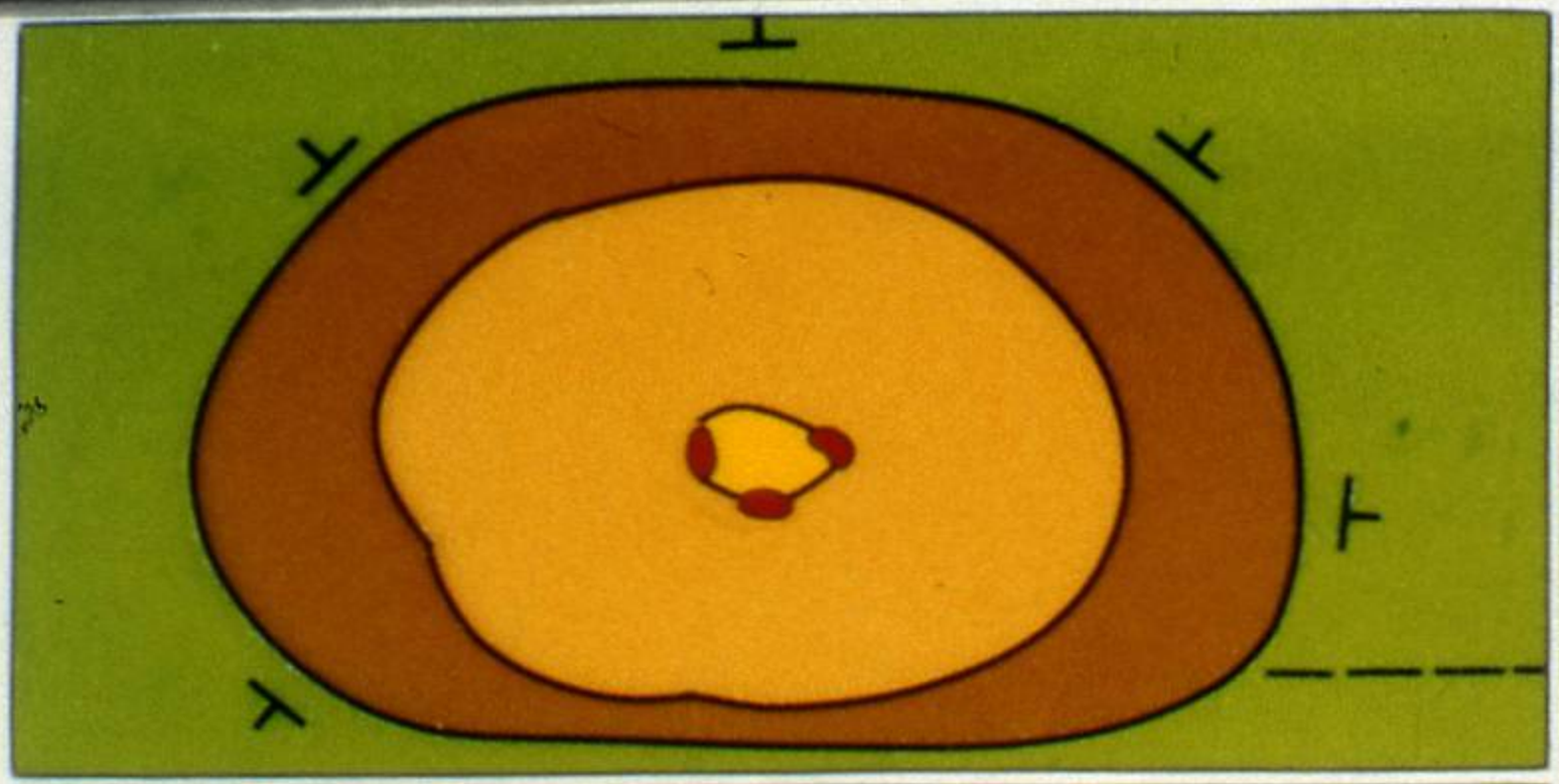
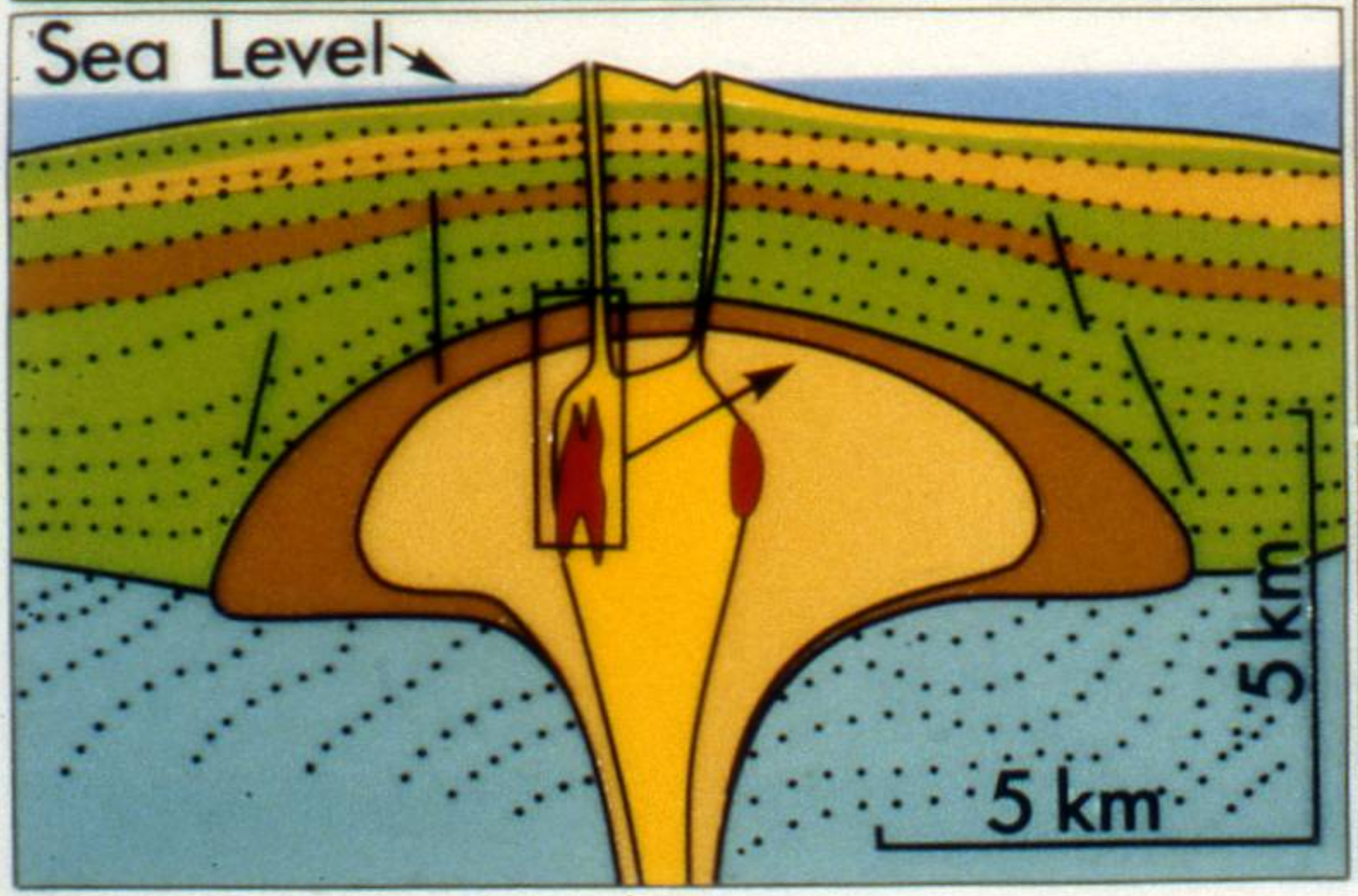
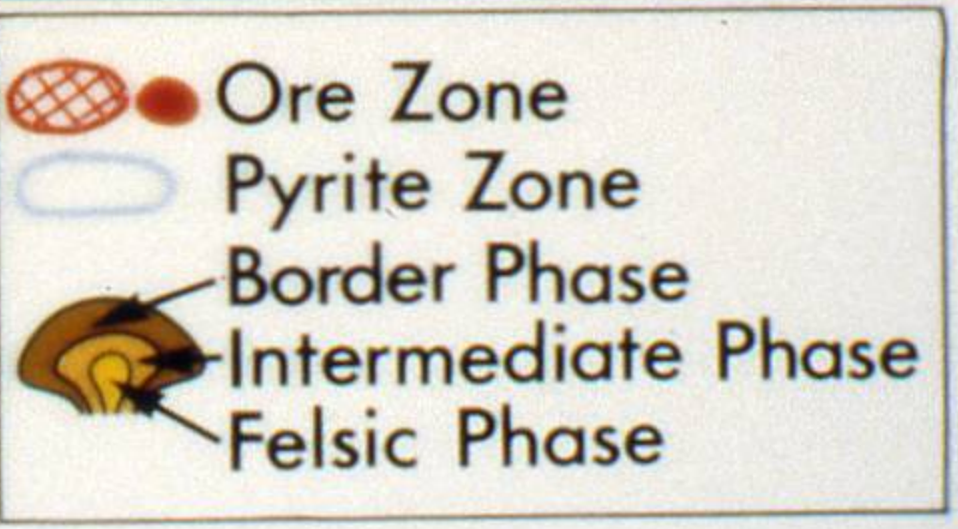


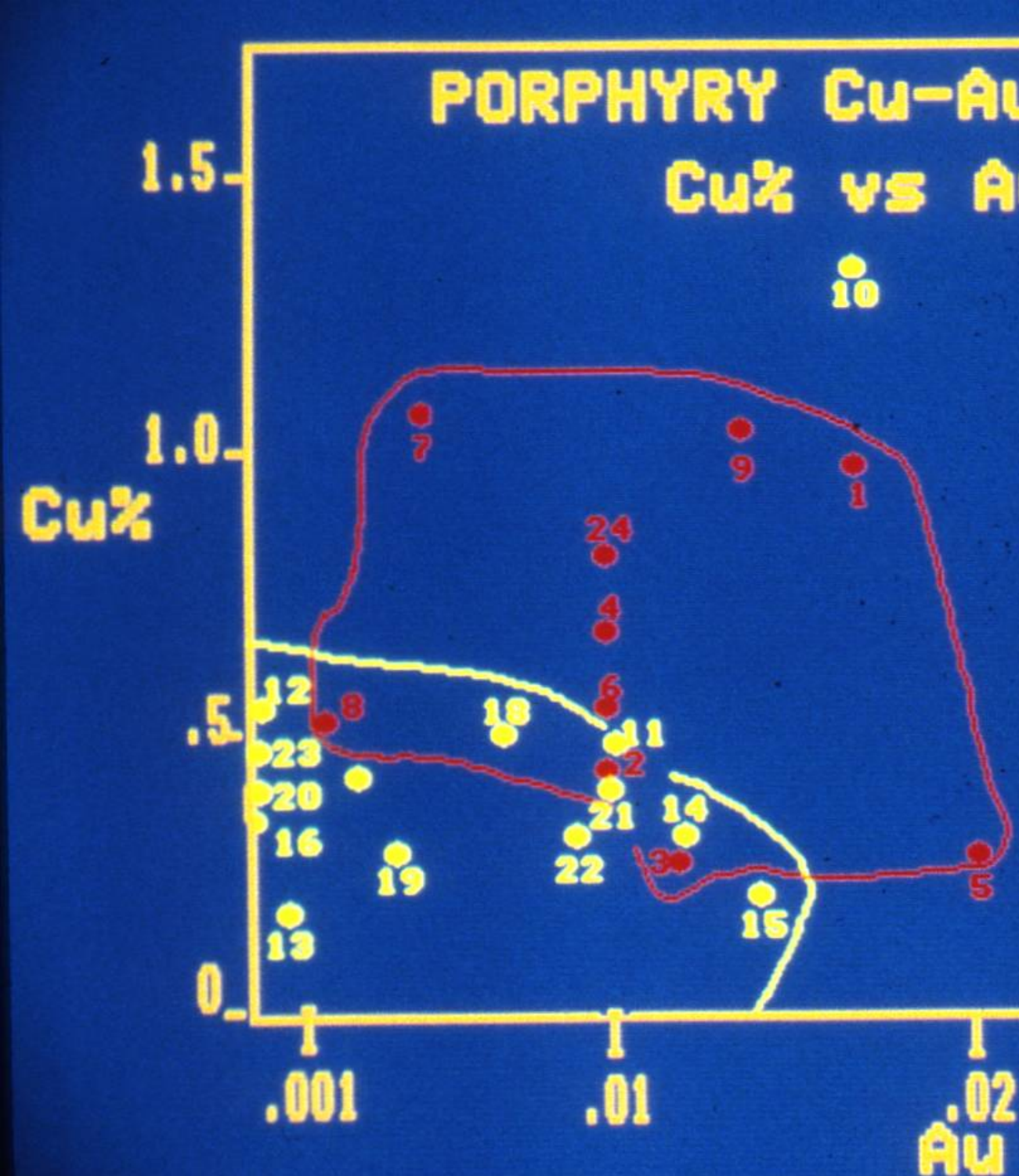

Sea Level
5 km
5 km


1 km
1 km


Ore Zone
Pyrite Zone
Border Phase
Intermediate Phase
Felsic Phase

PORPHYRY Cu-Au DEPOSITS IN BC

Cu% vs Au oz/T



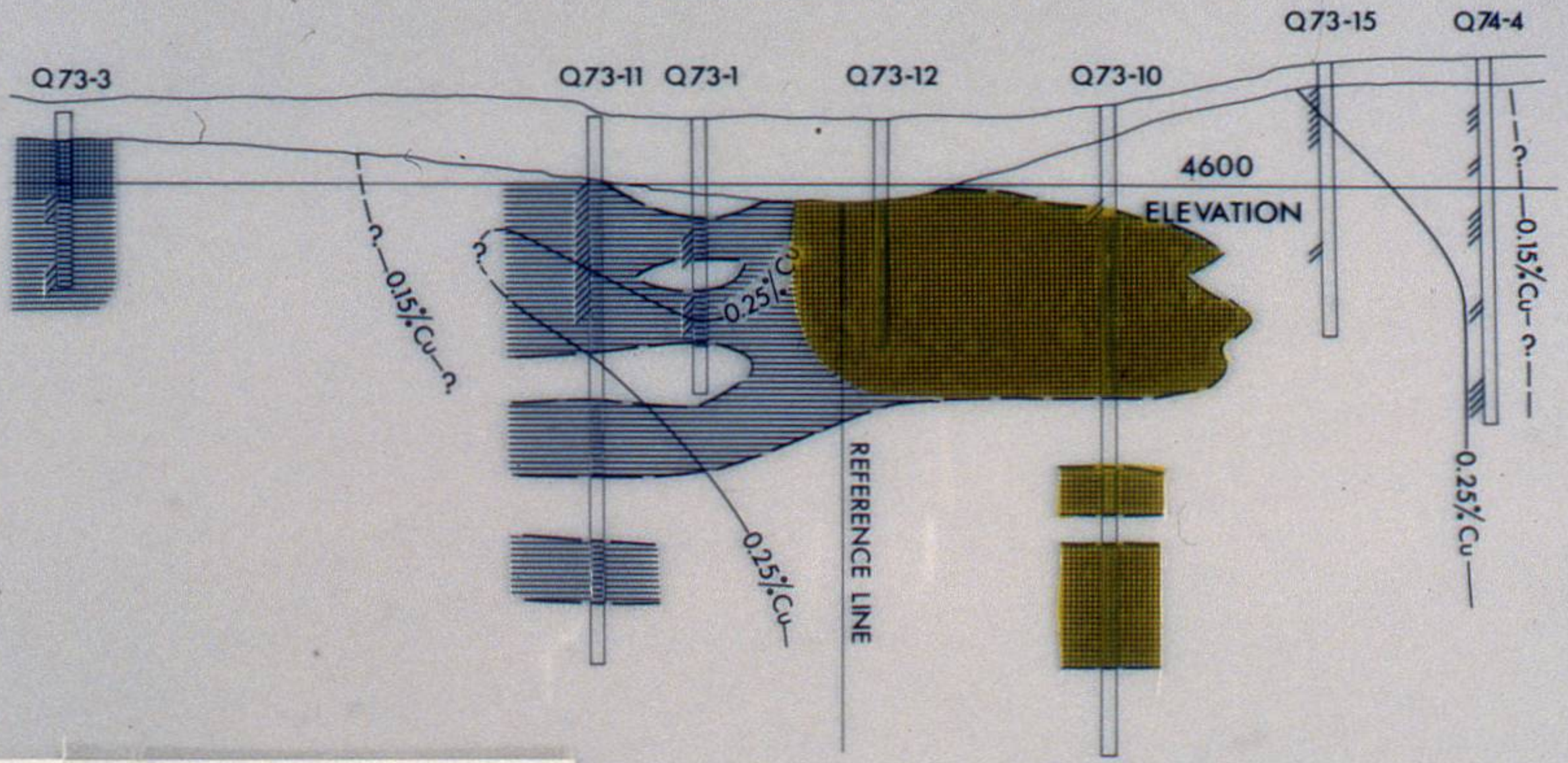
ALKALINE

1 AFTON
2 AJAX
3 CARIBOO BELL
4 LORRAINE
5 MT. MILLIGAN
6 RED CHRIS
7 COPPER MTN.
8 INGERBELLE
9 STIKINE COPPER
24 KERR

CALC-ALK

10 A.H. BX
11 BELL COPPER
12 BETHLEHEM
13 BRENDA
14 EXPO
15 FISH LAKE
16 GIBRALTAR
17 GANISLE
18 ISLAND COPPER
19 LIARD COPPER
20 LORNEX
21 MORRISON
22 POISON MTN
23 VALLEY COPPER

SECTION B



LEGEND

SECONDARY BIOTITE: PERVASIVE; SPOTTY

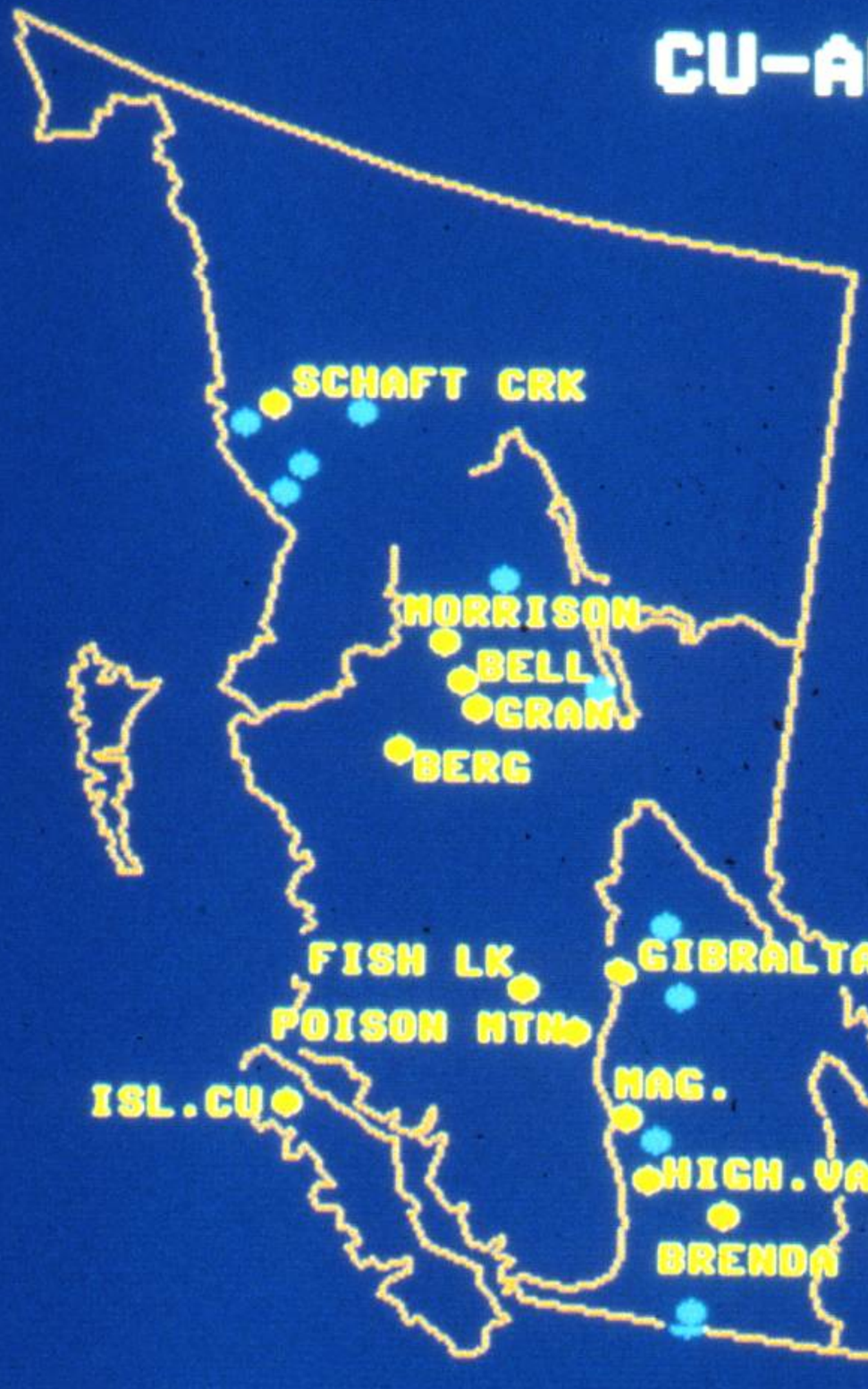
SECONDARY BIOTITE: VEINS AND FRACTURES

0 50 100

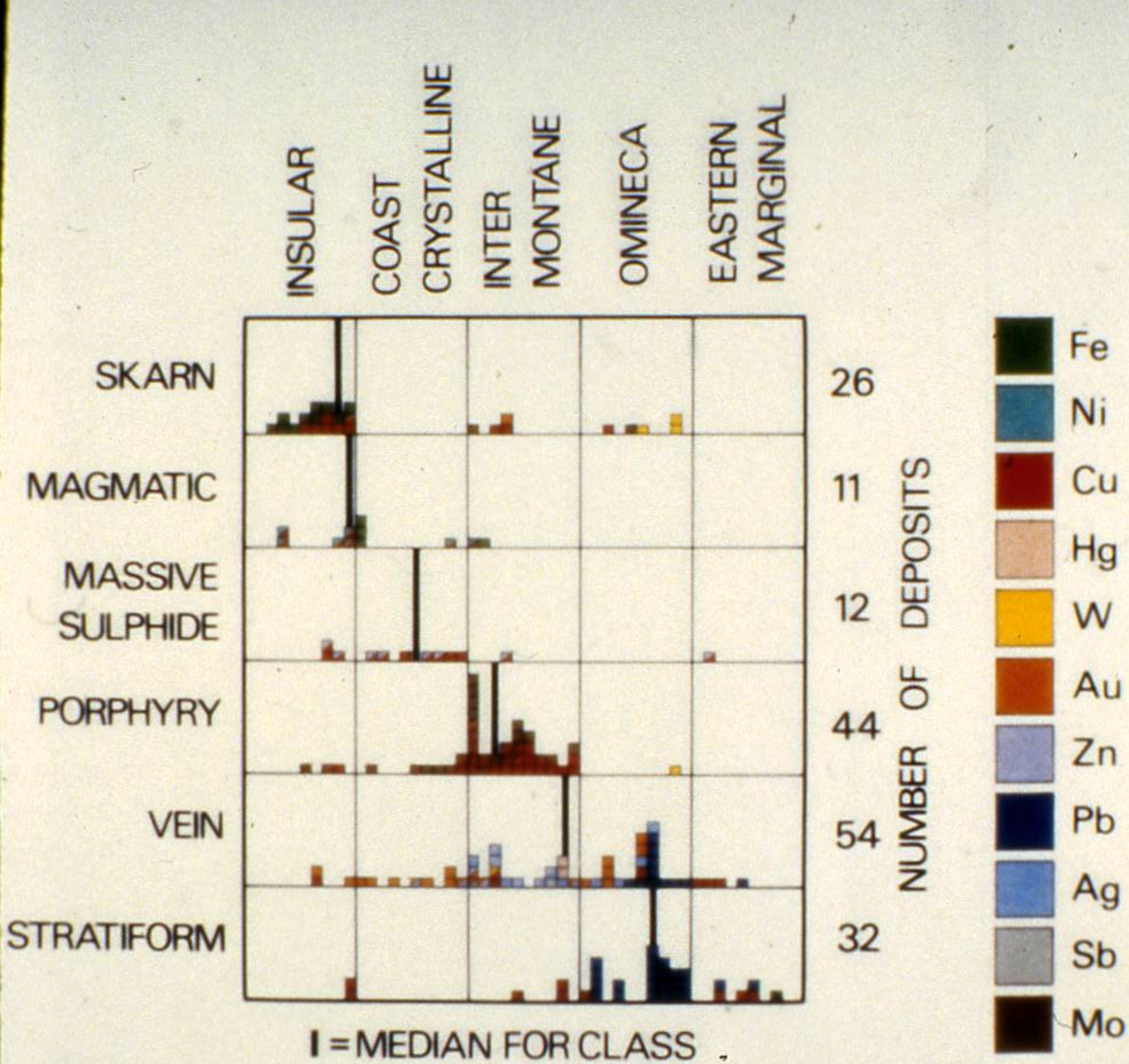
SCALE - METRES

CU-AU PORPHYRY DEPOSIT LOCATIONS

B.C.



- CALC-ALKALINE
- ALKALINE

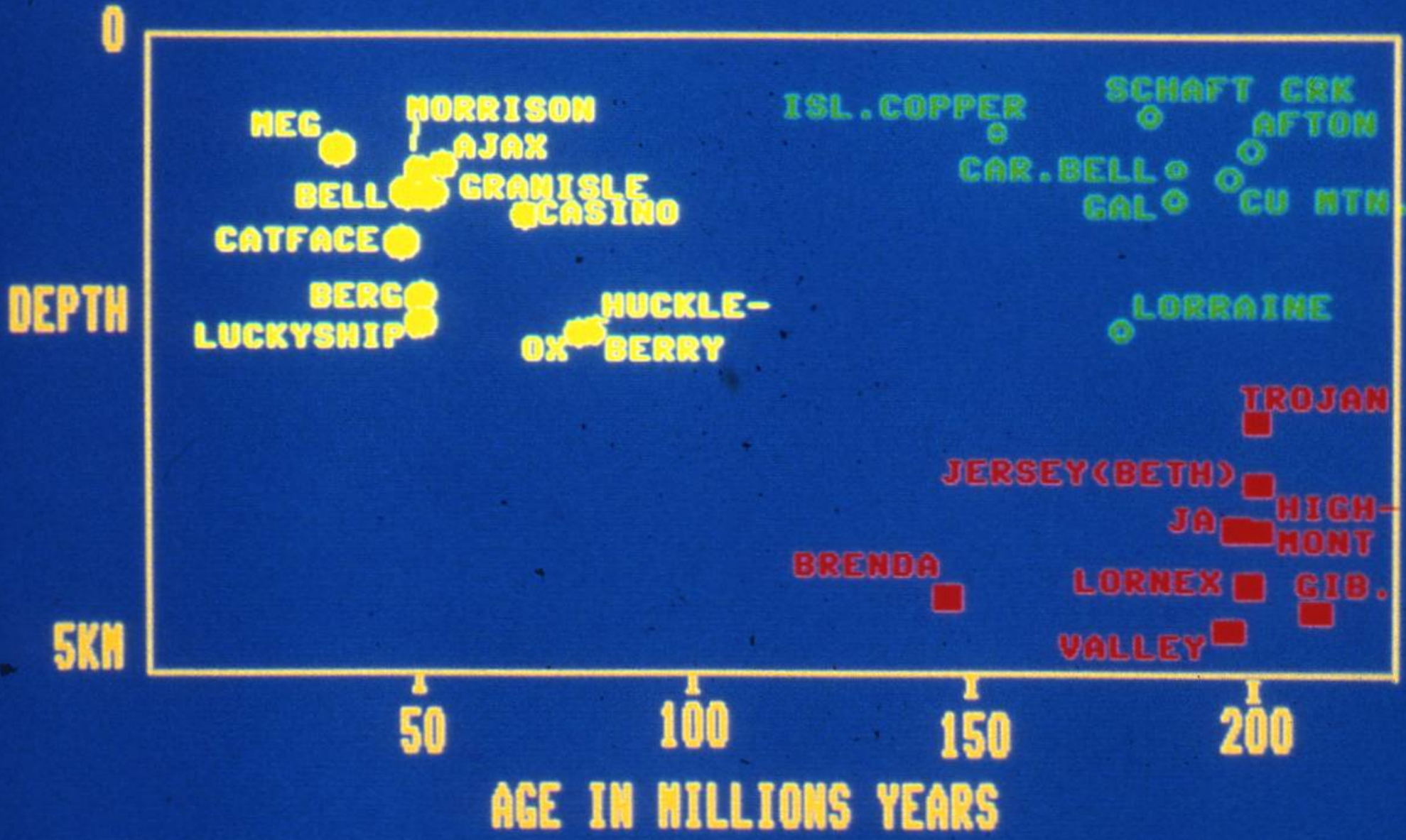


I = MEDIAN FOR CLASS

DISTRIBUTION OF CLASSES OF DEPOSITS BY TECTONIC BELT

Fig. 9A

AGE & SYMMETRY OF PORPHYRY DEPOSITS



AFTER SUTHERLAND BROWN

GEOLOGY PARTLY FROM QUINTANA DRILL LOGS
(PRE–1973 DRILLING)

4600 LEVEL

O DIAMOND DRILL HOLE EXAMINED

SECTION A

SECTION B

0.25 % Cu

0.15 % Cu

0 50 100

SCALE - METRES

LEGEND

POST–ORE PLAGIOCLASE PORPHYRY

QUARTZ PLAGIOCLASE PORPHYRY

'YOUNGER' PLAGIOCLASE PORPHYRY

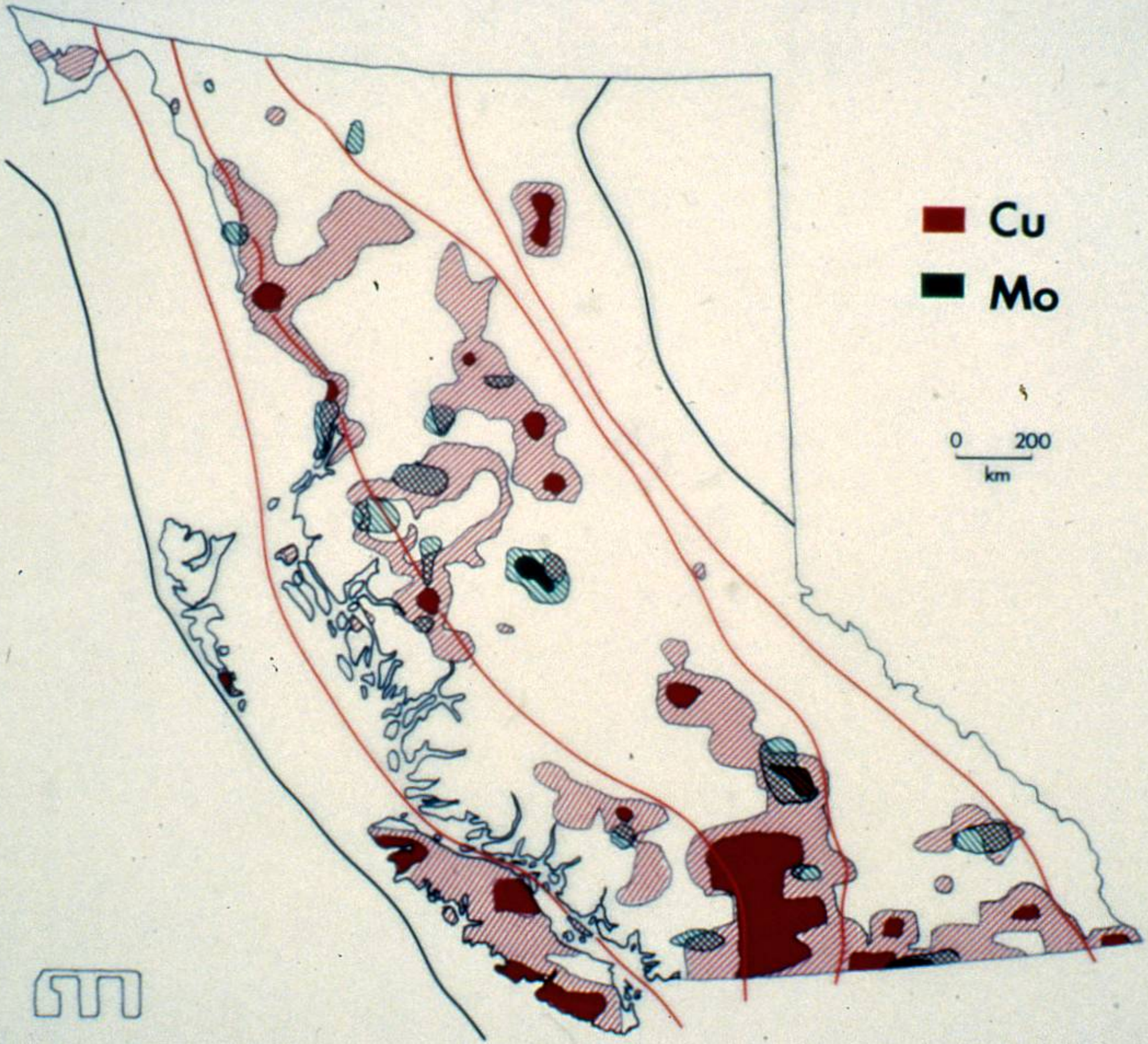
'OLDER' PLAGIOCLASE PORPHYRY (MATRIX BIOTITIZED)

HORNFELS: PORPHYRITIC ( ); SPOTTED ( )

FISH LAKE

COMPARISON OF FEATURES

FEATURE	CALC-ALKALINE	ALKALINE
COMP. PARA-MAGMATIC HOST		
PYROXENITE		1
DIORITE		3
SYENODIORITE		2
SYENITE		3
MONZONITE		2
QTZ DIORITE	6	
GRANODIORITE	10	
QTZ MONZONITE	8	
GRANITE	1	
AGE OF HOST	49-204 Ma	175-198 Ma


Cu
Mo
0
200
km

IONIC

COVALENT

LITHOPHILE

CHALCOPHILE

N Sn Mo

Cu Zn Ag

Cu Ag Au

PLUTONS

COUNTRY ROCKS

MAGMATIC

HYDROTHERMAL

SILICIC

CALC-ALKALINE

FLUORIDE/HYDROXIDE

CARBONATE COMPLEXES

CHLORIDE COMPLEXES

DEEP

SHALLON

HIGH T

LOW T

PEGMATITE

DISS STOCKWORKS

PORPHYRIES

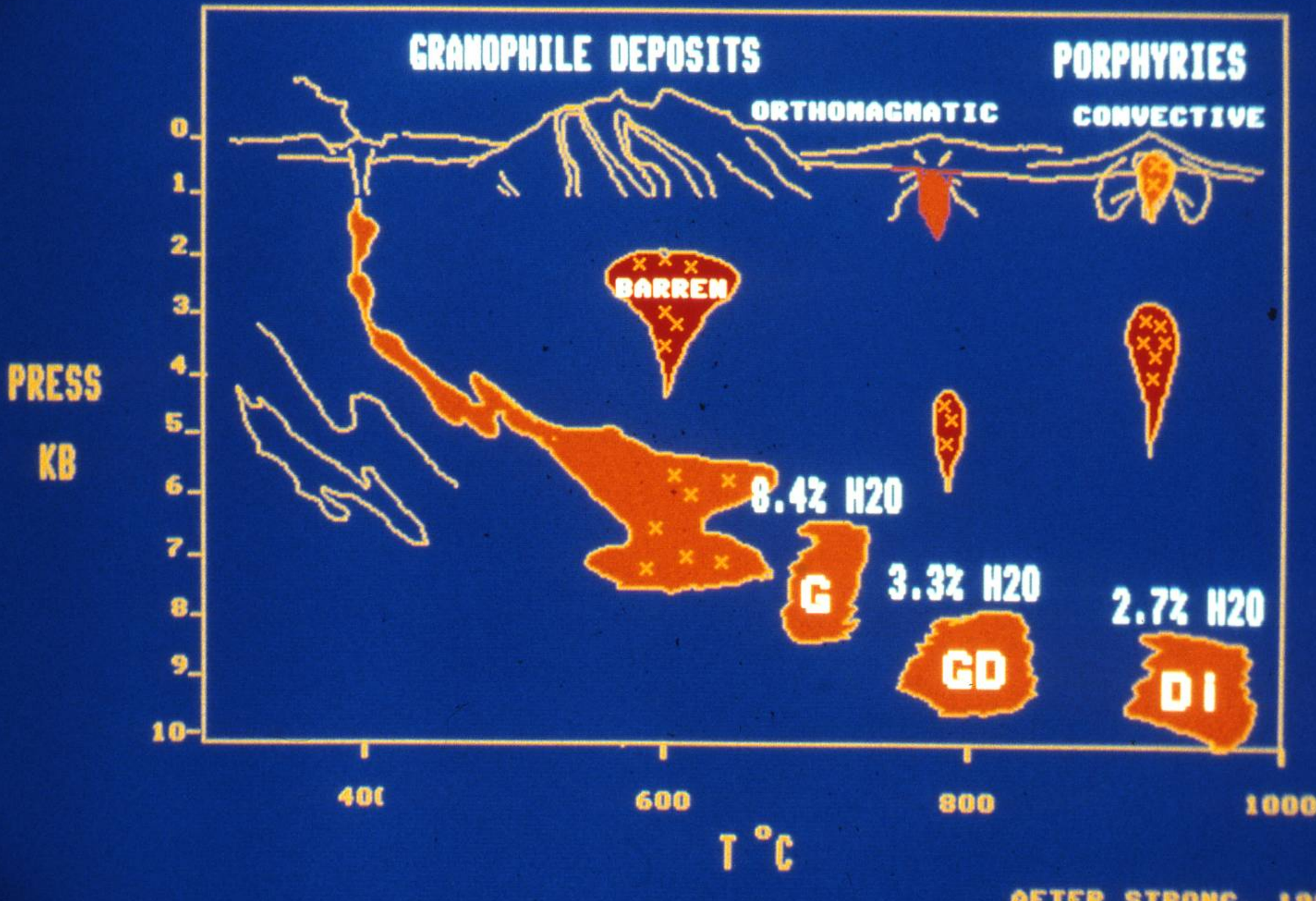
VEINS

CU-AU PORPHYRY DEPOSIT LOCATIONS

B.C.

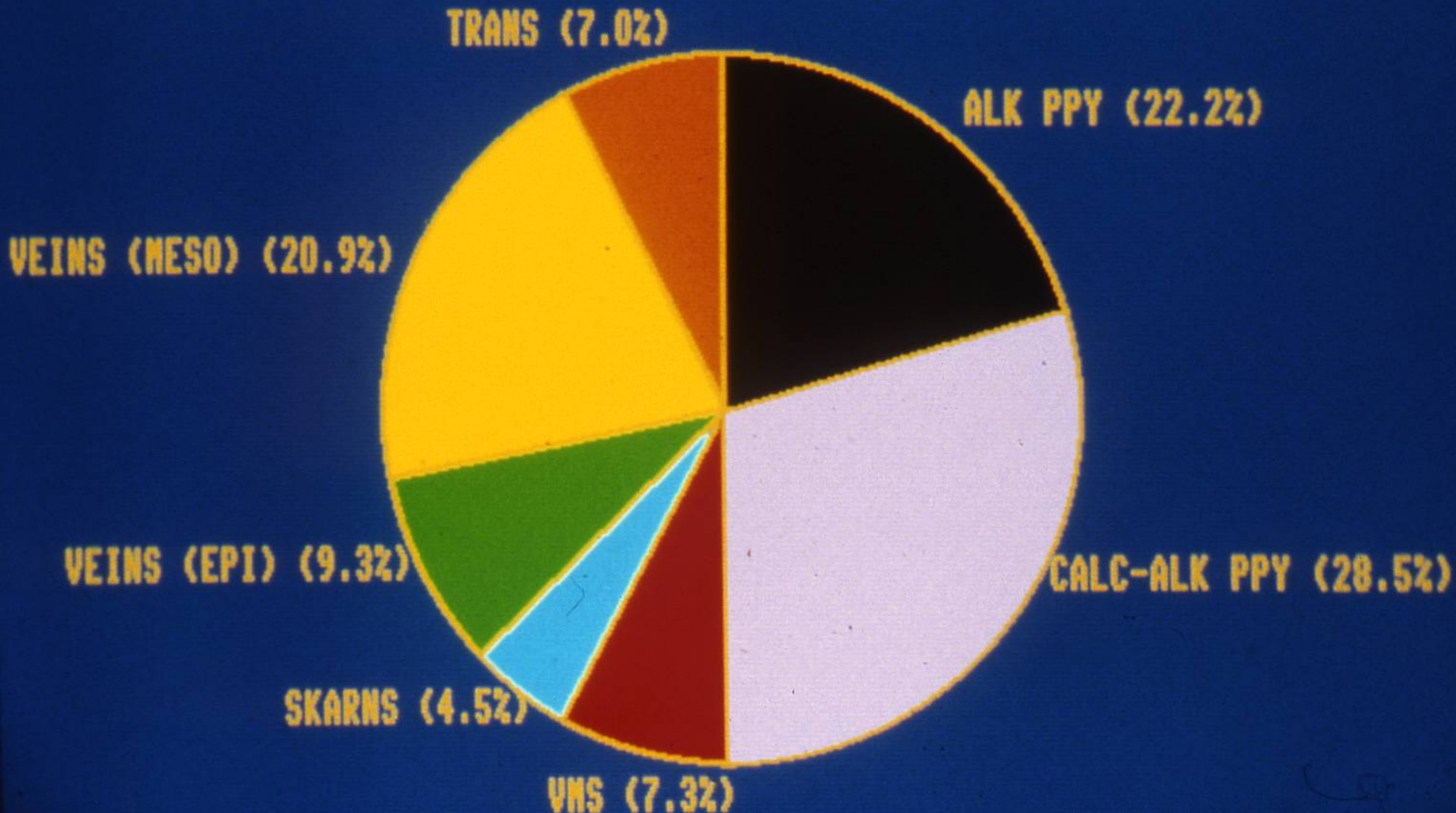
● CALC-ALKALINE

● ALKALINE



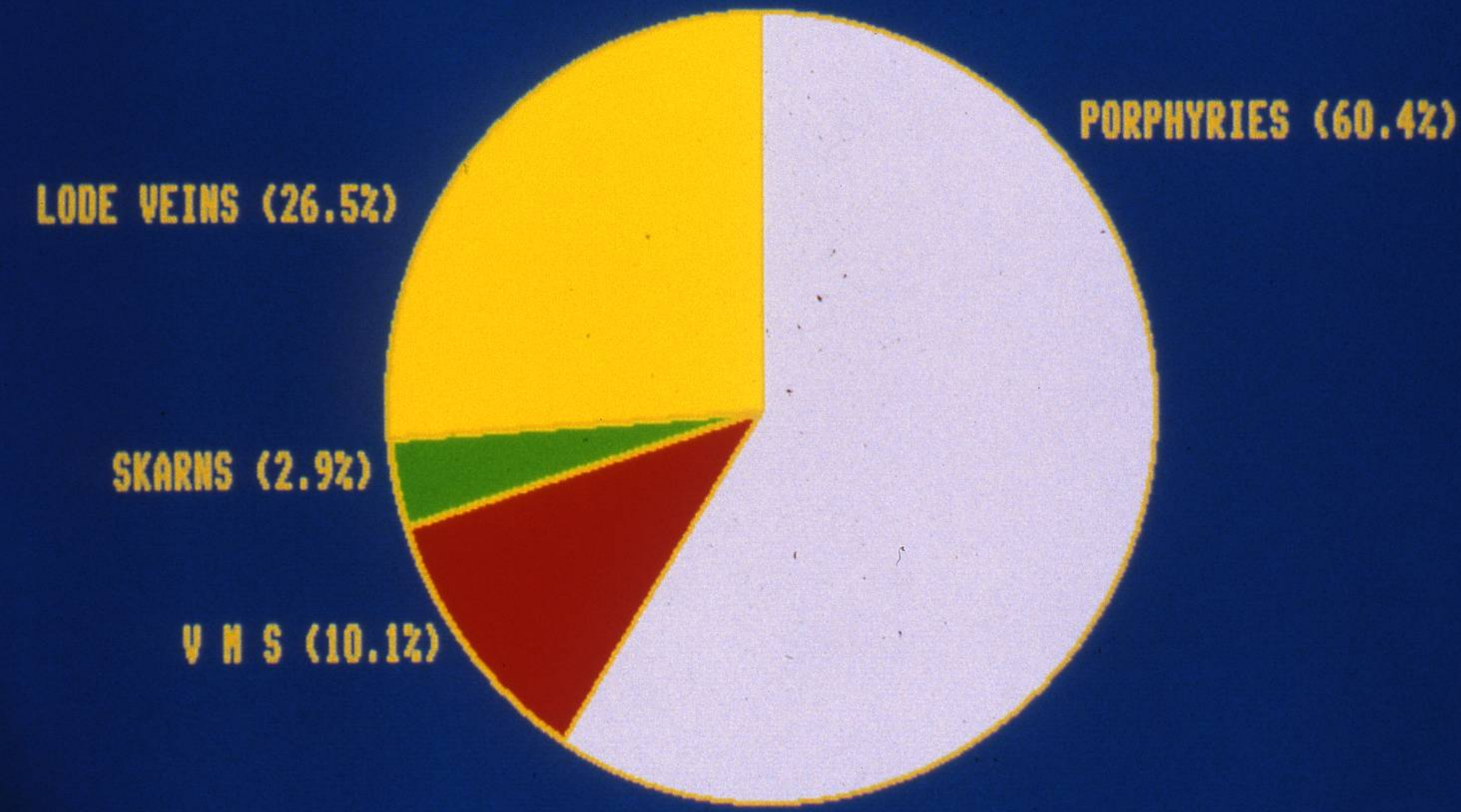
AFTER STRONG, 1988

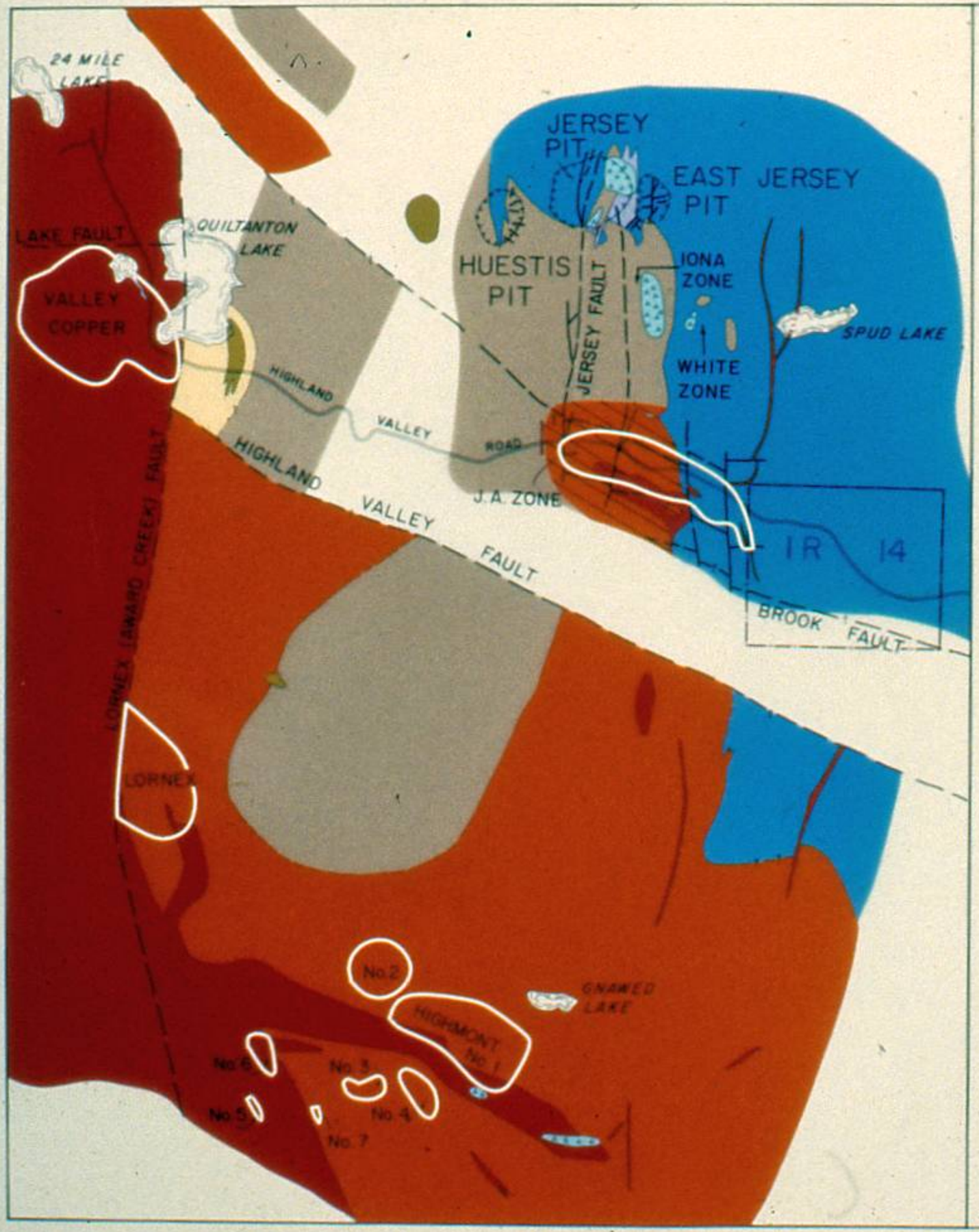
1988 LODE GOLD RESERVES
(BY DEPOSIT TYPE - TOTAL: 40.07 Ma OZ)



B.C. LODE GOLD PRODUCTION: 1980 - 1987

(BY TYPE: 21.6 MILLION OUNCES)





LEGEND

TERTIARY

- VOLCANIC FLOW ROCKS
- CLASTIC SEDIMENTS

GUICHON CREEK BATHOLITH

- BETHLEHEM PHASE and BETHLEHEM PHASE WITH QUARTZ EYES
- BETHSAIDA PHASE and OFFSHOOT DYKES and BODIES
- SKEENA VARIETY
- GUICHON VARIETY
- PORPHYRY DYKES
- BRECCIA BODIES
- OUTLINE of OREBODIES
- OPEN PIT
- FAULT (PROVEN, INFERRED)

SCALE 0 1/2 1 1 1/2 MILES

ISLAND ARC

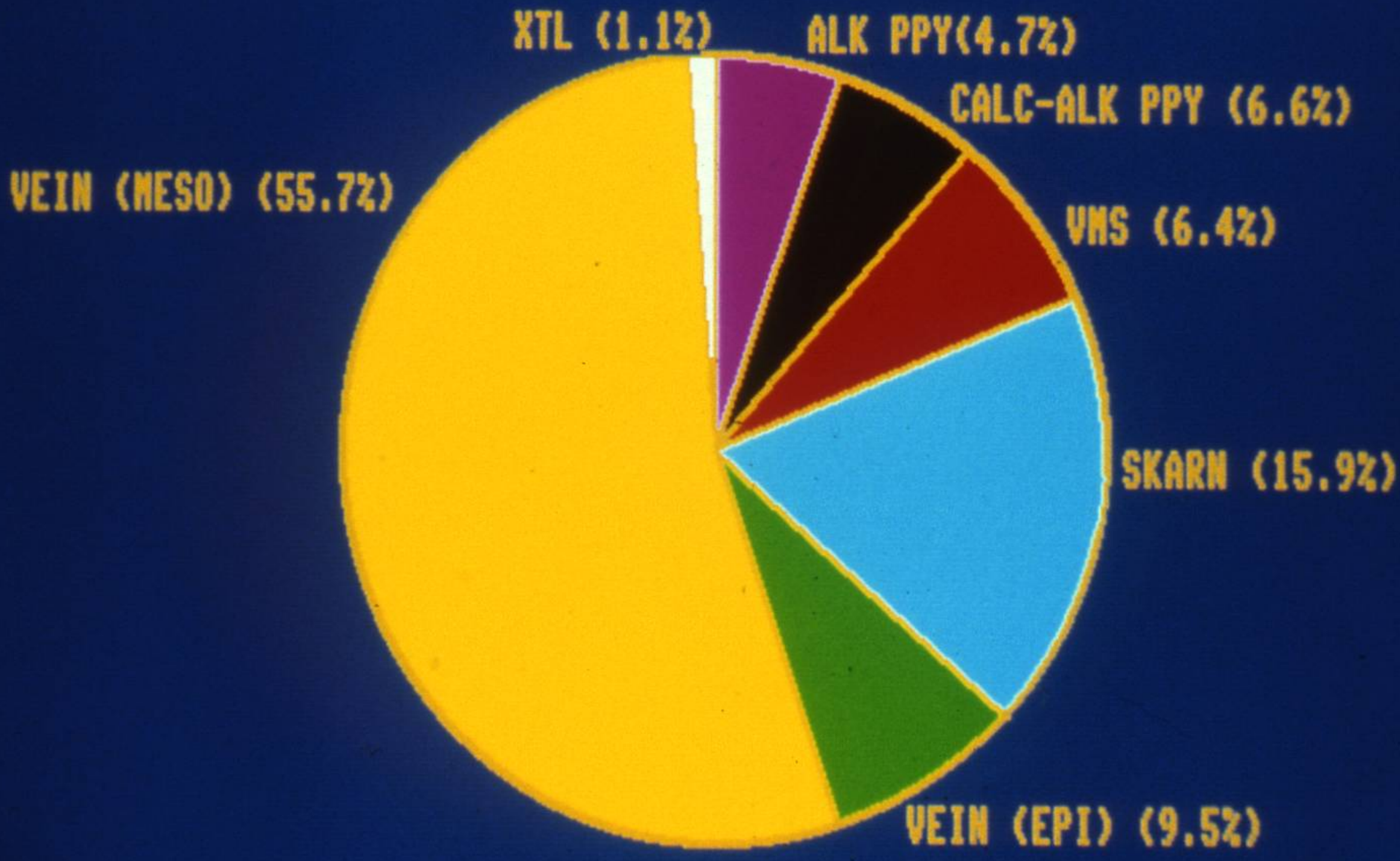
PORPHYRY COPPER - MOLYBDENUM - GOLD
COPPER - GOLD to GOLD

SUB-VOLCANIC PORPHYRY INTRUSIONS
- Calc alkaline or alkaline

LARGE FRACTURE SYSTEMS

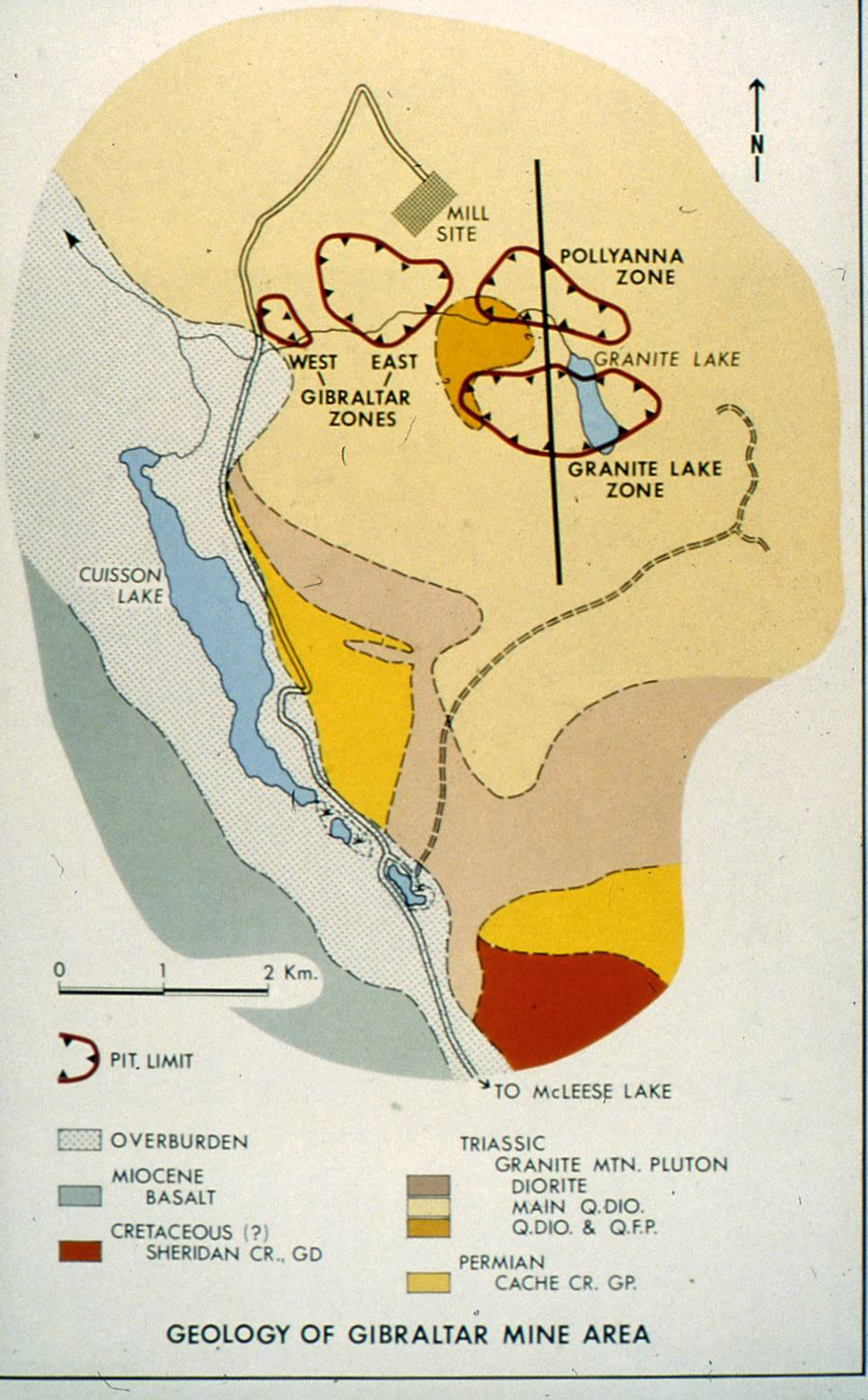
PERVASIVE ALTERATION
- Varies

B.C. LODE GOLD PRODUCTION 1894-1987
(BY DEPOSIT TYPE - TOTAL: 20.6 Ma OZ)



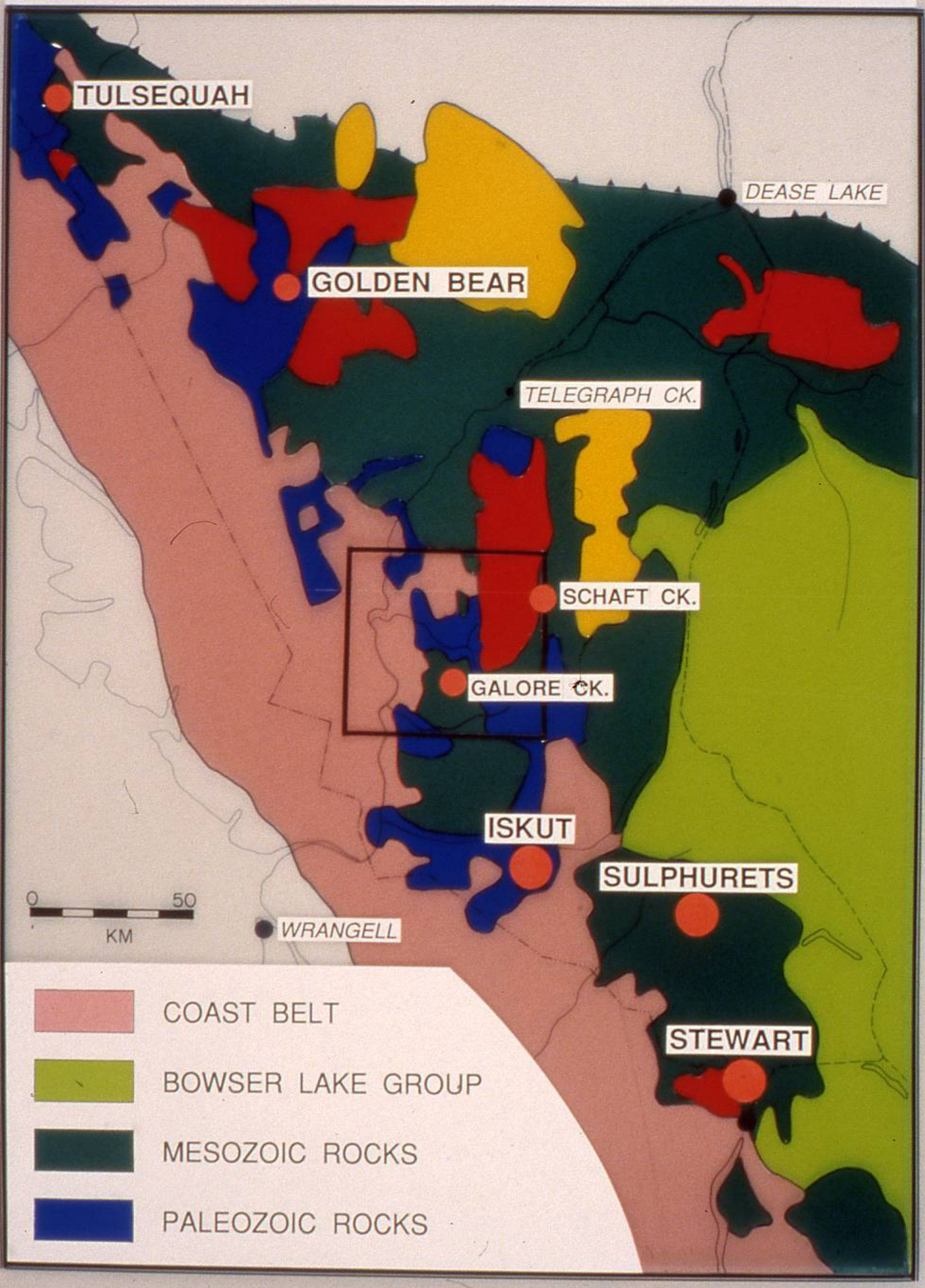
Cu-Au PORPHYRY DEPOSIT LOCATIONS B.C.

- ALKALINE
- CALC-ALKALINE



GEOLOGY OF GIBRALTAR MINE AREA

REGIONAL SETTING



PORPHYRY DEPOSITS

	SIZE	GRADE	CONTAINED Au
SCHAFT CREEK	1 BT	0.30% Cu 0.034% Mo 0.12 gm Au 1.08 gm Ag	120T
GALORE CREEK	125 MT	1.06% Cu 0.40 gm Au 7.70 gm Ag	50T

W

E

Q73-3

Q73-11

Q73-1

Q73-12

Q73-10

Q73-15

Q74-4

4600 ELEVATION

P

S

S

REFERENCE LINE

? 0.15% Cu ?

0.25% Cu

? 0.15% Cu ?

0.25% Cu

0 50 100

SCALE - METRES

LEGEND

POST–ORE PLAGIOCLASE PORPHYRY

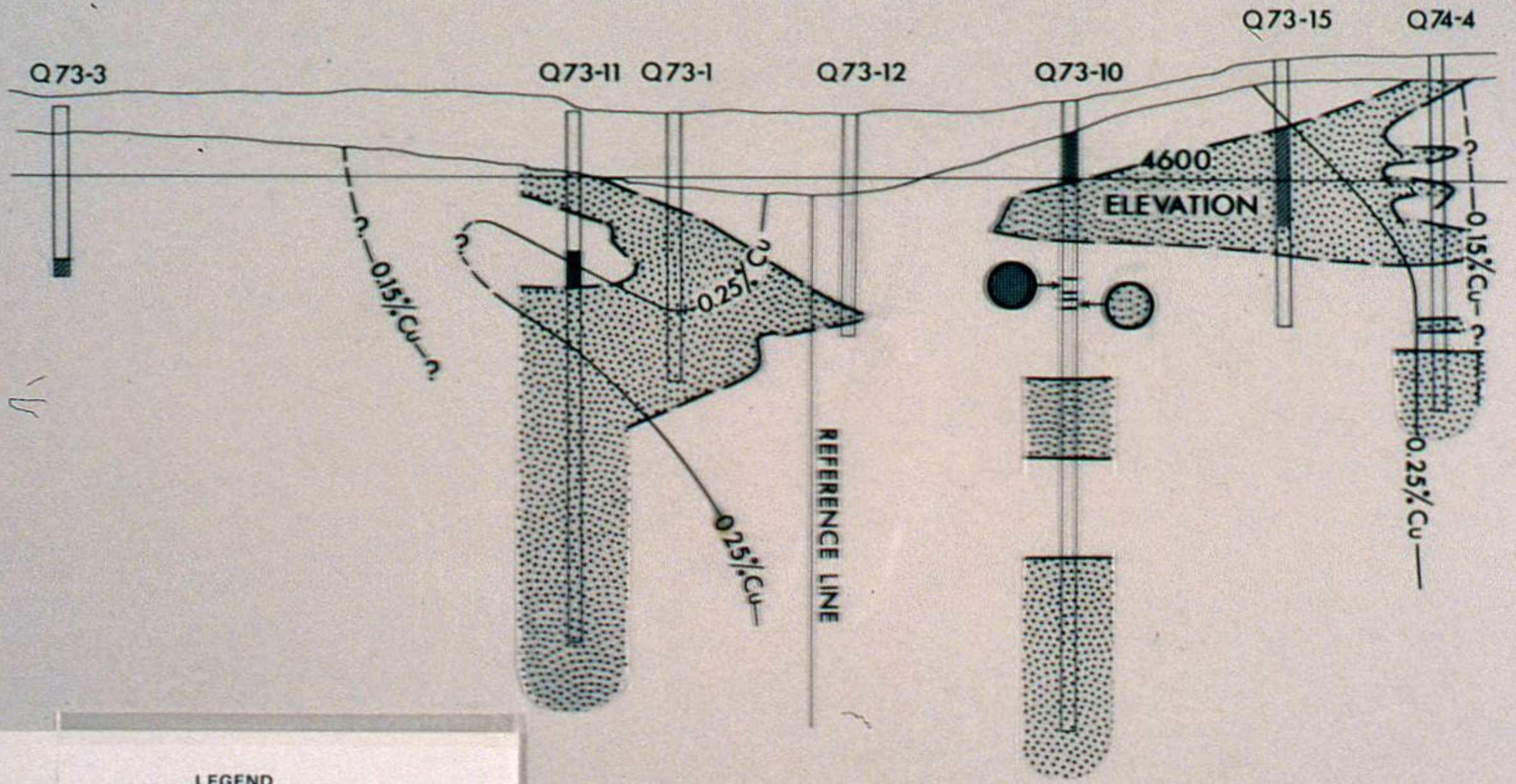
QUARTZ PLAGIOCLASE PORPHYRY

'YOUNGER' PLAGIOCLASE PORPHYRY

'OLDER' PLAGIOCLASE PORPHYRY (MATRIX BIOTITIZED)

HORNFELS: PORPHYRITIC ( ); SPOTTED ( )

SECTION B



LEGEND

FLAKY SERICITE: PERVASIVE; SPOTTY

FLAKY SERICITE: FRACTURE CONTROLLED

0 50 100

SCALE-METRES

KLOTASSIN

EARLY JURASSIC

BLACK LAKE

<0.704

SCHAFT

GALORE

BLACK LAKE

ALKALIC

CALC-ALKALIC

TOPLEY

<0.704

ISLAND

<0.704

MID-JURASSIC

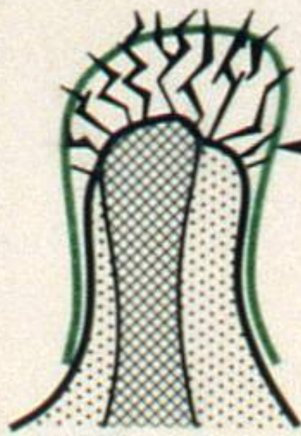
ISLAND

WESTCOAST
OMITTED

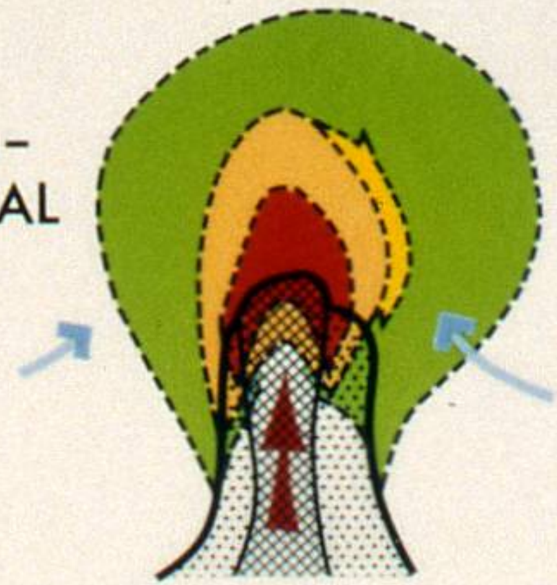
STAGED ALTERATION MODEL

Modified from Gustafson & Hunt, 1975

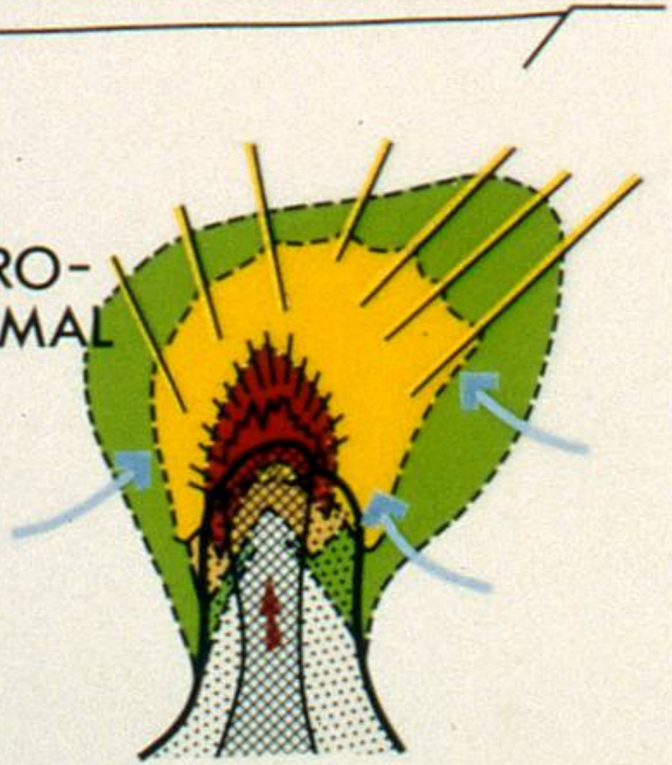
I
POSTMAGMATIC



II
EARLY
HYDRO-
THERMAL

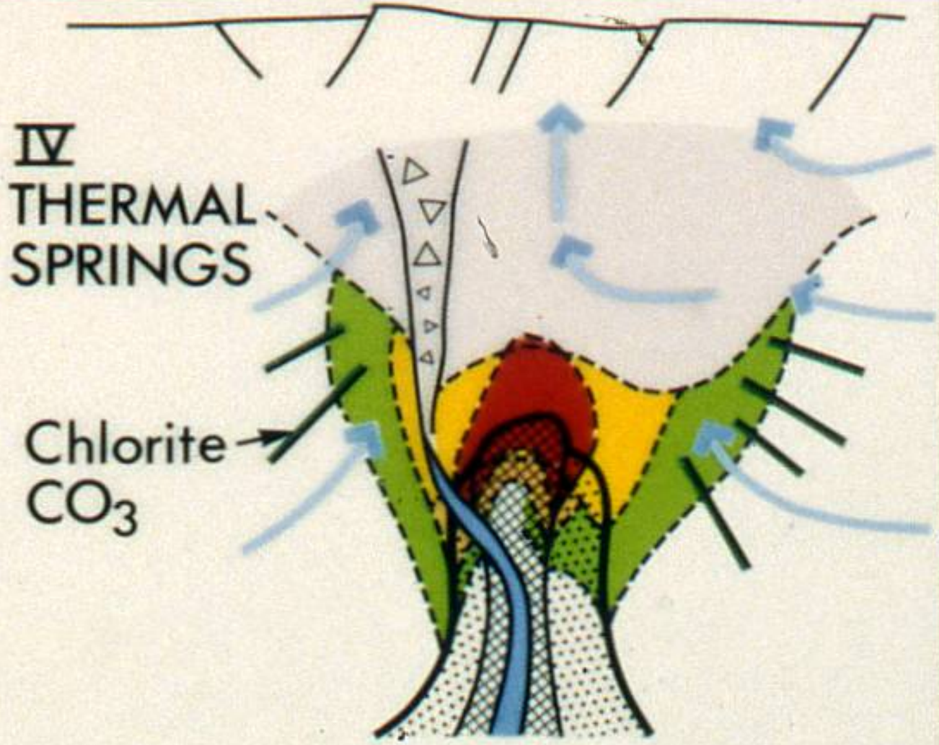


III
LATE
HYDRO-
THERMAL

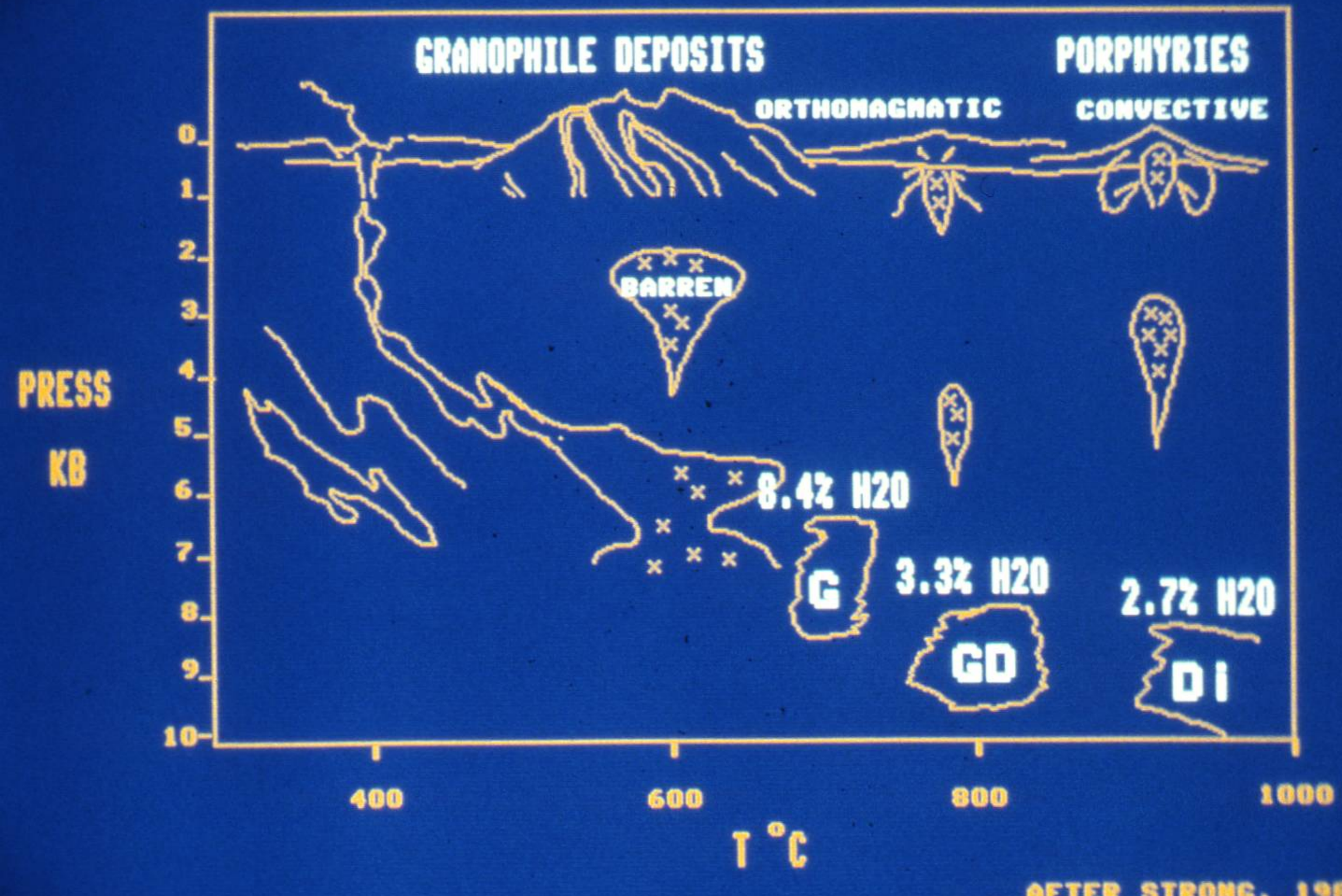


IV
THERMAL
SPRINGS

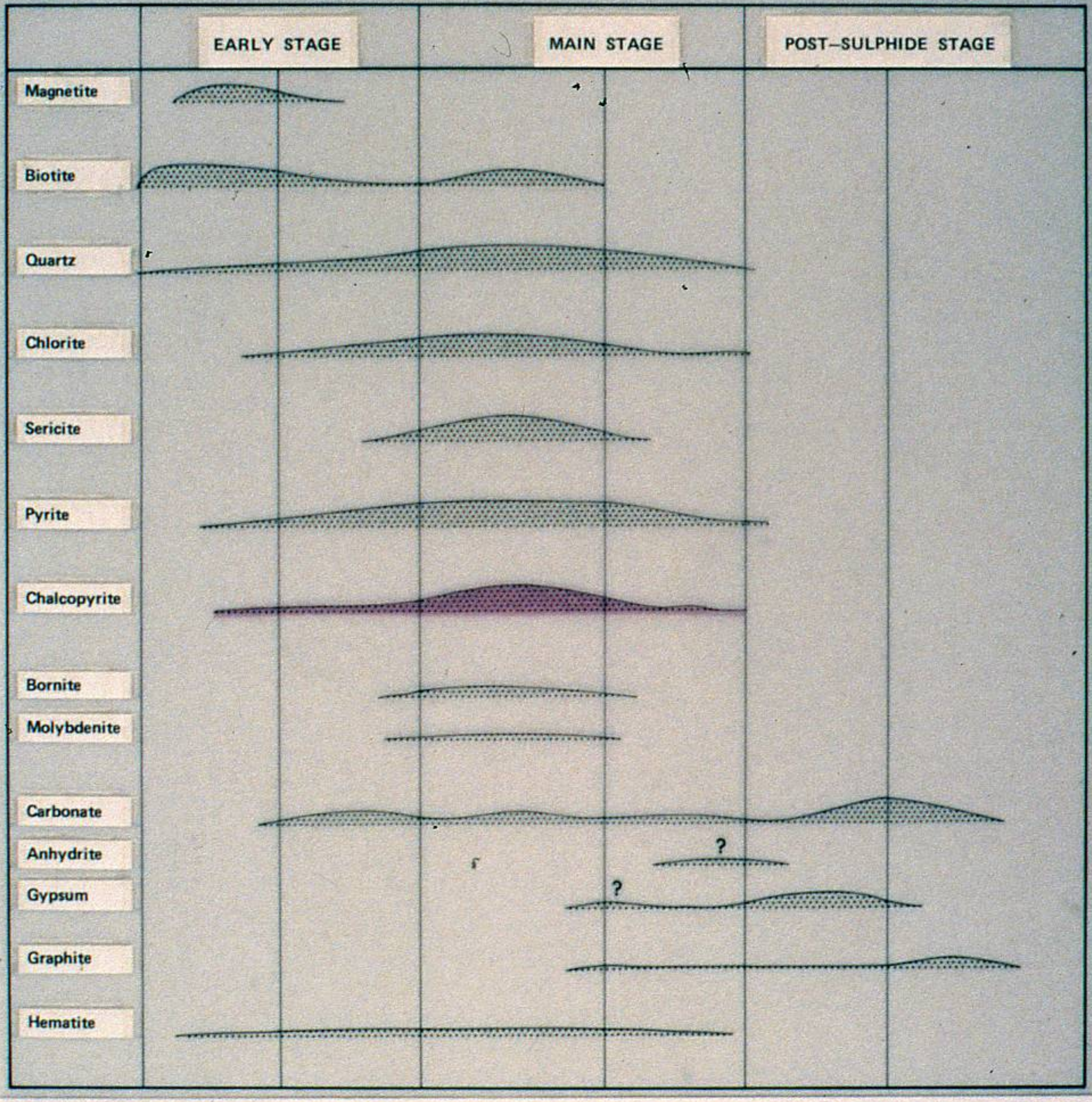
Chlorite
CO_3

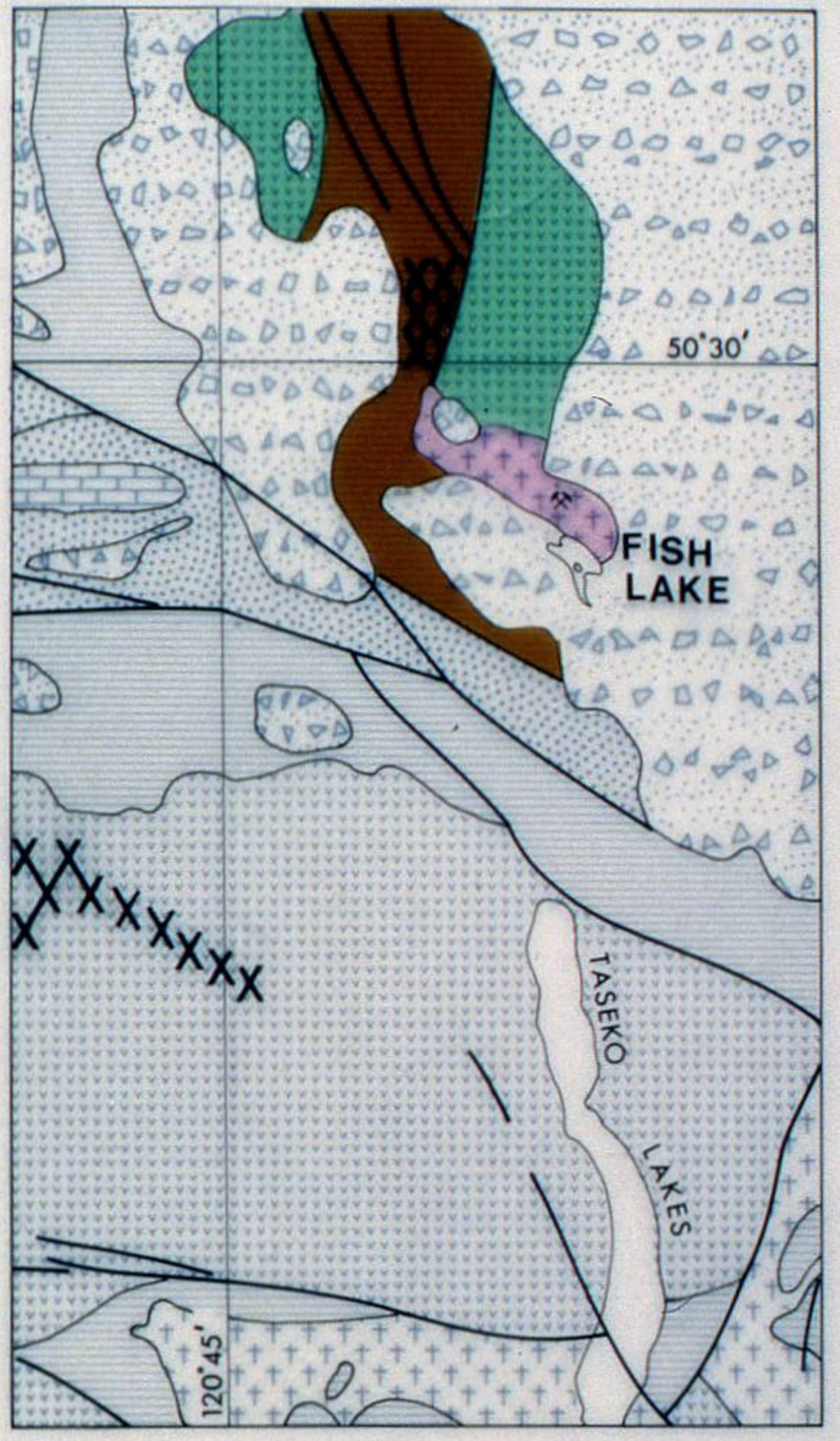


- Cu, Mo Sulfide Zone
- Argillic
- Propylitic
- Phyllic
- Potassic



AFTER STRONG, 1988


EARLY STAGE
MAIN STAGE
POST–SULPHIDE STAGE
Magnetite
Biotite
Quartz
Chlorite
Sericite
Pyrite
Chalcopyrite
Bornite
Molybdenite
Carbonate
Anhydrite
Gypsum
Graphite
Hematite
?
?



LEGEND

TERTIARY

BASIC FLOWS, TUFFS, BRECCIA

CRETACEOUS OR TERTIARY

DIORITE TO GRANITE

XXX DYKE SWARM AREA

CRETACEOUS

PYROCLASTIC VOLCANIC ROCKS, SOME FLOWS

SHALE, GREYWACKE, CONGLOMERATE

JURASSIC

ARGILLITE, TUFF, GREYWACKE, CONGLOMERATE

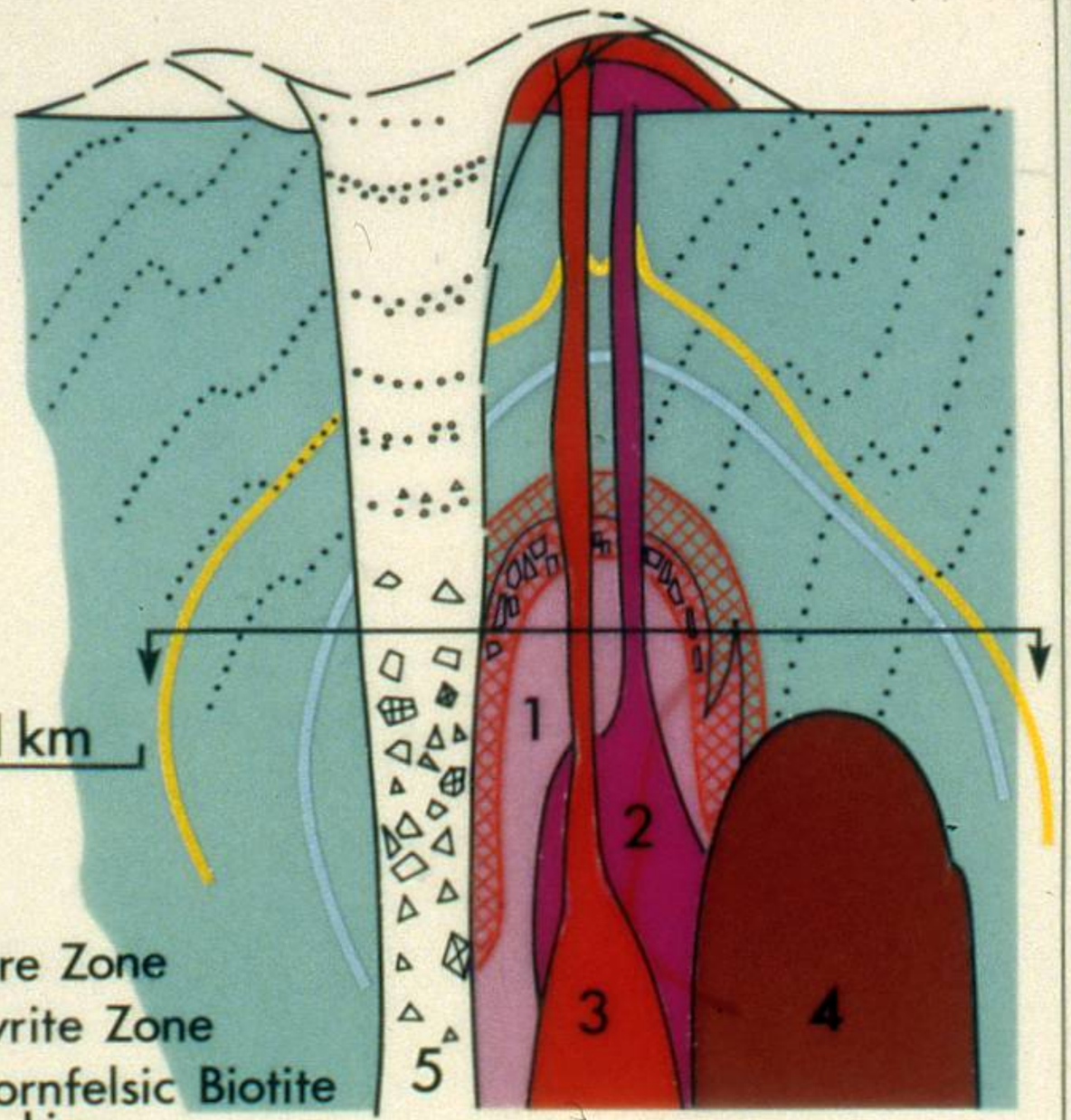
TRIASSIC

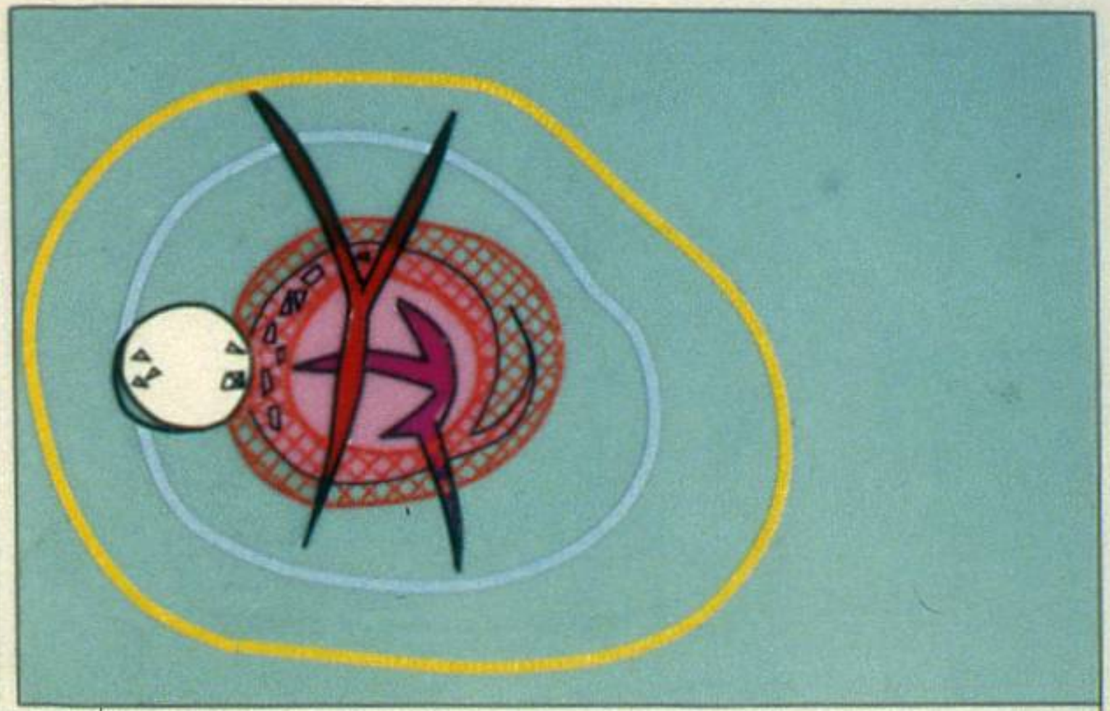
LIMESTONE

MINERAL DEPOSIT

0 4 8 12

SCALE - KILOMETRES





Annular Shell Type	Distance From Axis →
Metal	Mo Cu Fe Zn Pb
Alteration	Potassic Phyllic Propylitic
Metamorphism	Hornfelsic

Variable Correlation Between Shell Types and Degree of Development

28000 N
26000 N
24 500 N
24000 N
22000 N
8000 E
10000 E
12000 E
START LAKE
N

LEGEND

- Felsic Porphyry Dykes
- Hickman Intrusion
- 'Purple' Volcanics
- Epiclastic Breccia and Conglomerate
- 'Green' Andesite
- Augite Porphyry
- ▲ Intrusion Breccia
- 0.3 % Copper Isopleth

SCHAFT CREEK GEOLOGY

CROSS SECTION 24 500 N

MAIN ZONE

BRECCIA ZONE

METRES

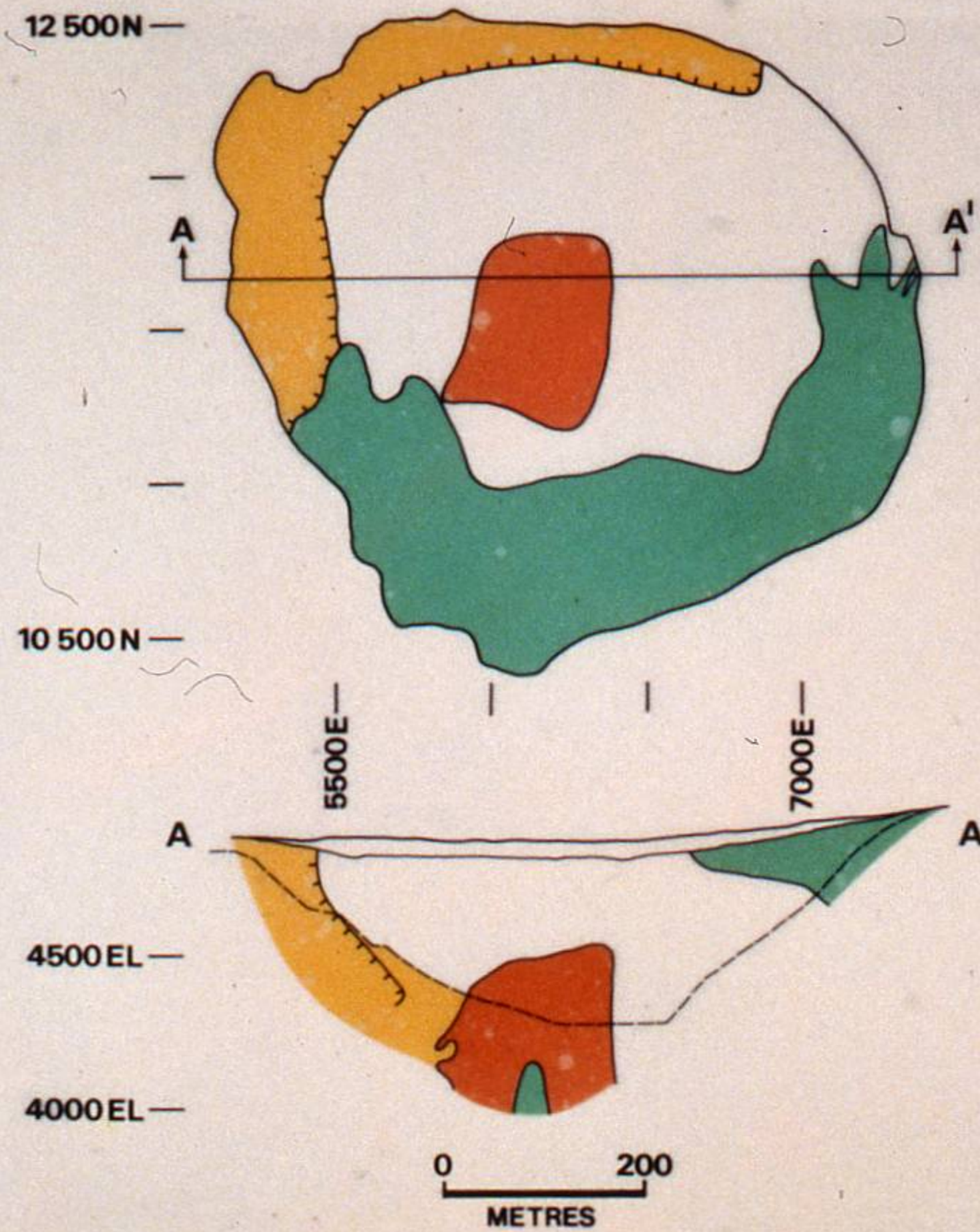
0 300 600 900

COMPARING CALC-ALKALINE AND ALKALINE PORPHYRY DEPOSITS

	DEPOSIT TYPE	
	CALC-ALKALINE	ALKALINE
NO DEPOSITS	20	5
TONNES (M) (MEAN)	206	49
COPPER, % (MEAN)	0.39	0.76
GOLD, ppm (MEAN)	0.31	0.39
SILVER, ppm (MEAN)	1.71	3.46

AFTER DRUMMOND AND GODWIN, 1976

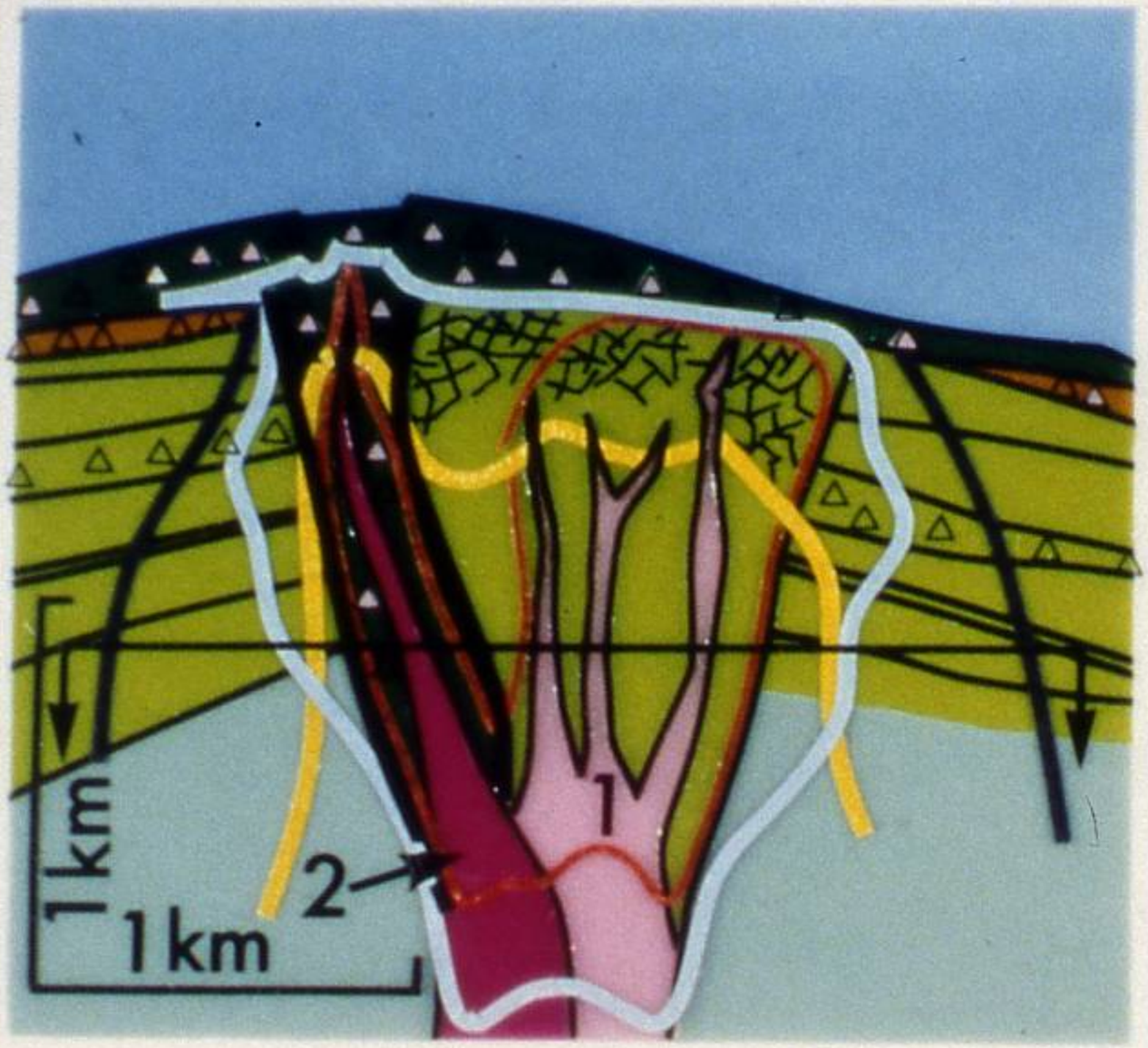
BETHLEHEM – JERSEY – ALTERATION



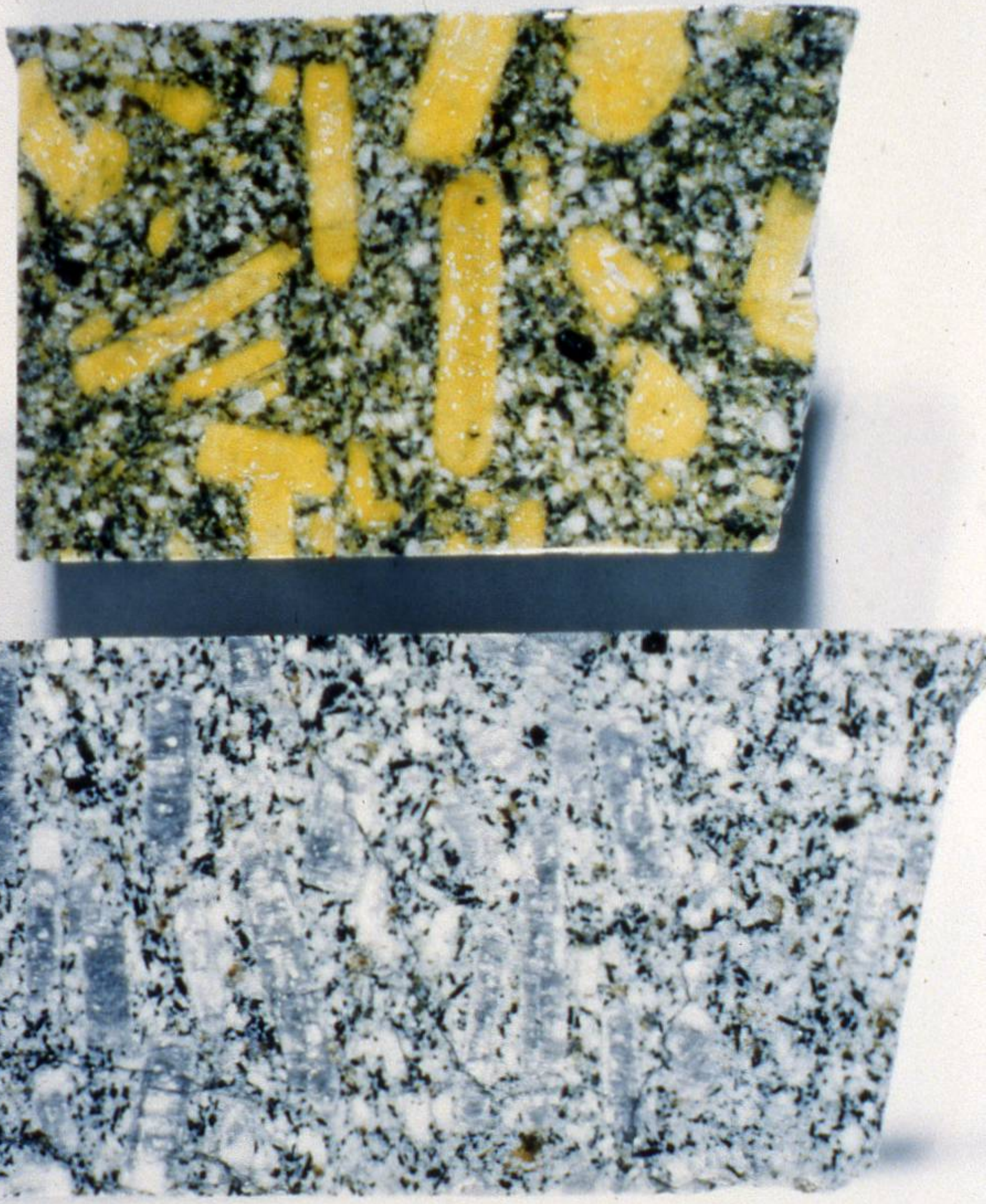
EPIDOTE >1 %

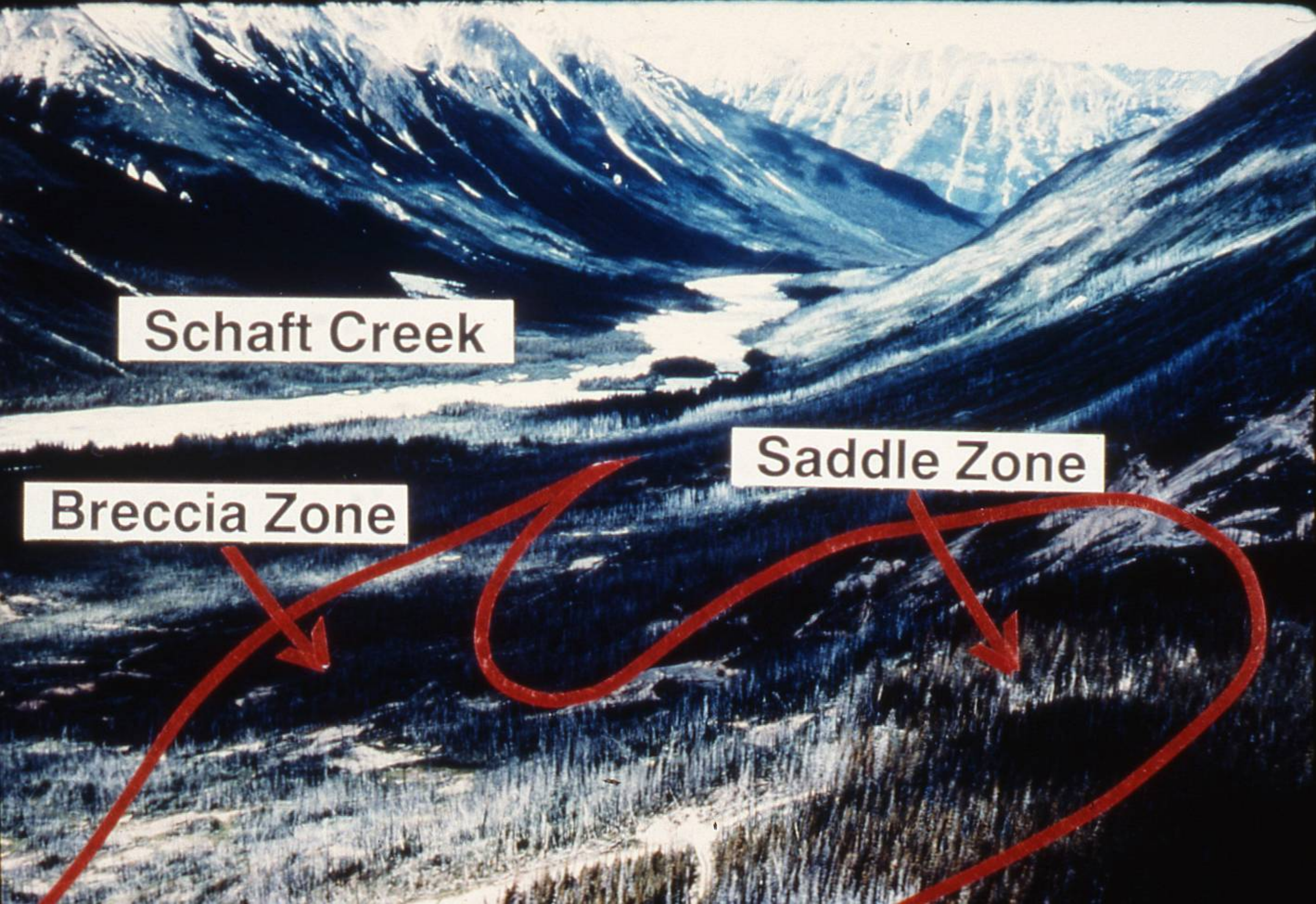
EPIDOTE <1 %

SECONDARY BIOTITE

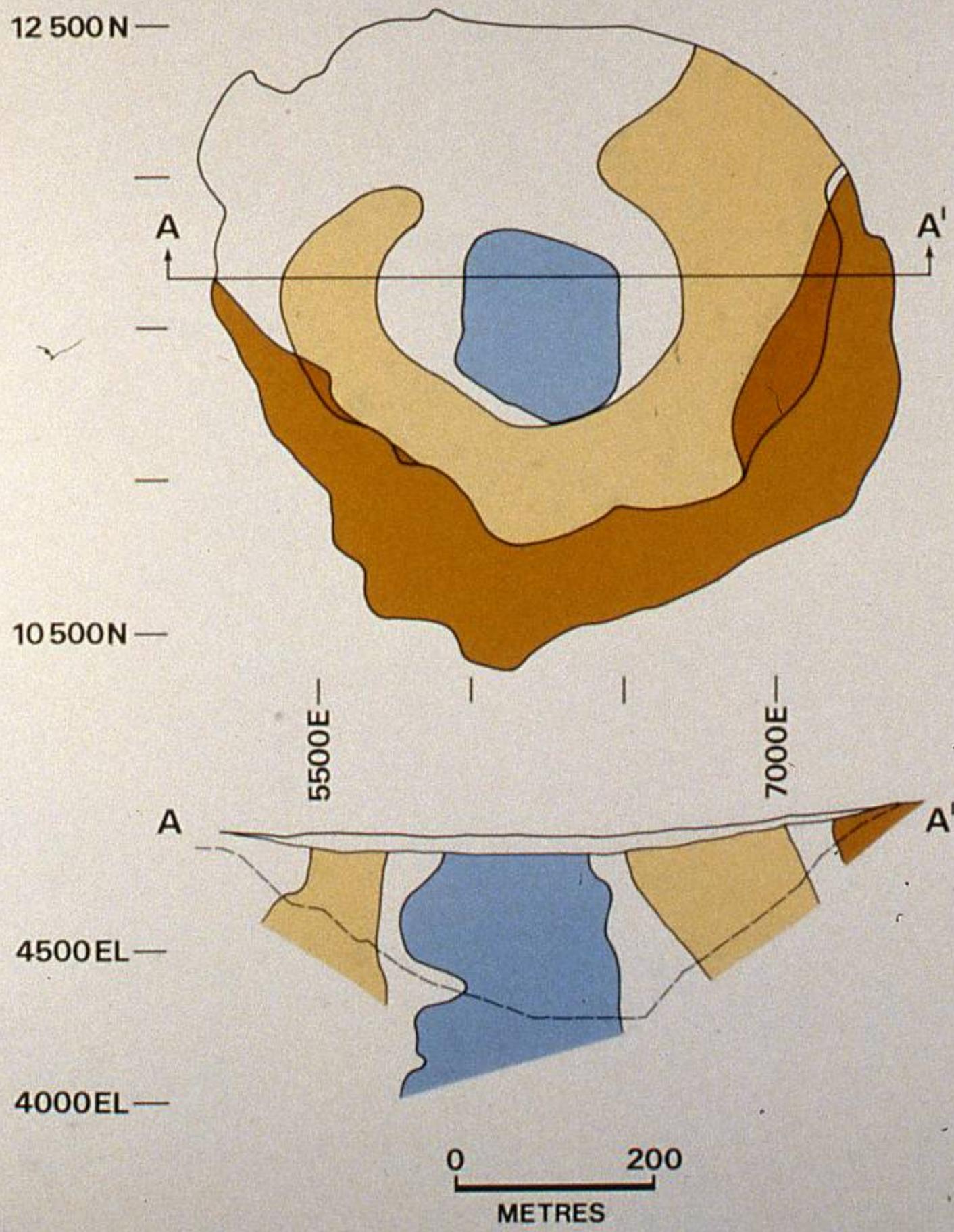


Ore Zone
Pyrite Zone
Intense Breccia Metasomatism
Original Hornfels
Propylite Zone




Schaft Creek
Saddle Zone
Breccia Zone

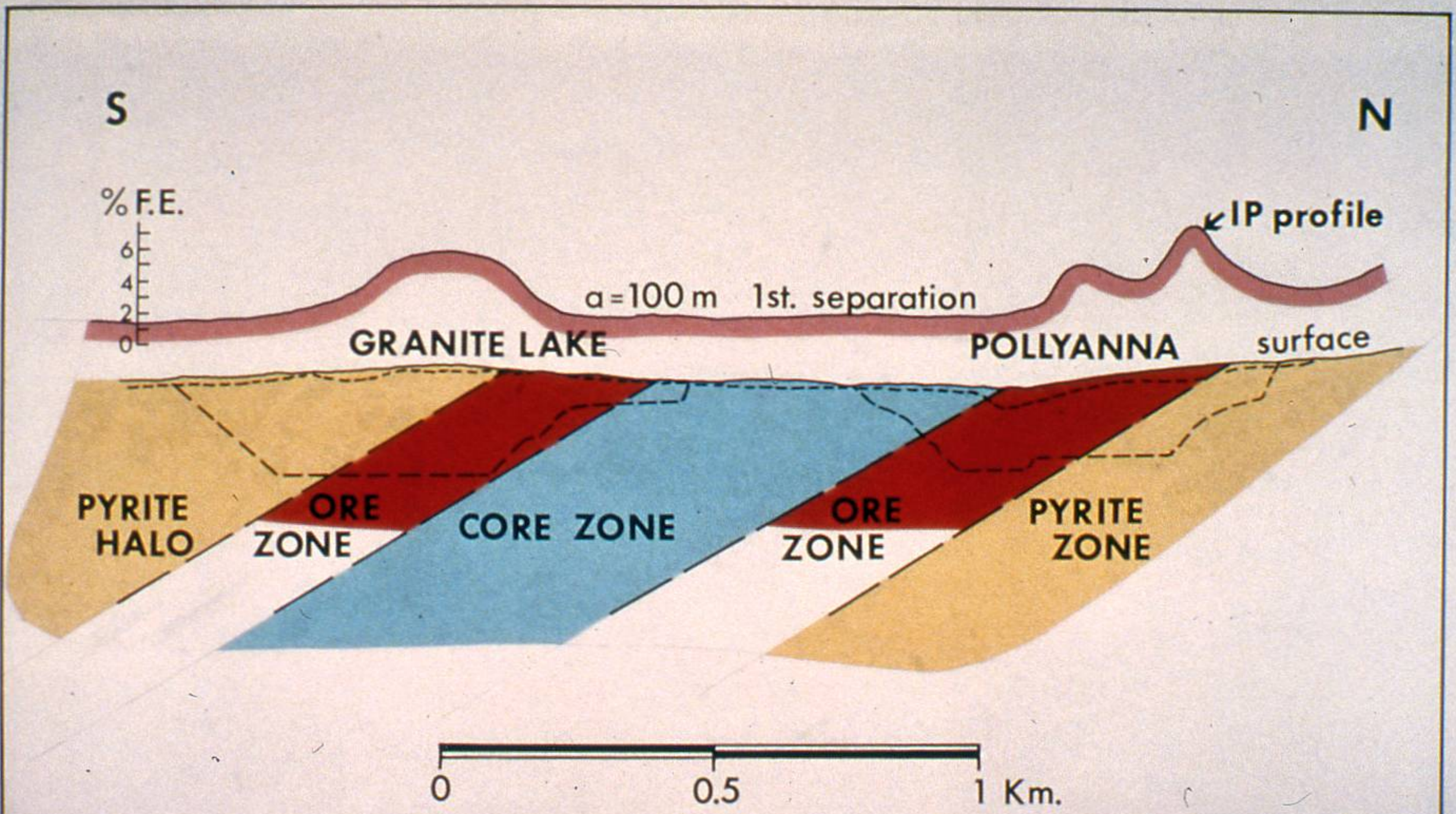
BETHLEHEM–JERSEY–HYPOGENE MINERAL ZONING



SPECULARITE ZONE

PYRITE >~0.1 VOL.%

BORNITE/ CHALCOPYRITE ≧1/1



SECTION 52600 E GRANITE LAKE AND POLLYANNA ORE ZONES

EARLY TERTIARY

<0.704

NANIKA

BABINE

GOOSLY/QUANCHUS

<0.704

CATFACE

CORYELL/LADYBIRD

Q73-3 Q73-11 Q73-1 Q73-12 Q73-10 Q73-15 Q74-4

EL 4790

4600 ELEVATION

EL 4580

EL 4450

EL 4360

EL 4370

EL 4230

EL 4210

0.15% Cu

0.25% Cu

0.25% Cu

0.15% Cu

0.25% Cu

REFERENCE LINE

?

?

?

?

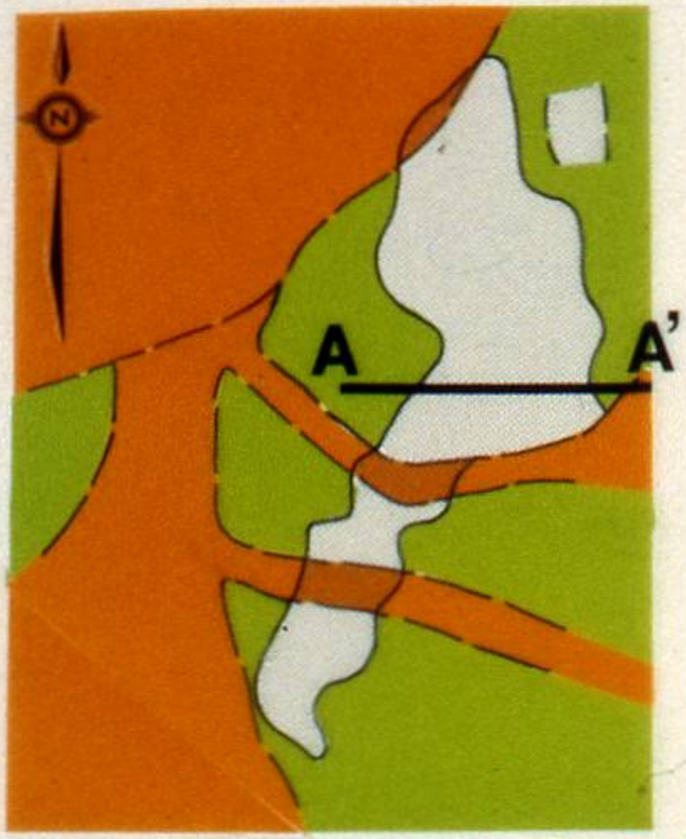
?

0 50 100

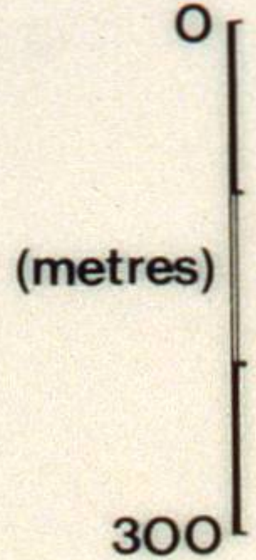
SCALE - METRES

LEGEND

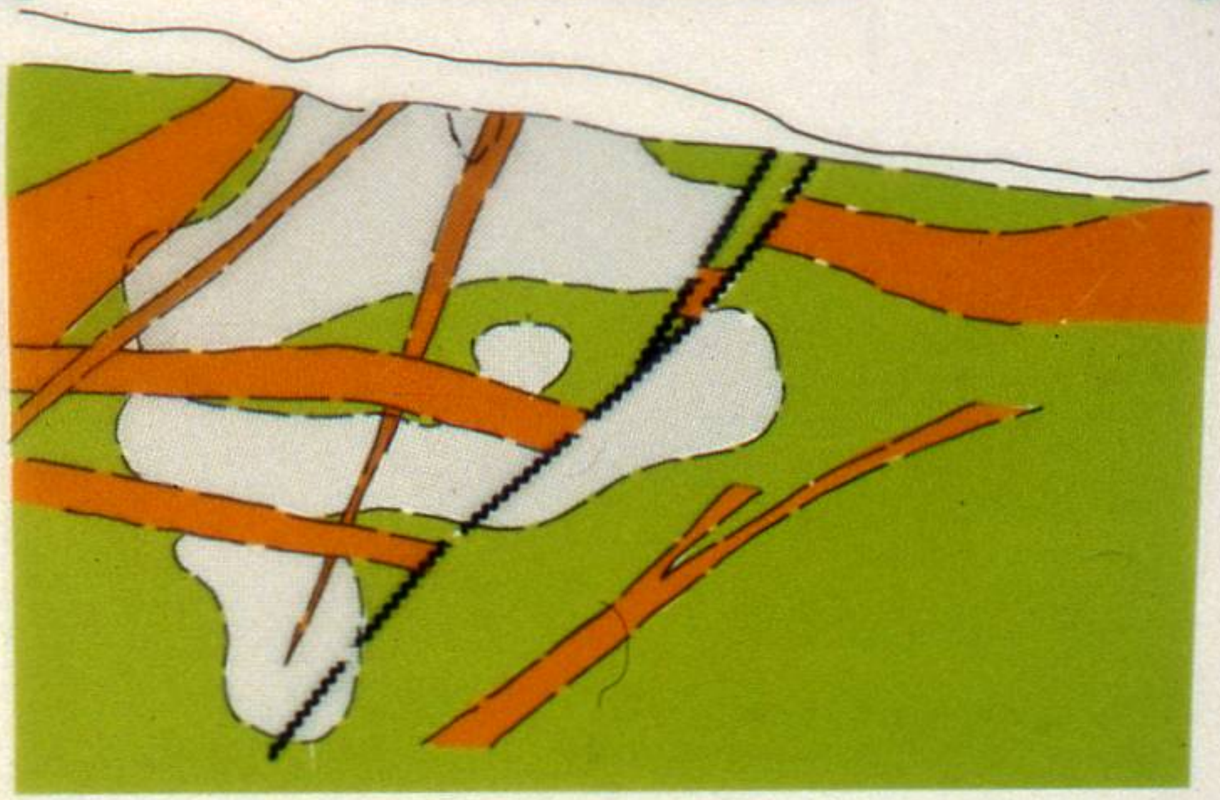
GYPSUM VEINS PRESENT



0 (metres) 1500



X - SECTION A - A'

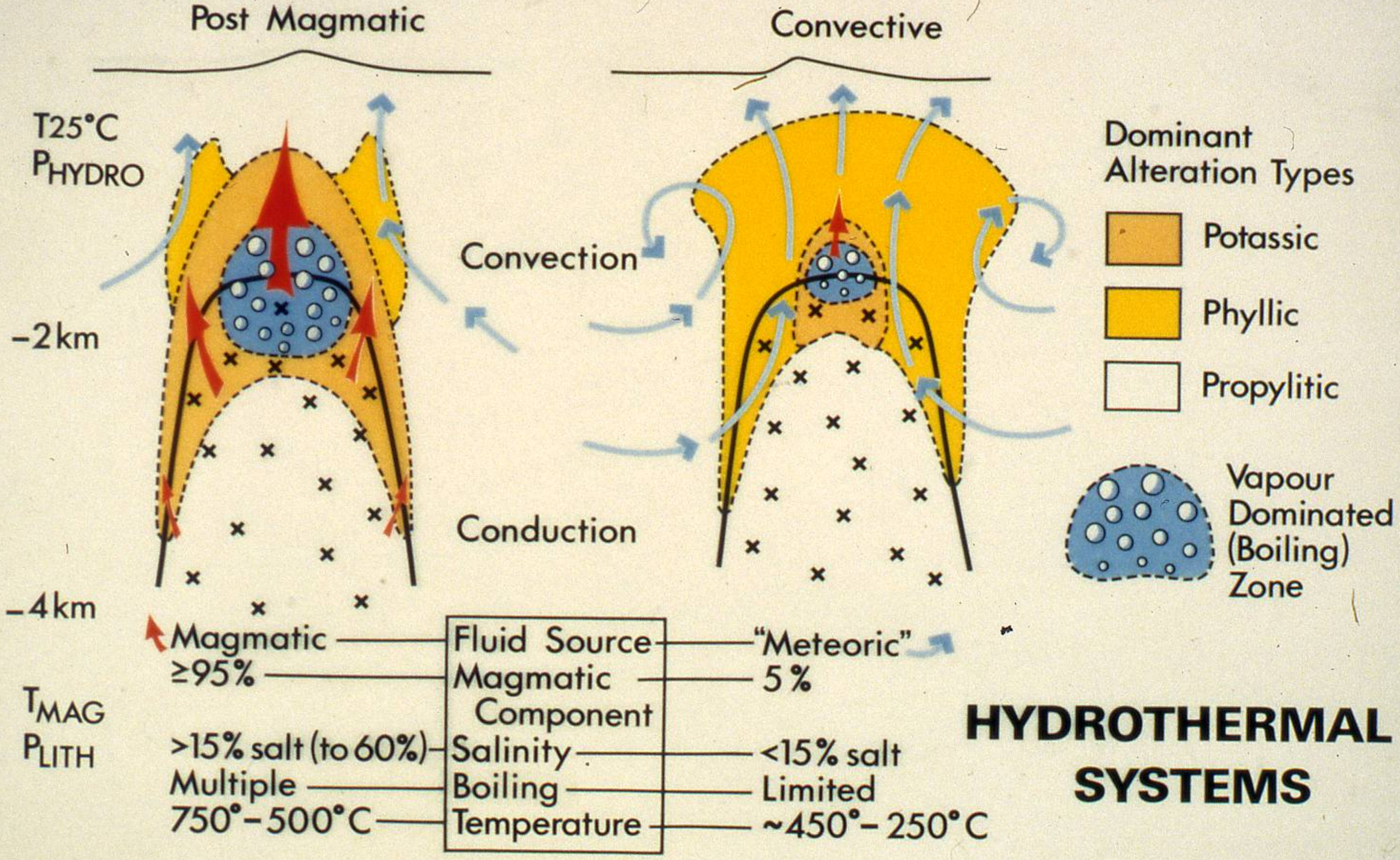


GALORE CREEK

Syenitic Intrusions

Volcanic Rocks

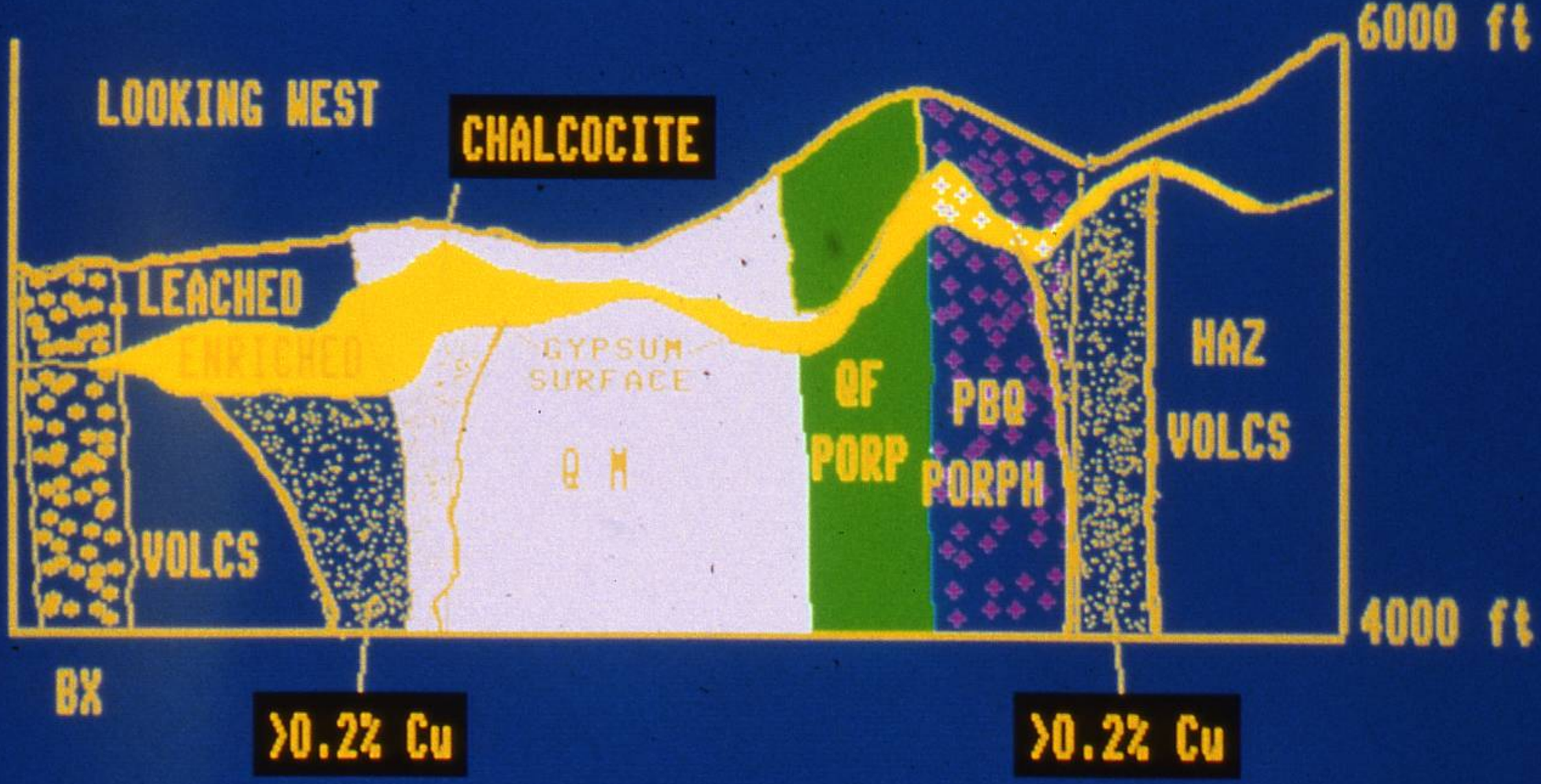
Central Zone



HYDROTHERMAL SYSTEMS

BERG DEPOSIT

IDEALIZED GEOLOGICAL SECTION



CU-AU PORPHYRY DEPOSIT LOCATIONS

B.C.

- CALC-ALKALINE
- ALKALINE