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MITCHELL CREEK

Geological Report

by

D.C. Malcolm, BASc., P.Eng. 2568

Vancouver, B.C.

December 3rd, 1962.

MITCHELL CREEK

OWNERS:

Dawson Ross	Mineral Claim numbers	1 - 12 inclusive
John Bull	Mineral Claim numbers	1 - 41 inclusive
Arbee	Mineral Claim numbers	35, 39, 40, 41, 54, 55, 56, and 57
CAN	Mineral Claim numbers	17 - 22 inclusive

Owned by:

Donald F. Ross, Wendell Dawson, Stanley Bishop, G.D. Towle and E.F. Lahmeyer

Under Option to:

Phelps Dodge Corporation of Canada, Limited,

LOCATION:

Sulphurets Creek -
Mitchell Creek - Latitude 56° Longitude 130° N.E.
Cassiar District
Skeena M.D. British Columbia

AUTHOR:

D.C. Malcolm, BASc., P.Eng. 2568

DATES OF WORK:

August 20th to October 1st, 1962

MITCHELL CREEK

T A B L E O F C O N T E N T S

MITCHELL CREEK

Geological Report

SUMMARY:

Geologists of the Phelps Dodge Corporation of Canada, Limited, mapped the Dawson-Ross, John Bull, Arbee and CAN claims in 1962 using a plane table and alidade to survey the accessible areas and air photographs and a helicopter to map the inaccessible sections.

Molybdenum sulphides and pyrite occur in silicified and altered areas in a schist and chalcopyrite together with minor amounts of bornite occur in three areas of monzonite and in the volcanic formations in contact with the intrusives.

LOCATION:

The Mitchell Creek claims are staked between Sulphurets Creek Glacier and Mitchell Creek Glacier and cover an area to the south of Mitchell Creek Glacier at the headwaters of the Unuk River in the Skeena Mining Division. Latitude 56° 30' - Longitude 130° 15' - approximately 50 miles north of Stewart, B.C.

GEOLOGY:

(a) Topography

The Ross claims cover an area of high relief typical of British Columbia's coastal mountains. The valleys are steep walled and deeply incised with a difference in elevation of 4,000 feet between the bottom of

Mitchell Creek and the top of the ridge on the Dawson Ross claims. Heavy rain or wet snow falls in the area most months of the year and this precipitation has formed the large Mitchell Creek glacier, two hanging glaciers and a large permanent snow field on the property. Lateral and terminal moraines cover the flatter areas with coarse glacial gravels.

(b) General Geology

The Geology of the Unuk River Valley is complex and has not been mapped in sufficient detail to give an understanding of the rock types, structures and alterations. The district is underlain by extensively folded, faulted and mineralized Mesozoic sediments and volcanics which have been intruded by numerous stocks and masses of acid composition. Dr. G.W.H. Norman, of Granduc Mines Ltd. has mapped the area and some information obtained from him was used by the writer.

(c) Rock Types

Three separate, unconformable groups of volcanics with interbedded sediments occur on the Ross claims and these have been intruded by a quartz diorite batholith which outcrops a few miles southwest of the property. A monzonite or syenite stock outcrops southeast of Mitchell Creek and small areas of this rock occur on the property. The following rock types were noted on the property:

(1) Younger Volcanics

The youngest layered rocks lie on the western part of the property and are probably upper Cretaceous in age. They occur as a series of open folds

whose axes are nearly horizontal and strike from north to northeast. The formation is thick and was mapped as a unit. The following rocks occur in it:

(1A) Conglomerate

This rock is a well bedded, relatively fine grained sandstone with rounded pebbles up to 1 inch in diameter but in general less than 1/8" in size. The pebbles are of schist, chert and volcanic material and the matrix is chloritic. Pyrite is disseminated throughout the rock.

(1B) Argillaceous sandstone

This rock is a fine grained sandstone, dark grey in colour, composed of chert and volcanic material; with a chloritic matrix. Pyrite is disseminated throughout the rock.

(1C) Hematitic iron formation and purple tuffs

These formations are fine grained and thin bedded. They contain 1" bands of hematitic tuffs, which weather dark red or purple, and $\frac{1}{2}$" to 1" bands of massive red hematite. The beds would probably contain 10 percent iron.

(1D) Andesite tuffs and flows

Beds of green tuffs and flows of andesitic composition occur abundantly in the Yonger Volcanic formation.

(1E) Porphyritic flows

These flows vary in colour from dark green to black and purple and form the base of the

Younger Volcanics. In all types of these rocks, the feldspar phenocrysts vary in size from 1/16 to $\frac{1}{4}$" with occasional crystals varying from $\frac{1}{2}$ to 1" in size. Some types contain numerous small hornblende needles. The matrix of these rocks varies from purple hematitic material to dark coloured andesitic or basaltic ground masses.

(2) Middle Volcanics

The greater part of the property is underlain by a series of sediments and flows. These rocks are extensively altered and sheared in some sections and are folded on axes with plunges to the west. They do not contact the Younger Volcanic series on the claims but are thought to be Jurassic or early Cretaceous in age or slightly older than the Younger series. The following rock types were mapped:

(2A) Argillites

Thin bedded, black siltstones and argillites outcrop to the west of the toe of Mitchell Creek glacier. They appear to be conformable with volcanics.

(2B) Volcanic Agglomerate or Conglomerate

This rock, which occurs in massive beds, was used as a marker horizon for mapping the geology. The typical rock has angular fragments of andesite in an andesitic matrix and numerous rounded pebbles of chert and re-crystallized limestone.

(2C) Andesite

Massive green volcanic flows of andesitic composition overly and underly the argillites and conformably overly the volcanic agglomerates.

(2D) Massive Quartz Mica and Quartz Feldspar Rocks

Massive siliceous rocks and quartz feldspar rocks occur on the central portion of the claim group. These are altered rocks found both interbedded with the volcanic series and interbedded with the older schist series. They are derived from both the andesites and a cherty tuff of the Middle Volcanic series. They are composed almost entirely of extensively pyritized quartz although occasionally some secondary feldspars can be found in irregular areas. The rocks are massive and grade into the andesites to the west.

(2E) Cherty Tuffs and Cherts

These are massive rocks apparently interbedded with the volcanic series on both sides of Mitchell Glacier. They could not be mapped separately on the northern side of the glacier; nowever, one band was separated on the southern side of Mitchell Creek Glacier.

(3) Schist Series

The oldest rocks on the property are a series of contorted schists of either Triassic or Permian age. They form an angular unconformity with the Younger and Middle Volcanics. Over the central section of the claims, the schists are overlain by a rusty conglomerate. The rock types are as follows:

(3A) Serpentine

One narrow dike-like band of serpentine was mapped on the southern side of Mitchell Creek glacier. It is a typical green schistose rock composed entirely of serpentine minerals.

(3B) Conglomerate

This is a boulder conglomerate with numerous well rounded schist pebbles which vary in size from 1 to 6 inches. The matrix is limonite.

(3C) Quartz sericite schist

This member is a thin, platy, pyritized, grey rock which contains a mozaic of crushed quartz separated by partings and flakes of sericite.

(3D) Quartz talc schist

This rock is similar in appearance to the sericite schist. However, it contains abundant plates of talcy materials.

(3E) Quartz chlorite schist

A dark grey to green schist which contains a mozaic of crushed quartz, extensive pyrite, and numerous chlorite plates and films.

(3F) Massive Quartz Mica rocks

Areas of massive siliceous rocks occur interbedded with the quartz sericite and quartz chlorite schists and appear to be altered members of the schist series. These rocks could not be separated in the field from the massive quartz mica rocks described under (2D).

(4) Monzonite

Three separate stocks of monzonite occur on the claims. To the southwest on the John Bull claims numbers 33 to 36, an area at least 3,000 feet in diameter shows flat outcrops of monzonite. On sample area number 2, the volcanics have been brecciated and intruded by narrow

stringers of monzonite and on area number 3 monzonite intrudes brecciated volcanics which grade into granitized volcanics. These intrusives vary in grain size but they all contain numerous orthoclase and plagioclase feldspars together with quartz, hornblende and biotite. Grains of magnetite and chalcopyrite can generally be found in the rocks.

(5) Granodiorite

At the head of Sulphurets Creek, 2 miles southeast of Mitchell Creek, a granodiorite intrusive of probably Jurassic age outcrops. This intrusive has a considerable influence in the alteration of the rocks on the Ross property.

(d) Structural Geology

The geological history of the claim area is complex. The schist series is folded into a series of tight isoclinal folds striking northwest and plunging nearly vertically. The rocks are extensively faulted with major faults striking northwest, northeast and east and dipping vertically. The schistosity of the rocks parallels all the fault directions but the bedding is crossed by the faults.

The Middle Volcanics, which overly the schists unconformably, are folded along east striking axes in a series of open folds which plunge at varying angles to the west. The Mitchell Creek valley is along the axis of an anticline. The rocks are jointed and faulted in a northerly direction with joints varying from north 10° east

to north 10° west and dipping steeply west. Some well developed northeast striking faults occur north of Mitchell Creek glacier.

The Younger Volcanics are folded in open folds, with a northeast strike and horizontal axes. Several northeast striking faults were seen in these rocks.

The monzonite intrusives have been forcefully intruded into the volcanics with breccia zones formed in the volcanics. These breccia zones were filled with pegmatitic appearing monzonite or feldspathic quartz veins.

Dr. G.W.H. Norman of Granduc Mines, on his large scale reconnaissance mapping, found the following 3 structures:

1. A thrust fault striking northeast and dipping 60° or less to the northwest located to the south of the claims.

2. A flat lying northwest striking fault near the toe of Mitchell Creek glacier between the schists and the middle volcanics.

3. A north striking fault along the contact of the Younger Volcanics and the older rocks located on the eastern side of the property on the Dawson Ross and CAN claims. These structures were not observed by the writer in the field.

Several northeast and east striking faults on the John Bull No. 1 Mineral claim show signs of recent movement and a 2 foot movement occurred on

September 9th, 1962 along faults on that claim.

(e) Alteration

Four types of alteration were noted as follows:

(1) Silicification of quartz veinlets

North of Mitchell Creek, whole formations have been silicified until the original rock has been completely replaced. These silicified areas have been faulted and quartz veins have been injected along the fissures. South of the glacier, some areas of both the schists and volcanics have been similarly altered. The schists in places are composed of up to 80 percent quartz. These veinlets have been injected into the contorted rocks.

(2) Feldspathization

In northwestern British Columbia, numerous areas of syenite or monzonite occur associated with copper mineralization and these areas may be a feldspathization of older rocks rather than separate intrusions. Dr. Norman believes that the syenite or monzonite intrusions in the Mitchell Creek area may be an alteration rather than a series of intrusions. The writer believes these are a series of intrusions which were forcefully injected into the older rocks as breccia zones were formed on the contacts. Some volcanic outcrops show fractures filled with pegmatitic material at the contact which grade to quartz fillings further from the intrusives. Feldspars are often associated with the areas of silicified rocks on the claims.

(3) Sericitization

Sericite is widely developed in the schist areas and is probably the result of the hydrothermal alteration of feldspars.

(4) Chloritization

Chlorite is well developed in some schist bands and the Middle Volcanics are extensively chloritized. Chlorite is extensive in the Younger Volcanics.

(f) Mineralization

Mineralization on the claims is both extensive and varied as follows:

(1) Rhodochrosite

A 2 foot vein of rhodochrosite occurs on Dawson Ross No. 2 claim in a porphyritic flow in the Younger Volcanics.

(2) Galena

Numerous small pieces of quartz-pyrite-barite float with small amounts of galena were found on the John Bull No. 1 and 2 claims. One quartz-barite-pyrite lense, 1 foot wide and 20 feet long was found on the John Bull No. 1 claim in chlorite schist. It is thought to be one of the sources of the galena float.

(3) Pyrite

Pyrite is extensive over the whole claim group and is the main source of the limonite staining on the claims. It occurs in the Middle and Younger Volcanics in quartz veins and as disseminations. In the schists and silicified rocks, pyrite forms up to 10 percent of the rock and

in some locations some 1 to 2 foot veins of massive pyrite were found. Gold values are negligible in the pyrite.

(4) Molybdenite

Molybdenite is widespread in the schists as thin platings in the schist partings. It is found in all the areas of schist south of Mitchell Creek and is occasionally found in quartz stringers in other rocks.

(5) Chalcopyrite

Chalcopyrite occurs very rarely in the schists and when it occurs it is associated with pyrite and molybdenite in silicified areas or in areas of quartz stringers. It occurs in joints and slips in the volcanics, as disseminations in the monzonite intrusives and in pegmatite and quartz stringers along the contacts of the monzonite.

(6) Bornite

Traces of bornite were found associated with disseminated chalcopyrite in the monzonite in sample area 3.

(7) Magnetite

Magnetite is disseminated in the monzonite and occurs in varying amounts throughout the claim area. The original magnetic anomaly over the claims was over areas of monzonite.

Report by:

D.C. Malcolm, BASc., P.Eng. 2568.

Vancouver, B.C.
December 3rd, 1962.

EXPENDITURES - MITCHELL CREEK CLAIMS

Geological Mapping

Wages:

Project Geologist	D.C.Malcolm,B.A.Sc. P.Eng. 2568	Aug.20-Oct.1/62	$2,774.19
Geologist	J. Buchholz B.A.	Aug.20-Sep.20/62	842.84
Geologist	V. Preto B.A.	Aug.20-Aug.31/62	241.55
Assistant	P. McWilliams	Aug.20-Sep.12/62	416.00
Assistant	R. Malcolm	Aug.20-Sep.12/62	416.00

Total Wages	$4,690.58
Camps and Cookery	782.75
Trucking and transportation	3,587.25
General field expense	356.25
TOTAL EXPENDITURES	$9,416.83

Certified as to accounting

V. M. Scott

V. M. Scott, Accountant.

And I make this solemn declaration conscientiously believing it to be true, and knowing that it is of the same force and effect as if made under oath and by virtue of the "Canada Evidence Act."

December 3rd, 1962. (12)

Declared before me at the City of Vancouver B.C., in the Province of British Columbia this 4 day of June, 1963, A.D.

Wendell Dawson

Shirley Jeannotte

Sub-Mining Recorder

Schedule "A"
Revised

MITCHELL CREEK CLAIMS

Claim No.	Record No.	Tag No.	Record Date
Dawson Ross No. 1	19887H	345526	July 24/61
Dawson Ross No.2	19888H	345527	July 24/61
Dawson Ross No. 3	19889H	345528	July 24/61
Dawson Ross No. 4	19890H	345529	July 24/61
Dawson Ross No. 5	19891H	345553	July 24/61
Dawson Ross No. 6	19901H	345554	July 24/61
Dawson Ross No. 7	19902H	345551	July 24/61
Dawson Ross No. 8	19892H	345552	July 24/61
Dawson Ross No. 9	19897H	345545	Aug. 14/61
Dawson Ross No.10	19898H	345546	Aug. 14/61
Dawson Ross No.11	19899H	345547	Aug. 14/61
Dawson Ross No.12	19900H	345548	Aug. 14/61
John Bull No. 1	19737G	413030	June 22/61
John Bull No. 2	19738G	413049	June 22/61
John Bull No. 3	19739G	413047	June 22/61
John Bull No. 4	19740G	413048	June 22/61
John Bull No. 5	19741G	413046	June 22/61
John Bull No. 6	19742G	413045	June 22/61
John Bull No. 7	19743G	413044	June 22/61
John Bull No. 8	19744G	413043	June 22/61
John Bull No. 9	19745G	413042	June 22/61
John Bull No.10	19746G	413041	June 22/61
John Bull No.11	19747G	413040	June 22/61
John Bull No.12	19748G	413039	June 22/61
John Bull No.13	19749G	413038	June 22/61
John Bull No. 14	19750G	413037	June 22/61
John Bull No.15	19751G	413036	June 22/61
John Bull No.16	19752G	413035	June 22/61
John Bull No.17	19753G	413034	June 22/61
John Bull No.18	19754G	413033	June 22/61
John Bull No.19	19755G	413032	June 22/61
John Bull No.20	19756G	413031	June 22/61
John Bull No.21	19757G	345505	June 22/61
John Bull No.22	19758G	345506	June 22/61
John Bull No.23	19759G	345507	June 22/61
John Bull No.24	19760G	345508	June 22/61
John Bull No.25	19761G	345509	June 22/61
John Bull No.26	19762G	345510	June 22/61
John Bull No.27	19763G	345511	June 22/61
John Bull No.28	19764G	345512	June 22/61
John Bull No.29	19765G	345513	June 22/61
John Bull No.30	19766G	345514	June 22/61
John Bull No.31	19767G	345515	June 22/61
John Bull No.32	19768G	345516	June 22/61
John Bull No.33	19769G	345517	June 22/61
John Bull No.34	19770G	345518	June 22/61
John Bull No.35	19771G	345519	June 22/61
John Bull No.36	19772G	345520	June 22/61
John Bull No.37	19773G	345525	June 22/61
John Bull No.38	19774G	345521	June 22/61
John Bull No.39	19775G	345522	June 22/61
John Bull No.40	19776G	345523	June 22/61

MITCHELL CREEK CLAIMS (Cont.)

Claim No.		Record No.	Tag No.	Record Date
John Bull	No.41	19777G	345524	June 22/61
Arbee	No.35	19124G	321818	June 16/60
Arbee	No.39	19128G	321819	June 16/60
Arbee	No.40	19129G	321820	June 14/60
Arbee	No.41	19130G	321821	June 16/60
Arbee	No.54	19143G	321822	June 14/60
Arbee	No.55	19144G	321823	June 16/60
Arbee	No.56	19145G	321824	June 14/60
Arbee	No.57	19146G	321825	June 16/60
CAN	No.17	20909	453517	Sept.18/62
CAN	No.18	20910	453518	Sept.18/62
CAN	No.19	20911	453519	Sept.18/62
CAN	No.20	20912	453520	Sept.18/62
CAN	No.21	20913	453521	Sept.18/62
CAN	No.22	20914	453522	Sept.18/62

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Department of Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 499 MAP 1

ICE

JOHN BULL 28 | JOHN BULL 27 | JOHN BULL 18 | JOHN BULL 17 | CAN 18 | CAN 17

JOHN BULL 26 | JOHN BULL 25 | JOHN BULL 16 | JOHN BULL 15 | CAN 20 | CAN 19

JOHN BULL 24 | JOHN BULL 23 | JOHN BULL 14 | JOHN BULL 13 | CAN 22 | CAN 21 | DAWSON ROSS 9

MITCHELL CREEK GLACIER

JOHN BULL 41 | JOHN BULL 40 | JOHN BULL 22 | JOHN BULL 21 | JOHN BULL 12 | JOHN BULL 11 | DAWSON ROSS 5 | DAWSON ROSS 6

MITCHELL CREEK

JOHN BULL 39 | JOHN BULL 38 | JOHN BULL 20 | JOHN BULL 19 | DAWSON ROSS 1 | DAWSON ROSS 2 | DAWSON ROSS 10

JOHN BULL 37 | JOHN BULL 29 | JOHN BULL 30 | JOHN BULL 2 | JOHN BULL 1 | DAWSON ROSS 3 | DAWSON ROSS 4 | DAWSON ROSS 11

JOHN BULL 31 | JOHN BULL 32 | ARBEE 35 | ARBEE 54 | JOHN BULL 4 | JOHN BULL 3 | DAWSON ROSS 7 | DAWSON ROSS 8 | DAWSON ROSS 12

JOHN BULL 33 | JOHN BULL 34 | ARBEE 39 | ARBEE 55 | JOHN BULL 6 | JOHN BULL 5

JOHN BULL 35 | JOHN BULL 36 | ARBEE 40 | ARBEE 56 | JOHN BULL 8 | JOHN BULL 7

SNOW FIELD

ARBEE 41 | ARBEE 57 | JOHN BULL 10 | JOHN BULL 9

LEGEND

- MONZONITE
- PORPHYRITIC VOLCANICS & SEDIMENTS
- ARGILLITES, SLATE, GRAYWACKE
- AGGLOMERATE & CONGLOMERATE
- ANDESITE
- MASSIVE QUARTZ MICA & QUARTZ FELD-SPAR ROCK
- CHERT
- SERPENTINE
- RUSTY CONGLOMERATE
- QUARTZ SERICITE & QUARTZ TALC SCHIST
- QUARTZ CHLORITE SCHIST
- COPPER MINERALIZATION
- MOLYBDENUM MINERALIZATION
- FAULT
- BEDDING
- SCHISTOSITY

Younger Volcanics | Middle Volcanics | Schist Series

Accompanying report on Claims, Dawson-Ross 1-12
John Bull 1-41
Arbee 35, 40, 41, 55, 54, 57
Can 17 & 22
by D.C. Malcolm P.Eng. For Phelps Dodge Corp. of Canada Ltd.

Dec 3, 1962
D C Malcolm
P Eng 2588

499 (M)

PHELPS DODGE CORP. OF CANADA, LTD.
VANCOUVER OFFICE

ROSS GROUP
GEOLOGICAL PLAN

Scale 1" = 500' | Date 22,10,62 | Drawn by J.P.H.