



GEOLOGY AND GEOCHEMISTRY

CYLINDER 1-4 CLAIMS

65°36'N; 136°57'W

116H/10

MAYO MINING DISTRICT

R.J. Cathro

May 10, 1979

090467



This report has been examined by the Geological Evaluation Unit and is recommended to the Commissioner to be considered as representation work in the amount of ~~\$ 2000.00~~ 2000.00

D.B. Craig 14 June 79
Resident Geologist or
Resident Mining Engineer

Considered as representation work under Section 53 (4) Yukon Quartz Mining Act.

B.R. Baxter
B. R. BAXTER
Supervising Mining Recorder
[Signature]
Commissioner of Yukon Territory

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INTRODUCTION

The Cylinder 1-4 claims are situated in unglaciated terrain characterized by sharp canyons separated by low hills. Scruffy black spruce cover much of the claim block. Above the canyons, swampy conditions are common near the base of the gentle slopes. Small springs draining upper Devonian black shales have produced prominent ferricrete gossans in these swamps and certain anomalous amounts of lead, zinc and sulphate.

The property was mapped and geochemically sampled on June 30, 1978 by R.J. Cathro, W.D. Eaton and P.J. Cockell using a Trans West helicopter Hughes 500C piloted by H. Dameron.

HISTORY

The limonite gossans at this location were first sampled in June, 1974 by Rob Carne and Colin Godwin of Dynasty Explorations Ltd. during a widespread reconnaissance program (Reef Project) for carbonate-hosted Zn-Pb mineralization in the Ogilvie and Wernecke Mountains. After anomalous geochem results were obtained, the gossans were lightly prospected while being staked in July, 1974 as the Jug 1-4 claims. The property was assigned a low priority by Dynasty when it was identified as a shale-hosted anomaly and was allowed to lapse after Dynasty merged the following year with Cyprus Mines Corp. and Anvil Mining Corp. Ltd. to form Cyprus Anvil Mining Corp. The anomaly was resampled and restaked on May 30, 1978 by R.J. Cathro for Archer, Cathro and Associates Ltd.

PROPERTY, LOCATION AND ACCESS

The Cylinder 1-4 claims lie four miles west of Hart River at 65°36'N, 136°57'W, within claim sheet 116H/10. They are recorded in the Mayo Mining District as follows:

<u>CLAIM NAME</u>	<u>GRANT NUMBERS</u>	<u>EXPIRY DATE</u>
Cylinder 1-4	YA30577-YA30580	16 June 1979

The nearest road access is MP 175 on the Dempster Highway and direct access is restricted to helicopter. Bell 206 (Jet Ranger) and Hughes 500C helicopters are available in Dawson on a casual basis from Trans North Turbo Air and Trans West Helicopters respectively.

REGIONAL GEOLOGY

The regional geology has been mapped by D.K. Norris of the GSC and was published as Open File 279 in August, 1974. In spite of the subdued and unglaciated terrain, Norris has produced a very detailed stratigraphic compilation that places the Jug anomaly in the Upper Devonian-Mississippian(?) Canol Formation shale. This is the same shale that has host to the barite sedimentary-exhalative mineralization in the Macmillan Pass district, Y.T., Gataga district, B.C. and Brooks Range district, Alaska.

The GSC stratigraphic succession near the Jug property is tabulated on the following page.

<u>Age</u>	<u>GSC Symbol</u>	<u>Formation Name</u>	<u>Lithology</u>
Permian	Pjc1	Jungle Creek	carbonate, shale, siltstone
		- DISCONFORMITY -	
Carboniferous	Chr	Hart River	siltstone, shale, limestone
		- DISCONFORMITY -	
Upper Devonian to Mississippian	Di	undivided	clastics
Upper Devonian to Mississippian	Dca	Canol	black siliceous shale
		- DISCONFORMITY -	
Middle Devonian	Do	Ogilvie	limestone
Middle Devonian	Dk	Cranswick	limestone
Lower Devonian	Dmi	Michelle	limestone, shale
Cambrian to Lower Devonian	GDr	Road River	shale, limestone
Cambrian to Lower Devonian	G?Db	unnamed	carbonates

The property is situated close to a major west-trending, north-dipping thrust fault that has juxtaposed unit G?Db to the north against unit Chr to the south. Norris has traced the Canol Formation sinuously through an area extending about 25 miles east and 30 miles south of the Jug property. One narrow belt extends a further 15 miles east to the Little Wind River. The total length of exposed surface trace of Canol shale in this district is about 180 miles.

PROPERTY GEOLOGY

The Cylinder claims are underlain by an almost flat-lying sequence of middle Upper Paleozoic rocks consisting of interbedded limestones and shales of Ogilvie Formation disconformably overlain by fine grained, clastic sedimentary strata of Canol Formation.

Middle Devonian Ogilvie Formation exposed on the property consists of thick bedded, partially recrystallized and dolomitized, fine to medium grained, grey, algal limestone. At the top of the Middle Devonian section, fossiliferous, partially recrystallized, chaotic limestone breccias contain brachiopods identified as:

- (i) Suborder Spiriferacea (M. Sil-Jur.)
- (ii) Suborder Dalamellicea (M. Ord.-Perm.)
- (iii) Order Strophomenicea (L. Ord.-Perm.)

Bedded clastic rocks assigned to the Canol Formation, of Upper Devonian to Mississippian(?) age concordantly overlie limestone breccias of the Ogilvie Formation. Basal beds consist of evenly bedded, 2.5 cm thicknesses of extremely siliceous, black, blue-black weathering cherty argillite with carbonaceous partings. This siliceous sequence is overlain by an unknown thickness of very fissile, gritty, strongly carbonaceous, moderately siliceous, non-calcareous, grey weathering black shale which contains gymnosperm(?) imprints on bedding planes. The uppermost part of the stratigraphic succession on the property consists of poorly exposed, brown weathering, moderately siliceous, silty, non-calcareous, black mudstones that are assumed to be part of the Canol Formation.

The occurrence of apparently deep water, fine-grained siliceous sediments concordantly overlying limestones which contain shallow water, sessile benthonic faunal assemblages implies an abrupt change in depositional environments, either

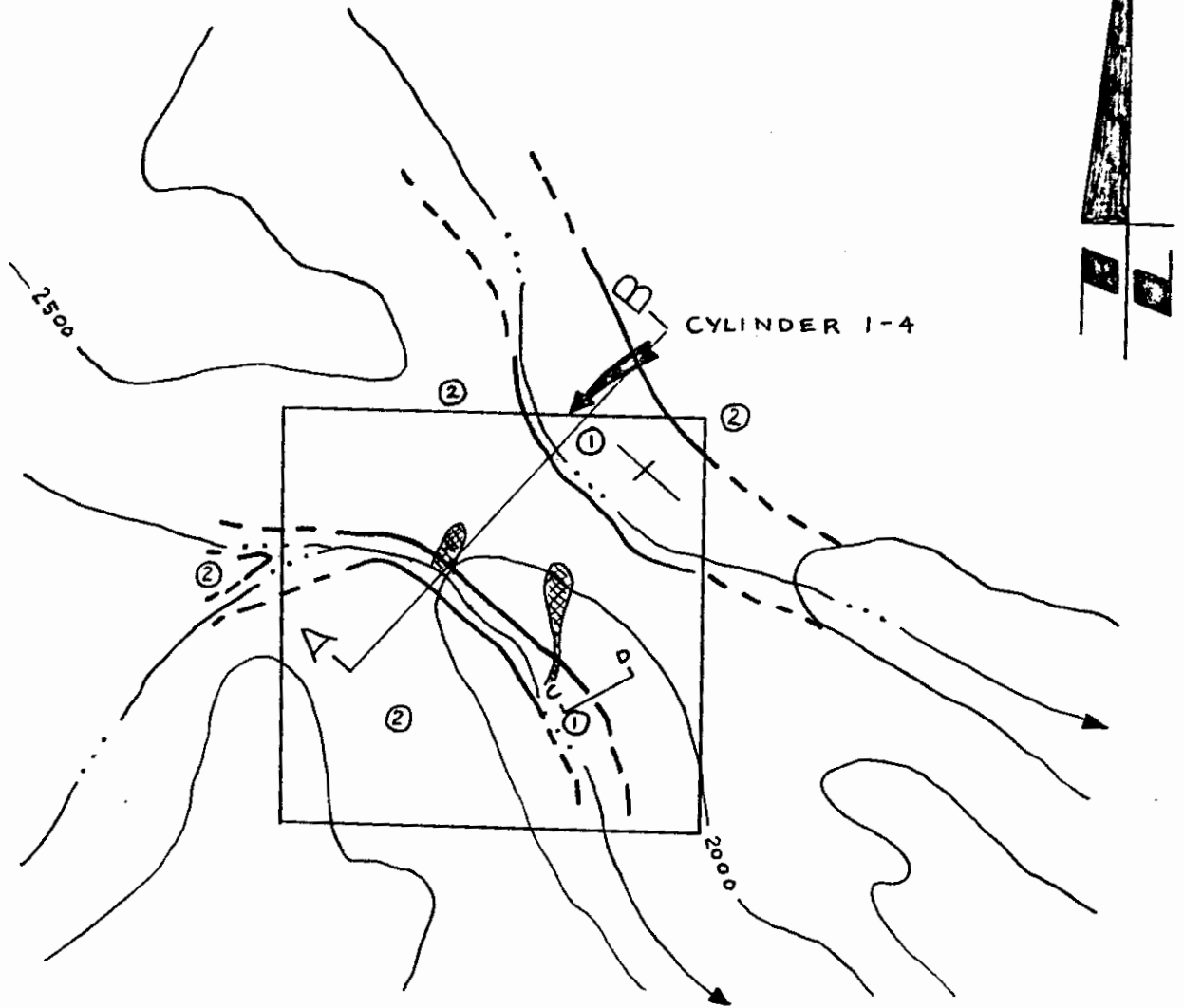
by a rapid eustatic sea level rise or by sudden local subsidence of the seafloor. The presence of poorly sorted carbonate breccias suggests the latter, perhaps through derivation from masswasting of oversteepened slopes into fault-bounded basins.

Figures 1, 2 and 3 illustrate the property geology, a geologic cross-section and a stratigraphic section.

GEOCHEMISTRY

To date, only a preliminary orientation survey has been conducted to determine water, silt, soil and rock background and anomalous contrast. The property is difficult to sample in a reconnaissance fashion because helicopter landing sites are infrequent and mainly confined to the main creek canyon on the south side of the property. Drainage from the hillside near the gossan consists only of small trickles from springs that flow through the moss and dribble over the canyon lip. Silt is scarce and consists mainly of limonite precipitate. Silt and water in the main creek are badly diluted by material from the headwaters and do not reflect the metal content near the gossans. All soil and rock analyses were performed at Chemex Labs Ltd., North Vancouver, B.C. using AA spectrometry of a nitric-perchloric extraction.

The gossans consist of recently precipitated limonite coating and burying a peat and moss blanket to a depth of a few feet at most. Four separate springs are present, of which only two were flowing in 1978. The two dry gossans are the largest and are probably the two that were seen by Dynasty in 1974. These gossans are very fresh and recent and have probably not been forming for more than a few years. They are identical to ferricrete gossans that are found



GEOLOGY

- ② Thinly bedded, highly fractured black shales
- ① Thinly bedded, fine grained, grey limestone and interbedded black cherts.

LEGEND

- Geologic contact, observed, approximate
- + Attitude of bedding, horizontal
- ⊗ Ferricrete gossan
- ┌ Claim boundary
- A ┌ B Cross-section
- C ┌ D Stratigraphic column

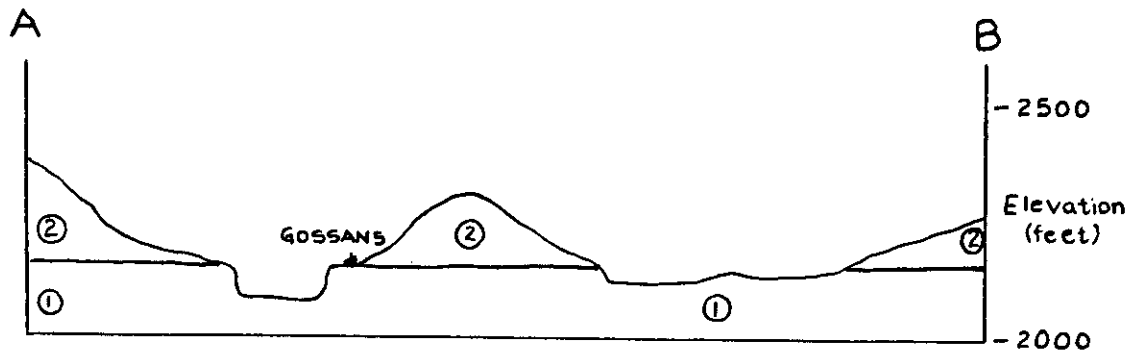
FIG. 1
ARCHER, CATHERO AND ASSOCIATES

GEOLOGY
CYLINDER 1-4
JUG JOINT VENTURE

SCALE 1" = 1/4 MILE



Figure 2. Cross-Section through Jug Property



GEOLOGY

- ② Thinly bedded, highly fractured black shales
- ① Thinly bedded, fine grained, grey limestone and interbedded black cherts

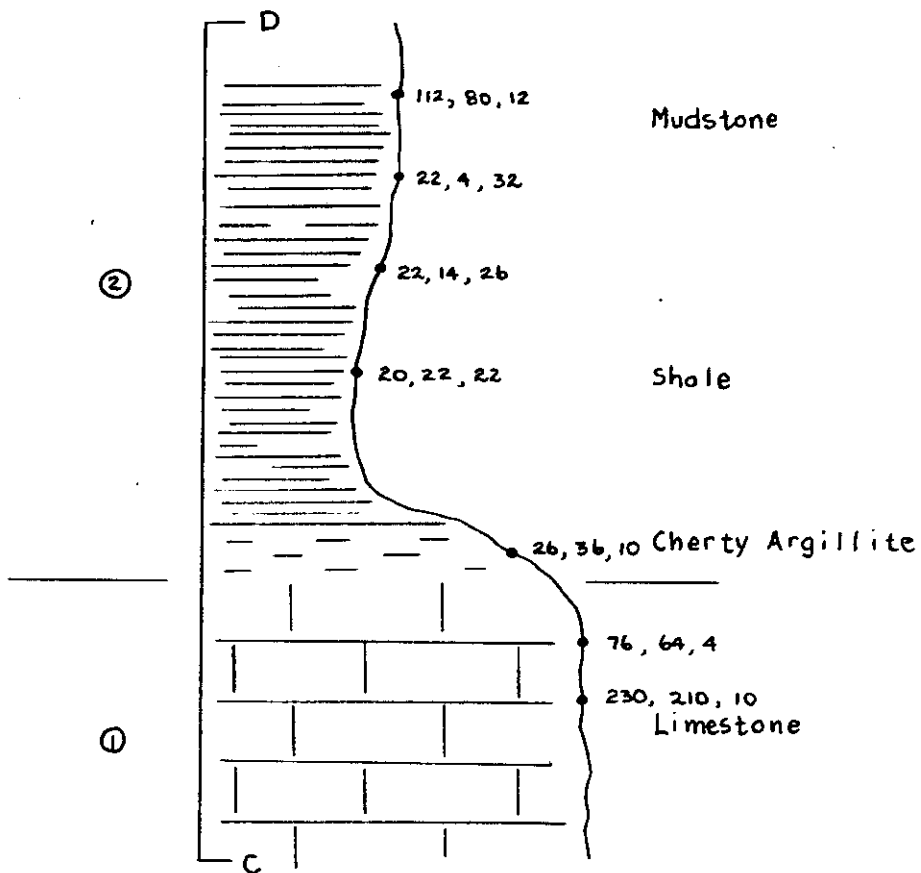


Figure 3. Approximate Stratigraphic Section with Rock Sample Locations (Analysis in ppm Zn, Pb, Cu)

throughout all the shale belts in Yukon and northern B.C. and indicate locations where acidic, iron-rich spring water has reached surface. In areas of discontinuous permafrost, such as the vegetation-covered portions of the Ogilvie Mountains, they probably represent short-lived thaw windows through the permafrost.

Geochemical assays are plotted on Figure 4 except for seven rock samples which are plotted on the stratigraphic cross section (Figure 3). The assays on Figure 3 are all within the expected ranges except for the anomalous lead content from the upper mudstone (80 ppm) and the basal limestone (210 ppm). Both specimens were barren of sulphides but both were coated with a thin buff-brown limonite precipitate. The 1978 assays are supported by results obtained by Dynasty in 1974, consisting of 710 Zn, 900 Pb and 260 Cu from limonite-coated limestone; 2900 Zn, 540 Pb and 52 Cu from black shale; and 2100 Zn, 44 Pb and 4 Cu from "a pink powder of unknown origin coating a snow drift" (all assays in ppm). These were the only rock specimens assayed by Dynasty.

Six silt samples collected either by Dynasty or by an Archer, Cathro crew from nearby creeks in 1974 assayed 290 to 950 Zn, 16 to 52 Pb and 22 to 62 Cu. Eleven soil samples collected randomly in 1978 near the shale-limestone contact all assayed from 15 to 220 ppm Zn and 1 to 18 ppm Pb. Ten scattered soil samples assayed by Dynasty in 1974 assayed 20 to 2100 ppm Zn, 16 to 56 ppm Pb and 4 to 35 ppm Cu.

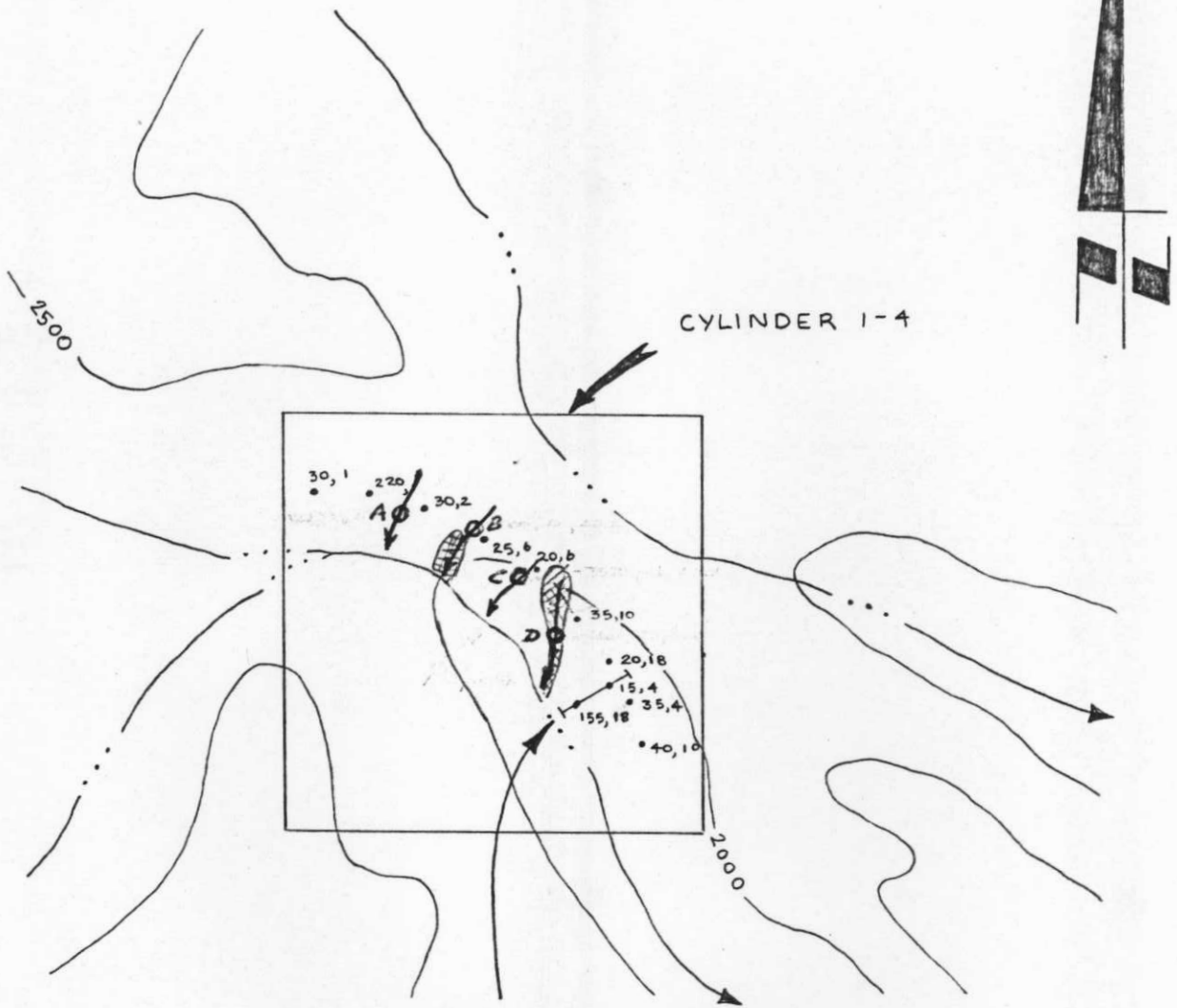
The main geochemical emphasis in the 1978 examination was on hydrogeochemistry in order to determine the origin and significance of the metal-rich limonite precipitate. Exploration for shale-hosted Zn-Pb deposits by Archer, Cathro and

Associates Ltd. in the past few years has shown that water sampling is the best means of detecting the presence of oxidizing sulphides and of differentiating sulphide from shale background response, particularly in unglaciated and/or deeply weathered conditions such as those prevailing in the northern Ogilvie Mountains. Analyses of four water samples collected from springs near the gossans are listed below (see Figure 4 for locations):

<u>Spring</u>	<u>pH</u>	<u>SO₄ (ppm)</u>	<u>Zn (ppb)</u>	<u>Pb (ppb)</u>
A	5.3	< 5	180	1
B	5.9	1300	2000	< 1
C	2.9	600	3500	< 1
D	2.6	1300	16000	< 1

These samples were tested for pH in the field using a portable meter and were analyzed by Chemex using the following technique. The samples were carefully vacuum filtered through Watman GF/c 0.45 micron glassfibre paper. The filtrate was returned to the original bottle and was retained, along with the filtered residue, for possible future analysis. An aliquot of the filtrate was then assayed for SO₄ content, adjusted to a pH of 2.5 to 3.0 with the addition of 3M HNO₃ and analyzed for zinc using the APDC/MIBK method, in which the element is chelated or complexed with ammonia pyrrolidine dithiocarbamate (APDC) and extracted into the organic solvent methy isobutyl ketone (MIBK). After the organic and aqueous phases separated, the metal content of the MIBK fraction was determined by AAS.

For comparison purposes, the creek draining the Tom deposit at Macmillan Pass, Y.T. assays 230 SO₄, >10,000 Zn and 35 Pb and has a pH of 2.9. It is the only Yukon stream assayed by Archer, Cathro that contains more than a trace of Pn.



ROCKS FROM SECTION

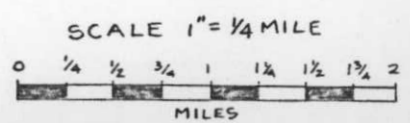
- 230, 210, 10
- 7b, 64, 4
- 2b, 3b, 10
- 20, 22, 22
- 22, 14, 26
- 22, 4, 32
- 112, 80, 12
- (Zn) (Pb) (Cu)

LEGEND

- Spring water sample site
- Soil analysis Zn, Pb ppm
- Geologic stratigraphic section
- Ferricrete gossan
- Claim boundary

FIG. 4
ARCHER, CATHRO AND ASSOCIATES

GEOCHEMISTRY
CYLINDER 1-4
JUG JOINT VENTURE



Background from streams draining the Canol shale in the Macmillan Pass district and elsewhere in the Selwyn Basin is about 35 SO₄, 50 Zn and <1 Pb, while the normal pH range is about 6.5 to 7.3.

As an experiment, the residues obtained by filtering the four Jug water samples were dried, weighed and analysed. This residue represents fine, suspended sediment in the water that normally settles out of the water over a period of a few days, and is actually fine silt. The assays are as follows:

<u>Stream</u>	<u>Residue Weight (mg)</u>	<u>Zn (ppm)</u>	<u>Pb (ppm)</u>
A	0.1	410,000	20,000
B	27.0	5,200	40
C	3.3	18,000	300
D	44.0	1,600	20

The significance of these assays is not known due to the absence of comparable data from known mineralization.

SUMMARY AND RECOMMENDATIONS

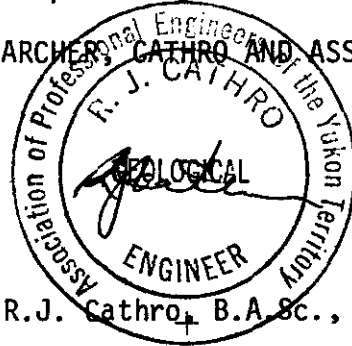
Measurements of SO₄ and Zn content and pH of spring waters draining black shale on the Cylinder claims has given assays comparable to the response from the Tom deposit at Macmillan Pass, Y.T. Moreover, the presence of anomalous quantities of lead in recent limonitic precipitate further supports the conclusion that these waters could be derived from oxidizing lead-zinc sulphides. Black shales characteristically give a high background response in the more soluble and mobile metals such as zinc but lead background is always low and it is considered as the key indicator metal of sulphides in shale.

The black shale occurring on the Cylinder property has been assigned by the GSC to the Upper Devonian-Mississippian(?) Canol Formation, the same unit that hosts sedimentary-exhalative Zn-Pb-Ba deposits at Macmillan Pass and Gataga District, B.C. and in the Brooks Range, Alaska.

A program of detailed sampling and prospecting is recommended to determine the origin and significance of the anomalous springs.

Respectfully submitted,

ARCHER, CATHRO AND ASSOCIATES LTD.



R.J. Cathro, B.A. Sc., P.Eng.

/mc