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ASSESSMENT REPORT  
BLUE RIVER CARBONATITES  
1982

December, 1982

Bent E. Aagist  
Project Geologist

**GEOLOGICAL BRANCH  
ASSESSMENT REPORT**

**11,130**

TITLE PAGE

Exploration assessment report for 1982 on the  
carbonatites north of Blue River, British Columbia, N.T.S.  
83D/6E.

<u>Claim Name</u>	<u>Type</u>	<u>Units</u>	<u>Record No.</u>	<u>Record Date</u>
Fir 1	2-Post	NA	1874	5/16/79
Fir 2	2-Post	NA	1875	5/16/79
Blue 1	Mineral	12	2460	3/21/80
Blue 2	Mineral	8	2461	3/21/80
Blue 3	Mineral	12	2462	3/21/80
Blue 4	Mineral	18	2463	3/21/80
Blue 5	Mineral	18	2464	3/21/80
Blue 6	Mineral	18	2465	3/21/80
Blue 7	Mineral	18	2466	3/21/80
Blue 8	Mineral	8	2467	3/21/80
Blue 9	Mineral	20	2468	3/21/80
Blue 10	Mineral	1	2469	3/21/80
BC-1	2-Post	NA	2970	9/25/80
BC-2	2-Post	NA	2971	9/25/80
BC-3	2-Post	NA	2972	9/25/80
BC-4	2-Post	NA	2973	9/25/80
BC-5	2-Post	NA	2974	9/25/80
AR-"I"	Mineral	8	1945	6/20/79
AR-2	Mineral	12	487	8/25/76
AR-3	Mineral	20	505	9/15/76
AR-4	Mineral	20	1946	6/20/79
BE-1	2-Post	NA	2956	9/3/80
BE-2	2-Post	NA	2957	9/3/80
BE-1	2-Post	NA	2907	8/27/80
BE-2	2-Post	NA	2908	8/27/80
Verity	2-Post	NA	33461	5/12/60
BE-3	Mineral	9	1943	6/23/79

Mining Division: Kamloops

Latitude: 52 degrees 17 min. to 52 degrees 27 min.

Longitude: 119 degrees 04 min. to 119 degrees 11 min.

Claim Owners: John Kruszewski FMC No. 161239

Elizabeth French FMC No. 146838

Anschutz (Canada) Mining Ltd. FMC ~~243460~~ 243876

Operator: Anschutz (Canada) Mining Ltd.

By: Bent E. Aagquist  
Project Geologist

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Folded Maps in Pockets

Claim Map 83 D/6E

Verity Area 1:4,000 Metric Contours

Verity - Paradise Traverses and Sample Locations

Verity - Paradise Geology

I. Summary

The tantalum content in the outcropping parts of the carbonatites on our properties near Blue River, B.C. is sub-economic. Potential still exists for economic concentrations of pyrochlore in the Verity-Paradise area, but a detailed ground geophysical program is probably the only exploration method, except drilling, that can locate such a concentration in this environment. The carbonatites on the Fir claims has some economic potential that could be evaluated quickly by trenching.

We have found indications of other carbonatites in the area, and we know that more carbonatites have been found in the Frenchman Cap area 150 km. to the south, see Fig. 1. Because the two areas are in the same mountain range, there is potential for finding more carbonatites in the area between the known occurrences. A grass root type exploration program is recommended to explore the mountains from Blue River to Revelstoke, south of Frenchman Cap.

II. Introduction

The 1982 field work at Blue River started in July and continued until the end of September. The work was done by myself and an assistant, Kevin Fisher, hired in Blue River. Most of the work was in the Verity-Paradise Area and it involved locating, mapping and sampling all known areas of carbonatite outcrop (Fig. 2 from Rowe, 1958). Detailed geology of some of the area south of Paradise Lake was provided by A.N. Mariano. Elizabeth French provided information about localities that she and her family had found over the years.

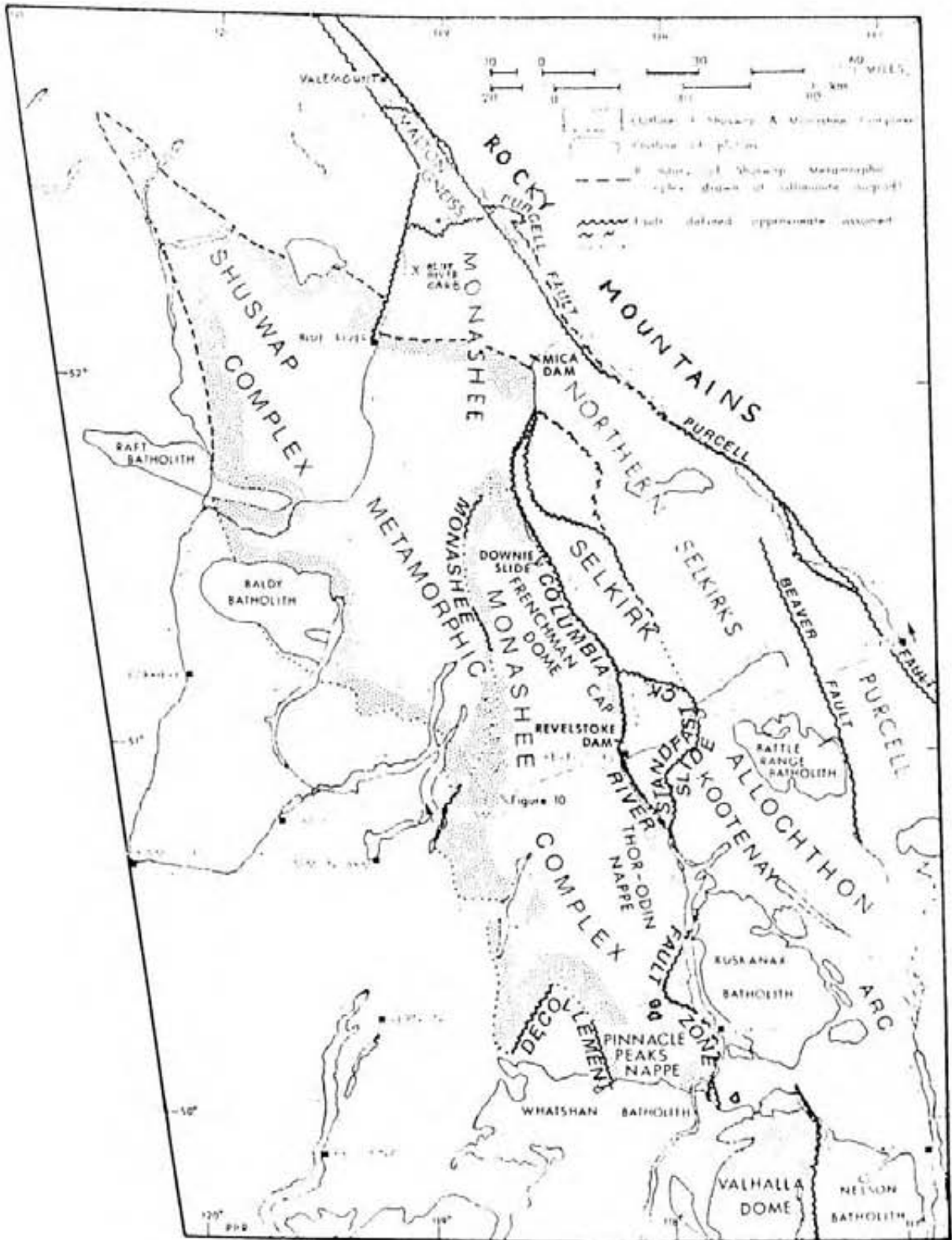


FIGURE 1

Shuswap and Monashee metamorphic complexes and adjacent rocks, major intrusions, regionally important faults.  
(Read and Brown, 1981)

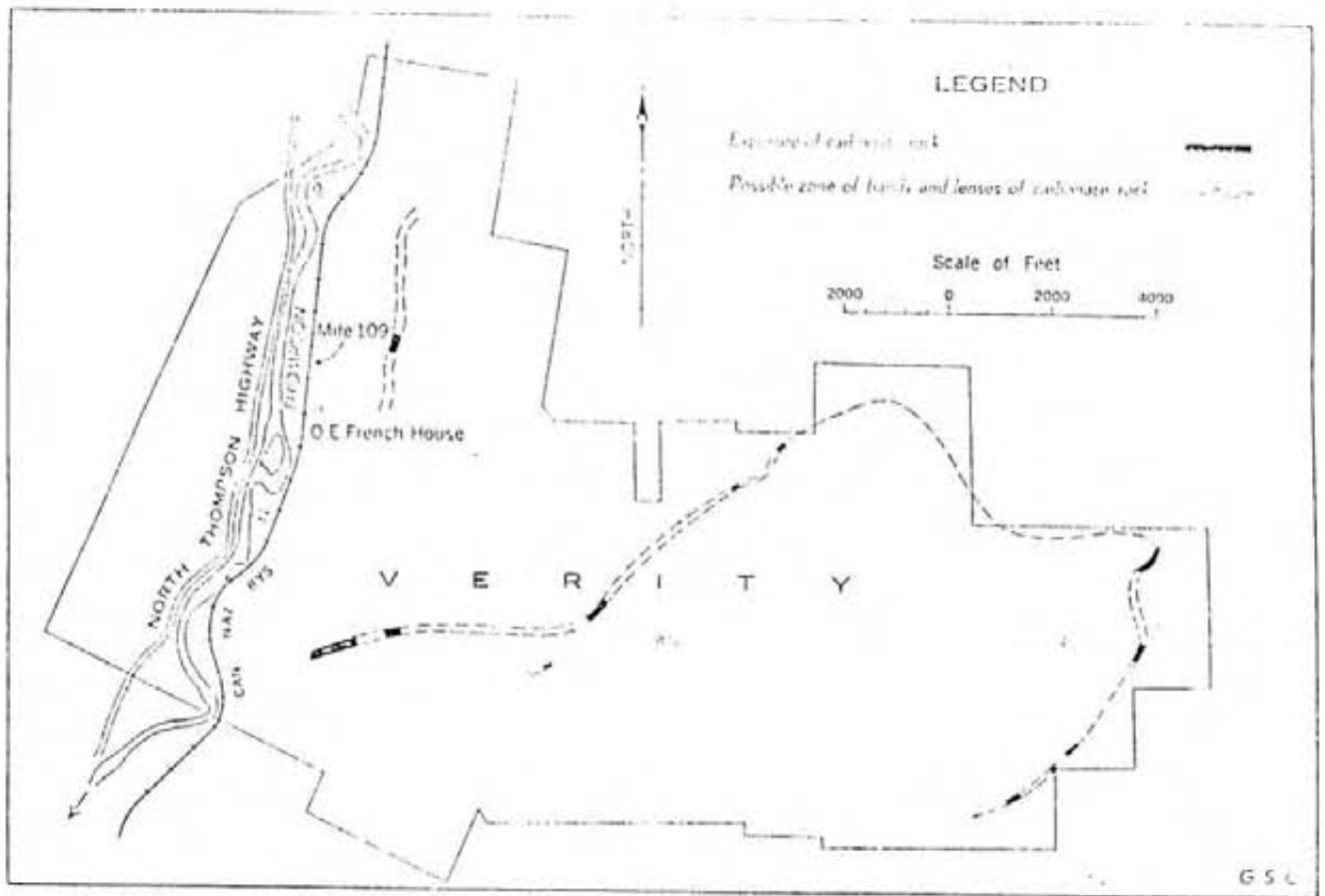


Figure 2. Sketch-map of the Verity property, southeastern British Columbia, showing occurrences of carbonate rocks. (From map by H.D. Hughes, 1952.)

### III. Location and Accessibility

The claim map in the back pocket show the location of our properties. Access to most of the areas was by four-wheel drive pick-up. The east half of AR-3 and all of AR-4 was checked on foot from a camp we established 2 km. south of Paradise Lake. The camp was at tree-line at an elevation of 2,018 meters (6,620 feet). Yellowhead Helicopters, from Valemount, flew personnel and equipment up to the camp.

### IV. Topography and Climate

Relief within the claim area ranges from 760 to 2,700 meters above sea level. Slopes of 20 to 30 degrees are common with local slopes up to 40 degrees. Undergrowth is thick, with devilsclub common in wet areas. Hemlock, cedar, fir and pine cover the slopes up to an elevation of 2,000 meters.

Precipitation averages 127 cm. per year, but annual variations can be great. Because of the steep hillsides and the heavy precipitation, dirt roads are commonly washed out especially in the spring.

### V. Field Work, 1982

Most of the field work was in the Verity-Paradise area. A few days were spent on the Fir Claims area, and a few days were spent checking general geology and prospecting for other carbonatites in areas adjacent to our claims.

A total of 124 samples were collected. They were sent to Chemex Labs in Calgary for crushing and pulverizing. A pulp was sent to X-Ray Labs in Don Mills, Ontario for Nb analysis, and they in turn sent a split to Nuclear Activation Services in Hamilton, Ontario for Ta analysis. Sample numbers and assay results are given in Appendix II.



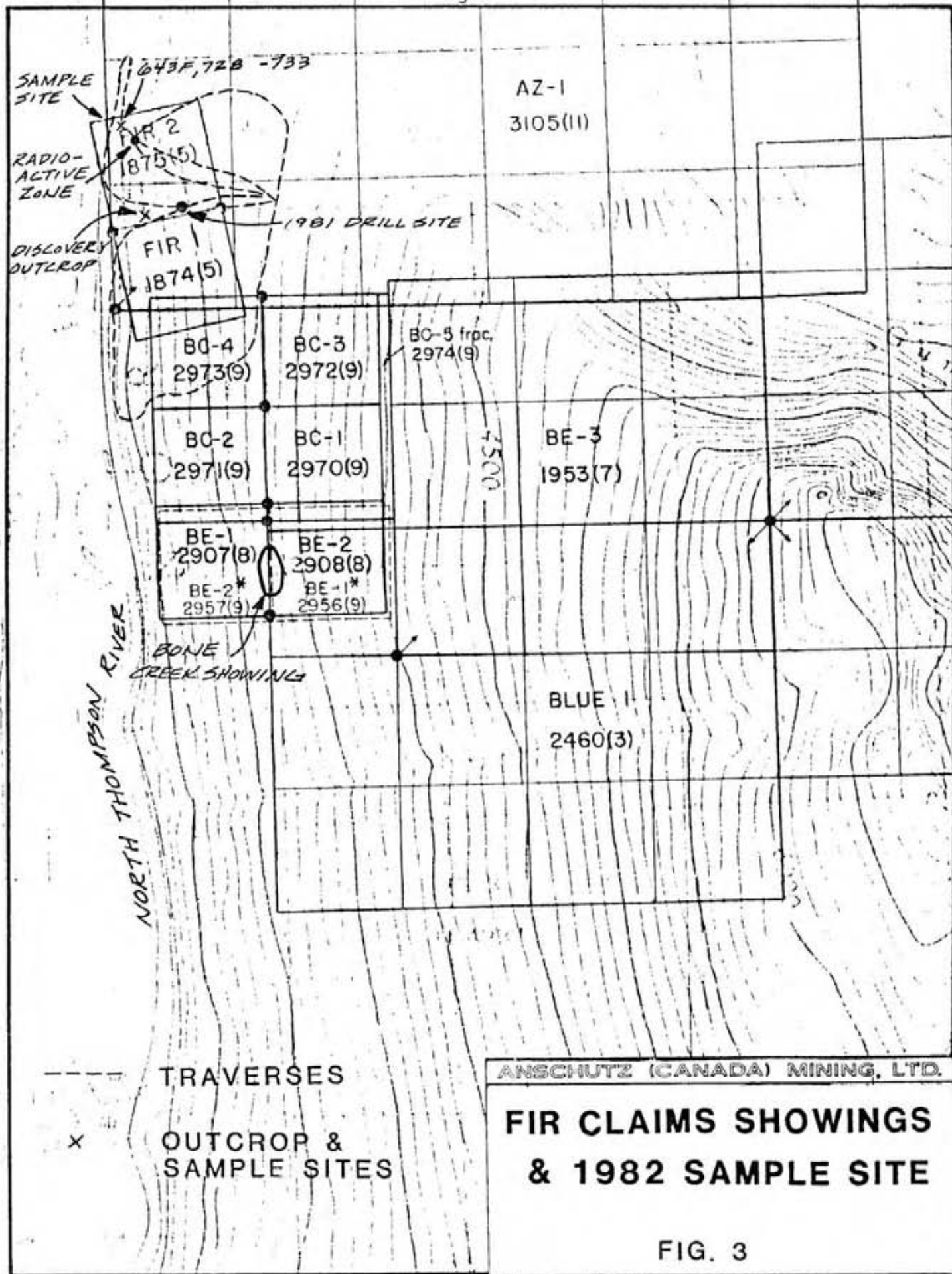


FIG. 3

The approximate areas traversed in the Verity-Paradise area are shown on the Sample Location and Traverse Map in the back pocket. Areas of detailed mapping and sample locations are also noted on this map, and the detail maps are in Appendix III. Geologic mapping and sample locations are also shown on the Verity Area metric topo map in the back pocket and the Verity-Paradise Geology map. The outcrops located correspond well with the occurrences mapped by Hughes, 1952, see Fig. 2. We missed the outcrops shown in the extreme southeast corner of Fig. 2. They probably crop out in the clearing in the trees that is shown in the center of the left picture of Picture #3 of the February, 1982 report. Time and weather did not allow us to check this area.

Areas not noted by Hughes are II, VI and VII. Also, he did not recognize the nepheline syenite complex east of the Paradise Ridge carbonatite, Area V.

Three traverses were made in the area of the Fir claims. One traverse was made south of the outcrop discovered by Elizabeth French and two to the north. Only one outcrop of carbonatite was discovered, at an elevation of 732 meters and UTM coordinates 351900, 5797850 see Figure 3. Seven samples were collected from this area.

Road traverses were made on the west slope of Mount Cheadle, along the Yellowhead highway between Lempiere and Bone Creek, and up Miledge Creek. No carbonatite or associated rocks were found on these traverses.

## VI. Geology

### A. Verity-Paradise Area Lithology

The mineralogy of the carbonatites was covered in last year's report and has been covered in detail in past

reports by A.N. Mariano, and therefore, it will not be covered in this report.

The carbonatite outcrops in Figure 2, Areas I, II, III, IV and V are similar in mineralogy and texture. They are probably part of a large carbonatite sill that has been broken up by faulting. At Paradise Ridge, Area V, carbonatite is in contact with fenite, see detail map and Picture #1. The fenite in Picture #1 has radioactive pyrochlore crystals with red reaction rims. The carbonatite at Paradise Ridge is mostly sovite with local beforsite. Beforsite crystals float in a matrix of sovite, indicating that sovite is later. A similar observation was made in the Verity drilling last year.

There is a nepheline syenite sill complex east and north of the Paradise Ridge carbonatite. The nepheline syenite is stratigraphically below the carbonatite. The intrusive relationship of the nepheline syenite to the carbonatite could not be determined because of structural complexity. The nepheline syenite has distinct banding resulting from alignment of biotite and feldspar crystals, and from local concentrations of calcite. Internal folding of bands occurs locally, Picture #2. Mineralogy of the nepheline syenite is discussed by A.N. Mariano (January, 1982, p. 90-95). The nepheline syenite is locally associated with amphibolite. In the cirque above Paradise Lake, a synclinal folded nepheline syenite has a core of black amphibolite, see Picture #3. On the west wall of the cirque to the east of the above cirque nepheline syenite overlies and is in contact with amphibolite. At this locality, at 2,590 meter elevation, 8,500 feet, the amphibolite has angular blocks of beforsite floating in it, see Picture #4.

Biotite rich sovite occurs locally in the nepheline syenite. This was not observed in outcrop, but it was seen in the talus slopes, see Picture #5. A biotite sovite phase was observed locally in the gneisses in the Paradise Lake area. The best exposure is at sample site 701 and 702. The sovite occurs as two lenses in the gneiss.

A sovite-amphibolite unit occurs near the top of the mountain at an elevation of 2,682 meters, 8,800 feet, see Picture #6. Similar outcrops have been mapped at three separate areas along the ridge immediately south of Paradise Lake, see Verity-Paradise Geology Map. The sovite and amphibolite occur as separate units, and the sovite has only minor amounts of accessory minerals. Most of the sovite bands are less than one meter in thickness, and in the exposure west of Paradise Lake, the sovite bands are 2 to 10 cm. thick.

Directly below the nepheline syenite complex is a zone of pegmatite sill like bodies. The pegmatites consists of white feldspar, quartz ± muscovite. Most pegmatites occur as lenses and are concordant with the surrounding gneiss, Picture #3. Pegmatites occur locally in the gneisses elsewhere, and some have a low angle discordant contact. The pegmatites are all similar in texture and mineralogy, and they are non-radioactive.

#### B. Verity-Paradise Area Structural Geology

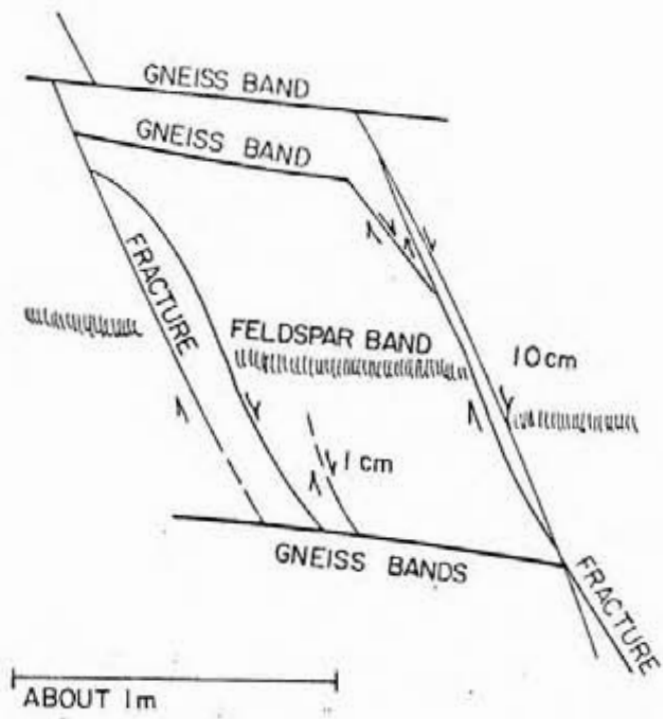
The general strike of the gneisses and intrusive units is N 60° W and dip is 15° to 30° SW. Crenulations, folds and boudin structures in the Paradise area have axes that trend east-west and some dip gently west, see geology map. A prominent synclinal fold is present in the syenite in Paradise cirque, Pictures #3. A large boudin of amphibolite can be seen in Picture #6.

The area has numerous faults that trend N 15° E and dip steeply west. Movement on these faults is west side down. Rotation occurs across some faults as noted by differences in dip and strike across the faults, see Paradise Ridge on geology map; also see Picture #3. A secondary set of faults trend east-west and are near vertical. Offsets on these faults is not known, but the faults probably formed during folding because they parallel the fold axes. The faults can account for the discontinuous nature of the carbonatite. A "deck-of-card type" normal faulting with only minor offsets can also explain the apparent strike of the carbonatites in the Verity area. The presence of small offsets parallel to the minor faults can be seen in Fig. 4. A similar observation was made in the Specimen Pit area last year, see 1981 report.

The structure in the ridges to the north and northeast of Paradise indicate that the area has undergone regional doming (see Picture #7) and that the Verity-Paradise area is on the southwest side of a dome. If this is the case, the NNE normal faults formed during extension caused by the uplift. The east-west folds would have formed as a result of north-south compression prior to uplift. The carbonatite and nepheline syenite were injected prior to deformation because they were deformed along with the gneiss. Later slumping, possibly along fault planes, may have displaced the carbonatite in Area III, and also some of the carbonatite in Area IV.

### C. Fir Area Geology

Only one new outcrop was found in the Fir area, a two meter exposure of beforosite, about 400 meters north of the discovery outcrop, see Figure 3. The beforosite looks identical to the beforosite in the discovery



U.T.M. 35785 580835

~~Fig. 2~~ Paradise cirque, fractures in gneiss with minor offsets. Fractures strike  $N25^{\circ}E$ , dip  $65^{\circ}NW$ ; gneiss strikes  $N55^{\circ}W$ , dip  $15^{\circ}S.W.$  Movement on slips is west side down 1-15 cm. Some slips die out and other start up parallel to them. This exposure is NW of Area V at an elevation of 2,167m (7110'). Arrows indicate relative movement. Locally slickensides rake  $60^{\circ}N$

ANROCKITE MINING CORPORATION

PARADISE CIRQUE

FIG. 4

8-25-82

B.E.A.

outcrop. Radioactivity on the outcrop was about twice background. About 55 meters vertically above the outcrop there is a zone of three times background radioactivity. The radioactivity continues up hill for 30 meters. There is no outcrop or float in the area. The thickness of the zone and its location would indicate that there is a zone of carbonatite there.

D. Reconnaissance

A boulder of sovite was found on the dirt road between Bone Creek and Hellroar Creek. The source of the boulder was not found, but the boulder was angular and sovite breaks up rapidly during transport. Therefore, the source is thought to be local.

Elizabeth French found carbonatite rocks west of the North Thompson River, on the ridge across from the Verity area. The specimens that Ms. French collected look similar to the carbonatite in Areas VI and VII. Sample #727 was a specimen of this carbonatite. Although there is no niobium and tantalum values in this particular sample, there may be pyrochlore bearing carbonatites elsewhere.

The garnet and staurolite-kyanite isograd in the Bone Creek area as shown on G.S.C. map 15-1967 is not valid. Most of the gneisses from Bone Creek to Lempriere are garnet bearing not staurolite-kyanite. Kyanite was found on the west slope of Mount Cheadle at an elevation of 2,042 meters, 6,700 feet. Garnet was found on the same slope at an elevation of 1,280 meters, 4,200 feet. Garnet bearing gneiss and schists are also common in the Howard Creek area, about 18 km. east of the Verity area.

The presence of marble units in the Miledge Creek area,

map 15-1967, was confirmed by a road traverse in that area. The marble was white, coarse crystalline and mostly massive. It had no accessory minerals, and it had very low radioactivity,  $\frac{1}{2}$  times background.

VII. Age Dating

The age of the carbonatites and the country gneiss is not known. Metamorphism has reset the age of some minerals resulting in a range of age dates depending on the mineral that is dated, 80.2 to 205 m.y. Mr. Gordon White, District Geologist with the B.C. Ministry of Energy, Mines and Petroleum Resources has kindly provided us with age dates, see Appendix V, and he is currently having zircon crystals dated, because they should provide the most reliable date.

VIII. Economic Assesment

None of the areas sampled had economic concentrations of tantalum. Areas I through V had tantalum values similar to the Verity area 100-200 ppm common, and also similar Nb:Ta ratios, less than 6:1 (see assays Appendix II). The nepheline syenite complex and the underlying sovite units in the Paradise area had very low tantalum values, less than 20 ppm. A number of samples in the carbonatites in Areas I-V had tantalum values of 340 pmm to 540 ppm, but the zones do not appear to be continuous, nor are they very thick. The Verity area, that was drilled in 1981, is the best defined and most continuous zone of carbonatite to date. About 2.13 million tons averaging 0.02%  $Ta_2O_5$  and 0.126%  $Nb_2O_5$  occur in the area, see Appendix IV for calculations. The Verity area metric contour map shows the blocks used in the calculations.

The limited work on the Fir claims has extended the known strike length of the carbonatite 400 meters north;



however, the grade is about the same as at Verity and the Nb:Ta ratios are similar.

An assessment report for the three claims staked last year, Verity First 1,2 and 3 fraction was submitted to the B.C. Gold Commissioner in October. This report, without maps, is in Appendix VI. The work will keep the claims in good standing until October, 1983.

IX. Conclusion

There is no obvious mineral zonation in the Verity-Paradise carbonatites that would point to an area of economic pyrochlore concentration. However, since only a small fraction of the carbonatite is exposed, there is a chance that an economic concentration of pyrochlore exists within the buried portion. A ground magnetic survey would help to outline some of the buried carbonatite, because magnetite is common in it, and a ground radiometric survey would outline near surface high grade concentrations of pyrochlore. One such area found this year was Area II.

Not much additional data was obtained on the Fir carbonatite. Ground radiometrics indicated a possible high grade zone to the north of the discovery outcrop. This carbonatite could not be found using magnetics. It has low radioactivity of two to three times background.

The potential for locating a carbonatite with economic mineralization in this part of B.C. is good. There are more carbonatites in the immediate area, and more carbonatites have been found to the south in the Frenchman Cap - Revelstoke area, see Fig. 1 (Gordon White and Trygve Hoy, B.C. Ministry of Mines, personal communications)<sup>1</sup>. There is good potential for finding carbonatites between Lempriere and Revelstoke, because there is geological continuity between the two areas, and the area is relatively inaccessible, and thus, not well explored.

X. Recommendations

Trenching in the radioactive zone located this year on Fir claims is recommended. The radioactivity is low when compared with the Verity carbonatite, but for the Fir carbonatite it might indicate high pyrochlore content, because the Fir pyrochlores have a relatively low uranium content.

Grass root type exploration is strongly recommended for the area from Lempriere to Revelstoke, an area of 160 km. by 35 km.

XI. Acknowledgments

I wish to express thanks to Gordon P.E. White of the B.C. Ministry of Energy, Mines and Petroleum Resources for his age dating, and for giving freely of his time and ideas whenever we have called on him.

Thanks to A.N. (Tony) Mariano for his continued interest in the project.

Special thanks to E.E. (Betty) French whose knowledge of the area was very helpful in locating some old showings. Her hospitality made it a pleasure to work in the area.

References

Aaquist, B.E., February, 1982. Blue River Carbonatites, British Columbia, Final Report, 1981. Anschutz Mining Corporation Report, (Assessment Report 82-90, B.C. Gold Commissioner), two books.

Mariano, A.N., January, 1982. Petrology, Mineralogy and Geochemistry of the Blue River Carbonatites. Confidential report to Anschutz Mining Corporation, 130 p.

Read, P.B. and Brown, R.L., July, 1981. Columbia River fault zone: Southeastern margin of the Shuswap and Monashee complexes, southern British Columbia. Can. J. of East Sci., V.18, No. 7, pp. 1127-1145.

Rowe, R.B., 1958. Niobium (Columbium) Deposits of Canada. G.S.C. Econ. Geol. Series No. 18, 118 p.

APPENDIX 1

Pictures



Picture #1 Albite - amphibole fenite (white and green) in contact with sovite (yellow). Radioactive pyrochlore crystals occur in the white albite and they have red reaction rims. Picture taken just west of Area V on Paradise Ridge.



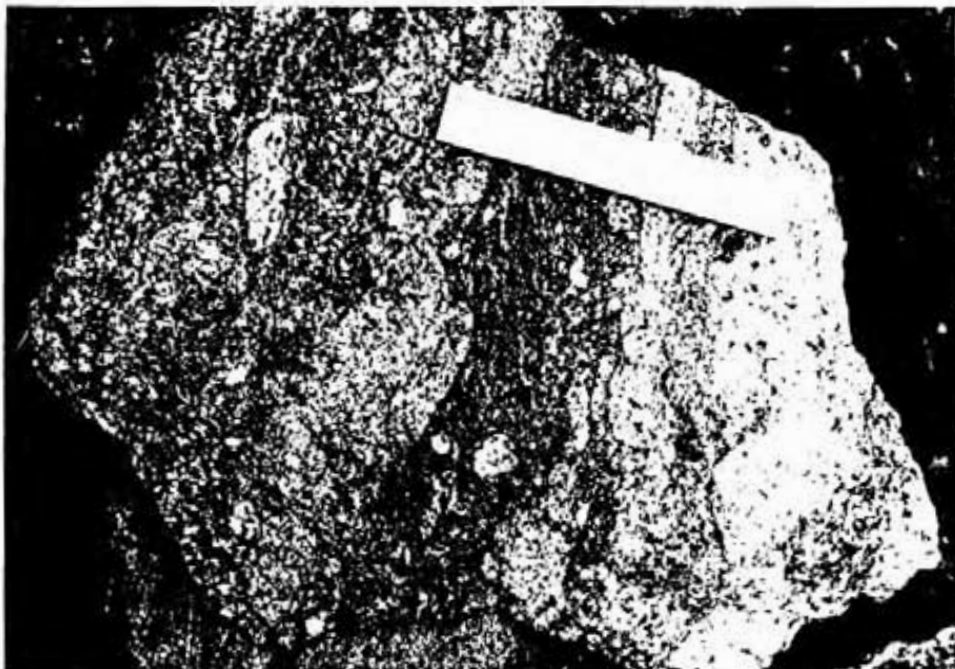
Picture #2 folded bands in nepheline syenite, in cirque above Paradise Lake. This is a close up of the outcrop to the right of center in Picture #3.



Picture #3 - Looking south on south wall of cirque above Paradise Lake. Right of center is nepheline syenite of Picture #2. Above nepheline is a black amphibolite which forms the core of a tightly folded syncline. Three major faults are visible in the cirque wall, see overlay. Nepheline syenite occurs as a light gray band in the cirque wall, lenses of pegmatite, yellow, occur above and below the syenite.



Picture #4 - Folded and crenulated amphibolite on west wall of cirque east of Paradise cirque. Note well developed fold in upper right, and the numerous near vertical fractures. Kevin, in center of left picture, is sampling a beforosite inclusion, 2 cm. left of his feet on picture is another large inclusion. The white body of rock above him is pegmatite.

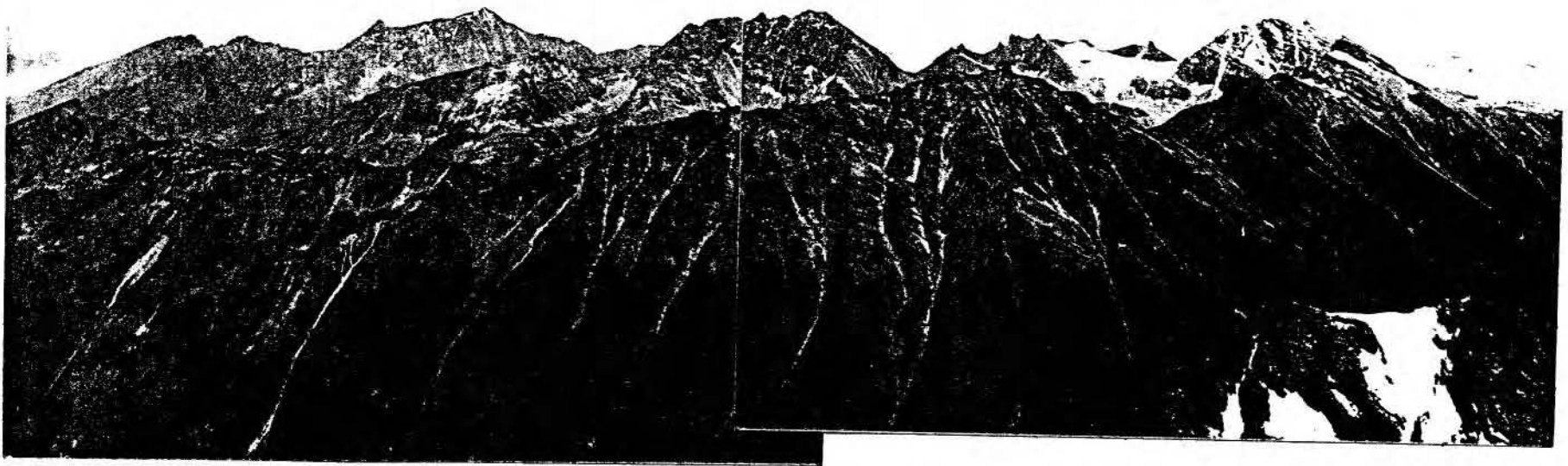


Picture #5 - Float below area of Picture #4 biotite rich sovite with inclusions of nepheline syenite and in contact with nepheline syenite on right.



Picture #6 - Sovite occurs as the recessive material on Kevin's right, note irregular folding and abrupt termination of sovite. Kevin is painting at other sovite bands. The large black mass in upper right of picture is an amphibolite boudin. Exposure is on south side of mountain east of Paradise Lake at an elevation of 2,682 meters (8,800 feet).





Picture #7 - From top of mountain east of Paradise, looking north and northeast. Note rocks in center and right dip east, and rocks on the left picture dip west.

APPENDIX II

Sample Numbers And Assay Results

SAMPLE	NB PPM	TA PPM	
611	280	130	Area I
612	500	400	
613	330	220	
614	2190	280	
615	600	50	
616	60	45	
617	120	68	
618	610	34	
619	260	190	
620	40	38	
621	80	78	Verity Clear Cut
622	170	21	
623	90	57	
624	70	58	
625	1140	260	
626	1000	150	Float south of Paradise Creek
627	1200	170	
628	230	46	
629	10	5	Area III
630	670	270	
631	>4000	2400	Area II
632	670	270	
633	1250	140	Switch Creek
634	230	17	
635	720	180	
636	<10	<5	
637	40	6	
638	90	16	
639	100	14	
640	110	23	
641	60	16	Fir Claims
642	150	87	
643	1080	120	

> - CONCENTRATION TOO HIGH FOR TREATMENT BY GEOCHEMICAL METHOD

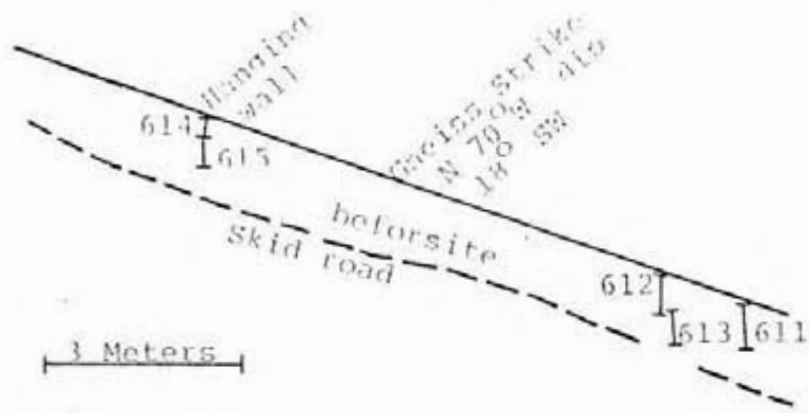
SAMPLE	N3 PPM	TA PPM	
643	240	72	} Area IV
644	880	97	
645	110	64	
646	30	18	
647	230	120	
648	300	160	
649	10	9	
650	170	73	
651	60	28	
652	2340	540	
653	360	110	
654	330	110	
655	840	300	
656	520	180	
657	250	83	
658	330	120	
659	430	190	
660	1130	220	
661	610	210	
662	250	100	
663	630	250	
664	340	120	
<u>665</u>	460	120	
683	110	11	} Paradise Cirque
684	140	13	
685	180	16	
686	120	6	
687	220	14	} Area VI
688	<10	<5	
<u>689</u>	<10	<5	
698	10	<5	} Paradise Cirque
699	<10	<5	
700	10	<5	
701	160	12	
702	160	8	
703	<10	<5	

SAMPLE	NB PPM	TA PPM	
666	360	130	Area IV
667	240	110	
668	280	120	
669	<10	<5	Elevation 8800' E of Paradise
670	<10	<5	
671	20	<5	
672	240	56	Area V
673	140	69	
674	290	56	
675	220	61	
676	370	300	
677	260	110	
678	180	56	
679	170	30	
680	60	12	
681	40	14	
682	230	230	Cirque east of Paradise Cirque
690	<10	<5	
691	<10	<5	
692	<10	<5	
693	200	9	
694	110	6	
695	290	18	
696	230	14	
697	190	10	

SAMPLE	N3 PPM	TA PPM	
704	<10	<5	Area VI
705	20	7	
706	110	39	Area VII
707	1570	350	
708	230	150	Area II
709	170	130	
710	140	34	
711	90	43	
712	250	93	
713	350	94	
714	350	120	
715	220	14	
716	260	32	
717	20	<5	
718	910	340	Area III
719	130	64	
720	1020	460	
721	890	410	
722	230	120	
723	20	17	
724	1150	470	
725	180	87	Paradise Cirque
726	250	150	
727	<10	<5	E.E. French sample
728	960	130	Fir Claims
729	640	110	
730	570	270	
731	500	160	
732	520	64	
733	860	150	

APPENDIX III

Detail Maps Of Areas I To VII

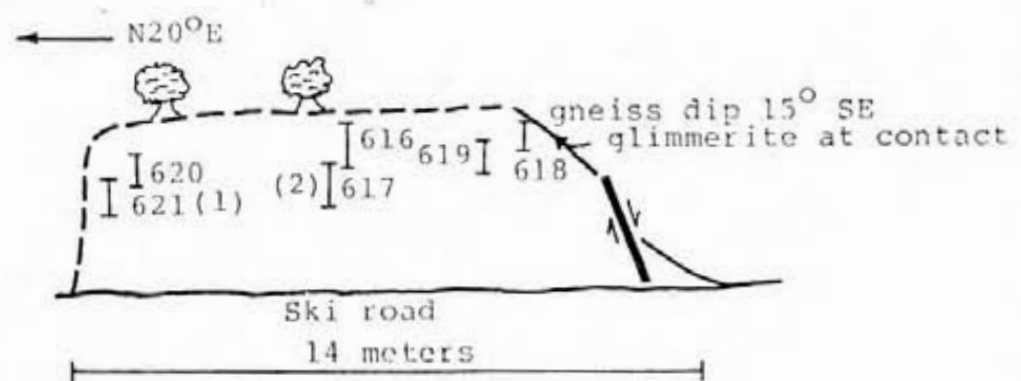


Samples 0.5m long

Scint Readings

- #611 170 cps
- #612 200-300 cps
- #613 300-350 cps
- #614 250 cps (30 cm long sample)
- #615 60-90 cps

Verity Clear Cut  
 UTM 5460745  
 Elev. ~4,600'



- |                    |       |            |
|--------------------|-------|------------|
| (1) Joints, strike | N40°E | Vertical   |
|                    | N80°E | Dip 60° NW |
| Secondary joints   | N10°W | Dip 65° NE |
|                    | N40°W | Dip 70° SW |

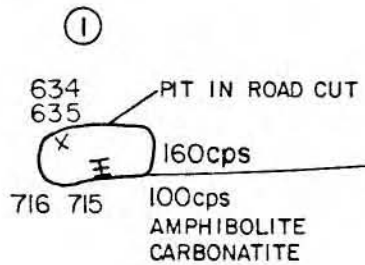
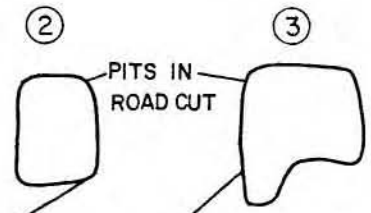
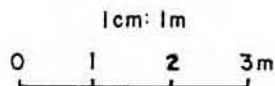
Amphibolite veins 2-4cm thick are common in these joints, slickensides poorly developed.

- (2) Maximum scint. reading, 350 cps.  
 Chip samples, 1 meter long

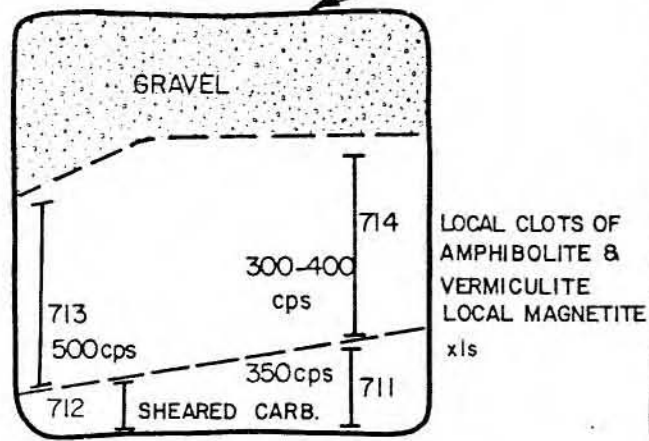
Verity Clear Cut  
 UTM545 074  
 Elev. ~4,500'

**VERITY CLEAR CUT  
 AREA I**

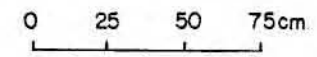
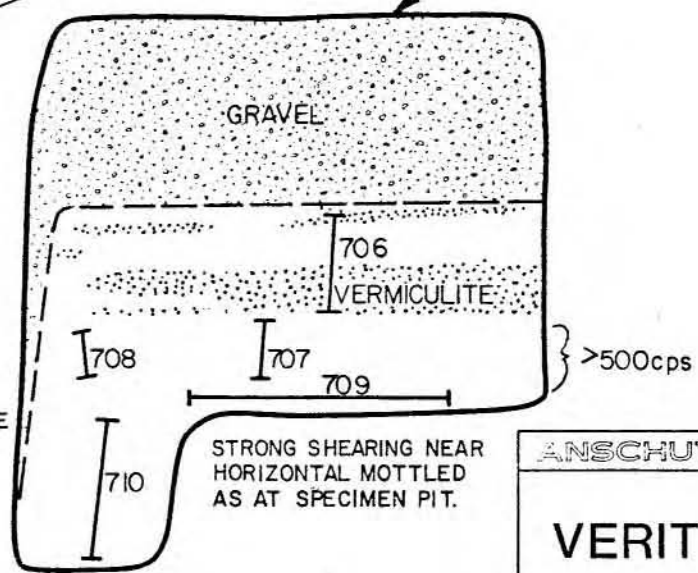




SECTION VIEW LOOKING EAST  
SHOWING OF SAMPLES 634 & 635  
ELEVATION 5100'  
UTM 55350815



APATITE CONTENT  
& xls AS TO SPECIMEN  
PIT.



ANSCHUTZ (CANADA) MINING, LTD.

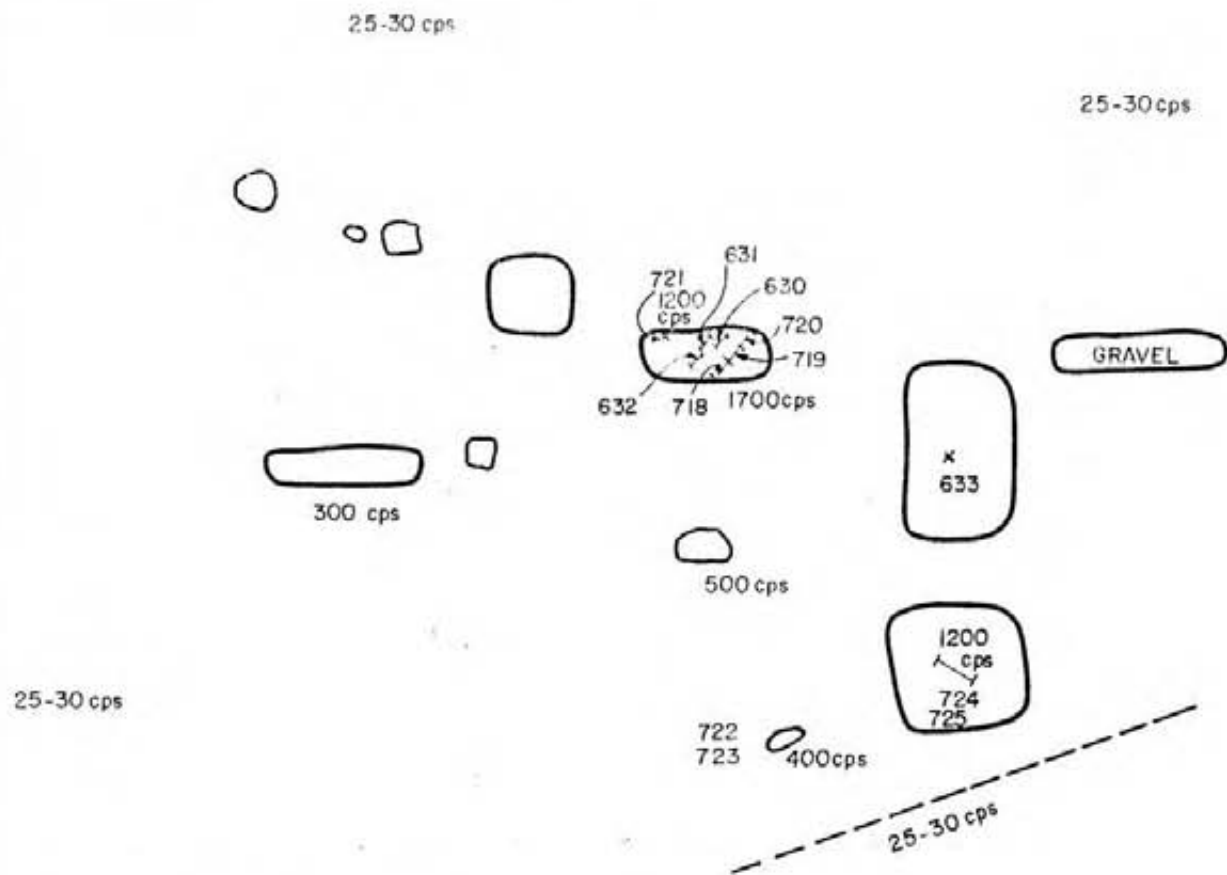
# VERITY PARADISE AREA

BEFORESITE EXPOSED IN PITS

## AREA II

B.E.A. 9-27-82

K.M.L.



SERIES OF OLD PITS DUG IN A RADIOACTIVE HIGH AREA ON STEEP HILL SIDE, 30° SLOPE. PITS WERE CLEANED OUT WHERE SAMPLES WERE TAKEN, BEFORSITE FRAGMENTS AND BLOCKS WERE FOUND, NO BEDROCK. RADIOACTIVITY DOES NOT EXTEND BEYOND AREA OF PITS.

UT.M. 5580 0875  
ELEV: 5400'

**LEGEND**

○ PIT OUTLINE

250cps SCINTILLOMETER READING  
COUNTS PER SECOND

721 SAMPLE LOCATION

0 2 4 6 8 10m

1cm = 2m SLOPE DISTANCE  
30° SLOPE, DOWNHILL TO WEST.



**ANSCHUTZ MINING CORPORATION**

**VERITY PARADISE  
AREA  
AREA III**

9-30-82

B.E.A.

K.M.L.

**LEGEND**

X or I  
643 645  
647

DIP & STRIKE OF BANDS

48  
bef.

SOV.

SOVITE

•2065

SURVEY LOCATION WITH ELEVATION IN METERS  
ELEVATION AT CAMP ASSUMED TO BE 2018m.

← 290 meters → 2065  
TO CAMP  
@ 268°

30-40  
GNEISS

1963  
SOV. x 643  
645

•1956

646 x SOV

652  
x 1953

647 x SOV  
651 1940

1937 48

•1930

•1951

•1957

•1963

•1974

SOV. x 668  
•2007

•1993  
•1986

**GEOLOGICAL BRANCH  
ASSESSMENT REPORT**

**11,130**

ANSCHUTZ (CANADA) MINING, LTD.

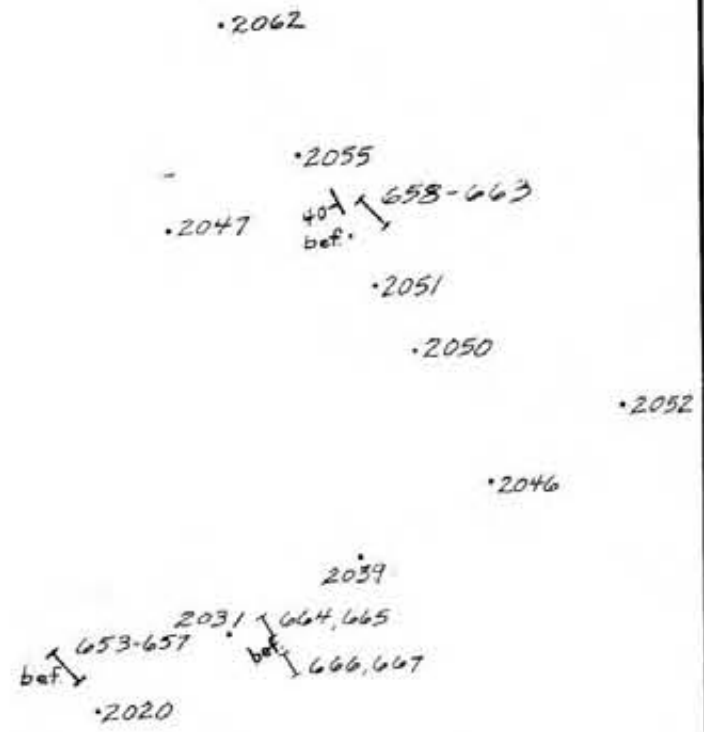
PARADISE SOUTH GRID  
SAMPLE LOCATION AND  
GENERAL GEOLOGY

AREA IV

AUG 82

B.E.A.

0 10 20 meters

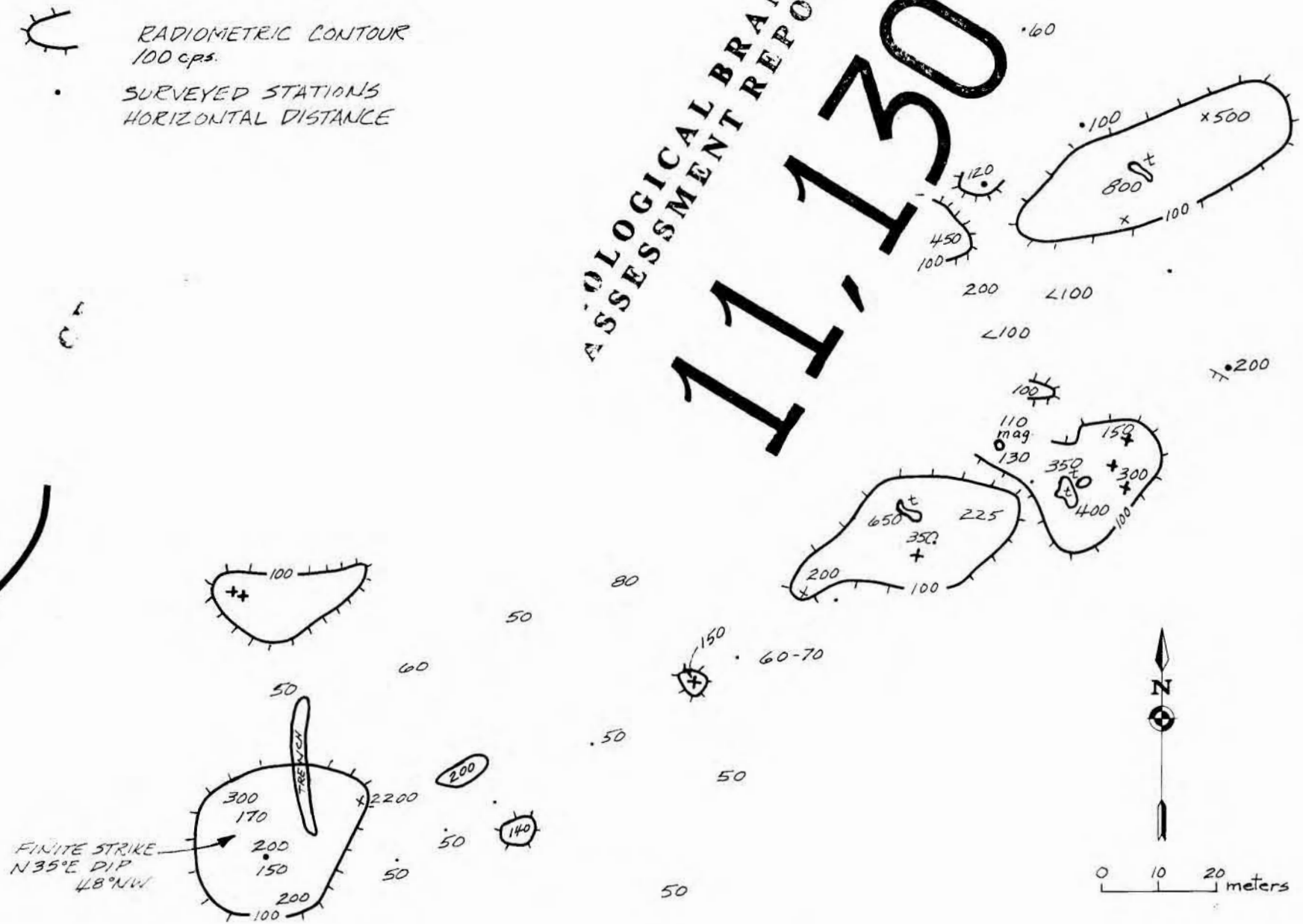


← 290 meters  
TO CAMP  
@ 268°

### LEGEND

- x & ⊕ PITS & TRENCHES
- ⊕ RADIOMETRIC CONTOUR  
100 cps.
- SURVEYED STATIONS  
HORIZONTAL DISTANCE

GNEISS  
OUTCROP

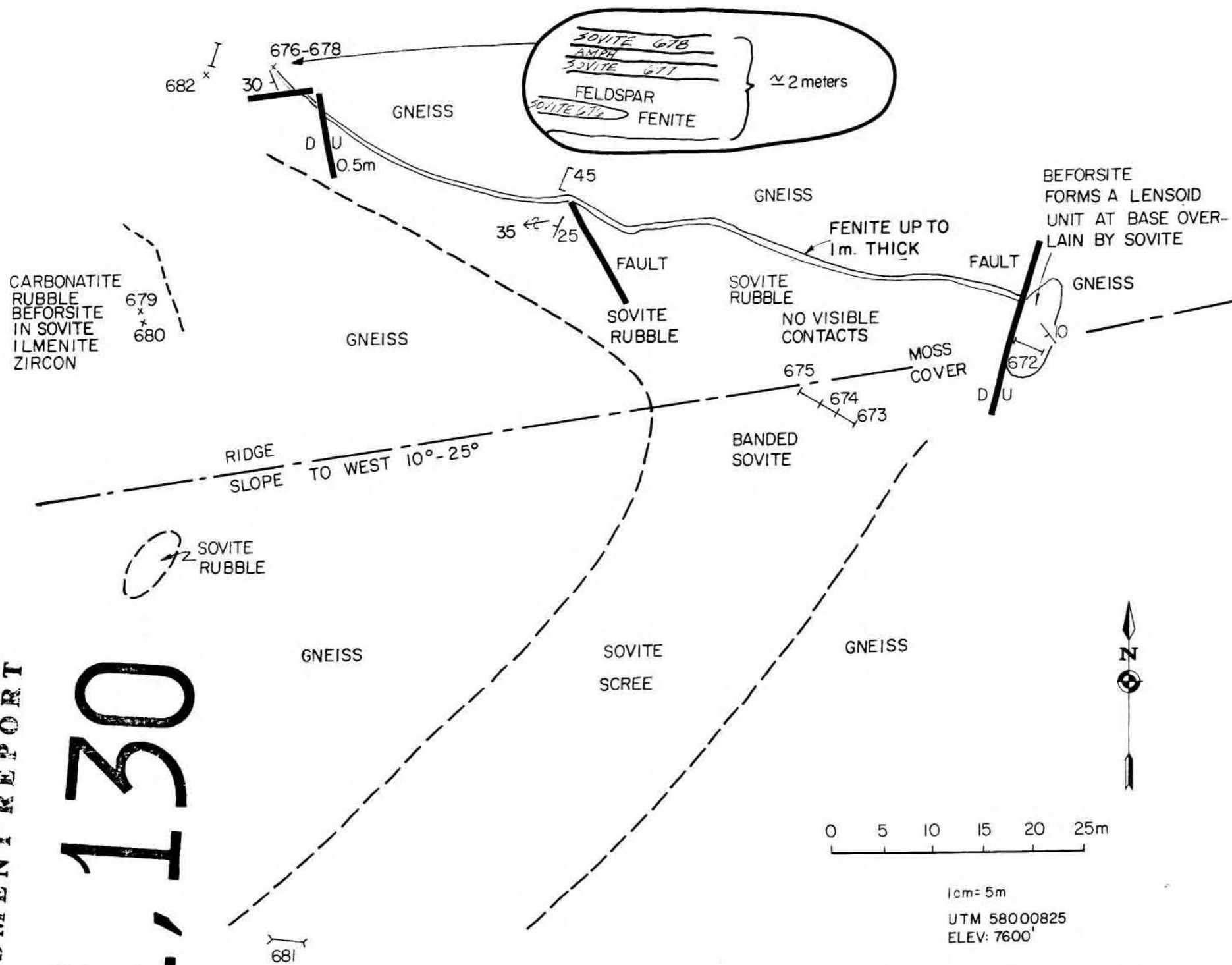


LOGICAL BRANCH  
ASSESSMENT REPORT  
**11-130**

ANSCHUTZ (CANADA) MINING, LTD.  
PARADISE SOUTH GRID  
RADIOMETRIC MAP  
AREA IV  
AUG 20 & 21 / 82  
B.E.A.

GEOLOGICAL BRANCH  
ASSESSMENT REPORT

11,130



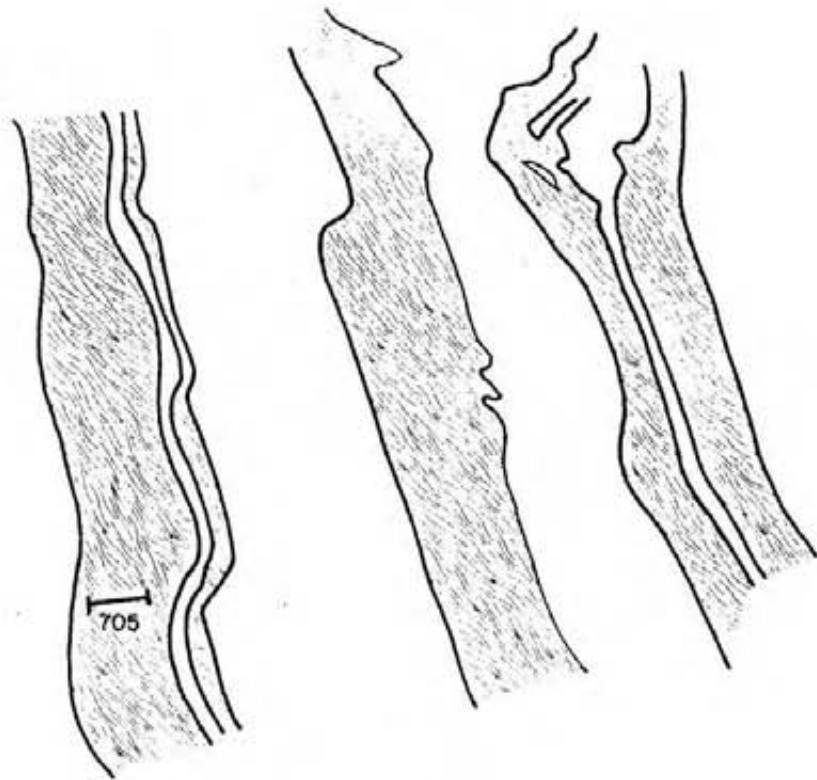
ANSCHUTZ MINING CORPORATION

PARADISE RIDGE

AREA V

8-24-82 B.E.A.





SOVITE INTERBANDED WITH GNEISS BANDING STRIKES N40°W TO E-W AND DIP 50°SW TO VERTICAL IN AREA, FOLD AXES STRIKE E-W, AXIAL PLANE IS NEAR HORIZONTAL, IN THE GNEISS BANDS OF QUARTZ THICKEN IN AXIAL PLANE, SHEAR STRIKE N10°E, VERTICAL, LOCAL 2-5cm LENSES OF QUARTZ IN SOVITE.

1cm = 20cm



ELEV: 2400'

UTM: 52000515

705- chip sample.

APPROXIMATE (PLANAR) MINING, LTD.

VERITY PARADISE AREA

PLATE VII

9-28-82 BEA

APPENDIX IV

Mineral Inventory - Verity Area

Width X Length X Thickness

Block A

$$75 \times 140 \times 18 = 189,000 \text{ m}^3 \times 2.76 \frac{\text{T}}{\text{m}^3} = 521,640 \text{ T}$$

$$\begin{aligned} \text{Nb}_2\text{O}_5 &= 0.166\% && 866\text{T} \\ \text{Ta}_2\text{O}_5 &= 0.019\% && 99\text{T} \end{aligned}$$

Block B

$$85 \times 130 \times 19 = 209,950 \text{ m}^3 \times 2.76 \frac{\text{T}}{\text{m}^3} = 579,462 \text{ T}$$

$$\begin{aligned} \text{Nb}_2\text{O}_5 &= 0.120\% && 695\text{T} \\ \text{Ta}_2\text{O}_5 &= 0.021\% && 121\text{T} \end{aligned}$$

Block C

$$50 \times 120 \times 21 = 126,000 \text{ m}^3 \times 2.76 \frac{\text{T}}{\text{m}^3} = 347,760\text{T}$$

$$\begin{aligned} \text{Nb}_2\text{O}_5 &= 0.090\% && 313\text{T} \\ \text{Ta}_2\text{O}_5 &= 0.015\% && 52\text{T} \end{aligned}$$

Block D

$$(75 \times 90 + 30 \times 75 \times 1/2) \times 14 = 110,250 \text{ m}^3 \times 2.76 \frac{\text{T}}{\text{m}^3} = 304,290\text{T}$$

$$\begin{aligned} \text{Nb}_2\text{O}_5 &= 0.089\% && 271\text{T} \\ \text{Ta}_2\text{O}_5 &= 0.020\% && 61\text{T} \end{aligned}$$

Block E

$$50 \times 40 \times 7.5 = 15,000 \text{ m}^3 \times 2.76 \frac{\text{T}}{\text{m}^3} = 41,400\text{T}$$

$$\begin{aligned} \text{Nb}_2\text{O}_5 &= 0.085\% && 35\text{T} \\ \text{Ta}_2\text{O}_5 &= 0.025\% && 10\text{T} \end{aligned}$$

Block E'

$$50 \times 40 \times 5.9 = 11,800 \text{ m}^3 \times 2.76 \frac{\text{T}}{\text{m}^3} = 32,568\text{T}$$

$$\begin{aligned} \text{Nb}_2\text{O}_5 &= 0.131\% && 43\text{T} \\ \text{Ta}_2\text{O}_5 &= 0.018\% && 6\text{T} \end{aligned}$$



Block F

$$50 \times 20 \times 11.8 = 11,800 \text{ m}^3 \times 2.76 \frac{\text{T}}{\text{m}^3} = 32,568\text{T}$$

$$\begin{array}{l} \text{Nb}_2\text{O}_5 = 0.061\% \quad 20\text{T} \\ \text{Ta}_2\text{O}_5 = 0.03\% \quad 10\text{T} \end{array}$$

Block G

$$40 \times 54 \times 9 = 19,440 \text{ m}^3 \times 2.76 \frac{\text{T}}{\text{m}^3} = 53,654\text{T}$$

$$\begin{array}{l} \text{Nb}_2\text{O}_5 = 0.091\% \quad 49\text{T} \\ \text{Ta}_2\text{O}_5 = 0.018\% \quad 10\text{T} \end{array}$$

Block H

$$62 \times 105 \times 6.6 = 42,966 \text{ m}^3 \times 2.76 \frac{\text{T}}{\text{m}^3} = 118,586\text{T}$$

$$\begin{array}{l} \text{Nb}_2\text{O}_5 = 0.102\% \quad 121\text{T} \\ \text{Ta}_2\text{O}_5 = 0.024\% \quad 28\text{T} \end{array}$$

Block I

$$58 \times 65 \times 9.8 = 36,946 \text{ m}^3 \times 2.76 \frac{\text{T}}{\text{m}^3} = 101,970\text{T}$$

$$\begin{array}{l} \text{Nb}_2\text{O}_5 = 0.099\% \quad 101\text{T} \\ \text{Ta}_2\text{O}_5 = 0.019\% \quad 19\text{T} \end{array}$$

TOTAL 2,133,898

APPENDIX V

Age Dating Of Blue River Carbonatites



November 12, 1982

Ms. E. French  
General Delivery  
Blue River, B. C.  
VOE 1J0

Dear Betty:

Re: Carbonatites

Further to our conversation in August and with apologies for the delay, enclosed please find a few photos from your area and of our excursion into Pyramid Creek with Bent.

Further enclosed are copies of some of the results that we have received from our lab during the past few years. The thrust of our work has been to try to establish criterion upon which British Columbia carbonate intrusives/extrusives could be designated as true carbonatites. Generally speaking the presence of anomalous values in rare earths is usually indicative of an igneous origin but we have not been able to obtain any standard or even a deviation from an arbitrarily established standard which would be deemed acceptable. In the course of carrying out this work we naturally were interested in possible ages and to this end dating attempts were made on the Verity richterite (a sodic tremolite of the amphibole group) and an age of  $80.2 \pm 2.8$  million years was obtained as well as an age of  $92.5 \pm 3.2$  on another richterite sample. The U.B.C. scientist, a J. E. Harakal felt that this K-Ar (potassium-argon) time clock may have been reset due to remelting during metamorphism. That is why we were particularly interested in the zircons which are usually the last mineral to be affected by metamorphism and we were hoping to have received results from U.B.C. prior to writing to you, hence the delay. As you may also see from the enclosed literature we have some dates from Howard Creek on phlogopite ( $200 \pm 7$  ma), hornblende ( $94.4 \pm 3.3$ ) and biotite ( $61.7 \pm 2.2$ ), and, Howard Creek phlogopite ( $205 \pm 8$ ).

Geologists are forever trying to tie things together. Bent and ourselves are of the opinion that the Verity may have all been part of a series of dikes and/or sills that have now been stretched across the country as far as Paradise Lake. To this end we have been trying to correlate each of these bodies one to the other for the past four years. We have tried using rare earths (chemical composition i.e.), mineralogy, age dating and

Ms. E. French  
November 12, 1982  
Page 2

after hearing a lecture on niobium, we felt that the complex atomic structure of the pyrochlore would be diagnostic for each different body and hence for each intrusion/extrusion. The problem was that with the rocks and thin sections we had gathered, we have had very little luck in finding pyrochlore where we wanted to find pyrochlore. Bent tells us that he has found it "everywhere" (slight exaggeration) and has even sent us samples to prove it, particularly from Paradise Lake where we drew a blank.

However, back to the drawing board so to speak. We now have a much more supportive and imaginative management in Victoria who have agreed to let us tackle the problem by trying to identify the daughter minerals in primary fluid inclusions in the apatite and/or fluorapatite which as you know is ubiquitous. Working on these rocks has not been easy and there are still techniques that we want to try, for example, thermoluminescence, but we are at the point that we feel we should try to get as much value as possible for our time and money, and fluid inclusions seem to be the way to go at this time.

One thing we have watched for closely in the field is whether the carbs cut the schists and whether there might be a source rock. South of Three Valley Gap we seem to have fairly conclusive evidence that carb has ingested country rock and cut the attendant fenite, whereas at Verity, fenite appears to cut both the carb and the country rock. We have found no obviously related source rock. Inasmuch as carb is by its chemical make-up believed to be associated with mantle or lower crust of the earth we might expect to find ultramafite or silica deficient rocks associated (there are a number of exotic rocks such as kimberlite that are associated with carbs in South Africa).

At Howard Creek we have a good nepheline syenite (expected) and to the north east some distance (1.5 km) away we have a coarse-grained, sharply contacted pegmatite-like body. We say "pegmatite-like" because we are optimistic that this might be more than a pegmatite and that this body might at least be companion fenitization. This is probably wishful thinking but we may be able to establish this by correlative strontium and rare earth content.

South Africa have established that metabasites and metasovites have more than 2000 ppm Strontium. This works fine here until we hit the Jordan River and Mt. Copeland area near Revelstoke. On Mt. Copeland we have good intersecting relationships with carb cutting nepheline syenite (similar relation to Three Valley Gap) but the Strontium content is way low.

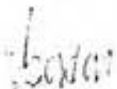
Ms. E. French  
November 12, 1982  
Page 3

We sincerely hope that you will forgive us for rambling on. We have spent a lot of time peering down microscopes and tabulating chemical analysis. Our lab in Victoria have been very helpful but if we told you that we had made significant progress we would be only fooling ourselves. The answer, if there is one, to an understanding of the emplacement of these carbonate bodies probably lies in a laboratory approach.

We expect to keep trying to accumulate information and we will certainly let you know the results of the zircon dates from Verity when we receive them. We carried out many kilos of carb from Howard to have a heavy metal separation carried out. However, we are not optimistic as there was no golden fluorescence.

Best regards and thank you for your many courtesies to us in the past.

Yours truly,

  
Gordon P. E. White, P.Eng.  
District Geologist

GPEW/jw  
Enclosures  
cc: Mr. Bent Aagust  
2400 Anaconda Tower  
555 Seventeenth Street  
Denver, Colorado 80202  
  
cc: Dr. V. Preto  
Victoria

Appendix VI

Assessment Report  
Verity First 1, 2 & 3 Claims  
Blue River  
British Columbia

October, 1982

Bent E. Aaquist  
Project Geologist

October 14, 1982

TITLE PAGE

Exploration assessment report for 1982 on three claims north of Blue River, British Columbia, N.T.S. 83D/6E.

<u>Claim Name</u>	<u>Type</u>	<u>Record No.</u>	<u>Record Date</u>
Verity First 1	2 Post	3860	Oct. 20, 1981
Verity First 2	2 Post	3861	Oct. 20, 1981
Verity First 3 Fraction	2 Post	3862	Oct. 20, 1981

Mining Division: Kamloops

Latitude: 52<sup>0</sup> 24'

Longitude: 119<sup>0</sup> 10'

Claim Owners: Anschutz (Canada) Mining Ltd. FMC <sup>243460</sup> 19044T

Operator: Anschutz (Canada) Mining Ltd.

By: Bent E. Aaquist  
Project Geologist

TABLE OF CONTENTS

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I. Introduction	<u>3</u>
II. Location and Accessibility	<u>3</u>
III. Topography and Climate	<u>3</u>
IV. Geological Work	<u>4</u>
V. Conclusions and Recommendations	<u>5</u>
 Appendix I	 <u>6</u>
Itemized Cost Statement	
 Appendix II	 <u>7</u>
Author's Qualifications	
 Pocket	
Claim Map Blue River Area	1:200,000
Verity Area	1:4,000



I. Introduction

The Verity First claims were mapped this summer, as part of a program that involved mapping and sampling of all known carbonatite occurrences from the Verity First claims to the top of the mountain, 6 km. to the east. About one and one half day was spent traversing on and around the three claims.

II. Location and Accessibility

The Verity First claims are about halfway between the towns of Blue River and Valémount. The claims are covered by N.T.S. map 83D/6E, Lempriere. Access to the area is via Yellowhead Highway #5. The claims can be reached by turning off the highway at Lempriere crossing, across the CNR tracks and then drive south along the B.C. Hydro access road for 5.5 km. See the claim map in back pocket for the location of the claims.

III. Topography and Climate

The claims are on the east bank of the North Thompson River at an elevation of 711 meters above sea level. The ground rises steeply to the east to an elevation of 880 meters at the east side of the claims. Hemlock, cedar, fir and pine cover the area

Average annual precipitation is 127 cm, but annual variations can be great.

IV. Geological Work

The Verity First 1-3 claims were staked to cover a possible westward extension of carbonatites in the Specimen Pit and Columbite Pit areas, see Verity Area map in pocket. The results of last year's work in the area indicate that the carbonatites are offset by north-south and east-west block faults. The more prominent of these faults are shown on the Verity Area map as airphoto interpreted lineaments.

Three traverses were made across the three claims. The traverses are shown on the Verity Area map. Only one outcrop was found on the claims. It is an area of poor exposure of massive white coarse crystalline quartz and feldspar pegmatite, at map coordinates 49,300N, 49350E, Verity Area. Two areas of massive to well banded quartz-feldspar-biotite gneiss were found, one in a railroad cut due north of the claims. The dip and strike of the gneiss and the presence of stickensided on joints in the outcrop in the railroad cut, fit the structural interpretation based on last year's work, assessment report 82-90.

Sand and gravel of unknown thickness covers most of the three claims. There are no indications of any carbonatite subcropping in the area. However, an undetected subcrop might exist and remain undetected, because the sand and gravel is mostly glacial outwash material derived from another area.

V. Conclusions and Recommendations

Although a westward extension of carbonatite was not found on the three Verity First claims, subcropping carbonatite might still exist. A detailed ground magnetic survey extending west from the Specimen Pit and Columbite Pit areas should detect the presence of subcrop carbonatite. A survey is recommended using an east-west base-line with cross-lines every 50 meters and readings taken every 10 meters along the cross-lines. The base-line should extend from the Speciment Pit west to the railroad, and cross lines extend from 49,400N to 50,200N, Verity Area grid.

APPENDIX 1

Itemized Cost Statement


Geologist Field Time		
\$170/day X 1 1/2 day		\$255.00
Room and meals \$50/day X 1 1/2 day		\$75.00
Use of 4 X 4 truck		
\$25/day X 1 1/2 days		\$37.50
Gasoline for truck		\$15.00
Report writing and drafting maps by geologist		
\$170/day X 1/2 day		\$85.00
Maps and report reproduction		<u>\$12.00</u>
	TOTAL	\$479.50

APPENDIX II

Statement of Qualifications

I, Bent E. Aaquist, do hereby certify that:

1. I am an employee of Anschutz Mining Corporation with its office at 2400 Anaconda Tower, 555 Seventeenth Street, Denver, Colorado, U.S.A.
2. I reside at 9462 Sierra Drive, Arvada, Colorado, U.S.A.
3. I am a member of the Canadian Institute of Mining and Metallurgy, a member of the Geological Association of Canada, and a member of the Association of Exploration Geochemists.
4. I am a graduate of the University of Alberta with a B.Sc. in Honours Geology, and a graduate of the University of Western Ontario with a M.Sc. in Geology.
5. I have practised continuously as a geologist since May, 1971.
6. This report is based on work carried out by me in 1982.

  
Bent E. Aaquist  
Project Geologist

Denver, Colorado, U.S.A.  
October, 1982

APPENDIX VII

Itemized Cost Statement

Geologist Field Time June 30 - Oct. 4, 1982	\$10,432.50
\$195/day X 5 <sup>3</sup> / <sub>2</sub> days	
Room and meals \$50/day X 5 <sup>3</sup> / <sub>2</sub> days	2,675.00
Assistant's time July 29 - Oct. 3, 1982	1,343.25
\$6.75/hr. X 199 hrs.	
Overtime 33 hrs @\$10.125/hr.	334.12
\$7.00/hr. X 8 hr.	56.00
Used of 4X4 truck	
\$25/day X 5 <sup>3</sup> / <sub>2</sub> days	1,337.50
gasoline for truck	785.00
truck repair and servicing	210.00
Plane Travel	
Kamloops - Vancouver, July 2, 1982	70.00
Calgary - Kamloops, July 7, 1982	93.00
Calgary - Kamloops, July 28, 1982	93.00
Prince George - Vancouver, August 10, 1982	111.00
Vancouver - Prince George, August 17, 1982	111.00
Kamloops - Calgary, September 1, 1982	93.00
Calgary - Kamloops, September 22, 1982	93.00
Telephone	
Rent mobile phone - 1 month	60.00
Cost of calls	370.30
Calls charged to mobile phone	104.10
Helicopter rental (Yellowhead Helicopters)	3,113.79
5.8 hours	


Supplies	
Camping gear, flagging, etc.	245.00
Groceries 14 days camping	256.00
Sample Assays	
124 samples Ta & Nb @\$10.50/sample	1,302.00
124 samples prep. @\$3.50/sample	434.00
Sample shipping and handling	120.00
Compiling results of Summer's work	
Geologist \$195/day X 10 days	1,950.00
Drafting \$80/day X 10 days	800.00
Typing report - 1 day	90.00
Maps & reports reproduction	800.00
Installing a crossing across CNR	
Tracks at Lempriere crossing	<u>485.00</u>
TOTAL	\$27,247.56

APPENDIX VIII

Statement of Qualifications

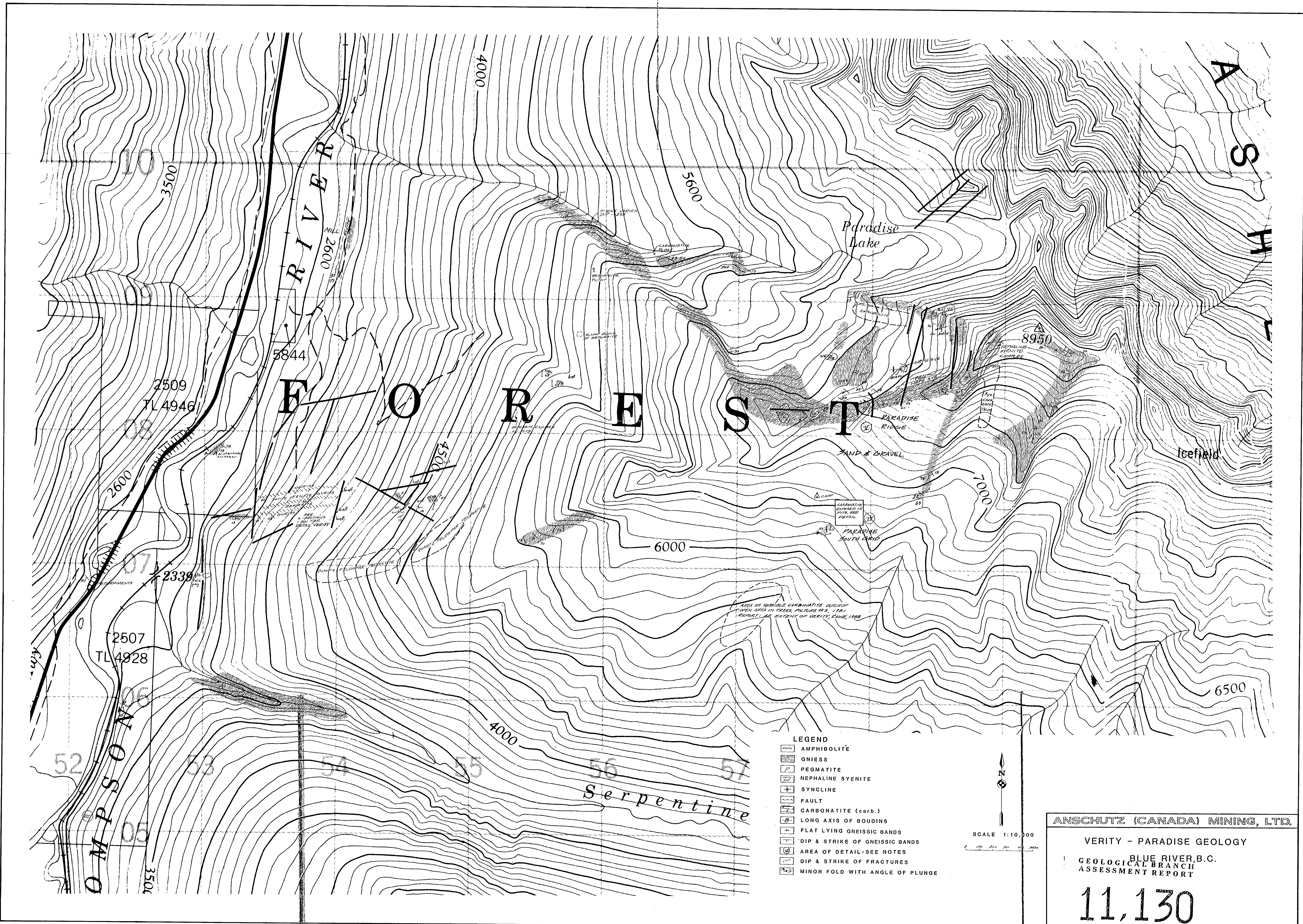
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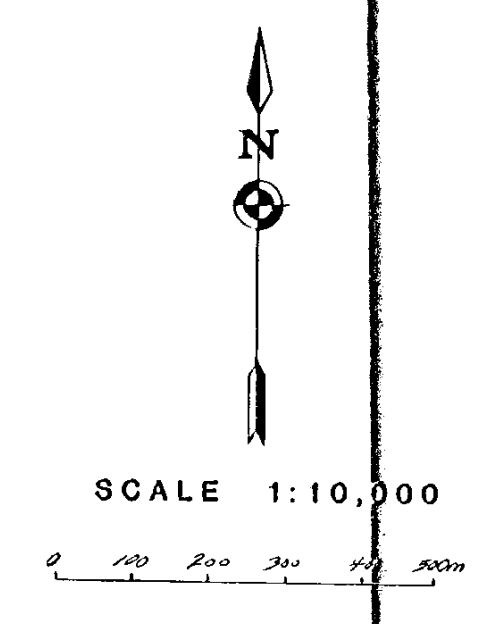
  
Bent E. Aaquist  
Project Geologist

Denver, Colorado, U.S.A.  
December, 1982





- LEGEND**
- AMPHIBOLITE
  - GNEISS
  - PEGMATITE
  - NEPHALINE SYENITE
  - SYNCLINE
  - FAULT
  - CARBONATE (carb.)
  - LONG AXIS OF BOUDINS
  - FLAT LYING GNEISSIC BANDS
  - DIP & STRIKE OF GNEISSIC BANDS
  - AREA OF DETAIL-SEE NOTES
  - DIP & STRIKE OF FRACTURES
  - MINOR FOLD WITH ANGLE OF PLUNGE



ANSCHUTZ (CANADA) MINING, LTD.

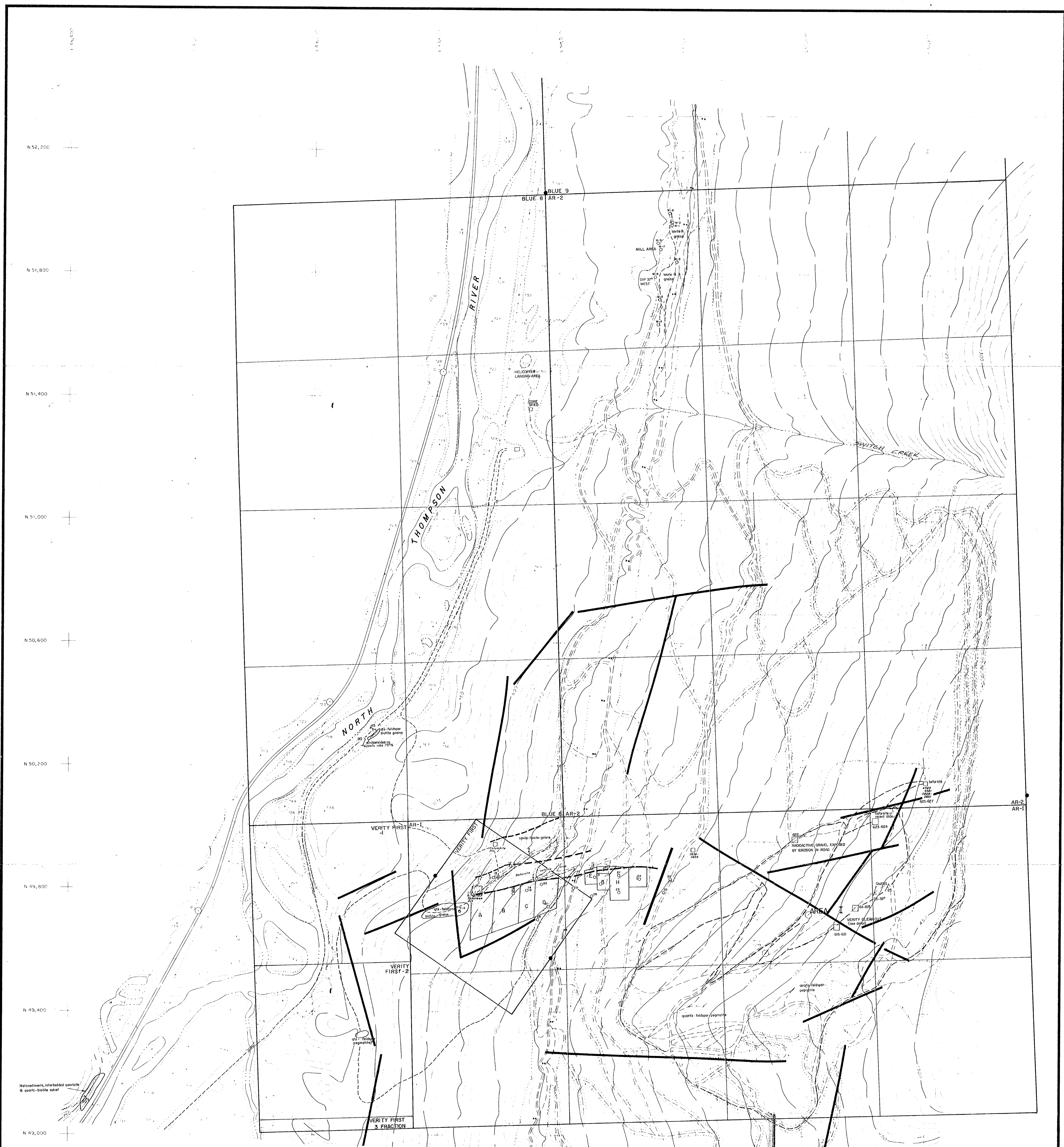
VERITY - PARADISE GEOLOGY

BLUE RIVER, B.C.

GEOLOGICAL BRANCH

ASSESSMENT REPORT

**11,130**



GEOLOGICAL BRANCH  
ASSESSMENT REPORT

**11,130**

TOPOGRAPHIC MAP  
OF THE

**VERITY AREA**

BLUE RIVER, BRITISH COLUMBIA

Prepared for  
**Anschutz Mining Corporation**  
Denver, Colorado

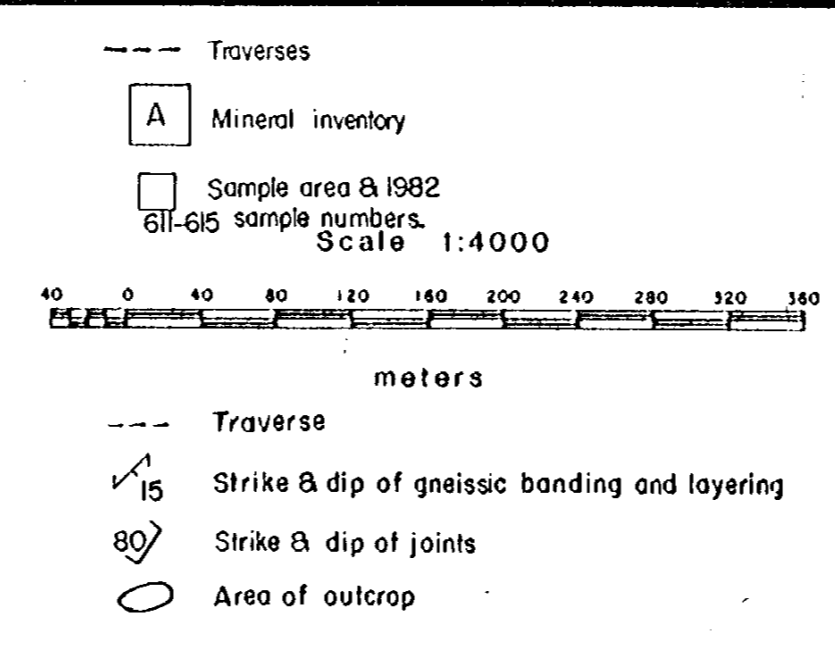
Scale: 1:4000 Date: October 1982 Sheet: 1 of 1  
Contour interval: 10 m

Prepared by  
**IntraSearch**  
Denver, Colorado

Date	Author	Revisions
12/01/81	...	...
11/28/81	...	...
11/22/81	...	...

Project #01170

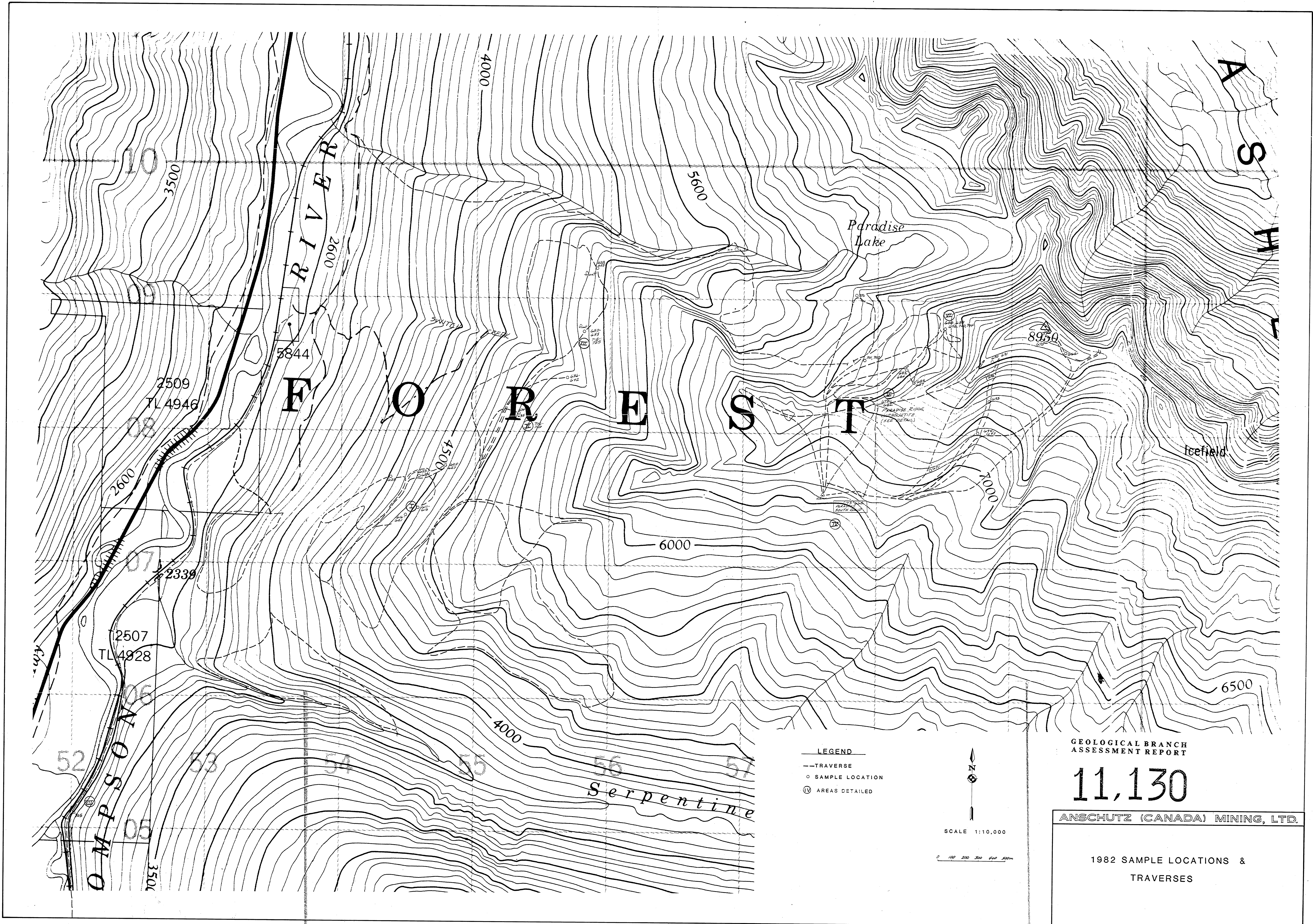
This map was compiled by photogrammetric methods from 1:20,000 scale aerial photography dated June 13, 1980.  
Horizontal and vertical control was established by Anschutz Mining Corporation.



**LEGEND**

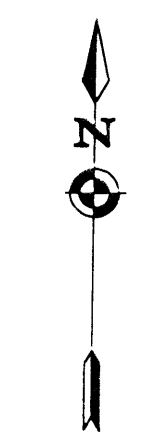
- Hard surface road
- Unpaved road
- Trail
- Railroad
- Trees
- Building
- Power transmission pole
- Vertical control point
- Approximate contour

- Photo center
- Hole number
- Diamond drill holes
- Sample locations
- Sample numbers
- Based on airphoto interpretation - 10/81
- Airphoto lineaments, possible faults
- 1:100 sketches of Specimen & Columbia pits

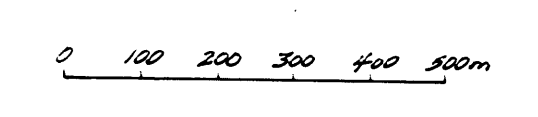


LEGEND

- TRAVERSE
- SAMPLE LOCATION
- Ⓜ AREAS DETAILED



SCALE 1:10,000



GEOLOGICAL BRANCH  
ASSESSMENT REPORT

**11,130**

ANSCHUTZ (CANADA) MINING, LTD.

1982 SAMPLE LOCATIONS &  
TRAVERSES

# CANADA

49

50

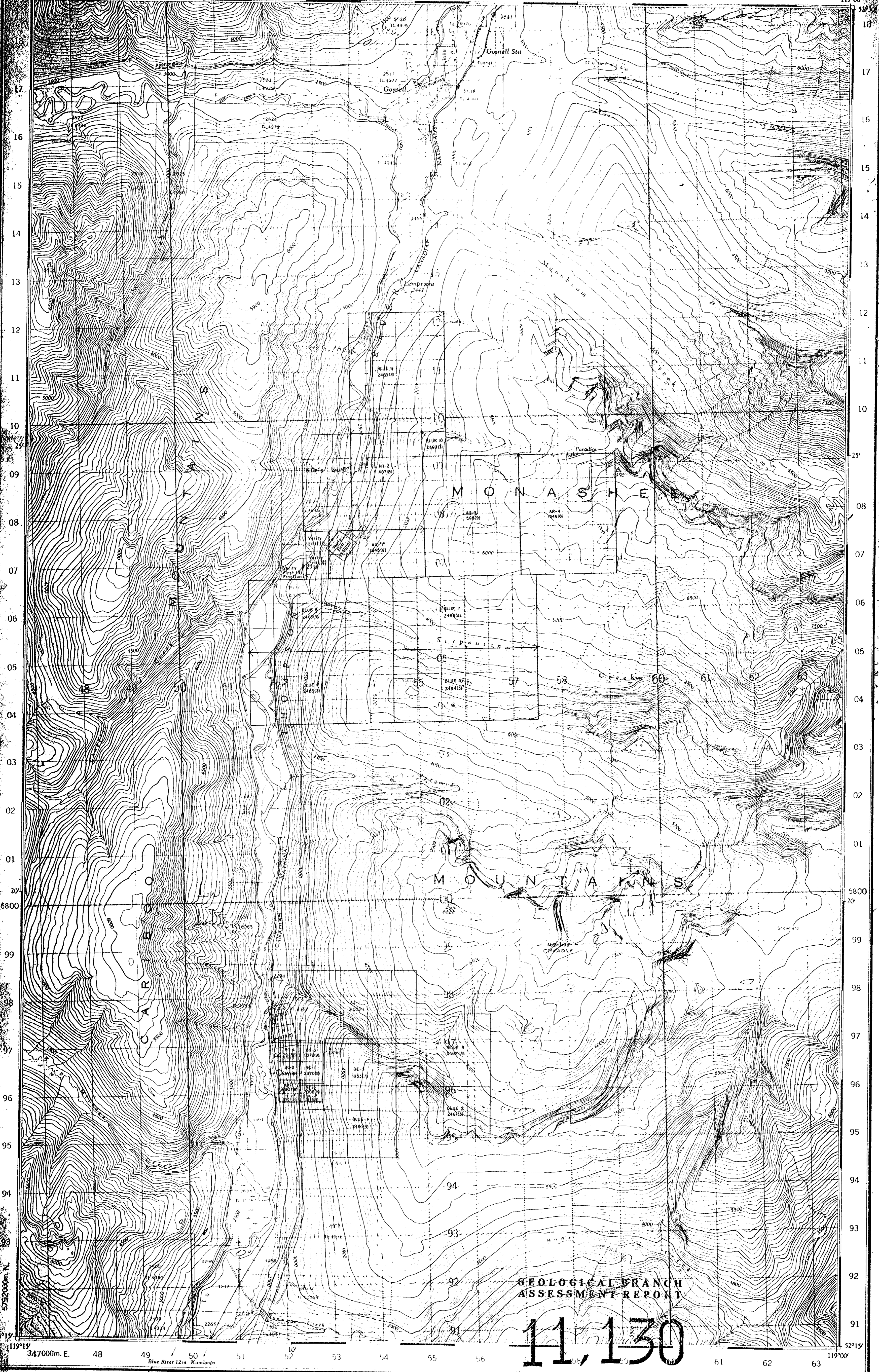
51

10

05

63

119°00'



572000m. N.

119°19'

347000m. E.

48

49

50

51

52

53

54

55

56

57

58

59

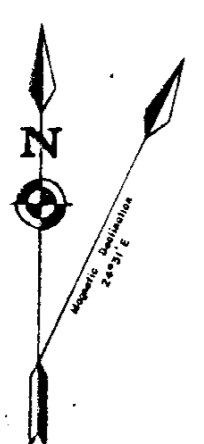
60

61

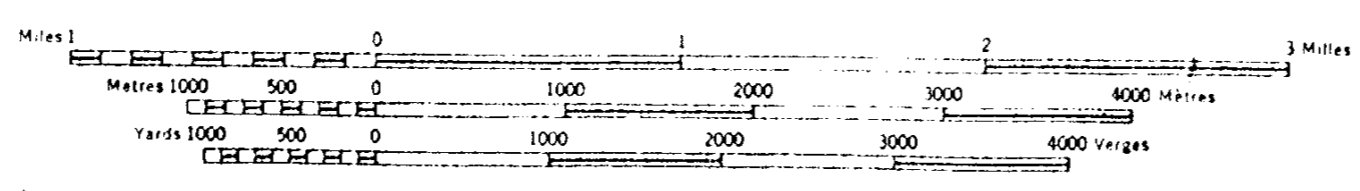
62

63

52°15'



\*Claim bounded by dotted lines



## LEMPRIERE KAMLOOPS DISTRICT BRITISH COLUMBIA

ANECHUTZ (CANADA) MINING, LTD.  
CLAIM MAP  
BLUE RIVER AREA  
OUTLINE OF PROPERTIES  
British Columbia, Canada  
SCALE 1:200,000  
CORRECTED JUNE/82

# 11,130