

CONFIDENTIAL

**GEOLOGIC REPORT  
on the  
KAY GROUP OF CLAIMS and UPPER WHITE CREEK,  
Kotza River Area, Y.T.**

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## SUMMARY STATEMENT

This report describes stratigraphy, structure and silver-lead mineralization on the Kay Group of claims and adjacent upper White Creek, 100 miles due northeast of Whitehorse, Y.T.

The rocks in the area are chiefly Paleozoic marine sediments which are locally invaded by small bodies of diabase, syenitic rocks, intermediate dikes, and granodiorite. The sedimentary rocks are broadly folded in a northwest-southeast direction and although these major structures do not appear overly complex, detailed structure in the incompetent members is very complex. The area is cut by northerly- and northwesterly-trending faults, some of which have served to localize alteration and mineralization.

Mineralization in the area consists chiefly of silver-lead veins and replacements, with local zinc and copper mineralization. A lower Cambrian limestone formation was found to be the most favourable host rock, especially where faulted or brecciated.

In view of the varied stratigraphy, complex structure and widespread signs of mineralization, further work is recommended on the claims.

## INTRODUCTION

### Location and Accessibility

The Kay Group of claims straddles the ridge which separates the heads of White Creek and Ketzka River in the Pelly Mountains of the Quiet Lake Map area of Whitehorse Mining District, about 110 miles due northeast of Whitehorse, Yukon. At present the area can be reached best from two lakes on which planes can land: (a) Bruce Lake from which 30 miles of good trail lead up Ketzka River, (b) Grayling Lake, from which it is a 15-mile hike up White Creek. The area can also be reached in two days by horses from the Canol Road which runs in a north-south direction about 30 miles east of the area. The Canol Road is in fair shape for travel and the White Creek area could be easily connected to it at Quiet Lake by building 35 miles of road up Nisutlin River, McConnell River, and White Creek. Such a road would place the area within a trucking distance of about 180 miles from Whitehorse, Y.T.

### Topography, Climate, etc.

The Kay Group of claims lies between 5000 and 6500 feet elevation on top of one of the higher ridges in the more rugged parts of the Pelly Mountains, where peaks reach up to 7000 feet elevation and valleys lie at 3500 feet or less. The Pelly Mountains form a pronounced weather barrier so snowfall is moderate to heavy (6 feet or more), and storms are common even in summer. The area is largely

clear of snow in early or mid-June and becomes blanketed again in mid- or late September. Timber suitable for exploration purposes (spruce and balsam) grows to elevations of 4500 feet. Water is generally plentiful in the lower parts of the claims, especially early in the season. The north slopes and other local areas are underlain by permafrost which restricts stripping of mineral showings. Many of the steeper slopes are subject to snow and rock slides which may locally endanger permanent construction.

### History

The Pelly Mountains in general have remained relatively unprospected until the last few seasons. In 1954 and 1955, however, a rich silver-lead discovery up Ketzka River drew the attention of Conwest and other companies to this region. Over 500 claims were staked on this discovery and around adjoining showings of similar mineralization late in 1954. In October, 1954, British Yukon Exploration staked the Kay Group of 32 claims, south of Conwest's ground on the divide between the upper West fork of Ketzka River and upper White Creek.

The general area did not attract as many prospectors as it deserved in 1955, probably because of its relative inaccessibility for short trips and because of the late spring. However, a number of new showings were found and Conwest's main showing continues to be promising. The general area also is promising enough to merit at least several seasons further prospecting and exploration.

From May 11 to October 2nd, 1955, British Yukon Exploration employed two to four men at Upper White Creek doing prospecting, geologic mapping, and trenching. Several silver-lead showings were worked on and twenty-seven additional claims (Yak Nos. 1 and 2, Yak fraction, Rain Nos. 1-16 and 25-28, and Pyrite Nos. 1-4 inclusive) were staked in 1955 to cover the new discoveries. For clarity and completeness the reader should refer to the geologic map included with this report.

## GEOLOGY

### Regional Geology

The Pelly Mountains in this region consist of folded and faulted Paleozoic marine sediments which are bounded on the southwest by a granitic batholith and on the northeast by the Pelly-Hoole trench, a zone of regional faulting which locally separates the Paleozoics from Yukon Group metamorphic terranes. Farther southeast in the Finlayson Lake map area the Paleozoics are reported to be overlain by a thin cover of Mesozoics (Don Gannon).

In the White Creek area Lower Cambrian limestone and phyllite are exposed along a N 70° W anticlinal fold and are bounded on the north and south by phyllites, dolomites, quartzites, and other rock types, some of which have yielded Devonian fossils. A second anticlinal fold is reported 10 miles to the north (W.A. Padgham). North of this reported anticline and 5 miles south of the one at White Creek, thick

massive limestone bands can be seen outcropping for miles. Between these two limestone bands, which may be the same formation, the structure may be a broad uplift.

#### Stratigraphy at Upper White Creek

The rocks on the Kay Group of claims and adjacent upper White Creek consist chiefly of beds of marine sediments which have been folded and weakly metamorphosed to phyllite, limestone, dolomite, and quartzite. The following stratigraphic sequence was observed at this locality where the section is exposed best:

#### Apparent Stratigraphic Section at Upper White Creek

White, brown and grey massive pyritic <u>quartzite</u> , minor greenish grey chert, limestone, and phyllite with ankeritic (?) <u>impure quartzite</u> and gradations to limy schists and minor green phyllite forming the bottom of this section.	} Several 100 ft.
<u>Black phyllite</u> or slate (may contain local slaty limestone).	} 100 ft.
Massive to thin bedded, buff weathering <u>dolomite</u> with local chert nodules and thin ribbon chert beds.	} 100-200 ft.
Thin bedded slaty limestone and oolitic limestone. Locally absent (?).	} 50 ft. ?
<u>Brown phyllite</u> (locally limy) grading downward to grey and <u>black phyllite</u> .	} 500 ft.
Blue-grey, massive, fossiliferous <u>Lower Cambrian limestone</u> (locally overlain by 50 feet of brown phyllite).	} 150-200 ft.
Several beds of slaty or shaly limestone alternating with greyish brown phyllite and grading downward into <u>grey phyllite</u> at least several hundred feet thick with minor limy and sandy beds.	} 500 ft.

Although this section appears to hold for this locality it does not preclude some degree of thickening by thrusting or isoclinal drag folding, especially in the incompetent members such as the phyllites where structure is very complex. No detailed studies have been made yet of thicknesses, lithology, facies changes, or paleontology. A collection of Archeocyathus fossils from the blue-grey limestone bed yielded several Lower Cambrian species identified and studied by Dr. V.J. Okulitch and Yoshio Kawase of the University of British Columbia. A colonial coral believed to be of Devonian age was found in float, probably derived from the vicinity of the dolomite.

#### Intrusive Rocks

On the southern half of the Kay Group of claims the quartzite formation is intruded by sills and dikes of fine-grained to medium-grained diabase with local hornblende and dioritic variations. Similar dioritic or gabbro intrusive plugs were found in the area. Altered dikes of intermediate composition are common throughout. On the Kay Group a lens of coarse-grained, varied-textured syenite with silicified phases and interstitial serpentine also cuts the quartzites. Similar diabasic and syenitic rocks occur in other localities as far west as Grayling Lake. A granodiorite stock was encountered 4 miles south of the Kay Group.

## STRUCTURE

### Chief Folds

The chief structure along which the Lower Cambrian section is exposed is an open anticline which trends about 110 degrees across the head of White Creek and plunges about 10 degrees southeast. This is referred to as the White Creek anticline. This fold, which is at least 2 miles wide and has been traced for several miles to the west, is complicated only by minor crumples and faults. The south limb dips from 30 to 50 degrees and along this south limb the Lower Cambrian limestone formation is exposed for 4 miles down the south side of White Creek, crossing then to the north side. Since this limestone is the favoured host rock for many of the silver-lead showings, many of the latter are found along the south side of White Creek.

The White Creek anticline barely extends onto the Kay Group of slates at the head of White Creek, then appears to be cut off by a major northwest fault beyond which it was not traced with certainty. The main structure on the Kay Group is a southeasterly plunging syncline along which the uppermost quartzite formation is exposed. The structure to the southwest was not determined. To the northeast this synclinal fold is succeeded by some minor folds, then by a broad anticlinal structure along which the black and brown phyllites are exposed. Still farther northeast, bordering Ketz River, quartzites are again exposed in a fold whose southeast end apparently plunges northwesterly --- Conwest's main silver-lead showing is in this structure.

### Detailed Fabric

Detailed structure in the area is shown best in the incompetent phyllite members, especially where thin limestone or dolomite bands serve as markers. In these rocks a foliation or slaty cleavage is well developed approximately parallel to the axial planes of the major folds, striking about 100 to 110 degrees and dipping vertically or steeply south. Drag folds, common in these incompetent members, have their axial planes in this approximate orientation also, and plunge chiefly horizontally or southeast, less commonly northwest. In places, small scale crenulations or lineations in the planes of foliation tend to parallel the axes of the drag folds. The chief lineation in the plane of foliation, however, is caused by a pervasive and fairly strong, gently-dipping secondary shear foliation which cuts across all of the above structures. Movement along these planes of secondary foliation has produced minor secondary drag folds which in some places obscure much of the earlier structure. Beyond the above generalizations any attempt to study these detailed structures would entail detailed mapping and statistical study.

### Faults

The rocks in the entire area are cut by northerly- and northwesterly-striking fracture and fault zones. On the north and south sides of White Creek several of these faults can be seen, with examples of both left- and right-handed movements up to 500 feet. These faults appear to have localized most of the silver-lead mineralization in the area.

One of the largest such faults apparently slices along the west side of the Kay Group of claims from the slopes of McNeil River valley across the head of White Creek into the head of Cache Creek, the second west fork of Ketz River. This fault seems to cut off the White Creek anticline structure and drops the northeast side down, cutting out up to 500 feet of the stratigraphic section in this area. The fault was directly observed on the east side of the cirque at the head of White Creek near Kay No. 20 claim but talus prevented determination of its dip. A quartzose breccia zone carrying limonite and some copper stain, found at the southwest corner of the Kay Group, may be part of this fault zone. Pyrrhotite and galena showings and associated quartz bodies with chalcopryrite on Oxo No. 19 claim at the head of Cache Creek also lie on or near this fault zone.

The syncline on the southwestern part of the Kay Group is complicated by steeply-dipping northwesterly-trending faults and perhaps also by cross faults, but lack of time and nature of the terrain did not permit their solution. North of the Kay Group on the Yak claims, the structure is again complicated by both minor folds and faulting.

West of the Kay Group, about 4 miles from the head of White Creek, the stratigraphic section described earlier is apparently juxtaposed against a southwesterly dipping sequence of limestone, chert, argillite, quartzite, etc., by another major fault which dips southwestward. The age of these rocks is not known and the postulated fault, although apparently

exposed in cirques draining into McNeil River, has not been observed closely; however, it is thought to be a reverse or thrust fault with movement similar to that of the one at the head of White Creek.

#### MINERALIZATION

Mineralization in the White Creek area consists mainly of galena and local sphalerite and chalcopyrite with appreciable silver values, especially where "grey copper" (tetrahedrite) is present. No gold values over 0.06 oz/ton were encountered. Pyrite and pyrrhotite and manganiferous siderite accompany much of the mineralization, producing characteristic iron rust that helps in prospecting. Magnetite is present in some of the siderite. Quartz and barite are present in some of the mineralization, especially the vein types. Some barite veins carrying sphalerite were found on Kay No. 17 claim. Arsenopyrite veins were found in the quartzite on Kay Nos. 18 and 20 claims. Chalcopyrite-bearing quartz veins and stringers were also found. Fluorite, some of which is slightly radioactive, occurs in and around the syenitic body on the Kay Group.

The silver-lead mineralization occurs in two types which grade into one another: (a) as veins or open-space fillings along fractures, breccia zones, or faults in any of the several rock types, (b) as irregularly shaped replacements in limestone. Some of the veins consist chiefly of galena and carry up to 70% lead and 50 to 60 oz/ton or more of silver while others are less pure and contain quartz, iron sulfides,

siderite, or sphalerite as well. The replacements consist of iron carbonate (siderite) with or without iron sulfides (pyrite and pyrrhotite), in which galena is scattered or forms stringers giving 12 to 15% lead and about 10 oz silver per ton. Although smaller, the veins tend to carry higher values while the replacements, although larger, are lower in grade. In most of the mineralization found so far the ratio of silver (oz/ton) to lead (%) averages about 0.7, being about 0.6 in iron-rich replacements and 0.9 or more in certain veinlets. However, higher silver values were encountered in two localities in vein type mineralization which contained grey copper, a silver-carrier in this area.

Most of the known silver-lead mineralization on the Kay claims and at White Creek is localized near the top of limestone or dolomite beds where they are cut by faults or fracture zones. The vein type mineralization occurs as veins or stringers in these fault or fracture zones and although found chiefly in the competent limestone or dolomite it also extends into the incompetent phyllites where the breaks are open enough, and may be well developed again in the competent quartzites. The replacement type mineralization has been found so far only in the Lower Cambrian limestone and appears to be localized at or near faulted or fractured and brecciated zones. In two places, on Kay No. 25 and 32 claims, disseminated lead-zinc-barite mineralization was found in dolomitic limestone which was locally silicified and in both cases overlain by black phyllite. It thus appears that the silver-lead

mineralization in the White Creek area is localized best where northerly or northwesterly faults and fractures serving as feeders cut mechanically competent and chemically favourable limestone, this in turn being overlain by incompetent phyllite which had a damming or restricting effect on further migration of the mineralizing solutions.

Trenching and preliminary detailed mapping was done on several showings on both the Kay Group and on adjoining ground but since this economic data has already been discussed in the report entitled "Summary Report on Silver-Lead Mineralization in the Upper White Creek Area, Y.T.", it will be omitted in the present geologic report.

#### CONCLUSIONS AND RECOMMENDATIONS

The chief structure on the Kay Group is a synclinal fold bounded on the southwest by a major fault and on the northeast by other folds and faults. Due to the many faults and complexities within the rocks on the claims, there could be many places in which ore may lie hidden. The favourable Lower Cambrian limestone formation outcrops on the southwest margin of the claims but elsewhere it appears to underlie the claims at a depth of 500 to 2000 feet or more and would be important only if a very persistent and promising vein structure could be traced to this depth.

Small showings of mineralization and pieces of float were found in so many places on and near the Kay Group of claims that further detailed prospecting, trenching, and

detailed geologic mapping of the more promising localities are necessary before any decision of more serious work or abandonment of any claims should be reached.

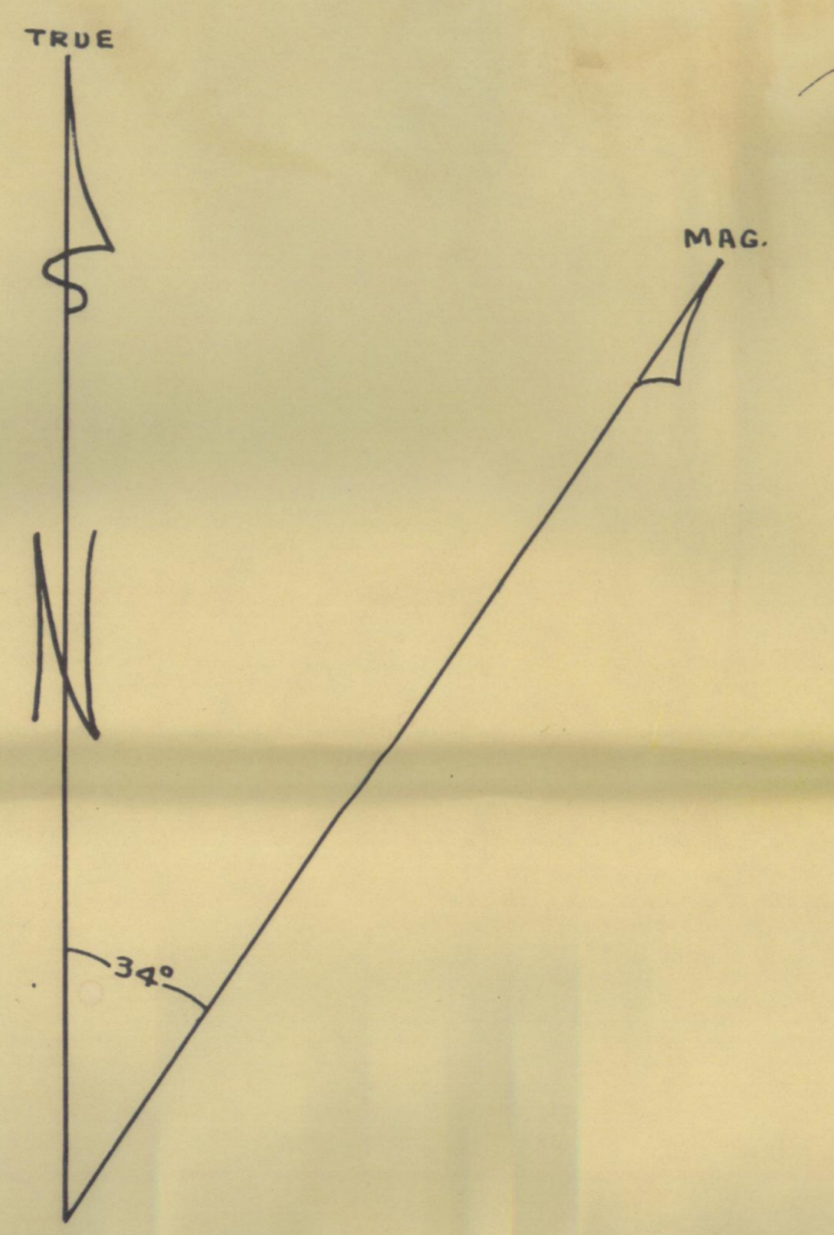
It is recommended that when the area is free of snow, a geologist should map each mineralized area in detail, trace the magnetic showings with a small magnetometer and the others with a small electromagnetic or electrical device. To expose the showings he should have at least two good men capable of trenching, using powder, and prospecting locally.

Respectfully submitted,

A handwritten signature in cursive script, appearing to read 'A.E. Aho'.

A.E. Aho, P.Eng.

- LEGEND**
- DIABASE, GABBRO
  - SYENITE, ETC.
  - QUARTZITE, CHERT, IMPURE QUARTZITE
  - BLACK PHYLLITE
  - DOLOMITE (INCLUDES THIN BEDDED LIMESTONE)
  - BROWN PHYLLITE (INCLUDES UNDIFFERENTIATED BLACK PHYLLITE)
  - LIMESTONE (MAINLY LOWER CAMBRIAN)
  - GREY PHYLLITE



PRELIMINARY  
GEOLOGIC MAP  
OF  
**KAY GROUP OF CLAIMS**  
AND  
**UPPER WHITE CREEK**

KETZA RIVER AREA, Y.T.  
JAN. 15, 1956 A.E. AHO  
SCALE 1 IN. = 500 FT.  
ACCURACY OF CLAIM POSITIONS NOT CERTIFIED

