

GEOPHYSICAL REPORT

On An

Induced Polarization Survey

Of a

Portion of the

TOUCH GROUP of MINERAL CLAIMS

TOUCH  
92H/15E

5849

Situated at

Aspen Grove

#5849

NICOLA MINING DIVISION

N.T.S. 92H/15E

Latitude 49° 57' N; Longitude 120° 35' W.

in

British Columbia

Field Work between April 2 and April 5, 1976

On behalf of

**DAVID MINERALS LTD.**

Of

Vancouver, B. C.

Department of  
Mines and Petroleum Resources  
ASSESSMENT REPORT

NO. 5849 MAP

Report by:

D. R. Cochrane, P. Eng.,  
April 29, 1976  
Delta, B. C.



**Cochrane Consultants Limited**  
4882 Delta St., Delta, B.C. V4K 2T8 946-9221  
Geotechnical Consulting / Exploration Services

geology  
geophysics  
geochemistry

## TABLE OF CONTENTS

	page
PREFACE .....	1
PART A: SUMMARY AND CONCLUSIONS .....	2
PART B: BACKGROUND	
B - 1: Location and Access .....	3
B - 2: Claims Information .....	3 - 4
B - 3: General Setting .....	4 - 5
B - 4: Previous Work .....	5
PART C: FIELD PROCEDURES	
C - 1: Field Methods .....	6 - 7
C - 2: Induced Polarization Data Processing .....	7 - 8
PART D: DISCUSSION OF RESULTS	
D - 1: Self Potential .....	9
D - 2: Apparent Resistivity .....	9 - 10
D - 3: Chargeability (IP) Results .....	10 - 11
APPENDICIES:	
I: Certificates .....	12
II: Assessment Work Details .....	13
III: Instrument Specifications .....	14
IV: Metric Conversion Table .....	15



TABLE OF CONTENTS CON'T

FIGURES:

		page
# 1	1. Location Map .....	2(a)
# 2	2. Claims Map .....	3(a)
# 3	3. Self Potential Results .....	map pocket
# 4	4. Apparent Resistivity Results .....	map pocket
# 5	5. Chargeability (IP) Results .....	map pocket



## PREFACE

In the fall of 1968, the author supervised geophysical work on David Minerals Aspen Grove property, better known as the Kidd Breccia. This structure is the focus of economic attention in the area and has been investigated by several companies, over the past several decades.

The purpose of the recent work was two fold:

1. to extend the geophysical coverage into an area not previously surveyed, and
2. to cover assessment work regulations on a total of nine (9) claims that required work credits totalling \$1800 prior to April 12, 1976.

This report describes the work and discusses the results obtained. An appendix lists costs incurred and describes assessment work details which, it is hoped, are concurrent with government regulations. This report uses metric units exclusively and a conversion table is appended in order to avoid possible misinterpretation.



PART A: SUMMARY AND CONCLUSIONS

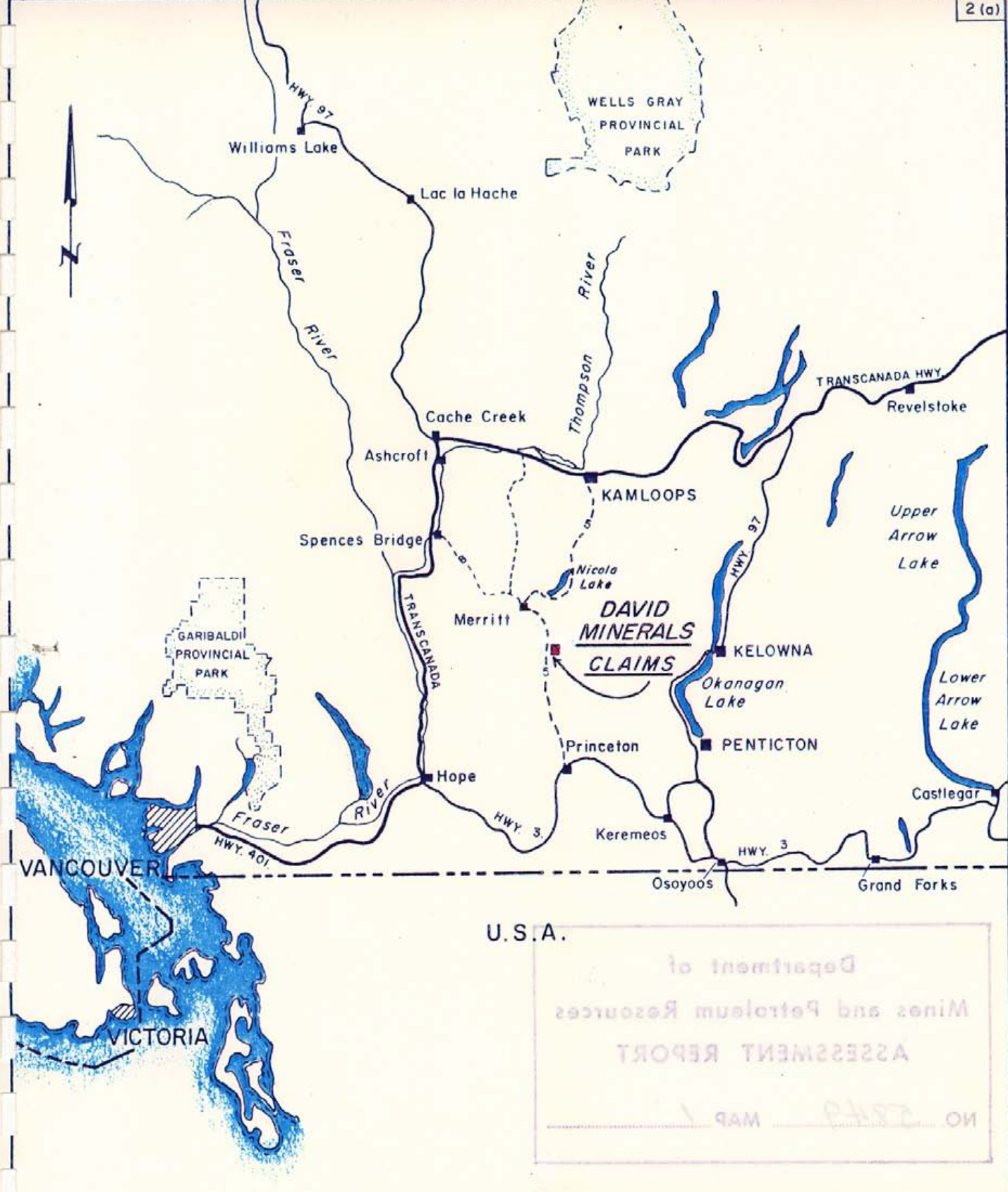
1. David Minerals Ltd. holds title to a total of 56 full sized claims and fractions which cover a copper prospect located near Aspen Grove in the southern interior of British Columbia.
2. Early in April, 1976, a field crew completed four lines of induced polarization surveying on the Touch 2, 4, 6, and 8 mineral claims located on the west central portion of the claim block.
3. This recent work "tied into" lines upon which a previous induced polarization survey was completed in the fall of 1968.
4. Anomalous chargeability (induced polarization) response was recorded in the recent survey in an area which has been bulldozer trenched and where malachite and chalcopryrite have been reported. The anomaly is "closed off" by the 1968 survey results and the center of the high chargeability response zone lies to the south and east of the April 1976 survey area.
5. Above average chargeability response was recorded on the northern most survey line, and additional geophysical surveying is suggested to the north of line 91+50 north.

Respectfully submitted,



D. R. Cochrane, P. Eng.  
April 29, 1976  
Delta, B. C.





U.S.A.

**DAVID MINERALS LTD.**  
 ASPEN GROVE AREA      NICOLA MINING DIVISION, B.C.

Touch Group  
**LOCATION MAP**

DRAWN R.K., B.C.	DATED APRIL '76	FIG. NO. 1
CHECKED / f	JOB NO. 1064 - CC	

PART B: BACKGROUND

B - 1: Location and Access

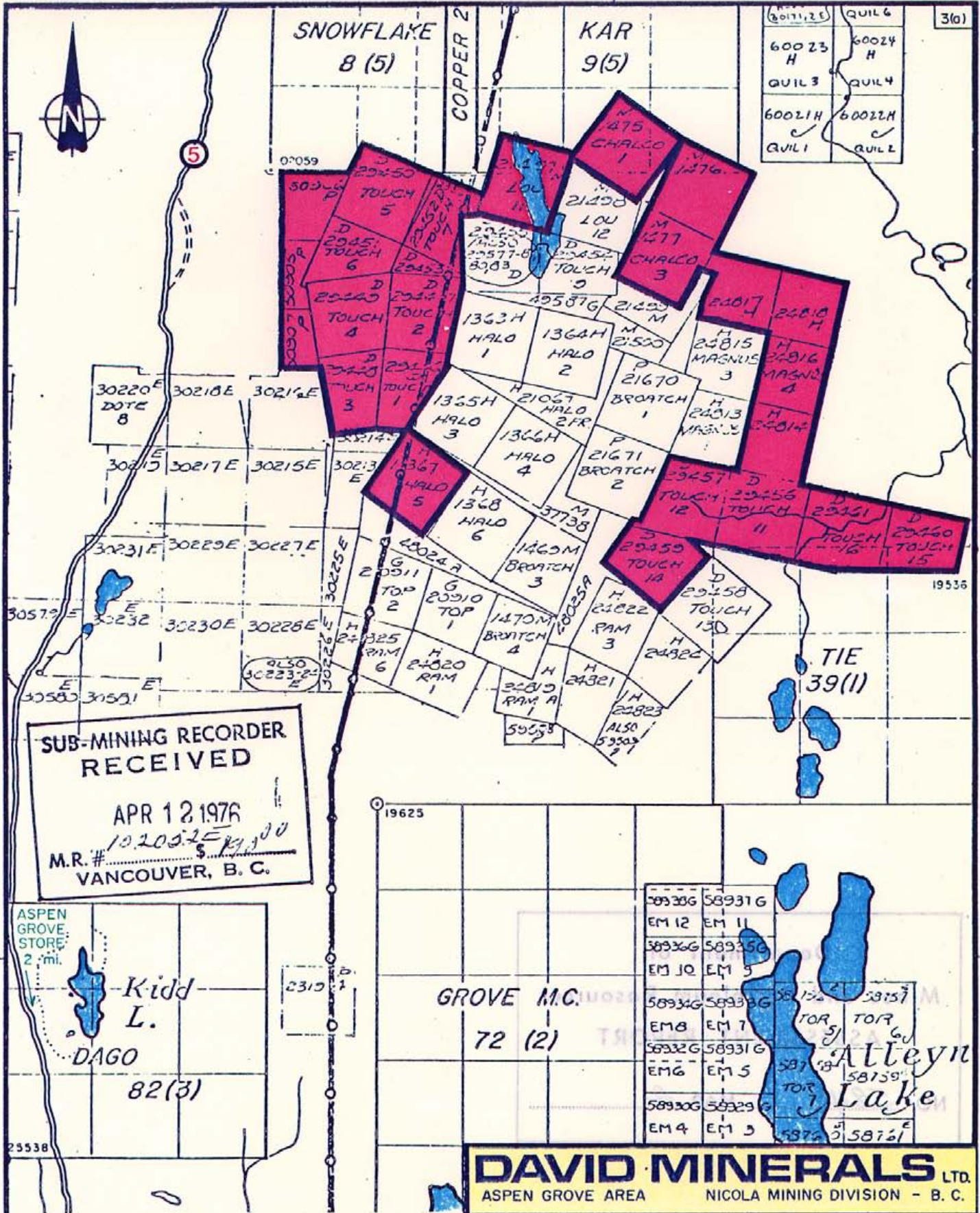
The settlement of Aspen Grove is 40 km. south of Merritt on Highway #5, and 56 km. north of Princeton. The Touch, Halo, and Broach claims lie 3 km. northeast of the Aspen Grove store, and normal access is by a number of unsurfaced roads which proceed east from Highway #5 about 1.5 km. north of the store. The claims lie immediately south of the Golden Sovereign Group described in G. S. L. Memoir 243, and north of Alleyne Lake. The latitude is 49° 55' North, and the longitude is 120° 35' West.

B - 2: Claims Information

The Aspen Grove property of David Minerals consists of a group of surveyed and unsurveyed claims and fractions, collectively called the Halo group. It is comprised of the following:

<u>Claim Name</u>	<u>Record Number</u>	<u>Expiry date</u>
Touch 1 - 16 (incl)	29446 - 61	April 12(17), 1977
Top 1 & 2	20910 - 11	June 10, 1976
Magnus 1 - 6 (incl)	24813 - 18	July 20, 1976
Vin #1 Fraction	49587	June 18, 1977
Ram A - 1	24819	July 20, 1976
Ram 1 - 6 (incl)	24820 - 25	July 20, 1976
Halo 1 - 4 (incl)	1363 - 6	July 28, 1977
Halo 5 & 6	1367, 1368	July 28, 1976
Halo 2 Fraction	21067	July 12, 1977
Broach 1 & 2	21670 / 71	Nov. 21, 1977
Broach 3 & 4	1469 / 70	Sept.22, 1976





**SUB-MINING RECORDER RECEIVED**  
 APR 12 1976  
 M.R. # 102052E \$1,100  
 VANCOUVER, B.C.

ASPEN GROVE STORE  
 2 mi.  
 Kidd L.  
 DAGO  
 82(3)

60023 H	60024 H
60023H	60024H
60023H	60024H

58930G	58931G	EM 12	EM 11
58930G	58931G	EM 10	EM 9
58930G	58931G	EM 8	EM 7
58930G	58931G	EM 6	EM 5
58930G	58931G	EM 4	EM 3

**DAVID MINERALS LTD.**  
 ASPEN GROVE AREA      NICOLA MINING DIVISION - B.C.

Touch Group  
**CLAIMS MAP**  
 (MINERAL MAP 92H/15E)

DRAWN: B.C.      DATE: APRIL '76      FIG. NO. 2  
 CHECKED: *pre*      JOB NO: 1064 - CC





Claims Information Con't

<u>Claim Name</u>	<u>Record Number</u>	<u>Expiry date</u>
Chalco 1 - 3 (incl)	1475 / 77	Sept. 22, 1977
Halo Fraction	37738	Sept. 26, 1976
Lou 11 to 14	21497 - 500	Sept. 27, 1977
SNO 1 & 2 Fraction	48024 / 25	Jan 26, 1977
EX 1, 1 Fraction, 2	50905,06,07	Nov. 18, 1977
<u>Total 56</u>		

The claims are held by David Minerals Ltd. of Vancouver, B. C.  
(FML # 143181)

B - 3: General Setting

The Halo group is situated in the Thompson plateau subdivision of the British Columbian interior plateau physiographic system. This is, in general, a gently rolling upland of low to moderate relief. The local Aspen Grove area, lies within the Fairweather Hills, with elevations normally between 1000 and 1200 meter. It is a rather impressive area of British Columbia, with a moderately dry climate, with open fields, bushy draws, and the landscape dotted with lakes.

The ground control grid lies at about 1220 meters in elevation and covers a small hill, gently sloping in all directions from near the center of the area surveyed.

The general region is underlain dominantly by Upper Triassic Nicola group intermediate volcanics with minor amounts of sediments. It is intruded by stocks, plugs, and dikes of Jurassic Coast Acidic



intrusions. A series of north striking faults trend across the area surveyed. One of the focal points of economic interest is the Big Kidd Breccia, consisting of altered brecciated diorite, with silicification, carbonatization and sporadic sections mineralized with magnetite, pyrite, chalcopyrite, bornite, and chalcocite. A number of pits, adits, trenches and drill holes have partially explored the breccia.

It is believed that only a relatively thin mantle of glacial drift covers much of the bedrock.

B - 4: Previous Work

Previous work on the claims has included limited diamond drilling, test pitting, driving of prospect tunnels and in 1968, a magnetometer and induced polarization survey. In 1972 the property was optioned to Amax Exploration who conducted geological and geochemical surveys.



PART C: FIELD PROCEDURES

C - 1: Field Methods

A Hewitt Enterprises Pulse Type IP was used throughout the survey. Instrument specifications are described in Appendix III.

The standard Wenner electrode array was employed with an "a" spacing (one third the distance between the current electrodes) of 100 meters. This spacing was utilized because of depth testing near the Big Kidd trench on December 3, 1968. In this area, the Wenner array was expanded from 80 to 500 feet at a series of intervals and response at a + 100 meters provided one of the better contrasts.

A brief description of the field procedure follows:

Prior to voltage application, the self potential is balanced, and recorded, between the two receiving pots "a" meters apart. Normally a voltage of 250, 500, or 1000 volts is impressed between the back electrode (one "a" behind the instrument) and front electrode (two "a" in front of the instrument). The electrodes in high ground resistivity stations, consist of a single steel or aluminum stake, and in low resistivity areas, of multiple aluminum foil electrodes situated about a central metal stake (to increase ground bearing, current and voltage). A two second pulse of d.c. current is applied, during which time the I (current in milliamperes) and dV (impressed EMF in millivolts) is observed and recorded. 0.4 seconds after cessation of pulses, the residual (decay) voltage is integrated for 1.2 seconds. From these data, the apparent d.c. resistivity and normalized induced polarization value may be calculated, as described in the data reduction portion of this report.



The transit interval was 100 meters along all the cross lines. Mr. M. Mathieu flagged the lines, Mr. Chase operated the instrument and Messers Willson and Williams helped Mr. Chase.

C - 2: Induced Polarization Data Reduction

The following information was recorded by Mr. Chase, the instrument operator at each pulse station:

1. The property, operator's initials, job and page number, "a" spacing, transit interval and remarks on topography;
2. The line and station co-ordinates;
3. The self potential reading in millivolts (S.P. mv);
4. The current in milliamperes (I ma);
5. The impressed emf in millivolts (dv mv);
6. The induced polarization decay voltage in millivolts (IP mv);
7. The current electrode voltage switch value;
8. The pulse time in seconds.

From this data, the apparent resistivity is calculated from the following relation:

$$p = \frac{2\pi \times a \text{ dV}}{I \text{ (ma)}}$$

Where: p = apparent resistivity in ohm - feet

$$\pi = 3.1416$$

"a" = 1/3 distance between the current electrodes

The normalized IP value is obtained by utilization of the following relation:

$$\text{Chargeability (in milliseconds)} = \frac{IP \text{ mV} \times K}{dV \text{ (mV)}}$$

Where: Chargeability = normalized IP in millivolt seconds per mil-



livolt or milliseconds.

$k$  = a constant depending on the IF setting.

The final apparent resistivity, self potential, and normalized IP values were plotted on the accompanying figures at a point midway between the receiving pots (i.e. 50 meters in front of the instrument position).



PART D: DISCUSSION OF RESULTS

D - 1: Self Potential

The self potential response ranged from a low of -42 to a high of +78 millivolts per 100 meters.

Normally gradient response in excess of 100 m.v. per 100 meters are considered anomalous and no gradients of this amplitude were recorded in the survey area.

Two weak gradients were recorded and these are shown on the accompanying figure, one at 200 meters west on line 78N, and a second at 300 meters west on line 87N. The latter mentioned is close to a bulldozer trench.

D - 2: Apparent Resistivity

Apparent resistivity response ranged from a low of 220 to a high of 1890 ohm meters. The 1968 results, of 187 resistivities, gave an average value of 790 ohm - meters and standard deviation of 345 ohm - meters. In order to conform with the earlier survey the D.C. apparent resistivity values were contoured at corresponding intervals.

The following categories of values maybe established:

<u>Range</u>	<u>Category</u>
below 460	anomalously low
460 - 790	below average
790 - 1130	above average
greater than 1130	anomalously high



The D. C. apparent resistivity map (see figure 4) shows north-south bias and this is believed to reflect the general attitude of the bedrock structure. The results also show a general increase in amplitude from west to east. The anomalously low response is centered on the west side of the survey area, but lacks corresponding high chargeability response. Since there is a decrease in the amount of bedrock exposure in this area, and the ground is somewhat swampy, it is possible that the anomalously low apparent resistivity anomaly is caused by increase moisture in a thicker overburden blanket.

D - 3: Chargeability (Induced Polarization)

The chargeability results are shown in accompanying figure #5.

Response ranged from a low of 8.0 milliseconds (ms) to a peak value of 30 ms. Based on the results of the previous work, and the new data, the following categories maybe established:

<u>Range</u>	<u>Class</u>
below 4	anomalously low
4 to 16.9	background to average
17 to 29.9	above average
greater than 29.9	anomalous

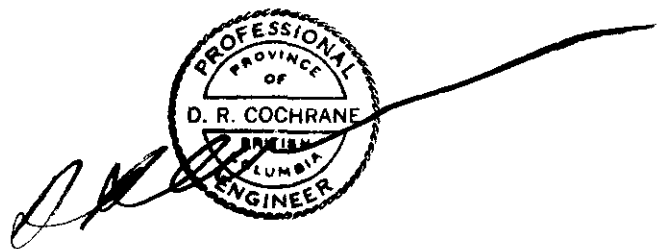
Based on this classification, the chargeability response within the survey area is about equally divided between background and above average responses. Two 30 ms values were recorded at the east end of line 87 north. This area has been trenched, and chalcopryrite has been reported in the bedrock. The high response zone is therefore



presumed to be caused by polarizing sulphide minerals.

Response on the northermost line is "above average" and additional IP surveying is recommended to the north.

Respectfully submitted,



A handwritten signature in black ink, appearing to read 'D. R. Cochrane', is written over a circular professional seal. The seal is for a Professional Engineer in the Province of British Columbia, with the name 'D. R. COCHRANE' in the center.

D. R. Cochrane, P. Eng.  
April 29, 1976  
Delta, B. C.





APPENDICIES

I: Certificates

D. R. Cochrane, P. Eng: Registered member of the Association of Professional Engineers, Province of British Columbia. Graduate of Queen's University (1964) with a M.Sc. (Eng) degree in economic geology. Continuous work in the mining exploration industry since graduation.

William Chase: age 27. Employed with Cochrane Consultants since 1969 as geophysical operator.

Lyle Williams: age 20. Helper, previous mining exploration work in the summer of 1975.

Paul Willson: age 20. Helper, employed in various capacities in exploration since 1972.

M. Mathieu: President of Scope Exploration Services, Merritt, B. C. Employed in exploration since the 1950's.

B. A. Cochrane: A.O.C.A. Drafting. Employed with Cochrane Consultants since 1970.



APPENDICES CON'T

II: Assessment Work Details

Project: David Minerals IP

Sponsor: David Minerals Ltd., Vancouver, B. C.

Location: Three (3) kilometers northeast of Aspen Grove, Nicola  
Mining Division.

Field Work: Between April 2 and April 5, 1976.

Field Personnel: Mr. M. Mathieu, Merritt, B. C. linecutting  
Mr. W. Chase, instrument operator  
Mr. Paul Willson, instrument helper  
Mr. Lyle Willaims, instrument helper

Data Processing: B. A. Cochrane and D. R. Cochrane

Report: D. R. Cochrane, P. Eng.

Typing: V. Elliott, April 28, 1976

Cost Breakdown:

(a) invoice from Mr. M. Mathieu for contract linecutting dated April 5, 1976.	Total =	\$ 304.50
(b) Induced polarization field work, personnel, equipment Total : 3 days at \$400 per day all inclusive	=	1200.00
(c) Data Processing and report preparation:		
- B. A. Cochrane 28.5 hrs. @ \$8.95/hr.	=	255.08
- D. R. Cochrane, P. Eng. April 29, 1976. A total of 1 day @ \$200.00 per day	=	<u>200.00</u>
	TOTAL =	<u>\$1959.58</u>



APPENDIX III

Instrument Specifications for HEW-200  
Pulse Type (Time Domain) Induced Polarization Unit

**Receiver-Transmitter Package:**

15" x 13" x 10"      Weight: 38 lbs.

**Transmitter Power Supply:**

30 volt rechargeable battery 5-RF 680 Central Lab.  
Primary Power Supply: 1 #420 ER dry cell timer battery

**Receiver:**

Common mode rejection 100DB (DC-60 Hz)  
Input impedance  $1 \times 10^6$  ohms  
Operation temperature:  $-20^{\circ} \text{C} + 75^{\circ} \text{C}$   
Sealed galvanometer type meters for very humid or wet climates  
Polarity automatically read on meter dial  
Three input combinations  
Sealed switches and panel for wet climate (dessicant incl.)

**Transmitter:**

24 - 30 volt DC-DC transistorized converter  
Power output 500 watts maximum  
Timer two second or four second pulse intervals  
Automatic reverse current cycling  
Operating temperature:  $- 20^{\circ} \text{C}$  to  $+ 75^{\circ} \text{C}$   
Sealed switches and panel for wet climates (dessicant incl.)  
Sealed meter for very humid or wet climates

**TIME CONSTANTS:**

The following table lists current on times, and corresponding delay and integration times

<u>Current On(seconds)</u>	<u>Delay Time (seconds)</u>	<u>Integration Time (seconds)</u>
2.0	0.4	1.2
2.5	0.5	1.5
3.0	0.6	1.8
3.5	0.7	2.1
4.0	0.8	2.4
4.5	0.9	2.7
5.0	1.0	3.0
5.5	1.1	3.3
6.0	1.2	3.6

**Manufactured by:**

Hewitt Enterprises and Terra Physics  
12215 South, 900 East  
DRAPER, Utah



APPENDIX IV:

CONVERSION TABLE

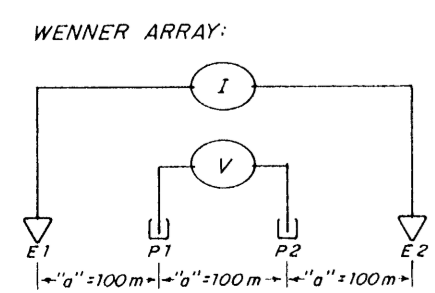
<u>Millimeters</u> <u>(mm)</u>	<u>Centimeters</u> <u>(cm)</u>	<u>Decimeters</u> <u>(dm)</u>	<u>Meters</u> <u>(m)</u>	<u>U.S. Equivalent</u>
1	0.1	0.01	0.001	0.0393700 inch
10	1.0	0.10	0.01	0.393700 inch
100	10.0	1.0	0.10	3.93700 inches 0.328083 foot
1,000	100.0	10.0	1.00	39.3700 inches 3.28083 feet
			1000.00	0.621372 mile





5849 M-3

NOTES:  
 TIME CONSTANTS - HEW 200:  
 0.2 seconds CURRENT ON  
 0.8 seconds DELAY  
 1.2 seconds INTEGRATION TIME



Department of  
 Mines and Petroleum Resources  
 ASSESSMENT REPORT  
 NO 5849 MAP 3

- LEGEND:
- 1976 I.P. SURVEY LINE (CUT & FLAGGED)
  - TRENCH
  - 4 X 4 ROAD
  - DAVID MINERALS (KIDD BRECCIA) CLAIMS.
  - APPROX. CLAIMS BOUNDARY "TOUCH GROUP"

**DAVID MINERALS LIMITED**

Touch Group Aspen Grove, British Columbia  
 Nicola Mining Division N.T.S. 92 H/15 E

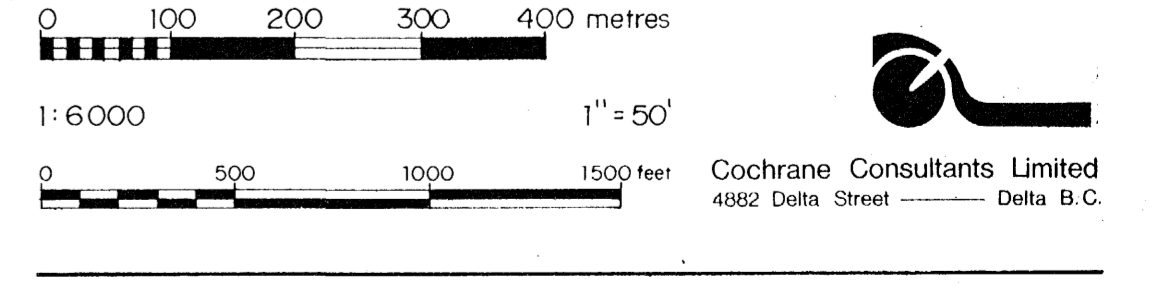
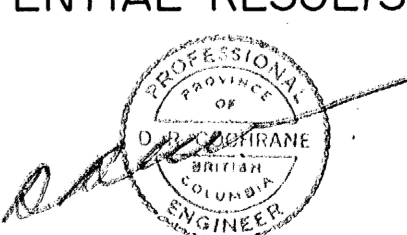
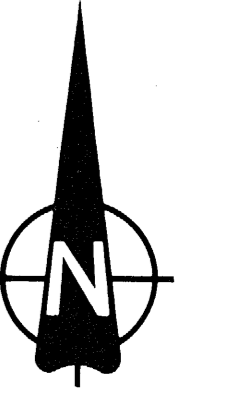


FIGURE 3  
 SELF POTENTIAL RESULTS (millivolts)



To accompany a report by D.R. COCHRANE, P. Eng., on the TOUCH GROUP, dated April 29, 1976 of DML/B.C. Dwn B.A.C.



5849 M-4

NOTES:

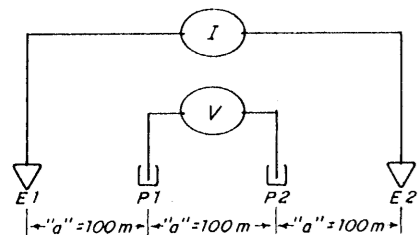
TIME CONSTANTS - HEW 200:

0.2 seconds CURRENT ON

0.8 seconds DELAY

1.2 seconds INTEGRATION TIME

WENNER ARRAY:



Department of  
Mines and Petroleum Resources  
ASSESSMENT REPORT  
NO. 5849 MAP. 4

CONTOUR INTERVAL:

- 460 ohm-metres
- 790 " "
- 1130 " "

LEGEND:

- 1976 I.P. SURVEY LINE (CUT & FLAGGED)
- CROSS TRENCH
- 4 X 4 ROAD
- DAVID MINERALS (KIDD BRECCIA) CLAIMS.
- APPROX. CLAIMS BOUNDARY "TOUCH GROUP"

DAVID MINERALS LIMITED

Touch Group Aspen Grove, British Columbia  
Nicola Mining Division N.T.S. 92 H/15 E

0 100 200 300 400 metres

1:6000 1" = 50'

0 500 1000 1500 feet

Cochrane Consultants Limited  
4960 Delta Street Delta B.C.

FIGURE 4  
APPARENT RESISTIVITY RESULTS (ohm - metres)



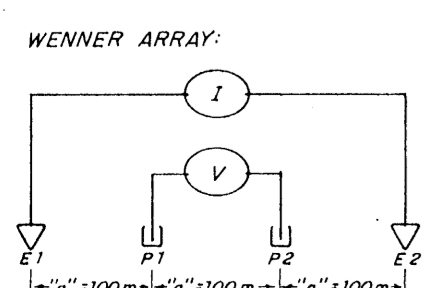
To accompany a report by D. R. COCHRANE, P. Eng., on the TOUCH GROUP, dated April 29, 1976 at Delta, B.C., Dm B.C.



5849 M-5

**NOTES:**

TIME CONSTANTS - HEW 200:  
 0.2 seconds CURRENT ON  
 0.8 seconds DELAY  
 1.2 seconds INTEGRATION TIME



Department of  
 Mines and Petroleum Resources  
 ASSESSMENT REPORT  
 NO. 5849 MAP 5

**CONTOUR INTERVAL:**

4 milliseconds  
 17 "  
 30 "

**LEGEND:**

- 1976 I.P. SURVEY LINE (CUT & FLAGGED)
- TRENCH
- 4 X 4 ROAD
- DAVID MINERALS (KIDD BRECCIA) CLAIMS.
- APPROX. CLAIMS BOUNDARY "TOUCH GROUP".

**DAVID MINERALS LIMITED**

Touch Group Aspen Grove, British Columbia  
 Nicola Mining Division N.T.S. 92 H/15 E

0 100 200 300 400 metres

1:6000 1" = 50'

0 500 1000 1500 feet

Cochrane Consultants Limited  
 4882 Delta Street Delta B.C.



**FIGURE 5**  
**CHARGEABILITY (I.P.) RESULTS (milliseconds)**



To accompany a report by D. R. COCHRANE, P. Eng., on the TOUCH GROUP, dated April 29, 1976 of Delta, B.C. Dm-B.A.C.