Dick

PACIFIC
WATERPROOF
FIELD BOOK

No. 301

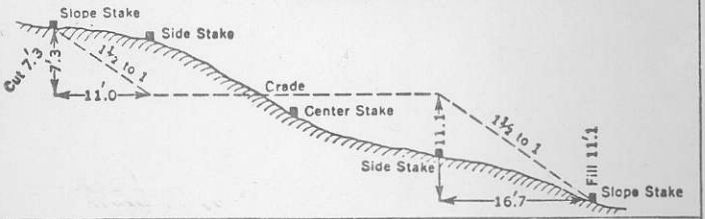
Ash Mountain

1980

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	0	.1	.2	.3	.4	.5	.6	.7	.8	.9	Cut or Fill
	Distance out from Side or Shoulder Stake										
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	38.8	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

Aug 8/80

Ash Mtn. Area

Left @ 8:30 AM from Rancheria.
Cloudy, windy, raining weather
Total Heli. time Aug 8 = 2.2 hr.

Set out at bottom of cirque
Many different rock types occur in the cirque talus:

1. Hornfels

There is a thermal aureole > 100 m wide developed away from the contact.
Hornfels are well bedded, argillaceous rocks. They are light brown, dark brown and black in colour; very fine grained and sugary-textured. Granitic veins, generally at most a few cm-wide are common, and commonly parallel the beddings. Hornfelsic rocks


hornfels
skarn
marble
hornfels
lepidolite
talus
granite

are vertically dipping and, unfortunately, not well fractured.
Biotite is the main mafic mineral present

2. Limestone

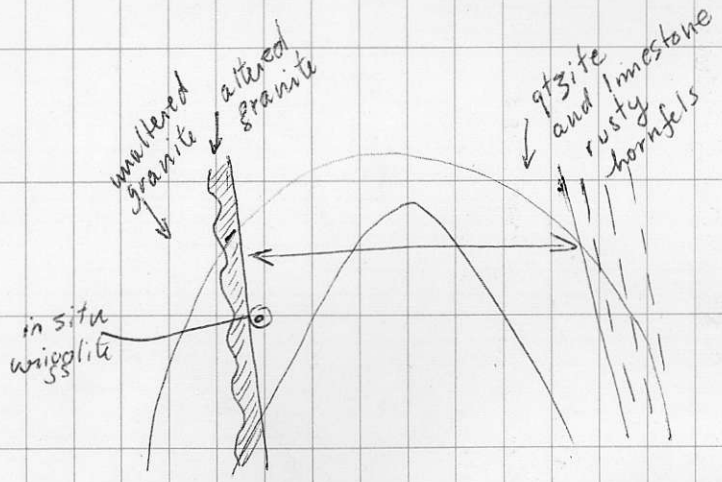
Coarsely crystalline white limestone is present in skree talus. They have been converted to coarsely crystalline marble with accessory garnet, vesuvianite, and pyroxene.

3. quartzite

90% SiO_2, accessory biotite, 2% overall quartz veins

4. Intrusions
   (a) Hornblende, biotite granite
   (b) altered, microlitic granite
   (c) tourmaline-rich pegmatites locally with lepidolite

a. Hornblende, biotite granite
   crops out in cirque


unaltered granite
altered granite
qtzite and limestone rusty hornfels
in situ wiggle

Aug 9/80

Ash Mtn.

Top of cirque. Follow skarn unit over top.

Sampled back side & top.
2,15 m-wide lstone beds irregularly altered.

Sample backside & top.
Mat in one sample.

Today, walked up the back side of the mountain and down both ridges on either side of the cirque.

Soil samples taken in
Ash Mtn cinque area
by Terry Zanger =
TAMO-1 to TAMO-11

Rock descriptions

Following rocks collected in main talus shoots on Ash Mountain. No precise locations noted on maps. Rocks all submitted for geochem for Sn only. Series LAMO

LAMO-1

Skarn.
Green garnet + calcite; 1cm-wide rusty-weathering patch, but no sulphides noted. Any Sn-geochem in this sample will be due to Sn content of gar. Low grade facies but

LAMO-2

Very rusty weathering, highly foliated, qtz-biot schist coming from cirque wall. 2% clots of pyrite or po? give rusty weathering.
Moderately fractured-fctrs parallel bedding planes. Colour: black/white mix. No other accessory

minerals noted.

LAMO-3

Skarn; garnetite.
Very rusty weathering, extremely dense, py-mo-bearing red-brown andradite-rich skarn. This piece of float is characteristic of the mm (cm-wide max) skarn beds found in-situ on the west wall of the cirque. (Actually, it comes from in situ bed!)

garnet (brown-red but not green variety	70%
cc	5%
px n (med green)	10%
py + cpy	5% (max)
unknown black platy mineral that is non-magnetic (see H.S.)	2%

This skarn is garnetite which has been further altered by later fluids → py + cpy + unknown minerals.

LAMO-4

Quartzite unit
This float is from the quartzite which separates the two limestone-skarn units in the argyre
The rock is extremely rusty-weathering on fracture faces but no pyrite observed as dissemination within the rock. Quartzite layers are interlaminated with vfg, fine black graphitic shale. Weakly to moderately fractured but again, fractures tend to parallel bedding plane, likely because the unit is vertically dipping. (H.S.)

LAMO-5 (HS)
Skarn
Magnetite-rich, in-part rusty-weathering, green-garnet, cc, qtz, px, minor skarn. Extremely dense rock. Mgt a major component and texturally appears to be later than the calc-silicate minerals.

Sulphide minerals were once present as evidenced by the pitted rusty patches. They have been completely oxided (weathered) and no fresh sulphides noted. Unlike Seagull skarns, this is a gar-mgt sample. No ferromagnesite present, at least not evident in hand specimen.

LAMO-6

Not for geochem. HS only

Two bags of quite unsuccessful chip specimens from the boulder of mica-bearing pegmatite. Mineralogy of the peg, which is 5 2 m-wide and cuts biotite schist is:

- qtz
- feldspar
- tourmaline
- biotite
- pink-white mica.

where present in books, the mica has a distinct pinkish hue which is quite strong locally.

This mineral is either lepidolite or a lithium-bearing muscovite. Both may be present.

The pegmatite dyke is distinctly miarolitic, with quartz tourm filling the miarolitic cavities. The light mica occurs as "books" mainly, and constitutes a maximum of 5% of the rock.

The origin of this particular dyke could not be located in the argillite wall, but unquestionably came from there.

Have photograph of this dyke, showing its distinct miarolitic texture, in my thesis.

LAMO-7

Extremely rusty - weathering, moderately - well fractured po-cpy-sph bearing quartzite. Po 10%
Cpy 2%
as fracture-fillings cutting well-

annealed quartzite.

LAMO-8

Two samples typical of the dense, green, garnet-rich skarn which typifies the calc-silicate rocks in the arque wall.
The first specimen is a rather poor example of the wrigglite, exhibiting a well-defined banded texture outlined by green, andraditic garnet. Qtz stace mgt present. Like most of the examples of wrigglite from this occurrence, the green-gar-rich rock is cut by red andraditic garnet. This indicates a second period of garnet deposition after the thin-bedding garnet formed.

The second piece is poorly foliated overall but with local domains exhibiting good wrigglite texture. Magnetite, which comprises ~2%

of the rock, it most abundant in the "wrigglitic" domains.

Mineralogy both specs

Green andradite
red-brown andradite
px
qtz
mgt
(cc)

There may be very minor fersh hastingsitic magnetite in one sample

* note: in one of these samples studied petrographically minor vanadium noted (or was it Dup Ska-n?)

LAMO-9

Typical "non-wrigglite" skarn. Non-foliated, coarse-grained assems (age of green andradite (80%), red andradite (10%) and calcite (10%) A few rusty-weathering "pitted" patches noted,

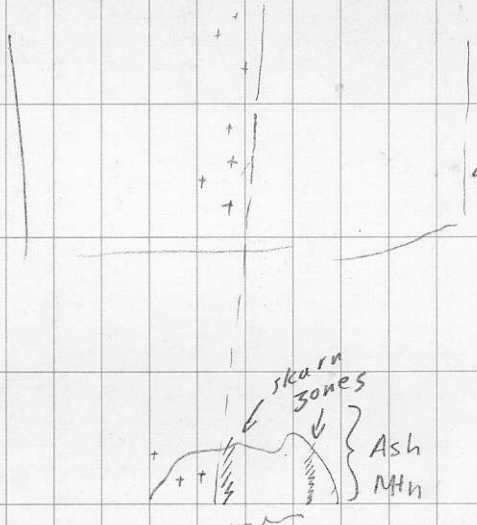
but no sulphides evident.

LAMO-10 Random chip samples of "wrigglite" skarn. Mgt-rich rx w alternating bands of vesuv, gt, etc. Cut (most) by late red-gt veins.

Back Side of Ash Mtn (drop-off Day 2 on back side)

LAMO-11 Back side Ash 2m-wide skarn zone formed in 3m-wide marble. Skarn zone can be followed over mtn peak and into cirque. Very weird rock! V. cse grnd black metallic unknown. Could be sphalerite but doesn't look quite right. Composes 30% of rock. Intergrown w green gt. and cse grnd cc skarn

LAMO-12 A few meters along strike (up hill) along same unit

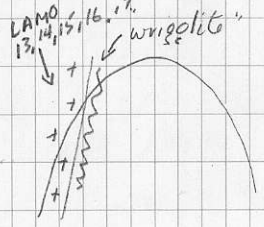


Skarn zone 2-3 m wide in two lstone beds which are separated by 5 m of so of barren ground.

Second zone of skarn is 1 m - wide bed on western part as sampled; observed on first day when traversing up ravine wall.

Again, black rusty metallic (sphalerite?) abundant in rusty-weathering patches (late Fe Zn introduction?) in banded calc-silicate skarn. Bands composed of qt, pxn, verdv ± cse grd cc

East cirque ridge - granite



Granite at contact with "wriggolite" on east ridge of cirque are variably altered @ contact. Appears that intrusion may have come up along fault because linear contact can be followed across valley behind cirque onto Can. Occidental ground. Next 5 samples of granite from o/c here.

LAMO-13

Miarolitic, alaskitic granite
Fine to med. grd, except in vicinity of miarolitic cavities

where grain size becomes pegmatoid
Cavities infilled w euhedral qtz &
tourmaline. Rock is buff-white
in colour, weathers orangey-yellow,
weakly rusty. 5% mafics overall -
all biotite - no rusc. observed.

LAMO-14

Yellow-brown-weathering, slightly
more highly-altered variety of LAMO-
13. Mafics largely destroyed &
altered to micaceous clays &
chlorite.

LAMO-15 As per LAMO-14

LAMO-16 Mafic-free, fine grained,
porous, white, highly-altered
alaskite-rhyolite except for
minor 'clots' of chloritic-clay
matrix. There are no mafics. Slightly
vesicular. Occasional xtls of
purple fluorite. Rhyolitic dyke rock?
(Didn't see any evidence of
dyking though)

LAMO-17

Yellow-brown-weathering, moderately to weakly fractured mafic poor gtz-fspr-biot granite w rare miarolitic cavities.

Chip samples of dark, f. gnd in-part rusty-weathering highly-fractured knobs on west side of cirque. Terry Z chip sampled these randomly on first day when we walked up cirque talus and on to west wall where knobs & minor skearn occurred.

LAMO-18

Tag says "taken across 30' of o/c" This is first sample taken. The chips alternate between rusty-weathering, thinly-bedded biotite hornfels and

LAMO-19

As per LAMO-18 "across 25" "

Same rx. Biot. brec(1) are py; mgt-bearing

LAMO-20 As above "across 40" "

Last chip taken - up to contact w/ 1m-wide skarn zone sampled as LAMO-3. Dominantly grz; fc

Other samples

LAMO-21

Marked on bag as "NE corner of enquiè." This is same unit as sampled in LAMO-11,12. and same bed rad grades, down w/ enquiè, to "wigolite."

Extremely mgt-rich skarn 80% massive mgt. w/ 20% green gt. and prx. Very heavy

(note change)

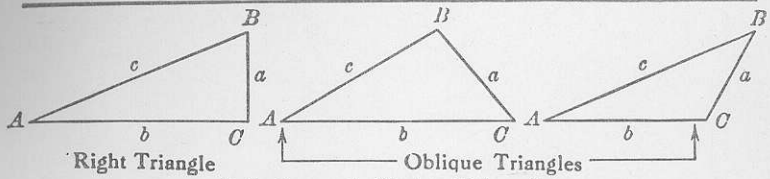
LAMO-25 Same locality LAMO-21
Rusty-weathering, highly fetrd schist.
Mnfls in minor dissem. py
upgraded adjacent to fctrs.
Biot. mnfls graded in and out
of maps free qtzite

LAMO-22
"Same site as TAMO-3"
Rusty-weathering, ese grnd
biot-musc.-qtz schist

LAMO-23
"West ridge of TMO-9"
rusty-weathering, fine-grained,
biot-mnfls mod.-well-fractured

LAMO-24
"Same as TAMO-10"
as per LAMO-23

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	
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	$B = 90° - A$, $b = a \cot A$, $c = \frac{a}{\sin A}$.
A, b	B, a, c	$B = 90° - A$, $a = b \tan A$, $c = \frac{b}{\cos A}$.
A, c	B, a, b	$B = 90° - A$, $a = c \sin A$, $b = c \cos A$,

Solution of Oblique Triangles

Given	Required	
A, B, a	b, c, C	$b = \frac{a \sin B}{\sin A}$, $C = 180° - (A + B)$, $c = \frac{a \sin C}{\sin A}$
A, a, b	B, c, C	$\sin B = \frac{b \sin A}{a}$, $C = 180° - (A + B)$, $c = \frac{a \sin C}{\sin A}$
a, b, C	A, B, c	$A + B = 180° - C$, $\tan \frac{1}{2}(A - B) = \frac{(a-b)\tan \frac{1}{2}(A+B)}{a+b}$, $c = \frac{a \sin C}{\sin A}$
a, b, c	A, B, C	$s = \frac{a+b+c}{2}$, $\sin \frac{1}{2}A = \sqrt{\frac{(s-b)(s-c)}{bc}}$, $\sin \frac{1}{2}B = \sqrt{\frac{(s-a)(s-c)}{ac}}$, $C = 180° - (A + B)$
a, b, c	Area	$s = \frac{a+b+c}{2}$, area $= \sqrt{s(s-a)(s-b)(s-c)}$
A, b, c	Area	area $= \frac{b\,c \sin A}{2}$
A, B, C, a	Area	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° 10′. From Table, Page IX. cos 5° 10′ = .9959. Horizontal distance = 319.4 × .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. Cosine 5° 10′ = .9959. 1 − .9959 = .0041. 319.4 × .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.

Product of

B.C. Industries
DIVISION OF
DIETERICH-POST COMPANY OF CANADA LTD.
960 RICHARDS STREET, VANCOUVER, B.C. V6B 4M4

Table 1. Description and tin content of rocks in the vicinity of Ash Mountain

Sample	Description	Sn (ppm)
LAMO-1	Skarn; green garnet + calcite; 1 cm-wide rusty weathering patch; no sulphides. Sn must be contained within silicate minerals.	3040
LAMO-2	Very rusty-weathering, highly-foliated, qtz-biot schist coming from cirque wall; 2% clots of py or po. gives rust. Moderately-well fractured with fractures parallel to bedding planes.	36
LAMO-3	Skarn; garnetite. Very rusty-weathering, extremely dense, py-mgt-bearing red-brown-rich andradite skarn. Float. Characteristic of the thin (1 m-wide) skarn beds found in-situ on the west wall of the cirque. Mineral proportions: garnet 70% cc 5% pxn 10% py+cpy 5% unknown 2%	930
LAMO-4	Quartzite; rusty-weathering	<5
LAMO-5	Skarn; mgt-rich; rusty-weathering; contains green gar., cc, qtz, pxn, mgt. Extremely dense. Mgt. a major component and appears to be later	375

10 hrs. 10 mins

3.4 $1,000 # 50 500 # 50

	than the calc-silicate minerals. Sulphides pitted and eroded	
LAMO-6	Hand Spec. only. Mica (lepidolite?)-bearing tourmalinized pegmatite.	35.00
LAMO-7	Quartzite. Rusty-weathering, moderately well-fractured with minor dissem. po + cpy as fracture-fillings.	<5
LAMO-8	Skarn. Dense, green, garnet-rich. Weakly developed 'wriggolite' texture outlined by green, andraditic garnet. Trace mgt. present. Late red andradite-filled veins. Mineralogy: green andradite, pxn, qtz, mgt, cc.	1105
LAMO-9	Skarn. Non-foliated, coarse-grained assemblage of green andradite (80%), red andradite (10%) and calcite (10%). A few rusty-weathering "pitted" patches but no sulphides present.	1020
LAMO-10	Wriggolite. Random chip samples. Mgt-rich rocks with alternating bands of vesuvianite, garnet, etc. Late, cross-cutting red garnet veins.	525
LAMO-11	Skarn zone. Back side of Ash Mtn. near summit. Unusual rock.	5565

35 35/hr.

	Contains a very coarse-grained, black, metallic unknown. Resembles sphalerite in colour and in having excellent basal cleavage. Unknown mineral comprises 30% of rock. Intergrown with green, andraditic garnet and coarse-grained calcite.	
LAMO-12	Same unit as LAMO-11. Same mineralogy, comprising banded calc-silicate skarn. Bands comprised of one or more of garnet, pxn, vesuvianite, and coarse grained calcite.	2060
LAMO-13	Granite. Miarolitic and alaskitic. Local pegmatitic domains. Miarolitic cavities infilled with euhedral quartz and tourmaline. Rock is buff-white in colour, weathers orangy-yellow, weakly rusty. Mafic content is 5% overall.	18.
LAMO-14	Granite. Yellow-brown-weathering, slightly more altered variety of LAMO-5. Mafics are largely destroyed and altered to micaceous clays and chlorite.	39
LAMO-15	As per LAMO-14	<5
LAMO-16	Granite. Mafic-free, fine-grained, porous, white, highly-altered,	<5

	alaskite/rhyolite. Weakly vesicular. Minor purple fluorite. Rhyolitic dyke rock?	
LAMO-17	Yellow-brown weathering, moderately-to-weakly fractured, mafic-poor, qtz-fsp-biot granite with rare miarolitic cavities.	<5
LAMO-18	Rock chips, taken across 10 m @ 0/c. Rusty-weathering, thinly-bedded, biotite hornfels and qtz-biot schists	21
LAMO-19	As per LAMO-18. Across 10 m; composite rock-chip sample. Biot. hnfls are py-, mgt-bearing.	<5
LAMO-20	As above. Across 15 m. Dominantly quartzite with minor hornfels and schist.	<5
LAMO-21	Skarn. Extremely mgt-rich (80%) with 20% green andradite and pyroxene. Extremely dense	675
LAMO-22	Rusty-weathering, coarse-grained, biot-msc-qtz schist.	29
LAMO-23	Rusty-weathering, fine-grained, biot hornfels. Moderately to well fractured.	<5

LAMO-24	As per LAMO-23	<5
LAMO-25	Rusty-weathering, highly-fractured, biotite hornfels with minor disseminated py, upgraded adjacent to fractures. Grades in and out of mafic-free quartzite.	<5