

Geochem Comments

Chu Chua

1. Alkali/Lime Plot

"cherts" low in alkalis

some altered "basalts" are very low in lime
+ alkalis

Basalts CaO 8-12% Σ alkalis 2-4%

Altered basalts - very scattered - a few have
 Σ alkalis increased most have lower CaO
+ lower Σ alkalis than the host rocks

Compared to Preto's NazO's are considerably
lower on average in the "fresh" + more so
in the "altered" basalts

DIAGRAMS

① Church Volc Class'n

② Histograms K₂O MgO Na₂O CaO

check ~~to~~ 9 - is it chert or
really alt. basalt?

Classification (Church scheme)

1. Most "cherts" have Al_2O_3/SiO_2 too low to fit on the plot
2. Most "cherts" + some "altered basalts" have alkalis too low to be in normal volcanic rock fields
3. On the Al_2O_3/SiO_2 vs Basicity Index most "basalts" + "altered basalts" plot in the basalt field - alteration decreases the Basicity Index slightly + lowers the Al_2O_3/SiO_2 ratio slightly.
4. On the alk. vs Bas. Index plot most of the "fresh" basalts lie in or close to the basalt field but regional metam. has led to some lowering of alkali content - altered basalts are ~~more~~ ^{slightly} to markedly depleted in alkalis.

* "CHERTS" ARE OUT OF THE VOLCANIC FIELD - could still be silicified volcanics though.

** ALTERATION

Σ ALKALIS — DOWN

BASICITY INDEX — DOWN (because CaO down?)

Pretz's Rocks - plot in basalt field - all but one go with the "fresh" basalts - one is with the "altered" basalt.

Fennell Fmn - Petro

Fe # alkals	$FeO + Fe_2O_3 + \frac{1}{2}(CaO + MgO)$	Al_2O_3 / SiO_2
3.68	✓ 21.76.	0.32
4.29	✓ 16.29	0.31
3.81	✓ 18.98	0.29
1.20	✓ 20.38	0.29
4.46	✓ 19.00	0.32
4.33	✓ 18.57	0.33

SiO₂

Section 9950 - no obvious conch with alteration but possibly SiO₂ depletion in bleach zones + local highs in the talcose alter zone.

The "cherty" zone has only 58% SiO₂ - silic. basalt? (CC14: 193.2)

"Unaltered" basalt mostly 47.5 to 50% SiO₂
Bleached zones (42-45%)

Section 10100N

"Unaltered" basalt 47½ - 49% SiO₂ (west)

"chert" 68, 72 - 86% SiO₂

Basalt east of chert 46 - 49 (lower near chert)

Adjacent to MS on west both higher + lower east - sl. lower

altered basalts ≈ basalts

CC12 350
CC 1 174.5
CC22 80 (180)

XCC12 350
CC14 74.5
CC25 34.5
CC26 30.5
CC11 67
CC1 74.5
XCC22 80 (180)
274.5
234.5
230.5
267
174.5

Al₂O₃

(9950) Basalts 14 - 15 1/2 west sl. lower adjacent to massive sulphides
13 - 14 east

Altn zone Talc? (22385)

Al₂O₃ slightly lower 13.6% (only one sample)

"chert" Al₂O₃ only 5.4% i.e. Tuffaceous chert

(10100) Basalt - avg 15 - 16 sl. lower near m. sulph. [west]
14 1/2 - 16 1/2 " " " " [east]

"Chert" 4 - 12% - Tuffaceous

Altered basalts ≈ basalts (sl. lower than?)

Fe₂O₃ (Total)

(9950N) Basalt - west - 10½ - 12%
- east - 10¼ - 11

Altn zone 4 - 10

(10100) Basalt - west - 10 - 12%

adjacent to m. sulph. - variable high or ~~low~~ ^{same}
- east - 9 - 10½

Chert - v. low to > 20% (in an altn zone)
3 - 7% generally

altered basalts ≈ basalts

MgO

(9950) Basalt 5½ - 7 (west) some to west

altn zone

avg to v. high (Talc altn)

Basalt - east 5½ - 7

(10100) Basalts West 6½ - 7 local n/10 near m. sulph

East - altn zone sl. lower "unaltered" 6 - 7%

Chert v. low but locally v. high where talc altn

occurs (20 - 35%)

0.25 - 3.0%

CaO

9950

Basalt 7-12 (west) 8-11 (east)

Lower in altn zones

CaO leached in
altered basalt
zones

10100

Basalt (west) $9\frac{1}{4}$ - $13\frac{1}{2}$ (east) $7\frac{1}{4}$ - $10\frac{3}{4}$

alt Basalt 6 - $8\frac{3}{4}$ — Decreased —

"chest" 0.1 - $1\frac{3}{4}$ % most ~~0.7~~ 0.7

Bas. near the ^{MS} ~~bas~~ on the west - levels locally decreased -
elsewhere not changed.

Na₂O

(9950) Basalt (W) 1.4 - 2.7 - 3.5 E (1½ - 3)
much lower below ~~up~~ Western mass. sulphide pod
& in altered basalt

"chert" - v. low

(10100) Basalt (W) 1.7 - 3.4 (E) 2.6 - 3.7
alt Basalt 2½ - 4.9 RAISED - albite?

chert 0.02 - 0.06 - 0.18

K₂O

(9950) Basalt (W) 0.05 - 0.40
(E) 0.5 - 0.6 - 0.03

"chert" 0.02

W side (Top) of M.S. K₂O higher 1.1 to 1.8

(10100) Basalt (W) 0.05 - 0.56
(E) 0.06 - 0.3

altered Basalt avg or high (> 1%)

Chert Rel. high in general
0.5 - 1.2 - 3.0 (local 0.05)

MnO (9950) Basalt (W) 0.17 - 0.20 (E) 0.16 to 0.25

alt. Basalt - little change
Chert - low

(10100) Basalt W (0.18 - 0.20) (E) (.17 - .19) σ_n @ 0.304

alt. Basalt .16 - .18 "unchanged"

Chert (0.09 - ~~0.20~~ 0.20)

v. low to basalt values + higher (one @ 0.27)

TiO₂ (9950) Basalt (W) 1.6 - 1.95 (E) ~ 1.65 - ~~1.73~~

alt Basalt the same (except the mineralogical altn sample)

Chert: low ~ 0.3

(10100) Basalt (W) 1.7 - 2.0 (E) 1.5 - 1.9 (most 1.5 - 1.6)

alt Basalt 1.5 - 1.8 (~ the same as unaltered)

Chert 0.02 to 0.65

(much lower)

1% 10000 ppm
.01% 100 ppm

Chu Chu

Massive Sulphides

Sulphides: Pyrite Cpy Sphalerite

~~other~~ gangue talc
barite
carbonate

Geochem - based on 16 massive sulphide samples (2 magnetite samples)

Cu Zn Minor Pb low Au, Ag
(17-231 ppm)

other elements Co 20 - 1030 (avg 370 ± 330)

Mo <10 - 418 [0.013%] (avg ~ 130 ± 130) <10, 220

Ba .09 to 10.8%
(Barite in gangue)

Ni 7 - 119 ppm 14, 40

As <20 - 410 (~190 ± 130) <20, <20

Cr 15 - 34 5, 5

~2.2 ppm } (ppb) Hg 41 - 13968 72, <10 ppb
± 3.3 ppm } avg 2220 ± 3350

Ribbon Cherts
vs felds.
tuffaceous cherty
tuffs.

Variscites

Alteration

Basalt vfg → pyroxene basalt
(augite)

Regional Alteration Assemblage

matrix Epidote, chlorite carbonate
zoisite

Plag → Saussurite Pyroxene - unaltered

Property Basalt