Box 13

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114-P-12

REPORT

ON

ALSEK PROSPECTING

1958 SEASON

NORTHWEST B.C.
YUKON and ALASKA

~~XXMINING DIVISIONXX~~

James J. McDougall
Geologist

~~XENGINEERXX~~ ENGINEER

14287

File #3306

December 3rd, 1958

A. J. Anderson, President,
Frobisher Limited,
2810 - 25 King Street West,
Toronto 1, Ont.

Dear Allan: Re: Alsek Prospecting

Enclosed are two copies of report by Jim McDougall covering our work in that area this summer. Jim has given a good general description of the area and our results. I would like to make the following comments -

Excepting along the south-west flank of the area, the country is not as rugged nor as inaccessible as you might gather from the pictures and report.

Aerial reconnaissance, using the Super-Cub planes, is an essential part of our method, but such reconnaissance should only take a small part of the time of the geologists and the pilot prospectors. With these planes one might spot in a few hours mineralized and geologically favourable areas that would take weeks to prospect and examine on the ground. Our pilots are first class prospectors and they realize this, and they would like to run down the showings that are spotted from the air while they are in a particular area. There is no good pin-pointing 50 favourable areas on the map in the course of a morning's airborne reconnaissance then leaving that area to go on to do the same 100 miles away.

A helicopter enables one to examine showings in a few minutes that might take days to reach if we had to walk in from the nearest float plane landing. Also, in such country, it is needed to place and service the ground prospectors.

Most of the discoveries we made this year were made by ground prospecting in areas where aerial reconnaissance indicated such prospecting, and were not made by direct spotting of the deposits from the air.

If there is another Kennecott in the area, it is probably in the rugged mountains between where we were working and the Alaska Coast. We should get all the information available on that area, and perhaps think in terms of a helicopter program on the Alaska side, i.e. closer to the Coast.

With best wishes.

Yours sincerely,

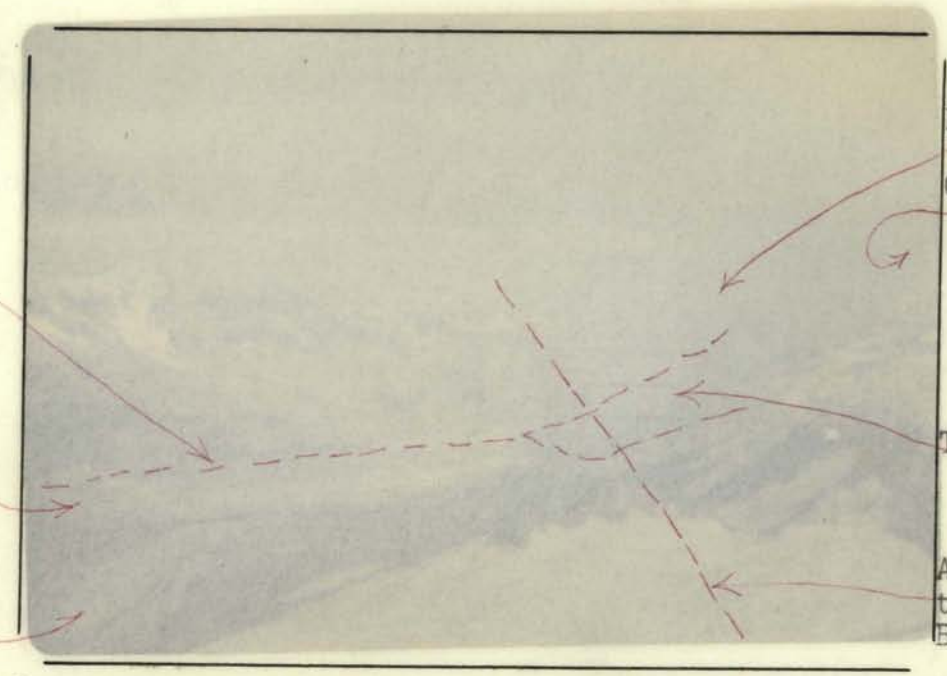
Alex Smith

AS/epg.
enclo.

Photo A-1

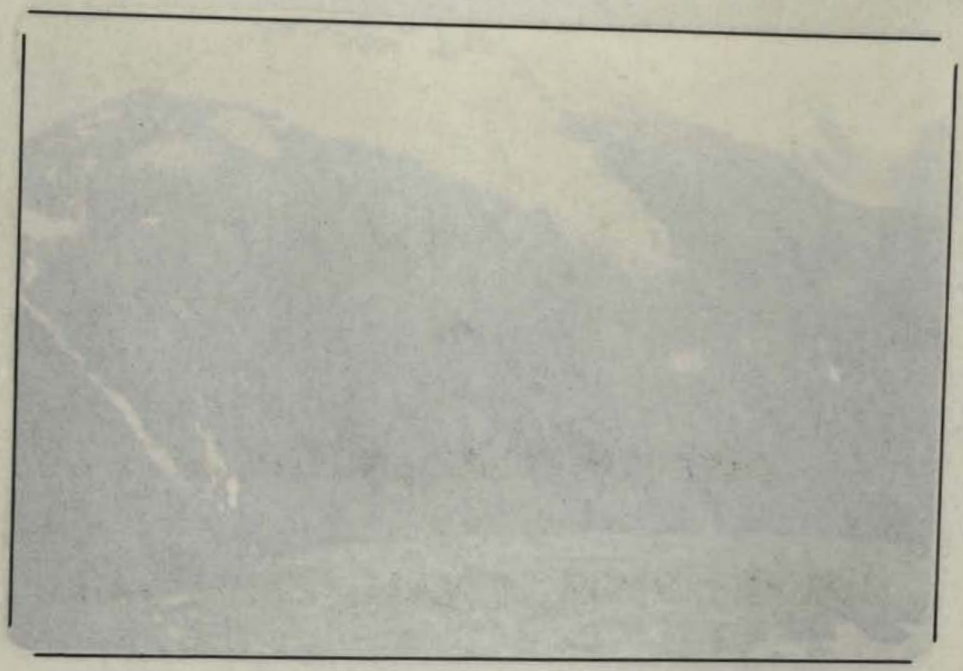
Looking south toward Mt. Fairweather (elev. 15,200') from head of Alsek Glacier.

Photo A-2



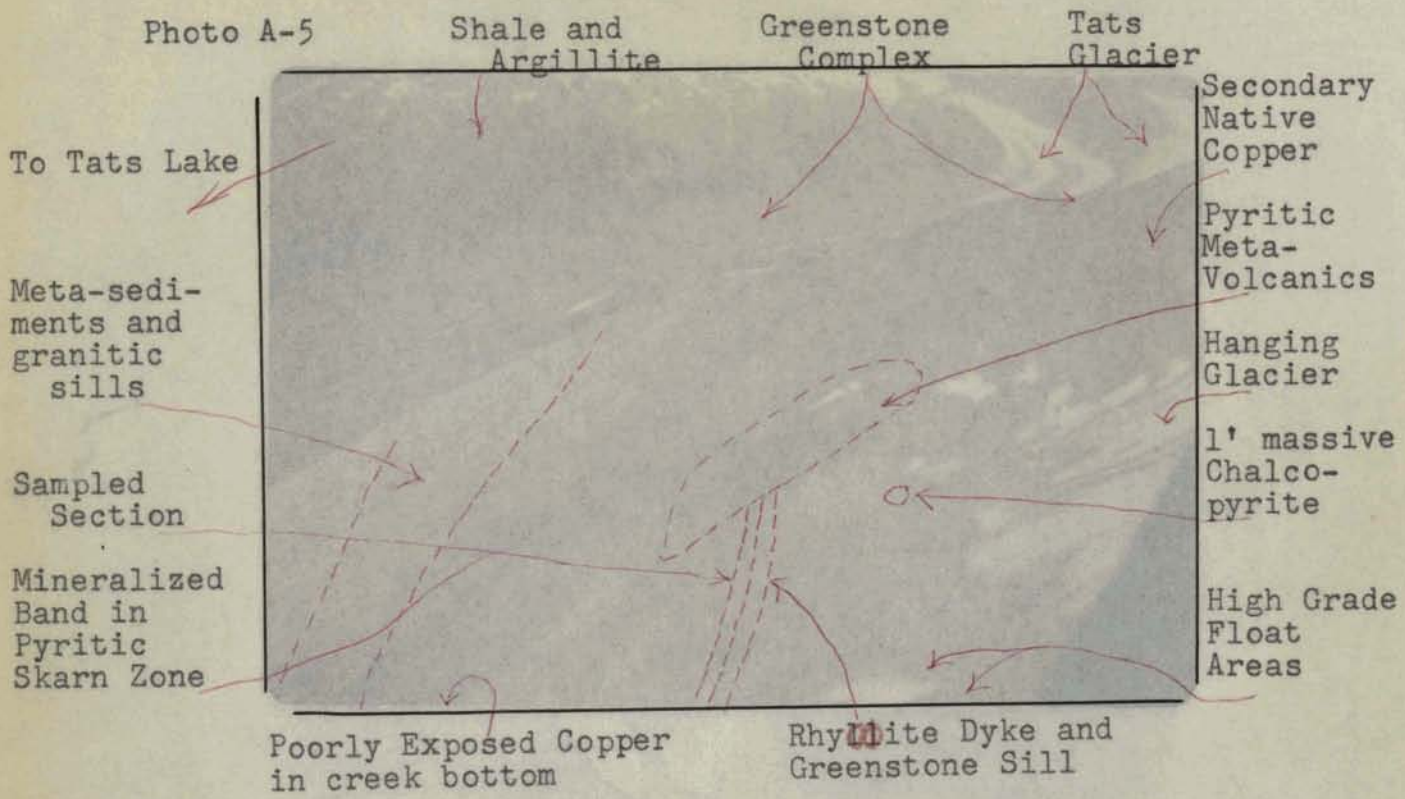
Looking southerly towards Tarr Inlet, the only Pacific water entry into Canada north of Stewart.

Phto A-7



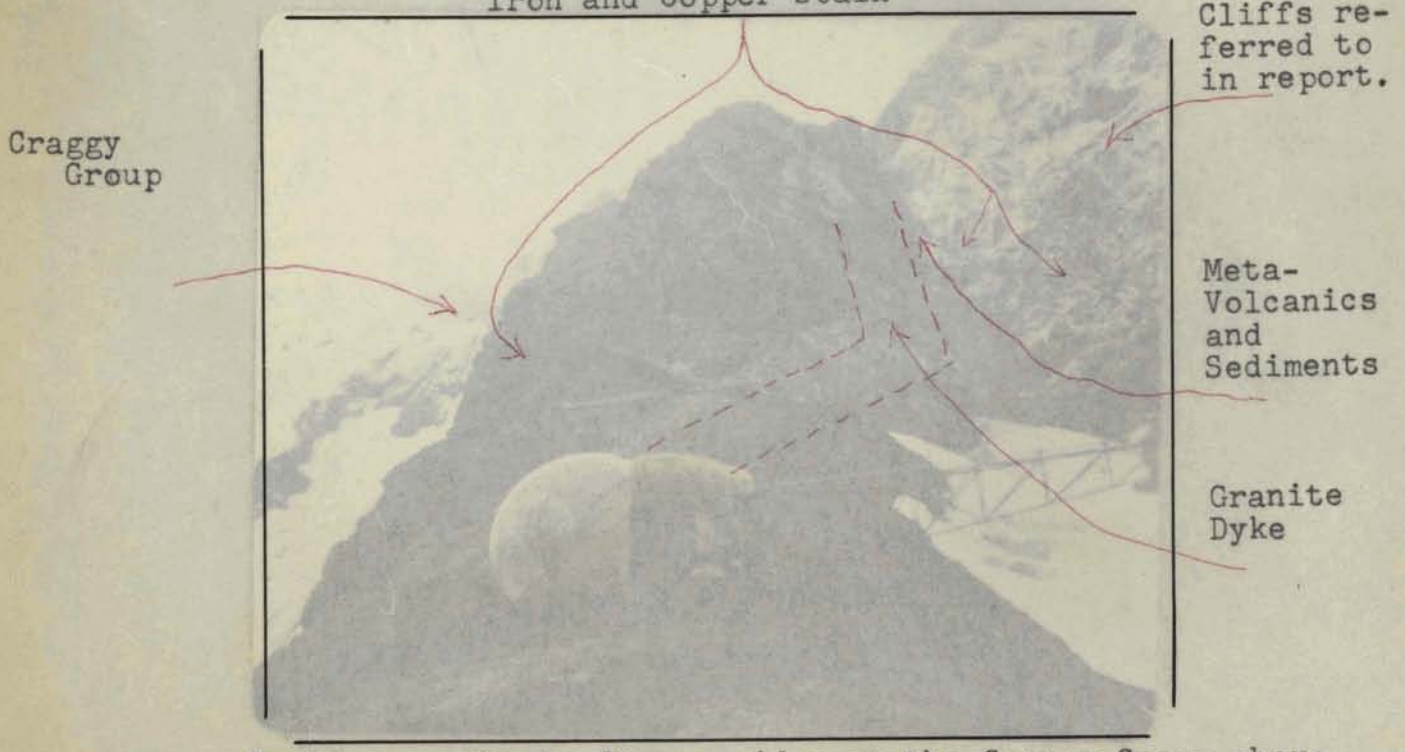
North Shore of Icehole Lake in the center of an extensively mineralized zone near the Alaska Border (See Text Reference). Floating ice discourages use of float planes. Note quartz veins outcropping 1-1/2" left from centre of picture. Color reproduction is poor.

Photo A-5



Looking northwesterly along strike of Tats Copper Showing. Note extensive gravel deposits in foreground and pyritic alteration zones associated with copper deposit.

Photo A-6



Looking southerly from a ridge on the Craggy Group above Frobisher Glacier. Note ruggedness of cliffs on which mineralization has been noted. This is the nearest the deposit has yet been approached.

Photo A-3 Alaska-B.C. Border top of range

Lower Alsek River at Gateway Knob in Alaska. This would be the major obstacle in the way of a river or road route up the Alsek. Looking northerly.

Photo A-4

Tats Lake Camp looking easterly. Super-Cub and Cessna 180 in foreground. August, 1958.

R E P O R T

on

ALSEK PROSPECTING - 1958 SEASON

NORTHWEST BRITISH COLUMBIA, YUKON & ALASKA

by

JAMES J. McDOUGALL

Geologist

Vancouver, B. C.

November, 1958

R E P O R T

on

ALSEK PROSPECTING - 1958 SEASON

I N D E X

MAPS: IN POCKET

Fig. 57	-	General Location 1958 Prosp. areas	- 1"=300 mi±
"A"	-	General Geology Tats Lake Area	- 1"=4 mi
AP3	-	General Property Map	- 1"=4 mi
IG3	-	Craggy-Windy Group Showings	- 1"=1/2 mi±

PHOTOS: IN FRONT OF REPORT

A1	-	Mount Fairweather
A2	-	Tarr Inlet
A3	-	Alsek River
A4	-	Tats Lake Camp
A5	-	Tats Copper Prospect
A6	-	Craggy Prospect
A7	-	Icehole Lake

R E P O R T

on

ALSEK PROSPECTING - 1958 SEASON

SUMMARY AND CONCLUSIONS:

During the latter part of the 1958 season selective prospecting was commenced in a rugged section of the southern St. Elias Mountains. The area comprises the extreme northwestern section of British Columbia, and the western section of the southern Yukon. The 3500 square mile area under consideration may be described in general as the drainage basin of the Alsek River. The country had never been seriously prospected or explored. Our work indicates that this section has a geological environment well suited to mineral deposits.

The system used during the last few years was continued. This involved fairly extensive aerial reconnaissance, using Super-Cub float equipped aircraft, followed by ground checking of the more accessible and favorable areas outlined. Our usual four man crew was increased to eight in August. For the latter half of that month a Bell G2 helicopter was employed in checking out-of-the-way deposits.

About forty new prospects were located. Several of these contain moderately high silver values, although tonnage potentials so far are low. Two copper deposits were staked. Only a small portion of the largest of these was checked due to a crippling time limit on the helicopter, coupled with the onset of extensive foggy weather. In ad-

dition, a fairly large high grade gypsum deposit was discovered near the Haines Highway and staked (see separate report). A zone west of our Maid of Erin mine was found to contain interesting copper-silver mineralization, but was not staked awaiting further prospecting to delimit it. Using information gained this year, a highly productive program is possible next season.

LOCATION, ACCESS AND PHYSICAL FEATURES:

The Alsek Area is presently defined as the drainage basis of the Alsek River in British Columbia, the Yukon and Alaska, lying west of the Haines Cut-Off Highway (See Map #A). Most of the area is unmapped topographically and geologically. A working base map was prepared using recently published Forest interim maps. All names in bold print are our own as no others exist. Plotting control is poor. During 1958 the B.C.-Yukon Boundary Survey, employing a helicopter full time, continued its survey to a point just west of the Alsek. A small map strip showing their stations was obtained from them.

A somewhat lengthier description of physical features and access is felt warranted in this report as such is not available elsewhere.

The Alsek area lies wholly within the largely unexplored section of the St. Elias Mountains in B.C. and the Yukon. With no exceptions it is the ruggedest part of Canada, and is at least 50% ice covered. The main valleys of the Alsek and its major tributary, the Tatsenshini, are below the 1500' contour, while at least ten mountains within

the relatively short drainage basin exceed 15,000' in height. Thus Mount Fairweather (the highest point in B. C.) rising rapidly out of the Pacific to 15,200', and Mount Logan, the highest mountain in Canada at elevation 19,200' (only a thousand feet lower than the highest peak in North America) have a relative relief rivalling or actually greater than that of Mount Everest.

There are no settlements in the Alsek south of the Yukon Boundary, with the exception of a few shacks belonging to salmon fishermen, sometimes seen at the large mouth of the river at Dry Bay in Alaska. Dry Bay is 50 miles southeast of the small fishing and communications center of Yakutat, Alaska, and about 150 miles northwest of Juneau. Haines in Alaska (population 500), along with Haines Junction and Whitehorse (population 6000?) in the Yukon, are the nearest settlements. The latter is about 100 air miles northeast of the map sheet and the former is 40 miles southeast of it.

Haines Junction, on the Alaska Highway at Mile 1016, is a small one-store settlement several miles up the Dezadeash River from its junction with the Kaskawulsh forming the Alsek. It is connected to the seaport of Haines by the 159 mile long Haines Cut-Off Highway, built in 1942, which also passes near our Maid of Erin Mine. Belouds Lodge on Dezadeash Lake (where our equipment is stored) is the only year-round settlement on the road, with the exception of the small Indian Village of Klukshu. Twice weekly bus service was offered between Haines and Whitehorse during 1958.

A rough 14 mile long road, south of Dezadeash Lake, permitted the establishment of a gas cache on better-suited Mush Lake. Several small placer operations were conducted in this area during the past season.

An existing road to Squaw Creek, on the top of the map ~~area~~ SHEET, was recently reconstructed, and an attempt is being made to re-open the once successful placer mines. A cat road, running from Dalton Post on the Upper Tatsenshini to Silver Creek just north of Survey Lake, is reportedly to be extended to the Bates Lake placer area.

A short, although now impassible, road to the Alsek follows the north shore of the Dezadeash from the Alaska Highway.

Pack trails exist along the O'Connor River and several of the easier passes to the north, and are used only by occasional hunting parties.

River travel along the lower reaches of the silt-choked Alsek River is dangerous but possible. If great care was exercised in avoiding ice blocks breaking off the Alsek Glacier at Gateway Knob (photo #A3) about 20 miles up the Alsek, the river could be navigated by shallow draft boat in much the same manner as the Taku has been further south. Turnback Canyon, where Zig-Zag Glacier has in relatively recent time (as evidenced by the stoppage of salmon) deflected the Alsek and forced it to cut a 5 mile passage through solid rock, is impassible and cannot be portaged without great difficulty. The river tumbles through gaps not exceeding 25 or 30 feet in width, and is about the roughest stretch of water

ever seen by the writer. Although no spectacular falls have developed, sudden 10 ft. drops are common and powerful undercurrents evident. Above the Canyon highly experienced rivermen with high-powered boats and ice-breaker type bows could navigate as far as Lowell Glacier. Dr. Kindle while mapping the Dezadeash Sheet for the G.S.C., successfully employed a river-boat above this point.

We were able to land our float plane along several unbraided stretches of the Alsek, but because of floating ice and rapidly changing water level this proved a hazardous adventure and was soon abandoned.

Except for a rapid-littered five mile stretch of Canyon below Squaw Creek, the Tatsenshini River could be navigated with small boat. This river, braided in part, is considerably clearer and slower than the Alsek, especially in the upper reaches, and glaciers are not immediately present along its meandering course. Landings can be made at several places along it, providing enough rudder control is present to permit a meandering approach and take-off.

It is doubtful if the rocky O'Connor or Noland Rivers could be ascended by boat for more than a mile or two under normal water conditions, and they offer only emergency conditions for aircraft landings.

The condition of the rivers in the Alsek has discouraged exploration of the area in the past. One of the first and only recorded attempts at river passage was made during the Klondyke gold rush when 200 gold seekers left Dry Bay by river boat. After an unsuccessful attempt at

the all-Alsek Route the first year, ~~only~~ a small percentage eventually made it up the Tatsenshini the second year, only to find themselves just a few days by trail from salt water on Lynn Canal. With the exception of one or two deserted Indian cabins on the Tatsenshini, the country is today just as the '98'ers left it.

Several prospectors have travelled the Alsek and Tatsenshini during the winter months searching for placer gold. The Indians report having helped another down the Tatsenshini Rapids with a canoe but haven't heard of him since.

There are no large lakes in the area, although during a reconnaissance trip late in 1957 we located about a dozen smaller ones which proved suitable for our aircraft. Of these, Tats Lake, at elevation 2400', was the best suited for our work and is large enough to handle most float aircraft as it is entirely free of timber. Range Lake (elev. 3400') 15 miles north of Tats Lake, is unusually deep and can handle most light aircraft under suitable wind conditions, as can Survey, Shini, Mineral, Rainbo and Firewood Lakes. Melberne Lake is in a gravel depression and has yet to be tested. Twenty-Second, Kusawak, O.K. and Dusty Lakes, along with several unnamed ones, are Super-Cub propositions and should not be attempted with aircraft drawing more water. Several lakes, such as Ritchie and Battle, are large enough but may contain floating ice. Icehole Lake (Photo A7, with considerable drifting ice, is risky due to

its unusual setting well below ice level.

Good airstrips for wheelcraft could quickly and easily be constructed in many of the broad valleys and extensive barren river flats throughout the map sheet.

Horses could be used north of the O'Connor and west of the Tatsenshini but dangerous river crossings and rock-strewn flats suggest their employment only as a last resort.

Besides the somewhat questionable river route into the area, several possible road approaches were noted and should be briefly described.

A road from Dalton Post, near Mile 110 of the Haines Highway, to the vicinity of Range Lake or the Alsek, could be constructed without too much trouble using the Detour Pass - Range Creek route. This would be dependent on mineral potential in the Range to Tats Lake section or west of the Alsek. Tunnelling under the glaciers or extensive rock work along the Alsek would be required.

Should showings near Tats Lake become important, a road down the Tatsenshini and up Tats Creek Valley would be necessary. The main difficulty along the route would be one of flash floods ~~caused by~~ (moving) the numerous short creeks.

A road up the south and east side of the Alsek from salt water in Alaska is entirely possible providing the river was adequately bridged at Gateway Knob. Here the river deviates sharply into an ice-littered lake formed by receding glaciers (see photo A3). Ten miles upstream beyond this some trouble might be experienced during high water as the proposed route must pass along a narrow gravel bar between a

smaller receding glacier and the river. Considerable rock fill, which is everywhere available, would be necessary. Elsewhere the Alsek is essentially a large bounder-ridden flat one to five miles wide, and good roadbeds can easily be built. Again permanent crossings of some of the small innocent-looking creeks must be elaborate affairs, and in the vicinity of a braided stream the whole valley must be bridged to offer any permanence.

Immediately southeast of the Alsek-Tatsenshini junction an all-Canadian route to salt water is a remote but definite possibility. A road could be constructed along the north side of Melberne Glacier from the eastern side of the B. C. portion of Tarr Inlet, the only salt water in Canada on the Pacific north of Stewart 400 miles to the south.

Melberne Glacier is joined by the Grand Pacific Glacier a few miles above the ice front filling the deep inlet. (See photo #A2). This ice front, although still reaching across the full two mile wide valley from wall to wall, has reportedly receded 12 miles in the last 34 years, so that now a waterway is open for about 3/4 of a mile inside Canada. The only dry land on which docks could possibly be constructed is the moderately steep, barren hillside along the east side. Floating ice may present a shipping problem, but this has been overcome under similar conditions at Taku and elsewhere in Alaska.

Along the 30-35 mile route to the Tatsenshini the major problem involved would be the crossing of two entrenched, rock-littered valleys occupied recently by glaciers whose

fronts have retreated eastward.

A road along the north side of the O'Connor River from the Haines Highway is possible, although one or two miles of extensive rock work would be required to skirt the Canyon about half way along it.

A road route in from the north, without several very expensive bridges, seems an impossibility at this time due to the steep terrain in the Bates River section. However, the Federal Government has proposed the establishment of a National Park along the Yukon section and this summer made preliminary studies of a road route into Bates Lake.

Timberline in the lower Tatsenshini is about 1800' increasing in the north and in the eastern tributary streams to about 2500'. The Alsek Valley proper, throughout its entire length above Dry Bay, is barren except for patches of spruce and cottonwood in protected localities. Some of the best timber is available on the Tatsenshini just above its junction with the Alsek. A jungle of alder, willow, dwarf birch and devils club - a combination typical of the north coast - is ever present below the 3000' level, and is a deterrent to foot travel until trails are cut through it. High grass, fireweed, and short-bush blueberries cover extensive areas of the numerous open broad valleys and hillsides above timberline. As most of our prospecting takes place above timberline, fuel has to be flown in. Permafrost is probably not present on the lower Alsek.

Wild-life is abundant, the area having seldom been hunted. The Yukon section of the St. Elias is a game

preserve. Ptarmigan, ground squirrels, mountain-goat and trout are plentiful. Dall sheep and moose are found along or east of the Tatsenshini. Grizzly bear are present in numbers rivalling that of any other part of the world, with the possible exception of some of the Alaska Coastal flats. Camps and provisions, and often even the aircraft, should be constantly guarded. We were fortunate in losing only one tent and a few provisions to them this year. Although fifteen "too close for comfort" were shot at our Tats and Range Lake camps, their loss was unnoticed.

Water power would doubtlessly be available from the many large creeks tributary to the Alsek, although severe silting and great diurnal changes in water flow would be serious problems. The upper Tatsenshini, in the vicinity of Squaw Creek Canyon, offers the best large site and the water is clear and ice free. The Alsek itself presents a very large power potential, especially in the vicinity of Bates Junction. Average flow at the mouth of the river is estimated at 14,000 c.f.p.s. The river drops 1600' along the lower 100 miles of its course, but power development anywhere along it would be an expensive proposition.

The winter climate in the Alsek varies from coastal near the mouth with considerable rain and snow to continental farther inland involving frigid temperatures with lighter snowfall. Except for extensive fog patches the summer climate is enjoyable, although deterioration begins in August. Only a few days were lost because of rain during the 1958 season. Most of the lakes and surrounding country were free

of ice and snow early in May and remained so until late September. However, as 1958 had one of the earliest springs on record, and a good fall, the prospecting season can be more safely described as lasting from late May to mid-September.

Several "experts" claim that many of the glaciers in the St. Elias Mountains are advancing. Our observations, with one or two exceptions (including Zig Zag Glacier) show the opposite to be the case. During a major earthquake, which severely shook the area during the night of July 9th, as much as 200' broke off the lower fronts of some of the ice masses.

Most mountains at one time were ice-covered to at least 6000'.

HISTORY AND ORGANIZATION:

The Alsek area was selected for prospecting as it was the only remaining large, geologically favourable unprospected section of Western Canada which would efficiently lend itself to our methods. We have kept in touch with the area for many years, particularly in conjunction with our work on Admiralty Island, Klukwan and the Maid of Erin. It seemed likely that similar geology of interest was present between the famous Kennecott Copper Mine some distance to the northwest and these localities.

Although previous exploration groups, chiefly Helicopter Explorations, Hudson's Bay and C. M. & S. had skirted the region, they believed it too rugged and remote to deal with. Several, including Kennecott, had current plans for its exploration until a change in policy this spring can-

celled their northern work.

A group known as the Mackenzie Exploration Syndicate and controlled by Karl Springer (who had also controlled Helicopter Explorations) retained interest in at least part of the area. This group had two men in the Bates River area this summer, preparatory to proposed helicopter work next season.

Trips had been made in the past into the Alsek area by Alex Smith and others. Late in 1957 the writer made a 5 hour reconnaissance in the Alsek locating possible landing spots and mapping the main geological features.

Using the same aircraft with pilot-prospector Stan Bridcut, work was commenced there early in July of this year. Tats Lake proved a suitable base and, as mineralization of interest was soon discovered, two additional prospectors, Bill Wilkinson and Dave Kimball (both known to the writer) were hired. Early in August Alex Smith with Quebec Metallurgical Industries prospectors Meade Hepler, Mike Donohue and Ernie Smith, supplemented our crew. These prospectors returned to Wedeene River at the close of the helicopter program, while Gerry Davis, who had been working with the second Super-Cub aircraft at Gataga and in the Watson Lake area, joined the group at that time.

A Bell G2 helicopter, under lease to Callison Air Service of Dawson City, and flown by an experienced mountain pilot, E.H. "Skeet" Northern, became available for two weeks in mid-August. Although a severe time limit of 40 hours was placed on the machine, it proved very efficient in moving camps and checking isolated showings previously outlined.

Our prospecting method consisted of locating geologically favorable belts and gossans from the air and ground prospecting them from the nearest lake or helicopter landing). We also traced up float found in creeks and on glaciers.

Two copper showings and one gypsum deposit were staked. The Tats Group of 4 claims covers the smaller showing and the Windy-Craggy Group of 14 claims covers the larger (see Map AP3). 32 claims were located to cover the gypsum and quartz vein deposits described separately.

GENERAL GEOLOGY

Except for strips on both sides of the Haines Highway (B.C.Dept. of Mines 1948), and the Dezadeash Sheet (G.S.C. Memoir 268, 1953) to the north, the geology of this portion of the St. Elias Mountains has not been attempted. The rock units of interest in the area are not well represented elsewhere as they are largely lost under extensive ice and Tertiary lavas to the north and smaller icefields and the Pacific Ocean to the south.

Map A, designated the Tats Lake Sheet, has been prepared from air and ground observations. Considerable of the air interpretation may be erroneous; however, our experience has been that such is close enough for prospecting purposes.

No fossils were found in any of the undivided sedimentary rocks. However, in keeping with strips mapped along the Alaska Coast to the south, the majority are prob-

ably of Paleozoic Age. These rocks, coloured blue on the map, comprise at least 60% of the map sheet, and are composed mainly of limestones, shales or argillites with minor cherts and quartzites. The base is not exposed and they are at least 10,000 feet thick. Metamorphism in varying degrees is everywhere evident, and is probably related to the numerous acidic and basic intrusives found throughout. Banded cherty metasediments and hornfelsic complexes are common near the granite stocks, as are massive marble and skarn zones.

A highly impure carbonaceous sandstone and a cherty "sharpstone-conglomerate", indicated in one locality just west of the Tatsenshini, may be related to the Dezadeash Group of Cretaceous Age described by Kindle. The distribution of this unit is not known but is evidently not great.

Volcanic rocks are varied but not too common. With the exception of small flows immediately west of the Haines Highway near the Parton River, no Tertiary lavas have been recognized on the sheet, although they are very common to the northwest. Most of the volcanic rocks occur interbedded with poorly defined sediments in an extremely complicated system referred to as the Greenstone Complex. This includes basalts, which are generally only slightly altered, and andesites which are generally highly altered. The latter often show a distinct intrusive relationship and can be confused with the widespread dykes and sills.

Several large granitic stocks and numerous smaller ones are found cutting the sediments through the south section. The largest and best defined is that composing Noisy Range, a snow-capped prominence of white quartz-diorite.

Some of the smaller stocks are poorly defined, being gneissic in part or containing so many sedimentary remnants or inclusions as to make them barely distinguishable. An unusual feature of the area is the fact that granite is seldom exposed in the numerous well developed creek valleys, but where present always occupies the highest ground between them

Basic plugs and numerous related dyke swarms are a characteristic of the region and cut the calcareous sediments along a broad, poorly defined northwesterly-trending band. In several localities, such as that clearly shown on the O'Connor River, the overall percentage of dyke and sill rock exceeds that of the country rock. Alteration is indicated by a white halo around the bodies. The basic rock grades from a fine-grained gabbro to a dark diorite. Hornblendite and pyroxenite intrusives, similar but smaller than those found at Klukwan, have been noted in the Greenstone Complex. True olivine or serpentine rocks have not been identified west of the Tatsenshini. Large carbonate-mariposite deposits are present.

Extensive glacial gravel deposits up to 400' in thickness are common on many lower, main valley slopes.

The structure appears complex and local faults related to larger structural features are common. A regional unconformity or major fault is indicated near Greenrock Creek. Most creek courses are cut in sediments and commonly dip attitudes on opposite sides of the main valleys oppose one another in a manner suggestive of anticilinal faulting with little displacement.

Numerous attitudes and some of the more well-defined faults have been plotted on our map.

There is a general indication that the rocks comprising the central and southern parts of the sheet have been upshifted along a great arch comprising as well the higher mountains to the north.

A general north-south cross section along the Tatsenshini and Alsek Rivers, which cut across the grain of the St. Elias, would show great thicknesses of altered Paleozoic sediments and dyke swarms, followed by the Greenstone Complex, a band of thin-bedded calcareous sediments, the Noisy granite, a granite-gneiss complex, and finally - on the Alaska side - Mesozoic strata followed by Tertiary(?) sediments.

From the foregoing it is evident that most of the geological features generally associated with ore deposits are present over extensive areas.

As an extension of the Kennecott Copper belt had been hoped for in the Tats Lake area, a short note on the former (visited briefly by the writer) in the way of comparison is warranted.

The rich Kennecott copper deposits are restricted to the lower portions of a massive orange-tinged dolomitic limestone just above the contact with an underlying basic volcanic of considerable thickness. Black shale overlies the Triassic limestone. A granitic intrusive plus associated dykes and smaller basaltic sills and dykes occur a short distance south of the deposits. The volcanic rock, locally known as the Nikolai Greenstone, is of Triassic or

Carboniferous Age. These altered basalt flows, which are at least 4000' thick, themselves contain small amounts of copper-sulphides. The well exposed low angle easterly dipping contact, due to the black and white rocks involved, is by far the most obvious ever seen by the writer. It can be easily traced for about fifteen miles to the southeast. Limestone of similar age has been mapped just east of Yakutat Bay and as such is only a few miles west of the Tats Lake Sheet.

The only possible counterpart to the Kennecott limestone in the Tats Lake sheet is the metamorphosed and dyke-ridden material north of the Greenstone Complex, the age of which is uncertain. However, a contact resembling that of Kennecott is not present. The basic sill and dyke rock intruded into these calcareous rocks, and the poorly defined basalts of the Greenstone Complex, could well be the counterparts of the Nikolai Greenstone. The composition and texture are similar and disseminated sulphides, pyrrhotite and chalcopyrite occur. However, whether this is the case or not, the writer feels that the widespread occurrence of pyrrhotite and chalcopyrite in the Tats Lake volcanics is an important related feature. However, it would seem that an excess of sulfur and iron was present leading to the formation of much "lower grade" minerals in our section. Thus the chances of a "second Kennecott",with its massive chalcocite deposits, being discovered have dwindled, although a bornite property is still a possibility.

Generally, our limited amount of work has indicated two types of deposits. The first of these, known as the

silver-copper type, is found between the Greenstone Complex and the massive granites. Within these the ratio varies between 1 and 2 oz of silver to each percent of copper. The copper is generally present as bornite or massive chalcopyrite. These deposits are generally related to small basic dykes or sills in the calcareous sediments or to skarn zones near granitic plugs, and take the form of veins or patchlike replacements. To date most showings of this type are small. The second type is more common and consists of disseminated chalcopyrite, with or without considerable pyrrhotite and magnetite, in a banded replacement or pyrometasomatic relationship within the irregular Greenstone Complex. Copper values range up to 8% in pyrrhotite-free "subtypes", but to date appreciable widths containing values exceeding 1-1/2%, although indicated, have not been found in place. Gold and silver values are those found in most B.C. copper deposits - about 50-75¢/ton.

Float in several creek-bottoms has revealed both well mineralized granitic rock and galena mineralization in sedimentary rock. The source of neither has yet been found. Large areas of mariposite-carbonate rocks containing low silver and nickel-copper values are present. Quartz veins are numerous in certain localities, but values in precious metals so far are also low. Well developed amphibole asbestos is quite common but the chrysotile variety, due to the lack of serpentine, is rare. However, several small veinlets were noted in an altered basic sill west of the Alsek.

DESCRIPTION OF PROPERTIES:

Those showings interesting enough to sample are numbered and plotted on Map AP3 along with assay tabulations. Most will be briefly described here and are designated the same map numbers. Some are float samples, checked generally for their precious metal content.

#1 - Several tons of well mineralized copper float scattered on the flats immediately below Tats Glacier.

The most common types of float are massive pyrrhotite boulders up to 500 pounds in weight and smaller rocks up to 200 pounds in weight containing disseminated chalcopyrite. The former is the better represented and contains copper values ranging from 0.8 to 2%. The latter is an impressively mineralized rock composed of what is either a silicified brownish but impure quartzite or a fine-grained silicic granite. Shiny chalcopyrite, generally containing little or no pyrrhotite, is evenly disseminated throughout the rock. All such material assayed between 4 and 9% copper with low gold silver values.

At least three of the sources of the chalcopyrite-bearing pyrrhotite has been found in the vicinity of Tats Glacier. However, the second and more important type has yet to be found in place, although a large part of the area has been checked. Some fear is held that the source is ice-covered. Similar material in large amounts has been found as float in an unchecked portion near Frobisher Glacier to the north.

Other less common float types include chalcopy-

rite mineralization in granite, pyroxenite, shale, argillite, skarn, metasediments, and volcanics.

The relatively fresh brown to grey, slightly amygdaloidal andeso-basalt(?) volcanics, which make up millions of tons of moraine material, contain an unusually high percentage of disseminated pyrrhotite. Under magnification, almost every specimen shows slight ex-solution chalcopyrite surrounding the larger pyrrhotite blebs. Assays in copper are low but much higher than common volcanics.

This "juiced up" volcanic, similar to that at Kennecott, illustrates the widespread mineralization present.

In general, glacier moraines and outwashes offer a fairly good representation of the bounding rocks. However, ice-movement and related rock distribution can be extremely complicated and baffling. Direct follow-ups can seldom be made. On Zig Zag Glacier hundreds of individual boulder trains parallel one another along a bending arduent course for almost ten miles yet no great mixing of the characteristic rock types has occurred.

#2 - Tats Group (see Photo #A4)

This showing, originally noted from the air, is a lenticular sulphide replacement of intermixed volcanics and sediments on the southwest edge of the Greenstone Complex (see Photo #A5). The deposits, which have been only hastily studied, outcrop a few hundred feet up a north tributary of a small glacier-fed creek which joins Tats Creek as it emerges from under Tats Glacier. The showings, at an approximate elevation of 5000', are accessible by a two hour

trip from Tats Lake.

The deposit occurs as an irregular replacement in a large, locally folded intensely pyritized zone of highly altered volcanics and minor meta-sediments. The red to brown weathering zone is cut by numerous sills or dykes of diorite(?), rhyolite and porphyritic greenstone. With the exception of a hard, smooth, maroon-weathering central band or "core" of near massive sulphides, the mineralized section is not clearly defined. As exposed it is about 400' long and varies between 15 and 40 feet in width. An additional several hundred foot extension is indicated along strike to the southeast under extensive gravel side moraines. This extension probably terminates against a large unexposed but strongly indicated east-west fault which the main creek now follows; while to the northwest the mineralized band terminates abruptly in the vicinity of a small talus slide and does not reappear along strike beyond. Cross-faulting or severe folding are indicated. The dip of the deposit is generally vertical although rocks a short distance south have a moderate northerly dip. The mineralized section is bounded to the north in part by a slightly mineralized irregular granular greenstone sill at least 20' in width and in part by a white, 10' wide rhyolite sill which parallels the deposit and which is also weakly mineralized. The bounding rocks on the south are massive, highly altered and pyritic volcanics which are probably tuffaceous in part. Sills are evident in this section also.

Mineralization consists of near-massive sulphides including pyrite, pyrrhotite, magnetite, and chalcopyrite in order of their abundance. Chip samples across the widest and best exposed 40' sections returned assay results as follows:

(a) 18' (south) - Copper 0.8%

(b) 22' (north) - Copper 2.3%

Average - 40' - 1.62% Copper, 0.3 oz. silver, 0.01 oz.gold

A 12 ft. width of copper-stained magnetite, 100' east of this section, assayed 1.55% copper, 0.2 oz silver and 0.02 oz gold.

The pyritized country rock was not sampled nor was a poorly exposed chalcopyrite-bearing zone of unknown width along the northern edge of a large diorite sill a few hundred feet downhill to the south of the main showing.

Several tons of high grade (2% Cu) pyrrhotite float are present on the gravel slopes several hundred feet east of the main deposit. Some of this well mineralized material occurs at an elevation greater than the main zone, indicating the possibility of a third paralleling zone to the northeast. Limited prospecting in this section failed to show such material in place and it thus could also have originated higher up the main valley now largely ice and gravel filled. Prospecting in the Complex along general strike for a mile to the north and west turned up only a 1' wide massive chalcopyrite vein (#6). Some secondary native copper was found in an extensive pyritic zone containing sulphate springs resembling those of the Gataga Gossans.

The main deposit would be of interest only if a much larger potential were proven elsewhere. It could easily be Packsack-drilled and would be directly accessible by a road from Tats Lake. Four claims were staked to cover the showing pending results in other more promising copper-rich sections to the north.

#3: - This occurrence consists of small amounts of float composed of soft deep green highly weathered copper minerals of which only traces of chalcopyrite remain identifiable. Secondary chalcocite and copper carbonates are evident. Silver assays of 22 ounces were obtained from this material which was found on the top of the 5200 foot(?) mountain immediately north of Tats Lake. The rock is so soft that it could not have been travelled far. It is believed related to the basic sills and dykes which cut the thin-bedded-calcareous sediments over widespread well exposed areas. The amount present does not suggest a deposit of interest, although such should be looked for in similar rock along strike.

#4: - This consists of a large brown carbonate (magnesite?) zone in which green mariposite is widespread. Small amounts of quartz and traces of pyrrhotite are present as is the occasional slight copper-stain. The material assays - Silver 0.4 oz. gold 0.01 oz. This type of deposit is of interest because of the gold-bearing quartz veins often associated with it.

#5: - Included in this designation are several float samples from moraine of the first glacier east of Tats Lake. The sample of most interest is a highly altered greenstone containing considerable deep green to black chlorite patches, quartz veinlets and slight pyrite and chalcopyrite. It assayed 0.2 oz of gold and 0.3 oz of silver. Only a small part of this basin has been prospected.

#7, 8, 9: - These showings are in the Greenrock Creek area and are associated with the major fault and/or unconformity previously described. Values are too low to be of interest although they do indicate some mineralization in the area.

#10: - These are representative of low-grade chalcopyrite-bearing rocks found around the eastern prongs of Tats Glacier and are not of importance except as an indication of widespread mineralization.

#11, 12 and 16: - At these localities small bornite or chalcopyrite-rich showings were found in both granitic and altered sedimentary rocks near a granite contact. No large deposit has yet been indicated.

#13: - This is a piece of galena-bearing quartz float found on the mountainside west of Tats Glacier but not yet found in place above. The silver to lead ratio is only slightly greater than 1 to 2, and thus the material is of little interest unless found in huge quantities.

#14, 15, 15A and 26: These deposits, known tentatively as the Windy, Craggy and Camp showings (see Map IG3) occur on the divide between Tats and Frobisher Glaciers. Although less than one-third prospected, these are the most important so far discovered.

The Windy zone was located during ground checking of an associated pyritic alteration zone which had been noted from the air at an earlier date. The Craggy zone was ~~noted~~ spotted from the air but attempts to reach it have so far been unsuccessful, although mineralized talus was obtained below it. Indications of the Camp Zone were discovered while attempting to reach the Craggy.

Three deposits are indicated. The only one as yet checked on the ground crops out along the western edge of a hanging glacier in a saddle on the divide between the two main valley glaciers. Several thousand feet north and west of this copper and iron-stained rock is noticeable on a steep extensive 1500 foot high cliff in an unusually rugged region of much-fractured hanging glaciers (See photo A6). This section is referred to as the "northern extension" or "Craggy" showing and that previously described the "southern extension" or "Windy" showing. Both occur in the same general zone and could well be parts of the same deposit. A third mineralized area is indicated about one mile west of the Windy zone along the very steep mountainside and is referred to as the "Camp" showing.

Access to the Windy deposit from Tats Lake is gained by following gravel trains on Tats Glacier. With some

difficulty Frobisher Glacier proper could be reached on foot also. A helicopter can land in several places between elevations 5500 and 6000 feet on the Windy ground. Landing spots are very limited on the Craggy section but such could be cleared rapidly. A landing was achieved on a narrow ridge at approximately the 4000' level about 1500' north of the cliff showings. Direct access to the cliffs is extremely dangerous from all directions and can only be achieved by adequate preparation and care. The Camp showings are probably accessible from the helicopter camp which was set up on a gravel train at an elevation of approximately 2800 ft. while attempting to prospect the Craggy zone.

General access up the main valley from the Alsek River several miles west of the Camp showings would be good, providing this point on the river could be reached - a remote possibility at present. Travel over the East Arm of Frobisher Glacier towards the Tatsenshini is possible, although the lower reaches of Henshi Creek would be quite difficult. Travel to the north would be exceptionally difficult or impossible.

The geological environment of the deposits is not known at present. They occur within the Greenstone Complex of altered volcanics and minor sediments, and are probably related to granitic dykes and sills. As shown on the Craggy cliffs, a rudimentary banding is present and dips are either vertical or steeply south. Although the Windy zone was briefly examined and sampled, a shallow but extensive gossan blanketed most of the showing. Only a small part of

this deposit along its western edge is believed not covered by the feeder glacier and only a portion of this is presently accessible without considerable difficulty. A mineralized zone at least 600' long and 200' wide is indicated within a much larger zone of pyritic alteration. Selective lens-like replacement by massive sulphides, chiefly pyrrhotite, pyrite and chalcopyrite, occurs irregularly along this zone. The rock types have not been well examined but are believed to be chiefly highly altered tuffaceous volcanics and sediments. Although attitudes are not clear, the deposit is believed to strike northwesterly. An extension of several thousand feet to the southeast across the northeastermost lobe of Tats Glacier is an indicated possibility. To the northwest the deposit is either cut off or deflected westerly along a broad fold apparent in this immediate area, or it plunges through the mountain in some unknown fashion to reappear as the Craggy extension several thousand feet to the north. Mineralization is not evident on the mountain top separating the two showings but does recur on the steep craggy cliffs immediately below, lending support to the latter possibility.

Chip sampling, which cut the Windy deposit obliquely along the only accessible outcrop for about 550', showed a weighted average copper content of 0.9%, a silver content of 0.2 oz and trace amounts of gold. The best 100' central section assayed 1.41% Cu. This sampling data is not a reliable estimate of the grade of the fresh material, due to considerable gossan and wallrock(?) content, but is, however, an indication of the low grade to be expected.

Prospecting of the remaining two showings was limited to the detection of considerable mineralized float in the talus below both. A crippling limit on helicopter time, combined with extensive fog, prevented the hoped for examinations. The prospectors did not even have time to return for the only samples they had of the Camp Showing.

Samples representative of several tons of mineralized material below the Craggy showing assayed up to 4% copper with gold-silver values of 50-75¢ ton. With one exception, these samples contained considerable pyrite and pyrrhotite.

Samples of copper-bearing rock, not seen by the writer but said to be extensively scattered in talus below the supposed Camp deposit, fit the description of some of the high-grade material present on the Tats Creek gravel flats. The lack of extensive pyrite and pyrrhotite is responsible for the absence of iron stain which would otherwise help outline the deposit. The rock is described as being a "light coloured silicic quartzite containing altered feldspars and disseminated chalcopyrite to the extent of about 4% copper." This is an important rock-type and the deposit must be investigated.

In general, such copper showings as described offer very little evidence of their presence until broken into with a prospecting pick. Unless at least a small amount of lime is present, the brightly coloured and obvious secondary copper carbonates are entirely absent. The pyritic alteration zones, which some exploration groups have been known to erroneously restrict their helicopter-aided checks to, are still the best scale indications of associated mineralization of interest.

Thus a considerable area remains to be checked adjacent to such pyritic zones so widespread in the Tats-Frobisher Glacier sections.

Fourteen claims were located to cover the major portion of the Windy and Craggy zones.

Showings #18 and 19 consist of float rock containing galena and chalcopyrite, the likely source of which has not been prospected. The galena, which is associated with quartz, is from a sedimentary area west of the Alsek. Granite, well mineralized with disseminated chalcopyrite, constitutes the second type and its source is probably the granite stock which cuts the sediments previously mentioned.

Neither float-type is widespread.

Locality #23 included highly silicic greenstone float from gravel trains on the Zig Zag Glacier. It is chiefly mineralized with pyrite and chalcopyrite.

#24, 30 and 31: Chalcopyrite, slight bornite, galena and sphalerite were discovered in an irregular limestone-magnetite-skarn area on the western limits of the unusually white Maid of Erin granite stock. Three small mountain glaciers effectively cover most of the area of interest which occurs at the top of a mountain at elevation 6000'.

Small scale chalcopyrite and magnetite replacement of certain flatlying calcareous beds in the skarn is evident and suggestive of the Maid of Erin occurrence five miles to the east. The best showing is a 1 foot wide band of massive chalcopyrite assaying 14.3% copper and 9.8 oz silver. The

surface of the several scattered copper-stained skarn areas is quite weathered and stripping might be done to advantage. To date no large deposit is indicated,although several zones remain to be checked. A deposit similar to the Maid of Erin is a distinct possibility in this unprospected although accessible section.

The remaining showings are chiefly mineralized quartz veins occasionally containing slight copper values but generally too low in precious metal content to be of interest. Several of the more accessible could stand better sampling with proper tools.

ECONOMIC CONSIDERATIONS:

To be commercial in this area, a mineral deposit will either have to be one from which a high grade concentrate can be made, or be of sufficient size to warrant the spending of large sums of money necessary to develop extensive transportation facilities. A Kennecott-type of deposit would satisfy both of these conditions, but nothing approaching it has been found.

The main hope seems to be for a large, low-grade chalcopyrite deposit. Should one exist in the Tats Lake area, considerable study would have to be devoted to the important transportation problem. This would involve the possibility of routes through to Tarr Inlet, Dry Bay or the Haines Highway. Local access by tunnels under the glaciers would be a likely possibility.

Similar conditions have been encountered at the Granduc

mines north of Stewart, B. C. Here work on a low-grade chalcopyrite deposit (1.4% Cu), with a potential exceeding 25,000,000 tons, has been suspended, after a considerable expenditure, to await better economic conditions. A deposit in the Tats Lake area would have to be this large at least even to be considered. Explorationwise, however, it must be remembered that surface outcroppings in the Granduc area were not impressive, and until considerable preliminary drilling was done no idea of the potential was realized. However, in most cases where exposures are good, a rapid field estimate of the potential can be made. This may be the case on the Craggy-Windy Group where any orebody of sufficient size should outcrop as such on the cliffs.

A relatively smaller orebody could be considered in the Tarr Inlet section, although floating ice might be a deterrent to cheap transportation.

Despite the ruggedness of the area, we feel it is more favorably located than much of that in the Central and even Southern Yukon presently being explored by others.

PROSPECTING PROGRAM SUGGESTED FOR 1959

In general, the preliminary prospecting program commenced in 1958 may be considered to be about half completed. Most of the more important mineral occurrences located were done so within a number of small local areas previously outlined by Super-Cub reconnaissance. A conservative "batting average" of 50% is claimed, that is signs of copper mineralization were discovered in 50% of the areas previously outlined. As shown on Map A3, at least 12 such areas remain to be checked. Among the most important of these are G, H, J and K.

Area G - contains a large, well exposed, extensively mineralized section containing all the geological features (except visible ore) necessary for several major mining camps. These features overshadow the fact that it straddles the Alaska boundary and is accessible only by a 7 mile long glacial gravel train above the Alsek. At considerable risk a Super-Cub, under proper wind conditions, can land in the ice-choked lake in the middle of the zone (see Photo #A7). Quartz veins, dykes, skarn zones, sediments, volcanics, granite, faults and abundant red and yellowish stains are evident within a three mile square section. This area could be most efficiently and safely checked by having a helicopter move in a small camp from Battle Lake six miles east across Battle Glacier.

Zone H - is an unusually rugged section containing the copper deposits already described. Extensive pyrite and pyrrhotite alteration is present on the exposed mountain

tops north of Frobisher Glacier in an environment similar to that of Craggy-Windy Group. Should any of these mineralized sections contain copper, their size is such to warrant interest. They can only be checked by helicopter employing the most experienced of pilots or by Swiss climbers - and then with some difficulty.

Zone J - contains what the writer feels may be an extremely large quartz "blow-out" and the geology is favorable for a gold deposit such as occurs a short distance south in Alaska.

Zone K - to the southeast displays considerable pyritic gossan along a major granite contact. Tarr Inlet is accessible by boat providing care is exercised in avoiding ice-breaking of the large rapidly retreating glacier which straddles the present head of the Inlet. However, this general area, believed to be totally unprospected, could be most efficiently checked by helicopter. Although in a gravel hole, Melberne (our name) Lake, about ten miles to the north, appears large enough for our float planes which could supply the helicopter.

Zone L - containing slightly stained metasediments along a major granite contact, can be worked from Melberne Lake. Silver-bearing copper mineralization may be found in this zone as it appears correlative with the Tats Lake section.

Zone A - contains small mineralized section easily accessible from the Detour Creek - Range Creek pass. A distinct mottled brownish vein, possibly lead-zinc, was seen

about half way up the mountainside one mile east of the Alsek above the Range Creek junction. This section can be checked by a one week fly trip out of Survey Lake. As the pass is low, it will be open early. As others are interested in this section, it should be one of the first checked. Considerable difficulty may be experienced crossing Debri Creek and could force a postponement awaiting lower water or a helicopter.

Although no large mineralized areas are indicated in Zone B enough copper-bearing float was found in Greenrock Creek to warrant further investigation. Unusual float composed of a highly(?) altered brown carbonaceous sandstone or greywacke is present. Some of this is well mineralized with iron sulphides and shows occasional chalcopyrite. A major fault cuts this section. Our float planes can land in the river at the mouth of the creek under favorable wind conditions.

Zone C - The creek cutting Zone C has not been checked for float. A poorly defined granite(?) contact and several small basic intrusives cut the massive sediments in this section. A landing can probably be made on the Tatsenshini within several miles to the north.

A poorly defined but extensive granite-sediment contact occurs in Zone D south of the O'Connor. Anything found in this area would be accessible from the Haines Highway. Helicopter checks made in the eastern portion showed copper-silver and silver-lead mineralization present in skarn zones warranting further prospecting and testing. This could be done from a camp in the vicinity of the gypsum as suggested

in another report. Quartz veins associated with volcanic rocks and skarn zones were noted along several valleys running south from the O'Connor and should be ground checked. Contacts in the western portion could readily be checked by helicopter.

Zone E - In this zone occasional impressively mineralized pieces of granite float carrying 2-4% copper as chalcopyrite were found. The indicated source is an unchecked granite stock high on the mountainside. Galena and arsenopyrite mineralization was found in quartz float in an area just south of this, composed of calcareous sediments cut by numerous basic dykes. Several mineralized zones associated with faults were noted at the head of two of the short valleys but were not checked due to unsuitable helicopter landing spots.

A helicopter is an absolute necessity if thisz zone is to be checked. The indicated copper section can be almost directly approached by helicopter but the galena(?) will require a short fly~~ing~~ trip.

Several rust areas related to granitic and basic intrusives were ~~rated~~ noted in Zone F. These can be checked only by helicopter.

Zone I - has been partially prospected resulting in the discovery of argentiferous bornite and chalcopyrite. The chances of a workable small high-grade deposit in this band of minor sill-like intrusives still exists, especially in the lower unchecked and more difficultly accessible Tats Creek Canyon. This could be pros-

pected by flying trips out of Tats Lake. Tats Creek cannot be waded and considerable difficulty may be experienced.

Other potential prospecting zones noted during aerial reconnaissance are present both on the Tats Sheet and the Yukon-Alaska sections. Although geologically favorable for ore deposits, they would, in general, present almost unsurmountable transportation problems, unless, however, a method be developed for extensive travelling on glaciers. A mineralized zone in Alaska - only a few miles removed across glaciers from salt water in the vicinity of Russell and Nunatak Fiords northwest of the Tats Lake Sheet, offers possibilities. Similarly "eyes" of apparently mineralized older rock were noted in the vast, Tertiary Lava district at the headwaters of the White River east of Kennecott. Along with immense ice fields, these lavas effectively cover any hoped for, unprospected southern extension of the Kennecott Copper Belt.

SUGGESTED PROCEDURE AND COSTS OF 1959 PROGRAM

It is recommended that a prospecting crew of about eight men, such as that employed during the latter portion of the 1958 season, and including the two pilot prospectors and their aircraft, be considered. Allowance should be made for a combined cook and overall handyman, especially if a helicopter is employed. One need for this was illustrated during the past season when the helicopter crew often had to prepare their own meals. Continuous guard should be kept

of camp because of the seemingly inexhaustible supply of grizzly bear. Should any development work be required during the active prospecting season, such as that possible in the gypsum and Maid of Erin copper districts, allowance should be made for men other than the pilots or the more highly trained prospectors to do it. As we were not authorized to hire extra men for test work on the Gataga showings, both pilot prospectors had their aircraft tied up for the better part of a month doing bullwork instead of hoped for prospecting during the excellent weather.

It is suggested that arrangements be made for the rental of a G2 helicopter to be used at least part of the 1959 season. Although about 75% of the area could be checked by older time-consuming methods, the use of a helicopter is justified for the following reasons:

1. The area is ideally adapted to the relative efficient use of a helicopter.
2. The mineral potential of this unprospected area justified the additional expense.
3. Competition from other helicopter equipped groups is expected in 1959.
4. An important safety angle is involved.

Factors leading to the efficient use of a helicopter in the Tats Lake Sheet, as against float aircraft, are obvious. These include the low timberline, broad river valleys, and large gravel trains which allow landings at almost any desired destination. Lakes suitable for

float aircraft are lacking in most new areas remaining to be prospected. The use of horses anywhere west of the Tatsenshini would be nightmarish due to the many torrential streams and boulder-strewn routes.

The area is more interesting geologically than any other unprospected portion of the north known to the writer who has seen most of it. The presence of widespread mineralization has been proven. As far as the writer can make out, during our short season on the Alsek, our small crew made as many new discoveries as all other companies in the Yukon combined. This has been disclosed by pilots and others familiar with these operations.

For instance, the helicopter-equipped parties of Y.C.G.C. and Asbestos Corporation excitedly staked a small garnet deposit in the Dawson Area - their sole find. The MacKenzie Syndicate, a group backed by Karl Springer, prospected, with helicopter, the often gone-over Nahanni River area and found ~~nothing~~ no entirely new deposits worth staking, (announced costs were $90,000. - 1/3rd being fixed wing plus 1/3rd helicopter charges). Newmont, with their 8 to 10 man crew, continued prospecting north and east of Mayo and Watson Lake, and reported finding several showings of "promotional interest" only. Although an efficient group, they are hampered somewhat by lack of mobility, which has been our strong point. Their cumbersome 195 Cessna aircraft, which they lease as we do our Cubs, is useless on small lakes. This company is believed to have wound up operations in the Yukon. The B.I.K. Syndicate, partially financed by McIntyre, continued

helicopter prospecting in the Stikine Area. Their only announced discovery of interest was a small basic plug near the Unuk River containing a combined 1% copper-nickel content. This basic intrusive is reported to have been originally discovered years ago. Ecstall River (Texas Gulf) working on the B.C. Coast, at a cost of $70,000. plus two helicopters, continued detailed prospecting but failed to locate a prospect as interesting as the large pyritic mass uncovered last year.

The MacKenzie Syndicate is known by the writer to be seriously considering a large scale helicopter program in the Alsek next year, but are worried about the "absence of lakes" for fixed wing support. Two men were in the Bates River section for six weeks this summer. As this group has had considerable helicopter experience, and know something of the regional geology as gained by previous work in the St. Elias beyond the head of the Donjek River, they could be formidable competition. Certainly they could easily locate and check many of our "hot areas" before we could even reach any of them.

Fifty-two helicopters were actively engaged in geological work in southeast and coastal Alaska this season. Although most of these were engaged in oil exploration, some were known to be conducting mineral searches which they will continue next season.

Most glacial creeks in this large untimbered area, even those shown by thin lines on the map, are cold, wild and unpredictable. They effectively block many exploration

traverses. Seemingly safe glaciers and snow-caps, through or around which safe routes could be found if conditions later warranted it, can also be extremely treacherous as experienced by the writer this season. Rescue from some of the deep, unmarked-on-the-surface crevasses would be impossible. Rolling rock in the steep regions of melting ice is also an everpresent danger during the day. A helicopter would eliminate many of these hazards to safety.

A helicopter in this area should carry sharpened runner prongs for landings on glacial ice.

ESTIMATED COSTS:

Overall costs chargeable to our Northern Prospecting during the past field season (including 50 hours helicopter time and $8500. Gataga assessment work) were approximately $40,000. Use of a helicopter for 100 hours plus a crew of eight for three months would cost an additional $15,000. Costs of these three previously mentioned companies, covering a similar amount of ground, were in excess of $80,000. each.

EQUIPMENT REQUIRED:

Although we have considerable bush camp equipment, a few additions are necessary and others should be seriously considered. Included in the former are some small portable oil stoves suitable for use above timber-line, additional clamp-ons, collapsible aluminum tent poles, etc. Two-way radio is a necessity for efficient helicopter use. We have satisfactory base radios but the small portables are still too large for convenient transport. The Department of

Transport is expected to licence for use a new midget-size partly transistorized radio being built in Vancouver by Spilsbury & Tindall for the Newfoundland Government. Two of these would be ideal for our work, and will cost in the order of $400. each. One could be mounted in an aircraft using the telescoped ariel provided. In order to obtain these sets, an order to purchase must be submitted months ahead of time as the sets have to pass local D.O.T. inspection.

Some petrographic work should be done this winter on several of the mineralized rock types, the originals of which are unknown.

Vancouver, B. C.
November, 1958

James J. McDougall,
Geologist.

S
N

TATS GLACIER

ROUTE TO TATS LAKE

HILL CAMP

SOUTHERN EXTENSION

ASSAY SECTION
SURFACE CHIP SAMPLES
150' AT 0.92 % Cu
100' AT 1.41 % Cu
100' AT 0.73 % Cu
200' AT 0.74 % Cu

5500

POORLY EXPOSED

WINDY GROUP

TOP OF HILL

6000

5500

No.2 SOUTH ARM

CLIFF

INDICATED NORTHERN EXTENSION

CLIFF

CRAGGY GROUP

CHALCOPYRITE IN META-SEDIMENTS

X

PROBABLE SOURCE OF FLOAT

ICE FALL

No.1 SOUTH ARM

5500

5000

4000

COARSE CHALCOPYRITE PYRRHOTITE FLOAT 1.2% TO 4% Cu

X X X

EXTENSIVE CHALCOPYRITE FLOAT. ESTIMATED 2 TO 4% COPPER. (SAMPLES LOST)

X X X

FROBISHER GLACIER

MORRAINE CAMP

DIVIDE TO HENSHI CREEK AND TATSENSHINI RIVER 2 MILES

4000

3000

2000

5000

PYROXENITE INTRUSIVE

2000

3000

4000

5000

1000' ARBITRARY

ALSEK RIVER

ZIG-ZAG GLACIER

SLIGHT COPPER IN BEDDED PYRRHOTITE REPLACEMENT OF META-VOLCANICS & META-SEDIMENTS

60

80

X

TURN BACK CANYON

MAP 1G3

PRELIMINARY AIR PHOTO SKETCH MAP OF

WINDY-CRAGGY GROUP COPPER SHOWINGS

J.J. McDOUGALL, FROBISHER LIMITED, 1958

SCALE - 1 inch = ½ mile (+-)

NOTE - FORM LINE INTERVAL 1000 AND 500 FT. BASE ELEVATIONS ARE INTERPRETATIONS ONLY AS NO TOPOG DATA IS AVAILABLE FOR THIS AREA. FROM AIRPHOTOS A12820-307, 308, & 341.

LEGEND

- OBSERVED OR INDICATED COPPER ZONE PLUS ASSAY DATA IN LENGTH AND % COPPER.
- GREENSTONE COMPLEX - UNDIVIDED. CONTAINS CONSIDERABLE META-SEDIMENTS AS WELL AS ALTERED VOLCANICS.
- GRANITIC ROCKS
- GLACIAL MORRAINE OR GRAVEL TRAINS
- GLACIER