

Wall Rock Alteration at the Sulphurets Gold-Silver Property, B.C.  
**D. V. LEFEBURE**, B. C. Ministry of Energy, Mines and Petroleum  
 Resources, Smithers, B.C., **S. B. BALLANTYNE**, Geological Survey  
 of Canada, Ottawa, Ontario and **K. E. HICKS**, Newhawk Gold Mines  
 Ltd., Vancouver, B.C.

Sulphurets is one of numerous silver-gold deposits in the Stewart  
 area of British Columbia. The quartz veins and stockworks are  
 hosted by altered volcanic and sedimentary rocks of the Hazelton  
 Group. Alteration patterns around these veins can be used to  
 assist explorationists.

The quartz veins in the West and Shore zones typically contain  
 tetrahedrite, electrum, pyrargyrite, argentite, galena, sphalerite  
 and sometimes barite. Gold occurs in a free state and as  
 inclusions in pyrite. Primary rock textures are not visible in the  
 strongly altered wall rock. Immediately adjacent to the  
 mineralized zones the wall rock has a gray, siliceous appearance  
 and contains up to 7% pyrite. Further away from the  
 mineralized veins there is sericite alteration with quartz  
 veinlets. Abundant disseminated pyrite (up to 20%) is common in  
 this zone and forms a "halo" around the veins. At greater  
 distances from the vein, sericite and less than 10% disseminated  
 pyrite are the principal alteration minerals. Minor carbonate  
 is found throughout the altered wall rock.

Anomalous values of Ag, As, Au, Ba, Hg, Pb, S, Sb, Te, Tl and Zn  
 are common in the altered wall rock. Ag, As, Pb, Sb, and Zn  
 concentrations correlate positively with high Au values. High Ba  
 and Tl contents define larger zones which generally envelope that  
 silver-gold veins. Anomalous sulphur values in the pyrite "halo"  
 correlate with high Hg and Te. All rocks within the alteration  
 envelope are strongly depleted in  $\text{Na}_2\text{O}$  and enriched in volatiles.

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SULPHURETS

Drue -  
 looks good overall.  
 Dimensions would give a better mental  
 picture of the scale of the systems. B.C. M.M.



To: V. A. Preto, Manager,  
Applied Geology and Coal

Date: June 15, 1987

D. Alldrick, W. J. McMillan

Re: 1987 CIM District 6 Meeting Talk

Bruce Ballantyne, Ken Hicks and I will be presenting a paper on the wall rock alteration at the Sulphurets property at the fall District 6 Meeting of the CIM. The abstract is enclosed for your information. There may be a publication produced in conjunction with the meeting which would include the Sulphurets data.

*David Lefebure*

D. Lefebure,  
District Geologist.

DL/ek

encl.

LOG NO:	6-22	GEO	1a
ACTION:	Copy to D. Lefebure, <i>abstract only</i> <del>to be filed</del>		
FILE NO:			

Tom Brown

Sulphurets

CIM

87/10/30

5.6 km N of Stewart

Unak R area

256 Holes

undergrd

8.85M so far 5.5 m 1987

Int volc & sed rx cut by pyenite plutons

Widespread altu

Qtz ser py

lesser clay carbonate

Mintzn - along NW flts mostly

mostly in volc rx

ore shoots steeply dipping, readily minable



ser/py alt volcs

qtz flooded core/stockwork

local <sup>in volcs</sup> potassic altu

pyrarexite  
sphal, ruby Ag, sulphosalts

tetrahed argent gel polyhydrate

electrum  
60/40 Au/Ag

- ore zones - multiple shoots / cut across but stay in

ore assoc with qtz veining

Decline in progress

WEST ZONE

1 MT .33 Au 21 Ag

SHORE ZONE

1/2 MT .26302 27.23 Ag

Section



ore zones  
silic core

alt volc

Sulphurets

Sulphurets

Lefebvre

CIM - 87/10/51

- Alteration Story.

- Wallrock altn can be a guide in drilling

Altn Facies

1 Qtz - minor pyr carb ser

2 ser-py-qtz

3 chl carbonate

Carbonate - sericite

1 - 4 core to edge

1 aut  
1 ag  
↑  
py highest

2 or 3 depend on primary rock compsn.

Path finders

Pb Zn Sb  
Cu Cd

Altn

up S K<sub>2</sub>O Ba

down

Na Ca Mn CO<sub>2</sub>

Changes HW → FW? not sure, sampling problem

Sulphurets

# Correspondence/Notes

CRM Dist 6 Victoria Oct 86

Sulphurettes

Norm Tribe 86/10/03

30 miles N of Stewart

Muddy Lk

Sulphurettes map view

Sulphurettes

History - placer prodn 30's

- long history of Exph - starting in 60's

81 shore & west zones discovered by Esso / dropped July 1983

1985 Joint Venture - Newhawk / Arandee / No?

Qtz stockworks / silic veins

Copper - with syenite

Qtz stockwork, some MoS<sub>2</sub>

Tremendous range of mineral types

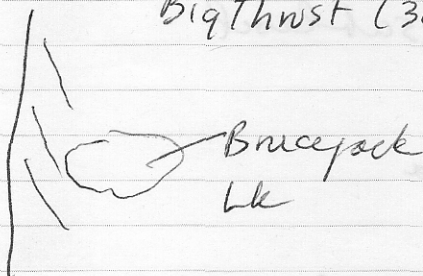
and metals

an op Cu Mo

Shore + West zones } 1 MT of 0.83 Au ±  
ag / au = 50/1 (now out of date)

Faults - strong, north trending

Big Thrust (30° W dip) postulated (Kirkham)



Geology

Syenites

veins / sed

ash zones, silic stockworks

large xl Plag ppy found recently - in drilling - sim. to Premier Ppy

Syenites anom in Au?



## Correspondence/Notes

zone 50 - 180' wide - along sed/volc contact

Big qtz veins in HW ore barren generally but  
are younger + pick up membn near main zone

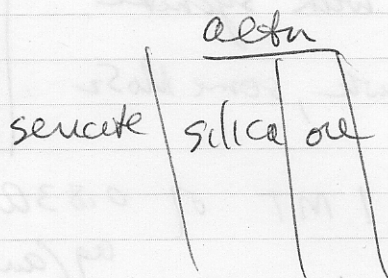
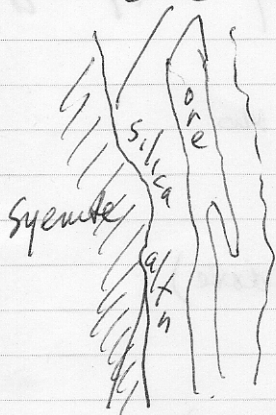
qtz in silic zone  
carry minor carb + sulphides  
py tetrahed sphal gal pyrrarg electrum

The rock is intensely fractured, qtz veined + flooded  
with  $\text{SiO}_2$

- along a shear feature? several periods of silicification

Section

zone v. steeply inclined



Portal cut in Aug - decline + sublevel

Weigh core to get SA - neat idea

Level - borderline epi-mesothermal

Plan to put the road up the ice (Nipple Glacier)

Ballantyne - lithogeochem planned next summer

Oxidn blanket - < 1 foot avg

<sup>fs</sup>  
Sulphurettes - Done budge

In Hazelton Volcs between Bowser Basin &  
Coast Complex

Cut by 4 sets of intrusions  
assoc. N-S linear zone carries mentzn.

Mentzn Cu Mo

pppy type \_\_\_\_\_ north

epithermal veins - south

pppy gold - central part - linear belt? - Skimlong  
altm Kfs altm

overprinted by seriate altm (fs destructive)

pppy Cu / Mo w granites + syenites

Gold ppy - ~~altm~~ - ser - py - minor tour

Cu - Mo - Au occurrences -

Epithermal veins -

ser (py) qtz altm

veins in splays + minor flts

Near shore zone qtz - cal - sulphide veins

qtz - electrum veins

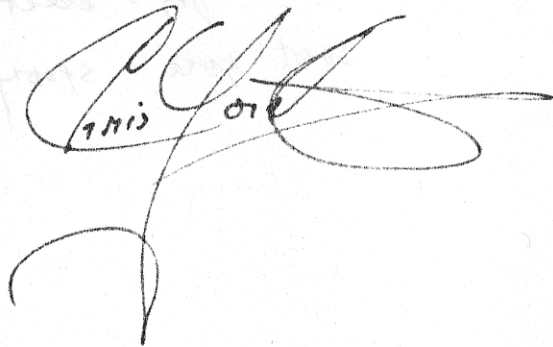
West zone - strong pervasive stockwork

SULPHURETTES

## NOTES FOR SESSION CHAIRPERSONS

1. Please take note of the paper cancellations listed on the sheet "Changes and modifications of the technical program" which is in your registration envelope.
  2. Please note any additional cancellations announced at the opening session (Welcome and Opening Remarks - University Centre Auditorium, Wednesday, May 11, 0820) or during breakfast briefings preceeding each day's sessions (0730 - Commons Dining Room).
  3. Please inform your projectionists of any cancellations.
  4. All speakers have been asked to load and preview their own slides in designated previewing rooms. Speakers have been instructed to hand the projectionists their loaded carousels at the begining of each session.
  5. Under no circumstances should you alter the scheduled times of presentations with respect to cancellations.
  6. You are asked to give each speaker a two minute warning (by passing a note) prior to the allotted time limit.
  7. You are asked to be very firm regarding allotted time limits. The sessions must run on time.
  8. Each lecture room is provided with:
    - Two, 35 mm projectors.
    - One large screen or two smaller ones.
    - One overhead projector.
    - Two projectionists
    - One flashlight pointer.
  9. Preview rooms are as follows:
    - Elliott 162
    - Cornett B135
    - Begbie 152
    - MacLaurin D109
    - Student Union Building (SUB) 111
    - University Centre - Rehersal Hall
- Adequate numbers of carousels are provided in each previewing room. One assistant will be in each previewing room.

Good luck and thank you.





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## NEWHAWK GOLD MINES LTD. (N.P.L.)

News Release 89-1  
January 9, 1989

TSE: NHG  
VSE: NHG

### Full Feasibility Study Underway for Sulphurets Property

Cominco Engineering Services Ltd. (C.E.S.L.) has been awarded a contract to conduct a full feasibility study for the Sulphurets property in northwestern British Columbia. C.E.S.L. has extensive experience in design and engineering of northern Canadian mines. The feasibility study for the Sulphurets property is now underway and is to be completed by mid March, 1989. In their pre-feasibility report, C.E.S.L. recommended that the major study be based on a 300 to 400 ton per day operation. Reported reserves for the West zone (all categories) are 854,072 tons grading 0.354 oz Au/ton and 22.94 oz Ag/ton.

*3 000 tons @ .387 Proven + Indicated*

Completion of a positive feasibility study by C.E.S.L. will provide the basis for consideration of a production decision for the West zone and for permitting and financing requirements. A Stage I feasibility report, which is required for the permitting process, is complete and will be presented to Provincial authorities within the next several days.

Work has resumed at Sulphurets following a short break for the Christmas season. The Sulphurets Joint Venture is mid-way through the winter exploration program. Currently, the ramp providing access to the West zone down to the 1300 m level is being extended to the 1250 m level. This extension is nearing completion and will be followed by underground diamond drilling of the UTC zone. A minimum of 3,400 feet of underground diamond drilling in 4 holes will test this zone which is situated adjacent to the West zone. The UTC zone was discovered by surface diamond drilling in late 1988 has returned some excellent gold grades over significant widths: 0.412 oz Au/ton, 9.78 oz Ag/ton over 36.0 feet and 11.937 oz Au/ton, 45.94 oz Ag/ton over 30.0 feet.

NEWHAWK GOLD MINES LTD. (N.P.L.)

Per:



Donald A. McLeod, President

The Vancouver Stock Exchange has neither approved nor disapproved the information contained herein.

*Sulphurets  
(standing file)*

## Director's Report to Shareholders

During the nine months ended 30 September, 1988, major exploration continued at the Sulphurets property located in northwestern British Columbia. The property is held by the Sulphurets Joint Venture in which Newhawk, as operator, holds a 60% working interest and Granduc Mines Ltd. holds a 40% working interest. Exploration expenses are contributed by the joint venture partners in accordance with their respective working interests.

Phase II of the 1988 exploration program started July 1 and was completed October 31, with a budget of \$5.8 million. Newhawk's share of the expenditure was \$3.48 million. The program concentrated on the West Zone and included advancing the decline to the 1250 meter level and additional drifting and raising to test the continuity of mineralization and provide drill stations for further underground diamond drilling. With the addition of 1,552 feet of drifting, 711 feet of raising and 171 feet of decline in this phase, the underground workings on the West Zone now total 8,917 feet.

The overland access route from Highway 37 to the minesite was completed in mid October and later in the month, the 3,500 foot airstrip at the toe of the Knipple Glacier became fully operational. Scheduled and chartered fixed wing aircraft are now used to transfer crews to and from Terrace or Smithers and the mine and all supplies are transported overland. There is now no dependence on helicopter support.

The underground work accomplished during the past six months together with continued geological interpretation has improved our understanding of the deposit. More complex than originally believed, the West Zone is structurally controlled within a quartz-sericite-pyrite alteration zone.

Gold and silver mineralization consists of electrum, tetrahedrite and ruby silver. This mineralization occurs within the Main Vein which runs parallel to the structure and also occurs within a series of high grade

conjugate sub-parallel quartz vein stockworks and breccias which splay off the Main Vein. These sub-parallel systems have now been followed successfully by drifting along strike up to 250 feet and raising up plunge for 100 feet. Chip sampling from drifting and raising on these systems has confirmed significantly high gold and silver values.

A portion of the West Zone mineral inventory calculated in April of 1988 has been upgraded to geological reserves. This new calculation was based on strict parameters with a minimum of three assay points, either drill hole intersections or underground samples, being used for each calculated block. Maximum assay point spacing of 30 feet was used for measured reserves and 30 to 60 foot spacing for indicated reserves.

Using a cut-off of 0.2 ounces gold equivalent per ton and a minimum mining width of 5 feet, approximately 30% of the area covered by the mineral inventory calculations was reported in mid November.

Measured and Indicated reserves in the West Zone are 304,044 tons grading 0.387 ounces of gold per ton and 26.19 ounces of silver per ton, or 0.780 ounces of gold equivalent per ton. Inferred reserves in the West Zone are 550,028 tons grading 0.335 ounces of gold per ton and 21.15 ounces of silver per ton or 0.652 ounces of gold equivalent per ton.

The three above mentioned categories represent a total of 854,072 tons grading 0.354 ounces of gold per ton and 22.94 ounces of silver per ton or 0.698 ounces of gold equivalent per ton, with an average mining width of 11.0 feet.

As further underground information becomes available, the remaining 70% of the area of mineral inventory will also be upgraded to that of geological reserves using the same parameters.

The UTC zone, discovered in the deep drilling program conducted in early 1988, has been further tested by four additional surface diamond drill holes. Five holes have now intersected the zone which lies about 250 feet east of the West Zone at the 1175 meter eleva-

tion, with some outstanding results.

A \$4.05 million Phase III program to be completed by the end of February 1989, is now underway. The objectives of the program are to continue underground exploration including the UTC zone and increase tonnage and confidence levels of reserves. Also planned in this Phase are the design and implementation of a bulk sample program and completion of a detailed feasibility study for the project. This feasibility study will include detailed design of facilities and approval in principle from government agencies and authorities.

Upon completion of the program, assessment of results will provide the basis for consideration of a production decision for the West Zone.

### Financial

Current working capital at the end of the period is in excess of \$5.0 million. Flow through private placements have been completed to meet Newhawk's \$2.43 million contribution to the Phase III program.

Your continued support is certainly appreciated and we look forward to the completion of the current program and reporting the meaningful results it will provide.

On Behalf of the Board,



Donald A. McLeod  
President and Chief Executive Officer

November 26, 1988