WANN RIVER NICKEL SHOWING

MINERALOGRAPHY.

Problem #4.

April 14, 1959.

W. J. P. Crawford.

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Introduction

The Wann River nickel prospect is situated several miles south of the Engineer mine in the Atlin Mining District. The prospect consists of a solid zone of massive pyrrhotite and disseminated chalcopyrite in a zone 5 feet wide. The country rock consists of pyroxenite and gabbro.

The samples available were examined megascopically and microscopically for mineral percentages and associations.

Location

the following information has been supplied by Dr. Thompson of the Department of Geology at the University of British Columbia

the Wann River nickel prospect is situated in the Atlin mining Division, B.C. It is on the north-western bank of the Wann River at the site of the old hydro dam of the Engineer mine. this dam lies 1.5 miles from the mouth of the Wann River on the take arm of Tagish Lake (p. 13)

Finders Description

the prospect consists of a zone of solid sulphides exposed on the S.W. wall of the canyon of the Wann River

Massive pyrrhotite and minor irregularly distributed chalcopyrite form a steeply plunging body about 5' across.

this body is surrounded by relatively barren hornblende pyroxenite which in places grades into hornblendite. the contacts of the Ni-sulphide body are in general sharp although they locally are gradational over a distance of several inches.

Patches and blebs of chalcopyrite occur in the surrounding ultra basic rocks. An evenly distributed gangue of coarsely xline. hornblende makes the sulphide body appear porphyritic

The prospect was originally staked about 1900 and restaked in 1953 for nickel. However.

a search of the Geological Survey and B. C. Dept. of mines. works provided no information.

The map shows the prospect as being 21 miles west of Atlin and 54 miles southeast of Carcross on the White Pass R. R.

Geology.

The Wann River forms the contact between the Labarge series and the Yukon group. (p. 13) The Labarge series consists of conglomerate, sandstone, and slates. The Yukon group in which the prospect is located consists of mica schists, amphibolites and pyroxenites.

Megascopic Examination

The mineralized samples numbered 2, 4, 6, 8, 10, 12 were examined. Pyrrhotite was identified by the pale cream color and magnetism, chalcopyrite by the yellow color and pyrite by the.

pale yellow color. The samples consist of coarse fibrous brecciated pyroxenite cemented by pyrrhotite the pyrrhotite appears to penetrate the fractures and cleavage in the pyroxenite breccia. Small films and lenses of chalcopyrite occur in the pyroxenite fibres.

The country rock samples numbered 1, 2, 3, 4. are a dull greyish green and probably pyroxenites they were identified by thin section.

Microscopic Examination

The minerals were identified by the following properties: pyrrhotite by the strong anisotropism and etch tests (p. 14), chalcopyrite by the yellow color, pyrite by the pitted surface. Some hematite showing deep red internal reflection under crossed nicols was associated with dull grey magnetite octahedrons.

Microscopically the country rock consisted of coarse crystals with 87° and 93° cleavage, an optic angle of approximately 60° and Z∧C of 48°-

54°. The colorless non pleochroic mineral is probably augite. Samples number 1, and 2 from 1/2 mile south of the nickel showing showed alteration to serpentine. Sample number 4 from the same area contained a plagioclase, maximum angle x'∧(010) ⊥ a = 30°, therefore labradorite. Therefore, the country rocks are serpentinized pyroxenites and gabbro. Sample 3 from the wall rock of the prospect, a pyroxenite contained 5 percent chalcopyrite.

Textures

The magnetite forms dull grey octahedrons in the hematite and a few small stringers in the chalcopyrite. the chalcopyrite is found as films and irregular blebs bordering the pyroxenite fibres. Some chalcopyrite is included in the pyroxenite. (Figure 4). The pyrite forms wavy veinlets in the pyrrhotite and also fractured blebs in the hematite. The massive laminated pyrrhotite (Figure 1, 2)

Comprises 60 percent of many samples. the lamellae appear to have formed as a replacement of the pyroxenite.

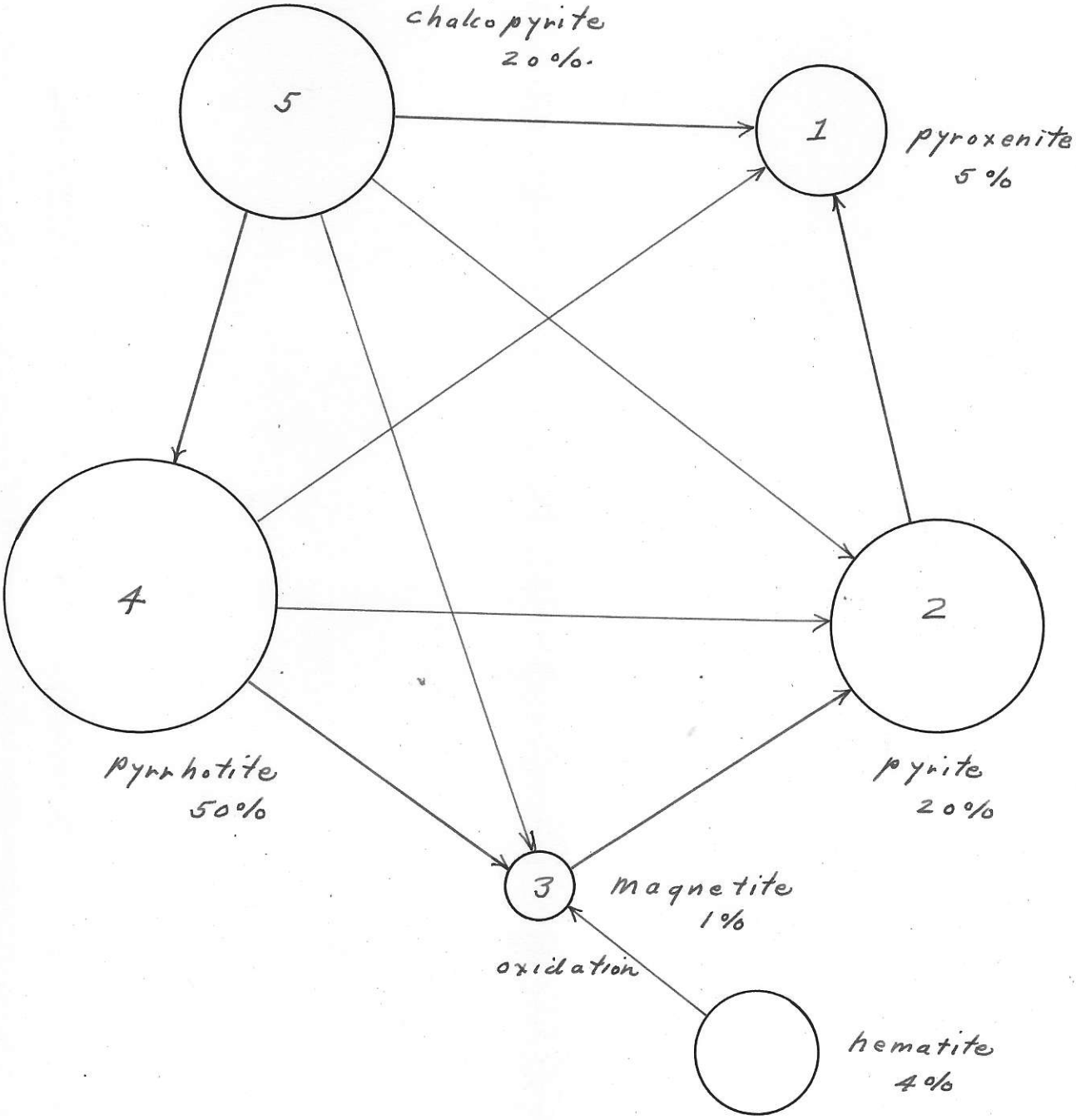
Relationship between composition and magnetism

No	Pyrrhotite	chalco-pyrite	Pyrite	Magnetite	Hematite	gangue	magnetism
2	60%	2				38	moderately strong.
4	60	10				30	moderate
6	60	5				35	moderate
8	50	20	20	1	4	5	very strong
10		60	30			10	very slight.
12		40				60	very slight.

the magnetism of samples 10 and 12 is probably due either to unexposed pyrrhotite or hematite or pyrrhotite in solid solution in chalcopyrite.

or finely divided magnetite.

Paragenetic Sequence.



percentages of sample 8.

Paragenetic sequence.

pyroxenite
pyrite
magnetite - hematite
pyrrhotite - chalcopyrite.

Classification

The textures infer that the original pyroxenite was brecciated and mineralized by pyrite and then magnetite. The magnetite has subsequently oxidized to hematite. This hematite could not originate from exsolution since there is a greater percentage than magnetite (Edwards). Subsequent intense brecciation occurred and the pyrrhotite cemented the breccia with chalcopyrite penetrating the gangue and replacing the pyrrhotite.

Pyrrhotite will hold up to 1.88 percent nickel in solid solution at standard conditions. ? and absorb up to 40 percent at above 425°C.

(Edwards). Therefore since no exsolution of pentlandite occurs the reaction must have occured below 425° or there is no excess pentlandite. Also since the chalcopyrite forms no exsolution textures in the pyrrhotite the reaction occurred below 600°C. (Edwards)

Uytenbogaardt (p 142, 1951) states that the wavy lamellae observed in pyrrhotite is due to the association of pyrrhotite and nickel-rich pyrrhotite. Therefore the amount of pentlandite in pyrrhotite probably approaches 1.88 percent. ?

Ore Dressing.

In the Wann River prospect only the chalcopyrite is of economic value due to the low nickel content of the pyrrhotite.

The grain size of the chalcopyrite would indicate a floatation process treatment to concentrate the ore. The average grain size is less than 100 microns.

Conclusion.

Since the knowledge of the prospect is very limited only a few general conclusions can be drawn. The mineral assemblage and textures indicate a high temperature mineral deposit. Pyrrhotite is often associated with either ultrabasics or contact metamorphic deposits. Due to the lack of geological evidence no conclusion can be reached as to the type.

The 1.88 percent or less nickel in solid solution renders the property worthless as a nickel prospect. the small size of the prospect! makes it of doubtful value at present as a copper prospect.

Probably mined out now!

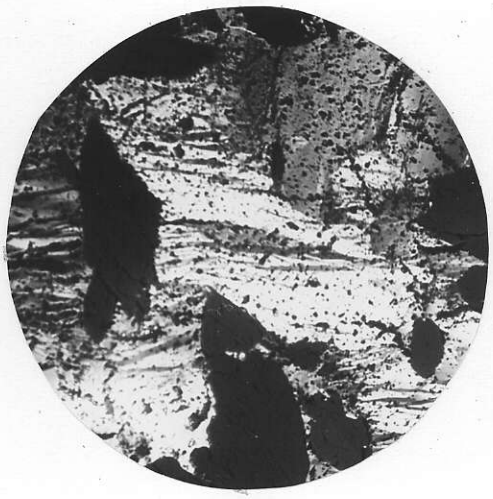


Figure 1

Twinned pyrrhotite lamellae with fibrous pyroxenite gangue. Crossed nicols. (X240)

Figure 2

twinned pyrrhotite lamellae in fracture pyroxenite gangue. Crossed nicols. X 240.

Figure 3

Chalcopyrite in gangue with pyrrhotite and pyrite. Plain light. X240.

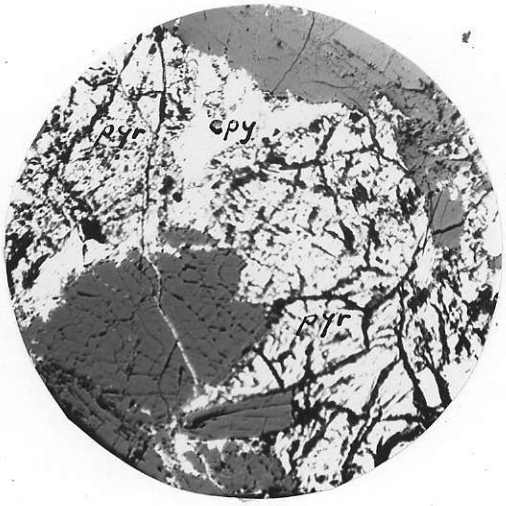
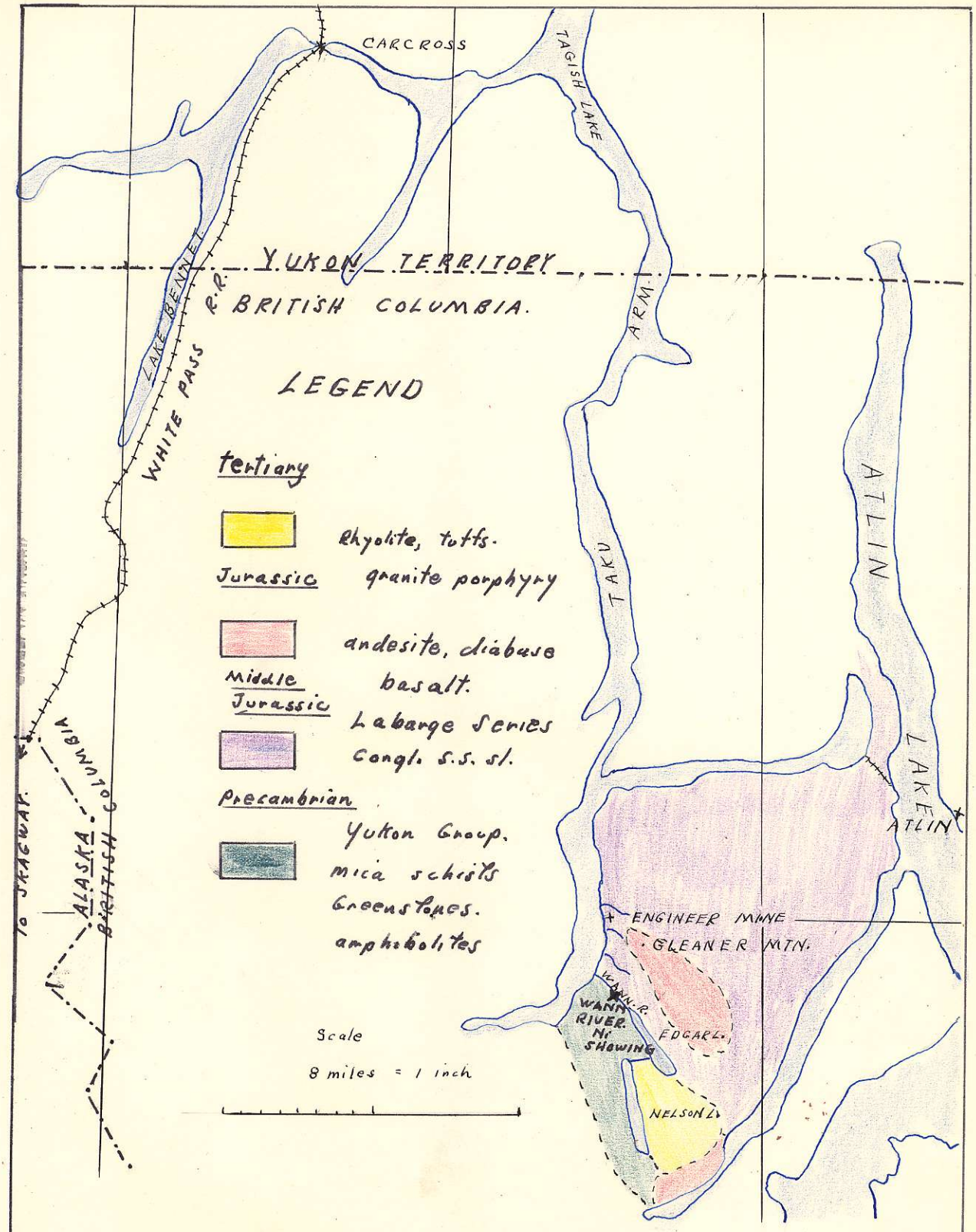


Figure 4

Chalcopyrite replacing pyrrhotite with pyroxenite gangue. Plain light. X240

Chalcopyrite - cpy . pyrrhotite - pyr. pyrite - py.



ATLIN SHEET

218 A 1930

W. E. COCKFIELD

MINERALOGRAPHIC LABORATORY

Date: April 9, 1959

Name or number of section: Wann R. #2 polished

Polish: good

Colour: light greyish yellow

Hardness: D

Streak: black

Texture: massive

Anisotropism: very strong bluish-grey to brown

~~Pleochroism~~: _____

Twinning: _____

Internal reflection: _____

~~Texture under xd. nicols~~: twinned lamellae

Cleavage: _____

Association: pyrite, chalcopyrite

~~Etch tests~~

$HgCl_2$		(-)
KOH	slightly brown rim	(+)
KCN		(-)
$FeCl_3$		(-)
HCl	effervesces - and etches lamellae	(-)
HNO_3	brown rim	(+)
Aqua regia		

Microchemical tests

Grain size

Mineral or Group: Pyrrhotite $Fe_{1-x}S$.

Confirmatory features such as magnetism, sectility, fluorescence, blowpiping, radioactivity, etc.

Interpretation of textures. The etching of the lamellae by HCl indicates Nickel in solid solution

Bibliography

Edwards, A. B. (1954) "Textures of the ore minerals," pp. 79, 107, 108.

Short, M. N. ; (1940) "Microscopic Determination of the ore minerals."

Uytenbogaardt, W: (1951) "Microscopic identification of ore minerals."