

5771

PALEONTOLOGICAL and GEOLOGICAL

EXPLORATION REPORT

on

GLASS GLASS QUARTZ A and B

by *J. F. Andrew*

JOHN F. Mc ANDREW, P. ENG.

LOCATION: 6 miles northwest of Merritt, B.C.  
In Nicola Mining Division  
T.S. 9212  
Latitude  $50^{\circ} 00'$   
Longitude  $120^{\circ} 45'$

FIELD WORK: Marie-Paule F. Mc Andrew, Prospector

Date of work: September 10 - 27, 1975

GOVERNMENT AGENT  
**RECEIVED**  
JAN 26 1976

JAN 22, 1976

MERRITT, B. C.

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INTRODUCTION

The 8 Chalco Claims were staked December 8, 1974 and recorded January 3, 1975.

	<u>Record Number</u>
Chalco 6	60329
Chalco 14-17	60330-60333
Chalco 38	60334
Chalco 45-46	60335-60336

During the period September 10 - 27, 1975 \$1650.00 was spent on the claims. \$825.00 was spent on Chalco Group A consisting of claims Chalco 14-17 and \$825.00 on Chalco Group B consisting of claims Chalco 6, 38, 45 and 46. The above expenditures were for geological and geochemical surveys on each group. \$200.00 was applied as assessment work to put each claim in good standing for 1 year

LOCATION and ACCESSIBILITY

The Chalco Groups A and B are located on the south side of Promontory Hills about 1½ miles south of the Craigmont Mine. The town of Merritt lies 6 miles to the southeast ( Refer to attached 1" equals 1 mile Location Map ). All parts of the claims are readily accessible by logging roads.

PURPOSE of the GEOLOGICAL and GEOCHEMICAL SURVEYS

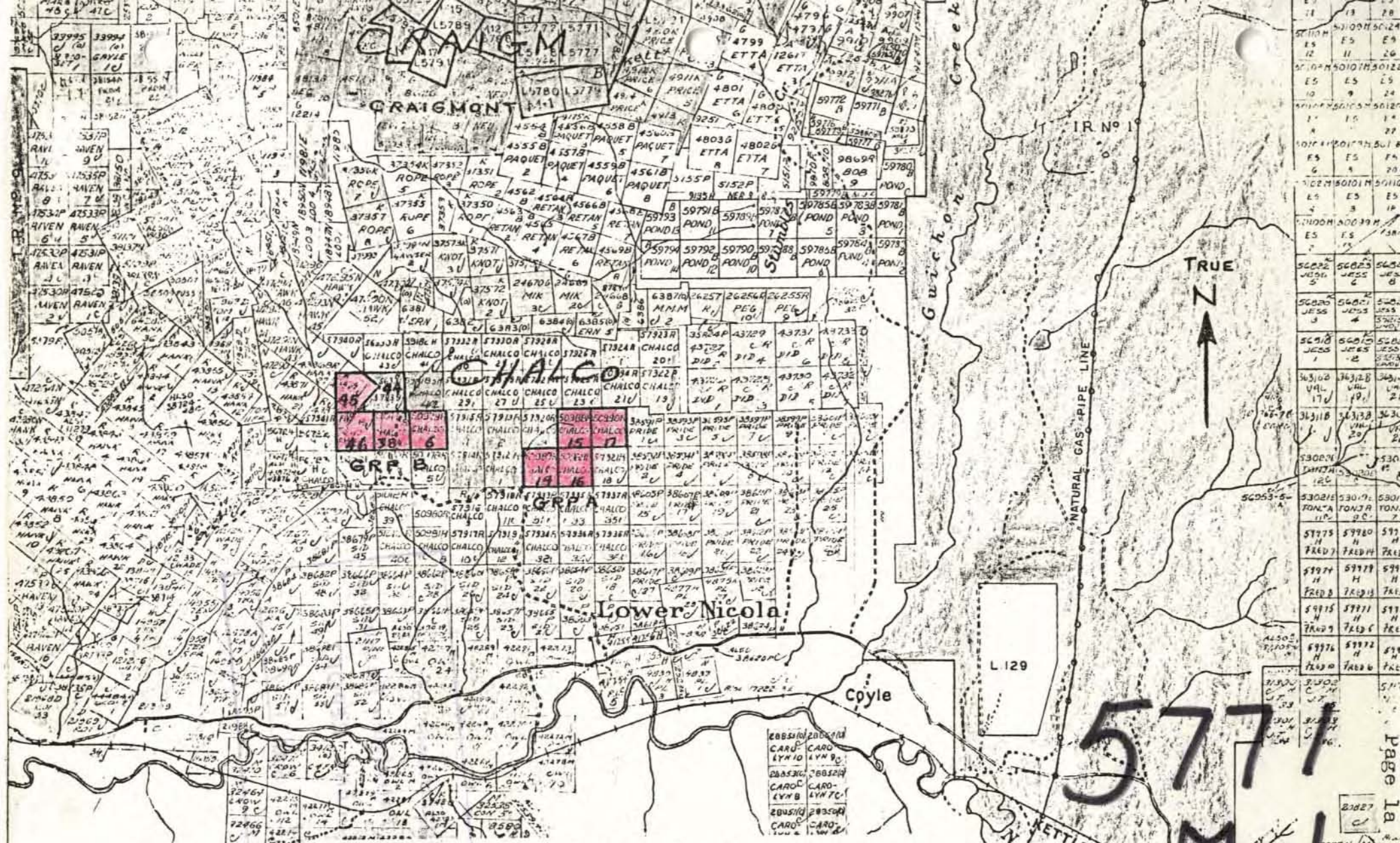
Since the fall of 1971 the author for numerous reasons has had more than a casual interest in the area now occupied by the Chalco Groups.

a) The geological and geochemical environment along with the mineralogy of this area bears certain similarities to the Craigmont deposit.

b) The claims lie in a predominately drift covered, flat basin 1 mile by 2 miles bounded to the east, north and west by pronounced ridges. The very nature of this type of ground commands extensive geological, geochemical and geophysical surveys.

c) London Pride Silver Mines Ltd. were obviously of the same opinion as that expressed in b) for from May 12 to June 7, 1969, under the direction of G.A. Dixon and C.A.R. Lammle extensive geosurveys were conducted. Numerous geochemical and geophysical anomalies were outlined, 3 copper showings located, 2 of which had a short drill hole put under them, then the property was abandoned. After studying the assessment reports filed by London Pride the author felt certain anomalies merited more detailed sampling and samples should be assayed not only for copper but mercury also since this element indicated the Craigmont orebody so well.

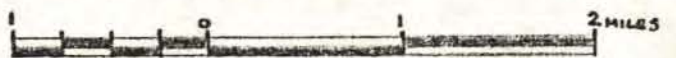




LOCATION MAP OF  
**CHALCO GROUPS A & B**  
 NICOLA MINING DIVISION  
 MERRITT, B.C.

MAP I

SCALE 1/4 MILE SEPT, 1975



514730	514760	514640	514600
12 U	12 U	12 U	12 U
514730	514740	514600	514650
12 U	12 U	12 U	12 U
514740	514720	514600	514670
12 U	12 U	12 U	12 U
514630	514100		
12 U	12 U		



DETAILS of the SURVEYS

Geochemical soil samples were collected at 200 foot intervals along north-south picket lines 400 feet apart and along east-west and north-south claim lines. In the course of soil sampling it was noted to get a decent B horizon sample it was necessary to dig down 1 to 1½ feet. Where available, the friable, somewhat oxidized B horizon was collected. In certain swampy areas only the A1 horizon could be obtained.

All geochemical and rock samples were sent to Min-En Laboratories Ltd. in North Vancouver, B.C.

Geological mapping and prospecting were done along existing lines and by brunton and pace traverses.

GEOLOGICAL SURVEY

In the B.C. Mines and Petroleum Resources Report, 1960 Dr. J.M. Carr describes the Geology of the Promontory Hills and the general area of the Chalco Groups in detail. It is worth noting how he describes the Craigmont orebody "The Craigmont orebody contains specular hematite, magnetite, and chalcopyrite with minor amounts of bornite, and the adjacent wallrocks are altered to epidote, actinolite, and garnet skarns, and are veined and replaced by orthoclase, quartz, calcite, chlorite, and tourmaline."








The regional geology described by Carr indicates intrusives south of the Chalco Claims; some believe this to be a prong of the Guichon Batholith but Carr thinks it is a separate intrusive body. North of the Claims Nicola group volcanics and limestones ( Triassic age ) are the chief components with occasional tuffaceous breccias. The eastern edge of the principal ridge to the east of Chalco Group A consists of the Kingsvale volcanic group ( Lower Cretaceous age ). Limestone lenses and minor beds are probably more frequent than mapped by Carr in this area.

London Pride did some geological mapping and trenching in the areas now occupied by the Chalco Groups. Although they failed to locate or uncover bedrock in these particular areas their observations in the adjacent areas are pertinent to the Chalco Claims. Quoting from their report:"

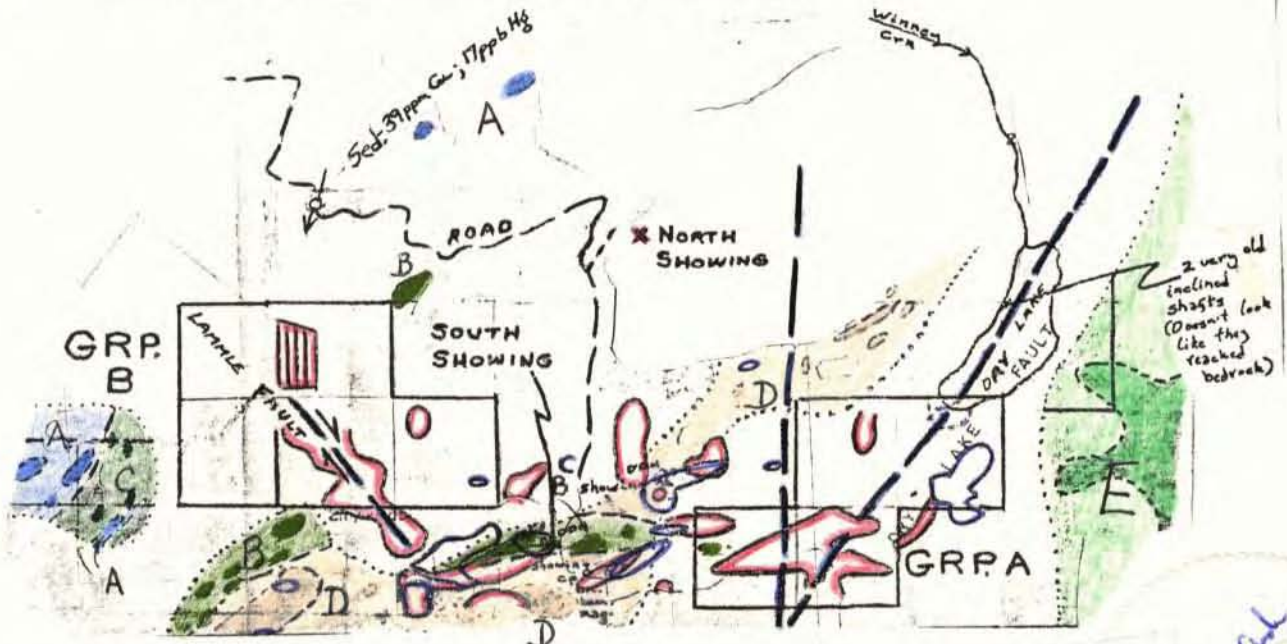
- a) claims are located in a favourable geological environment.
- b) Certain portions of the remainder of the property warrant some further consideration
- c) All but the Kingsvale volcanics, which are post mineral, are potential host rocks for mineralization.
- d) the areas of greatest exploration interest would be along the north side of the northeasterly trending granite contacts. Any geochemical or geophysical anomalies from these areas would warrant further consideration and definitive exploration."

GUICHON  
BATHOLITH  
NICOLA  
E CRAIGMONT  
KINGSSVALE  
(Geology after Carr, 1960)

LEGEND

- E  Kingsvale Group (LOWER CRETACEOUS)
- D  Quartz Monzonite (JURASSIC)
- UPPER TRIASSIC (NICOLA GROUP)
- C  Dacite
- B  Andesite
- A  Limestone
-  Geochem. Anomaly greater than 80ppm Cu
-  Mag. Anomaly greater than 1000gammas

*John M. McAndrew*  
Jan 22, 1976






MAP 2

GEOLOGICAL SURVEYS

of  
CHALCO CLAIM GROUPS  
Merritt, B.C., Nicola M.D.

Symbols

-  Geological contact
-  Outcrop boundary
-  Glacial deposits

Sept. 1975 Surveys by: John M. Mc Andrew, P. Engr.  
212-14840-105Ave.  
Surrey, B.C.

To Accompany: Geological and Geochemical  
Assessment Report on Chalco  
Claim Groups A and B  
Dated January 22, 1976



SCALE 1" = 1/2 MILE

*John M. McAndrew*  
Jan 22, 1976



GEOLOGICAL SURVEY contd

R. Lamble from his geological mapping for London Pride hypothesized a major northwest trending fault through the center of Chalco 38. This fault has been plotted on the author's accompanying geological map because of its apparent relationship to geochemical anomalies and possible association with suspected concealed mineralization.

Two of the showings located by London Pride have also been plotted on the author's geological map. These showings indicate typical skarn type mineralization. The "South Showing" consists of abundant hematite ( specularite ) along with chalcopryite, minor bornite and malachite. Occasional specks of pyrite and tourmaline are also present. This showing occurs at the contact of the Nicola volcanics and the intrusive. The "North Showing" on the contact of the limestone and Nicola volcanics contains chalcopryite, hematite, and some garnets. Although these showings are too small to be of any economic significance they do prove that the geological environment in this area is favourable for mineralization and illustrate the similarities of this mineralization to that of the Craigmont orebody.

In spite of diligent geological mapping and prospecting and some hand trenching the only outcrop located was in the west portion of Chalco 14 ( Refer to attached 1" equals  $\frac{1}{2}$  mile Geological Map ) and consisted of andesite. This was not surprising considering the flat basin-like nature of the ground. Obviously had there been considerable outcrop this ground would have been adequately tested long ago considering its proximity to the Craigmont orebody.

Rock Types: In order to get some idea of what might lie beneath this covered ground mapping was extended beyond the boundaries of the Chalco Groups.

**Kingsvale Group** - Due east of the Chalco A Group occur Lower Cretaceous rocks of the Kingsvale Group consisting of andesites and volcanic breccias. The andesite flows are moderately vesicular, massive, display local trachytoid texture, light to dark grey in colour and carry white feldspar phenocrysts. The volcanic breccia consists of angular to rounded fragments of andesite up to 2' in diameter in a matrix of argillized andesite tuff.

**Quartz-Monzonite** - A belt of quartz-monzonite outcrops runs in a northeasterly-southwesterly direction between Chalco Groups A and B and due south of Group B. These rocks are Jurassic to Lower Cretaceous in age. The quartz-monzonite is flesh coloured to pink and medium grained.

**Andesite** - Outcrops of medium to dark green andesite

Rock Types

Andesite contd - occur between Chalco Groups A and B, in the west portion of Chalco 14, and due north and due south of Chalco B Group. These andesites are Jurassic to Lower Cretaceous in age. They are fragmental in part but fragments rarely exceed 2" in diameter.

Dacite - Dacite of the Nicola Group, which is Triassic in age occurs due west of Chalco Group B. This is a light coloured, very hard, cherty rock containing volcanic glass shards.

Limestone - Limestone of the Nicola Group was mapped due west and north of Chalco Group B. This rock is grey, carries tiny siliceous skeletal remains and organic debris and locally displays well developed cleavage.

Alteration

The Kingsvale rocks mostly weather grey or brown but some layers show a pervasive reddish alteration, which appears chiefly to involve oxidation of magnetite and kaolénization of feldspar.

It is the writer's observation that the quartz-monzonite at the " South Showing " is very similar in texture and alteration to the mineralized monzonite on the Craigmont property, near the access road about 2000' from the mill site.

Outcrops of quartz-monzonite and andesite indicate widespread alteration chiefly of epidote, chlorite, specular hematite, tourmaline and K-feldspar in this general area.

Structure

Three major structures have been plotted on the geological map. These were inferred from Lamble's mapping, and photographic and topographic linears. Lamble's fault through Chalco Group B coincides with significant geochemical anomalies and where the two major linears intersect on Chalco Group A there is another large copper anomaly.

Local zones of minor faulting, fracturing and shearing are also common throughout this general area.

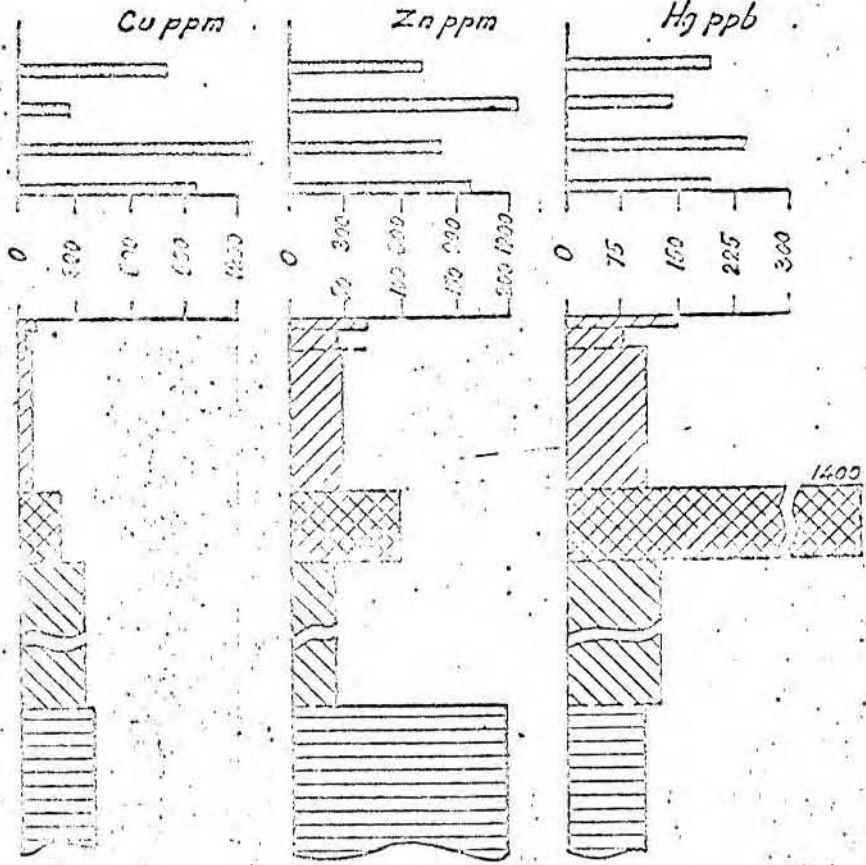
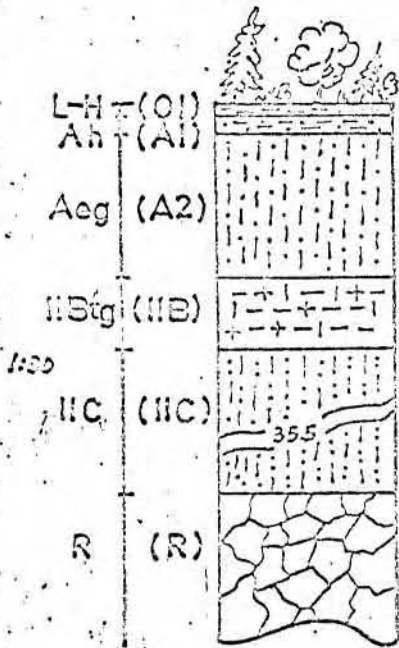
Mineralization

The observed mineral showings have already been discussed. One can only reiterate their similarities to the Craigmont type of mineralization.



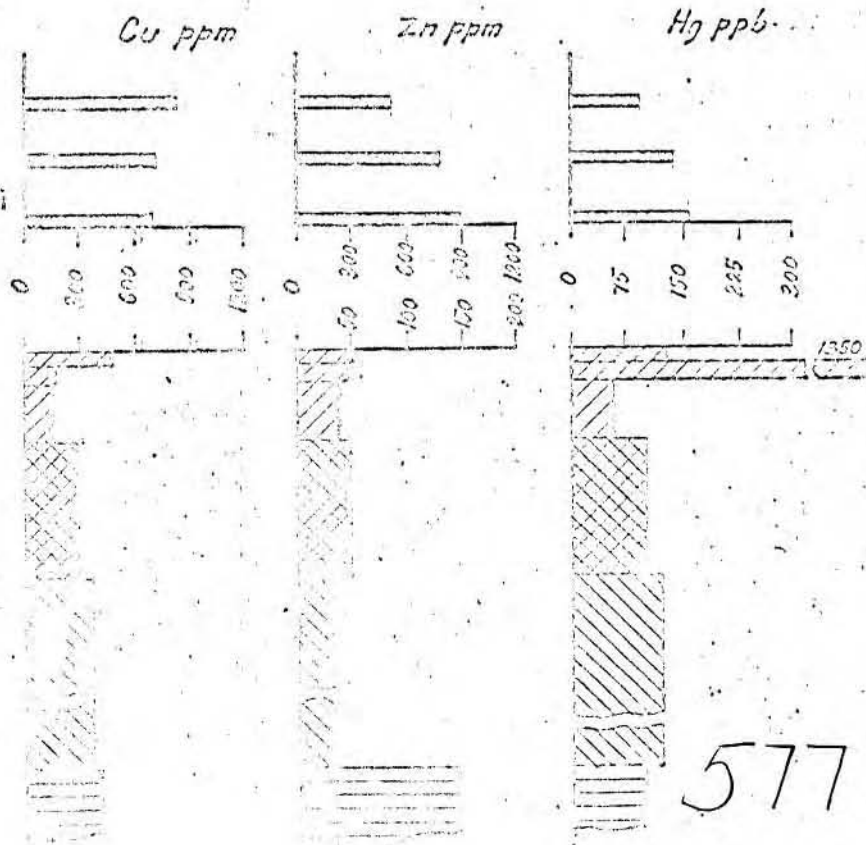
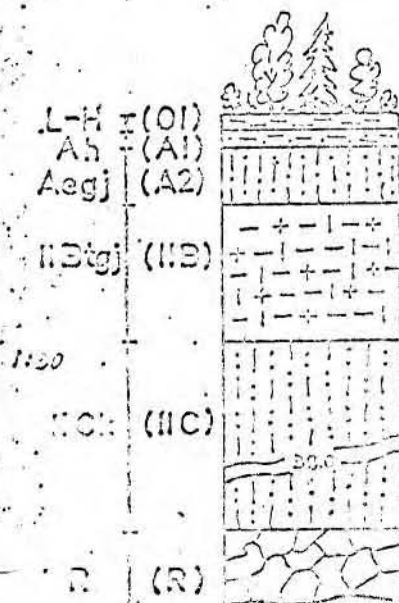
3

Pseudotsuga menziesii  
Pinus contorta var. lat.  
Juniperus communis  
Arctostaphylos Uva-Ursi



4

Pseudotsuga menziesii  
Pinus Ponderosa  
Arctostaphylos Uva-Ursi



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Craigmont Mines

To illustrate Hg anomaly over orebody

FIG. 4

## GEOCHEMICAL SURVEY

Introduction According to the writer's experience in this area the original orientation geochemical sample values match the Craigmont surface geochemical values for copper and are appreciably higher for zinc especially close to Dry Lake.

It is thought the overburden in this basin can act as a barrier for any extensive supergene development and the production of strong anomalies; presenting a case similar to the Craigmont soil anomalies.

All the geochemical anomalies defined by London Pride do not originate from the discussed showings as possible dispersion patterns.

The writer's experience indicates mercury sampling may be a successful tool to detect an orebody taking shallow soil samples. Mercury sampling and/or deep soil sampling for copper were believed to be the best approach to geochemically test the Chalco Groups. Attached Figure 4 fully illustrates how very well mercury soil sampling indicated the Craigmont orebody.

In 1972 Perry, Knox and Kaufman, Inc. optioned the Chalco Claims. They obtained some copper anomalous soil samples in the areas now occupied by Chalco Groups A and B. The highest mercury assay they obtained was 17 parts per billion in Chalco 14. In Chalco Group B mercury assays ranged from 3-7ppb and in Chalco Group A, except for the one that assayed 17ppb, 3-10ppb. It is difficult to account for their low mercury assays since samples taken by the author in Chalco Group A ranged as high as 91ppb ( B1-Trench2 ) and in Group B as high as 205ppb ( B1-14N100W ). Mercury values were probably lost by P.K. and K. during transportation to their lab. or during digestion at the lab.

The " limy " conditions in parts of this area are probably highly restricting copper ion mobility as regards secondary dispersion and this element may not be the best to use in this type of environment.

The Nicola Volcanics produce relatively high threshold copper values, which can on occasion easily mask otherwise anomalous secretions.

All geochemical and geophysical anomalies located by London Pride and Perry, Knox and Kaufman have been plotted on the Geological Map. I believe they have a certain relevance when discussing the Chalco Groups. Especially the two significant copper anomalies coincident with the 3 aforementioned major structures and linears.



GEOCHEMICAL SURVEY

Analytical Methods After drying the samples at a low temperature soils were screened by 80 mesh sieve to obtain the minus 80 mesh fraction for analysis.

For analysing copper 1.0 gram of the samples are digested for 6 hours with HNO<sub>3</sub> and HClO<sub>4</sub> mixture.

After cooling samples are diluted to standard volume. The solutions were analysed by atomic absorption spectrometers.

Copper was analysed using the CH H -  
air flame combination. 2 2

Mercury is also analysed by atomic absorption spectrophotometer using the flameless analytical technique. The detection limit of this technique is 5 ppb.

Results All the soil samples were analysed for copper and mercury.

The limited number of samples taken during this survey do not permit a proper statistical treatment for frequency distribution analysis of the elements but the necessary background and threshold levels given in this discussion are based on the writer's experience in this area. Anomalous values for copper greater than 80 parts per million, for mercury greater than 50 parts per billion were used for the geochemical maps.

All geochemical sample results have been plotted on Geochemical Survey Maps 3 ( Chalco Group A ) and 4 ( Chalco Group B ). Map 3 at a scale of 1" equals 400 feet was based on London Prides former geochemical sampling map. The primary purpose of samples in this area was to substantiate London Prides values and to determine if mercury results would indicate major structures through this area. Map 4 at a scale of 1" equals 500 feet was based on Perry, Knox and Kaufman's former geochemical sampling map. The main reasons for additional sampling in this area was to give better definition to P.K.&K.'s anomalies and determine if mercury results would indicate Lamale's Fault.

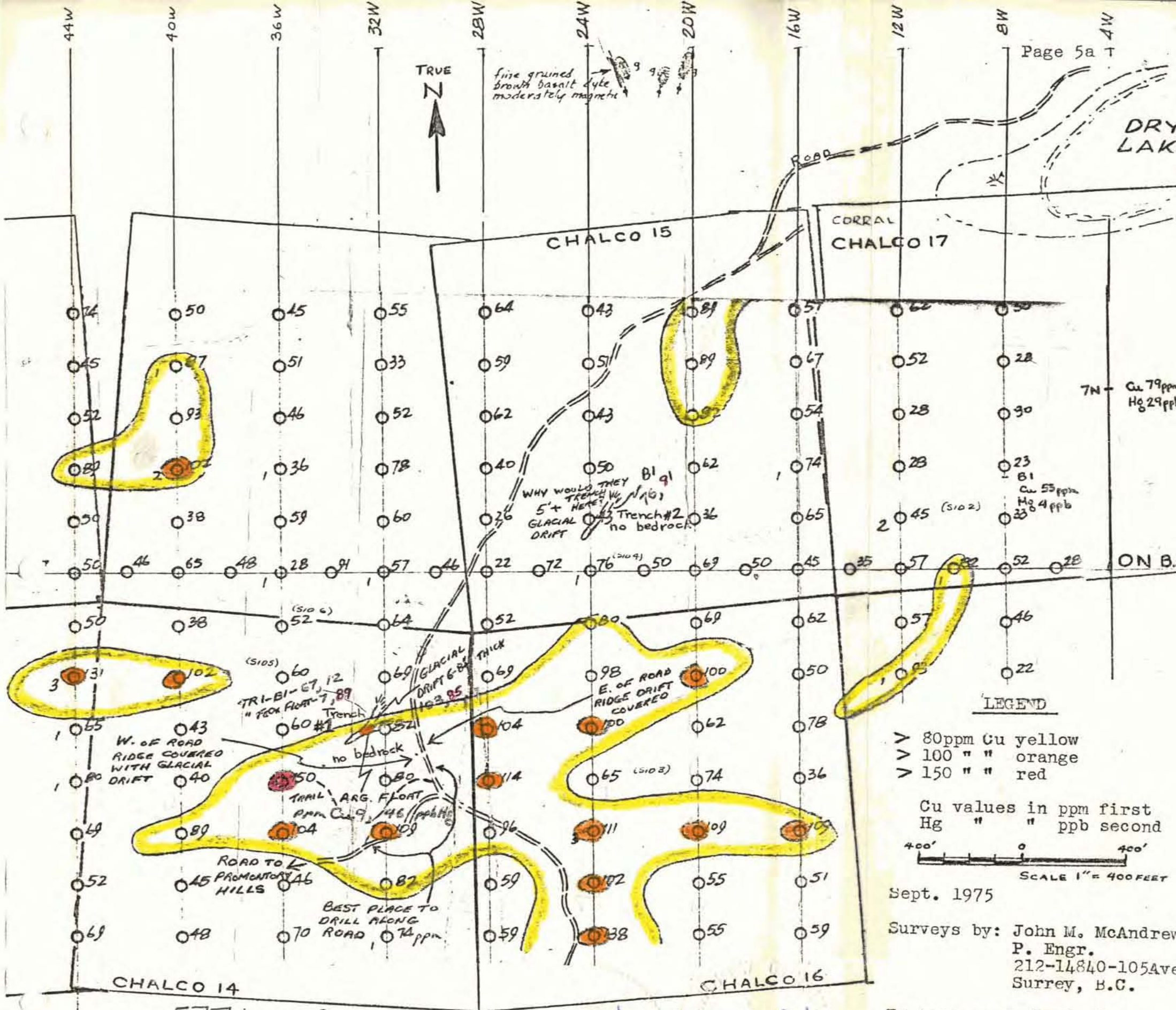
3 copper anomalous areas were defined on the Chalco Group B. No attempt was made to contour mercury results because of the great discrepancy between P.K.&K.'s and Min-EN's results. London Pride had adequately contoured the anomalies on the Chalco A Group which the author's sampling confirmed as being anomalous in copper. Areas highly anomalous in mercury occur in Chalco Groups A and B.



DRY LAKE



fine grained  
brown basalt dyke  
moderately magnetic



7N - Cu 79ppm  
Hg 29ppb

LEGEND

- > 80ppm Cu yellow
- > 100 " " orange
- > 150 " " red

Cu values in ppm first  
Hg " " ppb second



Sept. 1975

Surveys by: John M. McAndrew  
P. Engr.  
212-14840-105 Ave  
Surrey, B.C.

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MAP 3

GEOCHEMICAL SURVEYS on CHALCO CLAIM GROUP A  
Merritt, B.C. Nicola M.D.

*John M. McAndrew*  
*Jan 22, 1976*

To Accompany: Geological  
and Geochemical Report on  
Chalco Claim Groups A and B  
Dated January 22, 1976



MAP 4

GEOCHEMICAL SURVEYS  
on  
CHALCO CLAIM GROUP B

MERRIT, B.C., NICOLA M.D.

Legend

40- 80ppm copper, blue  
81-100 " " , yellow  
101-150 " " , orange  
151plus " " , red

Copper values in ppm listed first  
Mercury " " ppb " second



Scale 1" = 500ft.

September 1975

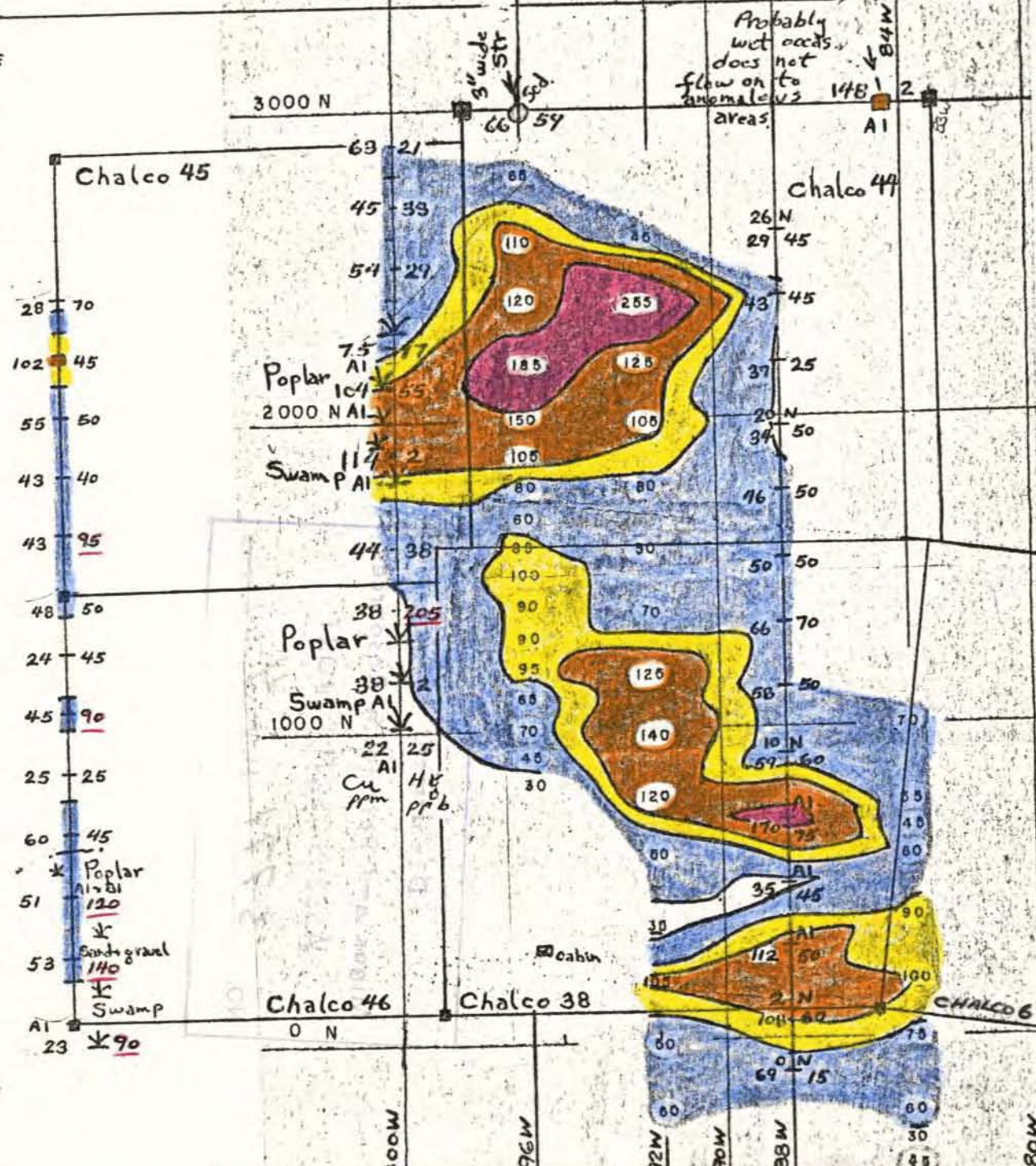
Surveys by: John M. Mc Andrew,  
P. Engr.  
212-14840-105Ave.  
Surrey, B.C.

To Accompany: Geological and  
Geochemical Report  
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Groups A and B  
Dated January 22,  
1976

5771 M-4

*John M. Mc Andrew*  
Jan 22, 1976

*John M. Mc Andrew*  
Jan 22, 1976





CONCLUSIONS

Based on Geology 1) The location of several zones of copper mineralization in the immediate vicinity of Chalco Groups A and B indicates the geological environment is the proper one to search for additional mineralization. The marked similarities to the Craigmont orebody as regards mineral assemblages in these showings is also an encouraging aspect.

2) One major fault and two major linears that intersect on Chalco Group A have not been tested as regards their mineral potential.

3) Although there is practically no outcrop on the Chalco Groups adjacent geological mapping indicates that host rocks favourable to mineralization lie beneath the cover on these claims.

4) Extensive alteration was noted throughout this area which is always a good indicator for mineralization.

5) The possibility of finding a non skarn deposit in this area should not be ruled out.

Based on Geochemistry 1) Surveys by London Pride; Perry, Knox and Kaufman; and the author have defined numerous copper geochemical anomalies that have not been properly physically tested. Trenching attempts failed to reach bedrock. Some of the anomalies are obviously due to dispersion from known mineral showings. But what about the large anomalies in Chalco Groups A and B? These are not due to the known showings. All things being equal are these dispersion patterns developed from significant zones of concealed copper mineralization? In the author's opinion this is a very good possibility.

2) In the Chalco B Group copper anomalies and some mercury highs are coincident with the projected extension of Lammle's Fault. The nature of the anomalous ground suggests a concealed limestone horizon. The limestone mapped due northward west of Group B probably belongs to the same horizon, now shows a displacement to the southeast of rocks on the northeast side of his fault, this could have resulted in said limestone horizon lying beneath the north portion of Group B. We now have a rather intriguing situation - a major structure, significant geochemical anomalies and a faulted limestone horizon all more or less coincident. Is there a fault controlled skarn deposit beneath the Chalco B Group?

3) The large copper anomaly in Chalco Group A coincides with the intersection of the 2 major linears. Mercury highs ( often indicative of structural zones ) occur in the area of linears. Have we concealed mineralization in this area localized around a fault intersection? This appears to be another excellent target area.



CONCLUSIONS

Based on Geochemistry 4) Mercury is one of the best trace elements for mineral exploration. Many metal geochemical anomalies can be displaced from above the orebodies by such processes as glacial erosion, soil creep and slides. Mercury, on the other hand, is continually volatilizing and strengthening the soil anomaly above the orebody. Should one process of nature sweep this anomaly away, in time, another one will be formed above the orebody. Mercury is so volatile that considerable research is presently being done to locate mercury anomalies by aerial reconnaissance. The foregoing explains the author's strong bias towards mercury soil sampling on the Chalco Groups. The fact that there was such a strong mercury soil anomaly above the Craigmont orebody is another good reason.

In spite of the considerable expenditures on and around the Chalco Groups over the years the ground is far from being adequately tested by drilling. Past trenching has been rather fruitless. Considering their proximity to Craigmont this is rather surprising but one should bear in mind that approximately 19 companies and individuals walked away from Craigmont before someone found the mine. Net profits to date from Craigmont exceed fifty million dollars.

RECOMMENDATIONS

Personal exploration philosophy governs to some extent along with financial considerations exploration programs. The author personally feels that definite drilling targets have been defined on both the Chalco Groups. Diamond drilling because of the considerable expense can at times be beyond the scope of the prospector owner. At least a half dozen diamond drill holes are required to give the Chalco targets a proper initial test.

A more survey oriented person might like to run more geosurveys prior to drilling.

a) Additional IP surveys might be in order. It is unlikely that the past IP penetrated beyond 100', or even that far ( personal communication ). The Craigmont orebody was hit at 120'.

b) More magnetometer surveys, especially in the area of the suspected limestone horizon in the Chalco B Group. London Pride's survey did not cover all the Chalco Claims.

c) Deep soil sampling with power auger and all soil samples analysed for mercury, copper and zinc.

d) Additional photo interpretation for existing faults and structures accompanied by detailed geological mapping.

e) Seismic testing to determine overburden thicknesses and to help interpreting geochemical and magnetometer results ( keeping in mind that thick clay layers at various parts of the basin might give false depth determinations.

John M. Mc Andrew, P. ENGR.  
January 22, 1976

*John M. Mc Andrew  
Jan 22, 1976*

*John M. Mc Andrew  
Jan 22, 1976*

STATEMENT of COSTS

CANADA  
Province of British Columbia

IN the MATTER of

TO WIT: Geological and geochemical  
report on behalf of Marie-  
Paule F. Mc Andrew, Prospector

I John M. Mc Andrew of 212-14840-105th Ave. of Surrey in the  
Province of British Columbia DO Solemnly Declare that geological  
and geochemical surveys were conducted on the Chalco Group A mineral  
claims- Chalco 14-17 and the Chalco Group B mineral claims- Chalco 6,  
38, 45 and 46 in the Nicola M.D. located 6 miles northwest of  
Merritt, B.C. during the period September 10 to 27, 1975 and a  
report describing these surveys was prepared during the period  
January 19 to 22, 1976. The following expenses were incurred:

	<u>Chalco Group A</u>	<u>Chalco Group B</u>
1. 37 soil and 2 rock assays	\$ 40.00	\$ 160.00
2. Vehicle rental and mileage	125.00	125.00
3. Supply costs, field conditions	40.00	30.00
4. Wages - John M. Mc Andrew, P. Engr. September 10 - 17, 1975 - 7 days (\$150/day) and 3 hours (\$20/hour)	600.00	510.00
5. Maps, drafting supplies, field gear	<u>20.00</u>	<u>          </u>
	\$ <u>825.00</u>	\$ <u>825.00</u>

AND I make this solemn Declaration conscientiously believing  
it to be true, and knowing that it is of the same force and  
effect as if made under oath, and by virtue of the Canada  
Evidence Act.

Declared before me  
at *New Westminster*  
in the Province of *British Columbia*  
this *22nd* day of  
*January* A.D. 1976

*L. Harford Harford*  
A Commissioner for the Province of  
British Columbia

*John M. Mc Andrew P. Engr.*



CERTIFICATION OF JOHN M. MCANDREW

Suite 212, 14840 - 105 Ave., Surrey, B. C. Phone: 588-8072

- 1) Registered as a Professional Engineer by the Association of Professional Engineers of B. C.
- 2) A fellow of the Geological Association of Canada.
- 3) B. Sc. in Geology from the University of Alberta, Edmonton, Alberta; post graduate courses in surveying McGill University, Montreal, Quebec.
- 4) Prior to consulting the author spent seventeen years in exploration property evaluation, mine geology and production with the following companies.

Anaconda American Brass Limited - Copper, Molybdenum  
 Silver Titan Mines - Silver, Lead, Zinc.  
 Columbia Iron Mining Co. - Coal  
 Newmont Exploration Ltd. - Nickel, Copper  
 Iron Ore Company of Canada Ltd. - Direct Shipping Iron ore  
 N. W. Byrne Company - Gold  
 Quebec Cartier Mining Co. Ltd. - Concentrating Iron Ore  
 Eldorado Mining and Refining Co. - Uranium  
 International Nickel Co. - Nickel, Copper.

*John M. Andrew*  
 Jan 22, 1976

*John M. Andrew*  
 Jan 23, 1976





