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92H/9

REPORT ON A PORPHYRY GOLD-COPPER  
PROSPECT ON THE BOCH AND MAC CLAIMS  
AT JURA, NEAR PRINCETON,  
BRITISH COLUMBIA.

by

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SUNDIAL RESOURCES LTD.

Kamloops Mining Division  
NTS 92 H/9  
Long. 120 27'W Lat. 49 34'N

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## 1.0 INTRODUCTION

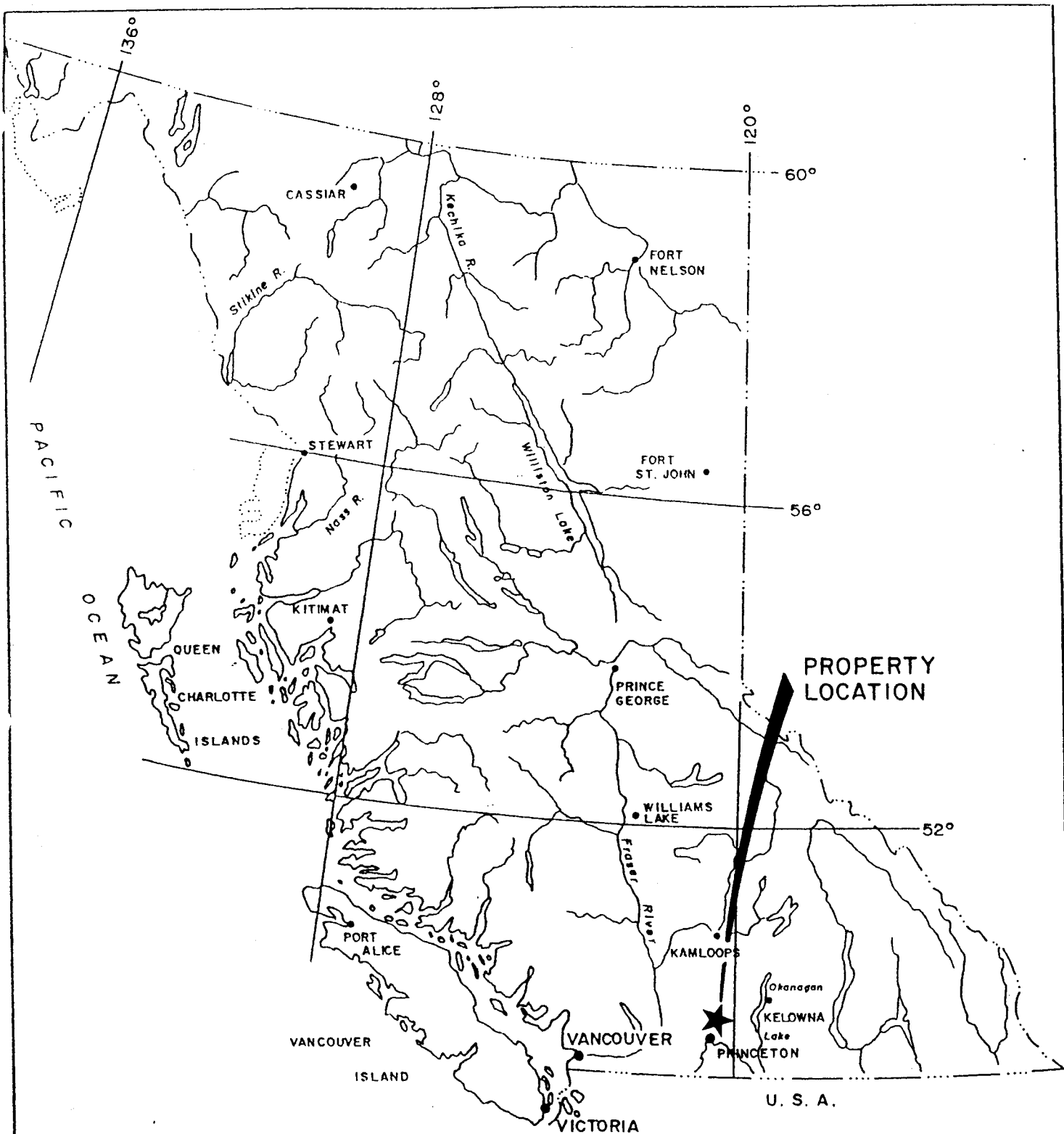
### 1.1 General Statement

Sundial Resources, a private British Columbia corporation, has acquired five claims, totalling 55 units, near Princeton in the southern interior of the province. The property is believed to comprise a significant porphyry gold-copper prospect only partly tested in the course of several exploration campaigns over the last 30 years.

This report constitutes a summary of previous work in the area of the claims, a hypothesis regarding untested targets on the property and an invitation to an incoming party to participate in further exploration and development of the prospect. Terms of participation are negotiable but are envisaged to include an option to earn a majority interest in stages in return for substantial expenditures on the claims and annual cash/stock payments to Sundial. In addition to its equity position, Sundial also wishes to retain a royalty interest in the property. The option will be convertible into a joint venture upon vesting by the third party.

### 1.2 Location and Access

The claims are located near Jura at 120 27' W. Long. and 49 34' N. Lat., some 300 km. by road east of Vancouver and 12 km. north of the town of Princeton (Fig. 1). Access is excellent year round. The property is served by a paved road running from Princeton to Summerland in the Okanagan valley. A network of old logging roads provides access to most parts of the ground. A CP Rail trunkline



**BRITISH COLUMBIA**

Scale 1:7,500,000 approx.

<b>SUNDIAL RESOURCES LTD.</b>		
<b>GENERAL LOCATION MAP</b>		
PRINCETON AREA BRITISH COLUMBIA		
Scale As Indicated	Date March, 1989	N.T.S. 92 H/9
J.E. Christoffersen P. Eng.		Figure 1

also passes through the property.

### 1.3 Physical Features and Climate

The property occupies the summit of a broad ridge separating the Summers Creek valley to the west and the Hayes Creek valley to the east (Fig. 2). The terrain is dominated by rolling grassland and parkland in the southern part of claim block passing into a thicker forest cover of pine, spruce, fir and poplar north of Christian Creek. Maximum relief is about 460 m. from Hayes Creek in the east to the ridge top at an elevation of 1250 m.

The climate is pleasantly semi-arid, typical of much of the interior plateau. Rainfall is light, averaging about 50 cm (20") per year, largely in the form of snow during the winter. Summers are hot and dry and winters moderately cold.

### 1.4 Claims

The property comprises five modified-grid claims totalling 55 units in the Similkameen Mining Division (Fig. 2). Claim details are listed below.

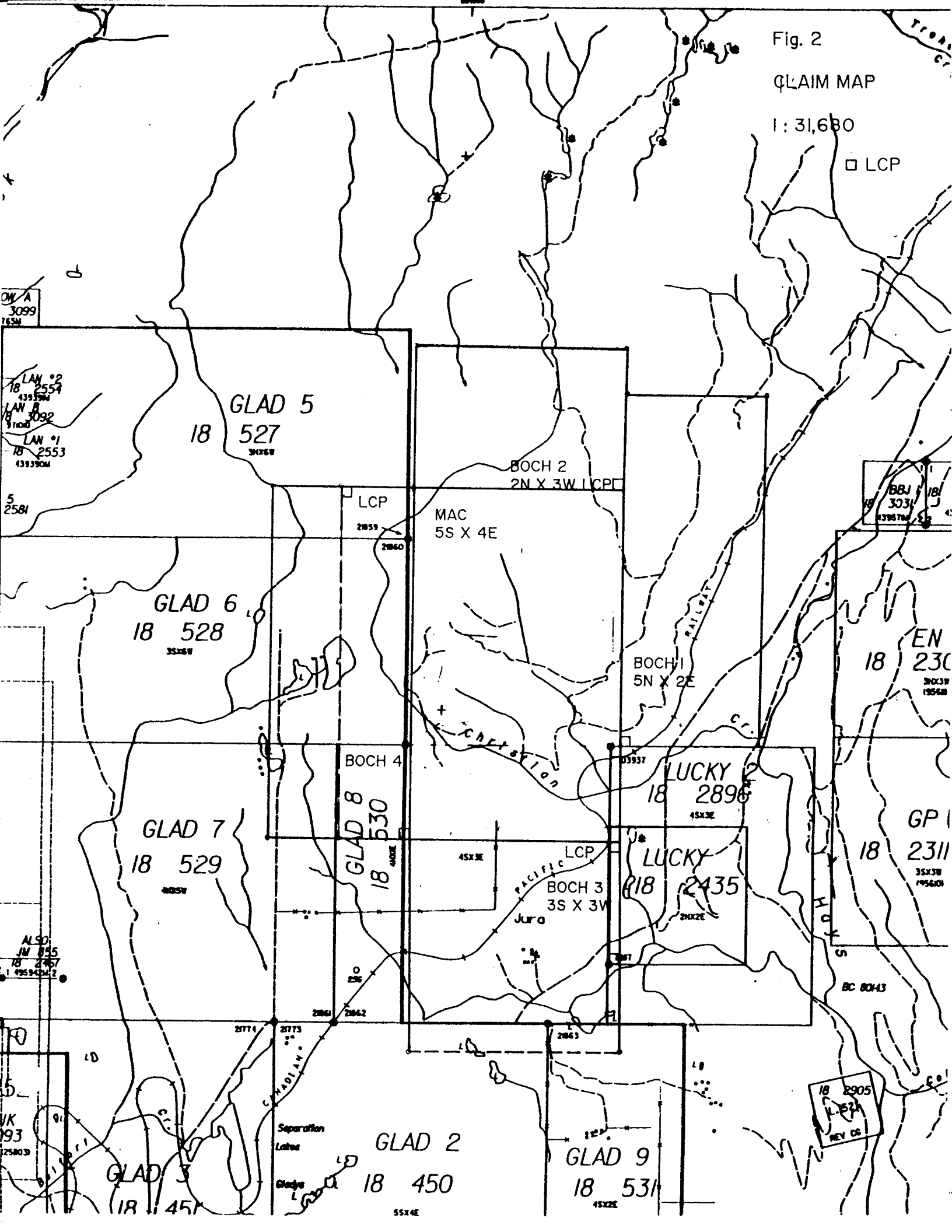
<u>Claim</u>	<u>Units</u>	<u>Staking Date</u>	<u>Record Date</u>	<u>Record No.</u>
BOCH 1	10	Nov. 9, 1988	Nov. 9, 1988	3237
BOCH 2	6	Nov. 10, 1988	Nov. 10, 1988	3238
BOCH 3	9	Nov. 10, 1988	Nov. 10, 1988	3239
BOCH 4	10	Mar. 31, 1989	Mar. 31, 1989	*
MAC	20	Oct. 11, 1988	Oct. 11, 1988	3209

Fig. 2

CLAIM MAP

1: 31,680

□ LCP



ON/A 3099 765W

LAW #2 18 2554 43950W  
LAW #3 18 3092 3700B  
LAW #1 18 2553 43950W

5 2581

18 3031 439570W 52

ALSO: JM 895 18 2747 439540W

18 2905 18 528 REV 02

\* Number not yet received.

The BOCH 1-4 claims were staked on behalf of Sundial Resources and are currently held in the name of J.E. Christoffersen, a director of the company. The MAC claim was acquired by option by Sundial from Chalco Resources, a private B.C. company. Details of the option agreement can be made available to interested parties.

Other adjoining ground of interest includes the LUCKY property to the east (16 units). The property does not constitute part of this package but the owner, Mr. Peter Peto of Penticton, has indicated his willingness to incorporate the claims in any arrangement with a third party. The Glad claims on the southern and western borders of Sundial's block expired by March 26, 1989 (hence the staking of BOCH 4).

## 2.0 HISTORY OF CLAIMS

### 2.1 Early History

Early work is recorded in the Annual Reports, Minister of Mines, B.C. in 1927 and 1928 on the Lucky Strike group, now the LUCKY claims. Exploration included the driving of three short adits and the excavation of several trenches on copper showings on the claims. Rice (GSC Memoir 243, 1947 and Map 888A) shows a gold occurrence in the same vicinity.

### 2.2 Kennco Explorations Ltd.

In 1959, Kennco carried out a comprehensive program on their FH group as part of a province-wide porphyry copper exploration



strategy (B.C. Assessment Report 318). Their work included airborne and ground magnetics, soil geochemistry, I.P., some seismic, geological mapping, trenching and 744 feet of diamond drilling. In the Jura area, Kennco concentrated much of its effort on the Lucky Strike showings where an I.P. anomaly measuring 1500m.x 600m. and partly coincident copper soil anomaly were identified (Fig.6). I.P. and seismic data to the west of this major anomaly, in an area of continuous overburden cover (BOCH 3 claim), indicated the presence of a mantle of young sedimentary rocks of the Princeton Group overlying Nicola Group volcanic rocks.

Kennco drilled four shallow holes into the I.P./soil anomalies (Fig. 6) but no geological and assay data are presented in the assessment report.

### 2.3 Amax Exploration Inc.

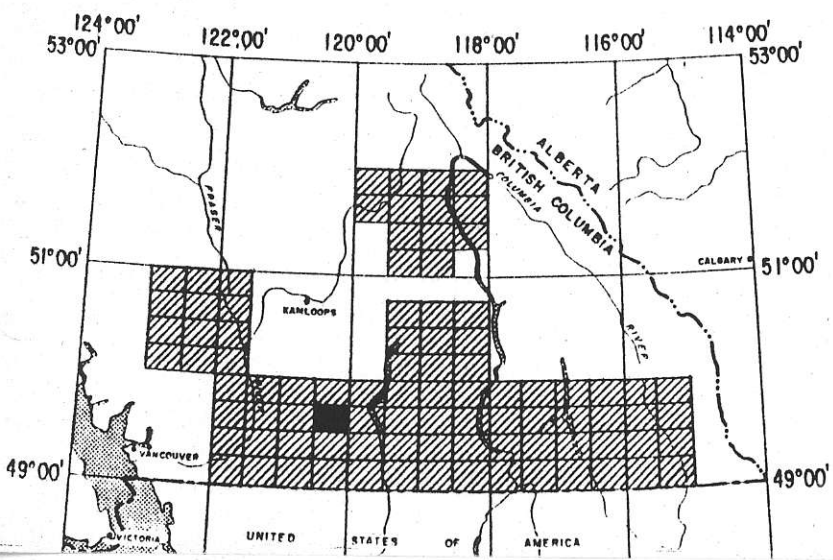
In 1970 and 1971, Amax carried out an assessment of the ELK, SLEEPER and ROK claims now covered by the MAC and BOCH 2 claims in part. Amax became interested in the area on the basis of a prominent aeromagnetic anomaly centered just north of Christian Creek (Fig. 3), which appeared similar to the magnetic expression in the vicinity of the Copper Mountain orebodies.

In 1970, Amax conducted geological mapping, soil geochemical, I.P. and ground magnetic surveys on behalf of Copex Mining Corp. on the ELK and SLEEPER groups (unpublished Amax report by the writer). The writer also examined drill core from two short holes completed



Fig. 3  
 AIRBORNE MAGNETIC MAP  
 92H9  
 1 : 50,000

- ISOMAGNETIC LINES (absolute total field)
- 500 gammas . . . . .
  - 100 gammas . . . . .
  - 20 gammas . . . . .
  - 10 gammas . . . . .
  - Magnetic depression . . . . .
  - Flight lines . . . . .
  - Flight altitude 1000 feet above ground level



earlier by Copex in the vicinity of an old adit in the north-west corner of the MAC claim. Core from both holes were observed to carry considerable chalcopyrite and pyrite in fractured and altered syenitic rocks. No assays were ever reported from the holes and the present location of the core is not known.

The geochemical survey outlined a strong copper anomaly (+ 100ppm with a peak value of 3300 ppm) over an area of 730m.x 500m. roughly centered on the adit (Fig. 6). A few single-sample copper soil anomalies lie a short distance to the south along Christian Creek. Trench rock sampling near the adit returned 52m. grading 0.17% Cu and 0.10 oz./ton Ag (Fig. 5). An I.P. survey conducted over the copper soil target indicated a weak coincident anomaly with a stronger anomaly evident south of Christian Creek (Fig. 6). It is to be noted that the I.P. survey was carried out during August when conditions were extremely dry and operating conditions proved to be difficult as a result.

In 1971, Amax completed geochemical, geological and magnetic surveys on its ROK group north of the Copex ground (B.C. Assessment Report 3189). No geochemical anomalies (Cu-Mo) of any importance were found and the claims were found to be underlain mainly by granitic intrusive rocks of the Pennask batholith.

#### 2.4 Quintana Minerals

In 1977, Quintana undertook mapping and rock sampling on its large Pioneer claim block, focusing essentially on the old Lucky Strike

copper showings previously explored by Kennco (B.C. Assessment Report 6292). Out of 45 samples collected, the best sample reported 0.41% Cu and 0.46ppm Au. Quintana concluded that the target represented the top of a porphyry copper system and merited deep drilling but none was done.

### 2.5 Superior Oil

In 1979, Superior drilled nine short percussion holes (765 ft./233 m.) also in the area explored by Kennco and Quintana (B.C. Assessment Report 7476). Seven of the holes were drilled to a maximum depth of 150 ft. (46 m.) and two were abandoned in overburden (Fig. 6). No assay data were provided and the drill logs are very skimpy. The holes encountered pyritic altered andesites for the most part near the eastern extremity of Kennco's I.P. anomaly.

### 2.6 Canadian Oxidental Petroleum

In 1978 and 1979, the company was engaged in uranium exploration on its large GLAD claim block in the Jura area. The company completed two holes in Princeton Group sediments some 300 meters south of the BOCH 3 claim (Fig 6). Indicated thickness of these Tertiary rocks is at least 425 ft (130 m.) below 40 ft. (12 m.) of glacial overburden at that point. One additional core hole drilled some distance to the west was abandoned at 56 ft. (17 m.) (B.C. Assessment Report 7795).

### 2.7 Count Fleet Explorations

In 1986, this company carried out geological mapping and rock sampling on the RATS claim (now the MAC claim) near the adit north of Christian Creek (B.C. Assessment Report 16135). The program outlined a zone of chalcopyrite-bornite-pyrite-magnetite measuring 150 m.x500 m. elongated in NW-SE direction and possibly open to the south east below glacial cover. The ore minerals occur as disseminations, fracture fillings and stockworks. The mineralized zone largely mirrors the soil geochemical anomaly outlined by Amax in 1970. Chalcopyrite and malachite were also noted in Nicola volcanics several hundred meters to the south in Christian Creek (Fig. 5). Thirty rocks samples were collected for copper, silver and gold analyses but no assays were reported.

### 2.8 Mingold Resources Inc.

In 1987, Mingold completed a copper-gold soil and rock geochemical survey on the LUCKY claims over the old Kennco area of interest (B.C. Assessment Report 16265). The soil results indicate near-coincident gold (+50ppb) and copper (+250ppm) anomalies in the vicinity of Kennco's four drill holes (Fig. 6). Rock samples taken from the same locality returned up to 0.82% Cu and 460 ppb Au (0.014 oz/ton).

Mingold also collected 11 rock samples in the north-west corner of the MAC claim, where the best assay gave 4159 ppm Cu and 88 ppb Au.

Later in 1987, Mingold drilled eight reverse circulation holes

totalling 2350 ft. (716 m.) on virtually the same sites as Kennco and Quintana previously (unpublished company report) (Fig 6). The holes were drilled to a maximum angled depth of 350 ft. (107 m.). Four of the holes encountered significant copper and gold with the best being RC87-1, which returned a five-foot assay of 0.62% Cu and 605 ppb Au (0.019 oz/t) and 65 ft. (20 m.) of 0.26% Cu and 306 ppb Au (0.01 oz/t) from 85-150 ft.

### 3.0 REGIONAL GEOLOGY

The BOCH and MAC claims lie within a major belt of Upper Triassic to Lower Jurassic volcanic rocks and comagmatic alkaline intrusions, which extend throughout the length of the Intermontane Belt in British Columbia. Several important porphyry gold-copper orebodies occur along the belt including, from south to north, Copper Mountain-Ingerbelle, Afton, Mt. Polley (formerly Cariboo Bell) and Galore Creek. All are associated with strongly altered alkaline porphyritic intrusions. High-grade gold vein deposits occur peripherally to some of the porphyry systems, especially in the Stikine region, and are likely genetically related to them. The QR gold deposit south of Quesnel is associated with the propylitic alteration zone peripheral to a small alkaline stock. It may represent a unique end member of the model by virtue of the dominance of gold, low copper content and the low level of sulphides in the system. It has been described by some workers as a "failed porphyry". Likewise, the Nickel Plate gold skarn deposit near Princeton may represent an end member related to a more mafic suite of alkaline intrusive rocks.

Within the Princeton map sheet, the BOCH and MAC claims are located roughly in the centre of the so-called Princeton-Aspen Grove copper belt (Fig. 4). The belt is underlain by a complex assemblage of volcanic rocks of Upper Triassic to Lower Jurassic age belonging to the Nicola Group. The volcanic rocks have been intruded by numerous plutons ranging from synvolcanic diorite, monzonite and syenite to Cretaceous granodiorite and granite. Several important gold-copper deposits and prospects along the belt, including Copper Mountain-Ingerbelle (Similco), Axe (Cominco) and Man (Brican), are controlled generally by the north-trending Boundary-Summers Creek fault system, a regional structural break, and locally also by secondary faults striking north west, north east and east.

At Jura, a north-west striking structure appears to have controlled the emplacement of the Summers Creek intrusions, a lobe-like composite body extending from the main mass of the Pennask batholith as far as the Axe property on Summers Creek (Fig. 4). Porphyry-style copper occurrences are associated with small satellitic stocks at the Axe property at the north-west extremity and at Jura at the south-east extremity of the Summers Creek plutonic complex.

#### 4.0 PROPERTY DESCRIPTION

##### 4.1 Geology

The geology of the area around Jura is presented in Figure 5, based upon the mapping and geophysical interpretations by the various

companies described earlier. Generally speaking, the geology is imperfectly known due to widespread fluvio-glacial overburden.

The eastern and northern parts of the map sheet are underlain by quartz monzonite, aplite and pegmatite of the Jurassic Pennask batholith (Unit 7). The batholith is intrusive into Nicola andesite and basalt (Unit 1) of Upper Triassic age and, apart from dykes of quartz-feldspar porphyry (Unit 8), constitutes the youngest plutonic rocks in the area.

A zoned stock of hornblende diorite (Unit 4) and hornblende monzonite (Unit 5), some 1,200 m. in diameter occupies part of the ridge north of Christian Creek. The stock intrudes Nicola rocks but is believed to be essentially coeval with them. It appears fresh in large part except in road cuts near Christian Creek, where it is chloritic and carries much disseminated and stringer pyrite. A second diorite stock of unknown dimensions lies about 1,000 m. to the north west.

Nicola basalts are strongly altered and mineralized over a large area west of the zoned stock. Alteration minerals comprise pink feldspar and epidote associated with disseminations and fracture fillings of chalcopyrite, bornite, pyrite and magnetite. Where pink feldspathic alteration is pervasive or nearly so, the rock is described as a metasomatic syenite (Unit 6). The mineralized zone coincides well with the large (730m.x500m.) copper soil anomaly and partly with the I.P. anomaly outlined north of Christian Creek by



Amax in 1970. Widespread magnetite no doubt coincides in part with the source of the prominent aeromagnetic anomaly lying just north of Christian Creek (Fig. 3).

Nicola volcanic rocks south of the zoned stock are exposed in many road cuts and trenches. Andesite and basalt are, in general, strongly altered to chlorite, carbonate and/or epidote and contain pyrite and minor chalcopyrite over wide areas. This pyrite zone corresponds broadly with the large I.P. anomaly outlined by Kennco in 1959 (Fig. 6). Within the pyrite zone, Kennco mapped an irregular body of dacite and dacite porphyry (Unit 2). The rock is highly pyritic and altered, fresh surfaces being bleached to a chalky white colour. Weathered surfaces are typically a deep goethite brown. The best gold and copper assays were obtained by Mingold from holes drilled in this rock type. The body appears to be covered by overburden along its west side.

In the northern part of the property, an elongate mass of hornblende-magnetite diorite and microdiorite clearly constitutes the source of an airborne magnetic anomaly to the north of the circular anomaly mentioned above (Fig. 3). The body has been interpreted as a sill and may form a large raft within Pennask quartz monzonite.

There are no outcrops in the south-west part of the claim block due to an extensive mantle of glacial cover of unknown thickness. Princeton sediments were interpreted from Kennco's I.P. and seismic

data to underlie the area. Diamond drilling by Canadian Oxidental south of the BOCH 3 claim penetrated a minimum of 425 feet (130 m.) of sediments below 40 feet (12 m.) of overburden. The sedimentary cover is suspected to thin rapidly to the north.

#### 4.2 Structure

Previous workers have noted structural features trending north, north west, north east and easterly but poor exposure and strong alteration in key areas has made the identification of important faults difficult. Aeromagnetism may confirm some of these directions on a regional basis (Fig.3). A north striking feature to the west of the area of interest may represent a subsidiary structure of the Summers Creek fault. North-west structures appear to bracket the strong magnetic anomaly just north of Christian Creek and a north-east striking fault may be reflected by a series of magnetic lows aligned along Hayes Creek. The north-west and north-east structures intersect in the Jura area.

#### 5.0 DISCUSSION

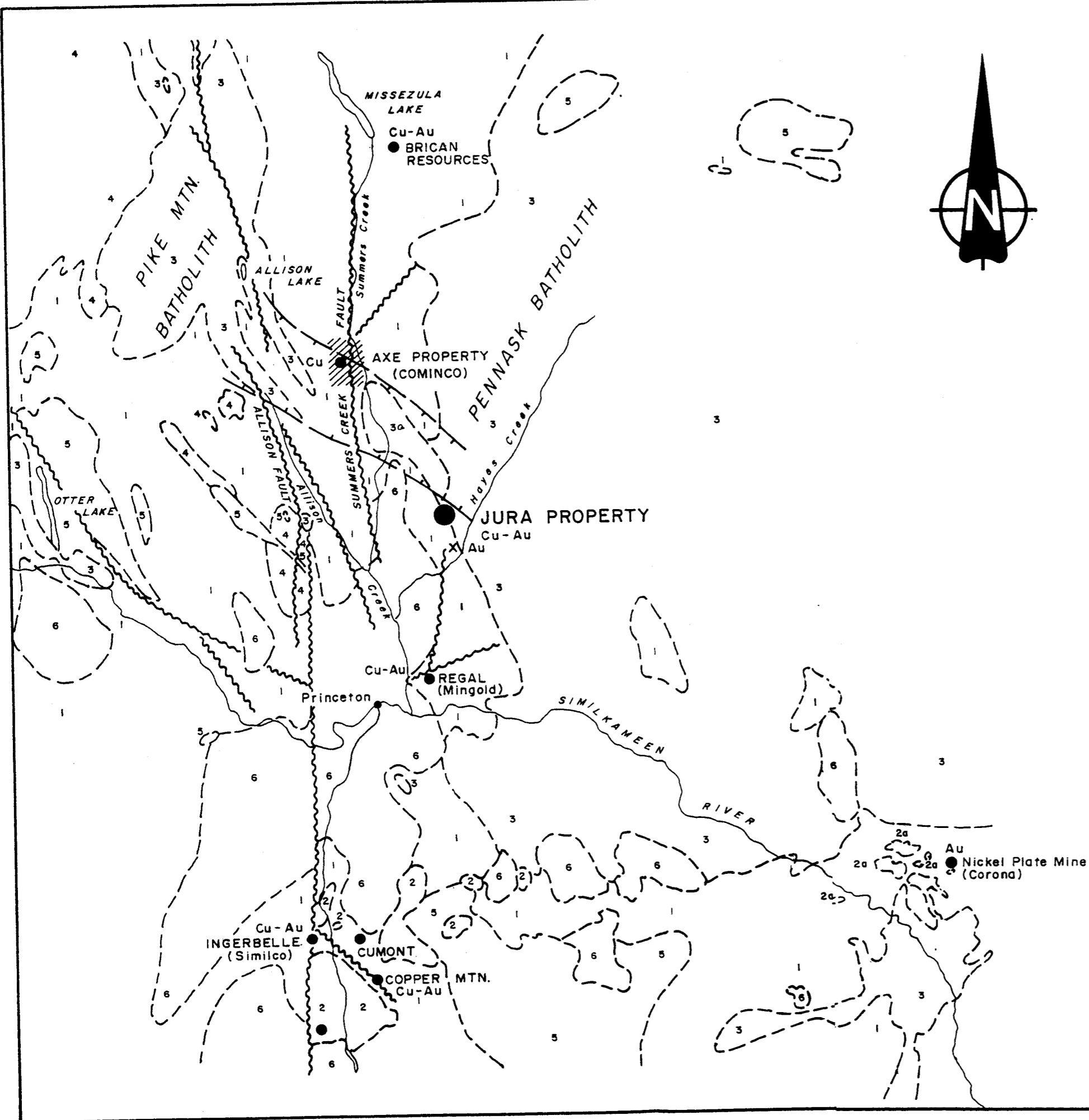
At Jura, copper ore minerals, with or without associated gold, are known in two distinct localities in the north west and south east of the area of interest. The two mineralized zones possess distinct alteration and ore mineralogies.

In the north west, fracture controlled to pervasive pink (k-feldspar?) and epidote are associated with chalcopyrite, bornite, pyrite and magnetite. The chalcopyrite to pyrite ratio is high but

the overall sulphide content is low (i.e. 1%). The mineralized zone is peripheral to two small alkaline stocks and the intensity of alteration in the volcanic rocks may suggest additional intrusions at no great depth. The alteration and ore mineralogy is consistent with the central potassic zone that forms the core of many porphyry gold-copper deposits associated with alkaline intrusive complexes in British Columbia.

To the south east, a large zone of volcanic rocks altered to chlorite, epidote and carbonate with associated pyrite and minor chalcopyrite is partly exposed. The overall sulphide content is high (i.e. 5%) with a high pyrite to chalcopyrite ratio. This area clearly represents a propylitic alteration zone, the full extent of which may not yet be known.

The two mineralized and altered zones are separated by over two kilometers of poorly explored and largely overburden-covered terrain. However, it is possible that the two zones form part of a single hydrothermal system constituting a potassic core in the north on the MAC and BOCH 4 claims with a large propylitic halo, largely buried under overburden and young cover rocks, extending south east to the LUCKY claims. The near coalescence of the Kennco and Amax I.P. anomalies along Christian Creek lends some support to the hypothesis (Fig. 6).



**LEGEND**

**TERTIARY**

6 Terrestrial sedimentary and volcanic rocks.

**CRETACEOUS**

5 Pink and grey granite and granodiorite; quartz feldspar porphyry (OTTER INTRUSIONS).

4 Volcanic breccia, andesite, basalt.

**JURASSIC**

3 Grey granodiorite, reddish granite and granodiorite, light coloured granodiorite and quartz diorite.  
3a - Summers Creek Intrusions.

2,2a Alkaline diorite, monzonite, syenite, 2a Gabbro.

**TRIASSIC**

1 Varicoloured tuff, breccia, andesitic and basaltic lavas, carbonate rocks (NICOLA GROUP).

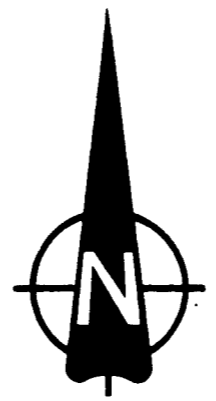
**SYMBOLS**

--- Geological contact.

~~~~~ Fault.

--- Zone of satellite stocks near Summers Creek Intrusions.

● Important deposit.



After Rice, G.S.C. Map 888 A.

|                                |                   |               |
|--------------------------------|-------------------|---------------|
| SUNDIAL RESOURCES LTD.         |                   |               |
| <b>REGIONAL GEOLOGICAL MAP</b> |                   |               |
| 0 1 5 10 km.                   |                   |               |
| Scale: 1:250,000               | Date: March, 1989 | N.T.S. 92 H/9 |
| J.E. Christoffersen P. Eng.    |                   | Figure 4      |

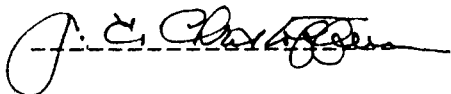
## 6.0 CONCLUSIONS

Disseminated low-grade copper and minor gold occurring in altered Nicola volcanic rocks appear to be related to an alkaline plutonic complex north of Christian Creek. Past work has focused on two distinct targets separated by over two miles of overburden covered terrain but there is evidence to suggest that the two zones may form the extremities of one large altered and mineralized system partly hidden under young cover rocks.

A major exploration program involving geological mapping, geophysics (I.P., seismics) and drilling is required to test the above hypothesis. Exploration targets include:

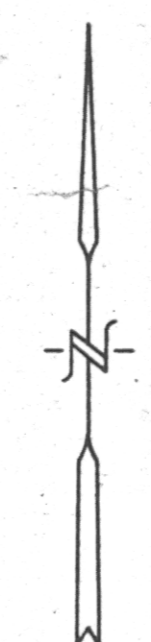
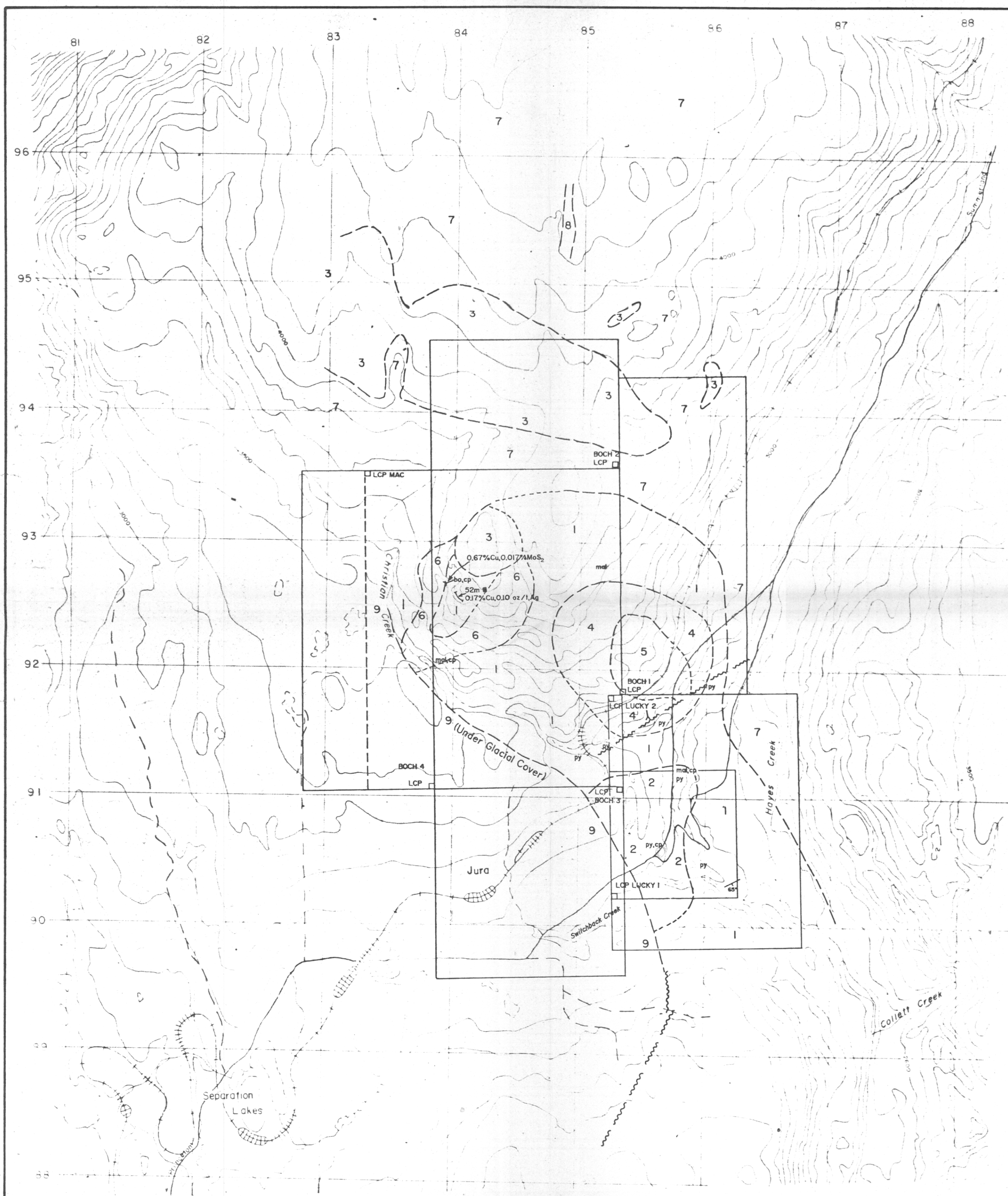
- 1) porphyry gold-copper as discussed in this report,
- 2) QR-type deposit near the periphery of alkalic stocks,
- 3) High-grade vein-type gold deposits peripheral to the alkalic complex.

No direct evidence exists for the presence of types 2) and 3) above but the environment is favourable for their occurrence and any exploration program should incorporate a search for them.



J.E. Christoffersen

April, 1989.



**LEGEND**

**TERTIARY**  
(Princeton Sediments)

- 9 - Sandstone, Shale, Conglomerate, Coal.
- 8 - Quartz Feldspar Porphyry Dykes.

**JURASSIC**  
(Okanagan Batholith)

- 7 - Quartz-Monzonite (incl. Aplite Phases).

**UPPER TRIASSIC TO LOWER JURASSIC**  
(Jura Alkalic Complex)

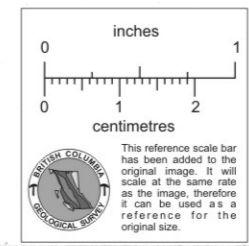
- 6 - Syenite (Metasomatic)
- 5 - Hornblende Monzonite.
- 4 - Hornblende Diorite and Syenodiorite.
- 3 - Hornblende Magnetite Diorite and Microdiorite, Minor Hornblende.

(Nicola Volcanic Rocks)

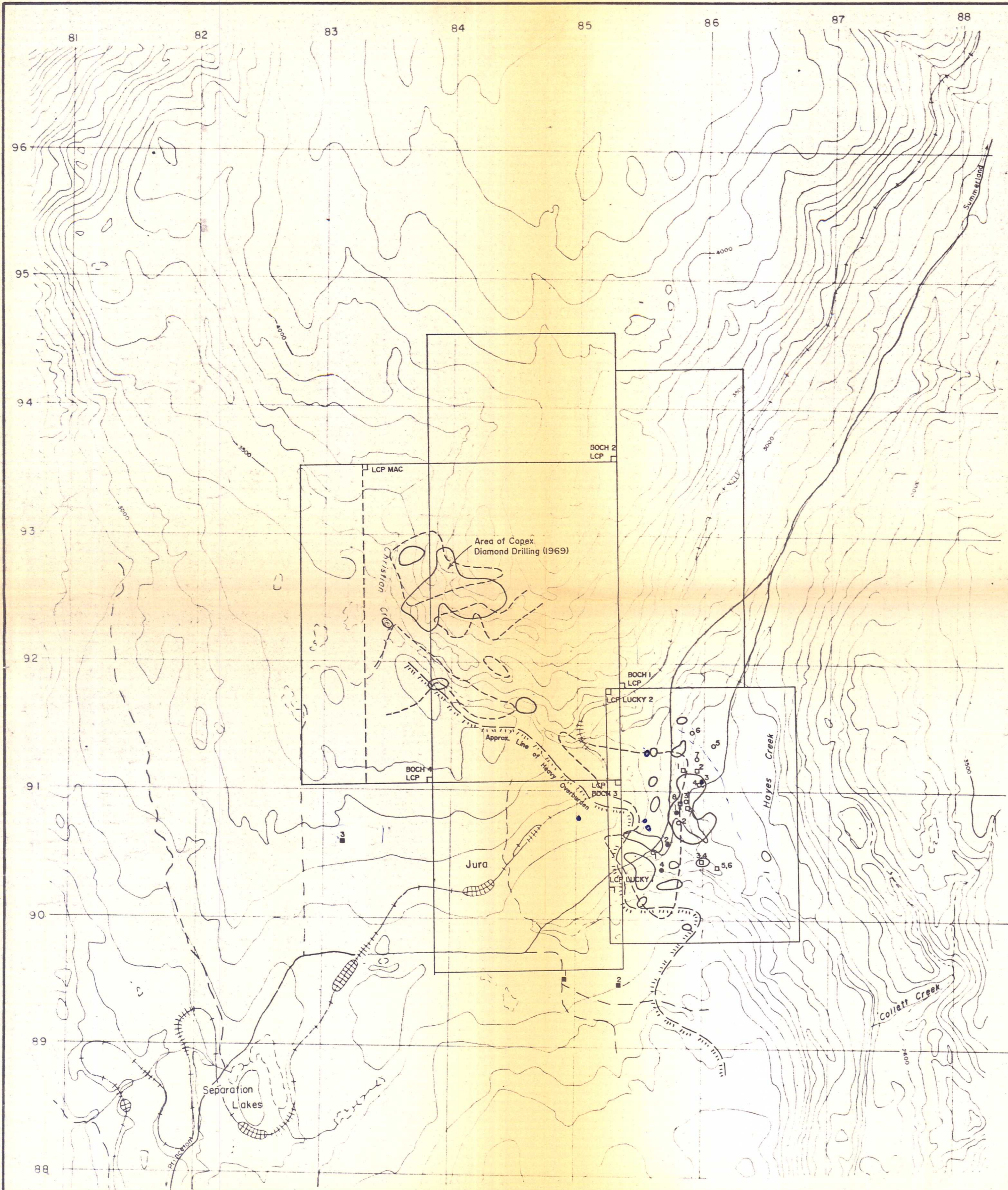
- 2 - Dacite.
- 1 - Andesite, Basalt.

**SYMBOLS**

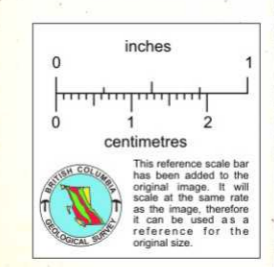
- py - Pyrite.
- bo - Bornite.
- cp - Chalcopyrite.
- mal - Malachite.
- Geological Contact (inferred, assumed).
- Adit.
- LCP Claim with LCP.



|                                   |                   |               |
|-----------------------------------|-------------------|---------------|
| <b>SUNDIAL RESOURCES LTD.</b>     |                   |               |
| <b>GEOLOGICAL COMPILATION MAP</b> |                   |               |
| <b>JURA AREA</b>                  |                   |               |
| Similkameen Mining Division       |                   |               |
|                                   |                   |               |
| SCALE: 1: 20,000                  | DATE: MARCH, 1989 | N.T.S. 92 H/9 |
| J.E. Christoffersen P. Eng.       |                   | FIGURE: 5     |



- +100 ppm Cu Soil Anomaly (Keneco - 1959/Amax - 1970).
- IP. Anomaly (Keneco - 1959/Amax - 1970).
- Keneco D.D.H. (1959) (744 feet).
- Superior Oil P.D.H. (1979) (765 feet).
- Mingold R.C.H. (1987) (2350 feet).
- Canadian Oxidant Petroleum D.D.H. (1979) (1160 feet).



|                                                                  |                   |               |
|------------------------------------------------------------------|-------------------|---------------|
| <b>SUNDIAL RESOURCES LTD.</b>                                    |                   |               |
| <b>GEOPHYSICAL, GEOCHEMICAL<br/>AND DRILLING COMPILATION MAP</b> |                   |               |
| <b>JURA AREA</b>                                                 |                   |               |
| Similkameen Mining Division                                      |                   |               |
|                                                                  |                   |               |
| SCALE: 1:20,000                                                  | DATE: March, 1989 | N.T.S. 92 H/9 |
| J.E. Christoffersen P. Eng.                                      |                   | FIGURE: 6     |