

THIS PROSPECTUS CONSTITUTES A PUBLIC OFFERING OF THESE SECURITIES ONLY IN THOSE JURISDICTIONS WHERE THEY MAY BE LAWFULLY OFFERED FOR SALE AND THEREIN ONLY BY PERSONS PERMITTED TO SELL SUCH SECURITIES.

NO SECURITIES COMMISSION OR OTHER SIMILAR AUTHORITY IN CANADA HAS IN ANY WAY PASSED UPON THE MERITS OF THE SECURITIES OFFERED HEREUNDER AND ANY REPRESENTATION TO THE CONTRARY IS AN OFFENCE.

NEW ISSUE

EFFECTIVE DATE: SEPTEMBER 6, 1988



# Springer Resources Ltd.

(hereinafter called the "Company")  
of #1730 - 999 West Hastings Street  
Vancouver, British Columbia, Canada

**1,200,000 COMMON SHARES**  
at a price of \$0.65 per share

	Price to Public	Commission	Net Proceeds to be received by the Company *
.....	\$0.65	\$0.07	\$0.58
.....	\$780,000	\$84,000	\$696,000

..... of the costs of the issue estimated to be \$25,000.

MARKET THROUGH WHICH THE SECURITIES OFFERED HEREUNDER MAY BE SOLD. THE PRICE OF THE SHARES BY WAS DETERMINED BY NEGOTIATION BETWEEN THE COMPANY AND THE AGENTS.

OF THE SECURITIES OFFERED BY THIS PROSPECTUS MUST BE CONSIDERED AS A SPECULATIVE INVESTMENT. PROPERTIES IN WHICH THE COMPANY HAS AN INTEREST ARE IN THE EXPLORATION AND DEVELOPMENT AND ARE WITHOUT A KNOWN BODY OF COMMERCIAL ORE. NO SURVEY OF THE COMPANY'S MINING AS BEEN MADE AND THEREFORE IN ACCORDANCE WITH THE LAWS OF THE JURISDICTION IN WHICH THE RE SITUATED, THEIR EXISTENCE AND AREA COULD BE IN DOUBT. SEE ALSO "RISK FACTORS" ON PAGE 24 HASERS OF THE SECURITIES OFFERED HEREUNDER WILL SUFFER AN IMMEDIATE DILUTION OF 26% OF MENT. REFERENCE SHOULD BE MADE TO THE HEADING "DILUTION" ON PAGE 25 HEREOF.

ER STOCK EXCHANGE HAS CONDITIONALLY LISTED THE SECURITIES BEING OFFERED PURSUANT TO THIS LISTING IS SUBJECT TO THE COMPANY FULFILLING ALL THE LISTING REQUIREMENTS OF THE VANCOUVER STOCK OR BEFORE MAY 6, 1989, INCLUDING PRESCRIBED DISTRIBUTION AND FINANCIAL REQUIREMENTS.

AUTHORIZED BY THE COMPANY TO PROVIDE ANY INFORMATION OR TO MAKE ANY REPRESENTATION OTHER CONTAINED IN THIS PROSPECTUS IN CONNECTION WITH THE ISSUE AND SALE OF THE SECURITIES OFFERED BY THE COMPANY.

UPON COMPLETION OF THIS OFFERING THIS ISSUE WILL REPRESENT 24.9% OF THE SHARES THEN OUTSTANDING AS COMPARED TO 29.6% THAT WILL THEN BE OWNED BY THE CONTROLLING PERSONS, PROMOTERS, DIRECTORS, SENIOR OFFICERS OF THE COMPANY, THE AGENTS AND ASSOCIATES OF THE AGENTS. REFER TO THE HEADING "PRINCIPAL HOLDERS OF SECURITIES" ON PAGE 26 HEREIN FOR DETAILS OF SHARES HELD BY DIRECTORS, PROMOTERS, CONTROLLING PERSONS, THE AGENTS AND THEIR ASSOCIATES.

DIRECTORS AND OFFICERS OF THE COMPANY ARE OR MAY BE DIRECTORS AND OFFICERS OF OTHER COMPANIES, WHICH MAY OR DO CARRY ON SIMILAR TYPES OF BUSINESSES AS THAT OF THE COMPANY AND CONFLICTS OF INTEREST MAY THEREFORE RESULT. REFERENCE SHOULD BE MADE TO THE ITEM "CONFLICTS OF INTEREST" ON PAGE 28 HEREOF FOR A COMMENT AS TO THE RESOLUTION OF POSSIBLE CONFLICTS OF INTEREST.

THIS PROSPECTUS ALSO QUALIFIES THE ISSUANCE OF THE AGENTS' WARRANTS. THE AGENTS MAY SELL ANY SHARES ACQUIRED ON THE EXERCISE OF THE AGENTS WARRANTS AT THE MARKET PRICE AT THE TIME OF SALE, PURSUANT TO THE PROVISIONS OF THE SECURITIES ACT AND REGULATIONS WITHOUT FURTHER QUALIFICATION. REFERENCE SHOULD BE MADE TO THE ITEM "PLAN OF DISTRIBUTION" ON PAGE 1 OF THIS PROSPECTUS.

WE, AS AGENTS, CONDITIONALLY OFFER THESE SECURITIES SUBJECT TO PRIOR SALE, IF, AS AND WHEN ISSUED BY THE COMPANY AND ACCEPTED BY US IN ACCORDANCE WITH THE CONDITIONS CONTAINED IN THE AGENCY AGREEMENT REFERRED TO UNDER "PLAN OF DISTRIBUTION" ON PAGE 1 OF THIS PROSPECTUS.

**NAME AND ADDRESS OF AGENTS**

**GEORGIA PACIFIC SECURITIES CORPORATION**

#1600 - 555 Burrard Street  
Vancouver, B.C.

**CONTINENTAL SECURITIES**

10th Floor, 1055 Dunsmuir St.  
Vancouver, B.C.

**CANARIM INVESTMENT CORPORATION LTD.**

#2200 - 609 Granville Street  
Vancouver, B.C.

**DAVIDSON PARTNERS LTD.**

#900 - 580 Hornby Street  
Vancouver, B.C.

**REGISTRAR AND TRANSFER AGENT**

**NATIONAL TRUST COMPANY**

#900 - 666 Burrard Street  
Vancouver, B.C. V6C 2Z9

Dh.  
 PROPERTY FILE  
 Unuk, Carl, Icey, Knip, Bou, Irv.  
 104B/89,10

Prospectus an Amendment to this Prospectus will be filed. No part of the proceeds of this Offering will be used to invest in underwrite or trade in securities other than those which qualify as investments in which trust funds may be invested under the laws of the jurisdiction in which the securities herein may be lawfully sold. Should the Company intend to use the proceeds to acquire other than "Trustee Type" securities after the distribution of the securities offered by this Prospectus, approval by the shareholders of the Company must first be obtained and notice of such intention filed with the Regulatory Securities body having jurisdiction over the sale of the securities offered by this Prospectus.

4. DESCRIPTION OF BUSINESS & PROPERTY OF THE COMPANY

(a) Mineral Properties

The Company is a natural resource company principally engaged in the acquisition, exploration and development of natural resource properties. The Company has interests in the following properties:

(i) Sulphurets Property

The Company has the right to acquire a 25% interest in 37 mineral claims, divided into five distinct non-contiguous claim groups (the "Claims") located in the Skeena Mining Division of British Columbia. The Company may acquire its interest in the Claims pursuant to a Purchase Agreement with Cove Energy Corporation ("Cove") of #1730 - 999 West Hastings Street, Vancouver, B.C., dated March 19, 1987 (the "Sulphurets Agreement"). The Claims are described as follows:

<u>Claim Name</u>	<u>Record No.</u>	<u>Number of Units</u>	<u>Expiry Date</u>
UNUK 1	5225	20	February 28/89
UNUK 2	5226	20	96 Units
UNUK 12	5228	20	1 Group
UNUK 11	5227	20	
UNUK 13	5241	16	
UNUK 14	5242	16	February 28/89
UNUK 15	5243	20	96 Units
UNUK 16	5239	20	1 Group
UNUK 17	5240	20	
UNUK 8	5238	20	

UNUK 10	5232	20	February 28/89
UNUK 9	5231	20	80 Units
UNUK 3	5229	20	1 Group
UNUK 4	5230	20	
UNUK 5	5233	20	February 28/89
UNUK 7	5235	20	88 Units
UNUK 18	5236	20	1 Group
UNUK 19	5237	20	
UNUK 6	5234	8	
UNUK 22	5246	20	February 28/89
UNUK 23	5247	20	64 Units
UNUK 24	5248	12	1 Group
UNUK 25	5249	12	
UNUK 21	5245	20	February 28/89
			1 Group

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ICEY 1	5223	8	Feb. 28/89, 17
ICEY 2	5224	9	Units, 1 Group
KNIP 1	5220	16	Feb. 28/89, 36
KNIP 2	5221	20	Units, 1 Group
BOU 1	5217	6	Feb. 28/89,
BOU 2	5218	15	41 Units,
BOU 3	5219	20	1 Group
IRV	5222	5	Feb. 28/89, 5
			Units, 1 Group
COUL 1	5211	20	Feb. 28/94, 40
COUL 2	5212	20	Units, 1 Group
COUL 3	5213	20	Feb. 28/91, 40
COUL 4	5214	20	Units, 1 Group

The Claims were staked and recorded by Hi-Tec Resource Management Ltd. ("Hi-Tec") on February 28, 1986. By a letter agreement dated August 15, 1986 Cove was granted the right to acquire a 50% interest in the claims by paying the sum of \$20,000, issuing 50,000 shares to Hi-Tec and agreeing to arrange for the Company to conduct an airborne geophysical survey on the Claims.

Under the terms of the Sulphurets Agreement, the Company has the right to acquire one-half of Cove's interest in the Claims (i.e. a 25% interest in

the Claims) by providing \$50,000 for the cost to conduct an airborne geophysical survey on the property, which has been paid, and paying \$50,000 to Cove, \$30,000 of which has been paid. The Company is obligated to pay the balance of \$20,000 due to Cove within two weeks from the receipt of Regulatory Approval for the transaction, which approval is being sought by way of this Prospectus. Richard N. McRae, President and Director of the Company is also President and Director of Cove, and Greg Amor, Secretary and Director of the Company is also a director of Cove.

The Claims are situated approximately 65 km North of Stewart, B.C. Access to the area is gained by helicopter. A road from Stewart, B.C. runs North passed the Premier Silbak Mine to an airstrip just North of the Scottie Gold Mine, some 42 km from Stewart. Helicopter time from this airstrip to the property is about 15 - 20 minutes. An alternate staging point is Highway 37 which is East of the Claims. The winter road from Highway 37 to the Lacana/Newhawk Joint Venture Camp at Brucejack Lake is scheduled for construction in early 1987. Brucejack Lake is located 14 km Southeast of the center of the Claims area, where the Lacana/Newhawk Joint Venture has reported excellent exploration results recently.

The Company has an Engineering Report on the Claims prepared by J. Paul Sorbara, M.S.c., F.G.A.C. dated July 6, 1987, and updated by a letter report dated February 3, 1988, copies of which are printed herein and are collectively referred to as the "Sorbara Report". Information regarding the Claims set out in this Prospectus is taken from the Sorbara Report.

Exploration for precious metals in the Sulphurets Creek area dates back to the late 1800's when placer gold was discovered in the upper reaches of the Unuk River. By 1898, several prospectors had entered the area including F.E. Gingras, H.W. Ketchum and C.W. Mitchell, who had erected a cabin and were working the gravels at the mouth of Mitchell Creek. The area of these workings is about 2.5 kilometers southwest of the Unuk claims.

In 1898, the first mineral claims in the area, the Cumberland and Globe groups, were staked by H.W. Ketchum and L. Brant. These claims proved to be attractive and by 1901, the Unuk River Mining and Dredging Company had



purchased them and established a stamp mill on the Globe group. A road between Burroughs Bay and Sulphurets Creek was also begun by this company but was never completed.

In 1905, Dr. Frederick Eugene Wright of the United States Geological Survey explored the drainage of the Unuk River. he concluded "that the area east of the granitic batholiths warranted careful examination which might reward careful prospecting ventures".

Interest in the region died down until the 1930's when several prospectors ventured into the area. Extensive gossans in the upper reaches of Sulphurets Creek attracted Bruce and Jack Johnson to stake claims in this area in 1935. Hence, the name "Brucejack Lake".

The region was quiet again until 1960 when the search for porphyry copper deposits led Newmont Mines to conduct a helicopter borne magnetic survey in the Sulphurets area. Claims were staked on behalf of Granduc Mines Ltd. at the Sulphurets Creek headwaters, and between 1961 and 1967, Granduc and Newmont conducted geological and geophysical work on this ground. More claims were acquired by Granduc and their exploration effort continued until 1970.

R.V. Kirkham completed a M.Sc. thesis on the geology and mineral deposits of the region in 1963 and E.W. Grove compiled a regional geological study on the Stewart area in 1968.

The jump in precious metal prices renewed activity, and in the period of 1975 to 1977, Texasgulf Inc. and Granduc Mines both conducted exploration in the Sulphurets area. In 1979, Granduc optioned their claims to Esso Resources Canada Ltd. who spent more than \$2 million over 5 years in exploration for precious metals.

The Esso-optioned claims reverted back to Granduc and were subsequently optioned under joint venture to Lacana Mining Corporation and Newhawk Gold Mines Ltd.

In 1985, the Lacana/Newhawk joint venture drilled 13,066 feet in the Brucejack Lake area. This effort along with the 26,068 feet previously drilled has outlined mineral reserves of 1,011,543 tonnes grading 0.826 ounces gold equivalent per tonne (silver: gold ratio 50:1).

In addition to these mineral reserves, the 1985 Lacana/Newhawk project located the new Snowfields Zone, situated about 5.5 kilometers east of the UNUK-20 claim (Figure 2). Company reports state that limited drilling (5 holes) on this bulk tonnage target has indicated over 7,000,000 tonnes grading 0.083 oz Au/tonne.

During 1986, 1,500 feet of underground development drifting and crosscutting was completed on the West Zone in order to obtain a bulk sample. The results showed an average grade of 0.225 oz Au/ton over 52.5 feet without including several high-grade pockets. These results were encouraging and a winter road to Brucejack Lake was started early in 1987. A permanent camp is being established and more drilling and underground work will be conducted.

The area covered by the subject property itself has received minor prospecting dating back to the early part of the century and regional government mapping. A more detailed mapping program was conducted by the British Columbia Department of Energy, Mines and Petroleum Resources in 1987.

The Sorbara Report indicates that geological reconnaissance and the airborne geophysical survey recently conducted on the claims by the Company at a cost of approximately \$50,000, indicate that two parallel Brucejack lineaments, defined on the Lacana/Newhawk brand continue in a somewhat disjointed fashion across the property. Further the Sorbara Report indicates that the airborne geophysical survey has shown that coincident and/or associated magnetic lows and VLF-EM conductors occur in several locations on the Property. Sorbara concludes in his Report that the "results are seen as highly encouraging and should be followed up by ground exploration" on the property.

Sorbara recommends that a two phased exploration program be undertaken on the property. The first phase of work should be an extensive summer exploration program of geological mapping, prospecting and reconnaissance soil sampling. In addition, Sorbara recommends that ground magnetometer and VLF-EM follow-up work should be undertaken on the anomalies discovered by the airborne geophysical survey. The Phase II work program is contingent upon favourable results from Phase I, and it would involve follow-up geochemistry and preliminary diamond drilling of targets generated in Phase I.

In the summer of 1987 Sorbara reports that approximately one-half of the Phase I work program was completed. The work which consisted of geological mapping, prospecting and geochemical sampling, produced very encouraging results. Several new showings and geochemical anomalies were found on the Unuk claims, and a large zone of anomalous silver concentration along with favourable alteration has been outlined on the Coal claims. In addition, very encouraging gold values were obtained from the Bou claim.

In light of the encouraging results of the work completed thus far, Sorbara strongly recommends that the Phase I work program be completed in order to define drill targets for the Phase II work program recommended in his July 6, 1987 Report.

The estimated cost of the Phase I and Phase II work programs is \$300,000 each, of which the Company's 25% share is \$75,000 for each Phase. The Company intends to expend a total of \$75,000 from the proceeds of this Offering to proceed with its share of the Phase I work program, and shall reserve a further \$75,000 from the proceeds of this Offering as a fund for Phase II work, should the results of Phase I be favourable.

The Claims are without a known body of commercial ore and the proposed exploration program is intended as an exploratory search for ore.

(ii) West Coast Ventures Limited

By an Agreement dated for reference June 24, 1987, between the Company and all of the Shareholders of West Coast Ventures Limited ("West Coast"), the

REPORT ON THE  
UNUK, COUL, ICEY, KNIP,  
BOU and IRV CLAIMS,  
SULPHURETS CREEK AREA, B.C.

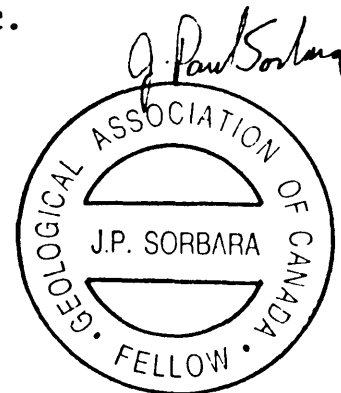
NTS 104B/8,9,10

For

SPRINGER RESOURCES LTD.  
#1730 - 999 West Hastings Street  
Vancouver, B.C.  
V6C 2W2

By

J. PAUL SORBARA, M.Sc., F.G.A.C.  
J.P. Sorbara & Associates  
6703 Nicholson Road  
Delta, B.C.  
V4E 2T2



JULY 6, 1987

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APPENDIX II: Estimated Cost of Proposed Exploration Programs.  
APPENDIX III: Airborne VLF-Electromagnetometer and Magnetometer Survey Report.

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- Figure 1: General Location Map, Sulphurets Creek Area, B.C.  
Figure 2: Claim Map, Springer Resources Ltd. Property showing adjacent properties and Mineral Deposits.  
Figure 3: General Geology of the Springer Resources Ltd. Property Area.  
Figure 4: Geology of the Brucejack Lake Area.  
Figure 5a,b,c: Airborne Geophysical Survey Results, Northern Claim Block.  
Figure 6: Airborne Geophysical Survey Results, Test Lines over Brucejack Deposit.

SUMMARY

The Unuk, Coul, Irv, Icey, Knip and Bou claims comprise 6 discreet claim blocks located in the Skeena Mining Division of British Columbia. Springer Resources Ltd. of Vancouver, B.C. holds a 25% interest in all of these claims.

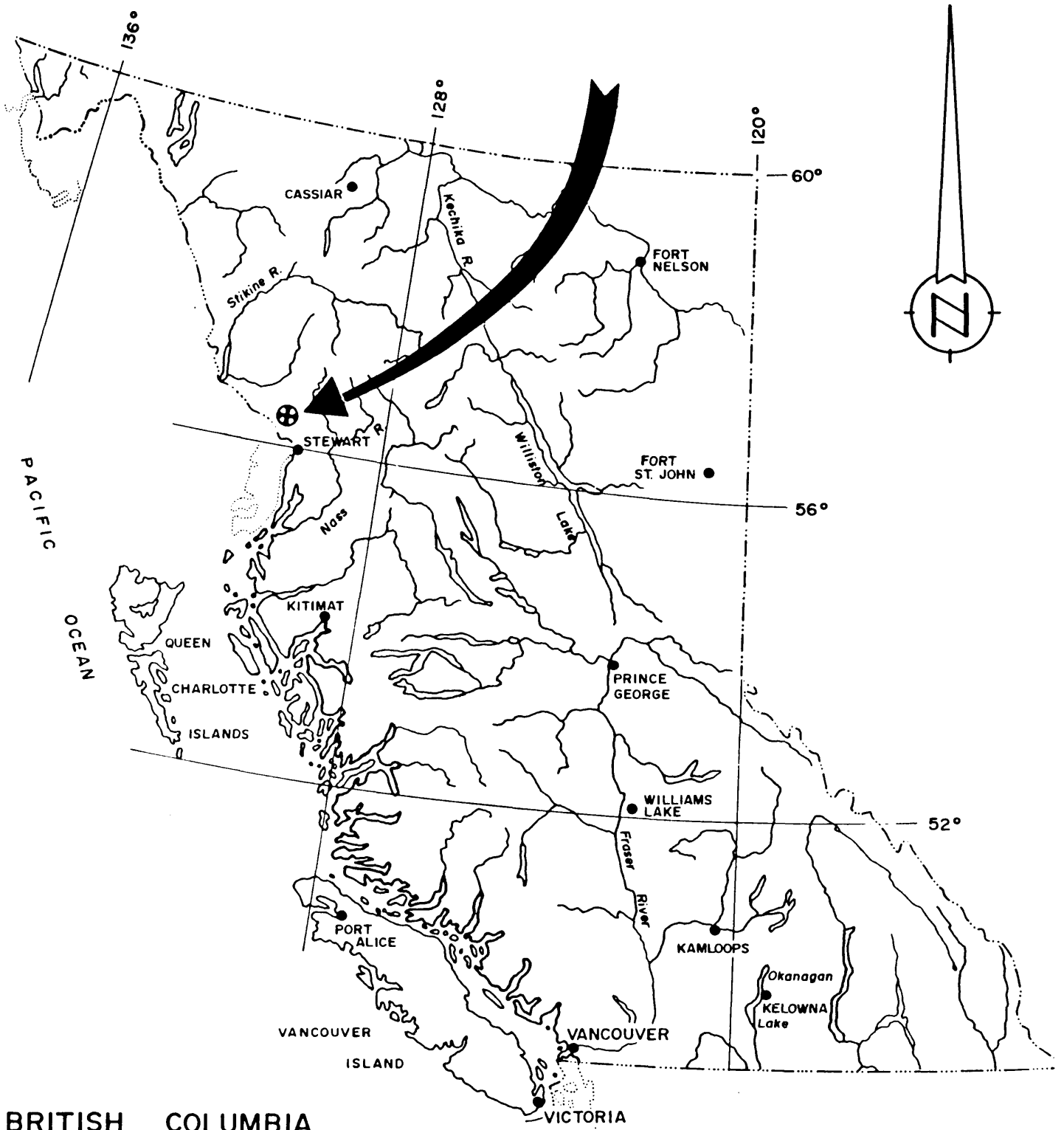
The claims are roughly divided into the northern (Unuk and Coul claims) and southern (Irv, Icey, Knip and Bou claims) portions. The northern portion of the Springer Resources Ltd. claims lies immediately north of the Lacana/Newhawk gold-silver deposits collectively known as the Sulphurets property. The southern portion lies immediately south of the Lacana/Newhawk property (Figure 2).

The Lacana/Newhawk Sulphurets gold deposits, in the Brucejack Lake area only, have a total indicated and inferred tonnage of 1.58 million tons grading 0.336 oz gold/ton and 22.86 oz silver/ton. Other areas of the property have the potential to host much larger quantities of lower grade mineralization.

The Lacana/Newhawk deposits are associated with two parallel lineaments which run roughly north-south. A recent airborne geophysical survey indicates that these lineaments continue to the north and cross the Springer Resources Ltd. Unuk claim group. The southern extension of the lineaments cross Springer Resources Ltd.'s Icey claim group which hosts favourable highly gossanized rocks that have received little prospecting in the past. The Irv claim lies only 2.5 kilometers from the Brucejack gold and silver deposit area.

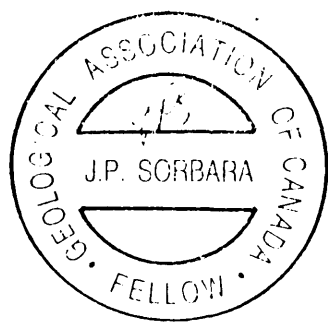
The writer concludes that the subject property has excellent potential for hosting significant quantities of precious metal mineralization and an exploration program designed to test that potential is recommended.





**BRITISH COLUMBIA**

Scale 1:7,500,000 approx.



<b>SPRINGER RESOURCES LTD.</b>			
<b>SULPHURETS AREA PROPERTY</b>			
SKEENA M.D., B.C.			
<b>GENERAL LOCATION MAP</b>			
Scale:	Date:	N.T.S.	Figure:
	June 1987	104 - B	1
By: <b>J.P. SORBARA &amp; Associates</b>			

## INTRODUCTION

This summary and evaluation of the Sulphurets Creek area property is done at the request of R.N. McRae, President of Springer Resources Ltd. The main purpose is to evaluate the potential of the subject property for hosting precious metal mineralization similar to that found in the Brucejack Lake or Iskut River areas, and to recommend a program designed to test that potential.

The report is based on a thorough review of published government reports, assessment reports and academic papers on the area, as well as the results of an airborne geophysical study of the property. An examination of the geology of the property was conducted by the writer, with helicopter support, during the period of November 5 to 8, 1986.

## LOCATION, ACCESS AND TOPOGRAPHY

The subject mineral claims are located in the Skeena Mining Division, approximately 65 kilometers north of Stewart, B.C. The claims comprise 6 discreet blocks which lie on NTS Map Sheets 104B/8, 104B/9 and 104B/10 and are roughly centered at latitude 56°35'North and longitude 130°20'West (Figure 2).

Access to the area is gained by helicopter. A road from Stewart, B.C. runs north past the Premier Silbak mine to an airstrip just north of the Scottie Gold mine, some 40 kilometers from Stewart. Helicopter time from this airstrip to the property area is about 15 to 20 minutes (roughly 20 miles). An alternate staging point is Highway 37 which is about the same distance east of the property. A winter road from Highway 37 to the Lacana/Newhawk joint venture camp at Brucejack Lake was constructed in early 1987. Brucejack Lake is located between

Springer Resources Ltd.'s largest northern claim blocks and the smaller southern blocks (Figure 2).

The property area is characterized by river and creek valleys and mountain peaks. Elevations range from 1,000 feet to 6,800 feet. The highest areas are covered by ice and snow all year. These icefields occur in 3 main zones which cover roughly 45% of the Unuk claim group. The remainder of the property is comprised of valleys and hillsides that are in some places forested and elsewhere above the treeline.

The valley of McTagg Creek is roughly central to the Unuk claim area and affords an excellent location for a summer exploration base camp. In-camp or nearby-based helicopter support would be necessary for an efficient exploration program. With this support, peaks outcropping above and through the icefields could be mapped, prospected and sampled. Field personnel could be set out and picked up throughout this large property on a daily basis.

Alternate base camp locations would be along Gingras or Mitchell Creeks which lie at the southern edge of the survey area, or along the Unuk River on the Coul claims. Due to the heavy snowfall in the region, summer exploration would not begin until July and could continue until October or possibly November.

In the event of the discovery, within the survey area, of a significant mineral deposit, one with the potential of becoming a mine, the presence of glacial ice would not necessarily make development unfeasible. Any ground discovery would be made in areas that are currently free of ice. Following such a discovery underground, would not prove overly difficult, even if the underground workings did extend under ice cover.

The drawback regarding the ice cover is that a mineral deposit that is now under ice would be more difficult to locate, in that it would rely on airborne geophysics without follow-up prospecting and geochemistry. The feasibility of diamond drilling would depend largely on local topography, as drilling through ice itself is not necessarily a problem.

In the case of the Lacana/Newhawk discovery at Brucejack Lake, the cost of their 10' x 10' development drift worked out to about \$500/foot (A. Beaton, Personal Communication). This price included labour, camp and all helicopter support and is readily comparable, if not cheaper, than underground costs in areas of road access.

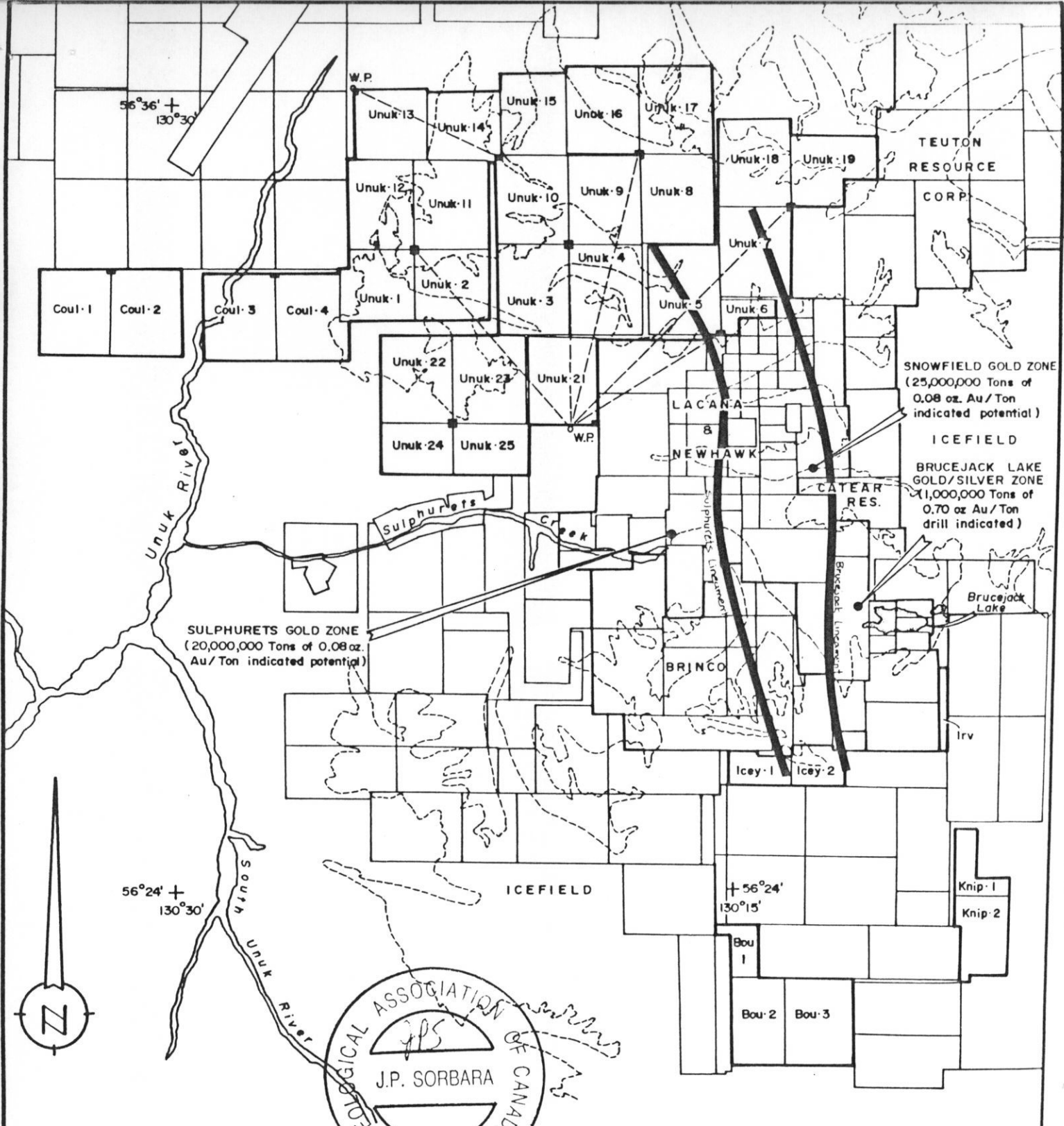
PROPERTY DATA

The subject property comprises 36 claims, totalling 623 units, which occur in 6 separate claim blocks (Figure 2). A 25% interest in all of these claims is held by Springer Resources Ltd. The balance of ownership is held by Cove Energy Corporation (25% in all claims), True North Resources (50% interest in the Unuk claim group) and Bayridge Minerals Ltd. (50% interest in the Coul, Icey, Knip, Bou and Irv claim groups).

A list of the claim names and other pertinent data is given below:

<u>CLAIM NAME</u>	<u>RECORD NUMBER</u>	<u>NUMBER OF UNITS</u>	<u>MONTH OF EXPIRY</u>
UNUK 1	5225	20	Feb. 28/88
UNUK 2	5226	20	
UNUK 12	5228	20	96 Units
UNUK 11	5227	20	1 Group
UNUK 13	5241	16	

<u>CLAIM NAME</u>	<u>RECORD NUMBER</u>	<u>NUMBER OF UNITS</u>	<u>MONTH OF EXPIRY</u>
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SULPHURETS GOLD ZONE  
(20,000,000 Tons of 0.08 oz.  
Au/Ton indicated potential)

SNOWFIELD GOLD ZONE  
(25,000,000 Tons of  
0.08 oz. Au/Ton  
indicated potential)

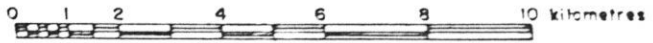
ICEFIELD  
BRUCEJACK LAKE  
GOLD/SILVER ZONE  
(1,000,000 Tons of  
0.70 oz Au/Ton  
drill indicated)

56°24' +  
130°30'

56°24'  
130°15'



REFER TO TEXT FOR DETAIL CLAIM NUMBERS



<b>SPRINGER RESOURCES LTD.</b>			
<b>SULPHURETS AREA PROPERTY</b>			
SKEENA M.D.; B.C.			
<b>CLAIM MAP</b>			
<b>SHOWING ADJACENT PROPERTIES</b>			
<b>and MINERAL DEPOSITS</b>			
Scale	Date	NTS	Page
1:150,000	JULY, 1987	104-B-88	2
By: <b>J.P. SORBARA &amp; Associates</b>			



### HISTORY AND PREVIOUS WORK

Exploration for precious metals in the Sulphurets Creek area dates back to the late 1800's when placer gold was discovered in the upper reaches of the Unuk River. By 1898, several prospectors had entered the area including F.E. Gingras, H.W. Ketchum and C.W. Mitchell, who had erected a cabin and were working the gravels at the mouth of Mitchell Creek. The area of these workings is about 2.5 kilometers southwest of the Unuk claims.

In 1898, the first mineral claims in the area, the Cumberland and Globe groups, were staked by H.W. Ketchum and L. Brant. These claims proved to be attractive and by 1901, the Unuk River Mining and Dredging Company had purchased them and established a stamp mill on the Globe group. A road between Burroughs Bay and Sulphurets Creek was also begun by this company but was never completed.

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The jump in precious metal prices renewed activity, and in the period of 1975 to 1977, Texasgulf Inc. and Granduc Mines both conducted exploration in the Sulphurets area. In 1979, Granduc optioned their claims to Esso Resources Canada Ltd. who spent more than \$2 million over 5 years in exploration for precious metals.

The Esso-optioned claims reverted back to Granduc and were subsequently optioned under joint venture to Lacana Mining Corporation and Newhawk Gold Mines Ltd.

In 1985, the Lacana/Newhawk joint venture drilled 13,066 feet in the Brucejack Lake area. This effort along with the 26,068 feet previously drilled has outlined mineral reserves of 1,011,543 tonnes grading 0.826 ounces gold equivalent per tonne (silver:gold ratio 50:1).

In addition to these mineral reserves, the 1985 Lacana/Newhawk project located the new Snowfields Zone, situated about 5.5 kilometers east of the UNUK-20 claim (Figure 2). Company reports state that limited drilling (5 holes) on this bulk tonnage target has indicated over 7,000,000 tonnes grading 0.083 oz Au/tonne.

During 1986, 1,500 feet of underground development drifting and crosscutting was completed on the West Zone in order to

obtain a bulk sample. The results showed an average grade of 0.225 oz Au/ton over 52.5 feet without including several high-grade pockets. These results were very encouraging and a winter road to Brucejack Lake was started early in 1987. A permanent camp is being established and more drilling and underground work will be conducted.

The area covered by the subject property itself has received minor prospecting dating back to the early part of the century and regional government mapping. A more detailed mapping program is being conducted by the British Columbia Department of Energy, Mines and Petroleum Resources in 1987.

#### REGIONAL GEOLOGY AND MINERALIZATION

The subject mineral claims are situated on the western edge of the Bowser Basin, approximately 10 miles east of the main Coast Mountains plutonic complex. This area is underlain by andesitic volcanics of the lower Jurassic Unuk River and Salmon River formations. These are in turn overlain by Jurassic siltstones, greywacke, conglomerates, volcanics and minor limestone of the Jurassic Bowser group.

The sedimentary and volcanic rocks are cut by the Mitchell Intrusions of possible Jurassic age (see Table 1). Kirkham (1963) reports these to include sills and dikes, as well as larger bodies of plagioclase-hornblende porphyry, syenite, and quartz syenite porphyry, orthoclase porphyry and granite. Some of these may be the sub-volcanic equivalent of the upper volcanics.

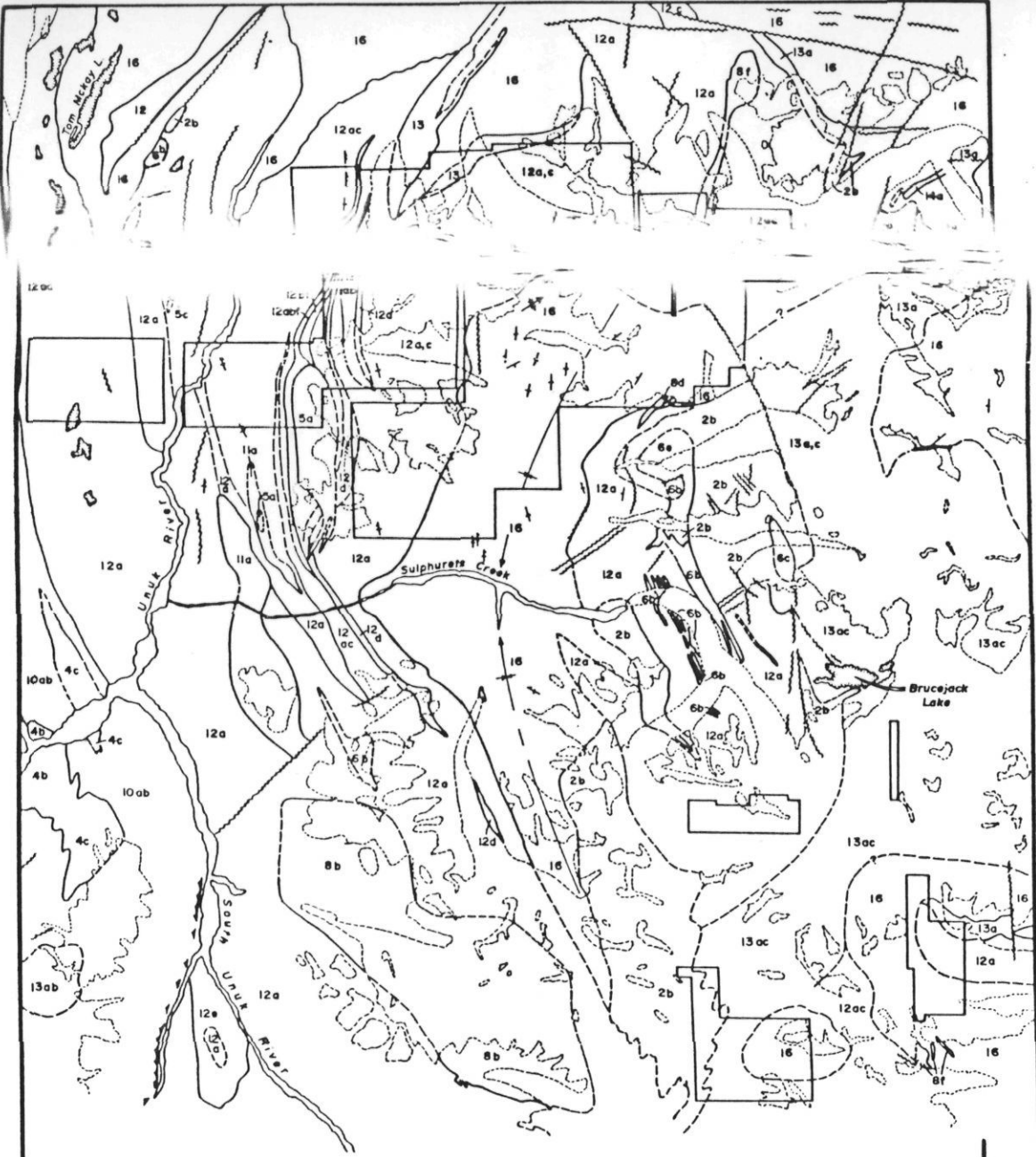
The wallrocks peripheral to most of the intrusive bodies are reported to be intensely bleached and altered to pyrite-quartz-sericite schists. The degree of alteration generally

TABLE 1

TABLE OF FORMATIONS FOR THE  
MITCHELL-SULPHURETS REGION

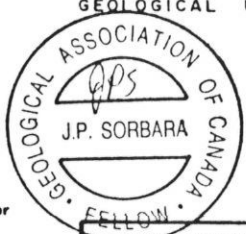
<u>PERIOD</u>	<u>GROUP</u>	<u>LITHOLOGY</u>
<b>Recent</b>		Unconsolidated glacio-fluvial and glacial deposits
	Unconformable Contact	
<b>Tertiary (?)</b>	Late Dykes	Keratophyre (basalt(?))
	Intrusive Contact	
<b>Jurassic</b>	Mitchell Intrusions	Granite Syenite & Quartz-syenite Porphyry Plagioclase-Hornblende Porphyry (Albite Syenite; minor Syenodiorite) - and altered equivalents
	Intrusive Contact	
<b>Lower</b>	Lower Hazelton	*Spilitized Diabase
<b>Jurassic (?)</b>	and/or	Intrusive Contact
	Possibly Upper Takla(?)	Volcanic Members - green and purple lapilli tuff, volcanic breccia, feldspar porphyry - and altered equivalents
		Unconformable or Conformable Contacts (?)
		**Sedimentary Members - carbonaceous argillite, siltstone, greywacke, conglomerate, and minor impure limestone - and altered equivalents

(from KIRKHAM, 1963)



- BEDDING (inclined, vertical)
- FAULT (defined, approximate)
- FAULT (thrust)
- SCHISTOSITY (inclined, vertical)
- SYNCLINE (normal)
- GEOLOGICAL CONTACT (defined; approximate or assumed under ice)
- EDGE OF ICEFIELD

SEE FOLLOWING PAGE FOR  
GEOLOGICAL UNIT DEFINITIONS.



after GROVE 1964-70

<b>SPRINGER RESOURCES LTD.</b>			
SULPHURETS AREA PROPERTY SKEENA M.D., B.C.			
<b>GENERAL GEOLOGY OF THE SPRINGER RESOURCES LTD. PROPERTY AREA</b>			
Scale: 1:150,000	Date: July 1987	N.T.S. 104-B/8,9	Figure: <b>3</b>
By: <b>J.P. SORBARA &amp; Associates</b>			

SEDIMENTARY and VOLCANIC ROCKS

MIDDLE JURASSIC

- 16 Siltstone, greywacke, sandstone, some calcarenite, minor limestone, argillite, conglomerate, littoral deposits
- 13 Green, red, purple, and black volcanic breccia, conglomerate, sandstone, and siltstone a) crystal and lithic tuff b) siltstone c) minor chert and limestone (includes some lava)

LOWER JURASSIC

- 12 Green, red, and purple volcanic breccia, conglomerate, sandstone, and siltstone a) crystal and lithic tuff b) sandstone c) conglomerate d) limestone e) chert f) minor coal
- 11 Pillow lava a) volcanic flows

UPPER TRIASSIC

- 10 Siltstone, sandstone, conglomerate a) volcanic siltstone sandstone, conglomerate b) and some breccia

PLUTONIC ROCKS

EOCENE (STOCKS, ETC.) AND OLDER

- 8 Quartz diorite b) monzonite d) augite diorite

MIDDLE JURASSIC AND YOUNGER

- 6 Granodiorite a) diorite b) syenodiorite c) monzonite d) alaskite

LOWER JURASSIC AND YOUNGER

- 5 Diorite a) syenogabbro

UPPER TRIASSIC AND YOUNGER ?

- 4 Diorite a) quartz diorite b) granodiorite

METAMORPHIC ROCKS

JURASSIC

- 2 Hornfels b) gneiss



decreases away from the intrusive bodies; however, the extent of alteration is hard to determine visibly. Kirkham's (1963) petrographic studies show that in thin section, even the freshest appearing rocks have suffered extensive alteration. This more subtle alteration adjacent to dikes and especially sills may well be missed in less than detailed mapping.

The intrusion of the porphyry bodies and the associated alteration is believed to have played an integral part in metal enrichment that has resulted in the numerous mineral deposits that characterize this area.

Regionally, at both the Silbak Premier mine near Stewart, and at Bronson Creek, 40 kilometers west of Sulphurets, a direct spatial relationship occurs between orthoclase porphyry and precious metal mineralization.

Schroeter (1983) examined the geology and mineralization in the Brucejack Lake area, just north of the Icey 1 & 2 claims. Here hornblende syenites, alkali feldspar syenites and country rocks are cut by numerous north to northwesterly faults and are intensely altered with sericite, k-feldspar, silica, carbonate and chlorite (Figure 4). Five separate sulfide zones occur along a 7 kilometer belt with mineralization occurring in several styles, including low grade disseminations, epithermal stockworks and veins. Found within these zones are pyrite, chalcopyrite, molybdenite, ruby silver, stephanite, ceragyrite, electrum, native gold, tetrahedrite, freibergite, argentite, galena, sphalerite and bornite.

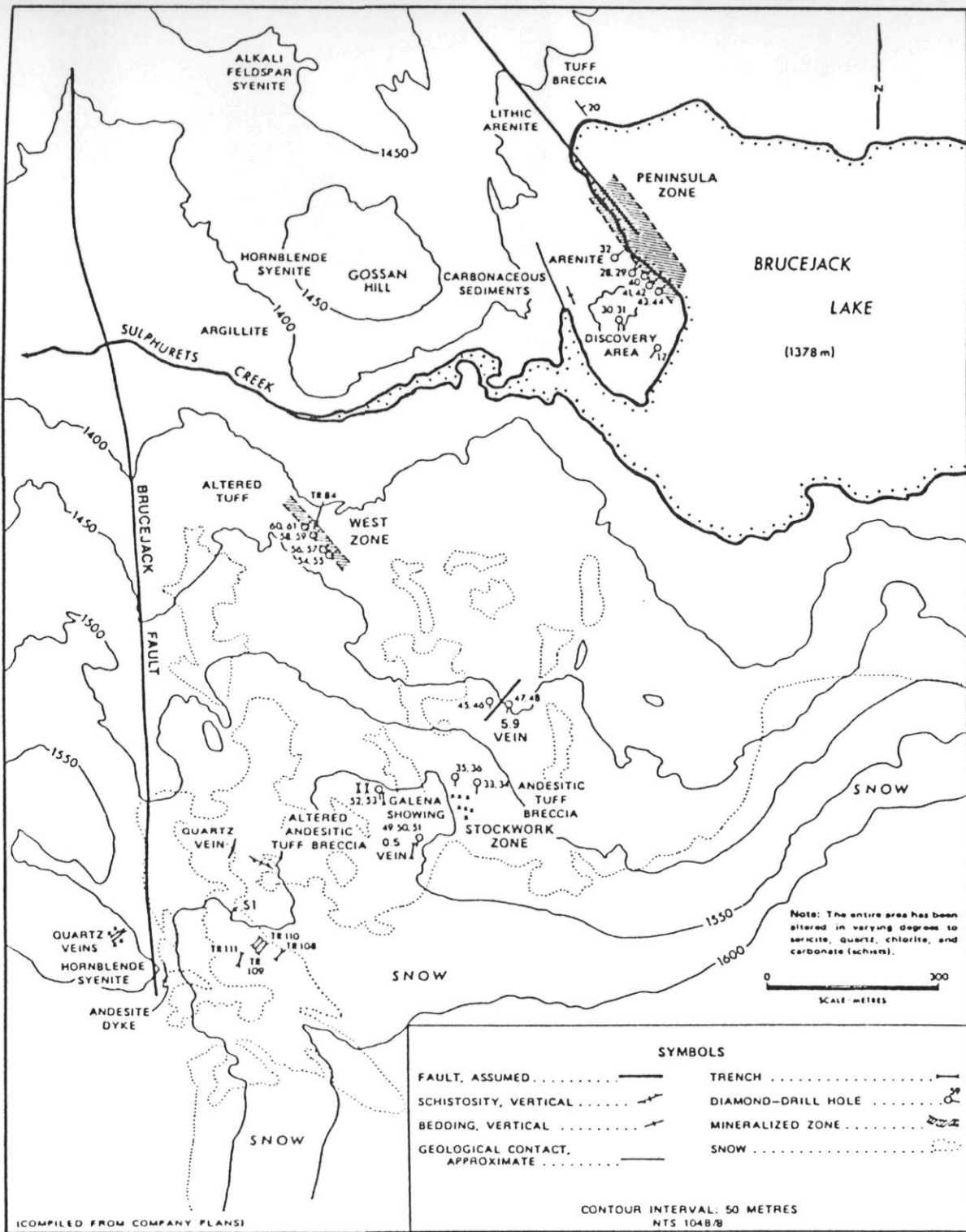
Within this area, two principal zones were identified. The Peninsula Zone (or shore zone) had been traced for 265 meters on surface and to a depth of 140 meters by intersections in 22 drill holes and was still open, when Schroeter visited the property in 1983. By the end of 1985, mineral reserves from

this zone were reported to be 490,000 tonnes grading 0.890 oz Au-e/tonne (Au-e = gold equivalent with a Ag:Au ratio of 50:1).

The West Zone, located about 700 meters southwest of the Peninsula Zone, had been tested by 21 drill holes at the time of Schroeter's visit. It measured 310 meters on surface, extended to a depth of 60 meters and was also still open. Schroeter reported ruby silver, freibergite, electrum, native gold, stephanite, galena, pyrite and sphalerite occurring in a stockwork of quartz veinlets in sericitic andesitic tuff. Mineral reserves to the end of 1985 for the West Zone are 496,452 tonnes grading 0.694 oz Au-e/tonne.

During 1986, Newhawk put in 1,500 feet of development drifting and crosscutting to obtain a bulk sample from the West Zone. During November, 1986, the writer had the opportunity to examine the underground workings and sample the mineralization. Two crosscuts have shown that the width and grade of the body is generally uniform with intermittent spectacular high grade sections. The first crosscut assayed 0.234 oz gold/ton and 6.2 oz silver/ton over a true width of 50 feet and 0.216 oz gold/ton with 14.25 oz silver/ton over a true width of 17 feet (Stockwatch, November 13, 1986). The second crosscut averaged 0.225 oz gold/ton and 16.60 oz silver/ton over a true width of 52.5 feet (Stockwatch, December 2, 1986). Grab samples reported from within this zone returned up to 5.786 oz gold/ton with 890.45 oz silver, but these results were not included in the grade calculations of 0.225 oz gold/ton over 52.5 feet.

Drilling has implied this body is 1,000 feet long and extends at least 1,000 feet down dip. High grade pockets and veins within the mineralized zone are reported to run up to 3 or 4 ounces of gold and hundreds of ounces of silver. A grab sample collected by the writer from the lowest crosscut returned values of 2.348 oz gold/ton and 1061.67 oz silver/ton.



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SULPHURETS AREA PROPERTY  
SKEENA M.D.; B.C.

GEOLOGY OF THE BRUCEJACK LAKE AREA (after Schroeter '83)

Scale: 1 : 110,000 app	Date: July 1987	N.T.S. 104-B/8/9	Figure: 4
By J.P. SORBARA & Associates			

The writer feels that this deposit will become a new major mine. The site geologist described the Brucejack deposit as being a lineal stockwork that trends north-northwest. Several other mineralized zones have been found along this trend which leads directly onto Springer Resources Ltd.'s Unuk claims to the north and onto the Ikey claims to the south (Figure 2).

The Gossan Hill Zone had apparently not been found until after Schroeter's 1983 visit, but lies only 400 meters west of the Peninsula Zone. To the end of 1985, mineral reserves from this high grade area totalled 25,091 tonnes grading 2.209 oz Au-e/tonne (again, Au-e = gold equivalent with Ag:Au of 50:1) over a true width of 10.5 feet.

Together, the 3 zones described above comprise the reported 1,011,543 tonnes of mineral reserves in the Brucejack Lake area, which have a weighted average grade of 0.826 oz Au-e/tonne. Two more zones, the Spine and Galena, lie just south of Gossan and West Zones. Here galena, sphalerite, pyrite, chalcopyrite and native gold are reported in altered andesite. Tonnages and grades for these areas are not yet available.

Northwest of Brucejack Lake some 3 1/2 miles lies the Snowfield Gold Zone, which had not been discovered until 1985. Based on 625 feet of surface trenching and 5 drill holes, preliminary estimates by Newhawk Gold Mines Ltd. are that this bulk tonnage zone could host 7,000,000 tonnes grading 0.083 oz Au/tonne. More work is needed, however, before these figures can be confirmed.

There are at least 10 more showings or zones in the area northeast of Sulphurets Creek listed on Newhawk company maps. Details of these are not available but their presence indicates that mineralizing systems were numerous in this region. The tonnage and grade of the West Zone and other deposits very near to it are tabled below:

<u>ZONE</u>	<u>CATEGORY</u>	<u>TONS</u>	<u>AU OZ/T</u>	<u>AG OZ/T</u>
West	Drill Indicated	535,765	0.332	21.06
West	Inferred	<u>480,965</u>	<u>0.332</u>	<u>21.06</u>
TOTAL WEST ZONE		1,016,730	0.332	21.06
Shore	Inferred	539,776	0.263	27.23
Gossan Hill	Inferred	<u>27,639</u>	<u>1.940</u>	<u>3.51</u>
TOTAL BRUCEJACK AREA	INDICATED & INFERRED	1,584,145	0.336	22.86

PROPERTY GEOLOGY

The area of the subject claims is predominantly underlain by volcanic breccia, conglomerate, sandstone and siltstone of the Lower Jurassic Unuk River Formation, as well as siltstone, greywacke, argillite and minor limestone of the middle Jurassic Salmon River Formation (Figure 3). The writer observed several small gossan zones within the geophysical survey area. These result from sulfide mineralization that is oxidizing at the surface and their presence is encouraging. The writer also collected a piece of float, or loose rock, just north of the survey area that contains abundant stringers of pyrite and carbonate in an calcareous-looking matrix. Outcrop in this area was argillite and topography and ice movement imply that this sample originated south of where it was found, in the direction of the Unuk claims. This sample returned values of .01 oz gold/ton, 31.5 ppm silver (roughly 1 oz/ton), 157 ppm As, 18 ppm Cu, 116 ppm Pb, 35 ppm Sb and 61 ppm Zn.

The Coul claims are underlain by Unuk River Formation of lower Jurassic age and occupy an east-west section across the

Unuk River Valley. The western half of this block is directly along strike from the Kay and Tok claims which are owned by Consolidated Stikine Silver.

At least 4 different styles of gold and silver mineralization are known to occur on this property (Kuran, 1985) which is only about 4 kilometers from the Coul 1 claim.

The first type consists of stockworks of sulfide veinlets mineralized by pyrite, tetrahedrite, galena and sphalerite which are associated with silver and gold values. These stockworks occur in rhyolite, banded rhyolite, rhyolite breccias and volcanic fragmentals which trend to the northeast and dip fairly steeply to the west. The second type of mineralization consists of gold values associated with disseminated pyrite and fault gouge in north-south striking shear zones. This type of mineralization was outlined in a 1985 drilling program. The third type of mineralization occurs as massive sulfides in cross fractures. Extremely high grade gold values are associated with these sulfides. The fourth type of mineralization occurs as north-northeast trending zones of massive sulfides consisting of layered pyrite, galena and sphalerite located on the flanks of volcanic domes.

The Icey, Knip, Bou and Irv claims lie in a mountainous area to the south of Brucejack Lake. The Irv claim lies about 2.5 kilometers southeast of Brucejack Lake and are along strike with several fault splays branching off of the Brucejack lineament (Figure 2). The Icey 1 and 2 claims lie directly on the trend of both the Brucejack and the Sulphurets lineaments.

In his examination of the southern parts of the subject property, the writer noted several well developed gossans. The local topography is steep and rocky but can be worked with helicopter support.



### PROPERTY GEOPHYSICS

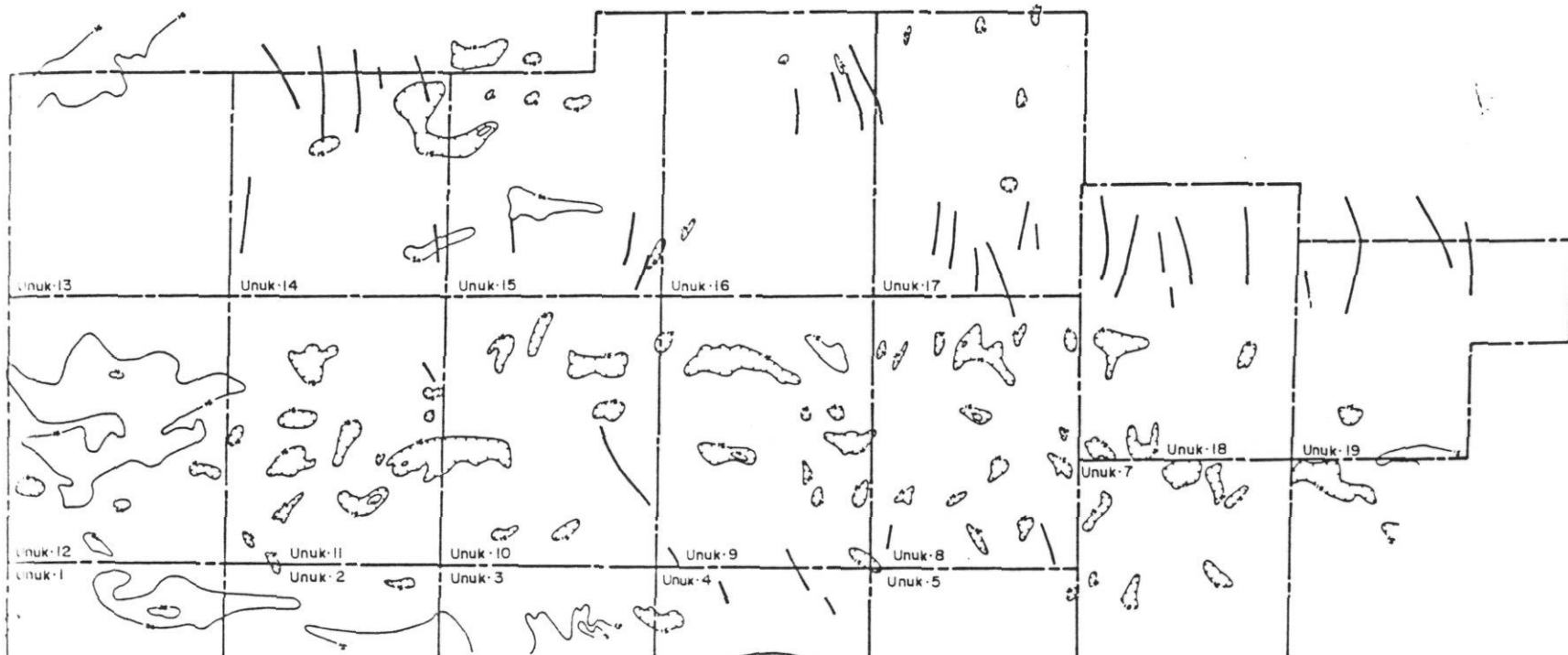
During November, 1986, airborne Magnetometer and VLF-EM surveys were conducted over the Unuk and Coul claims. For the sake of comparison with known mineralization, several test lines were flown over the Brucejack Lake deposit.

The test lines showed that the Lacana/Newhawk mineralization is associated with a sharp magnetic low with local conductivity highs (Figure 6 and Appendix III). The magnetic results (Figures 5a, b and c) of the airborne survey report show a general magnetic low striking north-northwest along McTagg Creek with up to 10 local lows along this trend. In addition, 3 or 4 conductivity highs (VLF conductors) also occur along the trend. Two of these are associated with a local magnetic low on the east side of McTagg Creek on the Unuk 21 claim. These results are very encouraging especially in light of the fact that McTagg Creek is relatively easily workable and would provide an excellent base camp location.



Numerous other magnetic lows and highs occur throughout the property including a coincident magnetic low and VLF conductor on the northern part of the Unuk 14 claim. The writer's reconnaissance geological work showed this area to be in the vicinity of a gossan that may have been the source of the float sample which contained abundant pyrite and 1 oz Ag/ton. This area is also ice-free and should be given a high priority.

The headwater of Gingras Creek on the Unuk 24 claim also has coincident mag lows and VLF conductors in an area that is easily workable. This target area should also be given a high priority.

The northwest extension of the 2 parallel Brucejack lineaments can be identified on the eastern side of the Unuk claim



Instrument: BARRINGER M-123 Magnetometer  
 Data corrected for diurnal variations  
 Base value = 56,000 nT  
 Contour interval = 500 nT  
 Plotted values:  $\pm 100$   
 Sensor elevation: 60 metres

 Magnetic low  
 VLF-EM Conductor



0 0.5 1 2 3 kilometres

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AIRBORNE GEOPHYSICAL  
 SURVEY RESULTS

Scale: 1: 50,000	Date: July 1987	N.T.S. 104-B/8,9	Figure: 5 a
By: J.P. SORBARA & Associates			

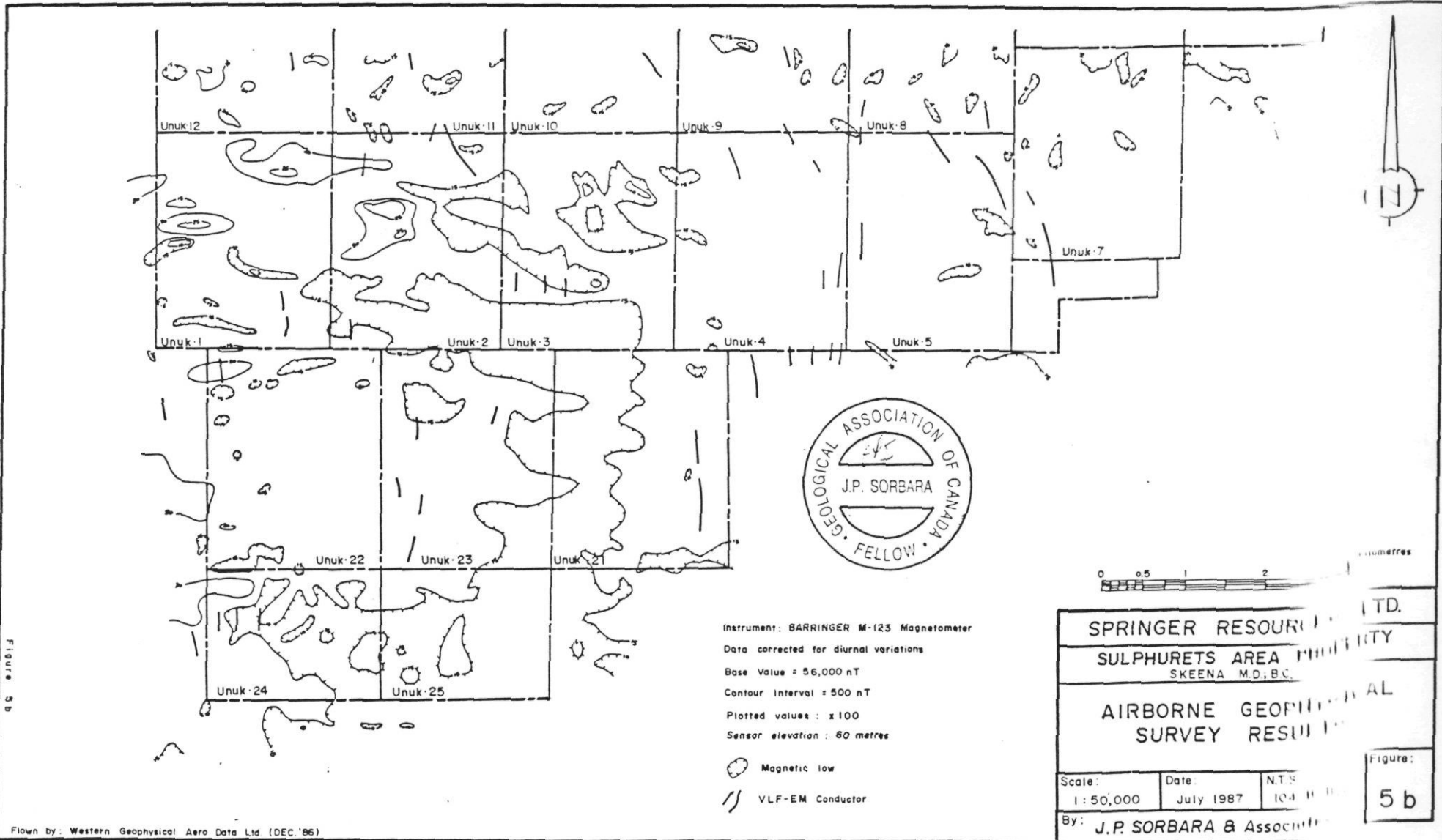


Figure 5b

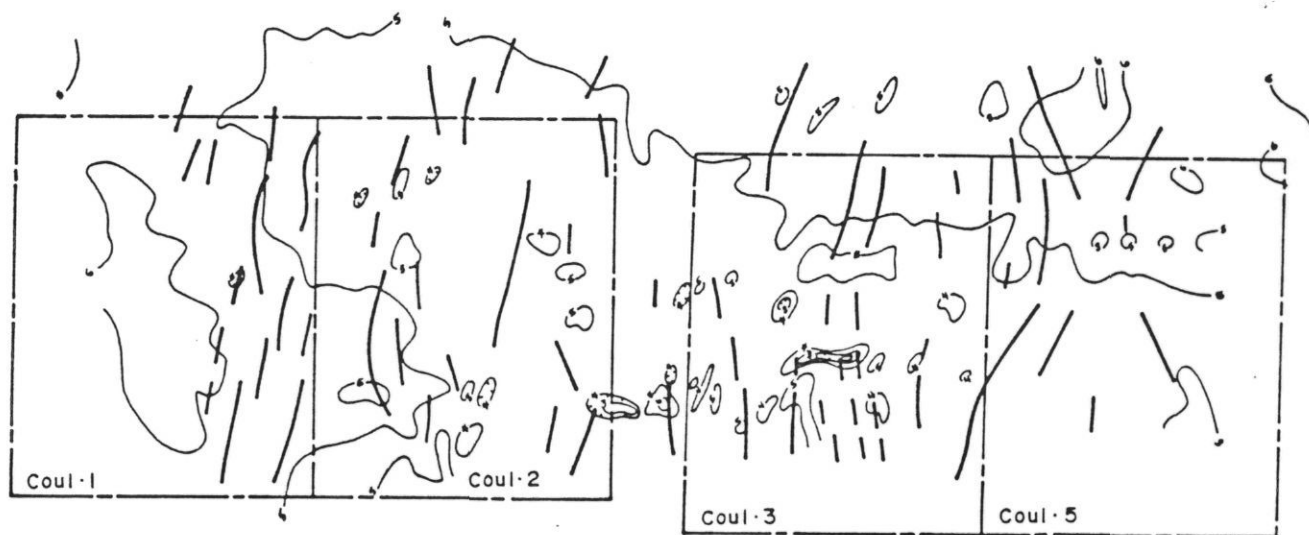
Flown by: Western Geophysical Aero Data Ltd. (DEC '86)

Instrument: BARRINGER M-123 Magnetometer  
 Data corrected for diurnal variations  
 Base Value = 56,000 nT  
 Contour Interval = 500 nT  
 Plotted values : x100  
 Sensor elevation : 60 metres

○ Magnetic low  
 // VLF-EM Conductor

SPRINGER RESOURCES LTD.		
SULPHURETS AREA SKEENA M.D., B.C.		
AIRBORNE GEOPHYSICAL SURVEY RESULTS		
Scale: 1:50,000	Date: July 1987	N.T.S. 104 11 11
By: J.P. SORBARA & Associates		

Figure:  
5b



Instrument: BARRINGER M-123 Magnetometer

Data corrected for diurnal variations.

Base value = 57,000 nT

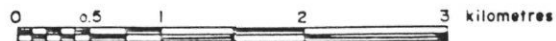
Contour interval = 100 nT

Plotted values: x 100

Sensor elevation: 60 metres

 Magnetic low

 VLF-EM Conductor



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SULPHURETS AREA PROPERTY  
SKEENA M.D.; B.C.

AIRBORNE GEOPHYSICAL  
SURVEY RESULTS

Scale:

1: 50,000

Date:

July 1987

N.T.S.

104-B/8,9

Figure:

5 c

By: J.P. SORBARA & Associates

block. Much of this area is under ice, however, some areas are exposed and may be examined with helicopter support.

The Coul claims on the west side of the property also contain numerous north-south VLF anomalies. The Coul 1 claim is along strike from showings on the Kay, Tok and GNC claims owned by Stikine Silver Ltd. The Coul 1 claim also contains an elongated Magnetic high which may be a small intrusive body.

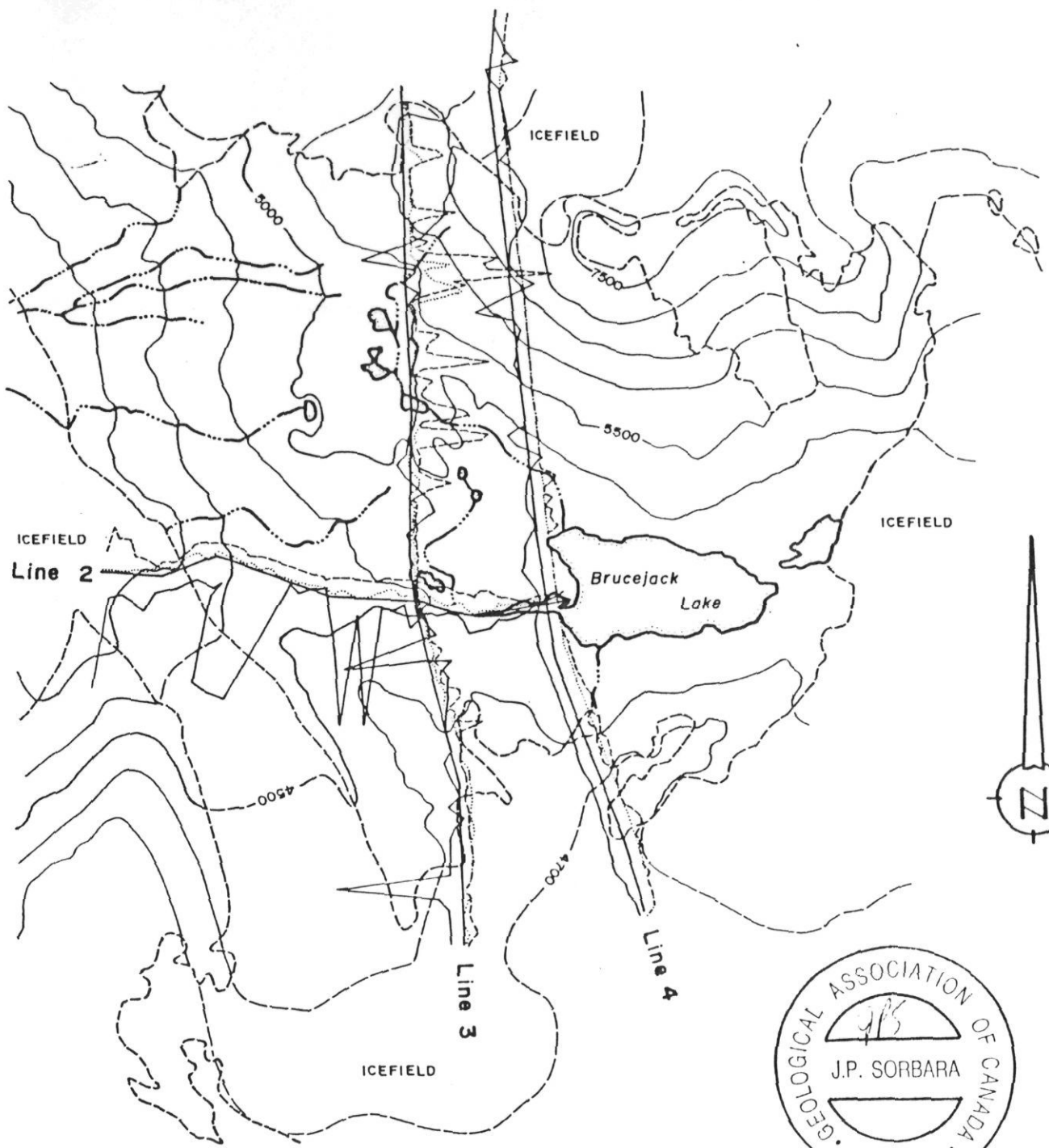
The text of the airborne geophysical report is included in Appendix III. The original maps from this report have been reduced in size and comprise Figures 5a, b and c.

#### CONCLUSIONS

The subject property is underlain by volcanic and sedimentary rocks and contain favourable gossan zones. Part of the claim area (roughly 40%) is covered by ice and cannot be explored on the ground. The remaining 60% of the property is characterized by wooded and barren valleys that afford good camp sites and excellent exposure for prospecting.

The northern part of the property (the Unuk claims) lie directly along the trend, to the north, of several recently-discovered mineralized zones, including the West Zone at Brucejack Lake where underground development has been started on what may become a major producing mine. Accessibility has not proved to be a major problem for this development work.

Results from the airborne magnetometer and VLF-EM survey, which accompany this report, show that the 2 parallel Brucejack lineaments, defined on the Lacana/Newhawk ground continue in a somewhat disjointed fashion across the Unuk claim block which is part of the subject property.



Magnetometer (100nT/cm.)

VLF-EM (10% / cm.)

Seattle

Annapolis



**SPRINGER RESOURCES LTD.**

**SULPHURETS AREA PROPERTY**  
SKEENA M.D.; B.C.

**Airborne Geophysical Survey Results**  
**TEST LINES OVER BRUCEJACK LAKE**  
(after PEZZOT '87)

Scale: 1:38,000 app.	Date: July 1987	N.T.S. 104-B/8,9	Figure:
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By **J.P. SORBARA & Associates**

**6**

The Brucejack Lake deposit is characterized by a sharp magnetic low with local conductivity highs on VLF-EM conductors. The airborne geophysical survey has shown that coincident and/or associated magnetic lows and VLF-EM conductors occur in several locations on the joint venture property. Some of these occur in areas of ice cover but many lie in areas that are easily workable, such as the valley of McTagg Creek. These results are seen as highly encouraging and should be followed up by ground exploration.

Some of the southern claim blocks, namely the Icey 1 & 2 lie along the southern extension of the Brucejack lineament and Sulphurets lineaments (Figure 2). The Irv 1 & 2 lie along strike from splays off of the Brucejack lineament which seem to be associated with mineralization in the Brucejack Lake area located about 2.5 kilometers to the northwest.

The writer concludes that the Unuk, Coul, Icey, Irv, Knip and Bou claims which are the subject of this report definitely have the potential to host precious metal mineralization similar to that found in nearby areas such as the Lacana/Newhawk property and the Kay and Tok claims.

An exploration program designed to test that potential is warranted and is recommended by the writer.

#### RECOMMENDATIONS

In order to properly evaluate the subject property, a two-phased exploration program is recommended with the second phase being contingent upon favourable results from Phase I. The first phase of work should be an extensive summer exploration program of geological mapping, prospecting and reconnaissance soil sampling. This work should also include some ground

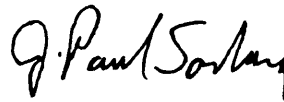
magnetometer and VLF-EM follow-up of the anomalies discovered by the airborne geophysical survey.

In order to accomplish this work, a helicopter-supported 6 man crew (project geologist, assistant geologist, prospector/blaster, 2 geological technicians and 1 cook) will be needed for about 2 months in the field. Work should start from a base camp on McTagg Creek with helicopter set-outs and fly camps for some of the targets. Base camp may be moved to the Coul claims at the appropriate time.

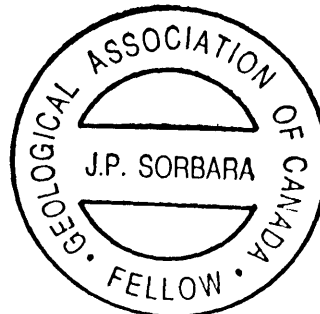
Helicopter supported evaluations of the claim groups south of Brucejack Lake, which are part of the subject property but were not covered by the airborne survey, should also be carried out. Geological mapping and rock chip sampling should be completed on these claims.

The Phase II program would involve follow-up geochemistry and preliminary diamond drilling of targets generated in Phase I. An estimated cost breakdown for these programs is given in Appendix II.

Respectfully submitted,



J. PAUL SORBARA, M.Sc., F.G.A.C.





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APPENDIX I

STATEMENT OF QUALIFICATIONS

I, J. PAUL SORBARA, of 6703 Nicholson Road, in the Municipality of Delta, in the Province of British Columbia, hereby certify:

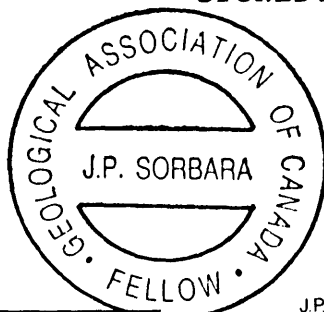
1. THAT I am a geologist residing at 6703 Nicholson Road, in the Municipality of Delta, in the Province of British Columbia.
2. THAT I graduated with a B.Sc. in geology from the University of Toronto, in the City of Toronto, in the Province of Ontario, in 1976, and with a M.Sc. in geology from the University of Toronto in 1979.
3. THAT I have practiced geology professionally from 1979 to 1987, including 5 years as an Exploration Geologist with Cominco Ltd.
4. THAT I am a registered Fellow of the Geological Association of Canada.
5. THAT this report is based upon a thorough review of published and printed reports and maps on the subject property and the surrounding area. The writer has not visited the property personally.
6. THAT I have not received, nor do I expect to receive any direct or indirect interest in the Unuk, Coul, Icey, Knip, Bou and Irv Claims, Sulphurets Creek Area, B.C., which are the subject of this report, or any other claims within a radius of 10 kilometers.
7. THAT I do not have, nor do I expect to receive any direct or indirect interest or securities in Springer Resources Ltd.
8. THAT I consent to the use of this report in a Prospectus or Statement of Material Facts for the purpose of a private or public financing.

July 6, 1987

SIGNED:

*J. Paul Sorbara*

J. PAUL SORBARA, M.Sc., F.G.A.C.



APPENDIX II

ESTIMATED COST OF PROPOSED EXPLORATION PROGRAMS

PHASE I:

Salaries:

Project Geologist (60 days @ \$275)	\$ 16,500.00
Assistant Geologist (60 days @ \$225)	\$ 13,500.00
Prospector (60 days @ \$225)	\$ 13,500.00
2 Geological Technicians (2 x 60 days @ \$175)	\$ 21,000.00
1 Cook (60 days @ \$150)	\$ 9,000.00
	<u>\$ 73,500.00</u>

Mobilization/Demobilization	\$ 30,000.00
Helicopter Support (150 hours @ \$500)	\$ 75,000.00
Geochemistry (5,000 samples @ \$9.90)	\$ 49,500.00
Geophysical Equipment Rentals	\$ 5,000.00
Domicile (360 man days @ \$25)	\$ 9,000.00
Camp Rental & Fuel (60 days @ \$150)	\$ 9,000.00
Field Supplies	\$ 5,000.00
Report Costs	\$ 5,000.00
Project Supervision & Engineering	\$ 28,000.00
	<u>\$289,000.00</u>
Contingencies	<u>\$ 11,000.00</u>

TOTAL: \$300,000.00

NOTE: As Springer Resources Ltd. holds a 25% interest in the property, they would be expected to fund only 25% of the total cost of Phase I or \$75,000.00.

PHASE II:

Diamond Drilling (1,500 M @ \$100/M)	\$150,000.00
Helicopter Support (150 hours @ \$500)	\$ 75,000.00
Salaries: 1 Geologist (60 days @ \$275)	\$ 16,500.00
1 Technician (60 days @ \$175)	\$ 10,500.00
Domicile and Camp Costs	\$ 8,000.00
Assays	\$ 9,000.00
Field Supplies	\$ 2,000.00
Report Costs	\$ 4,000.00
Project Supervision & Engineering	<u>\$ 25,000.00</u>

TOTAL: \$300,000.00

NOTE: As Springer Resources Ltd. holds a 25% interest in the property, they would be expected to fund only 25% of the total cost of Phase II or \$75,000.00.

APPENDIX III

AIRBORNE GEOPHYSICAL SURVEY REPORT

HI-TEC RESOURCE MANAGEMENT LTD.  
GEOPHYSICAL REPORT  
ON AN  
AIRBORNE VLF-ELECTROMAGNETOMETER AND  
MAGNETOMETER SURVEY  
SULPHURETS PROJECT  
UNUK 1-19,21-25 AND COUL 1-4 CLAIMS  
SKEENA MINING DIVISION  
LATITUDE: 56°32'N LONGITUDE: 130°19'W  
N.T.S. 104B/9E,9W,10E  
AUTHOR: E.Trent Pezzot, B.Sc.,  
Geophysicist  
DATE OF WORK: Nov.14/86-Dec.4/86  
DATE OF REPORT: Feb.6,1987



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## INTRODUCTION

Western Geophysical Aero Data Ltd. was commissioned by Hi-Tec Resource Management Ltd. to conduct an airborne magnetometer and VLF-electromagnetometer survey across properties in the Sulphurets Creek - Unuk River area in northwestern British Columbia. Seven hundred eighty-five kilometres of survey were flown from Nov. 14 to Dec. 4, 1986. In addition, three test lines were flown in the vicinity of the Brucejack deposit to determine whether a magnetic or electromagnetic signature could be associated with the known mineralization.

The project area lies to the north and west of the Brucejack and Sulphurets Gold Zones currently optioned by Newhawk Gold Mines Ltd. and Lacana Mining Corporation. Much of the survey area is covered by glacial ice and relatively unexplored. It was the intention of this survey to provide magnetic and conductivity information to assist geological mapping and also provide direction for ground follow-up investigations.

## PROPERTY

Two claim blocks were surveyed at this time. The smaller block consists of 4 claims totalling 80 units as described below.

CLAIM NAME	RECORD NO.	UNITS	RECORD DATE
COUL 1	5211	20	Feb.28/86
COUL 2	5212	20	Feb.28/86
COUL 3	5213	20	Feb.28/86
COUL 4	5214	20	Feb.28/86

The larger block consists of 24 claims as listed on the following page and illustrated on Figure 1 of this report.



CLAIM NAME	RECORD NO.	UNITS	RECORD DATE
UNUK 1	5225	20	Feb.28/86
UNUK 2	5226	20	Feb.28/86
UNUK 3	5229	20	Feb.28/86
UNUK 4	5230	20	Feb.28/86
UNUK 5	5233	20	Feb.28/86
UNUK 6	5234	8	Feb.28/86
UNUK 7	5235	20	Feb.28/86
UNUK 8	5238	20	Feb.28/86
UNUK 9	5231	20	Feb.28/86
UNUK 10	5232	20	Feb.28/86
UNUK 11	5227	20	Feb.28/86
UNUK 12	5228	20	Feb.28/86
UNUK 13	5241	16	Feb.28/86
UNUK 14	5242	16	Feb.28/86
UNUK 15	5243	20	Feb.28/86
UNUK 16	5239	20	Feb.28/86
UNUK 17	5240	20	Feb.28/86
UNUK 18	5236	20	Feb.28/86
UNUK 19	5237	20	Feb.28/86
UNUK 21	5245	20	Feb.28/86
UNUK 22	5246	20	Feb.28/86
UNUK 23	5247	20	Feb.28/86
UNUK 24	5248	12	Feb.28/86
UNUK 25	5249	12	Feb.28/86

#### LOCATION AND ACCESS

The survey area is located some 70 kilometres north of Stewart, B.C. in NTS 104B/9E,9W and 10E and the Skeena Mining Division. The approximate geographical coordinates of the centre of the claim blocks are latitude 56°32'N and longitude 130°19'W.

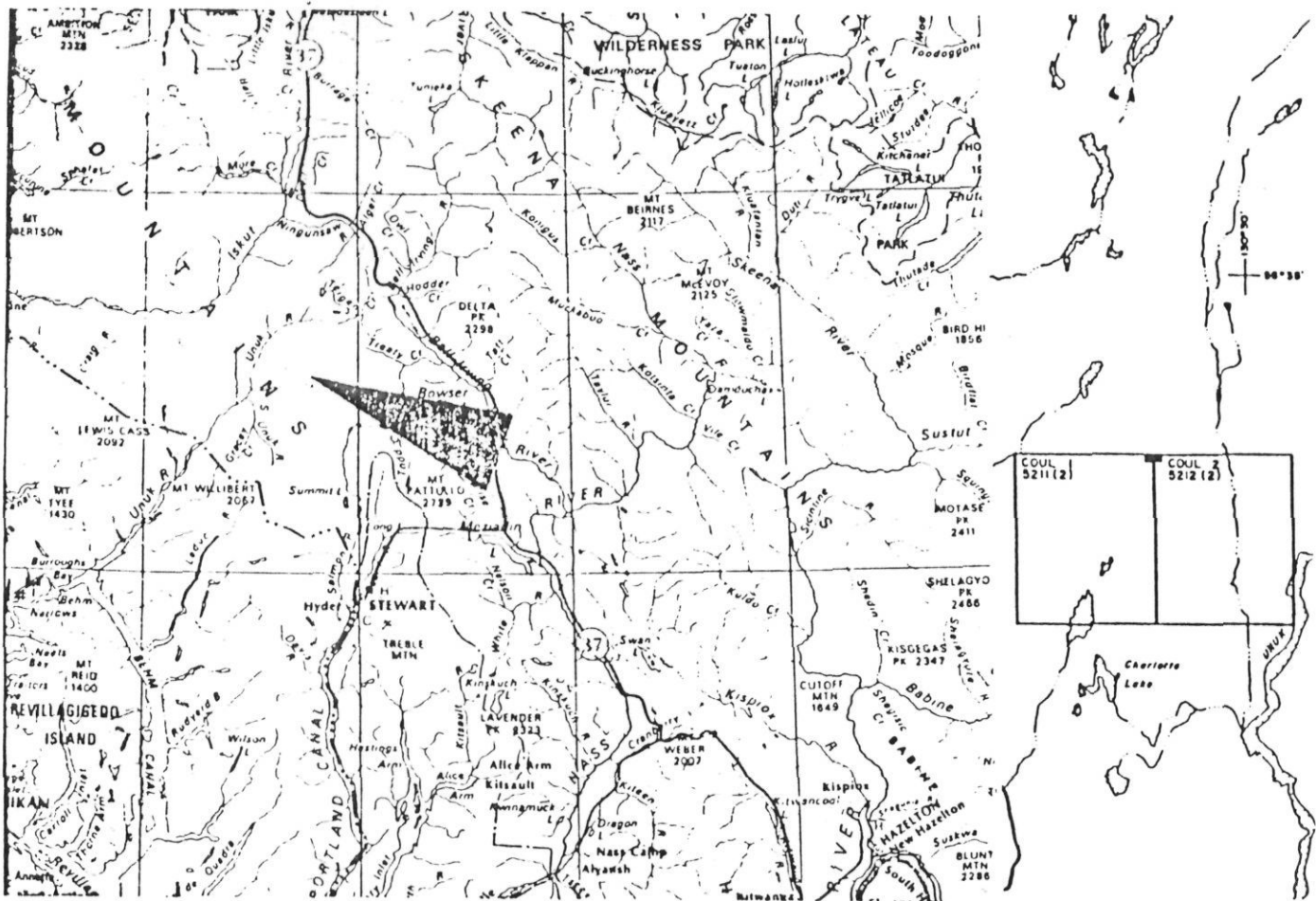
No vehicle access to this area is available at this time and normal access procedures involve helicopter ferry from Stewart, B.C. Vehicle access is available to a point some 30 km southeast of the properties and plans to extend the road to the Brucejack Lake area (10 km southeast of the property) are being considered by some of the other operators in the area.

#### GENERAL GEOLOGY

The majority of the UNUK claim group is overlain by glacial



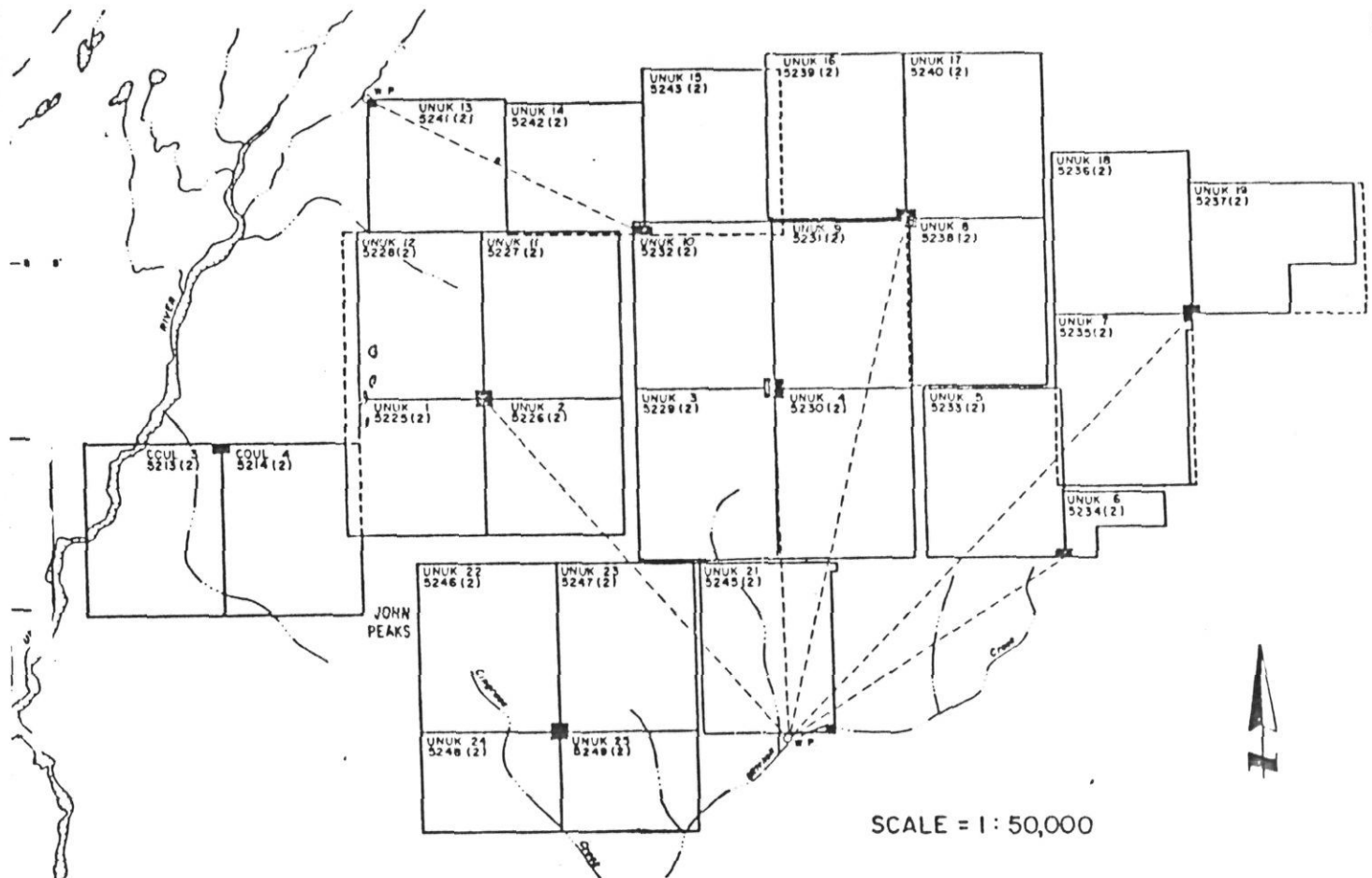




SCALE = 1 : 2,000,000



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Geophysical  
Aero Data Ltd.



HI-TEC RESOURCE MANAGEMENT LTD.  
 —SULPHURETES PROJECT—  
 LOCATION AND CLAIMS MAP

FIGURE 1

ice and is mapped as unexplored on the Geological Survey of Canadas' Map 9-1957 (applicable portion reproduced as Plate 1A in this report). The westernmost claims COJL 1 and COUL 2 are mapped as being underlain by intrusive rocks, mainly quartz monzonite, granodiorite and granite. To the south of Sulphurets Creeks, this map indicates Jurassic volcanics and its' metamorphosed derivatives as being the principal rock groups.

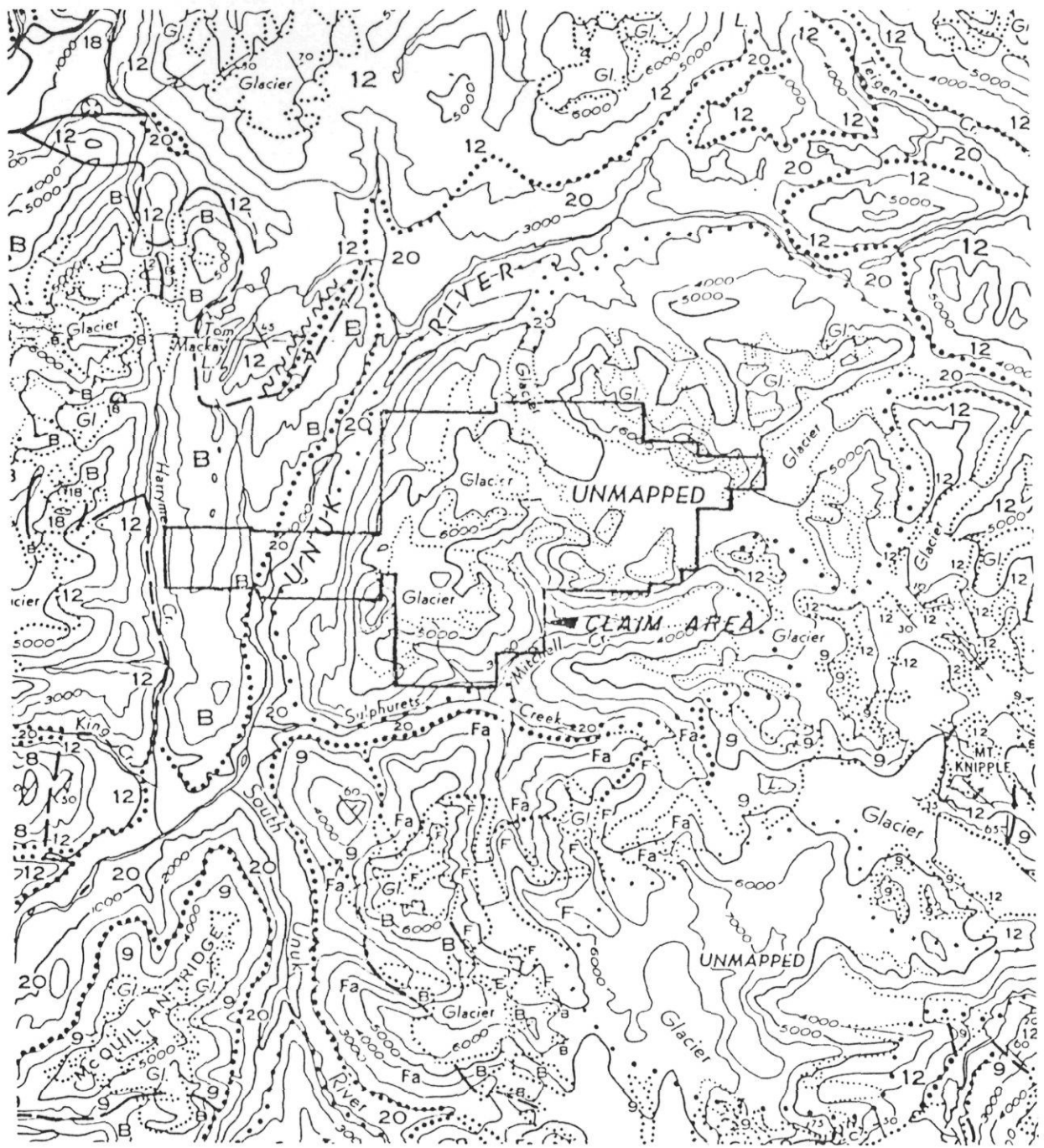
A more recent Geological Survey of Canada publication is Map 1418A; a 1:1,000,000 scale compilation of NTS map sheets 104 and 114 completed in 1974 (Plate 1B of this report). This map also indicates Jurassic volcanics and metamorphics as being the principal rock types but indicates that small areas of Coast Plutonic complex (phyllite, layered gneiss, schist, marble, mylonite) and Early Tertiary granodiorites are also present. It contradicts the 1957 mapping by showing the westernmost portion of the Coul claims to be underlain by upper Triassic siltstone, chert, sandstone and Tuff.

No detailed geological descriptions of the nearby Sulphurets, Brucejack and Snowfield gold zones were available to the author. Conversations with local miners and geologists indicate that the Brucejack zone is a high grade epithermal deposit reported to contain 1,000,000 tonnes averaging 0.826 oz gold per ton. This zone is known to contain pyrite, galena, ruby silver and native gold and appears to be related to a regional, north-south trending fault zone. A projection of this fault extends beneath the glacier on the UNUK claim group.

#### PREVIOUS WORK

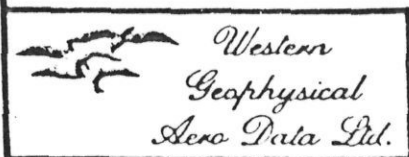
No previous work is known of by the author on the UNUK and COUL claims. A high altitude (2700 metres A.S.L.)





SCALE = 1:253,440

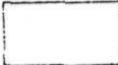
GENERAL GEOLOGY (9-1957)





# LEGEND:

## JURASSIC AND CRETACEOUS

 JKd DEZADEASH GROUP: greywacke, argillite, chert, conglomerate, minor coal.  
JKs siltstone, greywacke, conglomerate, shale (upper HAZELTON GROUP in part)

 JKk KLUANE schist

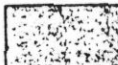
## JURASSIC

### MIDDLE AND UPPER JURASSIC

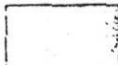
 JHs HAZELTON GROUP: siltstone, greywacke, conglomerate, shale

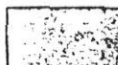
### MIDDLE JURASSIC

 mJHs HAZELTON GROUP: siltstone, greywacke, sandstone, tuff


 mJsv volcanic breccia, conglomerate, sandstone, tuff  
mJvb basalt, pillow lava, tuff, volcaniclastic rocks  
mJvr rhyolite, breccia, tuff, andesite

### LOWER AND MIDDLE JURASSIC

 JL LABERGE GROUP: greywacke, conglomerate  
Jl INKLIN: greywacke, siltstone  
Jic INKLIN: limestone  
Jp shale

 JT TAKWAHONI: conglomerate, grit, greywacke, sandstone, shale  
Jcg conglomerate, grit, greywacke


### LOWER JURASSIC

 IJs quartzite, greywacke, argillite  
IJsv breccia, tuff, conglomerate, sandstone


 IJv andesite, basalt

## TRIASSIC AND JURASSIC

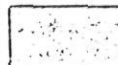
### UPPER TRIASSIC AND LOWER JURASSIC

 IJsn SHONEKTAW NAZCHA: porphyry, agglomerate, siltstone, tuff  
IJtv TAKLA GROUP: andesitic, basaltic flows  
IJtw TAKLA GROUP: greywacke, tuff, breccia, conglomerate, shale, limestone


## TRIASSIC


 Ts tuff, siltstone, limestone, breccia

### UPPER TRIASSIC

 uTKs KING SALMON: greywacke  
uTp phyllite, argillite, siltstone, greywacke, limestone  
uTs siltstone, chert, sandstone, tuff  
uTsv undifferentiated andesitic volcanic and clastic sedimentary rocks

## JURASSIC

 Jy syenite  
Jyd syenodiorite  
Jgd granodiorite  
Jqd quartz diorite  
Jdi diorite  
Jb gabbro

 sn phyllite, layered gneiss, schist, marble, mylonite



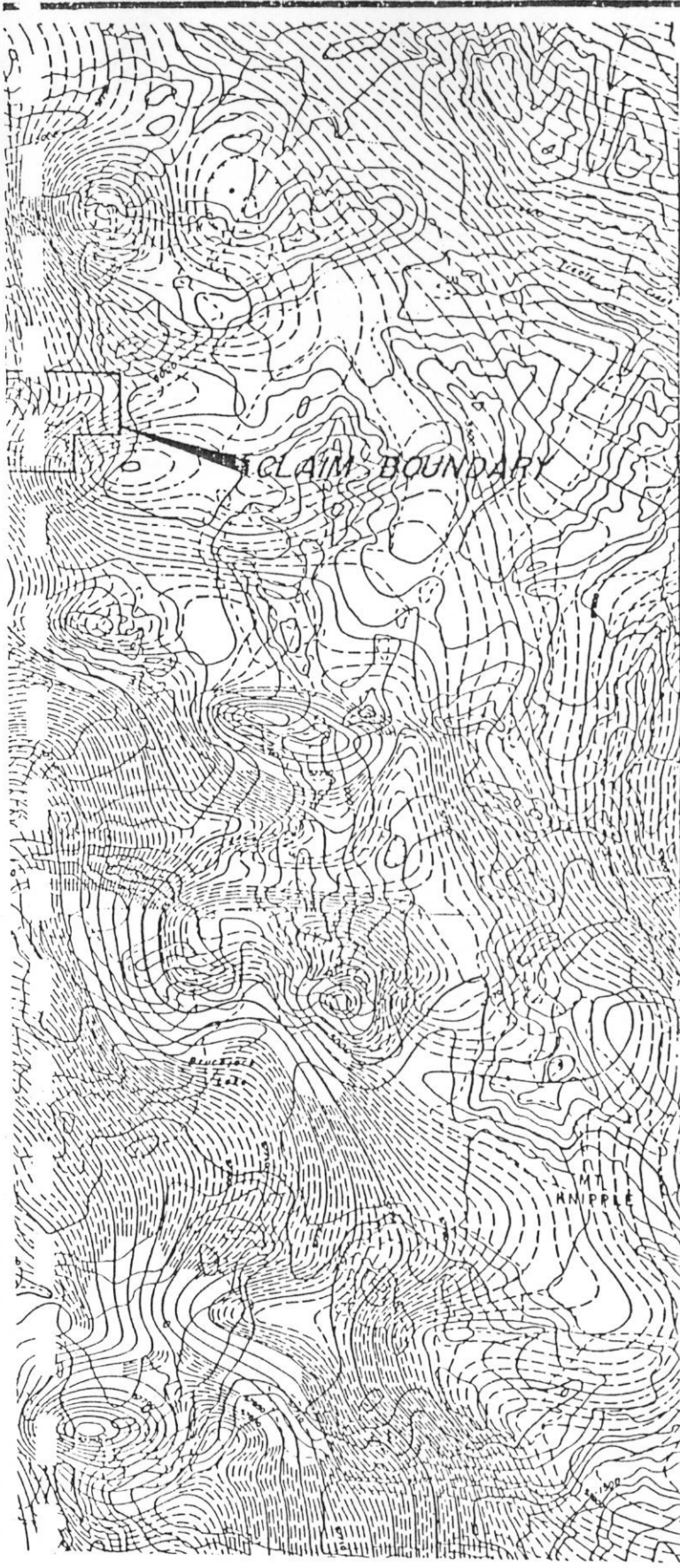
aeromagnetic survey was flown over this area from November 1975 to February 1978. The results of this survey applicable to these claims are published by the Geological Survey of Canada as maps 9212G, 9213G and 9224G. Portions of these maps are reproduced as Plate 2 in this report and a description of the trends observed is given under the Discussion of Results section of this report.

#### AIRBORNE VLF-ELECTROMAGNETIC AND MAGNETIC SURVEY

This survey simultaneously monitors and records the output signal from a proton precession magnetometer and two VLF-EM receivers installed in a bird designed to be towed 100 feet below a helicopter. A gimbal and shock mounted TV camera, fixed to the helicopter skid, provides input signal to a video cassette recorder allowing for accurate flight path recovery by correlation between the flight path cassette and air photographs of the survey area. A KING KRA-10A radar altimeter allows the pilot to continually monitor and control terrain clearance along any flight path.

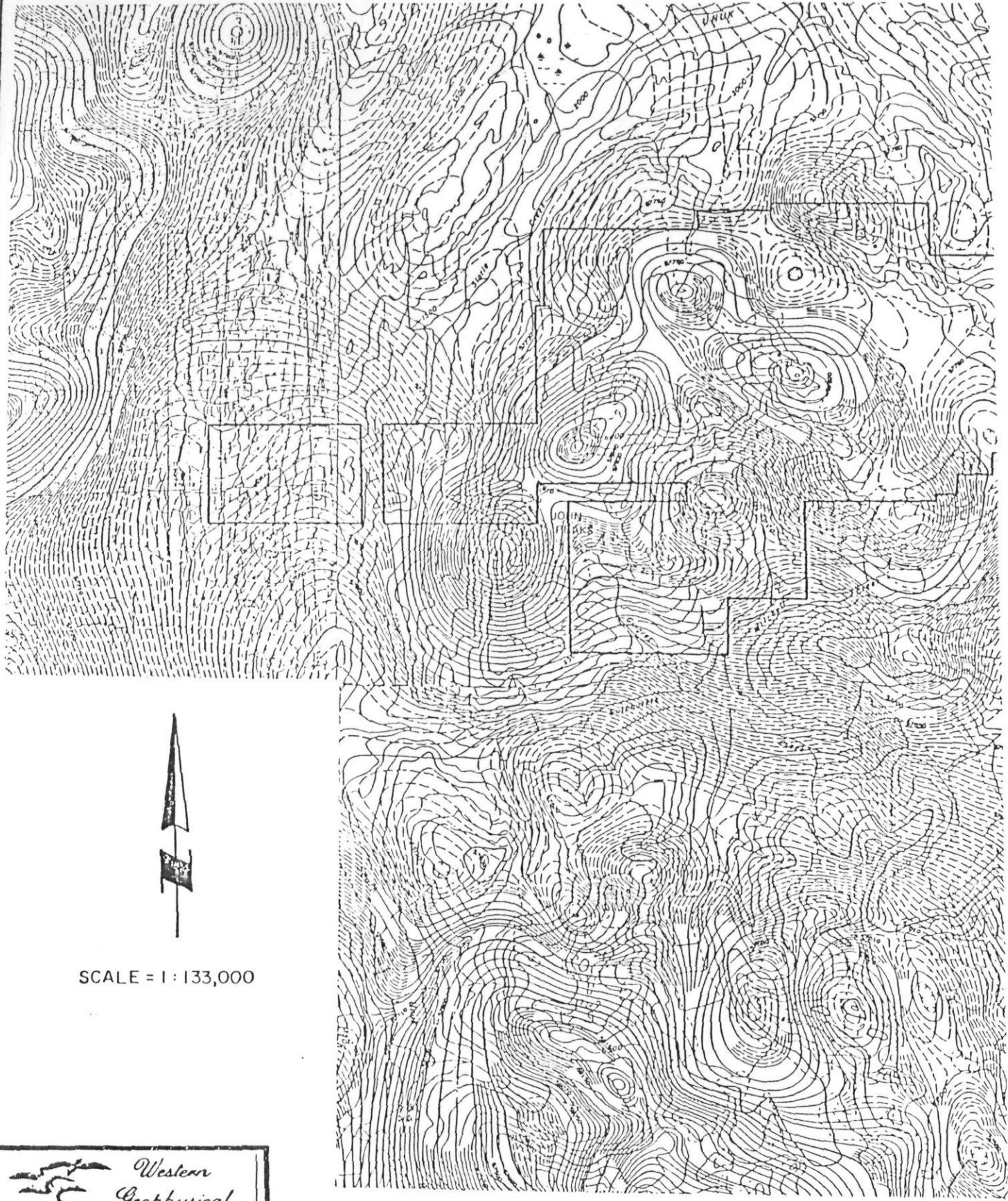
Continuous measurements of the earth's total magnetic field intensity and of the total horizontal VLF-EM field strength of two transmission frequencies are stored in three independent modes: an analogue strip chart recorder, digital magnetic tapes and a digital video recovery system. A three-pen analogue power recorder provides direct, unfiltered recordings of the three geophysical instrument output signals. A Hewlett-Packard 9875 tape drive system digitally records all information as it is processed through an onboard micro-computer. The magnetic and electromagnetic data is also processed through the onboard micro-computer, incorporating an analogue to digital converter and a character generator, then superimposed along with the date, real time and terrain clearance upon the actual flight path ~~video~~ recording to allow exact correlation between



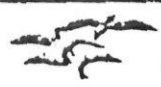


HI-TEC RESOURCE MANAGEMENT LTD.  
— SULPHURETES PROJECT —  
HIGH ALTITUDE AERO MAGNETIC MAP  
9212 G, 9213G, 9224G





SCALE = 1 : 133,000



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Aero Data Ltd.

geophysical data and ground location. The input signals are averaged and updated on the video display every second. Correlation between the strip chart, digital tape and the video flight path recovery tape is controlled via fiducial marks common to all systems. Line identification, flight direction and pertinent survey information are recorded on the audio track of the video recording tape.

### DATA PROCESSING

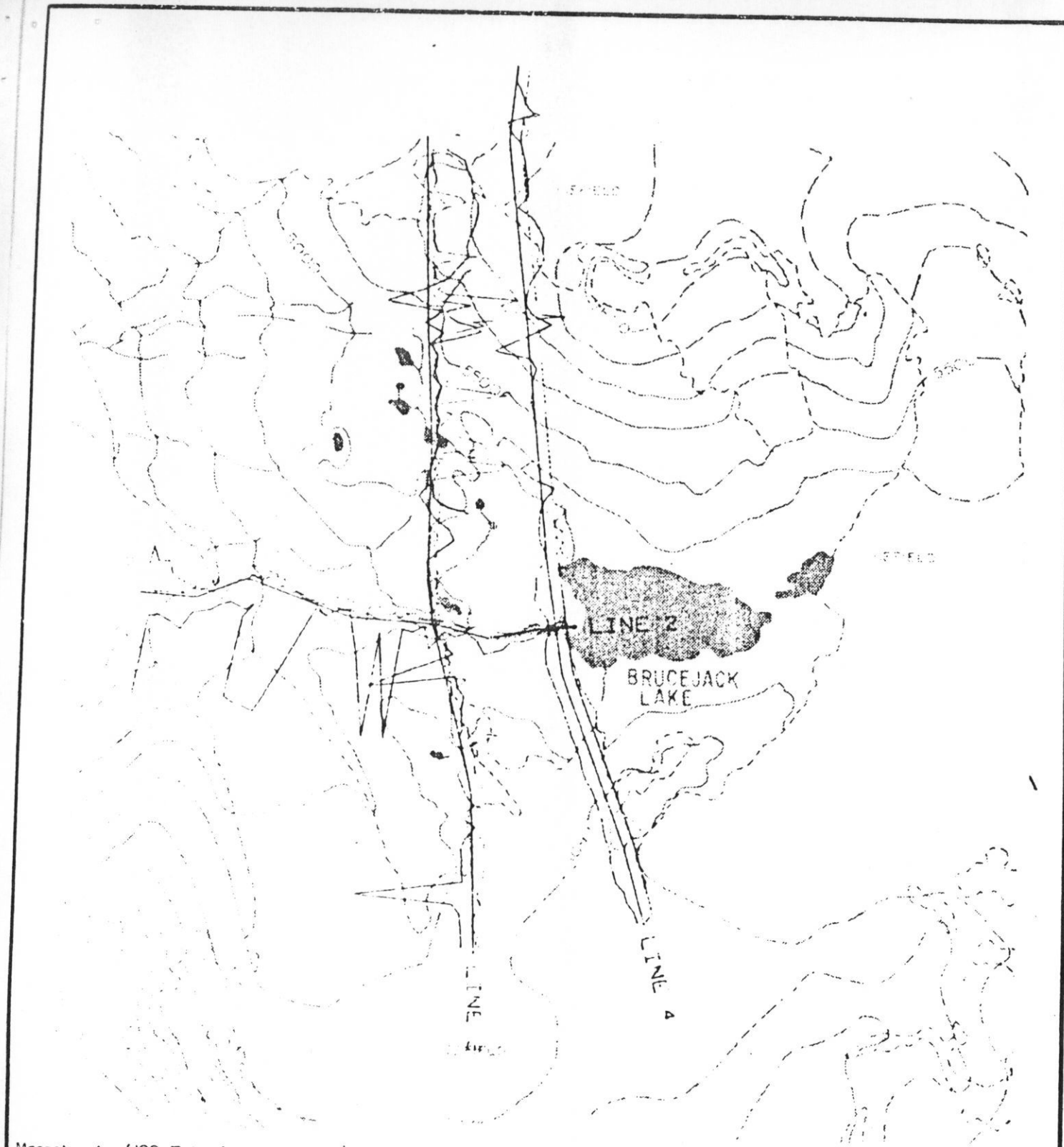
Field data is digitally recorded, with the time of day fiducial, on magnetic cassettes in a format compatible with the Hewlett-Packard 9845 computer. The recovered flight path locations are digitized and the field data is processed to produce plan maps of each of the parameters. A variety of formats are available in which to display this data.

Total field intensity magnetic information is routinely edited for noise spikes and corrected for any diurnal variations recorded on a base magnetometer located in the survey area.

Total field intensity VLF-EM signals are sensitive to topographic changes and sensor oscillation. Oscillation effects can be reduced by filters tuned to the dominant period. Long period effects attributable to topography can be removed by high pass filtering the planimetric data.

### DISCUSSION OF RESULTS

The airborne magnetometer and VLF-electromagnetometer survey across the UNUK and COUL claim groups totalled seven hundred eighty-five kilometres in length. Survey lines were oriented east-west and flown on 200 metre centres with data being recorded at one second intervals. In addition three lines totalling thirteen kilometres, were flown in the vicinity of the Brucejack Gold Zone.



Magnetometer (100nT/cm) : ———  
 VLF-EM (10%/cm) : ———  
 Seattle : ———  
 Annapolis : ———

Scale = 1 : 38,000 approx.

BRUCEJACK GOLD DEPOSIT TEST

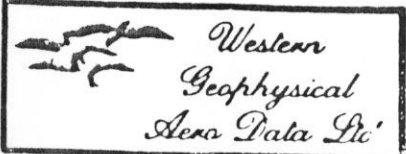


FIGURE 2

The results of the Brucejack test lines are presented as Figure 2. The magnetic data across the UNUK claims is presented in contour form as Figures 3A and 3B. Coul Creek magnetic data is presented on Figure 3C. The Annapolis frequency VLF-EM data across the UNUK claims is presented in profile format on Figures 4A and 4B. No Annapolis frequency information was recorded across the COUL claims. Seattle frequency information across the UNUK claims is presented on Figure 5A and 5B and across the COUL claims on Figure 5C.

Three test lines were flown in the vicinity of the Brucejack ore deposit to test the magnetic and VLF-EM response. The geophysical data is presented in profile format as Figure 2 in this report.

The mine portal is located near the intersection of testlines 2 and 3 and the underground workings extend 1500 to 2000 feet southwest from that point. Mineralization is associated with a major north-south trending fault, the surface expression of which is offset some 500 metres to the west of the underground workings.

The fault zone appears to be associated with a sharp magnetic low as observed on lines 2 and 3 near the mine site. No significant VLF-EM response was noted at this point. A similar magnetic low was observed on the south end of line 3 and may be related to the regional fault trend. A strongest magnetic low was observed on line 2 some 1000 metres to the west of the mine adit.

Test line 3 was flown north-south along the projected extension of the mineralization observed underground. This line was flown on the Brucejack test lines. A consistent magnetic low and conductivity high is observed on this line approximately 2 km north of the mine portal.





A high altitude aeromagnetic survey was conducted over the Iskut River area from Nov. 1975 to Feb. 1978. That portion of survey applicable to this project area is reproduced in this report as Plate 2. The UNUK claims are centred on a southwesterly trending magnetic high. This feature forms a bulge in the regional northwesterly trending isomagnetic contour lines and appears to be generated by a series of closed magnetic highs. Five distinct magnetic high features are mapped within the claims area as illustrated on Plate 2.

The magnetic contour maps presented as Figures 3A, B and C of this report are based on data gathered some 60 metres above the ground surface. This data conforms with the regional trends mapped however much more detail is observed. The large magnetic high observed on Plate 2 centred on the UNUK 1 claim appears to be generated from at least four discreet anomalies. These anomalies (Fig 3A) are generally elongated in the east-west direction and are associated with flanking magnetic lows. This dipole-type response is indicative of finite length source bodies and may be reflecting fault induced deformation of the larger northwesterly oriented trend.

Plate 2 shows a weak magnetic high trend extending southeasterly from the UNUK 1 claim across the UNUK 22 and UNUK 23 claims. This trend is also reflected in the low level magnetic data.

The southernmost claims in this group, UNUK 24 and UNUK 25, are situated on the flank of the regional magnetic trend and the low altitude magnetic data reflects a very complex geological environment. A large number of randomly sized and shaped magnetic highs and lows are mapped in this area. The source of these features are likely at or very near the surface and can probably be identified by ground geological

A large magnetic high mapped on Plate 2, centred in the southwest corner of the UNUK 9 claim, is also observed in the low-level mapping. Unlike the anomaly observed on the UNUK 1 claim, this feature appears to be generated from a single deep source.

A small, circular shaped anomaly mapped on Plate 2 in the southeast corner of the UNUK 14 claim appears in the low level magnetic data as a broad irregular shaped magnetic high with a narrow central core, elongated east-northeast and extending on to the UNUK 15 claim.

A weak magnetic high is observed on the northern half of the UNUK 16 and 17 claims in both data sets.

The magnetic highs noted above are of the shape and size typically associated with intrusive plugs. No geological support for this interpretation is known of by the author although dioritic and granodioritic intrusives are mapped in the general area.

Another major magnetic feature, less easy to explain, is a 2500 metre wide band, which runs east-west across the project area from lines 34 to 51 inclusive. This feature is composed of a large number of small, isolated magnetic lows. The individual anomalies do not appear to conform to any common size, shape or attitude but reflect similar magnetic intensities, some 200nT to 400nT below local background levels. The limited areal extent of the individual anomalies suggests near surface source bodies however the area is almost entirely covered by glacial ice. A source of the magnetic anomalies could be an east-west band of loosely consolidated rock debris; possibly a result of either glacial movement, fault gouge or an unconformable geological contact.



The Annapolis frequency VLF-EM data produced more definitive responses than the Seattle frequency information across the UNUK claim group. On the western half of the UNUK claim block, moderate VLF-EM signal amplitudes were observed with the majority of anomalies exhibiting short strike lengths of 200 to 400 metres as flagged on Figures 4A and 4B. No regional trends or lineations were mapped in this area.

Lower background levels were mapped across the eastern half of the UNUK claims, probably a result of the extensive cover of glacial ice. Moderate intensity anomalies show a broken but distinct line to line correlation indicating northerly to northwesterly trending conductivity lineations. The Brucejack and Sulphurets structural lineaments projected into this area do not show direct correlation with the VLF-EM defined lineations but parallel and subparallel trends are evident.

The Seattle frequency VLF-EM data for the UNUK claims is presented in profile format on Figures 5A and 5B. The data is generally much quieter than the Annapolis frequency information with the exception of lines 53 to 68. This "noisy" data was gathered on a different date than the rest of the data. It is unlikely that this noise was generated by a geological source.

In spite of the noise observed in this area, the northerly and northwesterly trending VLF-EM anomalies, mapped to the south in the Annapolis frequency data, are still evident. The more significant features have been flagged on the geophysical map.

The COUL 1-4 claims total 80 units and lie immediately west of the UNUK block of claims. The magnetic data is presented as Figure 2C of this report. An elliptical shaped magnetic



high, elongated north-south is observed centred on the COUL 1 claim. This feature roughly coincides with a topographic rise. Both expressions are likely caused by the same geological unit.

Two other magnetic highs are observed on these claims. One straddles the northern border of the COUL 4 claim and the other is located in its' southern portion. Both of these features are related to the large northeast/southwesterly trending magnetic high which crosses the westernmost UNUK claims as described above and illustrated on Plate 1.

A series of very small isolated magnetic highs and lows are observed across the claims. These are a result of very near surface, finite body sources and could likely be identified by ground geological investigations.

No Annapolis frequency VLF-EM data was gathered across the COUL claim group. The Seattle frequency information is presented as Figure 5C in this report. The COUL claims lie to the west of the UNUK claims, in the relatively flat bottom valley containing the Unuk River and Harrymel Creek. Numerous creeks and streams cover the area, primarily running north to northeast.

The Seattle frequency VLF-EM data reflects numerous surface conductors in this area. Most of these, as illustrated on Figure 5C, correlate with the Surface drainage systems. Conductors which are removed from these waterways do not display any significantly different characteristics. Additional information will be required to determine which of the conductors warrant detailed ground investigation. Correlation with soil geochemistry would be very useful in this area.





## RESULTS OF SURVEY

An airborne magnetometer and VLF-electromagnetometer survey was flown across the UNUK 1-19, UNUK 21-25 and COUL 1-4 claims on behalf of Hi-Tec Resource Management Ltd. Seven hundred eighty-five line kilometres of data was gathered from Nov. 14, 1986 to Dec. 4, 1986. An additional 13 kilometres was flown in the vicinity of the Brucejack gold deposit, immediately south of the UNUK claims area to test the geophysical response of that target.

The Brucejack deposit is associated with and probably controlled by a major north-south trending structural break. A sharp magnetic low was mapped across the deposit area but no significant VLF-EM response was noted. To the north of the known mineralized zone, along the host fault system, both magnetic lows and increased conductivity responses were observed.

The UNUK claim group is centred over a rugged and mountainous area north of the Brucejack gold deposit. The area is for a large part covered by glacial ice and unmapped geologically. The regional magnetic trend of this area runs northwest-southeast with a gentle gradient which increases the magnetic field by approximately 2nT/km to the northeast. The UNUK claims cover a southwesterly trending bulge in the regional isomagnetic contours. The detailed magnetic data shows this response is generated by a series of small closed magnetic highs. These anomalies are similar in size and amplitude to those generated by intrusive bodies in this geological environment. The individual anomalies are separated by easterly trending magnetic lows which likely represent faulting.

The regional northerly trending fault associated with the Brucejack gold deposit is reflected by a magnetic low which



enters the project area in the vicinity of the UNUK 5 and 7 claims. At this point the low magnetic trend forks, with one arm swinging to the northwest and the second continuing to the north. The resolution of this magnetic low drops in the claims area due to the interference from the above mentioned southwesterly trending magnetic high. A similar magnetic low strikes northwest across the property from the UNUK 21 claim, along McTagg Creek, to the UNUK 11 claim.

A number of small isolated magnetic lows are mapped, primarily on the eastern portion of the UNUK claim block. These anomalies were observed over a glaciated region however they appear to originate from near surface sources. Individual anomalies exhibit various shapes and orientations yet combined they form a distinctive band, some 2.5 km wide, which runs east-west across the claim group on lines 34 to 51 inclusive. The source of this anomalous trend is likely a zone of loosely consolidated material, possibly resulting from debris generated by glacial movement, an unconformable rock contact or fault gouge. Outcrop present at the eastern end of this trend on claims UNUK 18 and UNUK 19 should be mapped to identify the source of these anomalies.

A number of near surface magnetic anomalies are also observed on the UNUK 24 and UNUK 25 claims which are free of glacial ice and can be examined by normal prospecting techniques.

Numerous VLF-EM anomalies are observed across the UNUK property which warrant investigation. On the western half of the block, the anomalies exhibit moderate intensities and short strike lengths. To the east, the anomalies reflect larger northerly to northwesterly trending conductivity lineations. The zones run parallel to the Sulphurets and Brucejack lineaments which are projected into this area and likely reflect structural trends.



The COUL claims are located immediately west of the UNUK claims but are primarily staked over the Unuk River valley. The major southwesterly trending magnetic high which crosses the UNUK claims is present only on the easternmost of the COUL claims. The majority of these claims reflect a quiet magnetic field. The most significant magnetic feature is an elliptical shaped magnetic high, elongated north/south and centred on the COUL 1 claim. This response correlated with a topographic rise and may be reflecting a buried intrusion. A number of small, closed magnetic lows are mapped in the centre of the COUL claims, near the Unuk River. These anomalies are similar to those observed to the east on the UNUK claims and should be examined by surface mapping.

The COUL claims contain an excessive number of VLF-EM anomalies. Most of these are likely attributed to the numerous streams and creeks of the area. None of the anomalies mapped show any characteristics which separate them from the rest. Additional information will be required before assigning priorities for individual ground investigations.

#### RECOMMENDATIONS

The majority of the area surveyed is covered by glacial ice and will not lend itself to an easy application of normal prospecting techniques. Initial efforts should concentrate on detailed geological mapping and prospecting of outcrop available in stream cuts and on mountain ridges to determine the geological source of both the magnetic high trends and the sharp magnetic lows observed in the area. The small VLF-EM anomalies mapped warrant similar investigations. A limited amount of ground magnetometer and VLF-EM surveying should be undertaken to test any likely geological sources identified by this mapping. Initial efforts should



concentrate on the magnetic anomalies located on the UNUK 18, 19, 21 and 22 claims.

The COUL claims are situated in more moderate terrain however outcrop is scarce. Soil geochemical analysis would likely prove to be a very useful exploration tool in this environment. This information should be correlated with the magnetic and VLF-EM results presented in this report to select specific targets for detailed geophysics, trenching and drilling.

Respectfully Submitted,



E. Trent Pezzot, B.Sc.,  
Geophysicist



INSTRUMENT SPECIFICATIONSBARRINGER AIRBORNE MAGNETOMETER

**MODEL:** Nimbin M-123  
**TYPE:** Proton Precession  
**RANGE:** 20,000 to 100,000 gammas  
**ACCURACY:**  $\pm$  1 gamma at 24 V d.c.  
**SENSITIVITY:** 1 gamma throughout range  
**CYCLE RATES:**  
     Continuous - 0.6, 0.8, 1.2 and 1.9 seconds  
     Automatic - 2 seconds to 99 minutes in 1 second steps  
     Manual - Pushbutton single cycling at 1.9 seconds  
     External - Actuated by a 2.5 to 12 volt pulse longer than 1 millisecond.

**OUTPUTS:**  
     Analogue - 0 to 99 gammas or 0 to 990 gammas  
               - automatic stepping  
     Visual - 5 digit numeric display directly in gammas

**EXTERNAL OUTPUTS:**  
     Analogue - 2 channels, 0 to 99 gammas or 0 TO 990 gammas at 1 m.a. or 1 volt full scale deflection.  
     Digital - BCD 1, 2, 4, 8 code, TTL compatible

**SIZE:** Instrument set in console  
           30 cm X 10 cm X 25 cm

**WEIGHT:** 3.5 Kg.

**POWER REQUIREMENTS:** 12 to 30 volts dc, 60 to 200 milliamps maximum.

**DETECTOR:** Noise cancelling torroidal coil installed in air foil.



INSTRUMENT SPECIFICATIONSSABRE AIRBORNE VLF SYSTEM

## Source of Primary

Field: - VLF radio stations in the frequency range of 14 KHz to 30 KHz.

Type of Measurement: -Horizontal field strength

Number of Channels: -Two; Seattle, Washington at 24.8 KHz  
-Annapolis, Maryland at 21.4 KHz

Type of Sensor: -Two ferrite antennae arrays, one for each channel, mounted in magnetometer bird.

Output: -0 - 100 mV displayed on two analogue meters (one for each channel)  
-recorder output posts mounted on rear of instrument panel

Power Supply: -Eight alkaline 'AA' cells in main instrument case (life 100 hours)  
-Two 9-volt alkaline transistor batteries in bird (life 300 hours)

Instrument Console: -Dimensions - 30 cm x 10 cm x 25 cm  
-Weight - 3.5 Kg.



Instrument Specifications

FLIGHT PATH RECOVERY SYSTEM

i) T.V. Camera:

Model: RCA TC2055 Vidicon  
 Power Supply: 12 volt DC  
 Lens: variable, selected on basis of expected terrain clearance  
 Mounting: Gimbal and shock mounted in housing, mounted on helicopter skid

ii) Video Recorder:

Model: Sony SLO - 340  
 Power Supply: 12 volt DC / 120 volt AC (60Hz)  
 Tape: Betamax ½" video cassette - optional length  
 Dimensions: 30 cm x 13 cm x 35 cm  
 Weight: 8.8 Kg  
 Audio Input: Microphone in - 60 db low impedance microphone  
 Video Input: 1.0 volt P-P, 75 $\Omega$  unbalanced, sync negative from camera

iii) Altimeter:

Model: KING KRA-10A Radar Altimeter  
 Power Supply: 27.5 volts DC  
 Output: 0-25 volt ( 1 volt / 1000 feet) DC signal to analogue meter, 0-10 v (4mv/ft) analogue signal to microprocessor  
 Mounting: fixed to T.V. camera housing, attached to helicopter skid



INSTRUMENT SPECIFICATIONSDATA RECORDING SYSTEMi) Chart Recorder

Type: Esterline Angus Miniservo III  
Bench AC Ammeter - Voltmeter  
Power Recorder.

Model: MS 413B

Specification: S-22719, 3-pen servo recorder

Amplifiers: Three independent isolated DC  
amplifiers (1 per channel)  
providing range of acceptable  
input signals.

Chart: 10 cm calibrated width z-fold  
chart.

Chart Drive: Multispeed stepper motor  
chart drive, Type D850, with  
speeds of 2,5,10,15,30 and 60  
cm/hr. and cm/min.

Controls: Separate front mounted slide  
switches for power on-off,  
chart drive on-off, chart  
speed cm/hr. - cm/min. Six  
position chart speed selector  
individual front zero  
controls for each channel.

Power Requirements: 115/230 volts AC at 50/60 Hz  
(Approximately 30 W).

Writing System: Disposable fibre tipped ink  
cartridge (variable colors)

Dimensions: 38.6 cm X 16.5 cm X 43.2 cm

Weight: 9.3 kg.





ii) Digital Video Recording System

Type: L.M. Microcontrols Ltd.  
Microprocessor Control Data  
Acquisition System.

Model: DADG - 68

Power Requirements: 10 - 14 volts DC, Maximum 2  
amps.

Input Signal: 3,0 - 100 mvolt DC signals  
1,0 - 25 DC signals

Microprocessor: Motorola MC-6800

CRT Controller: Motorola MC-6845

Character Generator: Motorola MCM-6670

Analogue/Digital  
Convertor: Intersil 7109

Multiplexer: Intersil IH 6208

Digital Clock: National MM 5318 chip  
9 volt internal rechargeable  
nickle-cadmium battery.

Fiducial Generator: internally variable time set  
controls relay contact and  
audio output.

Dimensions: 30 cm X 30 cm X 13 cm

Weight: 3 kg.

iii) Digital Magnetic Tape

Type: Hewlett Packard cartridge  
tape unit.

Model: 9875A

Power Requirements: 24 volt d.c.

Data Format: HP'S Standard Interchange  
Format (SIF)



Tape Cartridge: HP 98200A 225K byte cartridge  
compatible with HP Series  
9800 desktop computers.

Tape Drive: Dual tape drives providing up  
to 8 hours continual  
recording time.

Controller: Internal micro-computer  
provides 23 built in commands  
External computer generated  
commands.

## STATEMENT OF QUALIFICATIONS

NAME: PEZZOT, E. Trent

PROFESSION: Geophysicist - Geologist

EDUCATION: University of British Columbia -  
B.Sc. - Honors Geophysics and Geology

PROFESSIONAL  
ASSOCIATIONS: Society of Exploration Geophysicist

EXPERIENCE: Three years undergraduate work in geology -  
Geological Survey of Canada, consultants.

Three years Petroleum Geophysicist,  
Senior Grade, Amoco Canada Petroleum Co. Ltd.

Two years consulting geophysicist,  
Consulting Geologist - British Columbia,  
Alberta, Saskatchewan, N.W.T., Yukon,  
Western U.S.A.

Nine years geophysicist with White  
Geophysical Inc. and Western Geophysical  
Aero Data.

