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REPORT

of

GEOLOGICAL INVESTIGATION

of the

LORNA LAKE AREA

Latitude: 51°05'N
Longitude: 123°10'W

FOR: Burlington Mines Ltd. (N.P.L.)

BY: F.Lee, Geologist of Western Geological Services Ltd.

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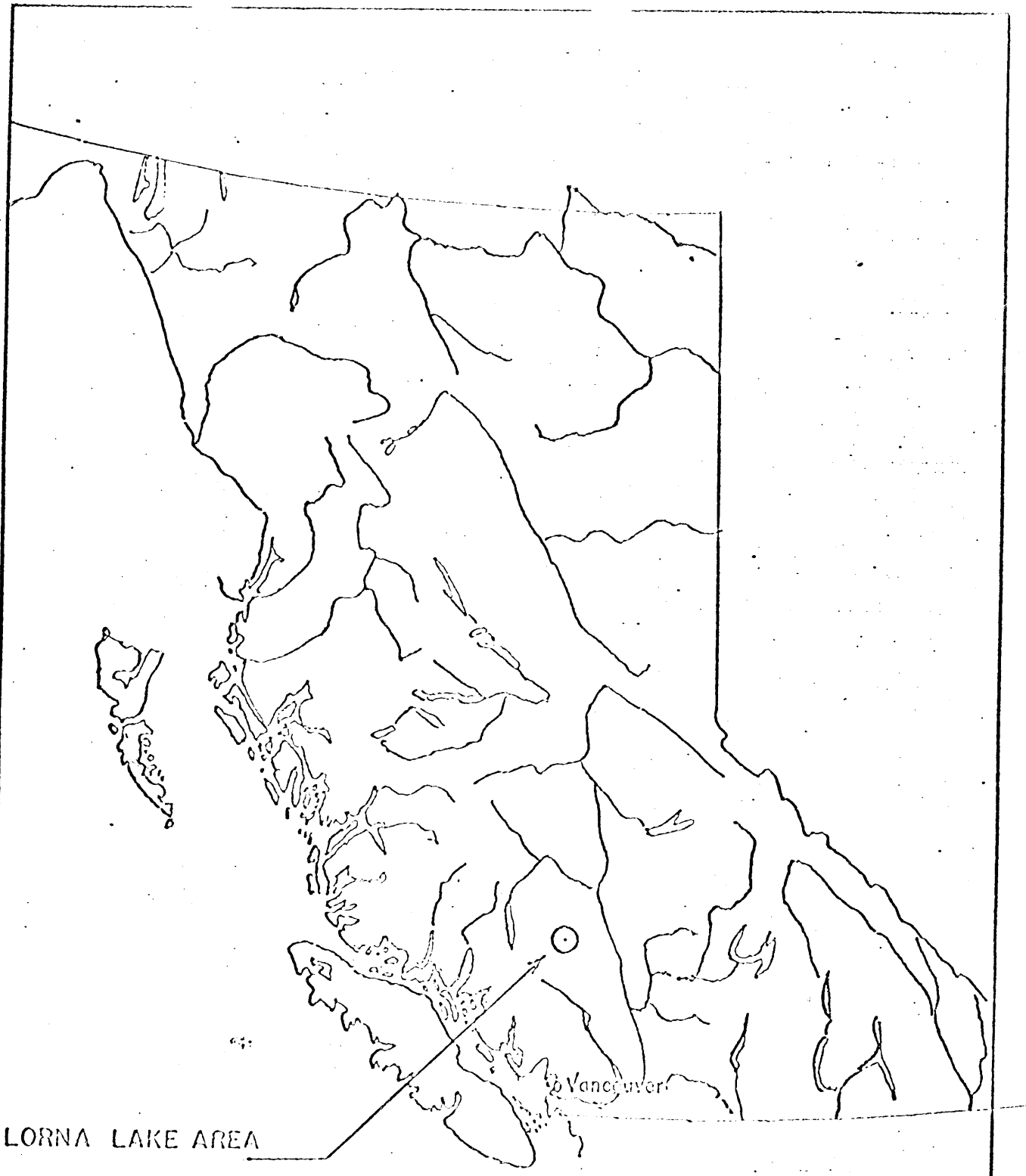
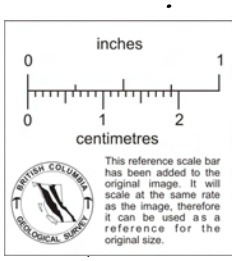
ACCOMPANYING MAP

FIG.

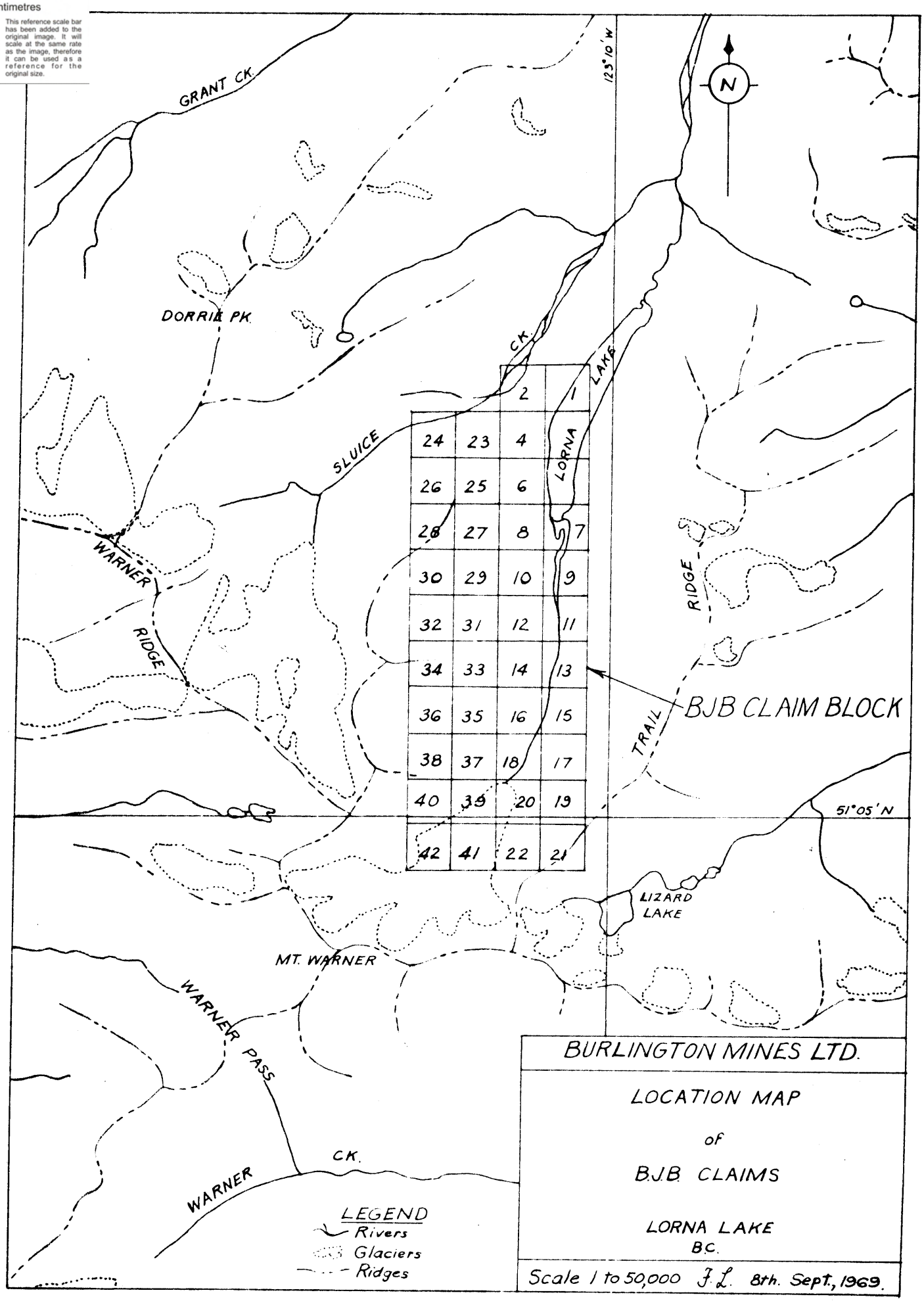




BURLINGTON MINES LTD.

LOCATION
of
LORNA LAKE CLAIMS

14-March-1969 E.A. Ramsay



BURLINGTON MINES LTD.

LOCATION MAP

of

B.J.B. CLAIMS

LORNA LAKE
B.C.

Scale 1 to 50,000 J.L. 8th. Sept., 1969.

REPORT OF GEOLOGICAL

INVESTIGATION OF THE LORNA LAKE PROPERTY

FOR BURLINGTON MINES LTD.

INTRODUCTION:

A camp was established on the Lorna Lake property of Burlington Mines Ltd. (N.P.L.) on August 9th, 1969. During the period August 9th, 1969 to August 20th, 1969 geological traverses were carried out to determine the mineral potential of the stock and surrounding country rock lying in the BJB claims. These claims were staked by W. Meyer and J. Buchholz on 12th and 13th February, 1969 and optioned to Burlington Mines Ltd. (N.P.L.) on 1st March, 1969. There are 42 claims, numbered BJB 1 to BJB 42.

During the period, part of the technical programme recommended by E.A. Ramsay, P.Eng. was completed.

LOCATION AND ACCESS:

The Lorna Lake property lies on and around Latitude 51°06' north and Longitude 123°10' west, straddling the headwaters of Big Creek north of Mt. Warner. Mt. Warner lies approximately 26 miles north-west of Bralorne, B.C. The only feasible access to the property at present is by 35 minute flight by helicopter from Goldbridge. Constant winds from the glacier on the north slope of Mt. Warner make use of Lorna Lake by a fixed wing aeroplane dangerous.

PREVIOUS WORK:

H. W. Tipper of the Geological Survey of Canada mapped the area in 1961 - 62 and the results were published as the Taseko Lakes Map #29-1963

In 1963, prospecting which included trenching and assaying was carried out by a major Mining Company, which employed a geologist and two prospectors for twelve days in the area.

Aerial photographs were taken of the area in 1950 and 1965. Department of Mines and Technical Surveys map Taseko Lakes - (92-0) and British Columbia Department of Mines, Forests and Water Resources provisional map "Warner Pass - 92-0/wE" show the topography and culture.

PHYSIOGRAPHY:

The area covered by the claims consists of a north-trending glacial valley enclosed on either side and at its southern end by high arete ridges and horns which rise almost 3,000 feet above the valley floor. Elevations vary from 6,400 ft. to 9,3000 ft. At the head (south end) of the valley is a receding glacier which is the source of the main stream of Big Creek. The glacier is fed by three cirque glaciers and two remnants of cirque glaciers lie on the western ridge of the valley between it and the glacier feeding Sluice Ck., another headwater of Big Creek. Differences in mapped positions of the glacier snout over 10 years suggest the glacier is receding at a rate of almost 100 ft. per year.

Moraine material is common but not greatly developed. Best developed lateral and terminal moraines were formed by a small, historically recent advance of ice.

With small, local exceptions timber line ends at approximately 6,800 ft. slightly lower in some places. Above this elevation virtually no vegetation exists and the ridges and valley sides consist of bare

rock, talus cones or scree covered slopes. Until comparatively Late Recent geological time the ridges were snow-covered the year round. Scree slopes and talus cones are well developed, particularly on the western face of the eastern ridge and exceed 500 ft. in height in places. Boulders vary from 2 inches to 10 feet in diameter but are usually uniform in size at any one place.

Several small streams flow from small snow fields on the ridges on the tops of the scree slopes footing the ridges. Here the water passes under the scree ---- none reaches the main stream.

Where the glacial valley of Sluice Creek joins that of Big Creek a large, well-formed medial moraine has been formed. On the west of this moraine Sluice Creek forms a braided course over ground moraine and on the east Big Creek has been dammed by a terminal moraine to form Lorna Lake (see map). The Sluice Creek valley is even more barren than that of Big Creek north of Lorna Lake.

GEOLOGY:

Method of Mapping:

As mineralization was expected to be best developed at or near the intrusion contact, the contact was followed where possible and constantly inspected. Where the contact could not be reached due to cliffs or extremely unstable, large-boulder talus slopes, the talus boulders were closely inspected and mineralization noted. It was intended that a prospector then be sent to areas of promising mineralization for more detailed investigation. No areas were seen which warranted this.

Where possible, sediment samples were taken for geochemical analysis. One sample was taken from each of nine small creeks but results can only be regarded as a rough guide due to the paucity of fines in the sediment.

General Description:

Sedimentary and volcanic rocks form the bulk of the area in and around the claim block. These rocks, apparently a continuous series, are of probable Upper Jurassic to Cretaceous age and originally consisted of various types of andesite, arenaceous rocks, impure siltstones, and arkoses. Measurable bedding was seen at only one place, at the south-western end of the valley. Here bedding was dipping 45^{o} to the west. Elsewhere, though moderate apparent dips were often seen, these dips or strike could not be determined. North of the claim block bedding is very steep to the north and may lie north of a large fault. Volcanic rocks are predominant in the southern and western parts of the valley while sedimentary rocks appear to be dominant in the east and north-eastern parts. The change in dominance appears to be gradual.

The whole of the above sequence has been thermally metamorphosed by an intruding adamellite stock to give a series of tough, dense metamorphic rocks. The volcanics are generally least altered and are still recognizable. Where noticably altered, they have been mildly to moderately chloritised and/or mildly epidotised. The sedimentary rocks have been generally much altered to produce a variety of hornfels - arenaceous hornfels, argillaceous hornfels, impure spotted slates etc. Though highly jointed, the beds show no shattering and no structures normally produced by kinematic metamorphism.

In the very southern part of the valley is a small exposure showing what appears to be Coast Range Batholith granodiorite intruding the sedimentary - volcanic sequence. This in turn is cut by the adamellite stock.

Careful mapping of the adamellite stock has shown that the stock is remarkably symmetrical. It is elliptical in shape, has its longer axis lying north-south along the valley, is approximately 16,000 ft. long and approximately 8,000 ft. wide on the surface. At 6,500 ft. elevation the dimensions of the stock would be approximately 16,000 ft. by 12,000 ft. Though termed an adamellite stock it is in fact composite and consists of three or four rock types. The most common rock type is adamellite, a pale grey, medium grained igneous rock intermediate between granite and granodiorite in composition. Most economic disseminated copper deposits are found in this rock type. Locally and erratically the ferro-magnesian mineral content of the adamellite falls to, or near, zero when the rock is technically termed an alaskite. The alaskite appeared to chiefly occur near, but not at, the stock contacts. Coarser than normal alaskite in several places has been mildly metasomatically altered but no introduced metallic minerals were seen in these altered areas. Granite has differentiated out from the adamellite at one restricted locality.

At the central, lowest part of the stock, just upstream and west from the campsite, is abundant granodiorite. This granodiorite has a rather finer grain than normal and can be easily distinguished from the similarly grained adamellite by its greyer colour and much higher ferro-magnesian mineral content. It is characteristically intruded by irregular veins and veinlets

of adamellite and also occurs as numerous xenoliths.

The whole of the stock edge and immediately adjacent country rock are intruded by numerous, generally irregular adamellite, alaskite, and aplite dykes together with thin quartz veins. The quartz veins in places cut the dykes and are glassy and barren. In addition to the irregular dykes there are a series of large dykes or sills which suggest a partial "shell" around the intrusion a few hundred feet outside its contact with the country rock.

The whole of the above suggests the following sequence:

(a) Intrusion of a small granodiorite stock, probably very shortly after emplacement of the Coast Range batholith;

(b) Sinking (collapse?) of the solidified granodiorite stock;

(c) Invasion of the space caused by (b) by adamellite magma and partial ingestion of the granodiorite. This was probably contemporaneous with (b). Only limited invasion of the country rock.

(d) Partial solidification of the adamellite followed by slight sinking of the mass and limited fracturing of the surrounding country rock;

(e) Introduction of adamellite magma to form a partial shell about the stock in the country rock together with numerous irregular dykes;

(f) Introduction of thin veins and veinlets of quartz and possibly minor sulphide minerals.

The whole sequence may have occurred at relatively shallow (Epizone) depth.

A weak sulphide halo surrounds almost the whole of the stock in the country rock. In one locality, at the extreme northern end of the stock, sulphide mineralization even occurs in the stock. The strength of sulphide mineralization varies and in parts is estimated to be 2%. The halo is

thought to be composite in origin; that is, part of the sulphide was an original constituent of the country rocks and has merely been concentrated while part has been introduced towards the end of stock formation. Pyrite is the predominant sulphide present but pyrrhotite is common in the rocks at the southern end of the valley. Arsenopyrite probably exists in the south-west between the main glacier and the cirque next to it. Where primary copper mineralization occurs it does so as disseminated chalcopyrite near quartz veinlets except at one locality where bornite occurs. Normally the sulphide is disseminated, greatest concentration being in the more argillaceous holocrystalline (even-grained) rocks, but thin, irregular veinlets of pyrite can be seen in various places.

Probably shortly after solidification of the stock a series of pegmatite dykes formed in the western part of the stock. They are only several feet in width and have been completely kaolinised. Kaolinization was by subterranean gases for accompanying faults have also been kaolinized along the fault walls. No sulphide minerals were seen in these dykes although minor malachite was noticed in one scree boulder. A little epidote is present.

Presence of sheared, chloritised arenaceous hornfels in the northern part of the area, together with an abrupt change of bed dips suggests that a large east-north-east fault may exist. Outcrops were too small and broken in the possibly faulted area to determine the definite existence of this fault.

A possible porphyritic andesite dyke or sill of Tertiary age occurs north of the intrusion.

ECONOMIC MINERALS:

The stock and surrounding country rock was investigated for copper and molybdenum mineralization.

Molybdenum mineralization occurs as molybdenite which has been found only at the extreme southern end of the valley. In all cases the molybdenite occurred as films and sheets on scree boulders or, in a few cases, on moraine boulders. No disseminated molybdenite was seen. The source of the molybdenite-carrying scree was not located although the cliff face above the scree was inspected. Possibly the source lies some way up the cliff face. In any case, the amount and spread of molybdenite-carrying boulders suggest that the molybdenite mineralization is not extensive. It is not known whether the molybdenite was introduced during stock solidification or whetehr it is unrelated to the stock.

Copper mineralization occurs in the area as chalcopyrite except at the south-western edge of the stock where bornite occurs. Traces of copper mineralization can be seen around almost the whole rim of the stock. These occur chiefly as occasional boulders of scree faced with a film of malachite and very often the source of these boulders cannot be traced. Where sources were traced the copper was found to occur as finely disseminated chalcopyrite lying at the face of, or near, a quartz stringer. The major exception to this is the main showing which was blasted using four hole of gelignite to reveal the unweathered rock. This showing occurs on a rock face about 50 feet high and consists of epidotemagnetite replacement of volcanics (?) very near the stock contact. The replacement may extend laterally some one hundred to two hundred feet and in thickness perhaps twenty feet.

Chalcopyrite and bornite are irregularly distributed throughout the epidote-magnetite near a series of thin faults. The magnetite seems to favour bornite while the epidote favours the chalcopyrite. Distribution is highly erratic and one bulk sample taken from the blast area assayed 0.16% Cu, 0.01% Mo, and 0.01 oz./ton Au. Due to the extremely hard nature of the rock and also to moraine cover, no exact idea of extent of mineralization was gained but limits could be set outside which mineralization was known not to occur. The enclosed area set by these limits make the mineralized zone appear quite small by required standards.

Analyses for copper and molybdenum were made on silt samples SW3 to SE10 and were as follows:

Sample No.	Cu ppm	Mo ppm
SW3	85	2
SW4	58	2
SW5	23	<.5
SW6	54	<.5
SE7	162	.5
SE8	58	<.5
SE9	104	<.5
SE10	1110	.5

Occasional scree boulders with malachite stain on their faces were seen in the vicinity of samples SW3 and SE9. Sample SE10 was taken in a small creek just north of the main prospect area in an area of known mineralization. No copper occurrences were seen in or near the creek from which SE7 was taken but few boulders showing malachite stain exist in the creek immediately north of it.

CONCLUSIONS AND RECOMMENDATIONS:

There is minor intermittent copper mineralization around much of the stock covered by the claims. However, the mapping traverses located

no localities which promised mineralization of any size or of even marginal grade. Similarly, mapping restricted the area of molybdenite mineralization to a small area in the south-west of the valley. The molybdenite float is believed to come from a fairly limited area above the cliff foot and this area was not located. There is evidence, gained from moraine boulders, that the existing glacier may overlie a showing of molybdenite.

No further work is recommended on determining the copper potential of the property. If further work is intended on the property it is suggested that the molybdenite float be traced to its source to determine its extent in bedrock.

T. F. Lee,
WESTERN GEOLOGICAL SERVICES LTD.

August 27, 1969

Vancouver, B.C.

Cominco Ltd./200 Granville Square/Vancouver 2, B.C./Canada
Tel. (604) 682-0611/Telex 04-507730

Exploration

Dr. W. J. McMillan
Department of Mines
626 Superior Street
Victoria, B. C.

March 18, 1974

BJB PROPERTY 0920 024

Dear Dr. McMillan:

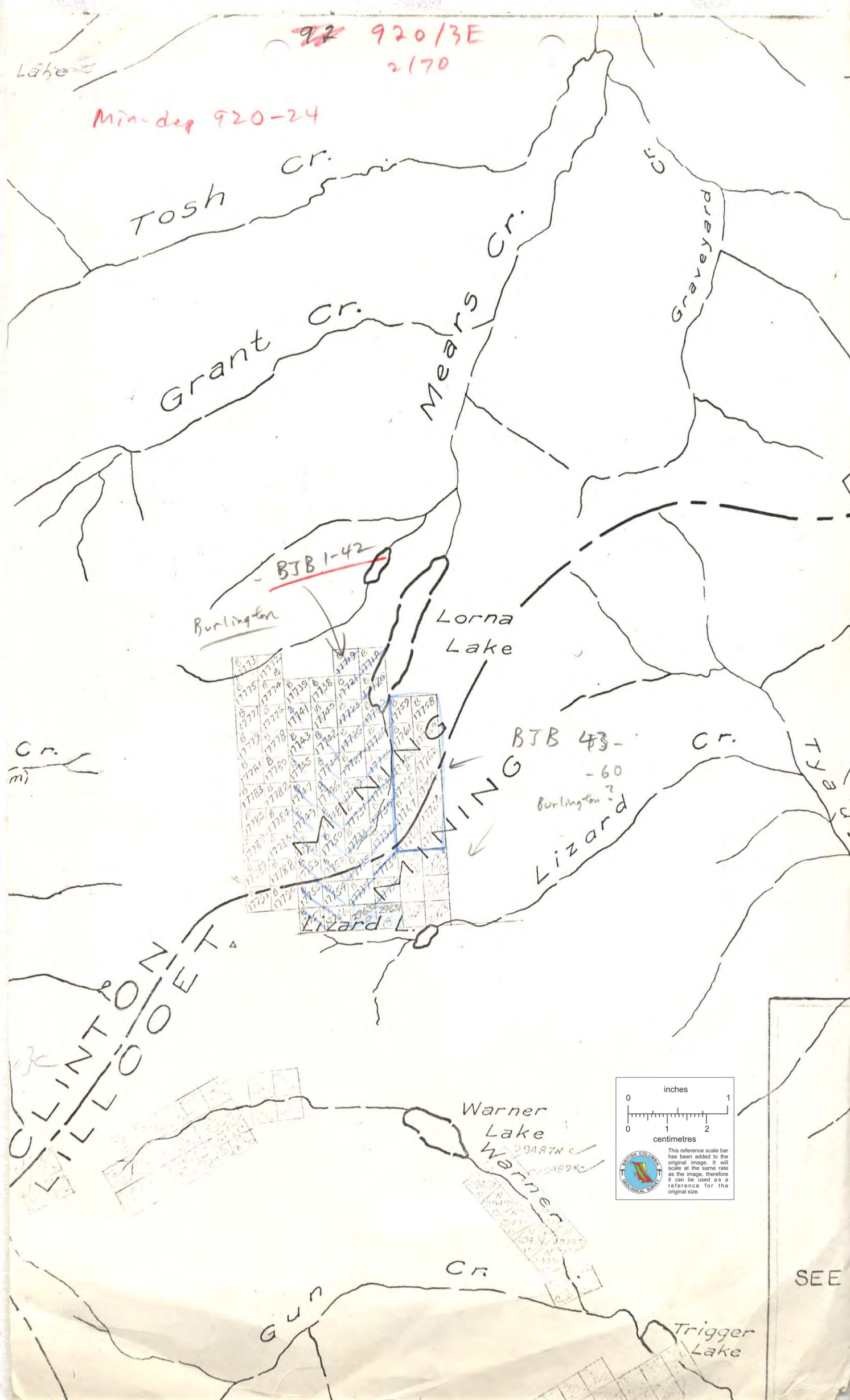
Please find enclosed two maps and twenty-one rock samples from the Lorna Lake property. The samples, I feel, give a good representation of the major rock types, textures and mineralization on the property. Sample locations are plotted on the maps.

Should you require any additional information regarding the geology of the area, don't hesitate to contact me.

Yours sincerely,

A. C. Freeze, Jr.
Assistant Geologist
Western District Exploration

ACF/vw
Encl.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2/70
Min. dep 920-24
Lake
Tosh Cr.
Grant Cr.
Mears Cr.
Graveyard Cr.
BJB 1-42
Burlington
Lorna Lake
MINING
BJB 43-60
Burlington ?
Lizard
Lizard L.
Cr.
CLINTON
LILLOOET
Warner Lake
Warner
Gun Cr.
Trigger Lake
SEE
inches
0 1
0 1 2
centimetres
BRITISH COLUMBIA GEOLOGICAL SURVEY
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.

TAPE NO. _____ REF. NO. 11 PRECON _____ INITIALS _____

Special Instructions _____

1BJB,,,,,,(920-24),,,,,,(Fig. C, No. 108)s10M and +4pts,

1LOCATION: Lat. 51! 06' Long. 123! 11'sroll back.

rm420,(920/3E)

o CLINTON M.D.,,,Sixteen miles east-southeast of the south end of Upper Taseko Lake, mainly southwest of Lorna Lake, between 6,300 and 9,600 feet elevation.

oCLAIMS: LORN 1 to 71.

oOWNER: COMINCO LTD., 200 Granville Square, Vancouver.

oMETALS: Copper, molybdenum, lead, zinc.

oDESCRIPTION: An Upper Cretaceous quartz monzonite stock intrudes lower Upper Cretaceous Kingsvale andesite and Upper Jurassic Relay Mountain sedimentary rocks. Mineralization is predominantly associated with the intrusive-volcanic contact and, in decreasing order, consists of pyrite, pyrrhotite, magnetite, chalcopyrite, molybdenite, arsenopyrite, native copper, lead, and zinc.

oWORK DONE: Surface geological mapping, 1 inch equals 500 feet covering all claims.

oREFERENCE:sI, B.C. Dept. of Mines & Pet. Res.,sM, GEM, 1972, p. 313,s10B,

s,

x