

676-2

Hole No:

826869

Lemare

92L/05

1992

0-9.5 overburden

9.5 - green, to apple green, with pale pink green patches, rhyolite faintly flow banded in places (70° to 55°), defined by jasper, or chloritic (devitification) layers.

- occasional ovoid quartz-filled structures (1-3mm) long axis parallel to sub-parallel to banding where present, reminiscent of ovoid structure stretching into banding (noted by Mike; Anne, Colin).

9.5-16 some veining is carbonate

9.5-26 - hydro fracturing, jigsaw, quartz veining (3%) strong stain, mottled green

- fracture controlled cp, sometimes cp only, sometimes
- blebby cp, sometimes with jasper, with qtz
- disseminated cp, " " albite halos.

2% cc veining (late)

3% qtz (cloudy to clear) veining

.3% py

.3% f.c. and blebby

1% jasper fractures, patchy fill, along with qtz of ovoid amygdalae.

10% gm K-spar, 5% gm chlorite

veining irregular 1-4 mm wide, set subll to CA

$55-75^\circ$

26.2 - 46.1 rhyolite = basaltic dikes ± fracture & gouge zones

26.2-25.5 - massive fine grained green rhyolitic ^{dk - chloritic}

- quartz carbonate veining (4%)

- .5% f.c. py, tr. cp

- .5% jasper patches, f.c.?

25.5-29.3 broken and fracture heavily veined (5-7%), .8% py
dk green fine grained - basaltic

29.3-31.1 crushed & broken basaltic material in a few blocks of (up to 8cm) competent massive gm rhyolite.

- 20% chloritic gouge

- 60% crushed and broken basaltic

- 1% py

31.2-31.8 - mass gm rhyolite

31.8-34.4 - crushed, broken, veined, basaltic

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- 60% crush & broken, basaltic
- 10% gouge
- .5-1% py, ± cp
- 25% chlorite

39.4-39.8 light grey, 50% gouge, some pinking (hem) (rhyolite?)

uc sharp 30°

40.0-42.3 more competent, grn, Hgrn, shears, fracture foliation (25-30°)
occasional pinking.

42.3-42.5 lt grey, to grey pink, broken, 10% gouge

20% Fe₂O₃


42.5-44.5 dark green, to pink, fracture in places,
shearing 35-40°

10% Fe₂O₃, chlorite

44.5-46.1 pink to grey, 20% gouge, green zones (chl)

30% Fe₂O₃

LC sharp 35°, sheared

46.1 - dk green, to jasperitic (patches in groundmass) fragmental
 lithic tuff → ? flow breccia, clasts angular, irregular chlorite
 structures, sometimes with jasper haloes, 1-3 mm vesicules?
 glass fragments.  SLT (Dacitic, ? more fluid?)
 1% calcite veining. (less fracture, fracture fill material
 than above. to 48)

48-58 medium to dk green

massive to fragmental) angular fragments

10% zones of SLT, qtz filled, jasper rims, haloes (LL qtz amygdals)

1% qtz veining



small ones SLT

chlorite filled (retain

jasper rims & haloes

deutritification? → SLT's ?

mild staining

1% jasper patches, fracture fill

some quartz veins have jasper ± py selvages
→ chlorite →

jasper ± qtz ± py → qtz ± jasper → qtz

13-15%
 py
 no K add.
 chlorite 5-15%

continues down to 149.0 - 156.9

- protolith remains similar
- more chl $\approx 20\%$ (some F.C), .5 - 1% py
- minor chloritic gouge zones
- some quality drops, brittle fracture
- faintly σ banded 20-30° CA.

156.9 - 161.3 vfg s.p. (5%) or less jasperitic envelopes to rare fracture
some phenos - pale green-yellow alteration (sericite)
slight increase in py at 159.0 to
15% gm chlorite.

161.8 - 166 - green (vfg & sparse chl.) faintly mottled with
maroon (Fe₂O₃), faintly maroon banded
maroon to red fracture envelopes .3% py
TRACE CP, sometimes associated with chloritic areas
or jasper chlorite envelopes
qtz - calc cross cuts jasper or jasper qtz.

~~166-177~~ 166 - 177.4 and beyond.
- becomes brecciated @ 165.9 (gradationally?) 165.9 - 192

- fragments
- angular to almost jagged
- very small to 5 cm across
- green, stony, green nonstaining, maroon nonstaining fairly

chl. 15
hem 15-20

hard

.5% py (some in \Rightarrow gm - siliceous to chloritic, dried glass or rock flour? ^{Sil.}

quartz veins \pm hematite envelopes (15%) at 70-80° CA
cross cut by quartz-calcite \pm hard pale green material @ 0-30° CA.

168.3 - gradually becomes more massive, hematitic, loss of
texture predominance of qtz-calc \pm gm mat veins and fill $\approx 3\%$

171.7 - 172 several thick veins 25° CA of quartz-cc, but
mostly pale green hard material. Sample at 2-172

172.7 - 177.4 continued elastic-fragmental appearance
varying maroon to green

maroon gm has green fragments sometimes

green gm has maroon fragments, but generally
fragments same colour as gm

frags remaining angular, some sorting, sand size "beds"
to zones with frags up to 1.5 cm green weakly stained
bedding ? x 65-70° CA.

maroon 1.9 m

Green 1.8

Maroon 1.3

are weak lamellae = primary?

↑ py down to .3%

168.9 - 192.0, sequence of pyroclastic flows, water reworked
bedded tuffs to medium to fine grained epiclastic sediments

beds are usually less than a metre thick, but
can show welding-like textures (sample 187.7). Most beds
have accidental lithic fragments up to 3 cm across but
for the most part are sorted. & some very fine grained interbeds
(183.6) showing silty beds and green-maroon colour alterations.

beds also show varying amounts of K-spar by stain, but
most appears a weathered primary. bedding 65° CA.

frags - clast 90-100% felsic volcanics

occasional vein

cal - cp selvage ± pf

Trace pf

192.0 approximately to 198 approximately. Contact zone of
pyroclastics and underlying basalt layer.

192-194 spheroidal (weathering?) basalt balls in paler
green material (epolith, palcosols?)

194-198 ~~too~~ broken and veined basalt, ^{to basaltic andesite} K-spar phytic T.A.
chlorite - calcite open space filling (5%) pf

broken like frags (feeders)

198-203 continued basaltic looking material, & occasionally Fe₂O₃
but highly veined, cc, chl, up to 1% py in fracture fills, blebs.
200.5 - 200.8 2% py blebs of CP. sheared broken, healed
by cc, Fe₂O₃, chl.

Small fault

10% chl, 5% cal.

203-210.5 - 213.

rock becomes less veined, massive to phytic 5% chl-mafic
2% k-spar - T/A (dike?)

208.0 - 209.2 chloritic gouge 8.5mm - 3cm wide, shear in
T/A (drilling down dike?) T/A flows.

md-grn, fine grained, hypi, tiny plug laths visible in gr.

uc sharp 30° c

213.0 - brick red, faint layering or bedding
strongly hematized elastic rocks, shg. ophiolite clasts to 1cm.
angular - subangular, 5% py Tr. CP

216-218.4 broken, rubble core, 20% green chloritic gouge.

218.4 - 220.7 maroon fine to c.s.g. hematized (? basalt)
although there may be vestiges of fragmental textures.

220.7 - 226 broken, rubble core 10% gouge, maroon to chloritic
green, fractures ~~are~~ high low angle to CA.

226-227.5 maroon, fine grained, faintly fragmental

- 227.5 - 233 continued competent core, no to faint stain

- thin calcite veinlets 0-40° CA. rare. fine grained aggregate of CP
up to 5mm across.

- irregular bands of brick red to jasperitic material, sometimes
making fragmental texture more distinct (maroon fig in red matrix
rather than maroon in maroon). 3% py

233-235.5 continued, slight increase in stain

235.5 - 239. broken, rubble

239 - 242.4 contacts upr obscure

basaltic to andesitic dike

- very fine to fine grain - (ophitic) mafic pluss

1-5% (Hb?) chl

- amygdaloidal, up to 3mm spherical - ovoid
chl - calcite

- 15% cc in ground mass.

242.4 - 244.7 all-hen altered (breccia?) moderate stain chpt.c.
alteration?

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58-67.9. continued Vitric Tuff, frothy flow, or devitrification marked flow - dacitic to rhyolitic - SLADS are 30-40° of rock 1-4mm across occasionally spheroid, often ovoid, but majority are elongate, irregular, cusped to shard like

- .1% cp
- .3% py
- halves.
- 70% chlorite (dk-grn) filled, pink jasperitic
- 30% qtz ± jasper ± chl ± sulphides.
- rare slat is CP filled

fracture fill material is less than 1% qtz. 0-20% CA. rock between slats mildly staining

58.3	Long axis of slats	30°		
67.9	"	70°	10%	5%
64	0-10°		chl - mild	K-spar - silica
	sample 67.7			hematite

67.9-78.6. - same, slight increase in quartz veining ~ 1% qtz

@ 72.8 vein 8mm thick w 1mm K-spar envelopes 15° CA barren. long axis of SLADS 15-25°

over all rock is slightly stronger staining only trace CP, usually small aggregates in SLADS

10% K-spar
100% chlorite
5% silica hematite (mostly jasper haloes around SLADS)

.5% py

@ 75m Long axis 30° CA

at x 77.5 in a rubble zone

Tr. CP.



.5% py

- becomes more massive, loss of SLADS, grey green
- stain becomes milder
- sparsely porphyritic (small dk grn lath-like to equant 5mm long, some may be broken) - flow, crystal tuff
- loss of K, Fe₂O₃; 10% chl

77.5-88.0

88.0-88.4

chlorite, Fe₂O₃ + silica breccia zone.

88.4-99.7 - becomes massive, non-phyric, pink-green faintly mottled, mildly to moderately staining

K-spar
chl
Fe₂O₃
sil.

some veining is calcite.

veining vein material 1% or less.

at 99.4 increase in fracture density, and irregularity
fracture fill pale green, massive, translucent, non reactive
still only 5% soft.

104.5 - 119.7

10%5 - increase in stain; veins return to gtz-calite 35° CA

laven, with occasional reappearance of soft green material
some veins @ 0°, vein material \approx 1%

- occasional ~~zones of~~ phyrlic zones, euhedral
to euhedral 5% .5-1m long dk grn mafic, lath like, occ. K-spar?

↑ v.f.g.

texture is aphanitic, vaguely mottled pink-green
(Fe₂O₃ - chlorite) most often pink material holds less of a stain
the green is K-spar-chlorite - (not quite as green as in fact most of the K-spar is primary - phylite - trachyte
occasional plag lath .1-.5 mm

pink maroon - Fe₂O₃

the green - chl - K-spar

↑ 2° ↑ primary.

some @ 0°

veinlets often at 30° gtz-calite, ± chlorite
sometimes veins containing chl have trace cp.

119.5 - 121 rubbled and broken zone

minor

121-130 - consistent moderate stain faintly banded in
places 30°-40° @ 124. up to 5% small lath-like dk grn
mafic phenocrysts, 1mm-2mm long long axis subparallel
to faint flow banding where detected

gtz-cal-chl veining less than 1%

pl less than .5%

moderate stain + mafic phenocrysts Trachyte to Trachyandesite.

130-140.5 - continued monotonous grey-green with a slight maroon cast

\approx 5-7% microphenos 50% matrix (Hb?) 30% plag 20% K-spar

all small most less than 1mm

v.f.g groundmass \approx 50% K-spar, 50% chloritic mafics + plag.

fracture with Fe₂O₃ envelope, rare

pl 3% or less.

244.7 - 245.8 - pink fine-grained alteration zone with sharp but faulted
disjointed contacts with surrounding maroon-green rhyolite-rhyolite breccia
L.C. 55° CA @ 244.9 5cm vaguely banded qtz-cal albite
vein (chla is fill in vein (last tube spec.) .3% apy.
245.8 - 250.3 hem-chl altered 3.0 to breccia

250.3 fg. basaltic dike? ground mass c.c., chlorite

252.1 sparsely amygdaloidal, non staining,
fracture fill, vesicule fill - quartz-calcite
fine to medium grained, euhedral qtz at times
± intergrown cp (.2%) total 7.

252.1 - 252.5 chloritic crush-zone zone 20° CA.

we sharp 50° CA

252.5 - End of hole breccia.

- fresh looking laterolithic breccia
matrix supported in upper regions to clast contact
to interlocking (pressure solution?)

Date - 465-3851

- most clasts are rhyolitic, - ignimbritic, flattened shards
- slag porphyritic.
- f. banded
- dark maroon massive
- occasional basaltic looking
- "

jasperite matrix

± occasional waxy py

truncated qtz veins in clasts.

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0-6.1 overburden,

6.1-30.7 grey-green, massive to faintly banded 50-60° to CA
hard, v.f.g. toaphanitic many zones of rubbled core to 12.0 m
but ~~some~~ no gouge, no stain 1-

minor Sericite 6.1-12.8

minor chlorite

1-2% py fc and disseminated
small jasperitic veinlets

2% small .5-1.5 mm euhedral plg phenocrysts

□ equant outlines, zone

1% latklike dk, chloritic mafic ⇒ Hb? euhedral 1mm

trace cp ± bornite ± covellite

6.1-12.8

FB 45-55°

2 py periods

① py veinlets, often sub-|| to banding have narrow
sericitic (part pale, v.f.g.) ± Fe₂O₃

② py veinlets, sometimes larger, up to 5 mm with chloritic
± jasperitic envelopes.

up to 7% small phenocrysts

moderate stain v.f.g. K-spar (primary in gm
devitrification?)

30.7 UC 45° flow contact

upper massive to banded, porphyritic

lower frothy, auto brecciated, gm devitrification
felsic flow

3-5% py

- green, pale to dark green, depending on variable chlorite

content 10-15%

SLADS

- frothy zones (amygdalules) silica filled ± py ±
often chloritic rims, sometimes central parts empty.

- 2-3% phenocrysts, sub euhedral, plg ± (□ cristobalite?) + Hb.

- pyrite veinlets^{car} have chloritic envelopes

- glossy, perlitic in places, tiny spherulites,

- plg phenos fresh to buff earthy alteration

41.5-43.5 plg ppt basaltic-andesitic dike medium green

LC sharp 60°

5% plg, 1-3mm, euhedral, cc veins, chl., (fresh
looking)

43.5-51.1 pyroclastic flow, lithic tuff. 100% felsic volcanics, some rounding

long axis of frags sub-parallel, matrix soft (chloritic pale grey green) pyritic (7%
? devit glass? subwelding?)

30.7
37.1
42.8

51.1 - rhyolite, flow banded to flow breccia, grey to almost white
54.3 non staining, gradational/slightly erosional contact with overlying
pyroclastic flow,
some brecciation may be hydrothermally enhanced, py
in matrix, jagged? 5% py

54.3^{59.7} continued massive to grey to sparsely porphyritic (small plug laths)
rhyolite - (K-depletion, non staining, brecciated primary to hydrofracture py-silica
in fill in places (3% py, 10% silica)

stads → 7%

tiny spherulites 3% (only in non massive rhyolite)

white to grey to chlorite green

59.7-68 same rock

- 50% fractured broken and rubbled core.

- colour can be greenish - chlorite

dull grey

- silica

grey pink

- silica minor hematite.

68-76 1% py 2% py

continued grey to green massive to sparsely porphyritic rhyolite
3% euhedral slag .5-.1.5mm, occasional □ cristobalite? .5% thin at grain laths
core becomes cloudy in places (disrupted with tiny spherulites)
faint stain (K-spar in groundmass)

76-87.7

continued massive ↑ to 82.0 3% py
Flow contact 55° ↓ 20% py

Frothy, vesicular, auto brecciated.

30-40° stads silica fill often with pyrite rinds

some fracture controlled py (thin veinlets) and sometimes
as matrix to breccia

tiny earthy flesh call colours specks ⇒ replacing

tiny spherulites

86.0 87.3 50 cm core missing, broken rubbled recovery

87.3-91 same, up to 60% stads, some very elongate 55° to 11 CA

91-93.3 basaltic to andesitic dils. 5% saussuritized
plagioclase phenos. chlorite + calcite in gm.

93.3-98.7 continued Slab flow / flow breccia
Slabs ovoid to irregular to stretched, pale
grey-green ^{sometimes} & .5 to 1 mm envelopes ± quartz inclusions, silica cores,
~~5%~~ 3% py

98.7 - 109.3 same, 3% py 3%-5% euhedral plagioclases

@ 109.2 SLABS become very elongate 25° CA up to 2 cm long.
114: -

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0-4.3 overburden

4.3-6.1 broken, rubble, (boulders?) rhyolitic, not sampled.

6.1- _____

Rhyolite - Rhyolite flow breccia

maroon to chloritic green flow banded to massive, very sparsely porphyritic. Also FB sometimes at very low angles. Some fractures have salmon-pink envelopes up to .5 cm thick

moderate stain { 6.1-16.6 10% envelope K-spar
10-20% chloritic
10-20% Fe₂O₃

occasional patches of fracture controlled jasperitic material.
.3% py

irregular quartz-calcite veins (mostly calcite) 1% vol.

16.6 - 33.4 10% Fe₂O₃ (some primary?) 20% chl.

16.6-17.0 → continued 3.0, as 6.1-16.6

17.0-19 → 3.0 flow breccia to lithic tuff

19.0-21.7

30% felsic
20% basaltic
rounded to sub-angular.
maroon to dk green.

contact ↓ rubble chloritic ore
50cm missing

21.7-30.8 3-2. 10% 1-3mm subhedral K-spar phenos.

maroon to maroon matrix (v.f.g to aphanitic) always stains
.1% py, no noticeable cp.

30.8 basaltic v.f.g. to gouge 30% dike in fault?

33.4-38.4 dike v.f.g. dk gran .1% py

38.4-38.8 rubble contact.

30.8 v.f.g to aphanitic, massive, Fe₂O₃ chl. v.f.g tuff - massive flow
44.5 .3% py .1% cp.

44.5-46.8 fine grained med dark-med green basalt.
contact sharp at 50° slightly chilled

46.B -

medium green bedded pyroclastic ash or epiclastic fine grained sand. ^{55°} CA

crosscutting fractures have chloritic envelopes, very narrow rock looks fresh

80% broken crystals? 10% slabs, pumice

coarse mottled silica vein at 47.9, ^{chlorite} mottled barren. 10cm thick, sub || to bedding.

@ 49.2 coarse beds have lithic fragments ^{porphyritic (chlorite)} ≈ 2mm.

L-C 53° at 50.2

49.3-50.2. largely juvenile material

50.2 - flow banded rhyolite.

650

K-spar

dark to light green to salmon pink to pale orange occasionally dark green bands. rarely bands look zoned. 10% flow of brecciated, green matrix rhyolitic about half the time, but is ^{other half} v.f.g. silica ± calcite cores ± chlorite selvages ± sulphide.

rhyolite fragments in flow breccia have salmon pink (K-spar) rims... some K-spar is secondary. & green rhyolite also stains well (not quite as bright as salmon pink) rhy - K-spar stable + chlorite, or K-spar addition + chlorite sparse pyrite in fractures and sometimes bands.

banding is folded and brecciated, but wherever consistent it is ³⁰⁻ ≈ 40° CA.

65.0-68.6 banded flow gradually becomes amygdaloidal but appearing as flattened quartz filled structures. Sx can become almost a void at 66.8, but still have slightly irregular outlines the largest are about 1 cm long ^{can have calcite cores} 5mm wide. They grade again into streaked out quartz structures which can imperceptibly grade into bands.

35° CA → maroon-green, strongly staining primary ± 2° K-spar peray (thermal oxidation) Fe₂O₃ + 2° and v.f.g chlorite - devit glass ± 2°

68.6-89.1: maroon-green flow breccia - matrix to breccia is chloritic, or hematitic (maroon or green) with some quartz-carbonate veining moderate stain

around 89.0 loses banded appearance, becomes maroon massive hematitic. @ 89.1-90. faintly bedded.

90.0-96.8 - maroon to green (interbedded) bedded pyroclastic rock

90.0-96.8 continued

@ 25-30° CA

sequences of v.f.g. ashes or muds, pyroclastic flows.
slightly erosional basal contacts, evidence of flattening, minor
welding (glassy ground masses, devitrification to chlorite mass.

slot though with tiny fractures sometimes with very
small amounts of sericite of clay sometimes appearing empty
most have \approx 1-5 mm envelope that darkens surrounding
rock (chlorite?) .5% disseminated py

96.8-97.6 \times fault, gouge bounded basaltic dike

97.6-111.8. ~~red~~ pink to maroon to purple splotchy, white-grey in
places, medium soft to harder than knife.

Texture appear fragmental, but in large part \approx silica, hematite
clay alteration is texture destructive.

roughly 97.6-100 pinkish gradation.

100-105 \approx maroon to purple

105-109 purple-dark purple-pinkish mottling

109-111.8 gradually loses purple to pink and then to
grey.

occasional fracture fill with soft grey translucent material
gypsum? .5% perhaps increasing in density down hole.

111.8-130.8

grey-white silica-clay rock. Argillitic to advanced argillitic

- sometimes texture destructive massive looking, sometimes fragmental
with rounded to subrounded grey hard clasts (4-5cm around) in white
groundmass - soft silica + abundant white clays, sericite.

less than .3% py.

some harder grey clastic frags (this may be alteration derived) are
pitted and may be acid leached.

115-130.8 density of later fracturing event (gypsum?) filled
becomes increases in density to 10% of rock. most are smoothly small
1-2mm with stockworking, with many at a high angle to core axis
 \approx ? flat lying? [Occasionally a vein of pure soft translucent
material 6 cm wide \approx 70° CA with beccated margins 10% gypsum
total. AA or argillitic with actinolite gypsum overprint.

some ducts, fragments show remnant SLADS or
and flow banding argillite with acid leaching

130.8 - 132

basaltic dike f.g. sheared and gouge at both 50° CA.
contacts with some pyrite in shear

132 - 140 continued Argillite - AA - w gypsum stockwork
grey and white rock has purplish casts
pyrite less than 5%

140 - 152.6 continued same. lower purplish cast

152.6 - 152.9 pale green basaltic looking material dike?
both contacts sheared ~60° CA.

152.9 hidden AA - argillite, broken coarse gypsum minor gouge

154.3

py 5% 7 154.3 - 161.4 - AA, fragmental, becoming duller grey, less
frequently gypsum vein (3%) some fractures have pyrite envelopes,
some are all pyrite. v.f.g. disseminated to small zones of
massive v.f.g. py (usually associated with fractures)

161.4 - 163.5 basaltic dike f.g. dk grn, sharp contacts 40° CA
15% epidote, disseminated near fractures, and enveloped

163.5 - dull grey siliceous + clay AA - argillite

180

10% py 7% gypsum veins
30% py 1-3% gypsum veins

pyrite can be found as ~~some~~ in envelopes to gypsum filled
fractures, rarely with and as charge to gypsum fact. massive
bodies of v.f.g. py, sometimes associated with an increase
in fracture density but sometimes just as bodies of massive
sulphide up to 5 cm across.

generally, ^{however} gypsum crosscuts py bodies.

some parts of this section appear very silicified,
dull grey fine grained massive quartz w py.

protolith from 163.5 - 180 loose fragmental texture
and becomes more massive. Fuzzy phenos - play? occasionally occur.

180 - 188.8 porphyritic texture gradually becomes crisper

groundmass becomes medium green, - chloritic - plagioclases are fresher looking. Occasional feldspar crystals have salmon-pink rims, white or corroded interiors, perhaps K-spar in a field where K-spar is not stable (prophytic).

Sgsun drops to rare veinlet
py is down to $\approx 1-3\%$