

## Report

on the

Bear Lake Project

Copper-Magnum Claim Groups

for

Roosevelt Mines Ltd.

Edmonton, Alberta

October 5, 1970

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S. A. Mouritsen, P. Eng.

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#### SUMMARY

The Copper-Magnum Claim Group consists of 110 contiguous located claims in a block approximately a mile and one-half in width and five miles long. The claim block follows the crest and northeastern flank of the mountain range parallel to and southwest of the Bear Lake - Sustut River valley in north central British Columbia.

The claims cover a strongly faulted zone associated with shearing and folding in altered volcanic tuffs and flows. The mineral zones appear to be spatially and genetically related to the main central fault zone although some of the concentration in the shears may be supergene in origin while the more disseminated mineralization may be hypogene in origin and could have preceded later shear zone implacement (e.g. chalcopyrite and later chalcocite).

Two main mineral localities and three main subsidiary mineral showings have been mapped and sampled in a general way. The two localities and one of the showings have been partially tested by short diamond drill holes.

The main areas of mineralization are: The West Locality, the "A", "B" and "C" showings and the "D" Locality.

The West Locality has low grade mineralization exposed in discontinuous outcrops over a length of several thousand feet. A diamond drill hole with 60% core recovery averaged 0.623 oz. Ag. and 0.561% over a full length of 60 feet.

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The "A" Showing is in sheared red volcanics and is sparsely disseminated bornite and chalcopyrite over an area 26 by 180 feet.

The "B" Showing showed potentially significant silver values and warrants additional trenching and sampling.

The "C" Showing returned good copper-silver values and additional trenching, sampling and geological study is recommended. The "D" Locality is in a glacially scoured basin several miles southeast of the West Locality. The surface exposure is roughly 900 feet by 300 feet. The bornite and chalcopyrite mineralization is heavy in the shear zones and disseminated sparsely in the rock and lightly sheared zones.

A pattern of 12 - 50 foot holes gave an arithmetic average of 0.208 oz. Ag. and 0.383% Cu. Heavily sheared zones assayed 3.65 Ag. and 6.40 % Cu. in 10 foot surface samples compared with 1.80 oz. Ag. and 5.70% Cu. in the same zones in drill holes. The property is readily accessible by aircraft. The extension of the Pacific Great Eastern Railway north from the south end of Takla Lake has right-of-way cleared to within a few miles of Bear Lake and shall bring the railroad within three miles of the property.

#### RECOMMENDATIONS

 Establish a supply base on the northwest corner of Bear Lake. This base should consist of an office, sleeping cabin and equipment shed.

 Construct a road from Bear Lake to the "D" and West Locality.
Cut long trenches across the "D" and West Localities to establish the continuity of the mineralization.

4. Grid and detail map all interesting mineral areas on the claims.

Sample and trench all potentially interesting shows. The grid should be laid out with a chain and compass and all stations checked with an altimeter so that structural control can be determined.

5. Carry out an I. P. survey using spacings of 100 feet and 400 feet. This survey would be of maximum value in areas of overburden such as valley floors. Here wide spacing would also be of value.

6. Diamond drilling should follow the above studies.

7. When recommendations 1 to 6 have been completed a preliminary production feasibility study should be made if the results are satisfactory.

8. If No. 7 is favorable additional diamond drilling will be necessary to block out ore.

## CONCLUSIONS

1. Copper and silver mineralization occurs along a major fault through the claim block. The principal areas are the "D" and West locality. There is insufficient work on the "B" and "C" showings to evaluate them at the present time.

2. The mineralization being mostly bornite with one ounce of silver to the unit of copper, will make a good concentrate if the production stage is found to be feasible.

3. Railway transportation will be available within three miles of the major showings.

#### INTRODUCTION

This report is prepared at the request of Mr. T. M. Hamel, Exploration Manager of Roosevelt Mines Ltd. The report is largely based on information collected under the supervision of Dr. J. F. V. Millar, P. Eng., during the summers of 1963 and 1964 and my own

visits to the property in 1969 and 1970. Geological and Mineral Resource reports on the general area include:

1946 McConnell Creek, British Columbia. Paper 46.6 Geological Survey of Canada, Ottawa. C. S. Lord. 1948 McConnell Creek Map Area, Omineca District, British Columbia. Memoir 251, Geological Survey of Canada, Ottawa. C. S. Lord. 1963 Report - Ankhnx - Bearnx Claim Groups - Omineca Mining Division, British Columbia. L. G. White, P. Eng. The purpose of this report is to update and summarize the material available.

#### PROPERTY

The property consists of 110 contiguous located claims held by right of location by Roosevelt Mines Ltd. and title is recorded at the office of the Mining Recorder for the Omineca Mining Division in Smithers, B. C.

## LOCATION

The position of the northwest end of the claim group is latitude 56° 14°N and longitude 127°4°W. Elevations of the main showings are from 4600 to 6200 feet a.s.l. The property lies in the Omineca Mining Division and the Smithers Land Recording District.

At present, the property is reached by aircraft from Smithers, B. C. The property should be accessible by rail within two years.

## CLIMATE

The Alpine climate is unpredictable. Fair to Good weather can be expected for exploration from June to September inclusive. Geological parties should be equipped for cool nights at high altitude.

## TIMBER

The Sustut - Bear Lake valley is well timbered with merchantable white and black spruce, lodgepole pine on sand flats and terraces and thick growths of willow and ground birch along the lakes and streams.

## WATER

Water is readily available from the many creeks and lakes.

#### POWER

There have been no power surveys of the several potential power sites in the area. Two are known which would appear to have sufficient potential to warrant checking. The Kotsine River flows southeasterly along the southwest flank of the driftwood mountains. At the south end of the mountain chain it swings to the east and drops about 100 feet over a falls before it flows into the Driftwood River about 25 miles from Bear Lake. The Sustut River flows through a series of canyons below several wide glacial valleys. It is possible that the topography here would be amenable to a fairly inexpensive dam and power development.

### HISTORY

Bear Lake was mentioned by Simon Fraser in reports to the North West Company in 1806. The Hudson's Bay Company founded Fort Connelly at the south end of Bear Lake in 1826.

Bear Lake was on the route of the overland cable survey for the North America to Asia made in 1856 - 66.

In 1963, Northern Exploration Limited carried out a sustained prospecting expedition working north from the Takla Lake, Babine Lake area. The main showing on the property were located during this project.

### GEOLOGY

The rocks in the claim group are generally upper division, Takla group rocks of volcanic origin with diorite intrusives and only minor greywackes sediments. Some of the volcanic rocks exposed along the fault in the central portion of the claims resembles the lower Takla group volcanic rocks.

The intrusive rocks are, (a) a fine-grained grey diorite and (b) a fine to coarse-grained always light colored quartz feldspar porphyry, and (c) basaltic dykes.

The diorite dykes are found toward the west half of the claim block. The quartz feldspar porphyry sills, dykes and stocks are numerous throughout the Patcha Lake Basin and in addition to the numerous tabular sill-like bodies, include one stock, nearly one mile in diameter at the head of the southeast basin and a small stock several thousand feet long and about 1000 feet wide. The composition of this rock is variable in regard to quartz - feldspar ratio and biotite content. These are the Kastberg intrusions of Lord. These rocks are malachite stained along fractures on the periphery of the "D" locality. The "B" showing lies along the border of a smaller stock mapped in the Patcha Basin. The Main Fault has been traced more or less continuously for about 12 miles and through at least 3 offsets, from the later northsouth faults. The structure makes a gradual swing from a strike E-W magnetic at the west end of the property to S40°E at Driftwood Lake on the east end. Dip varies from 55 - 65° both calculated and observed from several locations. The actual fault zone is not exposed clearly in any location, although very often, particularly in mineralized areas, fracturing extends into the walls of the fault. Where the fault zone cuts a scarp or cliff, the fault is

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marked by a sharp cut in the scarp and an indentation down to the talus, most of the bottoms of which are obscured by residual fine broken rock.

The Main Fault extends from Camp Creek at the west to at least Driftwood Lake in the east. At the west end, the West Terminal Fault is inferred which offsets the Bearnx Fault, the Takla series and the Sustut sediments, about one-half mile horizontally to the south.

The rocks in the area are quite fresh and unaltered. The lower division rocks along the Main Fault are almost always altered to some degree. In the West Locality, the alteration is mainly chloritization, feldspathization and in some rocks silification. A definite schistosity is developed in some locations.

## ECONOMIC GEOLOGY

It is possible that the mineralization was introduced through the fault zones, in particular, the Main Fault, finding lateral channels along the numerous side shears characterizing the West Locality, and precipitating out in the broken fracture zones. Certain more favorable volcanic beds are mineralized often quite removed from the known faults. This could suggest a primary source with secondary enrichment along the many shears and faults. The mineral deposits are primarily copper with associated silver

and very minor lead in the west section, minor silver in the central area, silver and gold in the east end. Copper minerals identified in the order of abundance are: bornite, chalcopyrite, tetrahedrite (freibergite), chalcocite, malochite and azurite. Minor associated galena and pyrite was noted locally.

The igneous nature of the rocks and the widespread mineralization indicates depth and width to the main mineral localities, and a large mineralized zone should be looked for.

## WEST LOCALITY

Several zones of heavy shearing with associated mineralization branch from the Main Fault on both sides of the ridge cut by the fault. A long stretch of the zone of potential mineralization is obscured by the overburden in the valley of Camp Creek and to the east of the West Terminal Fault. Mineralization consists of bornite and chalcopyrite, with minor tetrahedrite, pyrite and galena. Silver values are about 2 ounces to the unit of copper. A drill hole 60 feet long averaged 0.623 oz. Ag. and 0.561% Cu. over the entire 60 feet. Sampling over a slope length of 750 and a horizontal length of 575 feet averaged 0.725 oz. Ag. and 0.27% Cu. Sampling over the ridge in the cup basin showed an average assay of 1.14 oz. Ag. and 0.575% Cu. over 41 feet representing a strike length of 300 feet. All showings in this area could be continuous and should be checked. A large mineralized zone is possible at this locality.

## THE "D" LOCALITY

The "D" Locality is several miles east of the West Locality and about 8 miles west of Bear Lake.

The mineralization is in a zone about 300 feet wide and 900 feet long and open to expansion. The rocks are upper division Takla volcanics and range from basaltic to andesitic porphyries. The feldspar porphyries are locally of a birds-eye type and generally grey in color. The mineralization is bornite and chalcopyrite with chalcocite and tetrehedrite: quite similar to the West Locality.

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The high grade zones appear to be associated with the faults and shear zones however, good dissemination of copper minerals was observed into the country rocks which does not appear to be totally associated with the fault system. It is entirely possible that there is secondary enrichment in the fault and shear zones and that the disseminated mineralization is more primary in nature. The feldspar porphyry and the volcanics should be closely studied with these possibilities in mind. The character of the mineralization would indicate considerable depth to the mineralization. Twelve holes were drilled in the mineral zone with the following results (averages).

11-7-	Devila		Terror and there is	0
Hole	Depth	51	lver oz/ton	Copper %
D-1	50'		0.60	0.62
D-2	30'		0.73	0.482
D-3	50'		0.20	0.683
D-4	50'		Tr	0.14
D-5	50'		0.375	0.656
D-6	50'		0.06	0.11
D-7	50'		0.141	0.211
D-8	50'		Tr	0.33
D-9	50'		Tr	0.10
D-10	50'		Tr	Tr
D-11	50'		0.39	1.203
D-12	50'		Tr	Tr

The average of all holes drilled was 0.208 oz. Ag. and 0.383% Cu. THE "A" SHOWING

This zone may be associated with the "D" Locality but is not considered economically important at the present time.

## THE "B" SHOWING

The "B" showing is located 9 miles west of Bear Lake at an elevation of 5702' to 5888'.

The showing consists of malachite staining along the north border of a medium grained quartz feldspar porphyry stock 300 feet wide and 1400 feet long. The mineralization occurs in both the bordering volcanics and the felsite itself. The felsite is heavily shattered and iron stained. Assays from the felsite range to near lloz/ton Ag. with the better copper assays near the edges of the felsite. This stock should be carefully examined as a possible potential silver-copper deposit with the mineralization throughout the stock as well as penetrating into the surrounding solutions. The deposit is amenable to open pit mining methods.

## GENERAL DISCUSSION

The many other showings in the area shall not be discussed here. The writer wishes to discuss the possibilities of disseminated mineralization in the volcanics and more particularly in the quartzfeldspar and feldspar porphyry stocks in the area. The faults and shear zones are locales for rather startling mineral occurrences but could prove secondary to more primary disseminated mineralization in the felsite intrusions. These rocks should be studied carefully and explored both geologically and geophysically. The wide-spread mineralization would tend to indicate a large primary source and every attempt should be made to find this source. The showings tested to date could well prove to be of sufficient size to support mining operations of considerable size if the grade of the mineralization and the showings prove continuous. It is too early to make any predictions or estimates. The character of the

mineralization and its obvious relation to faulting, shearing and igneous intrusions lends additional promise to the claim area. The claims warrant a full scale exploration program.

## PROGRAM 1969

During 1969 fuel and equipment including a new 160-cubic inch air compressor, jackhammers, a diamond drill, and a 4 x 4 truck were airlifted into the area from the north end of Takla Lake after being barged from Fort St. James. Fifteen miles of road is being constructed from Bear Lake to the property.

## PROGRAM 1970

Mr. T. M. Hamel cut further trenches in the "D" Locality during September of 1970. These trenches are generally along the strike of the mineral zone and on the flanks. The trench samples were assayed by Crest Laboratories Ltd. with the following results. (The samples have been plotted on the "D" zone map).

Sample No.	Silver oz/ton	Copper %
A127	2.04	4.50
A128	1.14	2.50
B127	Tr.	0.23
B128	Tr	0.02
C127	Tr	0.32
C128	0.46	0.56
Cx127	1.52	0.29
D133	Tr	0.15
D134	Tr	1.06
E133	Tr	0.19
E134	0.56	0.85
F133	0.60	1.64
Averages	0.53	1.026

The average results are comparable with the other samples taken from this locality. All values were bulked for the average assay because this appears to be more representative of the mineral deposit. Mr. Hamel described the samples as "representative and not chosen." He describes these samples as a fair average.

### CLAIM DATA

The claims referred to in this report, the record numbers, and the assessment due dates follow:

Claims	Record No.	Assessment Date
Copper 1-60	68865-68924	March 1972
Roonx 1-8	65697 to 65704	Dec. 19, 1971
Roonx 9-16	65705 to 65712	Dec. 1971
Magnum 1-34	68939 to 68972	March 1972
Knox 1-14	68925-68938	March 1972
Eagle 1-6	70332 to 70337	March 1972

The claims are recorded at Smithers, B. C.

### BUDGET

This budget is based on the use of the owner's equipment which includes a DGB caterpillar tractor, Al60 cu. in. compressor, jack hammers, hoses etc. with the exception of a larger diamond drill to be brought in on the property.

## Capital Installation

Supply depot - frame cabin 10' x 15' with equipment	\$1,500.00	
Equipment - frame cabin	1,500.00	
Main camp - cooktent, 2 bunk tents, supply tent office tent, all with plywood floors and sides	4,000.00	
Camp equipment for cooking, stoves, bunks, utensils etc.	600.00	
Office equipment	200.00	

\$7,800.00

Capital equipment - expendable		
Miscellaneous tools, drill steel axes etc.	3,000.00	
Chain saw	400.00	
		\$3,400.00
Rental Equipment		
Radio 3½ mon @ \$125.00/mon	525.00	
Diamond saw & motor @ \$50.00/mon	175.00	
Blasting generator	70.00	
Gasoline plugger - 2 mon @ \$150.00	300.00	
		1,070.00
	~	10.070.00
Total Capital Equipment	<u>`</u> *	12,270.00
Road and Camp Construction		
Labour		
4 men 30 days @ \$35.00/day	4,200.00	
Supervisor 30 days @ \$50.00/day	1,500.00	
Engineering 5 days @ \$150.00/day	750.00	
W.C., U. I. C. etc 15%	700.00	
		6,950.00
Room and Board		
4 men 30 days @ \$10.00/day	1,200.00	
1 man 5 days @ \$10.00/day	50.00	
		1,250.00
Main Camp		
1 week for 2 men \$40.00/day	560.00	
W.C., U.I.C., C.P. etc.	90.00	
Supplies	100.00	
		750 01

750.00

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Bridge Construction - Patcha Creek		
4 men - 1 week @ \$35.00/day	980.00	
Supplies	350.00	
		1,330.00
Supplies		
Fuel - diesel 40 bbls. @ \$35.00	1,400.00	
Gasoline 5 bbl <b>s. @ \$50.00</b>	250.00	
Blasting supplies 20 cases	700.00	
Miscellaneous	325.00	
		2,675.00
Transportation	1	
Aircraft 15 hrs. @ \$60.00/hr	900.00	
Aircraft 7 hrs. @ \$120.00/hr	840.00	
		1,740.00
Cost Road and Camp Construction		14,695.00
Trenching Project		
Labour		
1 Supervisor - 40 days @ \$50.00/day	2,000.00	
4 men @ \$35.00/day	5,600.00	
3 helpers @ \$20.00/day	2,400.00	
W.C., U.I.C., C.P., etc.	1,500.00	
		11,500.00
Mobilization .		
3 men from Edmonton @ \$150.00	450.00	
2 men from Takla @ \$50.00	100.00	
Expenses	300.00	
		850.00

850.00

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Room and Board		
8 men 40 days @ \$10.00/day	3	,200.00
Supplies		
Fuel 40 bbl. diesel @ \$35.00/bbl.	1,400.00	
6 bbl. gasoline @ \$50.00/bbl.	300.00	
Engineering	150.00	
Blasting Equipment, powder, etc.	1,000.00	
Camp	250.00	
Miscellaneous	1,000.00	
	4	,100.00
Transportation	~	
Aircraft 12 hrs. @ \$50.00/hr	600.00	
6 hrs. @ \$120.00/hr	720.00	and the state of the
	1	,320.00
Assaying		
Samples, freight & assay charge	2	,600.00
Total for Rock Trenching	22	,720.00
Geological Project		
Geologist 90 days @ \$100.00/day	9,000.00	
Consultant 30 days @ \$150.00/day	4,500.00	
Expenses and Travel	2,000.00	
Helpers 1 for 90 days @ \$25.00/day	2,250.00	
l for 60 days @ \$25.00/day	1,500.00	
Room and Board 270 days @ \$10.00/day	2,700.00	
Mapping, duplicating, prints etc.	1,500.00	
Communications	1,500.00	
W.C., U.I.C., C.P. etc.	1,5000.00	

26,450.00

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Diamond Drilling Project A \$12.00/ft (contract drill)		36,000.00	
Allow 10 holes at 300 feet			
Labour (Company Drill)			
3 men 80 days @ \$40.00/day		9,600.00	
W.C., U.I.C., etc.		1,440.00	Teacher from the second se
			11,040.00
Room and Board			
3 men - 80 days @ \$10.00/day			2,400.00
Supplies and Spares			
Fuel 8 bbl. @ \$50.00/bbl.	<u>s</u>	400.00	
Bits and shells 100 @ \$70.00		7,000.00	
Core boxes		300.00	
Miscellaneous		300.00	ne i fai faisi in an
			8,000.00
Sampling and Assaying			
300 samples			3,500.00
Total diamond drilling			24,940.00
INDUCED POLARIZATION SURVEY			
Mobilization and demobilization		800.00	
25 miles at \$325.00/mile		8,125.00	alan an the second s
			8,925.00
Board and Room			
4 men 30 days @ \$10.00/day		1,200.00	
1 man 6 days @ \$10.00/day		60.00	
			1 200 00

1,260.00

# Line cutting and staking

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Diffe catching and staking		
2 men 20 days @ \$35.00/day	1,400.00	
Air transport - 14 hrs. @ \$120.00/hr	1,680.00	
Reports, prints, etc.	1,500.00	
Total I. P. Cost	14,765.00	)
FINALIZATION PROJECT		
Closing camp and equipment for winter, demo	bilization and feasib-	
ility studies		
Demobilization		
Labour 20 man days @ \$35.00/day	700.00	
7 man days @ \$50.00/day	350.00	
W.C., U.I.C., etc.	200.00	
Expenses and transportation	650.00	
1971 Report and feasibility	5,000.00	
Allowance for contingencies	1,800.00	-
Total of Finalization Project	8,700.00	)
RECAPITULATION		
1. Capital Equipment	12,270.00	)
2. Road and Camp Construction	14,695.00	)
3. Trenching Project	22,720.00	)
4. Geological Project	26,450.00	)
5. Diamond Drilling Project	24,940.00	)
6. Contract drill .	36,000.00	)
7. INDUCED Polarization Survey	14,765.00	)
8. Finalization Project	8,700.00	)
9. Overall contingency allowance	17,295.00	2
Total Expense estimate	177,835.00	0

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Note:

This expense estimate should be considered as a preliminary exploration program. The total cost for the total exploration program if the preliminary exploration program is successful could well exceed six times this amount because of the high cost of extensive diamond drilling to block out an ore body or ore bodies, surface rights, good roads, etc.

This report covers the more interesting aspects of the coppermagnum claim groups.

#### MAPS SUBMITTED

1. Regional Geology

- 2. Geology and Location of the Main Mineral Localities
- 3. Copper-Magnum Group claim map
- 4. West Locality and No. 1 & 2 showings
- 5. "D" Showing (Locality)
- 6. "B" Showing

The maps are bound at the back of the report.

Respectfully submitted, S. A. Mouritsen, P. Geol., P.Eng.

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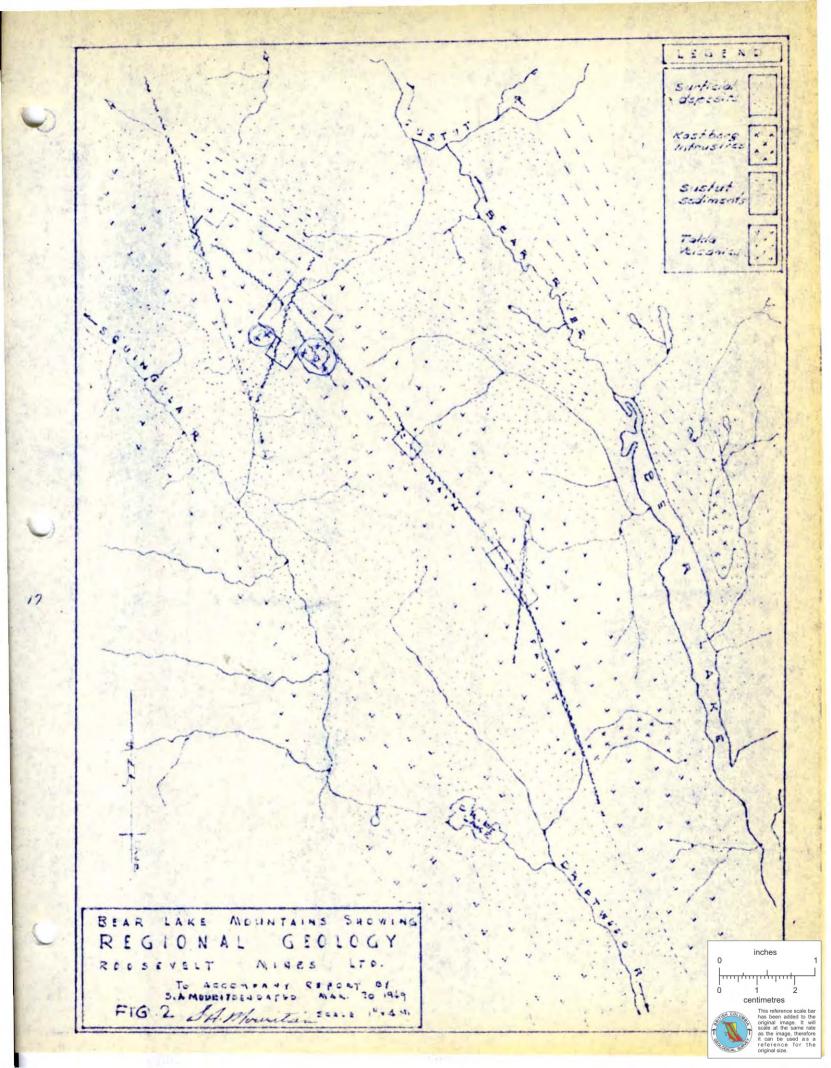
## CERTIFICATE

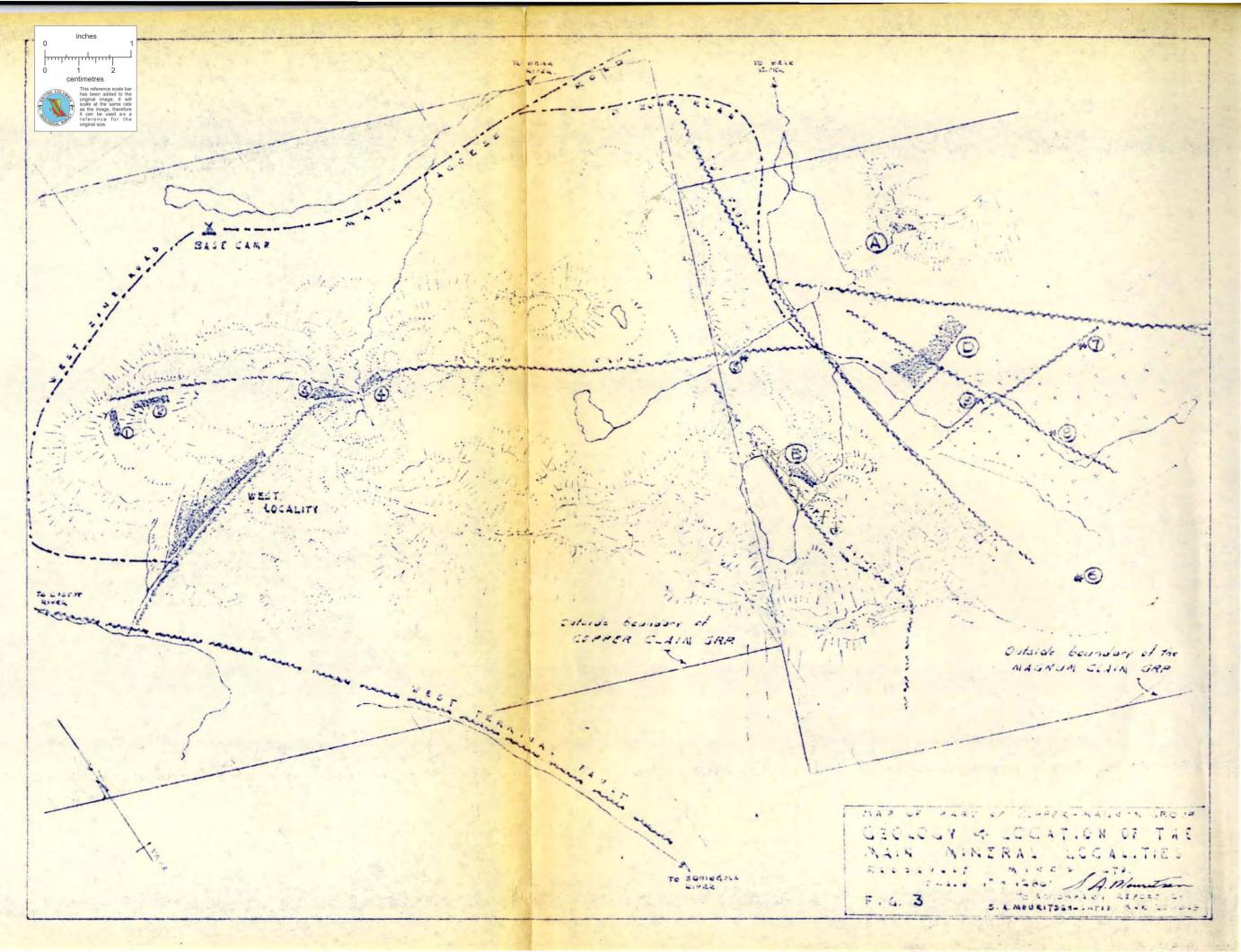
- I, Stanley A. Mouritsen, hereby certify:
- 1. That I am a Professional Engineer and reside at R. R. 1, Carstairs, Alberta.
- 2. That I am a member of the Association of Professional Engineers of the Province of British Columbia and the Province of Alberta.
- 3. That I am a graduate of the University of Manitoba, 1946.
- 4. That I have been engaged in geological and geophysical exploration continuously for 24 years.
- 5. That I have been in consulting for 13 years and maintain an office at Rm. 804 630 17th Avenue, S.W., Calgary, Alberta
- That I have no interest, nor do I expect to receive any interest directly or indirectly in the properties or securities of Roosevelt Mines Limited.
- 7. That I visited the property in July 1969 and June 1970 to make a personal investigation.
- 8. That I have examined and discussed the exploration results presented in this report with Dr. J. F. V. Millar, P. Eng., an Engineer well known to me for several years and am satisfied as to the validity of the results.
- 9. That I did use some of the cited information referred to under Introcution in this report.

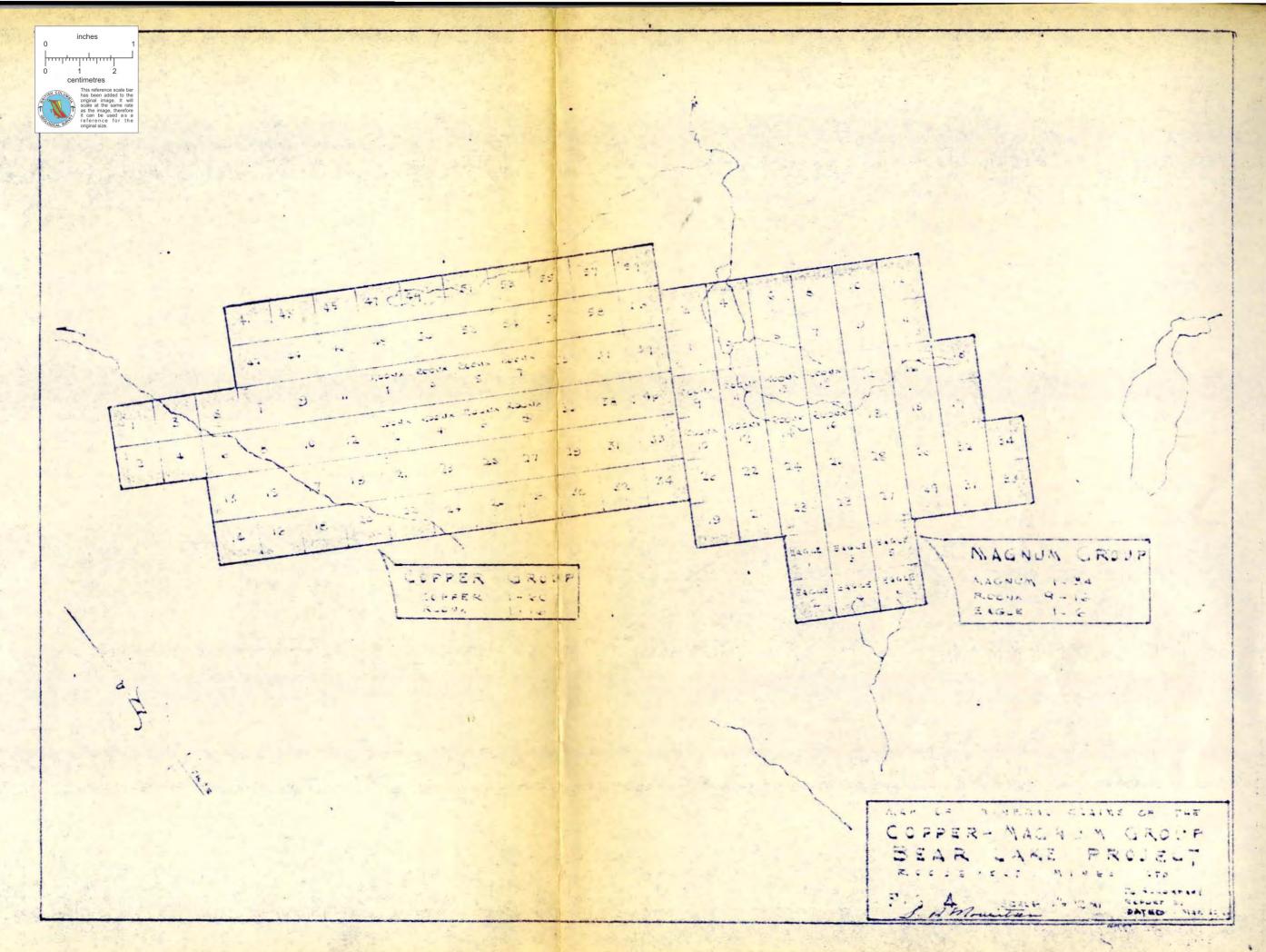
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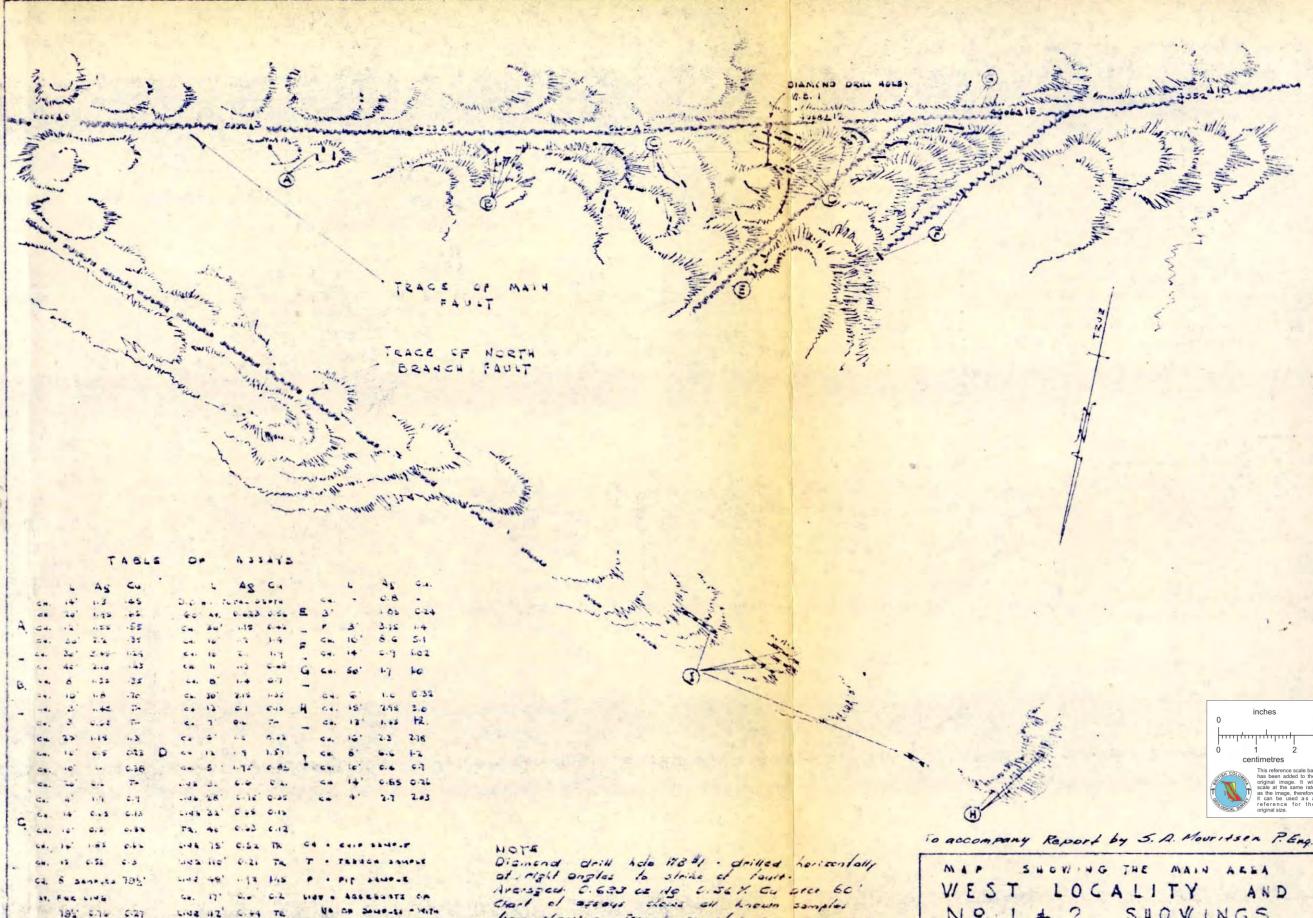
S. A. Mouritsen, P. Geol., P. Eng.

Calgary, Alberta October 5, 1970









Charl of assays chews all known samples hern slowing . Trench samples are overaged.

WEILATED AVERAGE

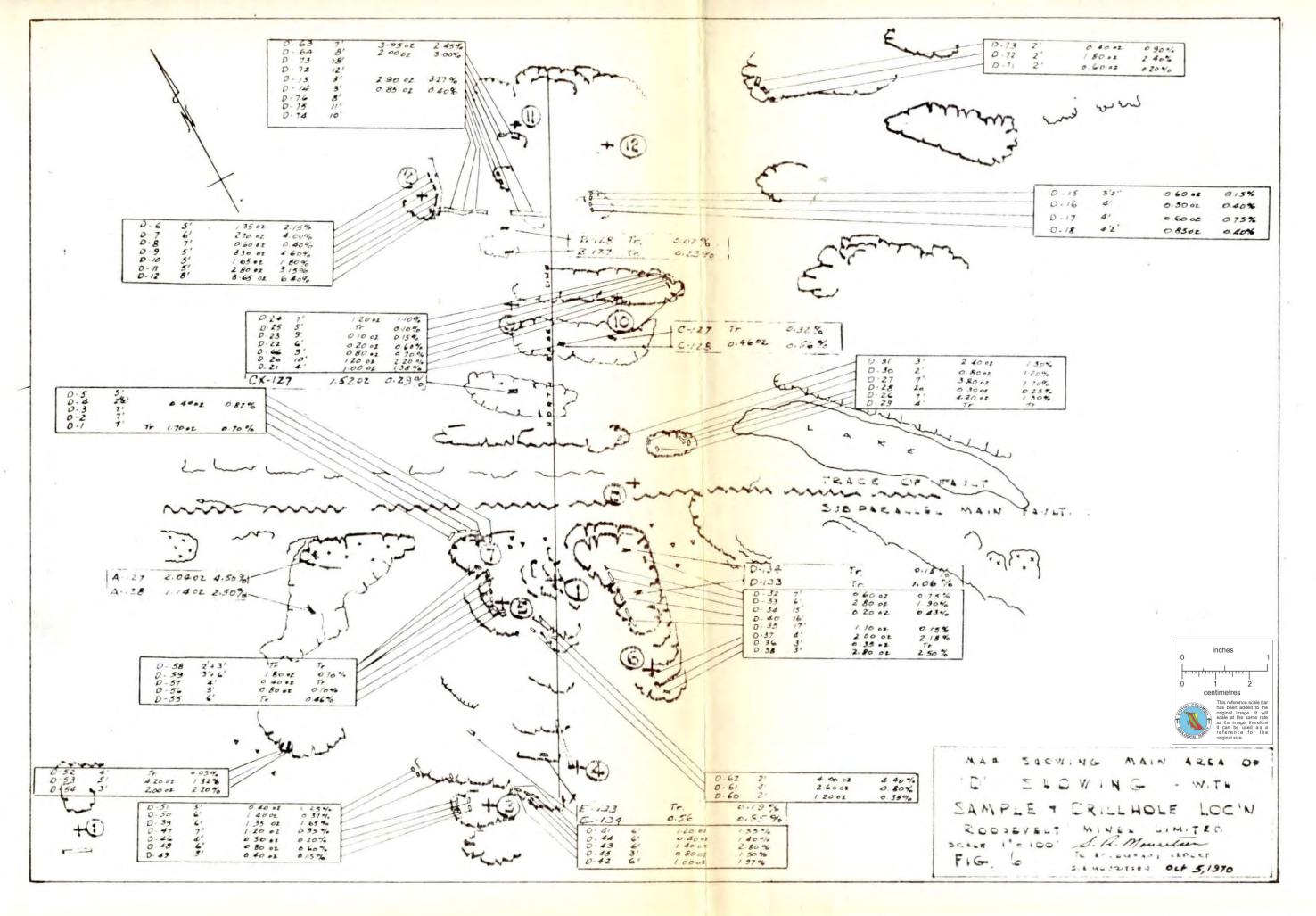
an. 16" 0.45 TE

Line 57' 6.40 0.2

T. 17' 6.4 0.38

7. 25' 6.3 6.2





Feldspor porphyry - well fractured and tren stained - some local Cu stain - medium to course texture

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No.	ENGTH	02.46	·/ cu	NC.	LENGTH	62. AG	% 20
10865	4%	0.95	1.36	154A	5		
1-10609	9'	0,70	1.00	1604	5'	0.3	0.2
310890	7'	1.20	1.65	17-03	5'	0.9	0.6
	8	0.95	1.30	1802	5	1.85	3.55
5.10892	5'	0.10	TR	1901	7'	1.85	1.40
6-10893	G '	0.30	TR	2000	٦.	0.3	0.05
2 -10895	2,'	0.40	TZ	2106		3.7	0.4
8.10894	4'	0.30	TR	2205		10.75	0.90
9.10896	10'	0.35	TRE	2307	4	27	0.85
10. 10897	10'	0.50	0.03	2408	3'	0.85	0.25
	5'	0.25	TH.	2599	3	0.25	Th.
2.10862	5'	0.65	1.05				
13, 10863	5'	2.10	4.00				
4. 10864	10'	0.70	1.46				

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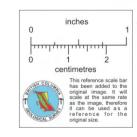
5

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DIAMOND DRIL

D





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