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FINAL GEOLOGICAL REPORT.

CW GROUP - STIKINE AREA.

G. W. Grant.

December 30, 1964.

STATEMENT OF QUALIFICATIONS AND EXPERIENCE - G.W. Grant

To whom it may concern:

I, Gerald W. Grant, presently resident in the Town of Timmins, Province of Ontario, state that the following is a true and accurate statement of my qualifications and experience.

EDUCATION

1950-1953 inclusive: Attended McGill University at Montreal, P.Q. Course leading to Bachelor of Science Degree in Geology. Geology courses completed: General Geology, Mineralogy, Structural Geology, Field Geology.

1954-1957(11 terms only): Attended Michigan College of Mining and Technology, Houghton, Michigan, U.S.A. Course leading to Bachelor of Science Degree in Geology. Geology courses completed: Mineralogy, Structural Geology, Petrography, Optical Mineralogy, Igneous, Sedimentary and Metamorphic Petrology, Economic Geology, Historical Geology, Paleontology, Index Fossils, Physiography, Principles of Sedimentation and Stratigraphy, Petrogeny. (All with plus 80% marks).

Did not complete all courses required for Degree prior to leaving in 1957 due to financial reasons.

EXPERIENCE

Summer 1950: Prospector's helper, O'Brien Gold Mines Ltd.

Summer 1951-1952: Junior Assistant, Quebec Geological Survey. Reconnaissance mapping, Northwestern Quebec.

Summer 1953-1954: Junior Geologist, Eldorado Mining and Refining Ltd. Detailed mapping. Beaverlodge, Saskatchewan.

Summer 1955-1956: Associated Group of Small Exploration Companies (Trojan, Jackson Basin, Anuwon). Party leader on geological mapping and prospecting programs, Northern Saskatchewan, Highland Valley, B.C., Northwestern Quebec.

Summer 1957:	Sulmac Exploration Services Ltd., Junior Geologist. Detailed and reconnaissance geological mapping, Northwestern Ontario, Northern Manitoba.
1958-February to June:	Cyprus Exploration Co. Ltd., Exploration geologist. Drill supervision, property acquisition, etc. Initial work on Solbec Copper orebody, Eastern Townships, P.Q.
June 1958-February 1963:	Sulmac Exploration Services Ltd., Exploration Geologist. Detailed and reconnaissance geological mapping, diamond drill supervision, supervising contract geophysical programs, property examinations. Ontario, Quebec, Manitoba, Yukon Territories, Northwest Territories.
February 1963-April 1964:	Leitch Gold Mines Ltd., Exploration Geologist. Supervising exploration program Ireland with part of time spent on program in Canada.
May 1964-Present:	Conwest Exploration Company Ltd., Exploration Geologist.
Professional Societies:	Junior Member A.I.M.E., Member Canadian Exploration Geophysicists Society.

G.W. Grant

G.W.Grant

March 13, 1965

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CW GROUP.

SUMMARY AND CONCLUSIONS:

The CW Group in the Stikine River Area of Northern British Columbia was geologically mapped and prospected during the months of June to September, 1964, by the writer and assistants. Stream sediment and soil sampling, with subsequent geochemical analyses for copper and molybdenite, was carried out concurrently with the mapping.

An area comprising more than 90% of the Group is underlain by volcanic rocks consisting of intermediate to acid flows and pyroclastics with minor associated sediments. These volcanics apparently belong to two distinct series. A band of white limestones from one quarter to one half mile in width crosses the eastern portion of the Group. Two small portions of the eastern end of the Group are underlain by graphitic argillite. Two intrusive bodies, one a coarse grained granite and the other a quartz monzonite, occupy small areas at the north west and north east corners of the Group respectively. Neither of these intrusives seems to host or originate copper mineralization. An intrusive body of syenite porphyry, exposed for a short distance along a creek bed, was located east of Galore Creek in an area largely covered with overburden at the eastern end of the Group. The eastern edge of the Coast Batholith complex outcrops just west of the west boundary of the Group, where it is of quartz monzonite composition.

Extensive mapping, trenching, geophysical surveying and considerable diamond drilling by Kennco has indicated copper mineralization of undoubted economic importance in the basin at the head of Galore Creek. This copper mineralization, consisting largely of chalcopyrite with minor bornite, is apparently confined to an extensive intrusive complex of syenitic composition and porphyritic texture (1). Indicated tonnage and grade of this deposit is of the order of two hundred million tons of somewhat better than 1% copper.

Limited drilling and rock trenching by Southwest Potash has indicated copper mineralization in a similar syenitic porphyry of much more limited extent lying south east of the Kennco Syenitic complex on the east fork of Galore Creek (2). This deposit has an indicated tonnage in the order of eight million tons running about 1% copper and a further possible twenty million tons of a grade of about 0.5% copper, although these tonnages and grades are regarded as highly speculative by the writer.

Copper mineralization, largely chalcopyrite, is also known to occur in the Stikine River area as disseminated replacement deposits in north east striking shear zones in volcanics, notably at the intersection of Camp Creek and Canyon Creek on the Kennco JW Group (5) and on the KIM Group of Kennco and Silver Standard (3) at the upper part of Sphaler Creek. Whether such deposits, apparently not directly related to porphyritic syenites, have economic significance, has not been established at the present time.

The Split Creek copper occurrence (4) presently held by Anaconda and Julian (Wenner Gren Interests) may be of the disseminated replacement type in volcanics, although reportedly intrusive underlies the volcanics here at shallow depths.

The only copper mineralization noted on the CW Group consisted of sparse chalcopyrite and possibly tetrahedrite in short narrow quartz veins (one inch to two feet wide) with some malachite staining and only very sparse chalcopyrite found in the adjacent volcanic wall rock. None of these occurrences are of any economic significance. These occurrences were largely restricted to the eastern third of the Group, with the exception of a few on the south side of Jack Wilson Creek Valley west of the end of Jack Wilson Glacier. All the located copper occurrences on the Group were reflected by anomalous geochemical results downslope or downstream and thus geochemical prospecting seems particularly applicable to the area. An area on the north west wall of Galore Pup Creek shows anomalous copper values in stream sediments, which appear too high to be explained by the apparently sparsely mineralized quartz veins and malachite stained volcanics which were accessible for examination. The volcanics also seem to be pyritized more intensely in this area. Stream sediment samples taken in close proximity to the syenite porphyry mass west of Galore Creek are anomalous. This syenite, while possibly of only limited extent, is remarkably similar in composition and texture to the Kennco and Southwest Potash stocks and while no mineralization was observed in the limited exposures, the presence of the syenite seems quite significant. In addition, considerable pyritization of the volcanics west of the syenite and south of the limestone volcanic contact suggest the possibility of an extension of this intrusive or another lying not far underneath the cover of volcanics.

INTRODUCTION:

The CW Group of Conwest Exploration was staked in February, 1964, in conjunction with two other groups, adjoining claims on which Kennco was known to be developing significant copper deposits.

This Group was mapped and prospected by the writer, aided by two graduate geologists, N. J. Dircks and W. Dollery-Pardy, and three helpers, W. Dennis, M. Louie and L. Louie.

Mapping was carried out, using transparent overlays on air photographs of approximate scale of 1" = 2640'. A stapled laydown mosaic of these aerial photographs on the same scale was compiled by Hunting Survey Corporation Limited covering the group and an extensive surrounding area. It proved useful in obtaining an overall picture of the group and for regional mapping but was not used for drawing up the base map. The base map was compiled by the writer. Topography was traced on overlays using only the center thirds of the air photographs. These traced overlays were laid and oriented to control taken from the Telegraph Creek Sheet, Map 104 G, in order to give the greatest possible accuracy and detail. Although neither control nor equipment was available for adjusting the individual photographs for tilt and scale, the result is essentially a semi-controlled mosaic. The resulting map was photographically enlarged to twice its original size to produce the final geologic map on a scale of one quarter mile to the inch.

Stream sediment and some soil sampling, with a total of 91 samples taken, was carried out concurrently with the mapping and the samples were analyzed for copper and molybdenite by the laboratories of Southwest Potash in Smithers, B.C., and X-ray Assay Labs in Toronto. Five thin sections and one polished section were studied by Dr. H. T. Carswell of Vancouver. Twenty-one samples were taken for assay and analyzed by Coast Eldridge in Vancouver.

The locations of all geochemical samples, assay samples and samples for thin section are marked on the CW Group geology map and all results are detailed in the appendix.

CLAIMS:

The CW Group consists of 267 claims, CW 1 - CW 267 inclusive, staked in February, 1964, and a further 18 claims, CW 268 - CW 285 inclusive, staked in August, 1964, to cover internal fractions noted after locating and plotting the original posts, making a total of 285 claims. Of these, 14 claims staked in February and 2 claims staked in August appear to be entirely or largely staked in contravention of the Mining Act, covering ground previously staked by Kennco as claims JW 1 - JW 14 inclusive in May, 1962. Claims, tag numbers, record numbers and apparent status are detailed in the appendix. Thus, effectively, the group consists of 269 contiguous claims but because of the

necessity for overlapping witnessed claims to avoid fractions, the actual area of the group is approximately 15 square miles. Its greatest east-west extent is 42,000 feet and the maximum north south extent is about 15,000 feet.

LOCATION AND MEANS OF ACCESS:

The CW Group of Conwest Exploration lies in the Coast Range Mountains of Northern B.C. The west boundary of the group lies about three and a half miles north east of the junction of Jack Wilson Creek and the Stikine River. The claims lie largely west of Galore Creek, generally between Jack Wilson Creek and Contact Creek. Galore Creek and Contact Creek flow into the Scud River which is also a tributary of the Stikine. The group is centred approximately at 57° 12'N and 131° 33'W and lies approximately 50 air miles south south west of Telegraph Creek, B.C., and about the same distance south west of Kinaskan Lake, the nearest points presently accessible by road.

Float equipped fixed wing aircraft can land in the summer on the Stikine River along much of its length west of the group. Docking facilities are available at the mouth of the Anuk River on the Stikine, some 5 miles south west of the group, both for float planes and for river barges. During the summer months a weekly barge service is available from the deep sea port of Wrangell, Alaska, up the Stikine to the mouth of the Anuk. The crew and camp equipment engaged in the CW Group mapping were moved by fixed wing float plane from Kinaskan Lake to the Stikine River and then ferried by helicopter up to the first campsite on the upper part of Camp Creek. The helicopter was also used to move to the second and final campsite near the head of Galore Pup Creek. The machine was utilized on several days for regional reconnaissance and also to examine inaccessible exposures on the claim group. Some six miles of trail had to be cut to facilitate access within the group through densely vegetated areas.

During the past field season Kennco completed two gravel airstrips suitable for Otter aircraft on wheels, one in the basin at the head of Galore Creek and the other on the gravel flats of the Scud River near its junction with the Stikine River. The same company also commenced work with one bulldozer on a tote road suitable for tractor transportation from the upper reaches of Galore Creek to the Stikine River. The presently proposed route for this road is north along the west side of Galore Creek and then up the south side of Galore Pup Valley, across the pass at its head on to Jack Wilson Glacier, and thence down Jack Wilson Valley to the Stikine. A large part of this route would lie on the CW Group and if it can be completed, could not only serve for bringing up supplies from the Stikine for any further development of the CW Group, but its construction could be used for assessment credit, assuming Conwest contributed to the cost. The furthest point reached before work was halted for the season was about one and one half miles up Galore Creek from the CW south boundary.

GEOGRAPHY:

The CW Group lies within the Western System of the Cordillera in the Coast Mountain Area. The Coast Mountains in the area consist of great upwarped blocks dissected by broad U-shaped valleys of gentle gradient, such as the Stikine, Scud and Porcupine Rivers. These blocks are secondarily dissected into smaller subdivisions by tributary streams with generally U-shaped valleys in their upper reaches but whose streams drop abruptly to the floors of the main valleys such as is well illustrated by Galore, Jack Wilson and Contact Creeks where they enter the Scud and Stikine valleys. Major tributaries to these creeks bear similar relations illustrated by the abrupt drop of Galore Pup Creek into Galore and Camp Creek into the valley of Jack Wilson Creek. Small tributaries are rapidly dissecting the walls of all these aforementioned valleys with V-shaped gullies, due to their steep gradient and the abundant supply of meltwater and high summer precipitation of the Coastal Rainforest climate of the area. The floors of these U-shaped valleys are largely covered with glaciofluvial deposits. Bedrock is seldom exposed on the valley floors, except along the lower reaches of the streams where they have cut back ravines from the hanging end of their valley above the larger valley to which they are tributary. Much of the outcrop on the steep walled sides of these valleys is inaccessible for close examination.

Topographically, the claim group occupies parts of four major mountain blocks. The westernmost is bounded on the north by the valley of Contact Creek and the cirque at its head, on the south by the valley of Jack Wilson Creek and on the east by the pass between Contact and Jack Wilson valleys defined by Camp Creek and the north-flowing tributary of Contact Creek. The highest point in this block is between 4500 and 5000 feet with the elevation of the pass bounding it on the east being about 2000 to 2500 feet.

The largest part of the claim group lies across a large mountain block bounded on the north by Contact Creek, on the south and southeast by Jack Wilson Glacier and Galore Pup Valley with their connecting pass, on the east by the valley of Galore Creek and on the west by the pass between Jack Wilson and Contact Creeks. Most of this block has an elevation of greater than 4500 feet and rises to a number of greater and lesser peaks of higher elevation separated by ice fields and glaciers. The most prominent height is a large sharp pointed horn near the center of the block just south of the north boundary of the group. It's summit is marked on the map with a small triangle. This unnamed peak has an elevation of somewhat greater than 7000 feet and is the highest point on the claim group.

A small portion of the southernmost claims lies on the north flank of the major ridge separating Jack Wilson Creek and Glacier and Galore Pup Creek from the large basin at the head of Galore Creek. The rather sharp crested ridge rises to elevations of close to 7000 feet at the peak termed Saddle Horn Mountain lying south of the claim group opposite the lower third of Jack Wilson Glacier. Where the crest of the ridge runs on to the CW Group near its termination at the Galore Creek Valley, the highest elevation on the group is about 5000 feet.

The CW Claims east of Galore Creek lie on the western flank of a major mountain block which rises gently at first to elevations of greater than 7500 feet some distance to the east of the claim group. The maximum elevation on the claims lying east of Galore is about 3000 feet at the north east corner of the group.

Galore Creek, separating the two latter blocks, has incised a narrow steep walled canyon up to 400 feet deep into the bottom of its U-shaped valley throughout most of its course across the CW claims.

The lowest elevation at the east end of the claim group, at the junction of Galore and Galore Pup Creeks, is between 1000 and 1500 feet. The lowest elevation on the group, at the west boundary of the claims at Jack Wilson Creek, is less than one thousand feet.

The higher elevations of the group have been extensively sculptured by mountain glaciation with the resulting formation of numerous mature and incipient cirques, arretes and horns. Permanent snow fields occupy many small sheltered basins and shelves down to about 4500 feet with extensive snow and icefields feeding glaciers at higher elevations. The fronts of some of the smaller glaciers are presently as low as 2500 feet and the ice front of Jack Wilson Glacier is presently at an elevation of 1500 feet. Hanging glaciers with falling ice and development of snow corniches on the edges of ridges and the upper rims of some of the larger valleys hinder examination of many of the higher rock exposures. Some twenty percent of the area of the group is occupied by permanent snow patches and snow fields and by ice fields and glaciers. The fronts of glaciers observed seem generally to be retreating. Glacial erratics were found on the bare flat top of a subsidiary peak just east of the Jack Wilson-Contact Creek Pass at an elevation greater than 5500 feet, indicating that much more extensive glaciation once overode much of the area.

The tree line in the area presently extends up to about 4000 feet elevation, above which only small shrubs and arctic vegetation exist. Generally scattered rather stunted balsam fir together with dense growth of alders are found from about 2000 feet up to the tree line, together with some devil's club. Below two thousand feet rather large sized Balsam, Douglas Fir and Hemlock, together with large cottonwoods near the major streams, are found. The undergrowth of these lower elevations is a dense jungle-like mass of alders and devil's club. The sky was overcast nine days out of ten during the summer, with frequent, generally light, rainfall. Sudden dense fog conditions at the higher elevations, apparently caused by warm moist air from the coast moving up the valleys and coming in contact with the snow and ice, are prevalent.

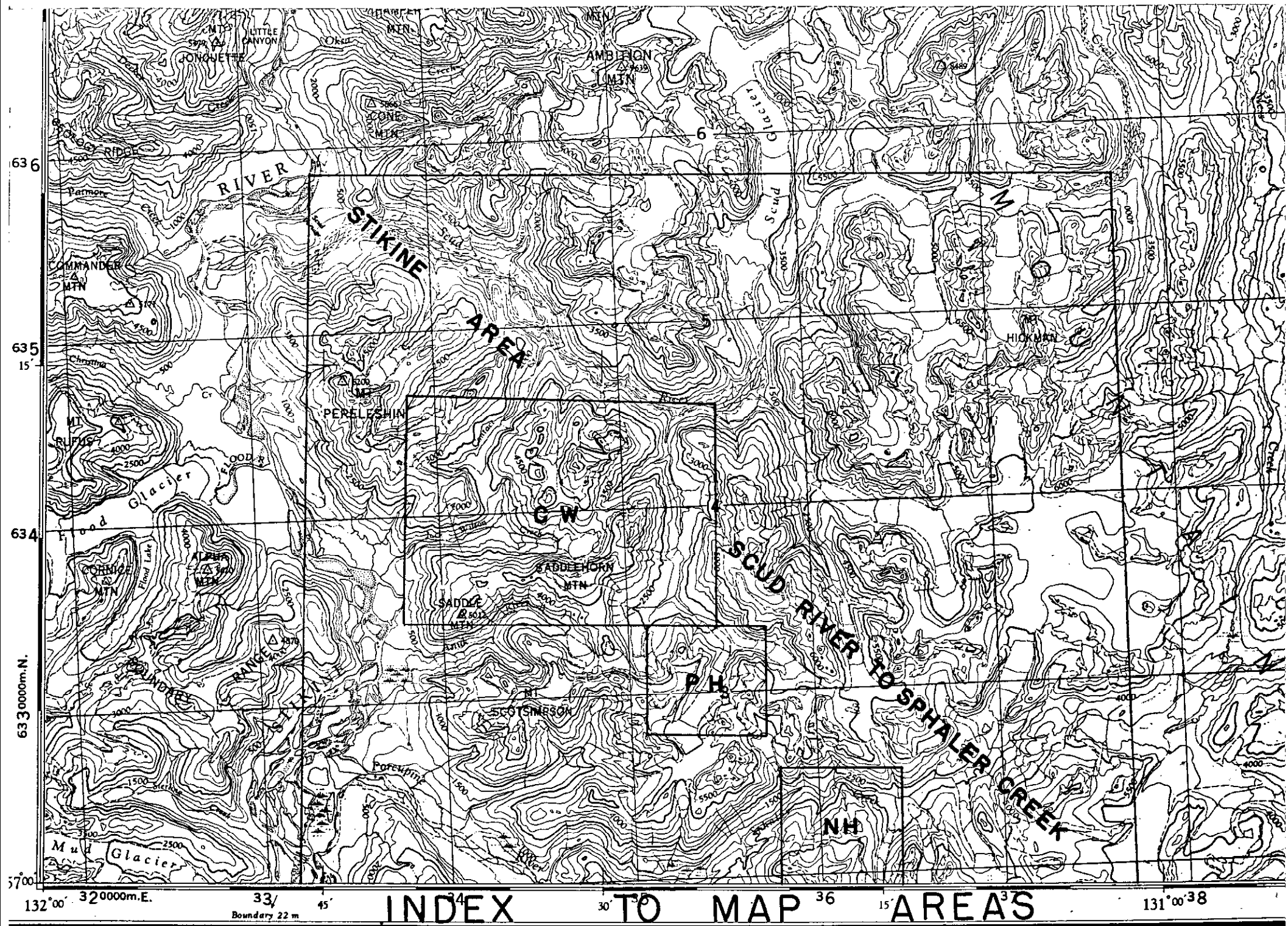
REGIONAL GEOLOGY:

The portion of the Stikine Area discussed, that is the area lying east of the Stikine River and between the Scud River and the Porcupine River-Sphaler Creek, is termed for convenience the Galore area in this portion of the

report. While the general outline of the geology of the Galore area is known, only a very sketchy study has been made of the Statigraphy, Structure and Age relationships both within the area and as they are related to other regions of Northern B.C. The information presently available for parts of this area is the result of reconnaissance mapping of portions easily accessible to the Stikine River by F. A. Kerr of the Geological Survey of Canada from 1926 to 1929, and helicopter reconnaissance mapping by officers of the Geological Survey of Canada in "Operation Stikine" in 1956. The former work is published on a scale of 2 miles to the inch, and the latter on a scale of four miles to the inch. The information shown for the Galore area on the more recent map appears to be taken largely from Kerr's map and most of the rest is termed unmapped.

In order to get a better picture of the regional geology, the writer made a one day helicopter reconnaissance of an area of some 20 miles by 18 miles centered approximately on the upper Y branching of Galore Creek. This work was done on the previously mentioned air photo mosaic compiled by Hunting on a scale of one inch equals one half mile which covered the area defined. Only a few landings could be made to check these observations from the air. Subsequently, this information was plotted on a base map covering a somewhat larger surrounding area of about 24 to 28 miles. The base map is of the same scale, one inch equals one half mile, and was made by tracing a photographic enlargement of part of the Telegraph-Creek Sheet topographic map, Sheet 104 G (scale 1/250,000). On this map was also plotted the information obtained from the mapping of the CW Group and the other two Conwest claim groups in the area and information obtained from published and unpublished maps of other mining companies. Where it seemed reliable, information from the two aforementioned Geological Survey of Canada maps was used for areas not covered by the other sources of information. The map, copies of which accompany this report, was divided into two sheets, an east and west half, for more convenient size. An accompanying index map shows the area covered by the large compilation titled Stikine Area, Scud River to Sphaler Creek, as well as the areas covered by the individual property maps.

The area generally comprises an embayment of sediments and volcanics into the multiple intrusions known as the Coast Range Batholith. This embayment results from eastwardly bulges of the Coast intrusives lying north and south of the embayment. The broader relationships of this structure and a similar one to the north are discussed by P. O. Hachey in his report Stikine Project 1964. A number of smaller intrusive bodies, some of them porphyritic and copper bearing, are found within this embayment. The age of the volcanics and sediments ranges from late Paleozoic to early Mesozoic but further subdivision is extremely tentative, especially where the volcanics are concerned. The Northern Coast Range Batholithic Intrusives of British Columbia are believed to have been emplaced periodically from Pre-Upper Triassic until Mid-Tertiary. The smaller intrusive bodies, particularly the porphyritic copper bearing bodies, are generally believed to be of Tertiary Age both in the Galore area and elsewhere in Northern B.C.



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N OF THE COMPASS NEEDLE, 1954

Telegraph Creek

Surveyed, compiled, drawn and printed by the ARMY SURVEY ESTABLISHMENT, R.C.E., 1950-54.
Aerial photography by the R.C.A.F., 1949.

Universal Transverse Mercator Projection

SCALE 1:250 000 (1" = 4 MILES APPROX.)

FROM SHEET 104 G

TELEGRAPH C

The sediments and volcanics have been tentatively subdivided into four generalized groups where possible, with some of the volcanics not classified where information seemed insufficient. While much of this classification is based on lithology, it is deemed satisfactory for purposes of economic geology.

The oldest rocks belong to two series which may be contemporaneaous and/or essentially the same. They are believed to be Pre-Permian. The first, (1) on the Stikine Area map, was mapped and classified by Kerr and is described as quartzite, schist, slate, argillite, limestone; schistose tuff, highly altered extrusives and/or intrusives. None of the exposures classified as (1) was examined by the writer. The other series (2) consists predominantly of volcanics, flows and pyroclastics. These rocks are generally so altered by chloritization and epidotization that the exact rock type cannot be distinguished and can only be safely termed greenstones. They are usually not obviously schistose and primary structures are seldom discernible. Dips, where noted, are generally steep. These rocks closely resemble typical Keewatin greenstones of the Canadian Shield, although undoubtedly very much younger in age.

Extensive areas are underlain by a thick series of generally well bedded sediments (3) consisting chiefly of white limestone with lesser amounts of interbedded cherts and argillites. The sediments are generally assumed to be Permian. They consist principally of limestone in the upper part of the series with argillite predominantly in the lower part. Whether there is any marked unconformity in the Galore area between series (1) and (2) and the Permian (3) is not known.

(4) A second series of volcanics, believed by the writer to be distinctly different from the volcanics of (2), is believed to be Triassic. These volcanics, consisting of flows and pyroclastics appear relatively fresh and primary structures are well preserved. Dips are generally not steep. The contrast between them is particularly evident on the CW Group and their relationships are discussed more fully in the report on the group itself below. Most previous workers appear to have assumed all or most of the volcanics in the region to be Triassic. It has been stated that west of the Galore area the Triassic and the Permian are conformable and no definite evidence to the contrary was noted.

In a broad sense, the sediments and volcanics appear to have been folded along north south axes. A number of the major faults recognized are north east striking but several have north north west trends and faults striking almost east west are also recognized.

Perhaps significantly the Galore Creek Syenite Complex appears to have been emplaced along the axis of a major north south anticline.

The complex known as the Galore Creek stock is the host of significant copper deposits being developed by Kennco Explorations. While in detail it is made up of a large number of various phases, many of them porphyritic,

two notable broad features may be noted, a breccia zone in the west central part and an apparently younger phase at the south east part. This stock is identified by the circled numeral (1) on the compilation map.

A smaller syenitic body known as the Copper Canyon Stock is located some two miles to the south east where Southwest Potash have found what appears to be significant copper mineralization within the intrusive. This location is marked (2).

Three other locations of notable copper mineralization, all apparently disseminated sulphide replacements in volcanics, are noted on the compilation map. These are the occurrences held by Kennco Explorations on the upper part of Sphaler Creek (3), that of Anaconda and Julian at Split Creek (4) and the one held by Kennco just north of Jack Wilson Creek (5).

GEOLOGY CW GROUP:

Pre Permian Volcanics.

The greater part of the group is underlain by highly altered volcanics with minor associated sediments assumed to be Pre Permian and apparently the oldest rocks exposed on the claims. These rocks are characterized by a high degree of chloritization and epidotization and to a lesser degree silicification. The rocks on the fresh surface are usually light to dark green to dark gray in colour. They generally weather to a light gray greenish colour. Flows, banded and massive tuffs, agglomerates and minor argillites and thin banded cherts have been recognized. The rocks are generally aphanitic to fine grained. In most cases the rock is so altered that the original rock type is doubtful and can best be termed greenstone. Where recognizable, most flows seemed to be of intermediate composition near andesite and rhyolites noted and a few basic flows. Tuffs, usually massive and occasionally finely banded were noted. Bands of agglomerate, possibly in some cases flow breccia occur throughout the series. The thickness of the beds observed was not more than a few tens of feet and they seem to be rather discontinuous. The fragments are invariably squeezed and elongated. The fragments range in size from 2" to 2 feet. In places, a medium-grained dioritic rock with mafic minerals completely altered to chlorite and epidote was observed. This rock in most cases appeared to grade imperceptibly into aphanitic greenstones and appears to be a phase of the flows. Occasionally, this dioritic rock showed intrusive relations with volcanics and it seems probable that it represents sills or dikes intruded at about the time the volcanics were laid down. Primary structures can seldom be recognized in the volcanics and except in the pass between the head of Jack Wilson Glacier and Galore Pup Valley, prominent schistosity is rare.

Permian Sediments.

Although large areas of the region are underlain by Permian sediments, exposures of these rocks are only found on the CW Claims as a narrow band of limestones from one to two thousand feet wide crossing the western part of the group. Two isolated patches of graphitic argillite in the same area are

assigned to the same series. The limestone is generally rather pure, buff coloured and partly or wholly recrystallized, probably due to the presence of the nearby intrusive. A few poorly preserved fossils, largely fragments of brachiopods and crinoid stems were noted. Fine bedding can be observed in a few places, although accessible exposures of the limestone were limited by overburden and the heavy forest cover in this area. A few thin argillaceous and chert beds are found in the limestone. Only minor development of skarn was noted near its contact with the intrusive, which is quite sharp. While the location of the contact between the older volcanics and the sediments could be closely defined, its exact location was almost invariably covered with talus or glacial debris. Where the limestone lies along the north boundary of the group, it is in fault contact with older volcanics to the south. Elsewhere, the nature of the contact could not be determined, but in the area just west of Galore Creek, attitudes in the limestone suggest that the Permian limestone and older volcanics are unconformable. This unconformity may quite possibly be due to faulting. The two small areas of argillite in the east portion of the claims, one north of Galore Pup Creek and the other south of it, are assumed to be Permian, - presumably the basal portions of the series as has been noted elsewhere. This rock is aphanitic, thinly bedded, graphitic, and black in colour. The small northern exposure was observed in fault contact with both the Permian limestone to the north and with the older volcanics to the south west. To the east its contact with the older volcanic is obscured. The contacts of the southern exposure with the volcanics is obscured where examined on the CW Group but reportedly appears conformable and is interfolded with older volcanics to the south. This suggests that this argillite, if Pre Permian, represents the base of the Permian and is conformable with the older volcanics; or that it should be here included with the Pre Permian volcanics.

Triassic Volcanics.

A younger series of volcanics, restricted to higher elevations of the central and east-central portions of the claims, was recognized. These rocks are assumed to be of Triassic age and are relatively fresh and unaltered compared to the older greenstones. On the CW Group these rocks are confined to two apparently unconnected masses, one occupying an isolated knob east of Canyon Creek and the other larger one the upper portion of the large central mountain mass culminated by the sharp peak which is the highest elevation on the property. These volcanics consist of flows, tuffs and agglomerates. The flows are generally fine to medium grained, occasionally aphanitic, both equigranular and porphyritic, and massive. In composition, they range from intermediate to acidic. The porphyritic flows contain predominantly feldspar and quartz feldspar phenocrysts from 1 - 4 mm in size in an aphanitic siliceous ground mass. In colour the flows are dark brown, occasionally purplish to light gray in colour, weathering light gray to brownish. They range in thickness from 30 to 50 feet. The tuffs are generally aphanitic, finely banded and dark brown in colour. The agglomerates are light gray in colour and contain angular fragments of gray porphyritic volcanic rock up to 1 foot in diameter in a matrix of smaller

fragments and somewhat siliceous fine grained to aphanitic material. One bed of agglomerate exposed on the south side of the isolated knob east of Canyon Creek is 175' thick. The contact between these presumed Triassic volcanics and the older volcanics (greenstones) is well exposed on the north west side of Galore Pup Valley and on the west side of the highest peak on the property. This contact is essentially flat lying and the westerly dipping Triassic flows and tuffs are truncated by the contact. Elsewhere the contact is obscured by talus and snow or ice. This contact seems to be a major thrust fault along which the Triassic volcanics have been thrust over the older greenstones (Pre-Permian). The isolated westernmost mass of Triassic volcanics is interpreted to be an outlier which has been isolated from the main overthrust block by erosion which has formed the intervening topographic low.

The exposed contacts between these younger Triassic volcanics and the Permian limestones are inaccessible in the area of the CW Group but are plainly visible from a distance and on the aerial photographs. The attitude of these contacts suggest that the volcanics are here infolded with the limestone and may or may not be conformable.

Contact Cirque Granite:

This rock occurs as a small isolated stock some 1500 feet by 4000 feet exposed in the well-developed cirque at the head of Contact Creek. The granite stock, whose long axis trends slightly south of east, intrudes the older, Pre Permian, volcanics. The southern contact is largely obscured by a small snowfield in the center of the cirque and morainal material near its mouth. Exact location of the contact is a matter of choice as the greenstones become progressively more intruded by dykes and masses of granitic material grading to predominantly granitic material with more or less altered inclusions of volcanics across several hundred feet. The intrusive is generally massive and ranges from medium grained to pegmatitic with feldspar crystals up to 2". The rock is gray green in colour and megascopically appears to consist of about 70% white feldspar, 20% quartz and 10% of altered amphibole. The granite is cut by milky white quartz veins and small aplitic dykes. A typical specimen of the intrusive examined in thin section (TH 19) indicates that the rock is a granite consisting of 50% Perthite, 20% quartz, 15% Plagioclase and 10% epidote with a variety of minor accessories and alteration products. The existence of fairly abundant inclusions and screens in the center of the mass suggests that the stock has been barefly unroofed by erosion.

West Boundary Quartz Monzonite:

Some one thousand feet west of the west boundary of the claim group are found exposures of granitic rock which represent the eastern margin of the Coast Batholithic Intrusives. The contact of these intrusives with the older volcanics is gradational across several hundred feet. Increasing numbers of dykes, veinlets and masses of intrusive material in the volcanics give way to screens and inclusions of more or less assimilated volcanics in the intrusive

decreasing in proportion going west. The intrusive is light gray in colour and appears almost leucocratic, except in the immediate area of inclusions. It is massive and generally medium grained. Negascopically typical specimens seem to consist of 30% quartz and almost 70% white feldspar with minor amounts of fine mafic material. At the edges of the intrusive and around partially assimilated inclusions dioritic phases are common, with the mafic mineral, apparently amphibole, altered to epidote and chlorite. A thin section (TH 20) of typical intrusive shows that the rock is a quartz monzonite consisting of 35% perthite, 40% quartz, 15% plagioclase with the original mafic constituent represented by 10% epidote, chlorite and opaque minerals.

Galore Creek Quartz Monzonite:

An intrusive mass approximately one mile in north south dimension is found cutting the Permian limestone around the intersection of Galore Pup and Galore Creeks. It is well exposed only along the canyon at the lower part of Galore Pup Creek and in the deep vertical walled canyon of Galore Creek. Unfortunately, Galore Creek Canyon is inaccessible both from above and along the creek which occupies the whole width of the canyon for the entire length of the course of this stream across the intrusive. The north and south contacts of the intrusive can be plainly seen from high ground west of Galore Creek but could not be examined. The rest of the area underlain by this intrusive is largely covered with overburden and heavily wooded, and its precise eastern extent could not be determined. The rock is massive and generally medium grained. In hand specimens the intrusive is light gray to slightly pinkish in colour and appears to consist of 60% white to pinkish feldspar, 20% quartz and 20% mafic minerals, largely hornblende, with some biotite. In thin section (TH 17) the rock is seen to be a quartz-monzonite consisting of 30% plagioclase, 15% perthite and antiperthite, 20% quartz, 20% actinolite, 10% chlorite, 1% biotite and the rest minor accessories and alteration products.

Galore Creek Syenite:

Intermittent exposures of a coarse grained porphyritic syenite were found along the sides of a small creek bed for a total length of some 500 feet. This creek is a south-flowing tributary of a larger stream which enters Galore Creek from the east at the south east corner of the claim group. Except for the edges of Galore Canyon and along the sides of the above-mentioned creek and the larger stream to which it is a tributary, no outcrop is exposed in this area. East of Galore Creek and north of the larger stream the topography rises relatively smoothly to the north east and is underlain by glacial till.

Where the aforementioned streams have cut down to bedrock through the overburden, the cover is observed to average about twenty-five feet in thickness with up to 50 feet of overburden noted to overlie the bedrock in places. To the south of the syenitic outcrops there is a gap of some 50 feet along the stream bed where outcrop is not exposed. South of this there is almost continuous

exposure of highly fractured and pyritized older greenstone down to the major westward flowing tributary of Galore Creek. Just below the uppermost greenstone outcrop a narrow (one foot) dyke of reddish felsite, probably related to the syenite, is observed to cut these older volcanics. To the north west of the northernmost syenite outcrop there is a distance of some seven hundred feet with no rock exposures before the granite on the north and the limestone to the south are observed outcropping on opposite sides of the gulley formed by a westerly flowing tributary of Galore Creek.

The syenite is a reddish to pink coloured rock consisting of closely packed, coarse unstriated red to pink feldspar phenocrysts (up to 1") in a finer felsitic groundmass with no quartz and little mafic material noted. The rock grades from medium to coarse grained and appears massive in structure. In thin section (TH 16) the rock is found to consist of 90% perthitic orthoclase, 2% plagioclase, 2% chlorite, 1% epidote, 2% white mica, 1% quartz and 1% carbonate, with the remaining identifiable accessories being zircon and apatite. A polished section of the same specimen showed only 1% of an opaque gray mineral, which is probably magnetite. Any original mafic constituents appear to have been altered to chlorite, epidote and opaque minerals, with the feldspars moderately altered to fine-grained white mica. The rock is cut by numerous thin (0.05 mm) subparallel carbonate veinlets. In the extremely limited exposures of this rock no sulphide mineralization was noted under the lens.

Dykes:

The Pre Permian volcanics, Permian sediments and to a lesser extent the Triassic volcanics are all cut by a variety of dykes, most of them less than five feet wide and extending for lengths of less than one hundred feet. Most consist of feldspar and quartz feldspar porphyries, with trap, diabase and minette dykes also noted. These dykes are no doubt considerably varied in age and origin, but at the scale of mapping most cannot be related to one another or to the various large intrusive bodies on or near the group. No apparent pattern of attitudes was noted, although most are near vertical. Only the more prominent or interesting were plotted (by symbol rather than to scale). A persistent westerly dipping gray dyke of quartz-feldspar porphyry from 10 to 20 feet wide parallels closely the upper part of Canyon Creek on Kennco's JW Group for at least 1200 feet. A medium grained diabase dyke with typical ephitic texture some 15' wide cuts older volcanics at Canyon Creek just south of its intersection with Camp Creek. Some one thousand feet east of the edge of the West Boundary Quartz monzonite a swarm of parallel dark gray to black hard, brittle aphanitic trap dykes from 3" to 2' wide cut older volcanics. These dykes contain angular inclusions of medium grained leucocratic granitic rock resembling the quartz monzonite and, therefore, were emplaced some time after the quartz monzonite had cooled. Some 5000 feet west of the intersection of Canyon Creek and Camp Creek a medium grained lamprophyre dyke some 75 feet wide cuts the volcanics. It consists of about 50% white feldspar and 50% biotite and seems quite susceptible to weathering. In thin section (TH 21) this rock is

defined as Minette, consisting of 30% biotite, 20% augite, 40% finer grained groundmass, mainly orthoclase with some plagioclase and 10% white mica with minor accessories. On Galore Pup Creek a gray horneblende feldspar porphyry dyke some 30 feet wide cuts the Permian limestone. A thin section taken from this dyke (TH 18) showed the rock to consist of 20% plagioclase and 15% actinolite phenocrysts with minor biotite, orthoclase, albite, white mica and other accessories in a fine grained interlocking ground mass making up 55% of the rock, 1% quartz, 15% actinolite and 45% probably albite.

Structure:

Because of the general lack of discernible attitudes in the older Pre Permian volcanics, little is known in detail of the structure over most of the claim group. In a general sense, the trend of these older volcanics is north to north west with steep dips. These older volcanics are probably isoclinally folded.

The Permian sediments generally strike north with dips steep to vertical.

The Triassic volcanics in the isolated exposure east of Canyon Creek strike essentially north south and dips are west from 30° to 55°, except where dragging occurs along a fault. The Triassic volcanics north west of Galore Pup Creek generally strike north west with most dips to the south west varying from 30° to vertical. The irregular folding evidenced here is probably due to crumpling of the Triassic volcanics as they were thrust over the older volcanics, as discussed earlier in the report.

Several strong faults are recognized on the group and lack of marker beds in the older volcanics probably presents the recognition of others. A major fault along which is recognized fault breccia and occasionally gouge extends from Jack Wilson Glacier north east, laaer curving more to the east, to the southern apex of the largest Triassic exposures. Nowhere could its dip be accurately determined but it seems nearly vertical. The fault forms a strong topographic lineament occupied by streams for much of its length. A north south striking fault cuts the Triassic volcanics east of Canyon Creek. Pronounced downward drag of the tuffs and flows adjacent to the east side of the fault indicates that the east side has moved up. Talus obscured the dip of this fault but it is probably near vertical. As beds on opposite sides of the fault could not be matched, the vertical displacement is not known. North of Galore Pup Creek the older volcanics are in fault contact with the Permian limestones to the north, with a subsidiary fault striking off to the south east separating a small body of graphitic argillite from the old volcanics to the south west. Horizontal displacement along the major fault, the dip of which is not known, must have been considerable and it may be related to the presumed flat lying thrust fault beneath the Triassic volcanics. Many other minor faults, too small to map and most of minor displacement, were noted throughout the group, although no pattern is apparent.

Geochemical Sampling:

A total of 91 stream sediment and some soil samples (638-628A inclusive) were taken, as indicated on the map. Samples 638 through 608A were analysed for copper, molybdenite and total heavy metal content (zinc). Samples 609A through 628A were analysed for copper and molybdenite. It had been intended to obtain coverage primarily by stream sediment sampling for such a reconnaissance program as this one but lack of accessible streams in many areas, snow covering many deep stream courses, and stream gradients too steep to trap sediments hindered the program. Soil samples were taken from certain talus slopes below inaccessible outcrops where streams were not available but the variety of unsorted material makes such samples from different areas somewhat unreliable for comparison.

The background for copper in the region is considered to be about 35 ppm with values greater than 100 ppm here considered anomalous. Few significant molybdenum values were present and these only accompanied the highest copper values.

Anomalous values for copper were obtained down slope and downstream from all the observed copper occurrences, thus showing geochemical methods to be an effective means of prospecting in the area. With some significant exceptions, all the anomalous values could be traced to minor copper occurrences of no economic importance. Anomalous values recorded near the minor copper occurrences usually ran from 100 to 300 ppm copper.

Stream sediment samples taken on streams tributary to Galore Pup Creek along the north west side of the valley wall across a distance of some 2000 feet (samples 693-699) were extremely anomalous. These values ranged from 300 ppm to 1300 - ppm copper. Most have higher than normal values in molybdenite. Intermittant malachite stained zones in the older volcanics, noted and examined above the locations of the stream samples, could all be related to sparse primary chalcopyrite in narrow, discontinuous, widely spaced quartz veins and an assay sample of the best looking stained volcanics (38700) ran only 0.36% Copper. No additional mineralization was noted on the inaccessible cliffs forming the wall of the valley above this point. As the above-mentioned geochemical results were not available until after the field season, no further checking of the area could be done.

Near the contact of the older volcanics and the Permian limestone, just above Galore Creek, sample 623A ran 4000 ppm. This sample was taken from decomposed, pyritized, volcanic talus material.

Two stream sediment samples, taken from creeks draining the area underlain by the Syenite Porphyry body east of Galore Creek (624A and 625A), gave anomalous values of 200 ppm and 250 ppm respectively.

Mineralization:

The only copper deposits so far developed in the Stikine Area which are of proven economic significance are of "Porphyry Copper" type and are, so far as is known, restricted to intrusives of syenitic composition.

The Galore Creek stock, lying south of the CW Group, is entirely covered by claims acquired by option or staking by Kennco. Extensive rock trenching, geophysical surveys and diamond drilling by Kennco have reportedly developed some 200 million tons of approximately 1.2% copper within this complex syenitic stock. While the stock comprises a variety of phases and is cut by numerous dykes, examination of the geological map on a scale of 1000 feet to the inch submitted by Kennco for assessment work in 1961 two broad subdivisions are indicated. One is a brecciated zone in the west central part of the stock and one apparently younger syenitic phase at the south east part. However, other information available and observed diamond drill locations suggest that disseminated chalcopyrite with minor bornite is found throughout the stock. It is believed that the amount of mineralization within the stock is related to type and degree of alteration and possibly to the amount of magnetite present. Types of alteration mentioned by Barr are epidotization, chloritization, and sericitization of mafic minerals and orthoclase and the development of carbonates. Replacement of mafic minerals by biotite is noted in mineralized areas. Pyritization and deposition of hematite are reportedly common at the contact phase.

A second smaller syenite stock, the Copper Canyon intrusive, is found some two miles south east of the Galore Creek stock. Here Southwest Potash carried out in 1957 some trenching and drilling on a similar Porphyry Copper type deposit. Limited drilling, inaccessible exposures and poor core recovery gave rather sketchy results but an estimate has been made of eight million tons indicated grading about 1% copper and a further possible twenty million tons of about 0.5% copper. The only additional work done on this prospect was some I.P. done in the late summer of 1964. Dobell reports that there is apparently some relation between the amounts of chalcopyrite disseminated in the intrusive and the amount of magnetite present. Alteration noted consists of sericitization, kaolinization, epidotization and the removal of mafics.

The exposures of syenite located in the eastern part of the CW Group, east of Galore Creek bear a number of significant resemblances to the two aforementioned intrusives containing porphyry copper deposits. Although there was no copper mineralization noted in the limited outcrop, this syenite is remarkably similar in texture and composition to the Galore Creek and Copper Canyon stocks. The alteration of the CW syenite, notably sericitization of the feldspars and the epidotization and chloritization of the mafics also bears similarities to the alteration of the other stocks. Magnetite is present in all three stocks.

The only copper mineralization noted on the CW Group consisted of fine to occasionally coarse specks and blobs of chalcopyrite and possibly some tetrahedrite in quartz and quartz-carbonate veins. These veins are generally very narrow (1" to a maximum of 2 feet), widely separated, and can seldom be

followed for more than fifty feet. With one exception, all these veins were found cutting the older Pre Permian volcanics. None were noted in the Triassic Volcanics or the various intrusives. A quartz carbonate vein, with minor chalcopyrite, apparently emplaced along a minor fault, cuts the Permian limestones just north of their contact with older volcanics some 500 feet west of Galore Creek. This vein is from six inches to one foot wide and one hundred feet long.

The wall rock of these veins is seldom notably altered and not frequently mineralized. While nearby fractures in the volcanics may be coated with malachite, fresh surfaces seldom show any primary mineralization. While quite a number of grab samples were assayed, chiefly to test for any gold content, none could be considered of economic interest as far as copper is concerned.

Occurrences of the copper bearing quartz veins are primarily restricted to the eastern part of the claim group, with the exception of a few south of Jack Wilson Creek west of the termination of the glacier. Most of the mineralized quartz veins are found in the section from the head of Jack Wilson Glacier to the north west wall of the upper part of Galore Pup Valley. The volcanics in this area are notably schistose and many of the veins in the pass area are more or less conformable to the schistosity. The rocks in this area are notably rusty weathering due to fine pyrite but copper content in the wall rocks of the veins is negligible.

A few similar quartz veins are noted in the volcanics along Galore Creek south of the limestone where the volcanics also exhibit some pyritization.

Similar quartz vein occurrences are found along the upper reaches of Canyon Creek on Kennco's J.W. group where the volcanics are somewhat pyritized.

Descriptions of assayed occurrences with values are contained in the Appendix.

G. W. Grant.

P. O. Hachey

December 30, 1964.

P. O. Hachey
Professional Engineer, No.5069
Supervisor.

BIBLIOGRAPHY.

BARR, D.A. Report on Geology, G.C. Claim Group, August 30, 1961.

BOSTOCK, H.A. G.S.C. Memoir 247, Physiography of the Canadian Cordillera, 1948.

BROWN, C.J. Preliminary Report on "S.S." Copper Group, Stikine River, B.C., December 7, 1956.

CARSWELL, H.T. Microscopic Study of Specimens Submitted by Conwest, November, 1964.

DOBELL, J.P. Geology of the Copper Canyon Prospect.

GALE, R. Personal Communications and unpublished map, Summer, 1964.

GEOLOGICAL SURVEY OF CANADA Map 9 - 1957 Stikine River Area.

HACHEY, P.O. Stikine Project 1964, December 15, 1964.

KERR, F.A. G.S.C. Memoir 246, Lower Stikine and Western Iskut River Areas, B.C., 1948.

SOUTHER, J.G. and ARMSTRONG, J.E. G.S.C., North Central Belt of Cordillera of British Columbia, Paper Given at Joint Meeting AIME-CIM, Vancouver, October, 1964.

APPENDIX I - Claims.

APPENDIX I.

CLAIMS.

Claim Numbers		Record Numbers	
CW 1 - CW 48	Inclusive	12676 - 12723	Inclusive
CW 49 - CW 211	"	13223 - 13385	"
CW 212 - CW 219	"	12724 - 12731	"
CW 220 - CW 267	"	13386 - 13433	"
CW 268 - CW 285	"	15758 - 15875	"

APPENDIX II - Assays.

APPENDIX II.

CW GROUP - ASSAYED SAMPLES.

Jack Wilson Creek - Galore Creek

Stikine Area, B.C.

38692 -- Grab sample Au - Tr, near west boundary of claims on ridge north of Jack Wilson Creek - zone of rusty weathering carbonate and quartz carbonate veins in volcanics, 50-75 feet long, 20-30 feet wide.

38693 -- Grab sample Au - Tr, near 38692 - small rusty weathering carbonate zone similar to 38692.

38694 -- Grab sample Au 0.01, Cu 076%, in small cirque south of Jack Wilson Creek opposite bottom of Jack Wilson Glacier - malachite staining on fractures in volcanics over area about 50' by 50'.

38695 -- Grab sample Au 0.04, Cu 1.19, in gully on south side of Jack Wilson Creek just west of bottom of Glacier. Malachite staining on fractures in volcanics over area about 25' by 25'.

38696 -- Grab sample Au - Tr, Cu 0.05, in fully on south side of Jack Wilson Creek near south west corner of CW Group. Rusty weathering zone in volcanics containing fine disseminated pyrite.

38697 -- Chip sample across 20' Au - Tr; Cu 0.03 - on side of ridge just west of camp about halfway between Jack Wilson and Contact Creeks. Silicified shear zone in volcanics with minor disseminated pyrite.

38698 -- Grab sample Au 0.02, Cu 3.85 - on north side of cirque at head of Jack Wil son Creek - occasional heavy chalcopyrite across 1-2' in quartz vein cutting volcanics.

38699 -- Grab sample Au - Tr, Cu 0.65 - in pass between head of Jack Wilson Creek and head of Galore Pup Creek - intermittent malachite staining and pyrite in small quartz veins (6" - 1' wide).

38700 -- Grab sample Cu 0.36 - on NW side of Galore Pup Creek opposite campsite. Silicified volcanic wall rock near intersections of fractures with malachite, containing minor fine pyrite. Malachite staining over area about 30' by 50'.

38776 -- Grab sample Au - Tr, Cu 0.18 - in pass between Jack Wilson and Galore Pup Creek. Sheared volcanic wall rock adjoining narrow 3"-6" qtz. carb veins containing chalcopyrite.

38777 -- Grab sample Au - Tr, Cu 0.04 - west side Galore Creek near south limestone - volcanic contact. Rusty weathering volcanics near limestone contact.

38778 -- Grab sample Au - Tr, Ag 0.4, Cu 0.04. Float in talus at base of inaccessible cliff face north side of pass between Jack Wilson and Galore Creek Pass. Tetrahedrite ? in quartz.

38779 -- Grab sample Au - Tr, Cu 0.05 - north west side Galore Pup Valley. Banded quartz - carbonate vein 1'-4" wide exposed for 10', contains minor pyrite and very fine dark coloured submetallic mineral.

38780 -- Grab sample Au - Tr, Cu 0.14. East side Galore Creek near south boundary of claims. Float in talus from inaccessible cliff face. Massive pyrite in altered volcanics with quartz.

38781 -- Grab sample Au - Tr, Cu 2.57 - west side Galore Creek at south boundary of claims. Pyrite and chalcopyrite in quartz vein 3" wide, 10' long with similar material some 5' away in parallel veins at edge of overburden. Veins cut chloritized and epidotized volcanics.

APPENDIX III - Geochemical Results.

APPENDIX III.

Geochemical Results.

No.	Mo.	Cu.	THM	Type	pH.
638	0	15	2	W	
639	0	25	8	W	8.0
640	0	10	1	S	
641	2	0	0	W	
642	2	10	0	W	7.1
643	2	0	0	S	
644	15	100	15	S	6.1
645	0	10	0	W	
646	0	20	0	W	
647	0	65	2	W	7.0
648	0	20	0	W	
649	4	200	4	W	
650	0	0	0	S	4.4
651	4	200		W	
652	0	120	1	W	
653	0	120	2	W	6.4
654	2	150		W	
655	0	0	0	S	
656	0	10	0	W	5.6
657	0	5	2	S	
658	0	30	0	S	
659	0	0	1	W	4.7
660	0	25	0	W	
661	0	30	0	W	
662	0	0	0	W	6.2
663	2	0	0	W	
664	0	25	1	W	
665	0	10	1	W	6.5
666	0	5	1	W	
667	0	0	1	W	
668	0	5	0	S	5.7
669	0	5	2	W	
670	0	0	0	W	
671	0	35	0	W	5.7
672	0	30	1	W	
673	0	120		W	
674	2	100		W.	6.9
675	0	5		W	
676	0	15	1	W	
677	0	10	0	W	7.0
678	4	250		W	
679	8	500		S	
680	0	60	15	W	6.1
681	0	50	3	W	
682	4	200		W	
683	0	30	0	W	5.9

No.	Mo.	Cu.	THM	Type	pH.
684	4	225		W	6.7
685	0	35		W	
686	12	160		W	
687	8	200		W	6.9
688	0	150	15	S	
689	40	750		W	
690	15	675	1	S	6.7
691	15	300	5		
692	15	130	1	W	
693	10	600		W	7.1
694	400	1000		W	
695	250	1300 +		W	
696	4	1000		W	5.8
697	8	1300 +		W	
698	4	300		W	
699	8	300		W	6.8
700	0	150	2	W	
601A	0	200	0	S	
602A	0	80	5	W	
603A	0	3	8	W	6.9
604A	4	10	8	W	
605A	0	100	5	W	
606A	0	35	10	W	
607A	0	40	30 +	W	
608A	0	65	2	W	

All above SWP

X-ray Assay Lab.

609A	0	80		W
610A	0	100		W
611A	0	60		S
612A	0	30		S
613A	0	50		W
614A	0	70		W
615A	0	70		W
616A	0	80		W
617A	0	60		W
618A	0	70		W
619A	0	200		W
620A	10	70		W
621A	0	350		W
622A	20	800		W
623A	0	4000		W
624A	10	200		W
625A	0	250		W
626A	0	250		W
627A	0	150		W
628A	0	150		W

APPENDIX IV.

Petrographic Information.

Microscopic Study of Specimens submitted
by Conwest Exploration Co.,Ltd.

Prepared by H. T. Carswell.

Specimen TH-16 - Coarse-grained Syenite (Galore Creek Syenite)

This rock contains coarse-grained pink, unstriated feldspar, with minor, altered, dark mafic patches. The mineralogy is:

90% Perthitic Orthoclase - 10 mm - low neg. relief, $2V = 90^{\circ}$ ca.
2% Plagioclase - 0.4 mm - polysynthetic twinning.
2% Chlorite - 1 mm - anom. brown birefr.
1% Pistacite - 0.1 mm - high pos. relief, high birefr., yellow, non-pleochroic.
2% White Mica - 0.01 mm - first yellow birefr., parallel extinction, length slow.
1% Quartz - 0.2 mm uniaxial (+).
1% Carbonate - 0.05 mm - high variable relief, high birefr., uniaxial (-)
0.5% Zircon - 0.1 mm - high pos. relief, high birefr.
0.5% Apatite - 0.2 mm - high pos. relief, low grey birefr., length fast, parallel ext., columnor.

The rock is mainly subhedral, coarse-grained orthoclase with inclusions of quartz and plagioclase. Aggregates of chlorite, opaque minerals, and mistacite, probably mimetic after a mafic mineral, occur in the rock. Minute, euhedral zircons and apatites are present.

Feldspars have been moderately altered to fine-grained white mica, and the rock is cut by numerous thin (0.05 mm) subparallel carbonate veinlets.

The polished section contains 1% of a hard, grey mineral so poorly polished as to be unidentifiable under the microscope. Under a hand lens it has the colour of magnetite, and it is magnetic.

Specimen TH-17 - Quartz Monzonite (Galore Creek Quartz Monzonite).

This specimen contains black, euhedral amphibale and biotite crystals in medium-grained pink feldspar with interstitial quartz. The minerals are:

30% Plagioclase (An32 to 0) - 2 mm - perp. to A, X, angle to C = + 17° to -20° - delicate oscillatory to gradual zoning, some crystals have normal zoning.
20% Actinolite - 2 mm. mod. pos. relief, amphibale cleavage, first yellow birefr., pleochroic green, X, greater than Y, biaxial (-), 2V = 80° ca., Z angle to C = 20°.
20% Quartz - 2 mm. - uniaxial (+).
15% Perthite and Antiperthite - 2 mm. - perthite has low neg. relief, biaxial (-), antiperthite has properties of albite.
10% Chlorite - 2 mm. - anomalous blue birefr.
1% Blotite - 2 mm. strong brown pleochroism.
0.5% White Mica - 0.05 mm. - length slow, parallel extinction.
1% Opaque Minerals - 0.3 mm.
0.5% Zircon - 0.1 mm. - high pos. relief, high birefr. uniaxial (+).
0.5% Sphene - 0.1 mm. - high pos. relief, extreme birefr.
0.5% Clinozoisite (?) - 0.2 mm. - high pos. relief, anom. blue birefr. parallel extinction, biaxial.

The rock contains euhedral plagioclase crystals with many different zoning patterns, many stuck together in pairs or in larger clumps. Subhedral perthite, antiperthite, and anhadral, interstitial quartz are other important minerals.

Euhedral actinolite is relatively unaltered, but chlorite with minute opaque grains has in part replaced biotite. Altered biotite is associated with anhedral grains of sphene, and zircon, as well as euhedral apatite. Clinozoisite also accompanies altered biotite.

Inclusions of plagioclase are found in biotite. The feldspars have been slightly altered to white mica. Quartz grains show signs of strain.

Specimen TH-18 - Hornblende - Feldspar, Porphyry. (Porphyry Dyke Cutting Limestone, Galore Pup Creek).

The rock consists of hazy white feldspar phenocrysts and a few dark amphibale phenocrysts in a dark grey-green matrix. The crystals are not obviously oriented. The minerals are:

20% Plagioclase - 2 mm. (An_{50}) - relief mod. pos., (-) 2V = 85° ca., combined Cb - Ab twins, X angle to C = 11 and 28°, perp. to A, X, angle to C = + 30°. Some zoned.

15% actinolite - 2 mm. - relief high pos., low yellow birefr., biaxial 2V = 90° ca., Z angle to C = 30°, green pleochroic, Z_1 greater than X_1.

2% Biotite - 0.5 mm. - strong brown pleochroism.
1% Orthoclase (?) - 1 mm. - zoned, 2V = 90° ca.
1% Albite - 1 mm. - no twinning, relief as balsam, biaxial (+) 2V = 70° ca.
1% White Mica - 0.01 mm. - first yellow birefr., length - slow, parallel extinction.
1% Zircon - 0.2 mm.
1% Apatite - 0.5 mm.
0.5% Carbonate - 0.2 mm.
0.5% Pistacite (?) - 0.2 mm.
55% Fine-grained interlocking Groundmass - comprised of:
1% Quartz - 0.2 mm.
15% Actinolite - 0.1 mm.
45% Albite (?) - 0.1 mm. - relief very low, pos.
0.5% Opaque Minerals - 0.01 mm.

The rock contains euhedral phenocrysts of zoned to unzoned, twinned euhedral plagioclase, euhedral actinolite, and euhedral biotite in a matrix of fine-grained albite, actinolite, and minor quartz. The plagioclase crystals which are similar to those in TH-17 in some cases have an albitized rim.

The feldspars have been moderately altered to fine-grained white mica. Actinolite has been slightly replaced by carbonate and pistacite.

Specimen TH-19 - Coarse-grained Granite - (Contact Cirque Granite).

Altered, anhedral, mafic patches occur in coarse-grained quartz and white feldspar. The minerals are:

50% Perthite - 5 mm. - low neg. relief, biaxial (-)
20% Quartz - 3 mm. - uniaxial (+)
15% Plagioclase - An_{15} - 3 mm. - unzoned, relief as balsam, biaxial (-), perpendicular to A,X, angle to C = 9°.
10% Pistacite - 0.4 mm - greenish, non-pleochroic, high pos. relief, low grey to second order birefr. biaxial (-), 2V = 85° ca.
1% Sphene - 2 mm - high pos. relief, high birefr., biaxial (+), 2V = 10° ca.
1% Chlorite - 0.05 mm. - low pos. relief, anom. blue extinction.
2% Carbonate - 0.5 mm. - high variable relief, extreme birefr.
1% White Mica - Length fast, parallel extinction.
1% Microcline - 0.2 mm. - grid twinning.
1% Apatite - 0.1 mm. - length - fast.
0.5% Opaque minerals.

The rock has a coarse-grained granitic texture, with large euhedral crystals of perthite and plagioclase in interstitial quartz. Some perthite contains patches and veinlets of microcline. Fine quartz grains occur along the mutual sutured borders of larger quartz crystals.

Patchy zones of fine-grained white mica have replaced feldspars. The mafic minerals have been completely replaced by aggregates of chlorite and pistacite accompanied by opaque minerals and sphene. Pistacite has slightly altered plagioclase, and a 0.5 mm. thick veinlet of pistacite cuts the rock. Veinlets of carbonate are present.

Specimen TH-20 - Medium-grained Quartz Monzonite. (West Boundary Quartz Monzonite).

The specimen contains unoriented, altered, mafic grains in medium-grained quartz and pale pink feldspar. The minerals are:

35% Perthite - 3 mm. - low neg. relief, (-) 2V = 70°
40% Quartz - 3 mm. uniaxial (+)
15% Plagioclase - An_{15} - 3 mm. - relief as balsam, 2V = 90° ca., perp. A, X, angle to C = -10°.
5% Pistacite - 0.5 mm. - high pos. relief., yellow, one cleavage, parallel extinction, high (-) 2V, anomalous blue extinction.
2% Chlorite - 0.1 mm. - anomalous blue birefr.
2% Opaque Minerals - 0.2 mm.
0.5% Rutile (?) - 0.1 mm. - equant dark brown grains.
2% White Mica - 0.05 mm. - parallel ext. - length slow.

The rock has a well defined granitic texture, with some zoned plagioclases. Some of the quartz grains near feldspar crystals have minute cusps into the feldspars, indicating some silicification.

The feldspars have been strongly altered to fine white mica, but have thin albite rims which remain unaltered. An original ten percent of mafic minerals have been completely replaced by aggregates of chlorite and pistacite accompanied by opaque minerals. Pistacite also occurs in plagioclase, and both feldspars contain numerous fine dusty inclusions.

Quartz and feldspars show signs of strain.

Specimen TH-21 - Minette. (Lamprophyre Dyke Cutting Older Volcanics).

Medium-grained, euthedral, unoriented biotite and pyroxene crystals occur in a groundmass of fine-grained white feldspar. The mineralogy is:

30% Biotite - 0.5 mm. dark red-brown pleochroism.
20% Augite - 2 mm. - high pos. relief, first blue birefr., pyroxene cleavage, colourless, biaxial (+), 2V = 60° ca., perp. to Z, X angle to C = 42°.
40% Fine-grained Groundmass - 1 mm. - mainly orthoclase with some traces of plagioclase.
10% White Mica - parallel extinction, length-slow, first yellow birefr.
1% Pistacite - 0.5 mm. - high pos. relief, high birefr., yellow, biaxial (-) 2V = 50° ca.
0.5% Apatite - 0.3 mm. - high pos. relief, low.
2% Opaque Minerals - 0.3 mm.

The texture is lamprophyric-euhedral, biotite and augite crystals are set in a fine-grained matrix of altered anhedral feldspars. Anhedral opaque grains associated with pestacite are disseminated throughout the rock. Most feldspars are thoroughly altered to white mica, saussurite (?), and a very fine-grained dusty mineral. Except for some slight pistacite replacement, the mafic minerals are unaltered.

DOMINION OF CANADA:
PROVINCE OF BRITISH COLUMBIA.
TO WIT:

In the Matter of

I, P. O. HACHEY, F.M.C. 27514, Agent for Conwest Exploration Company Limited, F.M.C. 27558.

of 901 - 675 West Hastings Street, Vancouver,

in the Province of British Columbia, do solemnly declare that during the period June 1 - Sept. 25, 1964, the following monies were expended on the CW Group, Scud River Area, Liard M.D., B.C.

SALARIES:

Name	Period	Rate	Amount	Man Days	Total
P. O. Hachey	June 1 - Sept.25	$750.00/Mo.	$500.00	20	
G. W. Grant	June 1 - Aug.12 Aug.22 - Sept.25	$675.00/Mo.	2,250.00	100	
N. Dircks	June 1 - Aug.1 Sept.2 - Sept.25	$575.00/Mo.	1,610.00	84	
W. Dollery-Pardy	June 1 - Aug.31	$500.00/Mo.	1,500.00	90	
L. Louie	July 1 - Aug.1 Sept.2 - Sept.25	$400.00/Mo.	710.00	54	
M. Louie	July 1 - Sept.25	$400.00/Mo.	1,100.00	86	
W. Dennis	July 1 - Sept.25	$400.00/Mo.	1,100.00	86	$8,770.00
CAMP & COOKERY:					4,500.00
HELICOPTER - 40 hours @ $125.00					5,000.00
					$18,270.00

And I make this solemn declaration conscientiously believing it to be true, and knowing that it is of the same force and effect as if made under oath and by virtue of the "Canada Evidence Act."

Declared before me at the City of Vancouver, in the Province of British Columbia, this 18 day of March 1965, A.D.

P. O. Hachey

A Commissioner for taking Affidavits within British Columbia or *A Notary Public in and for the Province of British Columbia.*

Sub-mining Recorder.

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APPENDIX IV - Petrographic Information.

STIKINE AREA

SCUD RIVER TO SPHALER CREEK

LIARD MINING DIVISION, B.C.

WEST SHEET

GEOLOGY

SCALE 1" = 1/2 MILE

FOR LEGEND SEE EAST SHEET

G. W. Grant

To Accompany:
FINAL GEOLOGICAL REPORT.
CW GROUP - STIKINE AREA.
G. W. GRANT - December 30, 1964.

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621

P.J. Hackey #5069
Dec. 30/64

CONWEST EXPLORATION COMPANY LIMITED

SCUD GLACIER

SCUD RIVER

SPHALER CREEK

MT HICKMAN

57° 15'

57° 00'

131° 15'

10'

05'

20'

75'

INTRUSIVES

- A — MAINLY QUARTZ MONZONITE, GRANODIORITE, GRANITE
- B — GRANITE
- C — QUARTZ MONZONITE
- D — SYENITE
- E — PYROXENE GABBRO

SEDIMENTS AND VOLCANICS

- 4 — TRIASSIC TO JURASSIC — MAINLY VOLCANICS MINOR SEDIMENTS
- 3 — PERMIAN AND ? EARLIER — CHIEFLY WHITE LIMESTONE MINOR ARGILLITE, CHERT
- 2 — PRE ? PERMIAN — VOLCANICS ALTERED, MINOR ARGILLITE, GREYWACKE
- 1 — PRE ? PERMIAN — METAMORPHIC ROCKS PHYLLITE, QUARTZITE, MINOR CRYSTALLINE LIMESTONE, ALTERED GREYWACKE AND VOLCANICS
- V — VOLCANICS (MAY BE 2 OR 4)

SYMBOLS

- GEOLOGICAL CONTACT (DEFINED, APPROXIMATE, ASSUMED)
- BEDDING OR BANDING (VERTICAL, INCLINED)
- SCHISTOSITY OR LINEATION (VERTICAL, INCLINED)
- FAULT
- OUTLINE OF PERMANENT SNOWFIELDS, GLACIERS
- RIVER OR STREAM BED (SAND, GRAVEL, BOULDERS)
- SIGNIFICANT MINERAL OCCURRENCES
- SYNCLINAL AXIS
- ANTICLINAL AXIS

G.W. Grant

To Accompany:
FINAL GEOLOGICAL REPORT.
CW GROUP - STIKINE AREA.
G. W. GRANT - December 30, 1964.

P.D. Hackney #5069 Dec. 30/64

PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA

STIKINE AREA

SCUD RIVER TO SPHALER CREEK

LIARD MINING DIVISION, B.C.

EAST SHEET

GEOLOGY

SCALE 1" = 1/2 MILE

621

SOURCES OF INFORMATION:
- PROPERTY MAPPING BY CONWEST, SUMMER 1964
- HELICOPTER RECONNAISSANCE, GWG, SEPTEMBER 1964
- PUBLISHED AND UNPUBLISHED MAPS OF VARIOUS OTHER MINING COMPANIES
- GEOLOGICAL SURVEY OF CANADA MAP 9-1957
- G.S.C. MAP 310A (1935)
- TOPOGRAPHY FROM SHEET 104 G (1954) 1:250,000

G.W. GRANT

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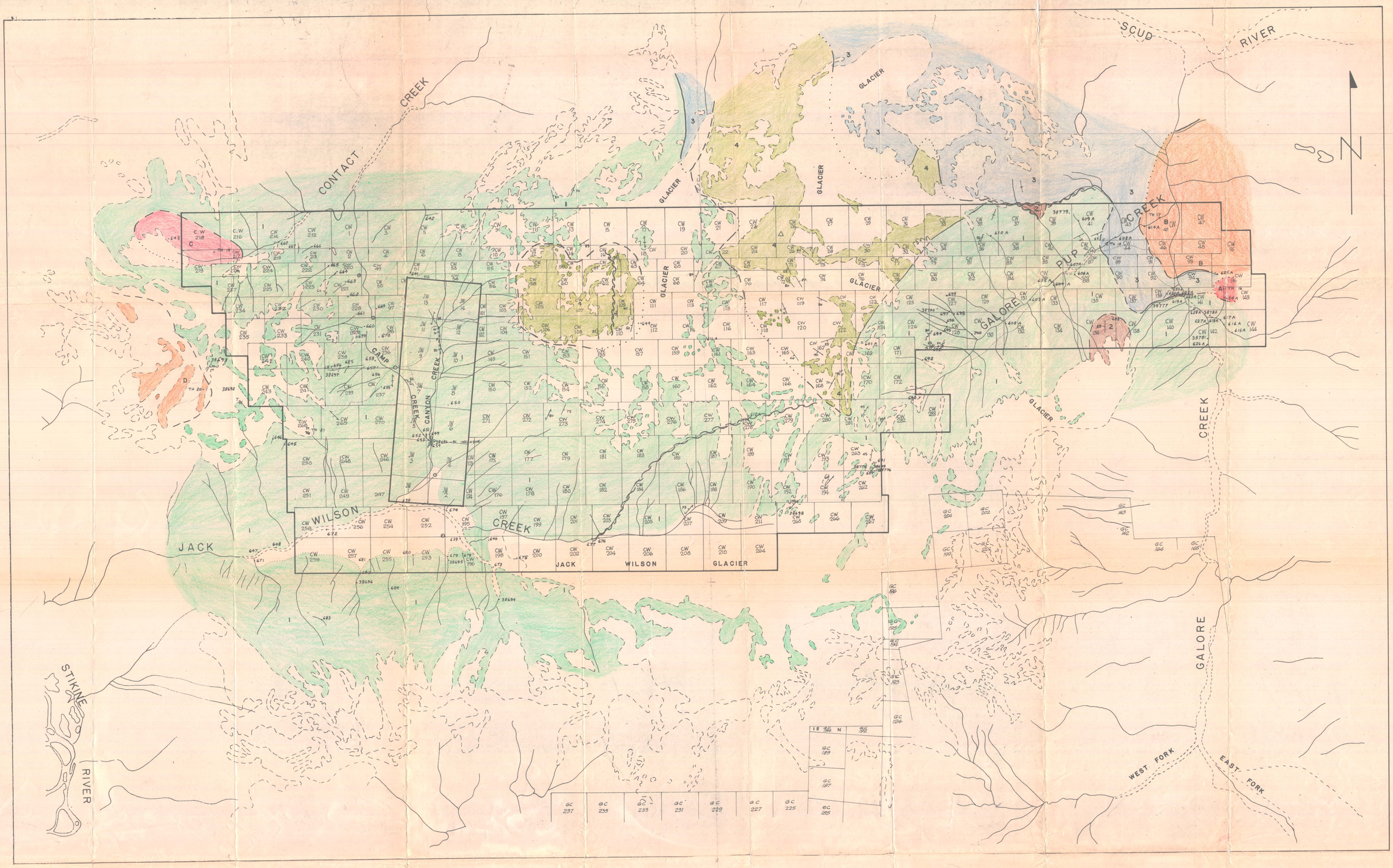
DECEMBER 1964

CONWEST EXPLORATION COMPANY LIMITED



INTRUSIVES

- A — GALORE CREEK SYENITE
- B — GALORE CREEK QUARTZ-MONZONITE
- C — CONTACT CIRQUE GRANITE
- D — WEST BOUNDARY QUARTZ-MONZONITE

SEDIMENTS AND VOLCANICS

4	TRIASSIC	VOLCANICS	INTERMEDIATE TO ACID FLOWS, BANDED TUFFS, AGGLOMERATE
3	PERMIAN	LIMESTONE	WHITE TO GRAY, COARSE TO FINE BEDDED, FOSSILIFEROUS
2	PERMIAN	ARGILLITE	GRAPHITIC, FINE BEDDED
1	PRE-PERMIAN	VOLCANICS	GREENSTONES, MASSIVE AND FINELY BANDED TUFFS, SQUEEZED AGGLOMERATE, INTERMEDIATE TO ACID FLOWS, MINOR ARGILLITE, GREYWACKE, ALL CONSIDERABLY ALTERED

To Accompany:
FINAL GEOLOGICAL REPORT.
CW GROUP - STIKINE AREA.
G. W. GRANT - December 30, 1964.

G W Grant P D Hachey #5069 Dec. 30/64

REGISTERED PROFESSIONAL ENGINEER OF P. D. HACHEY BRITISH COLUMBIA

SYMBOLS

- GEOLOGICAL CONTACT (DEFINED, APPROXIMATE, ASSUMED)
- BEDDING OR BANDING (VERTICAL, INCLINED)
- SCHISTOSITY (VERTICAL, INCLINED, DIP UNKNOWN)
- SHEARING, SHEAR ZONE
- DIKE (QUARTZ-FELDSPAR PORPHYRY, TRAP, DIABASE, MINETTE)
- FAULT
- GEOCHEMICAL SAMPLE
- ASSAY SAMPLE
- SAMPLE FOR THIN SECTION
- STREAM BED (SAND, GRAVEL, BOULDERS)
- EDGE OF FLAT AREA, JACK WILSON VALLEY
- OUTLINE OF SEMI-PERMANENT SNOW, SNOW FIELDS, GLACIERS
- CUT TRAILS THROUGH DENSELY VEGETATED AREAS

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CONWEST EXPLORATION COMPANY LIMITED

CW GROUP

STIKINE RIVER AREA, BRITISH COLUMBIA

GEOLOGY

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SCALE 1" = 1320'

G.W. GRANT

NOVEMBER 1964