

Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. **2749** MAP _____

GEOLOGICAL REPORT

ON

THE LANGEMARCK GROUP

SAGE CLAIMS NOS. 5-16, 42, 44, 46

SAGE VALLEY

Lat. 49°07' Long. 114°22'

FORT STEELE MINING DIVISION, B. C.

N.T.S. 82 G/1 W

CONDUCTED JUNE 24 - JULY 18, 1970

FOR FALCONBRIDGE NICKEL MINES LTD.

2749

Vancouver, B. C.

November 30, 1970

T. Gyr - Geologist

J. J. McDougall - Geologist,
Prof. Eng.

C O N T E N T S

| | <u>Page</u> |
|-----------------------------------|-------------|
| INTRODUCTION | 1 |
| LOCATION AND ACCESS | 1 |
| SCOPE AND METHOD OF SURVEY | 1 |
| REGIONAL GEOLOGY | 2 |
| LOCAL STRATIGRAPHY | 2 |
| STRUCTURES | 5 |
| MINERALIZATION | 5 |
| CONCLUSIONS | 7 |
| STATEMENT OF WORK | 8 |
| STATEMENT OF QUALIFICATIONS | 9 |

ILLUSTRATIONS:

- #1 Index Map (following page 1)
- #2 Geological Map of the Langemarck Group 1:10,000.....(in pocket)

INTRODUCTION

The examination of the Langemarck Group of claims was part of a larger exploration program carried out by Falconbridge Nickel Mines Limited on strataform copper deposits in southeastern B.C. and adjoining Alberta. The object was to examine the Pre-Cambrian Belt Formations in general and the Grinnell Formation in particular for possible economic copper concentrations. The search for strata-bound copper in the Grinnell Formation of Canada was initiated after a large strataform copper deposit had been found in the Revett Quartzites west of Bull Lake in northwestern Montana. The Grinnell Formation is probably the stratigraphic equivalent of the Revett Quartzites and minor copper mineralization within it has been known for some time.

The 15 Sage claims of the Langemarck Group were staked in November 1969 by Falconbridge Nickel Mines Limited.

LOCATION AND ACCESS (see index map)

The Sage claims of the Langemarck Group are situated approximately 2 miles southeast of a settlement known as "Joe McDougall's Ranch" on Sage Creek. They range in elevation from a high of 8400 ft. at Langemarck Mtn. to a low of 6000 ft. in the eastern drainage cirques towards Ruby Creek. The approach on foot is rather inconvenient and involves a crossing of Sage Creek (no bridge) and at least 3-4 hours walking. There are no trails leading in this direction. Helicopter access is the obvious answer to this problem.

SCOPE AND METHOD OF SURVEY

The object of this survey was to locate and trace copper bearing strata within the Grinnell Formation and to examine their possible potential.



INDEX MAP

LANGEMARCK GROUP

LANGEMARCK CLAIM GROUP

MILES

N.T.S. 82G/IW
 MAP REF. 157-70-8

J. M. Douglas

T. Spr

Geological mapping and detailed examinations of sections across the copper bearing strata were applied in order to determine the stratigraphic positions and possible connections between the different copper showings. Good outcrop conditions allowed a reasonable correlation.

REGIONAL GEOLOGY

The regional geology was mapped by R. A. Price, G.S.C. Paper 61-24, accompanied by map 35-1961, Fernie East Half. The general geological setting east of the Flathead River is that of a synclinorium (Akamina Syncline) of Precambrian and Lower Cambrian rocks which is overthrust from the west (relatively) onto younger sediments along the Lewis Thrust Fault. These rocks represent the most eastern outcrops of the Pre-Cambrian Belt Series.

The Grinnell Formation of the Clarke Range with its conspicuous red argillites can be traced westwards into the American Whitefish Range. However, west of this last mentioned range, the lithology of the formation changes considerably. Most of the red argillite beds disappear and thick quartzite beds take over (Revett quartzites). The correlation can only be maintained by the relative stratigraphic position of the two units.

LOCAL STRATIGRAPHY

The Precambrian succession includes the following formations (with increasing age):

Rooseville Formation
Phillips Formation
Gateway Formation
Sheppard Formation
Purcell Lava
Siyeh Formation
Grinnell Formation

Appekunny Formation

Altyn Formation

Waterton Formation

Three of these formations were encountered within the Langemarck Group: Appekunny, Grinnell and Siyeh Formations.

Appekunny Formation

The upper part of the Appekunny Formation within the Langemarck Group consists mainly of thin bedded grey green, arenaceous argillites. They are interbedded with $\frac{1}{2}$ -1 inch thick siltstone beds of the same colour and 1-5 inch thick white quartzite bands. The argillites are relatively uniform in appearance but show occasional white or pale green leached spots. Mud-cracks and ripple-marks are wide spread. The siltstones are extremely fine grained and argillaceous in varying degrees. The quartzites, medium to coarse grained, are thin bedded ($\frac{1}{2}$ -1 inch) and laterally not always persistent. Many of the quartzite bands show circular iron stained spots about $\frac{1}{4}$ inch in diameter which are most likely an end product of a leaching process. However, no malachite or sulfide remnants were observed.

The distinctive thick quartzite beds in the upper Appekunny Formation as seen from Sage Creek were not encountered within the Langemarck Group.

The contact to the Grinnell Formation is gradational and is best defined by the colour change from green to red.

Grinnell Formation

Within the Langemarck Group, the Grinnell Formation consists mainly of red argillites with interbedded siltstones, quartzites and green argillites. An andesitic sill was mapped in the upper part of the formation. The main rock type is a red and usually silty argillite. It is extremely fine grained thin bedded, and locally exhibits mudcracks and ripple-marks.

The mudcracks are often sand filled and stand out on the weathered bedding planes.

Locally, the red argillites are mottled with white or grey-green spots of $\frac{1}{4}$ inch diameter. All intermediate stages can be found between these mottled argillites and extensive interbedding of red and green argillite beds, where the beds vary in thickness between 1 inch and approx. 20 feet. The colour change can be abrupt from one bed to the next one or it can be gradational with fading of the main colours. Lateral change of colours along the same bed is often observed. There is no obvious lithological difference between the red and green argillites and the green colour may well be a result of post sedimentary leaching.

Interbedded with these argillites are red and green argillaceous siltstones, $\frac{1}{2}$ -1 inch thick, which form bands and lenses which extend several hundred feet laterally.

The white quartzites are medium to coarse grained and form bands or lenses varying between $\frac{1}{2}$ inch and 20 feet in thickness. However the single beds rarely exceed the thickness of 2-3 inches.

Crossbedding is abundant and many horizons carry well rounded argillite pebbles of $\frac{1}{4}$ to $\frac{1}{2}$ inch diameter with colours matching the surrounding argillites. Additionally, inclusions of fine disseminated argillite particles can produce pink or greenish coloured quartzites. Iron stained spots as discussed in "Appekunny Formation" are widespread whereas copper mineralization is almost totally limited to one horizon in the upper Grinnell Formation (see Mineralization).

The sill in the upper part of the formation consists of fine grained, massive, dark andesites. The rock type is comparable to fine grained types of the younger Purcell Lava Group. The sill is fairly persistent over

several thousand feet with a thickness between 10 and 20 feet. However, to the south it suddenly disappears and was only recognized in one additional location. The term sill is used tentatively in a non-genetic sense. No flow surfaces were observed.

The total thickness of the Grinnell Formation in the Langemarck Group varies between 800 and 1100 feet.

Siyeh Formation

The lower part of the Siyeh Formation shows intensive interbedding of grey-brown dolomites, grey green argillites and white quartzites. The fine crystalline dolomites are generally silty and form beds between 1 inch and 2 feet thick. The argillites show the same features as the Grinnell argillites with beds between $\frac{1}{2}$ inch and 3 feet. Their colour changes gradually from red to green with increasing distance from the Grinnell contact. The quartzites (1-3 inch beds) are coarse grained and generally non-persistent.

The dolomitic portion increases in percentage with increasing distance from the Grinnell Formation and the beds become thicker. Stromatolite-like structures were collected in the scree east of Langemarck Mountain.

STRUCTURES

The local bedding shows, on the west side of the Akamina Syncline, a flat dip of between 20 and 30° towards northeast. Several minor folds of the 1-10 foot range were noticed, their axes plunging generally northeast.

MINERALIZATION

Copper mineralization is confined to quartzite beds in the upper part of the Grinnell Formation and an adjoining sill. The sulfide minerals are bornite, chalcopyrite, chalcocite and pyrite. Malachite is widespread in surface outcrops and does not decrease effectively within 2-4 ft. of the

surface. The sulfides are either finely disseminated or recrystallized to blebs or nests of 2-5 mm diameter. Seams of massive bornite a quarter of an inch wide and several feet long were encountered occasionally. Though minor copper indications can be found in several quartzite horizons of the upper Grinnell Formations, the main mineralization seems to be concentrated in one quartzite horizon located under an andesitic sill. Several profiles measured across the mineralized section show in general the following stratigraphic succession (with increasing age):

Thickness
(feet

| | | |
|--------------|-------|---|
| Hanging wall | | Argillite, red, platy, with interbedded green argillite and white quartzite. |
| 3 - 6 | | Quartzite, white, in 2-3 inch beds, with interbedded green argillite in 3-5 inch beds, with ripple-marks. |
| 12 - 15 | | Andesite, sill, fine grained, dark green, massive with disseminated pyrite and minor chalcopyrite (1% or less) in the lower 3 ft. of the sill. |
| 5 - 15 | | Quartzite, white, in 2-3 inch beds, locally with green argillite pebbles, mineralized with bornite, chalcopyrite, chalcocite, pyrite and malachite, with interbeds of 3-5 inch thick green argillite. |
| Footwall | | Argillite, red and green, interbedded with white quartzite bands. |

The width of mineralization varies considerably (1-15 feet) as does the thickness of the interbedded barren argillites. The mineralization is relatively persistent in this particular quartzite horizon. However, surface leaching is abundant and sometimes leaves the quartzite without visible iron staining. In two locations, better copper mineralization was observed in horizons above the main andesitic sill. However, their lateral extent remains limited. The distribution of the mineralized outcrops is shown on the included geological map.

CONCLUSIONS

Copper mineralization in the Grinnell Formation is strataform. The best mineralized horizons are located in the upper part of the formation. Within the claim group the lateral extent is, with interruptions, at least several thousand feet. The thickness of the mineralized beds rarely exceeds 10 feet.

It is striking that the best copper mineralization is found in quartzites underlying the andesitic sill. The sill itself is partly mineralized close to the lower contact. From examination of the copper occurrences within the Langemarck Group, mineralization by solutions related to the sill intrusion or extrusion could be suspected. However, many other copper showings in the Grinnell Formation of Canada do not show this relationship. It may well be that copper in low quantities was distributed in several sedimentary horizons and enriched by later metamorphism and/or solutions related to the sill emplacement.

T. Gyr

T. Gyr

James W. Bouyatt

Vancouver, B. C.

November 1970

DOMINION OF CANADA:
PROVINCE OF BRITISH COLUMBIA.
To Wit:

In the Matter of

Geological Report
on the Langemarck Group.

I, Thomas Gyr

of #500 - 1112 W. Pender Street, Vancouver

in the Province of British Columbia, do solemnly declare that the following work was performed under my direction at a cost as outlined:

Geological mapping, geological report.

Cost

Geologist:

T. Gyr June 24, 25, July 16, 18, 1970 4 days @\$55.00 \$220.00

Geological Assistants:

D. Moule June 24, 25, July 14, 16, 18, 1970 5 days @35.00 \$175.00

J. Steele June 24, 25, July 14, 16, 18, 1970 5 days @35.00 \$175.00

Transportation

Helicopter 4.1 hours @\$230.00 \$943.00

Total \$1,513.00

=====

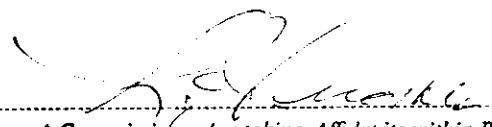
To be applied to the Sage Claims Nos. 5-16, 42, 44, 46 at \$100.00
per claim \$1,500.00

=====

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."

Declared before me at the City
of Vancouver, in the
Province of British Columbia, this 30th
day of November, 1970, A.D.

T. Gyr


Sub-Mining Recorder
A Commissioner for taking Affidavits within British Columbia or
A Notary Public in and for the Province of British Columbia.

FALCONBRIDGE NICKEL MINES LIMITED

1112 WEST PENDER STREET

TELEPHONE: 682-6242

VANCOUVER 1, B. C., CANADA

TELEX: 04-5938

November 30, 1970

The Mining Recorder
Fort Steele Mining Division
Cranbrook, B. C.

Dear Sir:

This is to certify that the geological work on the Langemarck Group of claims was done under my supervision.

The fieldwork was performed under the supervision of Dr. T. Gyr of Vancouver, B. C.

Dr. Gyr received his Doctorate in Geology from the Swiss Federal Institute of Technology (ETH), Zurich, Switzerland in 1966. From 1966 to 1968, he worked as an exploration geologist with the Geological Survey of Guyana. Since May 1969, he has been employed by Falconbridge Nickel Mines Limited as a field geologist in B. C.

Mr. J. Steele and Mr. D. Moule are both third-year students in Geology at U.B.C in Vancouver, and were qualified as geological assistants.


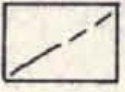

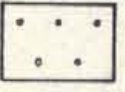





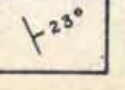
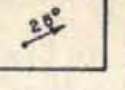
Very truly yours,

FALCONBRIDGE NICKEL MINES LIMITED



J. J. McDougall, P. Eng.

LEGEND

-  OUTCROP
-  GEOLOGICAL BOUNDARIES DEFINED, APPROXIMATE
-  TALUS
-  MORAINE
-  1 SIYEH FORMATION
-  2 GRINNELL FORMATION GENERAL
-  3 GRINNELL FORMATION ANDESITIC SILLS
-  4 GRINNELL FORMATION COPPER MINERALIZATION
-  5 APPEKUNNY FORMATION
-  1-23° BEDDING
-  2-28° LINEATIONS, MINOR FOLDS

To accompany geological report by T. Gyr and J.J. McDougall, P.Eng.,
on the LANGEMARCK group of claims, Sage Valley, Fort Steele M.D., B.C.
dated Nov. 30, 1970.

T. Gyr

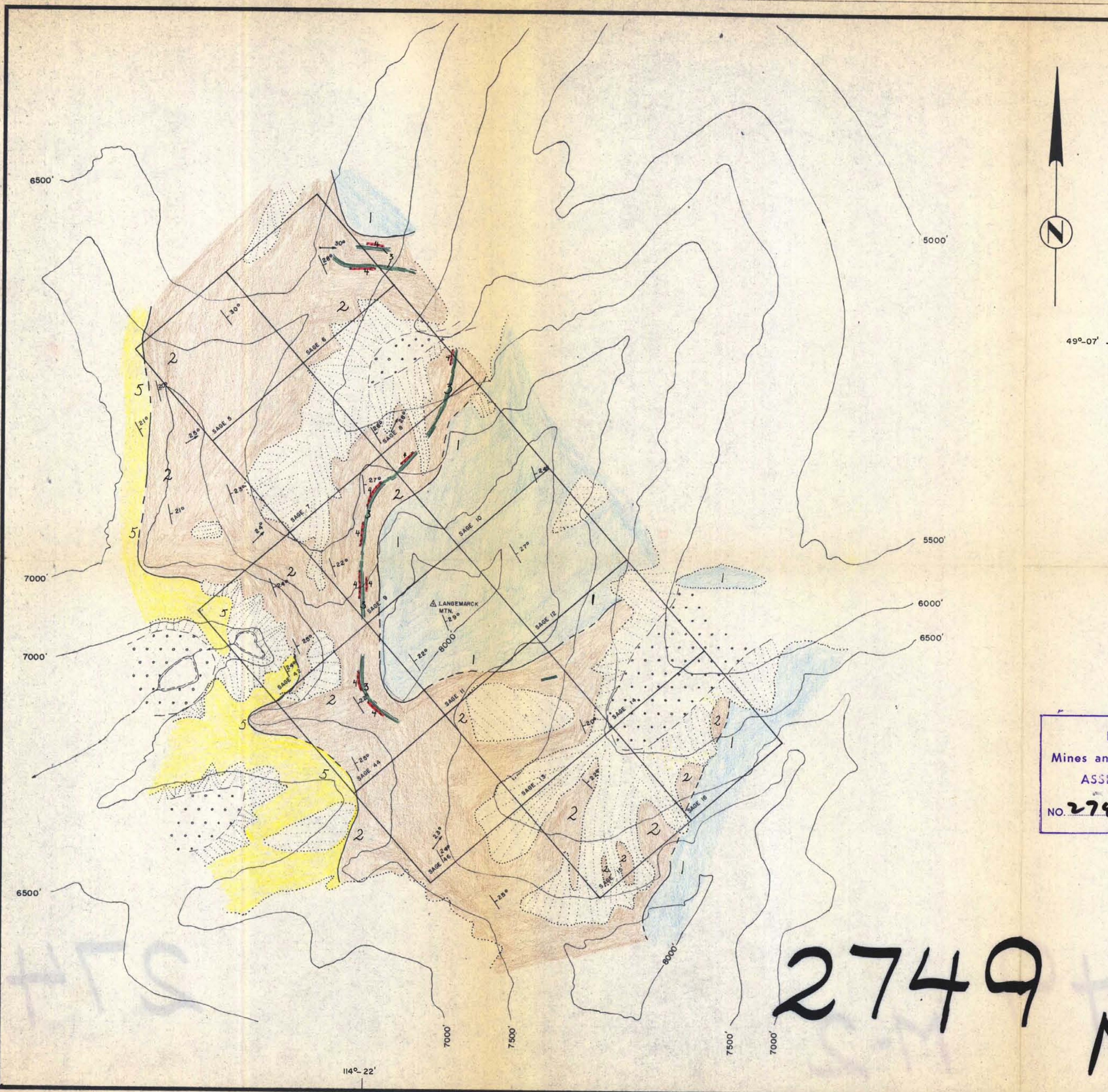
James McDougall P.Eng.

Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 2749 MAP #2

GEOLOGICAL MAP
OF
LANGEMARCK GROUP
SAGE VALLEY,
FORT STEELE M.D., B.C.

SCALE 1:10,000
0 1,000' 2,000' 3,000'

FALCONBRIDGE NICKEL MINES LTD.
GEOLOGY BY T. GYR



2749

M-2

114° 22'