

NOVEMBER 1966

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ENGINEERING REPORT



MAYFAIR MOLY MINES LTD. (N.P.L.)

SUITE 34 - 845 HORNBY ST.

VANCOUVER 1, B.C.

McGRATH MOUNTAIN
Alice Arm, B.C.

A MINERAL PROPERTY
of
MAYFAIR MOLY MINES LTD.

Telephones: 684-9029
and 684-2933

HAROLD A. QUINN
B.Sc. Ph.D., P.Eng.
Consulting Geologist & Mining Engineer

82 Mayfair Tower
845 Hornby Street
Vancouver 1, Canada

1 November, 1966

Mr. N.E. Jenkinson,
President,
Mayfair Moly Mines Ltd.,
Suite 34, 845 Hornby St.,
Vancouver 1, B.C.

Dear Sir,

As requested by you, I have prepared a report on the mineral property of your Company, including practically all of McGrath Mountain, at Alice Arm, Skeena Mining Division, Province of British Columbia.

The report is based largely on 2 trips which I made to Alice Arm in summer of 1966, one of 8 days in May-June and one of 22 days in August-September. It is also based on study of several of the items listed in its Bibliography, and on discussions with several geologists, mining engineers, prospectors and others, both in Alice Arm and in Vancouver.

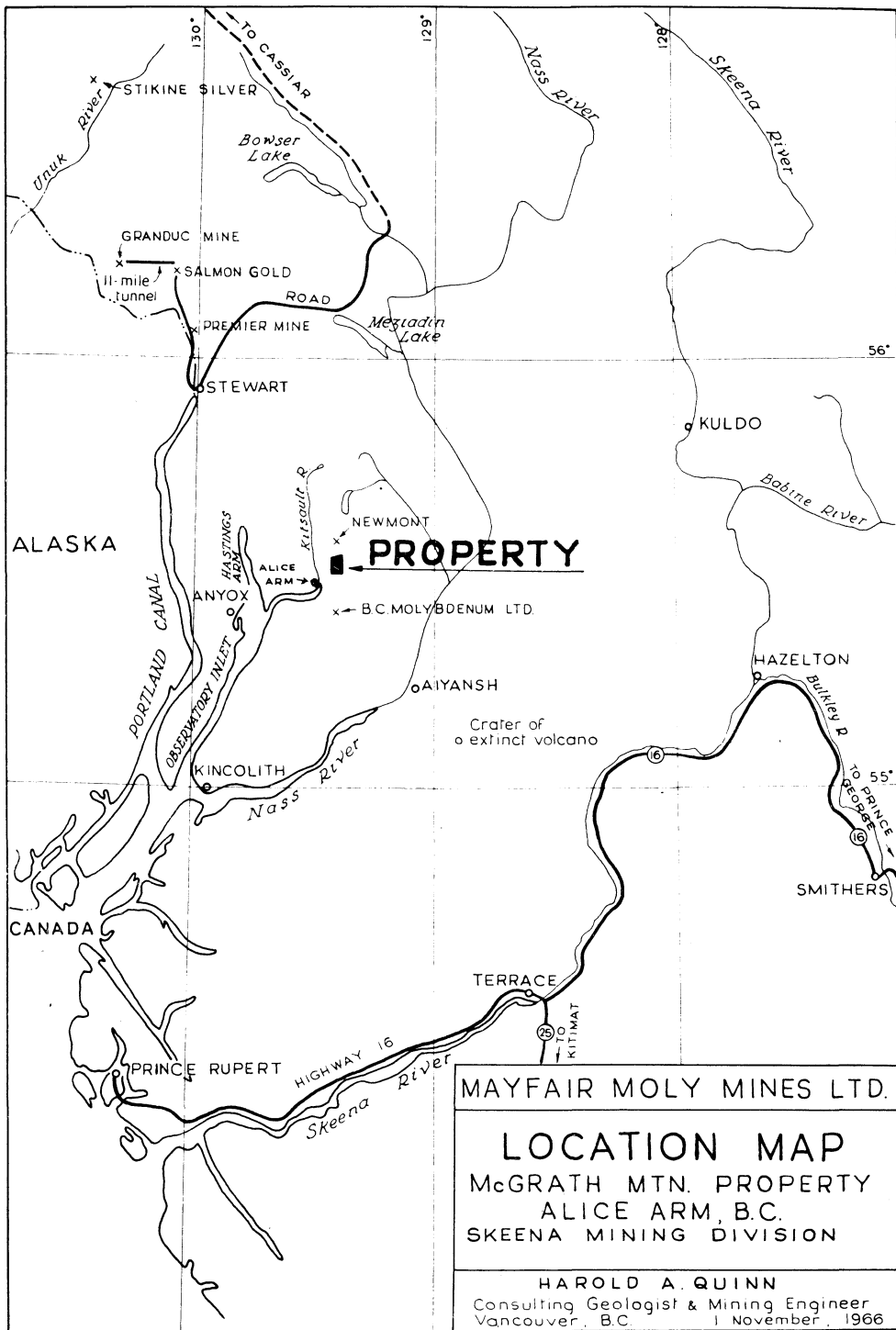
The report, including my recommendations and 5 maps, is submitted herewith.

Yours respectfully,

"H. A. Quinn"

Harold A. Quinn

HAQ/jas
Encl.



MAYFAIR MOLY MINES LTD.

LOCATION MAP
 McGRATH MTN. PROPERTY
 ALICE ARM, B.C.
 SKEENA MINING DIVISION

HAROLD A. QUINN
 Consulting Geologist & Mining Engineer
 Vancouver, B.C. 1 November, 1966

SUMMARY

Mayfair Moly Mines Ltd. holds a large, well-located group of mineral claims at Alice Arm, B.C. The 160 contiguous claims, with total area of 12 square miles, includes practically all of McGrath Mountain, 3 miles northeast of the settlement.

The property is strategically located within the Alice Arm Molybdenum Belt, where it lies between the properties of B.C. Molybdenum Ltd. (Kennecott Copper Corporation), Bell Molybdenum Mines Ltd. and Sileurian Chieftain Mining Co. Ltd. on the south and the properties of Newmont Mining Corporation of Canada Ltd., Conwest Exploration Co. Ltd. and Cyprus Exploration Corporation Ltd. on the north.

The north-trending Alice Arm Molybdenum Belt contains molybdenum-bearing granitic stocks of probable Tertiary age at intervals for 80 miles or more. It seems probable that this Belt will become, eventually, one of the world's greatest sources of molybdenum.

One of the stocks is now being brought into production by B.C. Molybdenum Ltd. at estimated cost of \$30,000,000. A huge body, only partly explored to date by Newmont Mining Corporation of Canada Ltd., is already known to contain more than 1,000,000,000 tons of molybdenum-bearing material. This vast body will soon be explored further by 10,000 feet of tunnelling and additional diamond drilling. Bell Molybdenum Mines Ltd. has found substantial amounts of molybdenum on its property.

Many mineralized zones and areas were found on the property of Mayfair Moly Mines Ltd. during the First World War and many dozens of adits and trenches were dug. Three of the adits are 1160 feet, 600 feet and 200 feet long, respectively.

The mineralization includes copper, molybdenum, gold, silver, lead, zinc, arsenic, iron and other metals. The geology of the property is complex and its rocks are highly fractured and faulted. Several magnetic deviations have been noted.

Because of its widespread mineralization, the heterogeneity of its geological environment, its location within the Alice Arm Molybdenum Belt and its proximity to known orebodies and potential orebodies of major size and importance, it is concluded that the Mayfair property is exceptionally favourable for the discovery of orebodies. It is recommended that the property be explored by a 2-stage programme, costing \$82,265 for Stage I and \$286,270 for Stage II, a total of \$368,535.

INTRODUCTION

Most of the information in this report was obtained during a field trip of 22 days which I made to Alice Arm from August 18 to September 8, 1966 for Mayfair Moly Mines Ltd. and Apollo Minerals Ltd. Some information was also gathered during an 8-day trip for Apollo Minerals Ltd. from May 27 to June 3, 1966.

During my August-September trip I visited various parts of the Company's property (McGrath Mountain) by helicopter with Gunn Fiva, Robert Zielinski and others. This work included inspection of a few claim posts, examination of 2 mineral showings and taking of character samples. Being favourably impressed with the mineralization, its geological setting, and the chances for discovery of substantial bodies of ore on McGrath Mountain, I took options on the Mac (Sunrise) and Sun (Highland) groups of mineral claims for Mayfair Moly Mines Ltd.

Visits were made to the camps and mining properties of B.C. Molybdenum Ltd., Newmont Mining Corporation of Canada Ltd., Sileurian Chieftain Mining Co. Ltd., Bell Molybdenum Mines Ltd., Apollo Minerals Ltd. and Northlodge Copper Mines Ltd. The exploration camp of Amax Exploration Inc., on west bank of Kitsault River about 3 miles north of Alice Arm, was visited several times. Mineral showings and mining properties were inspected on Illiance River (Jen group), Stafford Creek (Gem and Pot groups) and at Granby and Sylvester bays (Molly Mack group).

At Alice Arm, where there are no lodging and meals available for the general public, I was kindly permitted by Eric F. Lee to live in house of William J. Smith. Meals were kindly provided by Skeena River Timber Co. Ltd., by arrangement with Jim Wilson, local manager, and Neil MacDonald, proprietor.

Aerial transportation was provided by Bell 47G-3B-1 3 place (2-passenger) helicopter CF-UVI of Vancouver Island Helicopters Ltd. based at Alice Arm for \$123.00 per hour. Ground transportation was provided by transfer service of Pete Neilsen. Mrs. Neilsen is local agent for Pacific Western Airlines Ltd. and looks after the radiotelephones of both this firm and of B.C. Telephone Co. Unfortunately, neither of these telephones provide reliable, all-weather links with Prince Rupert. (To speak to anyone in the village of Alice Arm, phone Prince Rupert and ask for TELCO, Alice Arm.)

Appreciation is expressed to Mrs. John Schindler for her first aid treatment of an injured man. The cooperation of Jim Fawley for help with soil sampling is also appreciated. Prospector William Maclean of Alice Arm kindly supplied much useful information about the various mineral showing on McGrath Mountain.

THE PROPERTY

The large mining property assembled for and by Mayfair Moly Mines Ltd. on McGrath Mountain at Alice Arm actually consists of 7 contiguous properties or groups of mineral claims. See Claim Map and map of Mining Properties in this report. Some details on these properties are given in the following table:

MAYFAIR PROPERTIES

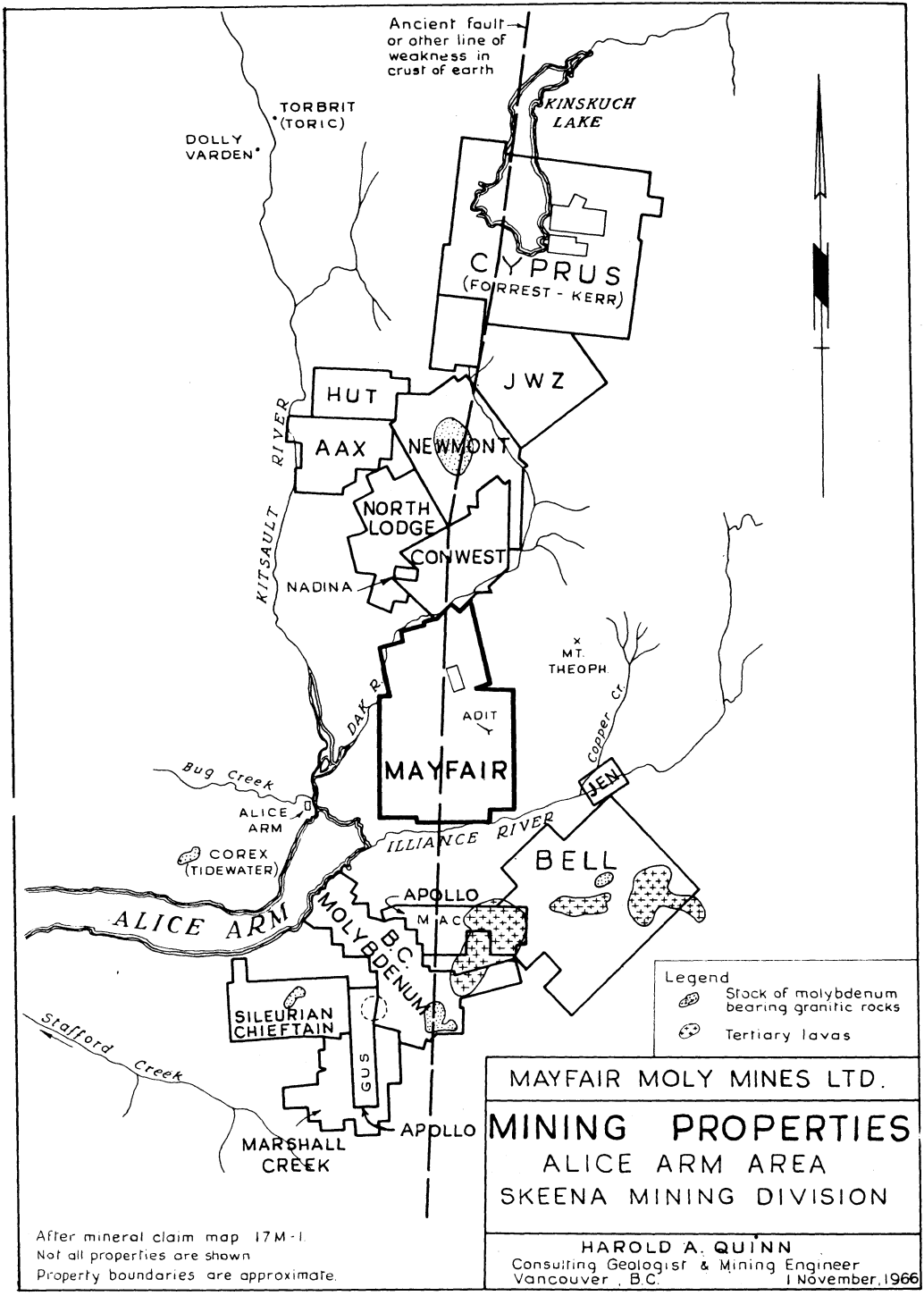
GROUP	CLAIMS	STATUS	LOCATED	RECORDED	MISCELL.
DAK	24	Purchase	July 5, 1965	July 14, 1965	Old San Diego
BEL 1-76	76	Location	Aug. 18, 1966	Aug. 19, 1966	Old Billy Mack
BEL 77-118	42	Location	Oct. 1, 1966	Oct. 4, 1966	
NORM	14	Location	Aug 18, 1966	Aug. 19, 1966	
MAC	10	Option	June 15, 1964	June 25, 1964	Old Sunrise
SUN	10	Option	July 10, 1965	July 17, 1965	Old Highland
STANDARD	4 c.g.	Lease applied for			141.99 acres
Total	180				

As some of the above claims were located over the earlier claims of the MAC and SUN groups, parts of them are invalid. By subtracting the 20 claims of the 2 latter groups, the total effective size of the Mayfair property is reduced to 160 mineral claims. Further information on this is given below.

From the Claim Map and the map of Mining Properties it can be seen that Mayfair Moly Mines Ltd. holds all of McGrath Mountain, except for 2 small Crown grants with total area of 92.16 acres.

Dak Group

This group of 24 mineral claims was purchased from prospector Robert Zielinski of Vancouver on July 27, 1966. He located claims DAK 1-16 on July 5 and DAK 17-24 on July 19, 1965. He recorded these 2 claim groups on July 14 and 21, 1965, respectively. Their record numbers are 26782 to 26797 inclusive and 26829 to 26836 inclusive.



Ancient fault
or other line of
weakness in
crust of earth

TORBRIT
(TORIC)
DOLLY
VARDEN*

KINSKUCH
LAKE

CYPRUS
(FORREST - KERR)

HUT

JWZ

AAX

NEWMONT

NORTH
LODGE

CONWEST

NADINA

x
MT.
THEOPH

ADIT

MAYFAIR

JEN

Bug Creek

ALICE
ARM

COREX
(TIDEWATER)

ILLIANCE RIVER

BELL

APOLLO

MACH

ALICE ARM

MOLYBDENUM

SILEURIAN
CHIEFTAIN

SCG

MARSHALL
CREEK

APOLLO

Legend

- Stock of molybdenum bearing granitic rocks
- Tertiary lavas

MAYFAIR MOLY MINES LTD.
MINING PROPERTIES
ALICE ARM AREA
SKEENA MINING DIVISION

HAROLD A. QUINN
Consulting Geologist & Mining Engineer
Vancouver, B.C. 1 November, 1966

After mineral claim map 17M-1
Not all properties are shown
Property boundaries are approximate.

Bel 1-76

This group of 76 mineral claims was located for Mayfair Moly Mines Ltd. on August 18 and 21, 1966 by prospectors Robert Zielinski, Walter R. Schwartz and Thomas H. Cross of Vancouver. The claims were recorded at Prince Rupert (actually at the sub-mining recorder's office in Alice Arm) on August 19 and 22, 1966. Their record numbers are 29621 to 29696 inclusive and their tag numbers are 715437 to 715500 inclusive, 708095 to 708100 inclusive and 707895 to 707900 inclusive.

Bel 77-118

This group of 42 mineral claims was located for Mayfair Moly Mines Ltd. on October 1, 2 and 3, 1966 by prospectors Walter R. Schwartz and Thomas H. Cross. The claims were recorded at Alice Arm on October 4, 1966.

These claims were staked, apparently over the claims of the MAC and SUN groups, because I noticed, during my visits to McGrath Mountain, that the position of the MAC group is shown wrongly by claim map 17M-1 (25)*. The MAC claims, which actually cover the old Sunrise adit on the east side of McGrath Mountain, are plotted on map 17M-1 on the western slope of the mountain, a mile or more west of the portal of the adit. It seems probable, too, that there is some error in the positions of the SUN and STANDARD claims on map 17M-1. Because of these plotting errors, much of the ground on the western slope of McGrath Mountain was actually open, even though it was not shown as being so by claim map 17M-1. Because of this, the ground was located for Mayfair Moly Mines Ltd.

The true positions of the Mac, Sun and Standard claims will be determined in time. It is obvious, even at present, however, that all of the Mac claims were over-staked by the Bel 1-76 group of claims. Regardless of this, the Company still controls all the mineral rights, because it holds both groups of claims.

Norm

This group of 14 mineral claims was located for the Company by prospector Robert Zielinski on August 18 and recorded at Alice Arm on August 19, 1966. Their record numbers are 29709 to 29722 inclusive. Their tag numbers are 708081 to 708094 inclusive.

Mac

This group of 10 claims was optioned for 3 years from brothers Gunn and Inge Fiva of Alice Arm, on August 24, 1966. They located these claims on June 15, 1964 and recorded them on June 25, 1964. Their record numbers are 23854 to 23863 inclusive.

Sun

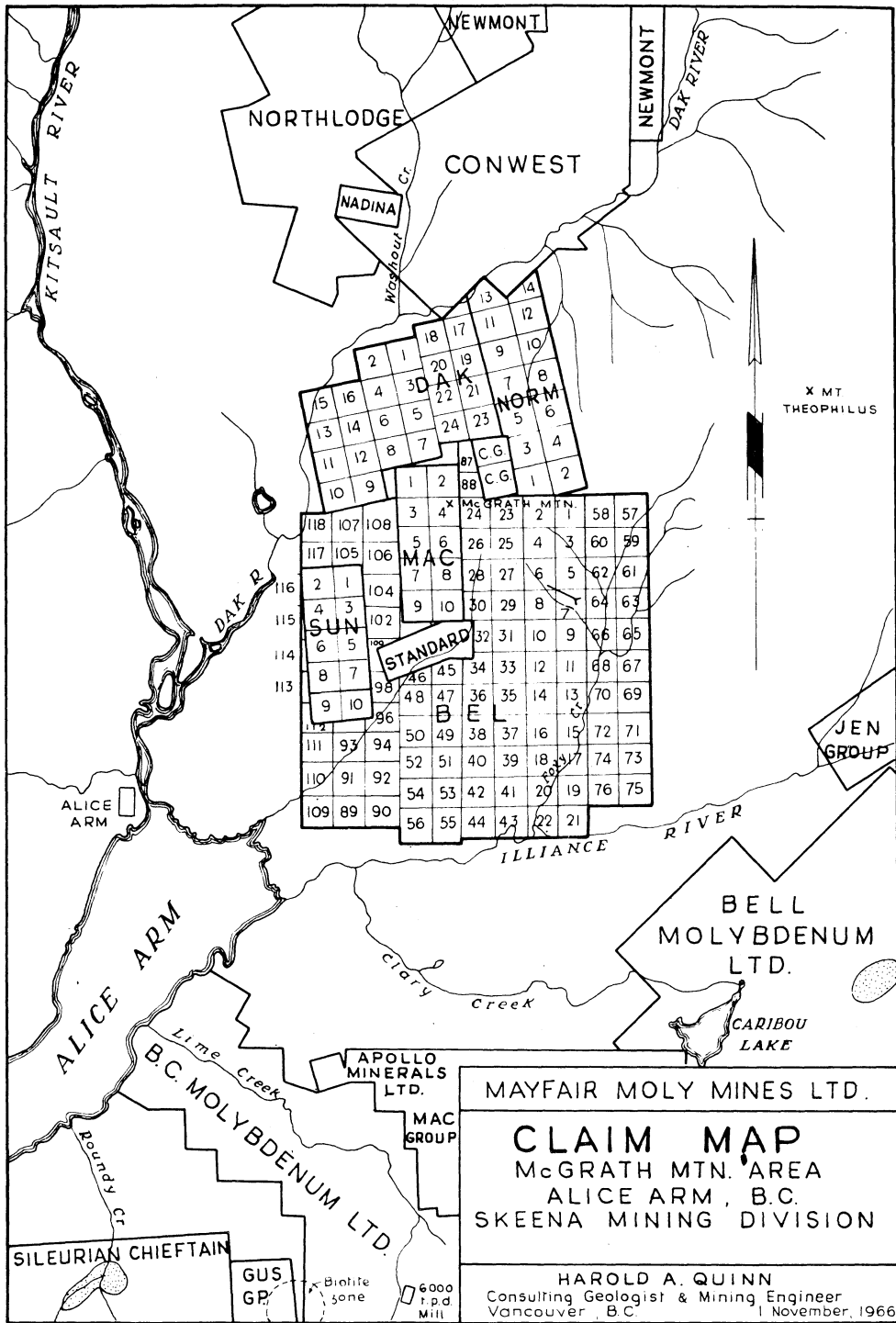
This group of 10 claims was optioned for 3 years from Gunn Fiva, Inge Fiva, Harold J. Lund and Cornelius Nils Hendrickson of Alice Arm on August 25, 1966. The claims were located July 10 and recorded July 17, 1965. Their record numbers are 26857 to 26866 inclusive.

Standard

Mr. N.E. Jenkinson, president of Mayfair Moly Mines Ltd., has applied to the Gold Commissioner at Prince Rupert for a Mineral Lease for the Standard, Standard No. 1, Standard No. 2 and Standard No. 3 contiguous Crown-granted mineral claims, lots 5501, 5502, 5503 and 5504, Cassiar land district. As these claims are open for leasing, they will probably be leased to Mr. Jenkinson soon.

They were formerly covered by Mineral Lease No. M68 of 141.99 acres, requiring annual work of \$4.00 per acre (\$568/year) for the first 10 years. Annual rental for the first 10 years was 50¢ per acre (\$71.). The lease contained an easement relating to smoke or fumes from any smelter, concentrator or other industry "which may in any way interfere with the enjoyment or occupation of the premises".

* Numbers in parentheses refer to Bibliography at end of report.



Location and Access

Center of the Mayfair property is 3 miles northeast of Alice Arm, a hamlet-port of 15 or so permanent residents at the head (N.E. end) of Alice Arm fiord. The southwestern end of the property is less than $1\frac{1}{2}$ miles due east of the settlement. The latter, at latitude $55^{\circ} 28'$ north and longitude $129^{\circ} 29'$ west, is about 4 feet above high tide on a flat delta at mouth of and on west side of the Kitsault River. Because of the surrounding mountains and the curving fiord, it is a well-sheltered spot. A dirt and gravel road runs southerly along the west shore of the fiord for $\frac{3}{4}$ mile or so to the government wharf, adjoining P.W.A. hydroplane float and bulk sales plant of products of Imperial Oil Ltd. (The latter is a commercial marine dealership operated by Alice Arm Holdings Ltd. (McClay, Mackay, Hanna et al) of Vancouver.) A similar road runs northerly along the west bank of Kitsault River for 16 miles or so to the Dolly Varden and Toric silver mines. A new road for 4-wheel drive vehicles runs northeasterly along the Dak River for 13 miles to the exploration camp on the Ajax molybdenum property of Newmont Mining Corporation of Canada Ltd. No road connects the settlement with the property and townsite of B.C. Molybdenum Ltd., $1\frac{1}{2}$ miles to the south. Access is by private boat, across the fiord. See Location Map, Claim Map, map of Mining Properties and government Claim Map 17M-1.

Alice Arm can be reached by air from Vancouver in $1/2$ day for \$131.00 (return fare). It is served daily, (twice daily in summer) by float planes and flying boats of Pacific Western Airlines Ltd. from Prince Rupert. Canadian Pacific Airlines Ltd. has 2 flights daily from Vancouver to Prince Rupert. The cost of chartering a Beaver aircraft for the 1-hour flight from Prince Rupert to Alice Arm is \$80.00.

Alice Arm is also served weekly from Vancouver by the coastal steamer M.V. Northland Prince of Northland Shipping (1962) Co. Ltd. This "steamer" leaves Vancouver at 10 p.m. on Tuesday and arrives at Alice Arm on Saturday. Single passage from Vancouver is \$65.50. Prices for freight are \$1.08 to \$1.25 per 100 lb. or per 2 cu. ft. The post office at Alice Arm is open Wednesday and Saturday mornings and all day Friday. Mail arrives twice a week. Staples are available at Gunn's Store, owned and operated by Gunn Fiva.

Because of its proximity to Alice Arm, access to the Mayfair property is relatively good. The southern, western and northern parts of its periphery can be reached easily by trail, boat and/or road. The southern end of the property is traversed by the old Illiance River Trail. This is a good trail, used in former years by pack horses. Much of the southern $1/2$ of the property can be reached by the old McGrath Mountain Trail, which leads from the northeastern shore of Alice Arm fiord to the portal of the old Sunrise adit on the eastern side of the mountain. It passes near or over parts of the old Standard and Billy Mack properties. On September 4, 1966 Inge Fiva and Harold Lund walked down to Alice Arm along this trail and slashed it, blazed it and marked with orange tape. A rowboat is required to reach both of the above trails from the settlement.

The northwestern and northern lower parts of the property can be reached by the Newmont road along the Dak River. The north central, highest parts are most conveniently reached by helicopter.

As mentioned earlier, the property includes all of McGrath Mountain, except for 2 small mineral claims near its summit. This mountain is shown on modern maps as "Wilauks Mountain". The local people call it McGraw Mountain. It is quite rugged, with some precipitous slopes locally. All but its summit is covered by dense coastal forest. Elevations range from sea-level to 4,000 feet at the summit.

The Illiance River runs along the southern end of the property in a narrow steep-walled canyon. Morley and Foxy Grandpa creeks run southwesterly into the Illiance River. Wilauks (Jones) Creek flows southwesterly into the northern end of the fiord.

Precipitation is generally heavy. From mid-October to May most of it falls as snow. Temperatures are not extreme, however. Field work can probably be done on most of the mountain in most years from June 1 to about October 15. This year it was all covered by new snow which fell on October 9.

All of the several cabins, which once existed on the property, have collapsed. (The walls of the Billy Mac cabin may be still standing.)

All bearings and directions given in this report are astronomic. The present magnetic declination at Alice Arm is about 28° E.

Climatologist Roy Peterson of the Federal Department of Transport at Vancouver airport kindly supplied the following information on the climate of the town of Stewart, B.C., 47 air miles northwest of Alice Arm:

Total annual precipitation* 70.62"
(Average for last 30 years)

Snow 198.4"
Rain 50.8"

Temperatures (30-year monthly averages)

January	24° F.
February	27
March	34
April	41
May	50
June	56
July	57
August	57
September	51
October	42
November	33
December	27

Annual average temperature 41° F.

Extremes of recorded temperatures:

High	94° F
Low	- 22

HISTORY

A good account of the history of Alice Arm area up to end of 1925 was published by the Alice Arm Branch, B.C. Chamber of Mines in 1926 (6). According to it, "molybdenum showings were found by Indians on the hill east of Silver City, which were investigated by Arch-deacon Collison and associates of the Naas Valley. Two English mining engineers examined the ground and sampled it, and a trail was built to it, but whether the ground was ever staked is not known". (These showings are evidently part of the orebody of B.C. Molybdenum Ltd. on Lime Creek).

Prospector Frank Roundy first visited Alice Arm in 1888. He staked 3 claims of the Esperanza silver mine in 1903. "This staking was instrumental in forming a small settlement and started the development of the district's mineral resources". Negro prospector John Stark came in 1900. In 1907 Joe McGrath, Norman Cane and Benjamin Williams staked a molybdenum property 4 miles down the fiord. (Probably the Tidewater property. H.A.Q.)

On July 10, 1910 prospectors Ole Evindson, Ole Pearson, K.L. Eik and E. Carlson found and staked the Dolly Varden silver mine (6), $\frac{1}{4}$ mile west of Kitsault River and 13 air miles north of Alice Arm.** A narrow-gauge railroad 17 miles long was completed to the mine in 1919 from the wharf at Alice Arm. In June 1919 the mine was seized from Dolly Varden Mines Ltd. by Taylor Engineering Co., following a dispute over railway construction debts. The latter company operated the mine until late in 1920. The 36,620 tons of ore produced were sent to the Anyox smelter and 1, 301, 238 ounces of silver were recovered. The mine was closed in December, 1920.

* Precipitation = Rain + 1/10 of snowfall, i.e. 10" snow = 1" rain.

** Not to be confused with the famous Dolly Varden mine found in 1872 in Elko County, northeastern Nevada, U.S.A. Ore of the latter contained Cu, Pb, Ag and Au.

In 1914 the Hidden Creek mine of Granby Consolidated Mining, Smelting & Power Co. Ltd. began production at Anyox, 14 air miles southwest of Alice Arm. This mine and the adjacent Bonanza mine of Granby Consolidated produced hundreds of millions of pounds of copper, many million ounces of silver and some hundreds of thousands ounces of gold. Hunter (12) estimates that the Alice Arm-Anyox-Stewart area had the following total production up to 1932:

Ore	22,145,700 tons
Silver	44,634,000 ounces Troy
Gold	1,398,460 " "
Lead	5,525,000 pounds
Zinc	1,673,000 "
Copper	577,945,000 pounds

These total amounts were obtained from the copper ores of Anyox, gold-silver ores of Premier, gold ores of Big Missouri and B.C. Silver, and silver-lead-zinc ores of Dolly Varden. He mentions the huge copper potential of the Granduc area, 25 miles northwest of Stewart, where Granduc Mines Ltd. has an orebody estimated to contain 32,500,000 tons averaging 1.93% copper.

In 1947 Torbrit Silver Mines Ltd. acquired the Tonic silver mine just across the Kitsault River from the Dolly Varden mine. A 2,000 H.P. hydro-electric plant and a 400 t.p.d. mill were constructed. Some 19,000,000 ounces of silver were produced before the mine was closed in 1958.

Prospector William Maclean of Alice Arm re-discovered the molybdenite on Lime Creek in 1911. He built a cabin there, drove an adit into the north wall of the canyon of the creek and staked the Canadian Girl mineral claim. Later he staked the Caribou and Lynx claims. Failing to interest Climax Molybdenum Ltd. and other companies in his ground he eventually dropped it.

During World War I a mill of 100 t.p. day capacity was built on the higher grade but smaller Tidewater (Corex) molybdenum deposit by Molybdenum Mining & Reduction Co. (5,1916). Production was small, however, and interest in the molybdenite of the area waned, except briefly from 1929 to 1932. Interest was revived in 1956 and led to partial exploration of a deposit on Roundy Creek by Southwest Potash Corporation, exploration arm of American Metal Climax (Amox) (27). This ground, now held by Gunn Fiva, is being explored further by Sileurian Chieftain Mining Co. Ltd. under an option agreement.

About 1962 or earlier Patricia Barber of Alice Arm staked 7 mineral claims on the Lime Creek molybdenite found in 1911 by Wm. Maclean. She allowed most of these claims to lapse and the ground was restaked by Gunn Fiva and Oscar Flint. Their claims were purchased outright by Kennco Explorations (Western) Ltd. for \$37,000, of which Fiva received \$22,200 (60%) and Flint \$14,800 (40%).

Early in 1965 or late in 1964 Kennco announced that its diamond drill programme of 44,648 feet in 66 holes had indicated the presence of 40,000,000 tons of ore with average grade of 0.23% MoS₂ in an orebody of annular shape above the 1,600 foot elevation in and near a small stock of granodiorite-quartz diorite on Lime Creek (26). Kennco announced further that the orebody would be mined and milled by a new company, B.C. Molybdenum Ltd., at rate of 6,000 tons per day. Estimated cost to production was about \$20,000,000. This figure has recently been increased to \$30,000,000.

It is planned to begin production early in 1968. A 5-mile road has been constructed from tidewater (mouth of Lime Creek), the open-pit mine is being prepared, the concentrator is being built and the right of way of a 92-mile electric transmission line has been cleared from Terrace to the concentrator. B.C. Hydro & Power Authority recently invited tenders on a contract to build the transmission line itself (33). In 1967, in addition to completing the above items, the company will construct a deep-water wharf and housing for its employees at its cleared townsite just north of Lime Creek on the eastern shore of Alice Arm fiord.

The above production announcement by Kennco led to the hurried staking of a few hundred claims around the Kennco and Sileurian properties in January and February, 1965 by Lionel R. Setter and associates of Vancouver.

Early in 1965 the exploration staff of Newmont Mining Corporation of Canada Ltd. became interested in a large mineralized area described by mining engineer Howard T. James in 1927 (5), on the eastern slope of Mt. McGuire, 8 miles N.N.E. of Alice Arm. James concluded,

"There are so many small veins and so much general mineralization on Red Top mountain that one might hope to find a commercial vein on it somewhere."

Newmont prospectors Stuart W. Barclay, Fred Haselberg and Ernest Edzerza were sent to investigate James' report of molybdenite, pyrite, pyrrhotite, etc. occurring over a large area. From May 7 to 11 inclusive, 1965 they staked the Ajax group of 91 mineral claims. In 1965 the company prospected the property, built a 13 mile road to it along Dak River, mapped geology of 1 square mile, trenched and sampled surface showings, cut picket lines and used 3 diamond drills to put down 5 holes for total footage of 5,185 feet (5, 1965).

In 1966 Boyles Bros. Drilling Co. Ltd. used 4 new wireline drills to put down 10 or more NX holes to depths of 900 feet or so. Total footage of these holes may be 8,000 to 10,000 feet. Tatsuya S. Takeda mapped the surface geology of part of the property at scale of 100 feet to 1 inch by plane table. Alan Morris and Mel V. Maki logged and sampled the drill cores. Henry Brehaut, mining engineer, supervised the exploration project.

According to prospector William Maclean, much of the mineralized area on the Ajax group was staked in 1908 by Murdoch Campbell, a prospector who lived at Anyox. Charles Gordon, policeman at Alice Arm, also found Molybdenite there in 1915.

The 2 seasons of surface exploration work by Newmont have indicated a molybdenum-bearing zone more than 3,000 feet wide, extending N. 35° W. for more than one mile. Topographic relief, supplemented by diamond drilling, indicates that the molybdenum mineralization has a vertical range of more than 2,000 feet. With incomplete and non-exact information, I estimate roughly that the mineralized body contains more than 1,000,000,000 tons of material grading between 0.1 and 0.15% MoS₂. This vast tonnage probably includes some very substantial lenses or zones of higher grade material.

Newmont is now planning to explore the body further by 10,000 feet of 8'x10' tunnelling (drifting and crosscutting), followed by underground diamond drilling.

In 1966 Cyprus Mines Corporation optioned the large property of Forest-Kerr Mines Ltd. at Kinskuch Lake and had part of it explored by Semco (Stokes Exploration Management Co. Ltd.) of Vancouver. This work included geological mapping, geochemical and geophysical (aeromagnetic) surveys, and the drilling of 5 diamond drill holes at south end of Kinskuch Lake.

In 1965, after the big molybdenum discovery of Newmont on Mt. McGuire, prospector Robert Zielinski staked the Dak group of 24 claims on the northwestern slope of McGrath Mountain. Noland Mines Ltd. optioned these claims and did a little trenching and other surface work on them (11).

Also in 1965, mining engineer Stanley J. Hunter of Vancouver staked the Bel group of 68 claims on the southern slopes of McGrath Mtn. on August 10 to 16 for Vancana Explorations Ltd., Vancouver. The claims were photographed from the air (14,000' A.S.L.) on September 5, 1965 (by Lockwood Survey Corp. Ltd.?) for McElhanney Surveying and Engineering Ltd., Vancouver. Fifteen contact prints (9"x9") at approximate scale of 1"=2,000' are available. Hunter wrote a brief preliminary report on the claims dated August 18, 1965 (12). As no exploration or other surface work was done on the claims during the first year, they lapsed on August 17, 1966. This and additional ground was staked for Mayfair Moly Mines Ltd. on August 18 and 21 and October 1, 2 and/or 3, 1966.

During the summer of 1965, Mastodon-Highland Bell Mines Ltd. prospected quite a large area east and southeast of Alice Arm both by helicopter and by ground parties. Three or more Mo-bearing plugs or stocks of granitic rocks were found and 3 groups of claims were staked. The largest of these groups, the Moly group of approximately 140 claims adjoins the property of B.C. Molybdenum Ltd. on the northeast. Bell Molybdenum Mines Ltd. has recently been incorporated to acquire and explore the Moly claims. This new company is controlled jointly by Highland-Bell Ltd. and Leitch Gold Mines Ltd.

In 1965 a Mo-bearing granitic plug about 1500 feet wide by 1800 feet long (N.E.) was discovered on the Moly group at about 4 miles N.E. of the orebody of B.C. Molybdenum Ltd. In 1966 some 30 or more miles of picket lines were cut and soil sampling was carried out along these. This work and prospecting located an anomalous area some 2,500 feet wide by 2,500 feet long (16, Oct. 24, 1966). Part of the rim of the plug was explored by 6 short drill holes. Some of these encountered substantial amounts of molybdenite.

In 1965 reconnaissance mapping and sampling of part of the property of Northlodge Copper Mines Ltd. just southwest of the Newmont property was done by David S. Barclay (et al?) of Alrae Exploration Ltd. In 1966 recce. soil sampling of the property was done by Larkin Ross and assistant of Crone Geophysics Ltd., Port Credit, Ontario for A.C.A. Howe & Associates Ltd., Toronto and Vancouver, for Northlodge C.M.L. (The property includes the old Red Bluff property (35,36,37,38).*

The history of the numerous mineral showings and old mining properties now included in the large property of Mayfair Moly Mines Ltd. is long and voluminous. Only a brief sketch of it will be given here. Further data will appear later under Mineral Showings.

Some of the old properties and showings are San Diego, Lone Star, Standard, Silver Bell, Sunrise, Maple Leaf, Billy Mac (or Mack?), Kent, Highland, I.X.L., Silver Cord (or Chord?), Casey's, War Dance, Alamosa, Silver Bar, Black Bear, Horse Shoe, Waverly, Three Mile and possibly the Motherlode, Devlin and others.

According to the B.C. Chamber of Mines (6),

"Other properties which contain large deposits of ore, are: Standard and Sunrise on McGrath mountain,"

According to resident engineer, G.A. Clothier (6),

"....properties on McGrath mountain, Illiance river, Line and Roundy creeks, have real prospective merit. There is therefore, a fine field here for the investigator and investor".

Clothier also pointed out that in the year 1925 30% of the ore mined in B.C. and 55% of the copper produced in B.C. came from within a radius of 20 miles of Alice Arm.

"Everything considered, this section has great prospective merit, and warrants thorough investigation by both prospector and operator."(6)

The Alice Arm brochure of 1926 mentions that the Silver Cord property on Dak river was being developed that year by British Colonial Securities Ltd. of Vancouver(6). Surface stripping and open cuts were being made on the ore. Anthony McGuire was in charge of operations.

* According to George Cross News Letter No. 209 (1966) of October 28, 1966, Northlodge recently dropped its option on the property, after paying \$12,500 on the purchase price of it. The ground has reverted to Nadina Explorations Ltd., which has an option to purchase it for \$25,000.

The same brochure (6) states that:

- (1) Standard Group, owned by Miles Donald, contains zinc ore.
- (2) Sunrise Group, owned by G.W. Morley and Al Clary, contains zinc ore.
- (3) Billy Mac Group, owned by Tony Calfa and associates, contains zinc ore.
- (4) Horse Shoe Group, owned by Elmer Ness, contains copper ore.
- (5) Devlin Zinc Group on Dak River, owned by Anglo-Belgian Mines Ltd. of Vancouver, contains zinc ore.

The brochure advises also that, "The timber line extends to an elevation of about 3500 feet".

Considerable work has been done on McGrath Mountain by engineers and geologists of the B.C. Department of Mines and Petroleum Resources. In 1916 Professor J.M. Turnbull, M.E., examined and described the San Diego, Black Bear, Casey's, and Alamosa groups (5). His accompanying map of the district at scale of 2.3 miles to 1 inch was reprinted in the 1926 Alice Arm brochure (6). In 1927 resident mining engineer Howard T. James described the Sunrise, Standard, Highland, Billy Mac and Silver Chord properties and included a map of McGrath Mtn. Camp (5). In 1929 resident mining engineer Joseph T. Mandy described the Sunrise group in detail and prepared a small map (5). In 1931 he described the Billy Mack and Three Mile properties.

In 1949 geologist James M. Black spent about six weeks examining and mapping some of the mineralized areas by plane-table survey and some pace and compass traverses (5). He reported at length on the Sunrise and Standard mineral showings, geology and workings. His map, at scale of 300 feet to 1 inch, shows the geology of parts of the Sunrise, Standard, Billy Mac (and Highland?) properties. In recent years geologist Nicholas C. Carter has done much useful mapping and reporting in the district (5). On September 9, 1966 he inspected the Sunrise, Standard and other properties during a traverse southwesterly from the Sunrise to Alice Arm.

In earlier years, from about 1920 to 1935, field officers of the Geological Survey of Canada were active in the area. Most prominent of these was Dr. George Hanson (1, 2, 3, 4). His map of Mining Properties in the Portland Canal Area (1) shows the following mining properties on McGrath Mountain in 1935:

I.X.L., Silver Bar, Silver Chord, War Dance, San Diego, Sunrise, Standard, Highland, Billy Mac, Kent and Maple Leaf claims, Alamoza, Lone Star, Silver Bell and Three Mile.

According to Dr. Hanson's report of 1928,(3)

"There is very little to record about the history of Alice Arm prior to 1900. Observatory inlet was named by Captain Vancouver in 1793. Alice Arm was named in 1869 after Alice, wife of the Rev. Robert Tomlinson, who was in charge of the Church Missionary Society mission at Kincolith. In an attempt to find a good trail route from the coast into the northern interior of British Columbia, the Provincial Government in 1874 sent an expedition into Alice Arm to search for a feasible route to Nass river."

GEOLOGY

The geology of much of the Alice Arm area is not accurately known. Map 307A, Portland Canal Area, of the Geological Survey of Canada, at scale of 4 miles to 1 inch was published in 1935, but it is based on reconnaissance field mapping done by various

men between 1919 and 1932, without base maps of modern accuracy (1). This early work was done also without air photos and without helicopters, two items of great aid to modern mappers of geology.

According to a recent announcement by the G.S.C., it plans to have staff geologist Dr. H.W. Tipper map the regional geology of a large area northeast of Prince Rupert, including Alice Arm, by Operation Skeena River (42). The area to be covered includes the following map areas: Hazelton (93M), McConnell Cr. (94 D W $\frac{1}{2}$), Nass River (103P) and Taseko Lakes (92 O).

In spite of present lack of precise public information on regional geology of much of the area, considerable detailed information on separate large parts of the area has been accumulated by various mining companies. Some of these are Kennco Explorations (Western) Ltd., Newmont Mining Corporation of Canada, Ltd., Cyprus Exploration Corporation Ltd., The Granby Mining Co. Ltd. and Amax Exploration Incorporated.

The B.C. Department of Mines & Petroleum Resources has recently done some useful work in the area. In 1964 their staff geologist N.C. Carter mapped the geology of 15 square miles of country extending south from Alice Arm for 6 miles. This mapping was done at scale of 1,000 feet to 1 inch and published at scale of 4,000 feet to 1 inch (5). It covers the Tidewater, Roundy Creek and Lime Creek (Alice) molybdenum deposits.

On a regional scale Alice Arm is in the eastern part of the Coast Range Mountains. Practically all of these mountains consist of rocks of Mesozoic age. Most of these rocks belong to the Hazelton group of sedimentary and igneous (mainly volcanic) rocks of Jurassic age. This group is intruded by batholithic and smaller bodies of Coast Intrusions, principally granite and related plutonic igneous rocks of acidic to intermediate types, practically all of them being of Jurassic or Cretaceous age. In recent years a few small plugs, dykes, dyke swarms and other intrusive bodies of quartz monzonite porphyry have been recognized as being of probable Tertiary age.

The settlement of Alice Arm and a large area south and southeast of it, lying south of Illiance River, is underlain by sedimentary rocks of the Hazelton group. According to Hanson (1), the settlement is near the southern end of a northerly striking anticline some 18 miles wide. This big fold plunges gently to the south at its southern end and gently northward at its northern end. It includes both sedimentary and igneous rocks of the Hazelton group. The sediments consist mainly of argillite and greywacke, but they also include some quartzite and minor amounts of limestone and tuff. The igneous rocks of the group include both extrusive and intrusive rocks, the latter being of volcanic type. In the Alice Arm area they consist mainly of feldspar porphyry (felsite) and augite porphyrite, and fragmental rocks of similar compositions.

An abrupt change of rock types at the Illiance River probably indicates the presence of an unconformity along the river, possibly accompanied by a parallel or sub-parallel fault. As noted by Carter (5), the sedimentary rocks south of the Illiance River,

"comprise a monotonous succession of interbedded argillites, siltstones, microgreywackes, greywackes, pebble conglomerates and minor chert. Medium-grained greywacke is the most common rock type, being a massive competent rock with little indication of original bedding".

The argillite commonly contains disseminated pyrite and pyrrhotite. Oxidation of these sulphides causes the rock to have a brown, iron-stained weathered surface in many exposures.

Most of the sedimentary rocks in the area mapped by Carter (2) strike north-easterly and dip steeply to the northwest. Their attitudes vary locally, particularly near the granitic contacts.

North of the Illiance River, particularly on the Mayfair property (McGrath Mtn.), argillite and greywacke are still present, but in much lesser amounts. According to Black (5,1949),

"most of the area is underlain by a northerly trending intrusive complex. In the northern part of the area (mapped by him) the complex is composed of 4 members One member (unit No. 3), referred to as a swarm of dykes, ---- continues southerly beyond the southern boundary of the area mapped. Another member (unit No. 4), represented by exposures of feldspar porphyry, may also be formed by dykes cutting older rocks".

The rock unites shown by Black's map are as follows:

- (4) Feldspar porphyry intrusives
- (3) Swarm of intermediate dykes, some sediments
- (2) Augite porphyry intrusives
- (1) Sediments, argillites and tuffs

It seems possible that some of his "augite porphyry intrusives" may be actually augite crystal tuffs.

Both pre- and post-mineral dykes and sills abound. Some of the (post?)-mineral dykes are probably lamprophyre. Although there are wide variations locally, the general trend of the rocks on McGrath Mtn. is north. Most dips are vertical to 80° east.

Both the rocks and some of the mineral zones are "chopped up" by 2 prominent sets of near-vertical fractures. One of these strikes about N. 60° W.; the other about N. 30° E. There appears to have been some later shearing along the northeasterly set.

It is felt that the rocks north of the Illiance unconformity are older than those south of it. An age of Middle to Upper Jurassic is postulated for those on the north, versus Lower Cretaceous for those south of the unconformity.

Returning to broad-scale regional geology, it should be mentioned that many thousand dykes intrude both the Hazelton group rocks and the Coast intrusions. The dykes range from Jurassic to Tertiary in age and from gabbro to quartz porphyry in composition. They are from one inch to 100 yards, or more wide. Dykes of diorite are found in the sediments on the shores of Alice Arm. A dyke of basalt or fine-grained gabbro is reported to cross the Illiance River north of Table Mountain.

Tertiary lavas of basaltic, phonolitic and/or noselite trachyte composition cap a few mountains between the Illiance and Nass rivers. One of these is Table (Widdzech) Mountain, four miles southeast of Alice Arm. In this mountain the horizontal lava flows are 10 to 50 feet thick and have a total thickness of 400 feet or more. They lie unconformably on the sediments of the Hazelton group.

Pleistocene and recent unconsolidated deposits include boulder clay, stratified blue clays, varved clays, gravel, sand and silt. The flat on which the settlement of Alice Arm stands consists of silt deposited there from the Kitsault and Dak rivers. Gravel terraces are reported in the valley of Lime Creek at elevations of about 275,300 and 450 feet above sea-level.

MINERALIZATION

Mineralization of the Alice Arm area is widespread, varied and complex. Its over-all pattern is still relatively unknown. Most of the known occurrences are probably relatively small, complex sulphide-sulphosalt veins rich in zinc, lead and silver. The largest of these recognized to date are in the Dolly Varden-Toric-North Star area on upper Kitsault River.

Substantial bodies of chalcopyrite were found at Anyox and on the Vanguard property, upper Kitsault River. This property is now being explored by Canex Aerial

Exploration Ltd. Another substantial copper deposit, on the Redwing (Canusa) property, southwest of Anyox, is being explored by Anaconda American Brass Ltd.

In recent years large deposits of molybdenite have been recognized. These are in and near (associated with) small plugs, and dykes and sills, of leucocratic, porphyritic, granitic Tertiary intrusive rocks. Some of the deposits are in quartz stockworks in roof pendants. Largest of these deposits found to date are held by Newmont Mining Corporation of Canada Ltd. and British Columbia Molybdenum Ltd., a subsidiary of Kennecott Copper Corporation. Some interesting information on the latter deposit is given in a report by James, Buffam and Cooper of Toronto (26, 10).

The molybdenum-bearing Tertiary plugs and stocks found to date appear to be rudely aligned in a northerly direction. I have termed this the Alice Arm Molybdenum Belt. See map in this report. As presently known, it is about 10 miles wide and 80 miles long. It is possible that it represents an ancient line of weakness or fault in the earth's crust and that this controlled the emplacement of the Tertiary plugs and stocks.

The main ore minerals of the district are pyrite, pyrrhotite, chalcopyrite, sphalerite, galena, magnetite, molybdenite, specularite, argentite, tetrahedrite, ruby, silvers and a little native silver.

Little is known about mineral zoning in the area. There probably were several stages of mineralization, as at Hudson Bay Mountain, 5 miles northwest of Smithers, B.C. (48).

On McGrath Mountain (Mayfair property) the geology is more complex than in most other parts of the area. Several substantial zones and lenses of minerals containing copper, lead, zinc, gold and silver were found by traditional prospecting methods before and during the First World War (1914-1918). Principal gangue minerals of the zinc-lead zones are calcite and other carbonates, barite, and quartz (usually mixed with the carbonates). Most of the zinc is in a resinous, amber-coloured variety of sphalerite.

Some molybdenum-bearing granitic float has been found on the northern slope of McGrath Mountain.

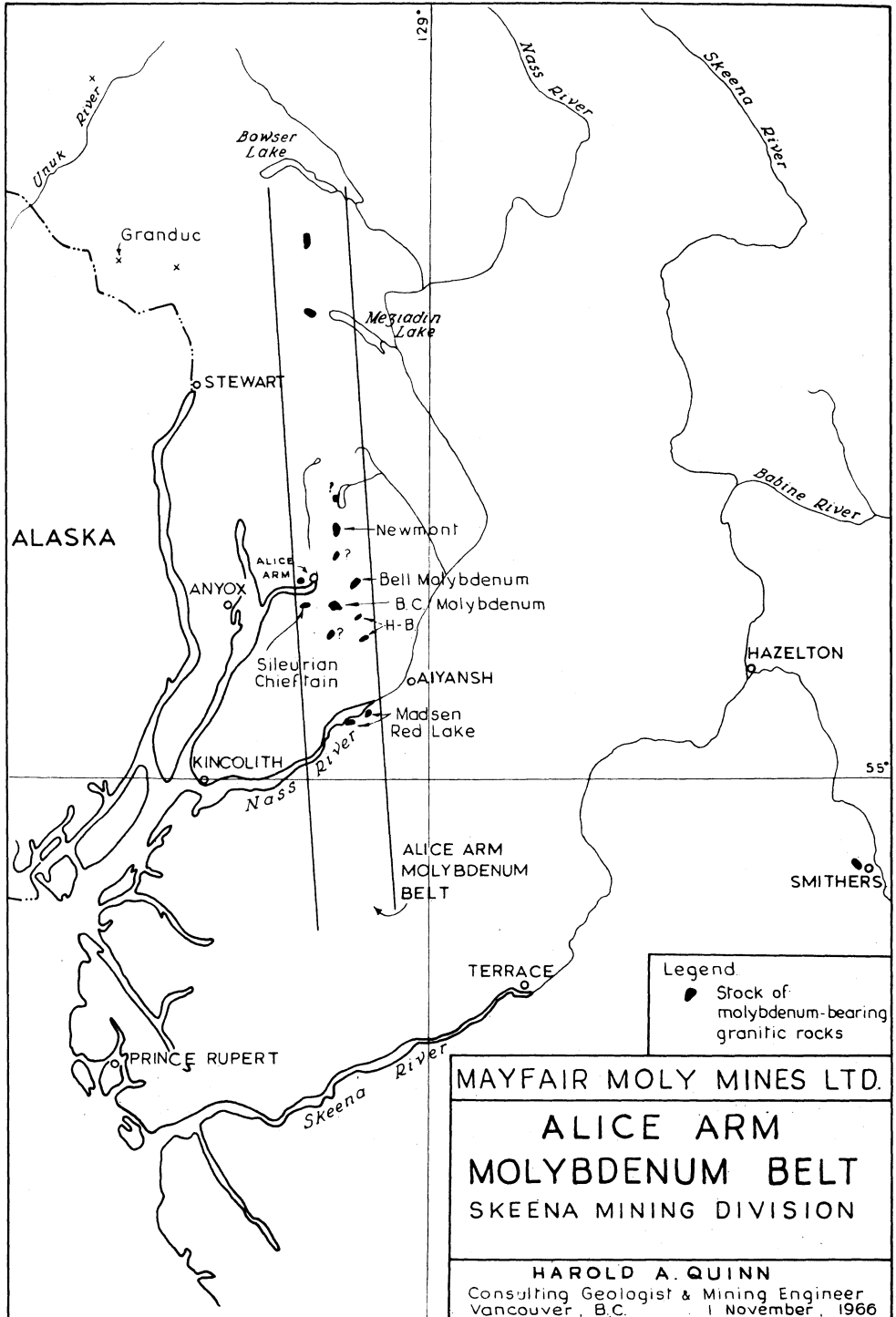
Prospectors Arthur Smith of Alice Arm and Stuart W. Barclay of Nelson have told me of other zones of lead and zinc minerals 25-30 feet wide that they have found on McGrath Mountain.

Hanson (1, page 40) notes that: (3)

"The augite porphyrite body of McGrath mountain contains disseminated pyrite, pyrrhotite, and chalcopyrite. Even where the rock appears to be quite fresh the sulphides are present. It is not always possible to say whether these sulphides were introduced or are original constituents. Evidence obtained by the microscopic examination of the rock where altered suggests that the sulphides were introduced into their present position. The augite porphyrite appears to be closely related to the intrusives of the Copper Belt and may be a potential mineralizer, but there is a lack of any evidence that it should be regarded as being the source of the chalcopyrite deposits. So far as is known these deposits do not show gradations to any of the other types of mineral deposits of the area."

MINERAL SHOWINGS

Of the numerous mineral showings found to date on McGrath Mountain, considerable information is available on the Standard, Sunrise, Billy Mac, San Diego and Highland, but very little on most of the others. The map of Mineral Showings in this report is based mainly on the earlier maps of Hanson (1), Turnbull (5) and Black (5). All locations are approximate.



ALASKA

129°

55°

Legend.

● Stock of molybdenum-bearing granitic rocks

MAYFAIR MOLY MINES LTD.

ALICE ARM
MOLYBDENUM BELT
SKEENA MINING DIVISION

HAROLD A. QUINN

Consulting Geologist & Mining Engineer
Vancouver, B.C. 1 November, 1966

(1) San Diego

The San Diego group of 8 claims, now included in the Dak group was staked about 1915 as a copper-gold prospect. Its main showing and old adits are in and adjacent to a steep little gorge on a small creek at 800 feet elevation on the northwestern flank of McGrath Mtn. This point is 1500 feet southeast of Dak River and about 4 miles northeast of Alice Arm. The portal of one of the short adits is reported to be on the northwestern boundary of claim Dak 5 (11).

Turnbull (5) reported that 2 holes were drilled on the showing in 1916 with an Ingersoll Rand calyx shot drill, 1½ inch core, by co-owner of the claims, S.J. Eubank of Seattle, Washington, U.S.A. (See Turnbull, page 64, for photograph of this drill in operation.)

According to Turnbull, page K 69:

"The mineralization consists of a general pyritization of the sandstone, accompanied by a varied distribution of chalcopryrite, generally carrying small but surprisingly constant gold values. The total quantity of sulphides is small, as far as observed. The chalcopryrite seems to occur in local concentrations, while the pyritization is more general. The interbanded slates are barren. Some mineralization has been found over a considerable area of the hillside of the above general character, but usually slight. A little arsenical iron was observed in nodules.

The dykes in general run about N. 20°E. (mag.). No definite direction can be stated for the mineralization at present.

The drill-cores have been shipped out and complete records have not apparently been kept. As far as could be obtained the records are as follows: Hole No. 1, depth 50 feet.

Cut two stringers, of which one ran 8.2 per cent copper. Direction vertical. Hole No. 2, depth 165 feet: 0-12 feet, gold trace, copper 1.7 per cent; 12-24 feet, gold 0.07 oz., copper 1.9 per cent; 24-36 feet, gold 0.02 oz., copper 2.8 per cent; 36-48 feet, gold 0.02 oz., copper 4.14 per cent."

(The upper 48 feet of core from Hole No. 2 averaged 2.6% copper. H.A.Q.)

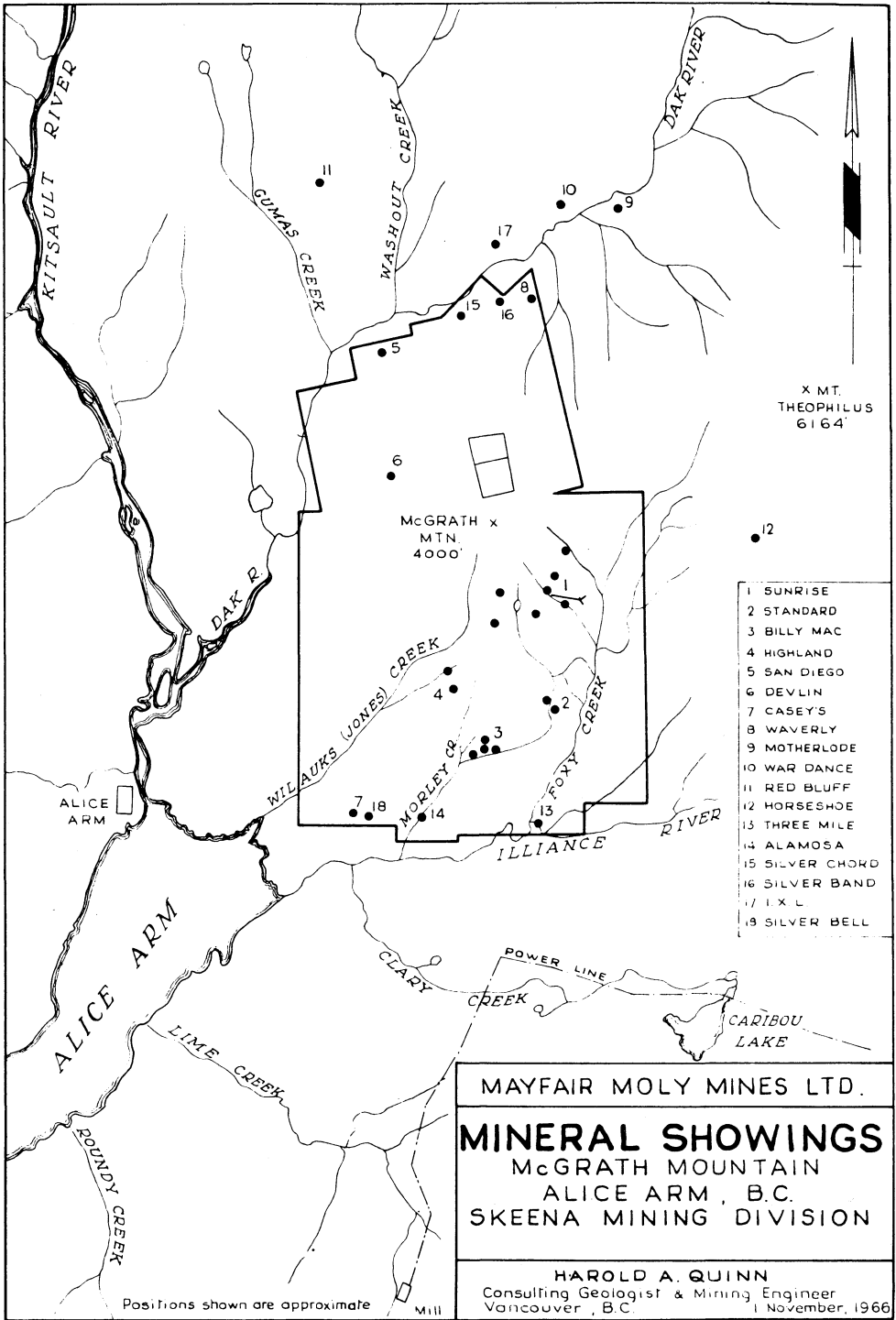
Turnbull advises further that:

"At 1,350 feet elevation a small open-cut shows similar formation, which here strongly resembles altered greenstone, and contains a little chalcopryrite and pyritization. In the gully above the drill several dykes cross and the formation is generally the same, somewhat pyritized, with a few spots of chalcopryrite. The steep gulch-walls are somewhat yellow-stained, and in places a bluish-white, watery slime oozes out, which was not identified.

A general sample across 40 feet, 25 feet below the drill taken by Mr. Eubank, gave \$1.20 gold and 0.7 per cent copper. The grey formation effervesces more or less with acid and is evidently somewhat calcareous, though not to any large extent."

It is possible that the San Diego main showing is the southern extension of the more prominent Red Bluff showing, 1 mile or so to the north.

In late summer of 1965 three men of Noland Mines Ltd. did some mapping, prospecting and trenching in the northern and northeastern parts of the Dak group,



X MT.
THEOPHILUS
6164'

- 1 SUNRISE
- 2 STANDARD
- 3 BILLY MAC
- 4 HIGHLAND
- 5 SAN DIEGO
- 6 DEVLIN
- 7 CASEYS
- 8 WAVERLY
- 9 MOTHERLODE
- 10 WAR DANCE
- 11 RED BLUFF
- 12 HORSESHOE
- 13 THREE MILE
- 14 ALAMOSA
- 15 SILVER CHORD
- 16 SILVER BAND
- 17 I X L
- 18 SILVER BELL

MAYFAIR MOLY MINES LTD.
MINERAL SHOWINGS
 McGRATH MOUNTAIN
 ALICE ARM, B.C.
 SKEENA MINING DIVISION

HAROLD A. QUINN
 Consulting Geologist & Mining Engineer
 Vancouver, B.C. 1 November, 1966

Positions shown are approximate

not far from the Dak River. They discovered small amounts of molybdenum and copper in 2 areas there and they blasted 2 trenches on these (on claims Dak 18 and 20).

(2) Standard

This old property of 4 Crown-granted claims has quite a long history; only a brief sketch of this will be given here, mainly from the detailed description of Black (5). The claims were staked by prospector William Maclean of Alice Arm in 1916. The property was first mentioned by Clothier in 1918 (5). In 1949 it was owned by Miles Donald, W.M. Maclean, N. Olsen and N. McLeod, all of Alice Arm (5).

The principal mineral showings, between elevations of 2,600 and 2,700 feet, lie along and near a small southerly flowing creek near the eastern flank of McGrath Mtn., south of the old Sunrise property.

According to Black (5), the showings were stripped and trenched in 1925 by The Granby Consolidated Mining, Smelting and Power Co. Ltd. In 1953 New Jersey Zinc Exploration Co. (Canada) Ltd. did further stripping and trenching and put down 4 vertical X-ray drill holes totalling 389 feet. Map of the latter work shows a band of carbonates and siliceous carbonates (mainly calcite and quartz) up to 30 feet wide just east of the creek at 140 feet north of the cabin (41). This band can be traced north for 160 feet, but intermittent more northerly exposures appear to indicate that it curves westward across and away from the creek, with possible total length of 500 feet or more. The southern and northwestern parts of the band contain much sphalerite and small amounts of galena. One lens of heavy zinc mineralization at 2700 feet elevation 100 feet west of the creek strikes northeasterly, dips 35° northwest into the mountain, is 140 feet long and has an apparent width of as much as 25 feet. According to Clothier (5, 1918),

"The quartz carries disseminated zinc-blende, bunches of zinc-blende, and bands of solid zinc-blende up to 2 feet thick."

The map referred to above (41) shows numerous faults (of small displacement?) most of them trending northwesterly and dipping northeast at 40° to 70° . It also shows a caved adit 30 feet or so long which was driven W.N.W. toward the upper lens of zinc mineralization by Wm. Maclean in 1920. According to Mr. Maclean, the 4 claims were surveyed by Frank Rice, B.C.L.S., about 1924, and Crown granted that same year. He advised also that N.J. Zinc cut a baseline and picket lines in 1953 and their Mr. Jones mapped the geology. Prospector Chris Andersen of Alice Arm advises that he guided Dr. H.C. Gunning, consultant for N.J. Zinc, to many of the mineral showings on McGrath Mtn. in 1953.

(3) Billy Mac

William Maclean told me that the mineral showings here were found by Gideon Morley about 1920. He (G.M.) staked 6 claims and sold them to James Peacock, Tony Calfa and Roy McKinley in 1921. They built a good cabin and did much work, including several rock trenches, on the property and named it after McKinley's wife, Billy Mac. According to Mandy (5), the cabin is at altitude 1,925 feet on the main McGrath Mountain trail. The property itself is on the southern slope of the mountain, south and west of the Standard and south and east of the Highland group.

According to Mandy (5, 1931),

"----- a tunnel has been driven about 50 feet on a banded and brecciated vein about 8 feet wide in shattered argillite. This vein strikes N. 40° E. (mag.) and dips 55° north. Fair zinc-blende mineralization with some pyrite in calcite stringers and lenses, and a marked development of graphite, features the vein, which appears to be a replacement along a defined shear-zone".

There are several veins and/or shear zones on this property. Another is described in the following excerpt from Mandy (5);

"At altitude 1,900 feet a brecciated and banded vein 15 feet wide outcrops for 250 feet along a bluff on the south side of the creek, striking east-west and dipping 30° south. Mineralization of this vein consists of sparse streaks of zinc-blende and some pyrite in a brecciated quartz-argillite gangue, which is best developed along about a 4-foot width of the foot-wall side."

Hanson's description of the Billy Mac Group includes the following (1):

"Sphalerite associated with quartz and calcite is exposed in a dozen open-cuts and short adits. Only one body has been traced as far as 200 feet. It is 20 feet wide, strikes northeast, and dips 30 degrees southeast. For a breadth of 5 feet along the hanging-wall the deposit is well mineralized with sphalerite; the remaining part is largely calcite containing many rock inclusions. The deposit may be the result of replacement along a crushed zone or along a particular stratum.

About 300 feet northeast of this deposit are two other exposures of vein matter. They are on opposite sides of a creek and may be parts of one nearly horizontal mineral body. The mineralization consists of quartz, calcite, and sphalerite. About 200 feet northeast of these showings are five exposures of vein matter belonging to one or more deposits of unknown size and shape. About 150 feet farther northeast is a line of open-cuts trending northeast, which may be in a single mineral body. Individual showings in these open-cuts are up to 8 feet wide and consist of quartz, calcite, sphalerite, and country rock inclusions. The mineral bodies are not well exposed. They have formed chiefly by replacement and may have formed along beds or along fracture zones."

I have at hand a specimen of fine-grained, massive pyrite collected from the Billy Mac. This indicates that there are some (veinlets?) of this mineral at least 1 inch wide.

(4) Highland

This group of 6 claims was immediately west (and southwest?) of the Standard group and west of the Billy Mac group, on the southern slope of McGrath Mtn. at 1500 to 2000 feet or so A.S.L. The property was reported on by James (5) in 1927 and by Hanson (1) in 1935.

William Maclean advises that the showings were found and staked by Joe McGrath about 1909. He and his wife built a cabin there and spent one summer prospecting and trenching.

The claims were restaked about 1914 by Ralph Ingraham and Frank Jones of Alice Arm. They did some tunnelling and other work, assisted by Stuart W. Barclay. Miles Donald restaked the property in 1952 but no work was done on it then or since then.

A few excerpts from James (5, 1927) will indicate the type of mineralization, etc.:

"The claims are underlain by a thick series of black graphic argillites, interbedded conglomerates, and a small amount of andesitic and felsitic rock, whose nature and relation to the sediments has not been determined. Like the other properties on McGrath mountain, there are numbers of showings on the property, but owing to their number and insufficiency of development there has not been enough work done to determine the length of any one ore-zone. ---Two or three of the exposures are in Jones creek, the most westerly creek on the claims and just west of the cabin. (This creek on the claims and just west of the Creek, H.A.Q.). The lowest cut on the west side of the creek is in slightly sheared argillites and has exposed a number of feet of mineralized ground.---Lead sulphide is plentiful in the specimen shown me from this place and, on assaying, it was found to contain some silver values. ---

On the east side of the creek, about 50 feet up-stream from the ladder which provides access to the stream-bed, is an open-cut in conglomerate. For 10 or 15 feet above the cut, up to the brink of the canyon, the conglomerate has weathered out into a fairly loose mass of boulders, each boulder consisting of a number of the pebbles of the conglomerate. The boulders are probably the result of the combined action of shearing and surface weathering. What sphalerite there may have been around the boulders has been leached out, leaving behind only a small amount of iron oxide, but on cracking the boulders many of them show mineralization with variable amounts of sphalerite, calcite, and barite. The mineralized zone is several feet wide and well worth prospecting, but so much loose material would have to be removed in getting down to the solid that it is disheartening for a single prospector to tackle. The attitude of this mineralized zone could not be determined very readily. It appears to strike about parallel to the first vein mentioned, but to dip in the opposite direction.

In the small creek east of the cabin are still other showings. Down-stream from the cabin is a sparsely mineralized zone in an andesitic rock. Farther up-stream, above the cabin, is a mineralized zone in the argillites which looks fairly promising. I understand that a cut has been put across this since my visit and has uncovered 5 to 6 feet of zinc ore. A specimen from the cut contained considerable pyrite as well as sphalerite. Still farther up is another mineralized zone in a very light-coloured, dense rock, which appears to be a highly metamorphosed feldspar porphyry."

Hanson (1) described the Highland Group as follows:

"The country rock is argillite intruded to the east by an augite porphyrite stock. West of the mineral deposits a body of felsite outcrops which may also be a stock.

At least two roughly parallel mineral zones are known on the property. One strikes northeast and has been imperfectly traced by five open-cuts for a distance of 400 feet. It is a sheared and shattered zone, 20 feet wide in some places, containing irregular bodies of quartz, calcite, and sphalerite. The best mineralized

matter consists of rock fragments cemented by quartz, calcite and sphalerite. The second parallel mineralized zone lies about 300 feet northwest. It is a clearly defined fault zone holding lenticular and irregular bodies of quartz, calcite, sphalerite, and a little pyrite and galena. About 600 feet north of these two deposits is another of somewhat similar type striking east and near the south end of the two parallel deposits are other exposures of sphalerite."

(5) Silver Chord

The former Silver Chord group of 4 claims (Silver Chord, Silver Chord No. 2, Big Gash, and Big Gash No. 2) is at the north end of McGrath Mtn., north (and west?) of the old Sunrise property. The cabins and underground workings are about 1,200 feet above sea-level and about 200 feet above (south of the main Dak River trail. The claims were staked by Anthony McGuire about (1925?).

According to Hanson (1):

"Development work on the group consists of two drift adits 200 feet and 600 feet long, respectively.----- The known mineral deposits on the group are two sphalerite-bearing quartz veins.

The second vein is exposed a few hundred feet west of the cabins. It strikes north, dips steeply west, and is at least 500 feet long. It consists of gashes and stringers of quartz and calcite in a zone varying between 1 and 25 feet in width. A narrow minette dyke follows the vein, either lying within it or along one of the other walls. Where the vein is widest it consists in general of about 20 per cent vein matter and 80 per cent rock. Where it is only a few feet wide it may be mainly vein matter. Pyrite, galena, and sphalerite are present in slight amount. The vein has been deposited along a shear zone which where widest was penetrated by vein stringers and where narrowest was usually filled by a single vein. The relative ages of the dyke and the vein are unknown. Later than both dyke and vein in parallel shearing intense enough to have locally changed the argillaceous wall-rock into graphite schist and to have altered the dyke beyond easy recognition".

Apparently the property was optioned to Kitsault-Eagle Silver Mines Ltd., managing director William G. McMorris of Vancouver, and that company did the 800 feet of tunnelling, mainly in 1927 and early 1928. A. McGuire supervised the work.

James (5, 1927) reported:

"Some narrow streaks run high in silver, suggesting that some of the silver minerals may be present locally ----- By the end of September No. 1 tunnel had been advanced to a total length of 232 feet and short cross-cuts had been driven at 80 feet and 137 feet from the portal. The first 60 feet of the tunnel developed shoots of zinc ore from 2 to 4 feet wide. One hundred feet lower in elevation, at 1,290 feet above sea-level, a second tunnel is being driven ----- The development of this property is being executed with some vigour. The lower tunnel is being continued during the winter and diamond drilling is planned for the spring."

(6) Sunrise

The mineral showings of this property, now covered by the Mac group of Gunn Fiva, are on the eastern part of the top of McGrath Mtn. and on the upper part of its eastern slope, about 4000 feet due north of the Standard showings. Most of them are near Sunrise Creek, a southeasterly flowing tributary of Foxy Creek. Their elevations are probably between 3500 and 3800 feet A.S.L.

According to William Maclean, the showings were found by Gideon Morley and Al Clary and staked by them about 1916 or 1917. They did a little trenching on the showings, exposing several brecciated zones 1 to 20 feet wide containing sphalerite, plus minor pyrite and galena, in gangue of calcite, quartz and minor barite.

In 1928 Kitsault-Eagle Silver Mines Ltd. (Wm. McMorris et al) optioned the property and began driving a 6 by 8 foot adit by hand steel to intersect the main showing 500 feet below its outcrop. The adit, with portal about 3200 feet A.S.L., was driven straight N. 80° W. for 1160 feet, with two 80-foot cross-cuts north and south. These are the most extensive underground workings in the vicinity of Alice Arm.

William Maclean reports that most of this drifting was done by Montenegro miners. Gunn Fiva also worked in the drift. The track is still in place. The portal is visible from the face.

Driving of the Sunrise adit was discontinued in 1929, without encountering the downward extension of the 12 - 15 foot Banded Vein exposed on surface 500 feet above it. Smaller veins were cut at 175 and 400 feet from the portal. According to Mandy (5, 1929):

"On the surface, formation exposures contiguous to the "Banded vein" indicate a westerly dip of about 45°, conforming to the westerly dip of the bedding-planes towards the tunnel-face. Should the "Banded vein" conform to this 45° westerly dip it would be encountered on the tunnel horizon at approximately 1500 feet in.

It is possible that the ore encountered at the 1,000-foot point may be the extension at depth of a surface showing at the head of the creek at altitude 3,650 feet. At the 1,000-foot point in the tunnel the structure has been drifted on to the north for 80 feet, with bunches of zinc-blende in quartz-calcite stringers showing at intervals. At 950 feet a crosscut has been started into the north side of the tunnel, where it is estimated this structure will be cut at 40 feet in. During the winter the first vein encountered in the tunnel will be drifted on to north and the second will be explored by drifting to the south. As the best mineralization encountered on the surface seems to lie to the south of the tunnel, it would seem logical to confine initial drifting to that direction where possible. Before advancing the crosscut tunnel any farther it is planned to determine the attitude of the "Banded vein" by additional surface work in the spring. This is a sound campaign of development".

Kitsault-Eagle relinquished its option on the Sunrise property in 1930.

The Sunrise mineral showings have been described in considerable detail by Howard T. James (5, 1927), J.T. Mandy (5, 1929), J.M. Black (5, 1949) and Hanson (1, 1935). Dr. Allan P. Fawley staked 12 or 16 claims on them in 1946 for Leta Explorations Ltd., but little or no work was done. In 1953 New Jersey Zinc Exploration Co. (Canada) Ltd. drilled 2 X-ray holes, total depth 146 feet, at about 3650-3700 feet elevation. One of these holes was vertical; the other was drilled westerly at -20°.

According to mining engineer Howard T. James (5):

"There are so many showings on these claims and they are so well situated for economical mining that I think they have considerable prospective merit and are well worth investigating".

On August 24, 1966 Gunn Fiva showed me a mineralized zone 400 feet northeast of Sunrise Creek on the upper eastern slope of McGrath Mtn., possibly on new Bell claim. The zone, with exposed width of 6 to 20 feet, strikes N. 35° E. Its dip was not determined accurately, but may be vertical to 50° N.W. It has been explored by 5 or 6 trenches for 200 feet or so along its strike. Some of these are caved and/or now expose no bedrock. The northernmost trench trends N. 55° W. for 22 feet across a 20-foot zone of brecciated, fine-grained, black rock, containing an intimate stockwork of white veinlets of calcite, barite and quartz. Most of the zone is heavily mineralized with disseminated to massive, resinous, brown sphalerite and small amounts of galena and pyrite.

(7) Casey's

This showing, described by mining engineer J.M. Turnbull (5) in 1916, was reported to be a few hundred feet north of the Illiance River near its mouth, 2 miles from Silver City. It was probably covered by the Little Joe group, owned by Geo. Casey and W. Shaw, of Prince Rupert.

Turnbull's description follows:

"At 460 feet elevation is a surface stripping and a 20-foot incline shaft on a 4-foot vein, striking S. 70° E. (mag.), dip 25 degrees easterly. Near the surface the vein contains an appreciable amount of galena and pyrite, with slaty inclusions, but is rather barren-looking in the bottom. Seventy feet lower a 35-foot tunnel shows 1 foot of solid vein and 4 feet of crushed filling. The surface is covered with wash and small timber, and the formation was not certainly determined. It appears to belong in the slate area. The interesting feature is the gangue, which is largely barite, or heavy-spar, with some quartz. In this feature it resembles some veins in the andesite or silver area of the upper Kitsault river."

(8) Alamosa

This old group of 2 claims, Alamosa No. 1 and Alamosa No. 2, owned by Nelson McInnis, existed on the southern (or south-western?) slope of McGrath Mtn. when it was described by J.M. Turnbull (5) in 1916:

"This slope of the mountain has a number of creek gulches running generally southwest. In one of these the slate formation has been crushed and is mineralized with stringers of quartz and calcite, some of which are strong enough to appear like veins for a short distance. Here and there a little zinc-blende occurs, but nowhere in commercial quantity. There is one tunnel 12 feet long and some open-cuts."

(9) Black Bear

This former group of 8 claims, owned by A.E. Dench et al, adjoined the Alamosa group on the northwest in 1916. It was on the southern (and southwestern?)

slope of McGrath Mtn., from 2000 to near 4000 feet elevation. The ground later became parts of other groups, possibly the Standard and/or others.

Turnbull (5) advises:

"Adjoins the Alamosa and very similar in character. On the Black Bear No. 1 claim, at 2,500 feet elevation, a 42-foot tunnel has been driven, which cross-cuts several feet of quartz and calcite stringers near the mouth, and one or two small ones farther in.

On the dump is less than 1/2 ton of ore, which contains some zinc-blende and a little galena.

On the east side of the mountain, at 3,800 feet elevation, is a sharp gully in the precipitous face of the hill. This is the seat of considerable fracturing and contortion, in which open-cuts and natural exposures show quartz stringers, with some bunches of zinc-blende."

This last-mentioned showing, at 3,800 feet elevation, apparently was included in the Sunrise group later.

(10) Foxy Grandpa Creek

Prospector Chris Andersen told me at Alice Arm of an adit driven into the west bank of Foxy Grandpa Creek on (or in search of?) a silver bearing vein. I have no further information on this.

(11) Silver Band

The Silver Band Group, described by Clothier(5) in 1918 apparently later became known as the Sunrise Group.

Part of Clothier's report is given hereunder:

"This group is situated on the north-east slope of McGrath mountain, about four hours' walk from the beach at Silver City townsite. There are four claims in the group, owned as follows: Sunrise, by A. Clary; Silver Bands, by G.W. Morley; Lucky Strike, by Hillier; and Tip Top, by J. Hutchison. On the Sunrise claim, at an elevation of 3,600 feet, several open-cuts have been made on as many veins of banded quartz and slate, the siliceous portion carrying mainly sphalerite or zinc-blende, with a trace of galena. The country rock is slate, very hard and siliceous in places near the vein, and so badly distorted and broken up that it is impossible to decide as to the continuity of the ore-shoot. At this elevation there are at least three croppings, varying in width from 2 to 10 feet, all badly oxidized on the surface; the enclosed slates seemingly altered to a soft, brownish easily pulverized rock.

Farther south about 200 feet, on the Silver Band claim, a big showing of slate and quartz 30 feet in width has been exposed. The vein-filling here shows a banded or lenticular structure of oxidized material and quartz up to a foot thick, carrying zinc blende and traces of galena, and long, narrow bands and kidneys of pure zinc-blende. I should judge the

slate content would aggregate about half of the total width of 30 feet. This is a big showing, but cannot be traced on the surface any distance; the amount of work done is very small toward opening up or proving such an extensive showing. It would take a crosscut tunnel 500 to 600 feet long from the valley to get under the cropping, but which would give probably 300 feet in depth, with a good chance of cutting other veins; otherwise the showings would have to be sunk on.

Some 1,500 to 1,800 feet north of this showing, on the Lucky Strike claim, what is probably this same vein is cut by a deep gulch."

(12) Silver Bell

Clothier (5) reported on this property in 1918, as follows:

"This claim, owned by Al Clary, Alice Arm, is situated on the south slope of McGrath mountain, to which there is a fair road from the beach. The showing at 600 feet elevation consists of a dioritic dyke or vein 15 feet wide, throughout which are stringers, bands, and bunches of quartz, carrying pyrite, arsenical iron, and some zinc-blende and galena. It has been opened up by an open-cut for 6 feet and continued in a tunnel across the vein for 12 feet farther. The vein strikes N. 15°E. and dips 55 to 60 degrees to the east. A sample was taken from a pile of ore on the dump which gave returns of: Silver, 0.6 oz.; lead, trace; zinc, 2.8 per cent. This is a big vein and further work would have to be done to draw any conclusions as to its possibility. The claim lies on comparatively flat bench; consequently any depth on the vein would have to be procured by sinking."

(13) Lone Star

Clothier's description (5) of 1918 follows:

"This group, consisting of five claims—Lone Star No. 2, Clipper, Silver Standard, Silver Standard No. 1, and Silver Standard No. 2 - is situated on the south side of McGrath mountain, adjoining the Silver Bell Mineral claim and about three miles from the beach. The claims are owned by G.W. Morley et al., of Alice Arm, B.C. At an elevation of 700 feet a tunnel has been driven across a 25-foot vein of grey quartz, in which are bands of pure white quartz running in all directions. The whole is considerably pyritized and also contains some arsenopyrite which apparently carries gold values in this particular section, the owners claiming as high as \$27 a ton in this ore. The vein has about the same strike as the Silver Bell vein below, but is a different vein. A grab sample from the dump gave only low values in gold and silver.

Just across a small creek from the tunnel is a formation of schistose argillites and slates carrying disseminated pyrite, and throughout it interlaced

- (2) This large property, encompassing practically all of McGrath Mountain, 3 miles northeast of Alice Arm, is within the Alice Arm Molybdenum Belt.
- (3) It is strategically located between the properties of B.C. Molybdenum Ltd. (Kennecott Copper Corporation), Bell Ltd. on the south and the properties of Newmont Mining Corporation of Canada Ltd., Conwest Exploration Co. Ltd. and Cyprus Exploration Corporation Ltd. on the north.
- (4) Many mineralized zones and areas were found on the property between 1910 and 1930, and many trenches and adits were made on these, mainly by individual or pairs of prospectors.
- (5) The mineralization contains copper, gold, silver, lead, zinc, molybdenum, arsenic, iron and probably other elements.
- (6) The geology of the property is complex and its rocks are highly fractured and faulted.
- (7) Several magnetic deflections or deviations have been noted, indicating anomalous magnetic conditions on the property.
- (8) Because of its widespread mineralization, the heterogeneity of its geological environment, its location within the Alice Arm Molybdenum Belt and its proximity to known orebodies and potential orebodies of major size and importance, it is concluded that the Mayfair property is unusually favourable for the discovery of orebodies.
- (9) Because of all of the above factors, careful and complete exploration of the property by modern methods is warranted. It is felt that major expenditures, of the order of \$100,000 to \$300,000, are justified.

RECOMMENDATIONS

It is recommended that exploration of the property be done in 2 stages, with the implementation of the 2nd stage depending upon results obtained in the 1st stage.

STAGE I

- (1) Establish a chained baseline running north through the central part of the property from Illiance River to Dak River, a horizontal distance of about 4½ miles.
- (2) Cut and chain picket lines across the baseline at 400-foot intervals. Average length of these 60 lines will be about 2.6 miles (13,800 feet, approx.).
- (3) Take soil samples along the baseline and picket lines at 200-foot intervals.
- (4) Prospect all of the property, find all old mineral showings, clean these out and sample them.
- (5) Make a ground magnetometer survey of the property. Readings to be taken at 100-foot intervals.

STAGE II

If the results of the above Stage I work are favourable, carry out the following Stage II exploration work:

- (1) Map the geology of the property at scale of 400 feet to 1 inch.
- (2) Do further prospecting, stripping, rock trenching and sampling.

- (3) Have a topographic map on Cronoflex made of the property and environs from the 2,000 scale air photos of McElhanney Surveying & Engineering Ltd. Scale 1"=400', contour interval 20 feet.
- (4) Cut helipads (helicopter landing pads) near the principal mineral showings, as may be feasible.
- (5) Make an induced polarization (I.P.) survey of the property. Although this will not detect the bodies of sphalerite, it probably will detect the pyrite and galena which are associated with them.
- (6) Stake (locate) all fractions and other open ground within the property. Also stake any worthwhile mineral showings which may be just outside the property.
- (7) Have a land surveyor make a preliminary tape and compass survey of all claims (claim posts and location lines).
- (8) Acquire lease or option control of the 2 Crown-granted mineral claims near the summit of McGrath Mountain.
- (9) Test and explore all mineralized zones and I.P. anomalies by diamond drilling. Most of this should be done with A X equipment, but it may be advisable to use X-Ray equipment on some of the smaller showings and in some of the more difficult topographic locations.
- (10) Bulldoze a road from Alice Arm fiord to top of McGrath Mountain, with branches to all of the more important mineral showings.

ESTIMATE OF COST

STAGE I

(First field season)

(1)	Line Cutting		
	Baseline, 4½ miles @ \$150/mile	\$	675
	Picket lines, 156 miles @ \$130/mile		20,280
(2)	Soil sampling, 158 line miles @ \$30/mile		4,740
(3)	Analyses of 4,230 soil samples for Cu,Pb,Zn,Mo @ \$2.40		10,150
(4)	Prospecting, 4 men for 120 days @ \$35/man/day		16,800
(5)	Magnetometer survey, 160 line miles @ \$100		16,000
(6)	Assaying of surface samples		1,000
(7)	Air transport of say 10 men to Alice Arm from Vancouver and return @ \$130.		1,300
(8)	Helicopter transport at Alice Arm, say 1½ hr./week for 18 weeks @ \$123/hr.		3,320
(9)	Engineering and supervision		4,000
(10)	Contingency		<u>4,000</u>
	TOTAL ESTIMATED COST FOR STAGE I		\$82,265

STAGE II

(2nd field season)

(1)	Geological mapping, 1 geologist and 1 assistant for 120 days @ say \$100/day.	\$	12,000
(2)	Prospecting, stripping, rock trenching and sampling - 4 men for 120 days @\$35/man/day		16,800
(3)	Topographic map of 15 sq. mile area		3,000
(4)	Cutting of 10 helipads @ say \$200 each		2,000
(5)	Induced polarization survey and related labour and camp costs - 160 line miles @ say \$400 mile		64,000
(6)	Staking of fractions and peripheral mineral showings		2,000
(7)	Preliminary survey of posts and location lines of 160 or more claims		5,000
(8)	Acquisition of control of 2 Crown grants		2,000
(9)	Option payments on Mac and Sun groups, and annual rental of Standard lease		3,070
(10)	Diamond Drilling: 4,000 ft. X-Ray @ \$10/foot		40,000
	6,000 ft. AXT @ 14/foot		84,000
(11)	Air transport of personnel to and from Alice Arm		3,000
(12)	Helicopter transport at Alice Arm		6,000
(13)	Bulldozing of road - Say 5 miles @ \$1,000/mile		5,000
(14)	Rental of lodging and storage space in Alice Arm for 4 mos. @ \$100/mo		400
(15)	Engineering and supervision, including logging and sampling of drill cores		10,000
(16)	Assaying of surface and core samples		3,000
(17)	Contingency		<u>25,000</u>
	TOTAL ESTIMATED COST FOR STAGE II		\$286,270
	Total estimated cost for Stages I and II		\$368,535

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Respectfully submitted,

"H.A. Quinn"

Harold A. Quinn,
B.Sc. M.Sc. Ph.D. P.Eng.

Vancouver, B.C.
November 1, 1966

CERTIFICATE

I, Harold Arthur Quinn, do hereby certify that:

- (1) I am a practising Consulting Geologist and Mining Engineer with offices and residence at 82 Mayfair Tower, 845 Hornby Street, Vancouver, Province of British Columbia, Canada.
- (2) I have received the following university degrees:
 - (a) B.Sc. (hons.) in Mining Engineering from Queen's University, Kingston, Ontario, 1941.
 - (b) M.Sc. in Geology from Queen's University, 1942.
 - (c) Ph.D. in Geology from Cornell University, Ithaca, New York, U.S.A., 1950.
- (3) I have practised my profession for more than 25 years.
- (4) I am a member, in good standing, of the Associations of Professional Engineers of the Province of Ontario and Yukon Territory.
- (5) I am a fellow of the Geological Society of America and of the Geological Association of Canada, and a member of the Canadian Institute of Mining and Metallurgy.
- (6) I am the author of 20 published reports, articles, papers and maps on mining and geological matters in Canada and various other countries.
- (7) This certificate is part of the attached report on "McGrath Mountain, Alice Arm, B.C. - A Mineral Property of Mayfair Moly Mines Ltd." dated November 1, 1966.
- (8) This report is based on my examinations of various parts of the property in August and September, 1966, on study of many of the items listed in its Bibliography, and on discussions with several geologists, mining engineers, prospectors and others.
- (9) I have no direct, indirect or expected interest in the properties or securities of Mayfair Moly Mines Ltd.

"H.A. Quinn"

Harold A. Quinn
B.Sc. Ph.D. P.Eng. (Ont. and Yukon)

Vancouver, B.C.
November 1, 1966.