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REPORT ON
SULTANA PROPERTY
HAZELTON, BRITISH COLUMBIA
SULTANA SILVER MINES LIMITED
Dolmage, Campbell & Assos. Ltd.
93-N-4

Sultana Silver Mines Ltd.

Report on

SULTANA PROPERTY
Hazelton, British Columbia

January 20, 1970.

D.D. Campbell
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Consultant

Vancouver, Canada.

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INTRODUCTION

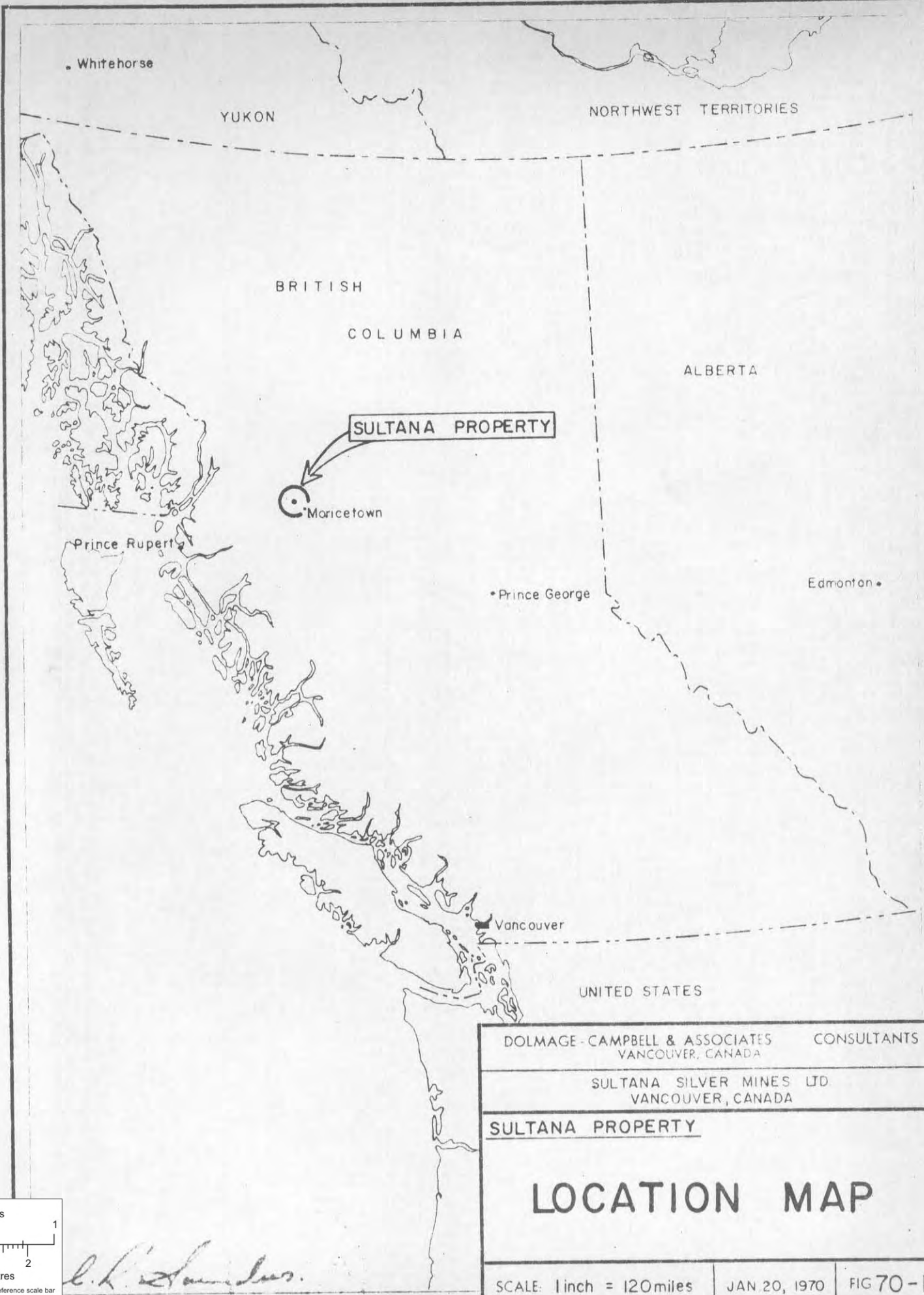
In August, 1968, Dr. D. D. Campbell of Dolmage Campbell & Associates Ltd. examined the Silver Tip group of claims owned by Sultana Silver Mines Ltd. and recommended an exploration programme for the property. The programme was initiated in November, 1968 but had to be suspended late in the following month because of severe winter weather conditions. Fieldwork recommenced in mid-June, 1969, and continued until mid-August when it was once again suspended as a result of losing a diamond drill in a fire and the inability to obtain another drill on short notice.

During both short periods of exploration, a geologist employed by Dolmage Campbell & Associates Ltd. was resident on the property. One of the writers, Mr. C.R. Saunders, during these same periods, visited the property several times and examined mineral showings and diamond drill core. This report is therefore based on personal examinations, results of the fieldwork, and all available private and government reports concerning the property and the area in general. Of the latter, B.C. Department of Mines Bulletin No. 43, Geology of the Recher Deboile Range by A. Sutherland Brown, has been most useful.

LOCATION: (55°06'N, 127°32'W) (Figure 70-1)

The Sultana property is located at the headwaters of Straw (Boulder) and Corya Creeks and across the intervening mountain ridge. Except in the creek valleys, most of the property lies above timberline to elevations of 7000 ft. It is two miles southsoutheast of Tiltusha Peak and three miles southeast of the old Red Rose mine.

A campsite is located near the head of Straw Creek at an elevation of about 5,000 feet. It is reached by approximately thirteen miles of dirt road built by Sultana Silver Mines Ltd. up the valley of Straw Creek from Highway No. 16, six miles north of Maricetown on the Canadian National Railway. There is no access up Corya Creek valley and, for the present, work in this area must be mobilized and serviced by helicopter.



Whitehorse

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SULTANA PROPERTY

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VANCOUVER, CANADA

SULTANA SILVER MINES LTD
VANCOUVER, CANADA

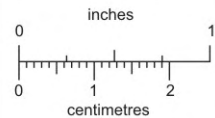
SULTANA PROPERTY

LOCATION MAP

SCALE: 1 inch = 120 miles

JAN 20, 1970

FIG 70-1



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C. L. Saunders

Topography in the area is precipitous at higher elevations and only somewhat less rugged on lower slopes. Outcrop is plentiful on steep ridges and mountain-tops but lower elevations are covered by deep boulder moraines. A recent moraine, not covered by vegetation, occupies the headwaters of Carya Creek down to an elevation of 3500 ft. Ample timber of merchantable size covers the property at lower elevations (3000-4000 ft.).

PROPERTY:

Sultana Silver Mines Ltd. owns a total of 155 contiguous recorded mineral claims in two groups; the Silver Tip group of 50 claims and the recently staked "S" group of 105 claims. Silver Tip claims numbered 1-34 have been surveyed by the firm of McWilliam, Whyte, Gable and Associates in 1967 and include as fractions, numbers 24, 25, 26, 30 and 34.

Claim Name

Record Number

Silver Tip 1-6

41038 - 43 inclusive

Silver Tip 7-17

47227 - 37 "

Silver Tip 18-34

47843 - 59 inclusive

Silver Tip 35-50

48748 - 63 inclusive

Tag Number

S 1-100

111501M - 600 M inclusive

S 101-102

43964M - 65M inclusive

S 103-105

68907M - 09M inclusive

HISTORY:

Two vein-type deposits on Rocher Debaule Mountain have produced about \$8 million worth of tungsten and copper ores, mostly during the period 1942-1954 but also on a smaller scale from 1915 to 1919. These two producers were the Red Rose Mine, tungsten-copper, and the Rocher Debaule Mine, copper, located three miles and five miles, respectively, northwest of the Sultana Silver property. About ten other properties on the mountain range have been variously developed but none reached a significant production stage.

Besides tungsten and copper, values were obtained from gold, silver, arsenic, cobalt, molybdenum, lead and zinc. Nickel and uranium have also been noted in the area.

SUMMARY AND RECOMMENDATIONS

The Sultana property of Sultana Silver Mines Ltd. consisting of 155 recorded mineral claims, is located near the south end of the Rocher Deboile Mountain Range, six to ten miles west of Moricetown, B.C. It is three and five miles, respectively southeast of the previously productive Red Rose and Rocher Deboile copper-tungsten and copper mines.

Geologically, the mountain range consists of a central north-south-trending core of granodiorite-monzonite that intrudes the Hazelton Group of sedimentary and volcanic rocks of Jura-Cretaceous age. The range is bounded by steeply-dipping, major, block faults. The Sultana property lies near the south end of the range, encompassing the intrusive granodiorite and intruded Hazelton rocks (primarily volcanics of the Brian Boru Formation), and a portion of the Pangea Fault.

Mineralization on the property consists of a silver-bearing quartz vein zone, disseminated copper (molybdenum) mineralization in the vicinity of the vein zone, and copper (silver) mineralization near the headwaters of Corya Creek, one miles south of the vein zone.

The property and surrounding area encompass known areas of mineralization and a geological environment similar to other copper-molybdenum metalliferous areas in the Cordilleran geological province. Because of this favourable geological environment, combined with known mineralization, the writers are of the opinion that an extensive, comprehensive exploration programme is warranted for the Sultana property.

RECOMMENDATIONS:

It is recommended that an exploration programme consisting of three essentially simultaneous phases be undertaken. The three phases should consist of: A) detailed exploration of the three known areas of mineralization on the property; B) thorough prospecting of the entire claim group; and C) reconnaissance prospecting of the most geologically favourable areas in the southern half of the Rocher Deboile Range. The estimated cost of this programme is \$192,000.

GEOLOGICAL SETTING

REGIONAL GEOLOGY:

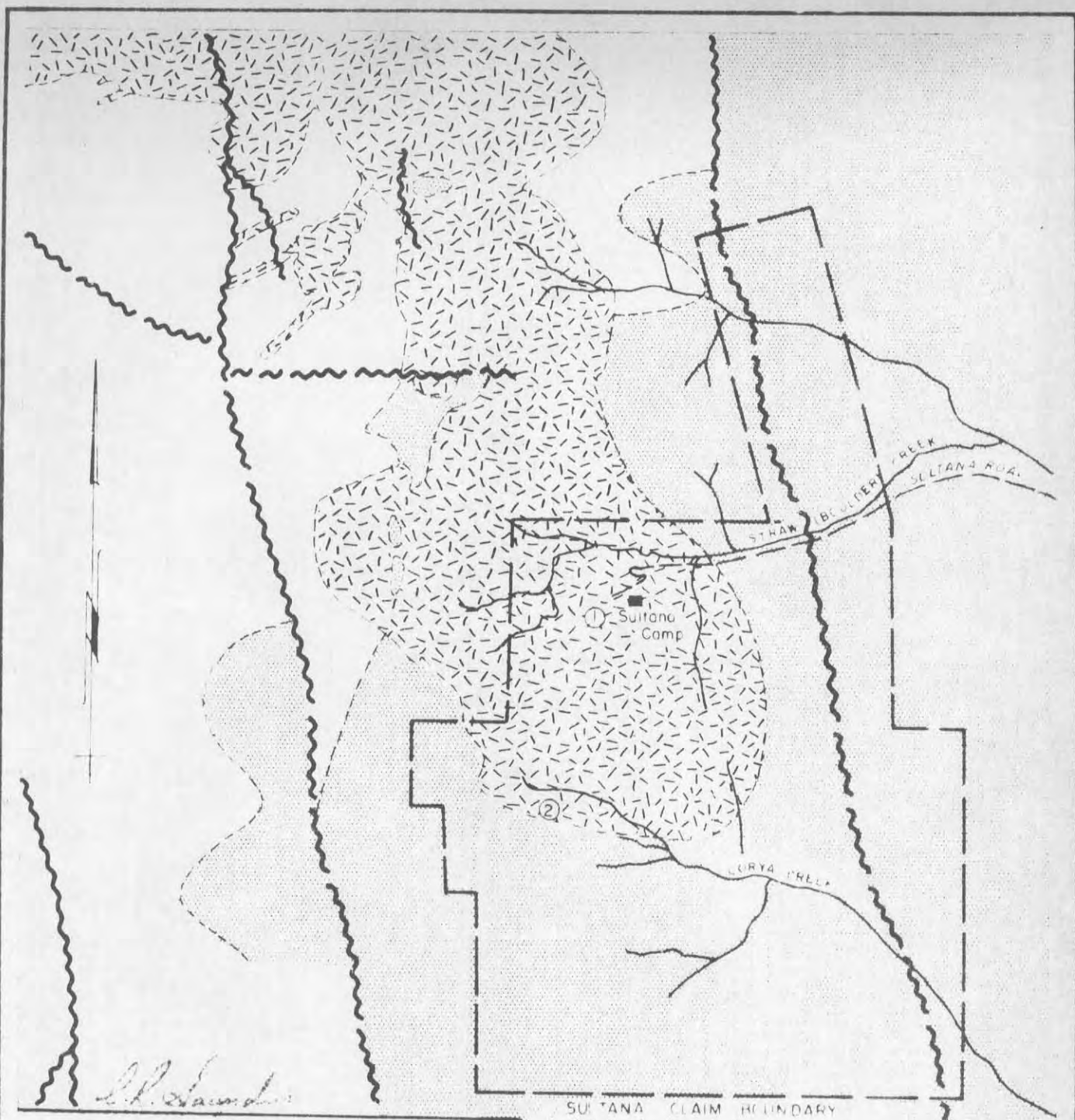
The Rocher Deboile Range has been geologically mapped by Dr. A. Sutherland Brown of the B.C. Dept. of Mines and Petroleum Resources. The results of this work are comprehensively presented in Bulletin 43 (1960) of the Department; "Geology of the Rocher Deboile Range".

According to Dr. Sutherland Brown's mapping, the mountain range is dominated geologically by a stock of granodiorite-monzonite that forms a north-south core of the range, underlying the highest peaks. The outcrop of this stock is 3-6 miles in width and 10 miles in north-south length, extending from Hagwilet Peak, (6700'), at the north end of the range, to Brian Boru Peak, (8200'), at the south end. The property of Sultana Silver Mines Ltd. lies at the southern end of the granodiorite stock, encompassing the granodiorite-Hazelton Group contact. (Figure 70-2). The Rocher Deboile granodiorite stock is an eastern outlier of the Coast Range Batholith, the eastern edge of which crops out 60 miles to the west.

The intruded formations that underlie most of the Rocher Deboile Range around the stock belong to the Hazelton Group of sedimentary and volcanic rocks of Jura-Cretaceous age. These formations strike northward and dip gently to the east, but they have been considerably dislocated by north-trending regional block faults.





Another dominant geological feature of the Rocher Deboile Range is the fact that the range is bounded by steeply-dipping, major, block faults; the Cap Fault to the west and the Pangea Fault to the east, with the block between them being upthrust. Almost midway between these two faults is a comparable parallel one, the Chicago Fault, that forms the west flank of all the peaks in the range.

Of the 16 recorded mineral properties on the Rocher Deboile Range, one is located on the Pangea Fault, three on or near the Chicago Creek Fault, (including the Red Rose), one on the Cap Fault, and most of the remainder are located along the east and west edges of the northern half of the granodiorite stock. It is thus evident that the range is mineralized over a wide area and that this hydrothermal mineralization is largely confined to the vicinity of the intrusive stock and the regional block faults.



L.P. Saunders

LEGEND

-  ROCHER DEBOULE STOCK
 -  BRIAN BORUJ FORMATION
 -  RED ROSE FORMATION
- } Hazelton Group
-  FAULT (defined, assumed)
 - ① VEIN ZONE & DISSEMINATED COPPER (MOLYBDENUM) MINERALIZATION
 - ② CORYA CREEK DISSEMINATED SULPHIDE ZONE

SULTANA CLAIM BOUNDARY

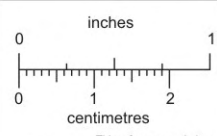
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REGIONAL GEOLOGY

SCALE 1 in. = 1 mile JAN 20, 1970 FIG 70-2



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PROPERTY GEOLOGY:

The Sultana property is underlain by only two formations; the granodiorite stock in the east-central area and the volcanic rocks of the Hazelton Group in the north, west and south (Figure 70-2). The block of claims extending northward covers the Pangea Fault. The volcanic rocks are andesitic flows, breccias and tuffs of the Brian Boru Formation. The granodiorite is a light grey mottled rock in which porcelanous tabular phenocrysts of plagioclase, dark green to black hornblende and black biotite are set in a white to faintly pink matrix. The rock is generally very homogeneous; it is well-jointed in a general large blocky pattern and in local finer blocks.

An area underlain by fine to medium grained diorite (?) occurs immediately south of the Sultana copper-silver vein zone. This rock, which weathers to a buff color, contains some chalcopyrite along fracture planes; it also contains the occasional watery white quartz stringer. The extent of this particular intrusive phase, or the presence of other similar intrusive phases, is not known.

The main geological structure underlying the Sultana property is the Pangea Fault (Figure 70-2), but it is largely concealed by forested overburden cover. In view of the known widespread occurrences of mineralization on the Rocher Deboile Range it is considered worthwhile to prospect and conduct a reconnaissance soils geochemical survey along the Pangea Fault.

MINERAL OCCURRENCES

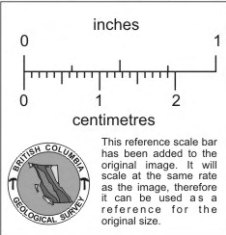
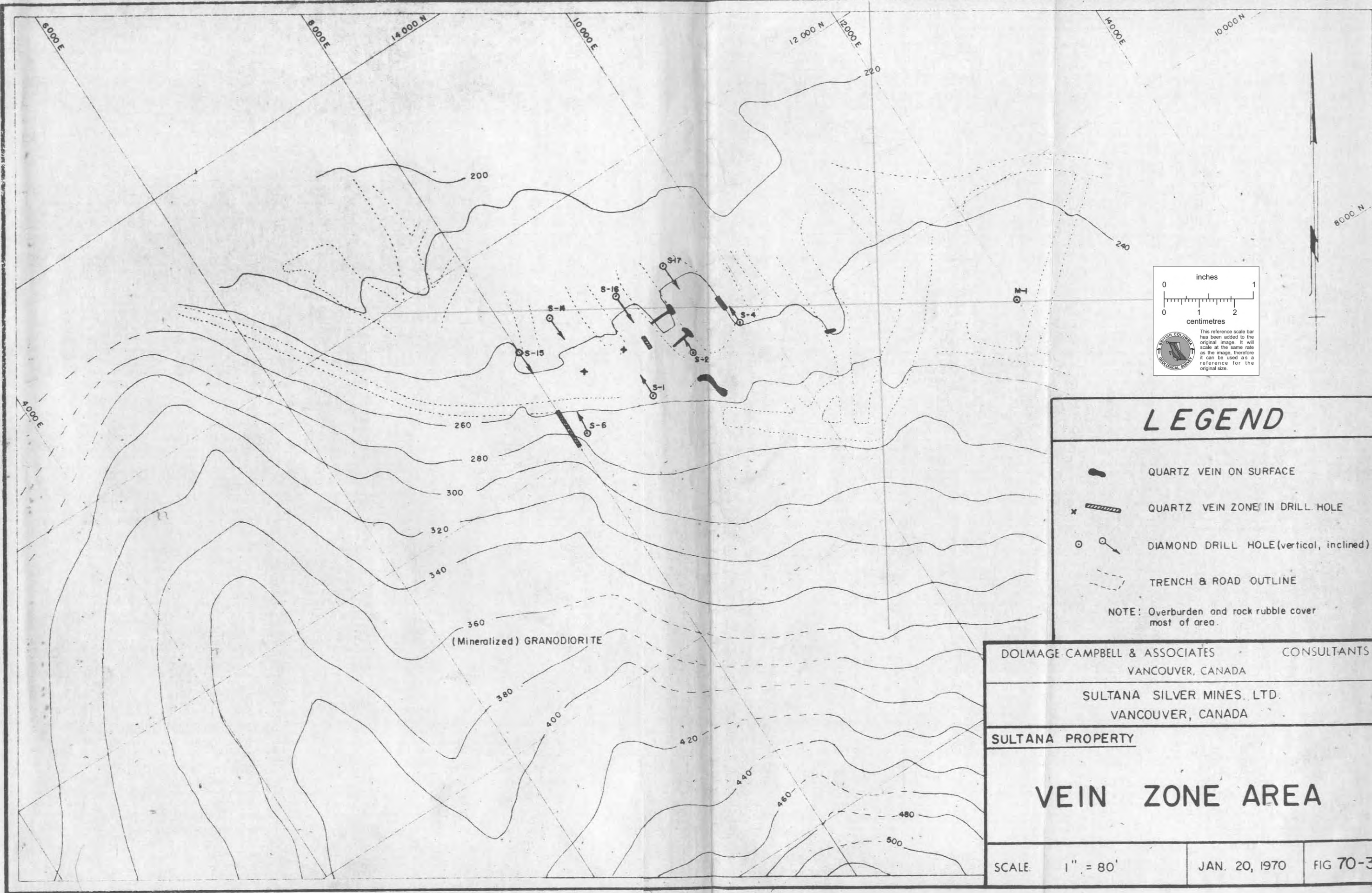
Two known mineral occurrences of economic interest on the property of Sultana Silver Mines Ltd. consist of a copper-silver vein stockwork and an area of disseminated chalcopyrite-molybdenite mineralization as fine fracture fillings in the granodiorite and related intrusive phases.

Mr. C.E. Carlson, president of Sultana Silver Mines Ltd., reports a third occurrence of copper mineralization at the headwaters of Carya Creek. This is presumably the same occurrence mentioned by Dr. A. Sutherland Brown in his report of 1960, as follows: "In addition to the vein deposits there is disseminated sulphide mineralization. This is almost entirely pyritic and is rarely intense, except near the southern contact of the southern dome (of the granodiorite) where it contains traces of chalcopyrite. Zones several hundred feet wide near valley level occur on either side of the large recent moraine on Carya Creek and in some dikes higher up the slopes." Assays obtained from specimens collected by Mr. Carlson in this area returned the following values:

<u>Gold (oz/ton)</u>	<u>Silver (oz/ton)</u>	<u>Copper (%)</u>
Trace	0.91	6.51
0.06	151.3	2.34
0.67	53.0	1.09
0.15	83.0	3.65

The absolute value of these assays cannot be related to potential grade of mineralization in the Carya Creek area but they do indicate the presence of gold, silver and copper mineralization in interesting enough quantities to warrant intensive follow-up exploration.

The silver-copper vein zone located near the head of the south fork of Straw Creek (Figure 70-2), comprises the original mineralization discovered and explored on what is now the Sultana Mines Ltd. property, and was Sultana's initial reason for staking the area. The zone is composed of two or more quartz veins, ranging in width from 2 to 12 feet, that are apparently displaced by faulting, resulting in a rather broken, discontinuous system of veins (Figure 70-3). The zone of quartz veining is up to 45 feet wide (true width in one drill hole), strikes approximately northeast, and appears to dip steeply south; to date it has been traced for approximately 200 ft. of strike length. Of eight holes drilled into the zone, four intersected quartz veins with varying amounts of sulphides, three passed through the projected zone without



LEGEND

- QUARTZ VEIN ON SURFACE
- QUARTZ VEIN ZONE IN DRILL HOLE
- DIAMOND DRILL HOLE (vertical, inclined)
- TRENCH & ROAD OUTLINE

NOTE: Overburden and rock rubble cover most of area.

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VANCOUVER, CANADA

SULTANA PROPERTY

VEIN ZONE AREA

SCALE	1" = 80'	JAN. 20, 1970	FIG 70-3
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intersecting veins (possibly due to fault displacement?), and one failed to reach the zone. Assays obtained from the vein intersections ranged from 0.6 to 18.6 oz/ton silver, 0.25 to 9.1% copper, and 0.01 to 0.03 oz/ton gold. Individual vein widths are two to three feet except for tiny quartz stringers. The host rock is weakly kaolinized granodiorite that is randomly fractured throughout with some fractures containing thin coatings of pyrite, chalcopyrite and occasionally molybdenite. This material generally assays less than 0.10% Cu with some values up to 0.20%.

Copper-molybdenum mineralization also occurs in fractured granodiorite to the east of the vein zone. One vertical hole was drilled in this area but returned only low values in copper, the highest being 0.15% and rare low values in molybdenum. It now appears that this hole is near the fringe of the disseminated zone. A further area of interest consists of a rusty weathering hill immediately south of the vein zone. This area is underlain by fine to medium grained granodiorite that is quite distinct from the coarser grained granodiorite underlying much of the claim area. It contains some pyrite and chalcopyrite on fractures but the extent of this fine grained phase and its sulphide content are unknown at present due to a lack of geological mapping and the frost-heaved and leached nature of the surface rock exposures.

CONCLUSIONS & RECOMMENDATIONS

The Sultana Silver Mines Ltd. property encompasses an area that is geologically favourable for the occurrence of copper and precious metal deposits in that a compound stock of granitic rocks intrudes regionally faulted volcanic rocks. Deposits of tungsten, copper and silver have been profitably mined from the volcanic rocks surrounding the stock. Three areas of mineralization have been located on the property. These are: a copper-silver vein zone near the head of the south fork of Straw Creek, disseminated copper (molybdenum) mineralization in coarse and fine grained granodiorite phases in the vicinity of the vein zone, and copper and silver mineralization near the head of Corya Creek. The property thus warrants considerable exploration in the form of examination of the known mineral occurrences, detailed geological prospecting of the entire property, and reconnaissance prospecting of surrounding geologically favourable areas. Neither the property nor the Rocher Deboule range has been comprehensively prospected by geophysical or geochemical methods, nor has it been explored for large, low-grade openpit type deposits.

The copper-silver vein zone, although erratic in both quartz vein continuity and sulphide content, contains sufficiently interesting values and widths to warrant further exploration. Extension along strike and at depth requires checking to determine the possible occurrence of a high grade, though small tonnage economically viable mineralized zone.

The disseminated copper (molybdenum) mineralization associated with and in the vicinity of the vein zone also warrants thorough exploration. The objective would be to outline a relatively large area of disseminated mineralization and then determine its valuable sulphide content.

Although little is known of the Corya Creek mineralization, initial indications of both size (Sutherland Brown) and sulphide content (Carlson) suggest that considerable detailed exploration is required to properly assess the area.

Recommendations: The following exploration programme, subdivided into three phases for convenience, is recommended to adequately explore the claim group and the surrounding area, and to assess the known areas of mineralization. The three phases can be executed simultaneously as weather, manpower and logistics permit.

Phase A: Exploration of mineralized zones

- 1) Copper-silver vein zone: Diamond drill on 100 ft. sections along a strike length of approximately 500 ft. to intersect the projected vein zone at 50-75 ft. and 100 - 150 ft. depths. Total footage required is 3000 ft. Detailed geological mapping of the area to be completed at the same time. Improve road from highway No. 16 to present campsite.
- 2) Disseminated copper (molybdenum) mineralization in vicinity of copper-silver vein zone: Complete detailed geological mapping, bulldozer trenching to obtain fresh exposures for sampling and examination, and initial exploration diamond drilling. The trenching required will not be extensive, probably totalling one week for a D8 or equivalent-size machine. Location, azimuth and dip of drill holes will be determined from detailed mapping. Total estimated footage is 3000 ft.
- 3) Corya Creek mineralized area: Detailed prospecting and geological mapping, sampling where possible and if warranted; this may require some hand trenching (blasting) since there is no surface access to the area. Diamond drilling is contingent on results of the surface exploration but a nominal footage of 2000 ft. is recommended. A small helicopter-established and supported camp will be required.

Phase B: Property exploration

The entire Sultana Silver Mines Ltd. claim group requires careful prospecting and reconnaissance geological mapping. A two man self-contained, helicopter supported party can carry out this phase, doing sampling and hand trenching as required. In overburden covered areas, particularly along the Pangea Fault, reconnaissance soil sampling will be required.


Phase C: Prospecting of geologically favourable areas outside the Sultana property

The Rocher Deboile Intrusives and the Jura-Cretaceous Formations it intrudes, particularly the Brian Boru volcanics, provide a favourable geological environment similar to other copper-molybdenum metalliferous areas in the Cordilleran geological province. This setting, plus the presence of some known mineralization suggests that careful geological prospecting of the area is warranted. It is recommended that a two man prospecting crew (geologist and assistant) carefully examine the southern half of the Rocher Deboile Range. The programme will require a self-contained camp and helicopter support - perhaps the same crew and camp from Phase B.

The cost of the exploration programme, not subdivided by phases, is estimated to be:

Diamond drilling - 8000 ft. @ \$12.00 per ft. plus \$2,000. mobilization cost	\$ 98,000.
Trenching - 10 days @ \$300. per day	3,000.
Road improvement and maintenance (primarily bulldozer work)	5,000.
Camp - re-open main camp, assemble two smaller mobile camps	3,000.
Crew maintenance - \$6.50 per man-day	9,000.
Transportation - truck and helicopter, including moving drill to Corya Creek area by helicopter	15,000.
Assaying	5,000.
Travel and Communication	3,000.
Supplies - engineering, blasting powder, etc.	2,000.
Engineering - prospecting crews, geologist	18,000.
Consulting	6,000.
Contingency - approximately 15%	<u>25,000.</u>
TOTAL:-	<u>\$192,000.</u>

Respectfully submitted,
DOLMAGE CAMPBELL & ASSOCIATES LTD.


C.R. Saunders, P.Eng.

Douglas D. Campbell, P.Eng., Ph.D.

Vancouver, Canada.

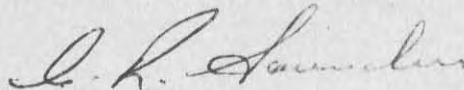
January 20th, 1970.

CERTIFICATE

I, C.R. Saunders, with business and residential addresses in Vancouver, British Columbia, do hereby certify that:

1. I am a consulting geological engineer.
2. I am a graduate of the University of British Columbia, (B.A.Sc., Geological Engineer, 1956).
3. I am a registered Professional Engineer of the Province of British Columbia.
4. From 1956 until 1967 I was engaged in mining and mining exploration in Canada for a number of companies. I was Chief geologist for Western Mines Ltd., when I left in 1967 to begin practice as a consulting geologist.
5. In November 1968 and several times during 1969, I personally examined the Sultana property of Sultana Silver Mines Ltd., and in addition have had access to all data and reports, both private and public, available about the property.
6. I have not received, nor do I expect to receive, any interest, directly or indirectly, in the properties or securities of Sultana Silver Mines Ltd. or any associated companies.

Respectfully submitted,



C.R. Saunders, P.Eng.

Vancouver, Canada.