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82F/9
82FNE052

→ SULLIVAN

@ KEG '95 (Apr.)

In → Original reserves = 160 m tonnes

@ 6.5% Pb, 5.6% Zn, and 67 g/t Ag

Closure! est 2001!

Next (Now) Target = 40 mt @ 10% Zn

OR 200,000 t/y

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→ SULLIVAN

NOTES ON MEG TALK

NOV. 27/91

(Notes taken by
B. Lane)

SULLIVAN Pb-Zn DEPOSIT
by Craig Leitch (GSC)

- part of a GSC collaborative project to study Regional scale & Deposit scale characteristics of the Sullivan Deposit/District.
(original budget - \$470,000 - since significantly reduced)
- will compare data/results with info. acquired from Middle Valley
- on a regional scale - look at spatial dist. of Sullivan and other m.s. deposits hosted in M. P. Aldridge rocks w.r.t. structure
 - source & type of hydrothermal effluent
 - heat source (Moyle sills injected into wet sets - evidence?)
 - hydrothermal alt.
- on a deposit scale - nature of the ore fluids
 - method of ore ppt./deposition.
 - lateral/vertical variations of bedded ore
 - post-ore modification
 - expl. significance of the deposit itself & its characteristics

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- Hosted in M. P. Belt - Purcell S.G. (Middle Aldridge or "Sullivan" horizon)
 - west of Rocky Mtn. Trench, area of numerous x-cutting faults - site of failed orogenic?

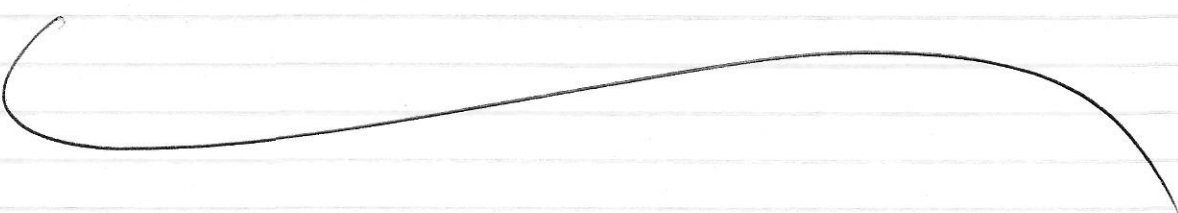
- Craig looked at xcutting deposits (North Star & Sternwinder) as possible analogues to ~~the~~ "breccia" zone (tourmalinite pipe) beneath Sullivan laminated ore.
- Craig & Bob Turner (GSC) relogged much core - found many more footwall dykes & sills than previously reported - (difficult to ID due to alteration) - & discovered that both pre- & post-mineralization dykes are present.
 - (10 m wide dyke (red dyke - ex.) with 30 m envelope of chlorite + albite alteration that xcuts tourmalinite.
- found "fossilized" fluid upflow zone (stringer zone) - wispy, delicate ~~pd~~ \pm apy, rare cpy xcutting tourmalinite, (+ native ~~both~~ bismuth)
- fluid inclusions several phases & stages
 - * early higher at % NaCl \bar{a} Ca, Mg (!) & high temperature
 - * later lower at % NaCl (5-10%), low temp.
- rocks divided up into "granophyre", "unaltered", (~~metabeds~~) altered, ~~low~~ tourmalinite and massive sulphide & determined % of stable detrital (ie. qtz), detrital (mostly feldspars, micas), and hydrothermal (alb., tour., sphene, chl. & Sx) epidote, garnet
- found PY > Pd in granophyre ~~unaltered~~ & altered L. Ald., but Pd > PY in tourmalinite and Sx
- tourmalinite is needle-like \bar{a} mzn vs. c-gr. in metamorphic rks.
- Mg-chlorite associated with mineralization & Mn-garnets
- increased muscovite & decreased biotite in assoc. with deposit vs. country rock.

For a much more comprehensive read

refer to GSC Current Research, Part A
(PAPER 1991-1A) p. 91, p. 27

and GSC Current Research, Part E
(PAPER 1991-1E) p. 33, p. 45,

p. 99.



Need - BCGS slide

Nelson Conference
Apr. 15/89

White: Industrial Minerals -

- Wollastonite - mainly assoc. with skarns
- Feldspathic Minerals
- ~100,000 tonnes market
- Dimension Stone

Makepeace: Silvana: Standard^{mine} - greatest producer - soon to be surpassed by Silvana

- 5 mile strike length of vein system
- extended potential along strike to west (other side of fault) i.e. west of Carnation Valley Fault. - low angle, thrust

Anderson: Sullivan - curvilinear thrust faulting in Aldridge Basin

- intrabasinal features - incl. tourmalinization / 'fragmentals'
- tourmaline - accum. on sea floor = bedded beds
(-15-70% tourmaline) re-sedimentation
- albite / chlorite alt'n
- sub basins eg. Sullivan, Vine
- non-typical of basins - more clastic!

Hagen: - 'Marker' system. (within Middle Aldridge)

- > doz units within 1400 m thickness

Ransom: - hydrothermal event with footwall 'pebble' fragmental with top of

- at ^{mud} least 4 'waste' bands between & above M.S.
= debris material, with sulphide clasts (ripped up)

Mosquito Ck.
Cuer d'Alene - vein
Spar Lk, Cu-Ag dep. - 150m ton camp
Sheep Ck.

Mar. 28/89

John Hamilton

Cam Allen - Spokane - Combs
SULLIVAN Session Chairman?

+ stemwinder
+ north strike deposits to south strike

- John Lydon (GSC)
to study deposit this yr.
(prev. PhD thesis)

- Faulted off to north by 3 to 4 km.

Res. @ Dec. 31/88

25 m tons @ 4.5% Pb, 85 opt Ag, 7.1% Zn

- Sullivan has contributed ~ $\frac{1}{3}$ of mineral wealth to BC!

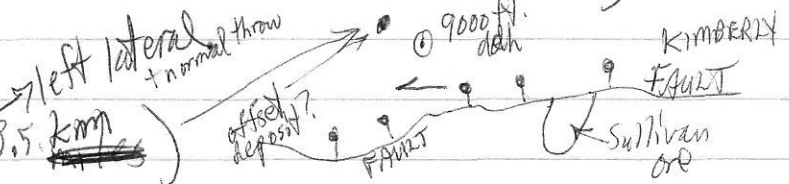
- Upper West Massive Ore + Lower East Bedded Ore
.03 to .07% Sn, .02 to .05% Sn turbidites

- concn of Sn and Fe

(Don't recover Sn any more because Western Massive Ore mined)

Kimberley Fault - problem

- offset to NW (~ 3.5 km)
@ 8400 ft. depth



- east verging tectonics

Middle Aldridge 'marker' horizons - occur immed. above Sullivan rocks
(us equiv. = Prichard Fm), (5cm to +5m thick)

- looking at individual turbidite beds (core scale)

- zircons from ash bed in Aldridge - waiting for result

- sediment transport from S to N (well documented)

- number of turbidites (eg. 9, 10) = left lateral work by Pat Harden

Geochronology 1.45 Ma - Sullivan

1.43 Ma - sills

- Yolfs above Sullivan (6 zircons) = sills came in very fast (burst of energy)

- tourmaline at depth (footwall) - albite in NW

* Sullivan North End (NW offset) - @ 8400 ft. depth ~ 1 ft. MS

of 4% Zn, 11 g/t Ag, 34% Fe, low Sn (00# 6464)
plus gabbroic sill below

key marker = 'R'
(didn't want to talk about it)

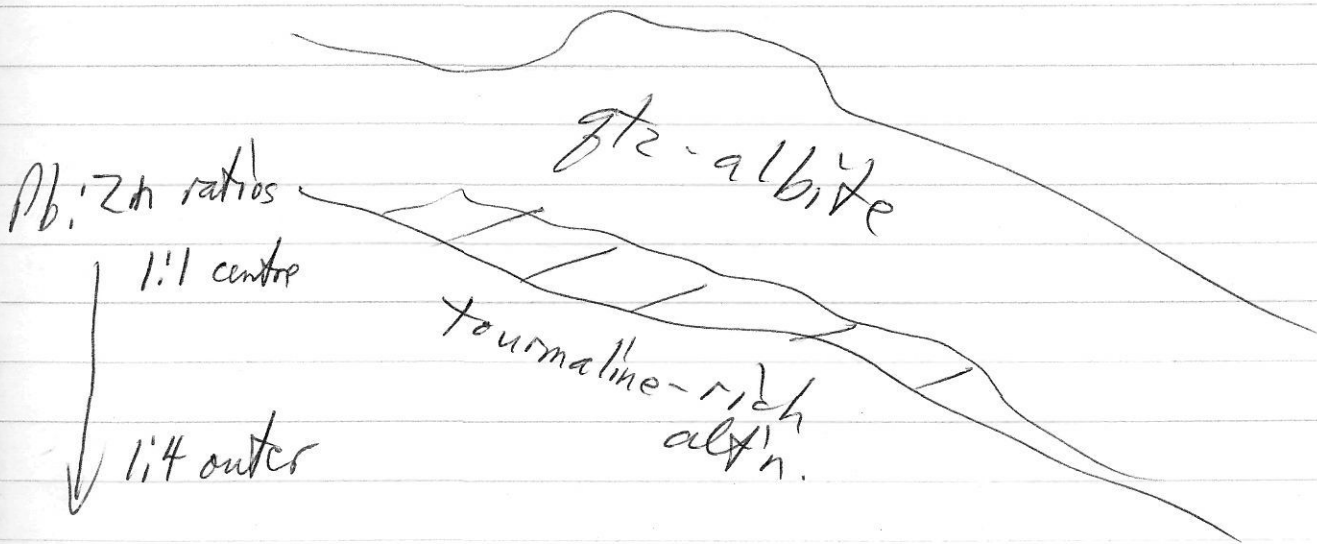
FAC
May 13/83

SULLIVAN

Tin Prod. 1941-81
~ 15000 tonnes tin conc. } Grade
9000 tonnes tin metal } 91% Sn

Sn recovery ~ 31%

Mined to date: ~ 160m tonnes @ 6.8 g/t Ag
6.1% Pb
5.9% Zn
0.03% Sn
25% Fe



SULLIVAN

Feb. 20/06

- * 1892 - Discovery
- * 1895 - mining started
- * longest-lived, continuous mining operation in Can. history.
- * one of largest Zn-Pb-Ag lvs. in world.

[> 160 Mt @ 6.5% Pb, 5.6% Zn, 67 g/t Ag]

* Production: 1909 - 2001 (92 yrs)
+ milled ~~150,493,162 t~~ 150,493,162 t

Au = 174,863 g	
Ag = 9,264,200,966 g ($> 285 \text{ Moz}$)	~ \$20 B value
Zn = 7,944,515,846 kg ($\approx 20 \text{ Mt}$)	plus
Pb = 8,378,235,800 kg (9 Mt)	addition
Cu = 5,106,748 kg	\$60 B
Sn = 9,702,553 kg	in gross product to BC economy

mined down to ~ 500m

- * Av. # of employees: > 1,000
- * Salary + benefits av. \$68,000/yr.

Cd = 3,094,872 kg
Sb = 413,700 kg
Bi = 21,880

VOS → Sullivan

SULLIVAN - Nov. 10/01

Will have ~20m
of min. @ closing - Dec. 21/01

~~1st~~ Model 1" = 40ft.
- started in 1927

est. \$750k to drill one
hole to geop. logs. Target
to offset Sullivan, N of K Fault

2m @ 146176 IRR-218
 3amt @ 15227 - 8yrs
~~offset~~ Sullivan
 Sullivan opening
 1/8 water logs
 6 yrs to build
 5m @ \$250m
 - 250m shaft ~ 800 1/8
 Monitor