

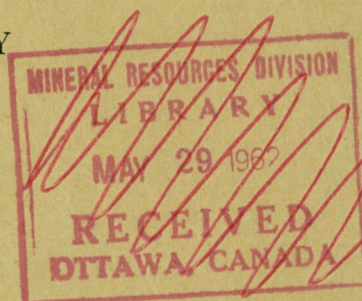
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DEPARTMENT OF MINES

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BUREAU OF ECONOMIC GEOLOGY  
GEOLOGICAL SURVEY



PRELIMINARY REPORT

(MINERAL RESOURCES OF) TERRACE AREA,  
COAST DISTRICT  
BRITISH COLUMBIA

BY

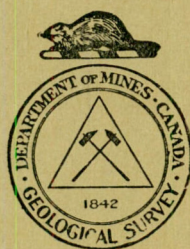
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MINERAL RESOURCES OF TERRACE AREA,

COAST DISTRICT

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E.D. KINDLE

PAPER 36-17

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MINERAL RESOURCES OF TERRACE AREA, COAST DISTRICT,  
BRITISH COLUMBIA

BY E.D. Kindle

INTRODUCTION

In 1935 the writer commenced the examination of the mineral deposits in Terrace district, British Columbia. Deposits containing gold, copper, lead, zinc, and silver are numerous in the area and have been briefly described from time to time in the Annual Reports of the Minister of Mines of British Columbia. Reconnaissance geological work has been done by Leach, McConnell, Hanson, and Marshall for the Geological Survey, Canada, and their reports are listed under Bibliography.

It has been the writer's endeavour to supplement the work already done by detailed examination of the deposits and of the geology in their immediate vicinity. Geological maps of those properties on which considerable development work has been done will be included in the final report. A number of assay returns from the individual deposits are also given as a guide to the grade of ore. The report is designed to assist the prospector and to attract the attention of mining companies to the economic possibilities of the area.

Terrace is 70 miles in a straight line east-northeast of Prince Rupert and occupies a lower central position in the Terrace map-area which lies between latitudes  $54^{\circ}20'$  and  $55^{\circ}00'$  and longitudes  $128^{\circ}00'$  and  $192^{\circ}00'$ . The area measures 40 miles from east to west and 46 miles from north to south. Skeena river flows in a south to southwest direction across the area and the Canadian National railway follows its valley. A good motor road extends from Terrace to Usk and is being continued eastward to connect with the Hazelton highway at Cedarvale. Kitsumgallum lake, 20 miles north of Terrace, and Lakelse lake 9 miles south of



Terrace are both accessible by motor car and boats are available on both lakes. A road extends north from Rosswood at the north end of Kitsumgallum lake to Cedar river, crossing a distance of 10 miles, and a good trail continues northwest from there to Nass river.

The area was too large to permit the examination of all mining prospects during the 1935 season, so that only the central and western part of the area was covered. The deposits examined include those in Kitsumgallum Lake section, those in the vicinity of Terrace, those on Thornhill and Kleanza mountains, and those in the vicinity of Usk. The properties are all easy of access as good pack-horse trails have been built up the mountains to them from the nearest roads.

Placer gold was recovered from Kleanza, Chindemash, Fiddler, Lorne, Douglas, and Phillips creeks, in Terrace area, as early as 1884 and placer miners still work the gravels in these streams from time to time.

Mineral claims were first staked in 1893 in the vicinity of Usk, the Emma, Four Aces, and Toulon being the first on which there is a record of early work having been done. In 1910 there were about two hundred claims staked in the vicinity of Usk on deposits containing gold, silver, and copper. A few years later, minerals containing gold, silver, copper, lead, zinc, molybdenum, and tungsten were found in deposits on Thornhill and Kleanza mountains a few miles east and southeast of Terrace. Silver, lead, and zinc discoveries were made north of Kitsumgallum lake about 1914 and about 1920 gold associated with lead and zinc minerals was discovered on the Bear and Black Wolf claims on Maroon mountain.

In 1918 considerable coarse gold was recovered in surface mining operations on the A. claim on Thornhill mountain and a few years later the Globe claim produced some gold. At the Cordillera mine at Usk a small amalgamation gold mill was built in 1920 and a little gold was produced. At the adjoining Lucky Luke mine, 25 tons of ore was shipped in 1924 and gave total returns of: 18 ounces of gold, 316 ounces of silver, and 11,162 pounds of copper. A small gold mill was recently installed at this property and some ore is stock-piled preparatory to milling operations. Some high-grade silver, lead, and zinc ores were brought out from mining claims at the headwaters of Legate, St. Croix, and Chindemash creeks between 1923 and 1927. In Kitsumgallum Lake section, some gold was recovered in 1923 on Maroon mountain with a small Ross gold mill on the Bear claim. About 50 tons of high-grade ore was shipped between 1925 and 1928 from the nearby Black Wolf claims. At the property of Columario Consolidated Gold Mines, Limited, 4 miles southeast of Usk, a 75-ton daily capacity flotation mill operated for about nine months in 1934 and 1935 and added further to the gold and silver production of the area. Omineca Gold Quartz Mines, Limited, are at present developing a gold prospect on Zymoetz river.

At present over one hundred groups of mining claims are held in this area and although there are relatively few prospectors, new discoveries are being made each year. Mineral occurrences are widespread and small commercial ore-bodies have been indicated. There is a marked lack of necessary development work on deserving properties and none of the small rich veins has yet been tested at depth with a diamond drill.

The writer wishes to express his appreciation to the citizens of Terrace and Usk for kindnesses extended during the summer, and is very thankful for the assistance rendered by

prospectors and mine officials. B.A. Robinson, J.H. Radcliffe, A.F. Killin, and R.D. Smith are commended for their able assistance with the field work.

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#### Physical Features

Terrace area is within the eastern confines of the Coast Range. It is characterized by high mountain peaks and deeply incised valleys. The stream gradients are moderate although the mountain peaks rise to heights of 7,500 feet. Below the 4,000-foot contour the mountain slopes are steep, between 4,000 and 5,200 feet they are smooth and rounded and gently sloping and above 5,200 feet they are steep with knife-edge ridges and serrated peaks. Small glaciers persist the year around on the north sides of the peaks. Below an elevation of 4,000 feet the valleys support a heavy growth of forest trees, namely, hemlock, Sitka spruce, balsam, red cedar, and cottonwood.



The area is drained by Skeena river, a wide, swift stream that flows in a southwest direction from Terrace. A few miles northeast of Terrace the course of the river valley is more northerly and the mountains rise precipitously on both sides. East of Terrace the tributary streams are deeply incised and flow in a northwest or southeast direction to join the Skeena. Zymoetz river, largest of these tributary streams, flows in a northwest direction and joins the Skeena 5 miles above Terrace. Lakelse river, Kleanza, Chindemash, St. Croix, and Legate creeks also flow northwesterly into Skeena river. Hardscrabble, Nicholson, Lowrie, and Phillips creeks are the more important streams flowing southeasterly into the Skeena. Farther north, Fiddler, Lorne, and Porcupine creeks flow about due east to the Skeena.

A wide, deep valley which runs from north to south across the western part of the area, intersects Skeena River valley at Terrace. It is known as the Kitsumgallum-Lakelse valley, being named after the two large lakes that lie within it, about 22 miles apart. Kitsumgallum lake, about 16 miles north of Terrace, is 7 miles long and 1 mile wide and occupies almost the full width of the valley; it is reported to be 450 feet deep in places. A large number of small creeks such as Clear, Douglas, Hall, Maroon, Goat, and Nelson drain into the lake, and at the northwest end two larger streams, Beaver river from the west and Cedar river from the north, enter the lake. The latter stream is confined to the northern continuation of Kitsumgallum-Lakelse valley. Kitsumgallum river drains the lake from the south end and follows the valley south, joining the Skeena about a mile west of Terrace. Lakelse lake, situated about 7 miles south of Terrace, is 5 miles long and a mile wide. It is comparatively shallow and the water is not clouded with silt as is that of

Kitsumgallum lake. Williams creek, a clear stream, enters the lake at the north end, and the Lakelse River outlet is at the southwest end. The entire valley bottom from Lakelse lake north to Kitsumgallum lake and beyond is covered by a thick deposit of river gravel and sand and bedrock is rarely seen. Near Terrace and in many other parts of the valley, flood-plain deposits have formed a very fertile soil well adapted to fruit growing and mixed farming. Weather conditions are also ideal as the winter temperatures seldom fall below zero and the annual rainfall averages about 40 inches a year.

#### GENERAL GEOLOGY

Terrace area lies along a part of the eastern contact zone of an elongated body of intrusive rocks known as the Coast Range batholith. The Coast Range mountains, which delimit these intrusives, run in a northwest direction along the Pacific coast in a belt roughly 90 miles wide. The eastern contact of the intrusives is bordered in this area by Mesozoic volcanic and sedimentary rocks. Rocks of three periods are present, Triassic, Jurassic, and Cretaceous. Of these the Jurassic sediments and volcanics, designated the Hazelton group, are the most important as they cover almost half of the area.

Outcrops of the older Triassic rocks are scattered and cover only a few square miles. The Skeena sediments occupy an old Cretaceous valley in the northwest part of the area. There are a large number of intrusive dykes throughout the district.

TABLE OF FORMATIONS

Period	Formation	Lithology
Recent and Pleistocene		Gravel, sand, silt, boulder clay, glacial drift.
Lower Cretaceous	Skeena	Shale, sandstone, conglomerate, coal
Early Cretaceous to Jurassic		Dykes
	Coast Range intrusives	Granite, granodiorite, quartz diorite, diorite, etc.
Jurassic	Hazelton group	<u>Sedimentary Division:</u> Sandstone, argillite, quartzite, greywacke, slate, tuffaceous sandstone, conglomerate <u>Volcanic Division:</u> Andesite, breccia, tuff, rare limestone, and argillite.
Triassic		Cherty quartzite, argillite, crystalline limestone, conglomerate.

#### Triassic

The Triassic rocks consist of heavy beds of crystalline limestone, cherty quartzite, slate, and argillite with some associated beds of breccia and tuff. A chert-pebble conglomerate and a limestone-boulder conglomerate also occur. The conglomerate, comprised of chert pebbles, also contains a few pebbles of volcanic rock. The boulders of the other conglomerate are large and well rounded and are believed to have been derived from a Carboniferous or Permian formation.

The limestone and cherty quartzite are extensively exposed on the east slope of Thornhill mountain, and fossil shells and Crinoid



stems may be seen in the limestone in this locality. Other exposures occur on the south slope of Kleanza mountain. There are several isolated outcrops of limestone in the granodiorite on the south side of Williams creek above an elevation of 3,700 feet. Here the limestone is considerably altered with a development of epidote and garnets and small amounts of magnetite, pyrite, and chalcopyrite are found along the contacts of the limestone. Three miles west of Amsbury flag station a considerable thickness of finely bedded crystalline limestone and marble outcrops a few hundred feet north of the railway. These occurrences are all roof pendants in the Coast Range granodiorite. The contact of the series with the overlying Hazelton group has not yet been observed and it is not known whether the two formations are conformable.

#### Hazelton Group

The Hazelton volcanic rocks of Jurassic age consist mainly of andesites, tuff, and breccia. This formation outcrops along Skeena river between Pitman and Kitsalas and underlies the greater part of the area east of Skeena river from Zymoetz river north to mount Sir Robert. Beds of argillite outcrop in Phillips creek at Brusk's cabin 2 miles from the Skeena and are probably interbedded with andesite. Along the Skeena the andesitic lavas are massive and their structure is difficult to interpret, but in general the flows dip in a northeast direction at moderate to steep angles, and farther north they dip more northerly and appear to underlie the Hazelton sedimentaries. On Kitsalas mountain at Usk the volcanics have an observed thickness of about 5,000 feet and the original thickness must have been several thousand feet greater.

The Hazelton sediments, considered to be of Middle Jurassic age, are composed principally of sandstone, argillite, quartzite, greywacke, slate, tuffaceous sandstone, and conglomerate.

This formation extends across the northern part of the area, roughly from the vicinity of Kitsumgallum lake eastward to the Canadian National railway and beyond, a distance of over 20 miles. The northern and eastern boundaries of the formation will be extended when further mapping is done, but on the west and south these sediments are intruded by the Coast Range batholith which swings around in a series of apophyses. Excellent sections of these rocks are exposed on Maroon mountain, Goat mountain, and mount Couture. The formation is gently folded and strikes east and west. The dips range from 30 to 75 degrees and average 40 degrees to the north or south. The observed thickness of the sediments on Goat mountain is 7,500 feet and the original thickness must have been greater than 10,000 feet. A conglomerate horizon about 75 feet thick occurs at an elevation of 4,000 feet on Maroon mountain. It has been traced around the west side of Goat mountain and then east to where it crosses Douglas creek at an elevation of 2,700 feet. Both the sedimentary and volcanic divisions of the Hazelton group are cut by the Coast Range intrusives and contain a great number and variety of mineral deposits. These are discussed in the section dealing with economic geology.

#### Coast Range Batholith

The contact zone of the Coast Range batholith with the intruded Hazelton series runs in a northwest direction across Terrace area, roughly from Zymoetz river to Kitsumgallum lake and beyond. West of this line, there are numerous roof pendants and several, large, isolated areas of volcanic or sedimentary rock enclosed in the granitic rocks of the batholith. The more westerly of the main mass of the volcanic rocks, as on Kleanza, Bornite, and Kitsalas mountains, is intruded by granitic tongues which extend eastward from the main body of the batholith. The largest

of these apophyses extends from the lower end of Kitsumgallum lake east to the Skeena in the vicinity of Pacific flag station. For many miles east of the main contact both sediments and volcanic rocks are cut by small, isolated stocks and bosses of the granitic rocks. The intrusives are dominantly granodiorite in composition, but all gradations occur from granite through granodiorite to quartz diorite and diorite and various porphyritic phases of these rocks occur. Mineral deposits are present in the batholithic rocks, but are not nearly as numerous as the deposits in the Hazelton series nor are they as rich.

#### Dykes

There are a large number and a great variety of dyke rocks throughout the area, suggesting a prolonged period of dyke intrusion following the consolidation of the Coast Range batholith. The dykes cut both the Hazelton group rocks and the Coast Range intrusives. They are usually vertical and average from 2 to 20 feet in width.

On Thornhill mountain, the granodiorite country rock is cut by lamprophyre dykes. These are cut by quartz orthoclase porphyry dykes, which are in turn cut by quartz diorite dykes. On the A claim the quartz diorite dykes are cut by hornblende porphyry dykes. A quartz albitite dyke on the St. Paul claim cuts lamprophyre dykes. A large hornblende gabbro dyke, roughly 50 feet wide, was seen half a mile south of the Eureka claim on Thornhill mountain. It exhibits a poikilitic texture, numerous small feldspar crystals being held as inclusions in large hornblende phenocrysts.

At the Columario mine, on Kleanza mountain, aplite, quartz albitite, quartz diorite, and biotite lamprophyre dykes are common, the quartz albitite dykes being most numerous. The



intrusive relations between these dykes was not discovered, but the quartz vein ore-bodies are younger than the quartz albitite dykes and presumably are younger than the other dykes.

On Maroon mountain an aplite dyke cuts across and is younger than the Bear quartz vein, and on the Black Wolf claim the same dyke is sheared, silicified, and mineralized with finely crystalline pyrite. On the Guld claim, an altered, brown weathering dyke cuts a somewhat similar aplite dyke. The brown dykes of this type are fractured and altered and are cut by numerous, small, intersecting quartz veinlets about one inch in width. On the property of Kalum Lake Mines, Limited, on the west shore of Kitsumgallum lake, there are both altered diorite dykes and lamprophyre dykes cutting granodiorite. The altered diorite dykes were intruded prior to vein formation, but the lamprophyre dykes are later and one may be seen cutting the quartz vein in a tunnel on the lake shore. A small diabase dyke cuts the diorite on the Lucy O'Neill claim and forms the hanging-wall of the vein.

The quartz albitite dykes in the southeastern part of the area are of particular economic interest as many of them have quartz veins along both walls, as on the Dardanelles and St. Paul properties. Alaskite dykes were noted by Hanson in 1925 with this relation to quartz veins on Legate and Chindemash creeks. Both the quartz albitite and alaskite dykes are identical rocks, but the latter are coarsely crystalline.

#### Skeena Formation

The Skeena formation of Lower Cretaceous age occurs in the valley north of Kitsumgallum lake. It is best exposed at Cedar River crossing and similar rocks are found on Clear creek and on the lower part of Little Cedar river. The formation consists of basal conglomerates, sandstones, and argillite, and occasional coal seams. Exposures of the graphitic coal may be

seen north of Cedar River crossing. In general the beds are folded into numerous open folds, the limbs of which dip about 30 degrees. Where there has been faulting, local dips are in some places as high as 70 degrees. These rocks are remnants of an extensive formation laid down unconformably on the Hazelton sediments in Cretaceous valleys and subsequently largely removed by Cretaceous and Tertiary erosion. The extent of the formation in Kitsumgallum-Cedar River valley has not been fully ascertained due to a heavy covering of gravel, and the north part of the area is still unmapped.

#### Pleistocene and Recent

Scattered glacial boulders are found over the whole area and glacial striae are present in many places parallel to the main valleys. Boulder clay is not common, but is usually found in small amounts in the tributary valleys of the larger rivers and lakes. Small morainal deposits have accumulated at the foot of the alpine glaciers.

Extensive gravel deposits cover the floor of Kitsumgallum-Lakelse valley and gravel terraces occur up to 200 feet above all the large streams and lakes. These deposits are believed to have been formed during the wane of the Glacial period and in Recent time through extensive deposition by overloaded streams and by deepening of the river channels. A number of clay horizons occur in the gravel beds at Terrace and furnish important water horizons. A vertical drill hole bored at Terrace is reported to have passed through 450 feet of gravel. Flood-plain deposits of sand and silt furnish a fertile soil in Terrace area.

#### ECONOMIC GEOLOGY

The initial discovery of gold and copper in the vicinity of Usk in 1894 precipitated a mild staking rush in that vicinity, but it was not for another twenty years that claims were staked on

the many mineral deposits farther east and south. Almost twenty-five years elapsed before the discovery of mineral deposits on Maroon mountain 15 miles northwest of Usk. There was considerable mining activity throughout the area between 1920 and 1930, but failure to find large ore-bodies discouraged the promoters. An attempt was made by Columario Consolidated Gold Mines, Limited, between 1933 and 1935, to develop their mining property near Usk into a paying mine. A strong vein system was explored, but ore shoots were not as numerous as anticipated. Acquisition and development of the Dardanelles property 12 miles up Zymoetz river by Omineca Gold Quartz Mines, Limited, during 1935-36, has stimulated new interest in the area and much of the old territory is now being re-prospected. Much of the more inaccessible parts of the area are still unexplored and unfortunately a heavy drift cover on many of the mountain slopes hides other excellent prospecting ground.

Small-scale placer operations have been carried on for almost fifty years in this area, and many of the old timers are still working their leases. Some coarse gold is recovered from time to time, but the yearly production is now very small. The placer gold occurs in Douglas, Lorne, Fiddler, Chimdamash, Kleanza, and Phillips creeks.

There are a great variety of mineral deposits in the area and over one hundred groups of mining claims have been staked. The minerals found in order of importance are: gold, silver, copper, zinc, lead, arsenic, tungsten, and molybdenite. These minerals are all contained in quartz veins which occur along faults, or in shear zones in the volcanic and sedimentary rocks of the Hazelton group, or in the batholithic intrusives near these rocks. Some quartz veins occur along the contacts of intrusive quartz albitite dykes. A few additional deposits occur in the Triassic and Skeena sediments.



From the standpoint of mineral associations the deposits may be subdivided into the following types:

Gold-bearing quartz veins associated chiefly with pyrite. The following properties have ores of this type: Omineca Gold Quartz Mines, Limited; Columario Consolidated Gold Mines, Limited; St. Paul and X; Globe.

Gold-bearing quartz veins associated with bornite and chalcocite. The Cordillera, Lucky Luke, Nugget, and Emma properties in the vicinity of Usk have ores of this type.

Gold-bearing quartz veins associated with pyrrhotite, sphalerite, and galena. The Bear vein on Maroon mountain has this mineral association.

Gold-bearing quartz veins associated with pyrrhotite and arsenopyrite. The Marten vein, north of Little Beaver river is of this type and a number of other occurrences of arsenopyrite are reported on neighbouring claims.

Quartz veins mineralized with galena and sphalerite and containing either argentite or tetrahedrite. The Hunter, Silver Plate, and Silver Bow veins are of this type. Other veins containing silver, lead, and zinc occur about 12 miles east of Usk near the headwaters of Legate and Chindemash creeks.

Veins and replacements of bornite, chalcocite, and chalcopyrite. There are a number of these copper deposits on Bornite mountain, the best known being the Lucky Jim property. Small veins of chalcopyrite also occur along the contacts of Triassic limestone roof pendants in the granodiorite, on the mountain slope south of Williams creek.

✓ Scheelite and molybdenite deposits occur on Thornhill mountain about 6 miles southeast of Usk. The molybdenite is in a pegmatitic phase of granodiorite and the scheelite occurs in a small quartz vein associated with free gold. The quartz veins in

granodiorite prospected by the Nicholson Creek Mining Corporation on Molybdenum creek, 3 miles north of Usk, contain molybdenite associated with pyrite.

The ore deposits are believed to have been derived from a common source, the Coast Range batholith. There is a gradual change in the type of deposit found in a direction at right angles to the main contact zone between the Hazelton group and the batholithic rocks. High-temperature minerals such as scheelite and molybdenite were deposited close to their point of origin in the igneous rocks. Gold pyrite deposits came next in a slightly cooler zone followed by the copper and arsenic zone minerals and finally the silver, lead, and zinc minerals were deposited in the zone of lowest temperature. The high-temperature minerals were deposited in the Coast Range batholith and the low-temperature minerals with few exceptions are as much as 15 miles from its edge. The gradation from gold through copper to silver-lead-zinc deposits shows no change in relation to individual intrusive stocks. It is probable that the metals rose from a source directly below them and that the horizontal gradation from high to low temperature metals is due to the increasing depth from southwest to northeast of the source rock, the Coast Range batholith.<sup>1</sup>

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<sup>1</sup>Hanson, George, 1927: Zoning of Mineral Deposits in B.C.;  
Trans. R.S.C. Sect. IV, pp. 119-126, 1927.

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As pointed out in the introduction, small commercial gold deposits are known to exist in this area and there is reason to expect, judging by the widespread mineralization, that new mines either large or small may be developed.

## Properties in the Vicinity of Kitsumgallum Lake

### Hunter Group

References: Annual Reports of the Minister of Mines, B.C.;  
1918, p.50; 1927, p.64; 1930, p.76.

The Hunter group is situated on Egan creek, a tributary of Cedar river, about 18 miles north of Kitsumgallum lake. There is a good road from Rosswood at the head of the lake to Cedar river, crossing a distance of about 10 miles. About one-quarter mile south of the crossing a good pack-horse trail branches off to the right and leads 8 miles farther north to the property. The trail rises gradually from an initial elevation of about 800 feet to somewhat over 2,000 feet, and then gradually drops down 500 feet to Egan creek. A log cabin is on the north bank of the creek and a prominent quartz vein is exposed at the water's edge on the south bank of the stream opposite the cabin. Oscar Olander of Rosswood is the owner.

The claims are underlain by gently folded sediments, chiefly sandstone and argillite. In the vicinity of the prospect workings the sediments strike about north 75 degrees east and dip 30 to 40 degrees northwest. About 1,200 feet upstream or to the east the strike swings more easterly and the dip is 25 degrees north. To the south on the south fork of Egan creek the strike changes to the southeast with an average dip of 30 degrees north. A 10-foot band of grit conglomerate with overlying coarse sandstone outcrops on the south shore of Egan creek about 500 feet west of the cabin. A fine-grained aplite dyke about 1 foot wide cuts the conglomerate and was the only intrusive seen in the vicinity.

The quartz vein exposed on the south side of the stream opposite the cabin has been followed by trenching for over 600 feet

in a southeasterly direction along the foot of a hill. Its average width is about 30 inches, but in places its width is over 5 feet. The vein occurs along a strong fault striking north 50 degrees west and dipping 55 degrees north-east. Slickensided surfaces not only enclose the vein but in places traverse the vein quartz, showing that some of the movement occurred during or after vein formation. The vein quartz is characterized in places by abundant, small, angular, and partly altered inclusions of brecciated wall-rock. Calcite crystals, some of which are 2 to 3 inches in diameter, occur in the vein. The vein is mineralized with chalcopryite, galena, tetrahedrite, and light brown sphalerite in varying proportions. On the whole, the sulphides are rather sparsely distributed in the surface exposures.

During the winter of 1926 a shaft 22 feet deep was sunk on the vein about 70 feet southeast of Egan creek. The shaft is now water-filled, but a considerable amount of vein material is on the dump. An average sample weighing one pound was taken for assay with these results: silver, 0.92 ounce a ton; gold, none; lead, 1.57 per cent; zinc 4.20 per cent. A 2-foot channel sample taken across the vein at a point 60 feet west of the shaft where there was an abundance of calcite with the quartz gangue assayed: silver, 0.84 ounce a ton; gold, none; lead, 1.06 per cent; zinc, 0.40 per cent. Another channel sample taken 100 feet west of the shaft across 30 inches of vein, assayed: silver, 0.36 ounce a ton; gold, 0.01 ounce a ton; lead, 0.69 per cent; zinc 0.3 per cent.

Six hundred feet southeast of the junction of the vein with the South fork of Egan creek, a smaller vein of similar appearance was seen along the south bank of the South fork. The latter vein is in line with, and strikes towards, the main vein, so may be its continuation. On the north side of the stream opposite the smaller vein a pit was sunk years ago on a 3-inch seam of carbonaceous shale.

Silver Plate and Silver Cup Claims

References: Annual Reports of the Minister of Mines of B.C.  
1913, p.78; 1914, p.109; 1921, p.44; 1926, p.72.

The Silver Plate and Silver Cup claims are situated about 12 miles north of Kitsumgallum lake. They are on the north side of the telegraph trail about 3 miles northwest of the Cedar River bridge. A wagon road approximately 10 miles long runs from Rosswood at the north end of Kitsumgallum lake to Cedar River crossing and a good pack-horse trail along the telegraph line leads from there to the property. There is a cabin beside the trail and the mineral showings are 200 feet above it at an elevation of 1,050 feet on the gentle southeast slope of Belway mountain. The claims were first staked in 1913 and have been known successively as the Iona, Silver Dollar and Silver Coin, and Silver Plate and Silver Cup group. In 1926 the Hopper Davis Syndicate sank a 20-foot shaft and shipped some high-grade ore. The present owners are Clarence Giggy, Donald Bruce, and partners, of Terrace.

Silver, lead, zinc, and copper occur in quartz veins and in mineralized brecciated zones in argillite and impure sandstones. The sediments strike about north 20 degrees east and dip from 55 to 65 degrees northwest. The deposit is under a heavy covering of drift and has been exposed by trenches for only 150 feet along its strike. No intrusive rocks were seen in the vicinity.

A quartz vein ranging from 1 to 2 feet in width occurs along a strong fault striking north 70 degrees east and dipping 65 degrees south. A quartz vein of the same width lies along a parallel fault 30 feet to the south. Between the two the sandstone and argillite have been severely brecciated and cut by minor faults. The brecciated zone has been impregnated and cemented by vein quartz, and small quartz veins have formed along the minor

faults. The quartz in both the veins and brecciated zones is mineralized with galena, chalcopyrite, tetrahedrite, and light brown sphalerite.

A 20-foot shaft was sunk about ten years ago on some of the best-looking ore along the fault vein and some of the ore from this operation is still stock-piled. A representative specimen taken from an open-cut by W.M. Brower in 1914 assayed: gold, a trace; silver, 56.4 ounces a ton; copper, 4.8 per cent; lead 6.1 per cent; zinc, 19.4 per cent. A sample across 48 inches of the mineralized brecciated zone near the shaft assayed: silver, 4.27 ounces a ton; gold, a trace; copper, 0.44 per cent; lead, 1.04 per cent; zinc 2.18 per cent.

One hundred feet southeast of the shaft an adit has been driven north for 50 feet. It intersects the two main veins and the mineralized brecciated zone between them. Five feet from the adit entrance, there is a 4-inch quartz vein; at 9 feet an 8-inch quartz vein; at 16 feet an 18-inch quartz vein; at 20 feet a 6-inch quartz vein; at 25 feet a 3-inch quartz vein; and at 45 feet a 21-inch quartz vein. The intervening rock from 10 feet to 45 feet from the adit entrance comprises the brecciated zone, but it does not carry as much quartz as in the vicinity of the shaft, nor is it as well mineralized with sulphides. A channel sample taken across the 21-inch quartz vein near the face of the adit and on the west side, assayed: silver, a trace; gold, 0.02 ounce a ton; copper, 0.02 per cent; lead, 1.10 per cent; zinc, 0.15 per cent. An 18-inch channel sample taken across the quartz vein 16 feet from the adit entrance on the east side, assayed: Silver, 0.14 ounce a ton; gold, none; copper, 0.04 per cent; lead, 0.19 per cent; zinc, none.

A trench should be excavated about 100 feet southwest of the shaft across the vein zone, to test the grade of ore in that direction.



Belway and Rex Claims

References: Annual Reports of the Minister of Mines, B.C.:  
1914, p.105; 1918, p.49; 1927, p.63; 1931, p.36.

The Belway and Rex claims, owned by Walter Raymond and William Corrigan of Terrace, are near the north end of Kitsumgallum lake on the east shore and are about a mile south of Rosswood. These claims were first staked in 1924 as the Treadwell and Juneau and since that time have changed ownership several times.

The rocks are chiefly fine-grained grey micaceous quartzites that strike east and west and dip roughly 30 degrees north. At a rocky point on the lake the sediments are intruded by a gabbro sill about 70 feet thick. The gabbro<sup>1</sup> contains up to 80 per cent of green uralite (secondary hornblende). In

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<sup>1</sup>Certain phases of the gabbro approach augite diorites and amphibolite in composition

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places the overlying impure quartzites have been converted to sericite schist.

A large pit roughly 10 feet square and 10 feet deep has been sunk on the south side of the gabbro sill on the south-east side of the point near the water's edge. Seventy feet east of the pit a tunnel has been driven north along two small fractures for 33 feet into the gabbro sill. Very little movement has taken place along these fractures and there is no vein filling, but the wall-rock is slightly altered with a development of epidote and is mineralized with a few splashes of chalcocite and bornite.

About 350 feet south from the gabbro sill, a tunnel has been driven for 50 feet east-northeast along a shear zone in grey, micaceous quartzite. The sheared zone is 30 inches wide, strikes north 70 degrees east, and dips 30 degrees northwest, and is parallel to the bedding of the enclosing sediments. In a number of places the shear zone contains epidote and bornite.

A number of specimens on the dump were seen to be well mineralized with bornite and were stained green with a coating of malachite. Free gold is reported to have been found in specimens of this description in the early days. A representative grab sample of this ore tested by the Mines Branch at Ottawa, assayed 0.34 ounce of silver and 0.24 ounce of gold a ton. Samples submitted by Joe Felber to J.T. Mandy in 1931 also assayed 0.24 ounce of gold with 0.6 ounce of silver.

An open, mud-filled fissure 4 inches wide, striking north 75 degrees east and dipping 65 degrees north, cuts across the sheared zone at the face in the tunnel but does not displace it. Surface waters working down along this crevice may have leached the metallic minerals from the shear zone in its vicinity, so further drifting is advised to test the mineralization farther along the shear zone.

Kalum Lake Mines, Limited

References: Annual Reports of the Minister of Mines, B.C.:  
1922, p.47; 1923, p.47, 1924, p.48; 1925, p.69;  
1927, p.63; 1930, p.74.  
Geol. Surv., Canada, Sum. Rept. pt. A, p.42, 1923.

During 1924 and 1925, Kalum Lake Mines, Limited, carried out development work on the Portland claims which lie on the west side of Kitsumgallum lake near its lower end. The claims were first staked in 1921 by C.A. Smith of Terrace. Nothing has been done in recent years.

The vein showings occur in a prominent outcrop of granodiorite which rises some 75 feet above Kitsumgallum lake. Along the north end of the outcrop, near the water's edge, the intrusive contact of the granodiorite with impure quartzite is exposed for 80 feet. Both rocks are silicified and impregnated with pyrite along their contact in a zone 1 to 2 feet wide that has been oxidized on the surface.

On the west and southwest, the granodiorite and quartzite are intruded by a stock of altered diorite about 150 feet in diameter. The stock is joined by three parallel dykes which strike south 25 degrees east across the granodiorite outcrop to the water's edge. The more southerly dyke is 14 feet wide and the other two are each about 6 feet wide. This rock is medium- to fine-grained with a granular texture. It is dull grey and is characterized by the presence of conspicuous, pink-rimmed, oval-shaped calcite phenocrysts. The granodiorite between and for 10 feet on either side of the two more southerly dykes is sheared in a direction parallel to the strike of the dykes and is cut by small, milky white quartz stringers which lie along the planes of shearing.

Along the contact between the diorite stock and the granodiorite, a prospect shaft was sunk in 1922 on an oxidized seam which opened up into a foot of quartz at a depth of 20 feet. This shaft, 50 feet from the water's edge, is now water filled and cannot be inspected, but there are several tons of pyritized quartz on the dump.

In 1924 and 1925, Kalum Lake Mines, Limited, sank an inclined shaft towards the contact of the granodiorite with altered diorite. The shaft is reported to have been sunk for 60 feet and a drift run westerly on the vein for 210 feet. This shaft is now water filled, but according to G.A. Clothier (1925) the vein consists of a foot or more of quartz consistently mineralized with pyrite and a little chalcopyrite. A sample of selected sulphides collected by J.T. Mandy in 1930 from the dump near the shaft house assayed: gold, 0.62 ounce a ton; silver, 2.2 ounces a ton. On the main rock dump, altered granodiorite cut by quartz stringers is abundant.

Three hundred feet southeast of the main shaft, an adit drift has been driven for 85 feet along a quartz vein in granodiorite. The vein above the tunnel entrance consists of quartz striking north 75 degrees east and dipping 65 degrees south. Forty feet within the tunnel the vein narrows to 6 inches and a second parallel vein 4 inches wide comes in along the north wall. At this place a 10-inch lamprophyre dyke cuts across the veins. Both veins occur along slickensided fault fissures of small displacement, so the lamprophyre dykes are later than the faulting and vein formation. At the southwest end of the tunnel the veins have pinched to mere stringers separated by 2 feet of altered granodiorite. Two channel samples, each 17 inches long, were taken across the face. One assayed 0.01 ounce of gold a ton with a trace of silver and the other showed only a trace of silver and

no gold. A sample of quartz from the north side of the adit, 50 feet from the entrance, assayed: gold, 0.01 ounce a ton, and silver, 0.15 ounce a ton.

North and west from the mine shaft the country rock is comprised of slate and quartzite, but it is about 600 feet to the nearest outcrop along the lake, the intervening area being heavily covered with gravel. The contact of the sediments with the intrusive rocks is believed to lie only a short distance northwest of the shaft, probably less than 100 feet. This contact might prove a very favourable place for further prospecting.

Bear Claim

References: Annual Reports of the Minister of Mines, B.C.:  
1920, p.41; 1921, p.43; 1923, p.47; 1924, p.47;  
1925, p.68; 1926, p.72; 1927, p.63; 1928, p.72;  
1930, p.74.

The Bear claim, owned by Matt Allard of Terrace, is situated on the north slope of Maroon mountain about 5 miles due east of the north end of Kitsungallum lake. An excellent trail about 6 miles in length, leaving the lake about 1 mile south of Rosswood at Olanders ranch, leads to this property and others on Maroon mountain. There are two log cabins at an elevation of about 4,300 feet just above timber line and the vein outcrops a short distance above at an elevation of 4,600 feet. In 1923 the claim was under bond to O.P. Brown of Seattle who operated a small Ross gold mill for a short time. It passed into the hands of the Chiro Mining Company in 1924, but nothing was done, and in 1925 the Hopper-Davis Syndicate took it over, drove a crosscut tunnel 143 feet long, and drifted 65 feet on a narrow, gold quartz vein. The prospect has since lain idle.

The Bear vein strikes north 50 to 60 degrees east and dips 50 to 70 degrees to the southeast. It is in a shear zone, for the most part parallel with the bedding of slates and sandstones, but in places cutting across the bedding planes at small angles for short distances. The southern end of the vein lies about 120 feet below a prominent conglomerate bed and 900 feet to the northeast the vein is 40 feet below the conglomerate. Thinning and thickening of the beds appears to account for the greater part of this difference. The conglomerate bed varies from 120 to 160 feet in thickness in this distance and farther northeast on the Gold Cap claim is about 240 feet thick. It is conformable with the overlying, as well as underlying, slates and sandstones, strikes north 25 degrees east and dips from 55 to

75 degrees southeast. Pebbles of quartzite, argillite, and granite are numerous and average from 1 to 4 inches in diameter. These sediments form part of the south limb of an anticline whose axis strikes east and which plunges eastward at a low angle. The sediments on the south side of Goat mountain form the north limb of the anticline and Hall creek has cut a deep valley along the axial plane.

An aplite dyke cuts across the Bear vein a short distance northeast of the upper tunnel. It is fresh and unaffected by the adjoining sulphides. The dyke may be followed for more than 3,000 feet southwest to a small lake on the Black Wolf claim. It ranges from 4 feet wide near its ends to 12 feet wide along its central part.

The best surface outcrops of the Bear vein are a few feet above what is known as the upper tunnel. For about 50 feet the vein maintains an average width of 3 feet consisting of a heavy mineralization of pyrrhotite with sphalerite, chalcopyrite, pyrite, and galena in a quartz gangue. South from the tunnel, the vein narrows to 6 inches in a short distance and within 200 feet it pinches out. Northeastward from the vein and aplite dyke intersection near the tunnel, the vein likewise narrows and maintains an average width of less than one foot. About 700 feet to the northeast a drift tunnel was driven south along the vein for 35 feet. For this distance it ranges from 3 to 6 inches in width and is sparsely mineralized. A short distance farther southwest the vein is exposed along the surface for over 100 feet and has widths up to 18 inches of white quartz, some of it honey-combed through oxidation of pyrite.

The upper tunnel, driven east 26 feet, intersects the vein about 15 feet below its surface outcrop. There is a drift 5 feet each way on the vein and a miniature stopo extends through



to the surface. A sample taken from the north face of the drift by H.T. James in 1928 assayed: gold, 1.26 ounces a ton; silver, 3.5 ounces a ton; lead, 6 per cent; zinc, 4 per cent. A representative sample from the south drift collected last summer assayed 0.16 ounce a ton in gold and 0.64 ounce a ton in silver.

The lower tunnel, about 85 feet below the upper one, was driven 150 feet east to the vein and a drift run 25 feet south and 39 feet north. In the south face the vein is only 4 inches wide, at the intersection of crosscut tunnel and drift, 6 inches wide, and in the face of the north drift 16 inches wide. A channel sample taken by the writer at the widest point in the face across 16 inches assayed: gold, 1.36 ounces a ton; silver, 1.77 ounces a ton. A sample taken by H.T. James in 1927 across the same face assayed: gold, 0.80 ounce to the ton; silver, 1.2 ounces to the ton, lead, 0.4 per cent; zinc, 5 per cent. The vein in this end of the drift is heavily mineralized with a fine impregnation of pyrrhotite and black sphalerite, with small amounts of chalcopyrite and galena in a quartz gangue.

The northeastern continuation of the Bear vein is described under Gold Cap.

Gold Cap Claim

Reference: Annual Report of the Minister of Mines, B.C.,  
1930, p.76.

The Gold Cap claim, owned by J. Carruthers of Terrace, is on the north slope of Maroon mountain about  $5\frac{1}{2}$  miles east of the north end of Kitsumgallum lake. It adjoins and lies north-east of the Bear claim, and is reached by way of the Maroon Mountain trail to the Bear claim from Rosswood.

The Bear vein continues northeast into the Gold Cap claim and has been exposed by trenching for about 300 feet beyond the Bear claim. It ranges from 2 to 6 inches in width and has the same bedded relations with the enclosing sediments as on the Bear claim except that it follows fairly closely the bedding plane of a narrow seam of soft, black, carbonaceous shale with overlying impure sandstone. The vein is of quartz, in places heavily stained and honeycombed by the leaching out of pyrite. An unoxidized sample containing a little pyrite and galena weighing 1 pound and 13 ounces assayed: gold, 0.06 ounce a ton; silver, 0.54 ounce a ton. Four hundred feet farther northeast, a number of pits trace a similar vein for 100 feet. An altered, brown-weathering dyke similar to the one on the Guld claim occurs about 50 feet east of the latter pits. It is cut by a stockwork of reticulating quartz veinlets about one inch in width. An assay of similar quartz veinlets taken from the dyke on the Guld claim showed a trace of silver and no gold.

Guld Claim

Reference: Annual Report of the Minister of Mines, B.C.,  
1930, p.76.

The Guld claim, formerly known as the Alice, adjoins the northeast boundary of the Gold Cap claim and is reached by way of the Maroon Mountain trail from Rosswood. Oscar Olander of Rosswood is the owner.

The conglomerate horizon from the Bear and Gold Cap claims extends onto the Guld claim, continues northeast for 600 feet, and then swings north and may be followed down the valley slope to where it crosses Hall creek to Goat mountain. Close to the line between the Guld and Gold Cap claims is a quartz vein in a sheared zone in the conglomerate. It is 18 inches wide, and 20 feet long, strikes north 30 degrees east, and dips 65 degrees west. Five hundred feet to the northeast a pit has been sunk on an altered, brown-weathering dyke which is cut by a stockwork of quartz veinlets of one inch average width. A sample weighing 1 pound and 11 ounces, taken by breaking off quartz chips from a large number of the quartz veinlets, assayed only a trace of silver and no gold.

About 150 feet farther northeast a deep pit has been sunk at the contact of an aplite dyke intrusive into black slates. Several, small quartz stringers lie along the contact and in the slate. About 200 feet farther northeast and farther down the slope, two other pits expose small quartz stringers in black slates. A short distance west of these pits the aplite dyke is intersected and cut by the brown-weathering dyke.

Black Wolf Group

References: Annual Reports of the Minister of Mines, B.C.:  
1921, p.43; 1924, p.47; 1925, p.68; 1926, p.72;  
1927, p.64; 1928, p.73; 1930, p.74.

The Black Wolf claims are situated on the north slope of Maroon mountain between elevations of 4,500 and 4,900 feet, about  $4\frac{1}{2}$  miles due east of the north end of Kitsumgallum lake. The main Maroon Mountain trail from Rosswood crosses the claims and passes close to the workings. The claims were first staked in 1921 and in 1924 passed into the hands of the Black Wolf Mining Company of Seattle. In 1925 a 70-foot tunnel was driven along a narrow gold quartz vein and 300 sacks of ore was packed down to Kitsumgallum lake. In 1928 some 25 tons of ore was taken from a tunnel driven along a vein in the conglomerate. Nothing has been done in recent years.

The geology is essentially the same as that on the Bear claim and has been described previously in some detail. The conglomerate horizon which crosses the Bear claim continues south across the Hawk, Hall Fraction, and Black Wolf No. 1 claims. In this distance, the average dip to the east changes from 55 on the Bear to 15 degrees on the Black Wolf claims. Quartz veins occur parallel the bedding in the underlying argillaceous sandstones and slates about 50 feet below the conglomerate horizon and one vein occurs in a fracture cutting diagonally across the conglomerate.

The vein in the conglomerate outcrops high up on a rock bluff. It strikes north 60 degrees east and dips 40 degrees northwest. The walls of the vein are slickensided and the striations plunge at 20 degrees to the northeast. Where a tunnel 50 feet long has been driven along the vein, it is well mineralized with pyrite, sphalerite, galena, and chalcopyrite and maintains an average width of about 12 inches. Below the tunnel the vein may

be followed along the rock bluff for about 50 feet in the conglomerate and in places is 2 feet wide. Above the tunnel it is quite narrow and may be seen to pinch out in 50 feet. A sample 1 foot long taken across the vein in the face of the tunnel, by the resident engineer in 1927, assayed: gold, 1.06 ounces a ton; silver, 2 ounces a ton; lead, 1 per cent; zinc, 5 per cent.

Two hundred feet north of the small lake on the Black Wolf No. 1 claim a 70-foot tunnel was driven along a flat-lying quartz vein which outcrops part way up a rock bluff. At the entrance the vein strikes south 60 degrees east and dips 5 degrees northeast. It has a maximum width of 10 inches and narrows gradually to 4 inches in about 30 feet in both directions along its strike. At the face in the tunnel the vein maintains a width of 4 to 6 inches, but the dip increases suddenly to 30 degrees northeast. A channel sample taken last season across 7 inches of vein quartz 30 feet from the tunnel entrance on the north wall assayed: silver, 0.22 ounce a ton; gold, 0.06 ounce a ton. The sample contained no sulphide, although in places the vein is sparingly mineralized with pyrite. Two hundred feet north of the tunnel is another quartz vein similar to the one just described. It lies just above a talus slope near the foot of the bluff, and has not been prospected. The strike is south 40 degrees east and the dip 20 degrees northeast. It ranges from 4 to 8 inches in width and is exposed for 100 feet. Three hundred feet farther north, a tunnel 30 feet long has been driven northeast on a 4-inch quartz vein which narrowed to a mere stringer parallel the bedding near the end of the tunnel.

On the northeast bank, close to the outlet of the small lake on the Black Wolf No. 1 claim, a trench crosses an altered, silicified, and mineralized aplite dyke. The dyke is  $3\frac{1}{2}$  feet wide, strikes roughly north and dips 35 degrees east. It has been

sheared, impregnated with finely crystalline quartz, and mineralized with pyrite. A 41-inch channel sample taken across the dyke at the trench assayed only a trace in gold and silver. The dyke has been followed north across the Hall Fraction claim by a number of trenches. A representative grab sample of the altered rock was taken on the latter claim from a deep open-cut 640 feet north of the lake on the north side of a small creek. The sample weighed about 2 pounds and was cut by numerous quartz stringers and veined with fine pyrite. It assayed a trace of silver and 0.02 ounce of gold a ton. Eight hundred feet north of the lake the dyke has increased in width to 8 feet and no longer shows any minerals. It continues north across the Hawk and Bear claims.

Motherlode Claim

References: Annual Reports of the Minister of Mines, B.C.:  
1920, p.41; 1921, p.43; 1923, p.48; 1930, p.74.

The Motherlode claim, owned by Oscar Olander of Rosswood, is situated on the west slope of Maroon mountain at the headwaters of the south fork of Hall creek, about  $4\frac{1}{2}$  miles southeast of Rosswood. It is reached by a trail that branches to the south, at an elevation of 4,000 feet, from the main Maroon Mountain trail from Rosswood to the Bear claim. There is a cabin on the claim at an elevation of 5,000 feet beside a small lake, and the workings are in a northeast-trending ridge which rises steeply to 5,700 feet south of the cabin.

Considerable interest was manifested in this property some fifteen years ago when rich pieces of float were found on the talus-covered slope of the mountain south of where the cabin now stands. The owners reported rich silver values from blocks of vein quartz mineralized with pyrite, zinc blende, galena, and tetrahedrite. The pieces of float are still to be seen scattered through the talus near the base of the peak. A representative specimen collected by J.T. Mandy, Resident Engineer in 1930, assayed: gold, 0.04 ounce to the ton; silver, 19 ounces to the ton; copper, 0.03 per cent; lead, a trace; zinc, 4.4 per cent.

The rocks on the claim consist principally of slates and argillite. The slates have well-developed secondary cleavage, but the bedding is poorly marked. On the knife-edge peak 600 feet above the camp the slaty cleavage strikes north 30 degrees east and dips 65 degrees northwest, but no bedding is discernible. At the base of the peak near the cabin, the slaty cleavage has a similar strike and dips 55 degrees northwest and the bedding strikes north 40 degrees east and dips



25 degrees northwest. A small quartz diorite stock intrudes the slates and forms part of the peak of the mountain at an elevation of 5,600 feet and a coarsely crystalline hornblende gabbro dyke was encountered in the prospect workings.

At an elevation of 5,400 feet a tunnel was driven for 206 feet in a direction south 38 degrees east in an effort to locate the quartz vein which furnished the float. The work was done on the supposition that the vein lay parallel with the bedding and that the bedding dipped steeply to the northwest. The tunnel intersects 80 feet of argillite, then a 40-foot hornblende gabbro dyke followed by 86 feet of argillite and slate. There is a 10-inch gouge-filled shear zone 6 feet from the face which strikes north 30 degrees east and dips 55 degrees northwest. A second tunnel was driven for 140 feet at a point 200 feet below the upper tunnel and again no vein was struck. At the time the property was visited, early in August, the lower tunnel was completely buried by a large snow drift and could not be entered.

Keystone and Lucy O'Neill Claims

Reference: Annual Report of the Minister of Mines, B.C.:  
1921, p.44.

The Keystone and Lucy O'Neill claims are on the north fork of Maroon creek, about 8 miles east of Kitsumgallum lake. The Keystone is on the west side, and the Lucy O'Neill on the east side, of the creek, a short distance north of the forks. A pack-horse trail now much overgrown follows Maroon creek from the lake to the claims.

A 3-foot quartz vein heavily mineralized with pyrite and chalcopyrite outcrops in a cliff of massive grey diorite on the east side of the stream just above the water. The vein is on the lower side of a dark, fine-grained diabase dyke about 3 feet wide that strikes north 30 degrees west and dips 60 degrees northeast. Some vein quartz also occurs on the hanging-wall side of the dyke, but only in small discontinuous lenses. The diorite adjoining the veins is altered and pyritized for several inches.

A shaft, 20 feet deep, was sunk on the vein in 1921 by George Little and associates. At the bottom of the shaft the vein is  $4\frac{1}{2}$  feet wide and the quartz is evenly mineralized with pyrite and chalcopyrite. Two channel samples were taken across the vein, close to the bottom on the east side of the shaft. The first sample, 32 inches in length, taken adjacent to the dyke, assayed: gold, a trace; silver, 0.89 ounce a ton, and copper 3.48 per cent. The second sample, from the remaining 22 inches of the vein adjoining the diorite, assayed: gold, 0.02 ounce a ton; silver, 0.68 ounces a ton; and copper, 1.51 per cent; across the  $4\frac{1}{2}$  feet the copper averages 2.68 per cent.

On the projected extension of the vein on the west side of the stream, 60 feet distant, a shear zone has a similar strike and dip, but has no vein filling. The diabase dyke lies 15 feet north of the shear zone but has a more northerly strike

and its dip is reversed to southwest. Vein formation on the east side of the stream was evidently dependent upon both dyke and fracture zone following the same path. Since they are known to diverge on the west side of the creek, it follows that any future prospecting should be done on the east side of the creek along the strike of the dyke. A thick drift cover hinders trenching but a well-placed trench should disclose whether the vein and dyke were getting larger or smaller in an easterly direction.

Martin Group

References: Annual Report of the Minister of Mines, B.C.:  
1918, p.50; 1925, p.69; 1926, p.73; 1928, p.71.

The Martin claims are 6 miles west of the north end of Kitsumgallum lake. A good pack-horse trail leaves the lake just below the mouth of Beaver river, leads west 3 miles to Little Beaver river, follows the north side of the river for 3 miles, and then climbs steeply from 1,500 feet above sea-level to 2,500 feet by a series of switchbacks to the property.

A narrow quartz vein heavily mineralized with sulphides occurs along a fault in grey, coarse-grained granodiorite at an elevation of 2,550 feet. The granodiorite extends down the mountain side to the river, but 50 feet above the vein it is in contact with the overlying intruded sediments, chiefly greywacke and argillaceous quartzite. A second parallel vein occurs in the sediments 125 feet above the main vein.

The main vein strikes north 40 degrees east magnetic and dips 55 degrees northwest. Its average width is 12 inches and the maximum width about 18 inches. Four large rock trenches expose the vein at regular intervals for a little over 300 feet. A channel sample taken across 12 inches of quartz in the southwest pit assayed a trace of silver and 0.02 ounce of gold a ton. Sixty-five feet farther northeast in the second pit the vein is heavily mineralized with massive pyrrhotite cut by small galena stringers. A channel sample 7 inches long across the vein in this pit assayed: silver, 5.04 ounces a ton; gold, 0.16 ounces a ton. In the remaining two pits the vein contains a high proportion of galena, some arsenopyrite and sphalerite, but almost no pyrrhotite. Seventy-five feet below the vein a crosscut tunnel was driven northwest. The vein was intersected 230 feet

from the entrance and consisted of only a few inches of barren quartz. The tunnel was continued an additional 45 feet, but no other veins were encountered.

The second vein is exposed for only a few feet by natural agencies between two large trees. The vein is 75 feet above the contact of the sediments and granodiorite and is enclosed in greywacke which strikes from 80 to 90 degrees northeast and dips 50 degrees north. The vein strikes north 40 degrees east and dips 42 degrees northwest. It is 7 inches wide, and is about 75 per cent solid arsenopyrite and 25 per cent quartz. A channel sample across it assayed: gold, 0.20 ounce a ton; silver, 0.36 ounce a ton; arsenic, 14.44 per cent. This occurrence suggests the desirability of searching for other veins in the sediments.

## Properties Near Terrace and Amsbury

### Autumn Group

References: Annual Reports of the Minister of Mines, B.C.:  
1916, p.97, 1922, p.47; 1927, p.62; 1929, p.76.  
Geol. Surv., Canada, Sum. Rept. 1925, pt.A, p.118.

The Autumn prospect is situated 1,000 feet northwest of the Canadian National Railway track, about 3 miles west of Amsbury flag station. Amsbury is approximately 8 miles west from Terrace.

Near the showings the rocks are composed of crystalline limestone, argillite, andesite, and schist, intruded by sill-like bodies of granodiorite. The beds strike north 50 degrees east and dip steeply. One sill of granodiorite, about 50 feet wide, is exposed about 200 feet southwest of the workings.

At an elevation of 375 feet, a quartz epidote replacement zone ranging from 3 to 6 feet in width, is enclosed in altered limestone and silicified schist. The silicified zone lies along a fault line, strikes north 50 degrees east, and dips steeply to the southeast. It is sparsely mineralized with pyrite and chalcopyrite. Three pits have been sunk on the zone over a distance of 250 feet. In the more northerly (No. 1 pit), small lenses of solid sulphide occur, one of which was 2 feet long and 4 inches wide. Pyrite is the only sulphide and is scarce in the second and third pits 20 and 250 feet to the southeast.

A tunnel 130 feet long was driven north 30 degrees west into the hillside to intersect the deposit from a point 20 feet below No. 2 pit. Seventy feet from the portal the tunnel cuts 6 feet of silicified and epidotized rock with no sulphides lying on the south side of the fault. A drift runs south along the deposit for 35 feet and north for 24 feet. A channel sample 4 feet long was taken across the face of the south drift and it assayed only a trace of silver and no gold.

A second tunnel 150 feet to the southwest is 45 feet long and was driven north 70 degrees west. Thirty-five feet from the portal a silicified, epidotized zone 3 feet wide was intersected. A channel sample taken across it on the north wall showed only a trace of silver and no gold. An assay of a selected specimen from No. 1 pit showed no gold nor silver.

About 800 feet north of the No. 1 pit, continuous beds of crystalline limestone are exposed in the bed of a small mountain stream. The beds strike north 55 degrees east and dip 75 degrees northwest. At an elevation of 300 feet in the stream bed, a zone of altered and silicified rock is exposed, and may be a continuation of the zone described above.



Oakwood Group

References: Annual Report of the Minister of Mines, B.C.,  
1925, p.68.

The Oakwood claims are a short distance north of the bridge crossing Skeena river at Terrace. Edmund Hamer of Terrace did considerable surface work on the claims about 10 years ago, but results were not encouraging. Two parallel faults occur in massive granite at an elevation of 525 feet, about 1,000 feet north of the bridge. The faults lie about 3 feet apart, strike north 20 degrees east, and dip steeply. Both contain narrow, lenticular quartz veins up to 8 inches wide. The faults are filled in part with sheared and brecciated granite. Two large trenches about 100 feet apart have been blasted out along the veins. In the more northerly trench the veins are very narrow. A grab sample of quartz from the lower trench was assayed for gold and silver with negative results.

A quartz albitite dyke, cutting granodiorite, outcrops about 800 feet to the northwest at an elevation of 825 feet. The dyke is 6 feet wide, strikes south 70 degrees east, and dips almost vertically. A pit has been sunk on a quartz vein 6 inches wide that follows the south wall of the dyke. The quartz is lightly mineralized with pyrite, and the granitic wall-rock has been altered and pyritized over a width of a few inches. A channel sample taken across the vein assayed only a trace in silver and no gold.

About 500 feet farther northwest, along the west slope of the hill, a large pit has been sunk on a sheared and mineralized zone in granodiorite. The shear zone strikes north, is 10 to 15 feet wide, and in it the crushed rock has been partly converted to talc schist.

The zone is cut by many quartz stringers and veinlets which carry small amounts of hematite and specular hematite. A sample of the mineralized quartz was assayed but showed no gold nor silver.

## Properties on Thornhill Mountain

### Globe Claim

References: Annual Reports of the Minister of Mines, B.C.:  
(1) 1920, p.41; (2) 1922, p.49; (3) 1925, p.71;  
(4) 1926, p.75; (5) 1928, p.75.  
Geol. Surv., Canada, Sum. Rept. 1926, pt. A, p.39.

The Globe claim, owned by E.T. Kenny of Terrace, is on the lower slopes of Thornhill mountain, a short distance from the Lakelse Lake road and is about 6 miles by road southeast of Terrace. It was first staked about 1910 and was known by its successive owners as the Iron Hat, Golden Nib, and Star claim. No work has been done since 1926 when it was worked under bond by O.P. Brown.

A strong shear zone, 5 to 15 feet wide, in coarse-grained granodiorite may be traced up the side of the mountain for about 1,000 feet and for a vertical distance of 600 feet. It has an average strike of north 50 degrees east and dips 70 degrees southeast. Lens-shaped bodies of quartz, some of them mineralized with pyrite, occur in the shear zone. The granodiorite contains many small veinlets of epidote and is sheared and altered with a strong development of biotite for a distance of at least 100 feet on either side of the shear zone. There are a number of finely crystalline, dull grey, andesite dykes, spotted in places with epidote. One of these is 20 feet wide and has been cut off sharply at the shear zone near the entrance to the lower tunnel. What is believed to be the offset continuation of this dyke lies on the west side of the shear zone about 250 feet to the north.

The main tunnel at an elevation of 370 feet above the Lakelse Lake road has been driven for 110 feet along the shear zone in a direction north 50 degrees east. The first 50 feet are in schist with quartz stringers. Fifty-five feet from the tunnel entrance, a 6-inch quartz vein comes in and widens to

2 feet in a few yards. At the 75-foot mark it has a width of 3 feet and 35 feet farther at the face of the tunnel it is  $11\frac{1}{2}$  feet wide. A short crosscut has been driven to the northwest, 5 feet from the face. The big quartz lens carries no disseminated sulphides but is cut by two or three narrow pyrite seams, which have the same strike and dip as the vein. The writer collected a series of five channel samples across the  $11\frac{1}{2}$  feet of quartz vein and all of them when assayed yielded only a trace of silver and no gold. A channel sample taken across 20 inches of schist and quartz from the roof of the tunnel, 24 feet from the entrance, showed neither gold nor silver on assay.

A second tunnel 100 feet distant and 30 feet higher follows a quartz pyrite lens for 40 feet. The vein has been mined out above the tunnel for 20 feet by a stope which opens out into what was formerly a third tunnel. In the roof of the stope, the vein has an average width of 2 feet and consists of silicified schist and quartz stringers. Along the northwest side of the vein is a seam of rather coarse pyrite averaging from 2 to 4 inches in thickness. The pyrite is accompanied by small veinlets of chalcopyrite and this sulphide ore is reported to carry up to \$60 a ton in gold. An oxidized sample taken from this vein at the upper entrance to the stope was crushed and panned and it yielded free gold. H.T. James reports that 30 tons of ore shipped from this working in 1926 gave net returns of: gold, 1.6 ounce to the ton; silver, 1.4 ounce to the ton; and copper, 1.1 per cent.

No. 4 tunnel is 400 feet vertically above the main tunnel and is 750 feet farther up the slope of the mountain. It has been driven for 35 feet along the shear zone in a direction north 60 degrees east. At the entrance to the tunnel the vein is 16 inches wide and consists of schist with quartz veinlets. The vein width has increased to 3 feet at the face of the drift, quartz

is abundant but no pyrite is present. Two channel samples were taken across the face by the writer. One, 19 inches in length, assayed 0.045 ounce of gold a ton and 0.04 ounce of silver a ton, but the other, 24 inches in length, contained neither gold nor silver. At elevations of 125 and 225 feet respectively above this tunnel there are signs of previous prospecting along the strike of the shear zone. At the highest point a tunnel now caved in was driven 50 feet in the overburden, but bedrock was evidently not reached.

La Libertad

References: Annual Reports of the Minister of Mines, B.C.:  
1929, p.77; 1930, p.78.

The claim is a short distance northwest of the Forest Lookout station, between elevations of 4,700 and 5,000 feet. The Lookout is 6 miles southeast of Terrace on the west slope of Thornhill mountain. The country rock consists of grey granodiorite cut by dykes of quartz orthoclase porphyry and by later dykes of quartz diorite and lamprophyre. Some of these dykes are shown on the accompanying plan. Two parallel quartz veins occupying fault fractures lie about 530 feet apart and strike north 30 degrees east magnetic across the claim. The lamprophyre dykes are offset by the faults, but the quartz diorite dykes are later and cut across the fault without displacement. The quartz veins are younger than the dykes. They are composed of a milky white quartz with little or no sulphide and in places exhibit many glassy, transparent quartz crystals.

Two quartz veins, each about 200 feet long and 100 feet apart, lie in the more easterly fault. The northern one has an average width of 8 inches and the other averages 16 inches. The dip of the vein ranges from 55 to 70 degrees to the southeast. A channel sample taken across 19 inches of quartz from the latter vein gave on assay only a trace in gold and silver.

The main quartz vein in the more westerly fault is about 450 feet long. It is 3 feet wide in places and the average width is about 18 inches. The vein dip is from 60 degrees to 75 degrees southeast. An 18-inch channel sample taken by the writer yielded only a trace of gold and silver. A third sample, about 1,100 feet to the southwest, where a pit had been put down on a 12-inch quartz vein dipping at 65 degrees to the northwest, likewise showed the presence of only a trace of gold and silver.

At the place where the trail from the Lookout crosses the westerly fault, a pit has been sunk on a narrow sheared and carbonated zone mineralized with small seams of chalcopyrite and galena. Samples taken here are reported to have yielded low assays in gold and silver.

Ptarmigan Claim

References: Annual Reports of the Minister of Mines, B.C.:  
1924, p.48; 1930, p.78.  
Geol. Surv., Canada, Sum. Rept., 1925, pt. A,  
p. 118.

The Ptarmigan claim owned by J. Michaud of Terrace adjoins the north boundary of the St. Paul claim and lies on the Zymoetz River slope of Thornhill mountain, approximately  $6\frac{1}{2}$  miles due south-east of Terrace. On the face of a steep bluff between elevations of 4,400 and 4,600 feet, an isolated roof pendant of sheared greenstone in grey, coarse-grained granodiorite has been impregnated by quartz and carbonate stringers and veinlets. The veinlets are roughly parallel to the schistosity striking north 45 degrees east and are sparsely mineralized with chalcopyrite and pyrite. The roof pendant is about 75 feet wide and extends down the bluff for at least 150 feet.

Approximately 300 feet higher and at an elevation of 4,900 feet there are two other roof pendants in the granodiorite, each about 50 feet in diameter and somewhat over 100 feet apart. Presumably they were once quartzites, but now are partly altered to talc schist and are heavily impregnated with finely crystalline pyrite. The outcrops are stained a rusty colour through oxidation of the pyrite.

There is a third remnant of sedimentary rock about 20 feet wide at an elevation of 4,700 feet. It has been transformed largely to schist and holds quartz and carbonate stringers carrying grey copper, chalcopyrite, galena, and pyrite over a width of 8 feet. The mineral deposit is confined to a shear zone that extends north-eastward down the mountain slope in the granodiorite. A chip sample collected by J.T. Mandy from an open-cut on the mineralized outcrop assayed 0.01 ounce to the ton in gold and 1.60 ounces to the ton in silver. A picked sample containing grey copper and pyrite was collected by the writer with the following assay results: gold, a trace, and silver 13.42 ounces to the ton.

St. Paul and X Claims

References: Annual Reports of the Minister of Mines, B.C.:  
1914, p.114; 1924, p.49; 1925, p.70; 1929, p.78;  
1930, p.78;  
Geol. Surv., Canada, Sum. Rept., 1925, pt. A,  
p.118; 1926, pt. A, p.41.

The St. Paul and X claims adjoin one another and extend from east to west across the summit of Thornhill mountain. Their position is approximately 6 miles due southeast of Terrace.

J.A. Michaud and W.A. Kirkpatrick of Terrace are the owners.

A quartz albitite dyke ranging from 10 to 15 feet in width crosses the claims in an east-west direction and dips about 45 degrees north. The dyke is very fine-grained and is conspicuous because of its light greenish grey to yellow coloration. It is of economic interest because of quartz veins that lie along its sides. Quartz veins occur for a known distance of 2,200 feet along the south or hanging-wall side of the dyke and for at least 800 feet along its north side. Vein quartz shows along the south side of the dyke wherever the foot-wall has been exposed by trenching, except at its western end. The country rock near the dyke is coarse-grained, grey granodiorite. A number of lamprophyre dykes occur, all of them older than the rhyolite.

Starting from the east, the dyke may first be seen at an elevation of 4,350 feet on top of a rocky bluff overlooking a small mountain lake. A quartz vein ranging from 1 to 2 feet in width lies on the foot-wall side of the dyke. The vein though badly weathered was seen to carry both pyrite and galena. Both vein and dyke strike south 70 degrees west and dip 50 degrees northwest for a short distance. One hundred feet west, the dip flattens to 35 degrees and the dyke and vein swing southward following a course of south 20 degrees west up the side of a steep hill. On the hillside both dyke and vein are concealed by a light drift

cover, but at an elevation of 4,625 feet a pit sunk on the dyke again discloses vein quartz along the footwall. Forty feet south of the pit and at a little higher elevation, a tunnel was driven for 25 feet towards the foot-wall of the dyke, but failed by a few feet to reach the objective.

The north side of the dyke may be easily followed for 600 or 700 feet above the pit in a direction south 50 degrees west. No veins are exposed and the foot-wall is covered by talus.

On the divide between the Zymoetz and Lakelse slopes of the mountain at an elevation of 4,875 feet, there is a quartz vein exposed at intervals for 200 feet along the foot-wall or south side of the dyke. The vein ranges from 1 to 5 feet in width with an average of  $2\frac{1}{2}$  feet. A channel sample taken there across a 3.3-foot vein width on the west wall of a short crosscut tunnel near the St. Paul claim post assayed as follows: gold, 0.02 ounce a ton; silver, a trace; lead, a trace; and zinc 0.75 per cent. The quartz contains about 5 per cent of sulphide comprised of pyrite, chalcopyrite, galena, and sphalerite in the vicinity of the tunnel, but 75 feet to the east where the vein reaches a width of 5 feet it contains almost no sulphides.

The dyke follows a course of south 80 degrees west from the claim post mentioned above, but is mostly concealed by talus from a steep hill which rises on its north side. A pit sunk on the hanging-wall, 500 feet west of the post, exposes a 12-inch quartz vein. Five hundred feet farther west, quartz veins are exposed on both sides of the dyke. The upper one has been followed by trenching and test pitting for about 300 feet and averages 12 inches in width. A channel sample taken from the northeast pit across 17 inches of quartz assayed only a trace in gold and silver. One hundred feet west of this point the quartz carries some sulphides and a small piece of gold was seen in a



weathered fragment. The vein on the lower side of the dyke is followed by trenches for over 100 feet at this place and averages about 2 feet in width.

The quartz albitite dyke has not been followed west of the claim posts near the crossing of the Lookout trail. Just east of the trail the dyke has been altered and contains magnetite cubes pseudomorphous after pyrite.

Annie Laurie Claim

References: Annual Reports of the Minister of Mines, B.C.:  
1930, p.78.  
Geol. Surv., Canada, Sum. Rept. 1926, pt.A, p.41.

The claim lies immediately south of the St. Paul claim on Thornhill mountain, and is owned by J.A. Michaud of Terrace. It is about 150 feet above Fivemile Creek lake, at an elevation of 4,200 feet. A rock trench, 25 feet long, 4 feet wide, and 5 feet deep, has been cut along a quartz vein enclosed in grey granodiorite. Tungsten occurs in this vein as light yellow-brown scheelite crystals. The scheelite is sparingly scattered through white quartz and is in the form of irregularly shaped nodules 1 to 2 inches in diameter. In ore specimens on the dump, sphalerite, galena, pyrite, and free gold were seen, the gold occurring in weathered crevices in the quartz. The quartz lens, as exposed in the trench, has a maximum width of 12 inches and tapers out to a mere joint plane filling, 1 inch in thickness at both ends of the trench. At the southerly face of the cut, a vertical joint plane is filled with 2 inches of pure barite.

A Claim

References: Annual Reports of the Minister of Mines, B.C.:  
1918, p.51; 1928, p.75.

The A claim is situated on the southwest slope of Thornhill mountain about 6 miles southeast of Terrace. It is reached by way of a pack-horse trail which leads from the Lakelse Lake road to the forestry lookout cabin on top of the mountain. There is a cabin on the claim at an elevation of 3,000 feet, reached by a short branch to the south from the main trail. The principal showing is on a small stream 200 feet above the cabin.

Grey, coarse-grained granodiorite intruded by an irregular dyke of quartz orthoclase porphyry is exposed in the stream bed. These rocks are cut by roughly parallel quartz diorite dykes, the largest of which is 15 feet wide and strikes north 35 degrees west. The quartz orthoclase porphyry has been offset by a vertical fault running in a northeasterly direction along the stream course, but neither the quartz diorite dykes nor the veins that cut them are faulted.

On the south side of the stream a flat-lying quartz vein intersects the three rock types. It has an average width of 12 inches and a length of 65 feet. A second flat-lying quartz vein 14 inches wide and 40 feet long is exposed on the north side of the stream. This one thickens and plunges steeply downwards at the V-shaped junction of a quartz diorite dyke with quartz orthoclase porphyry.

Near the stream a tunnel has been driven for 26 feet southeast on the more southerly vein. At the face of the tunnel the vein is in two parts, the lower consisting of 12 inches of quartz and the upper of 3 inches of quartz. The intervening quartz orthoclase porphyry is bleached and altered. A channel sample taken by the writer across 20 inches of vein material,

10 feet from the mouth of the tunnel and on the south side, assayed only a trace in gold. Fifty feet south on the face of a rock bluff of quartz diorite, another tunnel 12 feet long has been driven north along the vein. An 8-inch channel sample taken across the vein in this tunnel, 6 feet from the entrance and on the east wall, across the vein assayed 0.005 ounce in gold a ton. A third sample taken across the vein midway between the two tunnels where it was 20 inches wide and enclosed in granodiorite assayed only a trace of gold. A sample taken over a width of 11 inches from the vein on the north side of the creek also gave negative results.

In this vein on the south side of the stream, A. Oleson and W. Dahl discovered rich specimens of native gold in 1918. The gold occurred in that part of the vein enclosed in the 15-foot wide quartz diorite dyke. The resident engineer, G.A. Clothier, described the showing that year as follows:

"The overlying diorite has been stripped off for about 8 feet square, from which area of vein two or three small pockets of free gold yielded \$300 by mortaring and panning. The gold appears to assemble at points in the vein where small stringers of quartz join it from the country rock. One patch of gold left in place showed about 6 inches of iron oxide full of free gold. Associated with the free gold are sulphides of silver, mainly stephanite. I am reliably informed that the owners in further opening up this vein took out \$4,000 in free gold in two weeks during the past summer".

The part of the vein described above has since been mined away and its southeastern continuation is largely concealed by large blocks of rock which have fallen from the overhanging cliff. The information suggests that other pockets of free gold might be found by driving along the vein in a southeast direction within the quartz diorite dyke.

B Claim

References: Annual Reports of the Minister of Mines, B.C.;  
1924, p.49; 1925, p.71; 1928, p.75.  
Geol. Surv., Canada, Sum. Rept. 1926, pt. A, p.41.

B claim, formerly known as the Beaver, lies half a mile east of the main trail to the Forest Lookout at an elevation of approximately 3,000 feet on the southwest slope of Thornhill mountain. The position is roughly 6 miles southeast of Terrace.

A quartz vein in granodiorite outcrops along the bed of a small mountain stream at an elevation of 3,025 feet. Its strike is north 50 degrees east and the dip ranges from 30 to 40 degrees to the southeast. It may be followed down the east bank of the stream for a distance of 200 feet. The vein width ranges from 2 to 6 feet and the average is about  $2\frac{1}{2}$  feet.

A channel sample was taken across 18 inches of unmineralized quartz at the upper showing and assayed only a trace in gold and silver. A second channel sample collected across a 2-foot vein width, 75 feet south, assayed as follows: gold, 0.10 ounce a ton; silver 1.73 ounce a ton; lead, 0.67 per cent. In this vicinity the vein is well mineralized with pyrite, sphalerite, and galena.

At an elevation of 2,900 feet a 70-foot tunnel was driven east from the stream bed to intersect the vein continuation. Twenty-two feet from the portal entrance a shear zone striking north 70 degrees east and dipping 30 degrees south was met in the roof of the tunnel, but instead of following this the crosscut was driven more northerly. The shear zone in the roof may be the same in which the vein is enclosed on the surface a short distance to the north.

Seventy-five feet to the south a second adit was driven to intersect the vein. At 60 feet, an 8-inch shear zone was intersected and drifted on for 15 feet. The shear zone strikes north 35 degrees east and dips 40 degrees southeast. It is bounded on the east by diorite and contains very little quartz.

About 125 feet below the lower tunnel and on the strike of the surface trace of the vein a strong quartz vein is exposed in a trench. A channel sample collected here across 18 inches of the white quartz showed no trace of either gold or silver.

Coin Claim

The Coin claim, owned by Jack Bell of Terrace, is on the southwest slope of Thornhill mountain about one mile northeast of the Williams Creek bridge and half a mile east of the Lakelse Lake road.

A quartz vein occurs in granodiorite at an elevation of 800 feet. It strikes south 80 degrees east and dips 30 degrees northeast into a steep slope. The vein is exposed for a distance of about 80 feet and has an average width of about 14 inches. Midway along the vein exposure a 20-foot adit has been driven. On the face of the adit the granodiorite above the vein has been altered over a width of 3 feet. It is bleached and silicified and is impregnated with fine-grained pyrite. Microscopic examination shows plagioclase and microcline feldspars to be almost entirely altered to sericite. A 20-inch channel sample collected across this material above the vein gave the following assay: gold, 0.02 ounce a ton; silver, 0.27 ounce a ton. Five feet to the south on the west wall of the adit a 20-inch channel sample was taken across a comparatively unmineralized part of the quartz vein. The assay showed 0.01 ounce of gold, and 0.06 ounce of silver a ton. A grab sample was also taken near the entrance to the adit where the vein is well mineralized with pyrite, galena, and sphalerite. The sample assayed 0.02 ounce of gold and 1.04 ounces of silver a ton.

Eureka Claim

References: Geol. Surv., Canada, Sum. Rept. 1925, pt.A, p.118,  
and 1926, pt. A, p.42.  
Annual Report of the Minister of Mines, B.C.,  
1930, p.79.

Molybdenite occurs on the Eureka claim, about 2 miles south of the forest lookout station at an altitude of 4,800 feet on Thornhill mountain. The owners, J.A. Michaud, has cut a rock trench 6 feet wide, 6 feet deep, and 25 feet long on the best showing and has removed some high-grade ore. The actual outcrop over which molybdenite may be seen to occur is less than 50 feet in diameter, but the granite is spotted with small, rusty patches over an oval area of about 100 feet by 200 feet. The molybdenite occurs in rosette-shaped forms from 1 to 2 inches in diameter, the crystal groups commonly being in clusters. The molybdenite is associated with small, irregular, pegmatite dykes which are intrusive into a fine-grained, grey granite. In the trench the ore occurs in irregular-shaped pockets connected by very small, pegmatitic stringers. The pockets are outlined with a rust-coloured stain resulting from the oxidation of the pyrite that accompanies the molybdenite and they contain an abundant development of sericite and pseudomorphs of chlorite after hornblende. In places the molybdenite rosettes are coated by the straw yellow oxidation product, molybdite.

Fifteen feet east of the rock trench, a 2-foot pegmatite lens striking north 60 degrees east and dipping 30 degrees to the southeast, may be traced for 40 feet. Its surface exposures show very little molybdenite.



Properties on Zymoetz River

Omineca Gold Quartz Mines, Limited

(Dardanelle Group)

References: Annual Reports of the Minister of Mines, B.C.:  
1914, p.116; 1918, p.52; 1921, p.94; 1927, p.123;  
Geol. Surv., Canada, Sum. Rept. 1925, pt.A, p.115.

The Omineca Gold Quartz Mines Company is developing the Dardanelle group of mineral claims, situated on the north bank of Zymoetz (Copper) river, about 14 miles from Copper city and 18 miles from Terrace. Mr. Fred M. Wells is President and Managing Director of the company, Mr. R.L. Clark is Director, and Major E.J. Gook is Director and Secretary-Treasurer. The company's mine office is at Terrace, the head office is at Vanderhoof, B.C.

During the summer of 1935 a wagon road 10 miles long was built along the north side of Zymoetz river, connecting the mining property with the Terrace-Usk highway at the Zymoetz River bridge, and preliminary mining equipment and supplies were transported to the property in preparation for mining operations.

Quartz diorite and granodiorite rocks are predominant on the mining claims. They are evidently differentiates of the same magma as they may be seen to grade imperceptibly one into the other. These rocks are intruded by a dyke-like body of medium-grained, pink granite on the Independence and Dardanelles claims. A quartz albitite dyke runs in an easterly direction across the Trail, Trail fraction, Independence, Dardanelles, and No. 19 mining claims. On both the east and west it passes beneath a cover of drift. It is a dense, finely crystalline rock with a light, greenish yellow to white colour, and it varies in width from 18 feet to 24 feet. In its widest parts it contains small quartz phenocrysts, giving it somewhat the appearance of a quartz porphyry.

The mineral deposits consist of quartz veins most of which occur at intervals along the contacts of the quartz albitite dyke and some of which lie in quartz diorite a few feet away but parallel to the dyke. The strike of the dyke varies from north 70 degrees east to north 80 degrees east (ast.) and the dip is north from 70 degrees to 75 degrees. The strike and dip of the quartz veins conform to the strike and dip of the quartz albitite dyke. The veins range from 1 to 6 feet in width and average about  $2\frac{1}{2}$  feet. Their lengths are between 100 and 600 feet with intervening zones where no vein material is present. The dyke outcrops at frequent intervals for over 6,000 feet. The most westerly exposure is at an elevation of 600 feet and the most easterly is above an elevation of 1,800 feet. Trenching has disclosed the presence of quartz lenses along the west part of the dyke for a horizontal length of 2,300 feet and a vertical range of 600 feet. It is probable that trenching would reveal other veins along the northeast part of the dyke.

At an elevation of 475 feet a tunnel has been driven for 45 feet along a vein cutting dark green, altered, quartz diorite. The dyke is believed to lie only a short distance north of the vein, but overburden covers all rock outcrops. The vein varies from 1 to 3 feet in width and consists of fractured quartz mineralized with pyrite, sphalerite, chalcopyrite, and argentite. A channel sample taken by the writer across 15 inches at the face of the drift assayed 0.38 ounce of gold, and 10.54 ounces of silver a ton.

On climbing the hill, the first outcrop of the quartz albitite dyke is seen at an elevation of 600 feet, about 400 feet east of the lower tunnel, and here two veins are associated with the dyke. A sample taken in 1927 by Douglas Lay, across a width of 4 feet on the more easterly of the two veins, assayed as follows: gold, 0.12 ounce to the ton; silver, 2 ounces to the ton; lead, nil; zinc, 1 per cent. About 150 feet southeast of this point,

two open-cuts have exposed a second quartz albitite dyke which is apparently a branch from the main dyke. The lower open-cut shows a quartz vein, 4 feet in thickness, lying on the northwest side of the dyke, the second open-cut situated about 100 feet northeast along the strike of the dyke shows a quartz vein 2 feet in thickness on the southeast side of the quartz albitite dyke. Both veins are sparsely mineralized with pyrite. The actual width of this smaller dyke is not apparent, but judging by its finely crystalline character it cannot be over 10 or 12 feet.

The main quartz albitite dyke with its associated veins is best exposed at an elevation of 900 feet, about 1,400 feet east of the lower tunnel, where a shaft was sunk to a depth of 40 feet on a vein on the northwest side of the dyke. The quartz carries considerable pyrite and has a somewhat ribboned structure caused by slight shearing. Three channel samples were taken by the writer across a 76-inch vein section on the west side of the shaft. The lengths over which each sample was taken and their corresponding assay values are as follows: 17 inches - 0.015 ounce gold and 0.21 ounce silver; 32 inches - 0.06 ounce gold and 0.26 ounce silver; 27 inches - 0.07 ounce gold and 0.05 ounce silver (a ton). The first sample was taken on the north side of the vein adjoining the granodiorite, and the third was adjacent to the quartz albitite dyke.

During the summer of 1914 when the shaft was only 12 feet deep Mr. W.M. Brewer took a sample at the bottom across 4 feet which assayed gold 0.22 ounce and silver 0.8 ounce to the ton.

Two additional samples were taken by the writer across the quartz vein on the south side of the quartz albitite dyke at a point about opposite the 40-foot shaft. A sample across 15 inches adjacent to the dyke assayed 0.345 ounce of gold and 0.16 ounce of silver a ton. A sample across the remaining 20 inches of the vein gave no gold and only a trace of silver.

About 500 feet farther east at an elevation of 975 feet, recent work has disclosed a 3-foot quartz vein on the north side of the dyke. It is enclosed in a dark green, somewhat schistose, quartz diorite and lies parallel to, but is 5 feet distant from the quartz albitite dyke. It was in this neighbourhood that the provincial resident engineer collected in 1927 a sample across  $1\frac{1}{2}$  feet of decomposed quartz, with the following assay results: gold, 1 ounce to the ton; silver, 4 ounces to the ton; lead, nil; and zinc, 1 per cent.

Zymoetz Group

Reference: Annual Report of the Minister of Mines, B.C.,  
1934, p. C-4.

The Zymoetz group, owned by T.M. Turner of Terrace, is on the north side of Zymoetz river, about 8 miles east by road from Terrace. The prospect workings are located just above the river on both sides of the newly constructed road to the Dardanelle property and are about one mile east of the Zymoetz River bridge.

A quartz vein is exposed in the bed of a small stream about 60 feet above Zymoetz river and may be followed for about 50 feet along the surface on both sides of the stream. The vein strikes east and dips 75 degrees north. The country rock is a medium-grained quartz diorite. Where the vein crosses the creek, it splits into two parts for a short distance, each part being about 8 inches wide and separated by 3 feet of quartz diorite. The vein is well mineralized with sphalerite, pyrite, and some galena. The vein is exposed by open-cuts 200 feet west of the stream and is 2 feet wide and heavily mineralized with coarse pyrite. On the east bank of Zymoetz river an adit 65 feet long was driven north to intersect the vein. Where the vein is cut, 55 feet from the entrance, it has a width of over 2 feet and is mineralized with sphalerite, pyrite, and a little galena. A 28-inch channel sample taken by the writer, across the vein on the west wall assayed: gold, 0.08 ounce to the ton; silver, 0.15 ounce to the ton; zinc, 0.32 per cent; lead, a trace.

About 300 feet farther up the stream and 150 feet vertically above the vein just described is another quartz vein on which a 6-foot adit has been driven east from the stream bed. Here the vein is 24 inches wide and the quartz is well mineralized with pyrite and small amounts of finely crystalline magnetite. It strikes roughly east and west and dips 35 to 40 degrees north. A

23-inch channel sample taken across the vein in the face of the adit where free gold had been reported showed only a trace of gold and a trace of silver. Fifty feet to the west where the vein is exposed on the other side of the stream its width is only 8 inches and about 25 feet higher up, the vein pinches out on both sides of the stream.

Fifty feet south of the 6-foot adit, a quartz albitite dyke cuts the quartz diorite country rock in the steep bluff on the east side of the stream. The dyke is 10 feet wide at the stream, but farther northeast gradually widens to 18 feet or more. Forty feet north of the tunnel a similar quartz albitite dyke 10 feet wide is exposed. It narrows gradually to a few feet in width in a southwest direction but maintains its width to the northeast. A search might disclose quartz veins along these dykes farther northeast.

Properties on Kleanza Mountain

Adeline Claim

The Adeline claim is on the southwest slope of Kleanza mountain about 7 miles east from Terrace. The owner, Mr. Hagan of Dobie, has a cabin about a quarter of a mile east of the Zymoetz River bridge and has constructed a trail from there to the "Adeline" vein.

A quartz vein, averaging almost 4 feet in width, is exposed where it crosses a small stream at an elevation of 2,750 feet. The vein strikes approximately east and dips 30 degrees north. On the west bank of the creek it has been stripped for 20 feet and shows slightly rust-stained quartz without sulphides. It has been traced 50 feet farther west by small open-cuts. In the creek bed the hanging-wall is coarse-grained granodiorite and the footwall is fine-grained diorite. A quartz albitite dyke 6 to 10 feet wide east of the creek strikes north. The quartz vein strikes at right angles to the dyke and presumably cuts across it, but the contact is drift covered and the vein has not yet been traced farther eastward. A 14-inch quartz vein was seen along the west side of the quartz albitite dyke for a short distance north of the wider vein. Two channel samples were collected from the 4-foot vein on the west side of the creek. A sample across the upper 20 inches of the vein assayed a trace of gold and a trace of silver. The sample from the lower 24 inches assayed a trace of silver and 0.02 ounce of gold to the ton. About 300 feet farther down the slope at an elevation of 2,560 feet there are a number of small quartz veins enclosed in a greenish, fine-grained sheared rock, probably andesite. These veins were all discovered in 1935 and the owner has not yet had time to surface prospect his discoveries.

White Bluffs Group

The White Bluffs claims are on the southwest shoulder of Kleanza mountain about half a mile northeast of the Zymoetz River bridge. The bridge is about 6 miles east of Terrace on the highway from Terrace to Usk. T. Turner of Terrace is the owner.

A large pegmatite dyke about 60 feet wide has been traced for about 1,000 feet in a northeast direction between elevations of 1,000 and 1,500 feet. Its strike ranges from north 65 to 80 degrees east and the dip is vertical. The country rock is coarsely crystalline granodiorite and the dyke is composed of about 75 per cent white quartz with 25 per cent pink orthoclase feldspar. The feldspar seems to be too intergrown with quartz to be of commercial value.

The dyke itself shows no sign of being mineralized but in two or three places very narrow cross fractures have been mineralized with coarsely crystalline pyrite. These occurrences carry a little gold, but are too small to be of economic interest.

Several hundred feet south of the northerly end of the dyke a pit has been blasted out in a 5-inch quartz vein that has been exposed by a small stream. The vein contained irregular pockets of coarsely crystalline pyrite.



Black Bull and Gem Claims

The Black Bull and Gem claims lie west of, and adjoin, the Adeline claim on the southwest slope of Kleanza mountain. They may be conveniently reached by way of the trail to the Adeline from Zymoetz river, or by way of the trail from Edgar creek to the Silver Bow cabin. The owner is W. Hagan of Dobie.

At an elevation of 2,800 feet an open-cut exposes a vein comprised of alternating bands of andesite and vein quartz. The lower 6 inches is quartz followed by 6 inches of andesite, then 10 inches of quartz followed by 12 inches of andesite, with 12 inches of quartz on the upper side. The vein strikes south 60 degrees east and dips 40 degrees north. It has been traced for about 200 feet and narrows very much at each end, comprising in places only 5 to 10 inches of quartz. A representative specimen of the vein quartz, weighing 3 pounds and 4 ounces, assayed a trace of silver and no gold.

Several hundred feet down the slope from the Black Bull vein, at an elevation of 2,650 feet, a similar vein on the Gem claim consists of alternating quartz and andesite over a width of 3 feet. The strike is south 50 degrees east and the dip is 75 degrees north.

Terrace Claim

Reference: Annual Report of the Minister of Mines, B.C.,  
1926, p.124.

The Terrace claim owned by George Little and Arthur Clore of Terrace is on the west slope of Kleanza mountain about 2 miles east of Vanarsdol station on the Canadian National railway. It may be reached by way of the trail from the Terrace-Usk highway at Edgar creek to the Silver Bow cabin. From the cabin a trail leads down to the Silver Cliff and then to the Terrace claim.

A flat-lying quartz vein, 18 inches wide, is exposed in a pit in a creek bed about 100 feet south of the Terrace cabin at an elevation of 1,500 feet. The vein is mineralized with pyrite, a little galena, and sphalerite. According to the owners, the original vein outcrop dipped at a steep angle to the northeast and encouraged the driving of a 75-foot crosscut tunnel at a little lower elevation on the north side of the cabin in the hope of intersecting the downward continuation of the vein. The tunnel was driven through granodiorite country rock cut by occasional lamprophyre dykes, but no vein was found.

At the pit the hanging-wall of the vein is volcanic rock, but elsewhere the country rock is granodiorite. A transverse vertical dyke of diorite porphyry, 12 feet wide, cuts the vein off at the east end of the pit and the possible continuation of the vein beyond the dyke rock into the hillside has not been determined.

A representative grab sample of vein quartz lightly mineralized with sphalerite and pyrite collected last summer from the pit, assayed: gold, 0.49 ounce to the ton; silver, 2.40 ounces to the ton; zinc, 0.10 per cent; lead, none.

Silver Bow and Silver Cliff Claims

References: Annual Reports of the Minister of Mines, B.C.:  
1925, p.124; 1926, p.124..

These claims are part of a group of six situated on the west slope of Kleanza mountain between elevations of 1,500 and 2,500 feet. They are about one mile east of Skeena river and are approximately 2 miles due east of Vanarsdol station on the Canadian National railway. An excellent pack trail leaves the Terrace-Usk highway at Edgar creek and leads to the Silver Bow cabin at an elevation of 2,000 feet. George Little and Arthur Clore of Terrace are the owners.

A number of quartz veins containing silver, lead, and zinc minerals occur on the claims. They are enclosed in andesitic country rock and lie close to intrusive dykes of feldspar porphyry. The intrusive rocks are offshoots from the main body of the Coast Range granodiorite which occupies the west side of the mountain below an elevation of 1,500 feet. These veins were formed along small fault fissures striking south to southeast and dipping from 50 to 60 degrees north. Other quartz veins mineralized only with pyrite are found along the contacts of the feldspar porphyry dykes with the volcanics. The latter carry only small amounts of gold.

The best assays so far reported have come from a vein situated 400 feet northeast of the cabin at an elevation of 2,000 feet. The vein has been traced for about 200 feet and varies from a mere stringer at its southern end to 3 feet of quartz mineralized with galena, sphalerite, pyrite, and tetrahedrite near its centre. A representative specimen collected for assay from the main pit at a central point on the vein ran: gold, 0.08 ounce to the ton; silver, 6.34 ounces to the ton; lead, 7.62 per cent; zinc, 2.37 per cent. Specimens of the solid sulphide are reported by the owner to assay as high as 100 ounces of silver to the ton.

One hundred feet southeast of the cabin, a pit has been sunk on a similar type of vein. The vein has been traced southeast from this pit for about 250 feet. It strikes almost due south and dips 60 degrees east. The width ranges from 3 to 12 inches and averages 6 inches. An inclined shaft has been sunk for 30 feet on the vein at a point 250 feet south of the cabin. In the shaft the vein has been faulted several feet east by short, flat-lying faults.

A channel sample, 6 inches long, taken across the vein at a point 20 feet down the shaft, assayed: gold, 0.035 ounce to the ton; silver, 0.62 ounce to the ton; lead, 0.05 per cent; zinc, 0.20 per cent. In the original open-cut for this shaft, the vein was reported to consist of 10 inches of solid galena and sphalerite. A representative sample collected by D. Lay in 1926 assayed: gold, 0.20 ounce to the ton; silver, 84 ounces to the ton; lead, 50 per cent; zinc, 24 per cent.

Eighty feet south of the shaft, there is a 20-foot crosscut adit and a 20-foot drift on the vein. Where drifted on, the vein ranges from 3 to 6 inches in width and as at the bottom of the inclined shaft is somewhat sparsely mineralized with galena, sphalerite, and pyrite.

Two quartz veins occur along the sides of an 18-foot feldspar porphyry dyke cutting andesite 400 feet north of the cabin and less than 100 feet above the main trail. The veins strike south 35 degrees east and dip 50 to 55 degrees north. They are lightly mineralized in places with pyrite. The vein on the easterly or hanging-wall side of the dyke has been traced for 50 feet and has an average width of 20 inches. A channel sample from this one, taken across a width of 21 inches at a large pit, assayed: gold, none; silver, none. The vein on the foot-wall side is narrower and has been traced by two pits for 170 feet along the foot-wall side of the dyke. A sample across a width of 9 inches from the

main pit assayed: gold, none; silver, a trace. One hundred and fifty feet due east of the cabin another quartz pyrite vein containing a little chalcopyrite occurs on the east or hanging-wall side of another feldspar porphyry dyke cutting andesite. The dyke is 20 feet wide and extends several hundred feet to the southeast. The vein averages 15 inches in width at the pit and a branch vein runs into the dyke for about 20 feet. A 15-inch channel sample taken across the vein in the pit assayed: gold, 0.02 ounce to the ton; silver, 0.13 ounce to the ton; copper, 0.10 per cent.

Silver Cliff Vein. A trail from the Silver Bow cabin leads southwest down a steep slope to a small stream 350 feet below and then follows up the side of a steep ravine to the vein. A tunnel has been driven for 75 feet along the vein at an elevation of 1,700 feet. The vein strikes north 15 degrees west and dips 50 degrees northeast. The quartz is mineralized with pyrite, sphalerite, and galena. The vein occurs along a small fault slip in massive, fine-grained, greenish grey andesite and has an average width of 6 inches. A sample of the ore collected by D. Lay in 1925 assayed: gold, 0.10 ounce to the ton; silver, 21 ounces to the ton; lead, 26 per cent; zinc, 8 per cent. No work has been done on the tunnel since 1934.

Beanstock Group

The Beanstock claims, owned by George Little and Arthur Clore of Terrace, lie on the west slope of Kleanza mountain about 2 miles due east of Vanarsdol station. They are north of, and adjoin, the Silver Bow claims and extend from near the base of the mountain to above 2,600 feet. The claims are reached by way of the Edgar Creek trail to the Silver Bow cabin.

A quartz vein sparsely mineralized with pyrite has been traced by five pits in the overburden for 225 feet. Its position is approximately 1,000 feet due east of the Silver Bow cabin and 400 feet higher. The vein has an average width of 30 inches, strikes south 30 degrees east, and dips 35 degrees northeast. It fills a fissure in andesite and just above 2,450 feet it pinches out at the contact of the volcanic rocks with a small boss of granodiorite. A 15-inch channel sample taken across the vein in the more northerly pit 30 feet northwest of the discovery post assayed only a trace of silver and no gold. A 40-inch channel sample taken across the widest part of the vein, 30 feet south-east of the discovery post, assayed: gold, 0.04 ounce to the ton; silver, a trace.

This vein and (or) other veins have been traced northwest along the same strike for about 1,000 feet down the mountain slope. Widely separated pits expose quartz veins at six different places between elevations of 2,375 and 1,600 feet. The lowest vein examined was at an elevation of 1,600 feet across a small ravine about 300 feet north of the main trail to the cabin. It strikes north and dips 30 degrees east, is enclosed in volcanic rocks and consists of alternate bands of andesite and quartz over a width of 4 feet. The main body of the granodiorite which comprises the lower west slope of the mountain is a short distance below the vein. Most of these veins were discovered during the summer and the owners have not had time to trace them very far.

Rakeoff Group

The Rakeoff claims are on the west slope of Kleanza mountain about 3 miles due east of Vanarsdol railway station. The claims adjoin and are above the Beanstock group. The showings are reached by a rough trail half a mile long which continues up the mountain from the Silver Bow cabin. G. Little and A. Clore of Terrace are the owners.

At an elevation of 3,000 feet where the mountain flattens off for some distance, half a dozen pits and trenches expose three quartz veins enclosed in fine-grained, greenish andesite. The veins are parallel and strike approximately south 30 degrees east and dip from 50 to 60 degrees northeast. The vein quartz is milky white and in a few places is sparsely mineralized with pyrite. The largest vein averages 18 inches in width and has been traced for about 200 feet. A channel sample taken across 16 inches of quartz from the main pit between the two discovery posts assayed: gold, none; silver, none. The second quartz vein is 4 to 7 inches wide, lies 50 feet west of the main vein, and has been traced by two cuts for 40 feet. The third vein is on the southeast side of a stock of granodiorite 100 feet in diameter that outcrops 60 feet south of the southern end of the largest vein. It is 18 inches wide and is exposed in a trench for a length of 10 feet along its strike. Low, heavily drift-covered ground farther southeast has discouraged further prospecting for the vein in that direction.

Rosie Group

This group of claims, owned by Steve McNeil of Vanarsdol, is immediately east of the Terrace to Usk highway along Edgar creek at the foot of the west slope of Kleanza mountain. Edgar creek drains west into Skeena river about a mile above Vanarsdol station. A trail about 1,000 feet long leads from the highway along the north side of the creek to the workings.

The country rock underlying the claims is chiefly granodiorite cut by occasional lamprophyre dykes. On the north bank of the creek about 1,000 feet from the road there is a large block of included greenstone roughly 75 feet wide from east to west. From the west side of the greenstone a tunnel was driven for 31 feet last summer in a direction north 30 degrees west, into soft, altered granodiorite. There is a gradual transition to the fresh, unaltered rock at the face of the tunnel. The altered rock is white, and consists of granular quartz and sericite with a fine impregnation of pyrite. Three long channel samples taken at intervals along the eastern side of the tunnel over a total length of 11 feet assayed only a trace of gold.

The altered rock occurs at the junction of two faults, an east-west fault that displaces the greenstone along the north side of the creek 20 feet to the west, and a north-south fault that lies along the granodiorite greenstone contact. It is believed that the alteration was affected by heated water rising along the faults at their junction.

A pit has been sunk on a north-south fault 100 feet northeast of the tunnel and one has been sunk on an east-west fault 200 feet northeast of the tunnel. In both cases the surrounding granodiorite is altered and disintegrated over a width of 1 to 3 feet on both sides of the faults. Altered and disintegrated granite is also exposed on the south bank of Edgar creek, 260 feet southwest of the tunnel.



Columario Consolidated Gold Mines, Limited

References: Annual Reports of the Minister of Mines, B.C.:  
1919, p.97; 1920, p.81; 1921, p.95; 1922, p.97;  
1923, p.102; 1925, p.125; 1928, p.142; 1929, p.148;  
1930, p.136; 1931, p.70; 1933, p.96; 1934, p.C2.  
B.C. Dept. of Mines, Bull. No.1, 1932, p.55.  
Geol. Surv., Canada, Sum. Rept. 1925, pt. A, p.117.

The Columario mine property of Columario Consolidated Gold Mines, Limited, is situated on the west slope of Kleanza mountain between elevations of 1,700 and 2,300 feet, about 4 miles southeast of Usk. The Terrace to Usk highway along the east side of Skeena river at the foot of the mountain is one mile distant from the mine and a good wagon road connects the mine with this highway. The property consists of the Valhalla, Kleanza, and Tenderfoot groups of mining claims, totalling about thirty-five in number. Most of the work has been done on the following Crown-granted claims; the Valhalla No.2, Valhalla No. 3, Norman fraction, and L.C. fraction. Work was first done on these and the Golden Crown group by the Kleanza company in 1919. Columario Gold Mines, Limited, was formed in 1927 and carried out active development work for several years until succeeded by Columario Consolidated Gold Mines, Limited, in 1933. This company installed a new and complete mining plant and built a flotation mill with a daily capacity of 75 tons. The mill is close to the Terrace-Usk highway on the north side of Noble Five creek and is connected with the mine workings by a 12-bucket aerial tramway 4,800 feet long. About 8,000 feet of underground development work was done prior to the cessation of mining operations on May 31, 1935. The mill was operated from September 1934, until June 22, 1935, since which date the plant has lain idle. The company's head office is at 53 Indian Grove, Toronto. E. Bedford is president, C.C. Richardson, vice president, and H.P. Mills is secretary treasurer. Mining operations were directed by John Willman of Usk.

The mine is on the southeast border of a tongue of the Coast Range batholith, about 3 miles wide, which intrudes Jurassic volcanic rocks. The contact is very irregular and the andesitic volcanics in the mine workings are intruded by a great variety of smaller stocks and tongues of the granodiorite. The lower slopes of Kleanza mountain below the mine are underlain by the granodiorite, but at higher elevations the volcanic rocks are predominant. Both the andesitic volcanic rocks and the granodiorite are cut by quartz albitite, diorite, and lamprophyre dykes.

The quartz veins occur along a system of fault fractures, all of which strike from south 30 to south 45 degrees east and have an average dip of 50 degrees northeast. They are usually found in the andesite near intrusive masses of the granodiorite or along a fault contact between these rocks. Where faults pass through the granodiorite the veins tend to pinch out within a short distance. This factor is of economic significance as a large number of irregular-shaped bodies of granodiorite were encountered in the mine workings. In tunnel No. 3 veins occur on both sides of, and within a few feet of, a 3-foot quartz albitite dyke. Where they cross the dyke they are pinched and lean. The veins were found to be barren in many places, but where they are mineralized with seams of coarse pyrite a fair amount of gold occurs. In some cases the pyrite is accompanied by small amounts of chalcopyrite and galena. The veins average from 1 to 3 feet in width with occasional short lenses 5 feet wide.

Altogether eleven tunnels have been driven in developing seven different veins. Most of the work was done on the three veins that lie about 150 feet apart above the main haulage level. A brief résumé of the work done in the individual tunnels follows. Assay results from a number of samples taken in the various tunnels are also given.

No. 1 tunnel. (Main haulage level). Crosscutting, 1,550 feet; drifting, 80 feet; raise to No. 3 tunnel and raise to No. 4 tunnel.

No. 2 tunnel. Drifting, 300 feet; one short raise and a small stope. A 34-inch channel sample taken across the vein on the north side of the portal assayed: gold, 0.025 ounce to the ton.

No. 3 tunnel. Drifting, 720 feet (east drift 175 feet and west drift 545 feet); and a raise to the east drift of No. 5 tunnel. A 12-inch channel sample taken across the vein 175 feet from the portal assayed a trace of gold and a 19-inch sample 28 feet from the portal assayed 0.04 ounce to the ton in gold.

No. 4 tunnel. Drifting, 505 feet, crosscutting, 120 feet, and three raises and a stope through to No. 5 tunnel. The vein averages about 16 inches in width with a maximum width of 4 feet in two places. Most of the wider parts have been stoped out. A 14-inch channel sample taken across the vein 250 feet from the portal assayed 0.045 ounce to the ton in gold.

No. 5 tunnel. Drifting, 580 feet (main drift 460 feet and east drift 120 feet); crosscutting, 850 feet; raise and stope to No. 6 tunnel and a short raise from the east drift. The average vein width is about 18 inches with widths up to 4 feet. The widest parts have been stoped along. Twenty-five feet from the portal two channel samples were taken across a total vein width of 31 inches in the face of a stope where the quartz is well mineralized with coarse pyrite. Twenty inches assayed: gold, 1.07 ounces to the ton; silver, 2.20 ounces to the ton. The 19-inch sample assayed: gold, 0.155 ounce to the ton and a trace of silver.

No. 6 tunnel. Drifting, 135 feet. An 8-inch channel sample taken across the vein 66 feet from the portal assayed: gold, 0.01 ounce to the ton. A channel sample in two parts was taken across a vein width of 35 inches, 80 feet from the portal. An

18-inch section assayed 1.16 ounces to the ton in gold and the 17-inch sample assayed 0.075 ounce to the ton in gold.

No. 7 tunnel. Drifting, 107 feet and crosscutting, 35 feet. A 12-inch sample taken across the vein in the face of the south drift assayed 0.005 ounce to the ton in gold.

No. 8 tunnel. Drift, 145 feet. A 20-inch channel sample taken 33 feet from the portal assayed 0.88 ounce to the ton in gold. The vein is well mineralized with coarse pyrite.

No. 9 tunnel. Drift, 43 feet. Vein is small and the roof weak.

No. 10 tunnel. Drift, 30 feet. A sample across 15 inches of vein quartz 45 feet from the portal on the east wall assayed 0.02 ounce to the ton in gold.

No. 11 tunnel. Drift, 185 feet and crosscut, 15 feet. A 15-inch channel sample taken on the east wall 45 feet from the portal assayed 0.015 ounce to the ton in gold.

There are in addition some further vein showings at a little higher elevation between 500 and 1,500 feet southeast of the mine workings on which only surface work has been done.

Only one sample of the mill tailings was secured from Noble Five creek. It assayed: gold, 0.04 ounce to the ton; silver, 0.10 ounce to the ton.

Properties in the Vicinity of Usk

Independence Group

References: Annual Reports of the Minister of Mines, B.C.:  
1918, p.110; 1929, p.148.

The Independence claims are at the foot of the west slope of Bornite mountain about 2 miles southeast of Usk. The owner, Mrs. A.J. Kelch of San Francisco, has a small homestead adjacent to the Terrace-Usk highway and the prospect workings are five minutes' walk from her cabin at an elevation of about 350 feet.

At the base of a high rock bluff composed of andesitic lavas and interbedded tuffs, a tunnel has been driven for 200 feet on a mineralized zone along a fault. The fault strikes north 65 degrees east and dips at about 85 degrees to the northwest. Mullion structure and slickenside striations show that movement was in a horizontal direction along the fault plane. In the tunnel the fault fissure ranges from 1 to 3 inches in width. It contains a little quartz but is open in most places. On both sides of the fault, the wall-rock is impregnated over a width of 1 to 2 feet with tiny veinlets of bornite and chalcopyrite and the roof of the passage is much stained with malachite.

A 28-inch channel sample taken in the tunnel 96 feet from the entrance, across the fault and mineralized andesite in the roof, assayed: gold, 0.005 ounce to the ton; silver, 0.15 ounce to the ton; copper, 0.62 per cent. A second channel sample 32 inches in length was taken across the roof 155 feet from the entrance. It assayed: gold, a trace; silver, 0.015 ounce to the ton; copper, 0.22 per cent. Ten feet from the face of the tunnel on the west wall the fault fissure widens out and contains in one place 12 inches of sparsely mineralized vein quartz. A channel sample taken here across 12 inches of the vein quartz and 5 inches of mineralized andesite, assayed: gold, 0.015 ounce to the ton; silver, 0.13 ounce to the ton; copper, 0.91 per cent.

The fault may be readily followed on the surface for 700 feet up the slope of the mountain to an elevation of 400 feet above the tunnel and it probably goes still farther. There are four or five mineralized outcrops in this distance, but the mineralization is not continuous along the fault.

Emma and I.X.L. Claims

References: Annual Reports of the Minister of Mines, B.C.:  
1898, p.1153; 1914, p.132; 1918, p.109; 1927, p.125;  
1928, p.143; 1929, p.149.  
Geol. Surv. Canada, Sum. Rept. 1925, pt.A, p.116.

The Emma claim is at the foot of Bornite mountain about half a mile northeast of the Usk ferry crossing on Skeena river. The I.X.L. claim adjoins the east boundary of the Emma and extends up the mountain slope to an elevation of about 1,500 feet. These claims were staked in 1893 by C.W.D. Clifford, and are reported as the earliest stakings in the area. The Skeena River Gold Mining Company drove a tunnel for 165 feet on the Emma vein in 1897. The following year the claims were Crown granted. A.J. Lowary and associates did further work on the Emma in 1927 and 1928 and drove a tunnel on the I.X.L. claim. Mr. Patmore of Prince Rupert is the present owner.

The Emma tunnel was driven in an easterly direction at an elevation of 450 feet for 200 feet along a quartz vein in andesitic lavas. The vein strikes south 75 degrees east and the dip ranges from 25 to 40 degrees north. For the first 100 feet, the vein ranges in width from 1 to 2 feet. East of a cross-fault of small dislocation 105 feet from the portal, for 30 feet the vein is 6 feet wide; it then narrows gradually to a width of 2 feet. At 200 feet from the portal the vein is cut completely off by a cross-fault which strikes south 65 degrees east and dips 50 to 60 degrees southwest. Another somewhat parallel fault 12 feet farther east, dipping 35 degrees to the southwest, is marked by 6 inches of gouge. The tunnel continues for 50 feet beyond the latter fault in a northeast direction, and 23 feet from the face a crosscut runs southeast for 20 feet, and 37 feet from the face a 45-foot crosscut runs northwest parallel to the faulting.

The vein quartz is only sparsely mineralized with bornite and chalcopyrite, although in a few places these sulphides occur in small, rich pockets. The quartz is usually traversed and broken by numerous cross-fractures spaced from  $\frac{1}{2}$  to 1 inch apart. Surface waters have penetrated some of these crevices staining the quartz a rusty colour. There is a fairly heavy flow of water from the mouth of the tunnel. A 16-inch channel sample taken across the vein 75 feet from the portal assayed: gold, 0.16 ounce to the ton; silver, 0.73 ounce to the ton. Another channel sample taken across 30 inches of vein quartz on the north wall, about 160 feet from the portal, assayed: gold, 0.015 ounce to the ton; silver, 0.05 ounce to the ton.

The I.X.L. vein outcrops in the bed of a small stream at an elevation of 900 feet and is approximately 1,000 feet east of the Emma portal. The rock formation is andesite and in the tunnel there is a small aplite dyke. The vein strikes south 60 degrees east and dips 65 degrees south. It is exposed for almost 100 feet and near the centre has a maximum width of 7 feet. At its easterly end where the vein disappears into a high drift-covered bank of the stream the width is only 12 inches. The western part of the vein is much broken up in the old stream bed and appears to be cut off by a cross-fault which strikes north and dips 70 degrees east. Most of the vein is very sparsely mineralized, but at its widest point and for some distance either way, the hanging-wall side is heavily impregnated with bornite and chalcopyrite. A 28-inch channel sample taken across the mineralized portion of the hanging-wall assayed: gold, 0.02 ounce to the ton; silver, 2.52 ounces to the ton; copper, 1.21 per cent. The adjoining part of the vein across 22 inches assayed: gold, none; silver, a trace; copper, 0.12 per cent.

A tunnel driven east at an elevation of 850 feet intersects the vein 50 feet below the surface outcrop. A cave-in blocks the tunnel 100 feet from the portal.

Other quartz veins to the east at a higher elevation are described under Four Aces group.



Four Aces Group

References: Annual Reports of the Minister of Mines, B.C.:  
1914, p.132; 1927, p.125; 1929, p. 149.

The Four Aces group is situated on the west slope of Bornite mountain, about 2 miles due east of Usk. A good trail branches east from the highway half a mile northeast of Usk and leads to the Four Aces cabin at an elevation of 1,300 feet. The group includes the Four Aces, Golconda, McKinley, and Laurier claims which extend eastward up the mountain slope to timber line. These claims were originally staked in 1898. They have been held by Mr. Allison of Usk for a long time.

At an elevation of 1,750 feet on the Four Aces claim, an 8-foot shaft was sunk years ago on a 4-foot quartz vein in andesitic lavas. At the shaft the vein strikes about north and dips 20 degrees west. One hundred and twenty-five feet south of the shaft, the vein varies between 4 and 5 feet in width and dips at a low angle to the west. A representative sample, weighing 2 pounds, collected there by taking chips from different parts of the outcrop, assayed only a trace in gold and silver. Another large outcropping of flat-lying vein quartz occurs several hundred feet farther north at the same elevation. The exposure measures about 50 by 50 feet, is flat-lying, and has a thickness of 6 to 7 feet.

A trench 40 feet long and 15 feet deep has been cut across a quartz albitite dyke at an elevation of 1,475 feet. The dyke, which is sparsely mineralized with pyrite and chalcopyrite, is altered, and is traversed by an intricate pattern of intersecting cross-fractures stained with limonite. A grab sample of the altered rock assayed: gold, a trace; silver, 0.76 ounce to the ton.

Four hundred feet north of the Four Aces cabin, another altered quartz albitite dyke outcrops on the north bank of Emma creek at an elevation of 1,175 feet. It strikes south 55 degrees east and dips 20 degrees northeast. It is partly exposed by natural agencies for several hundred feet and may be seen to cut andesitic lava. The foot-wall part of the dyke is severely altered over a width of 2 to 3 feet and the altered part is mineralized with a little chalcopyrite and chalcocite. A 6-foot adit has been driven on the best mineralized part, but no increase in the quantity of sulphide was revealed.

On the Midget claim, which adjoins the east boundary of the I.X.L. and lies south of the Four Aces, a 3-foot quartz vein in andesite has been traced for a short distance at an elevation of 1,400 feet. The vein strikes south 70 degrees east and dips 40 degrees north. A short distance below, at an elevation of 1,200 feet, a strong quartz vein is exposed in two trenches on the upper part of the I.X.L. claim. This vein is from 2 to 3 feet wide, strikes south 70 degrees east and dips 40 degrees north. The quartz is mineralized with a little pyrite and chalcopyrite.

There are a number of small shear zones in andesite, some of them well mineralized with bornite and chalcopyrite on the Golconda claim which lies east and above the Four Aces claim. Considerable trenching and stripping have been done between elevations of 1,800 and 2,100 feet, but the copper deposits so far exposed are not of economic importance.

Cordillera Mine

References: Annual Reports of the Minister of Mines, B.C.:  
1914, p.141; 1917, p.97; 1918, p.110; 1919, p.98;  
1920, p.80; 1921, p.95; 1922, p.97, 1923, p.101;  
1925, p.125; 1926, p.124.  
Geol. Surv., Canada, Sum. Rept. 1925, pt. A, p.115.

The property is about one mile southwest of the town of Usk at the eastern base of Kitsalas mountain. The workings are about 600 feet from the Canadian National railway, and may be reached by a truck road from Usk. The claims were first staked in 1914 by James Darby and J.D. Wells. Development work was carried out by the Kitsalas Mountain Copper Company who built a small amalgamation mill in 1920 and produced some gold, silver and copper. The Usk Mining Company, present owners, did a little work in the autumn of 1929 and the spring of 1930 but have since been inactive.

The country rock consists of andesitic flows, chlorite schists, and green tuffaceous rocks, intruded by a number of small lamprophyre dykes. The exploratory work has been done on a system of quartz veins which strike northeast and dip from 15 to 35 degrees northwest. The veins are comprised of relatively short quartz lenses repeated along the strike of the vein. The quartz vein intersected by the main tunnel follows a strong fault, which strikes north 30 degrees east and dips 75 to 85 degrees northwest. Other veins with angles of dip ranging from 15 to 20 degrees join the fault from the southeast side.

The main crosscut tunnel is driven north 56 degrees west for 450 feet. The first 100 feet or more is heavily timbered as it passes through loose material, but elsewhere the walls are of relatively strong andesite flows. Four hundred feet from the portal a drift runs roughly north 25 degrees east for 63 feet and south 30 degrees west for 120 feet. At this point in the crosscut a quartz vein ranging from 2 to 11 feet in thickness runs for 30 feet in either direction. Its strike is north 10 degrees east and

the dip is about vertical. The vein quartz is sparsely mineralized with bornite and chalcopyrite and a little free gold. Twenty-five feet north of the main crosscut a rise follows the vein for 30 feet. The big quartz lens pinches out very suddenly for a few feet north of the raise, but a smaller lens replaces it towards the face of the drift. Thirty feet south of the main crosscut the big lens again pinches out but is joined by a 2-foot quartz vein which dips west towards it at 20 degrees. The big quartz lens lies along or close to two parallel faults spaced from 3 to 6 feet apart. Both faults dip from 75 to 85 degrees west and they are well exposed in the south drift which follows them most of the way. Twenty feet from the face of the south drift a 14-foot crosscut to the east intersects a 10-inch quartz vein dipping 15 degrees west. This comparatively flat-lying vein becomes a steeply dipping one on meeting the fault and may be seen to follow down along its dip a short distance.

The No. 2 tunnel is 275 feet northwest of the main tunnel and about 80 feet higher at an elevation of 500 feet. It runs north 70 degrees west for 415 feet. At 132 feet from the portal a drift runs south along a fault for 26 feet. At this place a winze 30 feet deep shows from 2 to 3 feet of vein quartz along its west side. This is the same lens as the big one on the main level. It has strong continuity in a vertical direction but is short along its strike. Three hundred and seventy feet from the portal entrance the crosscut tunnel intersects a quartz vein which strikes north 30 degrees east and dips from 30 to 35 degrees northwest. This vein ranges from 1 to 2 feet in width and consists of white, barren-looking quartz. The drift running northeast along the vein from the crosscut is 75 feet in length and the vein continues for 60 feet of this distance before pinching out. A crosscut driven west 53 feet from near the end of the north drift

failed to disclose other veins. The drift to the southwest along the vein is 90 feet in length and the vein pinches within a few feet of the face. A 19-inch channel sample taken across the vein 15 feet south of the main crosscut assayed only a trace of gold and silver.

At an elevation of 605 feet and approximately 150 feet northwest of the No. 2 tunnel, a 67-foot shaft has been sunk on a quartz vein which ranges from 2 to 5 feet in width and dips 30 degrees northwest. The vein is streaked with fine bands of bornite and chlorite schist. A 36-inch channel sample taken across the vein 29 feet from the shaft head on the southwest wall assayed: gold, 0.01 ounce to the ton; silver, a trace. On the surface this vein can be traced for 75 feet to the southwest, but for only 15 feet northeast. Another quartz vein occurs 60 feet to the northeast at a little lower elevation. This vein averages 1 foot in width and is well exposed for over 100 feet along its strike. It strikes northeast and dips 35 degrees northwest. A third quartz lens with a similar strike and dipping 15 degrees northwest occurs about 120 feet southwest of the inclined shaft. A tunnel at an elevation of 650 feet follows this vein for about 40 feet.

A strong quartz vein is exposed by trenches for 150 feet at an elevation of 800 feet. It strikes northeast, dips 25 degrees northwest, and ranges from 8 inches in width at its southwest end to 16 inches at the northeast end with a maximum width of 3 feet. It is lightly mineralized with bornite and some chalcocite throughout its length and in one place near the centre of the vein these sulphides were seen in comparative abundance. In the southeast and highest pit the quartz is slightly weathered, stained green, and contained small seams of bornite and coarse, free gold. A specimen of the quartz taken from the adjoining upper part of the vein assayed: gold, 0.01 ounce to the ton; silver, a trace. Two

other specimens showing free gold were found on the dump at a pit 65 feet to the northeast. Twenty feet northeast of this pit a 17-inch channel sample was taken across the vein with these assay results: gold, 0.04 ounce to the ton, silver, 0.46 ounce to the ton. According to Mr. Darby, caretaker at the mine, there are two other somewhat similar veins at several hundred feet higher altitude on the claim.

Results from the few samples taken suggest that it will be necessary to take bulk samples to arrive at a true approximation of the gold content of these veins.

Lucky Luke Mine

References: Annual Reports of the Minister of Mines, B.C.:  
1918, p.110; 1919, p.98; 1923, p.104, 1924, p.88;  
1925, p.125; 1928, p.146; 1934, p.C4.  
Geol. Surv., Canada, Sum. Rept. 1925, pt. A, p.116.

The Lucky Luke mine is on the east slope of Kitsalas mountain at an elevation of 1,000 feet, about  $1\frac{1}{2}$  miles southwest of Usk. It is approximately 1,500 feet distant from the railway which runs along the foot of the mountain. A rough road leads down from the mine to the railway and a fair truck road connects it with Usk. The property consists of four claims, the Lucky Luke, Hummer, Amigo, and Indian, the latter of which encroaches upon an Indian reserve along Skeena river. The owners, L.E. Moodie and R. Lowrie of Usk, operated the property from 1917 until 1923. S.A. Davis carried on development work in 1923 and 1924 and shipped 25 tons of hand-sorted ore which gave returns of: 18 ounces of gold, 316 ounces of silver, and 11, 162 pounds of copper. In 1934 R.W. Seeley took an option on the property and continued the development work. Nothing was done in 1935.

The country rock on the property is chiefly andesitic flows, some of them porphyritic, and also biotite and chlorite schists. These rocks are cut by a few narrow aplitic dykes. The vein consists of a series of narrow, lenticular quartz lenses along a fault or shear zone striking north 70 degrees west and dipping 65 degrees north. The quartz is mineralized with bornite and chalcocite and free gold is commonly seen, usually associated with the steel grey chalcocite.

The main crosscut tunnel, at an elevation of about 990 feet (aneroid reading), runs in a direction south 25 degrees west for 120 feet to the vein. A drift follows west-northwest along the vein for 130 feet to where a cross-fault cuts it off. The fault has been followed southwest for 35 feet without finding any sign of the faulted part of the vein. In this distance the

fault changes in dip from 70 degrees southeast to 80 degrees northwest and the strike changes from south 34 degrees west to south 84 degrees west. The striations along the fault are horizontal and are not heavily grooved, all of which suggests a relatively small offset along the fault plane. It was not possible to determine whether the west side of the fault block moved in a northeast or southwest direction. The shear zone in the drift ranges from 3 to 6 feet in width and its enclosed quartz vein averages about 9 inches in width. In a few places the quartz vein pinches entirely out for a few feet and then reappears. The shear zone has not been drifted along east of the crosscut tunnel. An aplite dyke about 10 inches wide occurs along the northeast side of the drift and comes within a foot of the vein in several places. It appears to have been intruded prior to vein formation. A winze was sunk from this drift in 1934 at a point 40 feet west of the crosscut tunnel. Douglas Lay, in the 1934 Annual Report of the Minister of Mines, writes that the ore continues in the winze to a depth of 40 feet and then pinches, but improves again, and in the bottom, 80 feet below the drift level, there is a width of about  $2\frac{1}{2}$  feet of quartz well mineralized with bornite and chalcocite and showing some free gold. The winze was filled with water at the time of our visit last summer.

A 9-inch channel sample taken across the vein 35 feet west of the winze on the south wall of the drift assayed: gold, 0.10 ounce to the ton; silver, 1.76 ounces to the ton. A 20-inch channel sample of biotite schist stained with malachite, taken across the roof of the drift about 20 feet east of the winze where there was no quartz, assayed: gold, 0.26 ounce to the ton; silver, 1.74 ounces to the ton.

Fifty-five feet above the main tunnel, there is a 20-foot tunnel leading to a drift which follows the vein for 96 feet



in a west-northwest direction. The shear zone averages 3 feet in width along the drift and the quartz vein occurs in narrow, lens-shaped bodies up to 18 inches in width. The two levels are connected by a raise on the vein. A 9-inch channel sample taken across 4 inches of quartz and 5 inches of schist, 32 feet from the face of the tunnel on the north wall, assayed: gold, 0.06 ounce to the ton; silver, 0.34 ounce to the ton.

Several ore specimens showing free gold were seen on a 15-ton stock pile of ore near the compressor house. In each case the gold was associated with the steel grey coloured chalcocite rather than the bornite. A sample weighing  $3\frac{1}{2}$  pounds taken from the ore pile by breaking off forty small pieces of ore from different parts of it, assayed: gold, 1.46 ounces to the ton; silver, 2.34 ounces to the ton; copper, 2.78 per cent. Another sample collected in a similar manner from about 20 tons of ore in the ore bin, assayed: gold, 0.24 ounce to the ton; silver, 1.06 ounces to the ton; copper, 1.50 per cent. An aerial tramline one-third mile in length has been constructed from the ore bin down the mountain side to a small gold mill near the railway. The mill is equipped with a small jaw crusher, a ball mill, and a Wilfley table. A Fordson tractor is set up to furnish the power.

Oxford Group

The Oxford claims, owned by H.R. Leacock of Prince George, are on the southeast slope of Kitsalas mountain about  $2\frac{1}{2}$  miles southwest of Usk. They are reached by a foot trail about half a mile long that branches to the west from the old road between Usk and Vanarsdol.

Several pits have been sunk along slip planes in andesitic lavas where these rocks are impregnated with pyrite. A typical sample weighing about 4 pounds, taken from a large pit at an elevation of 1,400 feet, assayed only a trace in silver with no gold. At an elevation of 1,900 feet, sixteen pits were sunk in tracing a narrow quartz vein in andesitic rocks. The vein averages about 6 inches in width and has been traced for possibly 200 feet. It strikes east and dips 35 degrees north. The quartz contains coarse pyrite. A sample collected by taking chips at different places along the vein assayed a trace of silver and no gold.

Nugget Group

References: Annual Report of the Minister of Mines, B.C.:  
1928, p.146.

The Nugget claims, owned by Pete Brusk of Vanarsdol, are on the south slope of Kitsalas mountain about 5 miles by trail from Vanarsdol station. They are reached by way of a short branch trail to the north from the Phillips Creek trail.

A quartz vein in andesitic country rock occurs in the bed of a small stream at an elevation of 2,000 feet. The vein is lens-shaped, has a maximum width of 2 feet, and is exposed for about 40 feet. It strikes north and dips 35 degrees west. To the south the vein appears to have been eroded away and to the north it is concealed. The vein quartz is heavily mineralized with chalcocite containing specks of free gold. A 3-pound specimen of typical vein matter assayed: gold, 0.28 ounce to the ton; silver, 4.40 ounces to the ton; copper, 4.6 per cent. A tunnel driven 52 feet northeast failed to reach the vein. A small fault along the stream bed strikes northeast and dips 55 degrees northwest. At the intersection of the vein and fault, the vein steepens and dips parallel to the fault. If the vein does not pinch it might be found by extending the tunnel 5 or 10 feet farther east. A small boss of granodiorite about 30 feet in diameter intrudes the andesite at the mouth of the tunnel and a 12-inch dyke from it runs north parallel to the vein.

Mr. Brusk states that there are three veins, each of which may be traced for several hundred feet, on the Lucky Strike claim, about 1,000 feet higher on the mountain.

Copper King Group

References: Annual Reports of the Minister of Mines, B.C.:  
1914, p.142; 1923, p.105; 1928, p.145.

This group of claims, owned by Pete Brusk, is on the south slope of Kitsalas mountain approximately 5 miles northwest of Vanarsdol. From Brusk's ranch the trail follows along the north side of Phillips creek for about 3 miles and then turns north up the mountain slope to the cabin at an elevation of 2,000 feet. The main vein occurrence is above the cabin, about 350 feet away.

A quartz vein occurs in andesitic rocks about 50 feet below a bed of volcanic breccia. The vein strikes north 65 degrees east and dips 65 degrees northwest. It has been traced by test pits for about 125 feet, and ranges from 18 to 27 inches in width. It is fairly well mineralized with coarse pyrite and contains a little chalcopyrite. A 27-inch channel sample taken across the vein where it is well exposed in a stream bed, assayed: gold, 0.04 ounce to the ton; silver, 0.46 ounce to the ton. Another channel sample taken across a 30-inch vein width in a pit 25 feet southwest of the creek assayed: gold, 0.04 ounce to the ton; silver, 0.34 ounce to the ton. A third sample, across 24 inches, taken from a pit 30 feet northeast of the creek where the vein quartz was not as well mineralized with pyrite, assayed a trace of silver and a trace of gold.

At a point 100 feet southwest of the creek and vein intersection, a tunnel was run northeast for 46 feet and then east for 48 feet. A strong fault was encountered which had offset the vein. The fault strikes north 20 degrees west and dips 65 degrees northeast. It is marked by 6 to 12 inches of gouge. A drift follows the fault for 100 feet to the northwest, but without finding any trace of the faulted part of the vein. Thirty feet along this drift, another drift turns off to the northeast and follows an earlier fault for 40 feet. The latter fault strikes

north 55 degrees east and dips 65 degrees northwest. It is readily seen on the surface where it follows up the bed of the stream above the vein.

On the North Star claim of this group, at an altitude of 2,800 feet, a quartz vein is exposed in the second mountain creek northeast of the cabin. The vein is in sheared andesitic rocks close to a large dyke of fine-grained granodiorite which outcrops on the west side of the stream. The vein strikes north 65 degrees east and dips 55 degrees northwest. It is exposed for about 50 feet, and ranges from 2 to 4 feet in width. The vein quartz is well mineralized with coarse pyrite and contains some fine-grained magnetite. A grab sample of typical vein matter, assayed: gold, 0.04 ounce to the ton; silver, a trace.

Nicholson Creek Mining Corporation

References: Annual Report of the Minister of Mines, B.C.,  
1934, p.C4.

The Nicholson Creek Mining Corporation owns a large number of mining claims north of Usk between Lowrie and Nicholson creeks. Development work is being carried out on a prospect situated 3 miles from Skeena river on the south side of Nicholson creek between elevations of 1,500 and 2,200 feet. A good motor road runs north for 2 miles along the west side of Skeena river from Usk and from there a fair tractor road leads west for 3 miles along the south side of Nicholson creek to the property. The head office of the corporation is at 700 Insurance Building, Seattle, Washington. R. Wadick is president, W.L. Willey is vice-president, and T.G. Shenton is in charge of mining operations. A large camp is established at an elevation of 1,530 feet, adjacent to Molybdenum creek which flows north into Nicholson creek. Twenty-four men were employed in September and a bunk house designed to accommodate fifty men was under construction. A long crosscut tunnel had been driven for 1,400 feet in a southwest direction through granodiorite country rock, but no ore-bearing veins had been intersected. The surface vein exposures which attracted the driving of this tunnel are situated about 1,150 feet southwest of the portal of the tunnel and at an elevation of from 400 to 500 feet higher on Calhoun and Molybdenum creeks.

At the junction of Calhoun with Molybdenum creek a 2-foot quartz vein outcrops prominently on the east bank of the latter stream. The vein strikes south 10 degrees east and dips from 50 to 60 degrees east. It occurs along a small fault in granodiorite country rock, is 250 feet in length, and has an average width of about 15 inches. The north end of the vein ends abruptly against a fault which strikes north 35 degrees east along

the bed of Molybdenum creek. The quartz is well mineralized with coarse pyrite and is crisscrossed by narrow seams of fine, granular molybdenite. The granodiorite wall-rock is altered for 1 or 2 feet on either side of the vein. A 24-inch channel sample taken from a fresh surface across the vein a few feet from the creek, assayed: gold, a trace; silver, a trace; molybdenum, 0.48 per cent. What may be the continuation of this vein, outcrops on the west side of Molybdenum creek about 50 feet above the forks. A 24-inch quartz vein with from 1 to 2 feet of altered granite on both sides of it is exposed for about 15 feet along the steep banks of the ravine. Its upward continuation is drift covered. The vein strikes south 40 degrees east, dips 70 degrees northeast, and is similarly mineralized with pyrite and molybdenite.

Sixty feet below the forks of Calhoun and Molybdenum creek, a 3-foot quartz vein also mineralized with coarse pyrite cubes and seams of molybdenite, outcrops on the steep east side of the stream. This vein is exposed for less than 100 feet. Fifty feet above Molybdenum creek the vein narrows to 6 inches in width and 25 feet higher up it pinches out altogether. The fault line along which the vein occurs extends farther to the southeast up the steep side of the ravine, but contains no vein quartz. At the creek the westerly extension of the vein is cut off sharply by the fault in the bottom of the stream bed.

A fourth vein is exposed in the bed of Calhoun creek, 300 feet above the forks. It strikes south 20 degrees east and dips 70 degrees northeast. At a waterfall about 10 feet high, the vein has a width of 22 inches of quartz and contains considerable pyrite and molybdenite. Sixty feet northwest of the falls the vein has pinched out entirely and only the fault slip along which the vein occurs is seen. About 100 feet above the waterfall the vein is 10 inches wide where it is exposed near the top of a steep bluff. Beyond this point it is hidden by a heavy drift cover.

About 300 feet farther upstream the granodiorite gives place to numerous roof pendants of andesitic rocks. A 22-inch channel sample taken across the vein at the 10-foot waterfall assayed: gold, a trace; silver, 0.26 ounce to the ton.

At the foot of a waterfall, about 60 feet in height, on Molybdenum creek about 500 feet below the Calhoun fork, is a sheared and altered zone in granodiorite on the east side of the creek. The zone is about 40 feet wide, strikes south 25 degrees east, and dips 80 degrees north. It contains a disseminated pyrite but is otherwise unmineralized. A sample collected with a pick across the 40-foot width assayed: gold, a trace; silver, a trace.

In the long crosscut tunnel a number of diorite dykes intrusive into the granodiorite are intersected. These vary from 2 to 8 feet in width, strike southeast, and dip steeply. The granodiorite is traversed by a large number of faults which are well exposed in the tunnel. The faults almost invariably strike from south 10 to 30 degrees east and dip steeply northeast. There are also six or eight sheared and altered zones in the granodiorite between distances of 400 and 1,300 feet within the tunnel, and their strike and dip is parallel to the strike and dip of the faults. Both faults and sheared zones were evidently formed at the same time. Wherever the granodiorite is broken or sheared the grey plagioclase feldspars are altered to a light pink colour and the rock contains an abundance of kaolin. From an economic viewpoint these shear zones have proved very disappointing to the operators as they contain little or no gold or silver. A channel sample across 1 foot of selected sheared granodiorite, sparsely mineralized with pyrite, 1,130 feet from the portal, assayed: gold, none; silver, a trace. A sample across 3 feet of altered and kaolinized granodiorite, 1,240 feet from the portal, assayed: gold, none; silver, a trace. A third sample taken across 7 feet of altered and sheared granodiorite 910 feet from the portal assayed: gold, none; silver, a trace.



Diadem Group

References: Annual Reports of the Minister of Mines, B.C.:  
1923, p.102; 1927, p.126; 1928, p.144, 1929, p.152;  
1930, p.133.

The Diadem property is about  $1\frac{1}{2}$  miles north of Usk on the west side of Skeena river and may be conveniently reached by a motor road from Usk.

In 1922 and 1923 A. Baxendale carried out surface trenching and test pitting between elevations of 800 and 1,250 feet on sheared zones in acid volcanic rocks mineralized with chalcopyrite and pyrite. In 1928 the Canadian-American Consolidated Mining Company, Limited, optioned the property from B. Shannon and carried out small-scale operations. The American Copper Mines, Limited, took the property over from Canadian Copper Mines, Incorporated, in 1930, and drove two crosscut tunnels about 4,100 feet apart in a search for copper ore-bodies below the surface outcrops, but without success. The claims are at present the property of the Nicholson Creek Mining Corporation and are lying idle.

An excellent detailed description of this property has been made by D. Lay in the Annual Report of the Minister of Mines, British Columbia, for the year 1930, pages 133-135, and interested persons should refer to it. The following is an account of work done in driving the crosscut tunnels and additional assays are presented.

The more easterly or No. 2 tunnel is about 800 feet west of the railway at an elevation of 470 feet. It is 1,050 feet long, driven on an average bearing of north 25 degrees west. The volcanic rocks in the tunnel range in composition from andesite to rhyolitic flows and are cut by two or three small dykes of feldspar porphyry. At about 750 feet from the portal there is a brecciated shear zone with quartz vein filling having a maximum width of  $3\frac{1}{2}$  feet. A

channel sample taken across 15 inches from the best part of the sheared zone on the north wall, assayed: gold, none; silver, a trace. At 885 feet from the portal two channel samples were taken across a sheared zone cut by quartz stringers. The samples were taken over a total vein width of 3 feet on the southwest wall and assayed: gold, none; silver, a trace. No copper minerals were seen.

The second tunnel is 4,100 feet southwest of the No. 1 tunnel and 300 feet from the Usk road at an elevation of 400 feet. It is driven for 140 feet in a northwest direction, mostly through porphyritic andesite with the last 15 feet a dark, fine-grained andesite. The contact of the two flows strikes north 20 degrees east and dips 60 degrees southeast. The tunnel does not intersect any veins.

A - B Group

The A - B group of claims, owned by S. Alger and W. Bell of Usk, is on the mountain between Nicholson and Hardscrabble creeks, about a mile west of the Canadian National railway. From the railway a trail leads west for one mile along the north side of Hardscrabble creek to a cabin on the Diorite claims. The route leads in a southerly direction from the cabin, across Hardscrabble creek and up the mountain slope to the mineral showings which are at an elevation of 2,650 feet near two shallow, marshy lakes.

The rocks are chiefly andesite on these claims, but considerable granodiorite was seen along the route to the property on the north slope of the mountain. In the bed of a small stream 400 feet southeast of a small shallow lake, a sheared zone mineralized with pyrite occurs in andesite. A small quartz albitite dyke about 75 feet to the southwest was the only intrusive seen in the vicinity. The mineralized zone is about 10 feet wide and is traversed by two parallel quartz veins ranging from 6 to 18 inches in width, the veins being from 2 to 8 feet apart. The veins strike approximately east and west and dip north steeply. Both veins and mineralized andesite are offset for a few feet by a fault which runs north and south along the centre of the stream bed. A hand specimen of the vein quartz mineralized with pyrite, assayed: gold, 0.01 ounce to the ton; silver, 0.31 ounce to the ton.

A somewhat similar mineralized zone occurs 200 feet north 75 degrees east from the one in the creek. An andesite outcrop 20 feet by 12 feet is sheared in a north-south direction and is cut by fine veinlets of pyrite with a little chalcopyrite. The andesite is cut by two narrow quartz veins striking about due northeast and dipping northwest. An average sample of vein quartz containing about 5 per cent of pyrite assayed: gold, 0.01 ounce to the ton; silver, 0.31 ounce to the ton. A specimen of the andesite,

cut by fine pyrite veinlets, assayed: gold, 0.01 ounce to the ton; silver, a trace.

A vein of black sphalerite with a little pyrite, ranging from 6 to 12 inches in width, occurs in light-coloured andesitic lava on a peninsular between the two small lakes. It is a vein filling along a fault of small displacement that strikes north 10 degrees east and dips 45 degrees east. The vein is exposed in only one trench, is drift covered to the southwest, and enters the more northerly lake 25 feet northeast along its strike. A sample of the sulphide assayed: gold, 0.01 ounce to the ton; silver, 0.07 ounce to the ton; zinc 10.20 per cent.

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