4756

GEOLOGICAL REPORT ON THE "S" GROUPS OF CLAIMS

93L/14W

54°127° N.E.

by

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for

Climax Molybdenum Corporation of British Columbia Ltd.

December 10, 1973

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INTRODUCTION

The following report and accompanying maps outline the geological study undertaken on the "S" groups of mineral claims on Hudson Bay Mountain, approximately six miles west of Smithers, B.C. The groups form the southwestern corner of a large block of claims and mineral leases held by Climax Molybdenum Corporation of British Columbia Ltd.

The company has been actively exploring a large low grade molybdenum deposit approximately one and one half miles northeast of the map area. To date, almost 200,000 feet of diamond drilling and approximately 10,000 feet of tunnelling have been completed on the project.

The geological mapping was done primarily to understand more about the Hazelton volcanic rocks, which host molybdenum bearing intrusives and a multitude of surrounding base metal occurrences.

PHYSIOGRAPHY AND ACCESS

The general topography of Hudson Bay Mountain is rugged and precipitous. Elevations of the study area range from 5000 to 7600 feet above sea level, and permanent snow fields occur in patches above the 6000 foot elevation. Much of the bedrock cover consists of angular talus with only the more gently sloped areas having minor soil development.

Access to the study area from Smithers was by a 13 mile secondary road that terminates at the local ski development. The remainder of the distance was completed on foot. A small fly camp was flown up to the map area. This was done in an attempt to cut down on travelling time. The camp was abandoned due to persistent adverse weather conditions, and the daily commuting from Smithers was resumed.

WORK DONE

Field mapping was done on a scale of 1" = 500'. Base maps were prepared from a 1" = 1000' scale British Columbia Department of Lands and Forest topographic map M-161, and from a 1" = 500' claim survey and topographic map prepared by Underhill and Underhill.

Control for mapping stations was established by triangulating with a Brunton Compass to surveyed claim posts and iron pins. Elevations were checked using a Thommen altimeter.

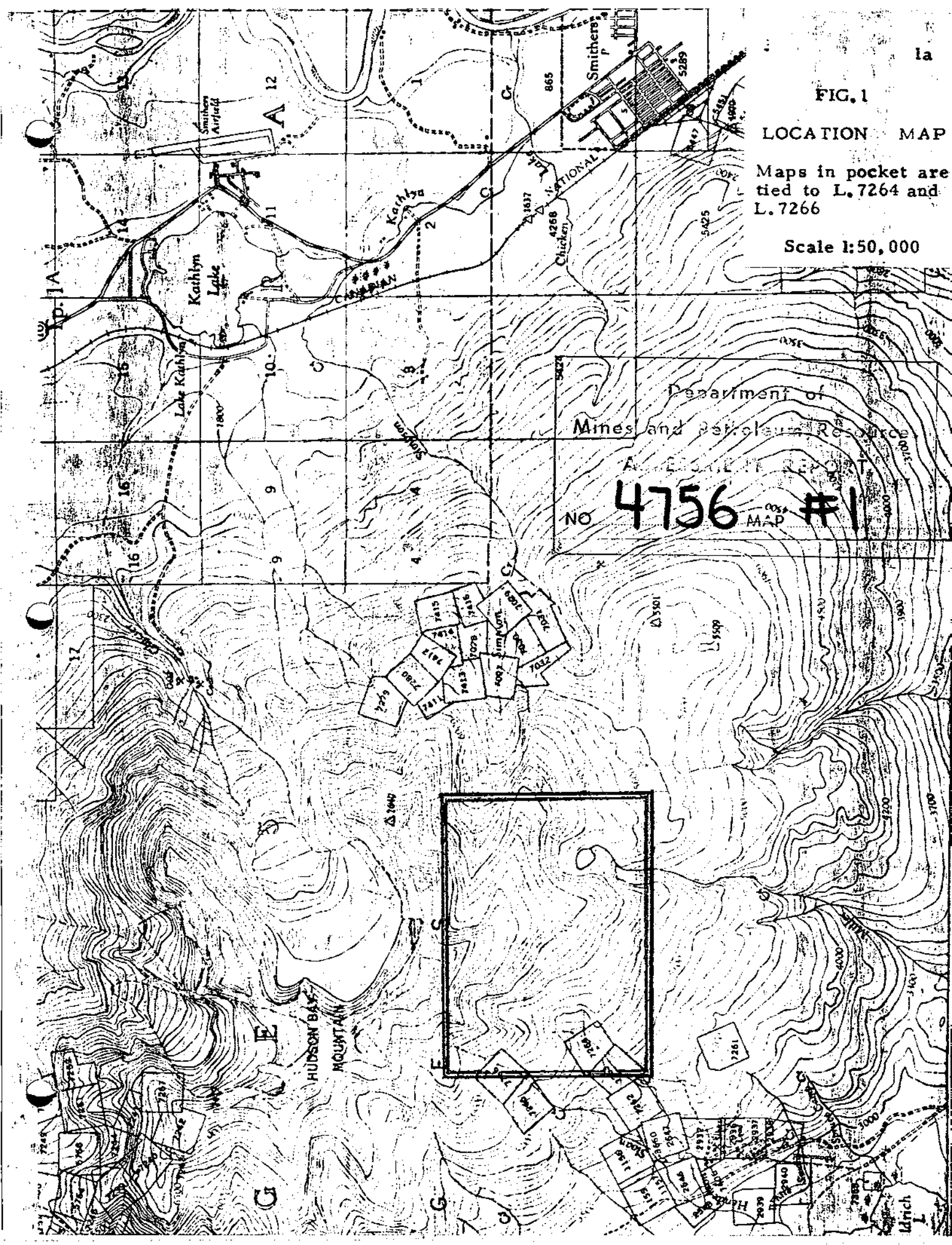

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FIG. 1

LOCATION MAP

Maps in pocket are tied to L. 7264 and L. 7266

Scale 1:50,000

A total of 65 mineral and rock hand specimens were collected for examination in the laboratory. Two mineral specimens from widely separated vein deposits were taken for assaying.

REGIONAL GEOLOGY

Hudson Bay Mountain is underlain predominately by volcanic and sedimentary rocks of the Hazelton Group. Most of these rocks are pyroclastics of intermediate composition. Minor basic flows, and small, irregular felsitic intrusions occur within this pyroclastic pile. All of these rocks are considered to be Jurassic in age.

Continental and marine clastic sedimentary rocks of the Bowser Group are unconformably plated over the Hazelton rocks on the northeastern flank of the mountain. These rocks are mostly dark grey to black greywacke, argillaceous quartzite and argillite, considered to be Upper Jurassic to Lower Cretaceous in age.

A series of intrusive bodies, believed to be related to the molybdenum deposit, occur near the center of the mountain. These rocks are encountered only in underground workings and in diamond drill holes well below ground surface. The oldest of the intrusions is a lenticular wedge shaped body of granodiorite/granodiorite-aplite, which is a host to much of the mineralization. A small steep sided plug of quartz porphyry intrudes the volcanic rocks and pierces the lower portion of the granodiorite sheet. The plug is in turn truncated by a large quartz monzonite porphyry stock, which appears to form the core of the mountain. This intrusive is believed to be the source of a radial swarm of feldspar quartz porphyry dykes which outcrop over much of Hudson Bay Mountain. Uplift and doming displayed by the sedimentary and volcanic strata is believed to be a result of forces exerted by this intrusive stock.

DETAILED GEOLOGY

ROCK TYPES

VOLCANIC ROCKS

The map area is underlain predominantly by a complex sequence of Hazelton Group pyroclastic rocks. These consist mostly of interbedded lenticular bodies of brown to greenish grown andesitic tuffs, crystal tuffs, lapilli tuffs and tuff breccias. Textural and compositional changes in these rocks are often marked over short distances. A few small lenses of dark

brown to black flow rocks are interlayered with the pyroclastics in the southern portion of the map area.

The only persistent marker horizon observed in the map area is a distinctive "Quartz Eye unit". This is an andesitic crystal tuff characterized by subhedral to euhedral quartz crystals up to 1/8 inch in diameter set in a brownish aphanitic groundmass. These quartz "eyes" constitute up to 30% of the rock near the base of the unit, and they diminish rapidly upwards. The Quartz Eye unit appears to be more resistant to weathering than the adjacent rock types, and it commonly forms ridges and localized topographic highs.

Volcanic rocks stratigraphically above the Quartz Eye unit are undifferentiated with the exception of two lenses of crystal (quartz) tuff. The size and abundance of the quartz "eyes" in these are less than in the main Quartz Eye unit. Quartz crystals average about 1/16 inch in diameter, and constitute up to 10% of the rock.

Volcanic rocks unconformably underlying the Quartz Eye unit are also undifferentiated with the exception of:

a) an area with numerous small vague, lenses of quartz crystal tuff intercalated with crystal (feldspar) tuff, lapilli tuff, tuff breccia and minor irregular basic flows (?). The quartz "eyes" in the lenses are less than 1/16 inch in diameter and they form less than 10% of the rock.

b) an irregular ovoid area of light green-grey glassy rock with varying amounts of small feldspar laths to 1/8 inch in length occurs near the center of the map area. On weathered surfaces, this rock displays a buff-white colour and highly contorted flow (?) banding. In most places contacts with the adjoining undifferentiated pyroclastics are sharp. Locally, the distribution suggests cross cutting relationships, and the map unit is considered to be a high level intrusion and/or flow.

INTRUSIVE ROCKS

1. DIABASE, DIORITE DYKES

The oldest intrusives in the map area are a swarm of very fine grained diabase and diorite (?) dykes and their metamorphosed equivalents. These dykes vary in width up to 50 feet, and many occur in a distinctive north west trending set that dip steeply south. Similar dykes also are found along the base of the Quartz Eye unit, and appear to occupy a basal unconformity. A few dykes have north to north easterly trends, but this set is not well developed.

The dykes are generally very fine grained and dark green to black in colour. Grain size commonly increases slightly towards the center of some of the wider dykes, but identification of the individual mineral constituents could be made only in thin section.

2. FELDSPAR, QUARTZ, BIOTITE PORPHYRY DYKES

The youngest rocks in the map area are a north to northeasterly trending swarm of feldspar quartz biotite porphyry dykes up to 15 feet wide which form the southern part of a prominent radial set of dykes that is centered near the main cirque on the Hudson Bay Mountain.

Grain size and relative abundance of phenocrysts in the various dykes is quite variable. In all cases the groundmass is very fine grained (<2mm) to aphanitic. Where phaneritic, the matrix appears to consist of equant interlocking grains of quartz and feldspar. Phenocrysts constitute up 20% of the rock. These are mostly subhedral to euhedral quartz with minor amounts of subhedral plagioclase and biotite.

Some of the dykes are highly sheared into thin plates parallel to the walls of the dyke. This has been caused by recurrent movement in the fracture system occupied by the dykes. Weathering and decomposition has been accelerated in these areas, and identification of the dyke rock can be difficult.

STRUCTURAL GEOLOGY

Folding related to doming, and block faulting are the major structural features in the map area.

Identification of consistent primary structures in the pyroclastic rocks is difficult to obtain. These are often obscurred by incipient secondary features. Pronounced variations in textures and/or composition over short distances, and the lenticular nature of the various tuff beds made differentiation impractical. The few marker beds and lenses that could be traced over any appreciable distance are used to make structural interpretations. Structures in, and west of Henderson Creek are complex, and not completely understood.

FAULTING

Small faults and dislocations are found throughout the map area. Most of these appear to fall in three sets. The oldest set, which locallized the basic dykes, trends northwesterly. Two later fracture sets strike north-northeasterly and northeasterly.

The steep north-northeasterly and northeasterly trending structures appear to have been a major control in the emplacement

of the porphyry dykes and many of the small fissure vein deposits.

Later movement was observed along the north-northeasterly faults as evidenced by shearing of porphyry dykes and vein lodes occupied by the structures. Post-mineral fault movement also along the northwesterly set is evidenced by its intersection with, and offsetting of mineralized veins.

A northeasterly trending zone of major dislocation in and/or parallel to the gulch occupied by Henderson Creek is suspected. Although no single fault of significant size could be located, the marked difference in attitudes of the Quartz Eye unit east and west of this area suggests substantial movement, with possible rotation in some block segments. It is suspected that the west side of this zone has been rotated, displaced upwards, and in a left handed sense relative to the eastern block.

FOLDING

The surface trace of the marker horizon in the Hazelton rocks east of the faulting on the east side of Henderson Creek appears relatively uncomplicated. From the 6000 to the 7000 foot elevation, this trace is closely approximated by a plane with an attitude of N45°W/48°N. The true thickness of the Quartz Eye unit in this area is about 200 feet.

Attitudes on primary structures within the unit are quite variable despite the uniform surface trace. It is not known if this is due to small scale secondary folding or to original depositional features.

East of Henderson Creek there is a westerly swing in strike, and a steepening of dip in the Quartz Eye unit immediately east of the left-handed fault at the 7100 foot elevation. This could be due to some drag phenomenon on the fault, or to the possibility that dips are steepening up dip on the limb of some large fold structure.

The surface distribution of other subdividable map units above and below the Quartz Eye unit show comparable trends to the main marker horizon east of the faulting near Henderson Creek.

A synclinal trough at the base of the Quartz Eye unit was noted on both the east and west banks of Henderson Creek near the 6250 foot and 6100 foot elevations respectively. The axial plane of these folds trends west-northwest, similar to fold structures reported at the Duthie Mine, just south of the map area.

The exposures of the Quartz Eye marker horizon on the western side of Henderson Creek are thought to be erosional remnants of a southerly dipping limb of a broad, open antiform. Attitudes on the basal contact of these remnants suggest possible secondary folding occurring along a northeasterly trending axis.

MINERALIZATION

Mineral deposits on Hudson Bay Mountain exhibit a crude mineralogical arrangement in concentric zones, centered by silica-molybdenum-tungsten-copper mineralization. This zone is successively surrounded by a quartz-pyrite zone, and an outer Base Metal zone. The Base Metal zone has been subdivided by Kirkham (ref.1) into an inner zinc-gold-copper-arsenic zone and an outer lead-silver-copper arsenic zone. The map area lies near overlapping contacts of the quartz-pyrite zone and the inner Base Metal Zone.

Mineral occurrences in the map area are predominantly fissure vein types. The chief sulphide minerals present in order of abundance are arsenopyrite, pyrite, sphalerite, galena and chalcopyrite. Gangue minerals consist mainly of quartz, calcite and siderite.

"ORE" CONTROLS

The fracture filled veins in the map area vary in width up to 10 inches. Individual veins seldom persist for more than 25 feet along surface trace. Many of the showings occur within short distances of porphyry dykes and many appear to be in fractures that are related to those occupied by the dykes. Hence, the north-northeasterly and northeasterly structural trends are considered to be the most important in the localization of the fissure vein deposits.

Limited evidence suggests that sulphide mineralization preceded emplacement of the porphyry dykes, and that later shearing along the same structures cut both the vein material and the dykes.

ALTERATION

The map area lies at the southern edge of a large (2 1/2 miles by 4 miles) ovoid alteration zone that is centered close to the toe of the main glacier on Hudson Bay Mountain. Near the edges this alteration zone is characterized by strong fracturing, pyritic replacement and fracture filling, and alteration of ferro-magnesian minerals.

In the map area, this type of alteration is irregularily developed and it does not appear to be related to any particular structure or rock type. The Quartz Eye unit may have been more resistant and in several cases the alteration terminates abruptly at the Quartz Eye contact. One exception is an area of altered Quartz Eye unit northwest of Crater Lake.

Adjacent to the fissure vein deposits, bleaching and fine grained pyrite replacement are common alteration features. In addition, bleaching occurs along some of the north-northeasterly and northeastern structural breaks.

Fine grained pyritic replacement occurs in the wall rocks of the porphyry dykes.

Recurrent shearing in some fissure vein deposits and along some porphyry dykes has occurred. This has permitted accelerated weathering and erosion.

K.E. Card B.Sc.

Supervised by:

D.A. Davidson P.Eng.

REFERENCES

(1) Kirkham, R.V., 1969 Mineralogical and Geochemical Study of the Zonal Distribution of Ores in the Hudson Bay Range British Columbia. Unpublished Ph.D. Thesis University of Wisconsin.

(2) Kindle, E.D. 1940 Mineral Resources, Hazelton and Smithers Areas, Cassiar and Coast Districts, British Columbia. G.S.C. Memoir 223.

(3) Jonson, D.C., Davidson, D.A., Daugntry, K.L. Geology of the Hudson Bay Mountain Molybdenum Deposit, Smithers B.C. Unpublished paper presented at annual meeting of C.I.M.M. in Vancouver, B.C. April 24, 1968.

APPENDIX I

APPENDIX I

S-1 GROUP

CLAIM NAME	RECORD No.
M-27	14566
M-31/35	14570/74
J-25/34	15923/32
J-45/48	15943/46
F-No.6	11769
F-No.7	11770
H-32Fr.	47551
M-5Fr.	128533
M-6Fr.	128534

S-2 GROUP

CLAIM NAME	RECORD No.
M-26	14565
M-36	14575
M-38/42	14577/81
J-35	15933
J-41/44	15939/42
M-1Fr/M-4Fr.	128529/32
M-7Fr.	128535

APPENDIX II

STATEMENT OF PROJECT COSTS

ANALYSIS OF PROJECT COST

LABOUR COST

NAME, ADDRESS OCCUPATION	PER DIEUM RATE *	No. DAYS WORKED		AMOUNT
D.A.Davidson P.Eng. Box 2511 Smithers BC Resident Geologist	72.85	26	1894.10	
K.E.Card B.Sc. Box 2854 Smithers BC Geologist	61.16	49	2996.84	
W.Flint RR#2 Smithers BC Technician	47.57	28	1331.96	
		TOTAL	6222.90	6222.90

* Per Dieum Rate is monthly salary plus fringes reduced to daily rate.

TRANSPORTATION

Ford 4x4 980 miles @20¢/mile		196.00	
Helicopter		78.60	
	TOTAL	274.60	274.60

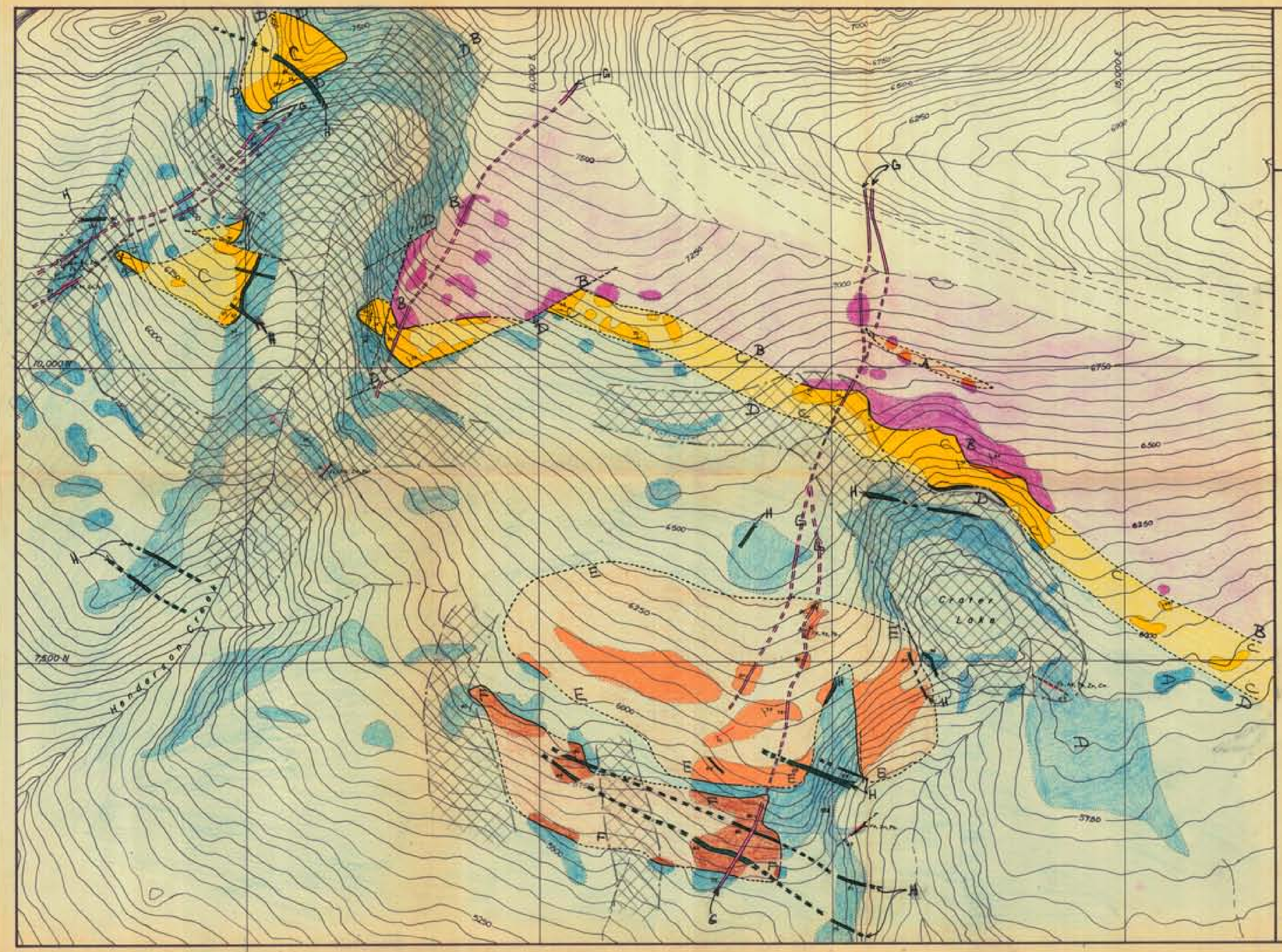
MISCELLANEOUS

Camp costs, food, etc.	25.84	
Preparation of Base Map and Micromasters for Plans. VanCal Invoice M1657	46.12	
Typing and Materials Report Preparation	30.00	
TOTAL	101.96	101.96

TOTAL COST$ 6599.46

DISBURSEMENT OF LABOUR

DATE	TYPE OF WORK	DAYS WORKED EMPLOYEE		
		D.A.D.	K.E.C.	W.F.
May 1973	Preparation of Base Maps and Compilation of Data	1	1	
Aug 1973	Mapping	6	16	16
Sept 1973	Mapping	4	12	12
Oct/Dec 1973	Drafting, Compilation of Data, Report Preparation	15	20	
	TOTAL	26	49	28



CLIMAX MOLYBDENUM

CORPORATION OF BRITISH COLUMBIA LIMITED

YORKE–HARDY PROJECT

GEOLOGICAL MAP OF THE "S" GROUP OF CLAIMS

scale: 1" = 500'

TN

LEGEND

VOLCANIC ROCKS

- **A** — *Lapilli tuff containing significant percentages of quartz eyes. Size and percentage of quartz eyes are considerably less than that of the quartz eye unit.*
- **B** — *Undifferentiated volcanic rocks thought to be stratigraphically higher than the quartz eye unit.*

— CONFORMABLE ? —

- **C** — *The quartz eye unit. (a quartz eye crystal tuff marker horizon.)*

— UNCONFORMITY —

- **D** — *Undifferentiated volcanics thought to be stratigraphically lower than the quartz eye unit.*
- **E** — *Strongly contorted flow banded intermediate glassy volcanic flows or near surface intrusions.*
- **F** — *Volcanics containing layers of quartz eye tuff.*

Jurassic – Hazelton group

INTRUSIVE ROCKS

- **G** — *Feldspar quartz biotite porphyry dykes.*
- **H** — *Greenstone, diabase, and diorite dykes.*

SYMBOLS

- *Geological boundary (defined, assumed).*
- *Primary bedding (vertical, inclined).*
- *Fault*
- *Jointing (vertical, inclined).*
- *Limit of area bound by 50% or more outcrop.*
- *Old workings (adit, trench).*
- *Mineralized vein structure; metallic elements in order of abundance.*
- *Alteration zones: bleaching and/or pyritic alteration.*

To accompany geological report on the "S" group, Hudson Bay Mountain, Omenica Mining Division 54° 127° N.E. by K.E. Card.

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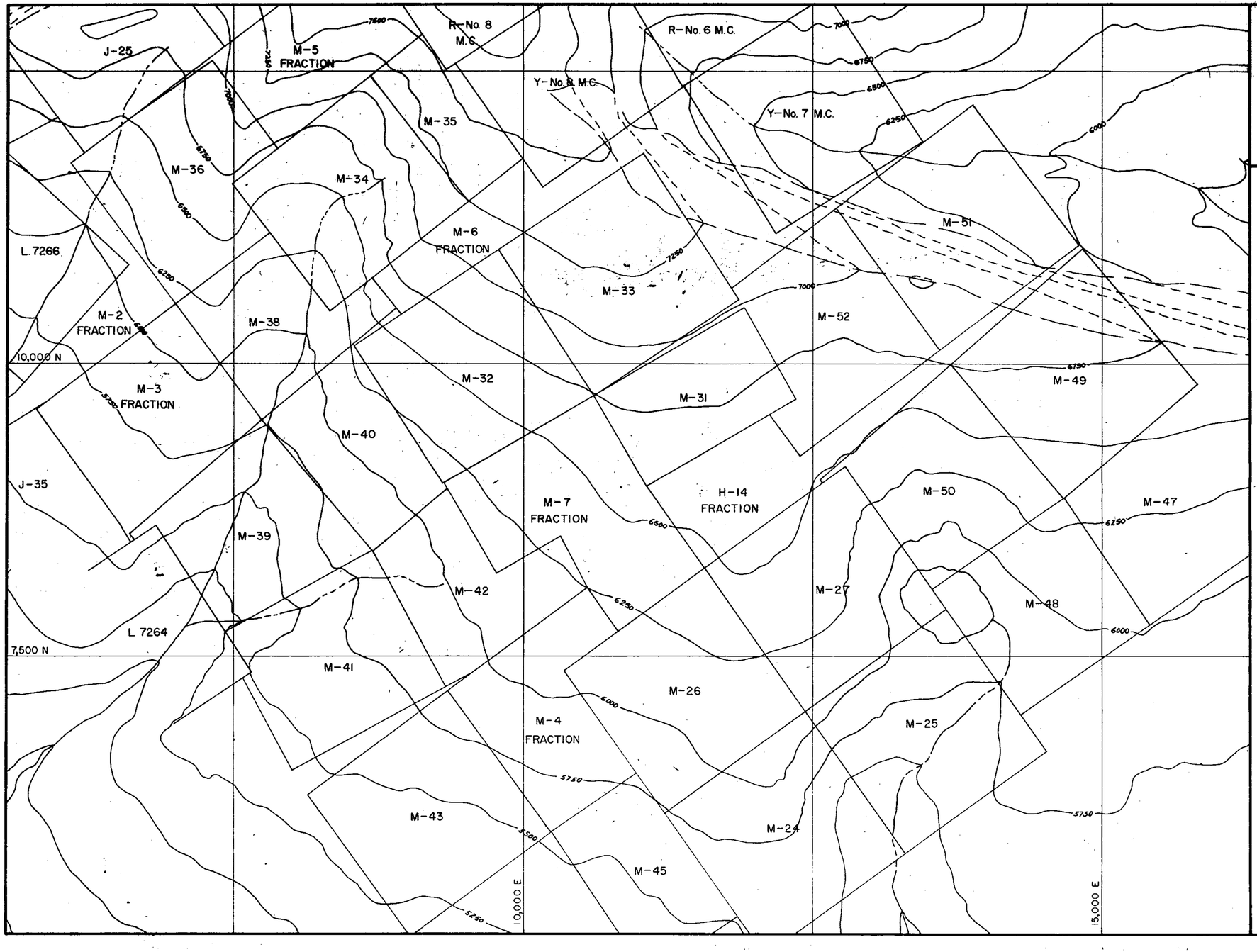

CLIMAX MOLYBDENUM

CORPORATION OF BRITISH COLUMBIA LIMITED

YORKE-HARDY PROJECT

CLAIM LOCATION MAP

0 500
scale in feet

TRUE NORTH

4756-M3

To accompany geological report on the "S" groups, Hudson Bay Mountain, Omenica Mining Division 54° 127° N.E. by K.E. Card.

DRAWN BY : K.E.C. DATE : 1/11/73