 - \frac{14 \times 14}{2 \times 302.6} = 302.6 - 0.32 = 302.28$ ft.

Handwritten calculations on a grid background:

$$\begin{array}{r} 640 \\ 3.05 \\ \hline 3200 \\ 19200 \\ \hline 195200 \end{array}$$