INTERNAL CORRESPONDENCE
G.M.C. 1008

FROM J. Boldy AT Toronto IN REPLY REFER TO

TO F.C. Berry, W.H. Thompson AT Toronto DATE September 18, 1979

SUBJECT Tungsten Skarns - Northern Cordillera

Introduction:

In view of the fact that exploration programs will be initiated for base metal search in shale-hosted environments in the northern Cordillera, attention is drawn to another major class of ore deposit - Tungsten skarns - which occur within the same general geologic/geographic area of investigation.

Regional Setting:

Early to mid-Cretaceous quartz monzonite plutons and associated skarns are located predominantly to the west of a major hinge line (shale line) which defines the westerly shaling out of Lower Palaeozoic carbonate rocks into the Selwyn Basin of the Yukon and northern British Columbia. As a group, the significant plutons are discordant to regional structural trends and are emplaced into relatively unmetamorphosed terrain and show well developed contact aureoles.

The economically important skarns tend to develop in the first thick and pure limestone beds located above Proterozoic clastic lithologies. The favoured stratigraphy appears to be limestone beds in Lower Palaeozoic sequences. Variations on this theme do occur, and details are illustrated in the attached Table.

Skarn Types:

Type 1. Tungsten-copper. These are the most significant to date and are associated with large pyrrhotite-rich bodies, grossly stratiform in shape. Scheelite and chalcopyrite are the principal minerals. Examples are the Cantung mine and the Mactung deposit.

Type 2.(a) Tunsten-molybdenum. These are sulphide poor skarns with molybdenite as a minor component. Examples are the Woah and Tai prospects near Tillei Lake.

2.(b) As above, with molybdenite veinlets having a wider distribution, particularly associated as a "porphyry" type overprint on a sulphide poor skarn. Examples are the Logtung and Mt. Haskins prospects.

Type 3. Lead-zinc. (accessory tungsten) Economically unimportant to date. Examples are occurrences around the Mount Billings batholith etc.

Cont'd.....

Type 4. Lead-zinc. (accessory tungsten & tin) Economically unimportant to date. Examples are occurrences around Cassiar and Seagull batholiths etc. Mercl/Stokt

Economic Characteristics:

The principal tungsten deposits of the northern Cordillera compare favourably with current producers of other metals in Canada. A review of their status is shown below.

Deposit	Size M.tons	Grade $\%WO_3$	Value/ton*	Value/Deposit	Status	Econ.Category
Cantung	5.86	1.64%	$203.36	$1.191 bill.	Producer	II
Mactung	30.00	0.90%	$111.60	$3.348 bill.	Prospective Producer	II
Logtung	100.00	0.12%	$ 16.80**	$1.680 bill.	Prospect.	III

* Tungsten ore: 65% WO_3= $124/short ton unit of 20 lbs. = $6.20 lb.
** Includes molybdenum values.

The Cantung mine (Amax 65%, Dome 20%) was discovered in the late 1950's. It was in fact previously discovered by Kennco Exploration who investigated it as a copper prospect - not realizing its high tungsten content! This fact was later revealed to the prospecting syndicate who examined Kennco's drill core with a fluorescent lamp. Formerly an open-pit operation, it is now an underground operation at 1,000 tons/day. Profit for 1978 was $20 million. (Its value/size equivalent is a higher grade variety of the Campbell Red Lake gold mine.)

The Mactung deposit (Amax 100%?) was discovered in the early 1970's. It is located a few miles to the north of Hudson Bay's Tom (Pb-Zn-Ag) deposit on the Canol Road near the Yukon-N.W.T. border. Currently underground development and exploration is underway on the deposit. It is reported to be the largest undeveloped tungsten deposit in north America. Eventual production is a certainty. (Its value/size equivalent is the Mattagami Lake Zn-Cu-Ag mine.)

The Logtung deposit (Amax option) was discovered in 1976 using stream sediment geochemistry. The original principals were members of the Cordilleran Engineering group. It is currently being investigated by Amax. It is located 5 miles from the Alaska highway. (Its value/size equivalent is the Granisle porphyry copper mine.)

Cont'd.....

Conclusions:

(1) Economically significant tungsten deposits occur in the northern Cordillera within a geological environment generally similar to that which hosts lead-zinc-silver deposits in argillites. To date, the best deposits occur associated with pyrrhotite rich sulphide bodies containing accessory chalcopyrite.

(2) The recognition of blue-white fluorescing scheelite is extremely difficult without the use of a fluorescent lamp. Such equipment should be available in the field and tests done on rock material suspected of containing the metal. Analyses of fluorescent samples should also be undertaken.

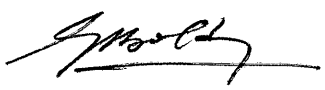
(3) Opportunities for joint venture involvement in tungsten search are probably available. This should be actively pursued and enquiries made as to their availability for the 1980 field season.

References:

K. M. Dawson & L. A. Dick, 1978 - Regional Metallogeny of the Northern Cordillera: Tungsten and Base metal Skarns in Southeastern Yukon and Southwestern Mackenzie District. Current Research, Part A, GSC Paper 78-1A, p.287-292.

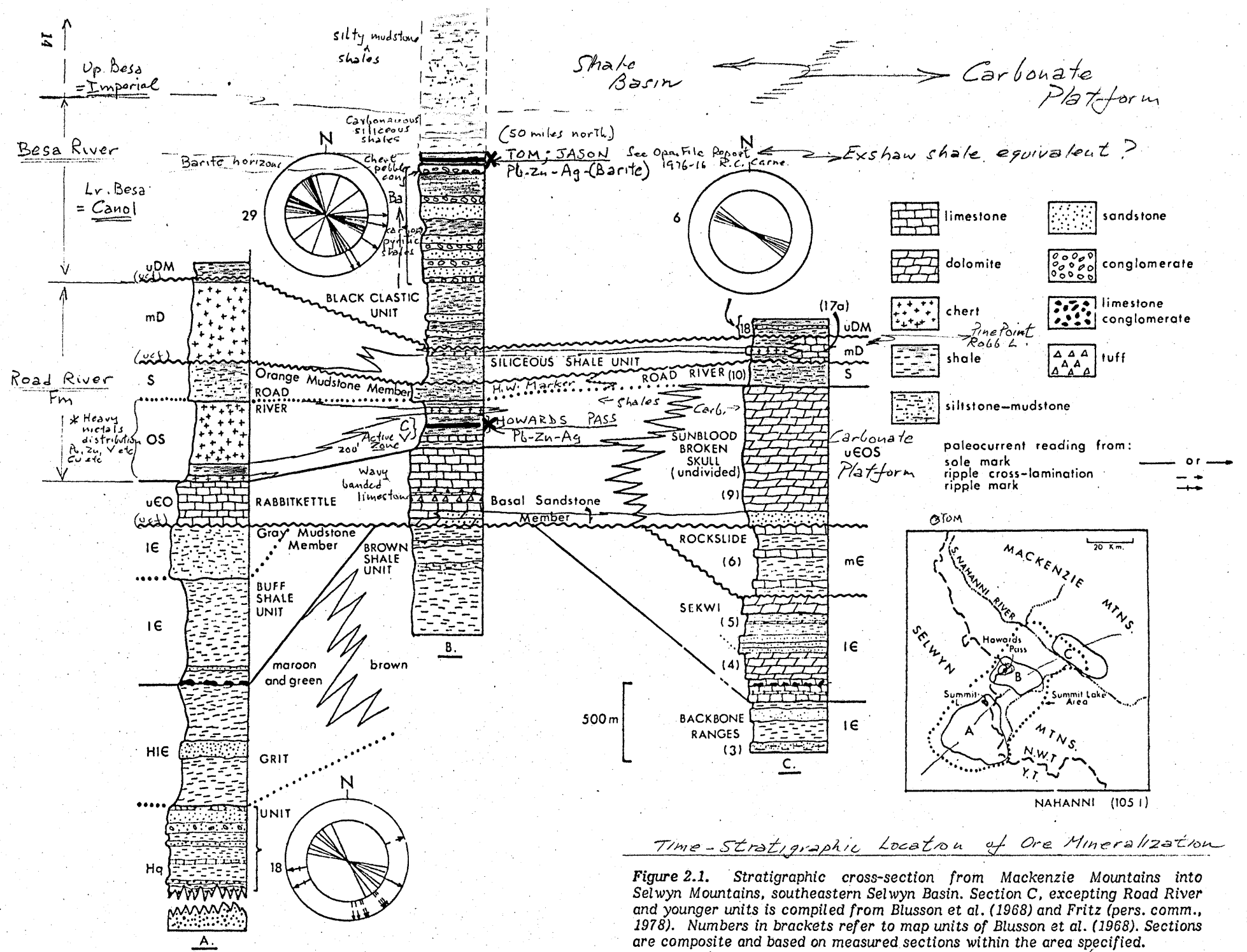
L. A. Dick, 1979 - Tungsten and Base metal Skarns in the Northern Cordillera, Current Research, Part A, GSC Paper 79-1A, p.259-266.

J. Boldy, 1979 - Exploration Guidelines - Shale - Hosted Pb-Zn-Ag Deposits, Northern Cordillera.



J. Boldy

Appendix. Fig.
Table



Time-Stratigraphic Location of Ore Mineralization

Figure 2.1. Stratigraphic cross-section from Mackenzie Mountains into Selwyn Mountains, southeastern Selwyn Basin. Section C, excepting Road River and younger units is compiled from Blusson et al. (1968) and Fritz (pers. comm., 1978). Numbers in brackets refer to map units of Blusson et al. (1968). Sections are composite and based on measured sections within the area specified.

After S.P. Gordey Paper 79-1A p13-16. (Current Research.)

CORDILLERAN SEDIMENTS
P.C. Meeting
OCT 21/80
2:00 PM.

OUTLINE

Definitions of Cordilleran Sed's

① RKG: DISCUSSION OF INITIAL MODEL AS PRESENTED IN ORIG. C.S. PROJECT PROPOSAL.

DEPOSITS		$ VALUES.		
H.P.	200 mt	10.6	Bill.	Ord (Sil?)
ANVIL.	84 mt	4.9	Bill.	Cambrian
CIRQUE	20 mt	1.6	Bill	Dev. Miss
TOM	10 mt	1.0	Bill.	Dev. Miss

② DISCUSSION OF METHOD USED (CHMC Method)

=> BY CONC HEAVY FRACTION - SEE ANOMALIES FARTHER FROM SOURCE → EXPAND SAMPLE PATTERN + EFFECTIVELY COVER THE AREA IN SHORTER TIME.

- LOOKS ESSENTIALLY AT SULFIDE FRACTION THUS OVERCOME PROBLEM OF Fe Mn HYDROXIDE SCAVENGING - FALSE ANOMALIES

- SPLES - WET SIEVED AT SPLE SITES (-80 Mesh TO GIVE 1.5 → 2 Kg OF SAMPLE (20 MIN/spl)

- MIN EN LABS - VANCOUVER - ANALYSED FOR Cu Pb Zn Ag Mo Fe Mn As Au Ba U (W)

③ DISCUSSION OF AREAS.

- 5 AREAS SURVEYED - ACCESS, GND SITUATION.

* i QUESNEL - BARKERVILLE 6 1:50,000 sheets
ii MUNCHO LK - TEST METHOD (1978 S-SED 80 DATA)
iii WATSON LAKE - BRIEF RECON
iv CLETWYND (CIRQUE TREND ORIENT - HWY - J.B).
* v. ROSS RIVER - 7 1:50000 SHEETS

* MAIN AREAS.

A: QUESNEL BKU. (ACCESSIBLE).
→ OF 6 SHEETS - ONLY 1 - SIGNIF RES.
→ 93A 14 - KIMBLE BLK STUART
- CUNN - ROUND TOP.

- FOLLOWUP PROGRAM - SEPT
- MAIN AREA OF INT - KIMBALL - BLK STUART
- TECK OPTIONED CLAIMS.
- RIO CANEX - BLK STUART - ADIT.
- RECCON. - J V TECK
- 1981 - RECON N (93H3)

B. MUNCHO LAKE (ACCESS - ALASKA HIGHWAY).

- COVERED AREA LOOKED AT BY P. BECK FOR BASIN RIM, 1978.
- 2 PARKS - OUT OF BOUNDS.
- AREA OUTSIDE OF PARKS - BESA RIVER SHALES - ANOMALOUS -
- FOLLOW UP 1981.

C. WATSON LAKE

- ROADS HEL. ACCESS.
- RECON - DEV/MISS BLK SLATES.
- PICK UP MT HUNDERE PB-ZN-AG DEPOSIT (CIMAK
- 1 AREA - NE CORNER - ANOM PB, ZN
- FOLLOW UP. 1981 (RECON ON GND SITUATION, BASE

D. CHETWYND : AREA ALONG B/HWY 97 Y. PR. GRG + DAWSON CRK - S EXTENSION OF CIRQUE - DRIFTPILE TRENDE (J.B).

- NO HIGHLY ANOM SPCs
- POSS EXTEND RECON OF THIS AREA N IN NILLISTON LK AREA.

E. ROSS RIVER. R.K.D HEL ACCESS
- CANOL RD / ROBT CMPBL HIW.

- 7 1:50 000 SHEETS COVERED
- 2 AREAS RECC FOR STAKING A, B.
- 10 AREAS RECC FOR DETAILED GEOCHEM, PROSP FOLLOW UP. C D E F G H J K L M.

④ SUMMARY : RECC.

QUESNEL ① JT VENTURE TECK - BRSTK - KIMBAL
② 1981 RECON N.

④ SUMMARY:

1980 RECON = 280 000.00 - 1304 spls
= 215.00/spl. (AV)

Lab = $45/spl
Field $190

= Follow up 230 SPLS - 27000.00 - 117.00/spl

= Recon - 1074 SPLS - 253000 = 235.00/spl

RECOMM: ① JV BECK.
② EXPAND RECON - MIDAS FAN - NORTH - 93H3

③ Follow up MUNCLO

④ Follow up WATSON

⑤ ACQUIRE GROUND - 2 ORIG RP.
- A 220 claims
B 80 claims.

⑥ Follow up 10 orig Ross R.

⑦ Sn. B.C. Road accessible area?

RECON 1981 - EXPAND ROSS AREA 6-7 1:50000
- QUESNEL N.
- WILLISTON LK (CIRQUE END S.)
- CLAPMAN LK (DEMPSTER HIGHWAY)
- 1 AREA S.BC - ACCESS - RDS.

- ALL DEPEND ON GND SITUATION.

⑤ BUDGET. 1981.

Ken Germundson

NOTES REGARDING CORDILLERAN SEDIMENTS

AUGUST 16, 1979

Met and talked at length with "Acting Regional Geologist," Ruth L. Debicki.
- geologist by training and experience.
- three years in Whitehorse.
Husband is regional manager for Inco.

Discussed general amount of work that has been done. Geology - generally of deposits. Important things said:

Stream sediment geochemistry with careful attention to Ph is best initial tool.

Experienced helicopter pilots know where previous sample sites were taken by previous surveys.

Impression - a lot of ground gets covered, but unless careful attention is paid to all features a good showing can be missed.

No doubt that the deposits are related to distant volcanic activity for metal source.

Interesting that the main occurrences lie at the Yukon/N.W.T. boundary. Also that two of the largest tungsten deposits and the largest lead-zinc deposit occurs almost in a straight line at this boundary.

Pointed to two large vague areas on map in Selwyn basin as good places to explore.

AUGUST 17, 1979

Met - Glen MacDonald, geologist for Noranda, Whitehorse. Had general talk about exploration in the Yukon and the availability of infastructure. Discussed Joint Venture mode but nothing specific.

Met - Cam Ogilvie, Manager, Chamber of Mines, Yukon. After discussion on numerous topics, concluded that there was no other lead to follow. Did plant concept that GMCL was interested in Yukon activities and that, while no specific programs were decided on, we are open to opportunities.

Met - Robert Hewton, Riocanex (and wife Barbara). Young, personable geologist, seems to have a good feel for Yukon and British Columbia work.

Met - Michael Marchand, PhD, IAWA geologist. Helpful sounding guy for future geologic evaluation of areas in Yukon and northern British Columbia.

Met and talked briefly with Tom Schroeter of B.C. Department of Mines, Smithers, B.C. States he has a field trip meeting planned for September 20-21 out of Smithers that may be quite valuable to attend. Needs more information to evaluate.

Had final chat with Al Archer of Archer, Cathro. Stated again that they could have a geologist on their payroll prepare a program for our consideration. Chap has done his thesis on the Tom deposit and has worked on most others. Is currently working on new Circe deposit (apparently being called after river nearby - Giague?.

Al Archer's feeling is that, with large deposits like the Can Tung, Mac Tung, Howards Pass, Tom and Jason deposits occurring in a restricted geographic area, there could well be more in the vicinity. Get the impression that fringe work on the belt may not have been intense or sophisticated enough to properly evaluate the ground.

AUGUST 18, 1979

Evaluation of impressions on the Whitehorse information.

Bets in the Yukon still remain good. Where huge deposits occur, there could well be others. The permissive geology covers a huge area, but the prospects appear to occur on the extreme east side of the basin. The area adjoining, between and on strike of the known occurrences, may well warrant intensive prospecting. The key method of exploration is stream silt sampling paying careful attention to Ph. Metals other than zinc should be used as screens. Most shale has zinc and can run up to 1% for miles. Some value may exist in looking for Kill patches. Over the Howards Pass the area is so large that it was not at first recognized. In treed areas a metal deposit may be evidenced by a gradation from healthy trees through stunted growth to actual barren ground where nothing grows over mineralized rocks.

The green moss that has a distinct tolerance for zinc is also a key indicator that can be observed in July and August.

Zinc Zap is also a prime tool in exploration.

There are also areas where the topography and drainage are such that stream sediments do not get good coverage of the formations. One would need to do rock sampling in this type of terrain.

Note - according to Al Archer, the stream silt sampling can only be done on south facing slopes. North facing slopes have intermittent permafrost and, therefore, no movement of metal in the soil to enhance the geochemical anomaly. This would be correct if the present soil cover has always been frozen. If the soils had been subjected to a lengthy warm spell prior to being involved in their present permafrost condition, one could possibly have a "frozen" anomaly.

In the eastern barren lands, I believe there is some room to suspect that warmer climates succeeded the retreating glaciers. Need to check permafrost history of Yukon. However, it would appear that north slope sediments have not been explored.

AUGUST 21, 1979

Met with R. W. Stevenson, Vice-President and Western Manager of Kennco, and Russell C. Babcock, Junior Vice-President, Bear Creek Mining Company, Spokane.

The main topic was expansion of Kennco - mainly in western Canada where they have a huge data base and a nucleus of an exploration group. They are currently considering ways and means and sound amenable to joint venture possibilities. Discussed types of metal searches and left door open to consider any real venture opportunities.

Write letter to R.W.S. stating that after our conversation would like to reiterate that joint venture possibilities were discussed in Toronto and met favourable response. Question of operator left open.

	T_A	T_B	T_C	T_D	H_1	2	3
Cu	.01	.01	Nil	.02	T	.01	.01
Zn	7.14	.01	13.8	.01	21.2	.05	28.3
Pb	2.62	.02	10.5	.01	18.7	.10	16.7
Ba.	36.6	1.16	35.9	.47	Tr.	.06	.01

MEMORANDUM
GMC 1071

DATE Sept 5/79

TO WHT LOCATION

- ☐ FOR YOUR INFORMATION
- ☐ NOTE AND RETURN
- ☐ PLEASE HANDLE
- ☐ AS REQUESTED
- ☐ FOR YOUR APPROVAL AND RETURN
- ☐ FOR DISCUSSION
- ☐ PER OUR CONVERSATION
- ☐ CHECK AND ADVISE
- ☐ FOR YOUR COMMENT
- ☐ PREPARE REPLY FOR MY SIGNATURE

COMMENTS:

(From Jerry Loglus)
Vanadium samples

H1 - .01 - high grade
H2 - .14 Shale country, foot wall
H3 - Tr Tosser
T-A - N:I
T-B - .03
T-C - N:I
III T-D - Insufficient Sample Shale underground from Zone A-

K.K.G.: I ORdered the following Assays on all Samples on 5234

Aug 23/79

% Pb ✓
% Zn ✓
oz/s Ag ✓
% Cu ✓

% Ba ✓
% C? — To Come
% V — To Come

H. W. Thompson

X-RAY ASSAY LABORATORIES
LIMITED

1885 LESLIE STREET, DON MILLS, ONTARIO M3B 3J4

CERTIFICATE OF ANALYSIS

INVOICE NO. 5234

TO: GULF MINERALS CANADA LIMITED,
ATTN: R. K. GERMUNDSON,
110 YONGE ST., SUITE 1400,
TORONTO, ONTARIO.
M5C 1T4

7 ROCKS SUBMITTED ON 3-AUG-79

WERE ANALYSED AS FOLLOWS:

	UNITS	METHOD	DETECTION LIMIT
HG	PPB	WET	10.000

X-RAY ASSAY LABORATORIES LIMITED

DATE 15-AUG-79

CERTIFIED BY J. Eagle

J. H. OPDEBEECK

SAMPLE	HG PPB
H-1	2400
H-2	110
H-3	17000
T-A1	3700
T-B1	200
T-C1	32000
T-D1	60

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T-C1	32000
T-D1	60

X-RAY ASSAY LABORATORIES

LIMITED

45 LESMILL ROAD DON MILLS ONTARIO M3B 2T8 445-5755

Certificate of Analysis

NO. 5234 PAGE 1 of 3

TO. Gulf Minerals Canada Limited
Attn: R. K. Germundson
110 Yonge St., Suite 1400
Toronto, Ontario
M5C 1T4

RECEIVED August 3, 1979 INVOICE NO. 5234

SAMPLE(S) OF 7 rock SUBMITTED TO US SHOW RESULTS AS FOLLOWS:

Element	Sens*	Concentration H-1	H-2	H-3	Element	Sens*	Concentration H-1	H-2	H-3
Antimony	(4)	ND	ND	ND	Manganese	(1)	T	FT	T
Arsenic	(4)	ND	ND	ND	Mercury	(4)	ND	ND	ND
Beryllium	(2)	ND	FT	ND	Molybdenum	(3)	ND	FT	FT
Bismuth	(2)	ND	ND	ND	Nickel	(1)	FT	FT	FT
Cadmium	(4)	TL	ND	TL	Silver	(1)	FT	ND	FT
Cerium	(5)	ND	ND	ND	Tantalum	(5)	ND	ND	ND
Columbium	(4)	ND	ND	ND	Thorium	(3)	ND	ND	ND
Chromium	(4)	T	T	ND	Tin	(2)	ND	FT	ND
Cobalt	(3)	ND	ND	ND	Titanium	(2)	ND	LM	ND
Copper	(1)	T	FT	FT	Tungsten	(4)	ND	ND	ND
Gallium	(2)	ND	FT	ND	Uranium	(3)	ND	ND	ND
Germanium	(1)	ND	ND	ND	Vanadium	(2)	T	TL	FT
Iron	(2)	L	L	L	Yttrium	(3)	ND	ND	ND
Lead	(2)	H	T	MH	Zinc	(4)	H	TL	H
Lithium	(4)	ND	ND	ND	Zirconium	(4)	ND	ND	ND

LEGEND

Key To Symbols

H - 10% plus
MH - 5-15%
M - 1-10%
LM - 0.5-5%
L - 0.1-1%
TL - 0.05-0.5%
T - 0.01-0.1%
FT - 0.01% or less
ND - Not detected

*Sensitivity (limit of detection)

1- 0.0005-0.001%
2- 0.001-0.005%
3- 0.005- 0.01%
4- 0.01 - 0.05%
5- 0.05 - 0.1%

Note: Better sensitivities can be obtained with special techniques, if and when required.

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Antimony	(4)	ND	ND	ND	Manganese	(1)	FT	FT	ND
Arsenic	(4)	ND	ND	ND	Mercury	(4)	ND	ND	ND
Beryllium	(2)	ND	FT	ND	Molybdenum	(3)	FT	FT	ND
Bismuth	(2)	ND	ND	ND	Nickel	(1)	FT	FT	ND
Cadmium	(4)	T	ND	TL	Silver	(1)	FT	ND	T
Cerium	(5)	ND	ND	ND	Tantalum	(5)	ND	ND	ND
Columbium	(4)	ND	ND	ND	Thorium	(3)	ND	ND	ND
Chromium	(4)	T	T	ND	Tin	(2)	FT	FT	FT
Cobalt	(3)	ND	ND	ND	Titanium	(2)	T	LM	ND
Copper	(1)	T	FT	FT	Tungsten	(4)	ND	ND	ND
Gallium	(2)	FT	FT	FT	Uranium	(3)	ND	ND	ND
Germanium	(1)	FT	ND	FT	Vanadium	(2)	FT	T	FT
Iron	(2)	M	LM	L	Yttrium	(3)	ND	ND	ND
Lead	(2)	LM	FT	H	Zinc	(4)	H	ND	H
Lithium	(4)	ND	ND	ND	Zirconium	(4)	ND	T	ND

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Antimony	(4)	ND	Manganese	(1)	T
Arsenic	(4)	ND	Mercury	(4)	ND
Beryllium	(2)	FT	Molybdenum	(3)	FT
Bismuth	(2)	ND	Nickel	(1)	FT
Cadmium	(4)	ND	Silver	(1)	ND
Cerium	(5)	ND	Tantalum	(5)	ND
Columbium	(4)	ND	Thorium	(3)	ND
Chromium	(4)	T	Tin	(2)	FT
Cobalt	(3)	ND	Titanium	(2)	L
Copper	(1)	T	Tungsten	(4)	ND
Gallium	(2)	FT	Uranium	(3)	ND
Germanium	(1)	ND	Vanadium	(2)	T
Iron	(2)	M	Yttrium	(3)	ND
Lead	(2)	FT	Zinc	(4)	T
Lithium	(4)	ND	Zirconium	(4)	ND

LEGEND

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M - 1-10%	T - 0.01-0.1%
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SAMPLE(S) OF 7 rock SUBMITTED TO US SHOW RESULTS AS FOLLOWS:

Element	Sens*	Concentration H-1	H-2	H-3	Element	Sens*	Concentration H-1	H-2	H-3
Antimony	(4)	ND	ND	ND	Manganese	(1)	T	FT	T
Arsenic	(4)	ND	ND	ND	Mercury	(4)	ND	ND	ND
Beryllium	(2)	ND	FT	ND	Molybdenum	(3)	ND	FT	FT
Bismuth	(2)	ND	ND	ND	Nickel	(1)	FT	FT	FT
Cadmium	(4)	TL	ND	TL	Silver	(1)	FT	ND	FT
Cerium	(5)	ND	ND	ND	Tantalum	(5)	ND	ND	ND
Columbium	(4)	ND	ND	ND	Thorium	(3)	ND	ND	ND
Chromium	(4)	T	T	ND	Tin	(2)	ND	FT	ND
Cobalt	(3)	ND	ND	ND	Titanium	(2)	ND	LM	ND
Copper	(1)	T	FT	FT	Tungsten	(4)	ND	ND	ND
Gallium	(2)	ND	FT	ND	Uranium	(3)	ND	ND	ND
Germanium	(1)	ND	ND	ND	Vanadium	(2)	T	TL	FT
Iron	(2)	L	L	L	Yttrium	(3)	ND	ND	ND
Lead	(2)	H	T	MH	Zinc	(4)	H	TL	H
Lithium	(4)	ND	ND	ND	Zirconium	(4)	ND	ND	ND

LEGEND

Key To Symbols

H - 10% plus
MH - 5-15%
M - 1-10%
LM - 0.5-5%
L - 0.1-1%
TL - 0.05-0.5%
T - 0.01-0.1%
FT - 0.01% or less
ND - Not detected

*Sensitivity (limit of detection)

1- 0.0005-0.001%
2- 0.001-0.005%
3- 0.005- 0.01%
4- 0.01 - 0.05%
5- 0.05 - 0.1%

Note: Better sensitivities can be obtained with special techniques, if and when required.

X-RAY ASSAY LABORATORIES LIMITED

DATE August 17, 1979 CERTIFIED BY J Eg

X-RAY ASSAY LABORATORIES

LIMITED

45 LESMILL ROAD DON MILLS ONTARIO M3B 2T8 445-5755

Certificate of Analysis

NO 5234 PAGE 2 of 3

TO. Gulf Minerals Canada Limited
Attn: R. K. Germundson
110 Yonge St., Suite 1400
Toronto, Ontario
M5C 1T4

RECEIVED August 3, 1979 INVOICE NO. 5234

SAMPLE(S) OF 7 rock SUBMITTED TO US SHOW RESULTS AS FOLLOWS:

Element	Sens*	Concentration T-A1	T-B1	T-C1
Antimony	(4)	ND	ND	ND
Arsenic	(4)	ND	ND	ND
Beryllium	(2)	ND	FT	ND
Bismuth	(2)	ND	ND	ND
Cadmium	(4)	T	ND	TL
Cerium	(5)	ND	ND	ND
Columbium	(4)	ND	ND	ND
Chromium	(4)	T	T	ND
Cobalt	(3)	ND	ND	ND
Copper	(1)	T	FT	FT
Gallium	(2)	FT	FT	FT
Germanium	(1)	FT	ND	FT
Iron	(2)	M	LM	L
Lead	(2)	LM	FT	H
Lithium	(4)	ND	ND	ND

Element	Sens*	Concentration T-A1	T-B1	T-C1
Manganese	(1)	FT	FT	ND
Mercury	(4)	ND	ND	ND
Molybdenum	(3)	FT	FT	ND
Nickel	(1)	FT	FT	ND
Silver	(1)	FT	ND	T
Tantalum	(5)	ND	ND	ND
Thorium	(3)	ND	ND	ND
Tin	(2)	FT	FT	FT
Titanium	(2)	T	LM	ND
Tungsten	(4)	ND	ND	ND
Uranium	(3)	ND	ND	ND
Vanadium	(2)	FT	T	FT
Yttrium	(3)	ND	ND	ND
Zinc	(4)	H	ND	H
Zirconium	(4)	ND	T	ND

LEGEND

Key To Symbols

H - 10% plus
MH - 5-15%
M - 1-10%
LM - 0.5-5%
L - 0.1-1%
TL - 0.05-0.5%
T - 0.01-0.1%
FT - 0.01% or less
ND - Not detected

*Sensitivity (limit of detection)

1- 0.0005-0.001%
2- 0.001-0.005%
3- 0.005- 0.01%
4- 0.01 - 0.05%
5- 0.05 - 0.1%

Note: Better sensitivities can be obtained with special techniques, if and when required.

X-RAY ASSAY LABORATORIES LIMITED

CERTIFIED BY J Eagle

DATE August 17, 1979

X-RAY ASSAY LABORATORIES

LIMITED

45 LESMILL ROAD DON MILLS ONTARIO M3B 2T8 445-5755

Certificate of Analysis

NO. 5234 PAGE 3 of 3

TO. Gulf Minerals Canada Limited
Attn: R. K. Germundson
11p Yonge Street, Suite 1400
Toronto, Ontario
M5C 1T4

RECEIVED August 3, 1979 INVOICE NO. 5234

SAMPLE(S) OF 7 rock SUBMITTED TO US SHOW RESULTS AS FOLLOWS:

Element	Sens*	Concentration T-D1	Element	Sens*	Concentration T-D1
Antimony	(4)	ND	Manganese	(1)	T
Arsenic	(4)	ND	Mercury	(4)	ND
Beryllium	(2)	FT	Molybdenum	(3)	FT
Bismuth	(2)	ND	Nickel	(1)	FT
Cadmium	(4)	ND	Silver	(1)	ND
Cerium	(5)	ND	Tantalum	(5)	ND
Columbium	(4)	ND	Thorium	(3)	ND
Chromium	(4)	T	Tin	(2)	FT
Cobalt	(3)	ND	Titanium	(2)	L
Copper	(1)	T	Tungsten	(4)	ND
Gallium	(2)	FT	Uranium	(3)	ND
Germanium	(1)	ND	Vanadium	(2)	T
Iron	(2)	M	Yttrium	(3)	ND
Lead	(2)	FT	Zinc	(4)	T
Lithium	(4)	ND	Zirconium	(4)	ND

LEGEND

Key To Symbols

H - 10% plus	L - 0.1-1%
MH - 5-15%	TL - 0.05-0.5%
M - 1-10%	T - 0.01-0.1%
LM - 0.5-5%	FT - 0.01% or less
	ND - Not detected

*Sensitivity (limit of detection)

1-	0.0005-0.001%
2-	0.001-0.005%
3-	0.005- 0.01%
4-	0.01 - 0.05%
5-	0.05 - 0.1%

Note: Better sensitivities can be obtained with special techniques, if and when required.

X-RAY ASSAY LABORATORIES LIMITED

DATE August 17, 1979 CERTIFIED BY J Eagle

X-RAY ASSAY LABORATORIES
LIMITED

1885 LESLIE STREET, DON MILLS, ONTARIO M3B 3J4

CERTIFICATE OF ANALYSIS

INVOICE 5569 REF. FILE 1772-P4

TO: GULF MINERALS CANADA LIMITED,
ATTN: W. THOMPSON,
110 YONGE ST., SUITE 1400,
TORONTO, ONTARIO.
M5C 1T4

7 PULPS ON HAND SUBMITTED ON 23-AUG-79

WERE ANALYSED AS FOLLOWS:

	UNITS	METHOD	DETECTION LIMIT
C	%	NA	0.010
V	%	XRF	0.010
CU	%	XRF	0.010
ZN	%	XRF	0.010
AG	OZ/TON	FA	0.200
BA	%	XRF	0.010
PB	%	XRF	0.010

DATE 20-SEP-79

X-RAY ASSAY LABORATORIES LIMITED

CERTIFIED BY .....

J. H. OPDEBEECK

SAMPLE	C %	V %	CU %	ZN %	AG OZ/TON	BA %	PB %
H-1	5.69	0.01	TRACE	21.2	0.30	TRACE	18.7
H-2	1.72	0.14	0.01	0.05	TRACE	0.06	0.10
H-3	6.10	TRACE	0.01	28.3	TRACE	0.01	16.7
T-A1	3.33	NIL	0.01	7.14	1.76	36.6	2.62
T-B1	0.93	0.03	0.01	0.01	TRACE	1.16	0.02
T-C1	0.07	NIL	NIL	13.8	4.38	36.0	10.5
T-D1	NSS	NSS	0.02	0.01	TRACE	0.47	0.01

NSS - NOT SUFFICIENT SAMPLE

X-RAY ASSAY LABORATORIES
LIMITED

1885 LESLIE STREET, DON MILLS, ONTARIO M3B 3J4

CERTIFICATE OF ANALYSIS

INVOICE 5569 REF. FILE 1772-P4

TO: GULF MINERALS CANADA LIMITED,
ATTN: W. THOMPSON,
110 YONGE ST., SUITE 1400,
TORONTO, ONTARIO.
M5C 1T4

7 PULPS ON HAND SUBMITTED ON 23-AUG-79

WERE ANALYSED AS FOLLOWS:

	UNITS	METHOD	DETECTION LIMIT
C	%	NA	0.010
V	%	XRF	0.010
CU	%	XRF	0.010
ZN	%	XRF	0.010
AG	OZ/TON	FA	0.200
BA	%	XRF	0.010
PB	%	XRF	0.010

DATE 20-SEP-79

X-RAY ASSAY LABORATORIES LIMITED

CERTIFIED BY . . . . . .

J. H. OVDEBEECK

SAMPLE	C %	V %	CU %	ZN %	AG OZ/TON	BA %	PB %
H-1	5.69	0.01	TRACE	21.2	0.30	TRACE	18.7
H-2	1.72	0.14	0.01	0.05	TRACE	0.06	0.10
H-3	6.10	TRACE	0.01	28.3	TRACE	0.01	16.7
T-A1	3.33	NIL	0.01	7.14	1.76	36.6	2.62
T-B1	0.93	0.03	0.01	0.01	TRACE	1.16	0.02
T-C1	0.07	NIL	NIL	13.8	4.38	36.0	10.5
T-D1	NSS	NSS	0.02	0.01	TRACE	0.47	0.01

NSS - NOT SUFFICIENT SAMPLE

Sept. 24, 1979.

AM - (1) Expense Account except for adding copy of request form.
(2) Re-order Landsat from Esio via Mrs Fischer
(3) Stock (Utilat - sold at 39¢ = $390
~~Bought~~ Am Buying 1000 Northern Continental Oil & Gas they will mail balance of $.

PM: - (1) Recall from trip - Bob Tole of Asarco -
Tourmaline Chert on North Star Hill - a prospects near Sullivan held for years.
Needs 2000' hole.

(2) Part of Micro filming.
(a) 94L = 6452, 6666, 6689, 6881, 6997. - 44 sheets pages
(b) 94M = 6840, 4483, (3840 Fluorite, 3975) 2880
(c) 94N = 3078 - eg Muncho Lake Barite Deposits
(d) 93 O = 6280 Welcome North.
(e) McBride - 5640 = 8 miles N of Mt. Renshaw.
(f) 93A, 14, 6855, 6314.
(g) 6806 of 94F/11&6 E½ - S.E corner = Cyprus Anvil - June 20 - Jul 14/78
(h) 6743 same as 6806.
Check Claims Maps - 94M/11 & 14, 94M/849, 94K/14. Nomad Ck.
(i) 7252, 7149, 7292, 7272, 7172, 7291, 7292, 6997
(j) 6896, 5359, 6736, 6663, 6889, 6688.

Mines and Petroleum Resources - Geol Division - 617 Government. 387-5975
General Enquiries 387-6242

94 B Looks like all carbonate but try
5246 - Cordilleran
6542 - Aquitaine.
5643 - not listed in the index -

94 C Susie Area
7172 - not listed in index -

94 F Cirque Area - - 7272 not listed on index }
✓6806
✓6743
✓6688 Cominco.

Several ~~1000~~ 7000 - reports - not on microfile
7272, 7270, 7318 7303, 7201

94K/4 W ½. - ✓6896 Welcome North
6689 Granby
✓6663 - Cyprus Anvil.
✓6881 - Serem
✓6736 - Texasgulf
5812 - Canex Placer - 52 films - not done - detail for 1975
✓5359 - " " Geol & Geochem
7149
7290
327 on Upper Norman Ck - Barite - along faults - still no one has looked at Gataga River
4300 - Eastern Ranges Stone - Dunedin

PROJECT: CORDILLERAN SEDIMENTS

CONCEPT:

Search for shale hosted Pb-Zn (Ag-Ba) deposits in the Selwyn Basin and eastern cordillera of the Yukon Territories and British Columbia.

MODEL:

Metalliferous hydrothermal solutions become mobilized by a buried heat source (volcanic, diagenetic) and these solutions are transported along "hinge lines" and deposited in structural or stratigraphic traps. Graben structures, creating mini-basins, provide favourable environments for the deposition of these deposit types. Barium, iron, silicon, mercury, and vanadium, etc. are variously associated with the deposits.

HISTORY:

1976: G.D.J. Boldy visited the deposits in the Anvil District and proposed a program to search for stratiform base metal deposits in the northern cordillera.

1979: G.D.J. Boldy and R.K. Germundson visited the Tom and Howards Pass deposits followed by assessment research in Vancouver.

STATUS:

1980 Field Program.

The initial reconnaissance program will include helicopter supported stream sediment geochemical sampling, prospecting and mapping of areas of favourable geology, detailed evaluation of all known showings in the areas of interest and evaluation of all properties solicited while in the field.

Four areas have been chosen for the initial reconnaissance program.

i Barkerville-Quesnel Lake, B.C.
ii Sheldon Lakes area, Y.T.
iii Watson Lake area, Y.T./B.C.
iv Kechika area, B.C.

A crew of 6 people, not including helicopter crew, and a budget of $220,000.00 will be required for this field program.

TD:js
Feb. 11, 1980

T. Dillon

ELEMENT	HOWARDS H1	HOWARDS H2	HOWARDS H3	TOM TA1	TOM TB1	TOM TC1	TOM TD1
Ba %	Tr	0.06	0.01	36.6	1.16	35.9	0.47
Be		Ft			Ft		Ft
Cd	TL		TL	T		TL	
Ch	T	T		T	T		T
Cu	T	Ft	Ft	T	FT	FT	T
%	Tr	.01	.01	.01	.01	NIL	.02
Ga		Ft		Ft	Ft	Ft	Ft
Ge				Ft		Ft	
Fe	L	L	L	M	LM	L	M
Pb	H	T	M H	LM	Ft	H	Ft
%	18.7	.10	16.7	2.62	.02	10.5	.01
MN	T	Ft	T	Ft	Ft		T
Hg							
Pb	2400	110	17000	3700	200	32000	60
MoS_2		Ft	Ft	Ft	Ft		Ft
Ni	Ft	Ft	Ft	Ft	Ft		Ft
Ag	Ft		Ft	Ft		T	
oz/Ton	0.30	Tr	0.13	1.76	Tr	4.30	Tr
Sn		Ft		Ft	Ft	Ft	Ft
Ti		Lm		T	LM		L
Va	T	TL	Ft	Ft	T	Ft	T
%							
Zn	H	TL	H	H		H	T
%	21.2	.05	28.3	7.14	.01	13.8	.01
Zi					T		

From the three Howards pass samples and the 4 Tom samples the following can be said.

Barium is a minor constituent in Howards Pass and a major element in the Tom.

Copper is negligible in both.

Lead is a major in both

Mercury is a major in both

Silver is present in both but higher in Tom

Zinc is present in both but appears higher in H.P.

ELEMENT	H_1	H_2	H_3	T_{A1}	T_{B1}	T_{C1}	T_{D1}
Ba	Tr	0.06	0.01	36.6	1.16	35.9	0.47
Cd	TL		TL	T		TL	
Ch	T	T		T	T		T
Fe	L	L	L	M	LM	L	M
Pb	18.7	.10	16.7	2.62	.02	10.5	.01
MN	T		T				T
Hg	2400	110	17000	3700	200	32000	60
Ag	0.30	T	0.13	1.76	T	4.30	T
Ti		LM		T	LM		L
Va	T	TL			T		T
Zn	21.2	.05	28.3	7.14	.01	13.8	.01
Combined Pb Zn	39.9	.15	45.0	9.76	.03	243	.01

X-RAY ASSAY LABORATORIES

LIMITED

45 LESMILL ROAD DON MILLS ONTARIO M3B 2T8 445-5755

Certificate of Analysis

NO. 4209-7 PAGE

TO. GULF MINERALS CDA LIMITED
Suite 1400, 110 Yonge St.,
TORONTO, Ont.
M5C 1T4
Attn: Paul Beck

RECEIVED Jan. 12/79 INVOICE NO. 4209-7

SAMPLE(S) OF 4 rock SUBMITTED TO US SHOW RESULTS AS FOLLOWS:

Fernie Basin
Pine Point
Cornwallis Island Zn
Cornwallis Is Pb

Sample	%Zn	%Pb	F-ppm	Cuppm	Srppm	Agppm	Cdppm
79-1	7.25	trace	130	10	50	x	215
2	10.7	5.94	130	16	10	x	320
3	4.80	0.13	150	18	30	4	580
79-4	21.7	39.0	110	68	10	76	1200

Sample	Bappm	Wppm	Hgppb
79-1	50	x	550
2	50	x	30
3	x	x	40
79-4	x	x	140

Note: x less than 1ppm Ag
20ppm W
50ppm Ba

X-RAY ASSAY LABORATORIES LIMITED

DATE Feb. 1/79. CERTIFIED BY

X-RAY ASSAY LABORATORIES

LIMITED

45 LESMILL ROAD DON MILLS ONTARIO M3B 2T8 445-5755

Certificate of Analysis

NO. 4353 PAGE

TO. GULF MINERALS CDA LIMITED
Suite 1400, 110 Yonge St.,
TORONTO, Ont.
M5C 1T4 Attn: Paul Beck

RECEIVED Jan. 31/79 INVOICE NO. 4353

SAMPLE(S) OF 1 rock SUBMITTED TO US SHOW RESULTS AS FOLLOWS:

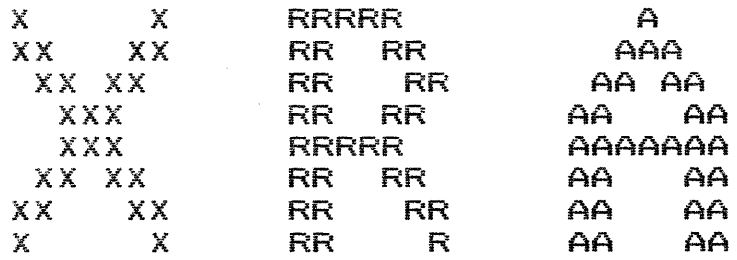
Sample	%F-	Cuppm	%Zn	Agppm	Srppm	%Ba	Wppm
79-5	23	56	0.43	10	1530	21.2	x

Sample	Cdppm	Hgppm	%Pb
79-5	2.	2.8	4.23

Note: x less then 10 ppm W

X-RAY ASSAY LABORATORIES LIMITED

DATE Feb. 8/79. CERTIFIED BY



MAJOR ELEMENTS

GULF MINERALS

TOTAL IRON REPORTED AS FEO
THE CONTRIBUTION OF TOTAL IRON TO THE SUM
IS CALCULATED AS FE2O3

REPORT NO. 4210-3 31-JAN-79

SAMPLES RECEIVED FROM P. BECK

31-JAN-79 X-RAY ASSAY LABORATORIES

SAMPLE	SIO2	AL2O3	CAO	MGO	NA2O	K2O	FEO	MNO	TIO2	P2O5	L.O.I.	SUM	FE/MG	K/K+NA
Perini Pegmatite 7 9 -1	2.42	0.74	56.0	39.7	0.00	0.19	0.69	0.16	0.06	0.04	33.52	78.9	0.02	1.00

++++++ INSUFFICIENT SILICA IN THIS SAMPLE
ALTERED (0, 2,-2,-2, 0, 2, 0, 0, 0, 0)SUM(-FE)= 6

Pini Pk. 7 9 -2	1.47	0.58	30.9	8.18	0.82	0.11	57.9	0.04	0.04	0.01	19.27	66.2	7.08	0.12

++++++ INSUFFICIENT SILICA IN THIS SAMPLE
ALTERED (0, 0,-2,-1, 2, 0, 0, 0, 0, 0)SUM(-FE)= 4

Perini Pegmatite Zone 7 9 -3	2.69	1.10	54.8	39.6	0.00	0.17	1.21	0.17	0.06	0.02	37.15	84.9	0.03	1.00

++++++ INSUFFICIENT SILICA IN THIS SAMPLE
ALTERED (0, 2,-2,-2, 0, 2, 0, 0, 0, 0)SUM(-FE)= 6

NORMATIVE MINERAL COMPOSITION (WEIGHT PERCENT)
[IRVINE & BARAGAR, CAN. JOUR. EARTHSCI. 8,523(1971)]

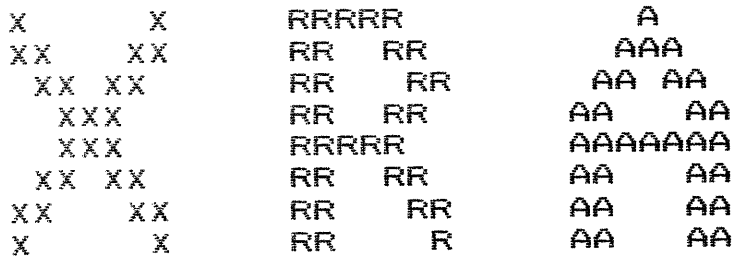
7 9 -1 ALTERED
Q -57.95 AN 1.45 KP 0.64 FO 69.06 FA 0.23 WO 0.75 LA 84.73 MT 0.37 IL 0.11 HM 0.52 AP 0.10

7 9 -2 ALTERED
Q -46.31 NE 1.27 KP 0.38 AC 4.06 FO 14.10 FA 76.00 LA 47.45 MT 2.96 IL 0.07 AP 0.02

7 9 -3 ALTERED
Q -56.85 AN 2.48 KP 0.57 FO 68.78 FA 0.25 LA 83.13 MT 0.40 IL 0.11 HM 1.07 AP 0.06

SUMMARY OF CLASSIFICATIONS

SUM	NUMBER
0	0
1	0
2	0
3	0
4	1
5	0
6	2
7	0
8	0
9	0
10	0
11	0
12	0



MAJOR ELEMENTS

GULF MINERALS

TOTAL IRON REPORTED AS FEO
THE CONTRIBUTION OF TOTAL IRON TO THE SUM
IS CALCULATED AS FE2O3

REPORT NO. 4353 08-FEB-79

SAMPLES RECEIVED FROM PAUL BECK

b showing
110 Ck.

08-FEB-79 X-RAY ASSAY LABORATORIES

SAMPLE	SIO2	AL2O3	CAO	MGO	NA2O	K2O	FEO	MNO	TIO2	P2O5	L.O.I.	SUM	FE/MG	K/K+NA
7 9 -5	21.6	4.95	72.7	0.00	0.10	0.10	0.37	0.00	0.22	0.02	1.55	36.6	36.99	0.50

++++++ INSUFFICIENT SILICA IN THIS SAMPLE

ALTERED (0, 2,-2,-2, 2, 1, 0, 0, 0, 0)SUM(-FE)= 7

NORMATIVE MINERAL COMPOSITION (WEIGHT PERCENT)

[IRVINE & BARAGAR, CAN. JOUR. EARTHSCI. 8,523(1971)]

7 9 -5 ALTERED

Q -59.32 AN 12.77 NE 0.45 KP 0.33 WO145.10 HM 0.41 AP 0.04 RU 0.22

SUMMARY OF CLASSIFICATIONS

SUM	NUMBER
0	0
1	0
2	0
3	0
4	0
5	0
6	0
7	1
8	0
9	0
10	0
11	0
12	0

Fig 1

TUNGSTEN AND BASE METAL SKARNS IN THE NORTHERN CORDILLERA

GSC Paper 79-1A. L.A. Dick.

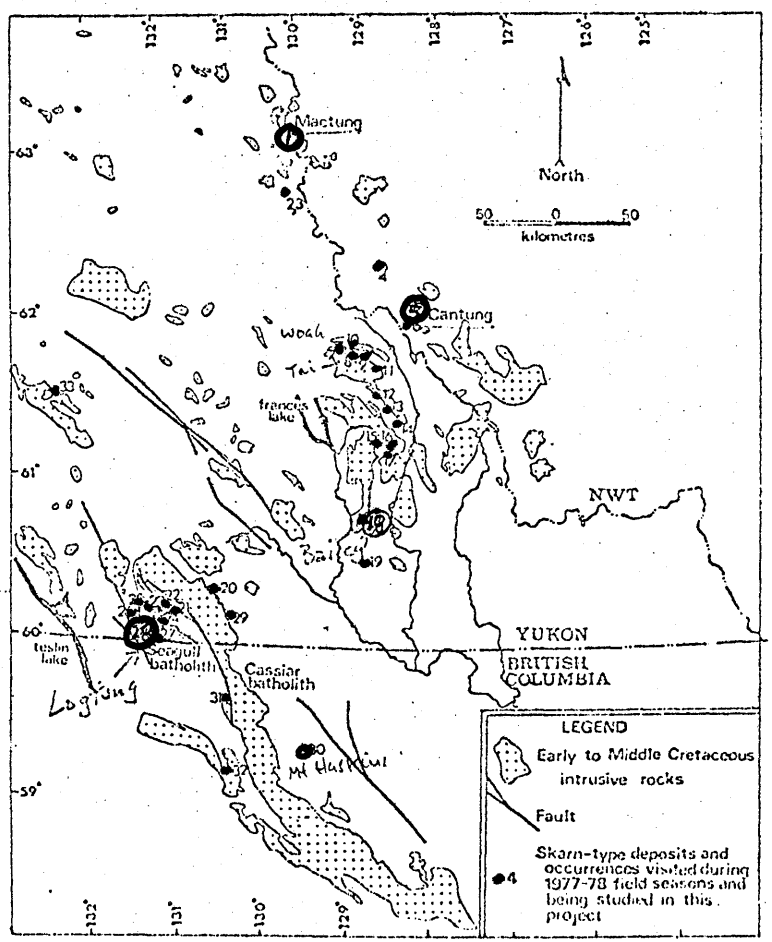


Figure 42.1. Location of skarn deposits and occurrences being studied in this project.

Skarn deposits and occurrences visited in 1977 and 1978

Occurrence Number	Name	Ore-element assemblage
1	Mactung	W-Cu — Prospective Producer
2	Clea	W-Cu(Zn)
3	Omo	W-Cu(Zn)
4	Lened	W-Cu
5	Cantung	W-Cu(Zn) — Current Producer
6	Baker	W-Cu(Zn)
7	Woah	W(Mo);Zn(W)
8	Tai, Broten	W(Mo);Zn(W)
9	Tanya	W-Cu
10	Zeus	Zn(Pb,W,Cu)
11	Cali	W-Cu
12	Ron	Pb-Zn
13	Fir Tree	Zn-Pb(W,Ag)
14	Black Jack	Zn-Pb(W,Ag)
15	Max	W(Cu,Pb,Zn,Ag);Zn-Pb(W,Ag)
16	Glenna	Zn-Pb(Ag)
17	Miko	Zn-Pb(Ag);Zn(W)
18	Bailey	W-Cu
19	Hundere	Pb-Zn(Ag)
20	Mid, Nite	W(Mo);Zn(W)
21	Bar	Zn-Pb(Cu,Ag,Sn)
22	Atom	Zn(Pb,Cu,Ag,Bi)
23	Bom, Munson	Zn-Pb(Ag,Sn,Cu,W)
24	—	W-Sn(Zn)
25	—	W(Cu,Sn)
26	—	Sn-Cu;W-Sn(Zn)
27	—	Sn-Cu(Zn,W)
28	Logtung	W-Mo — Potential Producer
29	Fiddler	W-Sn(vein)
30	Mt. Haskins	W-Mo;Pb-Zn
31	Blue Light	W(Sn)
32	Ash Mtn. area	Sn(in calc-silicates)
33	Stormy	W-Mo

From:
Tungsten & Basemetal Skarns in the Cordillera
L. A. Dick. GSC.
Current Research - GSC Pt. A. Paper 79-1A,
p. 259-266.

Table 1

Major Ore Assemblage	Minor Elements	Host Rocks	Host Rock Age	Intrusive Rock	Mineralization in Intrusive	Alteration of Intrusive	Skarn Minerals major	Skarn Minerals minor	Ore Minerals	Form
W-Cu Cantung Mactung etc	Zn	shallow dipping, relatively pure, coarsely crystalline limestone interbedded with biotite and calc-silicate hornfels	Lower Cambrian, Cambrian (1,4,5,6) Devonian (2,3,18)	variable; equigranular to highly porphyritic quartz monzonite and granodiorite stocks	minor molybdenite and scheelite in quartz veins (1,4,5)	greisen (sericite + quartz) is general	garnet (grossular-andradite-almandine) hedenbergite ferro-tremolite, biotite pyrrhotite, quartz	clinozoisite anorthite wollastonite vesuvianite sphene, fluorite, pyrite, calcite	scheelite, chalcopyrite sphalerite (2,3,5,6) ferberite (Mactung only)	Broadly stratiform. Skarn ter to follow bedding planes in ho Skarn may also replace interb or overlying calc-hornfels
Comments:	Large, pyrrhotite-rich skarn bodies, grossly stratiform in morphology. Exhibit extreme heterogeneity in mineral assemblages and ore grade within individual bodies. Biotite-bearing skarn important in this group.									
W-Mo (a) skarn misc. minor occ.	none	massive, coarsely crystalline limestone (33,7,8) Interbedded limestone/biotite schist (20)	Upper Proterozoic (7,8,20) Lower Cambrian (33)	Even textured granodiorite (7,8,20) Porphyritic quartz monzonite (33)	Rosettes of coarse molybdenite, minor scheelite (33) None observed at (7), (8), (20)	Intense greisen at (33). Minor pyroxene + epidote endoskarn (7)	garnet (grossular-andradite) hedenbergite, anorthite quartz	actinolite (7,8, 33), magnetite (7,8), wollastonite (7,8,20)	scheelite, molybdenite	Xenoliths in granodiorite bath (7,8). Broadly stratiform (20,
Comments:	Low sulphur skarn bodies which lack iron sulphides. Skarns are garnet and plagioclase rich. Silicate assemblage more homogeneous throughout skarn than W-Cu group. Molybdenite is a very minor component and is generally restricted to quartz veinlets (20), quartz-magnetite-actinolite veins (7,8) but can be heavily disseminated (33).									
(b) vein stockwork overprint on skarn Logtung etc	peripheral Pb/Zn skarn (30) peripheral Zn skarn (28)	light/dark green skarn, calc-hornfels	Lower Cambrian (28)	diorite, porphyritic quartz monzonite, quartz porphyry (28) granite porphyry (30)	molybdenite and minor scheelite locally at both localities	quartz porphyry locally greisen altered with minor pyrite at both localities	wollastonite (28) vesuvianite (28) garnet (28), pyroxene (28,30), quartz (28, 30), actinolite (28, 30)(vein), pyrite (28) (vein), fluorite (28, 30) (vein)		molybdenite, scheelite	vein stockwork overprinting s
Comments:	W-Mo mainly restricted to quartz-molybdenite-scheelite veinlets which overprint fine grained, iron and sulphur-poor skarn. Additional vein mineralogy at (30) include pyroxene-anorthite-fluorite-amphibole-calcite. Pyrite occurs in veinlets at (28). Veinlets at both localities may develop dark green amphibole selvages.									
Zn-Pb; Zn misc. minor occ.	Pb,Cu,W,Ag	Usually thin limestone units interbedded with biotite schist. Generally in metamorphic terrane.	variable from Upper Proterozoic to Devonian	Extremely variable. Skarn localized adjacent to leucogranite boudins and sills adjacent to quartz monzonite and granodiorite batholiths at (12), (13), (14), (15), (7), (8), (10). Adjacent to granodiorite at (15), (16). None exposed at (19). Occurrences (21), (22), (23) near exposure of Seagull granite.	none observed	none observed	pyroxenes (both diopside and hedenbergite can coexist) epidote, amphibole (actinolite, hastingsite), calcite	garnet magnetite pyrite chlorite pyrrhotite pyrite allanite smithsonite	sphalerite, galena, scheelite vein, chalcopyrite	semiconformable
Comments:	Zn(Pb) skarns tend to be small yet may attain significant ore grade. In general, galena-bearing sphalerite skarns, or portions of skarns, do not contain scheelite. Amphibole, epidote, calcite, and chlorite more common than in other groups.									
Sn-Cu-W misc. minor occ.	Zn,As	massive limestone to thinly laminated siliceous limestone, interbedded with biotite hornfels, calc-silicate hornfels, and quartzite	Devono-Miss.	leucocratic, tourmaline and fluorite-bearing alaskitic granite, occasional pegmatite dykes	not observed	Tourmalinization. Local greisen near skarn	axinite, beryl tourmaline, fluorite, vesuvianite, wollastonite, garnet (green, black, and red. May be tin-bearing) pyroxene (composition variable from diopside to hedenbergite), epidote, allanite, quartz, magnetite, pyrrhotite		malayaite, stannite chalcopyrite, sphalerite, scheelite, tetrahedrite? arsenopyrite	variable: from broadly strat replacement bodies to irregu lenses, and veins
Comments:	Boron, fluorine, chlorine, and beryllium-rich skarns. Mineralogy of skarns extremely heterogeneous. Tin not necessarily the most abundant ore element present.									

COMMUNICATION

Stratigraphic framework of zinc–lead deposits in the northern Cordillera northeast of the Tintina Trench

GRAEME P. MCLAREN AND COLIN I. GODWIN
Department of Geological Sciences, University of British Columbia, Vancouver, B.C., Canada V6T 1W5

Received July 20, 1978
Revision accepted November 16, 1978

Two major groups of sedimentary rocks hosting zinc–lead deposits in the northern Canadian Cordillera can be distinctly partitioned on the basis of depositional tectonics. A Proterozoic to Early Cambrian succession of carbonates and clastics is separated from a Late Cambrian to Devonian basinal shale and laterally equivalent platformal carbonate sequence by a regional erosional hiatus. This partitioning is emphasized by bimodal minor element distributions in carbonate-hosted sphalerite found throughout these rocks. Two populations of sphalerite, individually contained within the two major groups of host rocks, are separated by a unit that is relatively barren of mineralization. A regional geologic map, diagrammatic cross section, and time–space projection illustrate the stratigraphy, depositional tectonics, and location of sphalerite occurrences, and are presented as a framework for further research.

MEMORANDUM
GMC 1071

TO ... → RHG   LOCATION ......   DATE Sept 18/79

- ☑ FOR YOUR INFORMATION
- ☐ NOTE AND RETURN
- ☐ PLEASE HANDLE
- ☐ AS REQUESTED
- ☐ FOR YOUR APPROVAL AND RETURN
- ☐ FOR DISCUSSION
- ☐ PER OUR CONVERSATION
- ☐ CHECK AND ADVISE
- ☐ FOR YOUR COMMENT
- ☐ PREPARE REPLY FOR MY SIGNATURE

COMMENTS:

Tungsten targets in the Northern Cordillera.
Possibility for joint venture.
Good! Keep for [illegible] examination & explo. alternatives.
Mactung N.W.T.

FROM [illegible]

The Selwyn Basin is host for the following significant lead-zinc deposits.

① Tom Deposit of Hudson Bay Mining and Smelting, 9 million tons of 8.4 % Zn, 8.1 % Pb and 2.8 ounces of Ag; value in excess of 1 billion dollars. Devo Miss Shales $140 / ton

② Howards Pass – Ord-Sil portion of Road River Shales 250 m.t. of 5% Zn + 2.5 % Pb
Worth $65 / ton for 16 billion.

③ Cambro-Ord clastic host the Anvil (in production) Grum, Vangorda & Swim deps – overall value / ton about $80 total tonnage = 116 m.t.

The argillite-hosted Zn-Pb-Ag deposits of the northern Cordillera are the most valuable of the sedimentary class & are distributed in the Selwyn Basin & Eastern Marginal Belt of the Canadian Cordillera.

They are ~~both~~ are more numerous in the Selwyn Basin because of its ~~size~~ greater width and because of relatively simple structure as compared to similar rocks through the western part of the Rocky mountains Cassiar May belt) in B.C. from 49 – 60° Latitudes

Pay Bay ~~20~~ 10 250.00 Cash from the Market
~~Gets~~ Sheila ~~10~~ 10
R. BX ~~10~~ 10
~~200~~ 210 ~~400~~ Leave $40 for slush

No. L16-190-44- GRAND & TOY 4 SQUARES TO THE INCH

CORDILLERAN SEDIMENTS

AUG 8 – an approach to the game was devised yet.

1. Research
2. Meet People – Vancouver, Victoria & Calgary & Ottawa
3. Assessment pfls
4. Literature
5. Landsat.

Seek & ye shall find!

Oct 1/86

Access.	People
Option	Helicopter
Where	Camps
How Much	Logistics

TATHLINA:

To call – Vail
Lodgken
Mining Recorder in Yellowknife
Mr McLellan
Gale.
Forsythe.

SEPTEMBER 25, 1979

10:30 A.M. – Called Pat Fischer – Nothing much new.
People from U.B.C. were at Dr. Baille's Carbonate talks.
Told her Fulfmin may take more of Nathlin's action.

11:10 – Called Bill Padghem in Yellowknife.
Told him his core will be on the way.
Re-verified that geol etc report should be
sufficient to cover all claims in blanket fashion.

12:05 – Vic Hollister – Duval, Vancouver.
Not in today. Left message that "every thing has
been put on hold for the moment." Left my
phone number. ✓

SEPTEMBER 26, 1979 =

1:

MEMORANDUM
GMC 1001

DATE Nov 28/79

TO ..... LOCATION .....

☐ FOR YOUR INFORMATION	☐ FOR DISCUSSION
☐ NOTE AND RETURN	☐ PER OUR CONVERSATION
☐ PLEASE HANDLE	☐ CHECK AND ADVISE
☐ AS REQUESTED	☐ FOR YOUR COMMENT
☐ FOR YOUR APPROVAL AND RETURN	☐ PREPARE REPLY FOR MY SIGNATURE

COMMENTS:

J. Boldy

R. K. Germundson

W. A. Thompson JAT

Length, Width, grade need QUANTIFYING.

2000 x 100 x 30' = 2.2 m tons (ca.)

3000 x 600 x 200 = 15 m t.

@ 12 tons/m yd.

$100 per ton = 1,500,000,000.00

MEETING: CORDILLERAN SEDIMENTS November 28, 1979

The target: massive sulphides predominantly in shale; sites of deposition in mini-basins near hinge-lines (may be fault controlled).

I MODEL:

Heat source (diagenetic, volcanic) mobilize metals in hydrothermal solutions which are transported via hinge lines and deposited in suitable stratigraphic or structural traps.

- trap structures related to regional unconformities or hinge lines.
- hinge lines - related to carbonate - shale facies front, block faulting near facies front (in shales), 50-100 km from facies front (previous basin line).

Time-Stratigraphic relationships } Lengths 3 - 30 mile trends
Widths.

① Mini-Basin w/ no lateral equivalents

II SEARCH AREAS: 4 areas were proposed.

1) SW of Howards Pass - Sheldon Lakes Area - near Campbell Highway.
2) S. Yukon - near known showings.
3) Silt sample (> 1000 ppm Zn) in B. River shales.
4) E of Prince George, Barkerville Lower Paleozoic shales.
5) Kimberley-Asarco Strat Test Drill.

Jahns Time-Stratigraphic means eg: the Devonian

② - ① Devono Miss - Beco - Tom
② Ord Sil Road River - Howards Pass
③ Cambro-Ord. - Cyp
④ Hadrynian - Helikian - ete Cypress.

Some parts of sector so far have shown to be barren.

Gulf

III EXPLORATION TOOLS:

- Geochem - stream silt sampling, with surface soil and scree sampling as follow up.
- Regional - ERTS immagery, vegetation kill zones - size and depth of potential deposits a concern here.
- Elements - Zn (Cirque - 1400 ppm [bckd - 2300])
  Pb - soils - 70-100
  V
  Hg - H.P. - 17000 ppb
  Tom - 32000 ppb
- Heavy Min. Conc. vs. Stream Silts.

* - increase time for sampling
- possibly useful as follow up
- 2 samples at each station - 1 each side of creek.

IV LAND ACQUISITION:

1) Unclaimed area on trend but removed from known mineralization.
2) Near known deposit - possible option.
3) No acquisition - grassroots exploration.

V TO DO'S:

- Research 4 target areas
- Geol., geoch. land status, assessment, topography, mag, etc.

T. Dillon

TD/dda
Nov. 28/79

Gulf

CORDILLERAN GEOSYNCLINE (S.E. YUKON → NWT)

	OMINECA GEANTICLINE / CASSIAR PLATFORM	SELWYN BASIN	SELWYN BASIN	MACKENZIE ARCH	MACKENZIE TROUGH		INTERIOR PLATFORM
							ARCTIC COASTAL PLAIN / COPPERMINE ARCH
	PELLY MOUNTAINS (← SW)	MACMILLAN PLATEAU / WILKINSON RANGE / ANVIL RANGE	SELWYN MOUNTAINS / LOGAN MOUNTAINS	MACKENZIE MOUNTAINS / FLAT RIVER / GRIZZLY BEAR L.	REDSTONE PLATEAU / THUNDERCLOUD RANGE	WHITTAKER RANGE / REDSTONE RIVER	FRANKLIN MOUNTAINS / McCONNELL RANGE	NORMAN WELLS (NE →)	INTERIOR PLAINS / ANDERSON R. / HORNADAY R.
	14	15	16	17	18	19	20	21	22

PALEOZOIC

PENNSYLVANIAN — L

MISSISSIPPIAN — U

MISSISSIPPIAN — LOWER

felsic and mafic volcanics, conglomerate, limestone, shale chert; greywacke, slate, ultramafics, quartzite, argillite, chert-pebble-conglomerate

limestone

chert, quartzite, argillite, minor limestone, chert-pebble conglomerate

EARN

KALZAS limestone

CRYSTAL PEAK chert-pebble-conglomerate

TOM

chert-pebble-conglomerate

shale-pebble conglomerate

DEVONIAN — UPPER

siltstone, chert

chert, argillite, quartzite, limestone, chert-pebble conglomerate

shale, siltstone, sandstone, pyritic shale

slate, black pyritic shale

grey shale

shale, green-red siltstone, limestone

shale, limestone

sandstone, siltstone, shale

FORT SIMPSON

grey shale

siltstone, ss

grey shale

rusty sandstone

black shale

calcareous black shale

shale, limestone

HORN RIVER

black pyritic shale

grey shale

siltstone, shale, sandstone

limestone reefs

FORT SIMPSON grey shale; siltstone

HORN RIVER black pyritic shale

CANOL (IMPERIAL)

shale; limestone

shale, sandstone

sandstone, shale

shale

sandstone, sh

grey shale

to top of Hume Formation

CANOL bituminous sh

BEAVERTAIL ls

KEE SCARP ls

RAMPARTS ls

HARE INDIAN green shale

shale

DEVONIAN — MIDDLE

dark grey dolomite

dolomite

ASKIN

NAHANNI ls

HEADLESS ls, sh

LANDRY ls

MANETOE dolomite

FUNERAL shale, ls, slt

ARNICA dolomite

ls, dol

NAHANNI limestone

HEADLESS shale; ls

LANDRY ls

dolomite

FUNERAL shale, limestone

ARNICA dolomite

NAHANNI limestone

shale, ls

MANETOE dolomite

ARNICA banded dolomite breccia

BEAR ROCK dolomite, breccia; anhydrite

HUME

limestone

shale

BEAR ROCK dolomite, breccia, anhydrite

GOSSAGE dolomite

shale, limestone

limestone

dolomite

DEVONIAN — LOWER

dolomite, sandstone, quartzite

sandstone, dolomite, sandy dolomite

SOMBRE dolomite

CAMSELL dolomite, limestone, bx

DELORME buff-weathering dolomite, limestone

SILURIAN

dolomite, sandy dolomite, siltstone, volcanics

black graptolitic siltstone

black graptolitic slate

graptolitic shale, chert

HOWARDS PASS

ANVIL

graptolitic shale, slate, argillaceous limestone

ROAD RIVER

black graptolitic shale, siltstone, thin-bedded dolomite

massive coarse grey dolomite

WHITTAKER thick-bedded dark grey cherty dolomite and limestone

WHITTAKER

black vuggy cherty dolomite

limestone

WHITTAKER

black argillaceous limestone, siltstone, graptolitic shale

massive bedded dolomite

massive grey dolomite

limestone, dolomite

MOUNT KINDLE

silty grey dolomite

massive cherty dolomite

RONNING

dolomite

cherty dolomite

dolomite, in part cherty

ORDOVICIAN — UPPER

ORDOVICIAN — MIDDLE

black graptolitic shale

graptolitic shale, siltstone

SUNBLOOD thick-bedded dolomite, limestone, minor sandstone

mafic lava

ORDOVICIAN — L

light grey and orange-weathering limestone, dolomite

CAMBRIAN — UPPER

laminated calcareous siltstone, silty and argillaceous limestone

limestone, dolomite, silty and argillaceous limestone, siltstone

tilting

CAMBRIAN — MIDDLE

HARVEY

calcareous shale, argillite, limestone, minor volcanic breccia

dolomitic siltstone, dolomite, algal dolomite

shale, siltstone

shale, siltstone

dolomite

dolomite, siltstone, limestone

CAMBRIAN — LOWER

limestone

phyllite, slate

thin-bedded argillaceous

dol, slt, v

ss, dol, arg

limestone, calcareous slt

slt, dol

sandstone, siltstone, shale, ls

sandstone, shale, conglomerate

sandstone, shale, conglomerate

westward tilting

INDEX TO NUMBERED SECTORS

Miles 0 200

Kilometres 0 300

ARCTIC CIRCLE

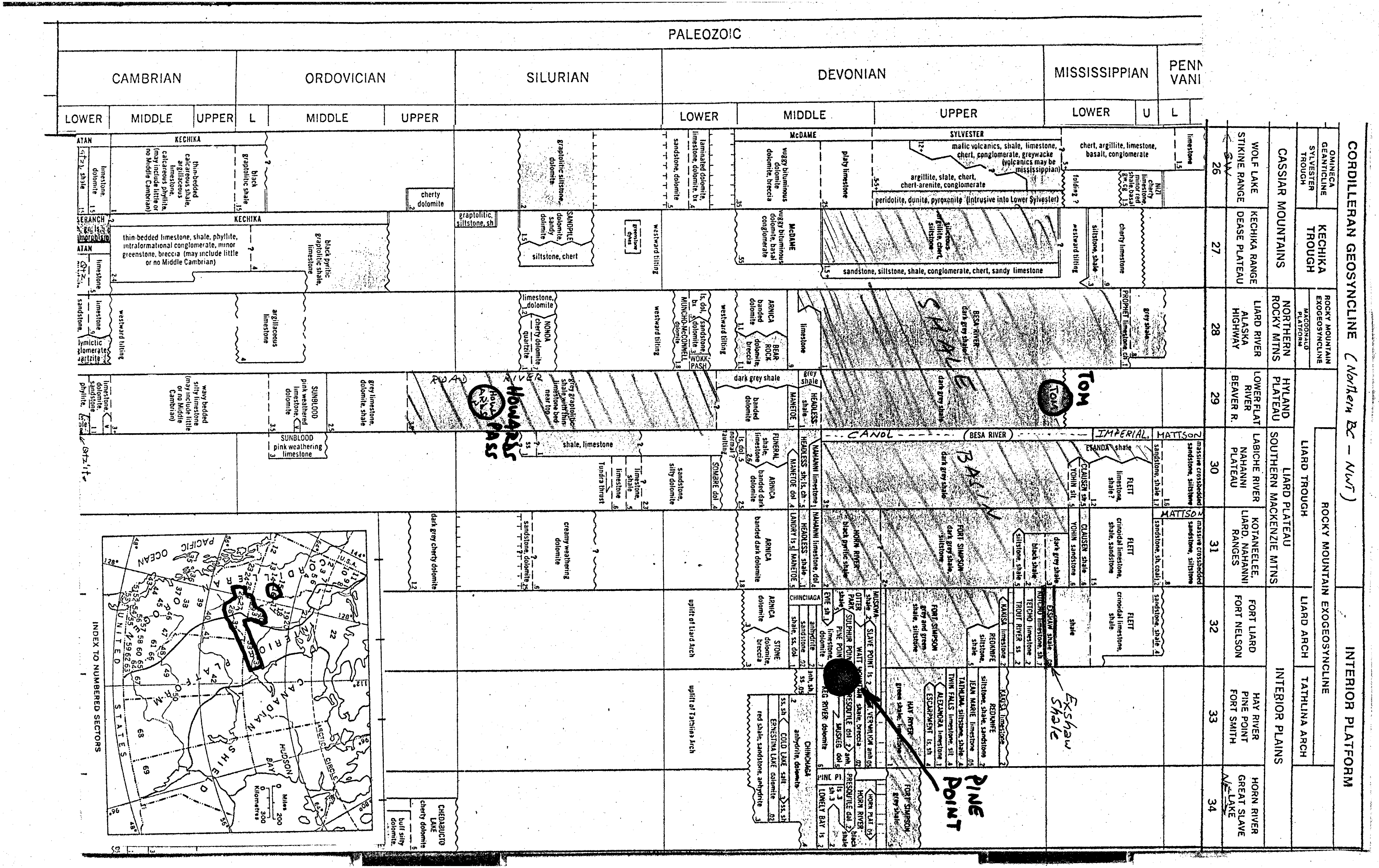
HUDSON BAY

CANADIAN SHIELD

PACIFIC OCEAN

U.S.A.

UNITED STATES


PALEOZOIC
CAMBRIAN
ORDOVICIAN
SILURIAN
DEVONIAN
MISSISSIPPIAN
PENN VANI
LOWER
MIDDLE
UPPER
L
U
CORDILLERAN GEOSYNCLINE (Northern BC - NWT)
INTERIOR PLATFORM
OMINECA GEANTICLINE
SYLVESTER TROUGH
KECHIKA TROUGH
ROCKY MOUNTAIN EXOGEOSYNCLINE
MACDONALD PLATFORM
LIARD TROUGH
LIARD PLATEAU
LIARD ARCH
TATHLINA ARCH
ROCKY MOUNTAIN EXOGEOSYNCLINE
CASSIAR MOUNTAINS
NORTHERN ROCKY MTNS
HYLAND PLATEAU
SOUTHERN MACKENZIE MTNS
INTERIOR PLAINS
WOLF LAKE STIKINE RANGE
KECHIKA RANGE DEASE PLATEAU
LIARD RIVER ALASKA HIGHWAY
LOWER FLAT RIVER BEAVER R.
LABICHE RIVER NAHANNI PLATEAU
KOTANEELEE, LIARD, NAHANNI RANGES
FORT LIARD FORT NELSON
HAY RIVER PINE POINT FORT SMITH
HORN RIVER GREAT SLAVE LAKE
26
27
28
29
30
31
32
33
34
KECHIKA
McDAME
SYLVESTER
ROAD RIVER
CANOL
BESA RIVER
IMPERIAL
MATTSON
SHALE
BASIN
TOM
HOWARDS PASS
PINE POINT
Exshaw Shale
INDEX TO NUMBERED SECTORS
PACIFIC OCEAN
HUDSON BAY
UNITED STATES
CANADIAN SHIELD
ARCTIC CIRCLE

GULF LETTERHEAD

Mr. R. J. CATHRO
Archer, Cathro and Associates Ltd.
Consulting Geological Engineers
1016 - 510 W. Hastings Street.
Vancouver, B.C.
V6B 1L8.

Dear Bob.

Enclosed is a cheque in the sum of ($5,600) fifty six hundred dollars in payment for one set of your Mineral Inventory of the Yukon. The set ~~may~~ can be sent to the Toronto ~~Office~~ office.

I expect to be in Vancouver during the weeks of September 10 to 21 and will contact you ~~at that~~ or Mr. Archer at that time.

Yours sincerely

Ken Zimmerman

ACCOUNTS PAYABLE CHECK REQUEST
GULF 70287 - A

GULF MINERALS CANADA LTD — RCN _____ FUNCTION _____
NAME OF COMPANY OR DEPARTMENT

Location _____ Date _____ 19 ____

MAIL	ARCHER, CATHRO AND ASSOCIATES (PAYEE NAME)
☑ Mail Direct	1016 - 510 W. HASTINGS ST., (STREET ADDRESS)
	VANCOUVER, B.C (CITY AND PROVINCE) V6B 1L8 (POSTAL CODE)
☐ Mail After Special Handling	Special Handling Instructions:

(ITEMS 1 AND 2 OF THIS SECTION MUST BE COMPLETED)

AMOUNT

(1) In Payment of:

One set of Mineral Inventory of the Yukon

$ 5,600.00 IN

(2) Business Purpose:

For specific use in lead, zinc search re:
CORDILLERAN SEDIMENTS AFE 9401
FAC 06115

(USE REVERSE SIDE IF NECESSARY)

R.F.

APPROVED BY _____ REQUESTED BY _____

REQUEST FOR CHECK RETURN

(NOTE: This check will be mailed directly to the payee at the above address unless you fully complete this section and obtain a proper countersignature.)

☐ Send Check to:

Specify Reason Return of Check is Required and Obtain Necessary Approvals.

_____ (NAME) _____ (ROOM NO.) _____ (BLDG.)

Reason:

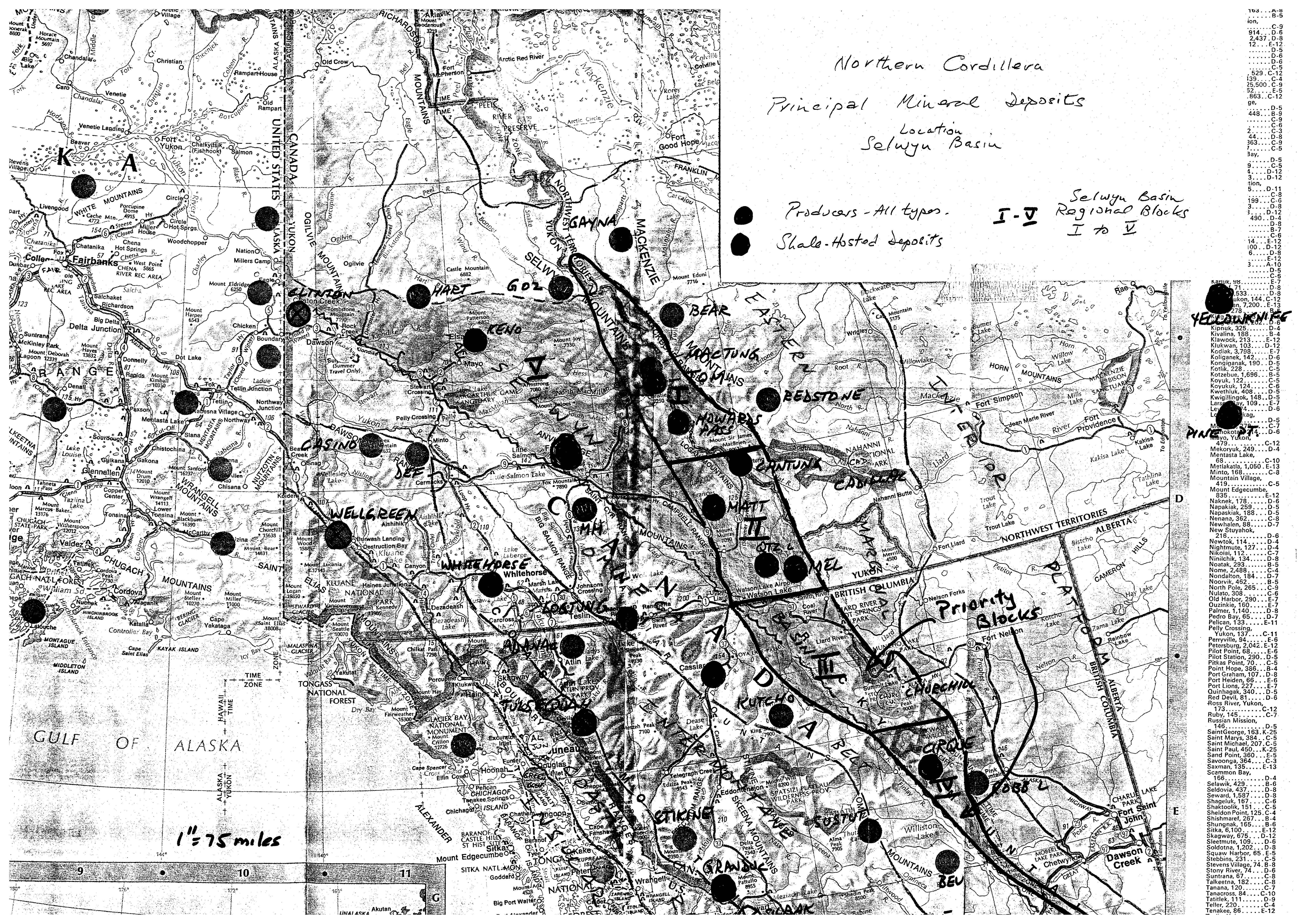
_____ (APPROVED BY) _____ (REQUESTED BY)

AUTHORIZED COUNTERSIGNATURE _____

ACCOUNTING DISTRIBUTION

AMOUNT 6 - 16		ACCT. 17 - 20	ANALYSIS 21 - 28	FACILITY 29-33	FACILITY 34-38	REFERENCE 1 39 - 48 MO.	REFERENCE 1 39 - 48 YR.	REFERENCE 2 VENDOR NO. 49 - 58	AFU 59-61	STATE 62 - 64	B/A 76-77	L 78	OP 79-80

PAGE _____ VENDOR _____ LEGEND _____



Northern Cordillera
Principal Mineral Deposits
Location
Selwyn Basin
Producers - All types.
Shale-Hosted deposits
I-V Selwyn Basin Regional Blocks I to V
Priority Blocks
1" = 75 miles
GAYNA
CLINTON
HART
GOZ
BEAR
KENO
MACTUNG
REDSTONE
HOWARDS PASS
CASINO
DEF
CANTUNG
CADILLAC
WELLGREEN
MATT
WHITEHORSE
KUTCHO
CHORCHIL
STIKINE
GRANDUC
BEU
YELLOWKNIFE
PINE PT
GULF OF ALASKA

Shale-Hosted deposits

1" = 75 miles

Priority Blocks

A-68-BI, (4-76)

TRANSMITTAL SLIP

DATE 31 May 1977

TO Jack Richardson

LOCATION Lab

- [ ] FOR YOUR INFORMATION
- [ ] AS REQUESTED
- [ ] FOR DISTRIBUTION
- [ ] NOTE AND RETURN
- [ ] CHECK AND ADVISE
- [ ] PER OUR CONVERSATION
- [x] PLEASE HANDLE
- [ ] FOR SIGNATURE
- [ ] FOR FOLLOW–UP RECORD
- [ ] FOR YOUR APPROVAL AND RETURN
- [ ] FOR DISCUSSION
- [ ] PREPARE REPLY FOR MY SIGNATURE

COMMENTS / PASS TO

These are the sections
we're interested in

Thanks

FROM Pat Fischer

LOCATION 4456

Sections Plotted on Topo Sheets (for which we have descriptions)

	SECTION NAME		SAMPLE CODE
①	Mount Lorette		63-LM-1, 2, 3-56
②	Mount Kidd		63-KM-1, 2-56
③	Little Elbow River		63-LER-1-56
④	Narboe Creek		63-NBC-1, 2, 3-56
⑤	Upper Elk Lake	✓	63-UEL-1-56 ✓AA-1089 ✓AA-1090 ✓AA-1091 ✓AA-1124
⑥	Elk Lakes	✓	63-EL-1-56
⑦	——		
⑧	Rundle mt.		42-RU-7-53
⑨	"		"
⑩	Loder Lime Kiln		Nil
⑪	Mount Head	✓	41-MH-54 41-MH-2-54 ~~AA0505~~ ✓AA0522 ✓AA0603 ✓AA0605
⑫	Crowsnest Lake		42-CNL-53
⑬	Mount Broadwood	✓	41-MB-54 ✓AA0505 ✓AA0506 ✓AA0507 ✓AA0523
⑭	Windsor Mountain	✓	41-WM-54 ? AA0771
⑮	Mount Hosmer	✓	41-HO-55 ✓AA0636
⑯	Upper Sand Creek	✓	41-US-55 ✓AA0636 ✓AA0631
⑰	Liphardt Creek	✓	41-LH-55
⑱	Upper Lodgepole		41-UL-55 AA0655 AA0771 ✓AA0633
⑲	Mount Darrah Col	✓	41-MDC-55 ✓AA0635 ✓AA0644
	East Mount Darrah	✓	41-EMD-55
⑳	Pengelley Spur		41-PS-55
	Mount Pengelly East		41-MPE-55
㉑	Eagle Lake		45-EL-54
㉒	Mount Costigan		41-MC-54 41-MC-54-2

INTERNAL CORRESPONDENCE
G.M.C. 1008

RKG

FROM E. P. Dillon AT Toronto IN REPLY REFER TO

TO R. K. Germundson/ AT Toronto DATE February 19, 1980
W. H. Thompson

SUBJECT MEETING WITH J. BARAKSO OF MIN-EN LABS, VANCOUVER

DISCUSSION

1) Min-En Lab's analytical costs appear competitive (see attached schedule).

2) Turn-around time for the analysis of recon stream sediment samples should be five to seven days.

3) Whole rock analysis - Min-En Labs is in the process of finalizing arrangements with X-Ray Assay Labs, Don Mills, whereby Min-En Labs will do the sample preparation at its facilities in Vancouver and ship the pellets to X-Ray for analysis. The data will be returned to Min-En Labs via teletype. It may be possible to have data stored in Gulf's data files at X-Ray.

   The efficiency of this arrangement will depend upon Min-En's sample preparation capabilities.

4) Min-En Labs may also be using X-Ray Assay Labs' neutron activation facility for gold and uranium analysis.

5) Heavy mineral concentrates - research conducted by J. Barakso of Min-En Labs shows that:

   a) Anomalous values in Zn and Pb can be traced 17 miles downstream from the Howards Pass deposit, and anomalous Cu and Zn were picked up in the salt chuck 35 miles downstream from the Stikine deposit.

   b) The concentration of the given element in the sample is increased dramatically; e.g., Howards Pass - anomalous values in Pb = 200 ppm in normal stream sediment and 4,000 ppm in heavy mineral concentrate sample.

.../2

The application of the heavy mineral concentrate sampling method in a reconnaissance program should permit the reduction of sample density and also detect subtle anomalies that may be missed by normal stream sediment sampling methods.

Drawbacks to the sole use of this method are the time taken to concentrate the sample in the field, the necessity of collecting a large sample in the field (1 kg) if the lab is to do the concentrating and the increased cost of sample preparation.

6) Cost analysis - sample preparation and analysis:

a) Heavy mineral concentrate -

Sample preparation	18.00/sample
Analysis (Cu, Pb, Zn, Ag, Mn)	4.10/sample
Total	22.10/sample

b) Stream sediment -

Sample preparation	0.50/sample
Analysis (Cu, Pb, Zn, Ag, Mn) + Hg	8.10/sample
Total	8.60/sample

CONCLUSIONS

Sample Procedure Core Sediments

1) During the 1980 field program for Cordilleran sediments, each sampling crew will use one of J. Barakso's small seive/pans to wet seive at least one pound (0.5 kg) of -20 mesh sample. Each sample will be run for regular stream sediment, and the portion of material seived for the regular stream sediment analysis will be combined with the coarse part of the sample and stored for possible future heavy mineral concentration and analysis.

2) During visits to the known deposits in the Selwyn Basin, heavy mineral concentrate and stream sediment samples will be collected to test J. Barakso's method on an orientation basis.

3) One of the four areas chosen for work this summer (1980), the Kechica area, will be tested with the heavy mineral concentrate method using the results of Gulf Minerals', 1978, stream sediment results. This will also be an orientation survey.

Comments and criticisms will be gratefully accepted.

E. P. Dillon

EPD/ht

INTERNAL CORRESPONDENCE
G.M.C. 1005

FROM E.P. Dillon AT Toronto IN REPLY REFER TO

TO W.H. Thompson, J. Boldy, R.K. Germundson AT Toronto DATE October 10, 1980

SUBJECT

Follow up of Regional Reconnaissance Program - Quesnel Lake - Barkerville Area, 1980

The results of the regional reconnaissance stream silt geochemical survey in the Quesnel Lake - Barkerville area showed that two areas on NTS sheet 93A14 were highly anomalous in Zinc with minor associated anomalous Lead and Silver (Fig. 1).

Anomalous Zinc, Lead and Silver values from the heavy mineral fraction of the stream silts ranged from 450 to 2080 ppm, 279 to 2540 ppm and from 4.0 to 6.2 ppm respectively.

These values led to a follow up program in the Kimble Creek - Black Stuart Mountain area and the Cunningham Creek - Round Top Mountain areas in September of this year.

The results of the detailed silt follow up program in the Kimble Creek area shows that several streams draining the MA, PA, ME, YOU, ALEX and TOM claims (staked in October 1979 by Brian Elliot & Heather Scudder) to be highly anomalous in Zinc (i.e.: 470 to 3080 ppm Zn) (analyses of whole stream sediment sample).

The anomalous area on Black Stuart Mountain (Fig. 2) is underlain by Cambrian Black clastics (argillite, siltstone, quartzite and shale) of the Midas Formation. This is the key target Formation of the 1980 program in the Quesnel Lake - Barkerville Area. In fact the Rio Canex is, at present, driving an adit to test a Pb-Zn-Ag prospect in the Midas Formation some 12 km west of Black Stuart Mountain.

In the spring (May) of 1980, the Stu I to V claims were staked and the entire block has recently been optioned to Teck Explorations, Vancouver, B.C.

Teck has just completed some additional staking to the south and east of the ME and YOU claims and seem to have covered the most favourable land in the area.

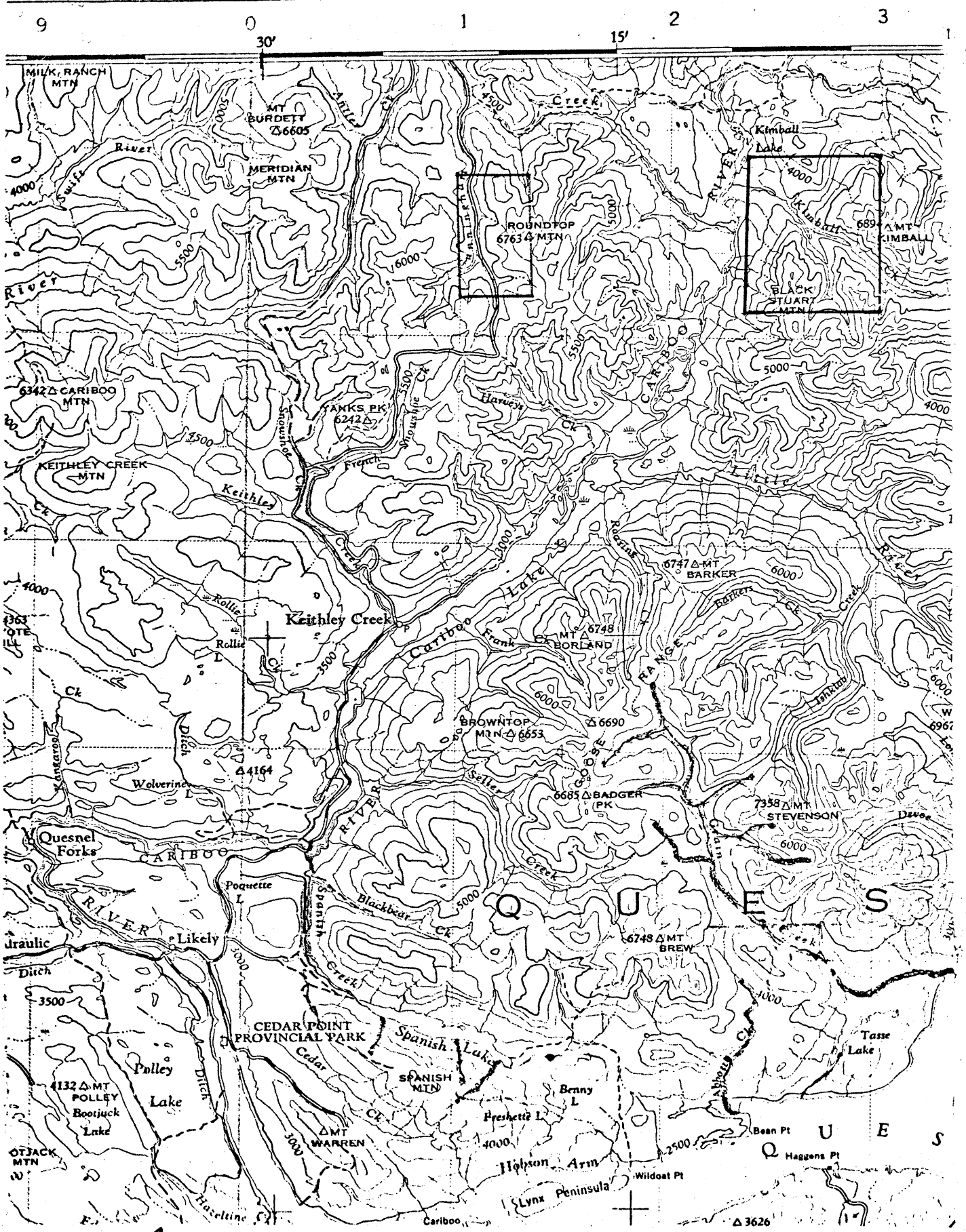
At this time, the author recommends approaching Teck in Vancouver regarding joint venturing with them on this ground.

Respectfully submitted,

Edward Dillon

E.P. Dillon
Project Geologist

EPD:ab



ANOMALOUS AREAS
QUESNEL - BARKERVILLE.

LOCATION MAP.
NTS : 93A

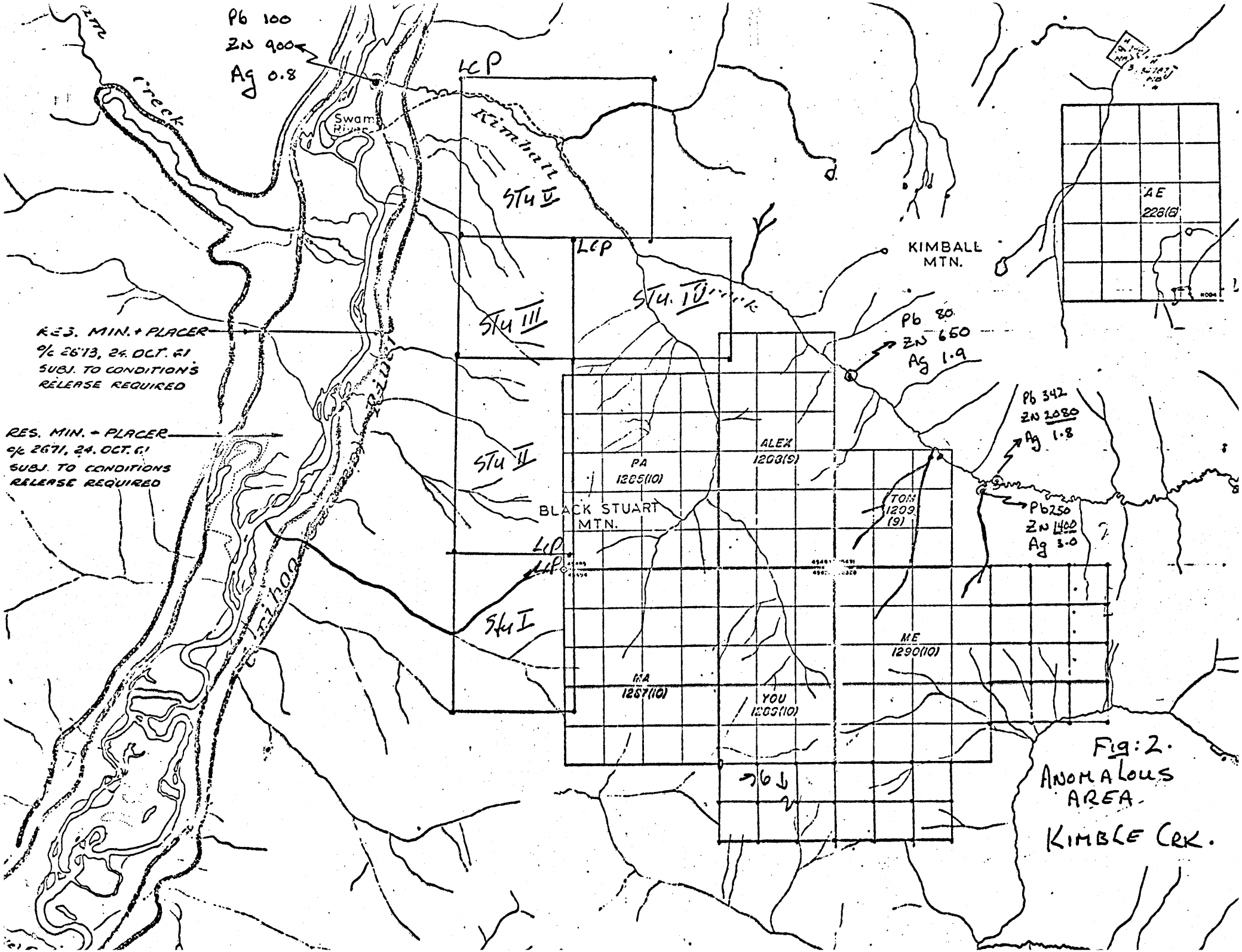


Fig: 2.
ANOMALOUS
AREA.
KIMBLE CRK.

INTERNAL CORRESPONDENCE

G.M.C. 1008

FROM W.H. Thompson AT Toronto IN REPLY REFER TO

TO Planning Council/ R.K. Germundson/E.P. Dillon AT Toronto DATE October 14, 1980

SUBJECT Cordilleron Planning Meeting

A meeting to review the preliminary results of the 1980 program and to consider an action-plan for land acquisition is scheduled for 2:00 p.m. Tuesday October 21, 1980.

Please advise if this date is not satisfactory.

W.H. Thompson

WHT:ab

WORK DONE

1980

CORDILLERAN SEDIMENT

Number of Heavy Mineral Samples - 1074
Number of Follow Up Samples - 230
1304

Cost of 1980 Program = $280,000
= $215/sample - (Average)

The cost for the Follow Up Program in Quesnel = $27,000 or $117 per sample.

The cost for 1074 Heavy Mineral Samples was $235/sample.

1. Quesnel-Barkerville: 6 Sheets done for Heavy Mineral analyses. Follow up Kimball Creek - target is Midas Formation. Key areas held by Tech and Rio Canex.
2. Chetwynd Trend out of Prince George. Heavy Mineral.
3. Muncho Lake, Nn. B.C. - some follow up of 1978 work.
4. Watson Lake Area - minor sampling.
5. Ross - Pelly Rivers: 7 Sheets done for Heavy Mineral analyses.

RECOMMENDATIONS FROM 1980 WORK

1. Approach Tech re Joint Venture on Kimball Creek claims - budget for work program required.
2. Stake two areas in Selwyn Basin - budget for work program required.
3. Volcanogenic belts in Quesnel Lake and Ross River areas warrant attention by Greenstone group.

WORK PROPOSAL

1981

CORDILLERAN SEDIMENTS

Yukon - Claim Evaluation: 2 areas
- Follow up within 10 areas outlined by 1980 Heavy Mineral Program
- Recon. Heavy Mineral Program for 7 of 1: 50,000 Sheets - Selwyn Basin

B.C. - Follow up - Muncho Lake area
- Follow up - Gold - Barkerville area
- Recon. 5 Sheets - areas to be selected from
  (1) Williston Lake on Cirque Trend
  (2) Barkerville Area - Midas Trend
  (3) Southern B.C.
- Joint Venture with Tech

CORDILLERAN SEDIMENTS

ESTIMATED 1981 COSTS

For Claim Staking (Capital Budget)

300 Claims in two areas of the Selwyn Basin - $ 50,000

1. P & E		$ 40,000
2. Cord. Seds. Field, Recon. & Follow Up		260,000
3. Claim Work (Separate Funding)		40,000
4. Joint Venture (Est.)		60,000 ± to 100,000
Total 1 thru 4	=	400,000 to 440,000
In Present Planned Budget		$300,000

Short Fall - $100,000 to 140,000

R.K. Germundson

R. K. Germundson

RKG:ab
October 20, 1980

Gulf Minerals Canada Limited

FILE NOTE

June 25, 1980.

CORDILLERAN SEDIMENTS,
QUESNEL LAKE AREA, B.C.
(N.T.S. 93A)

The main field area is underlain by sequences of miogeosynclinal shales, sands and limestones ranging in age from Proterozoic to Lower Paleozoic (see #6 on enclosed map). Thick black clastic sequences are present; many of these are heavily pyritized.

A belt of eugeousynclinal volcanics (Takla Lake Group) underlies much of the western third of N.T.S. 93A (#7 on enclosed map). The volcanics are Triassic to Jurassic in age and mainly andesitic in composition. However one property examined just south of the central part of Quesnel Lake contains abundant chert, rhyolite and tuffs containing pyrrhotite and minor chalcopyrite. Thick sequences of pyritic black clastics are associated with the volcanics and this part of the area is suitable for both a volcanogenic and a sedimentary search for minerals.

The first set of geochemical analyses are on hand. All of the 91 samples have metal analyses for the heavy mineral portion of the stream sediment. There are very strong demarcations between anomalous and non anomalous samples using the heavy mineral method.

Samples 200 to 236 were also run by "straight" geochemistry prior to separating the heavies. Essentially no anomalies are present for this set. The heavy mineral method seems to be proving itself as a key exploration tool.

R. K. Germundson

js

R. K. Germundson, Ph.D.

Gulf

MIN-EN Laboratories Ltd.

705 WEST 15th STREET,
NORTH VANCOUVER, B.C., CANADA V7M 1T2
TELEPHONE (604) 980-5814

ANALYTICAL REPORT

Project AFE 0421 FAC 08117 Date of report June 7/80.

File No. 0-256 Date samples received June 16/80.

Samples submitted by: Ted Dillon

Company: Gulf Minerals Canada

Report on: 91 H.M. 37 straight geochem Geochem samples

Assay samples

Copies sent to:

1. Gulf Minerals Canada, Toronto, Ont.
2. T. Dillon, Horsefly, B.C.
3.

Samples: Sieved to mesh Ground to mesh

Prepared samples stored ☒ discarded ☐

rejects stored ☐ discarded ☐

Methods of analysis: Specific gravity flotation and routine geochem analysis.

Remarks: Sample CS 80-123 was missing.

SPECIALISTS IN MINERAL ENVIRONMENTS

COMPANY: Gulf Minerals Canada

PROJECT No.: AFE 0421 FAC 08117

ATTENTION: Ted Dillon

GEOCHEMICAL ANALYSIS DATA SHEET

MIN - EN Laboratories Ltd.

705 WEST 15th ST., NORTH VANCOUVER, B.C. V7M 1T2
PHONE (604) 980-5814

FILE No. 0-256

DATE: June 16

Heavy Mineral 1980.

Sample Number	Mx ppm	Cu ppm	Pb ppm	Zn ppm	Mo ppm	Co ppm	Ag ppm	Fe ppm	Hg ppb	As ppm	Mn ppm	Au ppb	Ba ppm	V ppm	H.M. %
CS80-3		104	36	175	1		03	19400		20	545	5	190	8	2.06
5		75	20	270	1		04	29500		128	710	10	470	10	1.19
7		138	100	110	1		02	22400		145	225	10	320	6	2.28
8		6	4	26	1		01	18200		3	281	5	380	27	7.64
9		6	4	27	1		01	32000		<1	620	<5	290	37	5.69
12		265	45	250	1		04	22000		43	1020	175	370	30	0.86
13		195	80	400	1		03	22400		47	625	5	350	20	2.19
14		280	20	350	1		03	15300		54	1150	10	560	10	0.34
15		320	85	275	1		02	25000		101	1080	10	510	20	1.07
16		48	10	55	1		02	49000		7	275	15	400	29	1.13
17		13	9	32	1		01	36000		4	475	5	360	22	3.09
18		12	12	58	1		02	31500		8	600	10	290	21	1.12
19		25	12	63	1		02	15900		<1	570	15	330	28	1.13
22		36	16	56	1		01	33000		<1	325	5	340	16	2.61
24		10	11	33	1		01	16800		<1	250	5	370	15	11.67
26		18	20	115	1		03	58000		15	1050	20	690	25	0.78
27		41	23	100	11		03	64000		44	480	35	620	30	1.81
28		18	11	47	1		01	34000		4	440	5	320	20	3.54
30		14	9	58	1		01	26000		3	310	10	280	22	4.26
31		27	12	50	1		01	39000		1	345	5	200	16	6.59
33		19	6	53	1		01	29500		7	520	5	310	12	3.81
34		22	11	47	1		01	36000		6	465	<5	300	20	3.19
100		820	90	230	1		04	23000		97	970	20	370	22	0.67
101		1120	100	300	1		05	23000		95	850	15	410	20	0.58
102		555	150	265	1		04	24500		104	570	10	620	12	2.01
104		330	118	280	2		06	28800		77	410	10	300	14	2.73
122		30	12	42	1		01	46500		5	380	5	340	20	4.90
123	no sample														
124		36	17	88	1		03	67500		<1	920	10	570	27	2.02
CS80-125		38	17	82	2		02	79500		<1	1275	5	900	30	3.54

CERTIFIED BY: [signature]

COMPANY: Gulf Minerals Canada

PROJECT No.: AFE 0421 FAC 08117

ATTENTION: Ted Dillon

GEOCHEMICAL ANALYSIS DATA SHEET

MIN - EN Laboratories Ltd.

705 WEST 15th ST., NORTH VANCOUVER, B.C. V7M 1T2
PHONE (604) 980-5814

File No. 0-256

DATE: June 16, 1980.

Heavy Mineral

Sample Number	Mo ppm	Cu ppm	Pb ppm	Zn ppm	Mo ppm	Co ppm	Ag ppm	Fe ppm	Hg ppb	As ppm	Mn ppm	Au ppb	Ba ppm	V ppm	H.M. %
CS80-126	1.0	45	50	1			10	28000		<1	890	5	480	24	0.42
127	1.4	17	42	2			04	41000		2	735	5	300	38	5.82
128	8	11	33	2			07	35000		4	550	5	300	21	14.51
129	1.1	13	39	1			06	40000		5	690	5	420	26	9.83
130	1.5	18	30	1			05	35500		<1	470	5	350	22	8.14
131	2.1	18	32	1			06	36500		<1	705	5	260	15	4.24
132	1.8	14	34	1			06	31000		<1	540	5	320	17	8.09
133	1.4	12	26	1			06	49500		<1	575	5	260	48	25.58
200	340	66	360	26			36	168000		1.1	2450	1.5	1650	37	1.01
201	191	55	347	39			29	126000		18.7	1460	1.0	670	65	5.75
202	1.6	22	51	2			07	39500		2	510	2.0	410	26	5.03
203	1.8	28	40	1			07	46500		2.0	485	4.5	300	23	9.68
204	6	16	30	1			06	25500		5	410	5	400	19	7.37
205	183	82	115	1			18	87000		9	610	2.5	800	20	2.63
206	390	105	160	2			22	122000		7.2	1110	1.5	610	26	2.01
207	398	100	100	1			20	118000		2.7	960	2.0	700	40	0.96
208	618	125	95	1			10	96000		4.0	520	2.0	660	27	1.37
209	485	175	150	1			31	98500		7.1	760	2.0	500	25	1.06
210	520	195	160	1			32	121000		3.2	825	2.5	610	18	0.73
211	394	168	175	2			24	228000		13.1	620	3.0	500	16	1.35
212	285	115	145	2			28	211000		13.4	580	1.5	460	18	2.18
213	276	145	175	16			22	202000		11.2	775	3.0	610	24	1.13
214	188	190	140	1			20	225000		4.8	990	1.5	550	45	0.53
215	270	140	150	1			20	160000		5.0	695	1.5	520	27	0.86
216	420	260	215	1.0			36	270000		11.6	850	2.0	510	16	1.08
217	330	131	230	1			24	216000		11.6	450	1.0	220	13	4.61
218	258	107	100	1			16	145000		1.3	1420	1.0	490	35	2.51
219	160	87	103	5			15	128000		9	715	5	560	40	3.44
220	176	93	93	1			07	65000		2.4	465	1.0	540	14	4.40
CS80-221	9.7	7.7	7.9	1			07	52000		<1	395	5	520	11	2.75

CERTIFIED BY

COMPA Gulf Minerals Canada

PROJECT No.: AFE 0421 FAC 08117

ATTENTION: Ted Dillon

GEOCHEMICAL ANALYSIS DATA SHEET

MIN - EN Laboratories Ltd.

705 WEST 15th ST., NORTH VANCOUVER, B.C. V7M 1T2
PHONE (604) 980-5814

F... No. 0-256

DATE: June 16

Heavy Mineral 1980.

Sample Number	Mo ppm	Cu ppm	Pb ppm	Zn ppm	Mo ppm	Co ppm	Ag ppm	Fe ppm	Hg ppb	As ppm	Mn ppm	Au ppb	Ba ppm	V ppm	H.M. %
CS80-105		370	140	240	2		2.9	37500.0		<1	500	3.0	180	8	1.47
106		8	31	57	1		0.5	19900.0		<1	570	5	390	3.9	5.39
107		62	26	78	1		0.8	74500.0		<1	800	10	360	6.1	8.62
108		134	87	150	1		1.6	17800.0		<1	920	15	370	14	2.13
109		155	95	185	1		1.6	18400.0		<1	990	10	310	5	1.57
110		270	110	257	2		2.0	17200.0		8	935	2.0	320	2.3	2.60
111		212	145	200	1		2.2	37500.0		3	320	2.0	210	6	0.91
112		204	115	250	1		2.0	20500.0		<1	1055	10	350	1.6	1.80
113		242	150	185	2		2.6	27500.0		14	760	2.0	420	1.3	1.93
114		161	155	200	1		2.2	24500.0		<1	1000	1.5	300	1.0	1.55
115		226	116	209	1		2.0	22400.0		1	310	2.0	250	6	3.22
116		30	23	44	1		0.8	52000.0		<1	415	1.5	460	2.7	4.67
117		12	19	44	1		0.9	68000.0		<1	1890	5	200	1.7	5.29
118		20	61	73	1		1.6	14500.0		<1	3200	5	480	3.2	5.03
119		44	33	62	1		0.9	64000.0		2	625	5	460	2.9	2.83
120		25	31	55	1		0.7	79500.0		<1	585	1.0	250	1.1	3.85
CS80-121		12	18	29	1		0.6	20000.0		<1	440	5	240	9	14.15

CERTIFIED BY

COMPANY: Gulf Minerals Canada

PROJECT No.: AFE 0421 FAC 08117

ATTENTION: Ted Dillon

GEOCHEMICAL ANALYSIS DATA SHEET

MIN - EN Laboratories Ltd.

705 WEST 15th ST., NORTH VANCOUVER, B.C. V7M 1T2
PHONE (604) 980-5814

FILE No. 0-256

DATE: June 16, 1980.

Heavy Mineral

Sample Number	Mo ppm	Cu ppm	Pb ppm	Zn ppm	Ni ppm	Co ppm	Ag ppm	Fe ppm	Hg ppb	As ppm	Mn ppm	Au ppb	Ba ppm	V ppm	H.M. %
CS80-222		190	65	78	3		16	152000		25	875	8.5	380	45	4.62
223		161	60	97	1		13	90000		14	695	20	480	12	3.90
224		66	42	120	1		10	102000		18	660	15	520	12	3.51
225		108	44	119	1		10	102000		27	715	25	560	13	4.66
226		69	38	130	1		10	98000		7	965	25	580	23	2.17
227		86	50	96	1		12	118000		27	1125	20	340	17	2.11
228		146	75	150	1		11	118000		17	1380	35	540	15	1.92
229		58	42	106	1		07	72000		15	640	15	590	16	3.80
230		244	124	165	1		18	174000		64	840	20	610	16	1.35
231		55	49	122	1		08	81500		14	740	25	760	8	2.31
232		63	80	120	1		10	66000		17	1680	30	710	12	1.01
233		69	80	100	1		12	61500		21	1500	25	360	13	0.93
234		159	100	195	1		15	99500		178	1490	30	750	45	0.81
235		60	130	80	1		20	98000		20	1200	20	440	8	0.18
CS80-236		76	74	117	1		11	102000		19	935	25	520	20	2.55

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COMPA Gulf Minerals Canada

PROJECT No.: AFE 0421 FAC 08117

ATTENTION: Ted Dillon

GEOCHEMICAL ANALYSIS DATA SHEET

MIN - EN Laboratories Ltd.
705 WEST 15th ST., NORTH VANCOUVER, B.C. V7M 1T2
PHONE (604) 980-5814

F... No. 0-256

DATE: June 16, 1980.

Straight Geochem

Sample Number	Mo ppm	Cu ppm	Pb ppm	Zn ppm	Mo ppm	Co ppm	Ag ppm	Fe ppm	Hg ppb	As ppm	Mn ppm	Au ppb	Ba ppm	V ppm
CS80-201	0.0	8.8	1.6	8.7	2		1	0.3	9500		2.6	930	1.0	940	49
202	0.1	5.6	1.7	110	7		1	0.3	2000		3.5	760	5	820	26
203	0.2	7	6	3.1	1		0.6	1.3	0000		2	315	1.5	630	12
204	0.3	7	7	2.5	1		0.5	1.4	200		2	220	5	620	9
205	0.4	8	10	3.7	1		0.6	1.5	600		<1	295	5	930	18
206	0.5	1.4	1.4	3.6	1		0.5	1.7	300		1	215	<5	400	4
207	0.6	1.8	1.4	4.2	1		0.4	1.9	200		2	295	5	560	6
208	0.7	1.6	1.6	5.5	1		0.5	2.2	000		8	360	5	720	9
209	0.8	2.2	1.4	3.9	1		0.5	1.7	500		3	205	5	610	10
210	0.9	1.7	1.4	4.7	1		0.7	1.9	500		8	230	<5	620	8
211	1.0	1.5	1.5	5.1	1		0.6	2.2	500		2	245	<5	700	12
212	1.1	1.7	1.5	5.6	1		0.8	2.5	000		13	235	5	610	11
213	1.2	2.2	1.7	5.5	1		0.7	2.6	500		7	250	<5	680	8
214	1.3	1.6	1.6	5.2	1		0.6	2.1	000		13	275	5	670	9
215	1.4	2.2	2.4	6.5	1		0.9	2.5	000		4	440	5	560	12
216	1.5	1.7	2.9	6.1	1		0.6	2.1	500		1	310	5	630	11
217	1.6	1.8	2.2	5.6	1		0.8	2.2	000		2	290	1.0	540	14
218	1.7	2.8	2.7	6.7	1		1.1	2.9	000		10	270	5	630	13
219	1.8	2.9	2.0	3.2	1		0.8	1.7	800		10	280	5	300	12
220	1.9	3.6	1.5	3.5	1		0.5	1.8	300		2	240	<5	520	9
221	2.0	1.4	1.5	2.9	1		0.4	1.3	300		2	185	<5	470	5
222	2.1	1.2	1.3	3.7	1		0.4	1.6	200		<1	185	5	490	3
223	2.2	1.6	1.2	3.1	1		0.6	1.8	700		7	480	<5	480	5
224	2.3	2.1	1.2	3.4	1		0.7	1.8	300		<1	235	5	390	2
225	2.4	1.5	1.3	4.9	1		0.8	1.9	200		3	300	<5	470	3
226	2.5	2.2	1.4	5.3	1		0.9	2.0	500		7	310	1.0	440	9
227	2.6	1.2	1.2	4.2	1		0.9	1.6	500		8	295	5	500	6
228	2.7	1.1	1.1	2.7	1		0.7	1.4	800		<1	190	<5	280	3
229	2.8	1.5	1.4	3.6	1		0.5	1.6	700		1	265	<5	360	1
CS80-230	2.9	1.4	1.6	4.7	1		0.8	1.8	500		6	390	5	540	6

CERTIFIED BY

COMPA Gulf Minerals Canada

PROJECT No.: AFE 0421 FAC 08117

ATTENTION: Ted Dillon

GEOCHEMICAL ANALYSIS DATA SHEET

MIN - EN Laboratories Ltd.

705 WEST 15th ST., NORTH VANCOUVER, B.C. V7M 1T2
PHONE (604) 980-5814

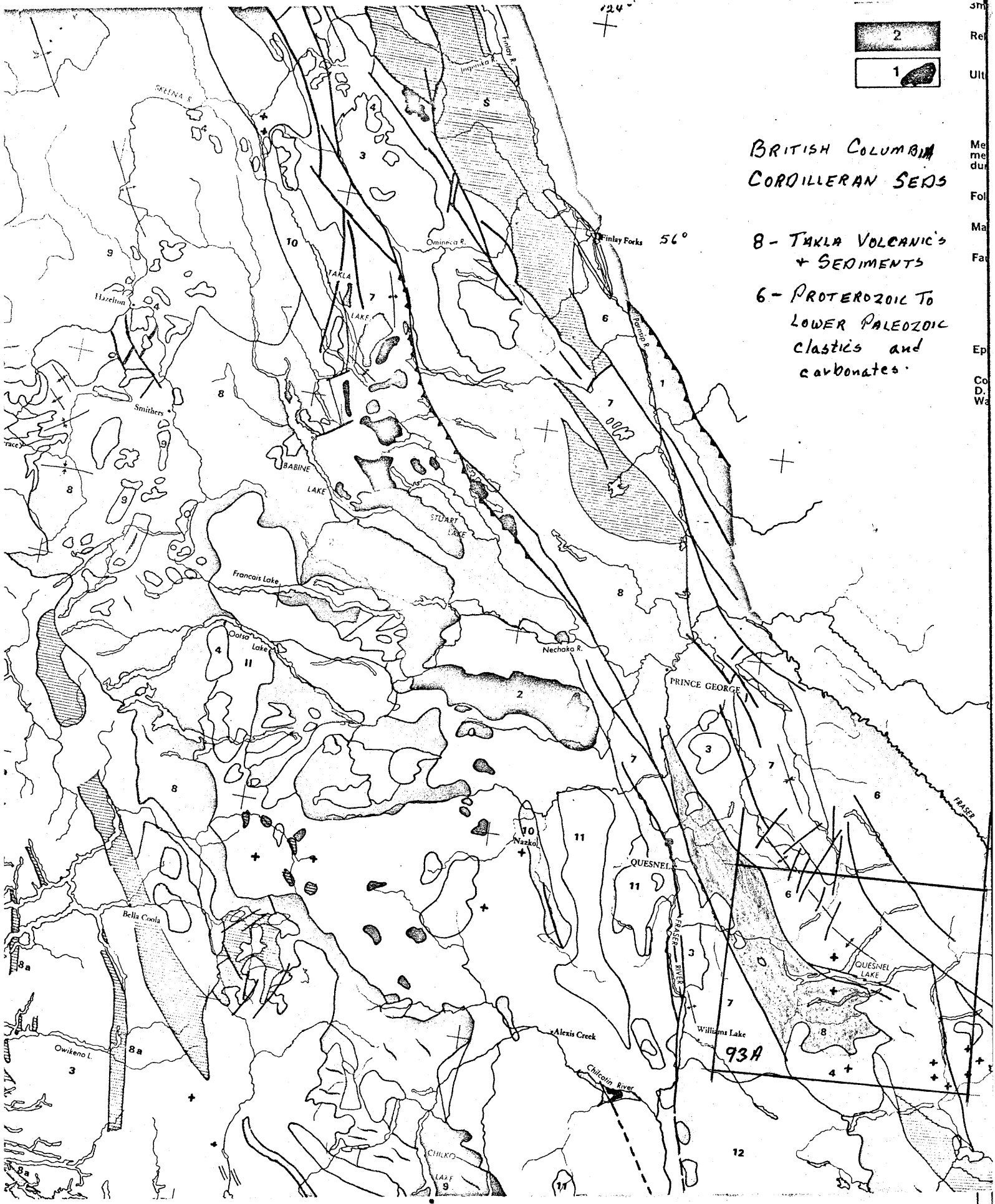
F... No. 0-256

DATE: June 16

Straight Geochem 1980.

Sample Number	Mo ppm	Cu ppm	Pb ppm	Zn ppm	Mo ppm	Co ppm	Ag ppm	Fe ppm	Hg ppb	As ppm	Mn ppm	Au ppb	Ba ppm	V ppm
CS80-230		11	15	43	1		07	18800		<1	235	5	490	6
231		16	14	46	2		08	24000		1	245	10	460	5
232		9	17	37	1		07	18100		<1	235	15	400	2
233		10	15	32	1		07	16400		3	315	15	380	3
234		12	16	43	2		08	18400		3	340	10	410	3
235		12	13	38	1		07	17000		7	295	5	400	4
CS80-236		8	15	25	1		08	13300		2	320	5	530	3

CERTIFIED BY


2
1
BRITISH COLUMBIA
CORDILLERAN SEDS
8 - TAKLA VOLCANIC's + SEDIMENTS
6 - PROTEROZOIC TO LOWER PALEOZOIC clastics and carbonates.
124°
56°
SKEENA R.
Ingenika R.
Finlay R.
Finlay Forks
Omineca R.
TAKLA LAKE
Hazelton
Smithers
Parsnip R.
BABINE LAKE
STUART LAKE
Francois Lake
Ootsa Lake
Nechako R.
PRINCE GEORGE
FRASER
Nazko
QUESNEL
FRASER RIVER
QUESNEL LAKE
Bella Coola
Owikeno L.
Alexis Creek
Williams Lake
93A
Chilcotin River
CHILKO LAKE

FROM J. Boldy AT Toronto IN REPLY REFER TO

TO F. C. Perry AT DATE Jan. 19, 1981.

SUBJECT Howards Pass Zn-Pb Deposit, Yukon-N.W.T.

Geological/exploration data regarding the deposit is covered in memos by me dated October 5, 1976, June 5 and August 13, 1979. Specific highlights as follows:

1) Discovered in Ordovician shales by geochemical stream-sediment sampling 1972 by Placer Dev.
2) Extensive zone(s) along 50 km strike length. High grade (> 30% Pb+Zn) areas referred to as XY and Anniv localities. Unofficial tonnage estimates by outsiders suggest > 225 million tonnes grading 5% to 7% Pb Zn plus 15 gt Ag.
3) Boldy and Germundson visited property in 1979. Elevation ± 1400m, in relatively subdued mountain setting, 80 km north of producting Cantung mine, along Yukon-N.W.T. border. Cyprus Anvil operations near Ross River 130 km to west.
4) Placer Development obtained a partner (U.S. Steel/Essex Minerals in Canada) in 1975 to participate in joint venture, with Essex providing $10 million within 10 year period for 50% interest, and operating management under Placer. Shell Canada (and others?) turned down proposal in 1975 as they wished to obtain an earned interest.
5) Adit for underground bulk sampling believed completed in 1980. Results unknown.

Notes

a) World class shale hosted deposit with gross value ± $25 billion @ ± $100 tonne. Very fine grained mineralization could cause poor metallurgical recoveries. (Possibly similar to MacArthur River Pb Zn deposit in Australia.
b) Relatively remote location - no infrastructure. Winter road access. Gravel airstrips. Major hydro power facilities needed. Major capital costs necessary.
c) If Essex Minerals backs out (as is rumoured), this could be due to: poor recovery of metals from bulk sampling, and/or long lag time to production, and/or other company priorities etc.
d) Further information needed. Essex may wish to retain an interest in any new deal, as their expenditures probably > $10 million.

J. Boldy.

js

MEMORANDUM
GMC 1071

DATE Aug 14/75

TO [redacted] RKG

LOCATION

- ☑ FOR YOUR INFORMATION
- ☐ NOTE AND RETURN
- ☑ PLEASE HANDLE
- ☐ AS REQUESTED
- ☐ FOR YOUR APPROVAL AND RETURN
- ☐ FOR DISCUSSION
- ☐ PER OUR CONVERSATION
- ☐ CHECK AND ADVISE
- ☐ FOR YOUR COMMENT
- ☐ PREPARE REPLY FOR MY SIGNATURE

COMMENTS:

Guidelines for N. Cordilleran exploration — Shale Hosted Pb-Zn-Ag deposits.

Keep.

Noted K.H.T.
Copies taken.

FROM

INTERNAL CORRESPONDENCE
G.M.C. 1008

FROM J. Boldy AT Toronto IN REPLY REFER TO

TO FCP, WHT, RKG. AT DATE August 13, 1979.

SUBJECT Exploration Guidelines
Shale-Hosted Pb-Zn-Ag Deposits
Northern Cordillera.

Introduction

Reviews and recommendations for the initiation of an exploration effort searching for stratiform shale-hosted Pb-Zn-Ag deposits in the Selwyn basin of the northern Cordillera were originally made in October 1976, followed by other communications, the most recent of which was made in June 1979. This memo is an update on the subject and includes some new data obtained from a recent visit to the area.

Reconnaissance Visit

R. K. Germundson and the writer visited the Tom deposit (HBM&S) and the Howards Pass deposit (Placer Dev.) between July 16th-19th in order to obtain personal impressions of the key shale-hosted deposits in the Selwyn basin, Yukon. An earlier visit was made to the Anvil district by the writer in 1976.

Tom Deposit, Yukon

Discovered by conventional prospecting in 1951. Intermittent exploration and underground development has outlined approximately 9 million tons of 16% Pb-Zn and 3 oz. Ag. (This tonnage could be increased to 12 million tons using a different tonnage factor). The depth potential is excellent and the delineation of 16-18 million tons will precipitate production. Further underground exploration will probably be undertaken in the next two years. The property is connected by road to Ross River and access may also be made by air to a gravel airstrip located on the property at an elevation of 3700 feet. The mine site is at an elevation of 5400 feet.

Geologically, the deposit is located along the shale hinge-line separating predominantly carbonate (platform) sedimentation to the east from shales and other clastics to the west. Stratigraphically, the deposit is located in Devono-Mississippian shales within the upper section of the Canol River formation, which is the lower member of the Besa River group. (See attached sections.) The immediate hanging-wall unit to the deposit is a siliceous pyritic argillite overlain by an extensive thickness of turbidite sediments, (intercalations of shale and silty mudstones with conglomeratic lenses). The footwall unit is a siliceous pyritic argillite, below which occur coarse

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cherty pebble conglomerates. A common characterisitic of the deposit is the presence of barite associated with the lead-zinc-silver mineralization. This is an important marker horizon. (The Exshaw shales of lower Mississippian age could be time-correlative). A gross resemblance to the Walton deposit in Nova Scotia and certain other European deposits is also evident. i.e. Meggen & Rammelsberg Germany and Tynagh in Ireland.

The adjoining Jason property (see memo June 5/79) has been recently optioned to Pan Ocean, who will be undertaking a $5 million drilling program over a period of up to 5 years. The geology and mineralization is similar to that at the Tom deposit.

Type samples of mineralization and associated lithologies were collected and have been sent for analysis. Results are awaited.

Howards Pass Deposit, Yukon

Discovered by regional stream sediment geochemical sampling in 1972. The program was originally predicated to search for vanadium deposits in the shales! However, over a period of a few years, certain samples returned high zinc values (> 2000 ppm Zn), and these samples were later checked for their lead content. This rechecking resulted in anomalous lead values being obtained (100-200 ppm Pb) from the stream sediment samples. Follow-up field examination of these localities resulted in the discovery of high grade (> 30% Pb+Zn) material from certain shaley horizons up-slope from the main geochemical stream sediment anomalies. Detailed soil sampling - particularly for lead - further outlined the mineralized areas of interest.

To date, an extensive zone(s) of Pb-Zn (Ag) mineralization has been outlined along a strike length approaching 30 miles in extent. Within it, there occur at least two main areas of "high-grade" material i.e. XY and Anniv localities. Unofficially, the tonnage potential is in excess of 250 million tons grading between 5%-7% Pb-Zn, with 0.5 ozs. Ag. per ton. Within this large tonnage there are apparently "several million tons" grading 20% Pb-Zn. Underground exploration is expected to be initiated in 1980-81. Access to the property may be made by air to either of two airstrips located on the property at an elevation of ± 4500 feet, a few hundred feet below the elevation of the deposit.

Geologically, this deposit is also located along the shale hinge-line, as is the Tom deposit approximately 50 miles to the north. Stratigraphically, the deposit is located in (Ordovician)-Silurian shales with narrow intercalated limestone and chert interbeds. This mineralized zone (locally termed the "active zone") is located within the lower section of the Road River formation which increases to a considerable thickness to the west. (See attached sections.) The "active zone" is the locus for fine grained lead-zinc (silver) mineralization and also contains (appreciable?) anomalous amounts of vanadium, carbon and certain other unspecified heavy metals. The hanging-wall unit is an orange mudstone marker horizon and the footwall unit is a bed of wavy-

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banded limestone. Total thickness of the "active-zone" is 250 feet. The mineralization within it follows cleavage planes, at a high angle to the bedding. As a matter of further interest - drainage off the deposits supports a peculiar pistachio-green moss, evidently containing high zinc values. No vegetation grows immediately above the deposits, - the so called "dead zone".

Type samples of mineralization and associated lithologies were collected and have been sent for analysis. Results are awaited.

Cyprus Anvil (Cirque) Discovery, British Columbia

A new discovery was recently reported from the south easterly extension of the Selwyn basin in north eastern British Columbia. It is located approximately 50 miles north of Williston Lake (see map). It was discovered by stream sediment geochemistry. Currently the deposit is being investigated by drilling and is at least 1/4 mile in strike length and 90-100 feet in thickness. Average values are 10% Pb-Zn with 2 ozs. Ag per ton. Geologically it appears to have the characteristics of the lower Mississippian type - barite rich, Tom deposit - hosted in the Besa River shales (Hudson Bay Oil and Gas Company are partners in this joint-venture.

Conclusions:

Exploration Direction

1) Geology: This forms the basic framework for all investigations. It is vitally important that a thorough understanding be reached on the importance of stratigraphy as a guide to the distribution of stratiform sedimentary deposits. Certain key time intervals within the stratigraphic succession are favourable for shale-hosted ore deposits. These horizons have recognizable characteristics and have to be delineated on the ground. All else will follow.

2) Geochemistry: Stream sediment geochemistry is one of the best tools. Lead-zinc and associated other metals i.e. barium, vanadium, carbon, silver, manganese and possibly mercury also probably occur to a greater or lesser extent. These may occur as pathfinders. An understanding of the mobility of some of these elements in the surficial environment is also important. The services of a geochemist are called for.

3) Geographic Location: The Selwyn basin extends from the Alaska-Yukon border (northwest of Dawson City) to Watson Lake near the Yukon-B.C. border and thence onwards to a location northeast of Prince George in British Columbia. It is flanked by the Tintina fault zone to the southwest and is located between the Omineca and Eastern Marginal Belts. Total length is approximately 1000 miles and the maximum width is 150 miles.

   Geographic location within this relatively remote area should be measured

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from existing road networks coupled to topographic elevations, rather than measured from lines of latitude. Proximity to hydro power is also an important aspect of possible future developments. The first choice of an exploration area should be its potential for a major economic discovery.

4) Property Acquisition: This aspect of exploration must not be neglected. Certain properties may be available for option. Assuming they are located with favourable geology - mineralization - geochemistry, attempts should be made to acquire the best of them (i.e. Jason etc.). Local knowledge of various properties/associated personnel is a prerequisite for this situation. This aspect of exploration should be more aggressive, and is the quickest method for involvement in the region.

5) Consultants: This is an all important aspect for those who do not have the required detailed background in any new exploration environment. The learning curve is too long and too expensive. Much time and effort can be saved by employing a consultant, especially one with a track record and with familiarity of the local scene.

6) Previous Exploration: There is no real point in repeating work in certain parts of this area if it has been previously covered by others in a grass-roots mode with negative results. Visits to Federal and Provincial government agencies to check out assessment records is all important, as are discussions with various personnel for a general appraisal of an area. Use of a consultant would be appropriate here.

7) GMCL Grass-Roots vs Joint-Venture: There is a place for both these aspects of exploration effort. For the moment (whilst GMCL is on the "learning-curve" in this environment), a Joint-Venture with a partner of merit is a lower risk situation than a basic grass-roots effort under its own steam. A Joint-Venture of merit may be available if further enquiries and contacts are made. This will not preclude a GMCL grass-roots effort at a slightly later stage which can operate in tandem in a different area within the basin. (See point 5.)

8) Stratiform Shale-Hosted Base metal Deposits: These deposits are amongst the most economically significant ore deposits in the world i.e. Mt. Isa, Australia; Sullivan, Canada: Meggen and Rammelsberg, Germany; to name a few. Representative examples are known in the Selwyn basin - the Tom deposit was the first to be discovered in 1951, followed by several others in the Anvil district during the 1950's, 1960's and even today. Howards Pass was discovered in 1972 and now, most recently, Cyprus Anvil have discovered the Cirque deposit in northeastern British Columbia. Similar major deposits have been also discovered along the Brooks Range in northern Alaska. This basin is of major proportions, other deposits remain to be discovered.

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(The search for basinal, stratiform, shale-hosted deposits should not be confused with the search for Mississippi Valley type, carbonate-hosted deposits i.e. Basin Rim search program. The targets have different geological/geochemical/geophysical characteristics and occupy a different "time-space" distribution in the development of the western Canadian Cordillera and Interior Plains.)

9) "Common Sense" Exploration: The essense of successful exploration contains three principal ingredients. These are (i) Recognition of good "ore-making" geology; (ii) Use of appropriate technology, and (iii) Deployment of personnel with proven exploration skills. This combination is vital for discovery. Lack of any one of these ingredients will invariably lead to failure.

Recommendations:

1) Obtain considerably more geological data-specifically to determine the distribution of favourable ore-making stratigraphy, such as the location of Ordovician-Silurian aged shales (Road River), and Devono-Mississippian (Besa River) shales in the Selwyn basin.

   Further, determine location of significant Pb-Zn-Ag-Ba mineralization discovered to date, by obtaining Archer-Cathro reference volumes for the Yukon. Also review assessment files to determine geological-geochemical work to date.

2) Prepare an "exploration index" map outlining various segments of the Selwyn basin as to their favourability for discovery. This will help focus attention to specific areas on a priority basis. Also to be considered would be proximity to existing road networks, topographic elevation, and intensity of previous work.

3) At the first instance, priority should be given to investigating the potential of the Canol formation, a unit of the Besa River shales. These host the higher grade sulphides i.e. Tom (type) deposit, and contain useful barite marker horizons.

4) Obtain the services of a qualified consultant before any final decision is made for field exploration. This would include an assessment of worthwhile properties for immediate acquisition if necessary. In addition, a decision could be made as to a joint-venture effort at the first instance, followed by GMCL grass-roots exploration at a later stage.

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5) Prior to field work, obtain the services of a geochemist. Stream sediment geochemistry is one of the proven ore finding techniques for these deposits.

6) Reference to the attached map outlines potential blocks of economic interest within which significant discoveries have been made to date. Priority should be attached to investigating data for Blocks III and IV at the first instance.

/js

Attachments: (i) Map of Northern Cordillera with Location of Principal Deposits.
(ii) Generalized stratigraphic x-sections.
(iii) Detailed stratigraphic x-section.

References

Gulf memos and reports: (GDJB)

Oct. 76	Review Cordilleran Stratiform Sulphide Search.
June 78	Exploration (Planning) Review - Base Metal Strategy. Part B.2.
May 79	A Certain Perspective on Canadian Ore Deposits. Vol. I & II
June 79	Argillite-hosted Zn-Pb-Ag Deposits. Northern Cordillera.
June 79	Addendum to previous memo re G.S.C. references to area of interest.