

ROBERT C. HART, P.ENG.

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AN ANALYSIS OF REPORTS
ON
THE BEATRICE PROPERTY
REVELSTOKE MINING DIVISION, B.C.

December 1982

R.C.
R. C. Hart, P. Eng.



CONTENTS

- I Introduction
- II Summary and Conclusions
- III Physical Factors
- IV History
- V The Geological Environment
- VI The Vein Structures - Dimensions and Grades
- VII Soil Geochemistry

Appendices

- 1. Copies of Consultants' Reports
- 2. Regional Map 1 cm = 24 kms - after Ashton
- 3. Property Map at 1" = 1500' (after Sanders) showing:
 - (a) approximate claim boundaries
 - (b) the mine area
 - (c) the geochemical anomaly
- 4. Composite Plan of the Vein System 1" = 30' - after Sanders

I INTRODUCTION

The following report was prepared at the request of Mr. George White of 41 Pheasant Lane, Islington, Ontario. It is based on an analysis of the reports of examination of the Beatrice Mine, a small high grade silver-lead-zinc deposit in the Revelstoke Mining Division, British Columbia by three independent consulting engineers, as follows:

1954 - B. W. W. McDougall, P. Eng. The Beatrice Mine, presumably on behalf of the Beatrice Mining Company.

1964 - K. G. Sanders, P. Eng. The Beatrice Property near Camborne, for Dakota Silver Mines Ltd.

1977 - A. S. Ashton, P. Eng. Beatrice Property near Camborne for Arch Mining and Milling Ltd.

1979 - A. S. Ashton, P. Eng. Beatrice Mine, Geochemical Survey.

1980 - A. S. Ashton, P. Eng. Geochemical Report, presumably for Taseko Mines Limited.

Mr. John Riva provided the writer with plans showing the results of geochemical surveys carried out by Mr. Ashton. He was also aided in his appreciation of the property by a brief report by the staff of a major mining company with whom he had been associated and by a visit to a nearby property a few years ago.

The recommendations made by McDougall and Sanders dealt with establishing the continuity of vein structures developed underground in the period 1897 - 1920 by diamond drilling and additional development. The recommendations made by Ashton were initially similar to those of McDougall and Sanders but after a cost study, were amended to include surface work - soil geochemistry, stripping, trenching and diamond drilling - and a decline.

However, it appears that no significant work of a technical nature was done on the property from the time the underground effort was terminated in 1918 - 1920 until a preliminary soil geochemistry survey

ROBERT C. HART, P.ENG.

in 1978, although at no time do the property rights appear to have been abandoned.

No title search was made by the writer.

The reports of McDougall and Sanders were made before the metric system was introduced in Canada. To avoid misunderstanding by citizens of U.S.A., adjustments have been made to ensure clarity.

II SUMMARY AND CONCLUSIONS

1. The reasonably assured reserves recoverable from the mine as derived by the writer from data in the three reports, totals 6,300 short tons grading approximately 13.6 ounces silver, 5.1% lead and 10.9% zinc per short ton. Approximately 40% of the total consists of material which was broken 75 to 80 years ago. No data are reported of the degree of oxidation or of the recovery of metals from oxidized or from fresh material. This must be ascertained before an estimate of the value of this reserve can be made.
2. The exploration of the Beatrice and Main Veins below an underhand stope on the first level for the former and below the second level for the latter was considered by McDougall to justify a few diamond drill holes, by Sanders to justify 900 feet (274 m) of drilling to find the Beatrice and a continuation of the third level adit some 500 feet (152 m) to find and explore the Main and 385 feet (117 m) of raising to prove continuity of the Main. After a review of costs, Ashton recommended exploration from surface in the form of soil geochemistry, followed by stripping, trenching and drilling if warranted. This would be accompanied by 1,000 m (3,280 feet) of diamond drilling on the original structures and a 40 m (131 feet) decline "to intersect the structure below the old workings".
3. Although a cost analysis is beyond the scope of this report, it is the writer's view that unless additional tonnage of ore grade material is found, re-opening the mine for exploration or for salvage purposes is difficult to justify.
4. The geochemical survey carried out southeast of the Beatrice outcrop in 1978, suggests that a basis for expanded tonnage may exist on the property. It has been shown that an area approximately 900 m (2,950 feet) long and up to 120 m (393 feet) in width and open to the southeast may contain additional deposits similar to the Beatrice and Main.

5. It is the writer's conclusion that additional soil geochemistry should be undertaken from the Beatrice to the south and east borders of the property, that fresh rock sampling by stripping, trenching and/or diamond drilling be undertaken to prove the existence and grade of new deposits, if any. This survey should be accompanied by a geological survey on a scale in the order of 1:3000, i.e. the scale of the present geochemical maps prepared by Ashton.

Such work may provide a sound basis for (a) abandoning exploration or (b) indicate a programme leading to a feasibility study.

III PHYSICAL FACTORS

The following are largely quotations from the three reports:

1. Topography - The topography in the Selkirk Mountains is "extremely rugged", "typically alpine mountain region". "The Beatrice deposit occurs at the summit of a divide at 7,300 feet (2,225 m) above sea level".
2. Climate - The average annual precipitation is "probably more than 50 inches" which includes water "from over 22 feet (6.7 m) of snow". "Snow usually comes first in October and at high altitudes remains over most of the terrain until June or later". "However, a well prepared camp would allow mining operations to be carried on throughout the year".
3. Timber - "The Lardeau area is thickly forested". "The tree line is at the 6,000 foot (1,829 m) contour".
4. Water - "There would be plenty of water for milling within half a mile or so of the workings".
5. Access - 45 - 50 miles (72 - 80 km) south and east of the city of Revelstoke which is on the Trans-Canada Highway and on the main line of the Canadian Pacific Railway. The last 5 to 7 miles (8 to 11 km) is said to require 4-wheel drive.

IV HISTORY

The Beatrice deposit was staked about 1897 and was under discontinuous development and limited production until 1918 - 1920. By 1920, development totalled some 2,150 feet (655 m) over a vertical range of 420 feet (128 m) from the surface outcrop at 7,320 feet (2,231 m) to the third level at a portal elevation of 6,900 feet (2,104 m). A near vertical raise or shaft connected the first level at 7,260 feet (2,213 m) with a sub-level at 7,160 feet (2,183 m) and the second level at 7,100 feet (2,165 m).

No significant work was done on the deposit from 1920 to 1978. In 1978, a limited soil geochemistry program, as recommended by A. S. Ashton, was carried out on part of the property and a diamond drill hole was started but not finished.

The production shipped from the mine was approximately 300 tons (273 tonnes) of hand-cobbed material. The hand cobbing was considered to be necessary to increase the ratio of argentiferous lead to zinc. However, at the Beatrice, the fine grained nature of the ore made it practically impossible to improve the shipped product to meet the smelter specifications imposed at that time.

It is of interest that at no time from discovery to the present do the key claims appear to have been abandoned. Some individual, some corporation was always ready to pay taxes. The number of claims have varied from time to time, six indentified by Mr. McDougall in 1954, thirty by Mr. Sanders in 1964, twenty-two at present.

V THE GEOLOGICAL ENVIRONMENT

The deposit occurs in a strongly folded series of late Precambrian sediments in a belt some seventy miles long and twenty miles wide, striking northwesterly, flanked by granite intrusives. Numerous vein type deposits of silver-lead-zinc have been found in the belt; many have been explored and some have reached production in past years. *

The rocks outcropping at the mine are described as grits, underlain at shallow depths by graphitic schists. Two silver-lead-zinc veins were found in the mine workings and gold in a quartz vein was located nearby. The Beatrice vein outcropped at surface where it was mined out over a length of 35 feet (10.7 m) and mined down to an underhand stope some 6 feet to 8 feet below the first level, a total depth of about 75 feet (23 m). Although exposed for 65 feet (19.8 m) in the underhand development, it was mined for only 45 feet (13.7 m) at the floor. The Beatrice strikes at right angles to the formations - northeasterly - and dips about 65° southeasterly. The other sulphide vein, the Main, appears to have occurred as a 25 foot (7.6 m) thin streak on the first level at 7,260 feet but was a strong but narrow vein some 55 feet (16.8 m) in length on the sub-level at 7,160 feet (2,183 m); however, on the second level at 7,100 feet (2,164 m), it appears to be wider but discontinuous and of lower grade. The Main vein strikes approximately northwesterly and dips 65° to the northeast.

* "The most successful was the Sunshine Lardeau Company which mined the Spider group of veins located about four miles from the Beatrice. It is reported that in the period 1950 to 1958, 140,000 short tons of material were treated which produced 0.08 oz. per ton gold, 12.1 oz./ton silver, 8.55% lead, and 8.92% zinc. The mine grade, the degree of concentration, and the smelter recoveries are not known."

The Gold Vein is reported to have been traced on surface for several hundreds of feet, and is shown on a sketch in one of the reports, to be located about 600 feet (183 m) in the hanging wall (northeast) of

ROBERT C. HART, P.ENG.

the Main Vein and parallel to it. McDougall notes its similarity to a Gilman Vein and (from inference) that any gold present occurs in pyrite. Topography is said to preclude diamond drilling from surface but it may be explored from underground workings. The consultants appear to give this vein a low priority.

VI THE VEIN STRUCTURES

1. Mineralization and Grades

The Beatrice and Main Veins each consist of a nucleus of sulphide veins and veinlets carrying rich silver flanked by patchy mineralization of a similar nature. Galena (PbS), sphalerite (ZnS), gray copper (presumably a silver-rich variety of tetrahedrite, a copper, antimony arsenical sulphide) and pyrite are mentioned in the reports. In nature, both galena and tetrahedrite frequently contain silver and this is particularly true in the Lardeau area.

The following tables on results of sampling the veins are taken from the Ashton report, and represent the work of McDougall, Sanders and the Ashton party:

SAMPLING

GLORY HOLE

Massive sulphide streak

		<u>Au</u>	<u>Ag</u>	<u>Pb</u>	<u>Zn</u>
Sanders	1.8'	0.02	14.01	0.37	20.06
McDougall	grab		80.7	13.70	28.80
Ashton	1.7'		20.9	2.1	43.0
Graham	grab		5.6		41.0

Hanging Wall - disseminated sulphides

Sanders	12.0'	0.04	13.4	2.56	14.99
McDougall	8.0'		18.9	3.95	12.70
Ashton	7.5'		7.0	0.4	9.7

Footwall of massive streak

Ashton	0-80 cm		0.3	0.2	0.1
	80-110cm		1.7	0.2	0.1

FACE #1 ADIT

Sanders	2.8'	0.02	14.2	3.08	12.18
Ashton	2.6'		12.2	1.6	9.9
Graham	2.0'	0.01	13.3	5.2	7.8

ROBERT C. HART, P.ENG.

SAMPLING

		<u>Au</u>	<u>Ag</u>	<u>Pb</u>	<u>Zn</u>
<u>DUMP #1 ADIT</u>					
McDougall	grab		17.30	4.10	18.65
Ashton	7 sample average		18.58	3.04	12.27

STOPE MUCK & BACK FILL #1 ADIT

McDougall	grab		42.55	6.55	33.30
Sanders	grab	0.04	75.8	27.82	14.39
Graham	grab #3 chute	0.01	0.5	0.7	0.5
	grab #3 stope	0.02	15.7	4.9	10.3
	grab above shaft	0.01	17.8	9.9	23.3
Ashton	1st chute		29.8	6.0	21.9
	above shaft		5.6	0.3	11.2
	3rd chute (cave?)		0.8	0.1	0.4

SUB LEVEL

McDouball	1.6'		44.00	15.60	
	1.3'		46.65	22.40	
	1.3'		25.00	9.05	
	car grab		61.00	30.30	22.40
Sanders	2.8'	0.02	32.4	12.74	12.50
Graham	#1		1.6		0.8
	#2		18.5	13.4	35.5
Ashton	2.46'				
	near face		20.02	3.6	26.8
	1.15'		35.3	9.1	13.7
	car grab		31.3	7.6	6.8

#2 LEVEL - MAIN VEIN

Sanders	2.0	0.02	3.6	0.94	8.23
	3.2	0.02	8.0	3.39	6.51

ROBERT C. HART, P.ENG.

SAMPLING

		<u>Au</u>	<u>Ag</u>	<u>Pb</u>	<u>Zn</u>
<u>#2 LEVEL - MAIN VEIN cont'd.</u>					
McDougall	composite 3'	0.01	6.60	1.90	5.40
Ashton	3.28'		0.3	0.1	0.1
	grabs		11.3	2.1	4.5
	3.28'		0.3	0.1	0.1
	9.84'		0.3	0.1	0.6
	3.28'		2.8	0.4	0.8

The data extracted below is an attempt to realistically analyze these assays in terms of recoverable grades. To obtain an estimate of the grade of the Beatrice, seventeen grab samples taken of material from the dump at #1 Adit, the stope muck and the backfill much above the #1 Adit were averaged. The result is: gold 0.02 and silver 19.76 ounces per short ton, lead 4.8% and zinc 12.9% per ton. This is considered to be a fair estimate of the approximately 2,700 tons of the Beatrice left in the stopes and down to the floor of the underhand stope. However, it should be noted here that the broken material may be largely oxidized and also may be re-cemented. Its acceptability to a smelter cannot be assumed.

The average grade of six channel or chip samples taken by McDougall, Sanders and Ashton from the sub-level have been used as an estimate of the grade of the Main Vein. The average is as follows: ¹ width - 1.77 feet (0.54 m) gold 0.02 and silver 19.17 ounces per short ton, lead 11.39% and zinc 18.2%. Assuming a mining width of 6.0 feet (1.83 m) and the grade of dilution an arbitrary 25% of the sampled grade of the vein then the probable grade of recoverable material will approximate gold 0.006 and silver 9.03 ounces per ton, lead 5.37% and zinc 9.40%. All the consultants found the Main Vein on the second level hard to sample because of dirt and lack of obvious sulphides. Five samples cut by Sanders and Ashton averaged gold 0.02 ounces and silver 2.26 ounces per ton, lead 0.98% and zinc 2.70%, over a width of 3.01 feet (0.92 m). However, a composite prepared by McDougall of thirteen samples varying from 1.2' to 5.5' in width (no average width provided) is silver 6.6 ounces per ton, lead 1.9% and zinc 5.4%. A sample taken by McDougall from the face of a raise on the

Main Vein 25 feet above the second level assayed 17.45 ounces silver per ton over a width of 7.0 feet (2.2 m). From these intersections on the Main Vein, it seems reasonable to conclude the vein is likely to be a viable entity from 25 feet above the second level to 50 feet below the first level, that is about 100 feet down dip; and for approximately 60 feet on strike at the diluted grade of the sub-level sampling. If so, it could be expected that 3,600 tons would be recoverable.

From this analysis, the measurable material of ore grade is, about as follows:

Vein	Tonnage	Silver (Oz. 1S.t)	Lead %	Zinc %
Beatrice-broken	2,700 ²	19.7	4.8	12.9
Main - at diluted grade	3,600	19.03	10.37	19.40
Total	6,300 ³	20.6	8.12	16.9

Total mining cost by Contractor \$250,000

Notes

1. McDougall did not assay for zinc; only Sanders assayed for gold.
2. See note above re oxidization and recoveries.
3. In a report to the Directors dated October 26, 1926, Walter J. Scorgie estimates there are "approximately 15,000 tons of ore in the dumps and in the mine". This estimate must assume a downward continuation of both Beatrice and Main Veins. Such assumptions are speculative; see Continuity below.
4. It will be noted that this grade is similar to that at the Sunshine Lardeau.

2. Continuity

The maximum exposed length of the Beatrice occurs on the first level where it is 70 feet (21.3 m); the maximum exposed length of the Main Vein is on the second level where it is 80 feet (24.4 m) Sanders reports that the ultimate lengths are unknown because ore remains in

We are going with 3 - stopping with going with 6 -

material defined outside mining contractor \$20.00 per ton

\$2,683,800 worth ore known about at this time (Positive) (we checked)

the face of each heading. However, the faces of the underhand stope on the Beatrice Vein below the first level were not sampled because the stope was full of water; and samples taken by both Sanders and Ashton on the Main Vein on the second level were low grade. Thus, although the veins may not have terminated, it cannot be shown that material of ore grade extends on strike beyond any face.

As noted above, the Beatrice is a cross fracture which on surface occurs in a "grit", presumably much stronger and supportive than the graphitic schists into which it passes before the first level is reached. It is said to be completely mined out from surface to about 6.5 feet (2 m) below the first level. However, the vein was only mined over a length of 40 feet (12.2 m) on the underhand stope compared to an apparent length of 70 feet (21.3 m) on the first level. It was sought but not found on its projected location on the second level. Possibly due to the deterioration in ground conditions (i.e. grits to graphitic schists) and the apparent shortening of the vein it should not have been expected to survive to the second level. On the other hand, the failure to locate it on the second level may be due to a flattening of the vein below the first level or to a rake easterly; no diamond drilling was done.

The Main Vein approximately parallels the northwesterly striking graphitic schists. Sanders has mapped a thin vein 25 feet (7.6 m) in length on the first level although none of the consultants appear to have sampled it. On the sub-level it is 50 feet (15.2 m) in length, 1.4 feet (0.4 m) in width and on the second level discontinuous low to moderate grade mineralization extends for 80 feet (24.4 m). The third level was stopped some 375 feet (114.3 m) from the projected location.

It seems to the writer that continuity of the narrow, short Beatrice and Main Veins in this strongly folded graphitic schist environment is too much to expect. On the other hand, similar mineralization is said to occur within the region over a vertical range of 5,000 feet, although the similarity of rock types and the continuity of individual veins throughout this range is not mentioned.

VII SOIL GEOCHEMISTRY

In October 1977, Mr. Ashton recommended taking steps to investigate the property beyond the known veins in an attempt to increase the tonnage base. His recommendations included soil geochemistry, stripping, trenching, and diamond drilling. In the event, the only part of the programme carried out was the soil geochemistry, although as he states in a later report, "limited drilling was done near the Beatrice with unknown results".

In 1978, Mr. Ashton and an associate picketed 26,660 feet (8130 m) of line, largely on the three claims southeast of the Beatrice, and took 242 soil samples ¹. The results of the sampling outlined an area anomalous in silver, lead and zinc over a length of nearly 3,000 feet (900 m) and over a width up to nearly 400 feet (393 m), open to the southeast. Within this broad anomalous area, an occasional high assay suggests the possibility of vein occurrences. Following this survey, sixteen claims were staked to the south and east to enlarge and protect the area of interest.

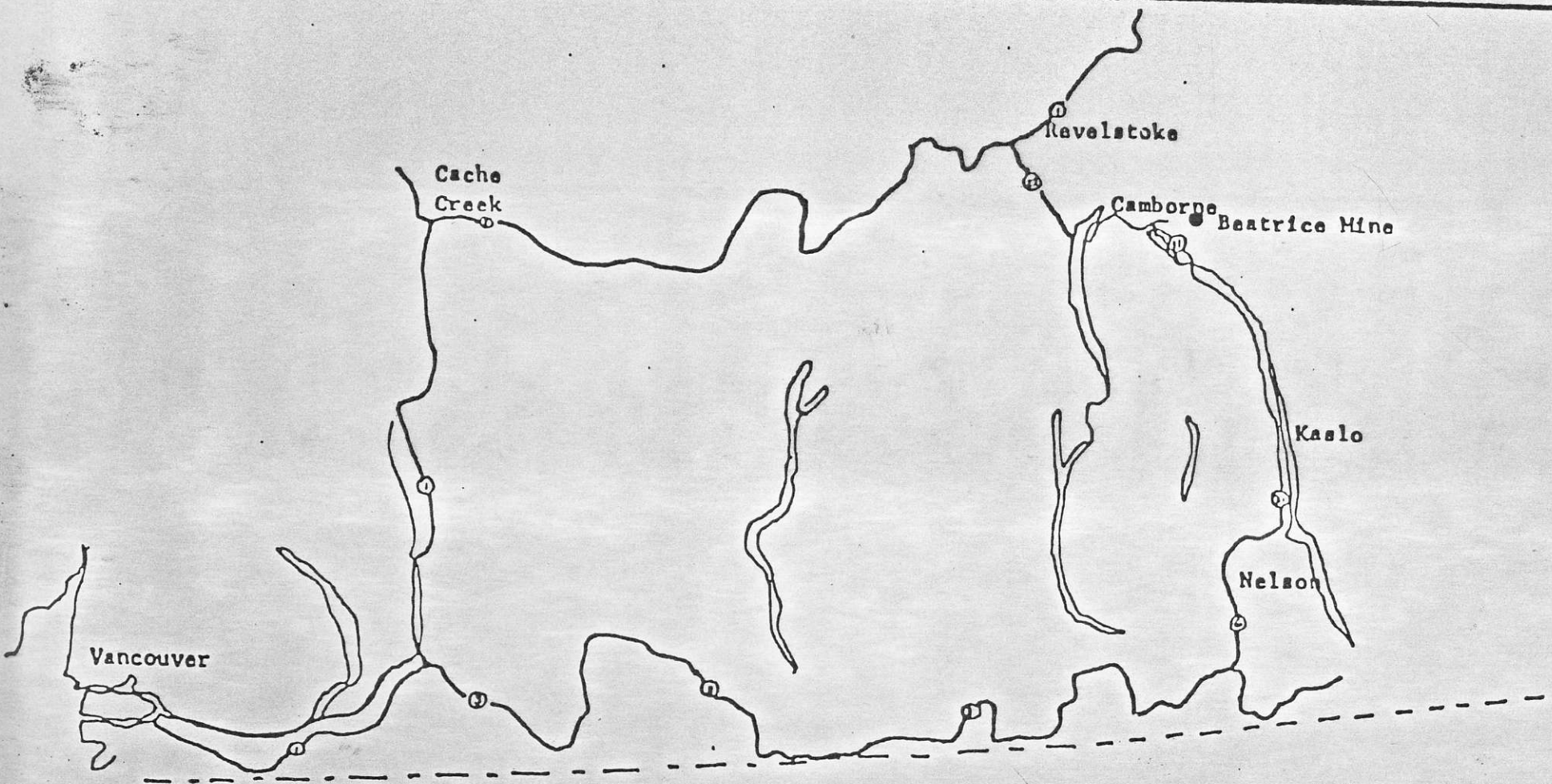
It is not clear from the maps and reports if the anomaly is directly down the slope or down access roads from the mine workings and portals. However, Mr. Ashton was obviously concerned with contamination of samples and notes that he took steps to avoid it.

Assuming adequate attention has been paid to the problem of contamination, then the writer agrees with Ashton that additional geochemical sampling is warranted on the new claim block south and east of the identified anomaly. Coincident with this soil geochemical programme, sampling of the most important "highs" within the anomalous area should be undertaken to determine if they are caused by mineral occurrences in bedrock. This could be done by trenching or diamond drilling, depending on topography and overburden.

No clear understanding of the economics of the deposit can be reached without a better "feel" for geology than is now apparent. Therefore, money for a geological survey should be included in the next work programme.

Note

1. Assays of these samples in p.p.m. silver, lead and zinc accompany the report of A. S. Ashton, dated February 20, 1980.



BEATRICE MINE

LOCATION MAP

Scale 1cm: 24

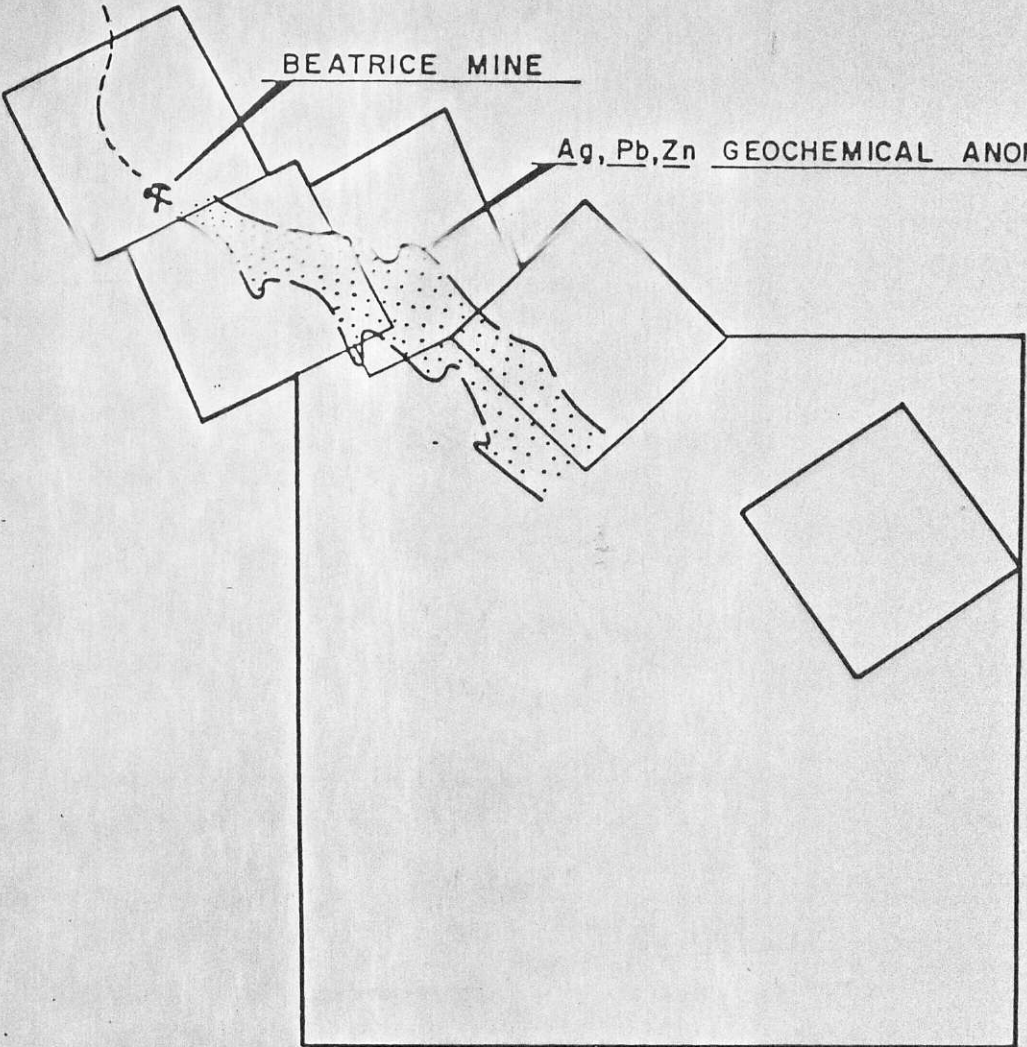


← To Comborne (7 miles)

Road

BEATRICE MINE

Ag, Pb, Zn GEOCHEMICAL ANOMALY



PROPERTY MAP

Scale 1" = 1500'

