600415

GEOLOGY 409

Problem No. 4

MINERALOGRAPHIC REPORT of DUNCAN LAKE AND WIGWAM PROPERTIES

Presented By

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6/4/61

Introduction

The properties discussed in this report are presently optioned by the C.M.S. Co. Ltd. Both prospects are lead and zinc sulphide replacements in a limestone marker bed (Badshot) in the Kootenay Arc, South central British Columbia.

The Duncan Lake property (as it is referred to by Cominco) is situated on a peninsula on the east shore of Duncan Lake which is in the Fort Steele Mining District of British Columbia. The prospect is four miles by water and twelve miles by road from Howser, a small settlement on the southwest end of Duncan Lake. This property has had several thousand feet of underground development work done on it. A small ore reserve has been proved up as the result of this and an extensive surface and underground diamond drilling programme. The property has recently been closed down.

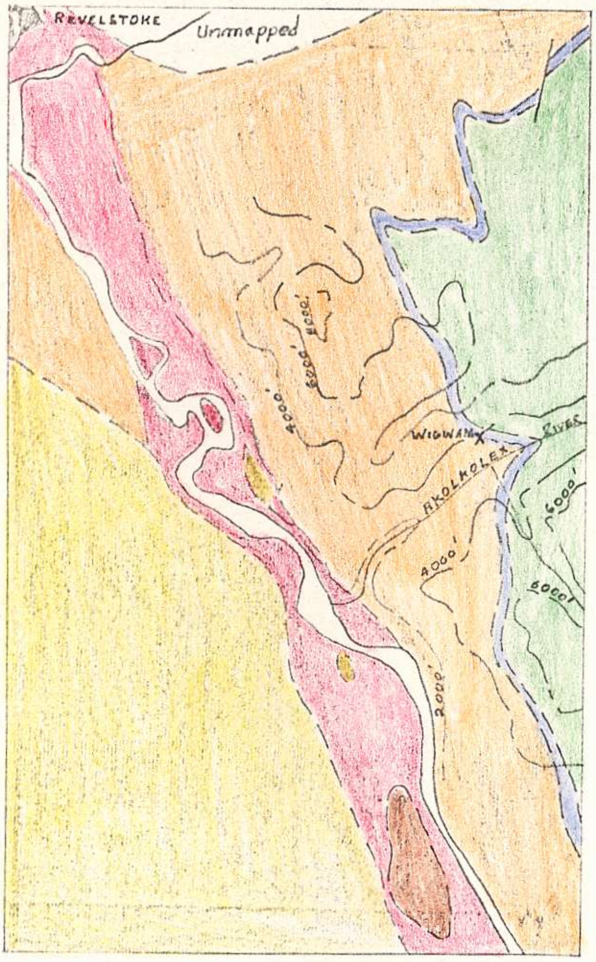
Because only a small amount of work has been done on it, very little is known about the second property which is referred to by Company geologists as the Wigwam property and which is in the Revelstoke Mining District. It's location is given approximately as eighteen miles south of Revelstoke, B.C. on the Akolkolex River.

Geology

The detailed geology of both properties has not been released by Cominco at the time of the writing of this report.

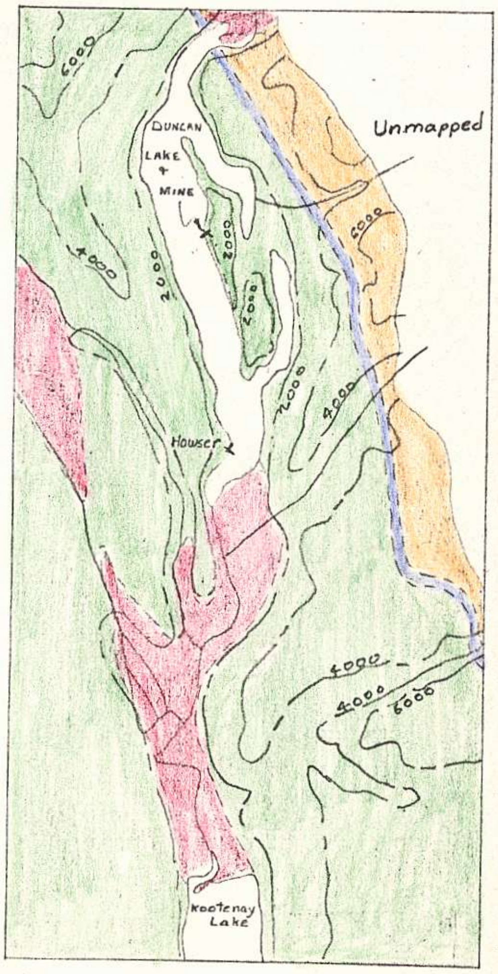
The following brief account of the geology of the Duncan Lake property is taken from the 1959 Minister of Mines Report.

Scale 1" = 4 miles
Copied from
G.S.C. Map by
Bancroft, Walker & Gunning



WIGWAM PROPERTY

DUNCAN LAKE PROPERTY



🟦 Badshot Limestone

🟥 Alluvium & Glacial Till

🟩 Hamill Series

🟧 Lardeau Series

🟨 Nelson Batholith

🟫 Chiefly Granite

⬜ Water or Unmapped

The mine is on the eastern limb of an overturned anticline which plunges gently to the north. The mineralization is confined to a band of limestone a few hundred feet thick which has been correlated to the Badshot formation. The Badshot formation is underlain by quartzites, micaceous quartzites and phyllites of the Upper Hamill Creek series which forms the core of the anticline. The lower part of the Lardeau series composed of phyllites and argillites overlies the Badshot. The Badshot itself contains beds and lenses of dolomite as well as dark grey to black siliceous dolomite all of which affect the mineralization in some cases.

The geology of the Wigwam property has not been mapped at present. However the deposit is thought to be a replacement by base metal sulfides of a recrystallized limestone and in places a quartzite member of the Badshot formation.

Specimens

The specimens from Duncan Lake and their descriptions are as follows:

D-1 Three specimens (two small and one large) containing galena, sphalerite, a silver grey fibrous unknown and oxidation products in a gangue of white quartzite. The larger specimen has slippage surfaces with an included angle of 60°.

A polished section (D-1) of the unknown was made.

D-2 Six specimens from the development muck of

Not a sentence

the southern drift on the 1800' level. All have a gangue of limestone and/or dolomite and grey and black silica rich dolomite. One specimen exhibits banding of grey siliceous dolomite and pyrite. Pyrite and galena with very little sphalerite ~~is~~ is noted in these specimens.

A polished section (B-6) was made in order to determine the relationship of galena to pyrite and gangue.

D-3 Two specimens from the development muck of a pilot raise to the surface 300' north of the 1959 crosscut. Pyrite, sphalerite and a small amount of galena occur in a gangue of black and white limestone. Although it appears massive to the naked eye the limestone is noted to be crystalline when viewed under a microscope.

Polished section B-3 demonstrates the sphalerite, pyrite and limestone associations.

C-36 This drill core from the No. 3 zone is a sample of the only known post dolomite intrusives. The margins of the dyke are narrow (about 1/2") brown in colour, and contain partly altered fragments of dolomite. The orbicular structures throughout the black fine grained groundmass are crystals of olivine altering to serpentine minerals.

A thin section (c-36) was made in order to study the specimen in greater detail.

The specimens from the Wigwam Property and their descriptions are as follows:

W-1 Two specimens of a fine dense pyrite, sphalerite mixture from massive sulfide bands 1" to 1' thick in recrystallized limestone.

A plasticine mounted polished slab was prepared from this material.

W-2 Two specimens showing sulfide replacement of a quartzite member of the Badshot formation.

A portion of one specimen was polished on 5 sides in order to study the structure present.

A conventional polished section was made out of the second specimen in order to study the galena-sphalerite-gangue relationships.

Polished Sections

A. DUNCAN LAKE

D-2 (B-6)

This section contains disseminated well crystallized pyrite and irregular galena patches showing good cleavage in a siliceous dolomite gangue. The metallics form about 60 % of the surface area of which 90 % is pyrite and 10 % is galena. One-half of one percent of the gangue is limestone.

did you watch it!

The pyrite is replacing the gangue but at the same time it is exerting its crystal form. The galena is replacing both the pyrite (along pyrite gangue contacts) and the gangue along grain boundaries.

D-3 (B-3)

This section contains Pyrite and sphalerite with very little galena concentrated in bands. The bands of gangue are mainly of high silica content.

The pyrite is crystalline although at first glace it may appear fractured. The pyrite crystals cut across the bands of gangue, thereby suggesting replacement of it.

The sphalerite has either a dark red or a light honey yellow internal reflection. The colour of the internal reflection does not appear to be related to the surrounding minerals.

The sphalerite and galena have replaced the pyrite cubes giving them a corroded appearance. It would appear that the galena and sphalerite are contemperaneous due to the fact that the galena appears as small elliptical patches in the sphalerite. Edwards has suggested that this is a possible criteria for contemporaneous deposition. All sulphides replace the dolomite and limestone gangue along grain boundaries only pyrite exerts its crystal form.

About 50 % of the surface area of this section is composed of sulfides of which 90 % is pyrite and 9 1/2 + % is sphalerite. There is very little galena present.

In general the greater the silica content of the gangue the less the amount of sulfides and hence the banded appearance.

Samples of the rejects of D-2 and D-3 were placed in dilute HCl until all reactions stopped. About 1/2 % of the banded D-2 sample as compared to 30 % of the D-3 sample contained Limestone. The D-3 sample was reduced to a very crumbly mass of white and grey siliceous dolomite with very well formed pyrite crystals (which showed no breakage) embedded in it. The bottom of the beaker had a small amount of black argillaceous material which is assumed to have caused the black limestone.

Colour of the

D-1

This section was made in order to try and identify the unknown sulfo-salt with etch tests. The tests were successful.

The Sulfosalt (Meneghenite) was not seen in contact with other minerals except quartz which it seems to have replaced and a dull brownish red substance to which it is altering. Galena was noted elsewhere in this section.

C-36

This is the thin section of the drill core sample from the post dolomite intrusives. The actual identification and write up of this slide was done by Al Stanley, a Ph.D. candidate. His original data sheet is presented on the next page. It is sufficient to say here that the

Copy.

PETROGRAPHIC REPORT

Spec. No. C-36 (6695) Thin section No. C-36. Coll.r ______ Year 1960

Location & Field Relation

Description of Specimen 5 inch section of AX drill core. The specimen is formed by 10-15% of dark green ovoids of serpentine upto 5 mm in size, within a soft, very dark green aphanitic groundmass. There seems to be not constant orientation or alignment of the ovoids.

Sketch.

Colour	pleochr.	Cleavage	RI / Biref.	Extinction.	2V.			Percentage.	Alteration.	Paragenesis – Primary – Secondary
None.	None.	1 poor parting	>> b. .020.	parallel to parting.	high. –ve.	1	Olivine.	15.		1, P
None.	None	1.	< low	∥ ↕ z .	—	2	Serpentine.		A	2
Black	Opaque					3	Magnetite.		A	2
None.	None.	1 (?)	.030	∥ ↕ z.	Small –ve.	4	Talc ?		A.	2
Brown.	↕ Dark.	1.	>	parallel to cleavage	Small –ve	5	Biotite.	25		1
None.	None.	90°,	> .029	Z∧c 42°	60°? +ve.	6	"Augite."	2		
None.	twinkling.	—	> v.high.	—	Uni. –ve	7	Carbonate.	50		
						8	Unidentified gdmass.			
Black	Opaque					9	Magnetite in gdmass.			
						10				
None.	None	▭ ⬡	> b. low.	straight.	—	11	Apatite.	>8		
						12	(N.B. % estimations by eye)			

Structures & Textures The rock is composed of rounded phenocrysts of olivine (upto 5mm in size) within a groundmass of crystals of augite, aligned biotite (about 0.5 mm 'long') and apatite (< 0.2mm in length) together with fine grained magnetite, carbonates and other fine grained unidentified material. The olivine phenocrysts ~~are altered at the~~ have a corona of serpentine and talc(?) and are very altered. The biotite is aligned about the phenocrysts in a manner that indicates flowage of the material prior to solidificat

General Remarks - Origin & History...... (P.T.O.)

NAME OF ROCK LAMPROPHYRE.

Examined by Alan ?. Stanley. Date 1st April 1961.
(after 12 noon)

Copy.

The rock is a fine grained basic dyke with olivine phenocrysts. The trial was ~~esto~~ essential $X^{\underline{\text{line}}}$ when the dyke was emplaced – as indicated by the aligned biotite and apatite." The olivine was out of equilibrium at this period (?) and the periferal alteration occured. Later stage deuteric activity has altered much of the fine grained groundmass – which is now unidentifiable.– no feldspars or feldspathoids ~~iden~~ 'recognised. Alteration of the olivine has been to serpentine (low Birefrigence) and talc (mod biref.)

Apart from the olivine 'zenocrysts' which are unusual (?) this is a typical lamprophyre.

dyke is a lamprophyre with olivine "zenocrysts".

B. WIGWAM PROPERTY

W-1

This specimen has a limestone gangue replaced by coarse grained pyrite which is disseminated, although in a band, and very fine grained sphalerite which is seen easily only under an arc lamp. The pyrite has also been replaced by the sphalerite as shown by the corroded edges of the pyrite cubes.

There are several quartz eyes throughout the gangue. It is difficult to say whether or not these have been partly replaced.

About 50 % of specimen is composed of sulfides of which 70 % is pyrite and 30 % is sphalerite.

W-2 (five sided)

This section has definite sulfide bands. The sulfide poor bands have a high silica content although there is some mineralization between quartz grains. There is relatively no pyrite present.

Sphalerite and galena replace dolomite as well as some quartz along grain boundaries. The sphalerite and galena appear to have been contemporaneously deposited. This is suggested by the fact that much galena is seen as small oval patches in sphalerite and vice versa.

About 40 % of the surface area of the specimen is metallic; of which 90 % is sphalerite and 10 % is galena.

W-2 (Bakelite Mounted)

This specimen also exhibits replacement of gangue (dolomite with some limestone) along grain boundaries by sulfides of iron, zinc and lead.

The metallics compose 60 % of the specimen of which pyrite is 85 %, galena is 14 % and sphalerite is 1 %. The pyrite occurs in cubes from less than twenty microns square to greater than 1000 microns square with an average of about 250 microns square. The galena varies from blebs of less than 4 microns diameter to long masses 600 by 2000 microns. The sphalerite occurs in small blebs all about 50 microns in diameter.

The galena shows good cleavage and triangular pitting. The pyrite is well crystallized although corroded by the sphalerite and galena replacing it. The sphalerite has a light honey-yellow colour internal reflection.

Paragenesis

The mineralization of these properties appears to have taken place after any tectonic movement had taken place. This is suggested by the relative lack of crushed or broken pyrite crystals. The caries texture as well as the small "ovals" of galena in sphalerite and vice versa suggests contemporaneous deposition of these two metallic sulfides. The corrosion of the pyrite crystals by both galena and sphalerite suggests that they are later than the pyrite.

The deposits are both probably mesothermal with two stages of mineralization. The first stage is the replacement of gangue by pyrite which has exerted its crystal form very well. The second stage of galena and sphalerite replaced both gangue and pyrite. A definite preference for the carbonate rich rather than the silica rich gangue by the sulphides is evident in both properties.

Identifications

Section - W-2 (5 sides)

Polish - good

colour - light grey

Hardness - C

Anisotropism - nil

Internal Reflection - good, varying from light honey-yellow to a deep red

HgCl2 - negative

KOH - negative

KCN - negative

HCl - negative

FeCl3 - negative

HNO3 - fumes tarnish

Aqua Regia - effervesces and stains dark brown

Noted replacing carbonate gangue along grain boundaries. Caries texture as well as "ovals" when in contact or within galena.

Mineral - Sphalerite (Zn,Fe)S

Section -D-1 and specimen

Polish -good

Hardness -C-

Streak -Grey

Habit -asicular, some massive

Pleochroism -none

Anisotropism-light grey, good blue grey, pinkish brown

Twinning -none noted

Texture under x'd nicols- massive

Internal reflection- none

Cleavage -1?

Association -altering to brownish red mineral, galena, pyrite

$HgCl_2$ -negative (left a scum which washed off)

KOH -negative

KCN -negative

HCl -negative (slight tarnish from fumes on one occasion)

$FeCl_3$ -negative

HNO_3 -negative effervesces, black stain moves in a wave across the mineral

Aqua Regia -black with irredescent rims, fumes stain light brown

X-ray -results on next page

Mineral -Meneghenite ($Cu_2S.26PbS.7Sb_2S_3$)

Pb Cu Sb S.

copy

"Cominco" Duncan Lake, B.C.
Meneqhenite.

X 3200
Fe / MnO
Mar. 10 /61.

ASTM. - 8-7.
Meneghinite.
$Cu_2S \cdot 26PbS \cdot 7\, Sb_2S_3$.

I	R	L	Sum	2θ	d		hkl.
½	57.9	32.5 ~~31.5~~	90.4 ~~88.4~~	25.4	4.41		
2	58.8	31.5 ~~30.0~~	90.3 ~~88.8~~	27.3	4.10	4.10	240
10	60.3	30.0	90.3	30.3	3.706	3.70	122, 320
	—						
	—						
10	62.3	28.0	90.3	34.3	3.285.	3.29	260
1	63.5	26.7	90.2	36.8	3.07	3.07	232
8	64.4	25.8	90.2	38.6	2.931.	2.91	270, 242, 180
2 (B)	65.6	24.6	90.2	41.0	2.77	2.74	360, 452, [illegible]
2	66.4	23.7	90.1	42.7	2.66	2.64	280
	4 or 5 lines	+					
3	72.9	17.2	90.1	55.7	2.07	2.07	
1	74.6	15.7	90.3	58.9	2.00	2.02	
1	75.4	15.0	90.4	60.4	1.926	1.935	
1	76.1	14.3	90.4	61.8	1.886	1.875	
1	76.7	13.6	90.3	63.1	1.851	1.846	
1	79.4	10.9	90.3	68.5	1.721	1.717	

Completed by
D. DRUMMOND
& J.E. CUYDER 10/3/61

Section - W-2

Polish - fair

Colour - brass yellow

Hardness - E+

Texture - crystalline, corroded boundaries, cavities filled with galena and sphalerite.

Associations - galena, sphalerite, silica, dolomite

$HgCl_2$ - negative

KOH - negative

KCN - negative

HCl - negative

$FeCl_3$ - negative

HNO_3 - negative

Aqua Regia - tarnish, slight effervescence.

Replaced by sphalerite and galena, replaces carbonate gangue. Definitely exerts cubical crystal form.

Mineral - Pyrite (FeS_2)

Section - W-2
Polish - good
Colour - white
Hardness - B
Texture - shows cleavage, good triangular pits
Associations - pyrite, silica, dolomite, sphalerite
$HgCl_2$ - negative
KOH - negative
KCN - negative
HCl - brown with irredescent film
$FeCl_3$ - irredescent
HNO_3 - black stain, no effervescence.

Replaces gangue and pyrite, cariestexture and small ovals when in contact with sphalerite.

Mineral - Galena (PbS)