

3420

ALBERTA COPPER AND RESOURCES LTD.

1971 EXPLORATION
OF THE
RAM CREEK PROPERTY
TOAD RIVER AREA
LIARD MINING DIVISION
BRITISH COLUMBIA

Geographic Coordinates
58° 33' N
125° 32' W
NTS Sheet 94K/13E

Department of
Mines and Petroleum Resources
ASSESSMENT REPORT

NO. 3420 MAP.....

by

L. B. Halferdahl, Ph.D., P. Eng.
and
G. A. Van Dyck, B.Sc.

October 15, 1971

L. B. Halferdahl & Associates Ltd.
401 - 10049 Jasper Avenue
Edmonton 15, Alberta

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INTRODUCTION

Field work on the Ram Creek property of Alberta Copper and Resources Ltd. in the Toad River area of northeastern British Columbia began with road construction in July 1971 and ended on September 10, 1971. The work included geological mapping and trenching across mineralized zones on the Bob Claim Group. Trenches were mapped and sampled. Other trenching was conducted on the nearby Mad Claim Group.

Road construction involved the improvement and relocation of an existing 18-mile tote road which links the property with Mile 6 on the road to the Davis-Keays Mine. This road was improved from tracked-vehicle standard to 4-wheel-drive standard.

Geological field work began on August 20 after most of the work on the road was completed and a camp was established on the property. A topographic map prepared from aerial photographs on a scale of 1 inch = 200 feet with 20-foot contours was used as a base map for geological mapping. Geological work was carried out by a geologist with three assistants. Work ended when it was seriously hindered by snow and frost above 6000 feet.

Transportation between camp and the Alaska Highway was provided by a rented 4x4, $\frac{3}{4}$ -ton truck, and supplemented by a second 4x4 for several weeks in late August. A trailer and tents provided accommodation. Two D-7 bulldozers were used for road work and trenching.

This report describes the evaluation of the Alberta Copper and Resources' property in the Toad River area of northeastern British Columbia based on mapping in 1971, examinations in 1969 and 1970, and published and unpublished reports.

SUMMARY

The Ram Creek property of Alberta Copper and Resources Ltd. consists of 4 mineral claims in the Bob Group, 31 mineral claims in the Mad Group, and 2 fractional mineral claims. The property is in an area of rugged mountains about 105 miles west of Fort Nelson, from which it is reached via the Alaska Highway and all-weather and 4-wheel-drive roads. Exploration of vein-type copper deposits in the area has been conducted by several companies including Churchill Copper Corporation, Davis-Keays Mining Company Ltd., and Canadian Superior Exploration Ltd. on the Windermere property.

The rocks in the area are mostly sedimentary, ranging in age from Late Precambrian to Devonian, with the Precambrian Proterozoic rocks being intruded by diabase dykes. The property is underlain by mudstones, siltstones, limestones, and dolomites of the Late Precambrian Aida Formation. These rocks have been sheared, faulted, and intruded by diabase dykes in some places.

Discontinuous copper-bearing veins ranging in width from inches to 9 feet in a shear zone, which has been intruded by a diabase dyke, have been traced for a total horizontal length of 3600 feet, and through a vertical distance of 1400 feet; more than half these distances are on the Bob Group. Oxidized samples gave grades up to 2.7 per cent copper. Near the summit of a mountain at an elevation about 7500 feet, a breccia zone about 23 feet wide in thick-bedded dolomite branches off the shear zone. It has been traced more than 700 feet across the summit of the mountain with about 500 feet on the Bob Group. Sampling of the breccia zone was restricted by cliffs and permafrost, but an oxidized sample across only 6 feet averaged 2.4 per cent copper. A previously collected fresher sample in another place averaged 4.8 per cent copper across 23 feet.

An attempt to locate the source of copper-bearing float on one of the Mad claims by bulldozer trenching was not successful.

Snow and frost in early September halted an attempt to locate the source of copper-bearing float on some of the Rim claims in the Mad Group. This work included the construction of about 8 miles of 4-wheel-drive road from the Churchill mine and switchbacks up a mountainside. Trenching will be possible there with only a small amount of work in another season.

RECOMMENDATIONS

1. Trench across the westerly extension of the breccia zone by blasting where necessary.
2. Drill to test the breccia zone at depth and its westerly extension.
3. Drill to test the Neil Vein in the shear zone at depth.
4. Prospect the Mad Group.
5. Complete stripping and trenching on Rim claims, and trench and map new showings found by prospecting.
6. Improve the 18 miles of 4-wheel-drive road.

PROPERTY

The mineral property described in this report is in the Liard Mining Division, British Columbia, and consists of 37 mineral claims in two almost contiguous groups. The Bob Group consists of 4 mineral claims, and the Mad Group of 31 mineral claims. There are also two fractional mineral claims.

<u>Claims</u>	<u>Record Number</u>	<u>Record Date</u>	<u>Expiry Date</u>
<u>Bob Group</u>			
Bob 1 to 4	36831 to 36834	April 21, 1969	April 21, 1978
<u>Mad Group</u>			
Rim 1 to 4	36231 to 36234	April 3, 1969	April 3, 1973
Rim 5 and 6	36835 and 36836	April 21, 1969	April 21, 1972
Rim 9 to 13	36837 to 36841	April 21, 1969	April 21, 1972
Mad 1 and 3	38930 and 38932	August 6, 1969	August 6, 1972
Mad 2 and 4	38931 and 38933	August 6, 1969	August 6, 1973
Mad 5 to 10	38934 to 38939	August 6, 1969	August 6, 1972
Mad 13 to 20	38940 to 38947	August 6, 1969	August 6, 1972
Mad 21 and 22	39028 and 39029	August 8, 1969	August 8, 1972
Mad 11 Fr. and 12 Fr.	39030 and 39031	August 8, 1969	August 8, 1972

Assessment work to be filed for these claims from the work reported herein will extend the expiry dates above. All 37 mineral claims are in unsurveyed territory, and only a few have been surveyed (Fig.2). Most claim posts for the 37 mineral claims have been checked and staking appears to be in accord with the Mineral Act of British Columbia. Only a few claim posts for claims located by others have been found and checked. Although there appears to be some overlapping of claims and one post for claims in the Bob Group has been re-established a few hundred feet from its original location, the size and location of the Bob Group as shown in Fig. 2 appears reliable. The locations of claims in the Mad Group are believed to be as shown in Fig. 2, but the sizes of some of these claims are in doubt because of overlapping with some of the adjoining Rex claims.

GEOGRAPHIC SETTING

The Ram Creek property is located about 105 miles west of Fort Nelson in northeastern British Columbia and about 16 miles south of the Alaska Highway. It is about 5 miles west of the mine of Churchill Copper Corporation and about 2 miles west of the copper deposit of Davis-Keays Mining Company. It is bordered on the east by Davis-Keays Mining Limited.

By road, the property is about 24 miles south of Mile 442 on the Alaska Highway: about 6 miles on a well-gravelled all-weather road to the Davis-Keays Mine, and about 18 miles on a 4-wheel drive road. Fort Nelson is about 600 miles northwest of Edmonton, Alberta, on the Alaska Highway (Mile 300) and is served by regularly scheduled airline flights from Vancouver and Edmonton. An extension of the Pacific Great Eastern Railway from Fort St. John to Fort Nelson, officially opened September 10, 1971, provides rail service to Prince George and thence to Vancouver or Prince Rupert.

The country surrounding the property is mountainous with peaks rising to 10,000 feet. Elevations on the property range from 5000 feet to 7700 feet with timberline at about 5000 feet. Most mountain slopes are mantled in scree and large solifluction lobes carry frozen rock debris onto the valley floors. Broad U-shaped valleys and braided streams, typical of glaciated regions, are characteristic. Spruce and pine forests in the lower valleys of the area, particularly the Toad Valley, can supply timber for mining. Water is available in Ram or Wolf Creeks and their tributaries, with a much larger quantity in the Toad River.

PREVIOUS EXPLORATION IN THE REGION

Copper mineralization was discovered in the Mt. Roosevelt area of northeastern British Columbia in the mid 1940's. Some surface exploration

and drilling was conducted on what has now become the mine of Churchill Copper Corporation in 1958 and 1959, but it was not until 1967 that development began. Since then Churchill Copper Corporation has found reserves totalling more than 1,000,000 tons grading more than 3.8 per cent copper and some possible additional reserves. A 750-ton-per-day mill began tune-up in April 1970; its temporary closure was announced in October 1971 because of prevailing low copper prices.

Work began on the Davis-Keays deposit in 1967. Surface sampling and underground exploration and development has outlined semi-proven and probable ore reserves of 1,375,700 tons averaging 3.38 per cent copper all in the Eagle Vein, according to a feasibility report completed in June 1971.

The Toad River property of Fort Reliance Minerals, about $7\frac{1}{2}$ miles to the west of the Alberta Copper property across the Toad River, was discovered in 1956, drilled in 1958 and 1959. Drilling indicated reserves of 78,000 tons grading 5.15 per cent copper. The property was surveyed in 1969. Several other properties in the area including those of Largo Mines Ltd., Copperline Mines Ltd., Lubicon Mining Ltd., and Windermere Exploration Ltd. were explored in 1968, 1969, 1970, and 1971.

REGIONAL GEOLOGY

The area of northeastern British Columbia which contains the copper deposits of Churchill, Davis-Keays, and others is within the Ranges of the Rocky Mountains. In this area they are characterized by a series of subparallel, low angle, southwest-dipping thrust faults and by folding. The rocks involved are mostly sedimentary and range in age from Late Precambrian to Devonian. Copper-bearing veins so far have been found only in the Late Precambrian Proterozoic rocks. The Precambrian sedimentary rocks have been cut by Late Precambrian diabase dykes, but not the younger strata.

The Precambrian sedimentary rocks in the area are reported by Bell (1968) to be more than 24,000 feet thick. Bell has divided these into several

formations ranging from 700 to almost 5,000 feet in thickness. The rocks consist chiefly of interbedded slates, slaty mudstones and siltstones, dolomite, limestone, and quartzite, most of which are present in all seven formations. They have all been involved in at least one orogeny prior to the most recent which produced the present Rocky Mountains.

During one of these earlier periods of deformation the sedimentary rocks were stressed, sheared, and fractured, with the shears and fractures subsequently becoming the loci of diabase dykes. The dykes are a distinct geological feature in the area due to their dark resistant nature and light grey margins. These intrusive bodies range up to 50 feet in width, and some have been traced for more than 5 miles. Associated with the diabase dykes are quartz-carbonate veins locally containing copper mineralization. The longest individual copper-bearing vein ranges from less than 3 feet to more than 13 feet in width, and has been traced for about 2000 feet. Whether or not there is a genetic relation between the dykes and the veins, it is apparent that both were intruded or deposited in similar zones of structural weakness. The type of fracturing and the sizes and orientations of the veins appear to be closely related to the competency of the different kinds of sedimentary rocks.

The veins comprise quartz-carbonate fissure fillings and replacement masses mineralized essentially with chalcopyrite and its oxidation products, malachite and azurite. Locally small amounts of pyrite, galena, and bornite are found.

GEOLOGY AND MINERALIZATION OF THE BOB GROUP

The Bob Group is underlain by nearly uniformly southwesterly dipping interbedded calcareous mudstones, silty mudstones, dolomites, and limestones, which appear to belong to the Late Precambrian Aida Formation (Bell, 1968). In the northeast part of the Group along a northwest-trending mountain ridge are outcrops of buff-weathering dolomite in beds up to several feet thick and

locally stromatolitic. These beds strike about 90° , dip 25° to 30° N, and form a rock unit more than 200 feet thick. All these strata have been locally folded, faulted, and intruded by northeasterly trending diabase dykes. As the dykes cut only gently folded Proterozoic formations, they were apparently intruded prior to the deposition of Lower Cambrian strata.

Diabase Dykes

The main dyke on the Bob Group forms a resistant spur or ridge near the top of the mountain; its debris is conspicuous as a dark band down the southwest-facing slope. It dips steeply and trends northeasterly. Its width varies from 7 to 40 feet with flexures and changes in attitude within short distances, but with a fairly consistent attitude. The dyke is generally fine-grained with local serpentization and large patches of rust. Prominent joints are almost parallel and perpendicular to its contacts, but some are obscured by later shearing.

Much of the contact between the dyke and the rocks it intrudes is obscured by shearing. Wedges and slivers of mudstone locally within the dyke are apparently either xenoliths or due to faulting. Dyke contacts with minimal shearing have margins of a distinct grey baked mudstone, some extending for several tens of feet on both sides of the dyke. Some resemble hornfels. These contact phenomena were observed near dykes on the north and south parts of the Bob Group.

Shearing and Faulting

A shear zone coincides with the location of the main dyke. Altered mudstone for several tens of feet on both sides of the dyke is strongly sheared, with the dyke itself less sheared. On the southeast side of the dyke a fault separates sheared and altered mudstone and interbedded dolomite from the relatively undeformed strata across the fault. Rusty green clayey gouge up to 2 feet thick is common along faults. To the southwest across Ram Creek along

its strike the shear zone cuts a prominent red conglomerate. There lateral displacement appears to be several tens of feet. On the northwest side of the shear zone, interbedded mudstone and dolomite are vertical with drag folds revealing a right lateral displacement. Near the top of the mountain the shear zone broadens; there the dyke splits into several subparallel bodies, probably the result of strong and extensive shearing. Limited exposure obscured the exact nature of the shear zone between Trenches 3 and 1. In Trench 2 the shear zone including the dyke is approximately 120 feet wide; in Trench 4 it is about 90 feet wide.

Other northeast-trending dykes on and adjacent to the Bob Group do not coincide with strong shearing.

Cleavage and Joints

Well developed sets of slaty cleavage exist in all the less competent argillaceous rock units: one very prominent cleavage strikes 145° and dips 45° SW, and a less prominent cleavage strikes 125° and dips 50° SW. The more competent dolomites and limestones lack the slaty cleavage, but show prominent joints. Secondary carbonates have been precipitated along many of these joints. A major set of joints strikes 45° , and a secondary set 15° ; both dip vertically or almost vertically.

Veins

The main and most conspicuous vein on the property outcrops along the northeast-trending ridge on one or both sides of the main diabase dyke. This vein has been named the Neil Vein. During 1970 it was traced along strike for 3650 feet by Copper-Keays Mines Ltd. It consists of varying proportions of quartz, ankerite, chalcopyrite, and remnants of the sedimentary host rock. Secondary copper minerals - malachite, azurite, or even a copper sulfate - are present in almost all copper-bearing parts of the vein. The Neil Vein consists of more than one nearly vertical tabular body within the shear

zone. These bodies range in size from the filling of microfractures to large and massive bodies all occupying parts of the shear zone parallel to the dyke. Only some of the bodies contain chalcopyrite. On some of the Ann claims of Copper-Keays Mines, the Neil Vein is on the southeast side of the dyke. As the Neil Vein is traced northeasterly onto the Bob Group, in Trench 4 it is southeast of the dyke and in Trench 3 it is northwest of the dyke. Along the ridge crest between Trenches 1 and 3, some veins strike northerly to northwesterly, diverging from the trend of the dyke and shear zone, and roughly parallel to the cleavage. Where the shear zone and dyke intersect dolomite units of the Aida Formation, the veins are more extensive as, for example, where vein material consisting of quartz and ankerite on a steep northeast-facing slope between Trenches 3 and 1 has apparently replaced part of a dolomite unit, but its bedded nature remains visible. Exposures were insufficient to reveal the age relationship between the dyke and the Neil Vein, but it may be similar to the Magnum Vein of Churchill Copper Corporation, which has been intruded by diabase dykes.

Along the road on the southeast side of the ridge which contains the main dyke, some knots up to one inch and stringers of galena are present in small quartz carbonate veins which cut black calcareous mudstone. The galena does not appear abundant enough to be economic. Assays of one sample show 0.045 oz. silver for each per cent lead.

Breccia Zone

A breccia zone occupies a position between the thickly bedded buff-weathering dolomite and the northwest margin of the shear zone. In Trench 2 which is almost normal to the shear zone, the breccia zone is about 25 feet wide and strikes 80° , different from the shear zone which strikes 40° . The breccia can be traced down both sides of the ridge for several hundred feet to where the dolomite is underlain by black finely-laminated mudstone. Frozen rubble and scree cover its possible extension below the cliff on the northwest side of the ridge, but observations made from across the valley suggest that it

may continue down the valley on the northwest side of the Bob Group.

The breccia zone consists of angular fragments of black dolomite from $\frac{1}{2}$ " or less up to 8 inches or even 24 inches in size surrounded by an envelope of white quartz from $\frac{1}{4}$ " to 2" thick. Brown carbonate, some coarsely crystalline, fills most of the spaces between the fragments not occupied by quartz. Chalcopyrite is disseminated throughout the quartz in grains or aggregates up to 2 or 3 millimetres, apparently deposited in open spaces not filled with brown carbonate. Even larger masses of chalcopyrite are present adjacent to a fracture about 10 feet from the dyke.

A fault striking 173° and dipping 24° NW cuts the breccia zone and neighboring dolomite. Movement of the top block to the northwest placed some of the breccia and large block of diabase above non-brecciated stromatolitic dolomite. Apparent displacement appears to be 60 to 100 feet.

TABLE 1: ASSAYS OF CHIP SAMPLES

Location	Type	Width	Sample Number	Per Cent Copper
Trench 1	vein	3½'	005	0.22
Trench 1	vein	3½'	004	0.08
Trench 2	vein	3'	012	0.05
Trench 2	vein	3'	013	0.03
Trench 2	vein	3'	014	0.07
Trench 2	vein	3'	015	0.30
Trench 2	vein	1½'	016	0.09
Trench 2	breccia	3'	017	1.15
Trench 2	breccia	3'	018	3.67
Trench 3	vein	4'	010	1.01
Trench 3	vein	5½'	011	1.80
Trench 4	shear-vein	3'	001	0.06
Trench 4	shear-vein	3'	002	2.79
Trench 4	shear-vein	3'	003	0.44
Trench 6	shear-vein	3'	006	0.64
Trench 6	shear-vein	3'	007	0.02
Trench 6	shear-vein	7'	008	2.23
Trench 6	shear-vein	9'	009	0.16

TRENCHING ON THE MAD GROUP

A trench on the Mad 9 claim near where copper-bearing float had been found along a creek exposed a diabase dyke and bedrock on both sides of it (Fig. 14) but not the source of the mineralized float. Prospecting and possibly trenching of this and adjoining claims is required to find the source of the float, and to further assess their economic potential.

A D-7 bulldozer was used to construct a 4-wheel-drive road from the Churchill Mine, across a 6000-foot pass to Wolf Creek and up one of its tributaries, a distance of about 8 miles, to the base of the southeast-facing slope on which some of the Rim claims lie. Considerable work was conducted with the D-7 in attempting to reach and trench the location of the previously known copper-bearing float a few hundred feet below and southeast of the saddle which separates the tributary of Wolf Creek from the headwaters of Ram Creek. Although snow and frost in early September prevented obtaining the information expected from this work, copper-bearing and lead-bearing float was found lower down the southeast-sloping mountainside. With suitable access, the desired trenching can be readily conducted next July or August, preferably with a smaller bulldozer such as a D-6. Access to the southeast-facing slope from Ram Creek would have required costly rock work.

CONCLUSIONS

The 37-claim property consisting of Bob, Rim, and Mad mineral claims lies a short distance west of two known copper ore bodies in the Mt. Roosevelt area of northeastern British Columbia and about the same distance east of another deposit near the Toad River.

Improvement of 18 miles of existing tote road provided satisfactory ground access for 4-wheel-drive vehicles.

Trenching and mapping of the Bob claims and adjoining area revealed both chalcopryite-bearing and essentially barren veins and shear zones spatially

related to a northeast-trending diabase dyke which has intruded Late Precambrian mudstone, siltstone, limestone, and dolomite. The veins are more extensive in dolomitic units. Discontinuous copper-bearing veins were traced along a strike distance of 3600 feet with widths from several inches to nine feet, and assays up to 2.7 per cent copper. All samples were collected as continuous chips; they were partly oxidized.

A copper-bearing breccia zone has a strike of 80° , different from that of the dyke and shear zone. It has been traced for more than 700 feet across the summit of a mountain more than 7000 feet in elevation. Part of this length on the east lies on mineral property belonging to Davis-Keays Mining Limited. Its westerly extension is obscured by rubble. The breccia zone appears to average about 23 feet in width. Partly oxidized chip samples were obtained across 6 feet, the remainder being frozen rubble and ice. Average copper content across the 6 feet sampled is 2.4 per cent. Chip samples obtained in 1969 after blasting to obtain fresher material contained more than 4.5 per cent copper in another part of the breccia zone.

The favorable, but complex geological structures on the Bob Group, including persistent copper-bearing veins in a shear zone which intersects a copper-bearing breccia more than 20 feet wide, warrant further work. The westerly extension of the breccia zone on the steep northerly-facing slope covered with permanently frozen rubble should be trenched or drilled or both, depending on the ease of access to suitable sites for trenching or drilling.

The presence of copper-bearing float in several places on the Mad Group warrants systematic prospecting, trenching on some of the Rim claims, sampling, and geological mapping.

Respectfully submitted,

G. A. Van Dyck

G. A. Van Dyck, B.Sc.

L. B. Halferdahl

L. B. Halferdahl, Ph.D., P. ENGINEER



Expiry Date: August 5, 1972

Edmonton, Alberta
October 15, 1971

REFERENCES

- Adamson, R.S. (1971) - Summary report Ram Creek property, Toad River, B.C.; Dolmage-Campbell & Associates, Vancouver, 15 p, unpublished.
- Bell, R.T. (1968) - Proterozoic stratigraphy of northeastern British Columbia; Geol. Surv. Can. Paper 67-68, 75 p.
- Campbell, D.D. and McCandless, R.G. (1969) - Geology of the Yedhe Creek property, Ft. Nelson, B.C.; Dolmage-Campbell & Associates, Vancouver, 12 p, 1 map, unpublished.
- Carr, J.M. (1970) - Geology of the Churchill copper deposit, in Technical Papers Fall Meeting, South Central Branch, B.C., CIMM, held at Kamloops, B.C., pp. 63-75.
- Halferdahl, L.B. (1971) - Bob, Rim and Mad Claims, Toad River area, Liard Mining Division, British Columbia; L.B. Halferdahl & Associates Ltd., Edmonton, 12 p, unpublished.
- Anonymous (1971) - Davis-Keays Mining studying plans for production; Northern Miner v. 57, no. 17, p. 3, July 15.

CERTIFICATE

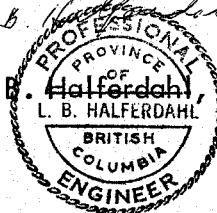
I, Laurence B. Halferdahl, with business and residence addresses in Edmonton, Alberta, do hereby certify that

1. I am a licensed Professional Geologist in the Province of Alberta and a licensed Professional Engineer in the Province of British Columbia.
2. I am a graduate of Queen's University, Kingston, Ontario (B.Sc. in 1952 and M.Sc. in 1954 in Geological Sciences in the Faculty of Applied Science) and of The Johns Hopkins University, Baltimore, Maryland (Ph.D. in 1959 in the Department of Geology).
3. From 1957 to 1969 I was on the staff of the Research Council of Alberta as a mineralogist and geologist where I was in charge of the mineralogy laboratory and conducted various field and laboratory investigations.
4. Since 1969 I have been a consulting geological engineer conducting and directing property examinations and evaluations, and exploration programs for metallic minerals, industrial minerals, and coal.
5. The data in this report were obtained from published and unpublished reports, from G.A. Van Dyck's examination and supervision of the work on the property from August 18 to September 10, 1971, and from my examination of the property July 22-24, August 18-20, and September 5-7, 1971.

Respectfully submitted,

Edmonton, Alberta
October 15, 1971

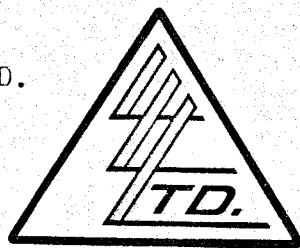
L. B. Halferdahl
L. B. Halferdahl, Ph.D., P. Eng.



Expiry Date: August 5, 1978

APPENDIX 1: CERTIFICATES OF ASSAY

To: L. B. HALFERDAHL & ASSOCIATES LTD.
 401 Northgate Bldg.,
 10049 Jasper Ave.,
 Edmonton 15, Alberta.



File No. 4589
 Date September 21st 1971
 Samples Chip

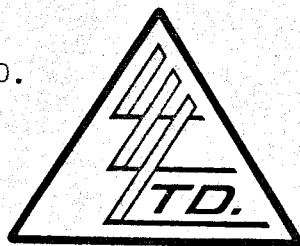
Certificate of
 ASSAY of
 LORING LABORATORIES LTD.

SAMPLE No.	Cu %
001	.06
002	2.79
003	.44
004	.08
005	.22

I Hereby Certify THAT THE ABOVE RESULTS ARE THOSE
 ASSAYS MADE BY ME UPON THE HEREIN DESCRIBED SAMPLES

Rejects Retained one month.
 Pulps Retained one month
 unless specific arrangements
 made in advance.

A. L. M. S. J. A. W.
 Licensed Assayer of British Columbia

To: L. B. HALFERDAHL & ASSOCIATES LTD.401 Northgate Bldg.,10049 Jasper Ave.,EDMONTON 15, Alberta.File No. 4532Date September 7th 1971Samples Chips

Certificate of
ASSAY of

LORING LABORATORIES LTD.

SAMPLE No.	Cu %
006	.64
007	.02
008	2.23
009	.16
010	1.01
011	1.80
012	.05
013	.03
014	.07
015	.30
016	.09
017	1.15
018	3.67

I Hereby Certify THAT THE ABOVE RESULTS ARE THOSE
ASSAYS MADE BY ME UPON THE HEREIN DESCRIBED SAMPLES

Rejects Retained one month.

Pulps Retained one month
unless specific arrangements
made in advance.

C. L. M. S. Isaac

Licensed Assayer of British Columbia

APPENDIX 2: FIELD CREW

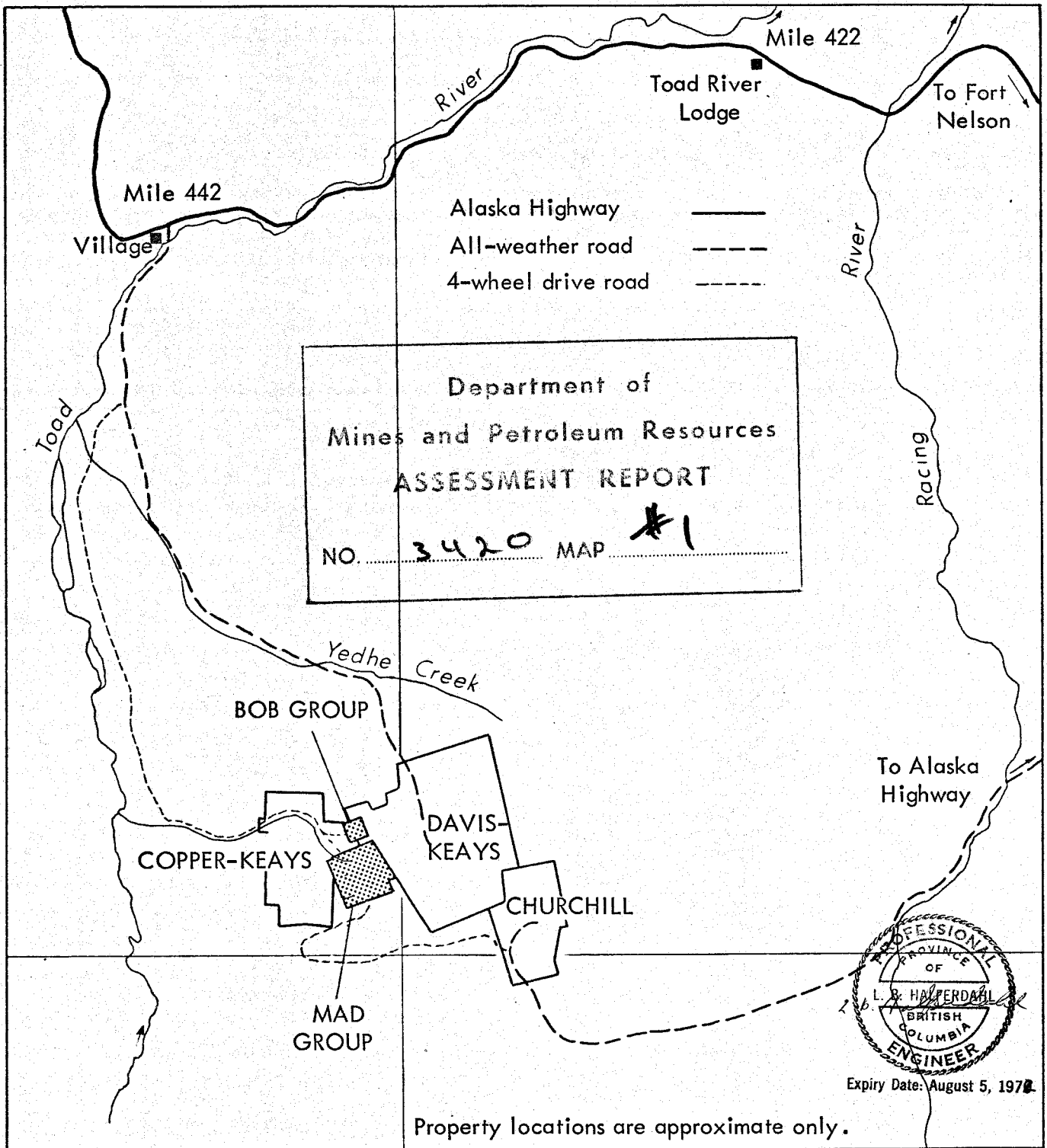
R. Bacon	Assistant	August 20 - September 3
J. Fitzgerald	Supervisor	July 9 - 13
B. Fowler	Assistant	July 30 - August 2
E. Fowler	Engineer	July 30 - August 2
J. Gorham	Assistant	August 7 - September 12
L. Halferdahl	Geologist	July 21 - 25 August 13 - 20 September 4 - 7
F. Nichols	Assistant	August 7 - September 3
G. Van Dyck	Geologist	August 13 - September 12

The dates above include mobilization and demobilization.

In addition to the above men on the staff of L. B. Halferdahl & Associates Ltd., Alberta Copper and Resources Ltd. employed two men:

R. Erickson	Foreman	July 4 - August 12
P. Petersen	Cook	July 4 - September 4

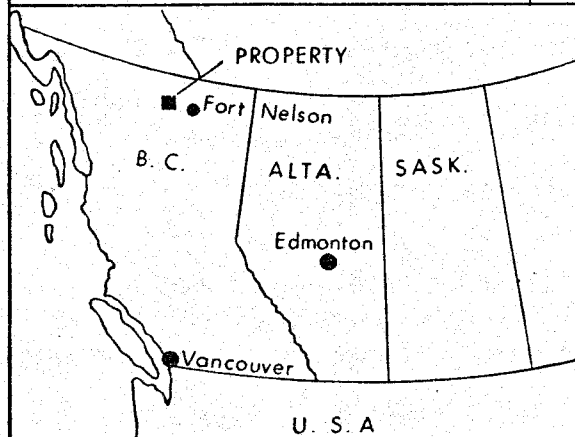
The work on the roads and trenching involving bulldozers was contracted to construction firms based in Fort Nelson.



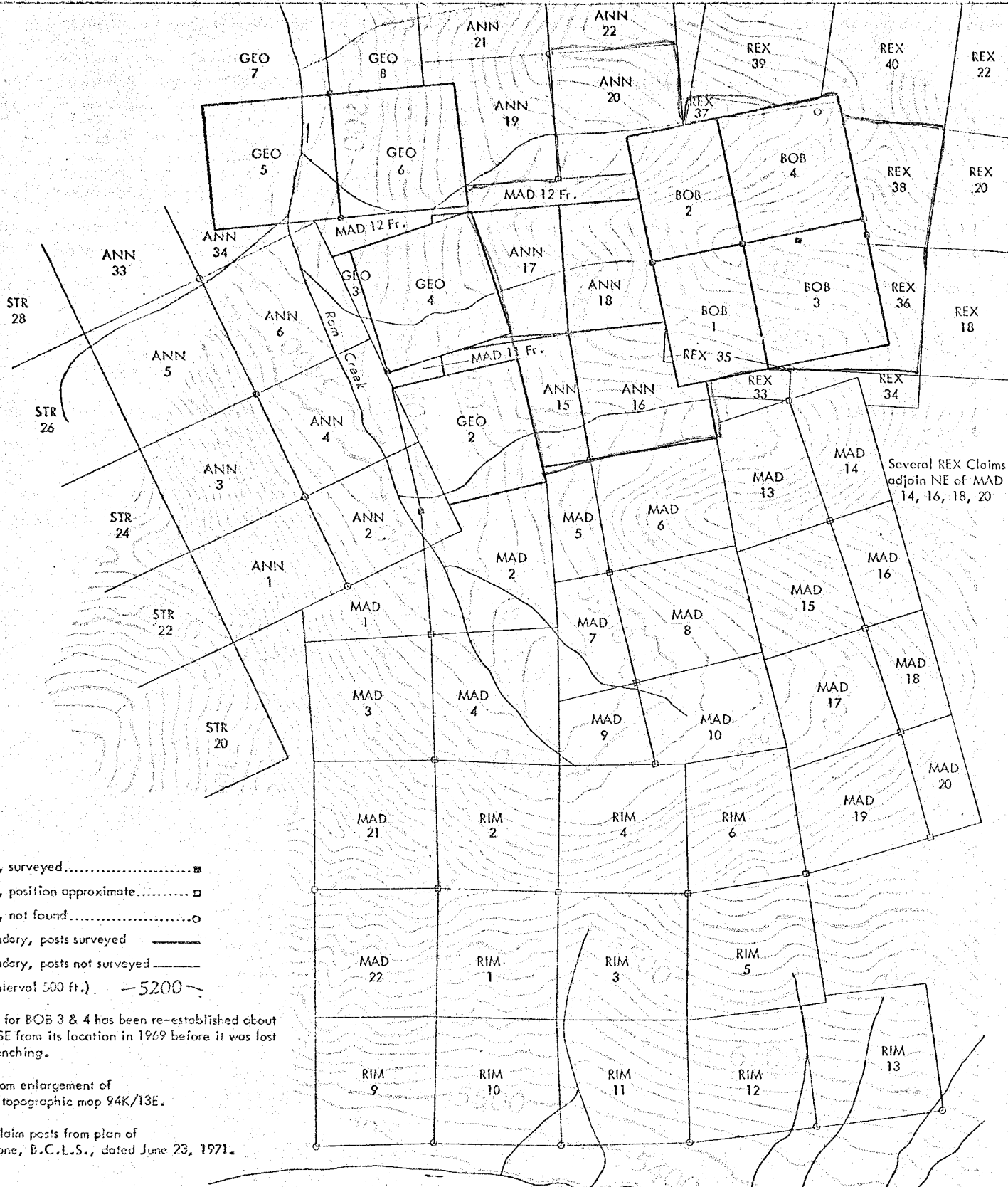
PROFESSIONAL
 ENGINEER
 L. B. HALFERDAHL
 BRITISH COLUMBIA
 2677

Expiry Date: August 5, 1978.

Property locations are approximate only.



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Fig. 1: Location Map	
RAM CREEK PROPERTY	
 SCALE IN MILES	
Drawn: LBH	October 1971

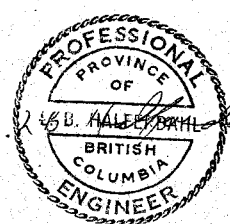


- Claim post, surveyed.....■
- Claim post, position approximate.....□
- Claim post, not found.....○
- Claim boundary, posts surveyed ————
- Claim boundary, posts not surveyed - - - -
- Contour (interval 500 ft.) - 5200 -

No. 1 Post for BOB 3 & 4 has been re-established about 300 feet SE from its location in 1969 before it was lost during trenching.

Contours from enlargement of 1:50,000 topographic map 94K/13E.

Surveyed claim posts from plan of K. Rathbone, B.C.L.S., dated June 23, 1971.



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NO. 3420 MAP #2

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Fig. 2: Claim Locations
RAM CREEK PROPERTY

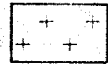
1000 0 1000 2000
SCALE IN FEET

Drawn: LBH October 1971

LEGEND FOR FIGURES 5 TO 14



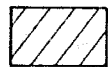
Breccia



Diabase



Mudstone, silty mudstone, siltstone



Dolomite



Quartz carbonate rock

Vein v

Shearing s

Shear zone

Fault with dip
81°

Geological contact with dip
75°

Strike and dip of beds
23°

Strike and dip of cleavage
45°

Strike and dip of joints - inclined ...
- vertical ...
40°

Per cent copper - width of sample in feet ... 3.67 - 3'

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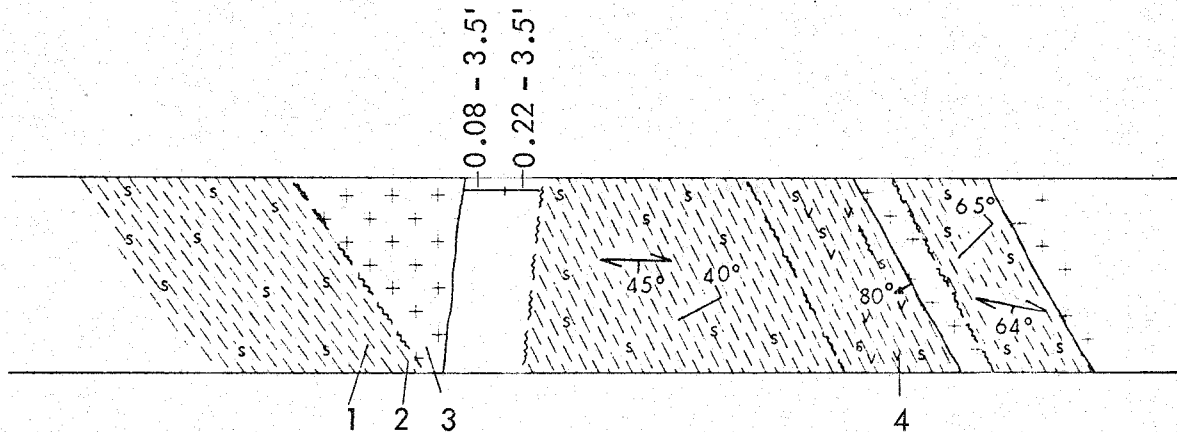
NO. 3420 MAP #3

338°

158°



SECTION



PLAN



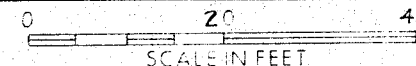
Expiry Date: August 5, 1972

1. Shear planes are parallel to contact and most pronounced at dyke contact.
2. 6" shear zone with chalcopryrite in minor veins.
3. Joints are parallel to contact; minor gash fractures with quartz veins.
4. Quartz-carbonite veins are folded, faulted, and sheared, and have a maximum thickness of 6".

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Fig. 5 Trench 1 - Bob Group
RAM CREEK PROPERTY



SCALE IN FEET

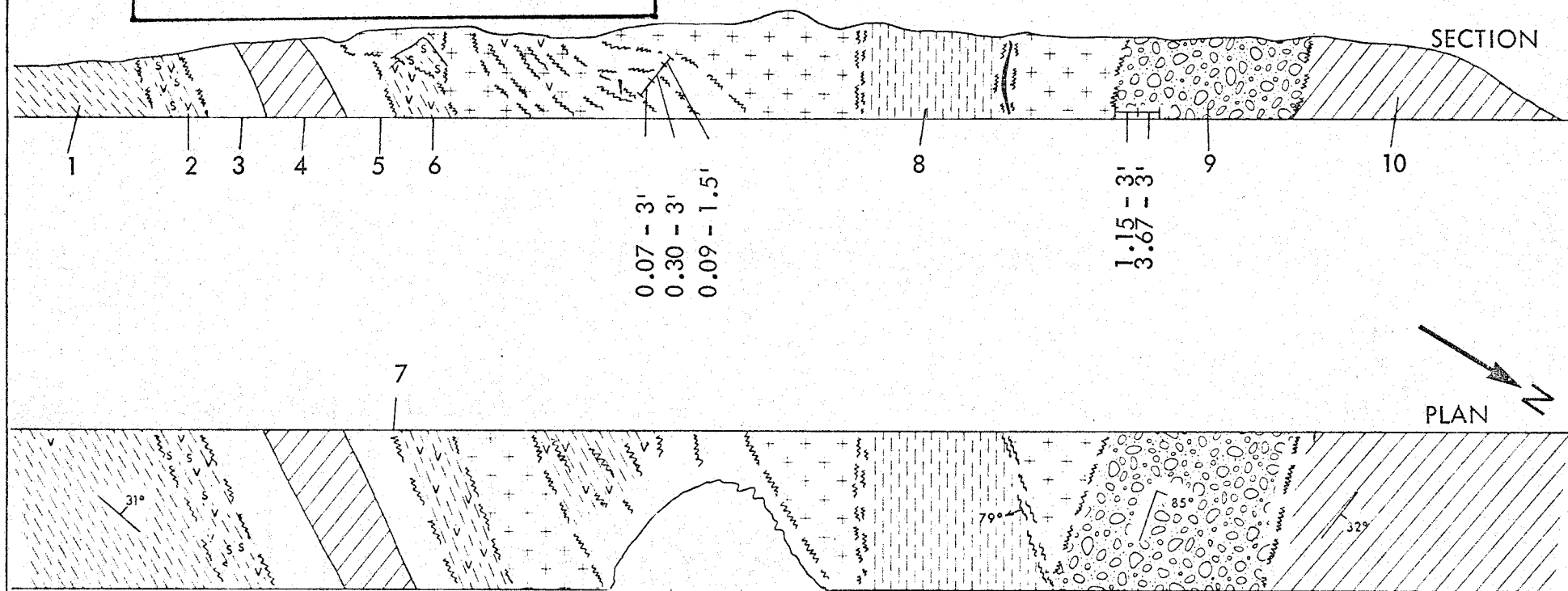
Drawn: GVD

October 1971

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 NO. 3420 MAP #4

150°

330°



0.07 - 3'
 0.30 - 3'
 0.09 - 1.5'

1.15 - 3'
 3.67 - 3'

1. With interbedded dolomite.
2. With contorted broken dolomite beds, 3" thick.
3. With fragments of dolomite and mudstone.
4. Thick bedded dolomite with interbedded mudstone up to 1'.
5. With mudstone inclusions and partings.
6. Veins 1" to 10" thick.
7. Rusty shear.
8. Baked; strongly jointed.
9. Ice and rubble prevented sampling of rest of breccia.
10. Stromatolitic; beds 2' thick.

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 OF
 BRITISH
 COLUMBIA
 ENGINEER
 L.B. HALFERDAHL
 Expiry Date: August 5, 1978

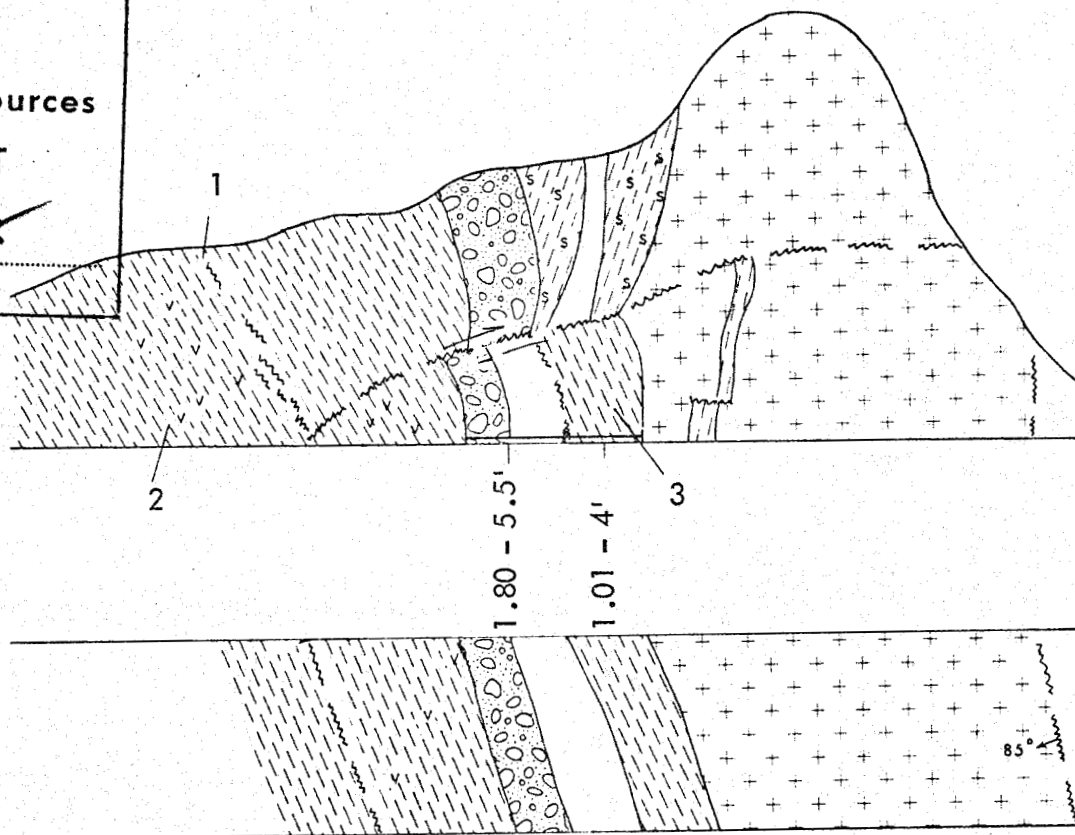
ALBERTA COPPER & RESOURCES LTD.	
L.B. HALFERDAHL & ASSOCIATES LTD. EDMONTON, ALBERTA	
Fig. 6 Trench 2 - Bob Group RAM CREEK PROPERTY	
<p>SCALE IN FEET</p>	
Drawn: GVD	October 1971

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NO. 3420 MAP #5

347°

167°



SECTION

PLAN

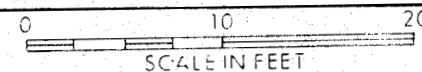
1. Disseminated chalcopyrite in veins in shear zone.
2. Contorted.
3. Baked.



Expiry Date: August 5, 1972.

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Fig. 7 Trench 3 - Bob Group
RAM CREEK PROPERTY

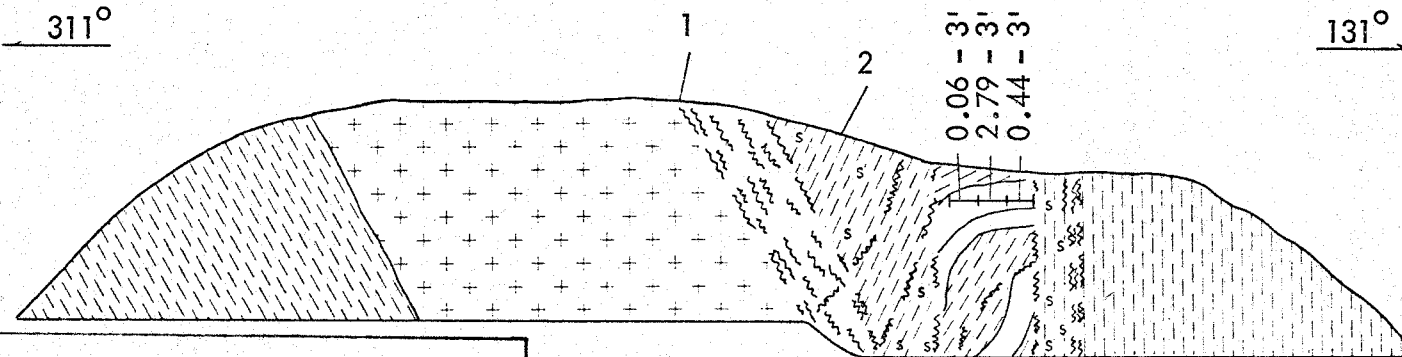


Drawn: GVD

October 1971

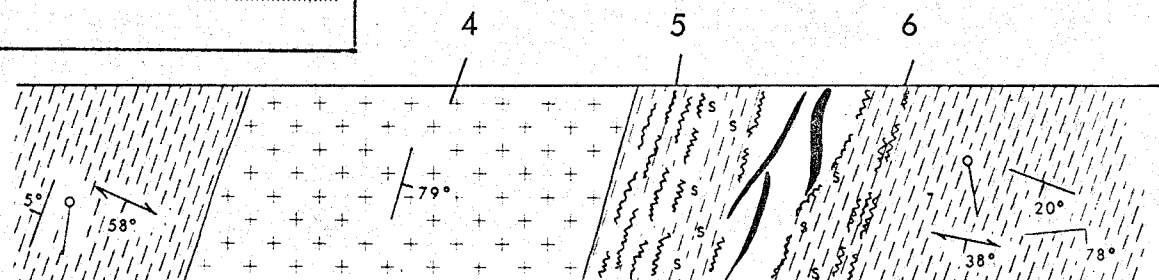
311°

131°



SECTION

Department of
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NO. 3420 MAP #6



PLAN

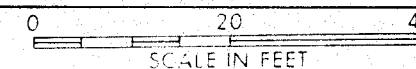
1. Sheared contact.
2. Contorted; rusty gouge along faults.
3. Malachite and azurite along shear zone.
4. Jointing in dyke subparallel and almost normal to contact.
5. Contorted mudstones; rusty gouge; small veins.
6. Gouge - 2'.

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Fig. 8 Trench 4 - Ann 18

RAM CREEK PROPERTY



Drawn: GVD

October 1971

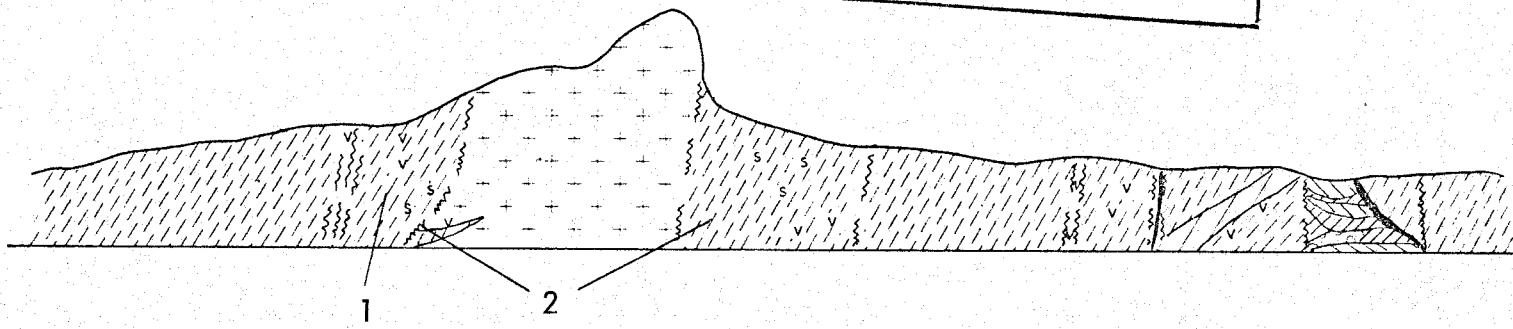


Expiry Date: August 5, 1972

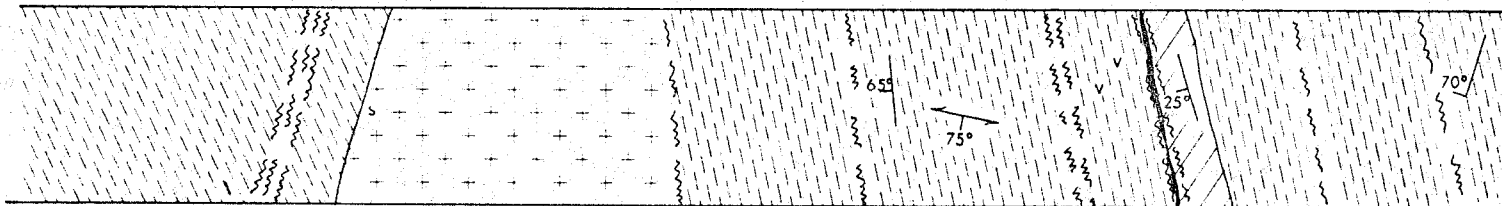
Department of
 Mines and Petroleum Resources
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 NO. 3420 MAP #7

316°

136°

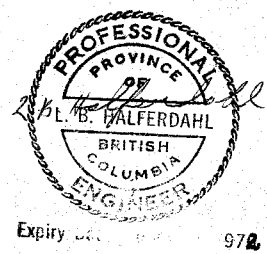


SECTION



PLAN

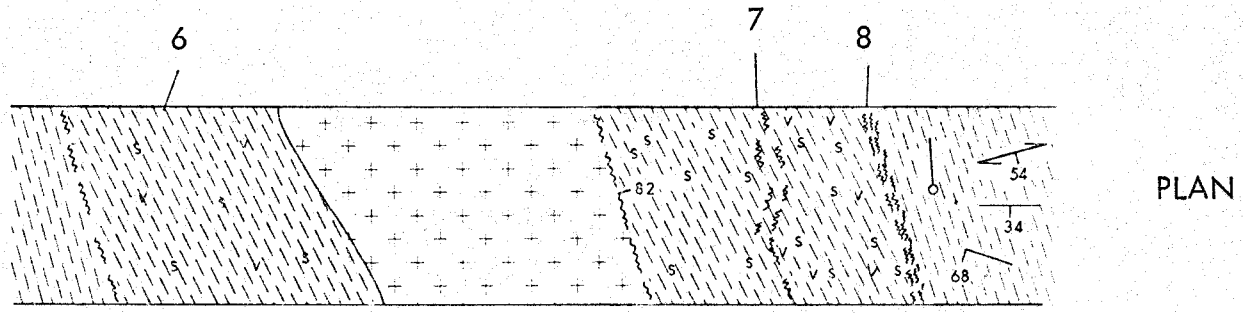
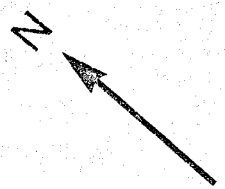
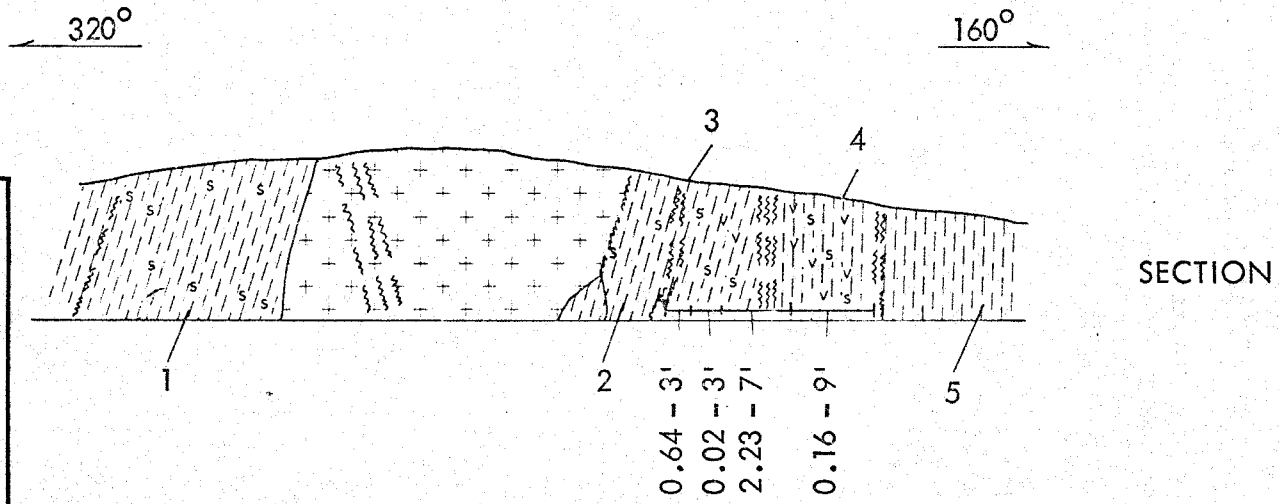
- 1. Indistinct malachite stains on shear planes.
- 2. Baked.



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Fig. 9 Trench 5 - Bob Group RAM CREEK PROPERTY
0 20 40 SCALE IN FEET
Drawn: GVD October 1971

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3420 MAP #8



1. Baked.
2. Altered dyke margin.
3. Disseminated chalcopryite.
4. Veins 1/4" - 4" with disseminated chalcopryite.
5. Interbedded limestone; beds 1" - 4".
6. Baked; minor chaicopryite in veins.
7. Vein 10" - 12".
8. Fault gauge 1'.



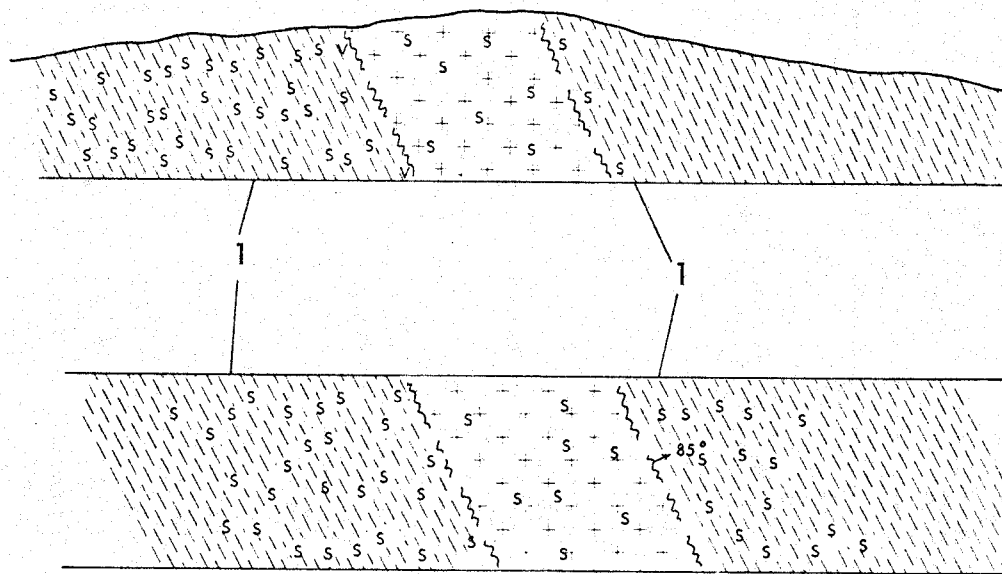
Expiry Date: August 5, 1972.

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Fig. 10 Trench 6 - Bob Group RAM CREEK PROPERTY
0 20 40 SCALE IN FEET
Drawn: GVD October 1971

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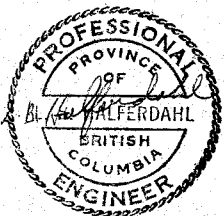
10°

190°



SECTION

PLAN



Expiry Date: August 5, 1978

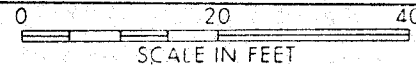
1. Strongly sheared; shear planes parallel dyke contact; no bedding visible.

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Fig. 11 Trench 1K - Ann 18

RAM CREEK PROPERTY

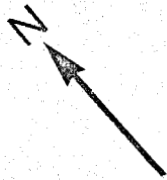


Drawn: GVD

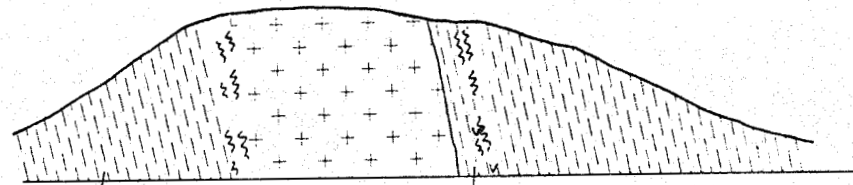
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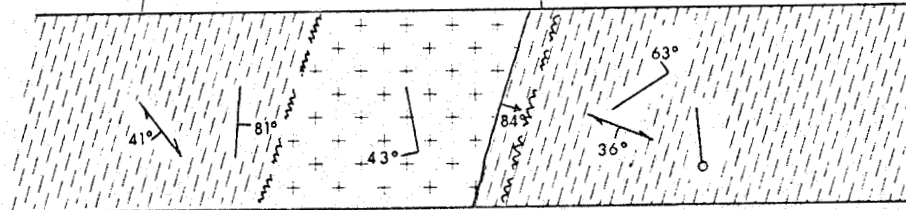
NO. 3420 M.P. #10



310° 130°



SECTION



PLAN



Expiry Date: August 5, 1972.

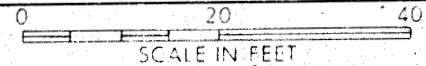
1. Fine laminated; interbedded with limestone.
2. Baked.

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Fig. 12 Trench 2K - Ann 18

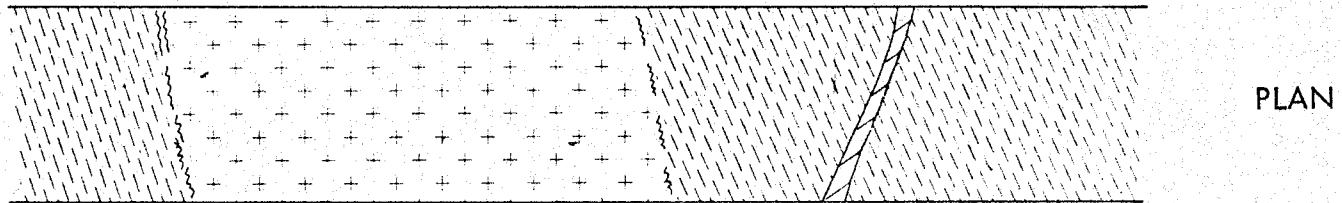
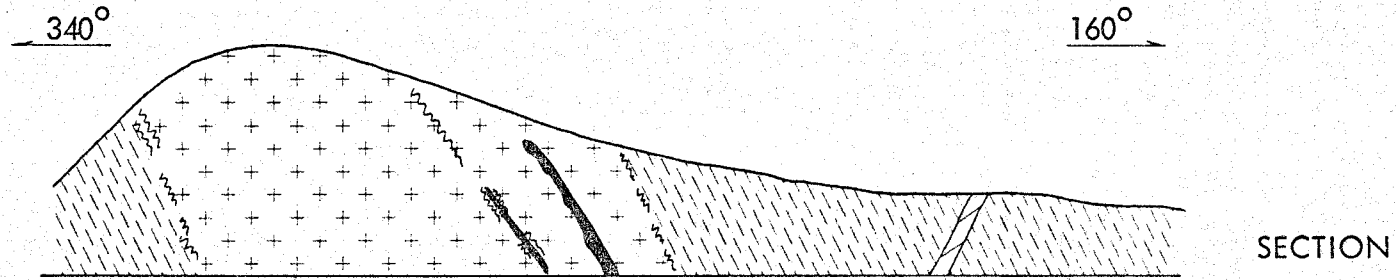
RAM CREEK PROPERTY



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NO. 3420 MAP # 11

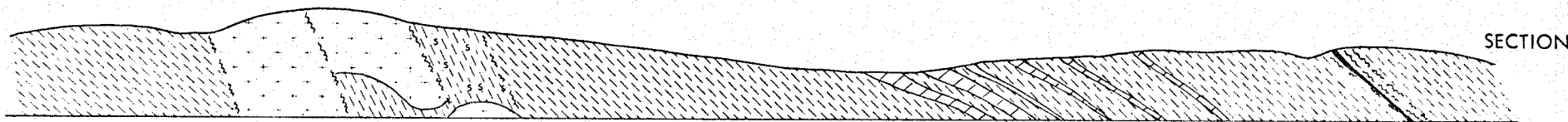


Expiry Date: August 5, 1978

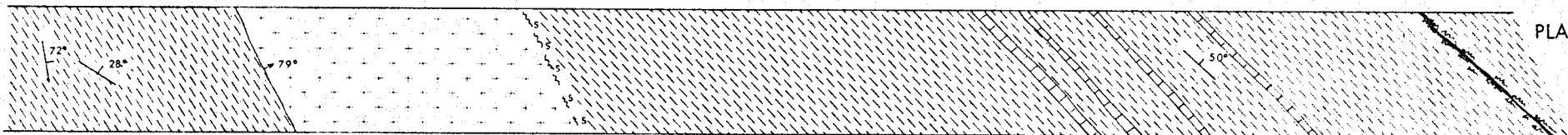
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Fig. 13 Trench 3K - Ann 18 RAM CREEK PROPERTY
0 20 40 SCALE IN FEET
Drawn: GVD October 1971

75°

250°

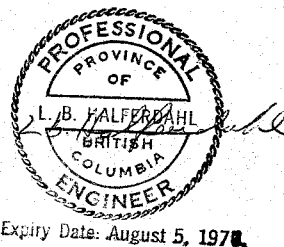


SECTION



PLAN

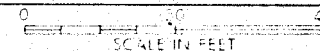
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Fig. 14 Trench - Mad 9
 RAM CREEK PROPERTY



Drawn: GVD

October 1971

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Fig. 3 Access Roads

RAM CREEK PROPERTY



DRAWN: L.B.H.

OCT 1971

To accompany geological report by L. B. Halferdahl, Ph.D.,
P. Eng., and G.A. Van Dyck, B.Sc., on the Bob, Rim, and
Mad Claims, Toad River Area, Liard Mining Division, dated
October 15, 1971.

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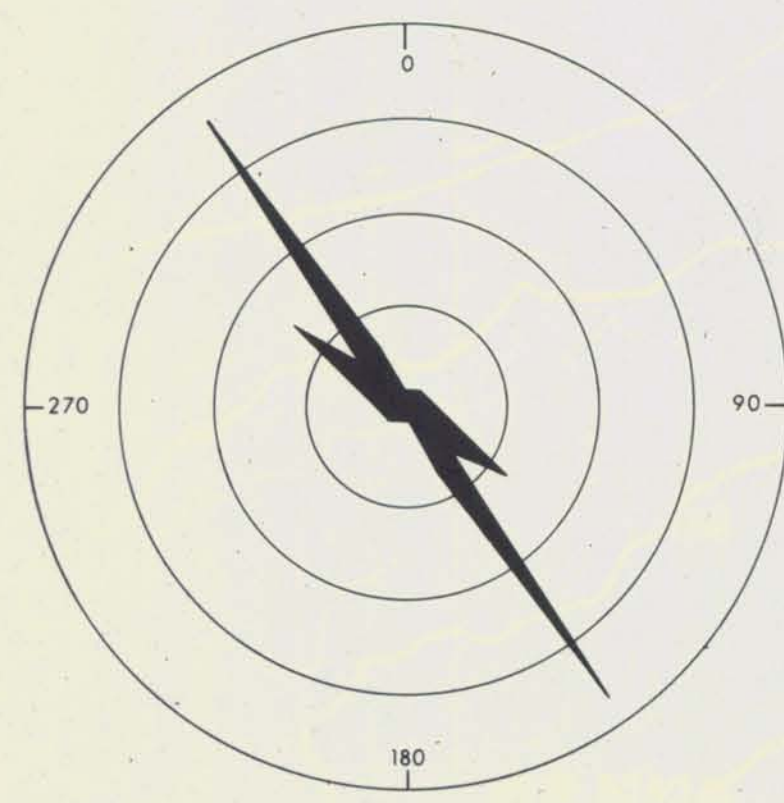
- All-weather gravel road
- 4-wheel drive road
- Contour (interval 500 ft.)

NTS topographic maps 94K, 94K/11W, 94K/12E,
94K/12W, 94K/13E, 94K/13W were used as
base maps.

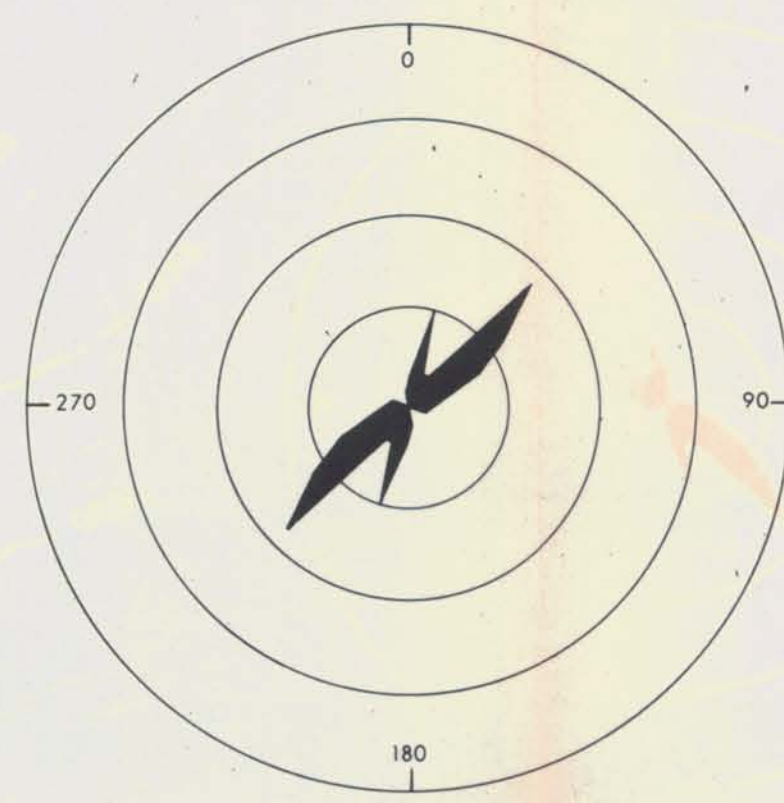
Locations of all-weather roads to Davis-Keays
camp, Churchill Mine, and 4-wheel drive road
from Churchill Mine to Wolf Creek are approximate.

Only selected contours are shown.





SLATY CLEAVAGE

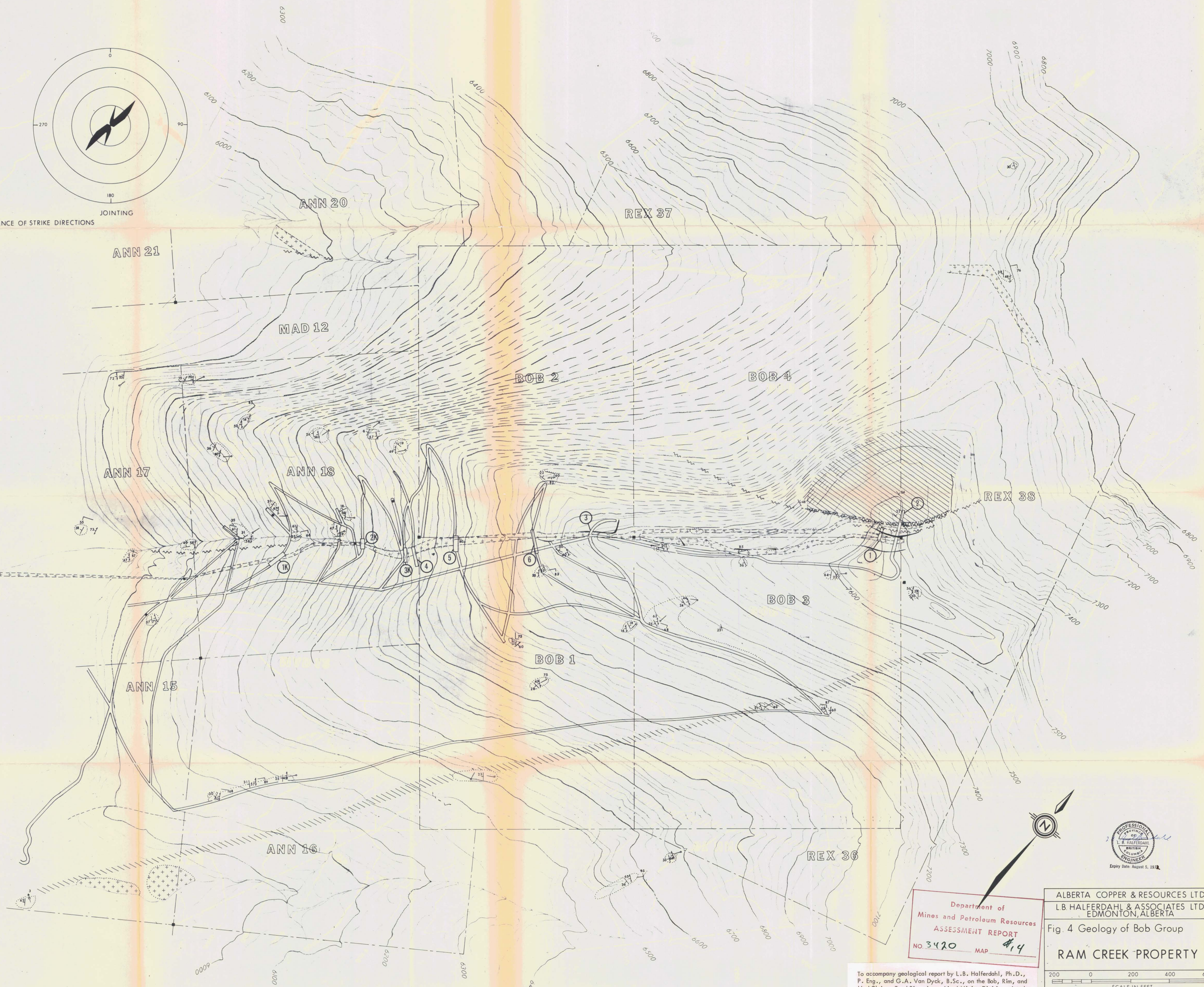


JOINTING

RELATIVE IMPORTANCE OF STRIKE DIRECTIONS

- LEGEND
- Dolomite
 - Diabase
 - Siltstone, mudstone, argillite
 - Breccia
 - Vein
 - Fault
 - Strike and dip of beds
 - Strike and dip of cleavage
 - Strike and dip of joints:
inclined
 - vertical
 - Anticline axis with plunge
 - Outcrop boundary
 - Geological contact, approximate
 - Road
 - Trench with number
 - Diamond drill hole, location approximate
(Drilling conducted for Copper-Keays
Mine Ltd., July and August 1971)
 - Claim post
 - Claim boundary
 - Claim name and number **BOB 2**
 - Contour (interval 20 ft.)

Contours drawn by photogrammetry from aerial photographs
A 11589 - 386-8, 1 in. = 2640 ft. approx., available
from the National Air Photo Library.



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NO. 3420 MAP #14

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EDMONTON, ALBERTA
Fig. 4 Geology of Bob Group
RAM CREEK PROPERTY

To accompany geological report by L.B. Halferdahl, Ph.D.,
P. Eng., and G.A. Van Dyck, B.Sc., on the Bob, Rim, and
Mad Claims, Toad River Area, Liard Mining Division, dated
October 15, 1971.

200 0 200 400 600
SCALE IN FEET
DRAWN: G.V.D. OCT 1971

