

ARIS SUMMARY SHEET

District Geologist, Nelson

Off Confidential: 91.10.22

ASSESSMENT REPORT 20451

MINING DIVISION: Golden

PROPERTY: Alcan  
LOCATION: LAT 50 47 00 LONG 115 34 00  
UTM 11 5626491 601045  
NTS 082J13E

CLAIM(S): Alcan  
OPERATOR(S): Cross, D.B.  
AUTHOR(S): Cross, D.B.  
REPORT YEAR: 1990, 15 Pages

COMMODITIES  
SEARCHED FOR: Magnesite  
KEYWORDS: Cambrian, Cathedral Formation, Dolostones, Magnesite, Dolomites  
Stratigraphic correlations

WORK  
ZONE: Geological  
GEOL 375.0 ha  
Map(s) - 1; Scale(s) - 1:15 000  
INFILE: 082JNW

GEOLOGICAL REPORT

ALCAN (2077) MINERAL CLAIM

LOG NO: 11-06	RD.
ACTION:	
FILE NO:	

Cross River area

Golden Mining Division

British Columbia

N.T.S. 82 J/13 East

Latitude: 50° 47' North

Longitude: 115° 34' West

20,751

GEOLOGICAL BRANCH  
ASSESSMENT REPORT

October 1990

Donald B. Cross  
& Associates Limited

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## **SUMMARY**

Field work consisting of geological mapping and sampling was carried out on the ALCAN property by Donald B. Cross & Associates Limited during the spring of 1990.

The purpose of this work was to identify and evaluate exposures of Cathedral formation dolomite for their potential to host high grade magnesite ore amenable to conventional open pit mining methods.

A biogenic reefal buildup in the Cathedral formation was identified and mapped in detail on the ALCAN property. The reefal horizon measures 520 feet thick (158.5 meters) and 0.6 miles (1 kilometer) in strike length. Mineralised horizons carry up to 86.6% MgCO<sub>3</sub> by weight.

## **INTRODUCTION**

This report contains the results and recommendations of field work carried out in 1990.

Initially, prospecting of a much larger area lead to the discovery of high grade magnesite mineralisation at the headwaters of Alcantara Creek. Coarse-grained, recrystallised dolomite, 'granola', forms a biogenic reef in which high-magnesium dolomite is formed by the process of dolomitisation. The magnesite mineralisation occurs as lenses accompanied by tight crystalline dolostone and sparry dolomite. The reefs are distinctive in outcrop owing to their rounded, bulbous shape, tan to white colour and irregular lateral contacts with enclosing rocks.

## **LOCATION AND ACCESS**

The ALCAN mineral claim is located in British Columbia, 40 kilometers

east of Radium Hot Springs. Its eastern boundary adjoins Alberta while Kootenay National Park lies 20 kilometers to the west. The Baymag mine lies 10 kilometers to the west at the junction of Mitchell River and Aurora Creek.

Road access to the area can be gained by turning off Highway 93 onto Settler's Road at kilometer 18, then travelling along Settler's Road to Palliser Road and then to the Cross River Road. At mile 18 on the Cross River Road turn north onto a road which crosses the Cross River and follows Alcantara Creek north to the property. Bridges on the Cross River Road past mile 12 were built in 1976 and are no longer capable of carrying the 15 or 20 tons indicated on the bridge signs.

#### **CLIMATE AND VEGETATION**

The Cross River area lies within the Blue Range of the Rocky Mountains near the Alberta-British Columbia border. The Cross River watershed feeds the Columbia River system which flows into the Pacific Ocean.

Mountains in the area area formed from limestone, dolomite and shale which have been sculpted by glaciation into rounded, sometimes flat-topped summits. River valleys are U-shaped, flat bottomed and wide, thereby affording easy road construction and maintenance.

Summer weather consists of warm days with unsettled air conditions and cool, clear nights. In winter months abundant snowfall accumulates at higher elevations giving way to avalanche conditions.

Tree line occurs at 7,200 feet a.s.l. (2,195 meters). Excellent stands of lodgepole pine and spruce grow on moderately sloped valley walls and flat valley bottoms.

Wildlife present in the area includes; grizzly and black bear, elk,



**ALBERTA**

EDMONTON

RED DEER

CALGARY

**BRITISH  
COLUMBIA**

PROPERTY  
SITE

LETHBRIDGE

**KEY MAP**

CROSS RIVER AREA, BRITISH COLUMBIA

moose, deer, goat, raptors, porcupine, gopher and squirrel.

Abundant fresh water flows year-round in all of the major water courses in the area.

#### PREVIOUS WORK

In 1966, the Geological Survey of Canada released Open File 634, Kananaskis Lakes West Half, in which G. B. Leech published the discovery of thick, high grade magnesite mineralisation on the western slopes of Mount Brussilof.

Claim staking by New Jersey Zinc Exploration Canada Ltd. was followed by additional staking by Baykal Minerals Ltd. and Brussilof Resources Ltd.

Early exploration of the properties was carried out in 1970-71 by Acres Research and in 1973-74 by Canex Placer Ltd. Baymag Mines Company Limited was formed in 1971 and was acquired in 1979 by Refratechnik, a German producer of refractory products. Commercial production of MgO was achieved by Baymag in 1982. The mine currently produces more than 110,000 tonnes of high grade magnesite ore annually.

#### GEOLOGY

The Cross River area is underlain by limestone, dolomite, shale and phyllitic rocks of Middle Cambrian age. This sequence of rocks strikes northeasterly and dips gently to the northwest.

At shallow depth lies the horizontal trace of the Main Ranges thrust fault along which the Cathedral formation and allied rocks have been transported several kilometers to the east. It is probable that the thrust

TABLE 1

## TABLE OF FORMATIONS

Mount Assiniboine area, British Columbia

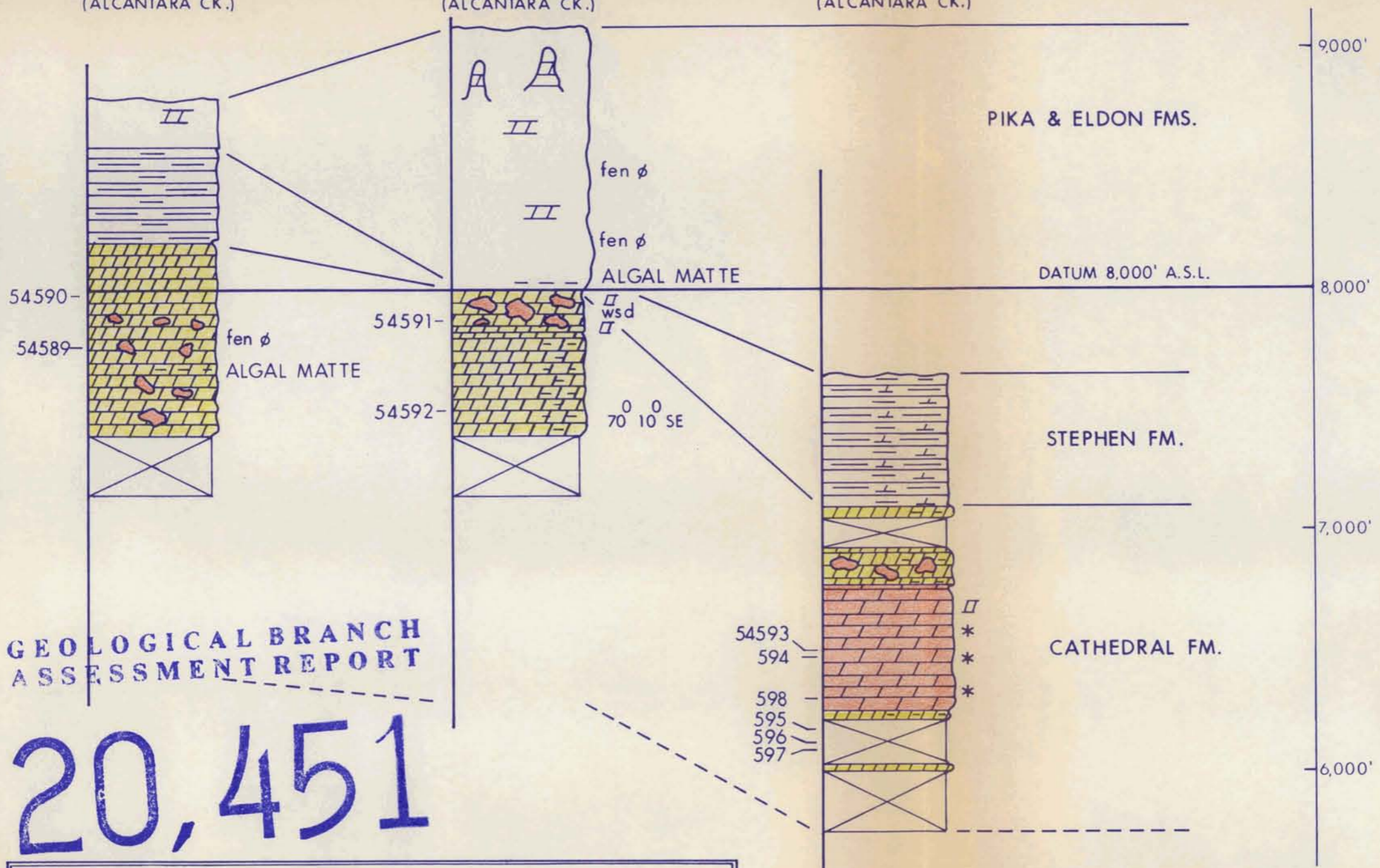
MIDDLE CAMBRIAN	PIKA FM.	limestone and dolomite, thin bedded, light to dark grey, fine grained, buff weathering, shale partings, cliff former
	ELDON FM.	dolomite, buff to white, no fossils, cliff former
	STEPHEN FM.	upper: f.g. crystalline limestone, middle: grey and green siliceous and calcareous shales lower: dark grey, f.g. argillaceous limestone
	CATHEDRAL FM.	bedded, coarse grained dolomite with thin limestone lenses, rapid and irregular facies changes, contains lenses of reef- like dolomite, magnesite
	— MOUNT WHYTE FM.	oolitic limestone in upper sections, middle member is a green shale, basal member is impure limestone
LOWER CAMBRIAN	GOG GP.	quartzite



TRAVERSE NO. 12  
(ALCANTARA CK.)

TRAVERSE NO. 13  
(ALCANTARA CK.)

TRAVERSE NO. 14  
(ALCANTARA CK.)



GEOLOGICAL BRANCH  
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LEGEND

LITHOLOGIES

- HOST DOLOMITE (POTENTIAL ORE)
- DOLOSTONE
- DOLOMITE/LIMESTONE
- LIMESTONE
- SHALE

MISCELLANEOUS

- SLUMP? OUTCROP NOT IN PLACE?
- 54502 SAMPLE ANALYZED
- 340° 10' SW ATTITUDE OF BEDDING
- COVERED INTERVAL

ACCESSORIES

- DOLOMITIC
- CALCAREOUS
- ARGILLACEOUS
- PYRITIC
- OOLITIC
- PODULAR OCCURRENCE
- FOSSILIFEROUS
- WELL FRACTURED
- RADIATING CRYSTALS
- DOLOMITE RHOMBS
- WEATHERS TO SAND
- FENESTRAL POROSITY

DONALD B. CROSS & ASSOCIATES LIMITED

CROSS RIVER AREA, BRITISH COLUMBIA  
ALCAN MINERAL CLAIM  
STRATIGRAPHY  
GOLDEN MINING DIVISION

SEPT. 1990      NTS. 82 J / 13E      DWG. NO. 2

fault served as a conduit along which hot, magnesium-rich fluids escaped to the surface.

The Cathedral formation rocks were deposited in a shallow, near-shore, marine environment in which life forms such as colonial corals, stromatolites (algae) and trilobites were present. The Mount Whyte oolitic limestone provided a stable platform upon which carbonate-fixing organisms lived. Field mapping suggests that these organisms formed biogenic reef mounds where water and light conditions were favorable for their survival.

The effects of strong tides and waves can be seen in areas where reef talus is encountered in outcrop. Because of these strong water currents the Cathedral formation dolomitic rocks contain little or no impurities and excellent porosity. Despite the widespread effects of dolomitisation on the Cathedral formation rocks fossil remnants of algal mattes and flat, tabular stromatolites can be found in outcrop. Tight argillaceous dolostone represents inter-reef calcareous muds that were deposited between growing reef mounds or in areas where water conditions proved hostile to reef growth.

Magnesite mineralisation is hosted by fossil reefs which are characterised by coarse grained, bladed, matted intergrowths of dolomite and magnesite crystals. This coarse texture is referred to as 'granola' texture since it closely resembles the rough surface texture of granola bars. Often the dolomitisation is so pervasive as to orient crystal growth in roughly parallel veins.

Reef growth ceased and carbonate deposition slowed when the basin deepened and the overlying Stephen formation shale was deposited. The shale is a reliable unit for determining strike and dip orientations.

The Eldon and Pika formations were deposited in a period characterised by shallow basin depth in a marine environment.

## PROGRAM RESULTS

Geological mapping and sampling in the Alcantara Creek area successfully outlined a biogenic reef buildup some 520 feet (158 meters) thick and 0.6 mile (1 kilometer) in strike length. High-magnesium dolomite sampled on the property was found to contain up to 86.6%  $MgCO_3$ , by weight.

The Alcantara reef forms part of the headwaters of Alcantara Creek where, throughout the local geological section, numerous small patch reefs were mapped. The largest patch reef occurs in the central portion of the ALCAN mineral claim. The reef base is obscured by overburden at an elevation of 6,300 feet a.s.l. (1,920 meters). The reef continues, as a vertical cliff face, to 6,820 feet a.s.l. (2,079 meters).

The highest  $MgCO_3$  values are associated with coarse-grained recrystallised dolomite and coarse, bladed, "horsetooth" crystals of calcite. Early reef development on the Mount Whyte formation platform appears to have been rapid as evidenced by the thick, well formed nature of the basal portions of the Alcantara reef. Deposition of patch reefs took place over a large area in an unstable basin where sediment deposition seems to have outstripped reef development as time progressed. This caused reef development to be impeded higher up in the section. Small patch reefs are interspersed throughout the geological section within a proportionately larger volume of inter-reef carbonate muds, now represented by tight dolostone.

The eastern boundary of the reef can be readily mapped since the reefal rocks are bounded and enclosed by tight dolostone. Rare occurrences of reef talus can be seen at the reef margin. The western limit of the reef is obscured in overburden and tree cover.

The basal cliff-forming portion of the reef exhibits the most consistent vertical and lateral continuity of dolomitised rock.



## CONCLUSIONS AND RECOMMENDATIONS

On a regional basis the Alcantara reef represents a significant reefal buildup in an area characterised by smaller patch reefs. The basal portion of the reef represents not only an excellent location in terms of physical and mining access, but also contains the best development of porosity, permeability and coarse grained dolomite.

Due to the cliff-forming nature of the basal reef section it cannot be sampled, in detail. Values of up to 86.6%  $MgCO_3$  have been recorded in the upper patch reef section where reef development was retarded. Because local conditions appear to have favoured large scale reef development of the basal section it can be expected that magnesite values should increase above 86.6%.

Access to the basal reef section can be gained by extending an existing road for a distance of 1 kilometer.

Diamond drilling of the basal Alcantara reef is recommended as a viable means of obtaining a continuous sample through the section. One drill hole 400 feet in length is recommended as a first test. Drilling of this hole should be incorporated into a larger drilling program elsewhere in the Cross River area.

## PROPERTY DESCRIPTION

The ALCAN mineral claim is located in the Golden Mining Division of British Columbia.

NAME	RECORD NO.	RECORDING DATE	UNITS	N.T.S.
ALCAN	2077	October 25, 1989	15	82J/13E

### MAGNESITE ANALYSIS

1. 1 gram sample into 250 ml. beaker.
2. Add 2 to 3 mls. H<sub>2</sub>O + 20 mls. HCl.
3. Boil for 10 to 15 minutes on a 2 switch plate.
4. Add 10 mls. HNO<sub>3</sub> and boil for a further 20 to 25 minutes.
5. Wash lids and sides down and take to dryness on a 1 switch plate.
6. After dryness, cool and add 5 mls. HCl and take to dryness again.
7. Bake for 10 to 15 minutes to dehydrate SiO<sub>2</sub>.
8. Take up in 10 mls. HCl + 10 mls. H<sub>2</sub>O. Heat, do not boil.
9. Filter through #40 S.F. with P.P. into 200 ml. flask.
10. Wash in with 30% HCl polishing beakers.
11. Wash 4 times with 30% HCl and 4 times with hot H<sub>2</sub>O.
12. Cool to room temperature and bulk.
13. Take aliquots for MgO, Fe, Ca.
14. Analyse on Atomic Absorption.

Report of Assay

Sample No.	%MgO	%MgCO <sub>3</sub>
54590	21.17	44.28
54591	41.39	86.58
54592	41.32	86.43
54593	24.19	50.60
54594	37.48	78.40
54595	32.97	68.97
54596	32.84	68.69
54597	22.70	47.48
54598	33.14	69.32

Type of sample: Rock chips

Date of Report: September 15, 1990

## STATEMENT OF COSTS

### Salaries

D. B. Cross, P. Geol. 10 days @ \$400.00 per day	
R. Smith 10 days @ \$350.00 per day	
K. Nielsen 2 days @ \$250.00 per day	\$8,000.00

### Helicopter support

2 hours @ \$685.00 per hour plus fuel	1,532.00
Equipment rentals camp, radio, etc.	1,050.00
Food 22 man-days at \$25.00 per man-day	550.00
Vehicle rental, fuel and mileage	600.00
Assays 10 at \$15.00 each	150.00
Drafting 10 hours @ \$25.00 per hour	250.00
Report Preparation 7 days @ \$400.00 per day	<u>2,800.00</u>

<b>TOTAL COSTS</b>	<b>\$14,932.00</b>
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**Author's Qualifications**


I, Donald B. Cross, of the City of Calgary, Alberta, do hereby certify the following to be true;

1. I am a Professional Geologist with a B. Sc. (Hons.), 1974, in Geological Sciences from Brock University, St. Catharines, Ontario.
2. I have been continuously employed since 1974 in the field of geological exploration.
3. The work herein reported was personally supervised by me in the field.
4. I am the principal shareholder of Donald B. Cross & Associates Limited an Alberta company, licenced to carry out geological exploration under APEGGA Licence P 4752.

<b>PERMIT TO PRACTICE</b> <b>DONALD B. CROSS &amp; ASSOCIATES LIMITED</b>
Signature <u><i>D.B. Cross</i></u>
Date <u><i>October 18, 1990</i></u>
<b>PERMIT NUMBER: P 4752</b>
The Association of Professional Engineers, Geologists and Geophysicists of Alberta

Respectfully submitted

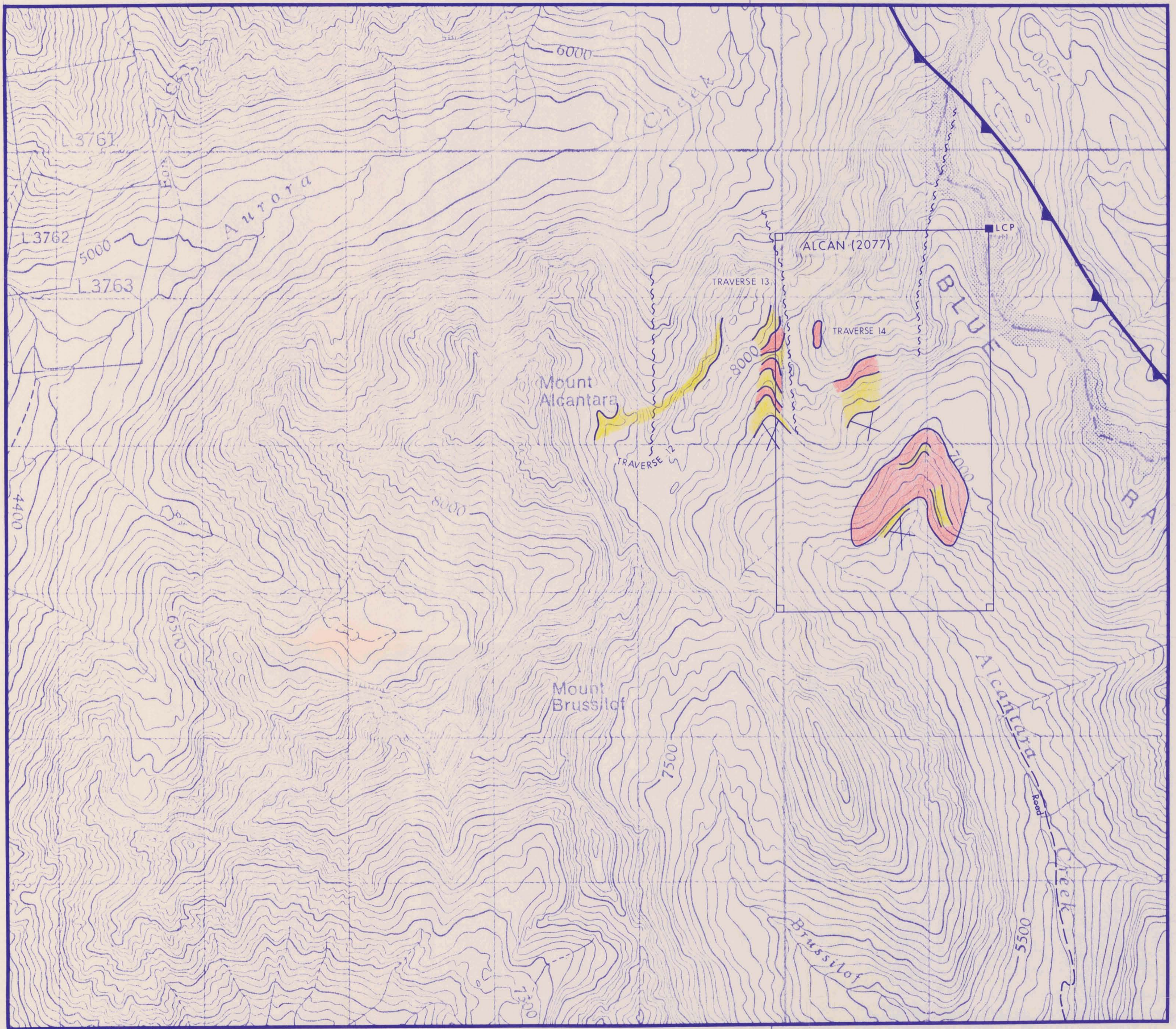
*D.B. Cross*



Donald B. Cross, P. Geol.



115° 35'



115° 35'

### LEGEND

- ANTICLINAL STRUCTURE
- TOP AND BASE OF CATHEDRAL FORMATION DOLOMITE AND DOLOSTONE WITH COVERED INTERVAL BELOW
- STRIKE AND DIP OF ROCK FORMATION

- POSSIBLE STRIKE EXTENSION OF CATHEDRAL FORMATION REEFAL HORIZON
- THRUST FAULT (TEETH POINT DOWN - DIP)
- Mg OCCURRENCE
- SYNCLINAL STRUCTURE
- FAULT
- REEF
- INTER-REEF SILTY DOLOSTONE

**GEOLOGICAL BRANCH  
ASSESSMENT REPORT**

**20,451**

DONALD B. CROSS & ASSOCIATES LIMITED  
CROSS RIVER AREA, BRITISH COLUMBIA

### ALCAN MINERAL CLAIM GEOLOGY

GOLDEN MINING DIVISION

SEPT. 1990

NTS. 82 J / 12, 13

DWG. NO. 1

