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Summary Report - 1978

Moyie Project - PN 177
Southeastern B. C., Idaho/Montana

November 1978

B. D. Simmons

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MOYIE PROJECT-PN 177

SOUTHEASTERN B. C., IDAHO/MONTANA

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SUMMARY

The Moyie Project was initiated during 1978 to explore the Purcell (Belt) Series between the Sullivan Mine in B. C. and the Coeur d'Alene district in Idaho-Montana. The program in 1978 consisted of reconnaissance mapping and stream sampling covering an area of about 2500 square miles in Canada and the U.S.A.

The most significant result of the 1978 program has been the definition of a previously unrecognized stratigraphic horizon. This contact, which can be directly correlated with massive sulphides at Sullivan, is the result of a unique tectonic event within the otherwise quiescent history of the sedimentary sequence. Much of the area underlain by this favourable horizon is virtually unexplored. On the basis of favourable geology and/or geochemistry, four properties have been acquired by staking.

Recommendation for 1979 are as follows:

(1) extension of reconnaissance geology and geochemistry to the south

(2) detailed ground follow-up of target areas staked in 1978

(3) airborne EM/mag surveys of selected favourable areas.

Results from 1978 could form the framework for an on-going project. With an adequate committment of time and funds, the chances for discovery of significant mineralization are considered reasonably good.

INTRODUCTION

The project was initiated in 1978 to investigate the Proterozoic Purcell (Beltian) Series between the Sullivan Mine in B. C. and the Coeur d'Alene district in Idaho-Montana. The concept was prompted by a review of data from the St. Eugene property at Moyie and by funding available through the B. C. government (the ADM program).

Significant mineral deposits in the area include the Sullivan (a megaton massive sulphide zone), the Troy (a stratabound disseminated copper-silver zone), and the Coeur d'Alene district (silver-bearing vein systems). Despite a long exploration history, much of the project area has received only cursory investigation. Recent work by Cominco and BCDM in adjacent areas suggests that the sedimentary sequence can be subdivided in greater detail. These subdivisions reflect changing sedimentary environment and they can be directly related to stratabound mineralization at Kimberly. The extension of these subdivisions into untested areas would define a highly useful exploration guide.

Field work was conducted from June through September. Objectives of the 1978 program were as follows:

1) reconnaissance mapping to define new stratigraphic and structural relationships on a regional scale.
2) reconnaissance geochemical coverage to define broad areas for more detailed follow-up.

These objectives have been met. In addition, four specific target areas were defined and acquired by staking.

GEOLOGY

Results of the mapping program are compiled on the enclosed 1:125,000 geological plan. This plan differs significantly from published maps of the area. Several aspects of the geology require brief discussion.

1) The Proterozoic sediments are a fairly monotonous sequence of impure quartzite and argillite. The sequence was probably deposited within an inland sea or basin near the continental margin. As reflected by lithology, evolution of the basin was remarkably uneventful except for abrupt and rapid basin subsidence between Lower and Middle Aldridge time. Subsidence was probably caused and accompanied by widespread block faulting. The Sullivan massive sulphide zone was emplaced at or near the sea floor during the subsidence and faulting.

   This stratigraphic horizon, previously undefined, can be recognized in the field by the abrupt beginning of a distinctive turbidite series. The horizon is outlined in red on the enclosed geology map and will be referred to in this report as the "Lower Aldridge contact". The nature of this contact, coincident with a unique tectonic event and known mineralization, strongly suggests its usefulness as a focus for exploration.

2) The structural pattern of the map area is dominated by broad open folds and gently arcuate thrust faults.

   a) Folding

      Several ENE-trending fold axes have been defined. The most prominent and continuous fold is the doubly-plunging Moyie Anticline. This fold is the backbone of the so-called Purcell Anticlinorium and it appears to have an important spatial relationship with significant mineralization.

Just north of the map sheet, the Sullivan deposit occurs at the intersection of this fold axis with the Lower Aldridge contact. To the south, the Coeur d'Alene district occurs where the possible extension of this fold intersects a northwest-trending regional fracture zone. The St. Eugene vein system occurs on the axis of this fold in a setting very similar to Coeur d'Alene.

The doubly-plunging nature of the Moyie Anticline is produced by doming, roughly centered on the Canada/U.S.A. boundary. The exact position and direction of the cross-fold axis is not known. Although structurally important, at present this domal feature has no obvious economic significance.

b) Faulting

Several significant thrust faults have been mapped. These faults result in important repetitions of favourable stratigraphy.

The north-central portion of the map area is an almost exact duplication of the Sullivan Mine sequence - the repetition caused by a thrust fault just north of the map sheet. The Lower Aldridge contact in this fault block has been solidly staked by Cominco and held since 1976. The same favourable stratigraphy is again repeated, however, south of the Moyie Fault. In this extensive area, the Lower Aldridge contact is relatively unexplored and almost totally open for staking. Cominco personnel report that they have only now begun a systematic appraisal of the area.

3) Numerous base metal showings were examined within the map area. With the exception of the St. Eugene and Vine deposits, none of these are of economic interest. All are vein occurrences with limited thickness and strike extent. Most occur within the sediments in close spatial association with gabbroic or granitic intrusions.

The St. Eugene vein system has been adequately described in a recent report (B. Simmons, Apr. 19, 1978).

The Cominco Vine deposit north of Moyie Lake was examined in some detail. A steeply dipping , northwest trending vein of semi-massive sulphides cuts gently dipping Middle Aldridge rocks. The vein is exposed in five substantial trenches for a strike length of about 400 feet. (The trenches will be filled-in this year.) The vein appears to pinch towards the northwest. From my sampling, the best grade/width was 4.80% Pb, 0.84% Zn, 2.35 oz/ton Ag, 0.030 oz/ton Au over 10.0 feet. Four or five angle holes have tested the vein to a shallow depth, reportedly with no improvement in grade or thickness. Cominco's current geophysics and drilling are designed to test the nearby Lower Aldridge contact in hope that the vein is an indication of significant stratabound mineralization at the favourable horizon.

4) Rock units within the map area are known by different names in the U.S.A. and Canada. Canadian nomenclature is used throughout this report. The Creston, separated into three formations elsewhere in the U.S.A., cannot be subdivided within the 1978 map area.

5) With local exception (e.g. St. Eugene Mine), outcrop is sparse (10 - 20%) throughout most of the map area. Because previous exploration has emphasized a prospecting approach, this lack of exposure should be considered favourably in evaluating the potential of the project area.

STREAM SEDIMENT GEOCHEMISTRY:

Geochemical results are graphically summarized on the enclosed 1:125,000 overlay. This overlay compiles sample data from 1965, 1971 and 1978, representing 3000 samples sites and 13,000 separate element analyses (12,000 analyses by Bondar-Clegg during the 1978 program). In Canada, most streams have been sampled at intervals of 1 km. or better. In the U.S.A., no "off-road" work was done and coverage is not as complete.

Standard specimens were included with every 50 samples and results check within 5 to 10%. Background and threshold values were calculated using accepted statistical methods from the results of the first 600 samples.

Seven obvious anomalies have been outlined, labelled zones A to G on the enclosed overlay. Zones A and B have been acquired by staking and will be described in a later section. Zones C to G are assigned lower priority but they should be sampled and mapped in greater detail before a final evaluation is possible. Several additional zones or one-point anomalies should be re-assessed if merited by future results in the area.

Results of the 1978 geochemical program should be considered with some reservation. Regional sampling programs are traditional in the Cordillera and their value in the search for zones of extensive mineralization and alteration has been amply demonstrated. However, relatively small targets of concentrated metals, i.e. massive sulphides, may be totally masked or respond

only weakly in a regional program. As an example, there is no indication of the Sullivan deposit on the latest GSC reconnaissance geochem. release. Despite these reservations, the 1978 geochemical program was justified by its low cost (salaries for the labour-intensive program were reimbursed by the government). Results, however, should not be given undue emphasis.

PROPERTY ACQUIRED

The following properties were acquired to protect target areas apparent after a preliminary review of the summer program.

1. Rusty Claims (120 acres, Yahk area B. C., 82F-1/E)

A heavily-weathered gossan of limited extent was discovered early in the season. Two contiguous 2-post claims were staked by an overly-enthusiastic assistant. Careful sampling of the gossan failed to indicate significant metal values. Despite the poor assays, further investigation was merited because of proximity to the unexposed Lower Aldridge contact.

An area of 1.5 X 1.2 miles was traversed at 1000' intervals. Soil samples (B. horizon) were collected every 200' along the traverses. The same lines were used for geological mapping. No significant anomalies were obtained and no further work is recommended. Unless additional ideas are generated, the claims should be allowed to lapse.

2. Pete Claims (1200 acres, Peterson Creek area B. C., 82F-1/W)

A 20 unit claim block was staked to cover the source area of a well-defined, multi-element stream sediment anomaly (geochem Zone A). The source area coincides with a well-defined aeromagnetic anomaly and is underlain by a faulted wedge of Creston Fm, host for the Troy deposit in Montana. Cominco and

others have recorded work on some small sulphide showings immediately to the east but the interpreted source area is totally unexplored. A program of detailed follow-up will be recommended for 1979.

3. NW Claims (2400 acres, Northwest Peak area, Montana)

A block of 120 claims was staked to cover the source area of a well-defined multi-element stream sediment anomaly (geochem zone B) which coincides with the Lower Aldridge contact. Unpublished spotty sampling by the US Forest Service confirms the anomalous zone. Despite fair exposure (±35%), an adequate explanation for the anomaly has not been found. There is no record of previous exploration. The block of claims is located within a designated "scenic area" and detailed follow-up must be planned accordingly.

4. Tourm Claims (1200 acres, Mt. Mahon area B. C., 82G-4/W)

A 20-unit claim block was staked to protect a zone of intense tourmalinization adjacent to the Lower Aldridge contact. The tourmaline zone is virtually identical in character to the footwall alteration at Sullivan Mine. Unfortunately, no mineralization was discovered and no geochemical response is indicated from silt samples. Despite these limitations, the alteration zone can be compared in signficance to an unexplored dalmationite pipe in the Noranda area. Detailed follow-up is strongly recommended.

In early June, Cominco staked at least two claim blocks to cover this alteration zone but failed to record the claims within the required time period. No exploration was conducted and their reasons for not recording are unknown.

RECOMMENDATIONS

Work conducted on the Moyie Project in 1978 was designed to form the basis for a longer term program, if merited. Results from 1978 justify continuation of the project. During 1979, the program should follow three lines of attack:

1) southward continuation of regional mapping and sampling
2) detailed ground follow-up of targets acquired by staking in 1978
3) airborne EM/mag surveys of selected favourable areas.

These recommendations are described in greater detail below. Projected costs have been outlined in the 1978 - 79 budget report.

1) Regional Work

Reconnaissance mapping and sampling should be continued southward in Idaho-Montana to at least latitude $48^{o}30'$. This work would define and investigate the southern intersection of the Lower Aldridge contact and the Moyie Anticline.

Some additional mapping and sampling is required to fill gaps within the U.S.A. area covered quickly during 1978.

2) Detailed Follow-up

a) The NW, Pete, and Tourm claims should be investigated by detailed mapping, geophysics and geochemistry. If merited, diamond drilling could be conducted in the late summer or early fall.

b) Geochemical zones C to G should be prospected and sampled in greater detail. Geophysical anomalies resulting from the surveys proposed below will require initial investigation. Claims should be acquired if and where merited.

3) Airborne Surveys

Combined EM/mag surveys of the Aerodat-type are recommended for the Mt. Mahon area (82-G-4W) and the St. Eugene/Cominco JV property (82-G-5W).

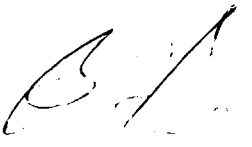
The Mt. Mahon area is underlain by the intersection of the Lower Aldridge contact and the Moyie anticline - a geological setting very similar to the Sullivan Mine area. Unfortunately, geochemical response is flat and outcrop is very sparse (±10%). Airborne geophysics is proposed to provide an additional parameter in evaluation of the area. It is recognized that the value of the survey could be limited by the gently-dipping nature of the sediments. However, using the Sullivan as a model, targets are expected to be equidimensional, magnetic and conductive.

There is no modern geophysical coverage of the St. Eugene/ Cominco JV property at Moyie Lake. Exploration of the property cannot be considered adequate without this information. An airborne survey is proposed as the most efficient method of gaining the required coverage. New targets might be defined. Alternatively, a lack of significant anomalies would largely eliminate the merit of maintaining the ground.

For the moment, strict definition of the survey areas is deferred. Both proposed areas cover fold noses and flight lines in two directions would be preferable. Cominco have been approached to share the cost of the survey at Moyie Lake. Dependent upon their participation, the survey areas will be defined balancing costs against adequate coverage.

CONCLUSION

Results of the 1978 program provide the framework for an ongoing project in southeastern B. C. and Idaho-Montana. With definition of the Lower Aldridge contact, we have acquired a useful tool in the search for another Sullivan deposit. (There is very little reason to believe that the Kimberly occurrence is unique.) Despite this new exploration guide, discovery of significant mineralization will be difficult and will require a firm committment of both time and funds. Without a strong committment, the project will have little chance of success. It is recognized that this committment must be rated against other projects which might yield a more rapid return.



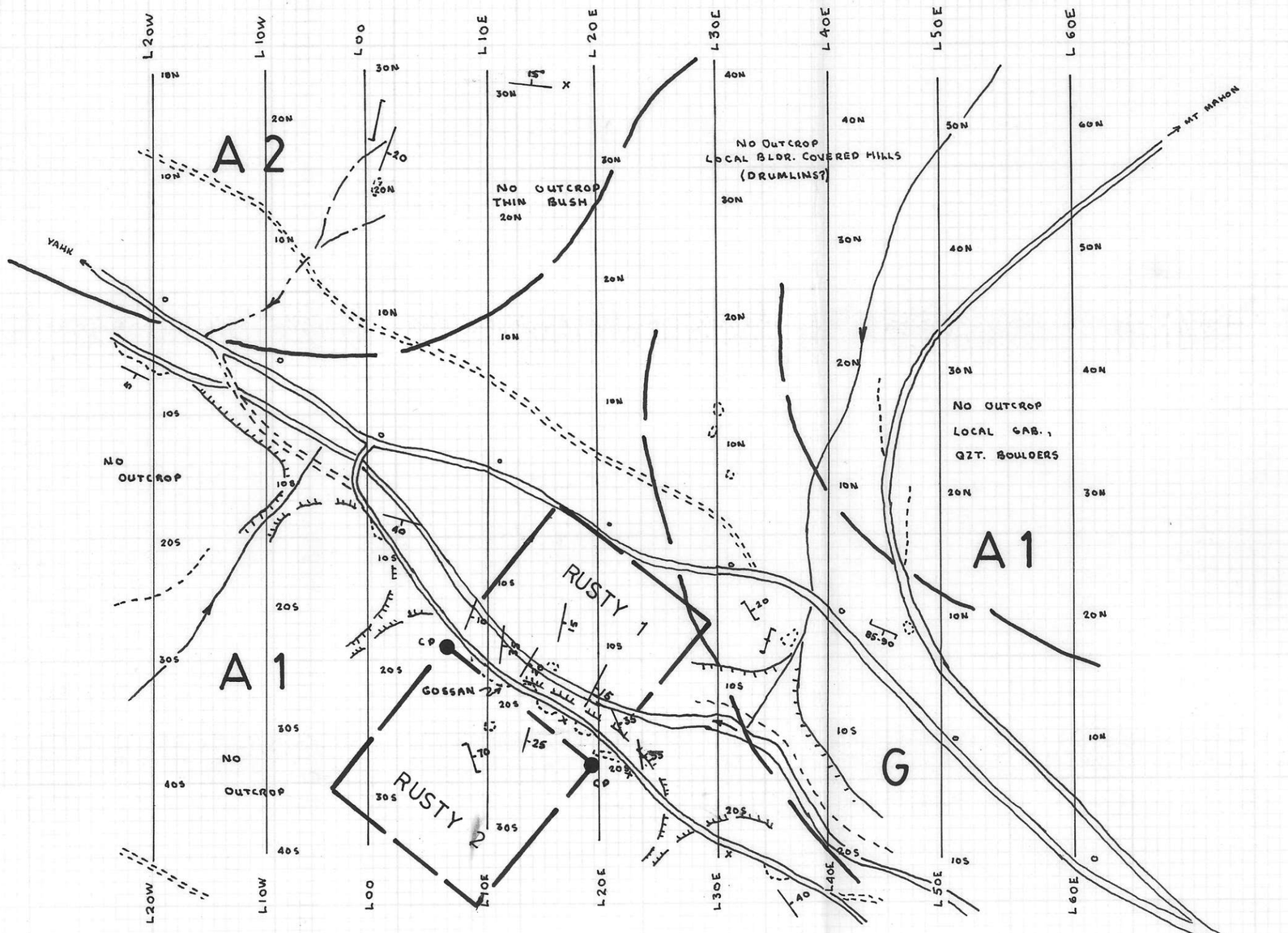
B. D. Simmons

MAP REF. No.:

N.T.S.: 82 F 1E

LEGEND

- G — Purcell sills [gabbro]
- A2 — Middle Aldridge
- A1 — Lower Aldridge
- Bedding
- Jointing
- Outcrop
- Steep slope



FALCONBRIDGE NICKEL MINES LTD.

PROPERTY: RUSTY CLAIMS AREA

LOCATION: MOYIE PROJECT PN 177

TYPE OF MAP: GEOLOGY

BASED ON: MAPPING-B.D.S, R.L.B.

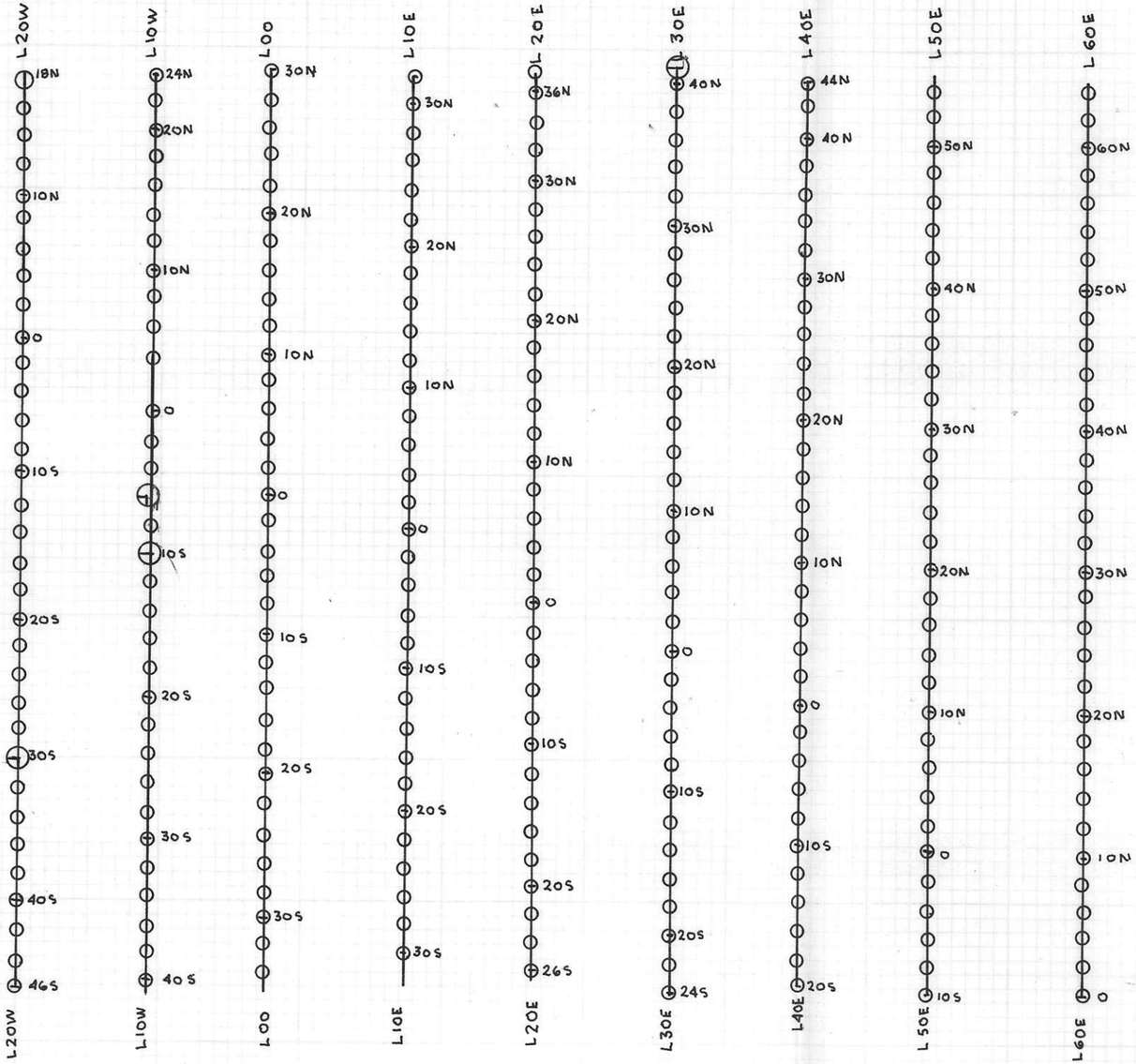
DATE OF WORK: AUGUST, 1978

DATE: OCTOBER 18, 1978

DRAWN BY: R BENNISON

1000 0 1000 2000

SCALE: 1 INCH TO 1000 FEET



MAP REF. No.:

N.T.S.: 82 F 1E

LEGEND

o Sample location
no anomalies

Low Order
zinc anomaly
80-160ppm

Cu, Pb, Ag, Cd
no anomalous values

B or C horizon sampled

Analyses by Bondar and
Clegg Ltd Sept, 1978

FALCONBRIDGE NICKEL MINES LTD.

PROPERTY: RUSTY CLAIMS AREA

LOCATION: MOYIE PROJECT PN177

TYPE OF MAP: SOIL GEOCHEMISTRY

BASED ON:

DATE OF WORK: AUGUST, 1978

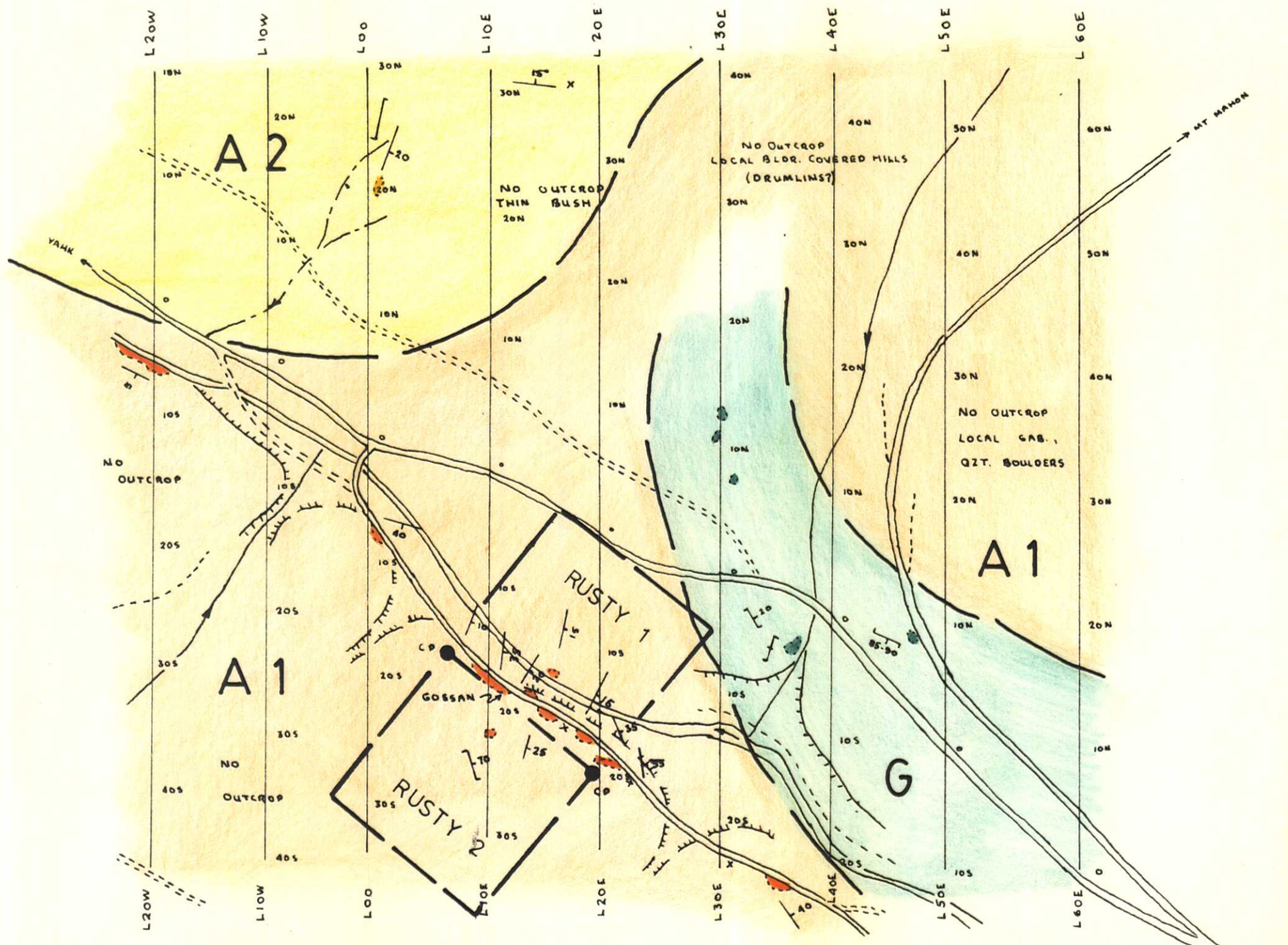
DATE: OCTOBER 17, 1978

DRAWN BY: R. BENNISON

1000 0 1000 2000

SCALE: 1 INCH TO 1000 Ft.

BCIL - 2547 - F.N.M.



MAP REF. No.:

N.T.S.: 82 F 1E

LEGEND

- G Purcell sills [gabbro]
- A2 Middle Aldridge
- A1 Lower Aldridge
- Bedding
- Jointing
- Outcrop
- Steep slope

inches 0 1

0 1 2 centimetres

This reference scale bar has been added to the original image. It will scale at the same rate as the image, therefore it can be used as a reference for the original size.

FALCONBRIDGE NICKEL MINES LTD.

PROPERTY: RUSTY CLAIMS AREA

LOCATION: MOYIE PROJECT PN 177

TYPE OF MAP: GEOLOGY

BASED ON: MAPPING-B.D.S, R.L.B.

DATE OF WORK: AUGUST, 1978

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SCALE: 1 INCH TO 1000 FEET

BCIL - 2547 - F.N.M.