

Owen Lake Project - May 15/91 - UBC.

- NSERC - Industry - 1989-1990 = Pacific Houston - G. Carlson

& ore reserves - MDRU. 1991 - New Nadina Explorations.

started 2 yrs. ago

Principal Investigator

A. Sinclair

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Research Ass

C. Keith; now Peggy Thomson.

Grad Students. - C. Hood - mineral.

X. Cheng - alteration.

MDRU

- ore reserves.

need industry funding to get NSERC grant.

funding - total = \$410,000

	1989	90	91	total
NSERC	70	70	52	192
Pacific Houston cash	5	35	5	<u>197</u>
company pers in kind <small>(into assays transport etc. comps etc.)</small>	70	35		105
New Nadina cash		50	50	
in kind.		25	25	<u>180</u>

Ore Reserves.

SCBC 30

Industry 3

total cash 230
in kind 180
410.

Geology.

Silver Queen - 35 km SE of Houston.
- just W of Equity Silver.

- Jurassic Hazelton = basement. intruded by Jurassic granites.

↓
overlain by Skeena Group
+ Cretaceous granites.

- extensional tectonics in late Cretaceous - early Tertiary.

local geol - Buck Creek Basin.

- outlined by Tertiary volcanics
- have windows of older rocks - Hazelton
Skeena
Tip Top Hill volcanics. - andesite
lavas & pyroclastics.

have east-west trend of intrusions \approx 54 MY - between Equity Silver & Silver Queen - associated with mineralization.

- property - Tip-Top Hill FP = andesite.
+ Mine Hill microdiorite.
+ intrusive rhyolite porphyries.

mineralization bracketed by amygdular dikes
& banded fp dikes.
dated at 51.5 MY.
age at Equity 50-57 \therefore similar ages.

P. Thomson - Structure. Interpret.

problems ① attitude + discontinuity of veins. - several strike + dip directions.

② vein morphology - veins bifurcate
stockwork vs single vein.
brecciation.

③ regional implication?

- major structures NW faults = Owen L; George L + Emil L | block faults
& ENE " ^{vertical slickensides.}

Some of major veins parallel to NW faults. i.e #3 vein.

- veins exhibit conjugate shears - result of varying fluid pressures in rx.

↓ have vertical + horizontal stress ∴ get 2 types of conjugate sets - explains different orientations of veins

Chris Hood - Vein mineralogy.

- concentrated on No. 3 vein.

- trend NW-SE or less commonly E-W.

- display abundant open space filling. ^{Ag-rich.}

#3 Vein - 300 DDH + U/G workings.

py-sph-gn, tet-cpy - most common ^{ore} minerals.

qtz-barite - common gangue minerals.

3 stages ① early Fe-rich qtz-py - marcasite - hematite.

② middle carbonates + sphalerite

most N.B. economically → ③ late Cu-Ag-Au - all sulphosalts
- ep-tet-gn.

examination of tetrahedrite

Cu-As in tet near source

Sb " " away from source. - also have more Ag rich portions away from heat source

tet veins zones = changing hydrothermal system.

Ag, Au in ① electrum
② tetrahedrite.

Au recovery poor due to fine particle size + association with refractory phases. Au^{also} with f.gr. py.

X. Cheng - Alteration.

weakly altered andesites - magnetic.

moderately altered lose magnetic character.

strongly altered rx - narrow envelope immediately adjacent to vein.

get increase in LOI, ^{SiO₂} K₂O adjacent to vein.
decrease in CaO + Na₂O " " "

Al Sinclair - Pb isotopes.

- Pb²⁰⁷ vs Pb²⁰⁶ plot

- Equity appears to be younger than Silver Queen. + reverse of what other age data suggest.

- mineralization associated with 50 m.y
Nanika intrusions

- means they evolved separately over last 200 My. i.e. different source/hydrothermal system.

source may be Bowser Basin / Hazelton.
source = volc. pile with 10% crustal sed.

different Pb/U ratios

M. Thomson - Fluid Inclusions

Why?

- ① trapping temp may indicate temp of mineralization.
- ② freezing temp indicates salinity + gas content
 meteoric vs. magmatic
 - boiling?
- ③ vapour ratios → boiling + mechanism of metal deposition.

- Silver Queen - formed at $\approx 230^{\circ}\text{C}$.

a. Bitumen - Barite Study

- timing of bitumen.

2 types of inclusions.

- ① aqueous
- ② hydrocarbon

- bitumen of terrestrial origin. $\delta^{13}\text{C} = -29$
 maturation level $\approx 120^{\circ}\text{C}$. = max temp of bitumen

T.e. later than ore related inclusions.

Interpretation

- ① fluid - meteoric - low salinity 2-3% NaCl.
- ② hydrocarbons (gas - methane) from late Cretaceous sed.
- ③ source of Ga may be from organic rich sed. →
 ↑
 in sph.

b. Mineralized Vein Study

① highly brecciated vein T_h trapping temp = 128°C - low for sph.
 T_m freezing temp = -4°C = 6% NaCl.

② banded colloform vein $T_h = 230 + 150^{\circ}\text{C}$ i.e. 2 trapping temp - can explain variety of mineralogy in veins.
 $T_m = -3^{\circ}\text{C}$ = 4.6% NaCl.

③ hem - qtz vein - early veins $T_h = 230^{\circ}\text{C}$.

M. Nowak - Ore reserves.
- drill hole data
+ drift data.

- point kriging - thickest part of vein in north - down to 2-3 ft in S.

Best Au in zone between central + south zones. }
" Ag " " " " " " " " } ie. where vein
not as wide.

At Sinclair. Conclusion

Practical Contributions-

1. detailed geol map
2. " structural interpret.
3. geostat ore reserve estimation.
4. metal distⁿ maps
5. mineralogy - associations, distⁿ; form of occurrence
6. detailed alteration study
7. exploration guides
 - o/b studies
 - NG3 vein extension of #3 vein.
 - vein orientation
 - Au increase to S
 - alteration increases to S.
 - mineralization coeval with Nanitka intrusions. (age + spatially)