



This report has been examined by the
Geological Division and is recom-
mended to the Department to be consid-
ered as a reference only in the event of
an emergency.

[Signature]

090410

Commissioner of Yukon

Geology, Geochemistry & Geophysics

Abbey 31-44 & 201-214 Claims

Watson Lake M.D. Claim Sheet 1051/12

Latitude 62°40'N Longitude 129°56'W

R.J. Cathro, P. Eng.

December 10, 1978





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

\$16,700.00

D. P. Craig 10 Jan 79
~~Resident Geologist or
Resident Mining Engineer~~

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

B. R. Baxter
~~Supervising Mining Recorder~~
Commissioner of Yukon Territory



ARCHER, CATHRO
AND ASSOCIATES LTD.
CONSULTING GEOLOGICAL ENGINEERS

Box 4127, WHITEHORSE, Y.T. VIA 389 667-4415

STANDARD BUILDING, VANCOUVER, B.C. 688-2568

1018 STANDARD BUILDING
510 WEST HASTINGS STREET
VANCOUVER, B.C.
V6B 1L8

REPORT ON
GEOLOGICAL MAPPING,
GEOPHYSICAL AND GEOCHEMICAL SURVEYS

ABBAY 31-44 AND 201-214 CLAIMS
ITSI JOINT VENTURE

WATSON LAKE MINING DISTRICT, Y.T.
CLAIM SHEET 105I/12

Latitude 62°40'N

Longitude 129°56'W

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

December 10, 1978

TABLE OF CONTENTS

	<u>Page</u>
Introduction -----	1
Property, Location and Access -----	2
Geology and Geomorphology -----	3
Table of Formations -----	5
Geochemistry -----	6
Conclusions and Recommendations -----	8

~~Appendix~~

~~"Report on Horizontal Coplanar Loop Electromagnetic Surveying on the
Abbey Claims" by Grant Hendrickson, Aquitaine Co. of Canada Ltd.~~

Figures

Figure A5	Geology - 1978 Grid - scale 1:5,000	in pocket
Figure A6	Lead Geochemistry - 1978 Grid - scale 1:5,000	in pocket
Figure A7	Zinc Geochemistry - 1978 Grid - scale 1:5,000	in pocket
Figure A8	Soil and Assay Profile - Pit 1, Line 54W	follows page 8

INTRODUCTION

The Abbey property was staked by Itsi Joint Venture (Union Oil Co. of Canada Ltd., Aquitaine Co. of Canada Ltd., and St. Joseph Exploration Ltd.) in July, 1977 to protect strike extension of the Road River Formation shale belt that hosts the stratiform Howard Pass lead-zinc deposits. Although no mineralization was found on the Abbey property, it was considered as a favourable geologic setting because outcrop is scarce and relatively subdued topography combined with locally thick overburden may have masked any mineralization that is present.

Following an initial program in 1977 that consisted of wide-spaced grid mapping, prospecting and geochemical sampling and a test Maxmin II electromagnetic (EM) survey line over the nearby Anniv deposit of Placer Development Ltd., a very weak lead soil anomaly near the southeast end of the property was selected for more detailed exploration in 1978. This program was conducted between May 26 and June 10 and consisted of 7.1 km of linecutting and Maxmin II surveys plus a small amount of geochem sampling and test magnetic surveys. One additional manday was spent on July 5 digging a hand pit.

Both the 1977 and 1978 programs were managed by Archer, Cathro & Associates Ltd. The 1977 crew, which was led by geologist Mike Phillips and included geophysical operator Arjan Gelling, Frank Gish, Cam Chalmers and Steve Todoruk, worked under the overall supervision of the writer. The geophysical equipment was rented to the project by Aquitaine, which also provided a geophysicist, Grant Hendrickson, to train the crew and interpret the survey. Hendrickson's report entitled "Report on Horizontal Coplanar Electromagnetic Surveying on the Abbey Claims" is attached as an appendix.

PROPERTY, LOCATION AND ACCESS

The Abbey property consists of 190 contiguous claims which form a block about 20 km long and 1.5 km wide extending from the southern margin of Cominco Lake at Latitude 62°39', Longitude 129°52' west-northwestward across the Prevost River at Latitude 62°43', Longitude 130°08'. The claims are registered in Watson Lake Mining District in the name of Archer, Cathro & Associates Ltd. as follows:

<u>Claims</u>	<u>No.</u>	<u>Tag Numbers</u>	<u>Expiry Date</u>
Abbey 1 - 99	99	YA20951 - YA21049	13 July, 1980
101	1	YA21051	" " "
103	1	YA21053	" " "
113-128	16	YA21063 - YA21078	" " "
136-185	50	YA21086 - YA21135	" " "
187	1	YA21137	" " "
189	1	YA21139	" " "
191	1	YA21141	" " "
193	1	YA21143	" " "
195	1	YA21145	" " "
197	1	YA21147	" " "
199	1	YA21149	" " "
201-216	16	YA21653 - YA21668	5 August, 1980

Fixed wing, float equipped aircraft can be landed on Cominco Lake. Otherwise, access is only possible by helicopter. The nearest float plane base is located at Ross River, 170 km to the southwest. Jeff Lake, located 65 km to the northwest on the Canol Road, can be used as a float plane base to ferry supplies. Gravel airstrips that will accomodate light aircraft on wheels are located at Macmillan Pass on the Canol Road, 70 km to the north, and at Howard Pass and the Anniv camp, 30 km and 24 km to the southeast, respectively. The Nahanni Range Road was extended northwestwards from Tungsten to Howard Pass during 1978 but will not be useable on a regular basis until 1979 or 1980.

GEOLOGY AND GEOMORPHOLOGY

The Abbey property is situated along the western margin of the Selwyn Mountains. Within the core of this range, peaks commonly reach elevations of greater than 2000 m and locally greater than 3000 m. With the exception of the higher peaks, local relief is about 600 to 700 m or less and terrain is relatively subdued and gentle. Main valleys within the central part of the range are U-shaped with truncated spurs below elevations of about 1800 m. Valleys in low areas along the edge of the range are generally broad and poorly defined. The Abbey claims are situated below timberline along the southwest side of a wide glaciated valley. Local relief is less than 200 m.

The region has been covered by two or more continental ice sheets, one of which reached a minimum elevation of about 2200 m. Younger, less extensive valley and alpine glaciers also covered much of the area. Small glaciers still occur on some of the higher peaks, notably the Itsi Range and Keele Peak.

Glacial deposits in the district tend to be rather thin and discontinuous in the mountains and are most common on the floor of the main valleys. Above timberline, particularly in places where the effects of younger glaciation are weak or absent, fissile rocks such as shale have been severely frost shattered into fine felsenmeer and talus. The Abbey property is covered by an extensive blanket of fluvial and glacial till and outcrop accounts for less than one per cent of the total area. The thickness of the till probably varies sharply from a few metres to several tens of metres depending on bedrock composition and glaciation.

The Abbey property is situated along the eastern margin of Selwyn Basin, which comprises a varied sequence of clastic and carbonate rocks that range in age from Upper Proterozoic through Upper Paleozoic. The Table of Formations on

the following page shows the various map units in the vicinity of the property. Carbonate rocks of the Cambro-Ordovician Rabbitkettle Formation are the oldest on the property. These are overlain by shales and chert of the Ordovician, Silurian and Devonian Road River Formation which are, in turn, overlain by shale, cherty argillite and chert conglomerate of the Canal Formation. Shale and coarse clastic rocks of the Imperial Formation form thick sequences in nearby areas. A more detailed description of these units was included in an earlier report on this property by the writer dated January 15, 1978.

The Road River Formation (unit R) includes both lower (Ra1) and upper (Rcm) units. The lower unit is host to the stratiform zinc-lead mineralization at the Placer Development/U.S. Steel Howard Pass and Anniv deposits, where the Road River Formation is called the Howard Pass Formation.

The structural geology in the vicinity of the Abbey claims appears to be simple and is dominated by a southwesterly dipping sequence of rocks that strike parallel to the claim block. Within this sequence, the contact between the Rabbitkettle limestone and the overlying Road River Formation marks the northeast boundary of the claims. Northeast of the limestone, a major west-northwesterly-trending fault juxtaposes the Rabbitkettle Formation against Devono-Mississippian clastic rocks of the Imperial Formation. West of the limestone, there is virtually no outcrop and the structure can only be inferred from the area southeast of Cominco Lake where rocks are relatively well exposed. In that area, the predominant structures are a series of broad, open folds. The sequence of strata which underlie the Abbey claims form the limb of the northeasternmost syncline. The southwestern side of the claim area is underlain by a thick sequence of chert and cherty argillite of the Road River Formation in which large scale folds cannot be defined. It is probable that the broad, open folds continue

TABLE OF FORMATIONS

RECENT

Q

unconsolidated alluvial and fluvial till

CRETACEOUS

Kg

granitic stocks and quartz-feldspar porphyry dikes, mostly quartz monzonite in composition

UPPER DEVONIAN OR MISSISSIPPIAN

IMPERIAL FORMATION

Iss

resistant, brown weathering, shale, siltstone, sandstone, grit, chert pebble conglomerate

LOWER AND/OR UPPER DEVONIAN

CANOL FORMATION

Cs

light bluish-grey weathering, black sooty chert; cherty argillite; light bluish-grey and locally rusty-brown weathering, dark grey and black silty shale; chert grit, chert pebble conglomerate; dark grey bedded barite near top of unit; may locally include younger clastic rocks of the Imperial Formation

ORDOVICIAN TO LOWER DEVONIAN

ROAD RIVER FORMATION

Rcm

resistant, orange to tan weathering, 'chippy' mudstone, variably dolomitic and pyritic silty mudstone, irregular 'flaser bedding characteristic

Ral

dark grey, brown, blue or black weathering, recessive, carbonaceous black shale; mudstone; cherty argillite; coarse grained black limestone

UPPER CAMBRIAN TO ORDOVICIAN

RABBITKETTLE FORMATION

u60c

wavy banded silty limestone, resistant, light grey, yellowish or brownish grey weathering, thinly and irregularly bedded

northwestward along the southwestern margin of the Abbey claims.

The geology of the 1978 grid area is plotted at a scale of 1:5,000 on Figure A5 (in pocket).

GEOCHEMISTRY

The geochemical survey of the Abbey claims in 1977 included analysis of 1570 soil samples and 100 silts for lead, zinc and copper and 43 stream water samples for pH, Zn and SO_4 . The soil samples were collected at 50 m intervals on lines 1600 to 2200 m long that were spaced at 400 m intervals across the trend of the Road River Formation. Numerous small streams drain the property and silt samples were taken wherever possible throughout the full 18.4 km length of the property. Survey control was provided by chaining and picketing the four claim location lines at 100 m intervals. The baselines, which were designated Baselines A,B,C, and D, were well flagged and blazed, but not cut. The sample lines were established with compass and hip-chain and were flagged at each sample site.

The grid sampling failed to show any significant anomalies in lead or copper although several zinc anomalies were outlined in those portions of the property underlain by Road River and/or Canol shale. The following assay response was obtained (in ppm):

	<u>Threshold</u>	<u>Weakly Anomalous</u>
Copper	125	126 - 200
Lead	35	36 - 100
Zinc	700	701 - 1400

Zinc response without associated lead response was ignored as probably hydromorphic in origin. After careful study of the geochemical data, one weak lead anomaly was selected for further investigation because it was situated in subdued terrain with extensive overburden and vegetation cover, close to the projected position of the mineralized portion of the Road River Formation just above the Rabbitkettle Formation limestone.

The anomaly in question is situated on line 56 west on claims Abbey 38,40,207 and 209. It consisted of a single silt assay of 68 ppm Pb and an adjacent soil assay of 42 ppm. Local background response is 20 ppm or less in silt and 10 ppm or less in soil. Associated response for the two anomalous samples was 3640 ppm Zn and 70 ppm Cu for the silt sample and 1320 ppm Zn and 50 ppm Cu for the soil sample, compared to local backgrounds of about 2500 ppm Zn and 50 ppm Cu in silt and about 700 ppm Zn and 40 ppm Cu in soil. Both zinc and copper show a slight tendency toward concentration in low, swampy areas which suggests hydromorphic transport.

The 1978 program consisted primarily of a Maxmin II electromagnetic survey of a 2400 m long area about 800 m wide extending from Baseline A to D and extending from lines 40W to 64W. The results of that work are included as an appendix. Because the program was conducted during spring break-up, the frozen ground conditions were not conducive to geochemical sampling and only 21 soil and silt samples were collected. These consisted of detailed fill-in sampling up to 200 m east and west of the original anomaly. A single hand pit was later dug to a depth of 1.22 m at a convenient location on line 56W after the ground thawed somewhat. The 1978 samples were assayed for lead and zinc only. The results are plotted at a scale of 1:5,000 on Figures A6 and A7 (in pocket).

This sampling showed that the lead anomaly, though subtle, is definitely real

and closely associated with a strong EM conductor. Silt response ranged from 10 to 88 ppm Pb while soil assays ranged as high as 86 ppm. Zinc response ranged up to 2450 ppm in silt and 3200 ppm in soil.

The hand pit was dug in weathered brown soils containing leached shale and is shown in profile on Figure A8 on the following page. Soil sampling showed a fairly constant metal content over the 1.22 m depth, ranging from 58 to 94 ppm Pb and from 3000 to 3250 ppm Zn. No estimate of overburden depth or type is available from the geochemical sampling and pitting.

CONCLUSIONS AND RECOMMENDATIONS

The Maxmin II electromagnetic survey has defined a strong conductor that strikes parallel to the contact between shale of the Road River Formation and underlying limestone of the Rabbitkettle Formation. This survey has not only defined the position of the contact closely on the basis of resistivity, but has confirmed the previous interpretation of the geological setting, which was very tentative because outcrop is so scarce. The conductor is interpreted to be caused by a combination of graphitic and/or sulphide zones conformable with bedding in the shale sequence and occurs in the lower part of the shale, below the upper mudstone unit and roughly equivalent to the stratigraphic position of important lead-zinc mineralization on the property of Placer Development/U.S. Steel to the southeast (called the Anniv and Main or XY deposits).

This strong conductor has been traced for a length of over 1600 m, extending from line 48W off the west end of the grid at line 64W. It is comparable in intensity and geometry to the response obtained in a 1977 test line across the

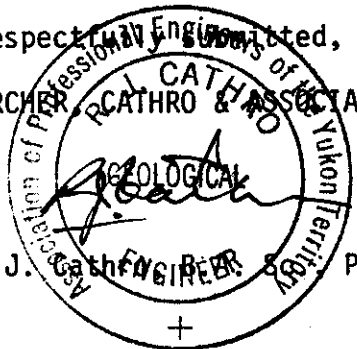
Anniv deposit that was carried out by Itsi Joint Venture in 1977. Several structural interpretations involving a combination of folding and faulting are possible from the available data. Hendrickson has interpreted the overburden depth as possibly as little as 7 m from the EM data; however, the overburden over such a recessive unit may have a complex origin and be much thicker in places.

The combination of a strong EM conductor beneath overburden of unknown thickness that exhibits a weakly anomalous lead and zinc geochemical response at surface, situated along strike at roughly the same stratigraphic position as the Anniv and Main (XY) deposits, constitutes an exploration target that merits drill testing. The target is located in low, rolling terrain within a strongly glaciated, broad valley. Scattered low outcrops of resistant limestone are situated nearby but the Road River shale does not outcrop locally. If the weakly anomalous geochemical response is occurring over thin residual overburden, it probably indicates only a weakly mineralized source. However, if the recessive shale has been locally scoured more deeply by ice movement and this geochemical response is being masked by thin patches of glacial till, it could be interpreted as a very significant target.

The next stage of exploration should consist of (a) additional Maxmin II surveys to further map the shale/limestone contact and the conductive zones, and (b) drill testing of the existing target. The initial hole (200 m) should be located on line 54W as shown on Hendrickson's EM profile. A small swampy lake situated about one km north of the anomaly could be used for mobilizing a drill with a ski-equipped fixed-wing aircraft for a late-spring drill program. This program should be scheduled for 1980 when the road to Howard Pass will be more passable and might be kept open in the spring to service a major program by

Placer/U.S. Steel.

Respectfully Submitted,
ARCHER, CATHRO & ASSOCIATES LTD.,



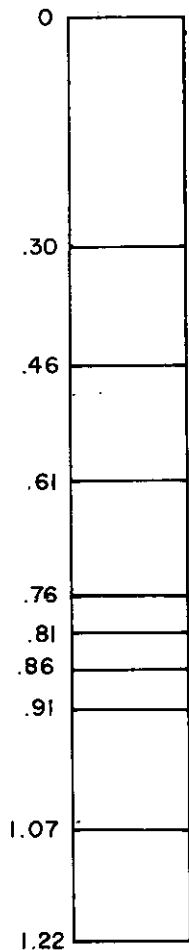
R.J. Cathro P. Eng.

RJC:jm

DEPTH (m)

ASSAY (ppm)
Pb Zn

DESCRIPTION



84 3200

Grey-brown clay

94 3200

Grey-brown clay

82 3250

Dark brown soil with shale fragments

60 3000

Brown frozen soil with
5cm volcanic ash layer

58 3000

as above

74 3050

Dark grey-brown soil with
shale fragments

72 3200

Brown frozen soil

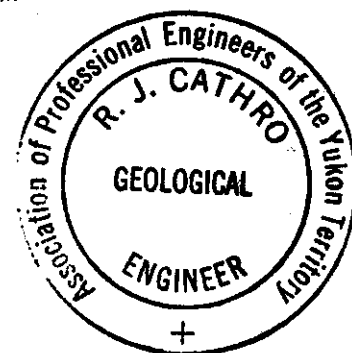


Fig. A 8

ARCHER CATHRO & ASSOCIATES LTD.

SOIL AND ASSAY PROFILE PIT 1, LINE 54 W

ABBAY CLAIMS
ITSI JOINT VENTURE

SCALE 1:100

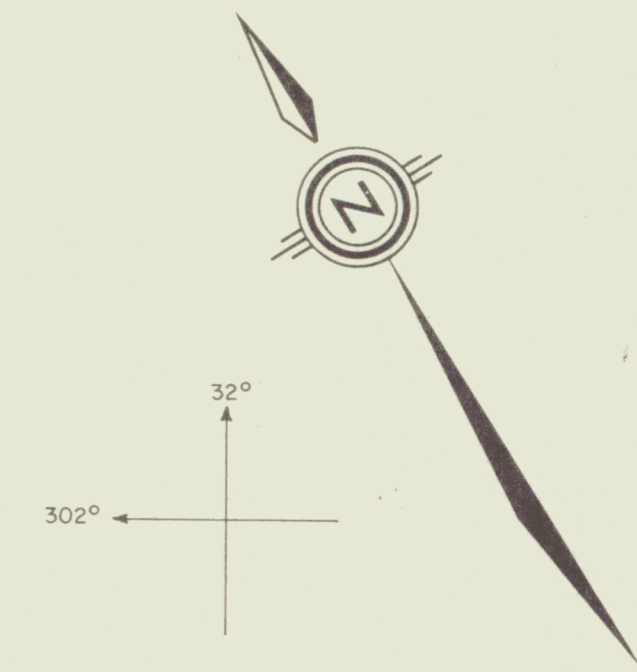


TABLE OF FORMATIONS

- RECENT**
 [Q] Unconsolidated alluvial and fluvial till
- CRETACEOUS**
 [Kg] Granitic stocks and quartz-feldspar porphyry dikes, mostly quartz monzonite in composition
- UPPER DEVONIAN OR MISSISSIPPIAN**
 IMPERIAL FORMATION
 [Iss] Resistant, brown weathering chert grit, sandstone shale
- CANOL FORMATION**
 [Cs] Light bluish-grey weathering, black sooty chert, cherty argillite, light bluish-grey and locally rusty-brown weathering, dark grey and black silty shales; chert grit; chert pebble conglomerate; dark grey bedded barite near top of unit, may locally include younger clastic rocks of the Imperial Formation

- ORDOVICIAN TO MIDDLE DEVONIAN**
 ROAD RIVER FORMATION
 [Rcm] Resistant, orange to tan weathering, chippy mudstone, variably dolomitic and pyritic silty mudstone, irregular flaser bedding characteristic
- [Ral] Dark grey, brown, blue or black weathering recessive carbonaceous black shale, mudstone, cherty argillite, coarse grained black limestone, a central siliceous zone is host to the Howard Pass zinc-lead deposits
- [R] Undivided Rcm Ral, CROSS SECTION only
- UPPER CAMBRIAN TO ORDOVICIAN**
 RABBITKETTLE FORMATION
 [u€Oc] Wavy banded silty limestone, resistant, light grey, yellowish or brownish-grey weathering, thinly and irregularly bedded

- LEGEND**
- [□] Hand pit
- [○] Area containing small, scattered outcrops or an abundance of residual rock fragments

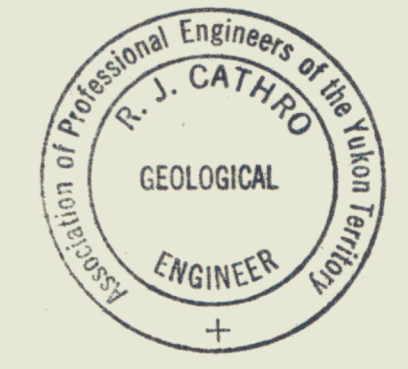
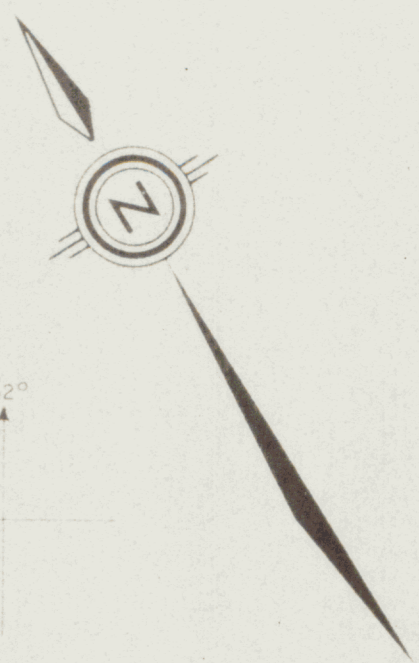


Fig A5
 ARCHER, CATHRO & ASSOCIATES LTD
GEOLOGY — 1978 GRID
 ABBEY CLAIMS
 ITSJI JOINT VENTURE

Scale 1:5000
 100 0 200 300 400 Metres
 TO ACCOMPANY A REPORT BY R.J.CATHRO DATED Nov 1978



32°
302°

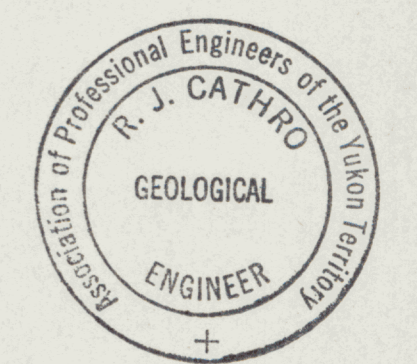


Fig A6

ARCHER CATHRO & ASSOCIATES LTD

LEAD GEOCHEMISTRY - 1978 GRID

ABBEY CLAIMS
ITSI JOINT VENTURE

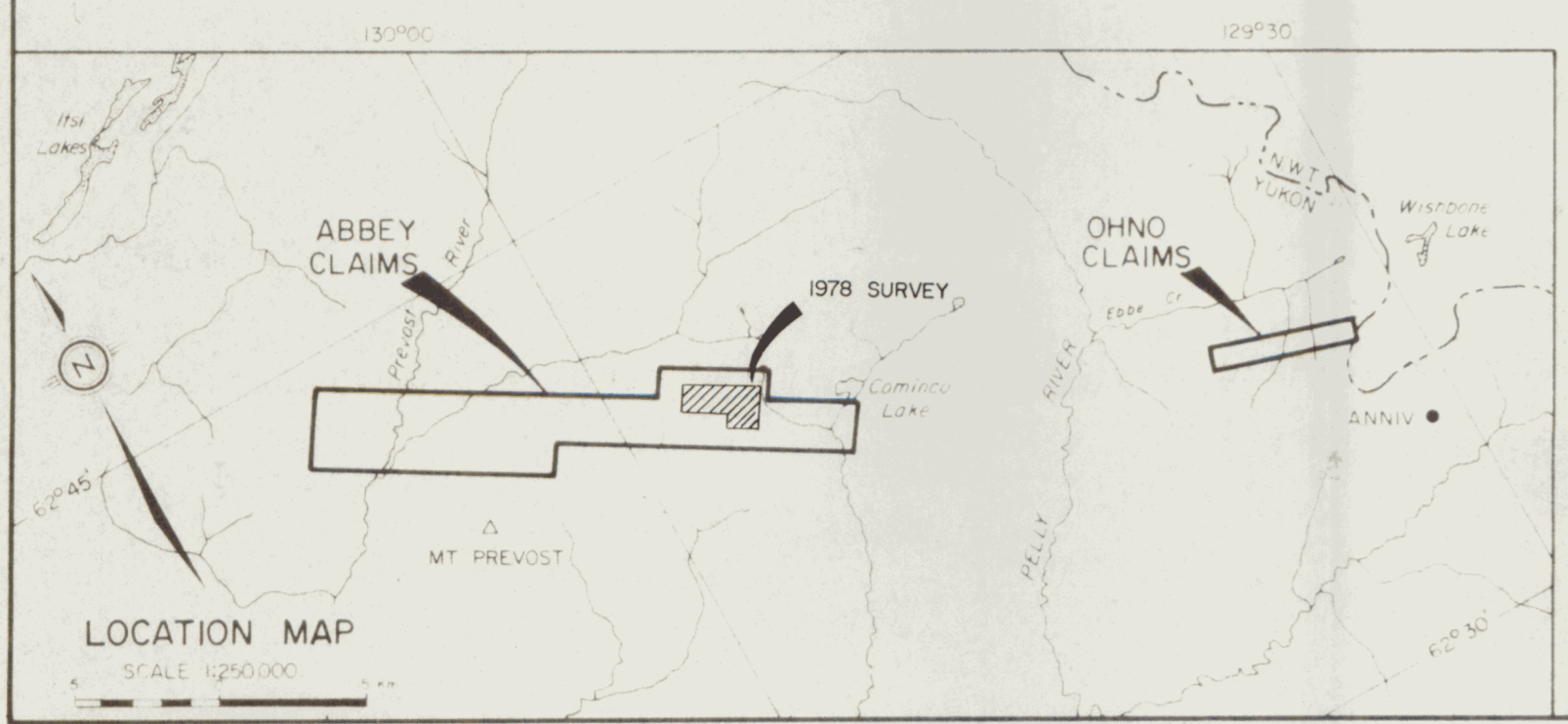
Scale 1:5000
0 100 200 300 400 Metres

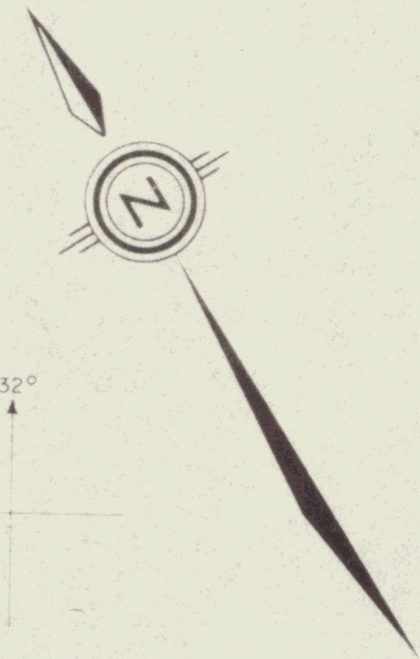
TO ACCOMPANY A REPORT BY R.J. CATHRO DATED NOV 1978

LEGEND

1977	1978	
• 14	• 28	Soil assay in ppm
X 14	X 28	Silt assay in ppm
■ 14	■ 28	Rock assay in ppm

Assayed at Chemex Labs, North Vancouver with atomic absorption spectrometry and nitric-perchloric digestion





32°
302°

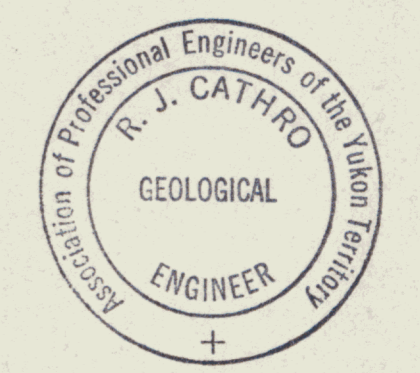


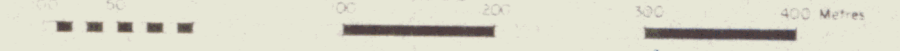
Fig A7

ARCHER, CATHRO & ASSOCIATES LTD

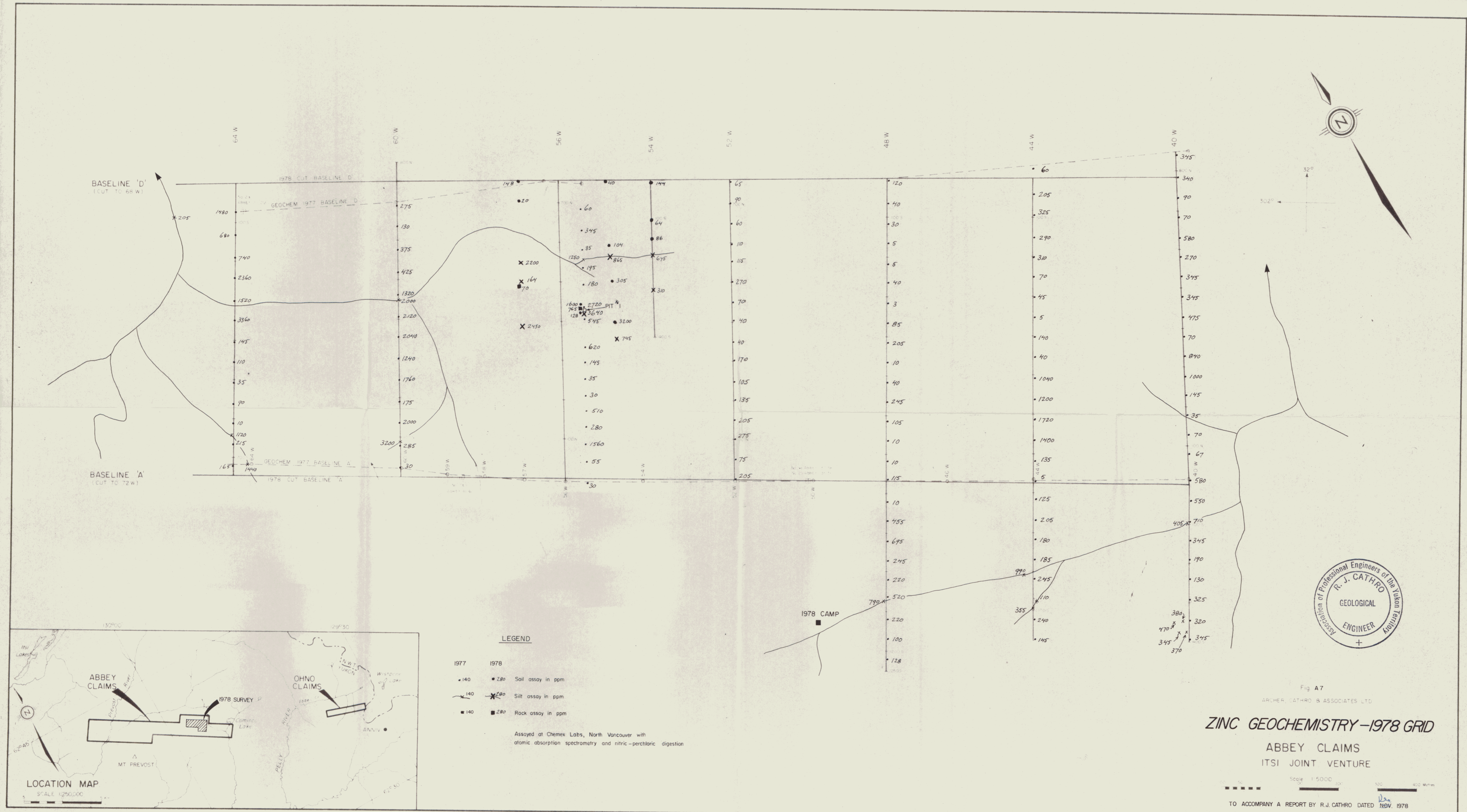
ZINC GEOCHEMISTRY-1978 GRID

ABBAY CLAIMS
ITSI JOINT VENTURE

Scale 1:5000



TO ACCOMPANY A REPORT BY R.J. CATHRO DATED NOV. 1978



LEGEND

- 1977 ● 280 Soil assay in ppm
- 1978 × 280 Silt assay in ppm
- 1977 ■ 140 Rock assay in ppm
- 1978 × 140 Rock assay in ppm

Assayed at Chemex Labs, North Vancouver with atomic absorption spectrometry and nitric-perchloric digestion