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HELICOPTER EXPLORATION CO. LTD.

Introduction:

The work done during the past field season was organized primarily as a prospecting effort with a view toward locating a mine or potential mine. Of secondary importance was the discovery of the relative merits of a helicopter as opposed to a conventional aircraft for this work.

The motivating idea for the work was, that the use of a helicopter would eliminate a large percentage of the time lost in the moving operations of conventional prospecting. This would permit a greater area to be prospected, which would, in turn, increase the chances of success.

In order to retain a true perspective of the value of the machine for the work, as well as the value of the work itself, it must be remembered that it was entirely experimental. There was no previously obtained knowledge from which to draw ideas or obtain suggestions. Preconceived ideas in some cases had to be discarded, and new ideas substituted. This was particularly true with respect to the physical operation of the work. The actual prospecting was to be done in the conventional manner.

Conclusions:

1. The metallic mineral discoveries made during the season are not of economic importance.

2. The chrysotile property, staked in the Atlin area, has a possible value to an asbestos company. This possibility is presently being investigated.

3. The helicopter is not a machine to be used in conjunction with a conventional prospecting scheme. The essence of the idea of

using a helicopter is speed and mobility of operation. In conventional prospecting a deposit is located and is developed on the spot. Therefore it can be seen that the two methods of operation are completely at cross purposes.

4. The machine is admirably suited to geological mapping, or a type of reconnaissance prospecting. The latter is a two year operation at least, as it is necessary to have a development crew to open up discoveries made by the reconnaissance crew. This can be modified somewhat so that one crew spends a certain period of time on reconnaissance and ends the season by detailed investigation of any discoveries made.

5. As a means of transport a helicopter is excellent for short hauls to difficult landing spots. It is not suited for work in isolated areas unless accompanied by a conventional aircraft with a longer flying range, and greater payload.

Aircraft:

The type of machine used by this Company is a Hiller 360. This has a conventional two-bladed rotar and is powered by a 178 H.P. Franklin motor. Instead of the usual wheels the machine was equipped with rubber, air-filled floats, suitable for landing on either land or water.

The rated lifting capacity of this machine is 600 lbs. This figure is somewhat confusing as it is calculated with the machine equipped with wheels, without doors or canopy and flying at sea level. The difference in weight between the floats and wheels is 105 lbs., and the weight of the doors and canopy is approximately 40 lbs; therefore the lifting capacity is immediately reduced by 145 lbs.

at sea level. The effect of higher elevations is an appreciable but undertermined factor. A further complication which arises when attempting to rate the lifting capacity, is the weather. The machine will take off and fly with much greater load on a day when there is a good steady breeze than it will on a dead calm day. For practical purposes the aircraft can be rated as having a minimum lifting capacity of 350 lbs. when equipped with floats, and operating at elevations in excess of 3000 ft. The maximum capacity is probably no more than 500 lbs.

The flying performance of the helicopter has indicated some advantages and some disadvantages as compared to a conventional aircraft. The two chief disadvantages are: (a) the short operational range, and (b) the small payload. The short operating range means that the machine cannot be used in isolated areas unless it is accompanied by another aircraft to ferry gasoline and supplies. This detriment can be somewhat obviated by the installation of a second fuel tank which almost doubles the gasoline load, but this correspondingly decreases the payload. The low payload is not so serious unless the machine is used for freighting. In our work the load was seldom more than 350 lbs. and no great difficulty was encountered in landing or taking off at elevations as high as 6300 ft. During reconnaissance work, with a load of 275 lbs. exclusive of the pilot, elevations of greater than 8500 ft. were reached.

During the season the helicopter was flown approximately 275 hours. Over that period of use the machine consumed slightly more than 10 gals. of gasoline and one-twelfth of a gallon of oil per hour. To eliminate possible time loss while awaiting replacements, a large inventory of spare parts was kept on board. Replacements were very few.

The total replacement cost up until the end of the season, that is before the general overhaul of the aircraft, was not more than $200.00. During the overhaul there will probably be an additional $400.00 worth of parts and service, to put the machine in condition to last another full season.

Personnel and Procedure:

Personnel of the operation consisted of four prospectors, one pilot, one aircraft engineer, one student geologist and one geologist. The original concept of an operating procedure was to have the helicopter transport one prospector and his outfit to a predetermined area. This area was sufficiently small for him to prospect it in three or four days. At the end of this time the prospector was to be moved to another area which he would prospect. The helicopter pilot would bring to base camp a sketch, and any notes and samples that the prospector had taken during his prospecting. The prospector would also be provided with a new topographic sketch of the area to which he was moving.

If mineral deposit was discovered, the prospector was to stake it, and locate it on his sketch. It was then geologized, mapped and sampled by one of the geologists.

The base topographic sketches were drawn by the student geologist, who also transposed the information supplied by the prospector, to a master plan. This left considerable time for the geologist to make property examinations and plan future prospecting.

This operating procedure had to be altered somewhat, because:

(a) The ground was being covered too quickly and not carefully enough.

(b) The geologist was not in close enough contact with the work and ideas of the prospectors.

(c) Bad weather could disrupt the entire schedule of operation.

The final plan of operation was for the geologist to make a reconnaissance survey of an area before any prospecting was done and make a rough geological sketch. This was given to the prospector and the points of interest were indicated. The prospector was then taken into the area and completed the detail. This usually involved a stay of a week to ten days.

A record of any samples taken was kept in a sample book showing the area, the name of the prospector, date, and a description of the sample. When the assays were received they were also marked in the book.

Areas Prospected:

Prospecting commenced on June 12th in the area to the north and east of the point where the Inklin River joins with the Nakina to form the Taku River. This is approximately 50 miles southeast of the town of Atlin, B. C. From this base, work proceeded along the Coast Range Intrusive for a distance of 35 miles to the northwest and 20 miles to the southeast. Forest fires prevented further prospecting southeasterly.

On June 30th, camp was moved to Atlin and prospecting continued in a northwesterly direction along the east contact of the Coast range to Warm Creek which flows into Fantail Lake. In addition, there was some 'spot Prospecting' done around small intrusive outliers to the east of Atlin.

On July 27th, operations were moved to the St. Elias range north of Alsek River. With the exception of a small area immediately

north of the junction of the Alsek and Kaskawulsh rivers, work was confined to a strip along the eastern border of the St. Elias Range, and including the outlying plugs and bosses, which presumably had the same origin as the St. Elias mountains.

On August 27th, because of extremely difficult operating weather, the crew was returned to Atlin to complete the work in that area.

The helicopter left Atlin to return south, on September 16th.

The season was completed by doing a small amount of development work on two properties which did not prove to be worthwhile.

Results of Prospecting:

Nakina River:

The Nakina-Inklin River area is underlain by an old (early Paleozoic) series of sedimentary rocks that have been intruded by small stocks and plugs of diorite, pyroxenite and peridotite. The latter are intimately associated with basic volcanic flows and tuff beds. The intrusives, particularly the more basic types, are characteristically altered to serpentine with a consequent deposition of iron oxide which forms a distinctive mantle of gossan over much of the area. The gossan is not confined to the areas that are immediately underlain by the intrusive however, but has been moved so that now most of the volcanic, and some of the sedimentary rocks appear, on the surface, as rusty outcrop.

Wide northwest-southeasterly trending carbonated shears strike across the area to the northwest of the Nakina River. These are characteristically rusty weathering due to the presence of minor amounts of pyrite, and contain numerous lenticular bull quartz and narrow magnesite veins.

No metallic minerals of consequence were located in the vicinity of either pyroxenite or peridotite. One showing which contained some copper (chalcopyrite) with minor amounts of gold and nickel, was staked around the contact of a small diorite plug (see map "Echo" claims).

Samples of surface material, which was somewhat oxidized, from this deposit, gave the following assays:

Description:	Au.	Ag.	Cu.	Ni.	Pt.
1. Massive pyrrhotite	.08	.60	.25	.10	Nil
2. Pyrrhotite with some chalcopyrite	.04	.24	3.00	.19	

The mapping of this property indicated that the mineralization is associated with a diorite plug with maximum dimensions of 80 x 350 ft., most of which area was interpolated from talus. It is probable that the plug will increase in size with depth, but in my opinion, the grade of mineralization is too low to warrant further development at the present time.

Atlin Area:

The Atlin area is underlain by rocks similar to those found in the Nakina River area. Old sediments and volcanics have been intruded by basic and ultrabasic stocks and plugs, as well as relatively small granite outliers of the Coast Range Instrusive. Small remnants of a

series of Tertiary volcanics, containing no metallic minerals obscured potentially favourable prospecting ground.

In the vicinity of Consolation, Boulder and Fourth of July Creeks, east of Atlin, there are metallic mineral deposits associated with the granite itself or apophoses of the granite.

Consolation Creek:

In the Consolation Creek area a bed of crystallized limestone is overlain by a dense acidic volcanic flow rock and underlain by coarse granitic intrusive. The volcanics and the limestones are in the form of a roof pendant, with a surface exposure which is 2400 ft. long by 1200 ft. wide, and has a vertical extent of plus 500 ft. The limestone is exposed on the south side of the pendant and has a surface exposure of 1200 ft. by 500 ft., and a vertical extent of 200 ft. Surrounding the above rocks, are various phases of acidic intrusive in the form of quartz porphyry, feldspar porphyry, and true granite.

At two points along the west contact of the limestone with the intrusive, which is quartz porphyry at this point, there are concentrations of sulphide (galena, sphalerite, pyrite and chalcopyrite) and magnetite. Between the two exposures, which are 350 ft. apart, there is a heavy mantle of talus overburden. (See sketch).

Assays of three chip samples across these exposures gave the following assays:

Description:	Au.	Ag.	Pb.	Zn.	Cu.
Across 13' of imperfectly exposed sulphide (Zone A)	TR.	4.65	9.50	5.60	0.30
Across 4.5' of sulphide sulphide principally sphalerite (Zone A)	TR	5.60	3.50	13.00	1.50
Across 4.5' from bottom exposure (Zone B)	.02	7.05	6.70	16.60	1.30

A minimum of trenching proved that there was no connection between Zones A and B. They are confined to shears and only extend plus or minus 20 ft. away from the limestone-quartz porphyry contact (See Sketches).

No further work is contemplated on this property.

Boulder Mountain:

On Boulder Mountain, the old sediments consisting of slates and limestone have been intruded by peridotite and pyroxenite. Later an outlier of coarse pegmatitic granite intruded both of the pre-existing formations.

Associated with, and in some cases enclosed within the granite, are several quartz veins. The veins are erratically mineralized with pyrite, wolframite and argentiferous tetrahedrite.

One of these veins, which follows along the contact of the granite and the sediments, was cleaned up and systematically sampled. The assay returns did not indicate commercial values (see sketch).

Fourth of July Creek:

The area around Fourth of July creek is underlain by coarse granite, which is traversed by a system of basic lamprophyre dikes. Prospecting in this area disclosed no deposit of economic importance.

Atlin-Ruffner Mine:

An attempt was made to examine the Atlin-Ruffner mine. This was found to be impossible without expending a great deal of time and money as the old surface trenches are all sloughed and the adits are ice-filled. An examination of the dumps established the fact that a large amount of underground work was completed.

Unless all the ore encountered was shipped, the ratio of ore to waste is extremely low, as there is practically no ore to be seen at the present time.

Chrysotile Asbestos - Monarch Mountain.

On Monarch Mountain, 5 miles southeast of Atlin, chrysotile asbestos is found associacted with ultrabasic intrusives. The deposit projects as a high hill to an elevation of 4500 feet, 1000 ft. above the immediately surrounding country.

The intrusive rock is, in many places, hidden by remnants of overlying basic volcanic flows. Where it can be observed it is seen to be intensely altered and serpentinized. Associated with the serpentinization is a complex fracture system on which cross fracture chrysotile has formed. The length of the fibre is short, seldom exceeding one-eighth of an inch, but the fractures are numerous and widespread.

The commercial importance of this deposit has not yet been established, but investigations are proceeding toward that end at the present time. Twelve claims were staked on this deposit and six on a similar, but lower grade deposit, located on the east fork of Ruby Creek, which flows into Surprise Lake.

St. Elias Range.

The portion of the St. Elias Range investigated was a strip approximately 20 miles wide, extending from the junction of the Kaskawulsh and Alsek rivers on the south, to Wolf Glacier on the north. Due to the extremely rugged nature of the terrain, prospecting, in most cases, was confined to a minute examination of the glacial rubble which can be traced up the glaciers to the source.

Where there were no glaciers, investigation consisted of an examination of creek beds and talus slopes.

The above mentioned area lies between the St. Elias range,(which is granitic,)on the west, and the northern extremity of the Coast Range granodiorite, on the east. Between the two intrusives is an area underlain by sediments and volcanics ranging in age from Pre-Cambrian to Tertiary, which have been intruded by small stocks and plugs of peridotite and dunite as well as outliers of the two later intrusives. The eastern boundary of these rocks is formed by a strong northwesterly-southeasterly trending fault extending from Dezadeash Lake on the south, to a point well north of the area investigated.

A prominent characteristic of the above rocks is the rusty weathering which gives the appearance of gossans but which is merely an iron oxide film produced by the presence of small quantities of pyrite in the rocks.

There are a great many narrow quartz veins which generally crosscut the general strike of the formations. Panning and selective sampling indicated that most of these are completely barren. One 6" vein, located in the sediments immediately north of the Alsek River gave the following assay:

Description:	Au.	Ag.	Cu.	Pb.
Quartz with tetrahedrite and galena	.12	132.10	6.70	3.80

This vein is less than 100 ft. in length and is considered to be only of academic importance.

In general, the results of the St. Elias work were disappointing. The general geology of the area is good, but metallic mineralization appears to be lacking. Of the total area covered, only the portion between Kluane and Wolf Glaciers is considered to be worthy of further consideration, and it is of doubtful merit.

Recommendations:

The following recommendations are made with the assumption that the Company will continue to use a helicopter for exploration.

(a) Preparatory Work:

1. Institute a detailed research of aerial photographs, geologic and topographic maps, and any literature or other available information of all possible prospecting areas prior to making a decision as to where to conduct the work.
2. Outline a detailed itinerary of prospecting, using aerial photographs.
3. Prepare base topographic maps, on a scale of 1 inch to 1/2 mile for Field use. All previously known mineral occurrences should be indicated on these maps.
4. Spend time enough screening possible prospectors so that only those most qualified are employed.

(b) Operating Procedure:

1. Instead of having a pilot and an engineer, employ a pilot-engineer to both service and fly the aircraft. He can be assisted by a general handy man who can also

be available for other odd jobs.

2. Employ six rather than four prospectors. This would allow for six one-man or three two-man parties. In some cases it is preferable to have a two-man party spend a greater length of time in an area than to have it investigated by one man only.

3. The necessary gasoline and supply caches should be made with a conventional aircraft at the beginning of the season. In addition, a small two-passenger aircraft should be kept on hand for emergencies, ferrying, and long distance reconnaissance.

4. Organize the work so that the latter part of the season, that is the end of September until freeze-up, can be used developing discoveries made during the season.

5. A detailed diary should be kept by the head of the party. If kept in a looseleaf binder this can be used as a form of weekly progress report. If such is done it should have accompanying maps for the sake of clarity.

Respectfully submitted,

D. M. Cannon

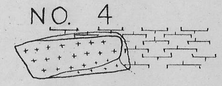
D. M. Cannon

Vancouver, B. C.
October 30, 1950

NO. 5 Coarsely crystalline limestone

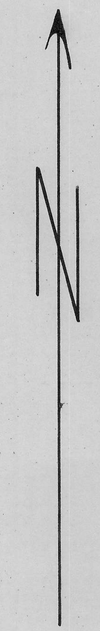
ZONE "B"

NO. 4



Garnetite above sulphides

Heavy talus



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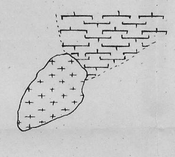
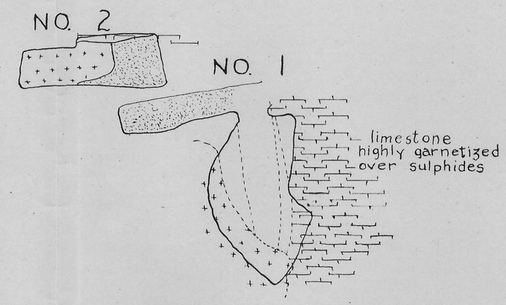


Talus overburden

between outcrops

NO. 2

NO. 1



limestone highly garnetized over sulphides

ZONE "A"

unaltered limestone float

CONSOLATION CREEK

SCALE 1 IN = 20 FT

Date Sept 1950