J. A.
89E

Bethlehem Copper

896504

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① Quartz Vein distribution

Only one hole had consistently rel. closely spaced quartz veins (avg 6' apart). Elsewhere, quartz veins <10' apart occurred locally.

Relnship to ore + geology.

The relatively closely spaced quartz veins may be interpreted as forming a fringe zone outside the central porphyry stock

Sporadic <10' zones occur in all rock types but seem to be more common inside the central stock.

② Quartz-Sericite Zones

are most closely spaced (<5' apart) in a central basin-like ~~zone~~ area which straddles the Guichon / Bethlehem contact. The bottom ~~extent~~ of the area west of the contact extends below drilling level but on the east it is subhorizontal.

③ BN / CPY DISTRIBUTION

BN > CPY in a zone which overlaps the contact of the stock ~~and~~ but does not coincide with best ore distribution. ~~and in fact only coincides with ore in one fairly small area~~ Although it does occur in the vicinity of the best grade zone, the zone seems to be controlled by the stock contact.

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Ore Distribution

The best ore is in a wedge-shaped zone within the QBm between the Guichon contact and the stock. Ore virtually ceases at the stock border but extends well out into Guichon C.R. The base of the ore zone is inclined moderately toward the east and reaches bedrock surface between holes 52 and 70. Overall, the ore zone is basin-shaped albeit asymmetric (its east border is steeply inclined).

Depending on the interpretation, the ore zone may be offset by vertical faulting. The fault would be between 6A & 8.

PYRITE ZONE

Coincident with and extending beyond and below the north half of the ore zone. No pyrite close to or in the stock. It even occurs in the best grade zone. Mostly in Guichon but extends well into QBm

The data can be interpreted with or without fault movement, whichever pleases you.

MoS_2 - the best MoS_2 values coincide with the best copper grade zone - MoS_2 pretty well ubiquitous but sparse. In all rock types, including the stock. Most is in the ore zone or the stock - elsewhere it is really spotty. Avg grade same as Lornex

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Calcite

Sparse in the ore zone but fairly common in the stock and Guichon CR a few hundred feet outside the ore zone.

Fe oxides - uncommon

Tourmaline - uncommon

Epidote

an epidote halo occurs west of and below the ore zone ~~but~~ and spottily in the stock ~~east of~~ the ore zone. Epidote is sparsely distributed throughout the ore zone also.

Altn Intensity

① Intensity decreases ~~westward~~ north? and possibly with depth

② Potassic Altn (pink) is best developed in the stock where altn is also, on average, more intense.

③ Outside the stock, the "best ore" zone more or less coincides with the more intense zone of altn.

895

altn Intensity

④ In general, alteration is not intense over significant widths anywhere in the ore zone. Local intense zones occur of course.

⑤ White plag altn vastly outweighs any other altn-type. Locally altn is greenish-white, green, cream, pink or mixed.

⑥ Altn colors are more variable in the stock with cm pink + green overshadowing white.

COMPARE X-RAY RESULTS

Mafic Altn

① Epidote after mafic most common in the stock, rare in the ore zone.

② Sericitic altn is most common in the best ore zone.

③ Fresh and chloritized or mixed altn zones are complexly distributed.

Proposed Faults

① Between 6 + 8 - geology - offset - west side down, or digitating intrusive

* one grade - no obvious effect - in fact it is awkward to fit a fault in there - depends on interpretation - fit w. west side up is feasible

gt2 + gt3 - ser - " " "

* could be a fault between 8A + 9 on QS diagram -- it is slightly awkward to have one there on the geology section (would work if there is a fault between 6 + 12 A)

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7 Pyrite occurs throughout the upper half of the ore zone and forms a blanket-like body above (but not necessary in contact with) the bornite "blanket." The pyrite zone extends to present bedrock surface. Pyrite was not seen in drill holes south of the ore zone but is present for several hundred feet north of the ore zone. It apparently forms ~~an~~ a pyrite-enriched halo north of the ore zone contact.

(8) zeolite - distr of zeolite is not obviously related to the orebody. Textural evidence indicates that zeolites post-date ore for the most part and zeolite zones "transect" the ore zone.

- virtually every hole carries zeolite but zones within holes may be zeolite-free. Note that the zeolite zone dips northward north of the ore zone so does not extend to B/R surface there.

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⑤ Qtz - Sericite zones -

Nowhere is there a significant ~~zone~~ area of qtz-ser zone development.

In drill holes away from the ore zone, there are <u>no</u> qtz-ser zones.

In the ore zone and adjacent to it, there are a few local areas with qtz-ser zones developed.

<u>Conclusion</u> If you see qtz-ser zones you are close to ore.

⑥ CPY/BN DISTN

Bornite exceeds CPY in abundance at the base of the ore zone and in an imperfect "blanket" extending both ways from the ore zone. The top of the bornite "blanket" is subhorizontal. Areas within the blanket are barren or have CPY in excess of Bornite.

CPY exceeds bornite in the ~~vast~~ major part of the ore zone and above the bornite "blanket."

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(1) MoS_2 - Forms a fairly continuous zone in which it is sparsely distributed and is discontinuous but fairly common below, for a short distance (a few hundred feet) north and as far as drilling tested to the south. The MoS_2 zone overlaps the ore zone but ~~extends~~ continues several hundred feet south of it.

(2) ore - assay boundary - there are several good but local zones outside the ore zone.

(3) Geology - the section is almost entirely in Guidon with only a few dykes. The dykes have Bethlehem (Dl) or Bethsaida (6p) affiliations.

(4) Quartz veins - In a general way, quartz veins are more abundant in and adjacent to the ore zone.
To the north, the number of quartz veins drops to almost NIL by hole 91. To the south the dropoff is slower. No strong concentrations of qtz veins occur.
Obviously, there is not a strong positive correln between ore and qtz vein abundance.

CHECK: Vein ∡'s with core – all steep? many low ∡?

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(17) Altn

overall, the rocks drilled have avg altn intensity in level 1–2 range.

In the ore zone, altn intensity is not very different than outside it.

White altn dominates overall although pink, green or cream altn are locally important.

(18) Mafic Altn – locally epidotized, replaced by cpy or pyritiferous. Epidote after mafic is local but only occurs where epidote vein or fr. fillings occur.

– sericitic altn of mafics is spottily scattered north of the ore zone was seen in two places in the ore zone & is rare south of it.

– Local zones with pervasive chlorite altn of mafic occur but overall ~~[illegible]~~ partial chloritization is the order of the day.

– The ore zone altn is not significantly different than that outside it.

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(13) IRON OXIDES

(a) ochreous hematite - sparsely distributed in areas outside the ore zone

(b) specularite - seen twice, once in the ore zone and once with magnetite + ~~ch~~ ch. hem north of ore zone (qtz-bn-spec veins)

(c) Magnetite - ~~a few~~ two localities (qtz-ep zones, magnetite clots (some cpy); chl-bn-ep-mag. fr.) at the N edge of the ore zone and one zone in the CR north of the ore zone.

(14) GYPSUM - NIL !!

(15) Tourmaline - rarely seen

(16) Epidote

Zones appear to be ~~subhorizontal~~ "blankets" albeit uneven in detail which are truncated by erosion. There is a near-surface zone partly in + north of the ore zone, which is underlain by a zone with sparsely distributed epidote which ~~and~~ is gradually underlain by a zone with almost ubiquitous epidote.

Most of the epidote is in fr + veins but locally it forms pervasive altn zones

LOCATE THEM

Veiw timing?
Look up Kspar, bi, act., etc mode of occurrence.

(9) Calcite
" is sparsely but widely distributed. It is uncommon in the Ore zone. It occurs with zeolites but is more abundant in zeolite-free zones and <u>most</u> abundant above the zeolite zone in the northern drill holes.

<u>IMPRESSION</u> zeolite + calcite zones overlap but are largely separate zones (independant).

(10) Kspar - secondary Kspar noted in only 10 instances. It was, in each case, well away (several hundred feet) from the ore zone. Too sparsely distributed to draw distr zones

(11) Actinolite - seen at ~~two~~ three locns - all north of ore zone

(12) Biotite (secondary) - widely, but sparsely, distributed. Occurs both in and away from the ore zone. Occurrences do <u>not</u> define a biotite zone.

<u>IMPRESSION</u> Both Kspar + Bi are spottily distributed and controlled by local structures

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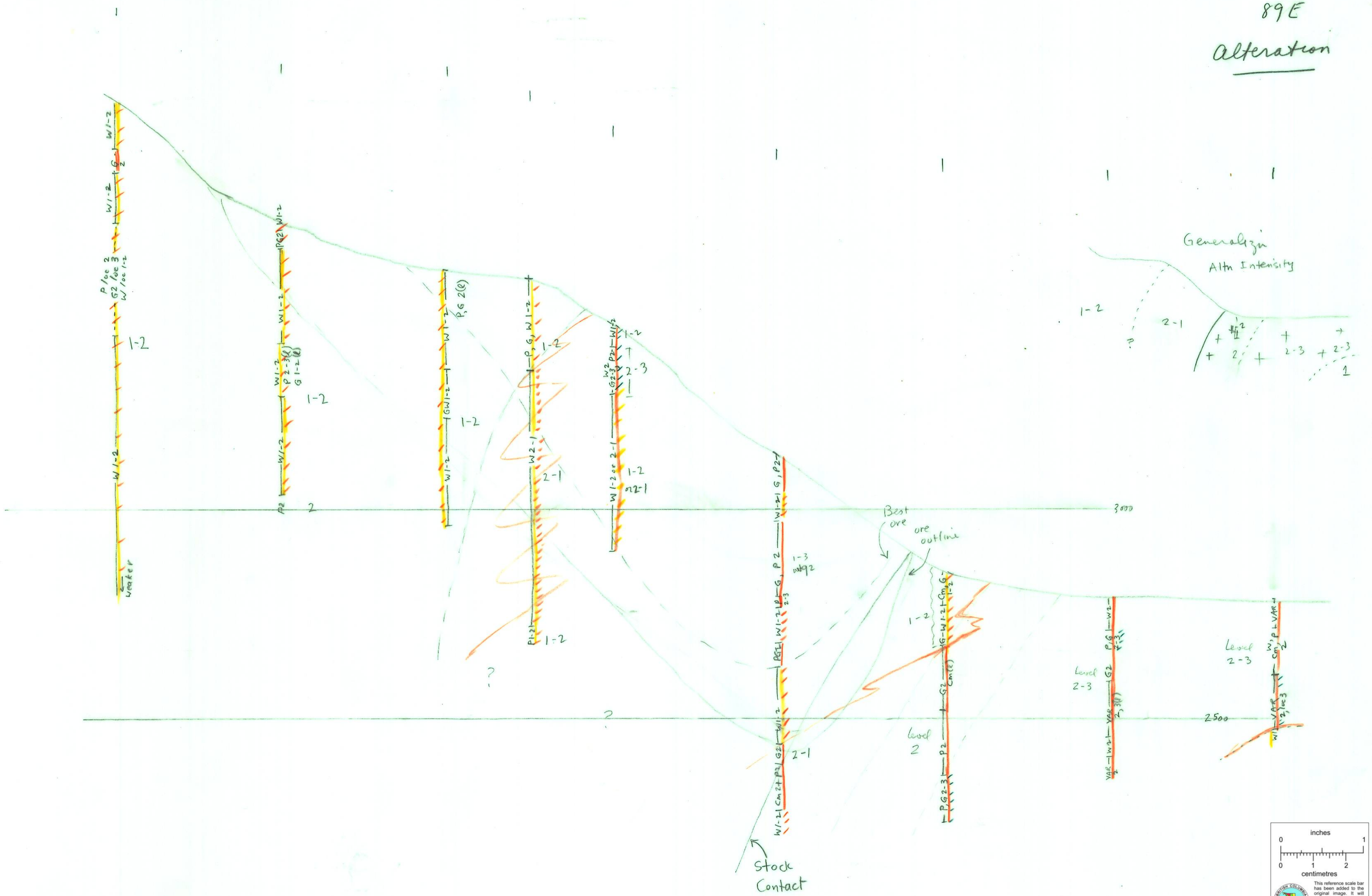
Alteration



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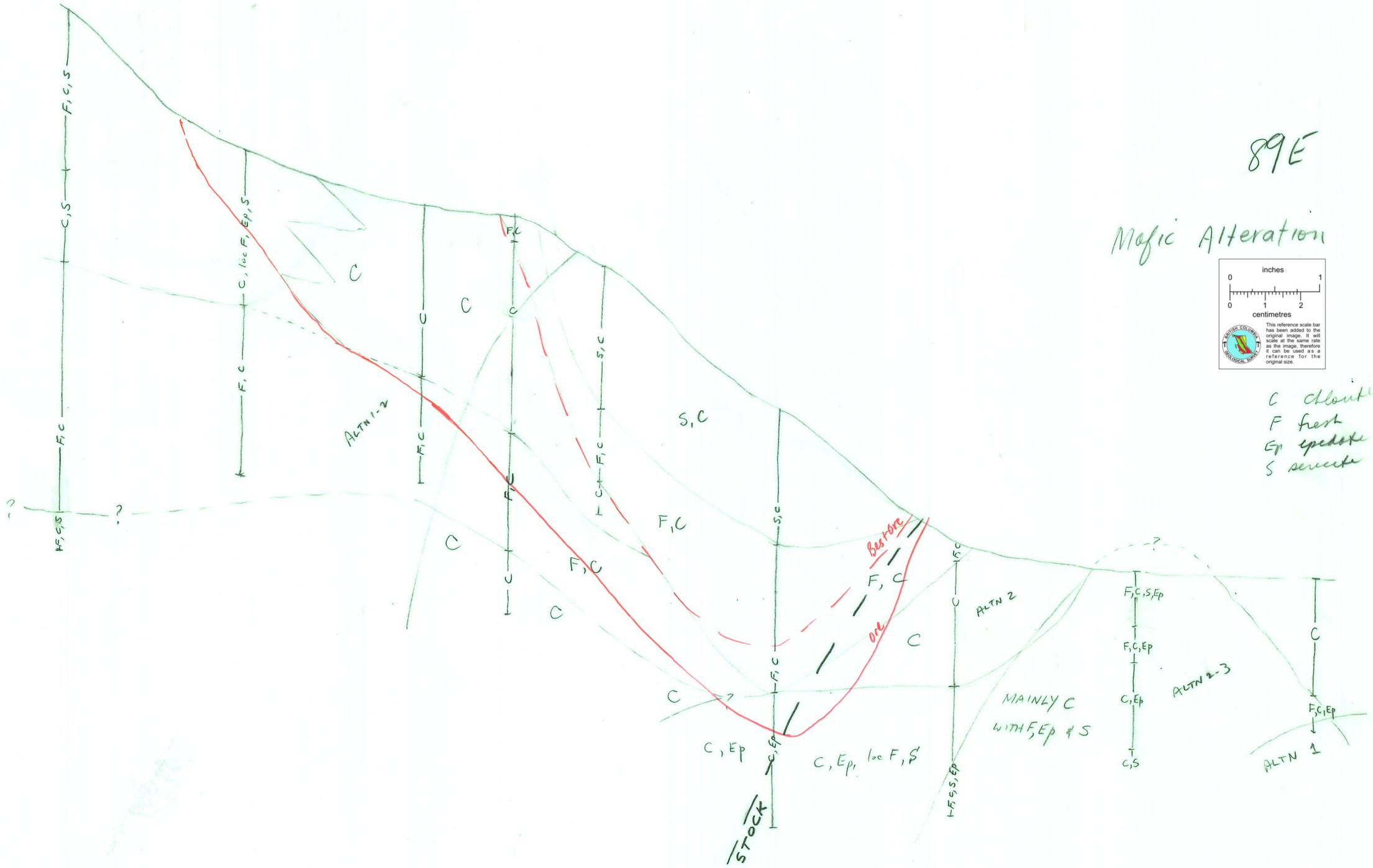
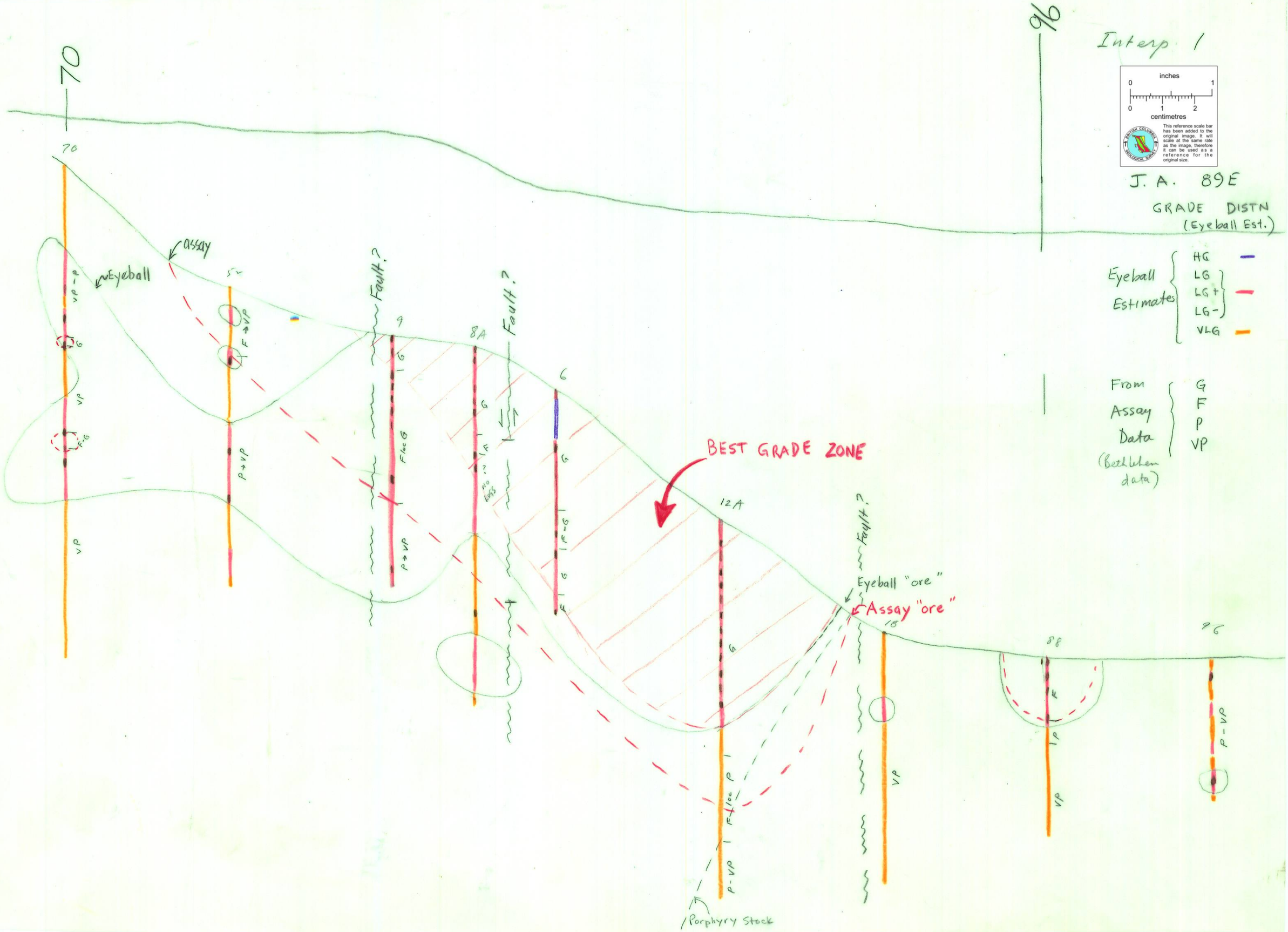
Mafic Alteration

C chlorite
F fresh
Ep epidote
S sericite


F, C, S
C, S
C, loc F, Ep, S
F, C
F, C
F, C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inches
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centimetres
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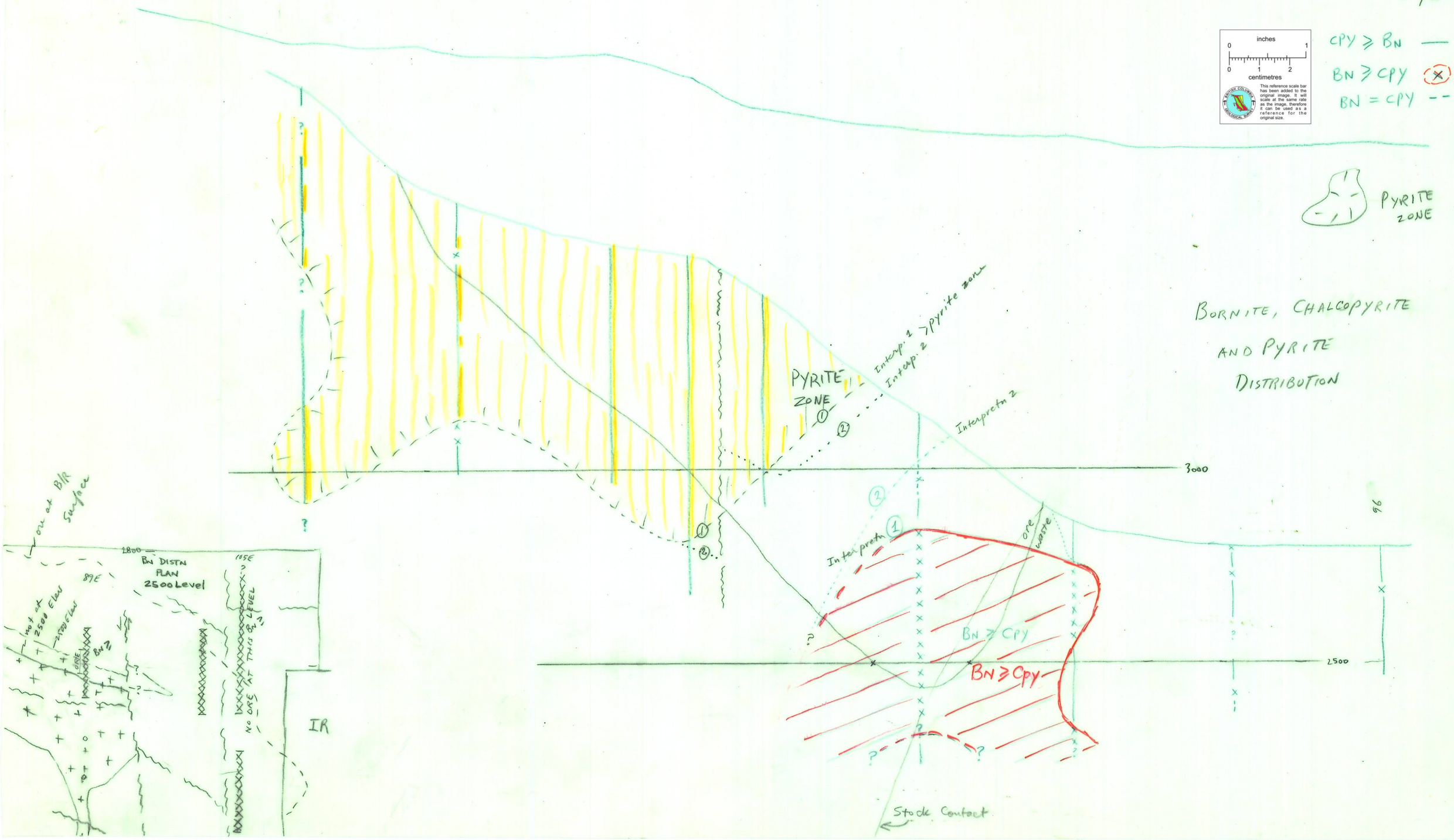
GRADE DISTN
(Eyeball Est.)
Eyeball Estimates
HG
LG
LG+
LG-
VLG
From Assay Data
(Bethlehem data)
G
F
P
VP
BEST GRADE ZONE
Eyeball "ore"
Assay "ore"
Porphyry Stock
Fault?
Assay
Eyeball
70
96
9
8A
6
12A
18
8B
9G

89E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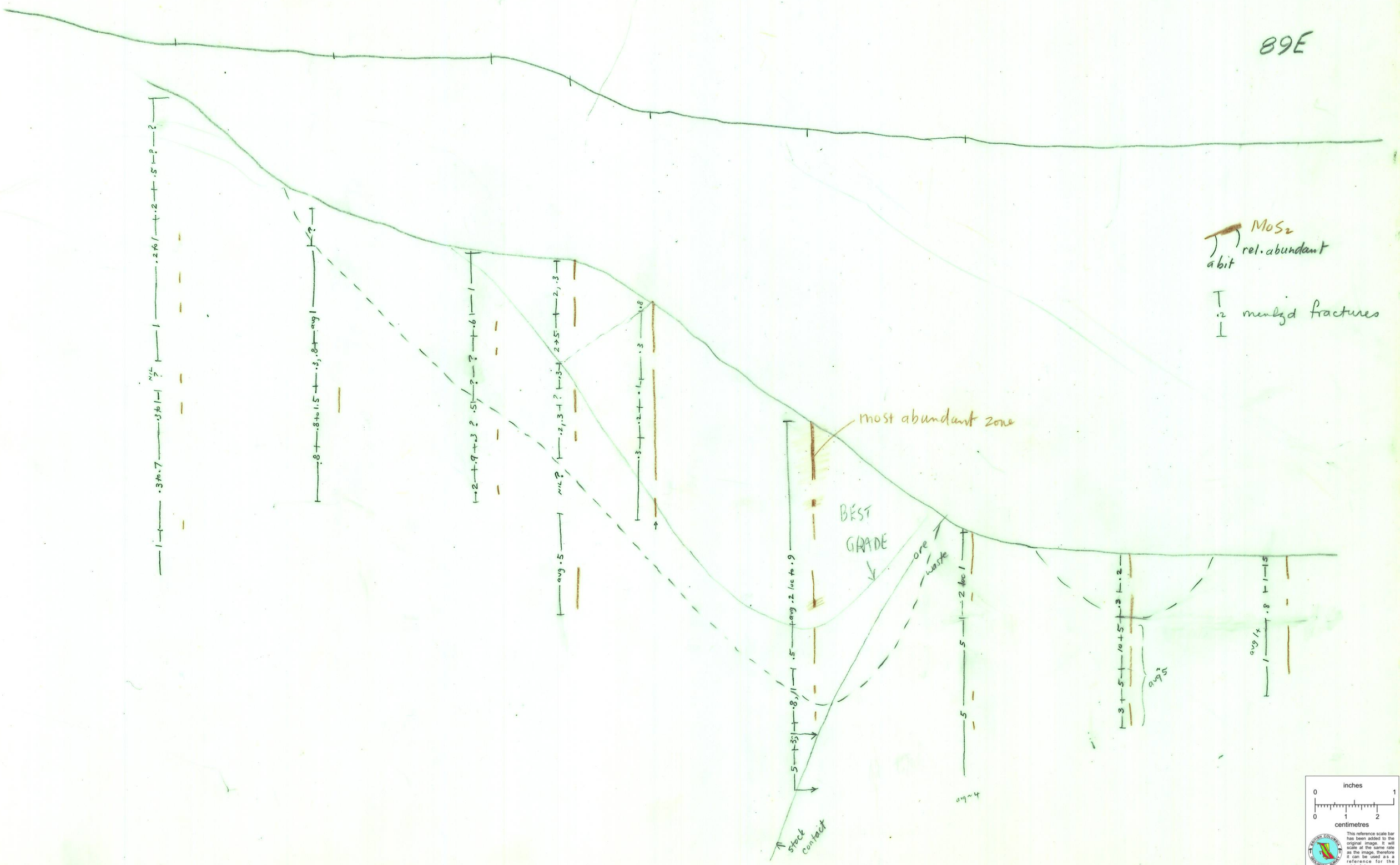
CPY ≥ BN
BN ≥ CPY
BN = CPY
PYRITE ZONE
BORNITE, CHALCOPYRITE AND PYRITE DISTRIBUTION
PYRITE ZONE
Interp. 1 ⊃ pyrite zone
Interp. 2
Interpretn 2
3000
2500
Interpretn 1
ore
waste
BN ≥ CPY
BN ≥ CPY
Stock Contact
96
out at B/R surface
2800
BN DISTN PLAN 2500 Level
89E
105E
not at 2500 ELEV
ORE
BN ≥
NO ORE AT THIS BN LEVEL
IR


89E
MoS2
rel. abundant
a bit
12 mm/yd fractures
most abundant zone
BEST GRADE
ore
waste
stock contact
avg .2 loc to .9
avg ~4
avg 5
avg 1x
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BRITISH COLUMBIA GEOLOGICAL SURVEY

Interp 1

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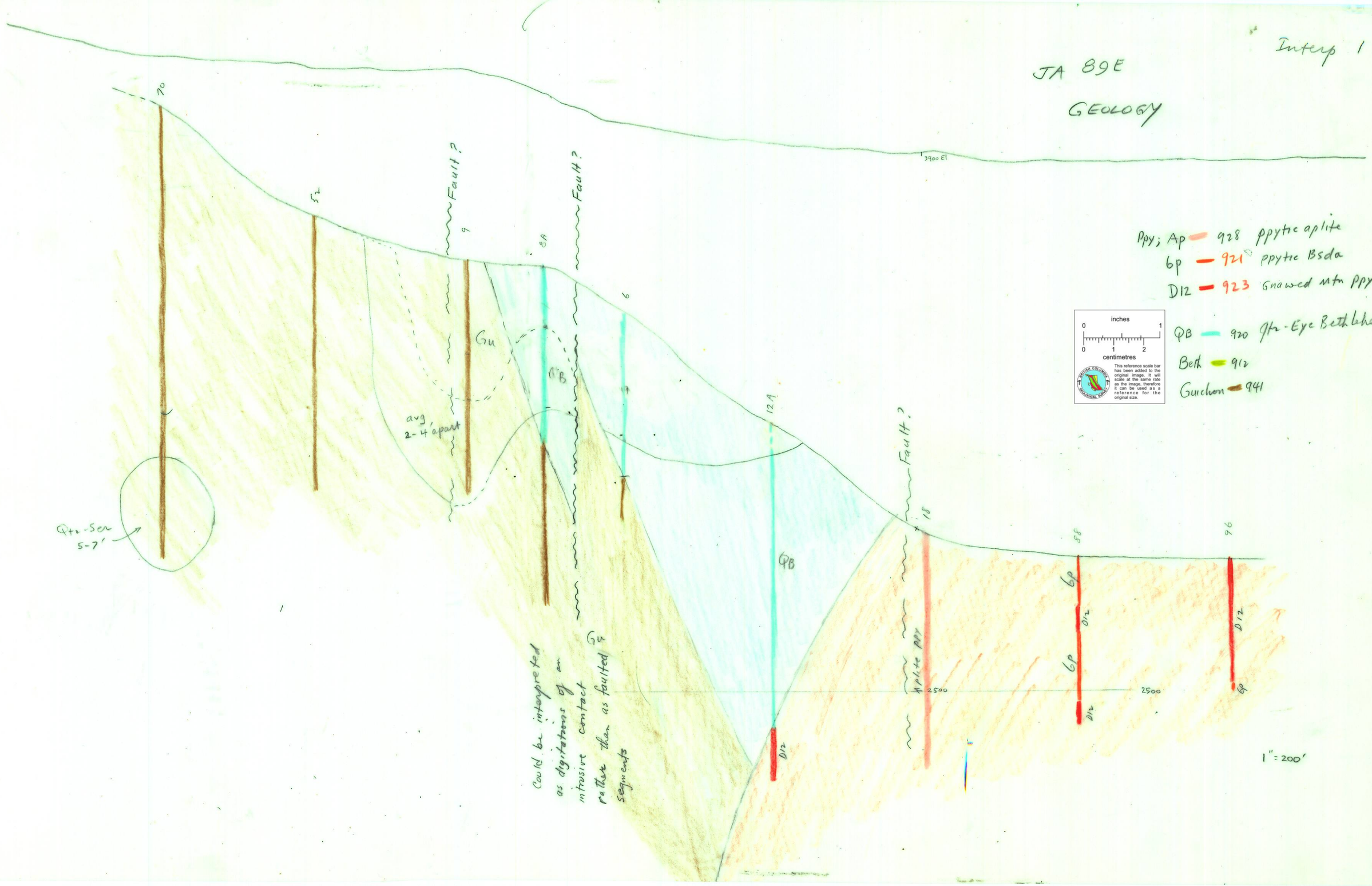
GEOLOGY



Interp. 1

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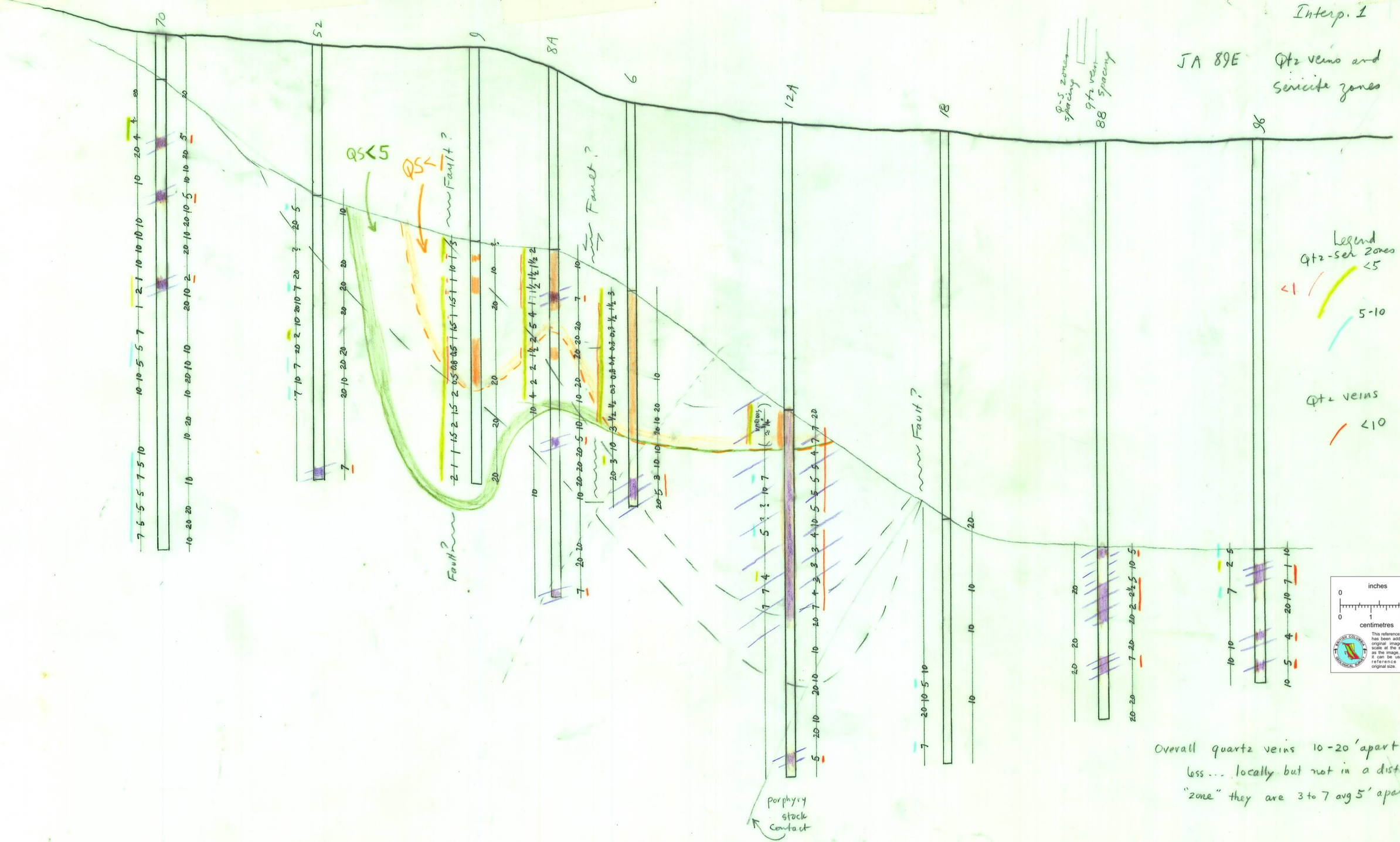
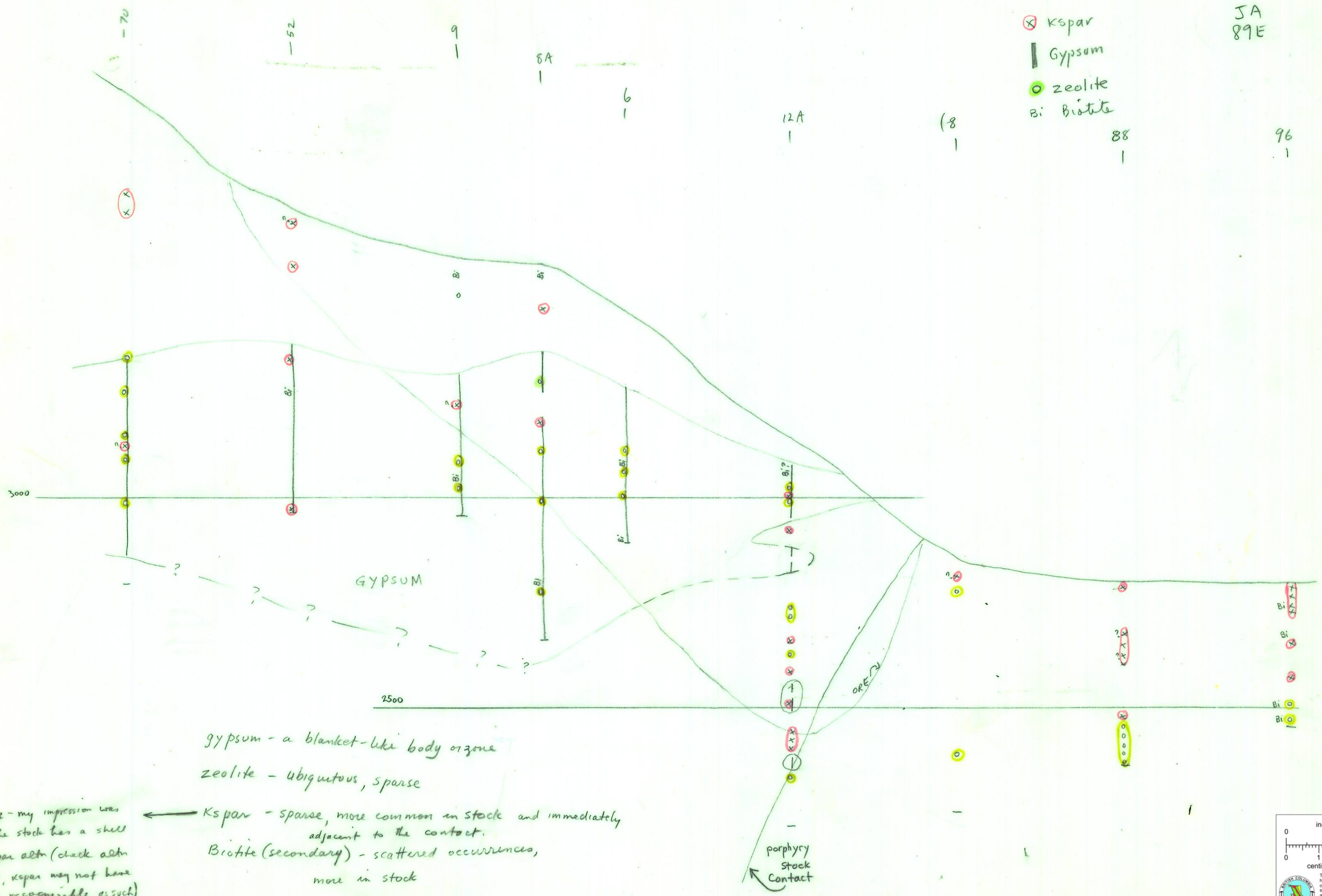
Qtz veins and sericite zones



Overall quartz veins 10-20' apart or less... locally but not in a distinct "zone" they are 3 to 7 avg 5' apart



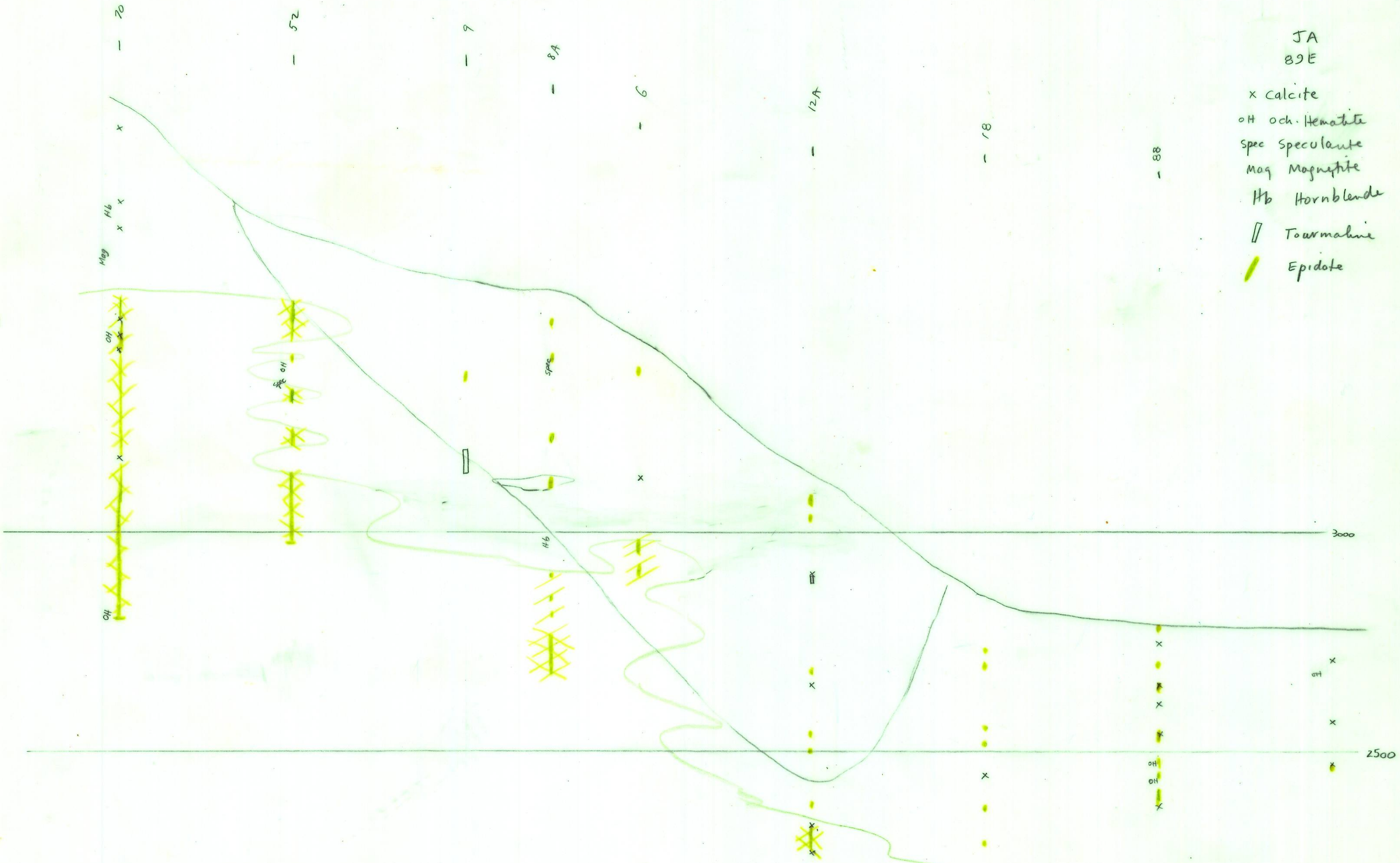
gypsum - a blanket-like body or zone

zeolite - ubiquitous, sparse

Kspar - sparse, more common in stock and immediately adjacent to the contact.

Biotite (secondary) - scattered occurrences, more in stock

note - my impression was that the stock has a shell of kspar altn (check altn color, kspar may not have been recognizable as such)



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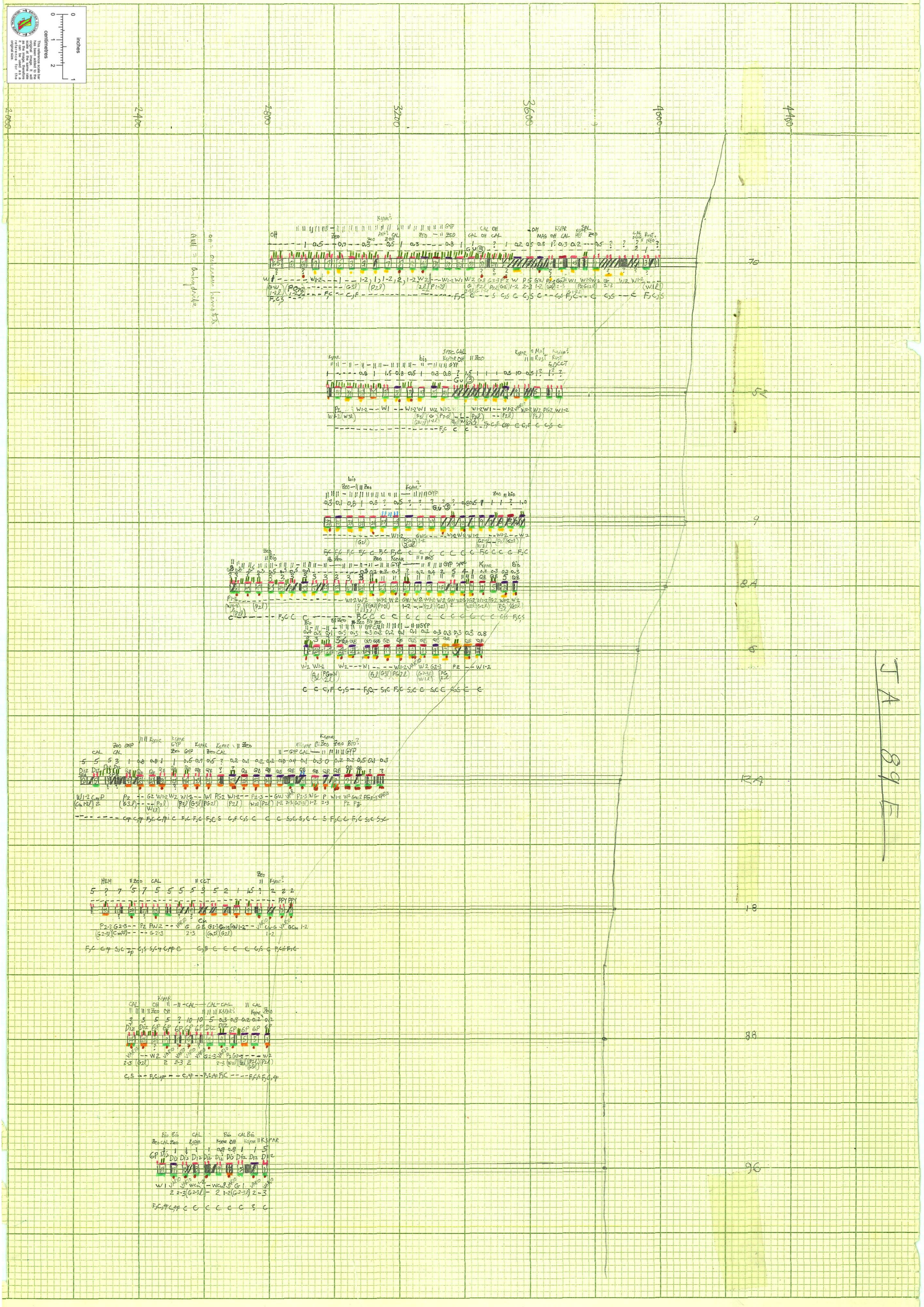
MADE IN CANADA

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