

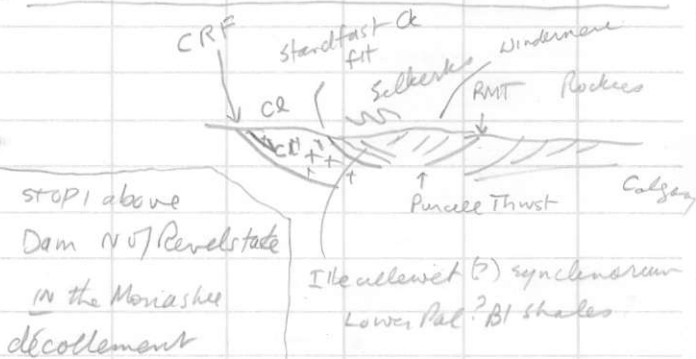
896455

1991

9/14/6

Transect - Revelstoke to
Hope

Randy Parrish / Brad Johnson
(Carleton, PhD)
Jim Morger
(Rick Meyers / Fred Dely)



standfast - W directed? E directed?
being studied

CRF Columbia R. F.H.

Clashnacudden? CR

Dec orthogn 370

115-100 ma granites

65 granite



CRF a normal fault
 MD Moneshee Decollement
 (stops)

sheared Hg metaseds
 Kenem indicators
 HW Windermere^(w) +
 older basement rx
 (.1.4 Ga)

CRF + Eagle RFT
 Eocene extensional
 flts

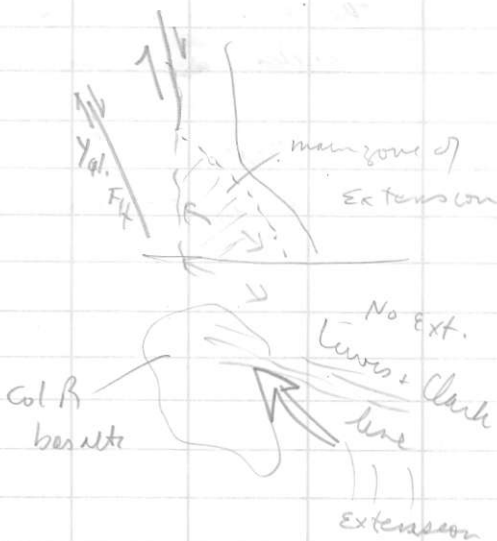
accreted rx - Int Belt
 thrust East as much
 as 200 km.

What triggers extension?
 strike slip flts / change
 of pl. tect. regime

stable
Crust may have been very
thick then. failed & thinned
gravitationally.

(A) + (B) same package of vx
Wind → Hamell Buddhot Urdean

Extension "ends" about
Valmont to north.



H₁ event - was thought
to be evidence but now
seems to be <100 ft
often between 70 + 60
is ~ same age as some of
the frontal thrusts of
the Rockies.

MD latest K - is it an
upward extension of
the basal detachment
fth of the Rockies?

Fabre at [stop 1] is
late K or younger

Rx - note Eocene brittle
orrupt & ductile strain
of thrust event.

metased calc gn + schist
upper ex to east

Diop scap garnet schists

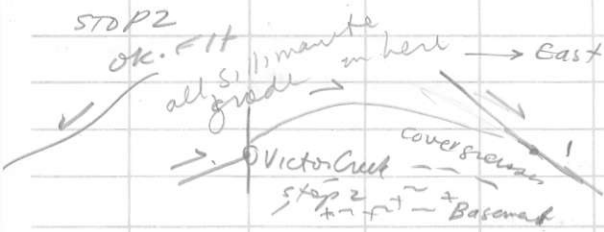
Good kinematic indicators

Fabrics thrust-related but
some may be extension-
related

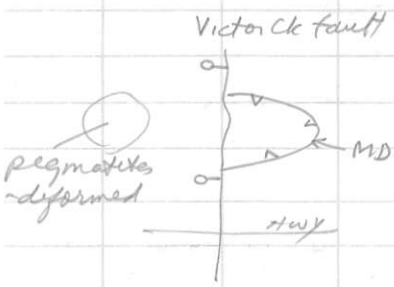
Thrust ended - extension
began 1 to 2 million yrs

Layers E dip here - flatten
to W as we travel
toward Craigjellachie

near 3 valley gap - ~~ab~~ below
MD - above gn in
metaseds,



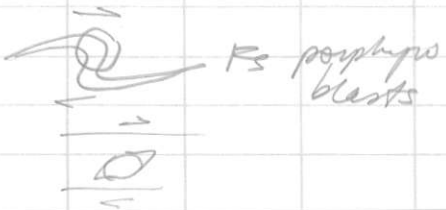
M.D is below us due to movement



Mylonites have asymmetric fabrics of 3 types



(s) Flattening Planes cleavage



MD Movement ~ 65 Ma zircons
monazites ~ 58 Ma

* problem

shear bands



view - plane \perp to foln included
the stretching lineation
stretch line is in the
foliation

C/S * plane of flattening so elongation
with shows you it is not a
shear band

Below MC

~2 Ga Basement

metasects on basement

qtzite schist marble

etc - some > 750 Ma

but may include rx

as young as Early

Paleozoic (? Cambrian?)

MD zone protolith could
be basement or Windermere
protolith (preferred)

* parts could be Protero.
basement is tectonic
pieces.

STOP 3 Vally Gap

Plag bio gneiss - amphib

boudens

metam. zircons ~ 1.4 Ga

u middle Proterozoic
age BUT field ideas
suggest Windermere

* Boudens AND matrix
are both old -
ND/Sm on matrix

LITHOPROBE

1 sec ~ 3 km depth
Get copies of the
'Xsections - ask Randy
how/where

Craygallechee

Eagle Bay rx to NW - med
grade (HQ to south sep by
Eagle R FZ (mylonites
developed))

Eagle R - extension of
w 40 km offset
Okanagan fault

stops near Sicamous

Footwall rx of Ok valley
fault

Intermontane Belt
starts across the fault -
NAm rx → rocks that
are mostly added

Jim - Omineca Belt exposes
met rx

uplift Late K → Early TERT

NAm strat. + Int Belt + west

Chemistry initial Sr

peg - laced paragneiss
W → shear

pegmatite - continued to be
emplaced into Eocene extension-

monazite 70 Ma at stop
but could be Jurassic &
reheated.

at the stop - mylonite -
sheared C/R + pegmatite
shear is west directed ce

This is an extensional
ductile fabric with west directed
shear

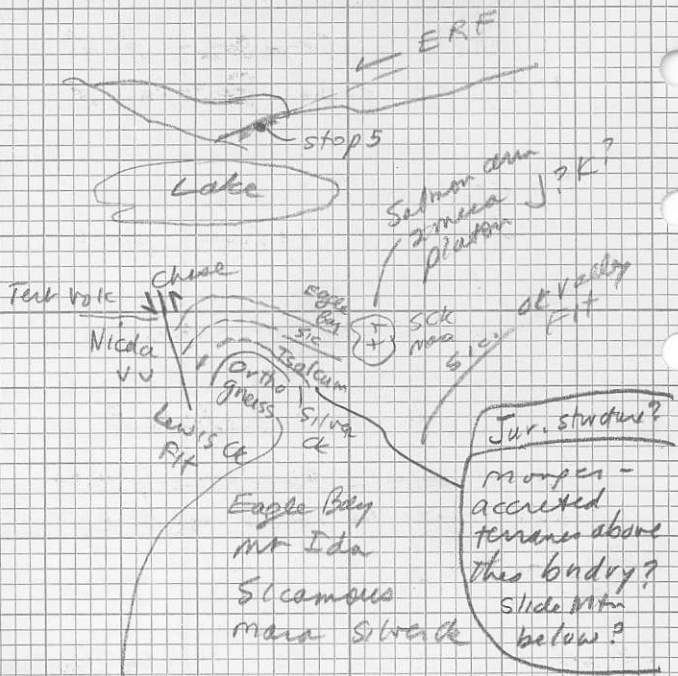


Scott Smith COMINCO - Highland Valley

SHEAR BANDS - late cut across
fold cut gives offsets
sigmoidal shapes

STOP 6 Sycamore Falls -
Hanging wall

STOP 6 near Sicamous Bridge



probably Dow or Ord

Panel vic?

Mongers? Lewis Ck a Thrust -

sent package westward

• may be late Test.

normal flt movement

> Boundary of Thrust Belt?

(Lewis Ck flt)

Waneta fet similar - puts
NAM rx over Russia/land.

Development -

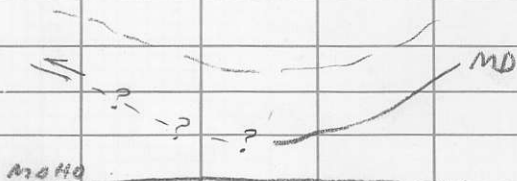
- > Jur E thrusting up to
200 km
- > Back thrusting later

Monger - Flake Tectonics?

(point made by Price years
ago with Δ zones etc in
Rockies.)

Adena
LK

Up Sides
LK



Sicanous - Ken Daughtry - possibly
Upper Paleozoic -

Sicanlooke - alife near Vernon is
probably Slovan (R)

Ken thinks Sicanoux probably
Upper Triassic

gradat on Eagle Bay on
Adams Lk is a different
basement.

Problem rx in Eagle Bay
look like Sicanoux too.

Is Eagle Bay thrust
southward?

Eagle Bay - Tsimiatan is
E

Possible Development

Thrust

Back Thrust

Fold

Normal F/T

etc

Rock at stop is graphitic
pelitic limestone + argillite
White marble lenses
folded + boudined

• Shuswap like viewpoint - skip
stop 7

• skip stop 8 Pluton intrudes
Eagle Bay

(stop 9) Salkom Greenstone
intruded by Tekt, dykes

- Dykes dip eastward - rotated?
is this on a panel moved
by a normal fault.

≡ to Fennel? Kaslo??

overview

NAm vx

Kootenay Terrane

- incl. Dev vx
- thrust of mid Paleozoic deformation
- detrital zircons - craton-derived
- just off's here?

Accreted Terranes

Low Sr⁸⁷/₈₆ ratios until
mid Jurassic

• Fossils - Slide Mt. / Sylvester

Early - Mid Perm fusulinids

≡ Wash - N Mexico

Jurassic fauna match
with Nevada

[HINTS OF OFFSET]

Relationships - mostly
thrust contacts

re Intermontane zone

X Lewis & Clark fault

Nicola subgreenschist
facies

Harper Ranch basement

to Nicola - structurally

rel. flat.

Dom. structures - Tech
Faults -

local major flts -
but basin + range type
to south

Ewing - Trans tension
not straight extension?

Cache Ck up over Anchor
Ck back

Eagle up over Nicola

sw directed fitting early
to mid / this side - late /
on other side of system
(Greig)

SLIDE MTN - Fennel -
Sylvester
Nicola Ashcroft

Quesnellia

Fyles T₂ over Anardish

Nicola has 2 basements

Arc // Harper Ranch
Dev - Perm

Oceanic // Chappayron
Metachert
U/Pu basalts
Kt pods
Dev - Perm - younger?
(and blocks one place)
Anarchest

Related to Slide Mtn

Nicola
Eastern sed facies -
like at Hedley

Uppermost Nicola =
Upper Norcan - may
continue into Jurassic
- younger part = to Postmont?

E - W

Nicola younger on East

Campbell de Union TR on

Paleozoic NOT Hwy

East of Canada large
plant (several km)

Quarry - many Pm

some Pennsylvanian

Locally to Devonian

Volc sst arg

Volcanic tuffs

Limestone

Fauna NOT like Cache
Creek

Are the 1st pods olistoliths?

Matrix here is same
age - 50 m.

> Similar to some of the Upper
Sylvester?

Wildhorse Batholith
195 Ma

into Nicola sedo -
adj. to vol package

West Belt

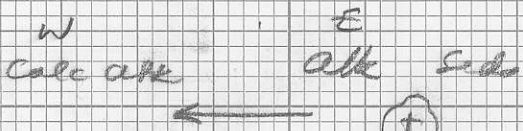
calc alk series

East Belt

Angite Ppy

Iron Maslc

200-105 Ma



Wildhorse Ck

Ross land

Early Jurassic

Did Nicola Arc broaden
in early Jurassic?

Young rx stripped off
by Ashcroft unconformity

Afton Pit closed 2 $\frac{1}{2}$ yrs ago
 $\frac{1}{2}$ g/t gold
10.5 MT reserve (underground)

Ajax (E & W) now being mined.

ore with NW trending faults
(some NE)

Crescent & DM are box pipes

Bounding faults reactivated

Afton 100 Cherry Ck

Ajax 100 Sugarloaf

Picrites - close to ore - in
faults?

STOP

Eastern Nicola

X1 tuff, volcaniclastics

• monoths Subcircularis

Onward - coarse volc.

bx.

 $\frac{1}{2}$ km before bridgepillow lavas on tracks
N of Hwy

View across Hwy

Jur Cgl on Nicola

Maene ammonite

Triassic?

Central Nicola

- red + gm volcanic-

clastics

Gaucher 210 - zircon

Cache Ck - crossed
into Cache Ck Terrane
E boundary is largely
a melange.

stop Mr Mike Melange

m4

to 3 x 15 m size

1st ~ $\frac{1}{2}$ km north of it

1st block / chert in argillite
matrix - 'some gneiss
Fossils - Pennsylvanian local serpentinite
Very low metam grade

- Some Nicola / Cache Ck mixing

West facing arc - see Nick
Mortimer paper

MODEL = melange = accretionary
complex - some arc mat' l
added?

Lat Juv thrusting pushed Cache
Ck over Nicola

Sylvester / Shasta / Harper
R - similar fusulinids

Cache Ck
Exotic fauna - Permian

Cache Ck not exotic to Nicola

BUT older exotic pieces occur
in the Cache Creek.

BIG PROBLEM How do you
get the Stakena in place
with Ck separating it
from Queensland?

see upside down Nicola
on Ashcroft locally due
to Ck overthrusting
to the east

(Bill Traver's paper)

Ashcroft - same age as
Ladner (Methow trough)
albeit no direct link
exists

Ashcroft Village

bottom of east overthrust

② syncline



STDP M-5

Gully

bl shale / chevron folds,
thrusts

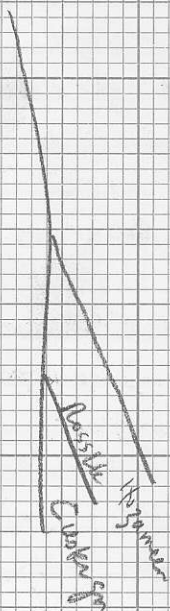
Guichon Batholith - overlain unconformably
by Ashcroft

Gully - deep water facies

Ashcroft Fm

Age - prob latest Jurassic 155 Ma

Sp Bldg not affected



Merritt → Hope → Kamloops

Jackson Mtn group -

Source to east ?

and K. Clusters from west

Bridge R Terrane (Hozomeen)

lots of chert

no big lsts

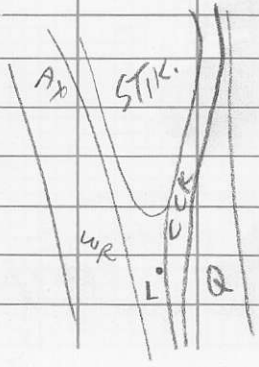
Blueschists found in Yalakom

Ovenshellia → Meckow →

Bridge R Ter (Hozomeen) → Hope (Fault) →

the Lytton complex

Stikine - as far s as Whitesail Lk



⊕ + Stikine Terranes

are they the

same ?

Cck separator

a problem - Cck

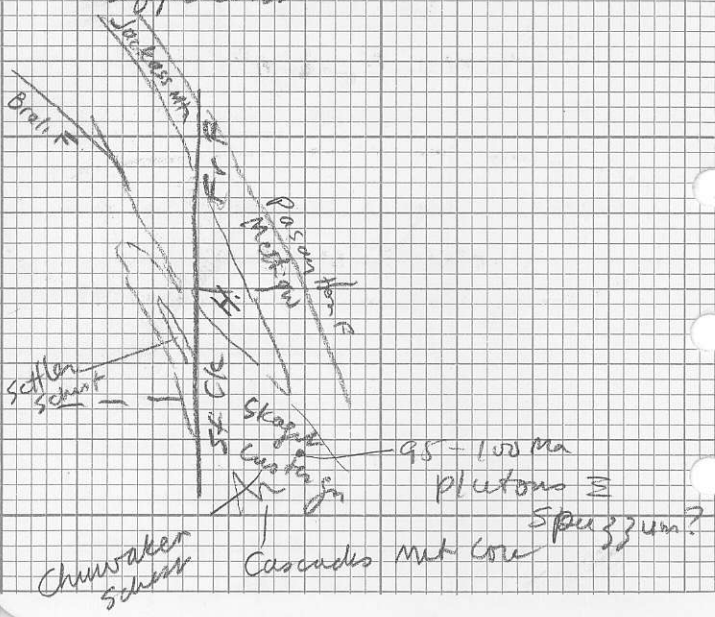
same all range

but different fossils

? are nodes shown as skeletons
of Whitesail mainly
western faces Bache de?
needs work.

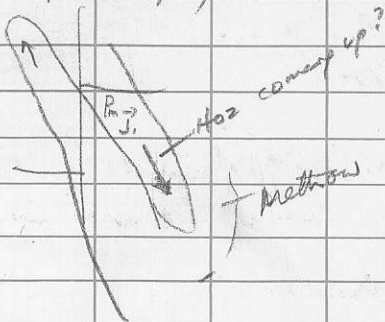
Rossland?
Nicola > Hazelton
Takla >

Rossland/Hazelton -
age same but chemistry
different



Passages - mostly K FET structural
strike slip

N plunging certain culmination?



REGIONAL N TILT?

⊗ PAID FRED \$23500 FOR THE
FIELD TRIP (CASH)

Iron Mtn - FW of Coldwater
Fault - a big one!

New Hwy to Kamloops
pretty well follows the
fault.

Nicola bath - deep level
popped up in horst

Quelchona fault

S end of Nicola Horst

is a messy zone -

Rocks to N or up?

- Normal fit - flattens
at depth

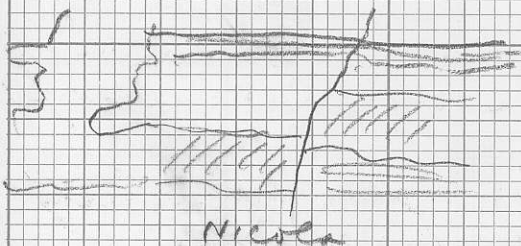
Merrett Eocene Seals
in valley - over ^{Test} / Volcs

are there also trans-
tensional basins?
- central extension +
sinistral offset?

<div style="border-left: 1px solid black; border-right: 1px solid black; padding: 0 10px;"> <p>Fraser Flt</p> <p>46 - 30</p> <p>Okanagan</p> <p>85 - 45</p> </div>	Princeton -
	Merrett - Har
	Ck - rel to
	movement on

Fraser/St Ck fault?

M2-1 Bedded Nicola
 cut by diorite sills/dykes
 - growth fault likely



M2-2 Spences Bridge Gp

tuff - bedded - carbonac.

zones - Randy found

tree fern fossils

low - Sp Bldg usually

more volcanic

Crossed Coldwater River

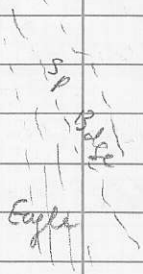
Complex litary intrusions
distances Bx's
Lower Sp Bdge - grayish
purple typical

Bdge Flt then deformed
Nicola with fabric developed

Sp Bdge deposited on a fairly
rough Nicola base?

T₂ + K may be very trending
to separate.

Passed the Keystone strike
- pp4 m52



Eagle deforming -
caused raised
welt + trough
behind

omit stop M2-3

snow covered

Eagle Plutonic Complex

- locally gneiss -

155 Ma

Fabric sw dip

mid K overprint 110

Tulameen Complex

Fabric 155 Ma?

No old inheritance

Stop at Tool booth

Variable dk to light

gneiss - swirled foln

cut by musc ksp or peg-

matite at low ϕ where

we saw it.

The Gneiss is apparently

metamorphic

Young Mt along Coquihalla R

Needs Pt Pluton | Hwy 91's
Eocene age? | Exposures
"pristine"

Coquihalla votes
22 - 23 Ma

Young Deformation -
Eoc or post-Eocene -

NOW HAVE LEFT THE INTERM.
BELT - in the Cascade Mtns
now.

Lots of NE structures & Vedder Mtn
Doctors Point (pluton zone)
part of Chilliwack along NE
Fr (23 Ma)

Cascade

E zone not LA RX
Methow / Hozomeen

Rossie Pt → not core

mark - early T mat.

Deep tonalite plutons

as program

West Bell

- W-directed thrusts

Challisville Gap / Culter, Fran

- Streets on E side verge E

Cascades discussed p 36 - couple of pages

- out of Needle Peak into

Ladner - Iso folds /

little andubrauta (Needle
Peak?)

L-M Jan - sits on Spider
Peak bossier (MORB)

Gabbro chem sim. P Spider
Ch(Tr) - related U/M

U Ladner on oceanic basement.
(Tr)

cut by some rate of dykes

? Spider Ch intrusions ??

Sim - no - probably Dewdney Ch

Ladner \approx to Ashcroft +

?? Cadwallader - ask Paul

x Hozaheen Felt near Carleton
road Xing

Coqu. Serp belt

Hoza Gro

major volc ch ag U/M

local list

Chem suggests oceanic
are elements

Hozomeen Step - s of ^{Red} Carolina
Early late K Trans-

pressional deformation zone

or is it compressional?

glenscheist facies -

or mtn topog \rightarrow prehnite

pumpellyite

Like Camp Lk Br R.

- a couple of places they have
dextral movement indicators

- Hozomeen to Hope where
there is a strike of Custer an

Pluton at Hope 42 Ma

interfuses Hozomeen top

Cogumallak Intrusion

next to area is - Silver
area

mtbrow/BR Canyon Fallsella
42-46

Rex mount Ppy ~42 - also
one near 60's

Pm match ~~at~~ 150
evidence > 100k.

Paragon Fit also shows
similar element of offset

Hope Bridge - Eoc gl in
abutment

Fraser Fault -

Age - Price + Carmichael
--- model tested by Meg Coleman

Fw of Mission R fault (like
Ross Lk flt)

Dips East Fw Higher
grade met rx (some is meta-
Br River) + fol. granites (46-47
Ma)

u Ductile Fw - transcurrent
dextral shear - Mid Eocene age
Hw Hozaan - lower grade
so some normal

Restoration - H-G rx used to
sit under the Hozaan +
the flt is \equiv to Yalakom flt

Fraser cuts Yalakom, so

Fraser must be younger

45 - 35 Ma (stitching by granite)

Reconstruction

Join Yalokan - Hogamean

BOT Mission Ridge ft hook

to Ross Lk system (different
than Jim)

Displacement goes to ~120
Ma

Jim other problem - some
zones may move more than
others

* Fresher system younger
than most of the extension
in the Okanagan.

Note late K movement
documented elsewhere in
B R Terrene

SDP Cg cgl - many clast
types mid Eocene?

Fwd is Custer gneiss
all local rocks there as
clasts

similar cgl patches
occur down into Washington

- just beyond road points
at Spuzzum platon

Paleomag - is it moved
or tilted? both?

Landslide - Savigay at UBC
studying these now

*slide under Minter gardens!

Along the Hwy - patches of

→ H₃ - ameen, Custer
gneiss, etc

H₂ - Custer contact

zeolitized.

→ are these landslide blocks?

Spargan intrudes Setts
schist (Ky gar schist)
- probably Mesozoic?

- lunch at campsite -

Back on the road -

Granite rx closely fractured.
Few age dates.

- pass U/M - back into
Athens again
more pelitic here
almost state highly
deformed.

- Thin slices of Jackson
Mn group

knob to left - a sliver of
Hogameen? (at Fraser
area)

Unscheduled stop

Basal Ladner

early Pleistocene

Ammonites found locally
shale/siltstone right
way up, poor ~~sea~~ cleavage
developed

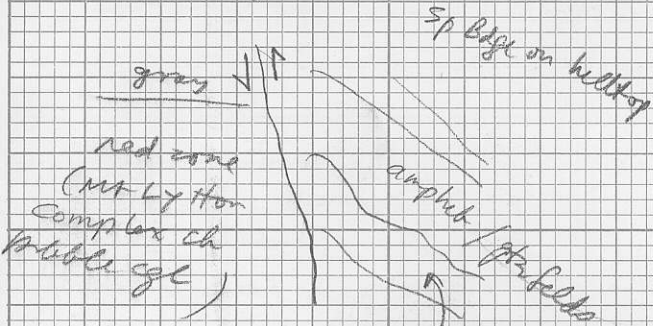
stop M2-8 / youngest Methow

Jackass Mtn - formation -
coarse cgl - locally chert
into interlayered sst. -

Submarine fans? Subaerial
(oxide nodules or clasts)?

- Methow "narrow belt" to ~2km
width along Fraser F1+ system.

Batane Ck - red sands are
chest cgl - Cenomanian



Laterite soil developed
regionally here? Pre-Tert?

Roots of Nicola are?

Brush along side of dykes
- feeds to Sp Bdg?

Amphibolites - form
fairly reg layers -
+ local nodules

Felds zones x/line - but
my 10mte elsewhere - annealed
here?

Age 220-230Ma

Further N - got 258Ma
= Permo-Triassic

- part of Eagle Ad belt -
topped up edge (105-101Ma)
of Int Belt? - shed Jackson
Mtn?

Sp Bridge deposited on
upwarping edge led to
unconformities - the Sp Bdge

• Relationship to Cache Ct unknown -
covered by Sp Bdge gp

(see Derek Brown BSc Thesis)

Sp Bridge

lower part 104-105M

Upper part = Spruce

used to be Knaprock.

S of Sp Bdg - Up Sp Bridge

@ road level, lower Sp Bdg

(epidotted) across R -

FH throw considerable -

E side down

Red Hill

Granite Gneiss

mass sheet 1177

(N. Mortimer - check)