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CONSULTING GEOLOGIST

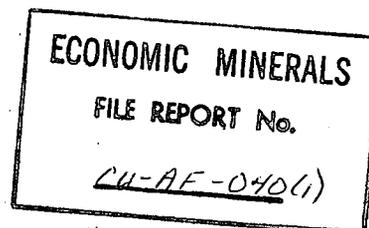
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F O R

F R A N C E S C R E E K M I N E S L T D.

Guy B. Allen, P. Geol.
December 1, 1973

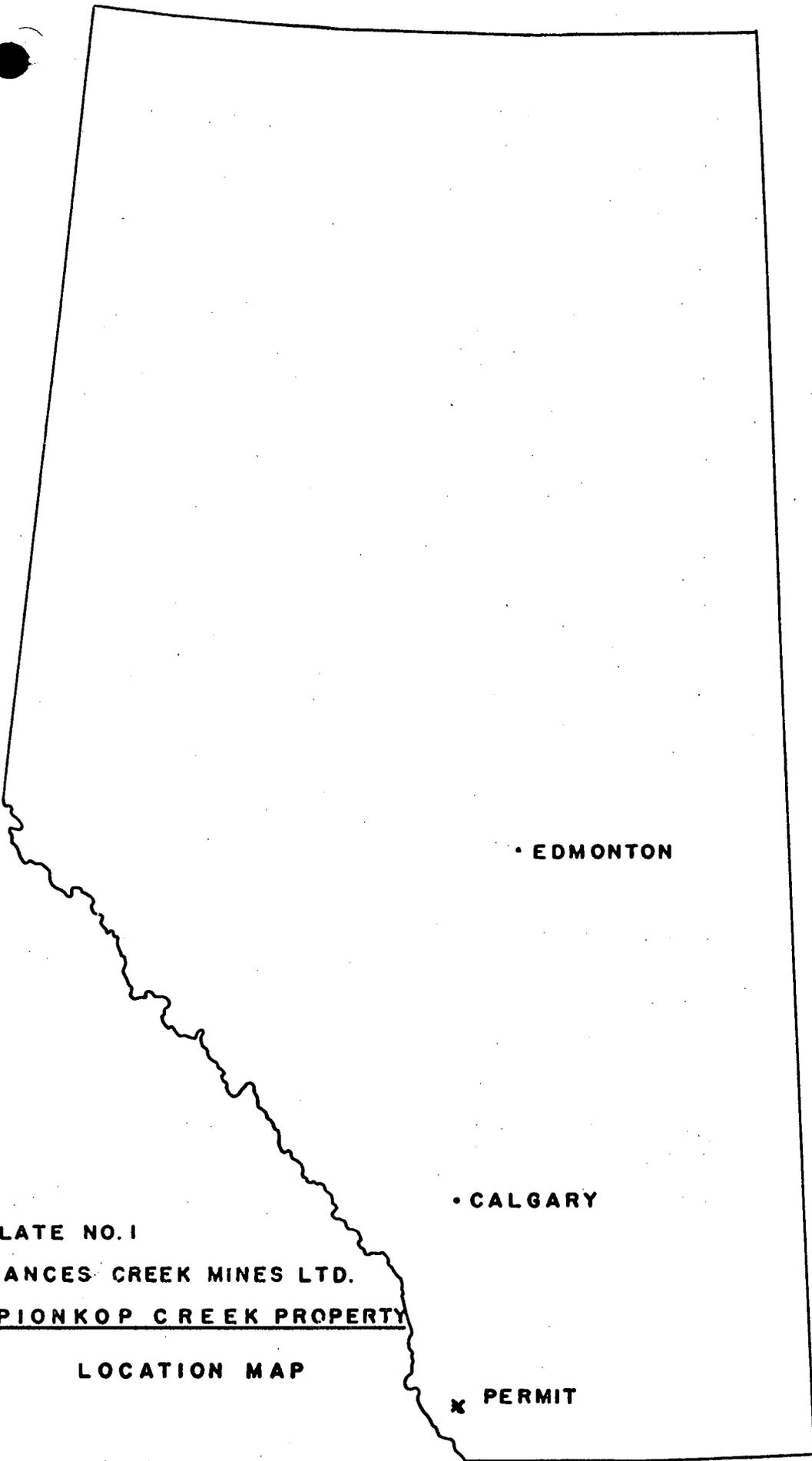
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• EDMONTON

• CALGARY

x PERMIT

PLATE NO. 1
FRANCES CREEK MINES LTD.
SPIONKOP CREEK PROPERTY

LOCATION MAP

Introduction

During the period October 12 - 23, 1973 Frances Creek Mines Ltd. carried out a prospecting and geochemical exploration program on Quartz Mineral Exploration Permit No. 175 in southwestern Alberta. The field work was performed by a two-man party consisting of Mr. Clifford Runham and Mr. Les Zettergreen, under the direction of the author.

The activities of the field crew consisted of collecting stream sediment and rock samples on predetermined traverse routes for geochemical analyses, and conventional prospecting.

The results of this work along with pertinent notes on the prospect and surrounding area make up the bulk of this report.

The author visited the property on October 23, 1973.

Summary

During October, 1973, Frances Creek Mines Ltd. conducted a reconnaissance prospecting and geochemical exploration program on its 9,650 acre Quartz Mineral Exploration Permit No. 175, located in Township 2, 3, and 4, Range 1W5, approximately 175 miles south of the city of Calgary in the Province of Alberta.

The Permit area lies along the eastern front of the Clark Range of the Rocky Mountain system. Relief is moderate to rugged and access is from Highway No. 6 by secondary roads along Yarrow, Spionkop, South Drywood and Drywood Creeks

Mineral exploration has been carried on sporadically for a number of years in the Clark Range. Most recently Kintla Explorations Ltd have outlined probable reserves of over 4 million tons of 1.5% copper or better on their property just to the east of Permit No. 175.

The Clark Range is formed of a slice of Precambrian sedimentary formations thrust over younger Paleozoic and Mesozoic strata. Within the Permit boundary sediments of the Grinnell, Siyeh, Sheppard and Gateway formations outcrop along with Purcell andesitic lavas. Copper, lead, silver and zinc mineralization has been found primarily in the Grinnell and Purcell strata and to some extent in the Sheppard formation.

The results of the Frances Creek Mines Ltd. 1973 prospecting and geochemical exploration program outlined three major and three minor areas drained by streams containing anomalously high concentrations of copper, lead and/or zinc. In addition, mineralized float and outcrop occurrences have been found in some of the areas. A float sample of mineralized Purcell lava in Area A assayed just under 0.8% copper while an outcrop sample of Grinnell sandstone in Area B assayed 0.308% copper.

The anomalous areas outlined are considered as warranting further exploration. A two-stage program of detailed geochemistry, prospecting and sampling, followed by trenching and drilling is recommended with the first stage costs estimated at just over \$8,000.

Description of Property and Ownership

The Spionkop Creek property is composed entirely of Quartz Mineral Exploration Permit No. 175, of which the Schedule is as follows:

IN TOWNSHIP TWO (2), RANGE ONE (1), WEST OF THE FIFTH
(5) MERIDIAN:

That portion of Section Thirty-five (35)
lying outside the Waterton Lakes National
Park Boundary;

AND

IN TOWNSHIP THREE (3), RANGE ONE(1), WEST OF THE FIFTH
(5) MERIDIAN:

The North West quarter of Section one
(1), Section Two (2), the North half
and South East quarter of Section Three
(3), the North half of Section Four (4),
the North East quarters of Sections
Five (5), and Eight (8), Section Nine (9),
the South half and North West quarter
of Section Ten (10), the West half of
Section Fifteen (15), Section Sixteen
(16), the East half of Section Seventeen
(17), the North half of Section Twenty
(20), the North half and South East
quarter of Section Twenty-one (21),
Section Twenty-two (22), the North half
and South West quarter of Section Twenty-
six (26), the North half of Section
Twenty-seven (27), Section Twenty-eight
(28), the South half and North East
quarter of Section Twenty-nine (29), the
North East quarter of Section Thirty-two
(32), the West halves of Sections Thirty-
three (33) and Thirty-four (34), the
South East quarter of Section Thirty-five
(35) and the South West quarter of Section
Thirty-six (36) and that portion of the
South West quarter of Section Three (3)
lying outside the Waterton Lakes National
Park Boundary;

AND

IN TOWNSHIP FOUR (4), RANGE ONE (1), WEST OF THE FIFTH
(5) MERIDIAN

The West half of Section Five (5);

containing an area of Nine Thousand, Six Hundred and Fifty
(9,650) acres, more or less.

The Permit, registered with the Government of Alberta on February 19, 1973, is held 100% in the name of Frances Creek Mines Ltd.

Claims to the north and east adjoining the Frances Creek lands are held by Kintla Explorations Ltd.

Recently, the area of the Eastern slope of the Rocky Mountains was withdrawn from further staking pending the results of ecological and environmental studies.

Location

The Spionkop Creek property is located in portions of Townships 2,3, and 4, Range 1W5, as described above, in the Province of Alberta. It is about 175 miles south of the city of Calgary and approximately 25 miles southwest of the town of Pincher Creek at Latitude $49^{\circ}13'$ and Longitude $114^{\circ}04'$. A portion of the southern border of the Permit adjoins the northern boundary of Waterton National Park.

Accessibility

The Permit area is easily accessible from Highway No. 6 by a turnoff to the west on a secondary road approximately two miles south of the village of Twin Butte, Alberta.

Gravelled and four-wheel drive roads follow the valleys of Yarrow, Spionkop, and South Drywood Creeks.

Physiography

The subject area lies along the eastern front of the Clark Range of the Rocky Mountain System. This range consists of Precambrian Purcell formations which have been thrust eastward.

East of the permit area the foothills form low, northwest-trending parallel ridges underlain by deformed Cretaceous strata.

Within the Permit area the northeast-trending ridges generally reach elevations above 8000' ASL. Intervening valleys average 4000' to 5000' ASL.

Slopes are moderate to steep.

History

This general area has been explored actively for oil and gas in recent years. Within the Waterton Field, natural gas is produced from over 10,000 feet below the surface and is piped to the Shell Oil Co. gas plant south of Pincher Creek.

Mineral exploration in the Clark Range has been sporadic. Kennco Exploration Ltd. investigated the copper deposits now held by Kintla Explorations Ltd to the east of Permit No. 175 and probably examined part of the Frances Creek Ground, although no record of any such work was available to the author. Cominco Ltd. and Falconbridge Nickel Mines Ltd. have also been active in the general area.

Kintla Explorations Ltd. is presently exploring their Big Horn claim group which is just to the east of the Frances Creek mines Ltd. Permit. On this property Kintla reports probable reserves of over 4 million tons of 1.5% copper or better in six zones.

Frances Creek Mines Ltd. 1973 Exploration Program

The 1973 exploration program on Quartz Mineral Exploration Permit No. 175 as undertaken by Frances Creek Mines Ltd. was designed to prospect by geochemical and conventional means, and determine the mineral potential of, this property within the confines of a reasonable budget.

To accomplish this end a two-man party of experienced prospectors was sent to the property to set up a field camp and carry out the program. Fifteen traverses were preplotted by the author in an attempt to cover most of the Permit area in a meaningful manner. Locations for stream sediment samples were also predetermined so as to give the maximum opportunity for locating a 'hot' stream within the drainage pattern of the area (see Figs. 1 & 2). Rock samples were to be collected either as float or from outcrop anywhere that mineralization was noted.

Roughly 85% of the area to be traversed was covered successfully. The remainder was found to be too dense in vegetative cover. The crew used a small trailer as camp, which they relocated on an average of every three days. Transportation was by truck.

A total of 126 stream sediment samples and 42 rock samples were collected. (see Fig. 2).

Regional Geology

The Clark Range of mountains is given form as an easterly thrust and upturned assemblage of Precambrian sedimentary strata extending northwestward from the Canada-United States border. The formations consist of argillites, siltstones, sandstones and carbonates with andesite sills and cut locally by dykes of chloritized diorite. The entire Precambrian sequence overlies Paleozoic and Mesozoic strata and is separated unconformably from this younger sequence by the Lewis Thrust Fault.

Geology of the Prospect Area

Within the Permit boundaries only Precambrian strata are exposed (see Fig. 1). These rocks have a regional northwest strike with generally low to moderate dips to the southwest. The formations underlying the property, starting with the oldest, are as follows:

1. Grinnell Formation - The Grinnell consists of bright red argillites in the lower portion with progressively thicker interbeds of red and white quartzitic sandstone toward the top. This formation occurs only in SW $\frac{1}{4}$ Sec.36 and the SE $\frac{1}{4}$ Sec.34, Tp.2, R1W5, of the Permit

2. Siyeh Formation - These rocks underly most of the subject area and consist of dolomite and limestone with argillite and sandy interbeds. The carbonate occurs in various hues and degrees of purity.

3. Purcell Lava - This is a zone of greenish chloritized andesite which forms an easily recognized stratigraphic marker in the area. It is approximately 250' to 300' thick

4. Sheppard Formation - These sediments, consisting of sandstones, dolomites, argillites, siltstones, and minor andesites occur on the ridges in the western portion of the Permit area.

5. Lower Gateway Formation - This zone of red and grey argillites with minor sandstones and dolomite may occur in the western part of the Permit on the ridge between Spionkop Creek and Yarrow Creek.

Economic Geology

The Clark Range, being primarily sedimentary, has historically not been considered an important metallogenic area. However, within this group of mountains mineralization has been recorded in recent years in the Grinnell, Siyeh, and Sheppard formations and in the Purcell Lavas.

Within the Grinnell formation chalcocite with minor bornite, chalcopyrite and malachite has been found in the sandstone beds and in dykes and sills of igneous material that cut the formation. Mineralization in the sandstone appears to follow the bedding indicating the original mineralizing solutions followed bedded porosity zones in moving through this material. The Grinnell contains copper on the Kintla Explorations Ltd. ground just to the east of Permit No. 175.

The Siyeh formation has sulphide gossans near Commerce Peak in British Columbia and has been reported to contain lead-silver mineralization near Spionkop Creek.

Copper mineralization has been found in the upper two feet of the Purcell Lavas near North Kootenay Pass on the Alberta-B.C. border. This is also believed to be the main host rock for Kintla Explorations Ltd's substantial reported copper reserves on the Big Horn claims east of Permit No. 175.

The Sheppard formation has been reported to contain lead-zinc mineralization in its upper part, 30 miles west of Pincher Creek, and chalcopyrite in its basal unit near North Kootenay Pass

The mineralization in the Precambrian rocks of the Clark Range is thought to have a hydrothermal origin with mineralizing solutions travelling up major fault channels and passing into and being deposited in the more porous sedimentary zones. Mineralized dyke and sill material was possibly injected at the same time.

Geochemical Results

The results of the program of geochemical exploration conducted by Frances Creek Mines Ltd. are shown on Figure No. 2. A total of 126 stream sediment samples and 42 rock samples were collected for geochemical analyses. The analyses were carried out by Loring Labs Ltd. of Calgary. Stream sediment samples were sieved to -70 mesh, then dissolved by hot nitric acid digestion. Copper, lead and zinc concentrations were then determined by Atomic Absorption methods, and recorded in parts per million. Rock samples were crushed and then submitted to the same analytical procedure. Results of these analyses are shown in Appendices A and B.

A statistical study was made of the stream sediment sample results. Values, obviously anomalously high were excluded from the study. The mean, range of values, median and mode were calculated for each metal. Using these results as a guide a threshold value was arbitrarily chosen for each metal, above which concentrations for that metal were considered anomalous. The results were as follows;

	<u>Copper</u>	<u>Lead</u>	<u>Zinc</u>
Number of Readings	121	124	123
Mean	16 ppm	24 ppm	64 ppm
Range	4 ppm - 29 ppm	10 ppm - 55 ppm	37 ppm - 112 ppm
Median	17 ppm	33 ppm	75 ppm
Mode	16 & 18 ppm	20 ppm	43, 58 & 63 ppm
Threshold	25 ppm	36 ppm	85 ppm

At locations where stream sediment samples showed higher concentrations than the threshold value for any of the three metals, that stream was indicated as anomalous on Figure No. 2.

The rock samples collected did not, from the author's viewpoint represent a suitable representative population for statistical analysis. These samples were the result of conventional prospecting for sulphide mineralization and, hence in most cases, were visibly mineralized, an anomalous situation in itself. However, as an attempt at a meaningful representation of the results, only those samples having copper values greater than 200 ppm and/or lead values over 100 ppm were shown on Figure No. 2. The locations for all rock samples collected is shown on Figure No. 1.

The geochemical results as shown on Figure No. 2 outline three major anomalous areas with indicated mineralization as well as a similar number of weaker but significant occurrences. These areas felt to be worthy of further investigation are as follows.

Area A - This area includes Sections 2 and 3 and the NW $\frac{1}{4}$ of Section 1, Tp. 3, Range 1W5 in the southeast portion of the Permit. Three creeks flowing north into Yarrow Creek yielded a number of anomalous samples with high values for all three metals represented. In addition, 8 rock samples were found at fairly widespread intervals with copper mineralization. All but one of these samples were of volcanic origin derived from Purcell Lava zones present in the area. One of these samples, T1-24, assayed just under 0.8% copper.

Area B - Area B takes in the SW $\frac{1}{4}$ of Section 36, the SE $\frac{1}{4}$ of Section 35, the north half of Section 26 and the NW $\frac{1}{4}$ of Section 27, Tp. 3, Range 1W5, located in the northeast portion of the Permit. Here, high concentrations of copper, lead, and zinc were found in sediment samples from three streams flowing north into South Drywood creek. One of these stream sediment samples ran 0.318% copper

an 0.2% zinc suggesting a very close source. A sandstone sample taken from a nearby outcrop (Grinnell Formation) assayed 0.308% copper.

Area C - This small area occupies the W $\frac{1}{2}$ of Section 34, Tp. 3, Range 1W5, where stream sediment samples SD13 and SD14 gave high values in lead and zinc and rock sample T11-3, a diorite, was high in lead.

Detailed exploration is warranted in these three portions of the Permit.

Other areas which could also bear follow-up investigations include; 1) NW $\frac{1}{4}$ Sec. 5, Tp. 4, R1W5

2) NW $\frac{1}{4}$ Sec. 32, NE $\frac{1}{4}$ Sec. 31, Tp. 3, R1W5, and

3) E $\frac{1}{2}$ Sec. 20, Tp. 3, R1W5.

Conclusions

The following conclusions can be made regarding the prospecting and geochemical exploration program conducted by Frances Creek Mines Ltd. on Quartz Mineral Exploration Permit No. 175.

1. The program successfully covered the Permit area on a reconnaissance basis by conventional prospecting and with geochemical methods using stream sediment samples.

2. Rock samples occurring as float and in outcrop were found containing significant concentrations of copper and lead at various localities on the Permit.

3. Analyses of stream sediment samples indicated a number of 'hot' streams with anomalously high concentrations of copper, lead and/or zinc

4. The combined results of the rock and stream sediment determinations outlined three major areas of indicated mineralization worthy of further investigation.

Recommendations

A two-stage program of detailed exploration is recommended for Quartz Mineral Exploration Permit No. 175.

The purpose of the first stage is to pin down the source of the geochemically anomalous conditions as uncovered by this years program. Efforts should be concentrated on the three major areas as described above. Detailed stream sediment sampling of the 'hot' streams using field kits for on-the-spot sample analyses, combined with a tracing of mineralized float occurrences and uphill prospecting should localize the mineralized zones. Any mineral bearing zones found should be defined by geological mapping and sampled on a systematic basis. The minor anomalous areas could also be examined in this manner if time and budget limitations permit.

The second phase of the program would involve direct evaluation of any mineralized zones by means of surface trenching and sampling and, if warranted, some short hole drilling. The extent of this phase would be dependent on the results of the initial exploration work.

The work done to date has also identified portions of the Permit showing relatively lower potential for significant mineralization. The size of the Permit may be reduced to approximately 6,930 acres by dropping the following lands; the N $\frac{1}{2}$ and SE $\frac{1}{4}$ of Section 9, the W $\frac{1}{2}$ and SE $\frac{1}{4}$ of Section 10, the W $\frac{1}{2}$ of Section 15, the S $\frac{1}{2}$ of Section 16, the N $\frac{1}{2}$ of Section 20, the NE $\frac{1}{4}$ of Section 21, the SW $\frac{1}{4}$ of Section 22 and the NW $\frac{1}{4}$ of Section 27.

Cost Estimate

Phase I - Detailed stream sediment sampling (using field analysis kits), prospecting and sampling.

Estimate is based on employing a two man sampling and prospecting crew for three weeks and the services of a geologist for one week.

1. Field Crew	
(a) Wages, etc. 21 days @ \$100	\$2,100.00
(b) Expenses - field and travel	\$350.00
(c) Vehicle (4X4)	
Mileage - 1500 miles @ 25¢	\$375.00
Rental - 21 days @ \$10	\$210.00
Gas, oil, etc.	\$75.00
(d) Camp and field gear (incl geochem. kits)	\$350.00
2. Geological Services	
(a) Fees - 6 days @ \$100	\$600.00
(b) Expenses - field and travel	\$275.00
3. Assays, Lab. analyses	\$500.00
4. Drafting, etc	\$200.00
5. Consulting Engineer's Services - supervision, evaluation of data, preparation of reports 8 days @ \$150	\$1,200.00
	<hr/>
	\$6,235.00
Contingencies @ 15%	\$935.25
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	\$7,170.25
Permit Renewal Fee - with reduced acreage	\$693.00
	<hr/>
	\$7,863.25

Phase II

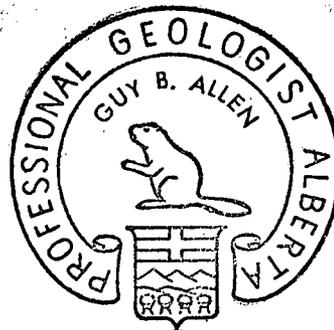
The costs of the second phase of the program will be dependent on the results of the initial work.

References

1. Agarwal, R.G., 1973
Recommendations for Field Program
on Permit No. 175, Waterton Area,
Southwest Alberta, of Frances Creek
Mines Ltd.
2. Allen, G.B., 1973
Report on the Spionkop Creek Prop-
erty of Frances Creek Mines Ltd. ,
January 10, 1973
3. George Cross Newsletter
Kintla Explorations Ltd; No. 134
July 11, 1973
4. Price, R.A., 1962
Ferne Map-Area, East Half,
Alberta and British Columbia, Geol.
Survey of Canada Paper 61-24

Guy B. Allen

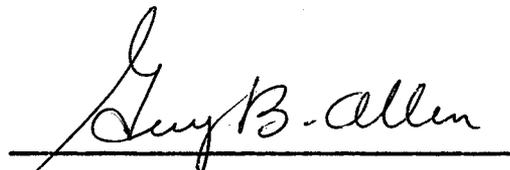
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December 1, 1973



CERTIFICATION

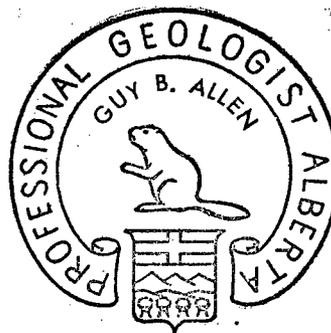
I, Guy B. Allen, residing at [REDACTED] Calgary, Alberta do hereby certify:

1. That I am a consulting geologist.
2. That I am a Professional Geologist registered in the Province of Alberta (#20282), and a Professional Engineer registered in the Province of British Columbia (non-resident status).
3. That I am a graduate of the University of Western Ontario where I received the degree of BSc in Geology in 1957.
4. That I have practiced my profession for over 12 years.
5. That this report is based on a visit to the subject property on October 23, 1973 and management of Frances Creek Mines Ltd.'s 1973 exploration program.
6. That I have no interest, direct or indirect, nor do I expect to receive any interest, direct or indirect, in the subject property or in the securities of Frances Creek Mines Ltd.



Guy B. Allen, P. Geol.

[REDACTED]
Calgary, Alberta
December 1, 1973

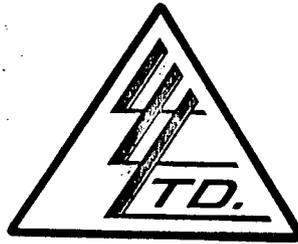


A P P E N D I X 'A'

Stream Sediment Sample Analyses

To: FRANCIS CREEK MINES LTD.,
 409-603 Seventh Ave. S.W.,
 Calgary, Alta.

File No. 7168
 Date October 25, 1973
 Samples Geo-chems



Certificate of
 ASSAY OF
 LORING LABORATORIES LTD.

-1-

SAMPLE No.		PPM Cu	PPM Pb	PPM Zn
D	1	12	20	37
	2	13	18	48
	3	12	17	43
	4	12	21	43
	5	12	21	43
	6	14	20	48
	7	8	18	41
	8	16	36	58
	9	12	21	48
	10	14	26	51
	11	13	17	37
	12	18	34	54
	13	13	25	50
	14	18	23	63
	15	22	28	64
	16	21	29	68
	17	23	44	64
	18	21	26	55
	19	22	29	58
	20	16	17	44
	21	12	15	43
SD	1	5	14	63
	2	48	26	58
	3	3180	360	2000
	4	9	10	50
	5	12	20	67
	6	14	33	67
	7	18	42	84
	8	17	39	67
	9	20	33	91
	10	18	44	78

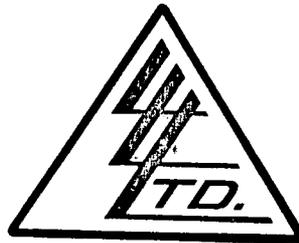
I Hereby Certify THAT THE ABOVE RESULTS ARE THOSE
 ASSAYS MADE BY ME UPON THE HEREIN DESCRIBED SAMPLES

Rejects Retained one month.
 Pulps Retained one month
 unless specific arrangements
 made in advance.

Licensed Assayer of British Columbia

To: FRANCES CREEK MINES LTD.,
 409-603 Seventh Ave. S.W.,
 Calgary, Alta.

File No. 7168
 Date October 25, 1973
 Samples Geo-chems



Certificate of
 ASSAY of
 LORING LABORATORIES LTD.

-2-

SAMPLE No.	PPM		PPM
	Cu	Pb	
SD 11	14	21	62
12	14	18	80
13	17	48✓	112✓
14	34✓	190✓	160✓
15	10	20	55
16	11	17	46
17	13	20	53
18	16	20	49
19	12	21	49
20	12	18	42
21	8	14	43
22	12	17	54
23	10	17	53
24	13	14	42
25	12	14	43
26	16	42✓	58
27	20	28	68
28	22	29	63
29	18	26	74
SD 30	18	34	68
31	13	25	72
32	18	39✓	91✓
33	16	33	72
34 *	18	53	74
35 *	14	44	88✓
36	20	23	62
37	20	36✓	71
38	16	31	64
39	14	29	64
SP 1	14	20	49
2	11	15	46

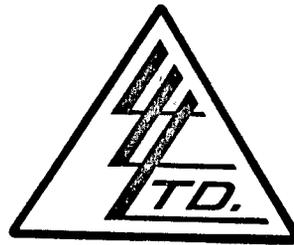
I Hereby Certify THAT THE ABOVE RESULTS ARE THOSE
 ASSAYS MADE BY ME UPON THE HEREIN DESCRIBED SAMPLES

* Rock Sample

Rejects Retained one month.
 Pulps Retained one month
 unless specific arrangements
 made in advance.

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Calgary, Alta.

File No. 7168
 Date October 25, 1973
 Samples Geo-chems



Certificate of
ASSAY of
LORING LABORATORIES LTD.

-3-

SAMPLE No.	PPM Cu	PPM Pb	PPM Zn
SP 3	13	17	45
4	26	23	49
5	12	14	53
6	14	18	54
7	20	20	70
8	16	18	64
9	10	29	56
10 *	420	63	350
11	16	26	63
12	12	17	63
13	16	20	150✓
14	18	17	75
15	17	31	99✓
16	13	20	65
17	14	28	95✓
18	12	29	69
19	16	34	69
20	36✓	17	69
21*	91	36✓	95✓
22	17	18	80
23	10	18	70
24	10	20	55
25	18	20	52
26	17	21	71
27	12	25	58
28	16	28	61
29	18	26	95✓
30	4	10	41
31	11	14	41
32	14	14	56
33	10	14	43

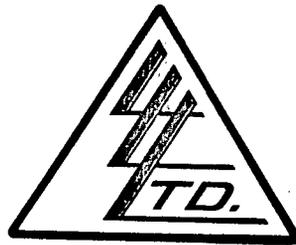
I Hereby Certify THAT THE ABOVE RESULTS ARE THOSE
 ASSAYS MADE BY ME UPON THE HEREIN DESCRIBED SAMPLES

*Rock Sample

Rejects Retained one month.
 Pulps Retained one month
 unless specific arrangements
 made in advance.

To: FRANCES CREEK MINES LTD.,
 409 3 Seventh Ave. S.W.,
 Calgary, Alta.

File No. 7168
 Date October 25, 1973
 Samples Geo-chems



Certificate of
 ASSAY of
 LORING LABORATORIES LTD.

-4-

SAMPLE No.		PPM Cu	PPM Pb	PPM Zn
SP	34	20	20	63
	35	22	34	53
Y	1	25✓	39✓	99✓
	2	22	36✓	112✓
	3	20	34	66
	4	18	34	89✓
	5	16	33	61
	6	17	36✓	87✓
	7	27✓	33	73
	8	18	26	88✓
	9	20	26	91✓
	10	27✓	31	93✓
	11	17	21	78
	12	14	23	75
	13	22	34	100✓
	14	20	26	80
	15	27✓	39✓	67
	16	14	20	69
	17	22	28	100✓
	18	18	21	70
	19	21	20	68
	20	20	23	77
	21	25✓	23	75
	22	16	26	77
	23	18	55✓	88✓
	24	18	18	50
	25	16	20	61
	26	13	20	64
	27	10	17	58
	28	10	14	55
	29	13	12	48

I Hereby Certify THAT THE ABOVE RESULTS ARE THOSE
 ASSAYS MADE BY ME UPON THE HEREIN DESCRIBED SAMPLES

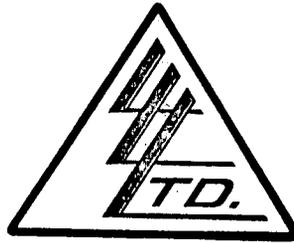
Rejects Retained one month.

Pulps Retained one month
 unless specific arrangements
 made in advance.

Licensed Assayer of British Columbia

To: FRANCES CREEK MINES LTD.,
 409-6 Seventh Ave. S.W.,
 Calgary, Alta.

File No. 7168
 Date October 25, 1973
 Samples Geo-chems



Certificate of
 ASSAY of
LORING LABORATORIES LTD.

-5-

SAMPLE No.	PPM Cu	PPM Pb	PPM Zn
Y 30	25✓	21	70
31	7	20	46
32	16	21	63
33	14	21	58
34 *	20	50✓	90
35	16	29	70
36	29✓	20	71

*Rock Sample

I Hereby Certify THAT THE ABOVE RESULTS ARE THOSE
 ASSAYS MADE BY ME UPON THE HEREIN DESCRIBED SAMPLES

Rejects Retained one month.
 Pulps Retained one month
 unless specific arrangements
 made in advance.

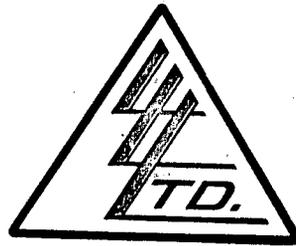
Licensed Assayer of British Columbia

A P P E N D I X 'B'

Rock Sample Analyses

To: FRANCES CREEK MINES LTD.,
 409, 3-7th Ave. S.W.,
 CALGARY, Alta.

File No. 7250
 Date November 12, 1973
 Samples Geo-chems



Certificate of
ASSAY of
LORING LABORATORIES LTD.

-1-

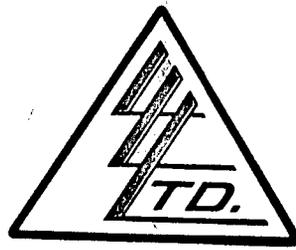
SAMPLE No.	PPM Cu	PPM Pb	PPM Zn
T1-22	405	48	77
23	94	28	125
24	7900	29	165
25	675	36	155
26	620	25	170
27	182	38	165
28	405	42	140
29	375	46	170
31	166	34	125
32	600	38	100
T2-30	1320	65	40
33	170	33	109
34	1020	31	112
35	174	26	117
37	465	21	117
38	360	17	121
39	710	26	130
40	470	21	100
T8-36	31	18	112
T10- 1	3080	25	28
T10- 2	333	28	40
T10-21	1420	190	39

I Hereby Certify THAT THE ABOVE RESULTS ARE THOSE
 ASSAYS MADE BY ME UPON THE HEREIN DESCRIBED SAMPLES

Rejects Retained one month.
 Pulps Retained one month
 unless specific arrangements
 made in advance.

Licensed Assayer of British Columbia

To: FRANCES CREEK MINES LTD.,
 409, -7th Ave. S.W.,
 Calgary, Alta.



File No. 7250
 Date November 14, 1973
 Samples Geo-chems

Certificate of
ASSAY OF
LORING LABORATORIES LTD.

-2-

SAMPLE No.	PPM Cu	PPM Pb	PPM Zn
T11- 3	178	170	39
4	91	31	80
5	77	23	109
6	46	33	39
T12- 7	68	45	135
8	74	25	155
T13- 9	690	25	121
T14-16	94	20	99
17	142	1260	170
17A	31	100	43
18	975	65	195
19	86	33	165
20	850	290	140
T15-10	485	29	140
11	94	790	52
12	32	530	65
13	855	31	35
14	460	29	140
15	333	50	32
R.S. No 41	4975	980	117

I Hereby Certify THAT THE ABOVE RESULTS ARE THOSE
 ASSAYS MADE BY ME UPON THE HEREIN DESCRIBED SAMPLES

Rejects Retained one month.
 Pulps Retained one month
 unless specific arrangements
 made in advance.

A P P E N D I X 'C'

Rock Sample Descriptions

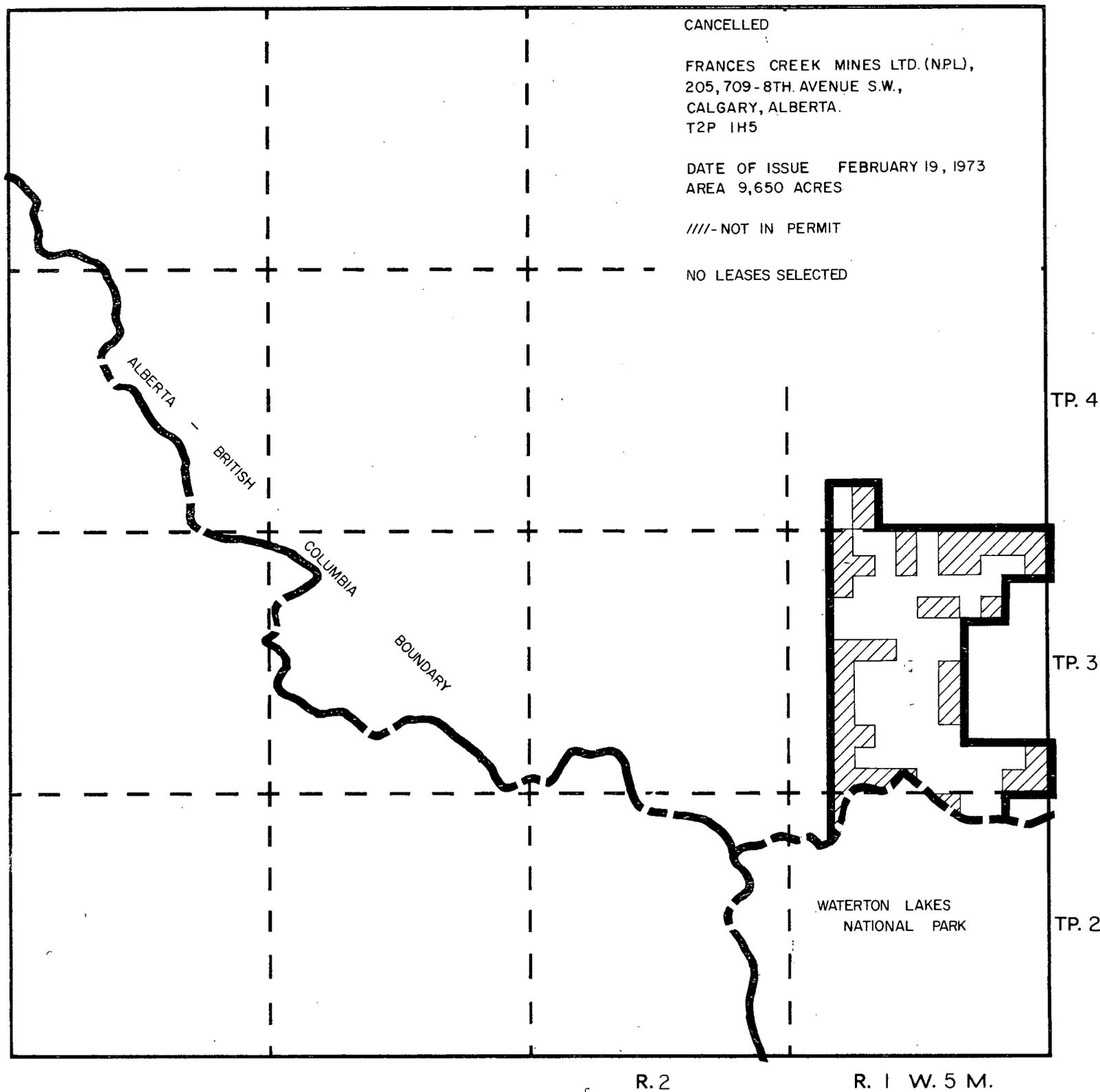
ROCK SAMPLE DESCRIPTIONS

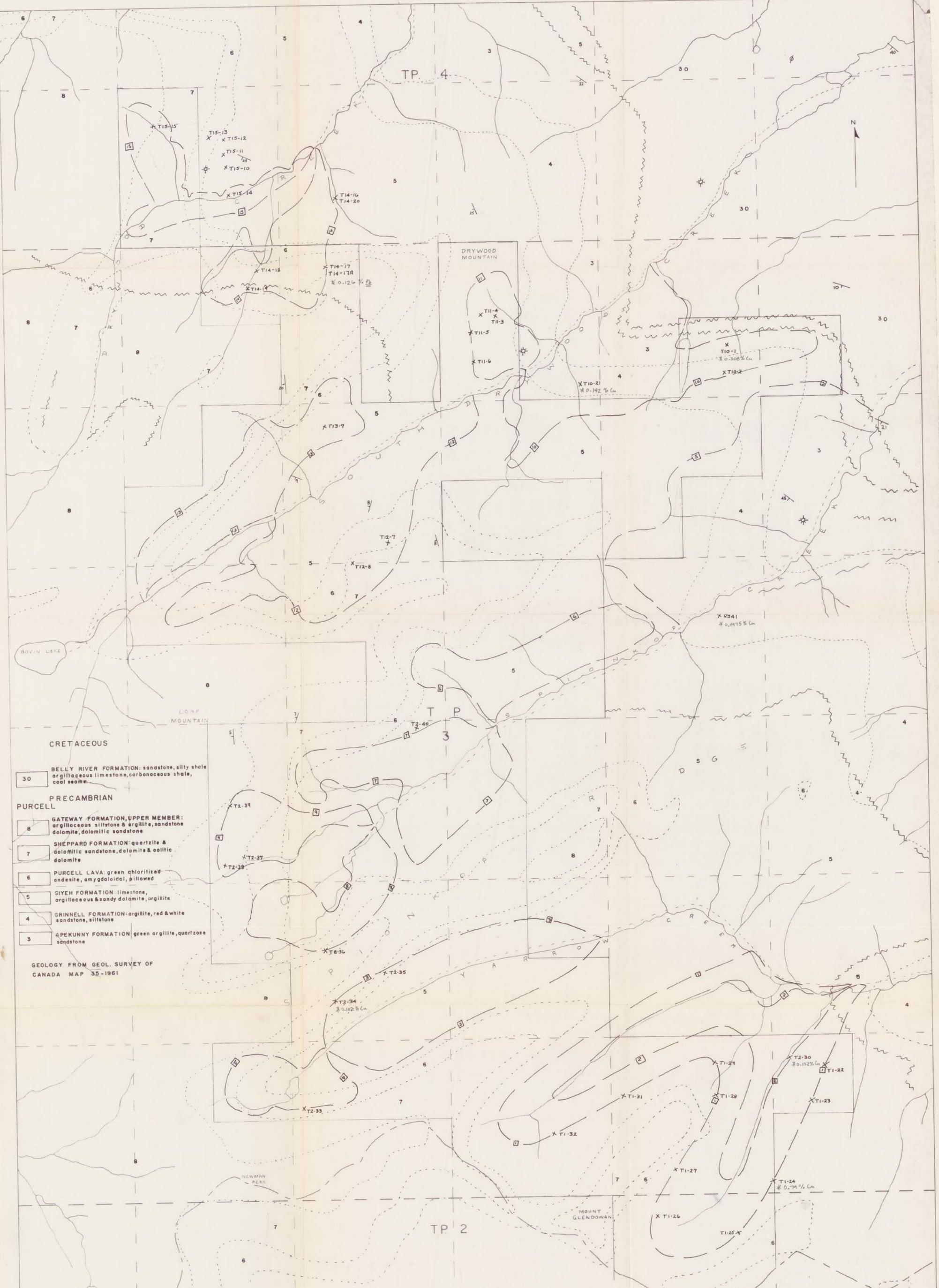
<u>Number</u>	<u>Lithology</u>	<u>Description</u>
T1-22	<u>Limestone float</u>	- medium grey, compact dense, slight pinpoint mottling of light and dark, banded, 1"-2" bands, slightly oolitic, no visible sulphides.
T1-23	<u>Andesite float</u>	- partly amygdaloidal, black, fine grained, some brownish tinge, occasional medium grained hornblende crystal, disseminated sulphides pyrite and chalcopryie as trace.
T1-24	<u>Andesite float</u>	- as described above, fair disseminated sulphides.
T1-25	<u>Andesite float</u>	- as described above, trace sulphides
T1-26	<u>Andesite float</u>	- as described above, trace sulphides
T1-27	<u>Andesite float</u>	- as described above, with veinlets of white crystalline quartz, trace sulphides
T1-28	<u>Andesite float</u>	- as described above, with veinlets of white quartz, trace to poor sulphides
T1-29	<u>Andesite float</u>	- as described above, quartz and calcie in amygdules, slight trace sulphides
T1-31	<u>Andesite float</u>	-- as described above, quartz veinlets, trace of sulphides
T1-32	<u>Andesite float</u>	- as described above, veinlets and amygdules of white calcie and quartz, slight trace of sulphides.
T2-30	<u>Quartzite float</u>	- fine grained, slight metamorphism, light grey, fractured with calcite in fractures, disseminated sulphides, chalcopryite and pyrite
T2-33	<u>Andesite float</u>	- as described above
T2-34	<u>Andesite float</u>	-- as described above
T2-35	<u>Andesite float</u>	- as described above, with veinlets and amygdules of white quartz, trace sulphides
T2-37	<u>Andesite outcrop</u>	- as described above, with amygdules filled with quartz and calcite, slight trace sulphides
T2-38	<u>Andesite outcrop</u>	- as described above, veinlets and amygdules of white quartz, trace sulphides
T2-39	<u>Andesite outcrop</u>	- as described above, trace sulphides
T2-40	<u>Andesite outcrop</u>	- as described above, large amygdules filled with quartz and calcite, trace sulphides

<u>Number</u>	<u>Lithology</u>	<u>Description</u>
36	<u>Andesite float</u>	- as described above, occasional quartz filled amygdule, very slight trace of sulphides
T10-1	<u>Sandstone outcrop</u>	- well rounded sand grains, well cemented, light grey, slightly metamorphosed, fractured, very slightly calcareous, argillaceous, trace sulphides
T10-2	<u>Sandstone outcrop</u>	- slightly metamorphosed, white quartz sand grains, non-calcareous but with elongate dolomite inclusions, medium grey, very fine grained, argillaceous, brecciated appearance, no visible sulphides.
T10-21	<u>Sandstone float</u>	- fine grained, rounded sand grains, good cementing, slightly metamorphosed, very slightly calcareous, well spotted with pinhead marcasite concretions, light grey, medium brown on weathered surface.
T11-3	<u>Diorite float</u>	- fine to medium grained, dark grey to black, uniform texture and colour, some green tint, gossaned on weathered surface, massive, blocky, no visible sulphides
T11-4	<u>Diorite float</u>	- as described above, no visible sulphides
T11-5	<u>Andesite float</u>	- as described above, with calcite filled amygdules, no visible sulphides
T11-6	<u>Argillite float</u>	- medium to dark grey, very fine grained, part very calcareous, part sandy, massive, blocky, calcite veining, no visible sulphides.
T12-7	<u>Andesite float</u>	- as described above, calcite in amygdules, no visible sulphides
T12-8	<u>Andesite float</u>	- as described above, partly vesicular, no visible sulphides
T13-9	<u>Andesite float</u>	- as described above, trace sulphides
T14-16	<u>Andesite float</u>	- as described above, large amygdules with quartz and calcite, no visible sulphides
T14-17	<u>Andesite float</u>	- as described above, with occasional calcite filled amygdule
T14-17A	<u>Sandstone float</u>	- very calcareous in dark bands and <u>Limestone</u> -very sandy as light bands, bands alternate, trace sulphides
T14-18	<u>Andesite outcrop</u>	- as described above
T14-19	<u>Andesite outcrop</u>	- as described above, with quartz veinlets, slight trace sulphides

<u>Number</u>	<u>Lithology</u>	<u>Description</u>
T14-20	<u>Argillite</u> float	- as described above, with trace of sulphides
T15-10	<u>Andesite</u> outcrop	- as described above, occasional quartz filled amygdule, trace sulphides
T15-11	<u>Limestone</u> float	- fine to medium grained, light to medium grey, partly siliceous, partly oolitic, partly fragmental, slight trace sulphides.
T15-12	<u>Limestone</u> outcrop	- light to medium grey, weathers light brown, argillaceous, very fine grained, massive, dense, no visible sulphides.
T15-13	<u>Dolomite</u> outcrop	- fine grained, light to medium brown, uniform texture and color, massive, blocky, no visible sulphides.
T15-14	<u>Andesite</u> float	- as described above, slight trace sulphides
T15-15	<u>Siltstone</u> float	- very fine grained, very hard, sharp, angular, slightly calcareous, light grey, partly fractured, weathers light brown, no visible sulphides.
RS41	<u>Sandstone</u> float	- well rounded sand grains, salt and pepper appearance, rust stained, fine to medium grained, trace disseminated sulphides.

QUARTZ MINERAL EXPLORATION PERMIT No. 175





- CRETACEOUS**
- 30 BELLY RIVER FORMATION: sandstone, silty shale, argillaceous limestone, carbonaceous shale, coal seams.
- PRECAMBRIAN PURCELL**
- 8 GATEWAY FORMATION, UPPER MEMBER: argillaceous siltstone & argillite, sandstone, dolomite, dolomitic sandstone
 - 7 SHEPPARD FORMATION: quartzite & dolomitic sandstone, dolomite & oolitic dolomite
 - 6 PURCELL LAVA: green chloritized andesite, amygdaloidal, pillowed
 - 5 SIYEH FORMATION: limestone, argillaceous & sandy dolomite, argillite
 - 4 GRINNELL FORMATION: argillite, red & white sandstone, siltstone
 - 3 APEKUNNY FORMATION: green argillite, quartzose sandstone

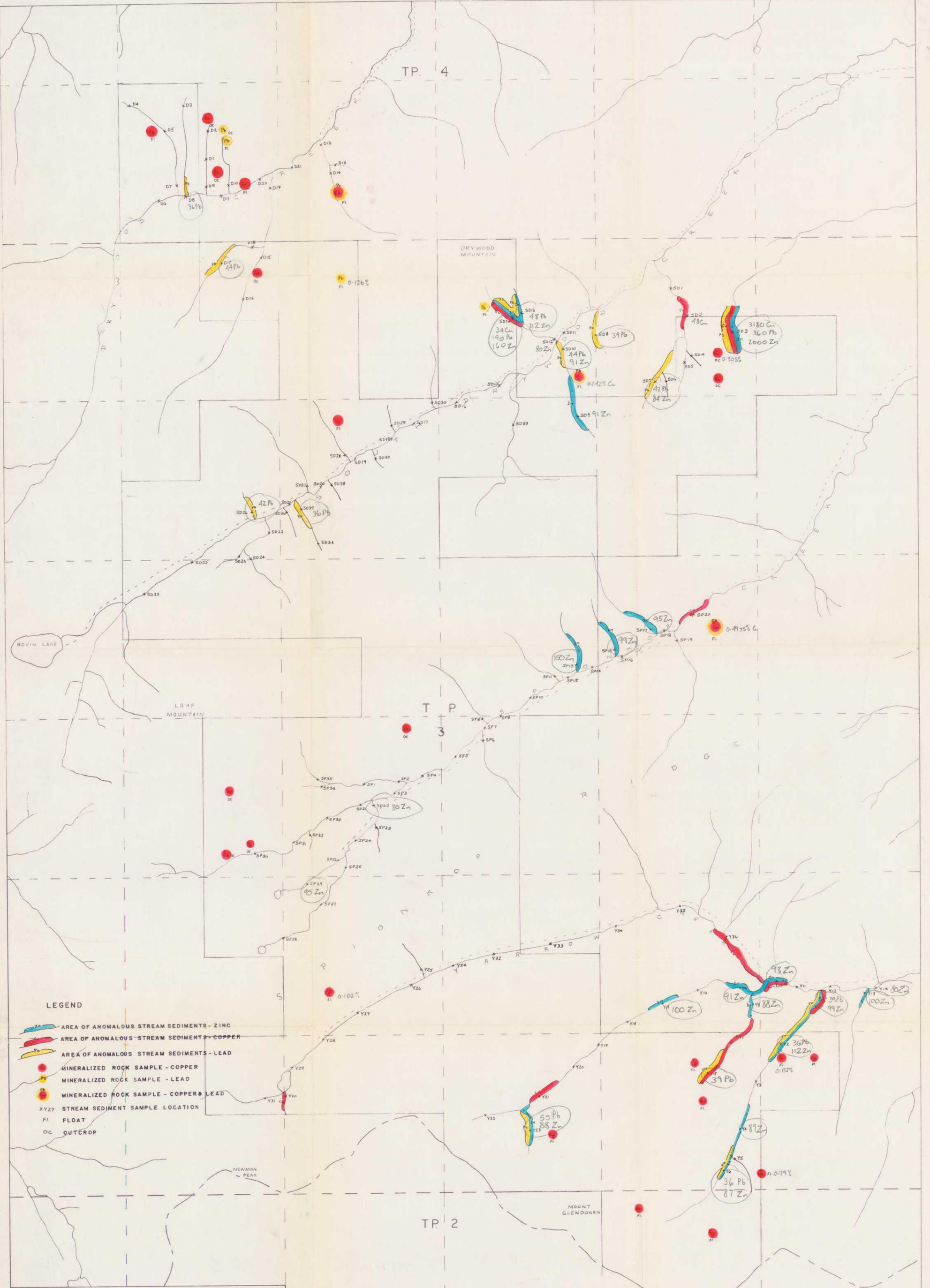
GEOLOGY FROM GEOL. SURVEY OF CANADA MAP 35-1961

FIGURE NO.1 19730004
 FRANCES CREEK MINES LTD.
 SPIONKOP CREEK PROPERTY
 SCALE: 4" = 1mi.
GEOLOGY & TRAVERSES

---	TOWNSHIP BOUNDARY	---	TRAVERSE ROUTE
---	SECTION BOUNDARY	---	GEOLOGICAL BOUNDARY
---	PARK BOUNDARY	X T2-33	ROCK SAMPLE SITE
---	QUARTZ MINERAL PERMIT BOUNDARY	---	BEDDING: STRIKE & DIP
---	TRAILS & ROAD	---	FAULT

WATERTON LAKES NATIONAL PARK

R1 W5



LEGEND

- AREA OF ANOMALOUS STREAM SEDIMENTS - ZINC
- AREA OF ANOMALOUS STREAM SEDIMENTS - COPPER
- AREA OF ANOMALOUS STREAM SEDIMENTS - LEAD
- MINERALIZED ROCK SAMPLE - COPPER
- MINERALIZED ROCK SAMPLE - LEAD
- MINERALIZED ROCK SAMPLE - COPPER & LEAD
- XY27 STREAM SEDIMENT SAMPLE LOCATION
- FI FLOAT
- OC OUTCROP

FIGURE NO. 2 19730004
 FRANCES CREEK MINES LTD.
 SPIONKOP CREEK PROPERTY
 SCALE: 4" = 1 mi.
 GEOCHEMICAL PROSPECTING

--- TOWNSHIP BOUNDARY
 --- SECTION BOUNDARY
 --- PARK BOUNDARY
 --- QUARTZ MINERAL PERMIT BOUNDARY
 --- TRAILS & ROADS

WATERTON LAKES NATIONAL PARK