PART F

ANNUAL REPORT

OF THE

MINISTER OF MINES

OF THE PROVINCE OF

BRITISH COLUMBIA

FOR THE

YEAR ENDED 31ST DECEMBER

1937

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BRITISH COLUMBIA DEPARTMENT OF MINES.

VICTORIA, B.C.

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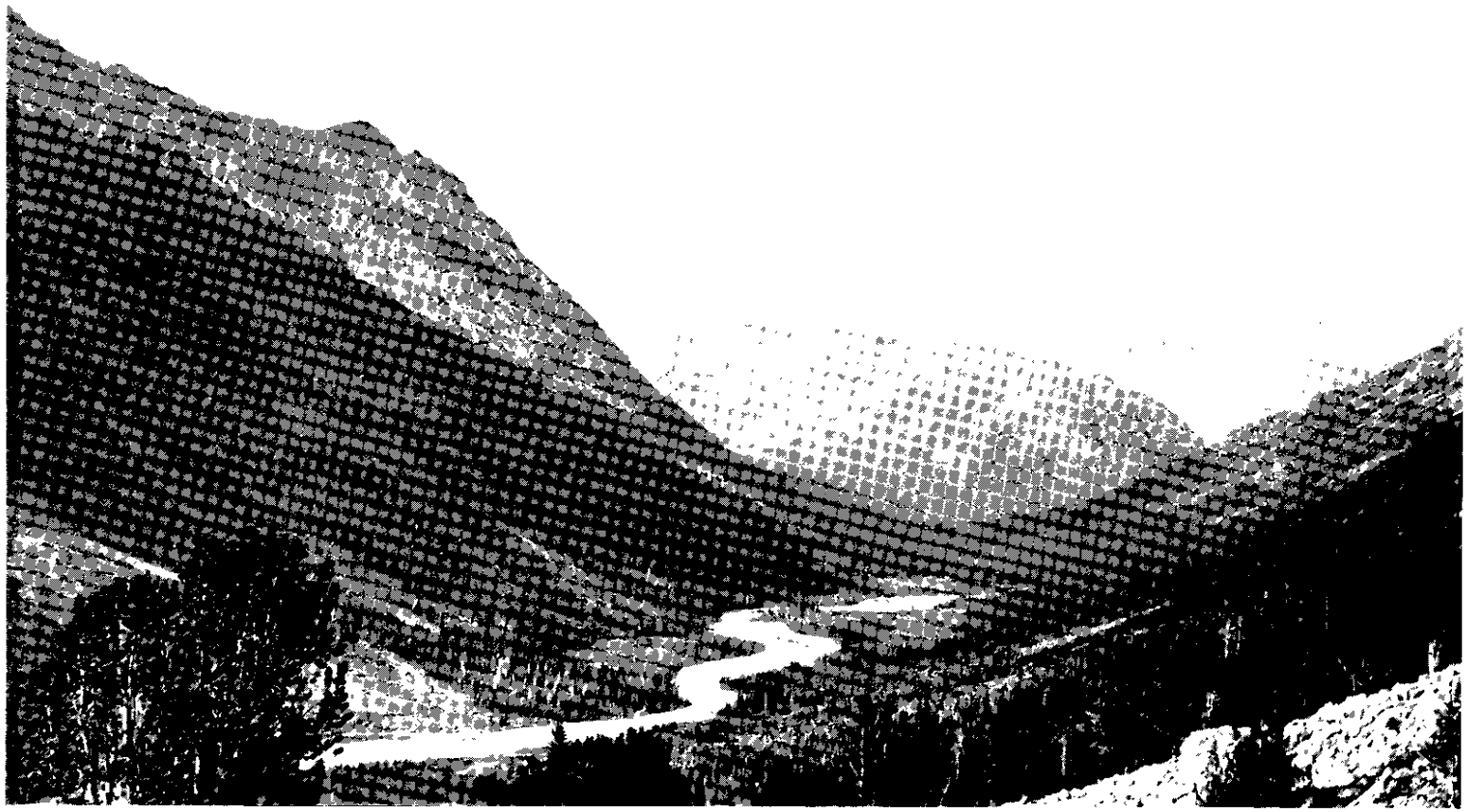


Fall Creek Valley below Hi Do Group.

Quartz-outcrop, Hi Do Group.

Black Horn Lake and head of Wolverine Creek.

PART F.

WESTERN MINERAL SURVEY DISTRICT (No. 6).

BY

B. T. O'GRADY.

GENERAL SUMMARY.

In the Bridge River area large-scale production was continued at the Pioneer and Bralorne, and in the latter case was substantially increased.

Mining and milling were discontinued at the Minto and Wayside and exploratory work was suspended at some other properties.

Prospecting and small-scale exploratory activities were conducted in certain areas. Stibnite and cinnabar prospects are being seriously investigated and tested.

In the Chilcotin area seasonal activities with small crews occurred at the following properties: Homathko Gold Mines, Limited, Morris, Langara, Vick, Hi Do, and Taylor-Windfall. Prospecting was actively conducted in the Black Horn Mountain area, which includes the Homathko Gold Mines, Limited, property, and in the Lord River area south of Taseko Lake.

The Zeballos area on the west coast of Vancouver Island rapidly developed as a new gold-mining camp during the year. A bulletin entitled "Lode-gold Deposits of the Zeballos Area, West Coast of Vancouver Island," by J. S. Stevenson, has been published. No reference, therefore, is being made to the area in the following report.

LODE-GOLD DEPOSITS.

CHILCOTIN DISTRICT.

Black Horn Mountain Area.

Homathko Gold Mines, Ltd.

The property of this company, in the Clinton Mining Division, is stated to consist of thirty mineral claims and fractions, being held by location. Associated with the company are L. Butler, N. Pohlman, and C. Mackill, who, with some associates, represent the original owners. The property is situated on the western side of the valley at the head of Wolverine Creek, a tributary of Mosley Creek (West Branch of the Homathko River), or about 24 miles south-south-west of Tatla Lake Post-office. The latter point is about 150 miles westerly from Williams Lake, on the Pacific Great Eastern Railway.

The claims cover the steep, rocky, eastern slopes of Black Horn Mountain, a conspicuous feature of the district, which rises to over 9,000 feet elevation. The tent camp, at 5,455 feet elevation, adjoins a lake, about 4,500 feet in length and up to 1,400 feet wide, which occupies a glacial depression at the head of Wolverine Creek. To the east of the lake the ground rises steeply towards Razorback Mountain, which culminates in a peak 10,667 feet above sea-level. Adjoining the camp, immediately below the property, there is a limited amount of balsam up to 10 inches in diameter, timber for mining purposes being available farther down the valley.

The workings, at elevations ranging from 7,094 to 7,300 feet, are above timber-line, being situated on steep to precipitous ground covered by talus and rock bluffs. There are two shallow glaciers on the claims and others, more extensive, can be seen to the south.

Access to the area is first by the Chilcotin Motor-road 151.8 miles westerly from Williams Lake; thence by rough road, over which trucks are operated, about 15 miles in length to the northern end of Bluff Lake. A pack-trail, 17 miles in length, roughly estimated, extends from the latter point to the claims. The first 2 miles of this trail, located along the rocky eastern side of Bluff Lake, includes a bad section, about 450 yards in length, where rock-work is needed to build a safe grade. From the southern end of the lake the trail traverses wooded ground, side-hill slopes being gentle to moderate. The pack-trail was cheaply and hastily built by N. Pohlman and associates in 1936, sections damaged by slides being reconstructed in 1937. It is generally a rough and meandering trail which needs relocating to improve

grades and shorten total distance. When justified by development, an aerial tram would be the best means of transportation from the vicinity of the showings to the valley below.

The geology of the district is described in Geological Survey of Canada Summary Report, 1924, Part A, under "Chilco Lake and Vicinity." The claims are largely underlain by greenstone which, below the workings, is intercalated with bands of argillite and conglomerate, the series being highly metamorphosed. The conglomerate is a rusty-weathering, sericitized, greenish rock, silicified in part, the pebbles being flattened and elongated. As appreciable gold assays had, according to report, been obtained from the conglomerate, three samples were taken by the writer, but these only gave traces in gold and silver. These rocks are intruded by and adjoin the eastern margin of the Coast Range batholith, the contact being markedly irregular. The deposits examined occur in Triassic greenstones about a mile north-east of a large area of granodiorite occupying the south-western part of Black Horn Mountain. In the vicinity of the showings there are several dykes, ranging in composition from andesite porphyry to quartz porphyry, and varying in width from 2 to 20 feet, some of which cut the veins. The general strike of the stratified formation is northerly and dips are westerly generally at from 40 to 45 degrees. In places the dykes strike westerly with vertical or steep northerly dips and at other points strike with the formation, dips not being definitely revealed.

The veins examined apparently conform in attitude with the strike and dip of the enclosing greenstone, which is schistose in part. They consist of quartz containing small amounts of sulphides, specified later, together with native gold. A large proportion of the gold is free from the sulphides and specimens containing visible gold have frequently been found. As the character of the ore is unusual, the results of the microscopic investigation on a polished section is given in full: "Metallic minerals identified in order of abundance: Arsenopyrite, pyrrhotite, chalcopyrite, sphalerite, pyrite, and gold. Arsenopyrite occurs largely as small disseminated crystals, forming in places nearly solid bands and masses of the mineral. Pyrrhotite occurs as irregular masses, associated with chalcopyrite and sphalerite and occupying fractures in gangue, these minerals veining and replacing arsenopyrite in places. Chalcopyrite and sphalerite occur as described, but are somewhat rare in the section examined. A few crystals of pyrite occur similarly to arsenopyrite. Gold is relatively abundant in the section examined. The following tables illustrate its size-distribution and mode of occurrence:—

Size-distribution. No. Grains Gold.	Greatest Dimension. Mesh.
2	Plus 100.
19	Minus 100 plus 200.
35	Minus 200 plus 325.
103	Minus 325.

"The largest grain noted was in the form of a veinlet about 350 microns long and 15 microns wide; the smallest ranged down to 1 or 2 microns, with the bulk of the minus 325 mesh gold between 10 and 30 microns in size.

Mode of Occurrence.	No. of Grains.
(1.) Grains in quartz	23
(2.) Grains in carbonate gangue	58
(3.) Grains on contact carbonate and quartz	4
(4.) Veinlets in quartz	41
(5.) Veinlets in quartz containing carbonate gangue	10
(6.) Veinlets in quartz containing carbonate and pyrrhotite and (or) sphalerite	8
(7.) Contact of arsenopyrite	5
(8.) Contact of pyrrhotite	3
(9.) Inclusions in arsenopyrite	4
(10.) Veinlets in pyrrhotite	2

"From the above analysis it would appear that a fairly large proportion of gold occurs in quartz alone. Actually, however, all the occurrences noted were in the proximity of fractures containing carbonate gangue. As judged by the section, gold bears little or no relationship to arsenopyrite, being controlled by carbonate-bearing fractures through the ore.

" These same fractures carry pyrrhotite, sphalerite, and chalcopyrite, but gold is believed to belong to a separate and later stage of mineralization, in that it was noted veining fractures in pyrrhotite in two places."

At the time of examination, in July, 1937, this type of ore was restricted to one open-cut, from which a few tons had been extracted and sent to the Gibson prospector's mill, referred to later, indicating that such material was of exceptional occurrence. Some or all of the sulphides specified, with, in addition, galena in places, occur in the vein, or veins, at other points, but assays in these other cases did not show proportionately high gold values, suggesting a possibility that there has been enrichment with gold at certain points during a later stage of mineralization. In this connection similar high-grade ore is reported to have been uncovered at and beyond the southern end of the property since the writer's visit.

The discoveries were made in the summer of 1936 by N. Pohlman and claims were staked by him and three partners, L. Butler, C. Mackill, and W. Pohlman. After some preliminary exploration, which revealed ore containing free gold, the owners installed a Gibson prospector's mill, driven by a water-wheel, on Wolverine Creek at a point about 1,500 feet downstream from the camp.

Since the summer of 1936, approximately 3.5 tons is stated to have been milled from which gold, recovered by amalgamation, returned a value of about $275. Milling was then discontinued and about 5.5 tons of similar ore, containing numerous specimens showing native gold, remains at the mill-site. Up to the time of the writer's examination, development, including a 45-foot adit, was very limited. The Homathko Gold Mines, Limited, a public company, was incorporated in May, 1937.

The principal working, from which the high-grade ore was extracted, is a large open-cut, at 7,180 feet elevation, on a narrow, rocky bench forming the top of a bluff, at the foot of which is located the incompleted adit-crosscut referred to later. These and adjacent workings, described hereinafter, are at the head of a glacial cirque which locally interrupts the uniform easterly slope. The open-cut, described as point A for convenience, exposes a lightly-mineralized quartz-showing 21 feet long which, in its central part, was up to 6 feet wide where it spread out against an apparent fault-plane striking north 10 degrees west and dipping westerly at from 50 to 60 degrees.

At both extremities of the showing the width of the quartz was reduced to 8 inches. Structural conditions were somewhat indefinite, the hanging-wall fracture apparently dipping 30 degrees westerly. In later, and deeper, work, however, the vein is reported to have become steeper.

Sampling results were:—Across 6 feet in the centre of this open-cut: Gold, 0.235 oz. per ton; silver, trace; across 8 inches at southern end: Gold, 0.56 oz. per ton; silver, 0.12 oz. per ton; across 8 inches at northern end: Gold, 0.06 oz. per ton; silver, trace. A grab sample from a small pile of quartz containing disseminated sulphides assayed: Gold, 0.32 oz. per ton; silver, 0.1 oz. per ton. Going southerly along the contour from location A, the outcrop is covered by talus up to a point 258 feet distant, where it was partially exposed in a shallow cut. Here a sample across 8 inches assayed: Gold, 0.14 oz. per ton; silver, trace; and a grab sample gave: Gold, 0.02 oz. per ton; silver, trace. At 85 feet farther to the south the vein reappears in bluffs, where a sample across 7 inches assayed: Gold, 0.17 oz. per ton; silver, trace. From this point to 51 feet farther south the vein, from 3 to 12 inches wide, is continuously exposed in the bluffs, and at the latter point a sample across 12 inches assayed: Gold, 0.82 oz. per ton; silver, 0.1 oz. per ton.

For another 100 feet going south along the rock-face the vein appears in the form of connected short lenses swelling in width from 3 to 12 inches. At the last-mentioned or farthest-south location a sample across 8 inches assayed: Gold, 0.06 oz. per ton; silver, trace. All the above exposures, south of point A, are at elevations varying from 7,180 to 7,165 feet and are on the edge of the precipitous slope to the glacial cirque. Southerly from the last-mentioned sample location the vein was not examined, its extension being covered by a shallow glacier, about 1,000 feet across, roughly estimated. In subsequent prospecting it is reliably reported that vein-outcrops have been found at intervals, sometimes very widely separated, southerly beyond the glacier across two claims of the *Homathko* property and farther south on to the separately-owned *Homestake* group adjoining the granodiorite. Some open-cuts are said to have been made exposing vein-sections which, in some cases, vary appreciably in

elevation, suggesting displacement if they belong to the same vein, or separate veins of similar attitude.

Reverting to the large open-cut at A and going northerly along the strike there is deep talus. Going 48 feet north 44 degrees east from point A, at 7,155 feet elevation and in a narrow gulch, there is a mineralized quartz-showing, 10 to 12 inches wide and 3 feet long, striking south-westerly towards the open-cut at A and dipping at 75 degrees to the south-east.

A sample across 1 foot at this location, described as point B, assayed: Gold, 0.09 oz. per ton; silver, trace. A and B showings are stated to connect in former stripping, but the ground between was covered with boulders. Differing in attitude from all other exposures seen, this latter vein-section may have been broken over by erosion adjoining the gulch.

The portal of the adit, at 7,094 feet elevation, is distant 90 feet along a bearing of south 77 degrees east from the large open-cut at A. It had been driven north 65 degrees west for 45 feet in massive greenstone, being directed towards the centre between A and B showings. At 12 feet in from the portal a quartz-calcite stringer was encountered and continued to the face. It varied in width from 2 to 12 inches, being sparingly mineralized with pyrite. A sample across 10 inches near the face gave a trace in gold and silver. Going north 56 degrees east for 80 feet from the adit-portal there is a band of iron-stained, silicified rock, 20 feet wide, which, on sampling, gave traces in gold and silver. This is apparently an extension of the conglomerate sampled at other points, though at this location pebbles are widely separated or absent.

About 1,000 feet, estimated, north-easterly from point A, and at 7,300 feet elevation, there is an open-cut, partly caved when examined, in a rock-slide sloping steeply to the east. Here there are lenticular quartz-showings, over a length of 12 feet, conforming to the 45-degree westerly dip of the schistose greenstone. This is known as the "galena-showing," this mineral being present in places with pyrite and sphalerite in the quartz which, at the northern end, is 24 inches wide and 20 inches wide at the southern end. A grab sample from a pile of about 1 ton of mineralized quartz extracted from this cut assayed: Gold, 0.805 oz. per ton; silver, 1.2 oz. per ton; lead, trace; zinc, 2 per cent. Between this working and the open-cut at A there are poorly-exposed outcrops of iron-stained quartz in places, indicating the possibility of other lenses or vein-sections along the strike.

Samples were taken at the mill-site as follows: From a pile of about 5.5 tons, excluding obviously rich specimens, a grab sample assayed: Gold, 1.52 oz. per ton; silver, 0.5 oz. per ton; lead, *nil;* zinc, 0.6 per cent.; arsenic, 0.59 per cent. As stated before, this ore was derived from the vicinity of the large open-cut at A. Pannings from a small quantity of tailings assayed: Gold, 38.60 oz. per ton; silver, 8.8 oz. per ton; lead, 1.1 per cent.; zinc, 1 per cent.; arsenic, 20.3 per cent.

Exploratory work was at a very early stage when the property was visited. The showings and indications are such that, in addition to tracing the "bedded" veins, thorough prospecting of the area may lead to the discovery of other veins, and in this connection a vein cutting the formation is indicated at one point. Since the writer's examination several other showings are stated to have been exposed principally towards the southern end of the ground.

Taseko Lake Area.

Hi Do.

This group of thirteen claims, in the Clinton Mining Division, is held by location and owned by A. Pelletier, A. J. Allaire, and associates. The property is distant about 5 miles south-westerly from the southern end of Taseko Lake and on the south-eastern side of Falls Creek, the most northerly tributary of the Lord River from the west. The name "Falls" is in local use, this creek being officially unnamed. The camp, at 6,525 feet elevation and in the edge of timber-line, is on the steep wooded ground sloping north-westerly towards the creek. The workings, at elevations ranging from 7,740 to 8,150 feet, are on a bare, rocky, or talus-strewn ridge to the south-east of the camp and separated from it by an extensively-glaciated basin, surrounding peaks rising to 9,000 feet elevation, or higher.

Access is by means of a fair pack-trail, 7 miles in length, roughly estimated, which first follows the western side of Lord River and then turns up the valley of Falls Creek. From the camp a switchback trail, about 1.5 miles in length, leads to the workings.

General transportation facilities are as follows: A recently-completed road, about 60 miles in length, connects Hanceville, a point 60 miles westerly from Williams Lake, on the Pacific Great Eastern Railway, with the northern end of Taseko Lake. This road is passable for trucks, and in August, 1937, a motor-boat was hauled in over it and used to reach the southern end of the lake, about 15 miles distant. This route now affords the best means of access to the "Whitewater" Camp, formerly reached by trail crossing the summits from the Bridge River. Passengers and supplies have frequently been taken to Taseko Lake by aeroplane, for which floats are provided at the southern end of the lake.

The formation in which the deposits have been found consists of granodiorite (post-Triassic) of the Coast Range batholith, which, not far to the north-east, forms an irregular contact with Triassic rocks, including greenstone, the marginal zone being marked by tongues of quartz diorite and hornblende diorite extending into the intruded rocks. Of five quartz veins, which strike north-easterly, four have steep north-westerly dips, the dip of the fifth being uncertain.

The superficial workings have not yet exposed primary mineralization, the showings from which gold assays are obtained being all more or less oxidized or shattered and decomposed.

Exceptionally high gold values, as in the case of No. 2 vein, are associated with iron-stained, oxidized, brecciated quartz. In the case of No. 1 vein the rusty quartz contains sulphide casts, together with small crystals of garnet and rare specks of pyrite and molybdenite. The oxidized quartz of the No. 5 vein shows occasional spots of chalcopyrite and, rarely, bornite.

Float and vein outcrops were discovered by Pelletier and Allaire in the summer of 1936, most of the work having been done during the 1937 season. In connection with this undertaking the Hi Do Gold Mines, Limited, was incorporated in December, 1937.

The following description of conditions is based on a pace and compass survey, aneroid elevations being approximate: The No. 1 vein strikes north 68 degrees east and dips north-westerly 75 to 80 degrees. It is exposed by three open-cuts and intervening outcrops on steep, talus-covered ground sloping north-east to a basin occupied by a shallow remnant of a glacier. In the lowest open-cut, at 8,080 feet elevation, or approximately 100 feet above the basin, the vein is 4.3 feet wide. From foot-wall to hanging-wall there is first a 3-inch band of oxidized quartz containing sulphide casts and small scattered crystals of garnet; then a 21-inch parting of altered silicified wall-rock; and, lastly, a 28-inch band of oxidized quartz containing sulphide casts, disseminated garnet crystals, and rare specks of pyrite and molybdenite.

A sample across the foot-wall band assayed: Gold, 0.01 oz. per ton; silver, trace; and a sample across the hanging-wall band gave traces in gold and silver. Going south-westerly up the steep slope for 15 feet there is an outcrop, at 8,100 feet elevation, where the vein, up to 5 feet wide, is composed of iron-stained quartz. A sample across 4.5 feet assayed: Gold, 0.01 oz. per ton; silver, trace. Continuing in the same direction for 20 feet, an open-cut, at 8,120 feet elevation, had been started, solid rock not having been reached. Continuity of the vein, however, was indicated by residual shattered quartz over a width of 4 feet. Going 35 feet south-westerly, and at 8,150 feet elevation, there is an eroded, decomposed, iron-stained quartz-outcrop of indefinite attitude, the cut not being deep enough to indicate the true conditions. Above this point there is deep talus to the summit of the ridge at 8,200 feet elevation. The vein was similarly covered below the lowest cut and by ice in the basin below.

The No. 2 vein workings, distant about 250 feet westerly from the open-cuts on the No. 1 vein and situated on the steep, rock-strewn ground sloping north-westerly to Falls Creek, comprise four open-cuts extending south-westerly along the 8,060-foot contour. At the north-eastern end there is a partly-timbered open-cut, 40 feet long, extending to south 45 degrees east, the depth at the face being 16 feet. This working, which had just penetrated the deep talus, exposed a shattered, oxidized, and partially-decomposed quartz-outcrop. The dip of the vein was uncertain as it was broken over in a folded, generally flat-lying attitude. Judging from the alignment of this showing with those in the other cuts, the strike is north-easterly. The granodiorite appeared to be coming up in the face, indicating a north-westerly dip, but more work was required to definitely ascertain this point. A sample across 7.5 feet of shattered, iron-stained quartz and decomposed siliceous material assayed: Gold, 0.42 oz.

per ton; silver, 0.8 oz. per ton; and a selected sample of heavily-oxidized quartz containing sulphide casts assayed: Gold, 17.10 oz. per ton; silver, 21.8 oz. per ton. Going south-westerly for 55 feet there is a parallel open-cut, 20 feet long, in the face of which there was a similar flat-lying showing apparently varying in width from 2 to 4 feet. A grab sample from this exposure assayed: Gold, 0.2 oz. per ton; silver, 0.7 oz. per ton. Continuing in the same direction for 20 feet, stripping showed shattered quartz and oxidized material, apparently flat-lying. Going 35 feet farther to the south-west there is an open-cut extending south-easterly for 20 feet. In this working the iron-stained shattered quartz, of undetermined width, was irregularly folded. A selected sample of quartz gave traces in gold and silver per ton.

Going north-easterly from the 40-foot open-cut for 400 feet along the ridge, and at 7,975 feet elevation, there is a shallow cut in talus from which loose masses of siliceous, oxidized material showing copper-carbonate stains were extracted and piled on the dump. Continuing in the same direction for 400 feet, and on the apex of the sharp ridge overlooking Falls Creek to the north-west, there is an open-cut at 7,810 feet elevation. This imperfectly exposes a vein, known as the No. 3, which apparently strikes north 60 degrees east with steep north-westerly dip. A sample of the quartz, lightly iron-stained and containing occasional sulphide casts, assayed traces in gold and silver per ton. Between this cut and the previous or "float" location, several poorly-exposed basic dykes strike westerly across the apex of the ridge. Going north 65 degrees east from the No. 3 vein cut down the steep talus-slope towards the shallow glacier previously mentioned, and at 7,760 feet elevation, an iron-stained, shattered, and partly-decomposed quartz-showing up to 7 feet wide has been stripped. A sample across 7 feet assayed: Gold and silver, trace per ton; this occurrence being located along the trend of the No. 3 vein, and the strike and dip are similar. The ground between the two showings, and along the strike in both directions, is covered by talus.

In a north 65 degrees east direction about 800 feet from the last-mentioned location and looking across the glacial basin is the contact between the batholithic rocks and greenstone of the Triassic series, the granitic formation plunging steeply to the north-west.

Going north-easterly 375 feet from the No. 3 vein-location on the ridge there are outcrops and small bluffs of quartz, known as No. 4 vein, on the slope to the glacial basin. This is at 7,740 feet elevation, the summit of the ridge above being at 7,840 feet elevation. The iron-stained quartz, visible for a length of 200 feet or more, and from 3 to 8 feet in width, strikes north-easterly with north-westerly dips of from 45 to 70 degrees. A chip sample from an exposure 3 to 7 feet wide and 30 feet long assayed: Gold, trace; silver, 0.4 oz. per ton. There are also quartz-outcrops along the trend of this No. 4 vein crossing the summit of the ridge. Going north-easterly along the summit from this last location there is, at 7,860 feet elevation, an outcrop of iron-stained quartz, containing sulphide casts, 6 feet wide. Disseminated through the quartz there are occasional spots of chalcopyrite and, more rarely, bornite. A selected sample from this showing, which is covered by talus along its strike, assayed: Gold, 11.90 oz. per ton; silver, 39.2 oz. per ton. This No. 5 vein apparently follows the usual north-east by east strike with an indicated north-westerly dip of 40 degrees.

When visited in the summer of 1937 the property was in a very early stage of exploration. The high gold assays were in both cases from oxidized material and may represent local concentration of gold due to oxidation. The character of the primary mineralization had not then been revealed.

Bridge River Area.

Jewel. This property, in the Lillooet Mining Division, consists of twelve mineral claims held by location and owned by the Jewel Prospectors' Syndicate. The camp buildings are situated about 4.3 miles north-west of a point where Walk Creek flows into the north-western side of Gun Lake. The developed area lies to the south-east of, and about 500 feet above, Roxey Creek, a north-easterly-flowing tributary of Gun Creek, the smaller stream being officially unnamed.

The workings, at elevations varying from 5,580 to 5,990 feet, are on the very steep or precipitous slope facing Roxey Creek, the ground being covered with bluffs and rock-slides, among which are scattered small evergreens, including a few trees from 1 to 2 feet in diameter. The elevation of the summit, back of the workings, is about 6,050 feet and the camp, at 5,360 feet elevation, is in lightly-wooded ground adjoining Gem Creek, at the foot of

the steep south-westerly slope of the same ridge. To be more explicit, the claims cover both slopes of the ridge which lies between Roxey and Gem Creeks, the latter stream being a branch of Roxey Creek.

The property can be reached by two different trails, and a caterpillar-tractor road, affording a third route, was under construction when the property was visited in August, 1937. The quickest means of access is by pack-trail, about 5 miles in length, roughly estimated, which extends north-westerly from the road at the *Pilot* mine, situated towards the centre of the western side of Gun Lake. The other routes are from the Gun Creek side, transportation conditions being difficult to describe accurately due to available plans being incomplete or incorrect. During 1936 and 1937 a length of several miles of the Gun Creek trunk trail has been converted into a narrow road over which trucks are used. The Tyaughton Lake Road, which branches off the highway at a point about 33.5 miles from Bridge River Station on the Pacific Great Eastern Railway, is followed for a distance of about 3 miles to its junction with the recently-extended Gun Creek Road. The latter is followed westerly for about 4 miles to a short distance beyond Freiberg Creek, where the road-width ends.

The old trunk trail, which at the time of the writer's visit was being widened by J. M. Taylor for the Jewel Prospectors' Syndicate, is then followed westerly for a further 3.5 miles, roughly estimated, to the bridge over Gun Creek at Herb Taylor's cabin. From the bridge a steep switchback trail, about 2.5 miles in length, extends to the camp. From the latter point a switchback trail, partly built on a good grade, leads to the summit above the workings. From the summit a foot-trail, connected in places with ladders, goes diagonally down to the principal workings. The caterpillar-tractor road, under construction, was located so as to connect the property with a proposed bridge over Gun Creek, at approximately 3,500 feet elevation and 1.5 miles down-stream from the existing bridge. The estimated distances given above are subject to revision when an accurate survey becomes available.

The deposits, in serpentine, occur as fissure-veins associated with dykes related to the near-by Bendor batholith. The area containing the deposits adjoins and roughly parallels the main contact of the quartz diorite, which, trending easterly, occupies the higher ground situated between 80 and 150 feet southerly from the showings examined.

The main dyke system, with which the fissures are associated, strikes from easterly to north-east by east, prevailing dips being southerly at angles ranging from 60 to 85 degrees. Occasionally these dykes, which are dioritic or composed of fine-grained quartz diorite, dip vertically or steeply northerly. The mineralized fissures generally adjoin the dykes on one or other wall, but structural relationships are often irregular and there are branching veins or stringers extending into the serpentine in places.

Mineralization consists chiefly of arsenopyrite distributed in streaks, kidneys, and small masses in the sheared, siliceous gangue, which is generally oxidized and decomposed. Quartz and calcite streaks are occasionally present as in the lowest adit where chalcopyrite and pyrite are associated with remnants of arsenopyrite in an oxidized matrix. Vein-widths, generally narrow, vary from a few inches to 2.5 feet, one exceptional showing, 5 feet wide, being exposed in a shallow cut.

The stakings date back a few years, part of the development-work, including the two shafts and intermediate adit, having been done by Bralco, Limited, when this company held an option in 1934.

An irregular vein-zone has been traced for a length of about 660 feet. Commencing at the eastern end of the showings, adjoining the blacksmith-shop, and going south 71 degrees west, the vein, from 0.3 to 2 feet wide, is exposed by open-cuts and stripping at short intervals for a length of 105 feet between elevations of 5,990 and 5,980 feet. For part of the length specified it follows the northern wall of a 7-foot dyke which dips 60 to 70 degrees southerly, the vein appearing to conform to the attitude of the dyke. At the lower or westerly point specified, a 65-degree inclined shaft, said to be down 15 feet but largely filled with muck, has been sunk on the vein where it has crossed to the southern side of the dyke, the latter forming the foot-wall. A sample across 0.6 feet at the shaft-collar assayed: Gold, 1.58 oz. per ton; silver, 1 oz. per ton; and a sample across 2 feet on the outcrop, 10 feet easterly from the shaft, assayed: Gold, 2.2 oz. per ton; silver, trace. Going south 44 degrees west for 100 feet from the above shaft, and at 5,950 feet elevation, there is a similar working sunk southerly for 20 feet on a 40-degree incline.

From the collar to 10 feet down it exposes the steeply-dipping vein which, at the latter point, is joined by a vein dipping 30 degrees southerly, the lower section of the shaft being obscured by muck. A sample across 1.5 feet, at the junction of the veins, assayed: Gold, 1.26 oz. per ton; silver, trace. Between the two shafts the vein-outcrop, from 1 to 2 feet wide, is almost continuously exposed by stripping and open-cuts. A sample across an oxidized exposure, 1.5 feet wide, in an open-cut at a point 45 feet north-easterly from the lower shaft assayed: Gold, 4.46 oz. per ton; silver, trace.

A little below this showing, the upper adit-portal, at 5,930 feet elevation, is situated 35 feet north 28 degrees east from the collar of the westerly shaft. It extends first as a crosscut for 22 feet to south 72 degrees east, where the vein is encountered. From the crosscut, drifting has been done in both directions, the southerly drift being 15 feet long to south 15 degrees west. The opposite drift extends first north 37 degrees east for 34 feet, then north 77 degrees east for 40 feet, and finally north 85 degrees east for 18 feet to the face, where the vein is 4 inches wide. Timbering in the back of both drifts and piles of ore stored in the southern drift obscured conditions, the vein, where visible, being from 0.3 to 2.2 feet wide and dipping easterly or south-easterly at angles varying from 35 to 70 degrees. The general relationship of the vein and dyke was not clearly exposed, but in the north-eastern drift-face the dyke was on the foot-wall side of the vein. A sample across 0.75 feet, 32 feet back of this face, assayed: Gold, 1.54 oz. per ton; silver, 0.4 oz. per ton; and a grab sample from a pile of oxidized ore in the southern drift, containing 35 tons, roughly estimated, assayed: Gold, 1.06 oz. per ton; silver, trace.

At 5,900 feet elevation the portal of another adit, known as the " intermediate " tunnel, is 100 feet south 63 degrees west from the upper adit-portal. It extends north 65 degrees east for 17 feet to point A; east for 17 feet to B; north 82 degrees east for 66 feet to C; north 73 degrees east for 50 feet to D; north for 60.5 feet to E; and finally north 5 degrees west for 14 feet to the face at F. At a point 13 feet past C, going towards D, a crosscut, being extended, was in 25 feet to south 15 degrees east. The vein is continuous, where visible between lagging, from the portal to where it goes into the wall at the sharp bend. At the latter point the vein is 0.3 foot wide and at the portal it is 2.5 feet wide, the average width being less than 1 foot. It follows the northern side of a dyke, which, from 2.5 to 3 feet wide, dips 65 to 75 degrees northerly.

At D it conforms to the attitude of the dyke, but at the portal the vein dips steeply southerly, converging with the dyke. At the latter point there is, in addition, a 3-inch mineralized streak on the foot-wall side of the dyke. In the above adit, between D and the face, dyke-rock is exposed at several points, the most definite dyke intersection, 6 feet wide, being at a point 37 feet north of D. A sample across 0.3 foot at D assayed: Gold, 0.02 oz. per ton; silver, trace. Another sample, across 1 foot, at a point 24 feet westerly from C, going towards B, gave: Gold, 1.08 oz. per ton; silver, trace; and a sample across 0.5 foot, 15 feet in from the portal, assayed: Gold, 1.12 oz. per ton; silver, trace. In a gulch, 65 feet south 81 degrees west from the portal of this adit, and at 5,850 feet elevation, a shallow cut exposes oxidized material with streaks of quartz and arsenopyrite on each wall, the showing being up to 5 feet wide. It is poorly exposed, but evidently dips southerly and is underlain by a dyke. A selected sample from this cut assayed: Gold, 2.06 oz. per ton; silver, 0.1 oz. per ton. Beyond this showing fracturing in serpentine is exposed at intervals by stripping and outcrops for a length of 250 feet, going first west and then north-west by west.

Mineralization, in places, consists of streaks and kidneys of arsenopyrite in sheared, oxidized showings which are from 0.25 to 0.7 foot wide. A sample across 0.5 foot near the western end of the section described, and at 5,830 feet elevation, assayed: Gold, 0.72 oz. per ton; silver, 0.6 oz. per ton. Dips are southerly, varying from 80 to 85 degrees.

The lowest adit, at 5,580 feet elevation, is about 390 feet north 71 degrees west from the intermediate adit-portal. It has been driven as follows: From the portal to station 1, south 70 degrees east for 37 feet; from 1 to 2, south 25 degrees east for 40 feet; from 2 to the face at 3, south 15 degrees east for 67 feet. At station 2 there is a branch which extends as follows: From 2 to 2-A, east for 36 feet; from 2-A to 2-B, north 43 degrees east for 15 feet; from 2-B to 2-C, south 60 degrees east for 31 feet; and from 2-C to 2-D, south 45 degrees east for 25 feet to the face. From the portal to station 1, an irregular vein, containing streaks and kidneys of sulphides, including chalcopyrite, is followed to where it goes into the wall at

the latter point. In this section, dioritic rock, possibly a dyke, is exposed along the north-eastern side of the vein, which varies from a stringer to 2.5 feet in width and generally dips 75 to 80 degrees south-westerly, but, where left at station 1, rolls over and dips north-easterly at a flat angle.

What appears to be the same vein, or stringer, is intersected at 2-B, and followed to 2-D, throughout which section it is vertical and varies in width from a stringer to 1.1 feet, the dioritic rock extending along the south-western side of the vein. No appreciable mineralization was noted in the section between 2-B and 2-D. Two selected samples from the sulphide kidneys in the drift-section adjoining the portal included a sample of mixed sulphides which assayed: Gold, 0.66 oz. per ton; silver, 0.1 oz. per ton; and massive chalcopyrite with minor amounts of quartz which assayed: Gold, 0.20 oz. per ton; silver, 4 oz. per ton; copper, 19.25 per cent. The course between stations 2 and 2-A follows a stringer, containing rusty quartz and calcite streaks, which dips 70 to 75 degrees south, dioritic rock being exposed on both sides. The same rock is exposed on the western side of the face at 3, this location being apparently close to the contact of the batholith. On the reverse slope of the ridge, above the camp, and at 5,600 feet elevation, a prospect-adit has been driven west for 33 feet, having just reached solid rock which consists of altered feldspar porphyry.

Summarizing conditions, the heavy sulphide ore, consisting mainly of arsenopyrite, presents a problem under present conditions, as it cannot be substantially beneficiated by concentration and the gold values are not high enough to make an appreciable profit by shipping crude to distant smelters.

Peerless Gold Mines, Ltd.

The property of this company, in the Lillooet Mining Division, consists of thirteen mineral claims and fractions held by location. The area examined adjoins the Tyaughton Lake Road, the camp buildings being about 0.25 mile southerly from the lake. The workings, at elevations varying from 3,300 to 3,441 feet, are on lightly-wooded, gently-undulating ground. Access is by the highway from Bridge River Station on the Pacific Great Eastern Railway for approximately 33.5 miles to the Tyaughton Lake Road, which is followed for about 4.25 miles to the camp near the workings.

The area is underlain by rocks of the Bridge River series, the deposits being associated with shearing in greenstone which, in one case, continues along the contact of greenstone and sediments. Exposures are generally limited in the vicinity of the workings, greenstone being apparently the prevailing formation. A small area of argillite and cherty quartzite is intersected towards the inner end of the lower adit. Local strikes and dips of the rocks are obscure, structural relationships between the greenstone and sediments in the lower adit being complex. The shearing is generally irregular, strikes being north-easterly with north-westerly dips varying from 35 to 65 degrees. Mineralization consists chiefly of pyrite and sphalerite, the latter mineral being abundant in massive streaks and bunches or in disseminations, and the gangue is composed of ankeritic carbonate accompanied by quartz and calcite. In a few samples taken by the writer, values ranged from a trace to 0.30 oz. in gold per ton; from 0.4 to 2.7 oz. in silver per ton; and from 1.5 to 10.4 per cent. in zinc. Away from the shearing the greenstone is frequently pyritized and silicified, but samples of such material showed only traces in gold and silver.

The stakings date back a few years to the period of intensive exploratory activity in the Bridge River Camp.

The upper workings, on the gentle southerly slope just below the apex of a low ridge, will be described with relation to the portal of the upper adit, at 3,426 feet elevation. A point 20 feet north 80 degrees east from the point specified, and at 3,441 feet elevation, marks the centre of a shallow trench extending north-south for a length of 20 feet. It has only just reached bed-rock, which consists of rusty-weathered greenstone.

No mineralization was noted in place, but on the dump there were specimens of quartz containing pyrite and sphalerite. Another shallow cut, full of debris, is situated at 3,431 feet elevation 18 feet south-west of the upper adit-portal. Similarly mineralized specimens are on the dump. Other shallow cuts in close vicinity are in soil. The upper adit, driven 17 feet to north 13 degrees west, is in greenstone, pyritized in places, no definite structure being in evidence. Outside and adjoining the portal the locally silicified greenstone contains disseminated pyrite. Two samples, from the face and outside the portal respectively, assayed traces

in gold and silver. Selected sphalerite and pyrite in quartzose material from the dump assayed: Gold, 0.12 oz. per ton; silver, 2.7 oz. per ton; zinc, 10.2 per cent.

The portal of the lower adit, at 3,400 feet elevation, is 98 feet south 26 degrees west from the upper adit-portal. This lower working has been driven as follows: From the portal to A, 100 feet to north 10 degrees east; from A to B, 21 feet to north 14 degrees west; from B to C, 28 feet to north 75 degrees east; C to D, 63 feet to north 60 degrees east; D to E, 29 feet to north 66 degrees east; E to the face at F, 48 feet to north 47 degrees 30 minutes east. Branch workings are as follows: From B to B-1, 14.5 feet to north 30 degrees west; D to D-1, 13 feet to north 33 degrees west; and D to D-2, 23 feet to south 55 degrees east. The area explored between the portal and D is in greenstone. In the course between the portal and A, a mineralized shear is intersected at an acute angle. First encountered in the western wall at 52 feet in from the portal, it crosses to the opposite wall and is left in the floor at 68 feet in from the portal. The showing, from 0.3 to 1 foot in width, is irregular in attitude, the strike being north-easterly and the dip averaging about 50 degrees north-westerly. A sample across 7 inches, at 54 feet in from the portal, assayed: Gold, 0.28 oz. per ton; silver, 2.7 oz. per ton; zinc, 10.4 per cent.

In the branch between B and B-1 there is a north-easterly-striking shear, accompanied by quartz and calcite, which dips steeply south-easterly. The main working at D and the branch between D and D-1 are in argillite, siliceous in part, and the D-2 section is in greenstone. Between D and the face at F there are cherty sediments along the north-western wall and greenstone extends along the south-eastern wall. Immediately south-east of D, at the contact, and extending north-easterly along it, there is a zone of shearing which dips 35 to 65 degrees north-westerly. Adjoining D the shearing is mineralized for a length up to 20 feet and over a width up to 2 feet. A sample across 1.8 feet, near the centre of this lens, assayed: Gold, 0.30 oz. per ton; silver, 2.7 oz. per ton; zinc, 8.6 per cent. The shearing becomes indefinite towards the face, a sample across 3.7 feet at the latter point assaying: Gold, trace; silver, 0.4 oz. per ton; zinc, 1.5 per cent. A point on flat ground, at 3,300 feet elevation, 575 feet south 84 degrees 30 minutes west from the lower adit-portal, marks the position of the collar of a shaft, steeply inclined to the north-east, which was full of water. Adjacent trenches are in soil and boulders, the underlying rock being evidently greenstone.

Benboe.

This group, in the Lillooet Mining Division, consists of six surveyed mineral claims, held by location and owned by the Benboe Deep Mines Syndicate. The property is situated on the western side of Tommy Creek, about 4 miles southerly from the confluence of this stream with Bridge River. Except in slide areas, the Tommy Creek Valley is well wooded up to the cabin, situated on a bench at 4,500 feet elevation. The workings, at elevations of from 4,650 to 4,750 feet, are on the steep to precipitous, rocky slope, brushy or sparsely wooded in part. Access is first by means of the highway which is followed for a distance of about 23 miles from Bridge River Station on the Pacific Great Eastern Railway to the cable crossing over the river at Swang's (formerly Beaubien's) ranch. From the latter point a trail, about 4.5 miles in length, extends to the claims. The lower 3-mile section of the original trail, used at the time of the writer's visit, was built along the steep side-hill forming the eastern side of Tommy Creek Valley, and was very poorly located, grades being prohibitive for loaded pack-horses.

The creek is then crossed and the remaining 1.5-mile section, following the western side of the valley, is on a fair grade. The lower, and bad, part of the trail is being reconstructed. Trail or road locations are necessarily confined to this valley, which is narrow with steep walls intersected in places by slide areas. While preliminary operations can be carried out during the summer and early winter months, slides at other periods may seriously interfere with transportation.

The claims are underlain by rocks of the Bridge River series, which, less than 2 miles to the south, are intruded by the Bendor batholith. The deposits are found in a vein in greenstone, schistose or shattered in part. Local exposures are limited and the strike of the greenstone was not definitely ascertained. At the adjoining *Stromberg-Shepherd* property interbanded greenstone and sediments strike north-westerly, dips being north-easterly at steep angles. The vein strikes about north 15 degrees east and dips 45 to 55 degrees westerly into the hill forming the western wall of the valley. It has been traced by shallow cuts for a length of 672 feet, its extension beyond these limits being covered by overburden.

The vein is formed along well-defined fracture-planes, but in no case has an open-cut been sunk deep enough to penetrate the oxidized zone, nor have any cuts been made large enough to expose a complete section of the deposit. As all the accessible outcrops are more or less oxidized, the exact nature of the mineralization cannot be determined, but must be inferred from similarities to related deposits in the area. The only sulphide recognized was stibnite, which occurred in disseminations in a quartzose gangue at one point, all other showings consisting of oxidized streaks and bands in altered silicified greenstone, calcite being present at some points. The six samples taken by the writer showed generally low gold and silver values.

Stakings in the area apparently date back to 1933. The Benboe Deep Mines Syndicate commenced development in 1935, since when work has been continued intermittently.

The vein has been traced by a series of open-cuts at approximately the same elevation or adjoining the 4,750-foot contour.

Commencing at the southern end and chaining northerly, conditions are as follows: At zero, rusty-weathered outcrop, 3.3 feet wide, associated with well-defined fracturing; at 43 feet, rusty-weathered, sheared, altered greenstone with no definite walls exposed; at 104 feet, similar conditions over a width of 3 feet; at 123 feet, similar material containing appreciable quartz; and at 152 feet, 2.5 feet of oxidized siliceous material, including calcite-streaks, which assayed: Gold, 0.10 oz. per ton; silver, 0.5 oz. per ton. A selected sample from the same place, showing disseminated specks of stibnite in quartzose gangue, assayed: Gold, 0.02 oz. per ton; silver, 8.8 oz. per ton. Resuming the chainage, the vein is poorly exposed in cuts at 194 and 212 feet. In the vicinity of the latter point massive stibnite is reported to have been found in an outcrop. At chainage 249 feet there is a width up to 4.5 feet of oxidized, silicified material. A sample across 4 feet here gave: Gold, 0.24 oz. per ton; silver, 0.4 oz. per ton. At chainage points 314, 430, and 475 feet there are oxidized outcrops up to 6 feet wide. At 559 feet there is an oxidized, partial exposure 2 feet wide, a sample across this width assaying: Gold, 0.18 oz. per ton; silver, 0.6 oz. per ton. At 580 feet a sample across a section 2.5 feet wide, made up of interbanded oxidized streaks and silicified greenstone, assayed: Gold, 0.05 oz. per ton; silver, 0.4 oz. per ton. At 642 feet an oxidized showing, 1.3 feet wide, assayed: Gold, 0.36 oz. per ton; silver, 0.5 oz. per ton. The vein is again partially exposed at 672 feet, beyond which it is covered.

Opposite, or south 65 degrees east from, the southernmost cut at zero, and at 4,650 feet elevation, there is an adit-crosscut driven for a distance of 48 feet to north 40 degrees west. Caving prevented inspection beyond the 40-foot point, this accessible portion being all in overburden. It is estimated that this working will have to be extended to 270 feet to intersect the vein. Exploration is at too early a stage to warrant any useful appraisal of possibilities.

Continuity of the structure is evident for an appreciable distance along the surface, but further work is necessary to determine if values in the oxidized material are enhanced by residual enrichment or impoverished by leaching. Mineralization may occur over greater widths than those exposed, and future work should include deep trenching at intervals to expose complete sections of the vein-zone and obtain information on which to base further plans. In this connection the steepness of the side-hill is an advantageous factor.

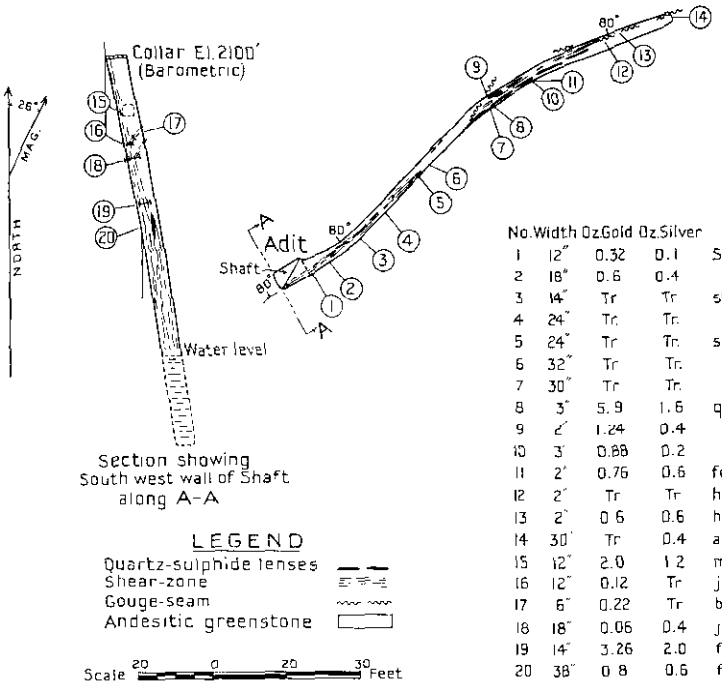
Vancouver Island.

Vulcan Group.* The *Vulcan* group is owned by the Crown Gold Mining Syndicate of Victoria and comprises the *Vulcan* Crown-granted claim and *Vulcan Nos. 1* and *2* mineral claims. The *Vulcan* claim was Crown-granted in 1898 and most of the work on it done about that time. Subsequently it reverted to the Crown and was again Crown-granted to Angelo Lorinde and Edgar S. Parr in September, 1937. The *Vulcan Nos. 1* and *2* were staked by Lorinde and Parr in December, 1936. The work on the *Vulcan* has been described in the Annual Reports of the Minister of Mines, British Columbia, for 1899, pages 826 and 851; 1904, page 302; and 1930, page 303.

The present camp and workings are at an elevation of approximately 2,100 feet and 6¾ miles by good trail north-westerly from the Second Nanaimo Lake, which is 17 miles by motor-road up the Nanaimo River from Nanaimo.

* Report by John S. Stevenson.

The camp is on a heavily-wooded hillside sloping gently north-westward into Robbins Creek, a small creek which flows south-westerly and westerly into Deadhorse Creek, and thence via Dash Creek into the Upper Nanaimo Lake. The workings, consisting of a shaft and drift from it, are on the north-westerly bank of Robbins Creek, approximately 450 feet north-eastward from the new cabin. Up-stream from the shaft the creek cascades over boulders and bed-rock on a relatively gentle grade, whereas down-stream from the shaft it flows over a series of cascades and falls to a point that is 80 feet below the collar of the shaft and some 165 feet westerly therefrom. From here the grade again becomes less steep.



No.	Width	Oz. Gold	Oz. Silver	Description
1	12"	0.32	0.1	Shear, some pyrite and quartz
2	18"	0.6	0.4	" " " " "
3	14"	Tr	Tr	sheared rock only
4	24"	Tr	Tr	" " "
5	24"	Tr	Tr	shear, a little quartz and calcite
6	32"	Tr	Tr	" " " " " "
7	30"	Tr	Tr	" " " " " "
8	3'	5.9	1.6	quartz sulphide lens in foot-wall
9	2'	1.24	0.4	" " " " hanging-wall
10	3'	0.88	0.2	" " " " foot-wall
11	2'	0.76	0.6	foot-wall gouge
12	2'	Tr	Tr	hanging-wall of shear
13	2'	0.6	0.6	heavy sulphide in hanging-wall
14	30'	Tr	0.4	andesite in the face
15	12"	2.0	1.2	mineralized shear
16	12"	0.12	Tr	junction of main and branch shears
17	6"	0.22	Tr	branch shear
18	18"	0.06	0.4	junction of main and branch shears
19	14"	3.26	2.0	full width of shear, well mineralized
20	38"	0.8	0.6	full width of shear

Vulcan. Plan and section of workings from chain and compass survey.

The workings consist of an inclined shaft, reported to be 105 feet deep (at the time of examination the surface of the water in the shaft was 81 feet from the collar), and a drift 138 feet long driven north-easterly from a point 16 feet down from the collar of the shaft. The reader is referred to the sketch-plan and section for the details as described below.

Mineralization occurs in a strong shear-zone in andesitic greenstone. The zone ranges from 1 to 3 feet in width; it consists of highly-crushed, unmineralized greenstone and two quartz-sulphide bands, a hanging-wall and foot-wall band, each of which ranges from 2 inches to sometimes 6 inches in width. These bands are very lenticular and discontinuous; short lenses of what might be called a third band sometimes occur between the other two. The material of these bands is quartz, associated with abundant pyrite and smaller amounts of galena and sphalerite.

The drift follows the shear-zone from the shaft to a point 15 feet from the face. Here the shear is cut at a small angle by a narrow gouge-slip that comes into the wall 25 feet from the face, gradually crosses the shear and its contained quartz, and then continues in greenstone to the face. The face is not in the shear-zone.

The shaft follows the shear-zone as far as it was examined (namely, 81 feet). The sheared material increases from 18 inches at the collar to 3 feet at 81 feet, and contains discontinuous bands and lenses of quartz similar to those in the drift. At points 25 and 30 feet from the collar, two branch shears, each averaging 1 foot in width and containing lenticular quartz, join the main shear and develop a good grade of material at the junction.

The gold values are confined to the quartz-sulphide bands and lenses, the sheared greenstone being practically barren. This would indicate that the grade and amount of ore depend on the presence of sufficient width and frequency of quartz-sulphide lenses. The distribution of these along the shear determines the grade of the material in any long section of the shear. The reader is referred to the assays on the accompanying plan.

GOLD-SILVER DEPOSITS.

Pacific Great Eastern Railway.

Birkenhead River Area.

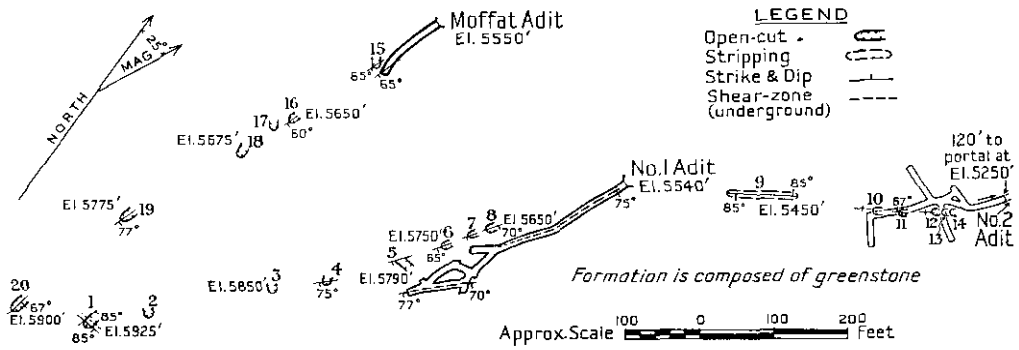
Gridiron. This group, in the Lillooet Mining Division, comprises seven claims held by location and owned by G. Moffat and A. J. Hendry. The property is situated on the southern side of Tenquille Creek, about 4 miles westerly from Birkenhead River, or about 14 miles by trail north-westerly from Poole Creek, a flag-station on the Pacific Great Eastern Railway, near Mile 72, from Squamish. It should be noted that all available maps of the area, which include the Birkenhead River and its tributaries from the west, Fowl and Tenquille Creeks, are extremely inaccurate. For instance, the junction of Tenquille Creek with the river is shown as being 3 miles from Poole Creek, whereas the actual distance is nearer 9 miles. Beyond Tenquille Creek the river actually extends towards the head of Noel Creek in the Bridge River area. The claims cover the rough ground, interspersed with small bluffs and patches of slide-rock, sloping steeply to the north towards Tenquille Creek, elevations ranging from 4,600 to 6,400 feet on the claims and to about 7,000 feet on the summits above. The camp buildings, at 5,400 feet elevation, or 900 feet above the creek, are at the edge of timber-line, the lower slopes being well wooded. Ample water for mine and domestic use is available near the camp and adit-workings.

The property is reached by a fair pack-trail following the Birkenhead River Valley for about 9 miles and then up Tenquille Creek for about 5 miles, the last section extending in a series of switchbacks up the steep side-hill to the camp. A reconnaissance made by C. E. Cairnes was published in Geological Survey of Canada Summary Report, 1924, Part A. As shown in Fig. 6, "Pemberton Area, Lillooet District," accompanying this publication, the basin of Tenquille Creek and the areas immediately surrounding it are largely underlain by Mesozoic rocks. To the south of the creek the formations are: Sandstones, slates, and conglomerates, tentatively assigned to the Cretaceous; batholithic intrusives, chiefly granodiorite and quartz diorite, of post-Upper Triassic age; andesitic lavas, tuffs, and breccias, intercalated with sediments, including limestone and argillite; the last series, definitely referred to the Upper Triassic, having been correlated with the Cadwallader series of the Bridge River Map-area.

On the *Gridiron* property structural conditions are rendered complex through deformation accompanied by much shearing and faulting. The general trend of the stratified rocks apparently varies from north 30 degrees west to north 40 degrees west, the average dip being north-easterly at 40 degrees. The prevailing exposures, in which most of the deposits have been found, are massive to schistose greenstones of volcanic origin. Included with them are belts of porphyritic, grey to reddish, volcanic flows. The series are strongly sheared along a north-westerly direction approximately conforming to their strike and, approximately at right angles to this, there is a second system of shearing and faulting, much of which is considered to be pre-mineral. Cutting the greenstones, there are occasional dykes of varying composition, including quartz porphyry, which do not appear to have any direct bearing on the mineralization. The deposits in the greenstones consist of lenses of quartz or silicified rock containing varying amounts of sulphide minerals, including pyrite, arsenopyrite, galena, sphalerite, chalcopyrite, and tetrahedrite, the mineralization being frequently associated with sheared or brecciated wall-rock. Polybasite, a silver mineral, was identified in specimens by Cairnes; native silver, of secondary origin, also being noted in fracture-planes at one point. Chief values are in silver, gold values being generally low.

The property was originally staked in 1923 under the name of the *Li-li-kel* group. Work was done under option by the Federal Mining and Smelting Company in 1926 and 1927. Subsequently the ground was acquired by the present owners and renamed *Gridiron* group. Past references are contained in the Annual Reports of the Minister of Mines, British Columbia, for the years 1923, 1925, 1926, and 1927.

The principal showings, situated on the *Gridiron* claim, follow the line of cross-faulting and shearing which trends in a general south-westerly direction up the slope of the hill from an elevation of 5,250 feet or less to 5,925 feet. Above the upper adit-portal, which is at 5,540 feet elevation, the shear-zone strikes approximately north 35 degrees east and dips south-easterly at from 65 to 75 degrees. Below the point specified, it turns and strikes from north 55 degrees east to north 40 degrees east, dips being variable and ranging from vertical to 80 degrees to south-east and to from 67 to 85 degrees to north-west. The shearing is irregular, fracture-planes frequently being offset a few feet in closely-spaced cuts. The above description of structural conditions applies more especially to surface exposures, the shearing at underground points being generally indefinite. The wall-rock, which in places forms a large proportion of the gangue, is dark-green, fine-grained, massive greenstone, strongly brecciated in places.



Gridiron. Pace and compass survey of workings.

Referring to the accompanying illustration, and commencing at the north-eastern end, surface and underground conditions are as follows: Of the five closely-spaced cuts above No. 2 adit, Nos. 12 and 13, which showed quartz with bands or disseminations of galena and pyrite, were sampled. In the No. 12 cut the sample across 2.5 feet assayed: Gold, 0.02 oz. per ton; silver, 14 oz. per ton; lead, 15 per cent.; zinc, 7.6 per cent.; and a sample across 1.5 feet in No. 13 cut gave: Gold, 0.06 oz. per ton; silver, 24 oz. per ton; lead, 4.6 per cent.; zinc, 4.6 per cent. The latter sample also contained chalcopyrite, but not in important amount. In Nos. 14, 11, and 10 cuts shearing was apparent without appreciable quartz or sulphide mineralization. At No. 9 location there are open-cuts and stripping extending over a total combined length of 90 feet, much of which is obscured by debris.

Two samples, taken 10 feet apart at the south-western end of the exposures, respectively assayed: Gold, 0.10 oz. per ton; silver, 58 oz. per ton; lead, 27.8 per cent.; zinc, 4.2 per cent. across 1.5 feet; and: Gold, 0.06 oz. per ton; silver, 100.5 oz. per ton; lead, 8.3 per cent.; zinc, 6.9 per cent. across 1.8 feet. Similar mineralization is visible at the north-eastern end of No. 9 location, the section between the mineralized extremities being poorly exposed. Above No. 1 adit, Nos. 6, 7, and 8 cuts, enclosed within a length of 70 feet, expose mineralized quartz and silicified rock averaging 2.7 feet in width. A sample taken across 1.2 feet at No. 6 location assayed: Gold, 0.04 oz. per ton; silver, 110 oz. per ton; lead, 3.9 per cent. No. 5 open-cut exposes up to 8 feet of sheared, rusty-weathered greenstone, silicified in part. At No. 4 cut a sample across 1.6 feet assayed: Gold, 0.06 oz. per ton; silver, 60 oz. per ton. At Nos. 3 and 2 cuts, which are caved, there is evidence of continuity of shearing and silicification. At No. 1 location mineralization is locally developed along two intersecting zones of shearing, one striking north-easterly and the other approximately east-west. A sample across 2.5 feet immediately adjoining the face of the cut developing the north-easterly shearing assayed: Gold and silver, trace; and a sample representing 1.5 feet associated with cross-shearing assayed: Gold, 0.38 oz. per ton; silver, 22 oz. per ton. These showings, where appreciable gold values have been obtained in previous sampling, are at the foot of rock bluffs, including porphyritic intrusives, into which it was not possible to trace any definite shearing.

In the lower adit there is nothing corresponding with conditions in the surface cuts above it, there being no definite structure or mineralization in evidence. In general this working, apart from crosscuts, is driven along various weak, south-westerly-striking fractures, with from vertical to steep dips to either north-west or south-east. There is no evident explanation of the lack of continuity of the mineralized shear-zone to this horizon, which must be attributed to structural weakness or to displacement by some unobserved faulting.

The first section of the upper adit, from near the portal to the first south crosscut, is driven along an indefinite zone of south-westerly-striking shearing, dips being south-easterly at from 75 to 80 degrees. No appreciable silicification or sulphide mineralization was noted in the back of this drift, the weak structure fading as the crosscut specified is approached. A parallel shear-zone was found in the south crosscut and followed for 85 feet to the south-western face of the adit.

In the back of this drift-section the wall-rock is irregularly silicified, disseminated pyrite being of common occurrence. In the floor, at a point 32 feet back from the face, there is a short exposure of well-mineralized quartz, a sample across 2.5 feet at this point assaying: Gold, 0.10 oz. per ton; silver, 3.5 oz. per ton; lead, 3 per cent. Specks of chalcopyrite, associated with the pyrite and galena, were also noted here. In the face, where structural conditions were more definite than at any other point in these workings, two samples taken over a combined width of 4.25 feet of silicified, pyritized, sheared greenstone gave a trace in gold and from 0.4 to 1.2 oz. per ton in silver. As shown on the sketch, adjacent workings, also in greenstone, extend along a zone of shearing and silicification which strikes north 10 degrees east to north 13 degrees east with easterly dips of from 60 to 75 degrees. In No. 15 cut, over the *Moffat* adit, rusty, sheared rock is exposed. Similar conditions are evident in No. 16 cut, together with irregular silicification and indefinite scattered mineralization. A sample across 2.8 feet on the hanging-wall side, in the face of the cut, assayed: Gold, trace; silver, 8.2 oz. per ton.

Cuts Nos. 17, 18, and 19 trace the continuity of the shearing, silicification being irregular with sparse mineralization. At open-cut No. 20, situated at the foot of the bluffs previously mentioned in connection with No. 1 cut, the silicified greenstone contains streaks of sulphide mineralization on both walls of an exposure 3.5 feet wide, the assay over this width being: Gold, 1 oz. per ton; silver, 9.5 oz. per ton; lead, 7.2 per cent. No definite shearing was noted in the bluffs southerly from No. 20 cut.

The *Moffat* adit is first driven south 13 degrees west for 82.5 feet, then south 2 degrees east for 22.5 feet to the face. From the portal to the bend it follows a well-defined wall dipping easterly at from 60 to 65 degrees. This is left at the bend and in the face of the adit there is an indefinite, approximately parallel fracture. Between a point 10 feet northerly from the bend and the face there are indefinite narrow areas of irregular silicification mineralized with disseminated pyrite.

In the absence of a more comprehensive plan, other scattered showings will be described approximately with relation to the several claim boundaries. Six of the claims are staked in a double row trending south-westerly.

The *Roosevelt* claim adjoins the *Gridiron* (which contains most of the previously-described occurrences) to the south-west and the former claim is adjoined to the north-west by the *Hoover*. The seventh claim, named *Jubilee*, adjoins both the *Roosevelt* and *Hoover* to the south-west, being equally distributed on each side of the line dividing those claims. On the *Hoover* claim, at 6,200 feet elevation, and about 1,000 feet westerly from open-cut No. 20 on the sketch, there is a small cut at the top of a rock-slide sloping north-easterly towards Tenquille Creek. Here a short exposure, 2 feet wide, of silicified iron-stained greenstone and quartz containing disseminated pyrite is associated with shearing which strikes north 40 degrees east and dips 75 degrees south-easterly. A sample across 2 feet gave traces in gold and silver. On the *Jubilee* claim, adjoining the dividing line between the *Hoover* and *Roosevelt* claims, or approximately 800 feet south-westerly from the last previously-described showing, there are two open-cuts at 6,200 feet elevation, situated on the north-eastern slope of the glacial basin. The cuts, 83 feet apart, partially develop a wide zone of mineralization which occurs in a belt of sheared, fine-grained, banded, siliceous rock, adjoining and overlying a band of north-easterly-dipping limestone. Mineralization consists chiefly of disseminated pyrite in a siliceous gangue.

A sample across 4.5 feet (partial exposure) in the south-easterly cut assayed: Gold, 0.18 oz. per ton; silver, 1 oz. per ton; and a selected sample from the north-westerly cut gave: Gold, 0.22 oz. per ton; silver, 1.6 oz. per ton. The continuation of this zone and its full width have not been explored. A few hundred feet northerly from these cuts the ground falls precipitously for 300 feet to a bench containing two small adjoining lakes. At 6,200 feet elevation and approximately 1,500 feet to the south-west of the last described workings there is, also on the *Jubilee* claim, a shallow cut. This location is on a grassy hump separating two glacial basins sloping towards Tenquille Creek. This cut exposes a 4-foot width of heavily oxidized and pyritized rock adjoining a small outcrop of limestone which apparently strikes north 70 degrees west with vertical dip. A sample across 3.75 feet assayed: Gold, 0.06 oz. per ton; silver, 0.8 oz. per ton; and a selected sample of pyrite gave: Gold, 0.16 oz. per ton; silver, 0.6 oz. per ton. No other work has been done to trace the continuity of this occurrence, which is apparently wider than the exposure.

Summarizing conditions at the present stage of development, the irregular ore occurrences on the *Gridiron* claim appear to be lenses developed along shearing and fracture planes which lack evidence of regularity and continuity. The comparatively good structural conditions in the inner end of the No. 1 adit suggest the extension of this drift-section to test the downward continuation of the good showing in No. 4 open-cut. At higher elevations the wide zone of mineralization in the two adjacent cuts on the *Jubilee* claim is of interest and could be further explored to ascertain its extent and continuity. Objectives for future exploration also include testing of intersections of the variously-striking systems of shearing and fracturing for possible mineral concentrations.

GOLD-ZINC-ANTIMONY DEPOSITS.

Bridge River Area.

Summit Gold Mining Syndicate.

The property of this syndicate, in the Lillooet Mining Division, consists of eleven mineral claims and fractions held by location and known as the *Summit*, *Summit Nos. 1* to *9*, inclusive, and *Zada*. The owners include J. Marron, F. Joubin, and J. L. Stewart, the last named being the trustee. The property lies to the west and south-west of the head of Fergusson Creek, which, at a short distance above Gold Bridge, flows into Bridge River from the south-east. The claims cover the rocky and talus-strewn summit country forming the watershed between Fergusson and Cadwallader Creeks.

The showings, at elevations ranging from 7,250 to 7,700 feet, are above timber-line, being situated on the summit or on the adjoining upper slopes towards the streams specified. The area forming the summit is, in a general way, smoothly rounded, but is divided into two narrow ridges about 1,500 feet apart, which roughly parallel the Fergusson Creek Valley. At the south-eastern end of the ground the two ridges are joined by a northerly-trending ridge up to 600 feet wide.

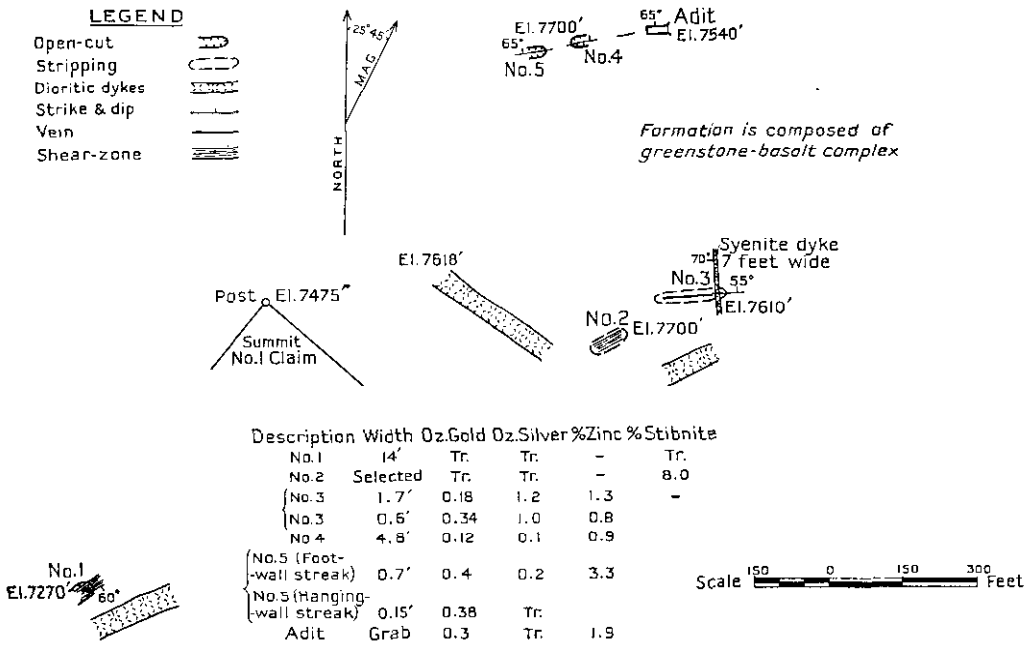
The north-easterly ridge continues south-easterly beyond the junction for a few thousand feet to the summit of Mount Fergusson at approximately 8,500 feet. The bare and abrupt northern slopes are interrupted by a wide bench facing Fergusson Creek, on which the tent camp-site is located at 7,430 feet elevation. The southern slopes are more uniform and gradually flatten towards the Cadwallader Creek Valley, the ground between elevations of 6,500 and 5,000 feet being lightly wooded. Below the latter elevation there is an abundance of useful mining-timber.

The camp-site is reached by pack-trail, 6 miles in length, roughly estimated, from Fish Lake settlement on the main road, about 53 miles from Bridge River Station on the Pacific Great Eastern Railway. As most of the discoveries have been made on the Fergusson Creek slope the above route is the natural one, but the *Summit* prospect can be more quickly and conveniently reached from the Cadwallader Creek side, first by branch road leading north-easterly from the south-eastern section of the *Bralorne* holdings for about 1.75 miles to a point near the northern boundary of the *Braeberne* property, adjacent to the 4,500-foot contour; thence by switchback trail extending north-easterly for a distance of approximately 2.5 miles.

The claims are almost entirely underlain by rocks of the Bridge River series, referred to the Pennsylvanian-Permian. They have been staked so as to cover an irregularly-shaped

area of greenstone-basalt complex, comprising about 450 acres in extent, this formation being bordered by argillites and cherty quartzites, except in the north-east corner of the property, adjoining Fergusson Creek, where the greenstone is invaded by quartz diorite of the Bendor batholith. The latter formation is also exposed along the northern edge of the ground, where a narrow belt of the altered sediments lies between it and the greenstone. Rocks of the Bridge River series are complexly folded, local strikes in the greenstone-basalt area being easterly with northerly dips averaging 45 degrees.

The deposits occur in the vicinity of wide dioritic dykes which cut the greenstone as shown on the accompanying sketch. These dykes are poorly exposed and the relationship between the segments is not known. One vein cuts a syenite dyke 7 feet wide as shown at No. 3 location. The mineralization in this case, and in that of the vein developed by Nos. 4 and 5 open-cuts and the adit, consists of arsenopyrite and sphalerite with oxidized streaks and occasional pyrite, the gangue being composed of quartz containing sulphide casts or silicified wall-rock. Gold assays in these veins, as shown on the sketch, were up to 0.40 oz. per ton across narrow widths.



Description	Width	Oz. Gold	Oz. Silver	% Zinc	% Stibnite
No. 1	14′	Tr.	Tr.	–	Tr.
No. 2	Selected	Tr.	Tr.	–	8.0
No. 3	1.7′	0.18	1.2	1.3	–
No. 3	0.6′	0.34	1.0	0.8	
No. 4	4.8′	0.12	0.1	0.9	
No. 5 (Foot-wall streak)	0.7′	0.4	0.2	3.3	
No. 5 (Hanging-wall streak)	0.15′	0.38	Tr.		
Adit	Grab	0.3	Tr.	1.9	

Summit Gold Mining Syndicate. Plan of workings from pace and compass survey.

In the case of the shear-zone at Nos. 1 and 2 locations stibnite-streaks and finely-disseminated arsenopyrite are associated with chalcedonic quartz in sheared and chloritized greenstone, the showings being largely oxidized. Samples of such material gave traces in gold and silver, one of the samples containing 8 per cent. antimony.

The stakings date back a few years to the period of intense prospecting activity in the Bridge River Camp.

At the No. 1 location an open-cut exposes the shear-zone 14 feet wide striking north 60 degrees east and dipping 60 degrees south-easterly. The apparent extension of this mineralized shearing is poorly exposed at No. 2 location, where stibnite-streaks are associated with quartz in a pile of weathered material. Both locations are on the Cadwallader Creek slope, the latter being close to the summit. At No. 3 location, on the high ground overlooking the Fergusson Creek slope, a vein has been stripped for a length of 160 feet down the slope between 7,700 and 7,610 feet elevation. Well defined and consistently mineralized throughout over an average width of 1 foot, it strikes north 85 degrees east and dips 55 degrees northerly. The 7-foot syenite dyke cut by the vein near the lower end of the exposure contains fine disseminations of iron sulphides. The open-cuts at Nos. 5 and 4 locations and the drift-adit,

26 feet long, develop a vein, from 4 to 5 feet wide, which strikes north 80 degrees east and dips 65 degrees northerly.

In No. 4 open-cut it is made up of two 4-inch quartz-bands mineralized with arsenopyrite and sphalerite, on the foot-wall and hanging-wall respectively, which are separated by 44 inches of silicified greenstone containing sulphides lightly disseminated or in scattered streaks. In No. 5 cut, conditions from foot-wall to hanging-wall are: Quartz-band 8 inches wide mineralized with arsenopyrite and sphalerite; 44 inches of silicified, lightly mineralized, greenstone; and 2-inch oxidized streak. At the adit location the rocks are shattered and erosion has occurred in the plane of the vein. The foot-wall "pay-streak," largely oxidized, is in evidence at the portal and in the face, conditions in the section between being obscured by timbering. The assay shown on the sketch at the adit location represents a grab sample from a pile of about 2 tons of mineralized quartz.

Summarizing conditions, the vein at the No. 3 location is well defined, though narrow, and shows uniformly strong sulphide mineralization throughout the exposure, the ground being covered at both ends. The "adit vein" shows evidence of continuity in isolated outcrops in the talus along the strike to the west. Both veins lack stibnite, which is present in small amounts in the shear-zone.

SILVER-COPPER AND SILVER-COPPER-LEAD-ZINC DEPOSITS.

Pacific Great Eastern Railway.

Squamish Area.

McVicar-Manson. This property, in the Vancouver Mining Division, consists of twelve mineral claims and fractions held by location and owned by J. H. McVicar and J. G. Manson. The holdings are situated on the south-western side of Raffuse (Goat) Creek, approximately 6.5 miles south 63 degrees east from Squamish, the southerly terminus of the Pacific Great Eastern Railway. The claims cover part of the uneven ground forming the ridge between the Stawamus River and Raffuse Creek and extend along the steep upper slopes to the latter stream, which is a tributary of the Mamquam River. The area, in which elevations range from 2,800 feet to 4,750 feet above sea-level, is heavily timbered on the lower slopes, the higher ground being covered with irregular wooded patches separated by open, grassy spaces. Several small tributaries of Raffuse Creek intersect the claims.

Access is first by means of a logging-road which extends easterly for approximately 2 miles from Squamish to the Mamquam trail, which is then followed for about 2.5 miles along the southern side of the Mamquam River Valley to the Raffuse Creek branch trail. This last section, 5 miles in length, roughly estimated, follows the timbered slope along the south-western side of Raffuse Creek Valley to the cabin. The road, used for truck-haulage, reaches an elevation of about 130 feet above sea-level at its junction with the Mamquam trail, which is a fairly good pack-trail. The Raffuse Creek trail is poorly located, being steep, rough, and rocky, with some unnecessary adverse grades. From the camp, at 2,800 feet elevation, a steep switchback trail is followed for about 1.5 miles to the upper camp, or tent-site, at 4,315 feet elevation, which adjoins the principal group of original workings. The Merrill and Ring logging-railway (standard gauge) serves the Upper Mamquam River Valley, including the area opposite the outlet of Raffuse Creek.

The area has not yet been geologically mapped, but an opportunity to interpret the local formations is afforded through the proximity of Geological Survey of Canada Map 199-A, accompanying Memoir No. 158, "Britannia Beach Map-area," which extends to the head-waters of Indian River, less than 2 miles, roughly estimated, to the south of the property. The general formation underlying the claims and extending north-westerly over to Ray Creek consists of a wide belt of Mesozoic volcanics and sedimentaries, probably corresponding to the Goat Mountain formation of the Britannia group, tentatively referred to the Triassic.

The rocks are largely metamorphosed, the series being enclosed within the Coast Range batholith. Prominent bluffs and outcrops of granite and granodiorite are exposed adjoining Howe Sound at Squamish and at points along the road up to 2 miles or more easterly, and granodiorite is also exposed along the southern side of the Ray Creek Basin about 2 miles to the north-west of the property. Batholithic rocks, as mapped on the Britannia sheet to the south and south-west of the ground examined, include granodiorite and quartz diorite, a

large dyke of the latter rock being shown crossing the Indian River near its source. Locally rock-exposures are comparatively rare, but in outcrops and wherever surface work has been done the formation consists of greenstone, rusty-weathered and schistose in part, silicification generally being pronounced in the mineralized sections. The greenstone, probably originally a porphyritic volcanic rock, is highly metamorphosed and in specimens examined microscopically contains abundant disseminated sulphides with veinlets and irregular masses of secondary quartz. The ground-mass, too altered for definite determination, is largely feldspathic and contains much chloritic and sericitic material. " Ghosts " of original feldspar phenocrysts are discernible, these being plagioclase. Occasional narrow basic dykes cut the formation but do not appear to have any economic significance.

The deposits examined are exposed at numerous points within a zone of regional shearing up to 2,300 feet wide and over a length up to 3,000 feet, these being the limits of the writer's investigation.

Mineralization, largely of replacement type, conforms in general with the planes of shearing or schistosity which, with rare exceptions, strike north-westerly, dips being from vertical to steep north-easterly or occasionally steep south-westerly. The associated minerals are pyrite and chalcopyrite, which, in many places, are accompanied by varying amounts of sphalerite and galena, the gangue consisting of silicified greenstone. Silver values are low, the gold content being negligible, judging from the writer's samples. Pyrite and chalcopyrite mineralization is of widespread occurrence, frequently forming wide showings of fair to good copper content. Oxidation is local or shallow, being confined to occasional decomposed streaks or iron-stain. The mineralization, of irregular character, is generally associated with one or more fractures or planes of shearing, but definite structural boundaries, such as might influence major concentrations, have not yet been revealed by the exploratory work done, much of which is scattered.

Claims in the Raffuse Creek area were first staked by J. H. McVicar and J. Brown in 1923, and a limited amount of diamond-drilling, comprising all the holes referred to later in this report, was done on the *McVicar-Manson* ground by the Britannia Mining and Smelting Company, Limited, in 1925 and 1928, the option of this company subsequently having been dropped. Since that time work done by the owners has been confined to annual assessment requirements.

As no detailed plan is available, the respective positions of the workings will be approximately described in relation to the several claim boundaries. The claims and fractions are staked along the strike of the major shearing, the ground of chief interest, from south-east to north-west, being covered successively by the *Whistler*, *Grouse Fraction*, *Harding*, and *Rainstorm*, together with the *Violet* adjoining the *Rainstorm* to the south-west, the *Lily* adjoining the *Whistler* to the north-east, and the *Rose* adjoining the *Harding* to the north-east.

The earlier workings are at 4,300 feet elevation on top of the ridge on the *Whistler* claim adjoining the upper camp, or tent-site, which is located at a point approximately 550 feet from the western boundary and 200 feet from the northern boundary of this claim.

A compass survey of this group of trenches was made as follows: Chaining north 29 degrees west along a base-line from the first trench at point A, trenches B, C, D, and E are situated at points 23.5, 41.5, 54.5, and 65 feet distant respectively. These trenches extend approximately at right angles to the general trend of the mineralized zone. Chaining north 70 degrees east along A trench from zero at A, the first 6-foot section is largely covered with debris in which ribs of rusty, silicified greenstone are exposed. The next 5-foot section, adjoining the face, consists first of massive banded galena and sphalerite 1.25 feet wide, the balance consisting of scattered pyrite and chalcopyrite streaks and oxidized seams. A sample across the 5 feet assayed: Gold, 0.04 oz. per ton; silver, 1.5 oz. per ton; copper, 1 per cent.; lead, 5.6 per cent.; zinc, 6 per cent. Chaining north 77 degrees east along B trench from point B, mineralization, first encountered at 11.5 feet, extends to 21.75 feet, where there is a northerly-striking, approximately vertical shear. In this section, 10.25 feet wide, there is first a width of 3.5 feet of heavy sulphide mineralization which assayed: Gold, trace; silver, 2.5 oz. per ton; copper, 3.2 per cent.; lead, trace; zinc, 14.9 per cent. The remaining 6.75 feet consists of silicified, rusty greenstone containing scattered streaks of pyrite, chalcopyrite, and sphalerite with occasional specks of galena.

The next 21 feet, beyond the shear-wall, consists of silicified greenstone, iron-stained in part. The last 5-foot section, in which there are disseminated streaks of pyrite and chalcopyrite with masses of sphalerite, assayed: Gold, 0.01 oz. per ton; silver, 1.5 oz. per ton; copper, 1.7 per cent.; zinc, 39.9 per cent. Chaining north 70 degrees east along C trench from C, the first 10-foot section, partially exposed, consists of silicified, rusty greenstone. This is followed by a band, 2.1 feet wide, of massive sulphides consisting chiefly of galena and sphalerite which assayed: Gold, trace; silver, 1.7 oz. per ton; lead, 25.8 per cent.; zinc, 12 per cent. Chaining north 60 degrees east along D trench from D, there is first a 6-foot section which is oxidized and partially decomposed. At 6 feet from the initial point there is an irregularly-dipping, approximately-vertical, shear which strikes north 25 degrees west. A selected sample from a mineralized streak formed along this shear assayed: Gold, trace; silver, 1.5 oz. per ton; copper, 1.5 per cent.; lead, 3.9 per cent.; zinc, 4.5 per cent. Beyond the shear, the next 13-foot section consists of rusty, silicified greenstone containing sparsely-disseminated sulphides. Between this point and the face, a 6-foot section of irregularly-disseminated mineralization assayed: Gold, trace; silver, 1.4 oz. per ton; copper, 1.6 per cent.; zinc, 3.3 per cent.

E trench, 10 feet long to north 60 degrees east, is largely covered by debris, the face being in rusty, silicified greenstone with occasional oxidized decomposed streaks. Chaining south 10 degrees east for 23 feet from the eastern end of B trench, there is a small open-cut at F, elevation 4,320 feet, where a 7-foot width of mineralization is exposed on the south-western side of a vertical shear striking north 60 degrees west. Of this a 12-inch width of massive sulphides, immediately adjoining the shear-wall, assayed: Gold, 0.005 oz. per ton; silver, 8.8 oz. per ton; copper, 6.3 per cent.; lead, 69.5 per cent.; zinc, 1.6 per cent.; and the remaining 6 feet assayed: Gold, trace; silver, 2.8 oz. per ton; copper, *nil;* lead, 0.6 per cent.; zinc, 5 per cent. Chaining south 55 degrees east 22 feet from this open-cut, a long trench is intersected at point G, elevation 4,320 feet. From G this trench extends north 55 degrees east for 15.5 feet to H, then north 80 degrees east for 34 feet to J, and finally north 70 degrees east for 27 feet to K. The continuation of this trench extends south 55 degrees west for 20 feet from point G, which is the centre of a 4.75-foot width of vertical north-westerly-striking mineralization made up of massive streaks of galena and sphalerite, with scattered streaks of pyrite and chalcopyrite and oxidized decomposed seams. A sample across the width specified assayed: Gold, trace; silver, 3.5 oz. per ton; copper, 3.3 per cent.; lead, 14.5 per cent.; zinc, 14.4 per cent.

Another section of interest cut by the trench begins at a point 9 feet north 80 degrees east from H. This is the western side of a 12-foot width of irregular mineralization associated with northerly-striking, approximately-vertical fracturing. A sample taken across 12 feet on the southern side of the trench, where the mineralization is noticeably stronger than on the opposite side, assayed: Gold, trace; silver, 2.8 oz. per ton; copper, 4.9 per cent.; lead, 2.7 per cent.; zinc, 7.4 per cent. In other parts of the trench there is exposed rusty silicified greenstone which, in the most easterly course, is sparsely mineralized with scattered sulphides. Easterly from this trench the ground falls off steeply towards Raffuse Creek.

To test the downward and lateral continuity of the above-described group of trenches, three diamond-drill holes were put down in 1928, the boxed cores remaining on the ground. New showings, recently opened up by the owners, are situated on the *Lily* claim about 1,400 feet north-easterly from the previously-described trench-workings on the *Whistler* claim. In this new location at point L, elevation 4,220 feet, on the timbered ground sloping gently towards Raffuse Creek, a trench extends easterly for a length of 25 feet, crosscutting a mineralized zone associated with planes of shearing which strike north 25 degrees west with 70-degree north-easterly dips. This showing, irregularly mineralized with banded streaks, masses, and disseminations of pyrite and chalcopyrite, was sampled along the southern side of the trench in 5-foot sections, which, from east to west, assayed as follows:—

Gold.	Silver.	Copper.	Gold.	Silver.	Copper.
Oz. per Ton.	Oz. per Ton.	Per Cent.	Oz. per Ton.	Oz. per Ton.	Per Cent.
Trace	1.0	0.9	Trace	1.8	7.6
Trace	1.4	2.4	Trace	1.2	5.8
Trace	1.8	6.6			

On the northern side of the trench the sulphide content is noticeably lower and a sample taken across that side would probably reduce the average values. The total width of the exposure, at right angles to the strike, would be 22.5 feet, reducing each sampled section to 4.5 feet actual width. No work has been done to trace the continuity of this showing along the strike, but going north 25 degrees west, 26 feet from the trench, there is an outcrop, 6 by 4 feet, of silicified greenstone, rusty-weathered in part, containing scattered streaks of pyrite and chalcopyrite. Going south 25 degrees east for 35 feet from the trench, there is a small outcrop of similar silicified rock, no mineralization being apparent. It is to be noted, however, that in this vicinity, as at other points on the claims, the mineralized host-rock is capped with from a few inches to 1 foot or more of white, bleached rock, which, when broken into, generally reveals sulphide occurrences.

On a local bench, about 160 feet east of L trench and at 4,180 feet elevation, a trench extends easterly for 20 feet from point M. In the westerly 15-foot section of this trench the silicified greenstone is irregularly mineralized, chiefly with pyrite and chalcopyrite, some galena and sphalerite being present in places. A chip sample across this 15-foot section, which is associated with irregular fracturing apparently striking about north 20 degrees west with uncertain dip, assayed: Gold, trace; silver, 2 oz. per ton; copper, 5.2 per cent.; lead, 2.6 per cent.; zinc, 1.1 per cent. Chaining along the bench north 15 degrees west for 60 feet from point M, a trench extends easterly for 10 feet from point N. The silicified host-rock is similarly mineralized, but includes a band of massive galena, up to 4 inches wide, at a point 4 feet from the eastern end of the trench, which has not reached the limits of the mineralization in this direction. The western end, at point N, is bounded by a smooth wall striking north 20 degrees east with 85-degree south-easterly dip, shearing planes within the exposure being parallel. A chip sample across the 10 feet assayed: Gold, trace; silver, 1 oz. per ton; copper, 1 per cent.; lead, 11.1 per cent.; zinc, 1.3 per cent.; and a selected sample from the galena-streak gave: Gold, trace; silver, 3 oz. per ton; copper, *nil;* lead, 66.4 per cent.; zinc, 5 per cent.

Chaining along the narrowing bench north 11 degrees east for 39 feet from point N, a trench extends easterly for 10 feet from point O. Its western end is bounded by a smooth wall striking north 20 degrees east with 65-degree south-easterly dip. Conditions of mineralization here resemble those in N trench, there being a galena-streak near the centre of the showing. A chip sample across the 10 feet assayed: Gold, trace; silver, 1 oz. per ton; copper, 0.9 per cent.; lead, 1.6 per cent.; zinc, 5.9 per cent. Mineralization may extend beyond the eastern end where the rock is covered. Streaks and narrow bands of red jasper are associated with the silicification in this trench.

A point 10 feet north 20 degrees east of the eastern end of O trench marks the western extremity of a narrow, partly-oxidized outcrop 20 feet long, disseminated pyrite and chalcopyrite mineralization being present where the shallow, bleached capping has been lightly broken into.

At 4,165 feet elevation, 100 feet east of M trench and on the edge of the steep slope to Raffuse Creek, there is a small open-cut at P. Here there is exposed heavy pyrite mineralization, with light chalcopyrite, in silicified greenstone. A sample across this showing, 2.5 feet wide, which is associated with approximately vertical shearing striking north 30 degrees west, gave: Gold, trace; silver, 0.5 oz. per ton; copper, 1.1 per cent.

From P chaining north 30 degrees west for 55 feet a small excavation at Q has been made exposing a 4-foot width of rusty-weathered rock containing oxidized, decomposed streaks. Continuing along the same bearing for 25 feet from Q and at 4,170 feet elevation, there is a small outcrop mineralized with streaks and bands of pyrite with accompanying chalcopyrite. On the *Rose* claim, at 4,140 feet elevation and 600 feet (paced) along a north 25 degrees west bearing from Q, there is, at point R, an outcrop of white bleached rock, 10 feet long and up to 6 feet wide, which is well mineralized with chalcopyrite where it has been lightly broken into at both extremities. A sample across 2 feet at the southern end of this capping assayed: Gold, trace; silver, 4 oz. per ton; copper, 12.5 per cent. Continuity of this occurrence is indicated by closely-spaced outcrops, well mineralized with chalcopyrite in places, for an additional length of 90 feet going north 15 degrees west, which bearing appears to mark the strike, the dip being uncertain but apparently steep, approximating vertical. The "R" line of outcrops is along the edge of the bench where

the ground breaks away steeply towards Raffuse Creek. Discussing the above-described new discoveries on the *Lily* claim and their indicated extension on to the *Rose* claim, an excellent opportunity is afforded for systematic prospecting, the overburden being generally light.

The area in the vicinity of the convergence of the north-westerly and north-easterly shearing warrants intensive surface exploration, some continuity of the mineralization associated with the converging fractures being indicated. It is probable that much more mineralization could be exposed through closely-spaced trenching carried across the full width of mineralized occurrences.

Other showings examined are as follows: At 4,320 feet elevation on the *Grouse Fraction* claim and on the side-hill just above a local bench, south 10 degrees east 70 feet from the stake marking the centre of the southern boundary of the *Harding* claim, an open-cut at S exposed a patch, 8 by 10 feet, of oxidized, highly-silicified rock containing scattered disseminations of pyrite, chalcopyrite, galena, and sphalerite. This showing, the structure of which is uncertain, underlies in part a 2-foot dyke of fine-grained porphyritic rock which strikes easterly and dips southerly at 50 degrees. At 4,290 feet elevation, on the *Harding* claim 50 feet north-west of the same stake, a small cut exposes a 15-inch width of pyrite-chalcopyrite mineralization associated with a vertical shear striking north 25 degrees west. A sample across the width specified assayed: Gold, trace; silver, 2 oz. per ton; copper, 7.4 per cent. At 4,255 feet elevation, 60 feet north 25 degrees west from the last described location, there is a 2-foot width of sparsely-disseminated iron and copper sulphides, no definite shearing being exposed.

At 4,130 feet elevation, going north 25 degrees west for 225 feet (paced), similar sulphides are distributed in alternating narrow bands over a width up to 3.5 feet. This showing adjoins an apparent fault striking north 75 degrees west with 70-degree south-westerly dip. At 4,030 feet elevation, 125 feet north 25 degrees west from the last-described showing, there is an open-cut with a rock-face 8 feet wide and up to 11 feet high. The exposure here comprises two bands of mineralization, 2.5 and 3 feet wide respectively, separated by 2.5 feet of rusty-weathered rock. These bands are heavily sheared along a north 25 degrees west strike and vertical dip and contain alternating streaks of pyrite and oxidized material, jasper being present in small amounts in the siliceous gangue. A diamond-drill hole was put down under this showing. At 3,980 feet elevation, 60 feet away along the same north 25 degrees west bearing, there is an open-cut with a face 10 feet wide and up to 12 feet high. This showing, associated with indefinite, north-westerly-striking shearing with steep north-easterly dip, includes a 5-foot section on the hanging-wall side made up of pyrite in masses and closely-spaced banded streaks. In the floor on both sides of the cut there are small massive occurrences of pyrite and chalcopyrite. Selected chalcopyrite assayed: Gold, trace; silver, 3 oz. per ton; copper, 19.6 per cent. Two diamond-drill holes were put down under this open-cut.

At 3,900 feet elevation and 150 feet north 25 degrees west from the last-described location there is an open-cut which extends northerly for 32 feet. Of this the southerly 20-foot section, containing scattered streaks and disseminations of pyrite and chalcopyrite, is associated with shearing striking north 25 degrees west with 65- to 70-dgree south-westerly dip. At 3,875 feet elevation and 50 feet north-westerly from the last-described showing there is an open-cut extending north for 30 feet which also cuts diagonally across similar sparse mineralization, chiefly pyrite, associated with indefinite shearing striking north-westerly with steep south-westerly dip. At 3,850 feet elevation and 30 feet farther to the north-west generally similar conditions are exposed in an open-cut, where, however, there is some appreciable oxidation associated with streaks of pyrite. All the above-described showings on the *Harding* claim are on ground sloping from moderately to steeply to the north-west.

On the *Violet* claim, at a point on a line bisecting it from north-east to south-west and approximately 500 feet from the *Harding* boundary, stripping has been done, at 3,880 feet elevation, on the edge of the steep northerly slope. In this exposure, which trends north 80 degrees east for a length of 12 feet, no definite shearing is in evidence, but the strike of the banding of the silicification and accompanying sulphides is northerly with a 70-degree

westerly dip. A sample across the central 4.5-foot section, where the mineralization is comparatively concentrated, assayed: Gold, trace; silver, 2 oz. per ton; copper, 7 per cent.

At 3,885 feet elevation, and 25 feet to the west of the last-described stripping, sparsely-disseminated pyrite and chalcopyrite are exposed in an outcrop 10 feet long extending to north 80 degrees east, the mineralization being somewhat concentrated over the westerly 4.75 feet of the showing, which is apparently associated with shearing striking north 15 degrees west and dipping westerly at 70 degrees. The remaining portion of the exposure is composed of the usual bleached capping. At another point on the same claim, about 430 feet northerly from the last previously described location, and at 3,750 feet elevation, there is, in a small cut, a 12-inch width of mineralization adjoining an irregular wall striking about north 15 degrees west with steep westerly dip, a sample of which assayed: Gold, trace; silver, 1 oz. per ton; copper, 2.4 per cent.

In the north-westerly corner of the *Harding* claim, at 3,000 feet elevation, there are disseminations of pyrite and chalcopyrite over a width up to 8 feet. No structural boundaries are exposed, but the mineralization follows the usual northerly to north-westerly trend, diamond-drilling also having been done in this vicinity.

Another location, adjoining which two diamond-drill holes were put down, is known as the "iron showing," which is situated on the gentle northerly slope on the *Rainstorm* claim close to its southern boundary and adjoining the No. 1 post of the *Harding* claim. Here there is a 9-foot width of heavy mineralization, chiefly pyrite, which is associated with shearing striking north 20 degrees west with 70-degree easterly dip. A sample across the 9 feet assayed: Gold, trace; silver, 0.6 oz. per ton; copper, 1.6 per cent. In addition to those described, other showings are reported as being situated at scattered points on the various claims comprising the group.

Summarizing conditions, mineralization, more especially pyrite and chalcopyrite, has been found at numerous, frequently widely-separated, points in the greenstone, which, except for the narrow dykes previously mentioned, is the only rock-type seen during the writer's examination. A large amount of useful prospecting remains to be done, which, if successful in revealing important mineral concentrations, could be followed by underground work to test continuity at depth. This would be more conclusive than diamond-drilling in an area where deposits appear to be generally lenticular or irregular in outline. In this connection the new showings on the *Lily* and *Rose* claims afford interesting objectives for initial efforts.

Christina. This group of five claims, in the Vancouver Mining Division, is held by location and owned by Basil Zurbriggen. The claims adjoin the *Whistler* and *Heather* claims of the *McVicar-Manson* property to the south and south-east and are situated about 7.5 miles south 60 degrees east from Squamish.

The superficial workings examined are on the uneven ground forming part of the ridge between Indian River and Raffuse (Goat) Creek, and on the upper slopes overlooking the latter stream to the north-east. The area is covered by wooded patches separated by open, grassy spaces, elevations ranging from 4,500 to 4,800 feet above sea-level. The temporary camp, or tent-site, at 4,550 feet elevation, is reached by a short extension of the trail south-easterly from the upper camp of the *McVicar-Manson* group at 4,320 feet elevation. General means of access and transportation facilities have been described in the foregoing report on the latter property.

The formation in which the deposits are found, consisting of greenstone, schistose or sheared in part, and chloritic schist, is part of the same wide belt of Mesozoic rocks, probably members of the Goat Mountain formation of the Britannia group, tentatively assigned to the Triassic. These rocks are sheared along planes striking northerly with steep easterly dips. A thin section of the greenstone examined under the microscope was found to be a very fine-grained rock composed of chlorite, sericite, and indeterminable material, being too highly altered for definite determination. The specimen contained veinlets and irregular masses of quartz, disseminated sulphides being present in abundance. The workings expose mineralization of replacement-type, conforming in general to the shearing planes of the enclosing rocks, the associated minerals being pyrite, chalcopyrite, sphalerite, and, rarely, galena. Silicification is less in evidence than at the adjoining property.

The claims were staked in 1937 and the work done consists of a few trenches and open-cuts.

Commencing at the northerly end of the showings examined, there is, at 4,720 feet elevation, an open-cut in rusty-weathered greenstone containing scattered disseminations and streaks of pyrite adjoining a fracture striking north and dipping at 65 degrees to the east, the mineralization being distributed over a width of several feet on both sides of the fracture, though silicification of the rock is restricted to the western side of the exposure. At the same elevation and 200 feet southerly, on a small bench adjoining a pond, there is a trench extending east-west for a length of 20 feet. Similar rock here is silicified and mineralized with widely-separated streaks of mixed pyrite, chalcopyrite, sphalerite, and galena, the sulphides being somewhat more concentrated over the 6-foot central portion of the 20-foot showing. A selected sample of the better material assayed: Gold, 0.02 oz. per ton; silver, 6.2 oz. per ton; copper, 1.6 per cent.; lead, 11 per cent.; zinc, 16.5 per cent. In a bare outcrop just north of the trench no mineralization is in evidence. At 4,715 feet elevation, and 35 feet to the south of the trench, there is a small open-cut exposing similar silicified rock, schistose in part, containing widely-separated sulphide-streaks, chiefly composed of sphalerite. At 4,500 feet elevation, and 500 feet easterly from the 20-foot trench, there is a small open-cut exposing similar sparse mineralization in shattered, silicified greenstone, from which a grab sample of the better material assayed: Gold, trace; silver, 0.6 oz. per ton; copper, 0.2 per cent.; zinc, 4.2 per cent. Between the latter point and the 20-foot trench, quartzite, containing finely-disseminated specks of pyrite, is exposed in a shallow cut. At the time of the writer's examination in September, 1937, no mineral concentrations of importance had been indicated by the limited amount of prospecting done, the results, however, considered with the *McVivar-Manson* showings, demonstrating the widespread nature of the generally irregular mineralization.

Ray Creek. This group of eight claims, in the Vancouver Mining Division, is held by location in the name of J. H. Crane, of Vancouver. The property is situated approximately 4 miles south 80 degrees east from Squamish, the southern terminus of the Pacific Great Eastern Railway. The claims cover the basin at the head of Ray Creek and the adjacent ground sloping westerly towards the Stawamus River, of which Ray Creek is a small tributary with a steep gradient. Elevations range from 3,200 feet at the camp buildings to 4,020 feet at the uppermost showing examined in the basin, surrounding which the ground rises steeply to an elevation of about 4,500 feet. The area is well wooded, the larger trees, up to 4 feet in diameter, being chiefly larch and hemlock, with some yellow cedar at higher levels. Access is first by logging (truck) road for about 2.6 miles easterly from Squamish to a point adjacent to the city power plant on the Stawamus River; thence by steep pack-trail, approximately 2.5 miles long, to the camp. The workings in the upper part of the basin are reached by an extension of this trail about 1 mile in length.

The deposits occur in pale-green tuffaceous schist which is part of a wide belt of altered volcanics and sedimentaries which strike north-westerly, local dips being steep south-westerly. The area has not yet been mapped geologically, but from its proximity to Geological Survey of Canada Map No. 158, "Britannia Beach Map-area," it can reasonably be inferred that the local rocks are members of the Goat Mountain formation of the Britannia group, tentatively referred to the Triassic. The schists are intruded by granodiorite of the Coast Range batholith which outcrops along the south-western side of the Ray Creek Basin, apparently representing the north-eastern margin of the wide band of granitic rocks flanking the head of Howe Sound, as indicated by Camsell in Geological Survey, Canada, Publication No. 1711, "Diagram showing the geology along the route traversed by the Pacific Great Eastern Railway between Squamish and Lillooet, British Columbia." Microscopic examination of specimens of the host-rock, taken from several points, indicate that it is tuff, highly altered in part, being a fine-grained rock composed essentially of feldspar and quartz, both occurring in all variations from anhedral crystals to broken fragments. Feldspar, largely plagioclase, predominates and is quite altered. Fine sericite is common. The mineralized schists form a belt, up to 1,450 feet wide, roughly paralleling the granodiorite-contact and lying between it and sedimentary strata, including quartzites, slates, and conglomerates.

The schists are frequently impregnated with pyrite in zones of shearing which correspond in general to the bedding or schistosity of the rocks. The iron sulphide is accompanied in places by chalcopyrite and occasionally sphalerite. Of two polished sections prepared from selected mineralized specimens, one section consisted of massive pyrite, highly

shattered in places and veined and replaced by chalcopyrite. About 5 per cent. of the pyrite occurred surrounded by chalcopyrite, which was minus 200 mesh in size. The other section showed disseminated pyrite and chalcopyrite in a siliceous gangue, the former being present in greater abundance. In this case the two sulphides were not intimately associated, about 15 per cent. of the chalcopyrite present being minus 200 mesh in size. In the few selective samples taken by the writer, gold values were a trace, silver ranged from 1 to 5 oz. to the ton, and the copper content varied from 2.3 to 10.9 per cent. One assay included 2 per cent. zinc.

The ground was staked by O. W. Rafuse in 1924. The Radiant Copper Company, formed in 1928, was dissolved in 1932. An electrical (Radiore) survey was made in 1929 and the work done since has largely been directed towards testing the "conductors" indicated graphically on a plan and marked on the ground. The *McKinnon* group, adjoining the *Ray Creek* property to the west, was diamond-drilled in 1927, this area being off the strike of the deposits dealt with in this report.

The following description of conditions is based on the Radiore plan which was used to identify the various workings. Commencing at the north-westerly extremity of the ground examined, and at 3,465 feet elevation, a long northerly-extending trench exposed a wide pyritized zone in schist, the iron sulphide being highly concentrated over a width of 15 feet. Going north-westerly down the medium slope for approximately 100 feet to 3,450 feet elevation there is an adit 10 feet long extending south-easterly. This working is in heavily pyritized rock, up to 10 feet wide at the portal, chalcopyrite being in evidence at widely-separated points in the floor of the adit where the sulphides are intimately associated. At 3,560 feet elevation, 765 feet south 43 degrees 30 minutes east from the mineralized section of the long trench, and on the southern side of the bed of Ray Creek, there is a caved cut adjacent to the granodiorite-contact, the dump here including a pile of about 1 ton of quartzose material containing disseminated pyrite and chalcopyrite. A grab sample from this pile assayed: Gold, trace; silver, 4 oz. per ton; copper, 10.9 per cent. A point in the creek-bed, at 3,880 feet elevation, 1,060 feet north 60 degrees 30 minutes east from the caved cut, and 180 feet up-stream from a waterfall, marks the centre between two adjoining adits, situated on the northern and southern banks of the creek respectively.

The adits are 50 feet apart along the north 30 degrees west trend of the sheared rock, the dip being south-westerly at 70 degrees. The northern adit, driven 10 feet as a crosscut to north 60 degrees east, is just reaching solid rock. The southern adit is a drift to south 30 degrees east, said to be 20 feet long, the inner 10 feet being caved. In the accessible section the rock is pyritized and silicified in part, and a grab sample from a small pile of the better material derived from this working assayed: Gold, trace; silver, 5 oz. per ton; copper, 9.9 per cent.

In the basin, 380 feet along a bearing of south 27 degrees 30 minutes east from the last point adopted for descriptive purposes, and at 3,920 feet elevation, there is the collar of a vertical shaft which, lagged and half-full of water, is said to be 50 feet deep, 47 feet of which was through overburden. Rock on the dump, derived from the bottom of the shaft and containing finely-disseminated pyrite, is similar to the prevailing schist but more massive. Continuing along the basin, and at 3,935 feet elevation, 1,450 feet south 36 degrees 30 minutes east from the last-described point, there is located the collar of a vertical shaft, now full of water, but said to be 30 feet deep, of which the first 20 feet was through overburden. A selected sample of schist, containing abundant pyrite and lesser chalcopyrite, from the dump assayed: Gold, trace; silver, 1 oz. per ton; copper, 2.3 per cent.

This location is not far from bluffs of granodiorite which, 250 feet on a bearing of south 35 degrees east from the shaft-collar, is cut by a prominent and wide south-easterly-striking, approximately vertical fracture. At 3,940 feet elevation, and 30 feet north of the last-mentioned shaft location, there is the collar of an 18-foot vertical shaft, now full of water.

At 4,020 feet elevation, near the head of the basin, and adjoining Ray Creek near its source, or 1,675 feet measured along a bearing of south 70 degrees east from the 30-foot shaft-collar, there is a shallow caved cut. A selected sample of material derived from this cut, consisting of disseminated pyrite, chalcopyrite, and sphalerite in the schistose gangue, assayed: Gold, trace; silver, 2 oz. per ton; copper, 5.1 per cent.; zinc, 2 per cent.

A short distance easterly, up-stream from this cut, there appears to be a change of formation, judging from the evidence of boulders and shattered masses of coarse breccia.

Summarizing conditions, mineralization, chiefly consisting of pyrite with occasional chalcopyrite, has been found where the rock has been exposed at widely-separated points in an area up to 1,050 feet wide and over a length of 4,700 feet, this area being roughly parallel with the north-westerly trend of the granodiorite-contact. Much ground, covered with overburden, remains to be prospected.

Mainland Coast.

Pender Harbour-Sakinaw Lake Area.

Cambrian Chieftain.

This group, in the Vancouver Mining Division, consists of seven mineral claims held by location and owned by F. Klein and associates. The property is situated about 4 miles north-easterly from the head of Pender Harbour, which latter point is approximately 46 miles north-westerly from Vancouver. The showings, at about 3,200 feet elevation, are on flat to gently-sloping ground, forming the top of the ridge, and adjoin the general steep slope westerly to the "foot-hill" country which extends between Pender Harbour and Sakinaw Lake. The mountain-sides below the claims have been logged off and burned over, but the property includes a good stand of hemlock, white fir, cedar, and cypress. On the flat area back of, or easterly from, the claims there is a large aggregate acreage of shallow to moderately-deep lakes which are drained by Anderson and Chieftain Creeks. The former stream, which flows into Pender Harbour, carries a large volume of water during part of the year, presenting power possibilities since it falls over 2,400 feet to the low ground bordering the coast in a comparatively short distance. Chieftain Creek, which passes within 300 yards of the cabin and flows into Sakinaw Lake, is said to be torrential in the spring season.

Present means of access is by a trail which leads from Kleindale, at the head of Pender Harbour, over the low, irregular ground, dotted with granite knolls, for a distance of about 3 miles to the foot of the mountain. From this point a switchback trail extends up the steep ground for possibly half the way up to the cabin, the trail not having been completed. Pender Harbour is a port of call for boats of the Union Steamship Company, the current service being three times weekly. The "Harbour" is a narrow inlet with deep water for about 3 miles from its entrance. As yet there is no dock near the head of this inlet, but one is said to be planned, and a partially-constructed road extends from its proposed site to a connection with a completed section of the road being built along the coast, which will eventually connect Powell River and North Vancouver. An old skid-road, which could probably be converted into a truck-road without much expense, could be utilized and extended in planning improved transportation to the foot of the mountain below the *Cambrian Chieftain* group.

The deposits occur in a zone of alteration bordering a band of limestone which is part of an extensive belt of Mesozoic sedimentary and volcanic rocks included within the Coast Range batholith. A mass of great volume is indicated by the roof-pendant formation which locally strikes northerly with vertical or steep dips to the east. Along the route followed by the trail, granite extends north-easterly from Pender Harbour up to approximately the 1,500-foot contour and the intruded rocks rise to about 3,300 feet elevation. To what depth the latter may extend is not known, but judging from their areal extent and the presence of remnants of calcareous strata at 425 feet elevation on the *King Midas* prospect, adjoining Sakinaw Lake, they might bottom at or near sea-level. In the vicinity of the showings the limestone-band is some distance, probably from 1,500 to 2,000 feet, easterly from the granite body, being separated from it by a belt of silicified rocks, believed to be altered volcanics. There is a belt of greenstone, a mile wide or more, to the east of the limestone. The latter, including the altered zone bordering its western side, is apparently about 200 feet wide. It strikes from north 7 degrees east to north 10 degrees east and dips from vertical to steeply to the east. The full width of the altered and mineralized zone is not exposed, but in places it appears to be 100 feet wide or more. It has been definitely traced for a length of 1,100 feet and, judging from widely-separated outcrops, extends for an additional length of 2,000 feet or more.

In this zone there is a considerable development of epidote and garnetite, with, in places, much magnetite, and cutting it and the mineralization there are numerous dykes, mostly

narrow, which strike north-westerly with vertical or steep south-westerly dips. The dykes are all more or less altered, the narrow ones grading from andesite porphyry to greenstone. The 15-foot dyke, shown west of the cabin on the accompanying sketch, approaches porphyritic diorite in composition. A thin section of this rock, examined microscopically, consisted of a medium- to fine-grained feldspathic ground-mass composed largely of plagioclase laths and containing altered phenocrysts of plagioclase. Masses of chlorite, biotite, and epidote probably mark sites of original phenocrysts.

In the northern section of the workings, mineralization, of replacement type, chiefly consists of chalcopyrite in bands and lenticular masses, or streaks and disseminations, accompanied in places by pyrite and occasionally by minor amounts of sphalerite, the altered gangue including epidote and garnetite with little or no magnetite. A polished section of selected mineralization, examined under the microscope, was found to consist of chalcopyrite as relatively large irregular masses and veinlets in a siliceous gangue, a few grains of sphalerite occurring with the chalcopyrite.

Selected chalcopyrite assayed: Gold, 0.02 oz. per ton; silver, 10.4 oz. per ton; copper, 24.4 per cent.; and other samples indicate consistently fair silver values associated with the copper sulphide. Going towards the southern extremity of the exposures there are extensive areas of mineralization, including segregations of magnetite, separate zones of pyrite and sphalerite, and finally pyrite containing scattered or lightly-disseminated chalcopyrite. Oxidation is generally light or shallow, the primary minerals being exposed at most points where work has been done.

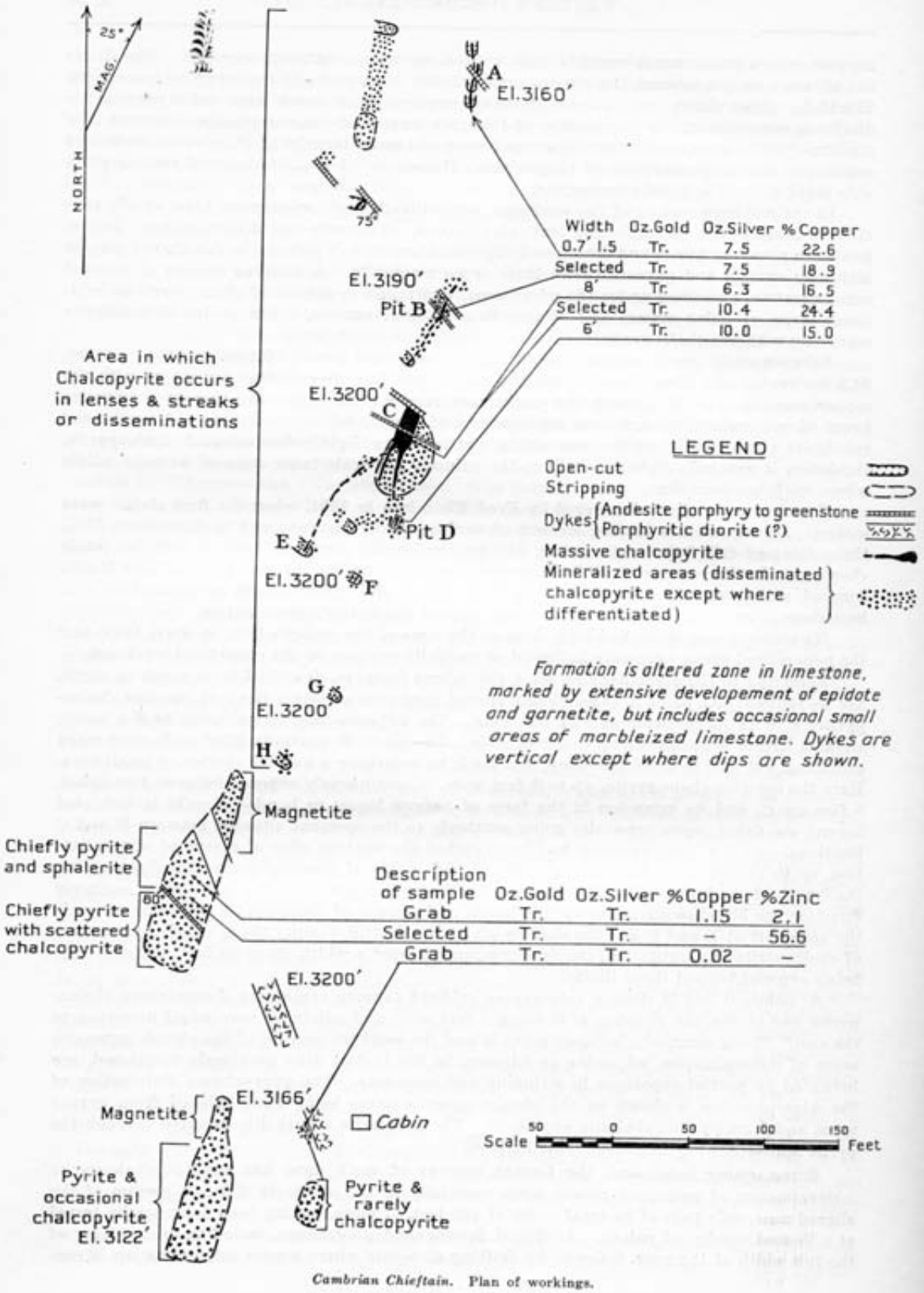
Copper ore was first discovered by Fred Klein late in 1934, when the first claims were staked. Subsequently a limited amount of surface work was done and in November, 1935, three diamond-drill holes, aggregating 140 feet in length, were put down to test the better showings. In the summer of 1937 the property was optioned by the Sheep Creek Gold Mines, Limited, and an aggregate amount of about 90 feet of underground work is reported to have been done at two points, this being since the time of the writer's examination.

No underground work had been done at the time of the writer's visit in May, 1937, and the mineralized areas were only indicated or partially exposed by the superficial workings.

Referring to the accompanying plan, the salient features, described from north to south, are as follows: At point A three closely-spaced open-cuts expose a band of massive chalcopyrite, 8 to 18 inches wide and 25 feet long. The adjacent cut, immediately to the north, shows a lens of chalcopyrite up to 2 feet wide. The pit at B, partially filled with snow when examined, but said to be 18 feet deep, was made by enlarging a natural crevice or small cave. Here the massive chalcopyrite, up to 3 feet wide, is continuously exposed between two dykes, 6 feet apart, and its extension in the form of narrow lenses or banded streaks is indicated beyond the dykes, more especially going southerly to the open-cut situated between B and C locations. At C a large open-cut had just reached the western edge of a zone of mineralization, up to 17 feet wide, including a width of 10.5 inches of practically massive chalcopyrite, the length of the latter being 21 feet going northerly to a dyke. In the opposite or southerly direction the big showing splits up into bands and streaks of chalcopyrite extending towards the open-cuts at E and F and the shallow pit at D. In this vicinity there is indicated a zone of chalcopyrite mineralization, chiefly disseminated, over a width up to 50 feet, the rocks not being exposed beyond these limits.

At points G and H shallow cuts expose oxidized capping containing disseminated chalcopyrite and pyrite, the showing at G being 3 feet wide and adjoining marbleized limestone to the east. Going southerly, between point H and the southern margin of the sketch, extensive areas of mineralization, adjoining or adjacent to the 15-foot dyke previously mentioned, are indicated by partial exposures in stripping and open-cuts. The approximate distribution of the mineralization is shown on the plan, magnetite areas being distinguished from pyritic zones and from pyrite-sphalerite exposures. The sphalerite occurs disseminated through the pyrite and separately in considerable masses.

Summarizing conditions, the limited amount of work done has exposed chalcopyrite mineralization at numerous points, more especially in the northerly 480-foot section of the altered zone, only part of its total width of 100 feet, or more, having been superficially tested at a limited number of points. An initial development programme, including crosscutting of the full width of the zone, followed by drifting at points where copper mineralization is con-



Cambrian Chieftain. Plan of workings.

centrated, would indicate the possibilities of this property. The property is well situated for cheap transportation, conditions being ideal for an aerial tram from the vicinity of the workings to the foot of the mountain. Construction of a road is under consideration to complete connection of the latter point with the proposed wharf-site on Pender Harbour.

King Midas. This group of eight claims, in the Vancouver Mining Division, is owned by W. Klein, D. Jeremiason, and associates. The property is within a quarter of a mile of the south-eastern side of Sakinaw Lake, apparently in the vicinity of Lot 4695, or about 48 miles north-westerly from Vancouver. The workings, at elevations of from 425 to 500 feet elevation, are just below the brow of a hill and at the top of the wooded ground sloping gently towards the lake. Access is from Kleindale, at the head of Pender Harbour, first westerly for 0.75 mile along the Government road, then by trail 1.75 miles in length.

Granite, grading into granodiorite, apparently underlies all or most of the area between Pender Harbour and the surface workings which develop mineralization along the irregular contact of the granitic formation with a zone of alteration in a calcareous remnant of roof-pendant rocks. The local trend of the contact is from north 65 degrees east to east. There is much overburden in the vicinity of the workings, which are closely spaced, and the general extent of the zone of alteration was not ascertained.

Where exposed it is composed largely of epidote, garnetite, and calcite, with scattered streaks and small masses of magnetite. In this matrix there are irregular, scattered streaks of chalcopyrite and pyrite, with occasional pockety occurrences of native copper in thin fern-like plates in cleavage-planes of the altered rock. The average copper content of the showings is evidently very light. Selected chalcopyrite assayed: Gold, 0.02 oz. per ton; silver, 11 oz. per ton; copper, 17.2 per cent. A polished section of specimen material, examined under the microscope, consisted largely of chalcopyrite containing fairly abundant hematite in the form of elongated radiating crystals. A few grains of magnetite and pyrite were also noted.

At 425 feet elevation, and just below the low bluffs forming the summit, the principal working is an open-cut extending 35 feet to south 30 degrees east, the depth at the face being 25 feet. This first crosscuts altered calcareous rock, silicified in part, for 18 feet, the inner 17-foot length being irregularly mineralized with scattered streaks of chalcopyrite, together with occasional light scales of native copper, in the gangue of contact metamorphic minerals previously specified, with, in addition, fairly abundant calcite.

The stratification of the original rock is obscure, but the mineralization is associated with closely-spaced, irregular fractures, which strike easterly and dip northerly at steep angles. A grab sample from a pile of a few tons of the better material assayed: Gold, trace; silver, trace; copper, 10.5 per cent. Selected mixed chalcopyrite and pyrite assayed: Gold, 0.02 oz. per ton; silver, 11 oz. per ton; copper, 17.2 per cent.; and rock containing native copper gave: Gold, trace; silver, trace; copper, 0.6 per cent. At 460 feet elevation two open-cuts, 50 and 60 feet easterly, respectively, from the face of the big cut, expose the contact-zone with mineralization of the same general character but more irregular and indefinite. At 500 feet elevation and 70 feet westerly from the face of the big cut there is an open-cut in altered granitic rock containing indefinite and widely-separated streaks and stringers of epidote and magnetite, chalcopyrite being rare. A selected sample from this location assayed: Gold, 0.02 oz. per ton; silver, 6 oz. per ton; copper, 16.8 per cent. Below the showings adjoining the granitic formation the rocks are covered with deep overburden on the gentle slope towards the lake.

CINNABAR DEPOSITS.

Bridge River Area.

Conardon Mercury Mines. The property of this syndicate, in the Lillooet Mining Division, is known as the *Lillomer* group and consists of five claims held by location, the owners being C. E. Cartwright and associates. The claims are situated on the north-eastern side of Pearson Creek, 3 miles north-westerly from the southern end of Tyaughton Lake. The workings, at elevations ranging from 6,900 to 7,100 feet, are situated on open ground above timber-line, the locally gentle, southerly slope being covered with grass and a scattered, shrub-like growth of small evergreens. They adjoin a shallow,

dry ravine trending southerly, slopes varying from 25 to 30 degrees in the vicinity of the workings becoming steeper at lower elevations.

The camp, in wooded ground at 6,200 feet elevation, is reached by pack-trail, 3 miles in length, which leaves the Tyaughton Lake Road at a point about half a mile south of the lake. From the camp a switchback trail on a good grade extends to the adit at 6,900 feet elevation. The section of the Tyaughton Lake Road giving access to the Pearson Creek Trail is about 4 miles in length. It branches off the Bridge River Road east of the Pearson Ponds at a point about 33.5 miles from Bridge River Station on the Pacific Great Eastern Railway.

The area is underlain by metamorphosed sediments and intercalated volcanic rocks of the Bridge River series, which are locally represented by quartzites, schists, and argillites, with greenstones occupying elongated, lenticular areas between the sedimentary strata. In the close vicinity of the principal workings rock-exposures are limited and much of the ground is covered by a heavy mantle of soil. The local strikes of the rocks average north 25 degrees west and dips are south-westerly, varying from 45 to 60 degrees in surface workings and 30 degrees at one point underground. The showings are confined to a lenticular body of greenstone, 120 feet long and up to 20 feet wide, which is underlain by quartzite and overlain by schist and argillite. Crystalline cinnabar, with occasional minute globules of native mercury, is chiefly associated with calcite, quartz and pyrite being present in places. There are no definite structural boundaries and the mineralization is irregularly distributed in streaks and patches impregnating sheared sections of the greenstone adjoining or adjacent to the underlying quartzite.

Float containing cinnabar is stated to have been found in the vicinity about sixteen years ago and claims were subsequently located. In this connection references to the property, when it was known as the *Marion* group, are contained in the Annual Report of the Minister of Mines, British Columbia, for the years 1927, 1928, and 1929. Most of the work has been done since 1929, the adit having been started in that year by the Lillooet Mercury Mining Company under the direction of C. E. Cartwright. In the same year a considerable amount of material, including tiles, for a retorting plant was packed in but not assembled. The Conardon Mercury Mines Syndicate was formed in 1936.

Ten open-cuts have been made to explore the greenstone body previously specified, most of these being distributed along its eastern contact. Of the latter series, Nos. 1, 2, and 3 open-cuts at elevations of 6,959, 6,955, and 6,952 feet, enclosed within a length of 30 feet adjoining the northern end of the greenstone, do not show any mineralization. No. 1 cut is immediately north of the "apex" of the greenstone and is in schist and quartzite. No. 2 cut, 10 feet south 14 degrees east from No. 1 cut, exposes the greenstone-quartzite contact, and No. 3, 30 feet south 25 degrees east from No. 1 cut, is entirely in quartzite, being slightly east of the contact. No. 4 cut, 38 feet south 14 degrees east from No. 1 cut, and at 6,944 feet elevation, has just reached the contact, and exposes an indefinite patch of cinnabar mineralization in sheared greenstone. A point 40 feet south 25 degrees east from the No. 4 cut marks the northern end of a wide excavation, at 6,924 feet elevation, which has been made in greenstone, adjoining the contact, for a length of 40 feet, its face being up to 18 feet high at the northern end. In this working, obscured in places by debris, erratic mineralization, which extends throughout its length along the quartzite contact, and across widths of from 5 to 10 feet, is more pronounced towards the northern end, where the sheared greenstone contains high-grade streaks and patches of cinnabar and accompanying native mercury. A sample from a pile of about 300 lb. of sorted material contained 12.3 per cent. mercury. The greenstone tapers off to its southern "apex" just south of the large excavation. The quartzite forming the foot-wall of the greenstone in the above working strikes north 25 degrees west and dips 45 degrees south-westerly. The main course of the adit below is entirely within this quartzite, no allowance having been made for the dip of the formation. The portal, at 6,900 feet elevation, is 73 feet south 4 degrees east from the strong mineralization in the north-eastern corner of the big cut. The main course of the adit extends north 10 degrees west for 92 feet. At a point 70 feet in from the portal there is a crosscut, driven north-easterly for 10 feet, from which a vertical raise has been put up to a height of 18 feet above the floor-level. Both crosscut and raise are in quartzite. At a point 80 feet in from the portal there is an inclined raise driven 26 feet to south 82 degrees west which intersects the quartzite-greenstone contact at 23 feet from the main adit, the greenstone having been

penetrated for 3 feet. The contact dips 30 degrees westerly and the greenstone in the face was mostly massive, but included a small area of sheared rock with which light cinnabar mineralization was associated, some minute globules of native mercury also being present. A selected sample of this material contained 0.2 per cent. mercury. Branching off north-westerly from the raise at the main adit intersection, a crosscut had been driven north-westerly for 10 feet and had not reached the greenstone.

In addition to the above described workings, ten widely-separated open-cuts have been made to prospect the formation, greenstone being exposed in some cases. The prospecting done, chiefly at points where the overburden is not deep, indicates that the greenstone areas are intercalated between the sedimentary rocks as lenticular areas or narrow bands. The discoveries made were, at the time of the writer's visit, restricted to the one greenstone body specified, and in this case the host-rock had only been penetrated for a few feet at one point underground. In this latter connection the light mineralization exposed is a little northerly from a point under the comparatively strong surface showing in the big cut, so that drifting along the contact southerly will be necessary to test its downward continuation.

SPECIAL REPORTS.

Typewritten copies at 25 cents each are available to those who specially request reports on the following properties:—

Bridge River Area: Gold Ridge; United Exploration Co., Ltd.; Bridge River United Mines, Ltd.
Taseko Lake Area: Chilco Exploration Co.
Siwash Creek Area (near Yale): British Gold Mining Syndicate; Golden Eagle; Coronation; Jubilee.
Cowichan Lake Area: Crown; Alpha Beta Group; Viking.
Nanaimo River Area: Silver Leaf.

PROGRESS NOTES.

LODE-GOLD DEPOSITS.

By B. T. O'Grady, James Strang, and Thos. R. Jackson.

Bridge River Camp.

Pioneer Gold Mines of B.C., Ltd.[3]—H. T. James, managing director; E. F. Emmons, general superintendent; Paul Shultz, mill superintendent. This mine is operated by three shafts known as Nos. 1, 2, and 3. No. 1 shaft is down to the ninth level; No. 3 to the fourteenth level; and No. 2 to the twenty-sixth level at a total depth of 3,250 feet.

During 1937, 20,600 feet of drifting, crosscutting, and raising was done. Second exits from the twenty-sixth level to the upper parts of the mine were completed and this improved the ventilation and reduced the temperature formerly prevailing in the lower levels. Water sprays are in use to reduce the production of dust. One hundred and forty-seven thousand eight hundred and seventy-six tons of ore was mined, which produced 61,335 oz. gold and 11,657 oz. silver. An average of 242 men were employed throughout the year.

Bralorne Mines, Ltd.[3]—Richard Bosustow, general manager; D. Mathieson, general superintendent; E. J. Chenowith, mine manager; J. F. Almstrom, mill superintendent. This mine operated throughout the year and produced 170,686 tons of ore, which yielded 83,081 oz. gold and 26,026 oz. silver. Three hundred and sixty-four men were employed.

Drifting, crosscutting, and raising with a total footage of 16,434 feet was completed, and the *Crown* shaft had been sunk to the 1,400 level at the end of the year. This is a 3-compartment shaft and is equipped with a double-drum Ingersoll-Rand electric hoist. Extensive development from this shaft is anticipated.

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(1) By B. T. O'Grady. (2) By James Strang. (3) By Thos. R. Jackson.

Definite progress was made during the year in augmenting and controlling the ventilation throughout the mine, and this is now maintained by positive means. Every effort is also made to reduce and control the production of dust by means of this increased ventilation, water sprays, and the elimination of blasting during the shift.

A new 2,000-cubic-foot electric-driven compressor was added to the power plant. During the year thirty new houses were built, making a total of 100 modern homes for the employees of Bralorne Mines. The townsite where this building was completed is about half a mile from the mine.

B.R.X. (1935) Consolidated Mines, Ltd.[3]—Ernest R. Shepherd, general manager; John Wallis, mine superintendent. During the year No. 2 shaft was started and sunk to a depth of 540 feet. This shaft is of three compartments with stations cut at 125-foot intervals. From the 500 station a crosscut was driven 257 feet, from which point drifting was carried on for 624 feet to the north and 550 feet to the south.

At the end of the year preparations were being made for the construction of a 100-ton-capacity mill. During the year this mine changed over entirely to electrical power wherever possible. Five hundred and forty feet of sinking, 142 feet of raising, 493 feet of crosscutting, and 1,262 feet of drifting were completed. Twenty-six men were employed.

Minto Gold Mines, Ltd.[3]—William Davidson, general manager; B. C. Campbell, superintendent. This mine operated until December 19th, when work was suspended. Sixty men were employed, and during the year 32,556 tons of ore was mined and milled. This produced 4,352 oz. gold and 12,867 oz. silver.

During the year 972 feet of drifting, 1,267 feet of crosscutting, 54 feet of raising, and 340 feet of sinking was completed.

Lucky Strike Gold Mines, Ltd.[1]—At this property, situated in Taylor Basin, crosscutting and drifting were continued in the lower adit (refer to Annual Report of Minister of Mines, 1936, page F 13 *et seq.*), a crew of three being employed, when the property was visited in July, 1937. A new upper working, known as the Coronation adit, was being driven at shallow depth below the outcrop.

At the following mines in the Bridge River area some intermittent work was done during the year: Pilot Gold Mines, Limited; Golden Ledge Syndicate, Limited; Mix Gold Mines, Limited; Gold Hill Mining Co., Limited; Holland Gold Mines, Limited; Congress Gold Mines, Limited. There were fifty men employed at above mines. No work was done at the Kelvin Gold Mines, Limited; Olympic Gold Mines, Limited; or Reliance Gold Mines. The Pacific Eastern Gold, Limited, mine was abandoned during the year.

In the Kelly Lake District the Grange Consolidated Mines, Limited, did intermittent work with a small crew during the year.

Squamish Area.[2]

Ashloo Gold Mines, Ltd.—This property is situated about 28 miles by road and trail from Squamish, on the Ashlu River. The mine worked steadily from May until the end of the year with around twelve to fifteen men underground and around twelve men in the mill and surface plant; 492 feet of drifting, 252 feet of crosscutting, 278 feet of raising, and 117 feet of sinking was done. Over 6,000 tons of ore was produced from stoping and development-work. The concentrates from the mill were shipped out by pack-horses to Squamish River and from there by truck to Squamish. The returns from the concentrates were 2,197 oz. gold, 2,209 oz. silver, and 18,932 lb. copper.

Chilcotin District.[1]

Morris.—At this property, situated 3 miles south-east of the southern end of Tatlayoko Lake, underground work was continued with a crew of five men; E. Penno being foreman and J. A. Wheeler manager. Since the property was described in the Annual Report of the Minister of Mines for 1935 the upper adit has been advanced, 337 feet of additional drifting having been done to the middle of July, 1937.

Langara, Standard, Argo.—At these groups, situated on the South Fork of Feeney (Ottarasko) River, 8.5 miles north-westerly from the southern end of Tatlayoko Lake, prospecting with a small crew it is reported to have been continued by J. I. Feeney.

(1) By B. T. O'Grady. (2) By James Strang. (3) By Thos. R. Jackson.

Vick.—At this property, adjoining the Lower Taseko River to the west near the northern end of Taseko Lake, activity was limited to surface exploration with a small crew in the autumn of 1937; C. M. Vick, the owner, being in charge. Since the property was described in the Report of the Minister of Mines for 1935 the two adits have been advanced, the lower one now being 370 feet long and the upper one 126 feet in length, most of the work consisting of drifting.

Taylor-Windfall.—Underground work is reported to have been continued throughout the open season, Sid Davis being in charge. A new lower adit was being driven to drain the shaft-workings and test the deposits at further depth. (*See* Annual Report, Minister of Mines, 1935, page F 17 *et seq.*)

Ashcroft-Kamloops Area.[3]

Vidette Gold Mines, Ltd.—Douglas B. Sterrett, general manager; Richard Avison, mine manager. This mine operated until November 17th, when work was suspended until January 1st, 1938, when prospecting and development-work was resumed.

During the year 11,016 tons of ore was milled and this produced 5,356 oz. gold and 7,837 oz. silver. An average of ninety men were employed. During the year 2,456 feet of drifting, 942 feet of crosscutting, 1,219 feet of raising, 29 feet of sinking, and 7,239 feet of diamond-drilling was done.

At Hamilton Creek Gold Mines, Limited (N.P.L.), and Savona Gold Mines, Limited (N.P.L.), some intermittent work was done during the year. No work was done at the Martel Gold Mines, Limited (N.P.L.), or the Telluric Gold Mines, Limited (N.P.L.).

Coquihalla Area.*

Home Gold Mines, Ltd.—F. Moore, manager. This is a small gold-mining operation in the Coquihalla area 7 miles west of Jessica and at 3,800 feet elevation. There are four adits, but during the year the only work done was the intermittent operation from No. 4 adit at an elevation of 3,800 feet, where some stoping was done and a connection made to No. 3. There is a small mill at No. 4 portal, and power for same is provided by a gasoline-engine and a Pelton wheel supplies power for a small compressor.

Kettle Valley Gold Mine.—Some intermittent work was done during the year at this property, formerly known as the Dawson Mine, situated near Verona, on the Kettle Valley Railway.

Texada Island.

Gem Gold Mines.[2]—This mine only worked the earlier part of the year. Some drifting and crosscutting was done on the 150-foot level; a small mill was erected but never operated.

PLACER-GOLD DEPOSITS.

Lillooet Area.[3]

B.C. Gold Dredgers, Ltd.—This is an under-water operation on the Fraser River at Lytton. The gravel is raised from the river-bed by means of a clam-shell type dredge, divers being employed to supervise this work when necessary. Twenty men were employed.

Fraser River High Bar Placers.—This operation is on the west side of the Fraser River at Kelly Lake near Clinton. This property started operations towards the end of the year with twenty-five men employed.

At the Northwest Mining and Development Company, Limited (N.P.L.), and the Nesikep Placers, Limited, Lillooet, general conditions were satisfactory.

COPPER DEPOSITS.

Howe Sound Area.[2]

Britannia Mining and Smelting Co.—C. P. Browning, general manager; C. V. Brennan, assistant general manager; and Chris G. Dobson, mine superintendent. The price of export refinery copper varied greatly throughout the year. Opening the year at 11.650 cents per pound, rising to 17.15 cents on March 15th, it steadily dropped to the year's low at 9.325 cents in November and closed the year at 9.725 cents.

(1) By R. T. O'Grady. (2) By James Strang. (3) By Thos. R. Jackson.

* By J. G. Biggs.

Following the company's usual policy towards its employees, copper bonuses were passed on to the workmen as the price of export refinery copper rose. In the spring three increases in pay of 25 cents each were given to all employees as copper went up, but were taken off again in the late fall as copper went down below 10 cents per pound. Wages at the end of the year were the same as at the beginning of the year. There were 774 men on the mine pay-roll at the end of the year, compared with 708 at the end of the last year. The total number of men in the entire plant was over 1,000.

The mine production in March was brought up to 6,000 tons per day and held at this figure throughout the rest of the year. During the year 2,149,820 tons were mined and 2,116,075 tons were milled, from which 32,400,253 lb. copper, 12,018 oz. gold, and 147,953 oz. silver were produced. The production of pyrite amounted to 85,715 tons. A great deal of development-work was done during the year and with very good results.

In the *Fairview* section the No. 5 ore-body was discovered and in a general way blocked out by 2,849 feet of drifting, crosscutting, and raising. This is a zone of low-grade copper mineralization with higher gold values than has heretofore been found.

In the lower *Bluff* section long diamond-drill holes have indicated a new body of copper ore which will be further developed in 1938. In the 4,100 tunnel a narrow stringer, on or close to the contact between the *Bluff* green-mottled schist and the foot-wall sedimentaries, was found to carry values in gold in association with chalcopyrite, sphalerite, selenite, and at times chert.

The 4,100 tunnel was advanced 2,018 feet to a point 13,592 feet from the portal. The new raise system and its associated work connecting the extension of the 4,100 level with the 3,500 and 2,700 levels in the vicinity of No. 4 shaft was commenced in June. When completed this will eliminate a great part of the 2,700 level haulage and will also mean a continuous ventilation system from the 4,100 level clear through to the upper workings.

The amount of ore drawn was increased from all sections except the *East Bluff*.

Three new sections were developed in the *Fairview*, and in the *Bluff* most of the ore was drawn from the west end of the 2,400, 2,300, and 2,200 levels. At the *Victoria* mine the shaft was sunk to the 3,500 level and the "C" ore-body developed for approximately 467 feet. On the 3,350 level the "G" ore-body was developed for 283 feet along the strike. It is understood that the company intends to sink further early in 1938. Most of the ore was broken in the "C" ore-body. Mining methods in the *Victoria* are similar to those of recent years, the square set and rill methods being used and tightly filled with glacial material. This produces a safe method of working and gives good ventilation in all the working-places. The precipitation plant was operated as usual, the only change being the addition of a launder-type flume that will use scrap rails, iron plate, etc., in place of tin cans used in other tanks.

Development-work.—Drifts, crosscuts, raises, and winzes completed during 1937 amounted to 4.52 miles, being made up of 10,012 feet of drifts, 4,136 feet of crosscuts, 7,094 feet of raising, and 2,556 feet of powder-blast workings, and 61 feet of sinking in the *Victoria* shaft. The new No. 5 shaft was raised 623 feet and has greatly improved the service to the *Fairview* and No. 5 mine on all levels between the 1,000 and 500. Diamond-drilling at various places from the surface to the 4,100 level amounted to almost 25,000 feet.

Improvements have been carried out in surface buildings. The Incline Camp was opened during the year and was entirely reconditioned. The Savoy was completed, making, with the Rita Carlton, two new living-quarters at the Beach, which have all the conveniences of a first-rate hotel. A new modern dining-room and kitchen were built at the Beach.

For the comfort of people travelling to and from the townsite a new stream-lined, all-steel car, the "Mount Shear," has been placed on the narrow-gauge railway from the top of the incline to the townsite.

Due to the increase of employees in the mining industry, it has been necessary for the Britannia Mining Company to train a large number of "green" men for underground work. Bi-weekly safety meetings have been held at various underground lunch-rooms and methods of improving working conditions and safer methods frankly discussed by officials and workmen. There is no doubt this has resulted in much good.

NICKEL DEPOSITS.[2]

B.C. Nickel Mines, Ltd.—The property of this company is situated near Choate and is under the supervision of C. B. North. During the first six months of the year the development-work consisted of raising 177 feet, crosscutting 83 feet, drifting 17 feet, and station-cutting 2,000 feet. All the crosscutting and drift-work served to open up a known ore-body —the Pride of Emory.

During May and June about 3,500 tons of average-grade ore was produced to supply prospective nickel-concentrate buyers with a sample of the product. To get this ore a certain amount of chute raises and stope entrances were made, thus leaving the mine in good condition for future mining. During the rest of the year all underground work was discontinued and a skeleton crew maintained to keep the buildings, plant, and road in condition until such time as a decision is come to for the erection of a mill. When working to capacity the total number of men employed was around twenty-five.

CINNABAR DEPOSITS.[3]

Manitou Mining Co., Ltd.—Clifford P. Reil, general manager. This property is located at the confluence of Mud and Relay Creeks and is about 17 miles from Minto. Much work has been done by open-cuts and over 2,000 feet of underground prospecting, to determine the tonnage of cinnabar available. Twenty-five men were employed during the year.

QUARRIES, SHALE, AND CLAY PRODUCTS.

BY

JAMES STRANG.

BURRARD INLET.

Coast Quarries, Ltd.—Conditions at Granite Falls quarry were generally found to be good, the number of men being about ten when fully employed. The stone from this quarry is used in general construction work.

NORTH VANCOUVER AREA.

Deeks Sand and Gravel, Ltd.—T. O. Burgess, superintendent. Condition of machinery, fencing, and other equipment was found to be generally in fair condition. Work was steadier throughout the year and several necessary repairs were made to the plant. Six men were employed.

Cascade Sand and Gravel Quarry.—W. A. McCullum, superintendent. Conditions at this plant were fairly good. About ten men were employed throughout the year.

B.C. Sand and Gravel Quarry.—K. Morrison, superintendent. This plant worked only occasionally throughout the year, employing about six men. The plant is kept in fairly good condition.

FRASER RIVER DELTA AREA.

Clayburn Co., Ltd.—This company's plant is situated at Kilgard, about 50 miles east of Vancouver. Fireclay, firebrick, and various refractory forms, as well as common brick and sewer-pipe, are produced. The fireclay is obtained from deposits near Kilgard; these are worked by underground-mining methods similar to coal-mining. The roads are well-timbered and ventilation is good. A shale-quarry is also operated in conjunction with the fireclay mines. A total of around seventy men are employed; about ten of these are in the mines.

Gilley Bros.' Quarry.—Situated at Silver Valley, Pitt River. The stone from this quarry is used for general construction-work. About twenty men are employed here. The plant is kept in good condition.

Maryhill Sand and Gravel Quarry.—Operated by Gilley Bros., Limited, and situated on the banks of the Fraser River. A power-shovel and conveyor-belt is used in the gravel-pit and the screening and crushing plant is operated electrically. About sixteen men are employed fairly regularly throughout the year. The entire plant is kept in very good condition.

(1) By B. T. O'Grady. (2) By James Strang. (3) By Thos. R. Jackson.

Nelson Island.

Vancouver Granite Co.—The company operates a dimension-stone quarry on Nelson Island. The plant is kept in good condition.

Texada Island.

Pacific Lime Co.—This company operates a large limestone deposit at Blubber Bay, producing quicklime, hydrated lime, and various limestone products. The quarry and plant operated throughout the year, with the exception of a brief stoppage due to a strike for higher wages. An agreement was soon reached and work was resumed. The plant and quarry are kept in good condition. Thirty men are employed in the quarry and about thirty-five in the plant. O. Peele is works manager.

B.C. Cement Co.—This company operates a limestone quarry on the opposite shore of Blubber Bay from the Pacific Lime Company. The limestone passes through a crusher plant and is conveyed along a belt-conveyor to scows, where it is shipped to the cement plant at Bamberton. Around seven men were employed. Robert Hamilton is in charge.

Van Anda Quarry.—A limestone-quarry operated by F. J. Beale supplies limestone to various pulp-mills and crushed limestone to the coal mines on Vancouver Island. From eighteen to twenty men are reguarly employed. Conditions were generally found to be good.

Saanich Inlet, Vancouver Island.

B.C. Cement Co.—Operating two quarries and a cement plant at Bamberton. Around twenty men are employed in the quarry and 105 men in the whole plant. A very fine new building of cement and steel has been erected as new living-quarters for single men. This company and its employees take a great deal of pride in carrying out all safety requirements and have held the Portland Cement Association cup for freedom from accidents for two years.

Fitzhugh Sound, Mainland Coast.

*Koeye River Quarry.**—P. Christenson, operator. The quarry is situated on Koeye River, about half a mile from its mouth and is about 7 miles south of Namu.

A second quarry was opened during the year and the tonnage of limestone considerably increased. Tonnage produced, 12,000 tons, all of which was shipped to Pacific Mills, Ocean Falls. Twelve men were employed.

Gabriola Island.†

Gabriola Shale Products, Ltd., Gabriola Island.—Charles T. deLong, manager. The plant at this property includes the following: Boiler, crusher, press, kilns, and driers. The method of working is by a series of benches, all blasting being done by electric battery and cable. A good quality of brick is turned out at the plant, Vancouver being the principal market for this product. Operations were carried on for a period of five months only during the year with a crew of twenty-four men.

Comox Area, Vancouver Island.†

Public Works Gravel-pit, Courtenay.—This gravel-pit is situated about 4 miles from Cumberland adjacent to the road to Courtenay. The material is used principally for road construction and repairs throughout the Courtenay District. This deposit is quite extensive and the sloping face extends for a distance of from 75 to 100 feet from the floor of the pit to the top of the bench.

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* By Charles Graham. † By John MacDonald.

INDEX.

ILLUSTRATIONS.

VICTORIA, B.C.:
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1938.

3,325-338-3170

The Annual Report of the Minister of Mines is now issued in parts as follows:—

Part A.—The Mining Industry (Statistical Review). John F. Walker.

Part B.—North-western Mineral Survey District (No. 1). Joseph T. Mandy.

Part C.—North-eastern Mineral Survey District (No. 2). Douglas Lay.

Part D.—Southern and Central Mineral Survey Districts (Nos. 3 and 4). M. S. Hedley.

Part E.—Eastern Mineral Survey District (No. 5). H. Sargent.

Part F.—Western Mineral Survey District (No. 6). B. T. O'Grady.

Part G.—Inspection of Mines. James Dickson.

PART E

ANNUAL REPORT

OF THE

MINISTER OF MINES

OF THE PROVINCE OF

BRITISH COLUMBIA

FOR THE

YEAR ENDED 31ST DECEMBER

1937

PRINTED BY
AUTHORITY OF THE LEGISLATIVE ASSEMBLY.

VICTORIA, B.C.:
Printed by CHARLES F. BANFIELD, Printer to the King's Most Excellent Majesty.
1938.

BRITISH COLUMBIA DEPARTMENT OF MINES.

VICTORIA, B.C.

Hon. W. J. ASSELSTINE, *Minister.*

JOHN F. WALKER, *Deputy Minister.*

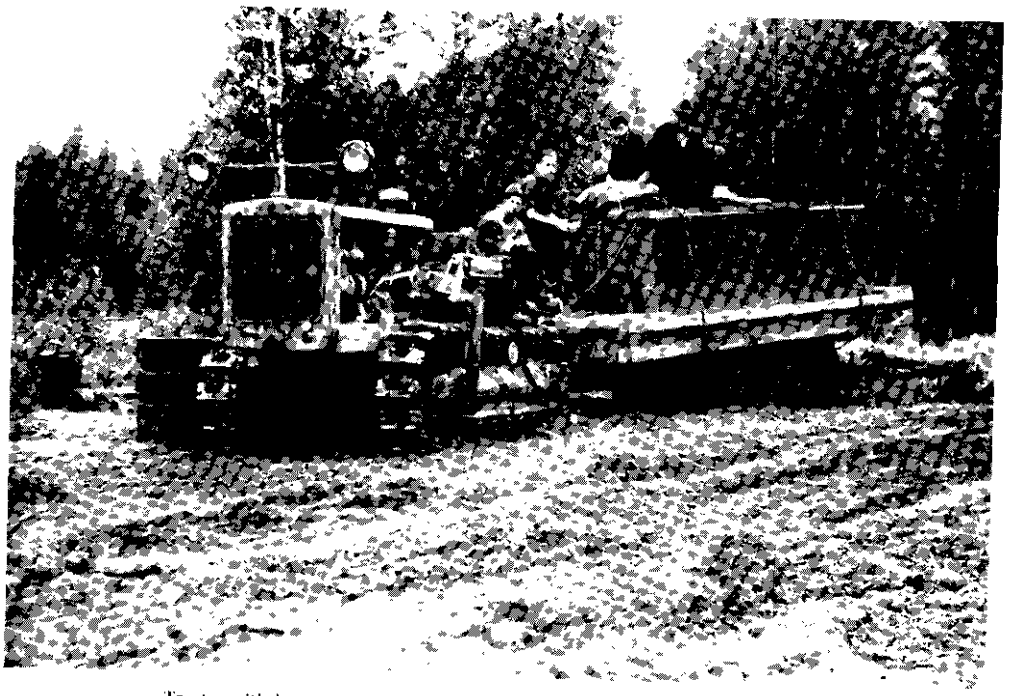
JAMES DICKSON, *Chief Inspector of Mines.*

D. E. WHITTAKER, *Provincial Assayer and Analyst.*

P. B. FREELAND, *Chief Mining Engineer.*

R. J. STEENSON, *Chief Gold Commissioner.*

Mining at the surface, above No. 5 level, Bayonne Mine.



Tractor with bummer and fuel-oil tank, used hauling oil to the Bayonne Mine.

Looking south-westerly from upland area near Silver Bell prospect, north of Revelstoke.

Powershovel, loading-pocket, and truck, Inca Placer Pit, Palmer Bar Creek.

PART E.

EASTERN MINERAL SURVEY DISTRICT (No. 5).

BY

H. SARGENT.

SUMMARY.

The marked increase in base-metal prices early in 1937 was followed by increased activity in a number of camps. Though by the end of the year base-metal prices had declined well below the January levels, production of silver, lead, and zinc showed substantial increases compared with 1936. The increased production came largely from the *Sullivan* mine, but there were also considerable increases in production from the Slocan-Ainsworth area, and some production from the Lardeau Mining Division. In these areas a number of properties were reopened and development-work was carried out in addition to the production activity. Several of the properties shut down on the approach of winter, influenced in part by the decline in base-metal prices. Crude ore was shipped in some volume from the Slocan-Ainsworth area, and a little was shipped from the Lardeau Mining Division. Some ore was milled at the customs mill constructed for Messrs. Ayerton and Cohen a few miles west of Nelson. Concentrates and shipping-ore went to foreign smelters as well as to the smelter at Trail.

Gold production also showed an increase over the previous year. This production came principally from properties equipped with mills, but also included shipments of siliceous ore from a number of properties in the Nelson Mining Division, as well as ore produced by leasing operations in Rossland, and some ore shipped to Kellogg, Idaho, from the *Midway* property in the Fort Steele Mining Division. Some silver-bearing fluxing-ore was shipped from the Slocan City Mining Division. A new gold producer was added to the list late in the year when the mill of Durango Gold Mines, Limited, in the Nelson Mining Division, began operating.

In the past two years marked improvements have been made to roads and trails serving mining districts and areas of prospective merit. The construction of the Big Bend Highway is rendering more accessible the large area north of the main line of the Canadian Pacific Railway. The western part of this project serves the area east of the Columbia River and north of Goldstream, though the rugged country back from the highway cannot be reached without considerable exertion. Goldstream is a tributary which enters the Columbia from the east about 60 miles northerly from Revelstoke. There has been placer activity over many years on Camp Creek, McCulloch Creek, and French Creek, which enter Goldstream from the north, and there has been some activity along the Columbia River north of Goldstream. The aggregate production of placer gold has reached a substantial figure. This gold doubtless originated in lode deposits within the area mentioned, in which there are some old lode-gold prospects. It is reasonable to suppose that the attention of prospectors interested in lode deposits will be attracted to this area.

In the following pages three placer operations are described. Some base-metal prospects are described from two localities in which until recently there has been little or no recent activity. Lode-gold deposits are described from two areas in the Nelson Mining Division and one each from the Ainsworth and Slocan City Mining Divisions. A number of these are prospects which have not been described in previous Annual Reports of the Minister of Mines.

LODE-GOLD DEPOSITS.

SLOCAN CITY AREA.

Lakeview. This Crown-granted claim, owned by P. Johnson, E. H. Kinder, and H. B. Kinder, is situated about 1 mile due east of Slocan City. A claim has been located to the north of the *Lakeview* and another to the south for the same owners. The *Lakeview* lies within a bend of Springer Creek, the north-west corner of the claim being about a quarter of a mile south-east of the bend and 500 feet above the

creek-level. The north and west boundaries of the claim are thus both roughly parallel with the course of the creek. Toward the north-west corner of the claim a camp with limited accommodation has been built on a small flat about 1,000 feet higher than Slocan Lake. The Springer Creek road, which leaves the main highway half a mile south of Slocan City, passes within a short distance of the camp, at a point about 2¼ miles from the highway.

From the little flat the ground slopes steeply to the west, and to the north there is a steep drop to Springer Creek. Not far south of the camp the flat merges with the general slope which rises to the east and south-east at a moderate angle. The ground is timbered, principally with small pine. The overburden in the vicinity of the workings is generally not more than 2 or 3 feet thick, but outcrops are infrequent. The "Slocan Sheet" accompanying Memoir 173 of the Geological Survey of Canada shows the area covered by the *Lakeview* as underlain by "crushed, mostly porphyritic, granite." The workings, which are on the slope just east of the flat, expose fracturing of north-south strike and in general of steep easterly dip. Quartz lenses and stringers occur in the fracturing, and disseminated sulphide mineralization is developed in the quartz and in the altered granite along the fracturing. Sulphides also occur along narrow parallel fractures in ribbon-quartz and as aggregates in the quartz, but in general they are sparingly developed. Pyrite is the most abundant sulphide; chalcopyrite, galena, and sphalerite also occur. Some of the pyrite is veined by quartz and by the other sulphides; it also occurs as small masses and as disseminated grains, with a little chalcopyrite or without other sulphides. Possibly a little native silver is present, though none was reported from sections studied in the laboratory. Chalcocite and covellite occur associated with late carbonate gangue replacing chalcopyrite, and cerussite replaces galena. Noticeable oxidation is shallow and was not evident on the adit-level, which, in September, 1937, had gained a depth of from 25 to 50 feet. However, there has been some alteration at that depth, as indicated by the cerussite in the sections studied microscopically. There are values in gold and silver, which in unoxidized ore are associated with sulphides, the gold in particular being associated with pyrite, as indicated in the following table of assays of samples and specimens:—

Description.	Gold.	Silver.	Lead.	Zinc.
	Oz. per Ton.	Oz. per Ton.	Per Cent.	Per Cent.
Quartz with much pyrite, from adit; selected	1.04	21.0	.....	.....
Well-mineralized ribbon-quartz from adit; selected	0.38	55.0	3.1	0.7
Quartz with some pyrite, from face of drift; width, 31 inches	Trace	1.6	.....	.....
Quartz with some gouge, mineralized with pyrite; width, 2 feet; from 12-foot pit above adit	0.06	2.5	Trace	.....
Altered granite mineralized with pyrite and containing quartz stringer, to west of previous sample, width, 2 feet	0.11	0.8	.....	.....

In September, 1937, the workings extended over a length of about 325 feet. In this length the average strike is north 10 degrees west and the dip about 70 degrees easterly. Quartz is developed in lenticular masses along the strike. For part of the length quartz is exposed in two fractures separated by a horse of granite. The width of quartz in the fractures varies from 3 inches to 3½ feet, and there are quartz stringers in the wall-rock making small angles with the strike of the main fracturing. Disseminated sulphide mineralization occurring in quartz and the altered wall-rock appeared to reach a maximum width of about 6 feet. The ribbon-quartz did not appear to be much wider than 6 inches and was not continuous. The occurrence of aggregates of pyrite in the white quartz was rather irregular.

The *Lakeview* is an old Crown grant, on which a shaft about 15 feet deep remained from former work. In 1935 some prospecting was done near the old shaft. The present owners became interested in the property in 1936, and continued surface prospecting; they then commenced an adit, which was being advanced southerly. In September, 1937, a small flotation-mill with a capacity reported to be 10 to 15 tons per day was being tuned up.

The surface workings on the slope just east of the little flat will be described from north to south, in which direction the outcrop rises 60 to 70 feet. For 65 feet from the north end

stripping exposed quartz and altered granite from 1½ to 3½ feet wide. The quartz contains pyrite and sphalerite. In the next 110 feet there were rather indefinite exposures in some surface-cuts. To this point the outcrop rises quite gradually. From 175 to 280 feet from the north end of the workings the outcrop rises more steeply, and for this length stripping exposed quartz from a few inches to 3 feet in width. Between 15 and 25 feet from the north end of this stripping a pit was sunk for about 12 feet on the vein. At the hanging-wall side quartz and some gouge over a width of 2 feet contains a little galena and some chalcopyrite, as well as aggregates of pyrite. Adjoining the quartz on the foot-wall side the granite is altered for 3½ feet, of which 2 feet next the quartz contains quartz stringers and is moderately well mineralized with disseminated pyrite. The assays of two samples, each across 2 feet, are given in the preceding table. The old shaft is between 35 and 40 feet from the north end of the stripping. At the south side of the shaft the quartz has a width of 2½ feet, which narrows to 16 inches at a point 30 feet south. At this point a sample across 16 inches of cellular rusty quartz, containing some pyrite, assayed: Gold, 0.50 oz. per ton; silver, 12 oz. per ton. In the next 35 feet the quartz is narrow. About 45 feet south of this stripping there was an indefinite exposure in a shallow cut.

The adit is a crosscut for 50 feet at south 55 degrees east to the vein, which it then follows for 40 feet in a direction of south 25 degrees east, then for 75 feet on a bearing of south 5 degrees east to the face, which is about directly below the end of the stripping on the surface. There is a chute at 15 feet, and another at the end of the 40-foot course connects with the shaft from the surface. The best mineralization exposed was in the first 50 or 60 feet of the drift. Stringers running into the walls might warrant some prospecting. In the face of the drift there was quartz 31 inches wide, containing a little disseminated pyrite. A fault striking east-west and dipping 75 degrees southerly, about 12 feet north of the face, displaced the vein 3 feet to the west. The drift was being driven southerly.

Retallack Area, Slocan.

Phoenix.

Two Crown-granted claims, *Phoenix* and *Fletcher*, formerly included in the *Phoenix* group, are now owned by Highland Surprise Gold Mines, Limited. The company also owns eight near-by or adjoining Crown-granted claims and three located claims. This report is limited to the *Phoenix* and *Fletcher* claims on which the work of the past two seasons has been done. The claims are situated in the upper basin of Lyle Creek, approximately 2 miles north-easterly from Retallack, which is on the Kaslo–New Denver road and on the Canadian Pacific Railway Company's Kaslo–Sandon and Nakusp branch line.

The upper basin of Lyle Creek is steep and rocky; several snowslides run into the basin and into Lyle Creek lower down. The workings on the *Phoenix* claim are toward the head of a south-easterly-flowing branch creek, which drops precipitously to Lyle Creek about 800 feet below the workings. The property is reached by a pack-trail, branching from the Whitewater Mine road, about three-quarters of a mile from Retallack. The trail, a little less than 2½ miles in length, climbs approximately 1,600 feet, reaching the camp and lowest working at about 5,450 feet elevation. For the first 1½ miles the average grade is moderate, but for the remainder of the distance the grade is steep and the country traversed is rocky. The country has been burned over and practically no living timber is left near the workings. There are good rock-exposures in the bluffs, below which there are talus slopes, while the slide-courses are filled with finer debris. The property is underlain by rocks of the Kaslo series.*

The workings are in greenstone, not far to the north-east of a serpentine belt. The greenstones are classified as andesite and dacite and related intrusives. These rocks are quite largely chloritized. In the underground workings several shear-strands are to be seen cutting the greenstone. The strikes of the shears vary from east of north to almost due west. The dips are generally steep, and vary from south-westerly to north or north-easterly. Shearing striking about 25 degrees west of north has been indicated at intervals for a few hundred feet. Quartz lenses and stringers are found in the shears of all strikes but in most cases are narrow and short. However, along shearing striking somewhat west of north, and dipping westerly or south-westerly, closely-spaced quartz stringers and lenses form most of the material for a

* Geological Survey, Canada, Memoir 173.

width of 2 or 3 feet on the surface, with an equal width in which quartz stringers are subordinate to the sheared greenstone. Underground at two points almost solid white quartz is exposed over a width of 4½ to 6 feet, and adjoining this quartz lenses or stringers are developed over a width of 5 to 10 feet in sheared greenstone. Quartz lenses or stringers, in zones from 4 to 6 feet wide, along shearing striking more nearly east-west, are exposed at one point on the surface and at one point underground, close to the shearing striking north 25 degrees west. Most of the quartz contains very little sulphide mineralization, but at some points it is moderately well mineralized with pyrite and chalcopyrite, usually as disseminated grains rather than as aggregates. The better-mineralized sections carry attractive values in gold and a little silver. Quartz more sparsely mineralized carries some values, while quartz and silicified sheared greenstone containing little sulphide mineralization carry much lower values. The following table gives the assays of typical material:—

Description.	Gold.	Silver.	Copper.
	Oz. per Ton.	Oz. per Ton.	Per Cent.
Quartz with pyrite and chalcopyrite, from surface cut; selected	4.00	2.0	1.5
Four inches quartz with fair sulphides; from upper level	0.60	0.2	Trace
Quartz with some disseminated sulphides, chiefly pyrite; from surface cut, selected	0.20	Trace	Trace
Sheared greenstone with quartz stringers, estimated one-third quartz; little sulphide mineralization; from face of upper level drift; width, 20 inches	0.04	1.0	Trace
Sheared greenstone with some quartz stringers; width 5 feet; from upper level	0.02	0.2	*Nil*

The writer did not see any free gold, but Cairnes reports one minute grain in a section studied microscopically.

Surface prospecting had been done at this property by 1917 when it was the subject of a reference in the Summary Report of the Geological Survey of Canada for that year. In 1928 and 1929 the property was under lease and bond to the Consolidated Mining and Smelting Company of Canada, Limited. During this period the upper level was driven. Work was stopped in March, 1929, and later the property reverted to the owner, M. J. Mahoney. In the fall of 1936 a camp was built for Highland Surprise Gold Mines, Limited, financed by The Old Colony Trading Company, of Vancouver. The company had a crew driving the lower adit by hand until the following spring. It was then announced that due to the hardness of the ground work would be stopped until an air-compressor had been installed, permitting machine-drilling. It was also announced that a road would be constructed to the property. The writer examined the property in June at which time no work was being done. Operations were renewed later but were suspended at the onset of winter.

The workings consist of some surface-cuts and two adit-levels. The elevation of the upper level as given in a former Annual Report of the Minister of Mines is 5,575 feet. From aneroid barometer readings the elevation of the lower adit is approximately 5,450 feet. These adits start a short distance east of a northerly-trending gulch. Quartz with sulphide mineralization is exposed at some points along the eastern side of the gulch, the floor of which rises quite steeply to the north. The writer examined exposures at approximately 80 and 200 feet northerly from the upper adit-portal but did not find a third exposure, which is understood to be farther to the north. The country is very rugged, and unconsolidated material obscures the shear-zone and mineralization except at the points noted. At the farther and higher point quartz lenses and stringers are exposed along the shearing which strikes north 25 degrees west and dips 70 degrees westerly. At the hanging-wall side for 2 to 3 feet the material is largely quartz, while the 3 feet to the east consists of sheared greenstone with quartz stringers. Some of the quartz is fairly well mineralized with medium-grained pyrite and chalcopyrite. A specimen of this material assayed: Gold, 4 oz. per ton; silver, 2 oz. per ton. Most of the quartz is mineralized with fine disseminated grains of pyrite and some chalcopyrite. A specimen of this material assayed: Gold, 0.20 oz. per ton; silver, trace; copper, trace. The other cut, 120 feet southerly, exposes irregular lenses of quartz over a width of 4 feet, which strike across the strike of the main shearing. This quartz is also mineralized with sulphides.

The upper adit is a crosscut for 80 feet at north 70 degrees west. At about 65 feet from the portal some shearing was encountered. From this point a working follows an irregular course for 250 feet northerly. This working does not follow shearing or mineralization for much of its length, and it lies west of the widest mineralized sections; however, as the average direction is about the strike of the shearing with which the mineralization is associated, the working is referred to as "the drift." The face of the drift is approximately 240 feet at north 25 degrees west from the adit-crosscut. Between 40 and 46 feet along the drift quartz lenses and stringers are to be seen in the west wall and half-way across the drift, but are not evident in the east wall, and apparently terminate against shearing along which quartz is developed 2 to 5 inches wide for 10 feet north of the cross-stringers. At the south side of this zone of cross-stringers, there is a lens of quartz 8 to 10 inches wide, which is quite well-mineralized with disseminated sulphide grains. The stringers in the 5 feet to the north are from ½ inch to 3 inches thick and contain little or no sulphide mineralization.

From a point 135 feet along the drift there is a crosscut 30 feet long at north 80 degrees east. In the last 12 feet it cuts through 6 feet consisting largely of white quartz with very little sulphide mineralization, followed by 5½ feet of sheared greenstone containing quartz stringers. From a point 55 feet farther along the drift there is a crosscut 30 feet long at north 40 degrees east. It cuts through 4½ feet consisting principally of white quartz with some sulphides. The last 4 inches contains much better sulphide mineralization. Beyond this for 10 feet the sheared greenstone contains quartz stringers. The next 11 feet to the end of the crosscut contains little quartz.

The crosscut ends at strong shearing striking north 60 degrees west and dipping almost vertically. The following channel samples were taken from south-west to north-east across the mineralized section on the south-east wall of the crosscut:—

Description.	Width.	Gold.	Silver.	Copper.
	Ft. In.	Oz. per Ton.	Oz. per Ton.	Per Cent.
White quartz with disseminated sulphides	4 2	0.10	0.2	*Nil*
White quartz, much more sulphide	4	0.60	0.2	Trace
Sheared greenstone with quartz stringers	5 0	0.02	0.2	*Nil*
Sheared greenstone with quartz stringers	5 0	0.04	1.6	*Nil*

The substantial width of mineralized sheared greenstone was not exposed in the workings except in the two 30-foot crosscuts.

The end of the drift is 55 feet past the second crosscut. There is a stub crosscut to the east 25 feet from the face, and from it to the face of the drift sheared greenstone 1½ to 2 feet in width contains a good deal of quartz. The strike is north 30 degrees west, and the dip is 80 degrees westerly. This strand probably diverges westerly from the hanging-wall side of the wider zone. At the face a sample across 20 inches, estimated to be one-third quartz, assayed: Gold, 0.04 oz. per ton; silver, 1 oz. per ton; copper, trace. The greenstone to the east is also much sheared. In the stub crosscut strong shearing strikes north 60 degrees west and dips vertically, the projection of this shearing would cross the wide mineralization not far north of the nearer 30-foot crosscut.

The lower adit-portal is about 200 feet from the upper portal at south 15 degrees east, and by aneroid barometer reading is 125 feet lower. It is a crosscut driven somewhat north of west, designed to intersect the north-westerly-trending shear-zone along which mineralization is developed on the upper level. This adit had been driven 215 feet when the property was examined in June, 1937. The average bearing for the first 195 feet is about north 55 degrees west; a more northerly course is followed for the remaining 20 feet. For 100 feet from the portal the working is timbered and lagged. At the end of the timbering quartz 2 to 4 inches wide is exposed for a short distance following shearing striking east-west and dipping 70 degrees to the north. Fifty-five feet farther another shear striking north 60 degrees west and dipping 80 degrees northerly is exposed. At this point some small quartz-lenses containing a little pyrite are exposed in 3 feet of sheared greenstone.

The surface exposures are at three points separated by considerable distances. On the upper level two crosscuts 55 feet apart expose quartz lenses and stringers with some sulphides, developed in sheared greenstone over widths of 11½ to 14½ feet. This mineralization

appears to follow shearing striking north 25 degrees west and dipping rather steeply westerly. The shearing may be regarded as indicated for a length of 110 feet from the first crosscut to the end of the drift. If narrower shearing intersected by the adit and followed for some distance in the drift is the same as that farther north the indicated length of shearing is 240 feet. The length of the wide development of quartz in the sheared greenstone is uncertain; it does not extend to the adit, 130 feet south of the first 30-foot crosscut; and to the north, the south-easterly projection of strong shearing, exposed in the stub crosscut, would cut across the northerly extension of the wide mineralization with unknown effect, not far from the second 30-foot crosscut. On the upper level other shear-strands contain quartz a few inches in width, and one occurrence has been mentioned in which quartz lenses and stringers, including an 8- to 10-inch lens containing sulphides, appear to lie in crosscutting attitude just west of the main shearing. It appears that the lower adit should have crossed the projection of the most continuous shearing exposed on the upper level. The two shears exposed on the lower level cannot be correlated with the principal shear or with lesser strands on the upper level. As the mineralization is incompletely explored by the upper level the projection to the lower level is somewhat uncertain.

Bayonne-Midge Creek Area.

The country lying west of Kootenay Lake and Kootenay River, south of the West Arm of Kootenay Lake, has been prospected with varying enthusiasm for years, and some attractive discoveries have been made. It is adjoined on the west by the country draining westerly into Salmo River and Cottonwood Creek, which contains the Sheep Creek and Ymir Camps, important producing areas, and the Porcupine Creek section, which has a record of production from the *Hunter V.*, and in which the *Howard* has recently been brought into production by Durango Gold Mines, Limited. Gold has been of principal importance in this area to the west, but silver, lead, and zinc have also been produced in some quantity. A part of the area west of Kootenay Lake and Kootenay River, in which there has been a good deal of activity for several years, is represented in the accompanying map, entitled "Sketch-map of the Bayonne-Midge Creek Area." The Crown-granted claims are indicated on the map and named in the accompanying list. The locations of some other properties are also indicated. The Canadian Pacific Railway follows the west shore of the lake and there are sidings at Midge Creek and at Tye just north of Cultus Creek. These points are between Nelson and Creston on the railway, roughly 40 miles from Nelson and 25 miles from Creston. A truck-road runs up Midge Creek for about 6 miles, and from the end there is a pack-trail to the *Wisconsin* near the head of Hughes Creek. From Tye Siding there is a truck-road to the *Bayonne*, a distance of roughly 23 miles. This road runs through the central part of the area to the south-west corner, and has branch trails serving a number of prospects. The southern part of the area is accessible from the Dewdney trail, part of which is shown on the map. The trail runs westerly up Summit Creek to the divide, then down Lost Creek, connecting with a road, which in turn connects with the Nelson–Nelway Highway. The eastern end of the Dewdney trail may be reached from the highway north of Creston, by a road across the Kootenay Flats. Access to the area is also afforded by trails from two other branch roads connecting with the Nelson–Nelway Highway. From the Sheep Creek road a trail continues up Sheep Creek over the divide and reaches the Bayonne road not far from the *Bayonne*, and from the Porcupine Creek road a trail leads to the summit, giving access to the head of Canyon Creek. Improvements were made to the Bayonne road in 1936 and 1937. The Midge Creek road was extended and the Dewdney trail and the trails from Sheep Creek and Active Creek were reconditioned in 1937. The area is thus quite accessible for prospecting and a considerable part is served by roads leading to the railway.

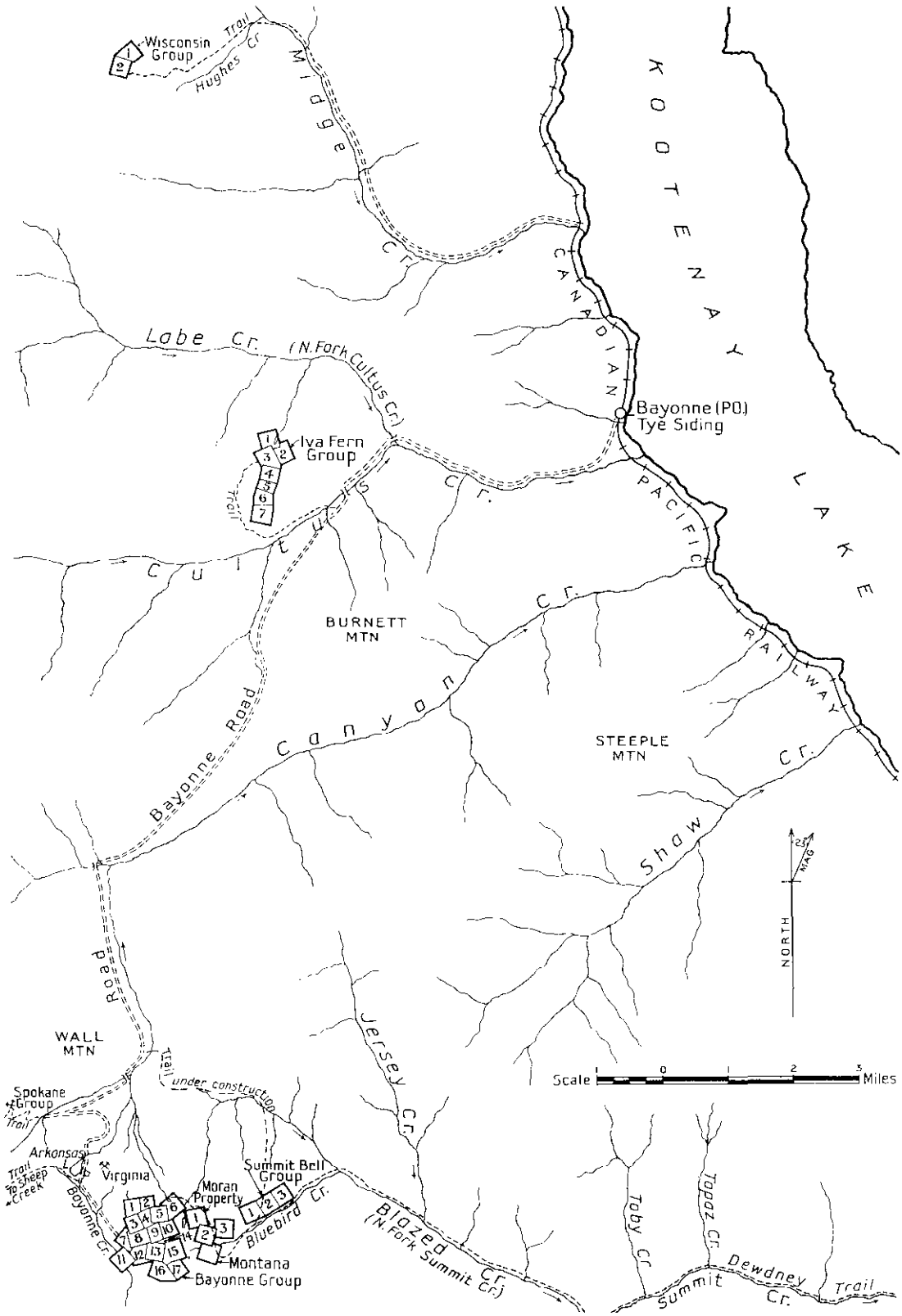
Several of the *Bayonne* claims were staked in 1901. The *Wisconsin* group was under development in 1903. Several other properties are of long standing. The discoveries were made and early prospecting was done before the construction of the present roads, which date from the past four years. From 1915 to 1918 ore was shipped to the smelter from the *Spokane* property. This ore was taken on pack-horses over the divide to the Sheep Creek wagon-road. The *Iva Fern* was first reported upon in 1917. Development-work was carried on at this property between 1925 and 1930. During this period a wagon-road was built from

Tye Siding up Cultus Creek for about 6 miles, and from this a pack-trail was built through a low pass to Canyon Creek and up Canyon Creek to the *Spokane*. This trail was later extended to the *Bayonne*. The Bayonne road, carried through to the mine in 1935, followed essentially the same route from the end of the wagon-road. A mill was built at the *Bayonne* in 1936, and production was started in November. In 1937 production included bullion from the *Bayonne* and some crude ore shipped to the smelter at Trail from the *Spokane*. In the Midge Creek section, several years ago, interest began to be taken in the *Wisconsin*, which had lain idle for many years. Surface prospecting and diamond-drilling were followed by a programme of underground development begun in 1935.

The area has not been mapped in detail either topographically or geologically. It is covered by the "West Kootenay Sheet," on a scale of 4 miles to the inch, published in 1904 by the Geological Survey of Canada. This map gives the geology on a topographic base, from reconnaissance surveys made when the area was much less accessible. In more recent years it has been discovered that the South Fork of Cultus Creek as shown on the earlier maps is actually the upper part of Canyon Creek. An area originally mapped as Nelson granite is now known to be occupied by a continuous belt of sedimentary rock at least 1¼ miles wide, extending from the *Iva Fern* south through the pass to Canyon Creek and possibly as far south as Blazed (North Fork of Summit) Creek. The writer does not know how far this belt extends north of the *Iva Fern*. There are also sediments at the *Wisconsin* on upper Midge Creek, which detailed mapping would probably show to be of considerable extent. The area is largely underlain by granitic rocks, doubtless related to the Nelson batholith. The belt of sedimentary rocks mentioned is of some interest as in it discoveries have been made which differ from the mineralization elsewhere. The area is quite rugged, the maximum relief as shown by the "West Kootenay Sheet" is about 6,300 feet from lake-level to the top of Steeple Mountain, of which the elevation is given as 8,050 feet. A number of peaks are shown as above 7,000 feet. However, round-topped ridges of lower elevation are characteristic of a good deal of the area. Fires have killed the timber on Midge Creek, also in sections on Cultus Creek, but most of the area is forested. There is generally a fairly deep soil mantle. On the ridges this mantle is usually loose and friable. This material has been readily moved by a bulldozer in stripping at the *Bayonne*.

On the *Bayonne* and *Spokane* properties, mineralization has been developed in quartz veins in granitic rock. Gold contributes the principal value. The workings are largely within the zone of oxidation; however, sulphides found in the veins indicate clearly that the gold in primary ore is associated with sulphides. The sulphide mineralization generally is not heavy though lenses of solid sulphides occur. Pyrite, galena, sphalerite, and chalcopyrite can be recognized with the unaided eye, and tetrahedrite has been recognized under the microscope. In both properties there occur lenses of solid galena which, though carrying good values in silver, contain relatively little gold. In the belt of sediments, previously mentioned, lead-copper mineralization with some silver but practically no gold is developed at the *Iva Fern*, while in two discoveries to the south, the *Cultus* group and the *Humdinger* and *Hunkadora*, the mineralization has been described as copper with some silver and a little gold. At the *Wisconsin* mineralization occurs close to shearing along the contact between a small mass of quartz-diorite and altered sediments. Here gold and some silver are associated with massive and disseminated sulphides. The sulphides include pyrite and arsenopyrite with minor quantities of chalcopyrite, sphalerite, and galena.

In the following pages descriptions are given of the properties in this area, on which there has been a good deal of work done in the past three years. Some other prospects are also described. The reports are based on examinations made by the writer in the past three seasons, supplemented by information obtained from earlier Annual Reports of the Minister of Mines. Distances given are commonly limited to the accuracy of pacing. Elevations are from aneroid barometer readings; in a number of cases they have been checked by readings on several occasions. The Annual Reports of the Minister of Mines from 1903 onward have contained references to properties in this area. The reports for the years from 1926 to 1930 contain references to base-metal prospects and some others, which are not described in this report.



Sketch-map of the Bayonne-Midge Creek Area.

BAYONNE-MIDGE CREEK AREA.

CROWN-GRANTED CLAIMS AS NUMBERED ON ACCOMPANYING MAP.

	No.		
Wisconsin Group:	1.	Lucky Strike	Lot 2929
	2.	Wisconsin	Lot 2928
Iva Fern Group:	1.	Excelsior	Lot 12657
	2.	Standard	Lot 12658
	3.	Fern	Lot 12656
	4.	Iva	Lot 12655
	5.	Black Cap	Lot 12654
	6.	Jewel	Lot 12653
	7.	Gem	Lot 12652
Bayonne Group:	1.	Kentucky	Lot 5966
	2.	Maryland	Lot 5085
	3.	Ohio	Lot 5962
	4.	Columbus	Lot 5961
	5.	Bayonne	Lot 5083
	6.	Oxford	Lot 5084
	7.	Virginia	Lot 6887
	8.	Skookum	Lot 9360
	9.	New Jersey	Lot 5967
	10.	Delaware	Lot 5960
	11.	Illinois	Lot 6888
	12.	Ontario	Lot 13016
	13.	Echo	Lot 13014
	14.	Echo Frac.	Lot 13015
	15.	St. Elmo Frac.	Lot 13018
	16.	Portland	Lot 13017
	17.	Idaho	Lot 13019
Moran Property:	1.	Mayflower	Lot 9356
	2.	Blue Bird	Lot 9357
	3.	Last Chance	Lot 9358
Montana:	1.	Montana	Lot 10778
Summit Bell Group:	1.	Summit Bell	Lot 10777
	2.	Maggie Aikens	Lot 10776
	3.	Michigan	Lot 10775

Bayonne Mine.

Seventeen Crown-granted claims or fractions, comprising what were at one time known as the *Bayonne* and the *Echo* groups, are being acquired by Bayonne Consolidated Mines, Limited (N.P.L.). The company's head office is at 1007 Royal Bank Building, Vancouver. Under the agreement this company erected a cyanide-mill at the property, and in November, 1936, commenced production.

The claims are situated on the south-westerly slope of John Bull Mountain north of Bayonne Creek. Bayonne Creek is a tributary of the West Fork of Summit Creek. The property is connected by road with Tye Siding on the Canadian Pacific Railway on the west side of Kootenay Lake. The road, approximately 23 miles in length, is used by trucks in the summer and caterpillar tractors during the winter. The claims and the road are indicated on the accompanying sketch-map of the area.

The south-westerly slope of John Bull Mountain on which the *Bayonne* workings are situated is quite gentle. The lowest adit, No. 8, is at approximately 6,000 feet elevation, while No. 1, half a mile to the north-east, is a little less than 700 feet higher. Below No. 8 level the slope is steeper to Bayonne Creek which is at about 500 feet lower elevation. The workings do not extend to the north-easterly side of the mountain which has a very steep slope. On the south-westerly side overburden is commonly from 3 to 6 feet deep. This slope is well covered with small balsam and spruce trees.

The rocks outcropping and found underground on the *Bayonne* property are medium to moderately fine-grained, and vary somewhat in composition, but for practical purposes may be called granodiorite. The property covers ground near the south-west corner of a considerable area of intrusive rocks which has been called the Bayonne batholith.

Recent work has been concentrated on the *Bayonne* vein-system to which this report is limited. The property also includes the old *Echo* group on which extensive surface prospecting and some underground work were done years ago.

The *Bayonne* vein-system is a zone of fracturing trending from north 60 degrees east to north 80 degrees east and generally dipping steeply to the south though there are also steep northerly dips. In some sections the granodiorite is cut by a strong fracture, between the walls of which horses of wall-rock are commonly included. The fracture splits at various points, and the branches may follow the general strike, possibly reuniting again, or may diverge from the general strike at considerable angles. At some points the zone as known is a rather weak fracture, or several parallel fractures. At several points fairly strong quartz veins have been crosscut some distance from the main break; work to date has not shown their relationship clearly. Where the vein is represented by a single quartz-filled fracture the width is usually not more than 2 feet though it may reach a width of 3½ feet of quartz. Quite commonly, however, there are two or more quartz-filled openings which with the horses between may have a total width of 4 or 5 feet and occasionally greater width. Where branches diverge there may be sufficient mineralization to constitute ore for a width of as much as 10 feet.

Gold, which contributes almost the entire value to the ore, appears to have been associated with sulphides, principally pyrite, galena, and sphalerite. The development of sulphides has been localized in certain sections of the vein. Oxidation commonly extends to a depth of 100 feet or more from the surface, and the ore so far mined is almost entirely oxidized material. In general this oxidized ore consists of rusty quartz with altered wall-rock. The quartz is honeycombed with vugs or vein-like openings, the walls of which commonly are coated with dark-brown rust. This rusty material is apparently the residue from oxidized sulphides, which have been largely leached away. Such ore may assay several ounces in gold per ton. At various points underground, notably on No. 8 level, at several points on No. 6 level, and at the inner stope on No. 5 level, white quartz containing unaltered sulphides has been found. In such places the widths have commonly been too narrow to permit profitable mining. The significance of this fact may well be that it is only the tightest and narrowest parts of the vein, as so far opened up, which have been preserved from oxidation. The sulphide minerals noted are pyrite, galena, and sphalerite. They appear to have been introduced into fractures in the vein-filling. The fractures being generally parallel with the vein-walls give the ore a pronouncedly banded appearance particularly notable in the high-grade oxidized ore.

In 1935 the writer selected typical vein-matter from No. 6 dump, which with a sample of selected mixed sulphides from the inner stope on No. 5 level gave the following assays:—

Description.	Gold.	Silver.	Lead.	Zinc.
	Oz. per Ton.	Oz. per Ton.	Per Cent.	Per Cent.
White quartz essentially free from sulphides	0.02	0.2	....	.....
Massive mixed sulphides	1.18	10.0	10.6	10.0
Massive pyrite	2.10	5.2	.....	.....
Selected mixed sulphide ore from chute, inner end No. 5 level	3.16	7.0	.....	.....

Material similar to the last sample was studied microscopically in the laboratory and reported on as follows:-

" Metallic minerals identified in order of abundance: Galena, pyrite, sphalerite, chalcopyrite, tetrahedrite.

" Galena occurs as irregular masses in a quartzose gangue also veins, and replaces pyrite in some places and replaces sphalerite. It contains a few tiny blebs of tetrahedrite.

" Pyrite occurs as disseminated crystals.

" Sphalerite occurs as irregular masses, commonly associated with galena.

" Chalcopyrite occurs as small irregular masses and blebs in sphalerite.

" Tetrahedrite occurs as tiny inclusions in galena."

The mine manager, P. N. Pitcher, supplied the information that a lens of galena encountered in one of the stopes assayed about 100 oz. in silver per ton, but contained relatively little gold. Information made public from time to time indicated that to the end of September from about 0.4 to 0.7 oz. of gold had been recovered per ton of ore milled, and that in the last three months recovery was roughly 0.67 oz. of gold per ton of ore milled.

The original staking of the *Bayonne* group was done in 1901 and the claims were brought to Crown grant in 1904. The *Echo* group, which adjoined the Bayonne group, was mentioned as a prospect in the Annual Report of the Minister of Mines, British Columbia, for 1904. The claims were brought to Crown grant in 1935. By 1915 the *Bayonne* vein-system had been developed by numerous surface-cuts, and by three adit-levels with two winzes and some raises. The two higher levels now known as No. 1 and No. 6 were reported to be about 500 and 1,200 feet in length, respectively. The length of the third adit, now known as No. 8 level, was not given. Apparently there was not much activity at the property from 1915 to 1929, but from 1929 till 1935 work was done intermittently, and during this period the present road was constructed to the property, following the route of a pack-trail, from a point on Cultus Creek about 5½ miles from Tye Siding. The road was extended to the mine in 1935 and that fall a shipment of high-grade ore was made to the smelter at Trail. This ore, amounting to about 36 tons, was mined from the No. 1 level. Control of the company passed to Grull-Wihksne Gold Mines, Limited, about the end of 1935. Work was resumed in 1936 as soon as it became possible to take in necessary material. Construction of the mill was completed in November and production was commenced.

Power is developed from fuel-oil hauled to the property. Diesel engines, in a flexible combination, drive the compressors and the mill machinery. The mill and power-house are situated a short distance from No. 8 portal. The process is dominantly cyanidation but a mineral jig is included in closed circuit with the ball-mill and classifier, and the tailings from cyanidation are passed over a concentrating-table. The oxidized ore has been found to settle very slowly, which has limited the capacity at times. This difficulty has been overcome in part by using thickeners in parallel. Following grinding and preliminary agitation, there are two thickeners in parallel, the overflow from which goes to the pregnant solution storage, thence through a clarifier to Merril-Crowe precipitation equipment. The underflow from the primary thickeners goes through a second set of agitators to two more thickeners in parallel. The underflow from these thickeners is dewatered and washed in an American filter. The cake from the filter is repulped and passed over a concentrating-table, the tailings from which go to waste. The concentrates are of rather low grade, but contain values in silver, lead, and gold. The quantity of concentrates made is not large, and this material was being accumulated at the property. The jig concentrates are cleaned on a corduroy blanket and then

amalgamated. Precious metal from the retorted amalgam and from the cyanide precipitate is converted to bullion at the property. The ore would be expected to be difficult to mill, and for a while the recovery was rather low. Adjustments in the flow-sheet and in the manner of feeding reagents have made it possible to secure a good extraction and maintain a fair capacity. Recently the mill has been treating about 40 tons of ore per day.

Description of Workings.

The *Bayonne* vein-system has been developed by seven adits, the highest being No. 1 and the lowest No. 8. There is no No. 7 level. The intervals between successive levels from No. 1 to No. 6 vary somewhat, but are generally a little more than 100 feet vertically. From No. 6 to No. 8 the distance is approximately 160 feet. As mentioned above, the old workings on the property are now known as Nos. 1, 6, and 8 levels. Of these workings, No. 8 has been driven about 600 feet before reaching a point vertically under the portal of No. 6 level. No. 6 level, though about 1,400 feet in length, was still about 700 feet short of reaching a point vertically below No. 1 level 520 feet above. This indicates the gentle slope of the hill. As a consequence of this feature and the fact that commercial ore discovered to date has been within the oxidized zone, comparatively near the surface, the workings are spread along a considerable distance.

The lower levels being nearer the mill were first brought into production and recent development has proceeded up the hill. Adits Nos. 5, 4, 3, and 2 have been driven, of which Nos. 5 and 4 were started at, or made connections with, raises from No. 6 level; Nos. 3 and 2 were being driven ahead in September, 1937, and No. 1 level was being retimbered. At that time levels Nos. 1 and 2 had no underground connections with the lower workings.

The various adits have been driven into the hill in a direction somewhat north of east. The general strike of the vein system is from north 60 degrees east to north 80 degrees east. No. 8 level starts as a crosscut driven about north-east, turning to follow the general trend at 350 feet from the portal. The other adits, even if started off the vein, follow the general trend closely. Not much crosscutting has been done. A composite plan of the workings is a long narrow belt with the lower workings overlapping, each lying close to or upon the levels immediately below. The upper levels have less overlap along the strike, but are restricted to the continuation of the same narrow belt. A longitudinal vertical projection as of September, 1937, shows the surface sloping down to the south-west at an inclination of about 15 degrees, with the various levels driven into the hill at vertical intervals of 100 feet or so.

The levels above No. 6 are limited to a few hundred feet in length and attain depths from the surface at their inner ends of from 80 to 180 feet. No. 2 level had been driven for a short distance under No. 1, but No. 3 had not yet advanced to a position under the portal of No. 2. The end of No. 4 was about under the portal of No. 3. No. 5 level was under No. 4 for 250 feet, while No. 6 level followed under No. 5 for the full length of that level and 300 feet farther into the hill. No. 8 level, 160 feet below No. 6, followed along under the outer 500 feet of that level. The stoped ground was in two sections; one extended from somewhat below No. 6 level near the portal, the other included ground principally above No. 5 level, but also a considerable block of ground between Nos. 5 and 6 levels.

No. 1 level: When the property was visited in September retimbering had reached a point about 300 feet from the portal, where a fault striking about north-south and of moderate dip to the west cut the vein. This fault steepened and curved to a north-westerly course a few feet ahead and above. The working beyond the fault was temporarily inaccessible because of caving. The best ore section up to the fault appeared to be about 90 feet in length, from 160 to 250 feet from the portal, in which the vein-width was from 2 feet to 4 feet. There is comparatively little cover overhead in this drift, as will be readily appreciated from the fact that at 225 feet from the portal a raise about 35 feet long reaches the surface. About at the fault there is an old winze down approximately 20 feet. The old level extends for about 200 feet past the fault, and near the face has a crosscut 60 feet to the east which cuts two quartz-filled fractures, on one of which about 60 feet of drifting was done.

No. 2 level was started when the ground was covered with snow. The portal, which is about 500 feet south-westerly from No. 1 portal and about 100 feet lower, is apparently north-west of the vein and the working did not cut the vein-fracture till 180 feet in. A rather weak fracture was followed to 320 feet from the portal, beyond which point the working was driven on line. When the writer visited the property the face was about 650 feet from the portal.

For the last 10 feet, 12 to 15 inches of mineralized vein had been followed. This was above a slip of low dip to the south-east, below which there was little vein-matter to be seen.

No. 3 level was started about 400 feet south-westerly from No. 2. Near the portal there is a raise connecting with No. 4 level. Though apparently not far from the vein the vein-fracture was not reached till the working was 140 feet from the surface. Beyond this point a fracture generally 2 to 6 inches wide was followed. About 340 feet from the portal there were two fractures each 3 to 4 inches wide. The left-hand one was followed. At 360 feet a short crosscut driven to the south-east revealed two good streaks of ore about 2 feet apart. Side-swiping to the south-east 6 feet ahead of the crosscut had exposed good ore, which was followed for 70 feet; the width, including horses of waste between the fractures, ranged from 2½ to 7½ feet. In the face the width was about 2½ feet. The two fractures had come together materially in the last 20 feet and the one on the north-west side had become much narrower. In this section the strike was about north 55 degrees east and the dip was steep to the north-west. The writer sampled the pay-streaks about 50 feet back from the face. After allowing for the waste in the vein, the average across a width of 6 feet was between 3 and 4 oz. of gold per ton.

No. 4 level was started near the top of the longest of the old raises from No. 6 level, and in the vicinity of one of the most important stopes. However, except near the portal, the stope had not been carried far above No. 4 level. From 120 to 220 feet from the portal a stope was started and carried up for a couple of sets. The vein here was narrow and the pay-streaks, from 1 inch to perhaps 4 inches in width, lying on either side of a horse, did not contain enough value to carry the waste which had to be broken. North-east of this stope the drift followed a weak fracture, some slips striking about due east cut the south wall here. At 240 feet from the portal a narrow fracture filled with rusty quartz runs into the south-east wall, while the drift follows a fracture dipping from 40 degrees to 55 degrees to the north-west. About 50 feet ahead the working turned easterly and crosscuts a slip at about 25 feet. The raise to No. 3 level from farther ahead in the crosscut cut through several narrow fractures.

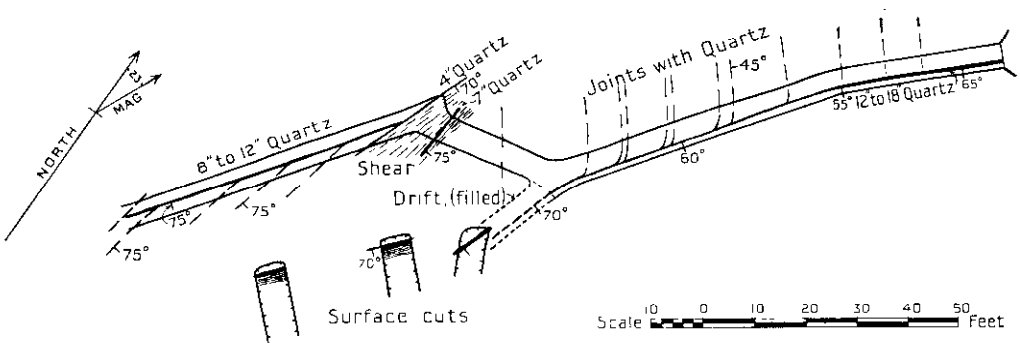
On the surface between Nos. 4 and 5 levels, at a point about 35 feet above No. 5 level, the vein split. The left-hand branch dipping steeply to the north-east was mined for 25 feet at north 40 degrees east then for 40 feet at north 60 degrees east, connecting with an inclined chute from No. 5 level. The right-hand branch had been followed between 25 and 30 feet, striking north 70 degrees east and dipping about 85 degrees southerly. In the face there was about 2 feet of good ore, the banded nature of which may be seen in one of the photographs with this report. This branch appeared to be curving to a course of due east. Stripping on the surface about 40 feet ahead of the face exposed a mineralized break. For a short distance from their intersection the ground between the two branches contained sufficient values to constitute ore, the width reaching a maximum of about 10 feet, after which the branches were mined separately. On No. 5 level the vein under this surface stope was not commercial. Crosscutting was in progress to test the value of a fracture which runs easterly into the wall of the drift.

No. 5 level starts some 400 feet north-east of the portal of No. 6 and about 110 feet higher. Known ore above this level had been very largely stoped when the property was visited. The first stope, which extended from 200 to 330 feet from the portal, was carried very nearly to the surface. The ground extending from about 400 to 550 feet from the portal was stoped up to No. 4 level. These stopes were connected above No. 5 level. Some ground was mined below the level in the first 35 feet under the first stope. A third stope from 580 to 660 feet in had been carried up a few sets, but had not proved to be profitable. In it the vein was from 6 to 12 inches in width and contained some unoxidized sulphides. The drift was stopped a few feet past this stope.

On No. 6 level the known ore-bodies had also been very largely stoped out. 6–1 stope, extending from about 170 to 350 feet from the portal, was carried to the surface a distance of from 50 to 80 or 90 feet. In that distance both upper and lower margins of the ore-shoot were followed westerly on a rather flat rake. The width of the stope was generally from 2 to 3 feet. Below the north-eastern end of 6–1 stope the ground was stoped from a raise put up on a vein-fracture from No. 8 level. The stope was started about 40 feet below No. 6 level and had a maximum length of about 80 feet. 6–2 stope, about 50 feet long, was opened

about 60 feet past 6–1 stope. At about 900 feet from the portal a raise goes through to the surface, connecting with Nos. 4 and 5 levels. 6–3 stope was carried up to No. 5 level on the south-west side of the raise, the stope length being from 40 to 50 feet. On the north-east side of the raise 6–4 stope was carried through to No. 5 level. It was started about 80 feet long in sulphide ore, reported to average approximately 0.3 oz. of gold per ton. The ore-length shortened to about 30 feet not far above the level, but, as oxidized ore, increased somewhat in length as No. 5 level was neared. No. 6 level drift extends for 1,400 feet north-easterly from the portal, or about 500 feet beyond the raise separating 6–3 and 6–4 stopes. In this section there are two 65-foot crosscuts to the north-west which cut quartz veins or shears striking north 55 degrees east or somewhat more northerly than the main drift. The main-drift fracture is weak near the end. Nearer the portal there is a 50-foot crosscut to the south-east which cuts some quartz-filled joints. To a point past the last stope the main break on this level is generally quite strong though it may be represented by two narrow veins lying on either side of a horse. At other points the vein is filled with from 2 to 3½ feet of quartz. Considerable sections of the vein are of fair width but are not well mineralized.

No. 8 level follows narrow irregular fractures for most of its drift length; that is, from about 350 feet from the portal to near the face. The quartz-filling is generally less than 6 inches wide and frequently is a mere stringer. However, at one point there was quartz from 8 to 10 inches wide for a length of about 30 feet, which was moderately well-mineralized with sulphides. This was found to pinch out a short distance above the roof. The dip of the fracturing on this level is steep to the north. From well in on this level a raise was driven through to No. 6, and used in connection with 6–1 stope and the stope below No. 6 level. An ore-pass and a manway were driven up to No. 6 level from points farther in.



Summit Bell Group. Plan of surface and underground workings from compass survey.

Summit Bell Group.

Three Crown-granted claims, *Summit Bell*, *Maggie Aiken*, and *Michigan*, are owned jointly by F. Aiken, of Bayonne P.O., and the estate of P. Casey, care of Mrs. P. Casey, of Spokane, who also own the *Montana*, lying to the south at the head of Blue Bird Creek. The *Summit Bell* group lies on the north-west side of Blue Bird Creek, a tributary of Blazed Creek (North Fork of Summit Creek). The property was formerly reached by a trail along Blue Bird and Blazed Creeks connecting with the Dewdney Trail on Summit Creek. It is accessible from the *Bayonne* by about 2½ miles of very rough trail. In the summer of 1937 Aiken was working on a new trail to connect with the Bayonne road at a point between 15 and 16 miles from Tye Siding. The proposed route would be between 5 and 6 miles in length. For three-quarters of a mile north-easterly from the *Summit Bell* cabin it lay along a rather steep slope, some sections of which are rocky. Beyond this the route crossed Blazed Creek and made its way north-westerly to a pass about 5,600 feet elevation. From the pass the route dropped to the South Fork of Canyon Creek, and climbed a short distance to the road on the far side.

There is a small cabin at 5,500 feet elevation, a short distance north-west of which the north-easterly-trending side-hill rises sharply. The workings lie on a steep slope above bluffs of granodiorite. The adit-portal is about 500 feet north-westerly from and approximately 235 feet higher than the cabin. The property was referred to briefly in the Annual Report of the Minister of Mines, British Columbia, for 1917. Since that time about 100 feet of additional work has been done underground.

The principal workings, consisting of an adit and three surface-cuts, are shown on the accompanying plan. There has been additional prospecting by surface-cuts farther west and some float was found, but the source was not exposed. The cuts are from 35 to 40 feet above the level of the adit floor. The two cuts to the west expose a foot-wall slip striking about north-east and dipping steeply to the south-east. There is quartz from 8 to 12 inches wide lying on the slip. On the hanging-wall side of the quartz the granodiorite is altered and rusty and is impregnated with quartz from 1½ to 2 feet. The quartz, and to some extent the altered wall-rock, have been mineralized chiefly with pyrite. In the most western cut the quartz at the foot-wall is about 8 inches wide, in the hanging-wall of which the granodiorite is altered and rusty for 22 inches. A sample was taken across 11 inches, including the quartz at the foot-wall and some altered granodiorite. In the next cut the quartz at the foot-wall 12 inches wide was sampled and a sample was taken across the next 22 inches, consisting of altered granodiorite containing a good deal of quartz toward the foot-wall side and mineralized with pyrite. The assays of the samples are as follows:—

Description.	Gold.	Silver.	Lead.
	Oz. per Ton.	Oz. per Ton.	Per Cent.
11 inches quartz and altered granodiorite from most westerly cut	0.72	1.0	*Nil*
12 inches quartz at foot-wall from middle cut	0.14	1.0	*Nil*
Next 22 inches altered granodiorite with quartz and pyrite	0.48	0.8	*Nil*

In the third cut quartz 18 inches wide, striking north 20 degrees east, is exposed. This would be expected to intersect the other vein a short distance to the north. Distributed between the dumps of the three cuts there is a ton or so of rusty honeycombed quartz.

The adit-portal is 110 feet north-easterly from the last cut. It starts as a drift following a quartz vein from 12 to 18 inches wide for 35 feet, at south 45 degrees west. For the next 55 feet on a course of south 35 degrees west the quartz is narrower. Notably in this section rather closely-spaced parallel joints in the foot-wall are filled with quartz which curves southerly to join the main fracture. Jointing is not conspicuous in the hanging-wall. The drift curves again at 90 feet from the portal. Ahead of this point the drift was filled with broken rock, but the fracture could be seen striking south 15 degrees west for 20 feet or so. A crosscut has been driven 25 feet south-westerly from this point, cutting through sheared granodiorite from 17 to 25 feet. There are some irregular quartz-lenses in the shear and one lens or vein 7 inches wide crosses the working. A joint containing 4 inches of quartz, striking south 15 degrees west, crosses the working at 25 feet. From this joint a fracture containing from 8 to 12 inches of quartz has been followed by drifting for 45 feet at south 35 degrees west. In this section the hanging-wall is cut by numerous parallel joints which are filled with quartz. A few joints also cut the foot-wall.

Much of the quartz is quite unmineralized, but some pyrite is developed at places in the quartz and in the wall-rock. A grab sample, from two small piles of quartz containing pyrite, one pile underground and the other at the portal, assayed: Gold, 0.96 oz. per ton; silver, 0.1 oz. per ton; lead, *nil*. As the mineralization appears to be irregular, extensive sampling, possibly bulk-sampling, would be required to determine the value of the deposit. Though the workings do not show it conclusively, there appear to be two roughly-parallel fractures 20 to 25 feet apart, between which numerous joints are filled with quartz. The pyrite mineralization is associated with the quartz veins cutting the granodiorite, and the pyrite apparently carries gold. There is some possibility that in favourable sections a deposit of this kind may contain a considerable tonnage of ore.

Spokane Group.

The eight claims, *Spokane, Spokane No. 1, Granite, Timberline, International, Continental, Meadow,* and *Bedrock,* are recorded in the names of R. M. and K. K. Laib, of Bayonne P.O. The claims are situated on the south slope of Wall Mountain, north of a tributary of Canyon Creek. The approximate position is indicated on the sketch-map of the area. From a switchback on the Bayonne road, approximately 18 miles from Tye Siding, a branch road has been built westerly up Canyon Creek about one-half mile. There the creek is crossed by a small bridge at approximately 5,200 feet elevation. From the bridge a switchback trail a little more than three-quarters of a mile long leads to the *Spokane* camp at approximately 6,050 feet elevation.

About a quarter of a mile westerly from the camp there is a pass leading north-westerly to another fork of Canyon Creek. The claims extend from the pass easterly on the mountain-side which slopes at from 25 degrees to 35 degrees in a direction somewhat east of south. The slope becomes more moderate on approaching the creek 850 feet below the camp. From the pass to a little east of the camp there is a fair cover of small timber, with larger trees on the lower slope. East of the timbered section the slope is swept by snowslides.

Rock outcrops on the ridge above the workings and at other points, but in general there is a cover of 2 to 3 feet of overburden. The exposures are of a moderately fine-grained granitic rock, containing occasional segregations of dark minerals. This rock, which for the purposes of the report is called "granodiorite," is probably continuous with the intrusive in which the *Bayonne* vein-system occurs. On the *Hilltop* and *Sitka* claims, which adjoin the *Spokane* group on the west, there are outcrops of sedimentary rocks intruded by tongues of granodiorite.

Work on the *Spokane* property has been largely on what is probably one vein, striking generally east to west and dipping steeply to the south. When followed westerly the outcrop angles up the slope, passing several hundred feet north of the camp. Underground workings and surface-cuts extend westerly from No. 5 adit for about 1,400 feet, then after a gap of 700 feet across a talus slope cuts in the pass and up the western side on the *Hilltop-Sitka* property expose quartz-filled fracturing of the same general dip and strike. Where well exposed the vein-width varies from a few inches to 4½ feet, in which the filling consists of quartz and sheared or altered granodiorite. The quartz varies from narrow stringers to lenses 2½ feet in width. Quartz may lie on both sides of a horse of granodiorite. Quartz-filled branch-fractures diverge from the main break at numerous points. Several lamprophyre dykes cut the vein without displacing it.

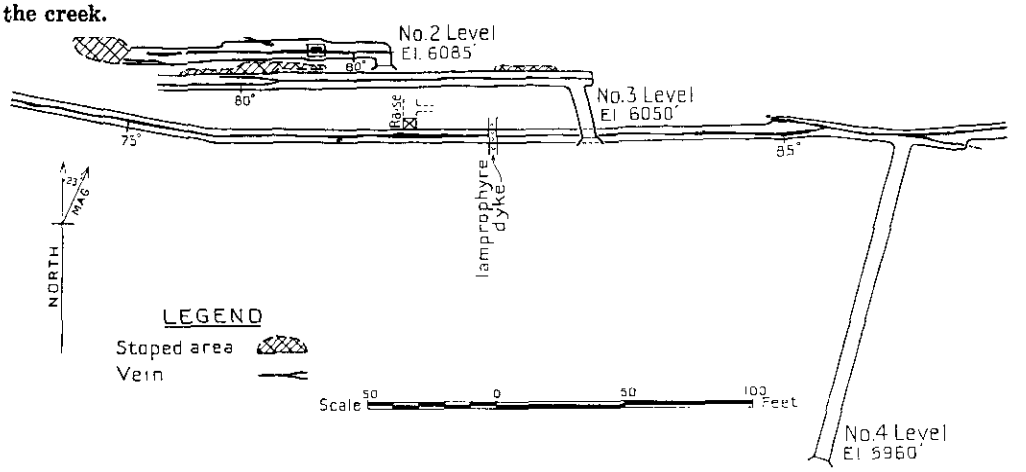
Sulphide minerals, pyrite, galena, some sphalerite, and some chalcopyrite, are developed as lenses and stringers and disseminated in the vein-filling. Copper and lead carbonates and iron oxide are developed in the weathered vein-matter. The workings reach a maximum of about 170 feet below the surface, at the inner end of No. 4 level. Most of the workings are at depths of less than 75 feet. Oxidation has affected most of the vein-matter exposed, but a good deal of sulphide mineralization is to be seen in the various workings. The ore contains variable values in gold and silver. Mixed sulphide may carry substantial quantities of gold. There are lenses of galena, which carry more silver than the mixed sulphides, but have only a little gold. An idea of the variation will be obtained from the following assays of three samples:—

Description.	Gold.	Silver.	Copper.	Lead.	Zinc.
	Oz. per Ton.	Oz. per Ton.	Per Cent.	Per Cent.	Per Cent.
Sample from roof of stope, No. 3 level	0.88	13.0	0.5	14.4	.....
Mixed sulphides, foot-wall streak, No. 3 level	0.20	1.0	Trace	2.6	5.6
Specimen of sorted lead ore, No. 3 level	0.04	45.0	0.5	79.0	*Nil*

Up to the fall of 1937, ten lots of ore had been shipped to the smelter. Details concerning the first six lots, amounting to 129.7 tons, appear in the Annual Report of the Minister of Mines for 1927. Four lots shipped in the first half of 1937 amounted to 127.4 tons. The smelter assays for the first lot—gold, 0.12 oz. per ton; silver, 48.5 oz. per ton; lead, 71.2 per cent.—were the lowest in gold and the highest in silver and lead of all shipments. A lot shipped in 1937 for which the smelter assays were: Gold, 0.82 oz. per ton; silver, 11.9 oz. per ton; lead, 16.1 per cent.; had the highest gold assay of all shipments. The ten lots amounting to 257 tons had an average content of: Gold, 0.597 oz. per ton; silver, 18.7 oz. per ton; lead, 27 per cent. From the sulphur-content of the shipments it is apparent that the ore was very largely oxidized.

According to information supplied by the Laib brothers, some old workings a short distance south of the camp are on ground which was staked in 1902, but which was allowed to run out in 1909. Laib brothers staked four claims in 1911, having discovered the east-to-west vein on which their work has been chiefly expended. In 1913 they staked two additional claims and staked the last two in 1936. Work has been done on the claims in all the years

since 1911. In that time they have driven about 1,000 feet of horizontal underground workings on five levels; they have also done the stoping and have sunk a shallow winze underground. On the surface a great many cuts and trenches have been made. All this work was done by hand. An arrastre was built near the creek in 1918, but the ore was found to be unamenable to amalgamation. For some years the property was reached by coming over the divide from Sheep Creek. From 1915 to 1918 six lots of ore were taken on pack-horses over the divide and down to the Sheep Creek wagon-road. Construction of the trail from Kootenay Lake via Cultus Creek made that route somewhat easier, particularly as it led directly to the railroad. With the construction of the truck-road through to the *Bayonne* in 1935, it has become much easier to move ore to the railway. The shipments made in the first half of 1937 were taken over the new road. In the fall the Laib brothers were engaged in the construction of an aerial tramway from the portal of No. 4 adit to a point on the more gentle slope near the creek.



Spokane Group. Plan of 2, 3, and 4 levels from compass survey.

The principal workings consist of five adits, of which Nos. 2, 3, and 4 are represented on the accompanying plan. The camp is about 700 feet south-westerly from the portal of No. 3 level and at the same elevation. The portal of No. 1 level is situated about 400 feet west of the portal of No. 2 level at approximately 6,200 feet elevation. The portal of No. 5 level is about 400 feet easterly from No. 4 portal, at approximately 5,870 feet elevation. As the ground slopes steeply in a direction somewhat east of south, and the vein, striking generally east to west, has a steep dip to the south, it has been possible to reach the vein at the various levels with very little crosscutting. No. 4 level starts as a crosscut reaching the vein in 135 feet, the surface trace of the vein at this elevation is in the course of a snowslide. No. 5 adit starts as a drift on the vein. It would be possible to reach the projected position of the vein at several hundred feet greater depth, with adit-crosscuts of reasonable length.

In examining the property the writer mapped the underground workings in considerably greater detail than can be recorded here; however, as the walls of workings have become coated with mud and products of oxidation, it is probable that some features of interest were overlooked. The vein splits at a number of points and some very narrow cracks were observed, which in a short distance opened up to a fair width of ore. Some rather strong branches of the vein pass into the walls of the workings and have not been followed. The appearance of certain sections suggests that branching fractures may have been important in the formation of ore-shoots. As there has been no crosscutting from the drifts it appears to the writer that there are possibilities that additional ore might be found within a comparatively short distance of the present workings, either in branches of the vein or possibly in fractures which may exist parallel with the present workings. The writer's mapping was based on a rough compass survey; it is quite probable that careful mapping based on a precise survey would yield valuable information. The writer did comparatively little sampling as there was already a good deal of information available from previous examinations and from shipments of ore. As the ore shipped had to stand quite high freighting charges in addition

to the usual railway freight and treatment charges, it had to be mined selectively and sorted. This implies that a considerable quantity of second-grade material must have been left in the dumps and unmined, in addition to the higher-grade ore now exposed underground.

There are several cuts and test-pits in the pass west of the camp. This is near the boundary between the *Granite* claim of the *Spokane* group and the *Hilltop* claim, recorded in the name of John Bell. As the boundary has not been surveyed the writer does not know the precise relationship of some cuts to it. The quartz-filled fracturing in granodiorite exposed by this prospecting has the general dip and strike of the fracturing in the more extensive *Spokane* workings.

About 700 feet easterly, after crossing granodiorite talus from a knob just east of the pass, one comes to a cut exposing 30 inches of jointed rusty granodiorite containing a 12-inch section largely of quartz. From this to the portal of No. 1 adit 400 feet easterly there are eight cuts, some of which have become filled with soil. These cuts show quartz from 2 or 3 inches to 2 feet in width. In several cases quartz lies on both sides of a horse and the total vein width is 3½ to 4½ feet.

A little north of the general strike, some 70 feet from the portal of No. 1 level, a small cut exposes 12 inches of rusty quartz striking north 20 degrees east and dipping at 60 degrees to the west.

The portal of No. 1 level is at about 6,200 feet elevation. It starts as a crosscut driven 12 feet northerly, from which a drift 60 feet long follows the vein on a course of about north 78 degrees west. In the crosscut the rock is jointed roughly parallel with and for 6 feet south of the vein, which is quite weak here. Five feet to the west the vein has widened and holds its width of 12 to 15 inches to the end of the drift. The north wall is quite regular and dips at 85 degrees to the south. The south wall is cut by two series of joints; the one of north-easterly strike and low dip to the north-west, the other striking at from 70 to 90 degrees east of north and dipping steeply either to the north or south.

Approximately 190 and 230 feet somewhat south of east from the portal there are two cuts which expose 5 to 8 inches of rusty quartz striking south 75 degrees east and dipping steeply to the south. Sixty feet due east of the second there is a cut which at the western side exposes 15 inches of rusty quartz containing some galena. This appears to be parallel with, rather than a continuation of, the vein exposed in the two cuts to the west, though it has the same dip and strike. On the east side of the same cut rusty quartz 18 inches wide strikes north 85 degrees east and dips 80 degrees to the south. The intersection of the two was covered with debris. This cut is over the inner end of No. 2 level and about 35 feet above the floor of the level.

No. 2 level at 6,085 feet elevation is about 400 feet easterly from No. 1. The working reaches the vein at about 3 feet from the portal then follows the vein about due west for 105 feet. The vein widens from about 2 feet at the entry to 3½ feet of rusty ledge-matter 30 feet along the drift. There is a winze down 5 or 6 feet about 25 feet from the entry. On the south side at 45 feet the vein is very rusty for a width of 12 inches. From 50 feet in the vein tends to split and several fractures branch off. The width of the main break is reduced to about 2 feet. At a split in the south wall at 80 feet very rusty quartz 12 inches wide appears, it becomes less rusty ahead. At 90 feet, 15 inches of vein cuts out a curving slip on the north side, but on the south side from that point to the face there is 18 inches of rusty vein. Ahead of the face for about 25 feet and above the drift in the last 10 feet the ground has been stoped to a height of 15 feet above the floor. It is reported that lots 4 and 5 of the earlier shipment came from this stope. These amounted to 65.4 tons, averaging: Gold, 0.73 oz. per ton; silver, 14.5 oz. per ton; lead, 14.5 per cent.

No. 3 level at 6,050 feet elevation starts as a crosscut about 20 feet in length. To the east of the end of the crosscut there is a drift about 5 feet long. The vein has been followed due west in a drift about 160 feet long. From 5 to 30 feet from the entry there is a stope, the roof of which is 12 to 15 feet from the rail. The vein in this section is about 3 feet wide. It is reported that the sixth lot of ore shipped came from this stope. This lot amounted to 20.7 tons and assayed: Gold, 0.16 oz. per ton; silver, 32.5 oz. per ton; lead, 57.8 per cent. The vein-walls on this level are generally quite regular and are usually from 2½ to 3 feet apart. From the end of the stope westerly along the foot-wall there is a fairly persistent streak, from 2 to 6 inches wide, consisting of rather fine-grained mixed sulphides stained with copper carbonates. The rest of the vein is rusty quartz and altered wall-rock. In this

section the vein is cut by several narrow lamprophyre dykes. From about 110 to 150 feet there is a stope above the drift; the manway is at 130 feet. In the 10 feet from the end of the stope to the end of the drift there is rusty, honeycombed quartz with some galena along the hanging-wall (south side). The width reduces from 18 inches at the end of the stope to 10 inches at the face. The hanging-wall quartz-lens was mined for the length of the stope, about 40 feet. Beginning 15 feet from the west end a foot-wall lens 6 to 12 inches wide, containing a good deal of galena, was mined to the east end of the stope. The roof of the stope at the west end was about 12 feet above the drift floor for 15 feet, then increased to 18 feet 30 feet from the west end. The foot-wall lens appears in the roof of the higher section, quite well-mineralized with galena, the hanging-wall quartz-lens contained less galena. On the first floor of the stope the foot-wall lens extends to the east end narrowing to 6 or 8 inches; on the other side of a 12-inch horse of granodiorite the hanging-wall lens is 18 inches wide. On the second floor 13 feet above the drift floor the stope is extended 21 feet farther east, giving a total length of about 40 feet at this elevation. The total length was reduced to 30 feet at 19 feet above the drift floor and to about 15 feet at the roof of the stope, roughly 30 feet above the drift floor. At the east end of the stope the foot-wall curves in and the width is reduced to about 18 inches on the second floor, but at the top of the stope at the east end there was a width of 27 inches of well-mineralized vein, a sample across which assayed: Gold, 0.88 oz. per ton; silver, 13 oz. per ton; copper, 0.5 per cent.; lead, 14.4 per cent. At the west end there was 3 feet of vein, but the whole width was not so well mineralized. The ground left at the west end of the stope for some distance below the roof had 6 to 8 inches well-mineralized with galena along the foot-wall, separated by a horse from 12 to 18 inches of ore along the hanging-wall. The top of the stope was within a few feet of No. 2 level in the section not far west of the winze. Shipments made in the first half of 1937 were reported to have come entirely from this stope; they amounted to 127.4 tons, which averaged: Gold, 0.65 oz. per ton; silver, 12.8 oz. per ton; lead, 20 per cent. Additional ore from this stope, amounting to 12 or 13 tons, was sacked and piled at the portal. A narrow fracture has been exposed by stripping for about 15 feet westerly from No. 3 portal. It is filled with quartz containing a little galena. For most of the length the fracture is not more than 1 inch wide, it strikes south 65 degrees west and dips 65 degrees southerly. At the end of the stripping the strike is due west and the dip is 80 degrees to the south, the width is 3½ inches. At this point there are parallel joints in the 2 feet south of the fracture.

No. 4 adit at 5,960 feet elevation starts as a crosscut driven northerly following a narrow lamprophyre dyke of steep westerly dip. It reaches the vein at 135 feet from the portal. A drift extends 40 feet to the east and to the west there is a drift 350 feet long. The vein contains 2 feet of quartz where intersected; 8 feet east it splits, one branch, 6 to 8 inches wide, strikes south 80 degrees east and at 22 feet passes into the wall. The other branch narrows gradually and is 8 to 10 inches wide at the face, 40 feet from the adit-crosscut; the strike is north 85 degrees east. This quartz is not well mineralized. West of the crosscut the strike of the vein is almost due west for about 270 feet. The width of quartz decreases from 2 feet to about 15 inches in the first 20 feet. This quartz contains some galena. The vein then splits, a foot-wall branch leaves the drift about 50 feet from the crosscut. Another branch continues along the south wall and 18 inches of quartz has been exposed by breaking through a slip at the south wall. This quartz is rusty and honeycombed. The amount of quartz decreases for some distance to the west, and there is more wall-rock between the walls of the fracture. From 140 to 185 feet there is a width of 6 to 8 inches along the foot-wall which is quite well-mineralized with mixed sulphides. Several narrow lamprophyre dykes cut the vein, and at 185 feet there is a 3-foot dyke, striking north to south. In 10 feet beyond the dyke the quartz widens from 8 to 24 inches, and widens to 30 inches at about 200 feet from the adit-crosscut, at which point there is a raise. Beyond the raise the width of quartz is 15 to 18 inches, to about 270 feet from the crosscut. At the widest point the quartz at the foot-wall is fairly well-mineralized. For 20 feet east and 70 feet west of this point the quartz is generally well-mineralized with sulphides. At 270 feet the course of the vein changes to north 80 degrees west and the width narrows gradually to 6 inches, but increases to 12 inches and narrows again to 8 inches in the face of the drift. On this level the walls of the fracture are usually from 2 to 3½ feet apart; quartz and altered wall-rock, or in some sections less altered horses of granodiorite, fill the fracture. The raise has reached a point about 55 feet above the level; a short drift runs 10 feet to the east at about 30 feet up. Some stoping was

done from this raise, presumably behind the chute which is on the west side. From immediately above the roof of the level to a point about 15 feet higher the vein-filling consists of 6 to 8 inches of mineralized quartz on each side of a horse about 12 inches thick. Beyond this point rusty quartz 18 to 24 inches wide containing some galena extends to the top of the raise. The foot-wall appears to be sheared here. It is reported that the first three shipments of ore from the mine came from this raise and stope. These amounted to 43.5 tons, averaging: Gold, 0.44 oz. per ton; silver, 35.5 oz. per ton; lead, 51 per cent.

No. 5 adit portal at approximately 5,870 feet elevation is about 400 feet from No. 4 portal, on a course of north 75 degrees east. It starts from a 20-foot open-cut driven on the vein, and continues as a drift for about 80 feet. The strike of the vein is north 85 degrees west and the dip 75 to 80 degrees to the south. The vein-filling, generally from 6 to 15 inches wide, is quite oxidized, though it contains some galena. It is reported that values so far obtained in this working have been low.

Between 20 and 300 feet southerly from the camp on the steep slope there are some old workings, consisting of small cuts and two short adits. The one adit at about 100 feet below the camp was driven 25 feet, following 3 to 6 inches of quartz which strikes from east to west and dips steeply to the south. In the face on the north side there is a quartz-stringer striking from north-east to south-west and dipping north-westerly. Straight down the hill, about 50 feet lower, the second adit was driven at from 20 to 30 degrees west of north for 60 feet. For 40 feet from the portal the adit was timbered and lagged. The inner 20 feet showed a shear from 12 to 15 inches wide striking north 30 degrees west and dipping steeply to the west. Quartz on the dumps of both adits is honeycombed, rusty, and contains a little galena.

Wisconsin. The *Wisconsin* and *Lucky Strike* Crown-granted claims are owned jointly by C. Hussey, A. T. Fleming, and G. Fleming, of Spokane, and the estate of H. H. Stambaugh, c/o F. Stambaugh, of Youngston, Ohio. The claims are situated on the ridge between Seeman Creek and Hughes Creek, tributaries of Midge Creek. The position of these claims is shown on the sketch-map of the Bayonne-Midge Creek area. Surrounding and extending north and south from the *Wisconsin* and *Lucky Strike* there are sixteen located claims in three groups. The *Aerielle* and *Belknap* groups are held in the names of A. C. Frost, of Seattle, and his associates. It is understood that the Crown-granted claims, and also the *Strathcona* group, which is owned by E. C. Wragge, of Nelson, and associates, are under lease and bond to Frost and associates.

From Midge Creek Siding, on the railway at Kootenay Lake, a narrow truck-road extends for about 6 miles up Midge Creek. From the end of the road a pack-trail continues up the creek, then crosses to the south-west side of the valley and a short distance farther crosses Hughes Creek. From the Hughes Creek bridge the trail climbs about 2,500 feet to the workings at 6,100 feet elevation, in a distance of roughly 4 miles. The total distance from the railway is about 12 miles. The country traversed was burned over a few years ago, and is generally steep, but from the crossing of Midge Creek there is very little rock exposed. There is a warehouse, with accommodation for the packer, at the siding. The camp at the property will accommodate about fifteen men.

The camp is in a little basin at the head of a small tributary which flows south-easterly to Hughes Creek. The portal of No. 1 adit is 200 feet north-west of the camp. To the west the ground rises in a gentle slope to a ridge about 500 feet above the camp. The basin is in the bend where a north-easterly-trending spur leaves the ridge. The rounded crest of the spur is at about 6,350 feet elevation on the line between No. 1 adit and No. 4 adit, the latter being on the north-westerly slope to Seeman Creek. In the vicinity of the workings the slopes toward Hughes Creek are moderate. Outcrops are not numerous and there is commonly from 2 to 8 feet of overburden, as shown by the surface-cuts. This section also was burned over and practically all the trees were killed.

The outcrops on the ridge to the west are principally quartzite, mica-schist, and limestone. Some of the schist contains curious twig-like aggregates of mica, and some of the quartzite is micaceous. There are fewer outcrops on the north-east spur, but it appears to be underlain principally by similar rocks including some argillite. In the vicinity of the camp there are outcrops of a medium-grained grey granitic rock which is also exposed underground. A specimen of this rock has been determined as a biotite-quartz-diorite. The occasional outcrops and the exposures underground suggest that in the vicinity of the principal workings there is a small and very irregular mass of quartz-diorite, from which narrow offshoots

penetrate the other rocks. The sediments generally have a northerly strike and dip from 45 degrees westerly to vertically.

The development-work has been principally on mineralization which has an average strike of north 30 degrees east and dips from 55 degrees to 70 degrees westerly. Oxidation has extended to considerable depths and in the surface and shallow workings the sulphides are quite largely represented by rusty gossan. Mineralization has been traced by cross-cutting surface-trenches over a length of about 900 feet. The workings expose shearing following the general strike, from which branch shears tend to diverge. The shearing is marked by from 6 inches to 2 feet of gouge and at some points by brecciation extending for several feet. From the central part of the deposit northerly the shearing appears, in a general way, to follow the western margin of the intrusive. The contact is very irregular, salients of sediments occur in the granitic rock, and offshoots of quartz-diorite extend north-westerly into the sediments. For some distance from the shearing and the contacts the rocks have been altered hydrothermally to the extent that recognition of the original character may appear impossible. The widespread staining by iron oxide increases the difficulty of recognition in the shallow workings. Some apparently pure limestone has not been materially altered. Quartz and sulphides occur in irregular lenticular masses, generally along the shearing. The sulphide lenses are from a few inches to 4 or 5 feet wide. Quartz and sulphides are also developed in the altered rock; calcite and siderite also occur. At some points overlapping sulphide lenses with disseminated mineralization give widths of 15 or 20 feet, and it appears that greater widths may occur where a branch diverges from the main shear. The greatest widths usually include horses of barren or very low-grade material.

Some of the oxidized material carries good values in gold, and some appears to have been thoroughly leached. Gold and silver are apparently associated with sulphide minerals below the zone of oxidation. Pyrite and arsenopyrite are abundant, chalcopyrite can be recognized occasionally, and in some sections sphalerite is to be seen. A small lens of galena was encountered in the north drift on the 150-foot level, and this mineral is also found veining the other sulphides. A sample of siderite from the north drift was found to contain 15 per cent. manganese. Some specimens of sulphide mineralization were studied in the laboratory; the microscopic study indicates that pyrite and arsenopyrite may be quite fine-grained, and in some cases are intimately intergrown. Chalcopyrite was found principally in veinlets in fractured pyrite and arsenopyrite. Some ore submitted by the operators of the property was tested in the Ore-dressing Laboratory of the Department of Mines and Resources at Ottawa. Microscopic study there indicated that sphalerite and a little chalcocite were found veining pyrite and arsenopyrite. Sphalerite as small masses, and sphalerite and chalcocite as tiny grains, were found in chalcopyrite. A little fine free gold was also reported as occurring in chalcopyrite.

Gold, silver, and copper occur in variable quantity through a considerable volume of mineralized material, zinc and lead appear to be more localized. The following tabulation of assays of samples of unoxidized material, taken by the writer, from the 150-foot level and from the winze, give an indication of the variability:—

Description.	Width.	Gold.	Silver.	Copper.	Lead.	Zinc.
	Ft. In.	Oz. per Ton.	Oz. per Ton.	Per Cent.	Per Cent.	Per Cent.
From face north drift, 156 feet from winze, disseminated sulphides in altered limestone with quartz and carbonate	5 4	0.09	0.4	*Nil*	*Nil*	*Nil*
Lens of galena east side north drift, 150 feet from winze	7	0.12	33.6	.....	56.0	.....
Lens of sulphides west side drift, 118 feet north of winze	13	0.64	2.4	0.5	*Nil*	*Nil*
Lens of sulphides in hanging-wall of winze, about 125 feet below No. 1 level	.....	0.27	2.6	*Nil*	.....	.....
Quartz with sulphides from crosscut to east, 30 feet south of winze	3 6	0.20	0.6	*Nil*	20.0	*Nil*
Face of drift, 145 feet south of winze, massive mixed sulphides, east side drift	15	0.50	4.6	*Nil*	4.0	*Nil*
Quartz with disseminated sulphides adjoining previous sample	15	0.20	1.0	*Nil*	*Nil*	*Nil*

In this deposit there seems to be a good chance of developing a substantial tonnage of material carrying moderate values in gold and some silver. Testing to date indicates that the gold is intimately associated with sulphides. The ratio of precious metal to sulphides is rather low, and base metals are not present in sufficient quantity to be of much value. According to the last information which reached the writer, metallurgical tests, which were still in progress, had not yet resulted in discovery of an economic milling process for treating this ore. Failing a milling process, the value of the deposit would appear to depend on discovery of material of sufficient quantity and value to warrant construction of a smelting plant within range of the property.

The property was the subject of a report by W. Fleet Robertson, under the heading "*Lucky Strike* group," in the Annual Report of the Minister of Mines for 1903, and under the heading "*Wisconsin*" was referred to in the Annual Report of the Minister of Mines for 1928, and in several reports since then. After many years of inactivity the property was examined in 1926 for Porcupine Goldfields Development and Finance Company, Limited. Since that date there have been several examinations and more recently substantial development-work has been done. In 1928 there was a radiore survey. In 1933 a programme of surface-trenching was carried out and three diamond-drill holes, totalling about 1,000 feet in length, were put down. These holes deflected from the initial directions and the results were inconclusive. A. C. Frost, of Seattle, and associates became interested in the property and have financed the work done in the past three years. In 1935 a McCormick-Deering Diesel engine rated at 50 horse-power, a Gardener-Denver compressor rated at 220 cubic feet of free air per minute, a small hoist, pumps, rock-drills, and other equipment were taken to the property from Midge Creek Siding on pack-horses. The winze extending 60 feet below No. 1 level was straightened and reconditioned, and by the end of the season had been extended to an inclined depth of 150 feet, and a station had been cut at that depth. The next season, after unwatering the winze, drifting was commenced on the 150-foot level. By the end of the season approximately 520 feet of drifting and 225 feet of crosscutting had been accomplished. In 1937 the workings were unwatered, but operations were suspended about mid-summer. In 1936 and 1937 a road from Midge Creek Siding was built to a point about 6 miles from the railway.

The workings are principally on the Crown-granted claims, and include about a score of cuts distributed along the general trend of the mineralization, explored underground by Nos. 1 and 2 adits, the 150-foot level, and by a shaft sunk from a point about 425 feet southerly from No. 1 portal. The No. 1 portal is near the common boundary between the *Wisconsin* and *Lucky Strike* claims. The other workings, consisting of surface-cuts, a 10-foot shaft, and adits Nos. 3, 4, and 5, are not directly connected with the principal showing.

The underground workings on the principal showing are represented on the accompanying plan. From a cut 75 feet south-west of No. 1 portal, surface-cuts crossing the strike are spaced at intervals of about 50 feet for about 500 feet southerly. These cuts are at about the same elevation as No. 1 level. The collar of the shaft, previously mentioned, is about 380 feet southerly from the first cut and 15 feet lower than No. 1 level. The shaft is reported to be 113 feet deep. The shaft-dump consists largely of rusty gossan, though some sulphides were noticed. The cuts expose rusty gossan from 3 or 4 feet to about 12 feet wide. There is a suggestion of lenses arranged *en échelon*. The wall-rock is largely mica-schist or micaceous quartzite, though quite commonly one wall is composed of altered granitic rock.

No. 2 level is a crosscut driven westerly from a point about 140 feet south of No. 1 portal, and at approximately 35 feet lower elevation. It cuts through quartz-diorite at the portal, then enters a band of limestone followed by altered sediments. At about 100 feet from the portal it encounters 2 feet of gouge followed by 3½ feet of massive, partly oxidized sulphides, and beyond that 12 feet of thoroughly oxidized material. The crosscut continues to about 140 feet from the portal in shattered rusty schist.

There is a gap of about 100 feet from the first cut mentioned to the next cut north, which is about 60 feet north of No. 1 portal. A series of cuts extends northerly up the slope for about 450 feet. The first cut north of the portal exposes 2½ feet of solid sulphide mineralization lying just west of 6 feet of kaolinized, quartz-impregnated, rusty, granitic rock. On the east side rusty, honeycombed rock, 6 feet wide, composed largely of quartz, is separated from the sulphide lens by 5 feet of kaolinized quartz-diorite. Three cuts up the slope show good

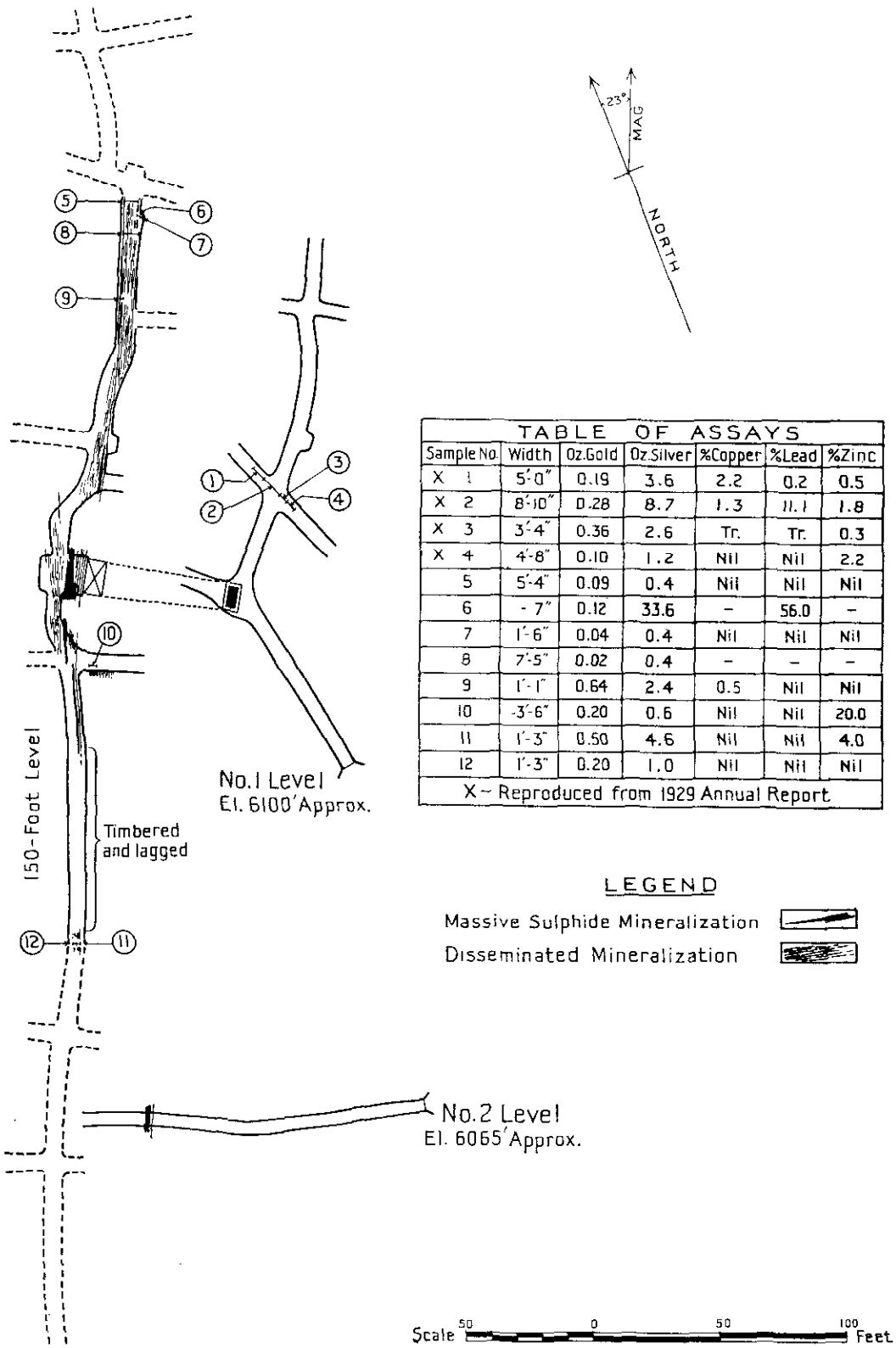


TABLE OF ASSAYS

Sample No.	Width	Oz. Gold	Oz. Silver	% Copper	% Lead	% Zinc
X 1	5'-0"	0.19	3.6	2.2	0.2	0.5
X 2	8'-10"	0.28	8.7	1.3	11.1	1.8
X 3	3'-4"	0.36	2.6	Tr.	Tr.	0.3
X 4	4'-8"	0.10	1.2	Nil	Nil	2.2
5	5'-4"	0.09	0.4	Nil	Nil	Nil
6	- 7"	0.12	33.6	–	56.0	–
7	1'-6"	0.04	0.4	Nil	Nil	Nil
8	7'-5"	0.02	0.4	–	–	–
9	1'-1"	0.64	2.4	0.5	Nil	Nil
10	3'-6"	0.20	0.6	Nil	Nil	20.0
11	1'-3"	0.50	4.6	Nil	Nil	4.0
12	1'-3"	0.20	1.0	Nil	Nil	Nil

X – Reproduced from 1929 Annual Report.

Wisconsin Group. Principal underground workings. 150-foot level from Superintendent's compass survey, extensions after August, 1936, in broken lines.

widths of rusty gossan, the third cut is about 175 feet from No. 1 portal. The next cut at 225 feet shows 3 or 4 feet of gossan. The next two cuts expose less evidence of mineralization, but another cut, about 450 feet from the adit-portal, exposes a width of 10 feet of dark, quartz-impregnated, rusty rock, and in the 5 feet adjoining this to the east there are quartz stringers containing arsenopyrite. This mineralization is east of the general strike, and may represent a bend or a split. It is about 180 feet higher than the adit. A shallow cut 50 feet ahead does not expose mineralization. The wall-rock in these cuts appears to be largely granitic.

The plan indicates the relative positions and extent of the underground workings in this section of the property. Such further information as can be represented conveniently on a plan of this scale is also indicated. Some of the information regarding No. 1 level is reproduced from the report by B. T. O'Grady in the Annual Report of the Minister of Mines, British Columbia, for 1929. On No. 1 level, the mineralized zone has been explored by drifting north-easterly about 150 feet from the point where the working encountered it. Crosscutting at this point and at two other points exposes mineralization extending over a width of 15 to 20 feet, which, however, includes horses of granitic rock and some sections of disseminated mineralization. Oxidation has been active, though massive sulphides and some disseminated sulphides are only partially oxidized. The inner end of the working is about 90 feet below the surface. The results of O'Grady's sampling are reproduced on the plan. This sampling covered a width of about 17 feet in the main zone, and adjoining it to the east 4 feet 8 inches of material regarded as outside the main zone. The winze from this level was examined in 1935 by the writer, when it had reached a depth of about 130 feet. The dip is between 65 and 70 degrees to the west. In deepening the winze from 60 to 150 feet a strong slip was followed. This slip was the foot-wall of a lens of sulphides, as shown by occasional breaks into it, by some test-holes, and by crosscutting it on the 150-foot level. The winze was in 5 feet of brecciated altered rock containing some quartz stringers and sulphides.

The 150-foot level was examined by the writer in August, 1936. At that time drifting had reached points approximately 150 feet north and 145 feet south of the winze station and some crosscutting had been done. Work done from that time to the end of 1936 is shown in broken lines on the plan. On this level the character of the deposit is not obscured by oxidation. A shear-gouge from 6 inches to 2 or 3 feet in width is exposed at intervals from the face of the north drift to 75 feet south of the winze station. South of that point the drift was timbered and lagged almost to the face where, however, gouge was exposed. On the hanging-wall side of the gouge there was a width of 15 inches of massive sulphides and adjoining that 15 inches of quartz and sulphides. E. W. McQuade, the superintendent, reported that through the timbered section the drift had followed the gouge, with 1½ to 3½ feet of quartz and sulphides along it. Quartz or massive sulphides are to be found along this gouge for most of the length which was then exposed, as indicated on the plan. In addition, disseminated mineralization occurs over considerable widths, doubtless better exposed by crosscutting since the examination. At the crosscut to the east, 30 feet south of the winze station, there is a width of 3 feet of gouge and brecciated rock. From 1½ to 5 feet east of this on the south wall of the crosscut there is a sulphide lens containing sphalerite. East of this there is a width of 6 feet containing a good deal of siderite and some sulphides, which is possibly a band of impure limestone, largely replaced. The next 6 feet consists of unmineralized limestone, and beyond that there is quartz-diorite. The crosscut follows an irregular fracture dipping steeply to the south. The north wall consists principally of granitic rock, with very little limestone and with very little mineralization east of the gouge. Mineralization is exposed for 9 feet west of the gouge in the curving drift. Of this width, the 5 feet next the gouge is quite well-mineralized with sulphides. At the winze station, there is much sulphide mineralization for 10 feet west of the gouge, and 4 feet of disseminated sulphides beyond that. The well-mineralized section includes 5 feet of massive sulphides at the south wall of the station and about 4 feet at the north wall. In the north drift massive sulphides were not exposed over as great widths. A lens of solid galena, about 7 inches wide, occurs at the east wall from 140 to 150 feet north of the winze station. McQuade reported that in the extension of the south drift massive mineralization was encountered in widths up to 5 feet, carrying the usual values in gold, and that the crosscuts from this drift and the crosscuts from the extended north drift exposed disseminated mineralization of rather low grade, which reached substantial widths.

No. 3 level, an adit now caved at the portal, was driven northerly from a point about 1,000 feet easterly from No. 1 portal, and at 120 feet lower elevation. It is reported that No. 3 level was designed to intersect the mineralization explored in the principal workings, and that it was apparently deflected to follow some minor fractures or joints. According to report, more than 1,000 feet of driving was done on this level. No. 5 level is a short adit driven from a point 500 feet east of No. 1 portal, at about 50 feet higher elevation. The underground work amounts to about 40 feet, exposing rusty, leached micaceous material, probably chiefly mineralized mica-schist. It is reported that this material carries negligible values. There are several open-cuts in the section extending up the slope between the portals of Nos. 3 and 5 levels. A 10-foot shaft on the crest of the spur exposes a little evidence of mineralization.

On the north-westerly slope of the spur, about 900 feet north-easterly from the last cut on the main showing and 1,400 feet from No. 1 portal, trenching has exposed bands of limestone lying between bands of mica-schist. In a 10-foot band of thin-bedded limestone, near the eastern end of the trenching, a rusty fracture 6 to 8 inches wide is exposed. The strike is about north-south and the dip 65 degrees westerly. No. 4 adit is about 90 feet south of this showing at approximately 6,200 feet elevation. The adit has been driven 25 feet due south and is timbered to the face, where there is a 2-inch rusty streak in limestone which strikes north 20 degrees west and dips 65 degrees westerly.

Greenstone Area South of Nelson.

In the following pages a property on Toad Mountain, another south-east of the highway 9 miles south of Nelson, three properties on Hall Creek, and one on the East Fork of Erie Creek are described. Small shipments of gold-bearing ore were made from four of the properties in 1937 and from a fifth in 1936. The properties have in common the fact that they are situated in an area underlain principally by greenstones which have been called the Rossland volcanic group. Tuffs and limestone occur with the greenstones, and in the vicinity of lower Hall Creek argillaceous sediments and conglomerate are found. Nelson is near the north-east corner of the area which is indicated on the West Kootenay Sheet of the Geological Survey of Canada published in 1904, and in greater detail on the Nelson Sheet published in 1912, the Ymir Sheet published in 1916, and the Salmo Sheet published in 1934. On the Salmo Sheet the rocks are mapped as Beaver Mountain-Rossland group, and in the Salmo Memoir 172 J. F. Walker points out that the association of the younger Beaver Mountain series with the Rossland series is so intimate that it is impossible to differentiate between them on a map at a scale of 1 mile to the inch. The geology of the area in the vicinity of Nelson and Ymir is described in Memoirs 94 and 191 of the Geological Survey, while the geology of the area to the south is described in Memoir 172. Concerning the volcanic group W. E. Cockfield wrote, in Memoir 191 published in 1936:—

"The rocks of this belt consist of a complex assemblage of basic volcanic rocks with pyroclastics. Bands of slate, tuff, and limestone occur. Augite andesite, augite porphyrite, hornblende andesite, and augite-feldspar porphyry are the main rock types. In places these rocks are highly sheared and converted to chlorite schists."

The volcanic group adjoins, and in part surrounds, considerable masses of granitic rocks of the Nelson batholith. Numerous dykes, which are not necessarily related to the Nelson granitic intrusive, cut the rocks of the volcanic group. Veins in the area quite commonly occur along or close to dykes.

The principal producing mine in the Greenstone area is the *Second Relief* on Erie Creek, where approximately 100 tons of ore are mined and treated daily. At intervals for several year lessees have shipped ore from the *Arlington* and *Keystone* mines, which occur in argillaceous rocks within the greenstone area in the Erie Creek section. For several years there has been a considerable production of shipping-ore from the *Clubine-Comstock* property on Boulder Creek. Lessees have made shipments of ore from the *Porto Rico* and *Spotted Horse* properties on Barrett Creek. A small quantity of ore was produced from the *Fern* on Hall Creek in 1935. In the vicinity of Nelson lessees have been making shipments of ore from the *Venus-Juno* and the *Athabasca* properties, on which the veins are partly in greenstone and partly in granitic rock. Several properties farther west are similarly situated, and have production records from former years. A number of the properties which have been mentioned also have previous production records, as has the *Perrier* property. Gold contributes

the principal value to the ores from all these properties, though values in silver are present. This is also true of the properties described in the following pages. While in general the veins are narrow, very good values have been obtained. Quite commonly high values in gold occur in the oxidized parts of veins. The gold was apparently deposited largely in association with sulphides. The quantity of quartz or carbonate vein-filling is variable, in some cases very little of such gangue matter is present, and the sulphide mineralization is developed along fracturing or shearing. In other cases there are more typical quartz veins. The sulphide minerals present are also variable in quantity and species. In some cases the base-metal content is of value, principally where galena gives the ore value in lead. Within the area the *Silver King*, on Toad Mountain, is a former producer of copper and silver, and there are some copper prospects.

The area is readily accessible from the Canadian Pacific and Great Northern Railways, the Provincial highways, and branch roads which serve various sections. Roads or trails are to be found on most of the creeks. From the end of the road up Barrett Creek a trail over the summit connects with the Erie Creek road, giving access to a considerable section. In 1937 the trail up Hall Creek and over the summit to Forty-nine Creek was reconditioned and work was done on the upper parts of the roads up both creeks. Three of the properties described are situated on Hall Creek, up which a road extends for 2½ miles from a point on the Nelson–Nelway Highway about 10 miles south of Nelson.

References to various properties in this area will be found in the Annual Reports of the Minister of Mines, British Columbia, and in the publications of the Geological Survey of Canada which have been mentioned. With the exception of the *Euphrates*, the properties described in this section have not been described in the Annual Reports of the Minister of Mines.

Daylight and Berlin.

Two adjoining Crown-granted claims, the *Daylight* and *Berlin*, which had reverted to the Crown, were leased in 1936 by the four Rolick brothers, of Nelson. The claims are situated south of Nelson a short distance north-easterly from the workings of the *Silver King* mine. The ground covered by the claims includes a flat area extending north-easterly on top of a spur from Toad Mountain. The sides of the spur slope steeply to the north-west and to the south-east. This area was apparently cut over when the *Silver King* mine was in operation, but is now grown up with young spruce, balsam, and pine. The property is reached by a branch from the *Silver King* road. The distance from Nelson is about 9 miles. The road climbs by a series of switchbacks, gaining a total elevation of about 4,000 feet above lake-level.

The property had been prospected by a shaft intersected by a short adit and by several pits or trenches reported to have been made about forty years ago. The Rolicks cleaned out the old adit and two short drifts running southerly from it, and stoped ore on either side of the shaft for a short distance below the adit-level. A shipment of 16.8 tons, made in June, 1937, contained 3.05 oz. gold and 1.6 oz. silver per ton. A similar quantity was ready for shipment in September.

There are extensive outcrops west of the workings, but on the flat outcrops are not so numerous. The shaft and adit are in sericite-schist which strikes at about 55 degrees west of north and dips at from 45 degrees to 55 degrees to the south-west. Similar rock is exposed on the north-east side of a low ridge about 500 feet north-west of the adit. The main part of this low ridge, which trends north-westerly between the *Daylight* and *Silver King* workings, consists of foliated greenstone. The strike and dip of the foliation are roughly parallel with those of the sericite-schist. Some 300 feet south-west of the sericite-schist outcrop there are several small veins and lenses in the greenstone in general following the foliation. These contain chlorite, small needles of tourmaline, and a little epidote; one showed a little copper-stain.

Roughly 100 feet north-easterly from the sericite-schist outcrop there is a pit down 7 feet, which exposes greenstone sheared across a width of 3 feet. The shearing strikes north 20 degrees west and dips 45 degrees westerly. In this shear there are small lenses of rusty quartz-carbonate material, the rust probably being derived from ankerite. Three hundred feet north-westerly is a second pit down 10 feet. It exposes greenstone intensely sheared for a width of 8 feet. The shearing strikes north 50 degrees west and dips 50 degrees to the south-west. A sample of 2 feet of rusty greenstone at the hanging-wall side of the shear

assayed: Gold, trace; silver, 0.2 oz. per ton. A sample of 18 inches of rusty quartz in the middle of the south side of the pit also assayed: Gold, trace; silver, 0.2 oz. per ton.

From the end of a 20-foot cut in rock the adit is driven south-west for 55 feet, ending at the shaft, which it intersects about 25 feet below the surface. From a point 35 feet from the portal a drift extends for about 20 feet at south 55 degrees east. The wall-rock is sericite-schist of light greenish-grey colour when fresh. It strikes about north 55 degrees west and dips 55 degrees to the south-west. The drift follows 4 to 10 inches of quartz mineralized with fine-grained pyrite and chalcopyrite, dipping less steeply than the schist and flattening toward the end of the drift, where it dips 35 degrees to the south-west. At this point the ground is stoped to the surface. From the shaft a narrow drift extends for about 35 feet at south 60 to 70 degrees east. A wedge-shaped block of ground has been stoped below this drift; the depth stoped runs from 12 feet at the shaft to nothing toward the end of the drift, where a slip of low dip to the west was encountered. A break-through connects this drift with the end of the drift nearer the portal. At the shaft there is a quartz-lens 6 to 8 inches wide on the north side, and another 4 to 8 inches wide on the south side. These appear to die out about where the flat slip was encountered, say, 20 feet in. From this point on the drift follows a narrow fracture dipping steeply to the north. On the opposite side of the shaft a narrow quartz vein striking due west and dipping 70 degrees to the south has been followed for 5 feet.

The shaft is reported to extend 75 feet below the adit-level. When the property was examined in September the water-level was about 12 feet below the adit. From this level a narrow drift extends 45 feet in a direction of about north 75 degrees west. In the first 15 feet from the shaft the ground below the drift has been stoped to a depth reported to be 8 feet. The inner 25 feet of the drift has been stoped to about 10 feet above the floor. The sericite-schist in this working is seen to be cut by irregular lenses and veinlets of quartz, the schist being silicified along the sides of small fractures which have no uniform attitude. Fine-grained pyrite and chalcopyrite are developed as small grains in the quartz and the silicified schists. Silicified schist containing very little sulphide was sampled; it assayed a trace in gold and silver.

The sorted shipping-ore consists of quartz or intensely silicified schist, mineralized with fine-grained pyrite and chalcopyrite. There are occasional small masses of chalcopyrite and of grey copper. Some of the material is rusty, but quite fresh-looking ore may assay several ounces in gold per ton. A large grab sample from about 2 tons of fine screenings from the rejects assayed: Gold, 0.34 oz. per ton; silver, 0.5 oz. per ton. This material, consisting very largely of schist, was being separated with a view to shipment. The total ore shipped in the year amounted to 43 tons, yielding 89.0 oz. gold and 45.0 oz. silver.

Material reported to be typical of the highest-grade ore consisted of schist largely replaced by quartz, mineralized with small disseminated sulphide grains. A microscopic study of a specimen of this material shows that the sulphides consist of small grains of pyrite, some of which contain minute inclusions of pyrrhotite. Gold was observed in the form of grains and stringers, in the gangue near pyrite, in pyrite, and at the contact of pyrite with gangue. The size-distribution reported was as follows:—

Number of Grains.	Largest Dimension.
2	plus 50 mesh (plus 250 microns).
3	minus 50 plus 100 mesh (minus 250 plus 140 microns).
5	minus 100 plus 200 mesh (minus 140 plus 74).
8	minus 200 plus 325 mesh (minus 74 plus 43 microns).
8	minus 43 microns plus 30 microns.
3	minus 50 microns plus 20 microns.
2	minus 20 microns plus 10 microns.
9	minus 10 microns plus 5 microns.
12	minus 5 microns.

Gold exceeding 200 mesh in size in the above table in all cases takes the form of stringers. In other words, the length of the stringer is shown here; the width varies from 10 to 1 microns.

Euphrates. Twenty located claims, situated south-east of Salmo River, about 9 miles south of Nelson, are owned by the Euphrates Mining Company, Limited (N.P.L.). The executive office of the company is in Nelson. The camp built for the *Golden Age* property on the other side of Cottonwood Creek is used. The camp, the *Euphrates* power plant, and the lower terminal of an aerial tramway from the workings, are convenient to Golden Age Siding on the Great Northern Railway Company branch line to Nelson, and to the Nelson-Nelway Highway. Supplies are taken up on the aerial tramway, the upper terminal of which is near the lower *Ell Tee* portal and the mine camp, approximately 1,000 feet above the Salmo River. The workings and camp are also served by a trail up the steep slope. The power plant consists of an air-compressor driven by a Pelton wheel, the water for which is flumed from Clearwater Creek, a distance of about 7,000 feet. There is also a 125-horse-power Diesel engine available in the event of failure of the water-power supply.

The claims cover a north-westerly-facing slope which rises steeply to an elevation of about 1,500 feet above the Salmo River, and more moderately beyond that point. Most of the area covered has been burned over, though some patches of living trees remain. There are extensive rock-exposures on the steep slopes. At higher elevation overburden is generally 2 or 3 feet thick. The rocks exposed are greenstones of the Rossland volcanic group, including augite porphyry, andesitic phases, finer phases, and a considerable mass of volcanic conglomerate. The matrix is generally chloritic and the rocks are commonly schistose. The foliation strikes about north 40 degrees west and generally dips steeply to the south-west. Mineralization occurs in four veins or shear-zones, the *Lost Cabin, Ell Tee, Minto,* and *Nickel Plate.* This report is concerned principally with the last two, on which recent work has been concentrated. All these occurrences are developed along shearing which in general has the same strike as the foliation in the greenstone. The dips are less uniform. The *Ell Tee* vein dips to the north-east cutting the dip of the foliation. The *Minto* vein has an irregular dip, which cuts across the dip of the foliation in some sections and in others follows it. The *Lost Cabin* shearing generally follows the dip and strike of the foliation, but quartz-lenses in the shear-zone cut the foliation on the dip. The so-called *Nickel Plate* vein consists of a light-coloured dyke intruded along shearing in the greenstone. The dyke contains disseminated sulphides. Quartz-filled fractures or stringers cut the dyke and to some extent cut the altered wall-rock. Sulphides are developed in the quartz and disseminated in the altered wall-rock. Lenses of sulphides occur in the *Ell Tee* and *Minto* veins, but in the *Lost Cabin* shear-zone the mineralization is generally sparingly disseminated. The sulphides include arsenopyrite, pyrite, sphalerite, galena, and chalcopyrite, all visible to the naked eye, while some tetrahedrite has been recognized under the microscope. Good values in gold were obtained in oxidized material from the *Ell Tee* vein, and sulphide lenses in the same vein also carry gold. Quite good values in gold occur with the sulphides in the *Minto* vein. A small vein on the *Ell Tee* lower level, well beyond the zone of oxidation, contains free gold. Gold values in the oxidized zones of the *Log Cabin* and *Nickel Plate* deposits do not appear to be high, but apparently are higher than in unoxidized material.

The property includes the old *Lost Cabin* group which was under development during the war. The *Euphrates* and several other claims were staked in 1926, and additional claims have been staked more recently. The Annual Report of the Minister of Mines, British Columbia, for 1917, contains a reference to the *Lost Cabin,* and under the name of "*Euphrates*" references appear in the Annual Reports of the Minister of Mines, British Columbia, from 1926 to 1934. Particularly in the 1929 report more detail will be found concerning the *Lost Cabin* and *Ell Tee* occurrences than is given here. The *Lost Cabin* was the subject of a reference in Memoir 94 of the Geological Survey of Canada, and a more extensive report on the *Euphrates* appears in Memoir 191, published in 1936.

Workings on the property are distributed over a considerable area. A number of the older workings are now inaccessible. The principal accessible underground workings are indicated on the accompanying small-scale map. These workings consist of two adits on the *Minto* vein and an extensive adit-level exploring the *Ell Tee* and *Nickel Plate* veins.

Two old adits on the *Lost Cabin* shear-zone are now inaccessible. Three surface-cuts in a distance of about 300 feet and a partly caved winze 250 feet south-east of the last cut are accessible. According to the company map, the winze is 830 feet higher than the portal of

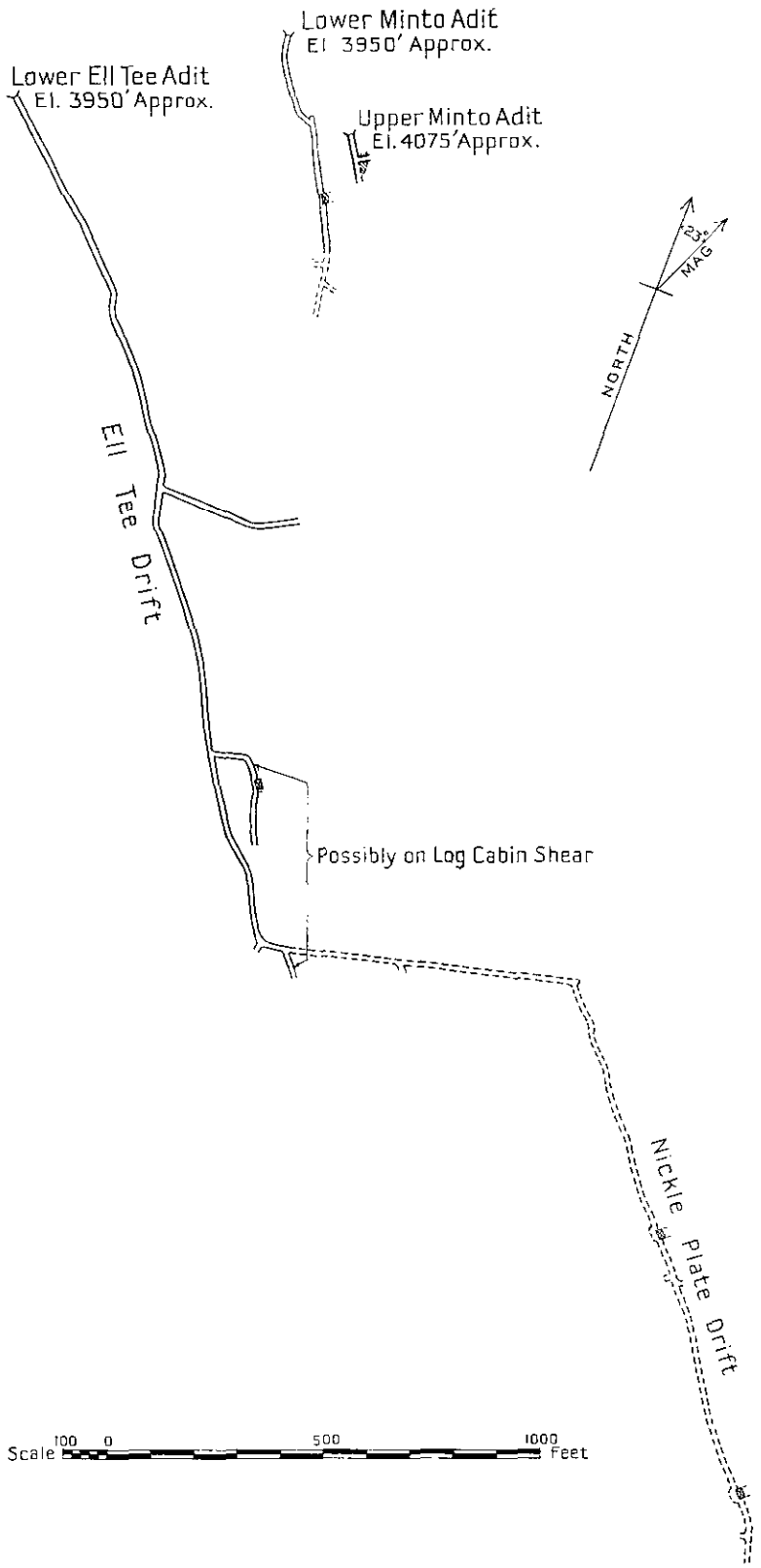
the lower *Ell Tee* level and approximately 2,200 feet from the portal on a course of south 42 degrees east. The cuts expose shearing which strikes from 30 to 50 degrees west of north and dips at from 70 to 80 degrees south-westerly. Irregular quartz-lenses are developed in the sheared greenstone for a width of 8 to 10 feet. The quartz and greenstone are rusty and the greenstone is partly altered to ankerite. The writer took a sample across 6 feet in one cut, which assayed: Gold, 0.12 oz. per ton; silver, 1.1 oz. per ton; lead, trace. Quartz selected from the irregular lenses in the same face assayed: Gold, 0.06 oz. per ton; silver, 1.8 oz. per ton; lead, 0.1 per cent. The shearing occurs over considerably greater width but is not so well marked. At the winze the greenstone is sheared across a width of 10 feet and is cut by narrow quartz stringers. The winze follows a quartz-lens 6 to 12 inches thick dipping 25 degrees south-westerly. This lens is quite well mineralized with pyrite and galena. On the plan of the workings two short drifts from crosscuts north-east of the *Ell Tee* adit-drift are marked " possibly on *Lost Cabin* shear." According to the company map these drifts are in the section of the strike covered by the surface workings and are in a position which agrees with the observed dip. The first drift follows several feet of shearing, containing quartz stringers and disseminated sulphides, south-easterly for 75 feet, then follows a narrow shear for 120 feet on a course of south 10 degrees east. In this distance the dip changes from 60 to 20 degrees westerly. The second drift follows shearing for 70 feet at south 40 degrees east. Some barren quartz stringers occur in the shear. The dip here is steep to the north-east.

The *Ell Tee* vein is a fracture along which there has been some shearing. The strike averages about north 35 degrees west and the dip is about 75 degrees north-easterly. The maximum width is about 2 feet, but is usually less than 9 inches. Quartz, containing more or less sulphides, occurs in the fracture. The width of mineralized quartz is commonly less than 4 inches, but it widens occasionally for short lengths forming lenses 8 to 10 inches wide and occasionally 12 or 15 inches wide. This vein has been explored by surface-trenching and by two adits. The trenches are now largely caved in. The upper adit, which is caved at the portal, is reported to have followed the vein for 175 feet. The second adit, 210 feet lower, is at approximately 3,950 feet elevation. It follows the vein for almost 2,000 feet south-easterly, but toward the end the vein becomes weaker and dies out or is lost. Two stopes were started in the outer part of the drift. Rather spectacular values in gold are reported to have been obtained from oxidized parts of the vein. It is reported that parts of the vein which are well mineralized with sulphides carry values in gold, but not sufficient to permit profitable mining of such narrow widths. There was some production from the oxidized parts of the vein.

The *Nickel Plate* vein was explored by trenching on the surface in 1935 and 1936. Crosscutting-trenches extend for about 1,050 feet south-easterly up a moderate slope. According to a small-scale map of the property, the nearest trench is approximately 3,300 feet, at south 55 degrees east, from the lower *Ell Tee* portal. The same cut is also about 1,300 feet somewhat south of east from the *Lost Cabin* winze. According to aneroid barometer readings these cuts are from 1,025 feet to 1,450 feet higher than the lower *Ell Tee* level. The first nine cuts covering a distance of about 650 feet are in quite regular alignment, exposing an altered, rusty, light-coloured dyke from 5 to 9 feet wide. The dyke is cut by quartz stringers, in some of which unoxidized arsenopyrite is exposed. The strike of the dyke is from 40 to 50 degrees west of north and the dip is steep to the south-west. At the ninth cut rusty gossan 2 feet wide lies north-east of 10 feet of spotted dyke-rock and on the south-west side there is gossan 9 feet wide. Samples of these two sections and a specimen of quartz with unoxidized arsenopyrite gave the following assays:—

Description.	Gold.	Silver.
	Oz. per Ton.	Oz. per Ton.
Rusty gossan, 2 feet wide, north-east of horse	0.20	Trace
Rusty gossan, 9 feet wide, south-west of horse	0.24	Trace
Quartz with unoxidized arsenopyrite, selected from *Nickel Plate* outcrop	0.20	Trace

Four more cuts to the south-east are less regularly aligned and show less quartz in the rusty gossan.



Euphrates Mining Company, Ltd. Plan of principal workings after company plan, extensions in broken lines from compass survey.

From the end of the adit-drift on the lower *Ell Tee* level a crosscut was driven somewhat north of east. It intersected a light-coloured dyke at about 730 feet. A drift followed the dyke for about 1,400 feet on an average course of south 40 degrees east. For most of its length the drift is narrower than the dyke, and swings back and forth exposing the walls at intervals. Three short crosscuts were driven from the drift. In September, 1937, raises were being put up at 625 and 1,275 feet from the start of the drift. From a compass survey, which the writer plotted on a small-scale company map, the position of this drift corresponds with the projection on this level of the surface exposures at a dip of about 73 degrees, and extends as far south-east as the cut which showed the split in the mineralization. Underground the wall-rock on both sides of the dyke is seen to be bleached, silicified, and platy for several feet, passing outward into slightly altered augite porphyry. Where first encountered the dyke is between 2 and 3 feet wide and has very irregular contacts. It is quite apparent here that the dyke has replaced some of the altered schist along the shear. To the south-east the width increases rapidly; the contacts are gradational, the change from fine-grained altered wall-rock to granular dyke-rock takes place in from 1 to 2 feet. The width of the dyke appears to be from 10 to 14 feet for most of the length, but about 40 feet from the face only 3 feet of true dyke-rock is exposed in the drift which, however, does not expose the hanging-wall. At the face sheared and altered wall-rock contained irregular quartz stringers and a good deal of pyrite across a width of 20 inches, the rest of the face consisted of less altered greenstone. The central part of the dyke is a medium-grained, light-coloured rock containing a great many disseminated grains of sulphides, principally arsenopyrite and pyrite. The marginal, finer-grained phase contains finer-grained disseminated sulphides. A specimen of the medium-grained dyke-rock was studied in the laboratory and classified as "altered porphyritic diorite." It is described as follows:—

"The fine-grained, equigranular ground-mass is composed almost entirely of altered plagioclase, probably oligoclase. Calcite and sericite occur as small irregular grains and laths; very little quartz or orthoclase is present. The rock is traversed by a tiny quartz-albite veinlet, and by several calcite stringers. Sulphide grains are disseminated through the section."

The dyke is cut by numerous quartz stringers commonly less than 2 inches thick. Many of these stringers are flat lying, others are in various attitudes. Aggregates of sulphides and fine disseminated grains occur in the stringers and in the dyke. The sulphides are principally arsenopyrite and pyrite; occasionally sphalerite occurs. Under the microscope some chalcopyrite was observed in grains of sphalerite. The assays of a few samples and specimens from this dyke are as follows:—

Description.	Gold.	Silver.	Lead.	Zinc.
	Oz. per Ton	Oz. per Ton	Per Cent.	Per Cent.
20 inches altered wall-rock, mineralized with pyrite and containing quartz stringers, face *Nickel Plate* drift	Trace	0.2	.....	.....
3 feet dyke-rock mineralized with disseminated sulphides, 40 feet north-west from face	Trace	0.2	.....	.....
Selected quartz with sphalerite	Trace	0.2	*Nil*	0.5
Selected quartz with arsenopyrite	0.08	Trace	.....	.....

The altered porphyritic diorite dyke is cut at a number of places by a much darker dyke, but the relationship of this dyke to the walls of the diorite was not exposed in the workings.

The crosscut to the *Nickel Plate* drift went through considerable widths of sheared greenstone containing irregular quartz stringers and at some points fine grains of disseminated sulphides. A 70-foot drift from the crosscut, which may be on the *Lost Cabin* shear, was mentioned previously. At another point a drift has followed quartz stringers south-easterly for 18 feet from the crosscut. About 265 feet from its start, the working crosscut a quartz vein about 2 inches wide. This vein was streaked with chlorite and contained a little free gold, but no sulphides were observed in it. The strike of the vein is north 20 degrees west and the dip is 75 degrees easterly.

The workings on the *Minto* vein consist of two adits. The lower *Minto* portal, as indicated on the plan, is approximately 650 feet north-east of the lower *Ell Tree* portal, and at

about the same elevation. The upper portal, approximately 125 feet higher, is about 300 feet south-east of the lower *Minto* portal. The upper adit is a drift 120 feet long following mineralization developed along shearing striking south 40 degrees east. The strike of the vein is about that of the foliation of the schistose greenstone in which it occurs. The dip of the vein, however, is quite irregular on this level and averages flatter than the dip of the foliation. The drift followed mineralization dipping about 55 degrees south-westerly, but about 80 feet in the vein turned over to the north in a flat roll, the axis of which plunges south-easterly at a moderate angle. Sixty feet from the portal an excavation on the south-west side of the drift encountered a widening which suggests the possibility of another roll below the level. The vein, which has a width of 2 to 8 inches in sections where the dip is parallel with the foliation, that is about 55 degrees south-westerly, is up to 18 inches thick where it cuts across the foliation in the flat roll. In the face the south-easterly plunge of the roll brings it near the floor of the drift. Here the roll is about 2 feet across, and the mineralization is 2 or 3 inches thick. In September, 1937, the ground had been stoped for a few feet north-east of the drift, from a point about 100 feet from the portal, back to a crosscut 60 feet from the portal. From the crosscut, a stope was advancing north-westerly a few feet above the level. This stope started about 12 feet from the drift and extended 15 feet farther to the north-east. The vein was exposed in the crosscut in a flat roll from the drift. At the south-west side of the stope it followed the foliation upward for a few feet, then rolled over to the north-east. From 12 feet north-east to the stope wall at 15 feet the vein was narrow, following down a slip dipping to the north-east. The ore exposed in the stope face was from 4 inches to 1 foot thick. There was also a narrow parallel stringer nearer the roof at the south-west side. The ore was being sorted and shipped to the smelter at Trail. Production in 1937 from this level amounted to 104 tons, of an average assay: Gold, 0.54 oz. per ton; silver, 12.4 oz. per ton; lead, 4.5 per cent; zinc, 2.5 per cent. The ore is a mixture of sulphides in quartz and carbonate gangue. A microscopic study of a specimen shows sulphide mineralization occurring as irregular masses in veinlets and replacing quartz and calcite gangue. The minerals identified in order of abundance are: Galena, sphalerite, chalcopyrite, pyrite, tetrahedrite, and arsenopyrite. Pyrite and arsenopyrite are present in relatively small euhedral and subhedral crystals. Sphalerite contains blebs of chalcopyrite and is commonly closely associated with both chalcopyrite and galena. Galena is dissociated from other sulphides for the most part, but in places veins and replaces sphalerite and chalcopyrite. Tetrahedrite occurs as small masses in galena, usually in contact with chalcopyrite. Both calcite and quartz are present as gangue minerals.

The lower *Minto* adit follows the formation south-easterly for about 200 feet, then turns easterly for 50 feet and cuts a narrow shear. This shear is followed for 325 feet at south 25 degrees east. The shear is from 6 to 10 inches wide and contains from 2 to 8 inches of quartz, some sections of which are well mineralized with sulphides. The dip averages about 60 degrees south-westerly. A composite sample of quartz and sulphides, taken at five points from 235 to 300 feet along the drift, averaging 5 inches in width, assayed: Gold, 0.52 oz. per ton; silver, 4 oz. per ton; copper, *nil;* lead, 1.3 per cent. In the 30-foot section, centered at a short raise started about 270 feet along the drift, the wall-rock is sheared and contains numerous quartz stringers for 4 feet in the hanging-wall of the continuous vein. This quartz contains very little sulphide mineralization. At 325 feet along the drift, the vein-shear is cut by another which strikes south 10 degrees east and dips at about 80 degrees to the west. This shear, containing occasionally a width of 2 inches of barren quartz, is followed 115 feet southerly to the face. In this section two crosscuts were driven from the drift.

Canadian Belle Group.

A Spokane company, known as the Canadian Belle Mining Company, is acquiring four adjoining Crown-granted claims, the *Canadian Belle, Canadian Belle No. 2, Canadian Girl Frac.*, and *Safeguard*, and three adjoining located claims, *Union Jack Fraction, Erin Fraction*, and *Yankee Boy*, from M. Herman, of Hall Siding, and his associates.

The claims are situated about three-quarters of a mile south of Hall Creek, in part west but principally east of Keno Creek, a north-easterly-flowing tributary which enters Hall Creek approximately 1 mile west of the Nelson–Nelway Highway at Hall Siding. The ground was burned over several years ago. It slopes steeply toward Hall and Keno Creeks. In general there is a heavy mantle of surface-wash but there are good rock-exposures on the steep upper slopes and at some other points. The trail to the workings leaves the Hall Creek

road about three-quarters of a mile from the main highway, and climbs 950 feet in its length of approximately 1½ miles. It appears that the four claims were brought to Crown grant in 1901, and had been prospected by open-cuts, a shaft, and several short adits. They had reverted to the Crown for taxes and were acquired from the Crown by M. Herman and his associates in 1934. An additional claim was located in 1935 and two others were staked in 1936. Late in 1936 the present company became interested in the property. Recent work has consisted chiefly in drifting on the upper and lower " A " levels.

The underlying rocks consist principally of argillaceous sediments, mapped by Drysdale (Geological Survey of Canada, Memoir 94), as Hall series, and shown as intruded south of the workings by a considerable mass of granitic rock referred to the Nelson batholith. The sedimentary rocks are cut by tongues of porphyritic granite. These rocks are in many places altered and rendered schistose, and may be difficult to distinguish. In general the beds have a north-westerly strike and dip rather steeply to the south-west, but they are much disturbed locally. Numerous surface and underground workings expose shears and fractures, varying in width from less than 1 inch to 5 or 6 feet, which cut the altered sediments and porphyritic granite. Most work has been done on shears or fractures striking from due north to north 30 degrees east, usually of steep westerly dip, though there are flatter dips to the west and some steep easterly dips. Some work has also been done on a mineralization of general east-to-west trend. At favorable points along the breaks quartz and sulphides developed as filling and also replacing the wall-rock. The sulphides include arsenopyrite, pyrite, pyrrhotite, and chalcopyrite, of which arsenopyrite is the most abundant. Samples of disseminated sulphide mineralization from various points yield rather low values in gold and silver. At some points almost solid sulphides are developed over widths up to 6 or 8 inches. A selected sample of sulphide, obtained from the " Upper A " dump assayed: Gold, 1.08 oz. per ton; silver, 0.8 oz. per ton. A microscopic study of a specimen of such material showed that arsenopyrite, occurring as massive crystalline aggregates, forms 90 per cent. of the section. The arsenopyrite has been fractured in places and veined by pyrite and chalcopyrite. In places pyrite is intimately intergrown with arsenopyrite. Pyrrhotite occurs as minute inclusions in arsenopyrite. Gold occurs as minute grains enclosed in arsenopyrite crystals, without any apparent relationship to the crystal boundaries or fractures in the latter. Seven grains were noted, all smaller than 1.5 microns in diameter. Six of these were enclosed in arsenopyrite, one was enclosed in gangue.

The workings, which are entirely east of Keno Creek, extend along the steep hillside on a general northeast-southwest trend for about 1,300 feet, in which there is one 300-foot section and one 400-foot section without exposures. The vertical range is from 4,500 to 4,800 feet elevation. The numerous surface and underground workings do not appear to be on a single break, but rather along a series of rather closely-spaced parallel breaks which in general are not followed far. The writer examined the property in May, 1936, and again in June, 1937; he was dependent upon a Brunton compass, pacing, and an aneroid barometer for determining the relative positions of various exposures. Lacking precise mapping certain relationships in an occurrence such as this remain in doubt.

The most easterly working is an adit at approximately 4,525 feet elevation, driven 70 feet at south 50 degrees east from the end of a 25-foot rock-cut. The wall-rock is rather blocky argillite, striking north 20 degrees west and dipping 75 degrees westerly. The working follows a fracture from 1 to 4 inches wide, which dips about 75 degrees to the south-west, and is filled with quartz, calcite, and sheared argillite, containing some sulphides. About 100 feet south-east of the portal and 35 feet higher there is a test-pit down 4 feet exposing shearing, which has the dip and strike of the fracture in the adit. At the surface there is a width of 10 inches of rusty material, and at the bottom of the pit 2 feet of silicified sheared argillite mineralized with sulphides. A sample half-way up the pit, where the width was 15 inches, assayed: Gold, 0.32 oz. per ton; silver, 0.1 oz. per ton.

South-westerly from this pit at distances of 100 feet, 140 feet, and 200 feet there are cuts not far from the trail. These expose rusty quartz in widths up to 4 feet. The quartz appears to be irregularly developed. At the best exposure the strike appears to be south 10 degrees west.

The top of a 30-foot shaft is about 300 feet south-westerly from the pit and at approximately 4,640 feet elevation. There are two adits in this section, for the purposes of this report called " Upper A " and " Lower A." South-west of the top of the shaft a cut exposes

shearing 2 feet wide in altered porphyritic granite. Quartz and sulphides are developed in the shearing which strikes about south 10 degrees west. Beyond this the exposures are of thin-bedded argillite to about 150 feet south-westerly from the shaft, at which point porphyritic granite is exposed lying south of the argillite. Some mineralization is developed in the granite near the contact. From this point to about 550 feet south-west of the shaft the overburden is deep and there are no exposures. The next working is a 10-foot adit driven south 60 degrees east from the end of a 10-foot rock-cut at approximately 4,800 feet elevation. In the face there is shearing containing blue quartz with sulphides, including pyrrhotite. The strike is north 30 degrees east. Selected well-mineralized material from the dump assayed: Gold, 0.52 oz. per ton; silver, trace.

About 75 feet south of the short adit is a cut on rusty shearing, which is exposed for 30 feet easterly. It strikes north 70 degrees east and dips 60 to 70 degrees northerly. Twenty feet west of the cut, down the slope to Keno Creek, there is 8 to 12 inches of sparingly-mineralized blue quartz with some parallel stringers. A sample of the best-mineralized material assayed: Gold, 0.04 oz. per ton; silver, 0.1 oz. per ton. Westerly down the hill there are no outcrops or cuts for 300 feet. In the next 100 feet there are four or five shallow cuts exposing quartz stringers which have a general east-to-west strike. In the lowest cut at 4,650 feet elevation, a narrow quartz-stringer containing some chalcopyrite strikes north 80 degrees west and dips steeply to the north.

The 30-foot shaft mentioned above is old work, and the timbering has not been renewed. " Upper A " adit at 4,610 feet elevation was driven 35 feet at south 45 degrees east to intersect the shaft at the bottom. At this point the shearing is 5½ feet wide. The eastern, or foot-wall, 12 inches is the best mineralized section. A sample of this material assayed: Gold, 0.12 oz. per ton; silver, trace. The remaining 42 inches assayed: Gold, 0.08 oz. per ton; silver, trace. A drift has been driven for 120 feet southerly following shearing in porphyritic granite. In the first 40 feet the strike is south 20 degrees west. The foot-wall slip dips 75 degrees westerly, while the hanging-wall is vertical or dips steeply to the east. Several shears of north-easterly trend cut the walls. For the next 50 feet the drift follows a white quartz-lens, which has a low dip to the west and strikes about due south. The quartz has an average thickness of 12 inches and contains some sulphides in segregations or bunches; it is cut by north-easterly-trending fractures of steeper dip, which contain mineralized quartz 4 to 10 inches thick. The last 30 feet of the drift follows two or three narrow shear-strands striking south 25 degrees west and dipping about 60 degrees westerly. They contain some quartz and sulphides. From a pile of ore at the portal the writer selected the sample of massive sulphides previously mentioned; it assayed 1.08 oz. of gold per ton. The average assay of two samples of quartz and partly replaced porphyritic granite, mineralized with disseminated grains of sulphide, was 0.2 oz. of gold per ton. This represents better-mineralized material than is exposed in any considerable volume underground.

The " Lower A " adit, 60 feet below, starts at a point about 70 feet at north 70 degrees west from the upper portal. It is a slightly curved crosscut driven approximately 155 feet at about south 60 degrees east. At 65 feet from the portal a fracture, striking south 20 degrees west, which crosses the adit was being followed southerly in a drift, then in 17 feet. The dip of the hanging-wall is 75 degrees easterly; the foot-wall is not so well defined. In the face there were some little stringers of sulphides. On the north-east side of the adit there is a wedge of white quartz. The rock north of the slip appears to be altered porphyritic granite. At approximately 105 feet from the portal there is 3 feet of sheared rock silicified and containing some sulphides. The strike is about south 10 degrees west and the dip is almost vertical. This may represent the downward continuation of the fracture in the shaft and " Upper A " level. A shear 2 or 3 inches thick, striking north 30 degrees west and dipping 50 degrees north-easterly, cuts the mineralized section.

Bear Claim. This claim, which was located in 1936 and brought to Crown grant in 1937, is registered in the name of Carl Peterson, of Hall Siding. It is situated on the south side of Hall Creek, lying to the west and south of the *Fern*. The property is reached by a branch trail from the end of the Hall Creek road, about 2½ miles from the Nelson-Nelway Highway. The trail climbs approximately 1,200 feet in the distance of roughly 1 mile from the end of the road to the lowest workings, which are at an elevation of approximately 4,900 feet.

of the other mineralized fractures or joints. The projection of the drift fracture at this level would be south of the cut, and the projection of the fracture in the cut to the level of the drift would be south of the drift. Two series of joints are exposed in the cut; south of the fracture parallel joints strike about north 20 degrees west and dip 80 degrees to the east. North of the fracture joints strike from 40 to 60 degrees east of north and dip north-westerly at about 60 degrees. Overburden obscures the relationship of the mineralized fractures in the adit and cut above it with those in the cut to the east.

Up the hill from these workings, about 350 feet to the south and at an elevation of roughly 5,150 feet, there are several cuts over a distance of 50 feet. The most northerly exposes shearing 4 feet wide, striking about north 20 degrees east and dipping 80 degrees to the west in the augite porphyry. On the hanging-wall side 10 inches of quartz containing a little chlorite is exposed. Due south 40 feet there is a cut 8 feet long following 4 to 5 inches of very rusty quartz lying on sheared greenstone. The strike is north 40 degrees east and the dip 55 degrees to the north-west. A sample of the rusty quartz assayed: Gold, 4.0 oz. per ton; silver, 0.4 oz. per ton. Westerly about 300 feet on the steep slope to the tributary creek a few cuts have been made exposing a very narrow vein.

Golden Eagle Group.

The Golden Eagle—an old Crown grant—and five adjoining claims, *American Eagle*, *Grey Eagle*, *Bald Eagle*, *Golden Eagle No. 1*, and *Nelson*, staked from 1933 to 1936, are owned by W. Rozan and A. D. Robertson, of Nelson. These claims are situated north of Hall Creek about 3¼ miles by trail from the end of the Hall Creek road, near the *Fern* lower camp. The *Golden Eagle* claim lies on either side of a small southerly-flowing tributary of Hall Creek and the located claims cover ground north, east, and west of the *Golden Eagle*. The main valley was burned over a few years ago, but the ground is well covered by overburden and outcrops are not numerous. The slope toward Hall Creek in the vicinity of the workings averages about 25 degrees. The tributary mentioned flows in a moderately-deep draw which in its upper reaches has rocky walls. About 2,000 feet to the east there is another deep draw. The rocks most abundantly exposed are augite porphyry and finer-grained greenstone of the Rossland volcanic group with some included tuff. Granodiorite related to the Nelson batholith intrudes the greenstone, as do tongues of porphyritic granite. There are also some aplite dykes and younger mica dykes. The principal workings consist of a shaft at 5,450 feet elevation, and surface-cuts on an irregular quartz vein near the small creek, and open-cuts about 1,600 feet south-easterly from the shaft at 5,600 feet elevation, where an aplite dyke is fractured and contains mineralization.

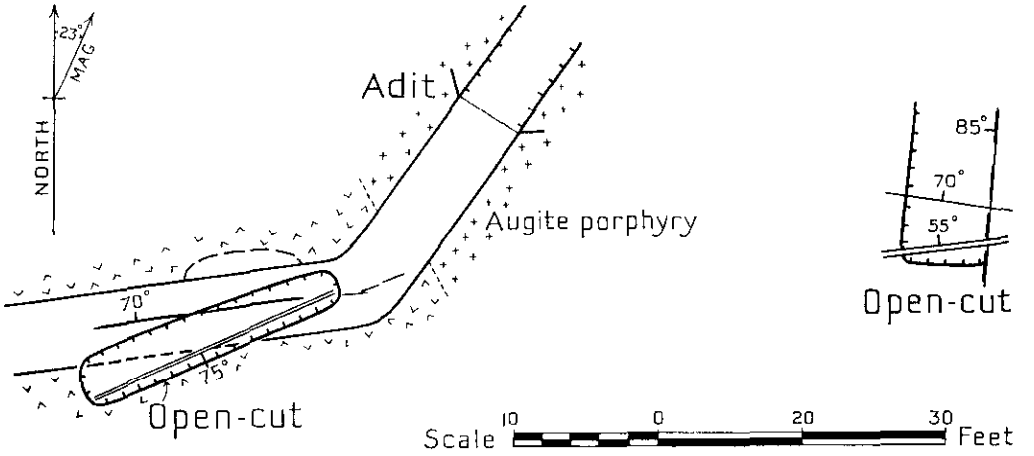
The quartz vein is exposed in a cut for about 20 feet west of the creek, in the shaft 20 feet east of the creek, and at intervals in cuts which run up the slope easterly for about 200 feet from the shaft. The width varies from a narrow stringer to 18 inches. In the vicinity of the creek the greenstone is intruded by porphyritic granite. The irregular southern contact has an east-to-west trend. The fracture cuts through both rocks near the contact, striking about north 80 degrees west and dipping at about 65 degrees to the north. Sulphide mineralization is not abundant in the vein as exposed and consists of pyrite with a little galena. A sample across 18 inches of vein in the cut 25 feet east of the shaft assayed: Gold, 0.16 oz. per ton; silver, 0.8 oz. per ton. Fifteen feet down the shaft on the east wall the vein is 10 inches wide, and assayed: Gold, trace; silver, 1.0 oz. per ton. On the west wall the maximum width is 3 or 4 inches. The shaft was 20 feet deep when the property was examined. West of the creek the vein is from 10 to 18 inches wide. It is cut by a 15-inch aplite dyke which strikes north 5 degrees east and dips 70 degrees to the east. The western segment of the vein is displaced 5 feet to the north. Mica dykes striking about due north cut the vein in the shaft and west of the creek without apparent displacement.

The two cuts about 1,600 feet south-easterly from the shaft are on a point sloping on the one side toward Hall Creek and on the other toward the draw mentioned above. The first cut is driven 12 feet into rock, passing from greenstone at 5 feet into aplite. The aplite is cut by fractures, of which two rather strong ones strike north 20 degrees east and dip steeply; they have a width of 1 foot at the surface but narrow going down. These and other fractures are quartz-filled. Pyrite and some chalcopyrite are developed in grains or small masses in the aplite close to the fractures. Selected aplite, cut by quartz stringers showing a little rust, assayed: Gold, 0.08 oz. per ton; silver, trace; copper, trace. Selected aplite containing

The ground covered by the claim has been burned over quite recently. The overburden is from 1 to 5 feet thick. Rock-exposures are quite good. The steep slope to Hall Creek is intersected by the almost precipitous slope to a small tributary west of the workings.

The bed-rock consists of augite porphyry of the Rossland volcanic group, intruded by dykes of porphyritic granite, a rock with a dark fine-grained ground-mass and light feldspar phenocrysts. The contacts are commonly very irregular.

The lowest workings, consisting of a short adit and two open-cuts, are at the eastern side of the claim close to the western boundary of the *Fern*. These workings are in porphyritic granite except for the portal of the adit which is in augite porphyry. Near the blacksmith-shop 150 feet to the west a 20-foot porphyritic granite dyke is exposed. Some distance farther west there is a shear striking about due north and dipping 60 degrees to the west. Just west of it another dyke-segment is exposed, it is 15 to 20 feet wide and can be traced for 100 feet on a course of south 70 degrees west. These may be segments of the dyke in which the workings are found.



Bear Claim. Plan of workings.

The two open-cuts and a short adit situated near the north-east corner of the claim are shown on the accompanying sketch-plan. These workings expose joints or fractures in the porphyritic granite varying considerably in dip and strike but having a general east-west trend and rather steep dips. There is some crushing of the wall-rock along them and some quartz is developed. The ledge-matter is rusty and partially decomposed, and may show fine free gold in considerable quantity. Three tons of ore from these workings shipped shortly before the property was examined in September, contained 9.65 oz. of gold and 0.94 oz. of silver. A sample of vein-matter mineralized with unaltered pyrite selected from the adit dump, assayed: Gold, 3.26 oz. per ton; silver, 0.4 oz. per ton.

In the eastern cut two fractures are exposed. Rusty sheared porphyritic granite and quartz about 8 inches thick, filling the more southerly fracture, contained a good deal of fine free gold. The adit-portal is about 30 feet to the west at approximately the same elevation. The adit starts as a crosscut from the end of a 4-foot rock-cut. At 14 feet from the portal the working turns to follow a vein-fracture 25 feet at south 82 degrees west. The fracture dips about 70 degrees to the north. It is weak crossing the adit, and may be lost at the irregular contact of porphyritic granite with augite porphyry which lies to the north-east. The contact is observed in the east wall of the adit just before the drift is reached. It appears to be offset a little to the south on the west wall, but as the ground is timbered this is not certain. At the floor of the drift, in the first few feet, the vein widened to about 10 inches of crushed wall-rock and quartz mineralized with pyrite. A few feet ahead it narrowed to 4 inches. In the face and last few feet it could not be distinguished definitely.

Almost vertically above the drift and 17 feet higher is a cut on the surface, which, for its length of 20 feet, exposes a rusty fracture one-half inch to 2 inches wide, striking south 65 degrees west and dipping about 75 degrees to the south in contrast with the northerly dips

sulphides assayed: Gold, 0.26 oz. per ton; silver, 0.3 oz. per ton; copper, 0.1 per cent. The second cut is about 40 feet to the north-east and exposes quartz-filled fractures in the aplite. One fairly strong fracture strikes north 70 degrees east and dips 60 degrees northerly. In the aplite near the fractures small lenses of sulphides are developed. The aplite dyke is not well exposed, but appears to be 15 to 20 feet wide and to strike a little north of east. About 200 feet north-east of the second cut there are four old cuts on a fracture in porphyritic granite. This fracture which runs northerly up the hill is filled with 8 inches of rusty quartz in the lowest cut. The higher cuts show only rusty breaks in the wall-rock.

Harriet Group.

The seven claims, *Harriet, Minnie M., Ruby, Tulip Fraction, Dew Drop, Rainbow*, and *Monitor*, were located in 1934 and 1935 by E. Ballinger, of Salmo. Recent work at the property has been done by a syndicate represented by A. S. Curwen, of Ymir, and C. A. Cawley, of Salmo, who have an agreement providing for purchase of the claims from Ballinger. The ground covered is near the head of the East Fork of Erie Creek, 3¼ miles by trail northerly from the point where the Erie Creek road crosses the East Fork. This point is about 10 miles by road from Salmo. The country has been burned over recently. It is drift-covered to a depth of from 1 to 6 feet in the vicinity of the workings which lie west of the creek on a moderate slope to the south-east.

The rock-formation where exposed is rather fine-grained greenstone. Two vein-fractures have each been traced by surface-cuts and explored by a short adit. The surface-wash is loose and soon covers the bed-rock exposed in cuts. The veins are narrow, varying from a mere crack to 10 inches, and probably average about 3 inches in width. They consist of white quartz containing a little chlorite and occasionally some pyrite. A good deal of free gold may be seen in certain sections in the surface-cuts. The wider sections do not appear to be rich. Moderately-coarse free gold may occur in milky quartz with little rust. A specimen of rusty vuggy quartz, containing inclusions of wall-rock, assayed: Gold, 4.40 oz. per ton; silver, 0.4 oz. per ton; and a specimen of quartz with fine-grained pyrite coated sooty-black assayed: Gold, 6.8 oz. per ton; silver, 0.3 oz. per ton. These specimens were selected from the lower adit dump. The veins are roughly parallel, about 90 feet apart, and strike from south-west to west, dipping from 40 to 70 degrees northerly, or into the hill. The outcrops of the veins rise as they are followed south-westerly. The vein which outcrops farthest from the creek is called " No. 1 " and the other " No. 2."

The No. 1 vein was indicated at the easterly end in three cuts over a length of about 50 feet varying from 1½ to 8 inches in width. Under these cuts No. 1 adit has been driven. South-westerly, on the projected strike about 250 feet from the last cut, a vein was exposed and followed in a series of cuts for a length of 100 feet. In this section the writer took a composite sample from five points, which assayed: Gold, 1.28 oz. per ton; silver, 0.4 oz. per ton; the average width was 3 inches. This was exclusive of sections showing a great deal of free gold. No. 1 adit at approximately 4,700 feet elevation was driven as a crosscut at north 55 degrees west for 25 feet where it cut the vein, which is 2 to 4 inches wide, dips 40 degrees to the north-west, and strikes north 65 degrees east. The vein was followed 10 feet north-easterly and 25 feet south-westerly to a fault, beyond which it was followed 15 feet striking north 80 degrees west and dipping 65 degrees to the north. The fault, which at the vein strikes due north-south and dips 75 degrees to the west, has been followed for 15 feet, in which distance it curves to a south-westerly course. From the fault white quartz, 8 inches wide, curves to join the vein on the south side 5 feet to the west. Two narrow quartz-stringers also run into the vein which, however, has the usual width of 2 to 4 inches west of the intersection.

The No. 2 vein 80 or 90 feet to the south-east was prospected by surface-cuts for a length of about 500 feet, and No. 2 adit has been driven under the cuts at the eastern end. Cuts were fairly closely-spaced at the eastern end, exposing a vein 3 to 5 inches in width striking south-westerly and dipping from 40 to 60 degrees north-westerly. The cuts to the south-west showed a similar vein carrying free gold at various points. The last 100 feet appeared to be offset up the hill about 20 feet to the north-east. This section had a width of about 3 inches and carried free gold. From a caved cut near the western end quartz, 8 inches wide, assayed: Gold, 0.03 oz. per ton; silver, 0.2 oz. per ton. No. 2 adit-portal is about 90 feet at south 20 degrees east from and 35 feet lower than No. 1 portal. The first 30 feet is a crosscut driven at north 80 degrees west to intersect the vein which was followed for 22 feet by a drift

at south 65 degrees west. In the face the vein is 3 inches wide. A sample across 4 inches, including a little rock from each wall, assayed: Gold, 3.86 oz. per ton; silver, 0.8 oz. per ton. Back from the face 3 feet the width is 10 inches. Here an 11-inch sample assayed: Gold, 0.92 oz. per ton; silver, 0.1 oz. per ton.

Six tons of ore shipped from the property in 1937 yielded 18 oz. of gold.

COPPER-GOLD DEPOSITS.

Salmo-Creston Area.

Motherlode Group.

The six claims forming this group were staked in July, 1937, by L. R. Clubine, of Salmo, and D. Archibald, of Creston. The claims cover ground north of Monk Creek, about 3 miles north of the International Boundary and 21 miles west of Port Hill, the United States customs port on the east side of the Kootenay River, about 7 miles south of Creston. The claims are in the valley of a southerly-flowing tributary of Monk Creek. Monk Creek flows easterly to Priest River, which flows south across the International Boundary. The claims may be reached by a branch trail about 1 mile long which runs north from the old Boundary Trail. From the ferry at Port Hill to the start of the Boundary Trail the distance is about 17 miles by fair road. The Boundary Trail is suitable for pack-horses; the grades are easy; some sections run through swampy ground. The distance to the branch trail is approximately 10½ miles. It is reported that the claims can also be reached from the Dewdney Trail, by coming southerly up a tributary of Summit Creek. The claims are situated near the divide between Summit Creek and Monk Creek.

The branch trail from Monk Creek to the claims climbs steeply for about three-quarters of a mile, then follows an easy grade northerly up the valley of the tributary creek to old surface-cuts about 1 mile from Monk Creek and 900 feet higher. The valley of the tributary creek is fairly broad; the slope rising to the west is quite moderate, the slope to the east is steeper. The country is timbered with balsam and spruce and some pine. Overburden is fairly deep and rock-exposures are infrequent. At the creek near the workings sheared greenstone is exposed striking north 10 degrees west and dipping 65 degrees easterly. Sheared greenstone is also exposed at various points west of the creek. East of the creek outcrops were not found for a considerable distance up the slope, but about 2,000 feet north-easterly there are extensive outcrops of sheared pebble conglomerate.

The claims cover ground prospected by Clubine about ten years ago, at which time a number of cuts and trenches were made. Nothing has been done recently and the cuts were partly caved in when the writer examined the property. The cuts at approximately 5,750 feet elevation are just east of the creek which flows southerly. The cuts and trenches run east-west designed to prospect mineralization in a zone of fracturing and shearing of general north-south strike and steep westerly dip. There are six cuts or trenches crossing the strike in a distance of 110 feet, and another cut a further 120 feet to the south. As the cuts were partly caved and the overburden is from 2 to 5 feet deep the occurrence was quite incompletely exposed. There was evidence of mineralization across a maximum width of 20 feet with an easterly extension which appeared to be along a cross-fracture. Clubine reported a considerably greater width from the caved-in part of one cut. In addition to rusty gossan, pyrite, chalcopyrite, pyrrhotite, and a little galena were exposed in a gangue of quartz, ankeritic carbonate, and sericitic material. Well-mineralized material was found to carry values in copper and silver, while rusty gossan gave an assay of 0.20 oz. of gold per ton.

The most northerly working is a shallow trench 60 feet long, extending easterly from a point near the creek. The next cut, about 40 feet to the south, is 20 feet long and largely caved in, but a good deal of quartz was to be seen over a width of about 3½ feet. Three cuts, each about 20 feet long, are at distances of 45 feet, 65 feet, and 90 feet from the most northerly working. These are partly caved in but showed evidence of quartz and sulphide mineralization for most of their lengths. At the west end of the cut at 45 feet a strong slip was exposed, striking due north and dipping 70 degrees to the west. The best exposure was in a cut which started near the creek and extended 45 feet easterly, attaining a depth of 10 feet at the east end. This cut, about 110 feet from the north end of the workings, was caved in for 30 feet from the west end. The rock walls exposed from 30 feet to the 10-foot face at 45 feet were rusty and cut by quartz-filled fractures. Near the face a 2-foot fracture,

striking north 20 degrees east and dipping 70 degrees westerly, contained quartz and rusty gossan. A sample of selected rusty gossan assayed: Gold, 0.20 oz. per ton; silver, 2.5 oz. per ton; copper, 0.4 per cent. The face exposed strong jointing striking somewhat south of east, standing vertically, and a quartz-filled cross-fracture 2 to 4 inches wide, striking a little north of east and dipping steeply to the south. A sample of the quartz assayed: Gold, trace; silver, 0.2 oz. per ton; copper, 0.1 per cent. On the surface, above the 10-foot face, a cross-fracture was followed 15 feet easterly in a shallow trench. Near the creek there was a pile of 5 or 6 tons of well-mineralized material, which Clubine reported came from the caved-in part of the cut from 23 to 30 feet west of the face. This material consisted of quartz, ankeritic carbonate, and sericitic material with fairly coarse pyrite, aggregates of chalcopyrite containing pyrrhotite, and a little galena. A sample of fairly well-mineralized material from this pile assayed: Gold, trace; silver, 4.5 oz. per ton; copper, 2.4 per cent. A 20-foot cut near the creek 120 feet farther south was almost completely caved in.

SILVER-LEAD-ZINC AND COPPER-SILVER DEPOSITS.

South-East Kootenay Area.

Burt Group.

The six claims constituting this group are held by John Powelson, of Dumont Siding, and his associates. The group lies north of Sand Creek, about 2½ miles north-easterly from Dumont Siding, which is on the Crowsnest branch of the Canadian Pacific Railway. The Dumont sawmill at the siding is adjacent to the southern Trans-Provincial Highway, at a point approximately 17 miles easterly from Wardner. The *Burt* group is reached from Dumont's sawmill by a logging-road, the distance being 3½ miles. From the road a trail about a third of a mile long climbs 400 feet to the upper adit, at approximately 3,900 feet elevation. The western end of the *Burt* group is about three-quarters of a mile from the transmission-line of the East Kootenay Power Company.

The fairly broad valley of Sand Creek runs south-westerly through the most westerly range of the Rocky Mountain system and merges with broad bench lands which extend to the Kootenay River some miles to the west. On the westerly slope of the mountain north of Sand Creek there is an extensive rock-slide. The workings on the *Burt* group extend from the intersection of the steep westerly slope with the equally steep south-easterly slope toward Sand Creek.

The slope to Sand Creek, in the vicinity of the workings, is generally grassy, with some trees. Overburden is up to 3 feet deep and there are not many outcrops. Rocks outcropping in the vicinity are principally of sedimentary origin. The workings consist of two adits starting from the westerly slope and some rather widely-spaced surface-cuts, the farthest of which is about 2,300 feet somewhat north of east from the upper adit. These workings expose flat-lying argillaceous beds, of a greenish-grey colour. The beds are cut by a dyke which has been very much altered but which may have had a composition of the general order of diorite. The dyke strikes north 75 degrees east and dips steeply southerly. It appears to have a width of 30 or 40 feet. Fracturing in the dyke, from 6 inches to 2½ feet in width, is filled with quartz and chloritic wall-rock. The fracturing strikes somewhat north of east and dips steeply northerly. At several points the vein contains a good deal of sulphide mineralization over widths from 1 foot to 18 inches. The sulphide minerals are principally galena and sphalerite, but also include a little pyrite and occasionally some chalcopyrite. Moderate values in silver were obtained from samples of the lead and lead-zinc mineralization. In the adits, and in a cut near the upper adit, the vein is displaced by faulting, the western segment is offset some feet to the south relative to the eastern segment.

The lower adit is an old working which, according to Powelson, was driven prior to 1914. Powelson and associates staked the group in 1936 and did surface work that fall. When the writer examined the property in June, 1937, further work had been done on surface-cuts; the upper adit had been driven 70 feet from the end of a 30-foot rock-cut; and the old adit, 60 feet below, was being reopened. Preparations were being made to make a shipment of sorted lead ore.

The vein is exposed in surface-cuts near the upper adit, the width between walls being from 1½ to 2½ feet, a good deal of the included material being chloritic wall-rock. Between 1,350 and 1,450 feet easterly from the upper adit-portal there are three cuts, the first shows

the vein 2 feet in width, the next appears to be in the foot-wall and exposes quartz stringers only. The third cut exposes fracturing across 30 inches of which 15 inches at the northern side consists principally of quartz containing some sulphides. From the dump here the writer selected quartz well-mineralized with galena, somewhat gneissic in texture. This material assayed: Gold, trace; silver, 8.0 oz. per ton; lead, 31.0 per cent.; zinc, 1.6 per cent.

About 550 feet farther a cut at 4,075 feet elevation has been driven 25 feet northerly to the vein. It cut through flat-lying sediments for 8 feet before reaching the contact with the dyke, which strikes north 75 degrees east and dips 75 degrees southerly. The dyke is rather fine-grained and altered. At the end of the cut the vein was exposed, striking north 75 degrees east and dipping 70 degrees northerly. Quartz 12 to 15 inches wide was fairly well-mineralized with galena and sphalerite. This cut is 250 feet or so above a bench just north of Sand Creek. There is an old partly-caved trench 300 feet to the east, beyond which a draw cuts across the projection of the strike.

The upper adit at 3,900 feet elevation was driven 50 feet at north 75 degrees east, following a vein containing 6 to 18 inches of quartz and a little sulphide mineralization. The drift then follows a 3-foot fault-strand at north 25 degrees east for 18 feet. The fault-strand dips 60 degrees north-westerly. At the end of the working, east of the fault, the quartz vein striking north 75 degrees east and dipping steeply to the north was encountered. This quartz, 18 inches wide, was mineralized with galena and sphalerite, a sample across the full width assayed: Gold, trace; silver, 7.0 oz. per ton; lead, 3.1 per cent; zinc, 6.2 per cent.

Down the westerly slope, at 60 feet lower elevation, the old adit started near the edge of the talus slope. This working followed a vein with quartz-filling from 6 inches to 2 feet wide for 150 feet at north 65 degrees east. The quartz was rusty, but did not appear to be well mineralized, numerous quartz stringers striking north-south cut the walls. At 150 feet the drift encountered a fault-strand striking due north and dipping 65 degrees to the west. The vein was encountered on the east side of the fault about 10 feet to the north. The working continued some distance past the eastern segment of the vein, but was partly filled with debris. From what could be seen it appeared that south of the fault the working had gone through the dyke into flat-lying sediments. The vein striking north 75 degrees east and dipping steeply to the north had been followed easterly for 15 feet from the fault. For this distance quartz 12 to 15 inches in width was well mineralized with galena and sphalerite.

Near the *Burt* group work has been done on three other properties, on copper-silver mineralization. West and north-west of the *Burt* group, Powelson and associates have located the *Dean* group and the *Rex* group. Both of these are old prospects on which pyrite and chalcopyrite in quartz and siderite had been exposed in the old workings. The writer visited the *Dean* group in 1937 and was shown some old surface-cuts and two short adits, one of which was caved. The *Rex* group was visited in 1936, at which time the workings consisted of shallow trenches and an 8-foot pit. Lying north of the *Burt* group there are the *Empire* and *Strathcona*, Crown-granted claims, which in 1936 were under option to Powelson and associates. This property has been described in the Annual Reports of the Minister of Mines, British Columbia, for 1898, 1929, and 1930. A good deal of work has been done on this property, and several of the workings were accessible in 1936. Much of the vein consists of siderite with some quartz and very little sulphide mineralization; however, there are better mineralized sections. Quite well-mineralized material may be selected from the dump of the highest adit. In the following table the assays are given of specimens and samples from these three properties:—

Description.	Gold.	Silver.	Copper.
	Oz. per Ton.	Oz. per Ton.	Per Cent.
Dean group, quartz with pyrite and chalcopyrite, from pile near portal of open adit	0.01	6.2	1.5
Dean group, grab samples from dump near portal of caved adit	Trace	0.4	1.4
Rex group, quartz and wall-rock with chalcopyrite; width, 5 feet; from west end of pit	Trace	1.6	1.1
Empire-Strathcona group, selected from highest adit dump—			
(*a.*) Material well-mineralized with chalcopyrite	0.06	3.2	8.9
(*b.*) Material well-mineralized with pyrite, some chalcopyrite	0.10	1.1	4.2

PLACER-GOLD DEPOSITS.

Inca Placer Leases.

During the past three seasons placer operations have been conducted by the Consolidated Mining and Smelting Company on the Inca Placer Leases which are adjacent to Palmer Bar Creek, not far from Lumberton, in the Fort Steele Mining Division. The workings may be reached by a branch road about 2 miles long which leaves the highway 7 miles from Cranbrook. Another route is by a branch road through Lumberton.

Palmer Bar Creek flows south-easterly in the vicinity of the workings, which are situated on the north-east side of the creek. Extensive testing has indicated an area of gravel 400 feet wide and about half a mile in length, carrying sufficient gold to be attractive commercially. This area trends northwest-southeast, parallel with the stream, and from 5 to 30 feet above the stream-level. North-east of the bench the ground rises fairly steeply to higher benches. The valley of the creek narrows between 30-foot walls of quartzite, not far north of the pay-gravel. The gravel is unsorted and contains many large boulders of granitic rocks and quartzite. As in other placer deposits adjacent to Palmer Bar Creek gold is found in the top few feet of gravel. Testing by the company included drilling several holes to bed-rock, the deepest going down about 200 feet. Numerous test-pits were also sunk. According to information supplied by company officials values of any consequence were confined to the top 3 to 6 feet of gravel. The gold, which is comparatively coarse, was found to become more flaky toward the south-east end of the pay area, while at the north-west end paying values ceased abruptly. In 1937 testing in one section indicated values extending north-easterly up the slope from the low bench.

While there is no barren overburden to be handled in this deposit there is a great quantity of very large boulders in the pay-gravel, and the great depth of underlying barren gravel presents unusual difficulties. Considerable ingenuity has been shown in the efforts designed to recover the gold economically. Water for sluice-boxes is obtained from a dam half a mile up-stream from the upper end of the pay-gravel. A flume carrying water from the dam has been built parallel with the long dimension of the pay area, along the slope which rises to the north-east above the low bench. Limited sections of the deposit have been worked by hand-shovelling into a line of sluice-boxes extending south-westerly from the flume across the pay-gravel toward the creek. Because of its cost and because of the quantity of large boulders this method had limited applicability. A later procedure was to load gravel mechanically into a substantially-built line of boxes designed to be moved along the deposit. The gravel was dug by a Diesel power-shovel which dropped its load on a belt-conveyor driven by a small gasoline-engine. The conveyor elevated the gravel to the sluice-boxes. It is 70 feet in length and was designed to be moved readily along the sluice-boxes. More recently the practice has been to move the gravel from the shovel to the conveyor in motor-trucks. A picture of a truck being loaded at a movable loading-pocket appears in this report. A grizzly with 6-inch openings is used above the loading-pocket, and the power-shovel stacks the oversize boulders nearby. The largest boulders are left in the pit. Two trucks were engaged hauling gravel from the loading-pocket to the conveyor at the sluice-boxes. This method of operation is flexible and eliminates the necessity of moving the conveyor frequently.

Hail Columbia Group.

This group of three placer leases held by A. McCrae is situated on the east side of the Columbia River, approximately 62 miles north-westerly from Revelstoke. The workings are accessible by a trail about a third of a mile long connecting with the Big Bend Highway. In 1937 the northern part of the highway was under construction but was passable as far as Mile 62; it is at no great distance from the river at this point. The McCrae leases were staked to cover ground extending for about a mile along the east side of the river. There is a narrow bench along the river in the vicinity of the workings, the ground rising rather steeply back of the bench. The slope is timbered with spruce and cedar trees up to 3 feet in diameter.

McCrae and his two sons operate the property. Work was started on the river-bank during the low-water period in 1934. The present working consists of a pit extending some distance from the river. A cut has been run for about 160 feet from the river-bank, starting at a point a short distance down-stream from the first working. The cut was made through unconsolidated material for 140 feet, but in the last 20 feet went through thin-bedded cherty sediments extending 3 or 4 feet above the floor of the cut. From the end of the cut the pit

was advanced easterly and was about 80 feet long in July, 1937. The pit averaged about 20 feet in width, the depth increasing from 10 feet where the pit started to more than 20 feet at the face. The surface slopes fairly steeply to the pit from the south-east. Near the face of the pit, at the south side, blue clayey ground 3 feet thick rests on bed-rock. Gravel 12 to 15 feet thick overlying the clay contains boulders, a few of which are 3 feet across. The gravel is quite rusty at the bottom and is weakly cemented. McCrae reported that values were obtained from the clay at bed-rock, and from the overlying gravel, but that the best values were coming from boulder-clay which overlies the gravel. The boulder-clay rests on an undulating surface marked by a layer of hard-pan; it is overlain by surface-wash containing a great deal of humus. The thickness of the boulder-clay is somewhat variable, averaging about 6 feet where exposed; it contains large boulders, some of which are 8 feet long. The gold is rather coarse, McCrae reported one nugget weighing 16 dwt. and others running up to 7 dwt.

A ditch running about 700 feet south-westerly carries water from a creek to a small draw in which a dam has been constructed. From the dam the water is conducted south-westerly through 800 feet of ditch and split-cedar flume to a reservoir just ahead of the pit. The reservoir, about 15 feet wide, 50 feet long, and 4 to 5 feet deep, is closed by a boom gate. When the writer visited the property it required about half an hour to fill the reservoir. Sluice-boxes built of split cedar were laid in the cut, from the end of the pit to the river. A track was also laid in the cut, and boulders which would not pass the 10-inch grizzly at the entrance to the sluice-boxes were trammed to the dump near the river. Where possible the very large boulders were being left in the pit, those around which it was inconvenient to work were being broken by blasting.

Last Chance Group.

In 1937 the six placer leases known as the *Last Chance* group were the scene of operations of a partnership represented by R. M. Reid. The leases are situated in a basin on the east side of McCulloch Creek, and lie north of leases held by D. Philmore and C. Williams lower on the creek. The creek flows southerly into Goldstream, a westerly-flowing tributary of the Columbia River, north of Revelstoke. From a point on the Big Bend Highway, about 57 miles from Revelstoke, the Old Goldstream trail runs north-easterly for about 5 miles to Goldstream. There is a cable-ferry crossing Goldstream, and from the north side a trail runs northerly for half a mile to the cabin occupied by Philmore and Williams. From this point a trail climbs the steep slope east of McCulloch Creek, attaining an elevation of 4,200 feet in the basin, 2½ miles by trail from the ferry and at 2,200 feet higher elevation. Three hundred yards farther, near the east side of McCulloch Creek, there is a small cabin which is understood to be on the No. 1 lease of the *Last Chance* group.

On the west side of McCulloch Creek opposite the basin the slope rises steeply, with numerous rock bluffs. About half a mile northerly from the cabin the basin terminates at a talus slope rising steeply to the north. The floor of the basin extends for about a quarter of a mile easterly from the creek. The slope to the south begins to be steep about a quarter of a mile south of the cabin. For a considerable distance the creek drops in a series of cascades. The steep slope east of the creek is wooded with small evergreen trees, as are also the more gentle slopes within the basin. Rock-exposures were noted west of the creek opposite the basin, but were not observed within the basin. It was reported that a shaft north of the cabin had reached a depth of 65 feet. It is apparent that there is a large volume of unconsolidated material in the basin but when the writer visited the property there seemed to be little precise information available concerning the depth to bed-rock, the nature of the unconsolidated material, and whether or not it carries values in gold. Information supplied by Reid after the operation had been shut down for the winter indicated that a considerable amount of testing had been done during the season.

When the writer visited the property in July, work was being done at the east side of the creek, about 300 yards southerly from the cabin, at approximately 3,950 feet elevation. Near this point the caved portal of an old drift indicated that former workers had done some prospecting here. The slope west of the creek rises steeply, but on the east side the slope is gentle and on this side there appears to be from 20 to 30 feet of unconsolidated material. In the creek channel there are many angular boulders, doubtless derived largely from the bluffs on the west side. The recent work had consisted in advancing a grade on the east side of the

stream from a point where the grade to the creek was steep and bed-rock was exposed. About 160 feet of sluice-boxes had been laid. Large boulders were moved by the aid of a hand-powered derrick. This work is reported to have yielded a little gold, but much better returns were being obtained from a point where the bed-rock dropped sharply toward the eastern bank of the stream. It was reported that values were almost entirely concentrated on bed-rock. The gold which had been recovered varied from moderately fine to quite coarse, the largest nugget being about 3/16 by 3/8 by 5/8 inch. The gold was angular and some of it was rather porous.

SPECIAL REPORTS.

Typewritten copies at 25 cents each are available to those who specially request reports on the following properties:—

BAYONNE-MIDGE CREEK AREA.

Montana.
Virginia Group.
Hilltop and Sitka.

PROGRESS NOTES.

LODE-GOLD DEPOSITS.

BY

H. E. MIARD.

VICINITY OF NELSON.

Granite-Poorman.—Situated on Eagle Creek near Blewett, about 5 miles west of Nelson. The Livingstone Mining Company, Incorporated, with H. R. Smith as manager, operated the mine throughout the year with a crew of eighteen (fourteen underground, two on the surface, and two at the mill). The total production amounted to 2,403 tons. Two hundred and sixteen tons, shipped to Trail, yielded 216 oz. gold and 239 oz. silver. In addition, 77 tons of concentrates yielded a total of 135 oz. gold and 210 oz. silver.

Venus-Juno.—This property, situated on Morning Mountain and owned by R. Heddle, of Nelson, was operated by lessees during the year, and 169 tons of ore shipped to Trail yielded 231 oz. gold and 451 oz. silver.

Athabasca.—Situated on Morning Mountain adjoining the *Venus-Juno*. Owned by the Noble Five Mines, Limited; manager, Paul Lincoln. Seventy-four tons of ore shipped to the Trail smelter yielded 127 oz. gold, 261 oz. silver, 2,742 lb. lead, and 3,567 lb. zinc. In addition, 4 tons of concentrates yielded 7 oz. gold, 12 oz. silver, 67 lb. lead, and 222 lb. zinc.

California.—This property was operated desultorily by four different groups of lessees, seven men entering into the various partnerships. A total of 31 tons was shipped from the mine, this yielding 41 oz. gold, 117 oz. silver, 454 lb. lead, and 2,019 lb. zinc.

Perrier.—Situated about 4 miles south of Nelson, on the road to Ymir. Owned by Perrier Gold Mines, Limited, with headquarters at Nelson. Four hundred and seventy-nine tons of ore shipped to the Trail smelter contained 121 oz. gold, 481 oz. silver, 2,055 lb. lead, and 8,009 lb. zinc; while one ton of concentrates yielded 1 oz. gold and 2 oz. silver.

Starlight.—Twelve tons of ore shipped from this property by J. Poje, of Nelson, yielded 12 oz. gold and 60 oz. silver.

Fern.—Situated on Hall Creek, and operated by Gold Fern Mines, Limited. Five tons of ore yielded 3 oz. gold and 28 oz. silver.

Alpine Group.—Situated at the head of Sitkum Creek. Operated by the Alpine Syndicate under the direction of B. N. Sharp. The construction of 9 miles of road along Sitkum Creek was completed; some camp buildings were erected; No. 10 level was started; and some surface-stripping was done. Twenty men were employed.

YMIR CAMP.

Tamarac.—Situated on Elise Mountain and operated by Balsam Gold Mines, Limited. Construction of a road from the *Goodenough* to the mine was completed. The old workings

were repaired, one of the winzes was pumped out, and an adit intended to intersect the vein at depth commenced. The number of men employed varied between twelve and seventeen, and the operations were directed by Paul M. Smith, who resigned late in the year and was succeeded by Fred O. Orr.

Ymir.—Operated by the Ymir Consolidated Gold Mines, Limited; manager, G. G. Sullivan. Lessees worked for some time during the early part of the year; the mine then remained idle until the later part of the year, when some exploratory-work was started underground. Three men were employed for some time on the surface in stripping operations. Twenty-two tons of ore shipped to the Trail smelter yielded 20 oz. gold, 95 oz. silver, 2,962 lb. lead, and 3,248 lb. zinc. The development-work done amounted to 72 feet of drifting and 77 feet of crosscuts.

Goodenough.—On Elise Mountain. Operated by the Ymir Consolidated Gold Mines, Limited; G. G. Sullivan, manager. The number of men employed varied considerably, according to the momentary nature of the operations, as few as nineteen and as many as forty-one being on the pay-roll at one time. The development and exploratory work done consisted of 719 feet of drifting, 234 feet of raising, and 1,532 feet of diamond-drilling. The total output was 8,702 tons, from which 863 tons of concentrates were produced, these yielding 2,806 oz. gold, 16,358 oz. silver, 294,565 lb. lead, and 185,453 lb. zinc.

Blackcock.—This property was operated under lease by Thos. Wilkinson, of Ymir, and associates. Eight tons of ore shipped to the Trail smelter yielded 4 oz. gold, 22 oz. silver, 479 lb. lead, and 386 lb. zinc. In addition, 9 tons of concentrates produced from ore treated at the mill of the Ymir Consolidated Gold Mines, Limited, yielded 33 oz. gold, 79 oz. silver, 2,577 lb. lead, and 1,984 lb. zinc.

Ymir-Wilcox.—Owned by the Wilcox Mines, Limited, and under lease to the Ymir-Wilcox Mining Syndicate; manager, Jas. A. Cullinane. The mine was operated during seven months, a total of ten men being employed. The development-work done consisted of 200 feet of crosscuts. A 10-stamp mill is operated. The total production amounted to 2,440 tons, from which 59 tons of concentrates were obtained, these yielding 156 oz. gold, 576 oz. silver, 8,592 lb. lead, and 6,550 lb. zinc. In addition, amalgam yielded 458 oz. gold and 457 oz. silver.

Yankee Girl.—Operated by the Ymir Yankee Girl Gold Mines, Limited; manager, H. W. Seamon, who resigned in September and was succeeded by L. G. Morrell. Mine superintendent, Jas. D. Ferguson; mill superintendent, Jno. Vallance. The average working force numbered 102, seventy men being employed underground, sixteen on the surface, and sixteen at the mill. The development-work done included 2,755 feet of drifting, 1,146 feet of raising, 129 feet of crosscutting, and 2,593 feet of diamond-drilling. The total production was 39,356 tons. A total of 2,956 tons of lead concentrates yielded 10,889 oz. gold, 44,937 oz. silver, 911,473 lb. lead, and 547,801 lb. zinc.

Ymir Centre Star.—This property, situated on Jubilee Mountain, is operated by the Wesko Mines, Limited, with Harold Lakes as manager, Harry Stevens as mine superintendent, and John Sandberg in charge of the mill. Operations were carried on actively throughout the year. The mine crew numbered thirty-nine, while twenty-three men were employed on the surface and six at the mill, including the technical staff. The development-work done comprised 1,618 feet of drifting and 781 feet of crosscutting. In addition, 3,407 feet of diamond-drilling were done also. A total of 34,633 tons was mined and milled, from which 2,874 tons of concentrates were obtained, these yielding 7,454 oz. gold, 59,939 oz. silver, 1,388,710 lb. lead, and 553,717 lb. zinc. In addition, 210 lb. of bullion shipped carried 244 oz. gold and 856 oz. silver.

Myrtle.—This property, situated on the outskirts of Ymir and owned by A. S. Curwen, was operated for some time by H. Brown, who shipped 3 tons of ore from it to the Trail smelter, the total returns being 3 oz. of gold and 9 oz. of silver.

Spotted Horse.—The Spotted Horse Syndicate, of Ymir, shipped 24 tons of ore from this property, which yielded 23 oz. gold and 14 oz. silver.

Vicinity of Salmo.

Queen.—Operated by Sheep Creek Gold Mines, Limited; manager, H. E. Doelle; mine superintendent, F. R. Thompson; mill superintendent, Louis Vogel. Exploration of the *Bruhn* and *Hideaway* veins, on the Nos. 5 and 7 levels, disclosed the presence of ore-shoots carrying high values, and the development of these new sections of the mine proceeded actively

throughout the year. Another crosscut was driven towards them on the No. 9 level. Little work was done on the *Yellowstone* vein. A new adit was started on the *Hideaway* and this, when connected with the workings opened from the *Queen* levels, will facilitate the ventilating of the entire mine by natural means. The average number of men employed was ninety-nine, sixty-eight underground, twenty-one on the surface, and ten at the mill. The development-work done totalled 9,302 feet; this comprising 5,546 feet of drifting, 2,737 feet of crosscuts, and 1,019 feet of raises. The tonnage mined and milled was 54,243, from which bullion, yielding 23,923 oz. gold and 8,419 oz. silver was obtained.

Kootenay Belle.—Operated by the Kootenay Belle Gold Mines, Limited; manager, Vere McDowall; mine foreman, Jno. Tonkin; mill superintendent, Neil Munro. The development of the section opened by No. 3 adit-level continued actively during the year and No. 4 level, started 313 feet below No. 3 in the early summer, had nearly reached A vein when some difficult ground was encountered, this decreasing the rate of advance to some extent. The power plant was reinforced by the addition of a Canadian Ingersoll-Rand 24-inch and 14½-by 12-inch L-type compressor, driven by a 300-horse-power synchronous motor. Development-work totalled 3,137 feet; this comprising 1,445 feet of drifting, 1,612 feet of crosscutting, and 80 feet of raising. The tonnage mined and milled was 39,935, from which bullion yielding 16,098 oz. gold and 5,476 oz. silver was obtained. Ninety-eight men were employed.

Reno.—Operated by the Reno Gold Mines, Limited; manager, W. S. Ellis; mine superintendent, A. K. Olsen; mill superintendent, Albert Norcross.

Exploratory-work, in the form of a crosscut driven to the *Donnybrook* vein and of some drifting done on this and on another parallel vein met while driving towards the former, was carried on in the course of the year. The sinking of a winze, from the lower level on the *Reno* vein, is contemplated as a means of exploring the deposit and continuing development at greater depth. Some of the older workings above No. 4 level were repaired with the object of resuming operations. In the early period of operation, owing to various factors, some ore-bodies now considered as valuable were left behind and must now be recovered under conditions which cannot be considered otherwise than as presenting considerable difficulty.

The total number of men employed averaged 120; seventy-eight underground, twenty-three on the surface, and nineteen at the mill. Development-work consisted of 3,581 feet of drifting, 1,400 feet of crosscutting, 297 feet of raising, and 14,618 feet of diamond-drilling. A total of 45,984 tons was mined and milled, this yielding 22,811 oz. gold and 9,373 oz. silver.

Gold Belt.—Situated on Sheep Creek and operated by the Gold Belt Mining Company, Limited (head office, 616 Stock Exchange Building, Vancouver). Manager, M. O'Donnell. Operations were limited to development-work, but it is reported that the construction of a mill is to be undertaken in the spring. Early in the year an ore-body was met in the 1,300 (now known as the 8,000) drift, and this led to considerable development-work being done on this and on a parallel vein. A further consequence was the driving of the 2,100 adit-crosscut, intended to strike these two veins 250 feet below the present workings. Incidentally, two other small but apparently rich veins were met unexpectedly in this new work. The total number of men employed varied between twenty-two (fourteen underground) in January and forty-three (thirty-two underground) in August. In the inner section of the mine diamond-drilling was done during the year. The development-work done totalled 6,505 feet, this consisting of 3,481 feet of drifting, 2,655 feet of crosscutting, and 369 feet of raising.

Clubine-Comstock.—On Boulder Creek, about 4 miles north of Salmo. Operated by Clubine-Comstock Gold Mines, Limited, with L. R. Clubine as manager. A crew of fifteen (eleven underground) was employed throughout the year, most of the work being done by hand. The production amounted to 998 tons, which yielded 956 oz. gold and 1,669 oz. silver.

Ore Hill.—Situated near the head of Billings Creek and about 4 miles by road from the Queen Mine. Operated by Kootenay Ore Hill Gold Mines, Limited, with H. D. Forman as manager. Eighteen men were employed (ten underground). The total production amounted to 974 tons. Of this, 505 tons shipped to the Trail smelter yielded 751 oz. gold, 1,102 oz. silver, 47,457 lb. lead, and 48,549 lb. zinc; while 68 tons of concentrates contained 233 oz. gold, 226 oz. silver, 9,540 lb. lead, and 7,966 lb. zinc.

Erie Creek Area.

Keystone.—Situated on the mountain of the same name. After having been operated desultorily by lessees for several years, the property was taken under option by Dufferin

Golds, Limited (head office, 729 Standard Bank Building, Vancouver). Four men were employed underground and four on the surface under the direction of Andrew Sostad. Sixty-four tons of ore shipped to the Trail smelter yielded 39 oz. gold, 83 oz. silver, 1,151 lb. lead, and 2,557 lb. zinc.

Second Relief.—On the north fork of Erie Creek, 13 miles by road from Erie. Owned and operated by the Relief-Arlington Mines, Limited, with S. M. Manning as manager, Walter Tattrie as mine superintendent, and Gustav Kvist as mill superintendent. The newly-discovered vein, on the north side of the gulch, has been opened by drifting over a length of several hundred feet. The shaft was sunk to the depth of another level in the course of the past winter, and the conditions found there differed little from those met at higher points. The number of men employed varied between ninety-two in March (fifty-five underground) and 103 in September (sixty-six underground, thirty-six on the surface, and eleven at the mill). The total tonnage mined and milled amounted to 26,822, this yielding bullion carrying 13,070 oz. gold and 2,963 oz. silver. In addition, refinery slag and amalgam shipped to Trail contained 66 oz. gold and 280 oz. silver.

Rossland-Trail Area.

Properties of the Consolidated Mining and Smelting Company of Canada, Limited—*The Iron Mask, Centre Star, War Eagle, Josie No. 1, Josie No. 2, Le Roi, Black Bear, Annie,* and *Columbia-Kootenay*—were operated by lessees under the arrangements made by the company in 1933. In all, thirty-four underground and surface leases, in which ninety-two men participated, were in effect in the course of the year. The total tonnage shipped to the Trail smelter amounted to 8,216 tons; this yielding 6,381 oz. gold and 7,596 oz. silver.

Velvet.—Situated on Sophie Mountain, about 12 miles west of Rossland, on the Cascade Highway, and operated by the Velvet Mining Company, Limited (head office, 8655 East Marginal Way, Seattle, Wash.), with Lewis Frederick as manager. The mine was operated for several months in 1937. Work on the property was suspended in September owing to a shortage of water. A crew of thirty-four was employed (sixteen underground, twelve on the surface, and six at the mill) for a period of eight months. The total tonnage mined and milled amounted to 7,948. The concentrates, shipped to the Tacoma smelter, yielded 1,085 oz. gold, 875 oz. silver, and 96,491 lb. copper.

I.X.L.—This property, situated on Mount Roberts, was operated for some time by the I.X.L. Lessors, Limited (of Rossland), three men being employed under the direction of Ole Osing. Two hundred and eighty-four tons of ore shipped to the Trail smelter yielded 270 oz. gold and 121 oz. silver. In addition, 86 oz. gold and 15 oz. silver were recovered from 393 lb. of concentrates.

O.K.—Operated by the O.K. Leasing Company (c/o Ira L. Hendrickson, Rossland). Only two men were employed during the year. Twenty-three tons of ore shipped to the Trail smelter yielded 3 oz. gold and 25 oz. silver. The development-work done consisted of 10 feet of drifting, 25 feet of crosscutting, 45 feet of shaft, and 28 feet of winzes.

Midnight.—Two lessees worked on this property during the year. Sixty-eight tons of ore shipped to the Trail smelter yielded 11 oz. gold and 34 oz. silver.

Gold Drip.—This property, owned by Mrs. M. D. McKinnon of Beverley Hills, California, was operated under lease by C. A. Ritchie and partner. Fifty-two tons of ore sent to the Trail smelter yielded 19 oz. gold and 29 oz. silver, while 30 lb. of high-grade ore, shipped separately, carried 3 oz. of gold.

Silverine.—Five tons of ore shipped from this property by the owners, A. O. Fried and M. Penny, of Rossland, yielded 1 oz. gold and 20 oz. silver.

Evening Star.—Situated on Monte Cristo and owned by the Evening Star Mining Co. The property was operated under leases held by R. H. Griswold, Sanford Heidler, Philip Krpan, the brothers Conroy, and Werner Nelson, a total of eleven men being employed. Aggregate shipments of 165 tons yielded 61 oz. gold and 42 oz. silver.

Iron Colt.—Philip Krpan and J. Radowich, of Rossland, shipped 9 tons of ore from this property, with total metal contents amounting to 2 oz. gold and 2 oz. silver.

Georgia Group.—On Monte Cristo. Operated by the Gold Cup Mining Company, Limited. A crew varying in number between seven and twelve (eight underground in the latter case), was employed in exploratory and development work under the direction of R. W. Haggen. The possibilities of the *Mascot* claim, adjoining the *Columbia-Kootenay* on the south and east,

were also investigated. The development-work done comprised 452 feet of drifting, 262 feet of crosscutting, 40 feet of sinking, and 304 feet of diamond-drilling.

In addition to the foregoing, small shipments were made from the *Queen* by O. Gowing and L. J. Penny (6 tons, yielding 10 oz. gold and 8 oz. silver); the *Bear*, by T. Mighton, of Trail (6 tons, yielding 18 oz. gold and 2 oz. silver); the *Snow Drop*, by C. Penny, of Rossland; and the *Columbia* mineral claim at Waneta, by W. Crowe (1 ton yielding 1 oz. gold and 3 oz. silver).

Cranbrook Area.

Midway Mine.—Operated under lease by Moyie Gold Mines, Limited; G. Todd, manager. This property is situated approximately 6 miles west of Moyie, and was leased in January from J. Leask, of Cranbrook, by G. Todd and associates. Work was commenced in the beginning of February to clean up around the surface, repair the ore bins and relay tracks preparatory to resuming operations underground. After some necessary repairs had been made to the main adit operations were begun at a point 1,100 feet from the portal, where some ore was mined for a test shipment. Apparently this did not turn out to be as satisfactory as anticipated, because operations were then continued in a more or less spasmodic manner during the summer, and finally suspended in the beginning of September, when the leasers dismantled the machinery and abandoned the property.

SILVER-GOLD DEPOSITS.

Salmo Area.

Shamrock.—Godfrey Birtsch shipped 5 tons from this claim which yielded 1 oz. gold, 23 oz. silver, 561 lb. lead, and 126 lb. zinc.

Lone Silver.—This property, owned by John and Robert Sapples, is situated near Rosebud Lake, approximately 13 miles by road south of Salmo. In 1937 it was operated first by a group of three lessees, headed by S. Heidler, of Rossland; then by the owners, with the help of two other men; and finally by the Lone Silver Gold Mines, Limited (head office 515 Royal Bank Building, Vancouver), with Guy S. Clarkson as manager. Eleven men (six underground) were employed in the latter case for a few months. The development-work done amounted to 120 feet of drifting and 40 feet of sinking. A total of 44 tons shipped to the Trail smelter yielded 9 oz. gold, 5,648 oz. silver, 5,842 lb. lead, and 3,727 lb. zinc.

Trail-Rossland Area.

May Flower.—C. R. Adams and C. Hutchinson shipped 6 tons from this property, the returns being 1 oz. gold, 169 oz. silver, 745 lb. lead, and 756 lb. zinc.

Rossland Union.—This property, situated on Union Hill about 3½ miles north of Rossland, was for some time under option to Calgary interests. A crew of eleven (six underground) was employed under the direction of G. S. Levis. After development-work consisting of 60 feet of sinking and 37 feet of drifting had been done, besides some surface trenching, operations were discontinued. Seven tons of ore shipped to the Trail smelter yielded 1 oz. gold, 240 oz. silver, 1,912 lb. lead, and 888 lb. zinc.

Slocan Lake Area.

Little Daisy.—This property, owned by Mrs. McNaught, of Silverton, was operated for some time by the Slocan Lake Gold Mining Company, Inc. (head office, 503 West Sprague Avenue, Spokane, Wash.), represented by S. E. Jones. A crew of six was employed under the direction of E. A. Erickson, the work done consisting in 106 feet of drifting and 12 feet of raising.

Molly Hughes.—This property, situated on the shore of Slocan Lake about 1 mile north of New Denver, was operated by the Slocan Idaho Mines Corporation (head office, 509 Hutton Building, Spokane, Wash.), with O. C. Born as manager. A crew varying in number between four and sixteen (eleven men underground in the latter case) was employed. The power plant was reinforced by the installation of a 23 k.v.a. Fairbanks-Morse alternator, driven by a 30-horse-power Fairbanks-Morse Diesel engine. The development-work done consisted of 44 feet of sinking, 200 feet of drifting, and 48 feet of crosscutting. Thirty-four tons of ore shipped to the Trail smelter yielded 2 oz. gold, 886 oz. silver, 180 lb. lead, and 205 lb. zinc.

Morning Star.—Situated on Springer Creek. P. W. Munroe and H. E. Scovil shipped 6 tons of ore from this property, the total metal contents being 7 oz. gold, 55 oz. silver, 340 lb. lead, and 344 lb. zinc.

McAllister.—This property, situated on London Mountain, was operated first by the Denver Mining Syndicate, the affairs of which were wound up in December, and afterwards by the Slocan Silver Mines, Limited, with George Allen as manager in both cases. A crew of five was employed underground. The tonnage mined and shipped amounted to 1,281, this yielding 17 oz. gold, 83,317 oz. silver, 179 lb. lead, and 129 lb. zinc.

GOLD-SILVER-LEAD-ZINC DEPOSITS.

Ymir Camp.

Howard.—This property, situated on the South Fork of Porcupine Creek, about 9 miles by road from Ymir, is operated by the Durango Mines, Limited (head office, 850 Hastings Street West, Vancouver), with Major A. W. Davis as manager, Jno. Anderson as mine foreman, and Wm. B. Donohue as mill superintendent. During the greater part of the year operations were limited to exploratory development and construction work. A mill was built close to Porcupine Siding, on the G.N. Railway, most of the machinery installed being brought from the *Dentonia*. At the mine a power plant consisting of a Canadian Ingersoll-Rand 15½-inch and 9½- by 8-inch compressor, driven by a 120-horse-power Fairbanks-Morse Diesel engine, and an Ingersoll-Rand 7½-inch and 12- by 12-inch compressor, driven by a 72-horse-power Diesel engine was installed. An aerial tramway 5 miles in length was built to link the mine and mill. The development-work done totalled 1,688 feet; this including 723 feet of drifts, 165 feet of crosscutting and 800 feet of diamond-drilling. The tonnage milled was 650, with production of 27 tons of lead concentrates yielding 52 oz. gold, 291 oz. silver, 12,007 lb. lead, and 3,840 lb. zinc; and of 28 tons of zinc concentrates with total metal contents of 4 oz. gold, 40 oz. silver, 1,099 lb. lead, 149 lb. cadmium, and 19,948 lb. zinc.

Nevada Group.—David Grobe, of Spokane, employed a few men in exploratory-work on this property, situated on Porcupine Creek. Ten tons of ore shipped to the Trail smelter by the owners, J. A. and M. Armes, of Vancouver, yielded 2 oz. gold, 56 oz. silver, 1,144 lb. lead, and 715 lb. zinc.

Porcupine Group.—An option on this property, owned by E. Haukedahl, of Ymir, was taken late in the year by C. Wolf, of Spokane.

DRY SILVER-ORES.

Vicinity of Salmo.

Florence.—Three tons of ore shipped from this claim by R. Sapples and C. Peterson yielded 72 oz. silver, 58 lb. lead, and 155 lb. zinc.

Slocan Lake Area.

Ottawa.—Situated on Springer Creek about 6 miles by road from Slocan City, and operated by the Ottawa Silver Mining and Milling Company, Limited (head office, 401 Sherwood Building, Spokane). W. R. Green, formerly in charge of operations, resigned late in the year, and was succeeded by C. R. Thomas, of Spokane, with D. D. Fairbanks as assistant at the mine. A new power plant, consisting of a Canadian Ingersoll-Rand 13½-inch and 8- by 8-inch L-type compressor, driven by a Deutz 150-horse-power Diesel engine, was installed. The development-work done was limited to the advancement of No. 8 adit crosscut over a distance of 1,000 feet. The number of persons employed varied between twenty (eleven underground) while the mill was being operated, and nine (seven underground) in December. The total tonnage mined was 375. Fifteen tons of dry ore sent to the Trail smelter yielded 1 oz. gold and 4,722 oz. silver; while the 18 tons of concentrates produced contained 8,749 oz. silver and 3,444 lb. lead.

L.T. and Riverside.—B. E. O'Neail, of Slocan City, shipped 4 tons from the *L.T.*, this yielding 794 oz. silver, 844 lb. lead, and 524 lb. zinc; and T. Elsmore, of Silverton, shipped 17 tons from the *Riverside*, with metal contents of 714 oz. silver, 759 lb. lead, and 679 lb. zinc.

SILVER-LEAD DEPOSITS.

Vicinity of Nelson.

Boadicea.—Lessees working on this property shipped 9 tons of ore, yielding 393 oz. silver and 5,042 lb. lead.

Ainsworth Camp.

Banker.—Situated near Ainsworth; owned by H. Giegerich, of Kaslo, and operated by the Ainsworth Mines, Limited (head office, 101 Adelaide Street West, Toronto), with Carl M. Mohr as manager. The number of men employed varied between nineteen (ten underground) in March, and fifty-two (thirty-two underground) in September. Later this was again reduced to twenty-three (fourteen underground). The chief development-work done consisted in drifting from the shaft and extending the adit-crosscut driven when the Consolidated Mining and Smelting Company was operating the property. The total tonnage mined (including 161 tons shipped in the name of the owner) amounted to 3,305 tons, with metal contents amounting to 27,464 oz. silver and 1,557,552 lb. lead.

Spokane-Trinket.—Adjoining the *Banker* and held by the Maestro Silver Lead Mines, Limited, with Carl M. Mohr as manager. No work was done on this property in the course of the year, beyond erecting a compressor-house, an ore bin, and a blacksmith-shop.

Jewel.—Some work of an exploratory nature was done on this property by the Ainsworth Mines, Limited, under the direction of Carl M. Mohr, this consisting chiefly in the sinking of a small winze. Three men were employed for some time. Twenty-six and a half tons of ore shipped from the mine yielded 196 oz. silver and 14,358 lb. lead.

Lady of the Lake.—S. Romer and A. Prestmo shipped 3 tons of ore from this property, yielding 118 oz. silver and 1,580 lb. lead.

Crow Fledgling.—The owner, W. E. Lane, shipped 7 tons of ore from this property, which yielded a total of 35 oz. silver and 835 lb. lead.

Crescent and Eden.—Robert Sherraden, holding a lease on this mine, shipped 22 tons of ore, which yielded 205 oz. silver and 17,368 lb. lead.

New Jerusalem.—This property, owned by Mrs. Elizabeth Bishop, of Los Angeles, California, was operated under lease by R. Hughes and A. A. Vassar, of Ainsworth. Three men were employed. The chief development-work done consisted in the driving of a raise connecting the adit-level with the foot of a small shaft sunk higher on the hill-side.

Kaslo-Retallack Area.

Lucky Boy.—The Wayside Gold Mines, Limited, employed four men for some time on this property under the direction of B. N. Sharp, and 50 feet of drifting was done.

Eureka.—Nine tons of ore shipped from this property by lessees yielded 601 oz. silver and 10,332 lb. lead.

Caledonia.—Three tons of ore shipped from this property by George McCready, of Retallack, yielded 1 oz. of gold, 1,217 oz. silver, and 9,047 lb. lead.

Fourth of July.—Lessees working on this claim shipped 3 tons of ore with total metal contents amounting to 136 oz. silver and 1,376 lb. lead.

Sandon-Three Forks Area.

Slocan Monitor.—This property, owned by the Slocan Monitor Silver Mines, Limited, is situated near Three Forks. Manager, Arthur Lakes. Operations were carried on successively by two different groups of lessees in the course of the year, the company, however, having some exploratory-work done at the same time, in the form of diamond-drilling and surface-stripping. A total of 71 tons shipped by the lessees yielded 6 oz. gold, 2,927 oz. silver, 50,840 lb. lead, and 15,059 lb. zinc. The development and exploratory work done consisted of 100 feet of raising, 28 feet of drifting, 822 feet of diamond-drilling, and 160 feet of crosscutting.

Black Colt and Palmita.—Owned by the Cunningham Mines, Limited. Clarence Cunningham, of Alamo, employed a small crew on these properties, and shipped 39 tons of ore which yielded 2,831 oz. silver and 31,054 lb. lead.

Queen Bess.—A group of four lessees, headed by E. Betalli, of New Denver, shipped 38 tons of ore from this property yielding 1 oz. gold, 3,880 oz. silver, 48,781 lb. lead, and 2,729 lb. zinc.

Slocan Lake Area.

Galena Farm.—This property, owned by the Galena Farm Mines, Limited, and situated a short distance south of Silverton, was under lease to a group of residents of that locality, headed by Warren Nelson, until late in the year, when operations were discontinued. Eight men were employed while the lease was in effect. A total of 234 tons shipped yielded 1 oz.

gold, 19,393 oz. silver, 110,656 lb. lead, and 22,343 lb. zinc; this including a shipment of 3 tons made independently by Chas. McAulay.

SILVER-LEAD-ZINC DEPOSITS.

CRANBROOK AREA.*

Sullivan Mine.—Owned and operated by the Consolidated Mining and Smelting Company of Canada, Limited. A. B. Ritchie, general superintendent;† Wm. Lindsay, mine superintendent; H. R. Banks, mill superintendent.

Back-filling of extracted areas: The surface operations in connection with this programme were suspended during the year, as a much larger quantity of ore was discovered in the particular stopes marked off for filling than was originally estimated, due to irregularities in the foot-wall. However, all available ore has now been recovered from these places, and an earlier start than usual will be possible with the tractor equipment on the surface in the spring of 1938. During the first seven months of this year, there were 72,000 cubic yards of fill provided by surface-caving through No. 14 shaft into X–9 stope. Above the 4,600 level, 140,000 cubic yards of stope volume were stowed by surface-caving after the stope pillars extracted, while in the other parts of the mine approximately 25,000 cubic yards of development waste was dumped into various stopes in preparation for back-filling.

The 3,932 shaft was extended for a distance of 25 feet below the main station on 3,900 level to provide a more efficient safeguard in the event of underwind while lowering men. The hoisting engine at the top of this shaft was also thoroughly overhauled and equipped with the latest safety features.

First-aid classes for the mine and mill were carried on, at which a large number of students were successful in obtaining their certificates. Of the total number of men actually on the mine pay-roll, 92 per cent. hold certificates for this important subject. Ten new men were trained and passed their examinations in mine-rescue work; added to those formerly trained, this makes a total of fifty-one men engaged at this mine who have qualified for this work under the supervision of J. M. Wolverton, safety engineer, and J. Shaw and S. Smith, instructors.

All mining men were deeply shocked to hear of the fatal accident to A. B. Ritchie, general superintendent, who was instantly killed on the morning of December 27th by being struck on the head by a flying rock off a blast while making his usual inspection of the underground workings. The late Mr. Ritchie was universally liked by all with whom he came in contact, men and officials alike, and through his untimely death the community of Kimberley and the Consolidated Company lost a good citizen and valuable executive official. Development at the *Sullivan* during the year consisted of 4,016 feet of drifting, 5,509 feet of raising, 426 feet of sinking, and 7,934 feet of diamond-drilling. A total of 2,227,123 tons was mined and 2,219,576 tons milled, producing 285,597 tons of lead concentrates and 238,413 tons of zinc concentrates. It might be of interest to mention in passing that the above tonnage is a record output for any one year from this mine. An average of 914 men was employed.

St. Eugene Extension.—Owned and operated by St. Eugene Extension Mines, Limited; S. S. Saxton, manager. For the purpose of proving and developing its claims in the vicinity of Moyie Lake, this company leased the *Lake Shore* claim including the *St. Eugene* shaft, from the Consolidated Mining and Smelting Company of Canada. This shaft has been full of water for nearly thirty years to a depth of 800 feet from the collar. The head-frame has been repaired and new buildings erected. Power is supplied by East Kootenay Power Company. A new hoist and necessary machinery for development has been installed. An average of fourteen men has been employed steadily at this operation during the last five months of the year. At the last inspection in December, the water had been lowered in the shaft to the bottom level but this area had not then been completely drained. During the dewatering operations, all necessary repairs were carried out in the hoisting and manway compartments.

WINDERMERE AREA.*

Excelda Mine.—Operated under option by Thunderbird Mines, Limited; R. C. Moffitt, president and general manager. Eight men were employed, five underground and three on

* By John McDonald.

† Deceased; Wm. Lindsay now general superintendent.

the surface. From information supplied by the manager, it appears that failure to reach a satisfactory renewal of their agreement with the original owners of the *Excelda* claims caused this company to suspend operations after having operated only for a period of six weeks, during which time a total drivage of 202 feet of drifting and crosscutting was accomplished. The light equipment from the mine was removed and stored in Wilmer and Invermere and the camp closed for the winter. To complete the season, the company completed some development-work on the *Queen Bess*, a group of mineral claims which are situated in close proximity to the *Thunderbird* trail; these claims were operated under lease and bond by Thunderbird Mines, Limited. Five men were engaged at this work, which consisted of two large open-cuts and a crosscut adit 23 feet in length. Some ore was discovered.

Golden Area.*

Monarch and Kicking Horse Mines.—Owned and operated by Base Metals Mining Corporation, Limited; Thomas Oxley, mine superintendent.

As in 1936, operations were confined principally to development-work and general repairs to the mill machinery. Development in the *Monarch* mine consisted of 739 feet of drifting, 1,701.5 feet of crosscutting, 350.6 feet of raising, 14 feet of sinking, and 7,766 feet of diamond-drilling.

Total drivage in the *Kicking Horse* mine consisted of 290 feet of main incline 11 by 10 feet for the new tram terminal underground, 56.5 feet of drifting, 36 feet of crosscuts, and 240 feet of raising for ore pockets and manway.

A new aerial tramway 1,700 feet in length was installed during the latter part of the year in preparation for production from this mine immediately the market price for lead and zinc is favourable. A storage-bin of 150 tons capacity is located at the lower terminal from which the ore will be transported by truck across the valley to the *Monarch* mill.

South Kootenay Lake Area.

Lakeview (Sanca).—Some work has been done intermittently on this property by different operators over a period of years. A small shaft sunk on the side of the Creston–Grey's Creek Highway is now connected by a raise to an adit-level started at a low elevation above the lake-shore. Improvised machinery was used for hoisting purposes. In the summer Robert J. Long, of Creston, who held an option on the property, employed four men in exploratory and development work for some time; 90 feet of sinking, 120 feet of crosscutting, and 500 feet of drifting being done. Seventy-two tons shipped yielded 320 oz. silver, 15,239 lb. lead, and 37,132 lb. zinc.

Vicinity of Nelson.

Silver King.—Jos. Pavich, working under lease, shipped 28 tons from this property with total metal contents amounting to 556 oz. silver, 3,703 lb. lead, and 5,159 lb. zinc.

Vicinity of Salmo.

Aspen.—On Deer Creek, operated by the Salmo-Malartic Mines, Limited, with Percy F. Horton as manager. During the first few months of the year a crew of twenty-two (seventeen underground) was employed, but this was reduced considerably later on. The work done in the course of the year consisted of 1,000 feet of drifting, 500 feet of crosscutting, 200 feet of sinking, and 1,700 feet of diamond-drilling.

Reeves-MacDonald.—Situated on the Pend d'Oreille River, close to the International Boundary, and about 5 miles from the customs house at Nelway. Early in March the Reeves MacDonald Mines, Limited, resumed the driving of the crosscut adit known as the River Tunnel, which had been abandoned since 1930. A crew of twenty-seven (sixteen underground) was employed for about eight months, this number being reduced somewhat towards the end of the year. The operations were conducted under the direction of Charles R. Lambly, of Metaline Falls, with B. N. Murphy in charge at the mine. The development-work done consisted of 1,615 feet of drifting.

Ainsworth Camp.

Krao.—The Krao Mines, Limited (B. F. Palmer, secretary, Kaslo, B.C.), shipped 18 tons of ore from this property to the Trail smelter, with total metal contents of 9,209 oz. silver, 1,206 lb. lead, and 3,022 lb. zinc.

* By John McDonald.

Kaslo-Retallack Area.

Cork Province.—On Mansfield Creek. Lessees working on this property shipped 6 tons of ore yielding 37 oz. silver, 1,061 lb. lead, and 1,122 lb. zinc; and 6 tons concentrates with total metal contents amounting to 201 oz. silver, 5,640 lb. lead, and 735 lb. zinc.

Utica.—Situated on Paddy Peak and operated by the Utica Mines, Limited, with L. McLellan in charge of the operations which were limited to development-work. The number of men employed varied between nineteen (ten underground) in the second quarter of the year and four in the third, this being increased again to eleven later on. The work done consisted of 132 feet of drifting and 122 feet of raising.

Whitewater.—At Retallack. Operated by the Whitewater Mines, Limited (head office Stock Exchange Building, Vancouver), with S. N. Ross as manager and Clarence Garrett as mine foreman. Operations were suspended at the mine late in the year. The average number of men employed ordinarily was fifty-one (thirty-one underground, eleven on the surface, and nine at the mill), with an additional seven for some time in the course of the summer.

Twenty-three tons shipped directly to the Trail smelter yielded 2 oz. gold, 1,962 oz. silver, 26,450 lb. lead, and 3,842 lb. zinc. From 56,180 tons milled, 674 tons of lead and 2,135 tons of zinc concentrates were obtained. The concentrates of the former class yielded 33,606 oz. silver, 594,440 lb. lead, and 121,240 lb. zinc; and the zinc concentrates yielded 23 oz. gold, 8,132 oz. silver, 44,333 lb. lead, 14,823 lb. cadmium, and 1,952,815 lb. zinc.

Wellington.—Situated at Retallack. Operated by the Wellington Mines, Limited (head office Nelson, B.C.), with A. G. Larson as manager and Stephen Kohar as mine foreman. Operations were limited entirely to development. Thirteen men were employed (eight underground).

Jackson.—E. W. Garrett, of Retallack, acting for James Anderson, of Vancouver, shipped 87 tons from this property, yielding 1,723 oz. silver, 28,010 lb. lead, and 44,931 lb. zinc.

Lucky Jim.—At Zincton. Operated by the Lucky Jim Lead and Zinc Company (head office, 616 Stock Exchange Building, Vancouver). Manager, John A. Fingland; mine foreman, Norman Nystad. Operations were resumed in the spring, after the mine had been idle for several years. The mill was operated irregularly as the supply of ore fluctuated considerably. The number of men employed varied between thirty-nine (twenty-three underground) in June, and twelve (seven underground) in November. The tonnage mined and milled was 12,100, from which 259 tons of concentrates were obtained, these yielding 452 oz. silver, 912 lb. lead, 1,682 lb. cadmium, and 238,224 lb. zinc.

Sandon-Three Forks Area.

Slocan Rambler.—Near Three Forks. This property has been idle for several years. However, the Ross Mining Syndicate, of Retallack, employed a few men for some time in sorting ore on the dumps and conveying it to the *Whitewater* mill. Eight tons of concentrates, with total metal contents amounting to 657 oz. silver, 3,000 lb. lead, and 2,122 lb. zinc were obtained.

Noble Five.—At Cody. Operated by the Noble Five Mines, Limited, with Paul Lincoln as manager and Peter Hansen as mine foreman. The mine was operated during several months with a crew of twenty-six (fifteen underground) the development-work consisting of 110 feet of sinking and 348 feet of drifting. The tonnage mined and milled amounted to 3,249, from which 281 tons of lead and 265 tons of zinc concentrates were obtained. The lead concentrates yielded 3 oz. gold, 23,855 oz. silver, 265,519 lb. lead, and 37,793 lb. zinc; while the zinc concentrates yielded 1 oz. gold, 2,031 oz. silver, 5,707 lb. lead, 1,796 lb. cadmium, and 235,223 lb. zinc. Operations were suspended early in December.

Ruth-Hope.—Owned by Ruth Hope Mines, Limited (head office, 616 Stock Exchange Building, Vancouver). Shipments made to the Trail smelter from this property consisted of 50 tons of ore, yielding 3,079 oz. silver, 43,351 lb. lead, and 8,129 lb. zinc; and 88 tons zinc concentrates yielding 2 oz. gold, 1,407 oz. silver, 3,590 lb. lead, 641 lb. cadmium, and 71,146 lb. zinc.

Number One.—Owned by J. M. Harris, of Sandon, and F. T. Kelly. Lessees working on this property shipped 90 tons of ore, yielding 1 oz. gold, 5,592 oz. silver, 80,862 lb. lead, and 18,610 lb. zinc.

Slocan Sovereign.—A group of four lessees, headed by E. J. Vandergrift, discovered an apparently fairly rich ore-shoot below No. 2 level, and took an option on the property. The mine had been abandoned for some time. A shipment of 61 tons to the Trail smelter yielded 3,187 oz. silver, 52,529 lb. lead, and 12,560 lb. zinc.

Silver Ridge.—Operated by the Silver Ridge Mining Company, with R. A. Grimes as manager. The work done was entirely of an exploratory nature and the method of surface prospecting by stripping and trenching with a bulldozer, heretofore untried in the Slocan, was introduced with highly gratifying results. The number of men employed was eleven, and 600 feet of drifting and 100 feet of crosscutting was done.

Victor.—Owned by Mrs. Dacy Petty, of Nelson, and worked under lease by E. Doney and son. Shipments from this property amounted to 226 tons, yielding 22 oz. gold, 27,449 oz. silver, 120,686 lb. lead, and 102,880 lb. zinc. The development-work done consisted of 50 feet of drifting, 50 feet of raising, and 45 feet of crosscutting.

Canadian Group.—Situated on Silver Ridge, at an altitude of approximately 7,000 feet, and adjoining the *Ivanhoe*. The Basal Mines, Limited (head office, Royal Bank Building, Vancouver), began exploratory and repair work in the early summer, and considerable headway had been made with the rehabilitation of the property when operations had to be suspended owing to the approach of winter. Ten men were employed (five underground) under the direction of A. J. Gaul.

Other properties in this section on which some work was done were the *Hinckley*, from which G. H. Murhard, of Sandon, shipped 2 tons yielding 166 oz. silver, and 2,434 lb. lead; the *Rio*, from which J. H. Pendray shipped 5 tons, yielding 501 oz. silver, 1,380 lb. lead, and 509 lb. zinc; the *Mercury*, operated for some time by Sam Marjoli, who shipped 5 tons yielding 628 oz. silver, 3,396 lb. lead, and 841 lb. zinc; and the *Springfield*, from which P. Chmelar, of Sandon, shipped 1 ton yielding 15 oz. silver, 297 lb. lead, and 328 lb. zinc.

Slocan Lake Area.

Mountain Chief.—Owned by H. Giegerich, of Kaslo, and operated under lease by John Cechelero, of New Denver, and associates. Forty-seven tons of ore shipped from this property yielded 3,565 oz. silver, 11,870 lb. lead, and 23,280 lb. zinc.

Hartney.—Owned by Thos. Avison, of New Denver. E. Cripps and associates took an option on the property, which had been idle for a number of years; a considerable amount of repair-work was done and a cabin and an ore bin were built.

Bosun.—Lessees (J. Zamboni and J. Beber) shipped 52½ tons from this property, yielding 2,986 oz. silver, 10,928 lb. lead, and 24,547 lb. zinc.

Mammoth.—On Avison Creek. Operated by the Western Exploration Company, Limited. Manager, A. M. Ham; mine foreman, Chas. Hanna; mill superintendent, Guy Waterman. Operations were resumed in the spring after the mine had been idle for rather more than a year, but were suspended again in December owing to the difficulties presented by transportation and the danger of snowslides. The average number of men employed was ninety-two (fifty-two underground, thirty on the surface, and sixteen at the mill). Development-work done consisted of 351 feet of drifting, 22 feet of crosscutting, and 547 feet of raising. The total tonnage mined was 25,008. Fifteen tons of ore shipped to the Trail smelter yielded 479 oz. silver, 3,208 lb. lead, and 2,929 lb. zinc; 2,160 tons of lead concentrates yielded 31 oz. gold, 256,244 oz. silver, 1,778,148 lb. lead, and 868,279 lb. zinc; while 2,801 tons of zinc concentrates shipped yielded 24 oz. gold, 36,772 oz. silver, 37,245 lb. lead, 25,657 lb. cadmium, and 2,631,790 lb. zinc. These totals include the concentrates obtained from ore mined at the *Standard* and treated at the *Mammoth* mill.

Standard.—Owned and operated by the Western Exploration Company, Limited. Manager, A. M. Ham. A considerable amount of repair-work had to be undertaken to bring this mine into working condition again. The number of men employed varied between a maximum of twenty-three (with seventeen underground) in September and eleven (seven underground) in November. Operations were conducted more actively after the *Mammoth* had been closed down for the winter. The development-work consisted of reopening old tunnels. The total tonnage mined was 3,861. Seventeen tons shipped to Trail yielded 471 oz. silver, 3,065 lb. lead, and 6,270 lb. zinc. The balance of the output was treated at the *Mammoth* mill.

Hewitt.—This property, owned by the Galena Farm Consolidated Mines, Limited, was operated by three groups of lessees, comprising a total of eleven men headed by Ed. Mathews, E. Burke, and G. Kirk, respectively. The tonnage shipped amounted to 314 tons, with total metal contents of 5 oz. gold, 31,257 oz. silver, 130,492 lb. lead, and 67,689 lb. zinc.

Slocan-Arlington.—Situated on Springer Creek. The Slocan-Arlington Mines Development Company (head office, Penticton, B.C.) shipped 528 tons of ore from the dumps on this property to the Trail smelter, and yielded 3,418 oz. silver, 9,823 lb. lead, and 5,947 lb. zinc.

Lucky Thought.—H. V. Dewis, of Silverton, shipped 83 tons of ore from this property, which yielded 2 oz. gold, 4,564 oz. silver, 23,424 lb. lead, and 39,695 lb. zinc.

Lardeau Area.

Spider.—Formerly known as the *Multiplex.* On this property, situated near Camborne, exploratory and development work was carried on through the greater part of the year by I. G. Nelson and Grover Cady, of Nelson, under the direction of W. S. Harris. Eleven men were employed (six underground), this number being reduced to three for the winter months. There is no machinery on the property, but arrangements are under way to secure electric power from the *Meridian* plant, about 1⅓ miles away from the mine in a straight line. Ninety tons of ore shipped to the Trail smelter yielded 8 oz. gold, 6,784 oz. silver, 34,019 lb. lead, and 29,838 lb. zinc.

True Fissure.—Situated about 5 miles from Ferguson and operated by the New True Fissure Mining and Milling Company, Limited (head office, 800 Guarantee Trust Building, Windsor, Ontario), with Alexander H. Smith as manager, John Asher as mine foreman, and Fred Robinson in charge of the mill. Operations were begun in the spring, and the summer was largely spent in improving the road, cleaning and repairing the mine workings, completing the construction of the mill, and erecting new living accommodation. The power plant was badly damaged by a freshet in the month of August and had to be rebuilt. Mining operations began in the fall, about 50 tons being treated at the mill daily. Electric power is supplied by a 300-horse-power alternator driven by a Pelton wheel, and is transmitted to the mine at a line voltage of 2,400. A 15½-inch and 9½-inch by 8-inch Canadian Ingersoll-Rand compressor driven by a 100-horse-power C.G.E. induction-motor has been installed. The development-work done consisted of 410 feet of drifting, 50 feet of raising, and 9 feet of crosscutting. Seventy-nine tons of concentrates shipped to the Trail smelter yielded 31 oz. gold, 3,804 oz. silver, 62,747 lb. lead, and 16,216 lb. zinc.

Silver Cup.—Situated about 8 miles from Ferguson and operated by the Silver Cup Mining and Milling Company, Limited. Operations, begun late in 1936, have so far been limited to the construction of a small flotation-mill and of an aerial tramway 1,700 feet in length, the erection of living-quarters and the treatment of ore recovered from the mine dumps. The only underground work attempted was the cleaning of a part of No. 7 level. A total of twenty-four men were employed (all on the surface and at the mill), at first under the direction of L. C. Penhoel, and later under that of M. C. Arnold. Two hundred and nine tons of concentrates shipped to the Trail smelter yielded 229 oz. gold, 22,344 oz. silver, 73,609 lb. lead, and 66,546 lb. zinc. The recovery of the latter metal is incomplete, a high percentage of it finding its way in the tailings. Owing to the condition of the road from Ferguson, after the first heavy snowfall, operations were suspended on the 13th day of December.

Vicinity of Albert Canyon.

Allco Silver.—At this property, operated by the Allco Silver Mines, Limited (head office, 708 Yorkshire Building, Vancouver), and situated on the middle fork of Silver Creek, about 12 miles north of Silver Creek Siding on the Canadian Pacific Railway, a crew of six (three underground) was employed for nearly a year under the direction of Roy D. Watson. The development-work done consisted of 65 feet of sinking, 50 feet of winze, and 115 feet of crosscutting. A total of 114 tons of ore shipped yielded an estimated 4,469 oz. silver and 86,640 lb. lead.

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1938.

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The Annual Report of the Minister of Mines is now issued in parts as follows:—

Part A.—THE MINING INDUSTRY (STATISTICAL REVIEW). John F. Walker.

Part B.—NORTH-WESTERN MINERAL SURVEY DISTRICT (No. 1). Joseph T. Mandy.

Part C.—NORTH-EASTERN MINERAL SURVEY DISTRICT (No. 2). Douglas Lay.

Part D.—SOUTHERN AND CENTRAL MINERAL SURVEY DISTRICTS (NOS. 3 AND 4). M. S. Hedley.

Part E.—EASTERN MINERAL SURVEY DISTRICT (No. 5). H. Sargent.

Part F.—WESTERN MINERAL SURVEY DISTRICT (No. 6). B. T. O'Grady.

Part G.—INSPECTION OF MINES. James Dickson.

PART D

ANNUAL REPORT

OF THE

MINISTER OF MINES

OF THE PROVINCE OF

BRITISH COLUMBIA

FOR THE

YEAR ENDED 31ST DECEMBER

1937

PRINTED BY
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1938.

BRITISH COLUMBIA DEPARTMENT OF MINES.

VICTORIA, B.C.

Hon. W. J. ASSELSTINE, *Minister.*

JOHN F. WALKER, *Deputy Minister.*

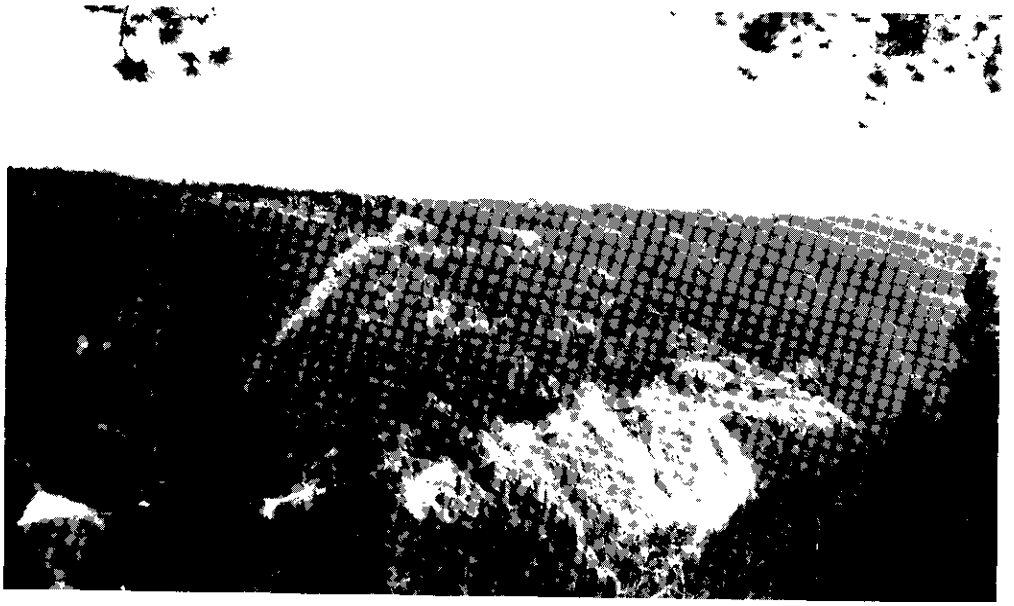
JAMES DICKSON, *Chief Inspector of Mines.*

D. E. WHITTAKER, *Provincial Assayer and Analyst.*

P. B. FREELAND, *Chief Mining Engineer.*

R. J. STEENSON, *Chief Gold Commissioner.*

Nickel Plate Mountain, looking north from height of land on south side of Similkameen River.



Copper Mountain.

PART D.

SOUTHERN AND CENTRAL MINERAL SURVEY DISTRICTS (Nos. 3 AND 4).

BY
M. S. HEDLEY.

GENERAL SUMMARY.

The year saw somewhat less mining activity in Districts Nos. 3 and 4 than appeared likely early in the season. This was due in part at least to the general economic uncertainty, and with one notable exception little new interest was shown in base metals. Prospecting appears to have been no more active than in recent years. The Geological Survey released a preliminary map and report by Cairnes on the West Half of Kettle River Area, and D. McNaughton was engaged in completing geological mapping of the general Hedley-Princeton Area.

The most noteworthy development was the reopening of Copper Mountain, begun during the winter. Capacity production was attained during the late summer and all concentrates are shipped to Japan.

Other centres of production have changed little. Gold Mountain closed down early in the year, but production from Kelowna Exploration and Hedley Mascot has been very satisfactory. Exploration-work on and in the vicinity of Nickel Plate Mountain has resulted in new discoveries as well as extensions of minable ground.

Osoyoos Mines has installed a cyanide plant to treat its flotation tailings and is also retreating a considerable tonnage of tailings previously discarded. Fairview Amalgamated increased mill capacity to 150 tons per day, and at the end of the year commenced a new lower adit-level.

The McArthur interests at Phoenix maintained a steady pay-roll, chiefly on the old Granby and Brooklyn properties. Lessees in the general Boundary and Kettle River Districts were active.

LODE-GOLD DEPOSITS.

HEDLEY CAMP.

References.—Charles Camsell, Geological Survey, Canada, Memoir 2, 1910; H. S. Bostock, Geological Survey, Canada, Summary Report, 1929, Part A; C. E. Cairnes, Geological Survey, Canada, Preliminary Report, "Mineral Deposits of the West Half of Kettle River Area"; Annual Reports of the Minister of Mines, British Columbia, 1901 to 1936, particularly 1901, 1903, 1906 to 1908, 1912, 1919, 1926, 1928, 1929, 1931, 1933 to 1936. The present writer included in 1936 a short summary of the principal geological features in the camp.

The beginning of the year showed some loss of confidence in the camp, but in middle and late summer there was considerable new development, and increased rather than reduced production is to be looked forward to.

Kelowna Exploration, as in previous years, has carried out a sound programme of mining and development on the *Nickel Plate* property, and this year spent a large amount of money erecting dwellings, bunk-houses, and a fine community hall at the mine camp. It optioned the *McNulty* group on Apex Mountain and did considerable work before heavy snowfall forced cessation of operations for the year. Late in the year it optioned twenty claims known as the *Tough-Oakes* and other groups adjoining the *Golden Zone*, north of Hedley, and plans a thorough exploration of this new ground during the coming season. This is an interesting section because, although no great amount of mineralization has yet been found, geological conditions appear distinctly favourable.

The results of mining at *Hedley Mascot* have been satisfactory, and geological examination has steadily progressed on the company's holdings. Diamond-drilling has shown the presence of hitherto unknown mineralization which is to be explored by adit 500 feet below the present working-level.

Trethewey Syndicate optioned two groups, the *Toronto* and *Galena*, and the *Horse Fly* group, and after a total of some 7,000 feet of diamond-drilling the options were dropped.

Canty Gold Mines (Hedley), Limited, which controls all of the late Dunc Woods' holdings on Nickel Plate Mountain, carried out an extensive exploratory programme on the *Boston*, *Pittsburgh*, and *Greenwood*. Starting on ground almost entirely mantled by drift and with only one or two showings of mineralization, stripping, diamond-drilling, and a geophysical survey gave sufficiently encouraging results to warrant, late in the year, the erection of a camp and the start of a 450-foot vertical shaft. The geology of this ground, while not yet fully understood, is so different from that of the present operating mines that a brief description will be given.

A granodiorite dyke some 400 to 600 feet wide trends approximately north 80 degrees east and at the known western end swings southward to be cut by a major fault which trends north 30 degrees west. In the angle between the granodiorite and the fault mineralization occurs in rocks that have suffered a high degree of metamorphism. These rocks have been intimately shattered, in many places to an amazingly fine degree, and have suffered wholesale recrystallization in combination with introduction of materials from magmatic sources. The resultant rocks are patchy, varicoloured aggregates of augite, epidote, albite, scapolite, quartz, and rarely garnet, frequently seamed with feldspar, quartz, chloropal, and other minerals. Originally they were undoubtedly sediments, but including dioritic dykes which have also been altered. The extent and high degree of metamorphism prohibits structural correlation and consequently makes the task of interpretation of drill-cores very difficult. Mineralization is reported to have been encountered over commercial widths in drill-cores and there is indicated a body or bodies of arsenopyrite mineralization which trends approximately north 50 degrees east and dips very steeply. The shaft is planned to investigate this ground to a depth of 450 feet and drifting will extend for a length of 400 or more feet. Further exploration will be necessary to test the possibility of extensions. Actual rock excavation in the shaft commenced late in January, 1938.

Hedley Sterling Gold Mines, Ltd. This is a public company with a capitalization of 2,000,000 shares, of which 1,285,132 are issued. The registered office is at 475 Howe Street and the business office is at Suite 6, 815 Hastings Street West, Vancouver. The directors are E. L. Boultbee, A. P. Dawe, James Lightbody, L. J. Richards, and H. B. Thomson; R. R. Steeves is secretary. The property consists of eight located claims and one fraction situated on the east side of Sterling Creek. It is 9,000 feet in length parallel to the creek, extending from below the main fork nearly to Similkameen River.

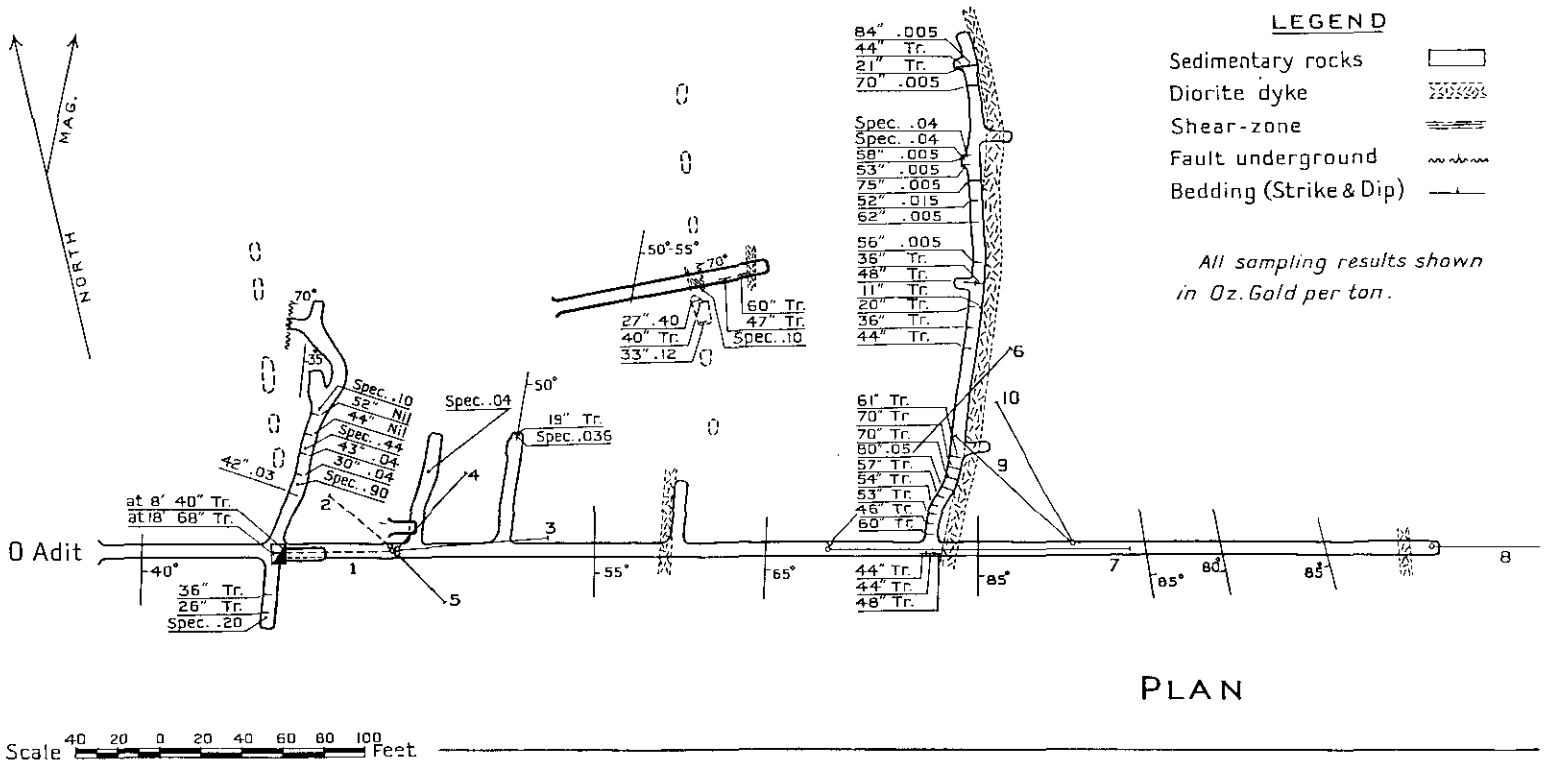
Sterling Creek flows in a narrow, steep-sided valley, the eastern side of which rises in timbered slopes broken by bluffs, at angles between 25 and 40 degrees, from an elevation of about 2,000 feet to some 4,000 feet. The northern and north-eastern part of the property is marked by prominent bluffs that rise precipitously above the Similkameen River flat.

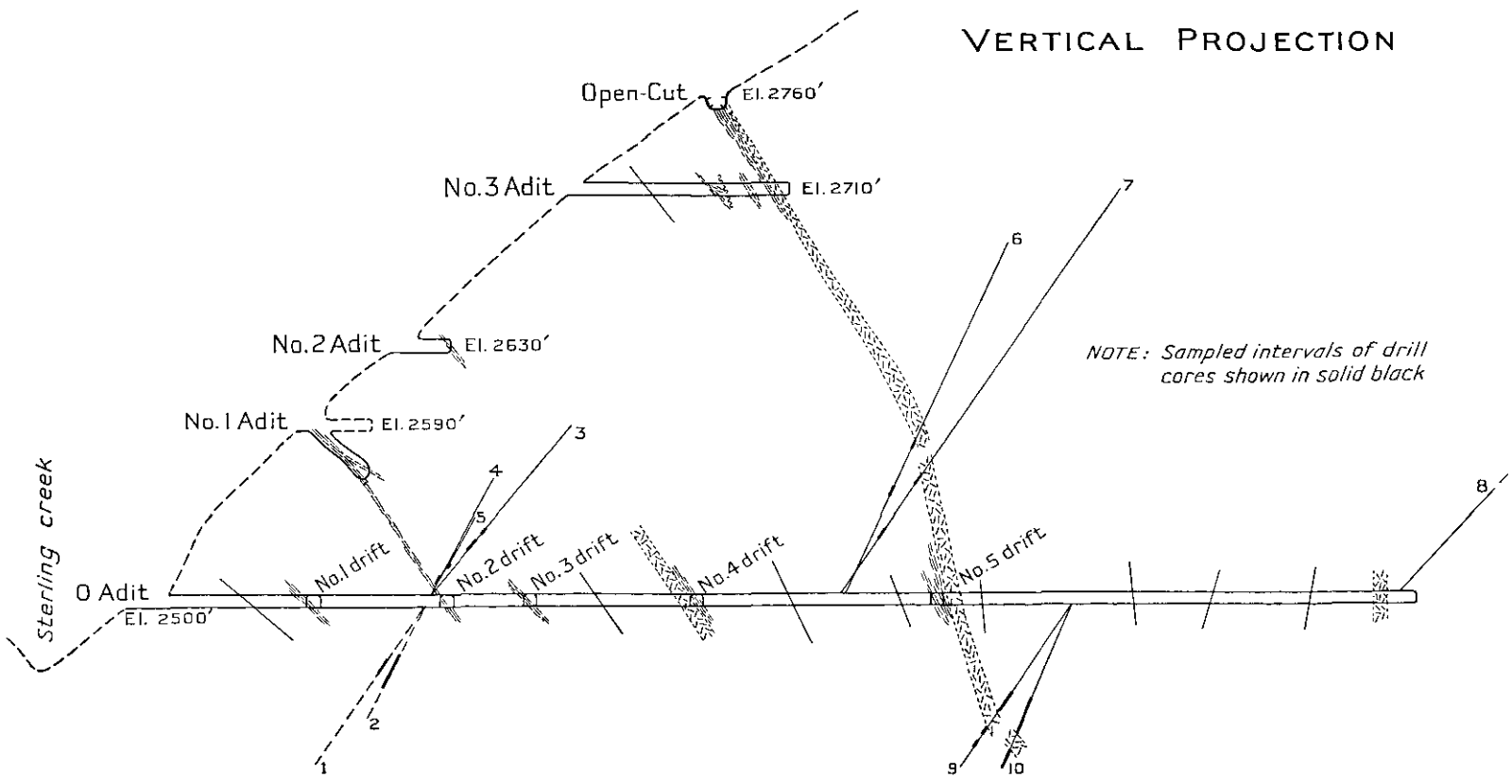
The property is reached by a narrow road that leaves the Hedley–Princeton Highway 4 miles west of Hedley. It is 2½ miles from the Similkameen River bridge to the *Patsy No. 2* workings at the end of the road. The camp is situated at a point half-way up the creek and from it a trail nearly a mile in length leads north-easterly to the *Patsy No. 1* workings.

The rock formations consist of a thick series of steeply-tilted argillaceous sediments intruded by dykes and irregular masses of diorite. The sediments strike in general north to north 40 degrees east and dip easterly at medium to steep angles. The detailed structure is not known. The diorite is rather variable in character and is quite irregular in distribution; the whole region contains dykes, stocks, and small irregular masses of this rock. There has been no marked contact metamorphism produced by the diorite.

Included in the dark-coloured argillites is a band at least 200 feet in thickness which is exposed on the east bank of Sterling Creek on the south end of the property and which contains the greater part of the *Patsy No. 2* workings. This band consists of light-coloured sediments, including impure calcareous rocks, cherts, limestones, and fine fragmental rocks that are possibly tuffaceous.

Mineralization is of four kinds. In the *Patsy No. 1* workings irregular weak fractures in argillites are filled with narrow widths of pyrite, arsenopyrite, sphalerite, and traces of chalcopyrite and pyrrhotite in quartz. Several hundred feet north-easterly from the main camp an irregular and discontinuous vein of white quartz bearing a little pyrite occurs in





Hedley Sterling Gold Mines, Ltd., *Patsy No. 2* workings. Plan and vertical projection on line of "O" adit, from compass survey.

argillites. In the *Patsy No. 2* workings five more or less bedded shear-zones in the lighter-coloured sediments are locally mineralized with arsenopyrite and quartz in addition to pyrite and some calcite; the arsenopyrite occurs in quartz veins and also locally as filling and replacement of cherty (silicified?) rock. One of these zones penetrates the darker argillites and is there mineralized with calcite and pyrite.

The earliest reference to the property, then known as the *Patsy*, is given in the Annual Report, Minister of Mines, British Columbia, 1927, page 240, when the two upper adits on the *Patsy No. 1* had been driven, and a bond was taken by American interests. In 1928 a little more work was done on the *Patsy No. 1*. In 1931 Sterling Gold Mines, Limited, optioned nine claims from Dan McKinnon and associates, the owners, and worked chiefly on the *Patsy No. 2* claim. The following year only two men were employed, and in 1933 the work was financed by Canada Lode Gold Mines, Limited; Hedley Sterling Gold Mines, Limited, was formed a year later. Work, under the management of Dan McKinnon, consisted of cross-cutting, drifting, and diamond-drilling on the "O" adit-level, and was suspended in July, 1935.

Patsy No. 1 Workings.—These workings are on the *Patsy No. 1* claim at the north-east corner of the property, on the edge of prominent bluffs at an elevation of about 2,500 feet. The rocks are argillites which dip, at this locality, steeply to the south, and are intruded by diorite of irregular distribution, one apparently extensive body of which makes up the bluff edge. Mineralization is in weak fractures and shears that cut across the bedding and appear to die out in diorite.

There are three short adits. The lowest or No. 3 adit, elevation 2,460 feet, consists of a section 75 feet long averaging due south from the portal, from the end of which a crosscut 53 feet long trends south 85 degrees west. Twenty feet from the portal a branch trends south 35 degrees west for 45 feet. The portal of No. 2 adit, elevation 2,500 feet, is 42 feet at south 18 degrees east from the portal of No. 3; the adit is 95 feet long on a curving line in an average direction of south 34 degrees west, and at 30 feet from the portal an underhand stope is 15 feet long and 15 feet deep. No. 1 adit is completely stoped out, 25 feet above No. 2, and was about 25 feet long. Above this uppermost adit the vein is continuously exposed for 25 feet on the dip.

There is one principal "vein" exposed on the surface and in No. 1 adit, but it has not been located in No. 2 adit. This "vein" strikes north 30 degrees east and dips 40 to 55 degrees north-westerly, and attains a maximum width of about 8 inches. It is a zone of weak fracturing and shearing in which mineralization occurs as a filling of pyrite, arsenopyrite, sphalerite, and rarely chalcopyrite and pyrrhotite in or accompanied by quartz and a little calcite. Mineralization is commonly 3 or 4 inches or less wide; it is discontinuous and locally "jumps" from one fracture to another, and even enters between bedding-planes at a large angle to the general trend. When the structure passes into diorite the mineralization is very weak.

A narrow, nearly parallel shear-zone 1 to 4 inches wide is disclosed in No. 2 adit—mineralization on this zone is very light. A cross-zone 1 to 3 inches wide, dipping flatly south-westerly, contains a little calcite and pyrite. A noticeable system of fracturing or jointing dips about 40 degrees westward and occasionally mineralization may be seen on one of these planes.

A sample of the mineralization in the bottom of the underhand stope returned: Gold, 2.44 oz. per ton. A sample of the nearly parallel shear in No. 2 adit returned: Gold, 0.10 oz. per ton. At the toe of No. 2 dump are seventy-five sacks (about 4 tons) of sorted ore; a grab sample from these returned: Gold, 1.36 oz. per ton.

Some 750 feet north of the main camp and 40 feet higher in elevation is a series of open-cuts. These are scattered irregularly along the steep grassy side-hill for 150 feet, and disclose dark-coloured argillites which strike north 40 degrees east and dip steeply south-east. In two of the open-cuts vitreous quartz, 18 to 20 inches wide and sparsely mineralized, appears to follow the bedding, but is evidently discontinuous. Two chip samples, one from each of the cuts, returned only traces in gold.

Patsy No. 2 Workings.—The *Patsy No. 2* workings are on the claim of the same name at the south end of the property. The lowest or "O" adit is about 20 feet above the creek and the highest open-cut is 200 feet higher on a bluff-covered 40-degree slope. The ground

continues to rise steeply to the east in wooded slopes with grassy cover and occasionally broken by bluffs.

The sedimentary rocks strike a little east of north and dip at medium to steep angles into the hillside. Fine-grained diorite dykes are quite common and some at least are sill-like in attitude; most of the dykes are no more than a few feet in width. The sediments are predominantly dark-coloured argillites, but the lower part of the hillside, at least as high as the uppermost cut, is made up of light-coloured fine-grained rocks which include impure limestone, chert, limestone, and what appear to be tuffs; these last are finely-granular grey rocks containing small fragments of slaty material.

The best structural section is given by the " O " adit-crosscut. At the face dark argillites dip steeply westerly and at 125 feet from the face the dip is steep to the east. From the latter point the dip is increasingly flatter in the same direction, and at the portal is about 40 degrees easterly. The inner 320 feet of the adit is in dark-coloured argillaceous rocks and the outer section, about equal in length, is in light-coloured assorted sediments. There is no apparent contortion of the sedimentary series, although local changes in strike and dip of several degrees are seen on the surface. There is no appreciable contact metamorphism produced by the diorite dykes.

The " O " adit, 645 feet long at an assumed elevation of 2,500 feet, encounters five bedded mineralized shear-zones known as Nos. 1 to 5 from the portal inwards. No. 1 adit and shaft is at an elevation of 2,590 feet directly over the " O " adit at 80 feet from the portal of the latter; the shaft is sunk 35 feet at 40 degrees on a shear-zone and the adit is driven 20 feet into the hanging-wall. No. 2 adit, elevation 2,630 feet, is 50 feet east of the shaft and is 13 feet long; a mineralized zone shows in its face. No. 3 adit, elevation 2,710 feet, is 180 feet north-easterly from the shaft; it is driven east 105 feet and discloses two mineralized shear-zones and some mineralized cross-fractures in the inner 40 feet. Above No. 3 adit is a 7- by 12-foot open-cut 6 feet deep on one of the shear-zones intersected by the adit. This open-cut is one of a series 300 feet long. Open-cutting has been done for 150 feet north of the shaft on the shaft or No. 2 shear-zone and for 400 feet southerly at scattered intervals on what are probably both No. 2 and No. 1 zones. A study of the accompanying plan and section will show the distribution of the several workings and of the shear-zones.

About 750 feet north along the hillside and 50 feet lower in elevation than the upper line of open-cuts are three small open-cuts in light-greenish cherty and limy sediments containing sparsely-disseminated pyrite and a trace of arsenopyrite accompanied by a very little quartz.

As intersected by the " O " adit, No. 1 shear-zone is 80 feet from the portal and is drifted on 32 feet south and 126 feet north. No. 2, No. 3, and No. 4, at 150, 190, and 275 feet from the portal, are drifted on northerly for 57 feet, 56 feet, and 30 feet respectively. No. 5 zone, 400 feet from the portal, is drifted on northerly for 250 feet. An individual description of the five shear-zones follows.

No. 1.—Mineralization occurs erratically within a bedded and poorly-defined shear-zone of a maximum width of 6 feet in light-coloured fine-grained dense sediments. Arsenopyrite and some pyrite occur in quartz accompanied locally by calcite or else as sulphide-filling and replacement in the chert.

At the south end of No. 1 drift is a vague bedded zone of light shearing and shattering containing a band 1 to 10 inches in width of quartz and arsenopyrite in varying proportions as well as some calcite. At the crosscut a foot-wall band of 2 to 4 inches of gouge is 4 feet below a hanging-wall band containing 2 to 6 inches of arsenopyrite, pyrite, quartz, and calcite. North of the crosscut the hanging-wall band is similarly mineralized with an inch to several inches of arsenopyrite and of quartz. At the fork in the level mineralization to a maximum width of 10 inches appears irregularly in one or both of the bands, and in the extreme face there is no mineralization except disseminated pyrite in the weakly-sheared rock. A steep fault is unmineralized.

No. 1 zone has not been developed on the surface but is perhaps represented in two open-cuts 400 feet to the south of the " O " adit. These show several inches of oxidized material, including arsenopyrite and quartz.

Four samples of selected arsenopyrite from No. 1 drift returned variable values in gold, from 0.04 to 0.90 oz. per ton. Several channel samples shown on the assay-plan returned *nil* in gold to 0.04 oz. per ton.

No. 2.—No. 2 shear-zone is, on "O" adit-level, poorly defined. Mineralization consists of tight-bedded lenses of arsenopyrite and some pyrite in chert accompanied by a little quartz and calcite, ½ to 8 inches in width. Although the accompanying plan and section are not strictly accurate, the No. 1 shaft is evidently on the same shear-zone. In the shaft the zone dips 40 degrees and contains at the collar quartz 12 inches wide bearing lenses of arsenopyrite. Half-way down the zone is widest, 6 feet, and contains a foot or more of quartz, weakly mineralized with arsenopyrite. At the bottom of the shaft the zone splits into a hanging-wall bedded section 6 to 12 inches wide and a steeper foot-wall section 12 to 36 inches wide, both consisting of oxidized rock. The hanging-wall split may connect with No. 3 zone. Open-cutting to the north shows weakly-sheared sediments and in one open-cut 40 feet north there is a 2- to 10-inch zone containing quartz and arsenopyrite. Open-cuts to the south are scattered and obscured and give little information.

A selected sample of arsenopyrite in No. 2 drift returned: Gold, 0.04 oz. per ton. Two samples in the shaft on the south wall returned: (1.) 8 feet from the collar, 40 inches wide: Gold, trace. (2.) 18 feet from collar, 68 inches wide: Gold, 0.16 oz. per ton.

No. 3.—On the "O" adit-level this is a 3- to 4-foot zone of weak shearing and light brecciation with local calcite-filling and a little pyrite. The rock is finely-banded dark- and light-coloured limestone. At the face a sample across a 19-inch shear-zone weakly mineralized with pyrite returned a trace in gold, and a selected sample of pyrite from stringers in the hanging-wall of this zone returned: Gold, 0.036 oz. per ton.

This zone may connect with No. 2 zone in the shaft, or may steepen and so be intersected by No. 2 adit. In this adit, in the extreme face, is a 1- to 3-inch stringer of sulphide dipping at 45 degrees; this stringer widens upwards to 12 inches of quartz at the grass-roots.

No. 4.—This is a poorly-defined shear-zone 3 feet wide on the hanging-wall of a 5½-foot sill of diorite. Irregular and small calcite stringers are accompanied by a little pyrite. The zone is not recognized on the surface. No samples were taken.

No. 5.—This is a steeply-dipping shear-zone in dark, locally graphitic argillites, following the foot-wall of an altered diorite sill which is 7 to 8 feet wide on the "O" adit and 2 feet wide on the No. 3 adit. At the "O" adit-crosscut the hanging-wall of the 12-foot zone consists of 8 inches of gouge beneath the dyke, between which and the foot-wall is sheared rock. The foot-wall is drifted on for 30 feet, past which the hanging-wall zone is followed throughout, and is 4 to 8 feet wide. The foot-wall zone diverges at 30 feet and is lost in the west wall.

In the first 150 feet of drift there is very little mineralization; some calcite and scattered pyrite occurs in the crushed and sheared rock. Twenty-five feet past the first timbered section a lens of quartz and calcite, 10 inches wide and sparsely mineralized with pyrite, occurs in the hanging-wall. At 165 feet considerable calcite in stringers and lenses, mineralized with pyrite, appears in the foot-wall, and at 175 feet the calcite is within 3 feet of the hanging-wall. At 190 feet, at the second short westerly crosscut stringers and lenses of calcite mineralized with heavy pyrite dip flatter than the main shear-zone and occur over a width of nearly 5 feet in the foot-wall of the zone about 6 feet below the dyke. This zone of calcite-filling becomes weak and poorly defined at the innermost westerly crosscut, and the end of the drift is in firmer, grey sediments containing small irregular stringers of calcite accompanied by a little pyrite.

No. 5 zone is intersected by No. 3 adit, at the face of which light-coloured sediments are weakly sheared for 5 feet in the foot-wall of a 2-foot diorite sill. At 20 feet from the face a 4-foot band of the sediments is weakly sheared and mineralized. At 30 to 40 feet from the face are one bedded stringer and one cross-stringer of pyrite 1 to 3 inches wide, cut by a steep fault.

No. 5 zone is again seen in the upper open-cut. Strong oxidation obscures the character of material, but there is a foot-wall section 2 to 3 feet wide containing quartz and arsenopyrite, in the hanging-wall of which is 3 to 4 feet of oxidized material. Open-cuts to north and south show only light-coloured sediments and a little oxidized material.

Twenty-eight channel samples were taken across the zone as shown on the assay-plan and two selected samples of pyrite, all in No. 5 drift. The highest of all of these returned: Gold, 0.05 oz. per ton. Two channel samples in No. 3 adit returned each a trace in gold, and one selected sample of pyrite mineralization returned: Gold, 0.10 oz. per ton. Three channel

samples from the upper open-cut returned from a trace in gold to 0.40 oz. gold per ton, the latter representing the foot-wall section, 27 inches wide, on the north end of the open-cut.

Diamond-drilling.—Ten diamond-drill holes, aggregating 1,360 feet in length, have been drilled from the "O" adit. These holes are plotted on the accompanying plan and section from approximate measurements taken by the writer. Holes Nos. 1 and 2 were not located and are plotted from a blue-print of the company.

The detailed log of the remaining core from these holes is not worth enumerating, although a few points are worthy of mention. Hole No. 8, from the face of the adit, encounters dark-coloured argillaceous sediments and one 2-foot and one 23-foot section of diorite; two closely adjacent sections of core are missing at 100 to 110 feet and have presumably been assayed, but the results are not known. Holes Nos. 6, 7, 9, and 10 are drilled across No. 5 shear-zone, above and below the adit-level, and each cuts the diorite dyke. In hole No. 7 the remainder of the split core is found in the core-boxes and shows adjacent to the dyke 2 feet of dark argillaceous breccia containing pyrite cubes, next to which is 3 feet of whitish, apparently bleached, clayey sediments containing pyrite cubes; a split, similar section to the latter is encountered at 34 to 40.5 feet. The presumably sampled core in the other three holes has been removed from the core-boxes. Hole No. 3 was not drilled far enough to intersect No. 4 shear-zone and dyke, which indicates a probable warp in the structure. Holes Nos. 2, 4, and 5 do not give any significant information, particularly as in all but one instance the sampled core has been entirely removed.

The nineteen sections of core which have presumably been sampled are shown graphically on the accompanying section; most of these clearly represent the several shear-zones. There is split core remaining in the core-boxes in only five sections (holes Nos. 2, 3, and 7), and none of these contains mineralization materially different from that exposed in the near-by adits. No samples were taken of the split core by the writer.

At the camp, framed and canvas-covered buildings are sufficient to house and feed a small crew of men. At the *Patsy No. 2* workings, alongside the creek, a framed structure houses a small Diesel-driven compressor plant as well as a blacksmith-shop equipped with steel-sharpener. There is also a core-shed.

Summary.—On the *Patsy No. 1* claim a narrow zone of shattering and shearing in argillites is mineralized in widths from a fraction of an inch to a maximum of 8 inches, and other narrow zones carry slight amounts of mineral. The mineralization, when strong, carries good gold values, but these are more than offset by the smallness and irregularity of the deposit.

On the *Patsy No. 2* claim are five shear-zones which tend to follow the bedding of light-coloured, in part calcareous and cherty sediments. The zones are not strong, mineralization is discontinuous, and values over minable widths are not commercial. Occasional interesting assays are obtainable of selected arsenopyrite in the lighter-coloured sediments. No. 5 zone penetrates the darker argillites at depth and is there seen to be a fairly strong zone mineralized sparsely with calcite and pyrite, and near the inner end of No. 5 drift the foot-wall of the zone contains as much as 5 feet of calcite heavily mineralized with pyrite; values in No. 5 drift are consistently low. Spotty values are indicated in the upper open-cut, but mineralization is not persistent.

The belt of sediments is interesting, because in these arsenopyrite, containing variable gold values, seems to occur in preference to the darker argillites. The mineralization so far encountered, however, is weak and discontinuous. Exploration of the belt might, if it is found to pass across or into an area which has been more structurally active, lead to the discovery of more worth-while mineralization.

Hedley Yuniman Gold Fields, Ltd.

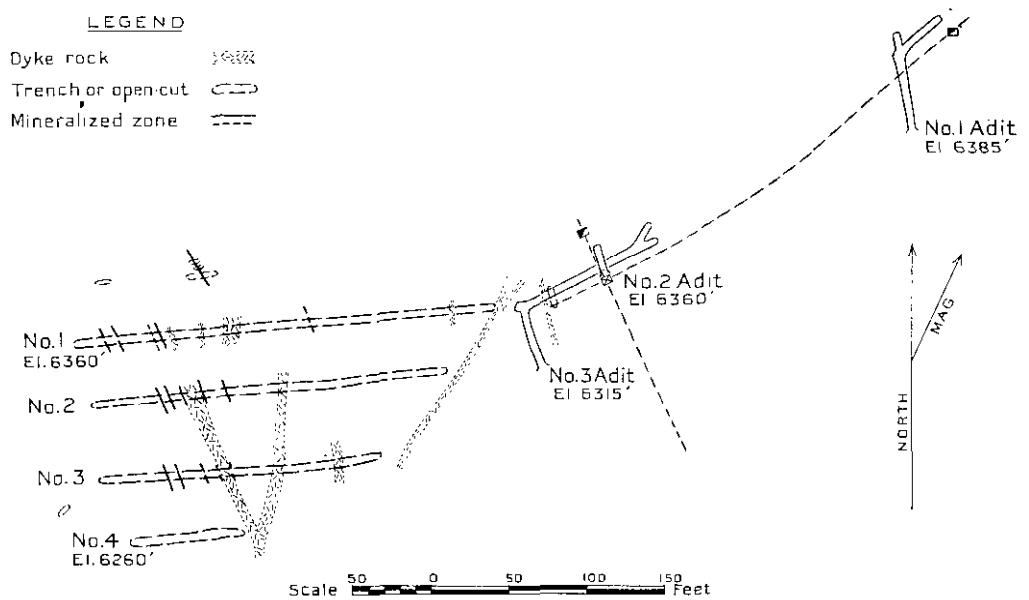
This public company, with a capitalization of 1,000,000 shares, has its registered office at 417 Metropolitan Building, 837 Hastings Street West, Vancouver. The president of the company is J. W. Gallagher, of Hedley, and the secretary is E. N. Rhodes Elliott, of Vancouver. The property comprises forty-four claims and fractions as well as eight Crown-granted claims held under lease, the latter being known as the *Yuniman* sub-group.

The property is on Bradshaw Mountain, 7 miles east of Hedley. It covers the headwaters of Bradshaw (15-Mile) Creek and extends south-easterly nearly to the drainages of Winters (16-Mile), Olalla, and Cedar Creeks. The lowest elevation is about 5,000 feet and the highest

nearly 7,000 feet. The section of ground on which most work has been done is on the *Yuniman* sub-group, and is near an old cabin at an elevation of 6,050 feet on the north side of Bradshaw Creek, a mile below the basin at the head of the creek.

The ground is rugged, but is only locally precipitous and is comparatively easy of access. The summits are rounded and sparsely timbered, and bluffs are not plentiful except on the borders of the property; much of the higher ground is used as summer range for cattle. Timber is plentiful on parts of the property and is burned off in some sections. Water for domestic purposes can be obtained from Bradshaw Creek and also in small quantities from numerous springs at elevations in excess of 6,000 feet.

A pack-trail extends from Bradshaw's, on the Hedley–Keremeos Highway, up Bradshaw Creek to the cabin, with a rise in elevation of 4,400 feet in the distance of approximately 5½ miles. The trail then climbs rapidly an additional 500 feet nearly to the ridge, and then continues east to the head of Bradshaw Creek, whence trails lead to Apex Mountain and down Shoemaker, Olalla, and Cedar Creeks. The route from Bradshaw is the easiest, climbing rapidly through the lower canyon and continuing up the valley largely over slide materials.



Hedley Yuniman Gold Fields, Ltd. Sketch-plan of part of property.

The geology of the region is illustrated in Cairnes' map and report on " West Half of Kettle River Area," Geological Survey, Canada, Preliminary Report, 1937. Brief mention by Bostock, Geological Survey, Canada, Summary Report, 1929, Part A, page 202, that Nickel Plate Mountain is on the north-west limb of a major anticline and that the area under consideration is on the south-east limb and lower in the sedimentary series. The rocks are mapped as predominantly sediments, including bands of volcanics, with a north-easterly strike and steep dips. A large body of granodiorite occupies the upper reaches of Winters Creek and extends almost to the Cedar Creek Divide; many dykes, most of which are dioritic in composition, intrude the bedded rocks.

Of the rocks classed as sedimentary a large proportion are cherts, in addition to argillaceous types. These cherts, or chalcedonic and quartzitic rocks, are frequently seen to be fragmental, with sub-angular to angular fragments a fraction of an inch to several inches in size, a fact usually to be seen only upon close inspection of weathered surfaces. Some of these rocks are banded, supposedly representing bedding, and some are seen to grade into argillaceous, volcanic, or dyke rocks. Replacive action by fine-grained silica has been proved on a small scale in the case of hornfels and dyke-rock on the *Yuniman* sub-group, and it is strongly to be inferred that siliceous replacement has been widespread. The limits of this action, its focal points, and the structural and mineralogical significance are not known.

Mineralization includes quartz veins and obscure zones of shearing and alteration, as well as, in two places, manganese mineral. The metallic minerals are pyrite, arsenopyrite, and rarely sphalerite and galena.

The accompanying sketch-plan shows the principal workings in the *Yuniman* sub-group, on the *Black Pine* and *Bush Rat* claims. These workings are located a few hundred feet up the steep grassy slope above the cabin previously mentioned. The three adits and two small shafts were driven many years ago, and the longer trenches have been put in recently by the present company. The rock in and about No. 1 adit is diorite, that at the west end of the trenches is greenstone, in the central part of the trenches it is argillite, and the remainder of the ground is predominantly "chert." The larger dykes are diorite, but there are also dykes of feldspar porphyry, lamprophyre, and andesite, and the total number in this area is large. Overburden precludes accurate mapping.

No. 1 adit, elevation 6,385 feet, consists of a crosscut 50 feet long, driven on a steep fracture bearing locally a little arsenopyrite, and a north-easterly drift 35 feet long on a mineralized zone that dips steeply to the north-west. A shaft is sunk 5 feet on this zone 50 feet higher in elevation. This is a tight, irregular, and poorly-defined shear-zone up to several inches in width. The diorite-walls have been strongly bleached for several inches, but not apparently sericitized. Mineralization is sparse and erratic and consists of pyrite and a little arsenopyrite, a trace of sphalerite and galena, and some quartz. A sample of selected material from the dump at the shaft returned: Gold, 3 oz. per ton; silver, 3.5 oz. per ton.

No. 3 adit, elevation 6,315 feet, follows the same zone for 100 feet. The zone, between chert-walls, is poorly defined and is a few inches wide, or else consists of two fractures 3 feet apart; it splits near the inner face and is nowhere heavily mineralized. A raise has been put up on the intersection with a northerly-trending vein to the level of No. 2 adit, and this cross-vein has been drifted on for 18 feet in No. 2 adit, elevation 6,360 feet, and a shaft sunk 6 feet on it at a point 25 feet higher; it outcrops down the hillside at an elevation of 6,180 feet. The vein is 4 to 10 inches wide and is composed of vitreous quartz frozen to the walls; in No. 2 adit additional ¼-inch stringers bring the total width locally to 16 inches. It is mineralized sparingly with pyrite and arsenopyrite and has not the appearance of a strong or continuous structure.

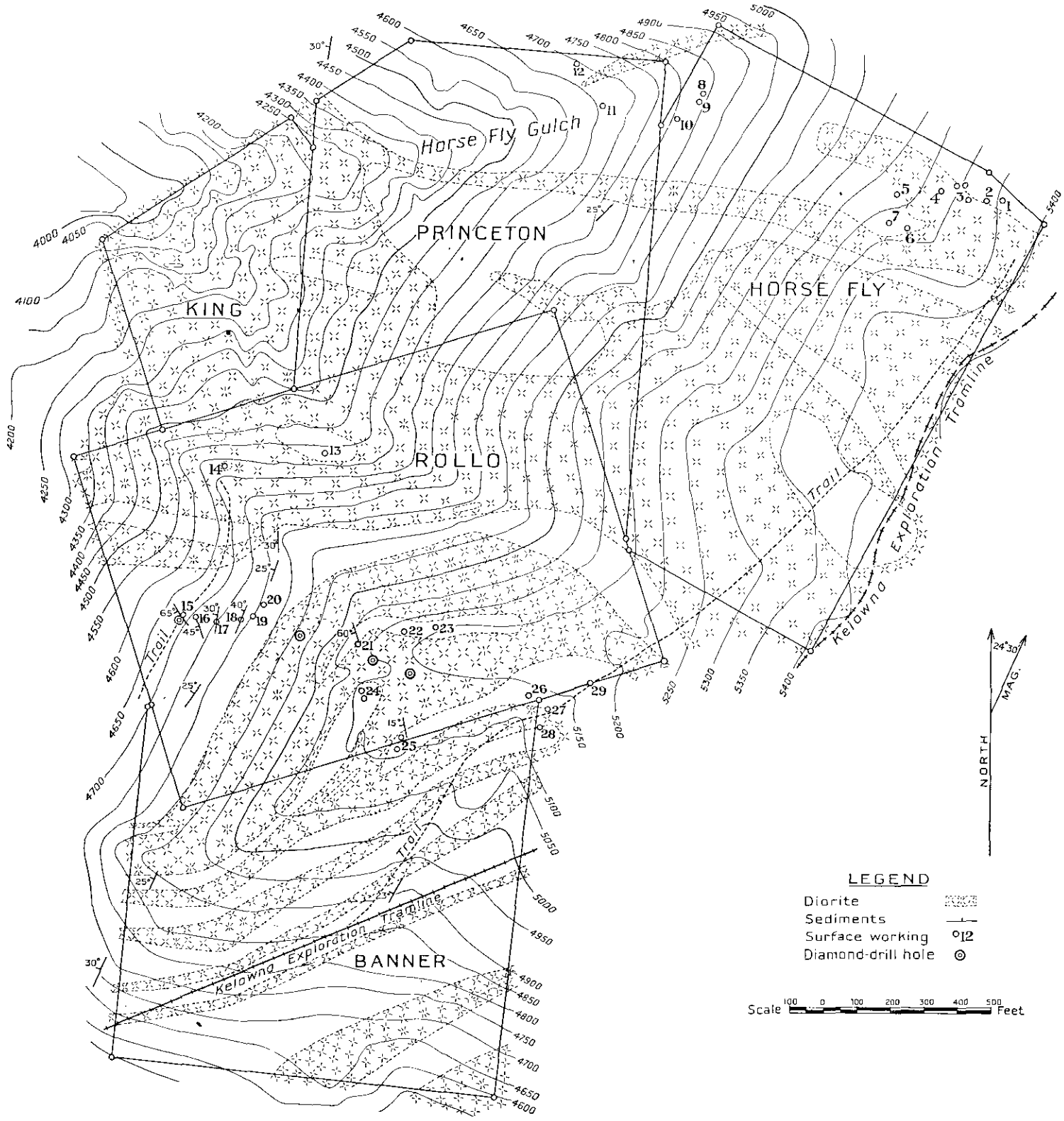
In the four long trenches there are several quartz veins, as shown on the sketch-plan. These veins all strike west of north, dip steeply north-easterly, and are from ¼ inch to a maximum of 14 inches wide. The commonest width is from 4 to 8 inches of crystalline, vitreous quartz mineralized with varying amounts of pyrite and arsenopyrite. The veins do not line up well, as exposed by the trenches, and are partly influenced by the presence of dykes; the eastern ends of the two upper trenches are poorly stripped. The arsenopyrite undoubtedly carries locally good gold values, but average values are hard to arrive at. Samples returned:—

(1.) No. 1 trench, 60 feet from west end, 4- to 5-inch vein: Gold, 0.06 oz. per ton.
(2.) No. 2 trench, 44 feet from west end, 4- to 14-inch vein: Gold, 0.16 oz. per ton.
(3.) No. 2 trench, 51 feet from west end, 3- to 6-inch vein: Gold, 2.40 oz. per ton.
(4.) No. 2 trench, 60 feet from west end, 4- to 8-inch vein: Gold, 0.02 oz. per ton.
(5.) No. 2 trench, 72 feet from west end, 6-inch vein: Gold, trace.

The presence of a number of fractures in such a small area and the fact that high assays are obtainable is undoubtedly interesting. Surface prospecting is the most satisfactory method of development, and it is to be hoped that a continuation of this work will demonstrate greater widths and continuity.

Over the remainder of the property, at widely scattered intervals, are a number of shallow workings made for the most part many years ago. These will be given brief mention only.

North-west of the above workings some 1,600 feet and at an elevation of 6,300 feet is a 10-foot shaft in dark argillite and black chert exposing a quartz vein, strike north 10 degrees east, dip 85 degrees east. The vein is up to 4 inches wide and contains arsenopyrite, locally in considerable quantity. Some 1,600 feet farther north-west is an 8-foot shaft in dark cherty rocks exposing a shear-zone, strike north 10 degrees east, dip steep to east. On this shear-zone there is an alteration to a clay-like material, but no apparent mineralization. On the Winters Creek slope just east of a triangulation station, elevation



Horse Fly, Rollo, King, etc. Topographical and geological map after surveys by company.

6,836 feet, is a narrow, vertical, rusty shear-zone, striking north 75 degrees east, in a coarse-grained feldspar-porphyry dyke.

On the south-west side of the Winters-Cedar Creek Divide, elevation about 6,500 feet, is a zone of oxidation which trends approximately north 30 degrees east and is apparently continuous for several hundred feet. There is on this zone one small open-cut at the south-west end, one 200 feet to the north-east of this, and at 300 feet there is a 40-foot cut in the end of which is a short, completely caved adit. All that can be seen in these workings is rust-stained, finely broken, cherty material. At the headwaters of Bradshaw Creek just short of the Olalla Creek Divide is some stripping in cherty rocks that show manganese-staining.

Opposite the cabin, on the bluffs between Bradshaw Creek and the south-easterly branch, at an elevation of 6,350 feet, is an approximately north-south zone of manganese-staining in cherty rocks. This zone is about 150 feet long and is up to 15 feet wide, along which rhodonite occurs irregularly and apparently in pockets. A 12-foot shaft is sunk on a vague shear-zone 3 to 4 feet wide, strike north 20 degrees west, dip steeply north-easterly, containing some pyrite and arsenopyrite.

Horse Fly, Rollo, King, etc.

Five claims, the *Horse Fly*, *Rollo*, *King*, *Princeton*, and *Banner*, were optioned by the (J. E.) Taylor Holdings Company and in 1937 the group was under option to Trethewey Syndicate. In this syndicate Brett-Trethewey Mines, Limited, Northern Canada Mining Corporation, and Hedley Mascot Gold Mines, Limited, hold equal interest.

The *Rollo* is the oldest claim in the Hedley District, having been staked by Peter Scott in 1897; the *Horse Fly*, *Princeton*, and *King* were staked, also by Peter Scott, in 1898. The group lies on the western slope of Nickel Plate Mountain in the angle between the Nickel Plate gravity and electric tramways, on the south side of Horsefly Gulch. The ground is steep and locally precipitous, with, except on parts of the *Banner* claim, a quite thick covering of timber. Rock-exposures are abundant, particularly where the slopes are steeper than the dip or cut the bedding at an oblique angle, as on the *Banner;* elsewhere dip-slopes show the underlying rocks, but not always strictly in place, and considerable talus blocks the bottom of Horsefly Gulch.

The road from Nickel Plate mine to Hedley Mascot passes the north-east corner of the *Horse Fly*, giving easy access to the upper part of the property. Both the tram-line and trail from Hedley to the Nickel Plate cross the *Banner* and skirt the east side of the *Horse Fly*, and a branch trail leads to the lower workings on the *Rollo*. Timber is plentiful, but water is limited to the needs of a very small camp.

Geology.—The geology of Nickel Plate Mountain has been described in detail by Camsell and Bostock, and no new or distinctive features are recognized on this group. The sediments include both Sunnyside and Nickel Plate beds with low westerly dips and very little contortion. Intrusive into these are masses of diorite, in part as sills, and some gabbro is seen, of the whitish altered variety, principally on the upper part of the *Horse Fly* claim. The accompanying map shows the distribution of intrusives and sediments, without differentiation of either.

The Sunnyside limestone is exposed on the south-east corner of the *Banner*, succeeded by the Sunnyside productive and Nickel Plate lower siliceous beds. The lower siliceous beds outcrop also on the eastern part of the *Horse Fly* and a band extends down to and widens on the *Princeton* and north-east corner of the *Rollo*. Beds of the Nickel Plate formation outcrop on the *Rollo* and northernmost part of the *Banner*. It is not known with certainty which those sediments are, stratigraphically, in Horsefly Gulch and on the northern part of the *Horse Fly* claim, as the known beds cannot be traced through, and the few exposures do not afford sufficient evidence for correlation on the basis of lithology. They are probably Nickel Plate.

The diorite, displaying almost everywhere a porphyritic habit with prominent hornblende, shows a strong tendency to follow the bedded structure in the form of sills. This is not universal, and that mass in Horsefly Gulch is undoubtedly stock-like. Several inclusions of sediments are known completely within the diorite, and crosscutting relations may be observed in many places even where the general distribution of diorite is sill-like. The diorite locally merges into the sediments, both the fine-grained "cherty" and coarse-grained

silicate types, and isolated patches and bands in sediments show random hornblende and feldspar crystals which are not normally developed during metamorphism; some of such patches and bands pass into diorite proper and some show no apparent connection with the diorite.

There seems to be very little folding or contortion of the sediments. Changes in attitude are noticed, but these are not systematic and no definite anticlines or synclines are developed. There is, rather, a local and slight warping, not surprising in view of the extensive intrusions. The only prominent and continuous flexure appears to lie just south of the prominent nose on the *Rollo* claim, and it is here that most mineralization is localized on this claim. Metamorphism is, on most of the property, quite intense, particularly on the *Rollo*, and coarse-grained silicate rocks are plentifully developed.

Mineralization is of two sorts—(*a*) following shears and fractures, adjacent to which sulphides may penetrate, where favourable, the surrounding rocks for relatively short distances, and (*b*) "massive" mineralization of inclusions of sediments or of highly-altered sediments nearly surrounded by diorite. Sulphides include arsenopyrite, pyrite, pyrrhotite, chalcopyrite, in a rock gangue; in a few instances a very little crystalline quartz accompanies the sulphides. In some cases the sulphides, particularly arsenopyrite, are related to calcite which may represent segregations from limy sediments, recrystallized limestone, or, more rarely, small calcite veinlets.

The workings on the group, principally open-cuts, were opened up many years ago and are now badly oxidized or caved in, or both. Many are unrelated and some represent simply surface scratching on indications of mineralization.

Near the north-east corner of the *Horse Fly* is a shear-zone, strike north 80 degrees west, dip 70 degrees south, traced for 300 feet by surface workings (1) to (5). It has also been intersected by diamond-drilling to a depth of 400 feet and proved to be a very uniform structure 6 inches to 3 feet wide. (2) is an 8-foot shaft and (3) is a 15-foot shaft. The shear-zone cuts through sediments and diorite alike and is mineralized with arsenopyrite, pyrrhotite, pyrite, and chalcopyrite in a gangue of silicified material and accompanied by a little calcite and crystalline quartz. The mineralization follows a well-defined and narrow zone of shearing and, in (2), spreads north along a favourable bed 6 to 8 inches wide for 10 to 12 feet; this following of the bedding appears to be strictly local.

A second shear-zone 100 feet to the south, strike north 75 degrees west, dips about 45 degrees southerly and is traced for 70 feet by (6) and (7). These two open-cuts disclose a tight shear-zone 1 to 1½ feet wide in garnetiferous sediments, mineralized with arsenopyrite, pyrrhotite, pyrite, and chalcopyrite. Both fissuring and mineralization definitely cut the bedding, but follow it locally and tend to jump across some beds.

On the edge of Horsefly Gulch are three apparently unrelated open-cuts. In (8) diorite, locally at least, cuts the bedding, on the foot-wall contact of which, strike north 30 degrees west, is a broken zone a few inches wide which is mineralized, and from which mineralization spreads outwards into the limy sediments. This is seen on a 6- by 8-foot face and amount and continuity of mineralization are obscure. In (9) in the foot-wall of a similar diorite contact, silicified limestone contains a fine dusting of sulphides. (10) discloses several steep fracture-planes striking from north-east to east, and a discontinuous crushed zone, 4 to 6 inches wide, bearing arsenopyrite and dipping nearly parallel to the hillside in dense silicified limestone. Farther west at (11) is an open-cut on a diorite-contact, strike north 30 degrees west, dip 65 degrees south-westerly, on the foot-wall of which, beneath limestone, strike north 10 degrees west, dip 15 to 20 degrees west, is 4 feet of limestone shot through with grains, small stringers, and masses of crystalline quartz, and mineralized with arsenopyrite, chalcopyrite, pyrite, and pyrrhotite. The total amount of mineralization and the localizing factors are obscure. At (12) is a small open-cut in copper-stained cherts and also garnetite, bearing chalcopyrite, and 100 feet lower on the hillside is a bed of dense green silicate rock, between sheets of diorite, mineralized with disseminated arsenopyrite.

On the north side of the *Rollo* is a large inclusion of garnetite which, particularly at (13), is mineralized with chalcopyrite. The garnetite is massive and contains lenses and irregular masses of coarse calcite up to several feet across, which latter appear to have been segregated from the original rock during metamorphism. The chalcopyrite, and a little pyrrhotite, is in stringers, small masses and disseminations, with no systematic occurrence. One open-cut is on a faintly discernible zone parallel to the steep hillside and contains locally

a 12-inch strand heavy in chalcopyrite. On the nose of the ridge at (14) is a small inclusion of garnetite and limy silicate rock which fades into diorite. In an open-cut is seen scattered arsenopyrite and less pyrite and chalcopyrite; the whole inclusion would appear to be mineralized.

Farther south on the trail, near an old cabin on the *Rollo* claim, are a number of shallow workings, (15) to (20). These are on a sharp structural flexure which presumably extends up to the top of the ridge at (21). The lowest open-cut is in altered limy sediments and limestone, containing bands of pyrite up to ½ inch wide, and some pyrrhotite. The next above shows an unmineralized contact between grey limestone and cherty sediments, and the next (17) limy sediments and a band of coarse calcite. (18) is a large open-cut in which are two 12-foot adits, just beneath the same band of calcite, and is in sediments including some epidote-garnet rock bearing arsenopyrite in lenses a few inches to 2 feet in width. At the southernmost adit is a mass of nearly solid arsenopyrite, apparently an 18-inch band dipping steeply to the north-west; this material is oxidized and stained pink and green, but a sample returned *nil* in nickel and cobalt. (19) is a 12-foot adit in limy sediments; a little arsenopyrite and chalcopyrite is seen on the dump. (20) is a cut in strongly-altered sediments containing some scattered mineralization in oxidized material.

Above, on presumably the same flexure, is a cut (21) in garnet-epidote rock. A zone up to 2 feet wide and associated with a central fissure bears considerable epidote, with which is associated prominent arsenopyrite. (22) and (23) are two cuts on formation, the former containing, in garnetite, a little arsenopyrite in glassy quartz with no vein form. At (24) are two similar cuts.

In flatly-dipping limestone and fine-grained siliceous sediments at (25) are interlacing bands, badly oxidized, but apparently of solid arsenopyrite accompanied by some pyrite. The maximum width is 6 inches and the average 3 inches or less. The bands are irregular and form a fracture pattern in part parallel with the bedding but also cutting it. The remaining open-cuts show only traces of mineral except in (26), where arsenopyrite, both bunchy and disseminated, occurs with a little pyrrhotite, pyrite, and chalcopyrite in coarse-grained silicate rocks.

Four samples were taken of selected material with intent to see whether the more solid arsenopyrite carries high gold values or not. The taking of representative or average samples is not possible in view of the condition of most of the workings.

(1.) (25) northern open-cut, bands of solid arsenopyrite: Gold, 1.61 oz. per ton; silver, trace.

(2.) (25) southern open-cut, heavy red oxide: Gold, 1.78 oz. per ton; silver, 0.42 oz. per ton.

(3.) (21) selected chip sample of better arsenopyrite: Gold, 0.86 oz. per ton; silver, 0.2 oz. per ton.

(4.) (18) heavy arsenopyrite from near southern adit: Gold, 0.58 oz. per ton; silver, 0.02 oz. per ton; nickel, *nil;* cobalt, *nil.*

The Trethewey Syndicate in the fall of 1937 did 5,285 feet of diamond-drilling in twelve holes on the *Rollo* and *Horse Fly* claims under the direction of V. Dolmage and Stan. Duffell. Four exploratory holes were put down on and near the ridge on the *Rollo* (*see* map) and the geologic section was crosscut by this means down to the Sunnyside limestone. Two holes were drilled some 200 feet south-east of (10) in the hope of intersecting commercial mineralization, and one hole was drilled on the east border of the *Horse Fly* to investigate on this claim a fracture seen on the *Terrier*. The northernmost shear-zone (1) to (5) was cut by four holes to a depth of 400 feet and was shown to be a very uniform structure differing in no essential respects from the surface showings. A single hole cut the near-by shear-zone (6) and (7) and was continued to cut the northernmost one also. Mineralization encountered in this drilling campaign proved to be sub-commercial, and the option was relinquished in December.

The close relation of most of the observable mineralization to zones of shearing and fracturing is in contrast with that at the Nickel Plate. Mineralization of beds adjacent to these "feeders" has taken place, but in all observed cases the effect has been distinctly local. The two inclusions at (13) and (14) are well mineralized and it may be assumed that these represent remnants of once more extensive bodies, now removed by erosion, together with

considerable of the upper part of the Nickel Plate formation. The metamorphism on this group is characteristically garnetiferous, and may be contrasted in this respect with that found in and about much of the commercial mineralization on Nickel Plate Mountain, in which epidote, albite, scapolite, and augite are prominently developed. Most of the diamond-drilling was done with the intention of proving the existence of bedded mineralization in the neighbourhood of the relatively small "feeders."

Hedley (20-Mile) Creek Area.

Golden Zone Mines, Ltd.

This company, capitalized at 1,350,000 shares, has its registered office at 524 Vancouver Block, Vancouver. J. A. Collins is president and J. Foss Weart is secretary. The property consists of four Crown-granted claims, under option, and the company controls in addition eight surrounding claims and one fraction. The property is about 7 miles north-east of Hedley at an elevation of about 6,000 feet, on the west side of a rounded summit that lies between several branches of Hedley (20-Mile) Creek drainage.

This is part of the dissected plateau-surface which reaches an elevation, half a mile to the east, of 6,200 feet. The topography is subdued in this vicinity; drift-covered flats and gentle slopes are quite heavily timbered and rock-outcrops are not plentiful. There is consequently abundant timber for mining purposes, but water, except for domestic use, will have to be brought a considerable distance by ditch or flume.

An old wagon-road, 12 miles in length leading up Hedley Creek from Hedley, was reconditioned in 1936 and made fit for automobile traffic. In the drier part of the year it is possible, as a short cut from Penticton, to drive north from the old Nickel Plate–Penticton Road a distance of 6½ miles to the property, although the return trip is very difficult.

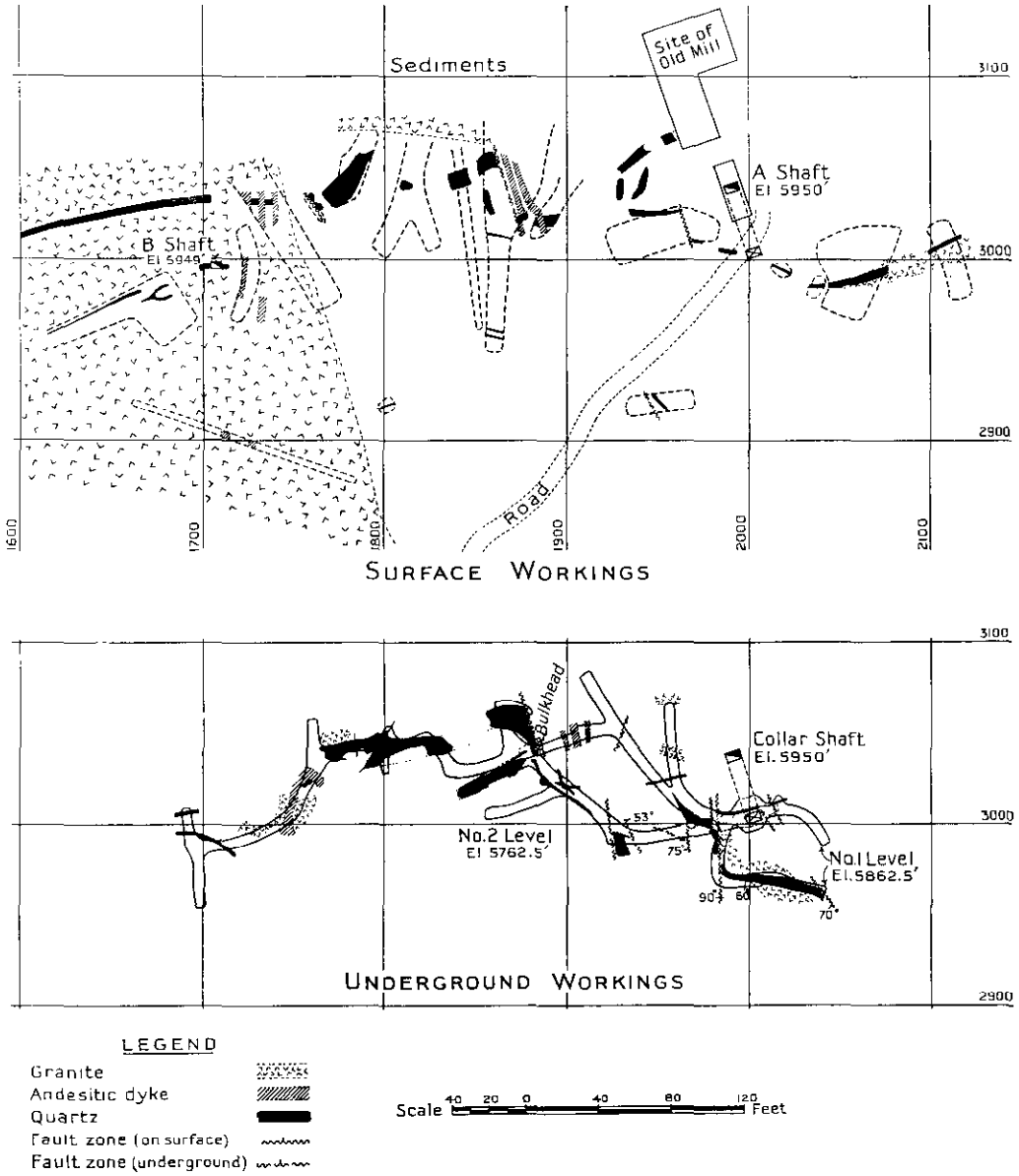
The mineral deposit occurs partly in sediments that form a fairly large area completely surrounded by members of the Okanagan intrusives, and partly in the intrusive granite. The sediments are locally argillaceous, limy, and cherty types and include a minor amount of greenstone. They are of Permian or Triassic age. They are intruded by a fine-grained biotite granite, south of which is coarser-grained granite slightly younger in age, and all rocks are intruded by porphyritic granite which lies a few hundred feet to the south-east. Post-mineral dykes of andesitic composition are a few inches to a few feet wide; these are fine-grained granular green rocks containing prominent vesicular cavities. The mineral deposits are quartz veins and replacements in both fine-grained granite and in sediments near the contact with the latter.

The four Crown-granted claims, *Golden Zone*, *Silver Bell*, *B.C.*, and *Irish Boy*, were staked in 1900, and after some development, which included sinking the A and B shafts 115 and 47 feet respectively, a mill was built in 1908. The mill was operated only for a very short time, due, it is said, to shortage of water, and during the next three or four years very little development-work was done, chiefly on the surface. In 1930 a local syndicate took over the property, and during that year and the two following more surface work was done and an adit was driven at a point several hundred feet west of the two shafts. Following some diamond-drilling and sampling in 1936, the present company was formed in October of that year.

A quartz vein 2 to 4 feet wide, in granite, is traced by open-cut and natural exposure from near B shaft, 550 feet west, past a prominent rock draw. The vein is faulted 100 feet to the north past this draw. An adit, elevation 5,790 feet, is driven from near the bottom of the draw westerly for 115 feet; the vein is intersected at a small angle 75 feet from the portal and is drifted on from there to the face, where it is faulted a distance of 3 feet. Midway between the adit and B shaft it is faulted 45 feet; a narrow stringer lies 6 to 10 feet in the foot-wall of the vein for a short distance on both sides of the draw.

The vein has a steep dip to the south and represents a simple fissure-filling of hard, vitreous, and locally crystalline and drusy quartz. It averages perhaps 3 feet in width, is up to 4 feet wide as exposed on the surface, and in the adit has a maximum width of 6 feet. It is mineralized with pyrite, sphalerite, and a little chalcopyrite. This vein carries low values in gold and silver. A selected sample from the dump of the adit, containing more sphalerite than pyrite, returned: Gold, 0.02 oz. per ton; silver, 8 oz. per ton; a grab sample from the dump returned: Gold, trace; silver, 1.2 oz. per ton.

B shaft, said to be 47 feet deep, is on a parallel vein 30 feet to the south. This vein is poorly exposed for a distance of 40 feet west and little can be seen as to its character. Material on the dump has the appearance of a replacement type rather than vein-quartz, and contains arsenopyrite and pyrite.



Golden Zone Mines, Ltd. Plan of principal, surface, and underground workings after surveys by company.

East of B shaft conditions are very different and a number of open-cuts partly expose the geology, as illustrated on the accompanying map. There is rather more granite than shown, east of B shaft, but the rotten nature of the rock and the irregular distribution make accurate mapping difficult. A study of the accompanying map, both surface and underground, will give a better idea of the geology than any verbal description. It is at once apparent that east of the granite-contact proper the quartz is exceedingly irregular; a width of 12 feet,

well mineralized with arsenopyrite, is seen in the large cut north-east of B shaft. Other widths and degrees of mineralization are extremely variable. Near the widest quartz a pile of selected material shows very heavy sulphide, both pyrite and arsenopyrite, and some of the latter is extremely fine-grained. A sample of solid sulphide from this pile returned: Gold, 1.94 oz. per ton; silver, 10 oz. per ton. The surface rocks are finely shattered, and in only a few instances is the quartz well exposed, so that details of widths and attitudes cannot be obtained.

Four diamond-drill holes were put down from the surface to intersect the vein or veins at depth. The core recovered was so badly broken that the information gained was of little positive value, but mineralized quartz was intersected.

"A" shaft was originally put down 115 feet at an average inclination of 72 degrees and a small amount of drifting done. The present company did considerably more drifting on this No. 1 level and sank the shaft vertically a further 100 feet to No. 2 level, on which latter level drifting was still in progress at the close of 1937. All of the ground is shattered and blocky and the larger faults form broad zones of gouge. The sediments dip 60 degrees westerly and are cut by irregular masses of granite and by an easterly-dipping system of post-mineral dykes (not mapped on No. 2 level, 20 feet west of the shaft). A fault-zone on No. 1 level, 130 feet west of the shaft, was caved at the time of the writer's visit in December, and the geology of the inner section, here illustrated, is taken solely from the company's maps.

The quartz occurs as fissure-fillings of small size, and as filling and replacement bodies of all widths up to 12 feet, which tend to fade into the formation; widths and attitudes are irregular. The quartz is mostly white and friable and is locally vaguely banded. Mineralization is in contrast with that on the surface; it consists almost entirely of pyrite, which occurs in two instances as nearly solid bands a few inches wide, as pockets, as stringers and scattered aggregates, and as fine platy smears. There is locally a little sphalerite, a very little arsenopyrite, and rarely a silvery mineral, jamesonite.

The quartz is partly offset by and partly follows the faulting, forming a rudely co-ordinate pattern, complex in detail. Not all of the faulting is later than the introduction of quartz, and part at least of the wide quartz is influenced by movement at a large angle to the dominant east-west strike. There are several narrow, approximately east-west strands, one of which is encountered in the shaft about 35 feet above No. 1 level.

Values, according to the company's sampling, are quite variable in the wider sections of quartz, including many low assays; better values, from a large fraction of an ounce to 2 oz. and higher, are to be found in the narrower, east-west strands. This is borne out by the writer's sampling, as follows:—

(1.) Face of No. 2 level drift, as mapped, main quartz 75 inches wide: Gold, trace; silver, 0.5 oz. per ton.

(2.) Face of No. 2 level drift, selected sample of best-mineralized material on foot-wall, including a very little sphalerite: Gold, 0.10 oz. per ton; silver, 10.5 oz. per ton.

(3.) No. 2 level drift, 24 feet from face, 40 inches on foot-wall of main lead: Gold, 0.01 oz. per ton; silver, 0.6 oz. per ton.

(4.) No. 2 level drift, 36 feet from face, stringer of heavy pyrite 4 inches wide on foot-wall of main lead: Gold, 0.10 oz. per ton; silver, 6 oz. per ton.

(5.) No. 2 level, roughly chipped sample across approximately 8 feet of quartz, 70 feet west of shaft: Gold, 0.06 oz. per ton; silver, 0.6 oz. per ton.

(6.) No. 1 level, at fork 55 feet north-west of shaft; narrow 1- to 3-inch stringer: Gold, 0.74 oz. per ton; silver, 1.2 oz. per ton.

(7.) No. 1 level, south-easternmost drift, 22 feet from face, quartz 45 inches wide: Gold, trace; silver, 0.4 oz. per ton.

(8.) In shaft, about 35 feet above No. 1 level, across a vein-zone from 8 to 18 inches wide and here 10 inches wide: Gold, 1.30 oz. per ton; silver, 0.6 oz. per ton.

In summary, from about B shaft and west is a steeply-dipping fissure-vein in granite, mineralized with pyrite, sphalerite, and a little chalcopyrite. East of this point, in sediments containing small, irregular masses of granite, are irregular fissure-fillings and replacement bodies of quartz, with steep dips and all widths up to 12 feet. These bodies have a general east-west strike, but also tend to follow, and are partly offset by, a somewhat later set of fissures that strike roughly north and south. The mineralogy also is in contrast with that

farther west; here sphalerite is very rare, and arsenopyrite, while rare underground, is locally abundant on the surface. In comparison with the surface it might be assumed that underground the body or bodies will die out to the east, and in crossing the general granite-contact to the west will change in form and mineralogy, but this has not been proved. Values, in badly-broken country, are erratic, and frequently low, except in some of the narrower east-west strands.

References.—Geological Survey, Canada, Memoir 2, page 204; Geological Survey, Canada, Preliminary Report, "Mineral Deposits of West Half of Kettle River Area," page 24; Annual Reports, Minister of Mines, British Columbia, 1930–1932.

Keremeos Creek.

Gold Valley Mines, Ltd.

Gold Valley Mines, Limited, was incorporated in April, 1936, to take over the undertakings of a private company of the same name, on property originally acquired by Olalla Mines, Limited, two years previously. The head office of the company is 417 Vancouver Block, Vancouver. The total capitalization is 3,000,000 shares.

The property consists of nineteen claims and fractions, five of which are Crown-granted. It is situated on the west side of Keremeos Creek, just below Olalla. The Penticton–Keremeos Highway crosses the eastern margin of the property 28 miles from Penticton and between 3 and 4 miles north of Keremeos.

The property flanks the flat bottom of the Keremeos Creek Valley and lies on steep and precipitous slopes that rise to summits in excess of 6,000 feet, 10 miles south-east of Nickel Plate Mountain. Grassy and bluff-covered slopes rise from the valley-bottom at angles between 20 and 35 degrees, and are dissected by occasional dry gullies.

The property is divisible into two sections; one, the *Sunrise* section, immediately south of Olalla, is served by trail a few hundred feet in length from the highway. The *Something Good* section, nearly a mile to the south, is reached by an excessively steep switch-back trail that climbs to a height of 1,000 feet above the highway. Sufficient mining-timber is to be found, and water for the *Sunrise* section is obtained from Olalla Creek, while at the *Something Good* water is obtained from the mine-workings and also from a spring 1,000 feet to the north.

Equipment and buildings include a blacksmith-shop at each of the *Something Good* adits, and a portable compressor at the No. 2 adit supplies air to both. A crudely-constructed aerial tram equipped with wooden "buckets" of small capacity leads from the No. 1 adit to a 60-ton bin near the road. On the *Sunrise* section a frame building houses a semi-permanent compressor installation and also a steel-sharpener. A building a few hundred yards distant in Olalla has been used as a bunk-house. B. C. McDougall has been in charge of a small and variable crew for the past year, except for a suspension of operations during excessively cold weather during the greater part of February and March of 1937.

The rocks of the region consist of a thick sedimentary series intruded by pyroxenite, granite, and some dioritic rock. The sediments are fine-grained and commonly dark-coloured argillites, cherts, and quartzites and less calcareous material, all possessing a blocky fracture. Interbedded with the sediments is greenstone which represents in part at least andesitic lava and perhaps local bands of tuff. The amount of greenstone is not known, but is clearly subordinate, and is not seen in the mine-workings. The structure of these rocks is not known.

Two prominent intrusive rocks are pyroxenite and granite. The former is a medium- to coarse-grained rock, light to dark green in colour, consisting almost entirely of augite and including a little biotite; it is found both east and west of Keremeos Creek Valley. One large body on the *Something Good* and *Great Eastern* claims is, at the elevation of No. 1 adit, nearly 2,000 feet wide and trends up and down the hillside; an offshoot from this body passes immediately south of the adit. A second body, of unknown extent, occurs on the *No. 2 Fractional*. The pyroxenite weathers to a light green sandy soil. A body of pink soda granite outcrops at the north end of the property and near Olalla. Some dioritic rock is also to be seen, part of which may be a border phase of the granite and part appears to be a dyke; outcrops are too scarce to show the distribution and relationships of these intrusives, but they are all pre-mineral.

Mineralization is entirely different at the two ends of the property. At the south end, on the *Something Good*, a shear-zone in argillites and quartzitic sediments contains in one place small cross-stringers of quartz, and in this section a brecciated foot-wall seam contains gold values. On the *Sunrise* claim are several small veins of white quartz, in granite and pyroxenite, weakly mineralized with pyrite. One of these veins is seen to contain a lens 3 inches wide mineralized with galena and copper sulphides in addition to pyrite.

Something Good Section.—A shear-zone in argillites and quartzitic sediments outcrops on the face of prominent bluffs at an elevation of about 2,600 feet and upwards for 100 feet and more. At the base of the bluffs the rock is pyroxenite, which consists of one large body with an offshoot 100 feet wide in the angle between which lies the shear-zone, apparently in both vertical and horizontal section.

The shear-zone, at the lowest point seen, at No. 1 adit is about 4 feet wide and widens upwards to 16 feet, 40 feet above the adit. From the latter point, partly covered by talus and again exposed 50 feet higher on a vertical face, the shear-zone is seen to be a branching structure of sheared and shattered rock. A further 100 feet higher it is lost in overburden and cannot be traced with certainty beyond this point. From 20 to 40 feet above the adit the shear-zone is transected diagonally by narrow quartz stringers striking north 60 degrees west and attaining a maximum width of 3 inches. Some little quartz is also seen as breccia-filling in this section and part has also been brecciated together with the surrounding rocks; the distribution of quartz is erratic and the total percentage low.

No. 1 adit, 1,035 feet above the road at an elevation of about 2,600 feet, is, at the portal, 30 feet south of the main body of pyroxenite and 40 feet north of the offshoot of the same rock. It follows the foot-wall of the zone, in sediments, for 350 feet, in which distance it curves gradually from south 75 degrees west to south 55 degrees west. No. 2 adit, 200 feet lower in elevation on the 35-degree slope, is driven south 73 degrees west for 315 feet to a point vertically below the portal of No. 1 adit; from the face a 25-foot crosscut is driven north 40 degrees west. No. 2 adit is in pyroxenite for its entire length and contains no apparent mineralization.

Measurements in No. 1 adit have been taken from a point vertically below the edge of a single set of lagging 15 feet above the rail, and which is 12 feet from the edge of the rock-cut at the portal of the adit. For the first 300 feet the adit follows a smooth wall which dips at a very high angle northerly; the adit then crosses into the foot-wall, and at 350 feet a crosscut is driven north-west 24 feet to intersect the shear-zone again. In the first 110 feet there is, adjacent to the smooth wall which is the foot-wall of the shear-zone, 6 to 26 inches of more or less cemented brecciated material, which consists of argillaceous and quartzitic rock and a varying but subordinate amount of vein-quartz, and contains small amounts of scattered pyrite in both fragments and cement. The cement seems to be entirely calcite, and in no part is this breccia material strongly coherent; the fragments are rarely as large as walnuts, and much of the material is of the coarseness of coarse sand. In the hanging-wall of this zone of crushing are shattered and sheared argillaceous and quartzitic sediments, the darker of which are frequently graphitic; these grade into firm ground and may or may not be sharply marked off from the foot-wall zone. From 80 to 110 feet the foot-wall zone becomes less marked, and in this distance grades from a few inches to a foot of finely-crushed and partly-cemented argillite into 1 to 3 inches of gouge.

From 110 feet from the portal in to the face the foot-wall slip is accompanied by an inch or so to nearly a foot of gouge or strongly sheared argillite, in many places graphitic. The remainder of the ground exposed in this inner 240 feet of the adit consists of dark-coloured argillaceous to cherty rock sheared and brecciated to a greater or lesser extent, and containing occasional veinlets and tiny lenses of calcite as well as sparse and erratically disseminated pyrite. A crosscut extends 25 feet north of the foot-wall at a point 175 feet from the portal, and shows merely shattered and sheared dark argillites.

Sampling.—In No. 1 adit holes have been drilled in foot-wall, hanging-wall, and back to a depth from collar between 4 and 5 feet, averaging about 4½ feet. Holes are drilled into the foot-wall at 5-foot intervals between 148 and 342 feet and into the hanging-wall between 148 and 348 feet; holes are drilled at 10-foot intervals upwards in the back from 150 to 340 feet. Sludge samples are reported to have been taken from all of these holes, 100 in number, but the assay returns are not at hand.

The writer took samples throughout the length of the adit, commencing at 20 feet from the outer edge of the lagging. Samples were cut with a moil across the foot-wall crushed zone, and restricted to this zone except where it was bounded by shattered or sheared rock, when the sample was extended to firm ground. In the innermost 100 feet samples were cut across the most shattered portion, regardless of whether there was a clearly-defined foot-wall zone or not. Both crosscuts were sampled for their full length.

From 20 to 80 feet the foot-wall zone was cut every 5 feet. From 80 feet in the foot-wall zone is less well marked and the sample interval was extended to 10 feet, the sample in each case being of strongly shattered or sheared ground as distinct from the normal blocky sediments. From 190 to 240 feet the back breaks to a shear-zone dipping southerly 15 to 45 degrees, and samples were not taken in this interval except as representing the material of this zone which appears to cross through, and to offset slightly, the main foot-wall slip. The westerly wall of each crosscut was sampled in 5-foot sections. The returns of this sampling are given below in tabular form. The samples were all run for silver, but as the highest return was 0.6 oz. per ton, corresponding to the highest gold value, and very few were above a trace, the silver values have been omitted.

Sample No.	Distance from Portal.	Width.	Gold.	Remarks.
	Feet.	Inches.	Oz. per Ton.	
4348B	20	7	0.30	Foot-wall breccia-zone.
49	20	35	*Nil*	In hanging-wall of above.
4350B	25	*11*	*0.16*	*Foot-wall breccia-zone.*
51	30	13½	0.24	Foot-wall breccia-zone.
52	30	36	0.02	In hanging-wall of above.
53	35	13½	0.36	F.W. breccia-zone.
54	40	23	0.44	F.W. breccia-zone.
55	45	23	0.36	F.W. breccia-zone.
56	50	25	0.54	F.W. breccia-zone.
57	55	15	0.22	F.W. breccia-zone.
58	60	27	0.06	F.W. breccia-zone.
59	65	20	0.06	F.W. breccia-zone.
4360B	70	32	0.72	F.W. breccia-zone.
61	75	52	0.30	F.W. breccia-zone (zone not clearly defined).
62	80	56	0.16	F.W. breccia-zone (zone not clearly defined).
63	90	11	0.32	F.W. breccia-zone (solid hanging-wall).
64	100	16	1.60	F.W. breccia-zone.
4365B	110	11	2.20	F.W. breccia-zone (solid hanging-wall).
66	120	54	0.04	Shear-zone.
67	130	25	0.08	On foot-wall.
68	140	15	Trace	On foot-wall.
69	150	42	Trace	On foot-wall.
4370B	160	37	0.02	On foot-wall.
71	170	70	Trace	Across back.
72	180	60	Trace	Across back.
73	180	60	Trace	Across back at crosscut.
74	180	60	Trace	West wall of crosscut.
75	180	60	Trace	West wall of crosscut.
76	180	60	Trace	West wall of crosscut at face.
78	200	12	Trace	Flat shear in back.
79	210	20	Trace	Flat shear in back.
4380B	250	50	Trace	Shear-zone.
81	260	48	Trace	Shear-zone.
82	270	70	Trace	Shear-zone.
83	280	40	Trace	Shear-zone (foot-wall, strongly crushed).
84	280	40	Trace	Shear-zone (hanging-wall, blocky ground).
85	290	55	0.02	Shear-zone.
86	300	64	Trace	Shear-zone.
87	310	62	Trace	In F.W. of foot-wall slip.
88	320	52	Trace	In F.W. of foot-wall slip.
4389B	330	51	Trace	In F.W. of foot-wall slip.
90	340	46	Trace	In F.W. of foot-wall slip.
91	350	60	Trace	W. wall crosscut, 15–10 feet from face.
92	350	60	Trace	Ditto, 10–5 feet from face.
4393B	350	60	Trace	Ditto, 5 feet at face, on strong shear.

An interesting section is undoubtedly shown in the first 110 feet in from the portal. The writer has not averaged this section, however, because only a few of the samples are taken over minable widths. He believes that a resampling at 3-foot intervals over practical mining-widths would be necessary before an accurate estimate of the value of this section could be made. The inner 240 feet of the adit is of no interest.

Values are restricted to that portion of the foot-wall of the shear-zone in which there has been some cementation by calcite of crushed and granulated material that contains some vein-quartz in addition to rock. The end of the mineralized section is coincident with the appearance of a poorly-defined shearing that emerges from the north wall of the adit, and from that point to the face the structure is characteristically that of an ordinary shear-zone in rocks of the type described.

The shear-zone has not been intersected by No. 2 adit, so it is not known whether values exist in pyroxenite walls. The distance on the shear-zone to pyroxenite below No. 1 adit is not known.

Appreciable values are restricted in No. 1 adit to a section little more than 100 feet long, of an average height to surface of 50 feet or less and of unknown depth. The situation of the workings makes transportation difficult and expensive, and, in view of the broken character of the ground and difficulty of sorting, neither clean nor cheap mining is indicated.

Two grab samples were taken from the surface of the full 60-ton bin near the road. One was of fines and one of the more highly-cemented breccia characteristic of the outermost 80 feet of No. 1 adit. These samples returned each a trace in gold.

Sunrise Section.—As previously mentioned, the rocks underlying this section include granite, pyroxenite, and sedimentary and dioritic rocks, the distribution and relationship of which are obscured by overburden. Mineralization is in the form of narrow quartz veins.

On the highway, a quarter of a mile south of Olalla, is an old adit driven 88 feet in a direction south 75 degrees west. This adit follows a vertical quartz vein 5 to 16 inches wide, frozen in granite. The quartz contains calcite locally and is very sparsely mineralized with small grains of pyrite. At 34 feet from the portal the vein, here containing considerable calcite, is partly lost in the north wall, from which it emerges at 54 feet, and is continuous to the face. A crosscut is driven 10 feet north at 68 feet, and a similar strand of quartz 6 feet distant is drifted on for 10 feet to the west.

Three samples were taken in this adit:—

Face of north drift, quartz 17 inches wide: Gold, *nil;* silver, *nil.*

Main adit, opposite crosscut, 5 inches wide: Gold, trace; silver, trace.

Main adit, 28 feet from portal, 16 inches wide: Gold, trace; silver, trace.

An old shaft is sunk to a reported depth of 45 feet on what is evidently the same vein at a point 150 feet westerly and 110 feet higher than the adit. This shaft shows the vein to be vertical and 8 to perhaps 20 inches wide, between solid and unaltered granite-walls.

The vein cannot be traced farther, but some 600 feet westerly from the shaft and 260 feet higher is an open-cut in pyroxenite and exposing quartz that may or may not be the continuation of the same vein. The quartz is in two members 6 feet apart, dipping 70 to 85 degrees northerly, and is quite irregular. The width varies from 5 inches or less to 32 inches, and no appreciable mineralization is to be seen in the white and friable quartz. Neither of the veins appears to be continuous; the foot-wall vein pinches out at a depth of about 12 feet and the hanging-wall vein appears to lens out along the strike.

Samples returned:—

Foot-wall vein, west side of cut, 32 inches wide: Gold, trace; silver, 0.4 oz.

Foot-wall vein, east side of cut, 8 inches wide: Gold, *nil;* silver, *nil.*

Hanging-wall vein, west side of cut, 15 inches wide: Gold, trace; silver, 0.4 oz.

An adit is collared 130 feet north of this cut and 100 feet lower, and is driven 217 feet in a direction south 6 degrees east directly beneath the cut. No mineralization of any significance is encountered by this adit, which is in pyroxenite for its entire length. One small and discontinuous lens of quartz is to be seen on the west wall 45 feet from the portal, at 170 feet an 11-foot branch is driven easterly in sheared pyroxenite, and at random intervals throughout the remainder of the crosscut sparse stringers and tiny lenses of calcite and quartz are seen to occur. Unless there has been some faulting, for which there is no evidence, the veins exposed in the upper cut do not persist to the level of the adit.

On the edge of the highway, 130 feet northerly from the old adit, is an open-cut which has been continued as an adit a distance of 10 feet in a direction of south 80 degrees west on a shear-zone which dips 75 degrees northerly. This shear-zone contains as much as several inches of quartz or quartzose material, of irregular distribution. A sample across the face, showing an average width of 19 inches, including practically no quartz, returned: Gold, 0.04 oz. per ton; silver, trace. At the top of the portal in the foot-wall of the zone is a lens of quartz to a maximum width of 9 inches, including an extreme foot-wall band 3 inches wide mineralized with galena, chalcocite (?), and perhaps other copper- and silver-bearing sulphides. This material is reported to assay high in gold and silver, but was not sampled by the writer because of the spotty nature of mineralization and the fact that the whole lens is not continuous.

In addition to these showings on the *Sunrise* section of the property, several hundred feet north-west of the old adit, and 100 feet or so apart, are three piles of a hundred to several hundred pounds of quartz, the sources of which are not clearly indicated, although of local derivation. Between this point and the new upper adit a little work has been done on granite that is seen to contain a strand of quartz 4 to 10 inches wide and dipping 15 degrees north-westerly. Another exposure of white quartz is seen 65 feet north-easterly from the portal of the upper adit, but no work has been done on it and width and attitude are not apparent.

Conclusions.—On the *Something Good* section of the property No. 1 adit discloses a mineralized section 100 feet or so in length that contains interesting gold values. The upward extension of this section is distinctly limited and the downward continuation has not been proved. The chief matter in doubt is the behaviour and value of the shear-zone in pyroxenite, the boundaries of which body of rock are not known beneath the portal of the adit. Even if values do not persist downwards into pyroxenite there may be 100 feet of depth in sediments, and close-interval sampling following further development may show a minable body of limited dimensions. Calculations at the present stage of development are inadvisable.

On the *Sunrise* section there is at present no minable tonnage. The continuity and value of the quartz veins so far developed are not encouraging. Surficial exploration, so far hardly attempted, is the only means of further exploring this part of the property.

Kelly Creek.

Kelly Creek flows into the Tulameen River from the north-west about 12 miles above the village of Tulameen. The stream is about 6 miles in total length and flows in a broad, open valley at a low gradient from the southern base of Coquihalla Mountain (elevation 7,068 feet). A trail leads up the valley and branches at the second fork. The country traversed is Eagle granodiorite, to the west of which and at the headwaters are Cretaceous sediments, tuffs, and breccias capped, at Coquihalla Mountain, by Tertiary lava (*see* Cairnes' report and map, Geological Survey, Canada, Summary Report, 1922, Part A, page 95).

Quartz veins occur in the Cretaceous rocks at the first fork 3 miles from the river, between the second forks, and also on the north-east valley-wall 1 mile from the second fork. On the high summit across the creek and due south of Coquihalla Mountain there is scattered sulphide mineralization in volcanic rocks. The rock of this summit is fine-grained and light-green in colour and contains considerable quartz; microscopic examination classes it as granodiorite, and it might be intrusive.

W. B. Marks. Immediately below the first main fork of the creek, 3½ miles by trail from Tulameen River, W. B. Marks owns two claims known as the *Evening Star* group. The showing is in a small canyon on the creek at an elevation of about 4,000 feet. A quartz vein, dip 50 degrees west, is exposed for a length of 30 feet in greenstone by open-cut and short adit. The vein is 5 to 12 inches wide and tends to split into stringers; in the face of the 20-foot adit two stringers an inch or so wide are apparently in the hanging-wall of the vein proper, which is not at this point seen. The quartz contains locally considerable pyrite and a little chalcopyrite. In the open-cut a sample of the vein, averaging 7 inches wide, returned: Gold, 0.30 oz. per ton; silver, 0.1 oz. per ton; a grab sample of the dump returned: Gold, 0.28 oz. per ton; silver, 0.2 oz. per ton. The vein has not been traced farther. One-quarter mile west of this point, in partly silicified, sheared greenstone, is some irregular frozen quartz mineralized with pyrite and a little chalcopyrite.

One mile north of the second fork, at an elevation of about 4,850 feet, in the bed of a small tributary creek is a quartz vein exposed for a total length of 20 feet by open-cut and short adit. The vein has a strike of north 80 degrees west and a dip of 60 degrees north in sheared greenstone; it is from 5 to 26 inches wide, tends to split, and is mineralized with pyrite, a little chalcopyrite, and a trace of galena. A sample across the widest part, 26 inches wide, returned: Gold, 0.32 oz. per ton; silver, 2 oz. per ton; and a sample across 5½ inches at the portal of the adit returned: Gold, 0.31 oz. per ton; silver, 1 oz. per ton.

The prominent ridge south of Coquihalla Mountain, elevation about 5,650 feet, consists of light greenish-grey volcanic (?) rock, intruded near the valley-bottom by granodiorite. On the crest of the ridge the rock for a distance of about 300 feet is altered and weakly sheared, with development of epidote in tiny films and patches and also small veinlets of quartz. Small amounts of pyrite, galena, chalcopyrite, and sphalerite can be detected in this material. Only a slight amount of surface work has been done here, and part of the mineralized rock was said to be covered by snow early in July. Sulphides occur in very small quantity, and the distribution is obscure, but the area seems well worthy of surface prospecting; the north side of the ridge is excessively steep for 1,500 feet.

Chisholm. Archie Chisholm, of Tulameen, owns one claim at the base of this same ridge on the eastern side. A quartz vein striking north 10 degrees east and dipping 50 degrees west, in sheared greenstone, is 130 feet higher than the creek, at an elevation of about 4,400 feet. The vein averages about 10 inches wide, contains some carbonate, and is mineralized with pyrite and chalcopyrite. A sample from the dump returned: Gold, 0.04 oz. per ton; silver, 0.2 oz. per ton. Some 100 feet higher in elevation is another similar vein striking north 60 degrees east, mineralized with pyrite, chalcopyrite, and tetrahedrite. A selected sample from this vein returned: Gold, 0.02 oz. per ton; silver, 1.9 oz. per ton.

Central Camp.

Mabel. This group, centred about the old *Mabel* claim, consists of ten claims and fractions, six of which are Crown-granted. It is owned or controlled by Dr. G. H. Worthington, of Vancouver, and associates; J. G. Creelman is foreman in charge of the work. The group is in the old Central Camp and is situated on the summit on the road which leads from Boundary Falls to the highway west of Grand Forks. This is a part of the plateau-surface at an elevation of about 4,700 feet and is characterized by a subdued rocky topography, well timbered. The rocks are chiefly sedimentary and schistose, intrusive into which is a broad dyke of diorite. Serpentine outcrops at the east end of the property.

On the *Mabel* is an old shaft sunk prior to 1900 on an irregular zone, strike north 35 degrees west, dip about 70 degrees north-easterly. An open-cut extends 30 feet north-west from the shaft in schistose sediments and ends in diorite. The workings are caved in, but the zone appears to have been one of quartz stringers in the schist. A little glassy quartz remaining on the dump shows pyrite and sphalerite. A new shaft is being sunk 125 feet to the south-east and 30 feet lower, and was about 60 feet deep at the time of the writer's visit. It is at an inclination of about 65 degrees to the north-east and for the greater part of the distance follows the foot-wall of a broad dyke of diorite, in brown, micaceous schist. Mineralization occurs only in the schist which trends a little south of east and is truncated by the diorite at a small angle; the shaft follows this intersection. The distribution of mineralization is obscure, but it is associated with a marked silicification of the schist and is partly in and partly accompanied by very irregular quartz in bands which parallel the schistosity and in irregular ribbons which cut across it; the whole tends to be discontinuous, although there are apparent total widths as great as 8 feet.

Sulphides include chiefly pyrrhotite and less chalcopyrite and sphalerite. Pyrrhotite occurs as impregnations in schist and chert, as fracture-fillings in the rock, and strikingly in semi-crystalline vein-quartz; chalcopyrite is finely and intimately associated with the pyrrhotite, and sphalerite occurs as less common patches and aggregates of grains. A sample across 44 inches at the bottom of the shaft returned: Gold, trace; silver, 0.2 oz. per ton. Three selected samples were taken from the dump—(1) of nearly pure pyrrhotite returned: Gold, 0.68 oz. per ton; silver, 0.8 oz. per ton; (2) of material carrying considerable sphalerite returned: Gold, 1.36 oz. per ton; silver, 1.5 oz. per ton; zinc, 4.6 per cent.; (3)

of pyrrhotite in quartz with chalcopyrite returned: Gold, 0.74 oz. per ton; silver, 0.5 oz. per ton; copper, trace. It is not known what relation this mineralization bears to that in the original shaft.

About 400 feet west of the shaft is an old pit, on the dump of which is schist containing a little quartz and pyrrhotite, pyrite and chalcopyrite. Other open-cuts extend on this westerly line for half a mile at wide intervals; with the exception of some recent stripping on schist formation, these old surface workings are badly caved and show narrow widths of quartz mineralized chiefly and in small amounts with pyrite.

On the *Falcon* claim is an old 15-foot shaft on a band of nearly solid pyrite, dip 60 degrees north-west. This shaft was being cleaned out. On the *Oro* claim is an old shaft said to be 65 feet deep, on the dump of which is schist impregnated with pyrite. Other showings, poorly exposed, are to be seen north and east of the *Mabel* shaft.

Shipments amounting to a total of 72 tons were made to the Trail smelter and yielded 11 oz. gold and 35 oz. silver.

BEAVERDELL AREA.

Rosemont. This group of three claims is owned by W. R. Fowler and associates, of Okanogan, Washington. It is 7 miles north-east of Beaverdell on the west side of St. John Creek, at an elevation of about 4,400 feet. The nearly level plateau-surface here falls off rather sharply into the small valley of St. John Creek; the plateau has been largely burned over, but the timber in the valley has been unaffected. A rather steep road was constructed in 1937 from the Harrison Ranch in Beaver Creek Valley up to a good cabin near the uppermost workings.

The ground is in an area of Wallace formation about half a mile wide nearly surrounded by quartz diorite. The geology is so mapped by Reinecke, but actually there is considerable quartz diorite seen penetrating the older rocks which represent remnants of the batholithic roof. The Wallace here is represented by sediments, some of which are limy, and all are highly altered, even to the point, locally, of granitization. The mineralization is in rather obscure zones in Wallace formation and consists of sulphide impregnations accompanied by more or less quartz.

There are a number of scattered workings extending from the cabin, elevation 4,400 feet, eastward and downhill a distance of 900 feet with a difference in elevation of 180 feet. Near the cabin is a vertical shaft which is perhaps 60 feet deep and is now full of water. From the material on the old dump it may be judged that the shaft encountered no great amount of mineralization, although some mineralized quartzose stringers are seen just below the collar; recent work by the present owners has shown that these stringers open out, immediately to the north and for a distance of some 20 feet, into a band which dips 45 degrees easterly in Wallace formation. This band contains considerable pyrrhotite, less pyrite, and a little chalcopyrite in glassy quartz and silicified wall-rock. Some narrow bands of quartz containing flaky and cellular pyrite are said to carry consistently high gold values; a sample of such material assayed: Gold, 2.40 oz. per ton; silver, 0.4 oz. per ton; arsenic, trace. Some 60 tons of mineralized material, largely pyrrhotite, was on the dump awaiting shipment.

An open-cut 30 feet northerly on the strike fails to uncover the continuation of this band, which may, however, have an irregular strike. Other small open-cuts near by and near the cabin show Wallace formation containing pyrrhotite mineralization, the attitude of which is obscure. South and south-west of the shaft a distance of 150 feet are two open-cuts in Wallace formation near quartz diorite; in these there is some irregular mineralization. South-east of the shaft, along a Wallace-diorite contact, are a few open-cuts in which traces of mineralization are seen.

At the lower end of the line of showings are two open-cuts driven into the side-hill a distance of 22 and 34 feet; they are 70 feet apart and show pyrrhotite-pyrite mineralization in Wallace formation in and accompanied by quartz and silicified rock. A 12-foot shaft 620 feet south-east of the main shaft shows a quartz vein 3½ feet wide in a zone 6 to 10 feet wide; the strike is north 50 degrees west and the dip is vertical.

The finding of high-grade material, missed during the sinking of the main shaft by a few feet, is interesting; unfortunately, the degree of oxidation makes it impossible to tell whether the higher gold values are associated with quartz stringers of a second generation or are an integral, if spotty, part of the main mineralization. Considerable stripping and

careful sampling could be done to prove continuity or otherwise of these apparently unrelated and as yet little understood showings.

Forty-one tons of ore shipped to the smelter yielded 26 oz. gold and 28 oz. silver.

Midnight. This group of four claims, owned by William Youngson and associates, of Beaverdell, is 1¼ miles south of Beaverdell, just off the highway. The showings are on the steep, timbered, and grassy slope between 75 and 150 feet above the valley-flat. A shear-zone in quartz diorite contains tetrahedrite and galena, and a little pyrite, chalcopyrite, and sphalerite in white, finely crystalline quartz.

A series of open-cuts 150 feet long trends north 70 degrees east, and 100 feet farther westerly on the same line is an adit driven by hand-work for 50 feet. The shear-zone dips 50 degrees southerly and is from a few inches to 2 feet wide and contains several inches of quartz at most; one section consists of crystalline quartz containing pyrite and other sections are of sheared and altered rock containing bands of sulphides with small amounts of quartz. The adit had not reached the shear-zone in October, but a fault was encountered, strike north 50 degrees west, dip 55 degrees south-west, on the foot-wall of which the quartz diorite was altered to the sericitized "ledge-matter" typical of Wallace Mountain and in which random grains of tetrahedrite were seen.

The degree of oxidation on the surface obscures details of mineralization and structure, and until the shear-zone can be located and drifted on underground it is too early to form definite opinions. High gold assays, in terms of ounces, have been reported. A sample of sorted material from the uppermost open-cut returned: Gold, 0.46 oz. per ton; silver, 30.6 oz. per ton; copper, 2.2 per cent.; lead, 8.3 per cent.; and a specimen sample returned: Gold, 0.70 oz. per ton; silver, 61 oz. per ton; copper, 4.3 per cent.; lead, 14.4 per cent. The finding of substantial gold values is comparatively new in this part of the district, and the reported finding of similar float near by is, in the opinion of the writer, indicative of other shear-zones and warrants detailed prospecting in spite of heavy overburden.

COPPER-GOLD DEPOSITS.

Similkameen River Area.

Red Buck Mines, Ltd. This company has its main office in Olympia, Washington. Fred F. Foster, of Spokane, is mine manager, and Jesse R. Villars, of Montana, is consulting engineer. The group of seven claims is on the west side of the Similkameen River Canyon, 11 miles south of Princeton and 1½ miles north of Copper Mountain main adit. The camp and lowest adit are 30 feet above the river, at an elevation of 2,550 feet.

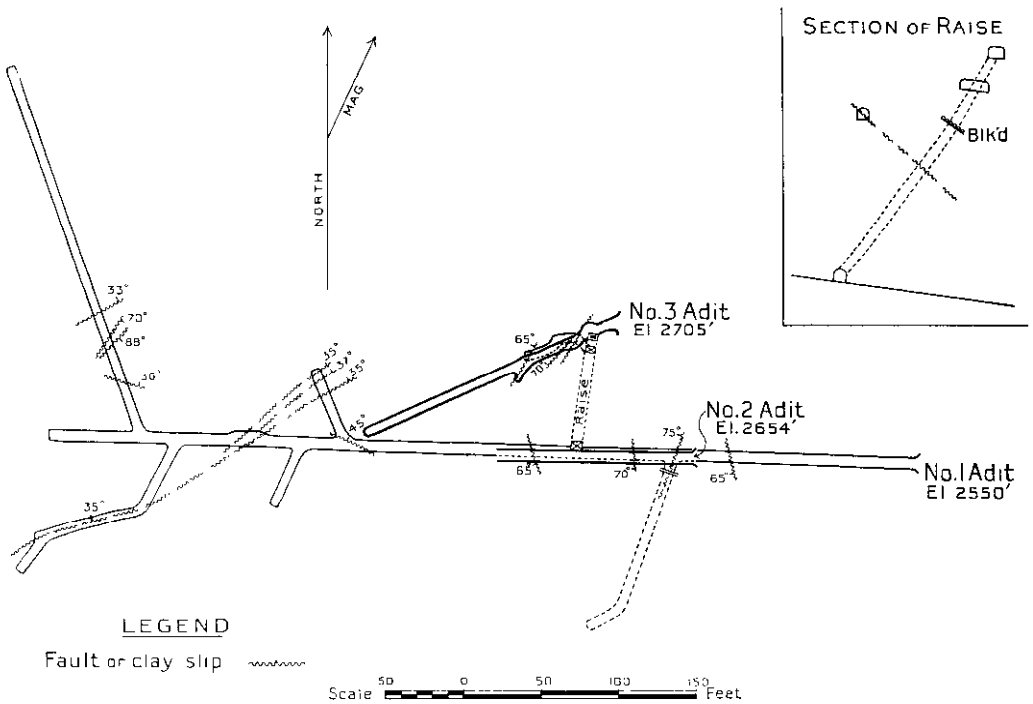
The canyon-wall here is steep, having at this point an average slope of 37 degrees between road and river, and even steeper sections exist a few hundred feet north and south. The road is about 800 feet above the river, and above the road the slope is much less precipitous. The east side of the canyon is equally steep, except for a section in the bend of the river immediately opposite.

The camp is reached by a steep zigzag foot-trail from the road, or by foot-trail and log bridge from the Copper Mountain branch of the Kettle Valley Railway, opposite, which is some 300 feet higher in elevation than the river.

The geology of the region has been fully described by Dolmage, who writes of the *Red Buck* in part (Geological Survey, Canada, Memoir 171, page 36): "The deposits occur in latite and andesite of the Wolf Creek formation where it is extensively impregnated with pegmatite and intruded by irregular masses of Lost Horse intrusives. The pegmatite consists of orthoclase, albite, and quartz, thus closely resembling that on the *Duke of York*. The pegmatite veins generally trend in a north-westerly direction following the general strike of the Wolf Creek formation. The ore-bodies are very irregular in form and indistinct as to limits, but tend roughly to follow the strike of the pegmatite. The ore consists of irregular disseminations of chalcopyrite and pyrite with much feldspar and other pegmatitic material distributed through andesite and latite over a large section of the Red Buck and adjoining claims. The deposits have not been sufficiently exposed and their limits are too indefinite to enable them to be accurately delineated." To this the writer can add nothing, except that during his examination he found many intergrading rock-types of the varieties named, in a

complex area of intrusion. He failed to see, on the ground, any systematic arrangement of intrusion or mineralization, and little to account for the localization of mineralization.

The property, principally the *Red Buck* claim, has been known for many years, having been staked prior to 1895. Most of the early development-work was done by 1900 and some time not long after the ground was drilled by B.C. Copper Corporation. In 1910 a shipment of 40 tons of sorted ore returned: Gold, 0.14 oz. per ton; silver, 1.5 oz. per ton; copper, 6.63 per cent.; and in 1915 a 30-ton shipment returned: Gold, 0.08 oz. per ton; silver, 0.9 oz. per ton; copper, 6.63 per cent. The *Red Buck* was optioned by Fred Foster and associates in 1928, and later Red Buck Mines, Limited, was formed. The two lowest adits and the raise were driven by hand-work by this company.



Red Buck Mines, Ltd. Plan of principal workings after company surveys.

There are a number of old open-cuts, chiefly about No. 3 adit, but as none of these is deep, some are filled in, and all are badly oxidized, nothing much can be learned from them beyond the presence of copper-stain and some unoxidized chalcopyrite.

An old adit, elevation 2,695 feet, is some 400 feet south of No. 3, across slide-rock in bluffs. This is driven south 15 degrees west for 30 feet, then south 50 degrees west for 43 feet to the face in dark-grey volcanic rock. This rock has been minutely shattered, along some of the individual planes of which has been introduced pink feldspar, from paper-thin films to several inches in width. There has been (hydrothermal) alteration also on some planes, producing a light bleaching in an irregular and coalescent pattern, from paper-thin films to patches several inches across. This altered material is mineralized with chalcopyrite and pyrite as scattered grains and short, tiny films. The feldspar films and masses and the alteration appear to be related; most, but not all, of the mineralization is related to the alteration, and scattered grains of chalcopyrite can be seen in most rocks in this vicinity. Some 100 feet north and north-west of the portal is greenstone.

About the portal of No. 3 adit are copper-showings in monzonitic rocks over an area 50 feet each way, and also for 100 feet north-west of the adit. There does not seem to be any regular or continuous body, but rather discontinuous patches of mineralization, and the total amount of copper present, while not large, is impossible to estimate. No. 3 adit is 180 feet long, 23 feet below which is a sub-level 40 feet long driven from a winze, in monzonitic rock

cut by pegmatite. Mineralization, consisting of chalcopyrite and some pyrite, is almost entirely restricted to the outermost 100 feet of the adit, and in this section is locally heavy, particularly in the outermost 30 feet. Oxidation partly obscures the geology, and it is not possible to form an opinion of the shape, attitude, or controlling factors of the deposit. Both in the adit and in the sub-level strong mineralization is locally, but only locally, limited by shear- or joint-planes striking north-east and dipping 60 degrees north-westerly; in one or two places mineralization is bounded by a plane striking north-west. Beyond this fact the relations are obscure. A raise from No. 1 level, the upper part of which is now inaccessible, is said to have encountered no significant mineralization until a relatively few feet below the No. 3 adit sub-level.

No. 2 adit, elevation 2,654 feet, was driven west 130 feet at the time of the writer's visit, early in August. The rock is pale-greenish diorite which, in the inner 20 feet, is locally altered in light-coloured, siliceous seams and patches and is lightly mineralized with chalcopyrite and pyrite. A large fault-plane crosses the adit diagonally about 80 feet from the portal. Two sets of steep joint-planes, probably unrelated to the mineralization, strike north 30 degrees west and north 30 degrees east. Mineralization is restricted to the innermost 20 feet of the adit, and is erratic, discontinuous, and not heavy.

No. 1 adit, elevation 2,550 feet, consists of a section driven west for 560 feet, from which are two branches to the north and three to the south. One drift, 155 feet from the portal, follows a major fault to the south, but is bulkheaded off, as shown on the accompanying map. The outer 110 feet of the adit is in greenstone, then to 350 feet is in grey diorite, and then to 425 feet is in greenstone, cut by red pegmatite and locally crushed. The inner section of the adit, past the major fault-zone, is in monzonitic and dioritic rock, and some pegmatite. From about 255 to 300 feet from the portal is a section fairly well mineralized with pyrite and a little chalcopyrite; a chipped sample on the north wall, across 5 feet horizontal, at the east end of this section assayed: Gold, trace; silver, trace; copper, *nil;* and another sample over a 4½-foot interval at the centre of this section assayed: Gold, 0.01 oz. per ton; silver, trace; copper, 0.2 per cent. The raise, which connects with No. 3 level above, is accessible only to a bulkhead 120 feet above the adit, which is at a fault-zone. A fault-zone 90 feet above the adit is evidently the same as that cut and then drifted on in the inner section of No. 1, and the same as that cut in No. 2. Some pyrite mineralization is seen beneath the bulkhead, and worth-while copper mineralization is reported to have been encountered by the raise a few feet below the sub-level beneath No. 3 adit.

Nos. 1 and 2 adits do not add materially to the knowledge of mineralization on the property. They do show the presence of faults of perhaps major importance. Until more work is done it is impossible to estimate the value of the copper body in No. 3 adit, regarding which size, attitude, and continuity are matters for conjecture, and concerning which it can only be said that high assays in copper are obtainable.

The company during the summer made arrangements with the Canadian Pacific Railway for a 600-foot spur on the railway opposite camp, and were engaged in putting in a 112-horse-power Diesel engine, a 550-cubic-foot compressor, and drill-sharpener, etc. From a 100-ton bin at No. 1 adit-portal a Riblett Airline tram of 750 tons daily capacity was constructed to a 350-ton bin at the switch, a distance of approximately 1,300 feet, with a vertical rise of 375 feet; the tram to be electrically driven with Diesel-generated power. At the time of the writer's visit, early in August, No. 2 adit was being driven by hand-work.

Tulameen Area.

Lucky Todd.

Dan Vuich, of Tulameen, owns six claims on the west side of Tulameen Valley at the mouth of Railroad Creek. The hillside proper rises steeply, at an average slope of 30 degrees, and is covered thinly by slide and detrital material. A foot-trail extends from the road north-westerly across the showings.

The rocks are members of the Cretaceous bedded series in an embayment in the contact of a large body of Eagle granodiorite which lies to the east. Most of the rock about the showings is greenstone intruded by phases of what is probably Eagle granodiorite, which rock outcrops immediately south of the showings. Mineralization is in poorly-defined zones and disseminations on which work to date has failed to demonstrate continuity or precise relationships. The workings consist of a little surface work and eleven adits of an aggregate footage

of more than 600 feet; the adits are all crosscuts except in two instances, and many have been abandoned either before reaching their objective or because results were not promising.

An adit, elevation 4,550 feet, 770 feet above the road, is driven north 85 degrees west for 25 feet, then northerly for 60 feet. In the second section a copper-bearing zone of shearing is followed for 25 feet, when it is cut by north-easterly faulting, and a similar zone is encountered in the innermost 15 feet; these two zones may be the same, faulted. Sparse pyrite and chalcopyrite occur over a width of between 3 and 6 feet; the zone cuts out on a fault at the south end and is throughout its length complicated by shears and slips which strike at a small angle to the drift. A second adit, 60 feet south, is driven in partly-sheared greenstone near a contact with diorite north 75 degrees west for 40 feet, and shows traces of mineralization.

A third adit 100 feet north 20 degrees west from the first, and 15 feet higher, is driven north 25 degrees west 36 feet, then north 75 degrees west 30 feet; 12 feet from the portal a branch is driven west 18 feet. In the first section a westerly-dipping zone of shearing is followed, but with easterly-dipping components and flat rolls; the first branch is in greenstone and the innermost section follows a southerly-dipping fault in greenstone and some talcose schist, with slight evidence of mineralization. The zone in the first course is disclosed to good advantage in a large open-cut in greenstone and talcose schist at the portal; mineralization is here seen across 15 feet east-west in both easterly and westerly dipping strands. Sulphides include chalcopyrite, pyrite, bornite, and tetrahedrite. A sample across 50 inches at the west side of this exposure returned: Gold, trace; silver, 11 oz. per ton; copper, 1.6 per cent.; and a sample across 34 inches on an easterly-dipping strand near the east side returned: Gold, trace; silver, 0.6 oz. per ton; copper, 1 per cent.

Other adits near here and to the north are driven westerly as crosscuts on what has apparently been considered an approximately north-south zone. This is essentially true, but mineralization tends rather to be localized within it on short, narrow zones of shearing and to be interrupted by nearly parallel breaks, and also to occur patchily with little apparent control. This is an area of general metamorphism, and intrusion of dyke-like bodies, a few hundred feet north of the westward bulge in the main body of granodiorite.

Evidence of copper mineralization can be seen along a northerly line, slowly ascending the valley-wall to an elevation of 5,100 feet in a distance of about three-quarters of a mile. The rocks are " greenstones " as well as sandy sediments and breccias. More stripping might yet be done in order to define, if possible, the limits and intensity of mineralization.

GOLD-SILVER-LEAD-ZINC DEPOSITS.

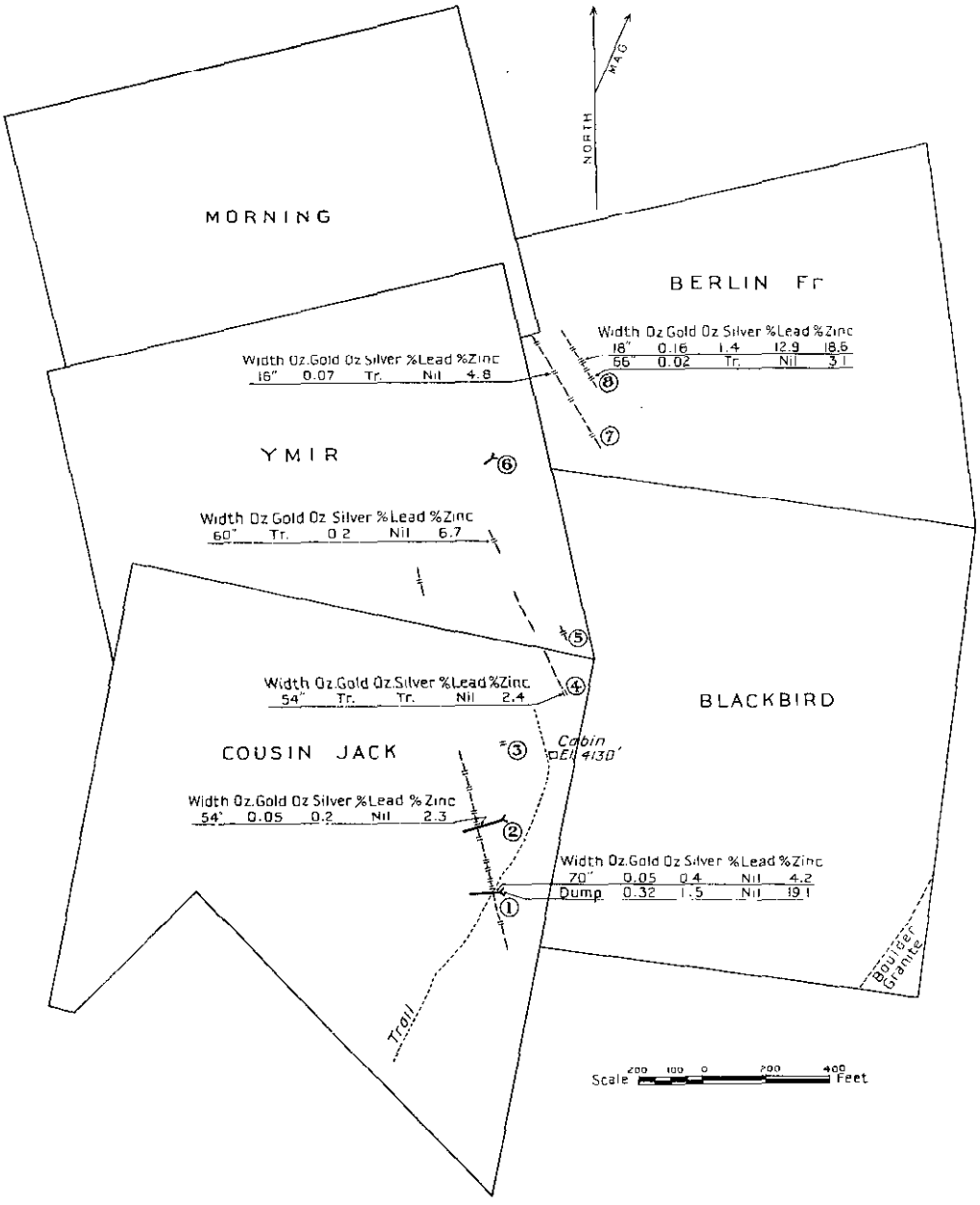
TULAMEEN AREA.

Cousin Jack. This property, consisting of five Crown-granted and five located claims, is owned by John Osborne, W. D. Vallance, and associate, of Tulameen and Blakeburn. It lies on Boulder Mountain 4½ miles north of the village of Tulameen and 1 mile due west of the railway at the head of Otter Lake. The topography is subdued, the southern section being nearly flat and the northern section sloping at medium to high angles to the east and north-east. A short distance east of the property the ground falls off rapidly to the Otter Creek Valley. There is adequate timber for mining purposes, and water is obtainable, for domestic use only, from a spring near the cabin.

An excessively steep trail leaves the Tulameen–Merritt Highway on Otter Lake near Smith Creek, and climbs the 1,670 feet rapidly to the summit of Boulder Mountain, and then drops 100 feet in the next half a mile to the cabin, elevation 4,130 feet. (NOTE.—On Geological Survey, Canada, Map 46A, the elevation reads approximately 4,600 feet.) An alternative trail, used for pack-horses, crosses Rabbitt Mountain and Boulder Creek, and is about 4½ miles in length from the Law's Camp Road.

The rocks are members of the Tulameen series, intruded by Boulder granite. The showings lie 1,000 feet to 1,500 feet north-west and west of the granite-contact, in greenstone which is more or less sheared. The shearing, the planes of which dip westerly at angles between 15 and 25 degrees, is locally so intense as to produce a chlorite-sericite schist, and when most intense the rock is pyritic. Mineralization is in four well-defined zones that strike west of north and in part follow the dip of the schistosity and in part are nearly vertical. Two isolated exposures may indicate two additional zones which have not been traced.

The most westerly zone is traceable for some 1,200 feet and is opened up by two adits and a number of open-cuts. No. 1 adit (1), elevation 4,235 feet, is 70 feet long, in addition to which there is an 18-foot open-cut at the portal. Mineralization includes chiefly pyrite and sphalerite and a little galena in varying proportions in quartz and silicified greenstone. It



Cousin Jack. Sketch-map of principal showings from survey by W. D. Vallance.

occurs as impregnation and replacement of the schistose greenstone and only to a minor extent as fissure-filling by quartz. Some of the material is banded, evenly, or warped and convoluted. Width and attitude are uncertain, because the mineralization both cuts across and follows the planes of schistosity. The strongest section is at the portal and is lost in the

bottom of the adit; throughout the adit are bands, stringers, and masses, individually up to 2 to 4 feet wide, with predominating flat westerly dips. In No. 2 adit (2), elevation 4,190 feet, 122 feet long, there is a rib of quartz across the back 65 feet from the portal that is 20 inches wide, and this widens downward irregularly to several feet in width. The dip is steep to the west and the mineralization is not heavy. Some irregular white quartz occurs near the portal and some at 70 to 90 feet from the portal. The open-cuts on this zone show apparent widths of 4 to 5 feet or more of quartzose material more or less strongly mineralized; there is apparently variation represented between the extremes of habit seen in the two adits. It is difficult, if not impossible, to judge the width and attitude in these or in most open-cuts on the property; the strike seems quite uniform and the dip is westward at a high angle, but there is a tendency everywhere for the mineralization to penetrate along the planes of shearing, so that in cross-section any body is seen to consist of an irregular stem with branch-like offshoots, principally on the west side.

An open-cut at (3), elevation 4,150 feet, discloses stringery quartzose mineralization in weakly-sheared greenstone, dipping apparently flatly westward. This is across 8 to 10 feet but is poorly exposed.

A zone (4) north of the cabin is traced for 550 feet. At the southern end is an open-cut on a nearly vertical lead of quartz in sheared ground; the lead is here about 5 feet wide, not all quartz, and is weakly mineralized with pyrite and sphalerite. An open-cut at (5), elevation 4,105 feet, just opened up, discloses quartz, apparently flat and less than 12 inches wide, with some likely-looking mineralization.

An adit at (6), elevation 4,000 feet, 25 feet long, bearing south 55 degrees west, is in flatly-sheared greenstone containing considerable pyrite in fine scattered grains. There is a little flatly-dipping mineralization above the portal which is not encountered in the adit.

The next main zone at (7), elevation about 3,980 feet, is traced 350 feet and on it are four open-cuts. These disclose more or less sheared greenstone in which are ribs of quartz or siliceous sulphide seams, some dipping steeply and some flatly, as well as crenulated ribbons of quartz and sulphide mineralization. The apparent width of the zone in these open-cuts is about 2 feet, and mineralization is variable and only locally strong.

The easternmost zone (8), elevation about 3,915 feet, is traced for 200 feet, and is opened up by three open-cuts, a short adit-crosscut 20 feet long, and a filled-up shaft said to be 35 feet deep. The mineralization exposed by these several workings is hard to describe without going into extreme detail; it is very irregular, in flat, steep, and curving strands individually up to 2 feet wide and over apparent widths up to 6 feet and more. One sample—which assayed: Gold, 0.16 oz. per ton; silver, 1.4 oz. per ton; lead, 12.9 per cent.; zinc, 18.6 per cent.—was taken across a steep 18-inch band containing the most galena seen; another sample, channelled 5½ feet down the face of the adit, including little mineral except in the central 2 feet, assayed: Gold, 0.02 oz. per ton; silver, trace; lead, *nil;* zinc, 3.1 per cent. More opening-up accompanied by bulk-sampling would be necessary before averages of dimension and metal content could be obtained.

The results of sampling by the Resident Engineer in 1935 and 1937 are shown graphically on the accompanying sketch-map. These samples have been taken more or less at random, and from them it is not safe to estimate the average value of these quite complex deposits. Work has progressed slowly for the last four seasons towards a more extensive opening-up of the various showings.

SPECIAL REPORTS.

Typewritten copies at 25 cents each are available to those who specially request reports on the following properties:—

Tulameen Area: Grasshopper Mountain, Lloyd George, Britton, Britton Mountain, Sootheran.
Pass Creek: Maple Leaf.
Highland Valley: Snowstorm.
Beaverdell: Florence, Hard Cash, Charybdis, Cranberry Creek, Gachain.

PROGRESS NOTES.

BY

H. E. MIARD AND JOHN G. BIGGS.

LODE-GOLD DEPOSITS.

*North Thompson River Area.**

Windpass Gold Mining Co., Ltd.—A. J. Smith, general manager. The *Windpass* mine, situated 5 miles from Boulder, on the Canadian National Railway, is at an elevation of 5,340 feet, and transportation to the mill, 2.5 miles distant and at an elevation of 1,828 feet, is by an aerial tram.

During the year the inclined shaft was completed to the 900-foot level and a considerable amount of drifting and raising done on Nos. 7, 8, and 9 levels on each side of the shaft. This operation supplied 75 per cent. of the ore milled during the year.

The inclined shaft at the *Sweet Home* mine was deepened during the year for development and prospecting purposes. The ore from the *Sweet Home* is carried by motor-trucks to the *Windpass* aerial tram. Power is supplied by a 400-horse-power Diesel electric plant at the mill-site and carried by a high-tension line to the mines. A fire at the power-house on June 14th caused a shut-down for two months. Sixty-three men were employed and 13,180 tons of ore, yielding 4,742 oz. gold, was mined during the year.

*Hedley Camp.**

Kelowna Exploration Co., Ltd.—W. C. Douglas, general manager; Floyd Turner, mine manager. This company operates the *Nickel Plate* mine, on Nickel Plate Mountain, about 4,000 feet above and 4 miles distant from Hedley, where the concentrator is located.

Transportation to the concentrator is by a surface electric-haulage system from the mine to a point above the concentrator, where the ore is transferred from the mine-cars to a surface incline 10,000 feet long, in two sections, with a difference in elevation between top and bottom of 3,500 feet. Balanced skips carry 6 tons of ore and are controlled by electric motors.

The workings of the *Nickel Plate* mine and adjacent *Hedley Mascot* mine are directly connected, with a decided advantage to the ventilation of both mines.

An important development at this property during 1937 was the driving of the "Bull Dog" adit at the same elevation as the top terminal of the surface incline and some 3,000 feet south of the *Nickel Plate* mine.

A townsite has been laid out about half a mile from the mine and modern accommodation built for families and single men. Recreation facilities are provided by a new community hall, motion-picture equipment and tennis-court, and a new school. Eighty-six men are employed underground and 121 on the surface. Production amounted to 77,887 tons of ore, yielding 29,929 oz. gold and 4,622 oz. silver.

Hedley Mascot Gold Mines, Ltd.—C. W. S. Tremain, general manager. This mine is situated 1 mile north of Hedley.

During the year a second Bellis and Morcom motor-driven compressor of 750 cubic feet capacity was installed and a new bunk-house built. Production amounted to 59,115 tons, yielding 21,422 oz. gold and 6,492 oz. silver. In addition to production, a considerable amount of prospecting has been carried out by drifting and diamond-drilling. Seventy-five men are employed.

Hedley Amalgamated Gold Mines, Ltd.—Herbert Neil, manager. This mine is situated 1½ miles north-west of Hedley. Development has been carried out in the "Red Tunnel." Towards the end of the year a winze was sunk 200 feet from the portal, and some drifting was carried on from the bottom of the winze.

Power is provided by a motor-driven Gardner-Denver compressor of 500 cubic feet capacity. Employees live in Hedley and are transported by a motor-truck. Ten men were employed at the end of the year.

* By John G. Biggs.

Gold Mountain Mines, Ltd.—Frank Dollemore, manager. This property is 3 miles west of Hedley. In January a 50-ton-capacity mill was completed and put into operation for several months, then shut down and had not resumed operations at the end of the year.

*Fairview Camp.**

Fairview Amalgamated Gold Mines, Ltd.—J. A. McKenzie, manager. This mine is 4 miles west of Oliver at an elevation of 3,050 feet. It operated throughout the year with a varying tonnage. The main adit has been driven 2,600 feet, and during the year a raise was put through to the surface at a point 1,100 feet from the portal and has considerably augmented the ventilation of the mine. Stoping above the main level provides the required ore at the present time, and during the latter part of the year a second adit was started 130 feet below the main adit with a view to production at this level.

Power is obtained from the West Kootenay Power Company and a Gardner-Denver compressor of 750 cubic feet capacity supplies air for the drills. The mill, increased to 150 tons daily capacity, is situated at the *Morning Star* mine, 2 miles distant by motor-road. Sixty men were employed.

*Osoyoos Lake Area.**

Osoyoos Mines, Ltd.—J. O. Howells, manager. This mine is immediately west of Osoyoos. There are three adits, known as Nos. 1, 2, and 3, at elevations of 1,460, 1,545, and 1,580 feet respectively. During the year mining was carried on in the upper two adits, while further exploratory work was done in the lower adit, which is also the main haulage-level.

During the year the capacity of the flotation section of the mill was increased to 75 tons daily, with the addition of cyanide treatment for the tailings. Fifty-two men were employed.

*Vernon Area.**

Kalamalka Gold Mine.—P. Murphy, manager. This mine is situated at Lavington, 11 miles east of Vernon, and is reached by a good road. After a considerable period of inactivity operations were resumed here during the summer by seven men.

Carmi Area.

Carmi.- Forty-two tons of ore shipped from this property by the owner, Jas. Kerr, of Carmi, yielded 28 oz. gold and 267 oz. silver.

Kettle River Area.

Mogul.—From this property, situated on Horseshoe Mountain, 24 miles by road from Westbridge, Clyde Sherdahl and S. Berglund, of Rossland, shipped 99 tons of ore to the Trail smelter, this yielding 146 oz. gold and 45 oz. silver.

Greenwood-Boundary Falls Area.

Bay.—J. W. Van Strieder and Jno. Klinosky, of Greenwood, shipped 13 tons of ore from this property to the Trail smelter, with total metal contents amounting to 12 oz. gold and 48 oz. silver.

Elkhorn.—F. Jaubin and J. W. Van Strieder shipped 18 tons of ore from this property, situated about 1 mile north of Greenwood. The metal contents amounted to 3 oz. gold, 444 oz. silver, 307 lb. lead, and 365 lb. zinc.

Number Seven.—This property, belonging to the Consolidated Mining and Smelting Co. of Canada, Limited, and situated a few miles from Boundary Falls, has been operated on lease by W. E. McArthur for the past three years. Comparatively little work was done in 1937. Shipments amounted to a total of 186 tons, yielding 34 oz. gold, 1,015 oz. silver, and 2,392 lb. lead.

City of Paris.—This is an extensive mine, abandoned for more than thirty years but with workings still generally accessible, although a winze, said to be 370 feet in depth, is, of course, now flooded to the collar. It is evident that an ambitious programme of development was carried out there at one time, evidence of it being still found in the remains of surface structures as well as underground. H. M. Brinkman and Celius Nelson, of Grand Forks, hold a lease on the property, the principal owner of which is Miss Margaret Johnson, of Los Angeles, Cal. Sixty-one tons of ore, shipped to the Trail smelter, yielded 12 oz. gold, 853 oz. silver, 151 lb. lead, and 164 lb. zinc.

* By John G. Biggs.

Jewel Lake Area.

Dentonia.—Owned by the Dentonia Mines, Limited. Head office, 706 Credit Foncier Building, Vancouver. Manager, Major A. W. Davis. Underground operations were suspended at the end of 1936, but final shipments of 36 tons of ore and 3 tons of concentrates were made to the Trail smelter at the beginning of 1937. The ore yielded 53 oz. gold, 433 oz. silver, and 2,184 lb. lead; while the total metal contents of the concentrates amounted to 18 oz. gold, 93 oz. silver, and 265 lb. lead. The operation of the cyanide plant, treating the tailings of the flotation-mill, resulted in the production of 236 lb. bullion carrying 452 oz. gold and 2,506 oz. silver.

Amandy.—Shipments totalling 140 tons were made from this property by the owner, E. C. Henniger, of Grand Forks. This yielded 52 oz. gold and 961 oz. silver.

North Star.—Operated by the Greenbridge Gold Mines, Limited. Head office, McLean, Philpot & Co., Ltd., Stock Exchange Building, Vancouver. Development-work proceeded with a crew of six (three underground) until the beginning of August, when the working force travelled to Northern British Columbia to dismantle a mill purchased by the company; the machinery being subsequently brought to Grand Forks, where it was intended to install it on a site permitting the mill to serve several properties. The general conditions prevailing in the mine and on the surface were always satisfactory. The development-work done amounted to 343 feet of drifting and 357 feet of raising. The total tonnage mined amounted to 473; from which 31 tons shipped to the Trail smelter yielded 4 oz. gold and 62 oz. silver, and the tonnage milled yielded 13 tons of concentrates, with total metal contents amounting to 44 oz. gold, 228 oz. silver, and 659 lb. lead.

Grand Forks Area.

Yankee Boy.—Situated on Hardy Mountain, about 4 miles from Grand Forks, and operated by the Riegel Mines, Limited, for some time, first with Clyde B. White and later with Oscar Thompson as manager. The company employed a crew of eight (seven underground) in development-work for some time, 540 feet of drifting being done, and then abandoned the property and removed all equipment from it. In the latter part of the year a group of four lessees, headed by Wilhelm L. Schwarz, of Grand Forks, worked out a few shoots of fairly high-grade ore, conveniently accessible from the surface. Shipments amounting to a total of 362 tons were made to the Trail smelter, this yielding 251 oz. gold and 332 oz. silver.

Little Bertha.—This property, owned by the Pathfinder Mining Company, of Pullman, Wash. (D. C. Manly, manager, Grand Forks), was operated by lessees during the first and part of the second quarter of the year, who shipped 411 tons of ore to the Trail smelter, yielding 157 oz. gold and 1,503 oz. silver. The development-work done consisted of 30 feet of drifting and 30 feet of raising.

Olympic.—On this claim, owned by Jno. Kitchen, of Grand Forks, and situated on Smelter Lake, above the Kettle Valley Railway, some exploratory work was carried on for a time under the direction of A. W. Kelly. Four men were employed. This operation must not be confused with a property of the same name in the Beaverdell area.

Franklin Camp.

Union.—This property was operated under lease by A. J. Fee & Co., of Grand Forks. Twenty-four tons of ore shipped to the Trail smelter yielded 101 oz. gold, 214 oz. silver, 1,307 lb. lead, and 1,446 lb. zinc. The metal contents of 2 tons of concentrates, also shipped, amounted to 6 oz. gold, 35 oz. silver, 12 lb. lead, and 27 lb. zinc.

Paulson Area.

Molly Gibson.—This property, situated in Burnt Basin, about 4 miles from Paulson, has been operated by the Molly Gibson Mines, Limited (managing director, A. E. Petzold, 1318 Twelfth Avenue West, Calgary, Alta.; secretary, I. J. Trembath, Rossland), for a couple of years, all operations being limited to exploratory and development-work and concentrated almost exclusively on the adit known as the Purcell tunnel. The ore-zone is found in an extremely hard siliceous limestone and, consequently, progress has been rather slow. The mechanical equipment consists of a CIR 9- by 8-inch portable compressor and of a No. 4 IR

drill-sharpener. A crew of seven (four underground) was employed until the latter part of the year under the direction of George H. Tyrrell. The development-work done consisted of 194 feet of drifting and 316 feet of crosscutting.

GOLD-COPPER DEPOSITS.

Phoenix-Eholt Area.

Brooklyn.—This property, owned by Robert Forshaw, of Greenwood, was operated under lease by W. E. McArthur. Some exploratory work will be undertaken, as circumstances permit, to investigate its possibilities, certain features leading to the belief that profitable operations can be conducted on a comparatively small scale. A considerable amount of repair-work was intelligently effected, both on the surface and underground. The ore is hauled by trucks to the Providence mill, owned and operated by the lessee, at which the output of the neighbouring Granby is also treated. A crew varying in number between four and six was employed. The total tonnage mined and milled was 1,879, this yielding 624 oz. gold, 456 oz. silver, and 34,114 lb. copper.

Granby (Old Ironsides).—This property has been purchased from the Granby Consolidated Mining, Smelting, and Power Company, Limited, by W. E. McArthur (P.O. Box 629, Greenwood). The ore is hauled by trucks to the mill, a distance of approximately 6 miles. The operations, conducted entirely on the glory-hole system, employed seventeen men (eleven at the mine and six at the mill). A total of 15,376 tons mined yielded 1,791 tons of concentrates, with total metal contents amounting to 1,451 oz. gold, 3,947 oz. silver, and 433,450 lb. copper. The removal of the old ore-bins and of overhanging portions of the walls in the glory-hole eliminated features which had complicated the situation to some extent when operations were resumed at the mine after it had been abandoned for nearly twenty years.

Athelstan.—After some repair and exploratory work had been done on this property, situated in Wellington Camp, by W. E. McArthur, operations were discontinued temporarily, partly on account of the fact that the high percentage of sulphides present in the ore rendered the ratio of concentration insufficient to permit shipment under advantageous conditions.

B.C.—This property, situated near Loon Lake and abandoned since 1903, was acquired some time ago by A. M. Docksteader and E. Vant. The mine, opened by a vertical shaft now flooded and inaccessible, was apparently fairly extensive, but before suspending operations and removing its machinery the former operating company worked out the ore remaining above a large square-set stope on the 150-foot level up to the surface, wrecking the upper part of the shaft in the process. When the mine was visited in October, operations had been suspended temporarily and the construction of a small mill was being considered. This project, if carried out, would imply also development-work of some kind. A slab of ore left on one of the walls of the former glory-hole was mined and shipped in the course of the summer; the tonnage thus obtained amounted to 39, yielding 76 oz. silver and 4,801 lb. copper.

Blue Bell.—Situated at Summit Camp and owned by M. Ludlow, of Eholt. J. W. Phillips and F. Simpson took a lease on this property and employed four men for some time in exploratory work, which consisted chiefly in driving a short drift about 50 feet below the surface from the shaft sunk on the claim before its abandonment in 1903. The shaft itself is said to be 130 feet in depth.

COPPER DEPOSITS.

*Granby Consolidated Mining, Smelting, and Power Co., Ltd.**—A. S. Baillie, president and general manager; W. R. Lindsay, general superintendent; Geo. Buckle, mine manager. The *Copper Mountain* mine of this company is 12 miles south of Princeton and is reached by a good road and also by a branch line from the Kettle Valley Railway at Princeton.

The surface elevation at the mine is 4,000 feet and practically all the workings are below this elevation. The ore-crushing plant is located below the portal of No. 6 adit, which is the main transportation level; this level at a point 2,700 feet from the portal intersects the main No. 1 shaft at a depth of 800 feet from the surface.

Practically all production at present is from above No. 6 level, but preparations are being advanced for extensive mining below this level.

The concentrator is at Allenby, 7 miles nearer Princeton, and much work was done here, before starting operations, to incorporate modern advances in concentration, since this operation was shut down in 1930.

A total of 509 men were employed at the end of the year, as follows: 172 men underground, 170 on the surface, 44 in the mill, and 103 at the power plant.

Repairs and preparations for mining were under way from the beginning of the year and production started in June. By the end of the year 3,000 tons of ore per day was being mined, with a net production for the year of 452,352 tons of ore, which yielded 7,692,756 lb. copper, 2,102 oz. gold, and 58,436 oz. silver.

GOLD-SILVER-LEAD DEPOSITS.

Greenwood Area.

Providence.—At this property, situated about 1 mile north of Greenwood and operated by the Riegel Mines, Limited, the operations carried on in the course of the year were limited to exploratory, development, and repair work; the last point, in particular, having been seriously neglected by a previous operator. No. 1 shaft was cleaned out, retimbered, and again made available as an airway and means of exit. The mechanical equipment at No. 2 shaft consists of a single-stage, Gardner-Denver XH model compressor, with a capacity of 265 cubic feet, driven by a 40-horse-power G.E. induction-motor, and a single-drum hoist driven by a 30-horse-power G.E. motor. The pumping equipment in the same shaft is particularly efficient. The number of men employed varied between twelve and eighteen, with six and thirteen underground, respectively. The operations were directed by Clyde B. White in the early part of the year and later by Oscar Thompson. The development-work done consisted of 1,325 feet of drifting, 80 feet of raising, 550 feet of crosscuts, and 125 feet of shafts.

SILVER-LEAD DEPOSITS.

Beaverdell Area.

Highland Bell.—This property, owned and operated by the Highland Bell, Limited (head office address, P.O. Box 464, Penticton), maintained its now well-established reputation as being the most profitable operation on Wallace Mountain. Development proceeded from the winze sunk below the Staples crosscut adit; while persistent and well-guided exploration of the older workings led periodically to the discovery of ore-shoots which contributed their quota to the production. Constant study of the highly-disturbed ground and careful correlation of features met at one point with those encountered in other parts of the workings are prime conditions of success on Wallace Mountain. A CIR 440-cubic-foot compressor, driven by a 90-horse-power Rushton-Hornsby Diesel engine, has been added to the power plant. The provision of stronger hoisting equipment at the winze has become necessary. A crew of thirty (twenty-two underground) was employed throughout the year under the direction of N. M. Mattson. The development-work done comprised 540 feet of drifting, 320 feet of raising, and 160 feet of sinking. Shipments of ore totalling 3,141 tons were made to the Trail smelter, this yielding 116 oz. gold, 407,645 oz. silver, 308,085 lb. lead, and 464,592 lb. zinc.

Sally.—Adjoining the *Highland Bell* and operated by the Sally Mines, Limited (head office address, P.O. Box 420, Penticton), with N. M. Mattson as manager. Exploratory work was carried on and some stoping was done with a crew of five (four underground). The tonnage mined and shipped amounted to 295, yielding 6 oz. gold, 24,126 oz. silver, 14,249 lb. lead, and 22,834 lb. zinc.

Beaverdell-Wellington.—Operated by the Beaverdell-Wellington Syndicate, with A. J. Morrison as manager. This has been a remarkably successful operation, deriving added interest from the fact that the property consists of a single claim. A crew of twenty-one (fifteen underground) was employed throughout the year. The development-work done in the course of the year consisted of 606 feet of drifting and crosscuts and 375 feet of raising. Shipments amounting to a total of 970 tons yielded 55 oz. gold, 199,463 oz. silver, 139,997 lb. lead, and 198,727 lb. zinc.

Beaver.—This property, owned by the Beaver Silver Mines, Limited (head office, 708 Yorkshire Building, Vancouver), and operated by a group of five lessees headed by Hilmer S. Nordman, adjoins the *Highland Bell*. A considerable amount of repair-work had to be undertaken before mining operations could begin, but this was done carefully and intelligently. Shipments amounting to a total of 166 tons were made to the Trail smelter and yielded 8 oz. gold, 29,822 oz. silver, 15,867 lb. lead, and 36,292 lb. zinc.

Tiger.—John L. Nordman and partner shipped 15 tons of ore from this property, with total metal contents of 2,563 oz. silver, 1,776 lb. lead, and 2,721 lb. zinc.

Wallace.—Operations on this group of claims, held by the Wallace Mountain Mining Company, were limited to exploratory work, three men being employed (two underground) under the direction of N. M. Mattson. A single-stage, 10- by 12-inch compressor, driven by a McCormick Deering gasoline-engine, was installed. The work done consisted of 100 feet of crosscuts.

British.—The British Silver and Gold Mines Syndicate, with headquarters at Princeton, employed four men in exploratory work on this property, adjoining the *Wellington*, with John Evans in charge of operations. The development-work was done without the assistance of machinery of any kind.

Advance and *Crater Lake.*—In the same area two lessees worked for some time on the *Advance*, owned by John Southern, of Beaverdell, and further exploratory work was done on the group of claims held by the Crater Lake Mining Company on Dry Creek.

SILVER-LEAD-ZINC DEPOSITS.

Greenwood Area.

Last Chance.—A group of claims situated near Boundary Falls, including the *Last Chance* and the *Republic*, was held under option for some time by the Greenwood Gold Mines, Limited (head office, 1216 Dominion Bank Building, Vancouver), with N. O. Carpenter and later Ira J. Babe as manager. A small power plant, consisting of a Holman single-stage 7¾- by 6-inch compressor, driven by an International P.K. model internal-combustion engine, was installed and 550 feet of drifting was done on the *Last Chance* claim and close to the surface. A crew of ten (six underground) was employed for eight months. The tonnage shipped amounted to 114, this yielding 4 oz. gold, 696 oz. silver, 12,093 lb. lead, and 4,432 lb. zinc.

Lightning Peak Area.

Waterloo.—From this property, the operation of which is burdened with excessive transportation costs due to its difficult accessibility, F. Nesbit, of Edgewood, shipped 1 ton of ore which yielded 30 oz. silver, 149 lb. lead, and 457 lb. zinc.

Paulson Area.

Eva Belle and Halifax Groups.—These two groups, situated in Burnt Basin, are part of a total of twenty-one claims on which options were held by Joseph Grafton, of Rossland, the balance being known locally as the *Tunnel* and *Lone Hand* groups, beside the *Ennismore* and *Gray Rock* claims and the *Gray Rock Fraction.* All are easily accessible, being not more than 4 miles from Paulson. A few prospectors have been investigating the possibilities of this section for a number of years, but very little has been done up to the present time on these properties. Four men were employed for some time, the work done consisting chiefly in sinking test-pits and advancing a short adit-crosscut.

PLACER-GOLD DEPOSITS.

Greenwood Area.

Boundary Creek Placers, Ltd.—The construction of a pipe-line, 10,000 feet in length, bringing water from the falls for hydraulicking operations, was completed early in the season. Twelve men were employed under the direction of J. W. Phillips.

NON-METALLIC DEPOSITS.

Christina Lake Area.

Fife Lime Quarry.—Owned and operated by the Consolidated Mining and Smelting Company of Canada, Limited. Twelve men working on contract shipped 17,947 tons of limestone from this property to the Trail smelter.

INDEX.

ILLUSTRATIONS.

VICTORIA, B.C.:
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1938.

3,325-338-3029

The Annual Report of the Minister of Mines is now issued in parts as follows:—

Part A.—THE MINING INDUSTRY (STATISTICAL REVIEW). John F. Walker.

Part B.—NORTH-WESTERN MINERAL SURVEY DISTRICT (No. 1). Joseph T. Mandy.

Part C.—NORTH-EASTERN MINERAL SURVEY DISTRICT (No. 2). Douglas Lay.

Part D.—SOUTHERN AND CENTRAL MINERAL SURVEY DISTRICTS (NOS. 3 AND 4). M. S. Hedley.

Part E. EASTERN MINERAL SURVEY DISTRICT (No. 5). H. Sargent.

Part F.—WESTERN MINERAL SURVEY DISTRICT (No. 6). B. T. O'Grady.

Part G.—INSPECTION OF MINES. James Dickson.

PART C

ANNUAL REPORT

OF THE

MINISTER OF MINES

OF THE PROVINCE OF

BRITISH COLUMBIA

FOR THE

YEAR ENDED 31ST DECEMBER

1937

PRINTED BY
AUTHORITY OF THE LEGISLATIVE ASSEMBLY.

VICTORIA, B.C.:
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1938.

BRITISH COLUMBIA DEPARTMENT OF MINES.

VICTORIA, B.C.

Hon. W. J. ASSELSTINE, *Minister.*

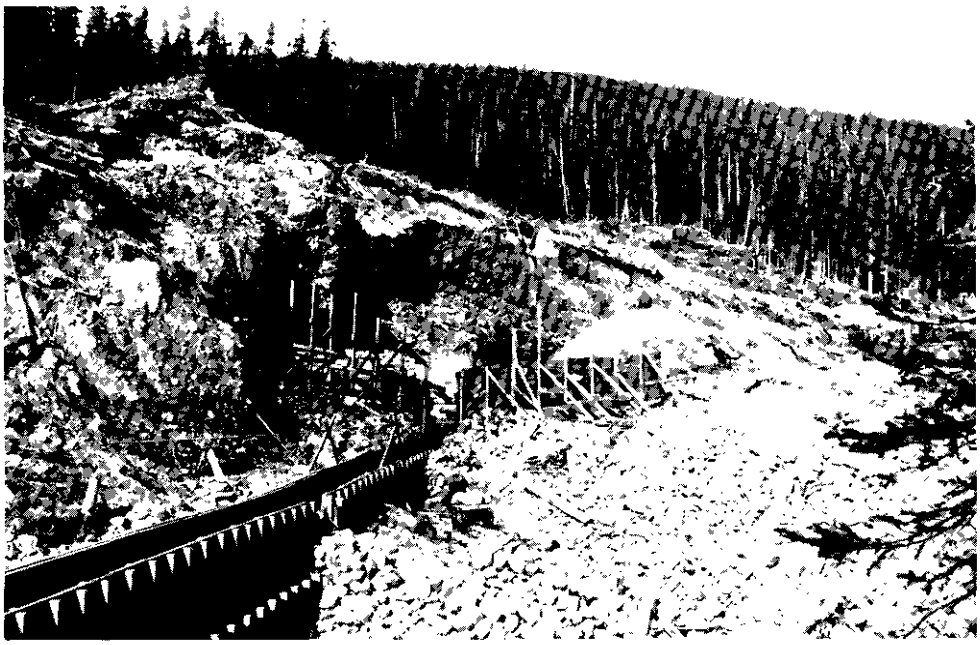
JOHN F. WALKER, *Deputy Minister.*

JAMES DICKSON, *Chief Inspector of Mines.*

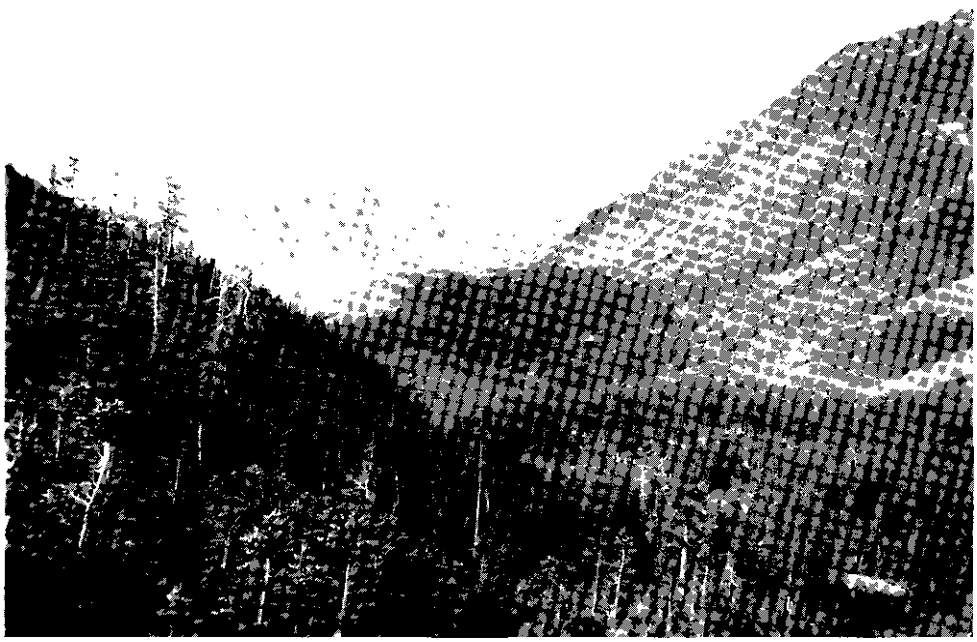
D. E. WHITTAKER, *Provincial Assayer and Analyst.*

P. B. FREELAND, *Chief Mining Engineer.*

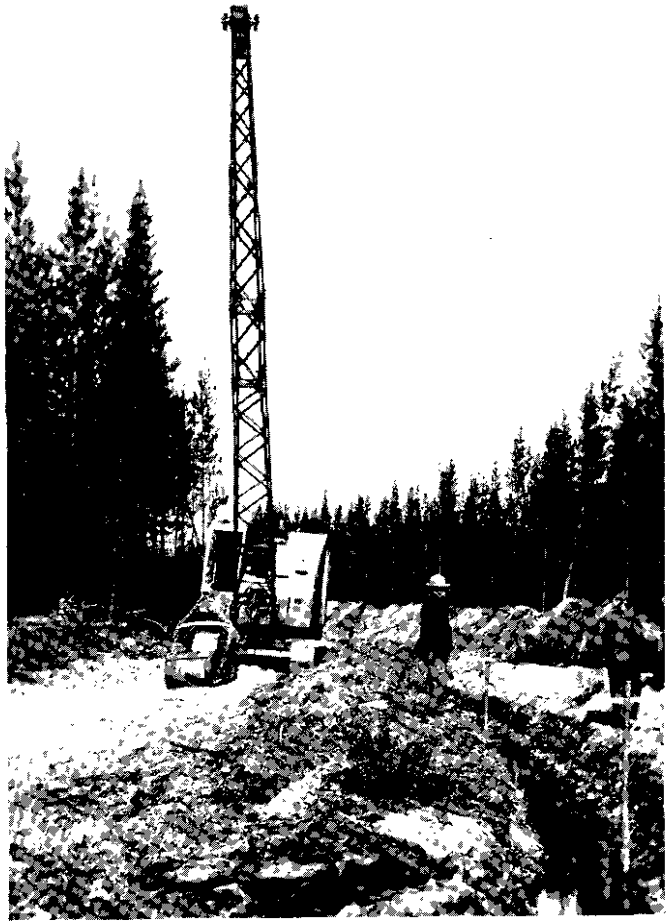
R. J. STEENSON, *Chief Gold Commissioner.*



Hydraulic operation of Venture Exploration Co. (East Africa), Ltd., on Harrison Creek.



Head of Driftwood Creek, near Smithers.



Ditch-construction using boom drag-line, Germansen River, operation of Venture Exploration Co. (East Africa), Ltd.

Venture Exploration Co. (East Africa), Ltd., scow at Germansen Landing.

PART C.

NORTH-EASTERN MINERAL SURVEY DISTRICT (No. 2).

BY
DOUGLAS LAY.

SUMMARY.

The construction of a sampling plant at Prince Rupert, completed on August 23rd, as part of the Government's ore-purchasing scheme, and the favourable terms available to shippers of small lots of ore were the means of stimulating effort on the part of prospectors, and inducing activity which is likely to persist, in several instances, through the winter.

A feature of the year were activities in the northern part of the Omineca Mining Division. Much headway was made by Chas. F. de Ganahl in connection with extensive plans for hydraulicking on a major scale on the lower part of the Germansen River, which created employment for over 200 men. Encouraging results attended preliminary development by Consolidated Mining and Smelting Company of Canada, Limited, at its *Croydon* group, near Aiken Lake, at the headwaters of the Mesilinka River. Noteworthy was the amount of road-construction carried out by the Dominion and Provincial Governments on the road from Fort St. James to Manson Creek, and by Chas. F. de Ganahl within the Manson section, very greatly extending the range of possible travel by motor-truck.

Lode-gold production was interrupted by a strike of employees of Cariboo Gold Quartz Mining Company, Limited, and Island Mountain Mines, Limited, which came into effect on May 25th, and caused temporary suspension of operations by both these companies. The former company reopened with a reduced force on July 15th, and shortly thereafter resumed normal production, which early in September was stepped up to a milling rate of 250 tons daily. The latter company reopened on August 16th, and shortly after resumed its normal milling rate of about 125 tons daily.

The installation of a hydro-electric power-distributing plant on Swamp River, in the Cariboo District, is again engaging attention. Interest in this matter has undoubtedly been stimulated by recent progress made in lode-gold mining; by the present outlook; and by the activity apparent in placer-mining.

Base-metal mining was confined to individual efforts during the year, and increased activity in this direction may be expected under the stimulus of the Government's ore-purchasing scheme. Corporate effort apparently does not find sufficient encouragement under the present conditions of the metal market.

Widespread activity in placer-mining continued in the Cariboo District and in the Manson section, and still further expansion seems likely.

Noteworthy was the yardage of approximately 1,400,000 cubic yards hydraulicked at the *Bullion* mine by Bullion Placers, Limited, and a gauge of the major proportions now reached by this property. An increase in yardage to approximately 2,000,000 cubic yards is anticipated next year by the management.

The scale on which hydraulic operations are planned next year by Chas. F. de Ganahl on leases acquired on the lower part of the Germansen River is indicated by the large volume of water, amounting to 150 cubic feet per second, which will be conveyed to the ground from the upper part of the river for this purpose. The water-supply will be available under a head of 220 feet at the "Warbauer" pit, the name assigned to the hydraulic pit started by A. E. Ward and J. Bauer, and described in the Annual Report, Minister of Mines, British Columbia, 1936. This project involved a heavy construction programme during the year, including about 15,000 running feet of flume in cross-sectional dimensions 6 by 4 feet, and about 25,000 running feet of ditch-line of proportionate dimensions. Essential concomitant operations were those of logging, sawing, and road-construction. Timber limits on the Omineca River supply logs for a sawmill of 20,000 feet board-measure daily capacity situated at Germansen Landing. To enable material to be delivered at various necessary points by motor-truck, roads were constructed between Takla Lake and Old Hogem, and

between Germansen Landing on the Omineca River and the end of the road from Fort St. James at Slate Creek. A scow, driven by outboard engines and capable of taking a load of from 15 to 20 tons, was also put in operation on the Omineca River between Old Hogem and Germansen Landing. It is anticipated that hydraulicking will be commenced about the middle of May next.

At the property of Germansen Mines, Limited, on the Germansen River, fossil bones were discovered during the year. These were identified by the Geological Survey, Canada, as belonging to Bison, the age not being older than Pleistocene. So far as is known, this is the first discovery of fossils in the placer deposits of the Manson section.

Coal-mining was carried on by F. M. Dockrill at the Bulkley Valley Colliery, near Telkwa.

The writer desires to express his cordial thanks for the co-operation and kind hospitality extended by prospectors and mine operators in the course of his duties.

GOLD-SILVER-COPPER DEPOSITS.

Usk Area.*

Grotto Group. This group of twelve claims, owned by J. Bell, Lee Bethurem, and George Alger, of Usk, includes the property known originally as the *Diamond* group, and later as the *Diorite* group. The mineral-showings here described do not include those in the Annual Reports of the Minister of Mines for the years 1916 (under "Diamond") and 1929 and 1931 (under "Diorite"). The property is located in the valley of Hardscrabble Creek about 1 mile westerly from Pitman, elevation 375 feet, on the Canadian National Railway.

The property is reached by fair wagon-road from Pitman for three-quarters of a mile; thence steep trail for one-quarter of a mile to the top of a ridge at 850 feet elevation; then for half a mile the trail descends on a fair grade across rock-slides to the cabin on a bench at 610 feet elevation. The cabin is 125 feet north from and 30 feet above the creek. To transport ore by go-devil, the upper half-mile of trail will have to be widened and the quarter-mile descent to the road will have to be relocated. There is a quarter-mile of trail on good grade directly to the railway from the junction with the road.

Hardscrabble Creek flows easterly, and in the vicinity of the showings the valley is confined by 20- to 40-degree, densely-timbered slopes deeply covered by glacial clay and boulder overburden to at least 1,000 feet elevation. Occasional rock ridges outcrop through the overburden along the slopes. Glaciated, "roche-moutonee" rock bluffs confine the creek itself along appreciable distances, and in the creek-bottom bed-rock, forming frequent riffles and low falls, is generally exposed. Immediately below the cabin the creek enters a steep rock-walled gorge about three-quarters of a mile long, then cuts its way for three-eighths of a mile through deep glacial boulder-moraine to its confluence with the Skeena River at 350 feet elevation.

The main showings are located along the rocky confines of both sides of the creek-bank between elevations of 585 and 615 feet. A new discovery has been made at 1,010 feet elevation on the steep slope of the south bank.

The locality is in the vicinity of the easterly-plunging easterly contact of the Coast Range batholith. The area embraced by the claims is underlain by andesitic volcanics intruded by granitic tongues and by both basic and acid dykes. The volcanics are composed of apparently layered tuffs, breccias and flows striking north-westerly across the creek and dipping steeply south-westerly. Small shears and slips conformable to the trend and dip of the formation are characteristic. The veins strike north-easterly across the trend of the volcanics and dip 35 to 70 degrees north-westerly. They occur in the andesitic rocks adjacent to their contact with porphyritic granodiorite and sometimes in the intrusive itself.

The main showings along the creek consist of quartz veins varying from a few inches to about 3.5 feet wide, mineralized with pyrite, chalcopyrite, specularite, and sparse sphalerite. Characteristic are slight westerly bends for short distances along north-westerly-striking slips and shears. At these points, mineralization and vein-width are generally increased and sometimes the slip is mineralized for short distances, forming a small branch vein. This characteristic could be ascribed to incipient faulting or, where the vein follows a sheared

* By Douglas Lay and J. T. Mandy.

contact between the intrusive and the volcanics, to an irregularity or slight swing of the contact.

A second type of deposit along the creek is discontinuous and reticulated tightly-frozen quartz stringers and patches from ½ to 12 inches in width, distributed across a width of 8 to 10 feet in andesitic or hybridized-andesitic volcanic rocks. These are very irregularly mineralized with patches of massive chalcopyrite from about 1 to 8 inches in diameter.

A third type of deposit, occurring at 1,010 feet elevation, is disseminated chalcopyrite in a highly siliceous and cherty rock, possibly a silicified tuff or arenaceous sediment.

The area covered includes the property known originally as the *Diamond*, subsequently renamed the *Diorite* group, discovered many years ago, and from which a shipment of 10½ tons of ore assaying 5.2 per cent. copper, and containing combined gold and silver values to the extent of 65 cents, was made by Stanley Ross and associates in 1916. Ownership then passed to J. M. Dechene, who carried on prospecting for some years. In 1929 the present owners acquired the adjoining ground, on which are contained the mineral-showings described herein, and more recently the area covered by the *Diorite* or *Diamond*, and have carried out most of the development here described.

Along the northerly bank of the creek and about 150 feet south-east of the cabin, a quartz vein 1 to 2.7 feet wide, striking north-easterly and dipping 35 to 50 degrees north-westerly, outcrops on and adjacent to the contact of porphyritic granodiorite and andesite. It can be traced on the surface by natural outcrop at an adit-portal, and by an open-cut for a distance of 84 feet in a north-easterly direction from the creek. In a caved stripping in deep glacial debris, 20 feet north-easterly of the open-cut and at 5 feet lower elevation, the owner reports intersecting the vein showing good mineralization, and vein material typical of the deposit is seen on the dump. About 33 feet north-easterly from this stripping and at about 5 feet lower elevation are an old caved open-cut and adit in deep glacial debris adjacent to the creek, about which there is no accurate history; some typical vein material on the dump leads to the supposition that the vein was also located in this working. In the 84 feet definitely traced, about 30 feet of the vein-structure at its south-westerly end extending to the creek consists of an unmineralized fissure 4 to 8 inches wide.

At 590 feet elevation and about 150 feet south 47 degrees east from the cabin, an open-cut 15 feet long and 8 feet deep has been excavated in glacial debris. The vein, 1.5 to 2.7 feet wide, strike north 55 degrees east, dip 35 degrees north-westerly, is exposed in the floor of the cut. The hanging-wall is andesite and the foot-wall is porphyritic granodiorite. The vein is well mineralized with massive aggregates of pyrite and chalcopyrite associated sometimes with specularite and very sparse sphalerite. A sample across the vein over a width of 40 inches in the centre of this cut, and 29 feet north-east of the adit, assayed: Gold, 0.10 oz. per ton; silver, 15 oz. per ton; copper, 0.8 per cent. A sample across a vein-width of 40 inches in the cut, and 24 feet north-east of the adit, assayed: Gold, 0.11 oz. per ton; silver, 8 oz. per ton; copper, 0.6 per cent. A representative sample of about 1.5 tons of vein material on the dump at this cut assayed: Gold, 0.30 oz. per ton; silver, 25 oz. per ton; copper, 3.6 per cent. A selected sample of specularite from a small pile by the cut assayed: Gold, 0.20 oz. per ton; silver, 25 oz. per ton; copper, *nil*.

At 575 feet elevation, distant 24 feet south 54 degrees west from this open-cut, the vein outcrops on the 12-foot high face of a bluff. It strikes north 54 degrees east, dips 40 degrees north-westerly, and is well mineralized with pyrite, chalcopyrite, and some specularite. Here an adit is driven north 40 degrees east, angling slightly across the vein, which is between andesite on the hanging-wall and porphyritic granodiorite on the foot-wall. For 22 feet the vein is well mineralized across widths of from 1 to 3.8 feet. At 22 feet from the portal a shear 1.5 feet wide, strike north 5 degrees west, dip 60 degrees westerly, cuts across the adit. The vein continues through this shear, striking north 50 degrees east, and is well mineralized across a width of 3.5 feet for 2 feet beyond the shear. At 20 feet from the portal the working forks with closely parallel branches to the north-east. The right-hand or south-easterly branch is accessible for 26 feet, beyond which point the owner reports that it extends 8 or 10 feet. The direction of the working is first north-easterly and then more northerly. Along 24 feet of this branch the vein is crushed, averages 1.5 feet in width in the roof, and is very sparsely mineralized and has porphyritic granodiorite on the hanging-wall, with andesite on the foot-wall. Beyond the shear the vein appears to be faulted between

the roof and floor of the working by a fault striking north 30 degrees east and dipping from 10 to 20 degrees north-westerly. The fault shows halfway up the south-east side of the working and dips into the north-west side about the floor. This fault does not appear to cut the shear, in which case the well-mineralized section of the vein, 24 feet long between the portal and the shear, would not be affected by it. The owner reports that the vein shows a sparsely-mineralized width of about 12 inches above the flat fault, beyond the muck-pile blocking access to the rest of the working.

At 22 feet from the portal a branch vein on the east side of the shear follows the contact of the porphyritic granodiorite wedge in a north-easterly direction. This is followed in the left-hand or north-westerly working along a bearing of between north 45 and 47 degrees east for a distance of 26 feet, at which point the fracture angles acutely into the north-west wall. For the first 10 feet of this length this branch vein contains a width of 8 to 12 inches of fair chalcopyrite and pyrite mineralization in a quartz gangue. Beyond this, to its point of entry into the north-west wall, the fracture pinches to a width of from 1 to 2 inches and is not mineralized.

The working continues along the contact on a bearing of north 45 degrees east, with porphyritic granodiorite on the south-east wall and andesite on the north-west wall, the contact being coincident with a shear-plane 12 inches wide striking north 20 degrees east and dipping 60 degrees north-westerly. A shear in the south-east wall strikes north 83 degrees east and dips 40 degrees south. This comes up from the floor and is cut off in the roof by the shear along the contact at a point 53 feet along the working. At a point 35 feet along the working a crosscut extends into the porphyritic granodiorite of the south-east wall. This is filled with muck, but is reported by the owner to have intersected the south-easterly working and main vein in a distance of 7 feet, the vein being on the contact of porphyritic granodiorite and andesite and still exhibiting the irregular, crushed, and sparsely-mineralized character above the flat fault previously described.

At a point 53 feet along the working it turns into the porphyritic granodiorite along a bearing of north 83 degrees east, and 15 feet farther in intersects what is probably the main vein on the south-easterly contact of the porphyritic granodiorite wedge. Due probably to the proximity of the flat fault below the floor of the drift, the vein here is crushed and disturbed, but is well mineralized with pyrite, chalcopyrite, and specularite across a width of 3.2 feet. It strikes north 50 degrees east, dips from 60 to 70 degrees north-westerly, and conforms in attitude to the granodiorite-andesite contact. The vein is followed for 18 feet to the face, showing a continuing width of 1 to 1.5 feet in the roof with fair mineralization. The last 10 feet of the working turns slightly across the vein to a bearing of north 73 degrees east, with the vein in the face sparsely mineralized across a width of 10 inches, striking north 50 degrees east and dipping 70 degrees north-westerly into the north-westerly corner of the face. About 10 feet back from the face an unmineralized shear 6 inches wide, strike north 10 degrees east, dip 60 degrees westerly, cuts the vein at an acute angle.

It should be noted that both workings are practically on or just slightly above the flat fault described in the south-easterly one. The face of the north-west working, which is 86 feet long, is roughly less than 20 feet northerly of the old caved adit. The back is consequently not more than 10 to 15 feet thick at any place, which, allowing for an average thickness of 6 feet of glacial debris and soil on top, leaves a maximum of only about 9 feet of rock or vein.

The following samples were taken in this adit:—

	Gold.	Silver.	Copper.
	Oz. per Ton.	Oz. per Ton.	Per Cent.
Across 13 inches at portal	0.18	5.6	1.4
Across 2.75 feet, 8 feet from portal	0.36	13.5	1.6
Across 15 inches, 13 feet from portal	0.16	7.5	2.1
Across 3.5 feet, 4 feet along south-easterly working	0.16	7.5	1.0
Across 3.5 feet, 18 feet from face, north-westerly working	0.20	31.2	1.4
Across 15 inches at face, north-westerly working	0.04	2.2	0.3

At the portal a dump of vein-matter having a volume of 135 cubic feet, equivalent to 11¼ tons, has been accumulated. The owner reports that this is about half of what was originally accumulated, the rest having been lost by high water in the creek. A representative sample of this dump assayed: Gold, 0.20 oz. per ton; silver, 12 oz. per ton; copper, 1 per cent.

At 590 feet elevation, about 300 feet south 63 degrees west from the adit and on the opposite or southerly side of the creek, a quartz vein outcrops in altered andesite on the edge of the creek. It strikes north 48 degrees east, dips 70 degrees north-westerly, and can be traced for about 20 feet on the bluff-face bordering the creek to about 10 feet above the present water-level. Further possible continuity up the hill is obscured by thick timber and heavy overburden. It varies from 6 to 12 inches in width, with free walls, and is well mineralized with massive aggregates of pyrite and chalcopyrite associated with some specularite. In the bluff-face at elevation 600 feet and 20 feet from the creek, an adit is driven along a bearing of south 45 degrees west into the 38-degree hill-slope and angling slightly across the vein for a distance of 21 feet. For 14 feet of this distance the vein-width varies from 12 inches at the portal to 2 inches at 7 feet from the face. For the last 7 feet to the face it pinches and disperses in a disturbed area and at the face is cut off by a well-defined fault, striking north 45 degrees west and dipping 75 degrees south-westerly. A sample of selected mineralization from the 14-foot length in the adit and the surface exposure on the bank of the creek taken from vein-widths varying from 2 to 12 inches assayed: Gold, 0.80 oz. per ton; silver, 24 oz. per ton; copper, 3.3 per cent.

On the northerly side of the creek-bed, at 605 feet elevation and about 100 feet north 15 degrees west from the last-described adit, a series of tightly-frozen lenticular and discontinuous reticulated quartz stringers and patches from ½ to 12 inches wide occur in granitically-hybridized andesite. These are distributed across a width of about 10 feet and a length of about 40 feet and strike north 72 degrees east. They are very irregularly mineralized with widely-separated massive patches and blebs of chalcopyrite from ½ to 8 inches in diameter.

At 615 feet elevation on the southerly side of the creek-bed and about 300 feet westerly from this showing a similar one occurs. In this, however, the quartz stringers strike north 80 degrees west. A composite sample of selected chalcopyrite from these two showings assayed: Gold, 1.94 oz. per ton; silver, 13 oz. per ton; copper, 18.4 per cent.

At 1,010 feet elevation on the southerly side of the creek, and about 700 feet south 25 degrees east from the cabin, an open-cut 10 feet long through overburden on the 36-degree hill-slope discloses disseminated chalcopyrite in a highly silicified, cherty rock. The rock is appreciably shattered and characterized by major jointing striking north 40 degrees west and dipping 42 degrees north-easterly, with minor jointing striking north 80 degrees east and dipping 50 to 70 degrees north-westerly. Chalcopyrite in fine dissemination, accompanied by some pyrite, is fairly evenly distributed through the cherty rock. The occurrence has not been traced and no definite walls are exposed, so that its attitude cannot be determined. A representative chip sample of the open-cut over a length of 10 feet and a width of 5 feet assayed: Gold, trace; silver, 0.4 oz. per ton; copper, 0.4 per cent.

Refer to Annual Reports, Minister of Mines, British Columbia, 1916 under "Diamond," 1929 and 1931 under "Diorite" and "Grotto"; "Lode-Gold Deposits of British Columbia," Bulletin No. 1, 1932, under "Grotto"; Geological Survey, Canada, Memoir 212, 1937, under "Grotto" and "Diorite."

GOLD-COPPER DEPOSITS.

Usk Area.*

Lucky Luke. This group consists of four claims owned by G. L. Moody and Chas. Kelly, of Usk. The property is distant about 1¾ miles from Usk, and is reached by a pack-trail half a mile in length branching from the Usk–Vanarsdol Wagon-road at a point about 1¼ miles from Usk. The property is on the heavily-timbered, lower eastern slopes of Kitsalas Mountain, which rise at about 20 degrees, increasing in steepness toward the summit. On the lower slopes glacial debris and dense vegetation obscure the formation at most points, but occasional bluff-like outcrops become more numerous

* By Douglas Lay and J. T. Mandy.

at higher points. The camp buildings and underground workings are situated between elevations of approximately 1,000 and 1,100 feet, the former being about 700 feet above the Canadian National Railway.

A lenticular quartz vein varying in width from a few inches up to 2½ feet occupies in part a shear-zone from 3 to 8 feet wide, strike north 70 degrees west, dip 65 degrees north-easterly, in andesite intruded at some points by aplitic dykes or tongues. The latter antedate the mineralization, but are probably closely contemporaneous with the formation of the shear-zone. Mineralization observed in the quartz vein consists of bornite, chalcocite, lesser amounts of pyrite, and some specularite and magnetite. Malachite-staining is widespread. Free gold occurs frequently in association with chalcocite. Mineralization is bunchy, and post-mineral movement is much in evidence, leaving the vein-walls free and facilitating selective mining and sorting underground.

After discovery by the original owners, L. E. Moody and R. Lowrie, in 1917, the property was operated by them until 1923, when an option was secured by S. A. D. Davis, and 25 tons of hand-sorted ore was shipped that year which contained 18 oz. gold, 316 oz. silver, and 11,162 lb. copper. Thereafter no material amount of work was carried out until 1934, when R. W. Seelye optioned the property. Underground development consisted in sinking a winze from the lower adit. A small mill of nominal capacity of 20 tons daily was erected close to the railway, and a power-operated 1-bucket aerial tram constructed for conveying ore from the lower adit to the mill. The milling plant consists of a 9- by 8-inch jaw-crusher, 3- by 2½-foot Herman ball-mill, inclined corduroy table, and Wilfley table. Power was supplied by a Fordson tractor. In 1936 about 10 tons was treated, yielding between 800 and 1,000 lb. of concentrates, according to W. R. Adams, in charge of operations at that time. A grab sample of these concentrates, contained in a small bin outside the plant, assayed: Gold, 0.90 oz. per ton; silver, 16 oz. per ton; copper, 27.9 per cent. Owing to litigation between optionor and optionee, operations were suspended in 1936. In the spring of 1937 prospecting on the surface was resumed by G. L. Moody and L. E. Moody.

The shear-zone is exposed by open-cutting and trenching for 75 feet along its strike above the upper adit between elevations of 1,130 and 1,175 feet. The quartz vein, varying in width from 2¼ feet at the south-east end of the open-cutting to 2 inches, is continuous in intermittent outcrops for this distance. A face 10 feet high, average width 2.1 feet, was sampled at the south-east end of the exposure. This sample assayed: Gold, 0.16 oz. per ton; silver, 0.3 oz. per ton; copper, 0.7 per cent. Several long trenches across the strike have been made north-west of the exposure described, without apparently affording proof of the continuity of the vein in this region, in which it is evident from the underground working that faulting has taken place. Open-cutting this year was carried out north of and also below the portal of the lower adit, disclosing pyritization and a certain amount of cupriferous mineralization in the andesite formation. Small quartz veinlets were also uncovered. Surface prospecting on the projected strike of the vein below the lower adit would appear to be well advised, as the existence of faulting in this region is not known so far, and there is much to suggest that the vein may prove stronger in this region than at points north-west. Moreover, any discoveries will be more adjacent to transportation, and there is also the possibility of uncovering a parallel vein or veins.

Two adits, commencing as crosscuts at elevations of 1,110 and 1,045 feet respectively, follow the shear-zone for respective distances of 96 and 130 feet. These adits are connected by a raise, and in the near vicinity of the bottom of the latter a winze has been sunk from the lower adit to a depth of 80 feet.

The upper adit intersects the shear-zone 20 feet from the portal, and then follows a quartz-band averaging a few inches in width more or less continuous to the face. The latter shows evidence of incipient faulting, with a drag of the quartz to the south. Mineralization save for malachite-staining is somewhat sparse, except in the vicinity of the top of the raise from the lower adit, where a width of 16 inches of well-mineralized quartz is exposed. In this region also, another small band of quartz 4 inches in width occurs on the hanging-wall side of a narrow aplitic dyke, which here forms the hanging-wall of the shear-zone for some distance. The vein material, about 13.6 tons, recovered in the course of driving this adit is piled at the portal. A representative sample assayed: Gold, 0.36 oz. per ton; silver, 0.7 oz. per ton; copper, 1 per cent.

The lower adit intersects the shear-zone at 120 feet, then follows it north-west for a distance of 130 feet to a fault striking north 35 degrees east and dipping 70 degrees south-east. The vein following the shear-zone is cut off by the fault, which has been followed for 35 feet south-west. The main working has been driven ahead on the strike through the fault, but the dislocated part of the vein has not yet been found. Striations on the fault-plane are horizontal and are not deeply grooved. In view of the fact that the quartz in the face of the upper adit evinces drag to the south, and a similar appearance is exhibited by the vein immediately south-east of the fault on the lower level, available evidence points to displacement of the vein to the south. The quartz vein reaches a maximum width of 27 inches near the bottom of the raise to the upper adit, and for a length along the strike of about 30 feet in this region mineralization is heavy. North-west of this point the vein-fracturing weakens, and also the mineralization within it. The raise shows continuous well-mineralized quartz for practically its entire height and a sill-floor stope has been carried out over a length of 30 feet immediately above the lower adit, where bands of solid bornite and chalcocite several inches in width are exposed. This raise is situated about 35 feet north-west of the point at which the shear-zone was first penetrated by this adit. An aplitic dyke penetrates the shear-zone in the central part of the raise and for some distance forms the hanging-wall of the shear-zone. At some points the dyke is itself slightly fractured and mineralized similarly to the quartz vein. The 25-ton shipment of hand-sorted ore previously mentioned came from the stope. Also recovered from this adit are:—

(*a.*) Twenty-four sacks of closely-sorted ore the estimated weight of which is about 1,900 lb. A grab sample of this assayed: Gold, 11.1 oz. per ton; silver, 21 oz. per ton; copper, 34.8 per cent.

(*b.*) A dump estimated to contain 16.6 tons, from which a sample assayed: Gold, 0.64 oz. per ton; silver, 3 oz. per ton; copper, 2.8 per cent.

A few feet east of the aforementioned raise a winze was sunk in 1934 to a depth of 80 feet on the dip of the shear-zone. This is now filled with water, but was examined in 1934. Ore was continuous to a depth of 40 feet, then pinched, but subsequently improved. At the bottom, on the north-west of the winze, a width of 2½ feet of well-mineralized quartz showing bornite and chalcocite and free gold at some points was exposed in 1934. Subsequent to examination in that year it is understood that a drift was continued 15 feet north-west of the winze, disclosing continuation of the sulphide mineralization. From this winze is a dump of vein-matter of approximately 21 tons. A sample of this assayed: Gold, 0.04 oz. per ton; silver, 2 oz. per ton; copper, 3.1 per cent. The 10 tons milled in 1936 also came from the winze, according to report.

The underground workings to date disclose one possibly profitable mineralized section in the form of a steeply-plunging or vertical lens in the vicinity of the winze and raise between the adits. The extent along the strike is not more than about 30 feet, but the major axis extends from the top of the raise to the bottom of the winze and possibly beyond these limits in both directions.

Having regard to the fact that the vein where dislocated by the fault is weak, it would not seem likely that the dislocated portion even if recovered will prove materially different. It would, therefore, seem advisable to endeavour to trace the vein along its strike in a south-easterly direction from the underground workings.

Refer to Annual Reports, Minister of Mines, British Columbia, 1918, 1919, 1923, 1924, 1925, 1928, and 1934; and to Geological Survey, Canada, Memoir 205, 1937.

Nugget Group.

This group, consisting of five claims owned by P. Brusk, of Vanarsdol, is situated on the south slope of Kitsalas Mountain on the north side of Hankin (Phillips) Creek. The base-camp is situated on the Usk–Vanarsdol Wagon-road, immediately adjacent to the left bank of Hankin (Phillips) Creek, and is distant 2½ miles from Vanarsdol and 4½ miles from Usk. An excellent pack-trail 1¾ miles in length follows the left bank of Hankin (Phillips) Creek on an easy grade, not much exceeding 8 per cent., for a distance of about 1 mile, and then, leaving the creek, switchbacks up the steep, densely-timbered mountain-slope to the property. Grades on the latter part of the trail are steep, but not unduly so. The mountain-slope in the vicinity of the showing examined, at elevation 1,850 feet, approaches an angle of 30 degrees and is densely timbered.

Owing to snow conditions in May, it was only possible to examine one of the surface showings and a short adit adjacent thereto. While it is understood that there are other showings, it is from the showing examined that the owner intends, later in the season, to commence work with a view to ship to the Prince Rupert Sampling Plant.

Quartz separated by bands of andesite occupies a fissure in andesite with an average width 2 feet, strike north 22 degrees east, dip from 28 degrees to 42 degrees north-westerly. The fissure-walls are free, as are also the individual bands of quartz, a feature which facilitates selective mining and close sorting. The quartz-bands are at some points heavily mineralized, and at other points sparingly so, with chalcocite, which, apart from prevalent malachite-staining, forms practically the sole mineral present, save that free gold occurs at some points.

The property was discovered a number of years ago and all development has been carried out by the present owner.

In the bed of a small creek flowing south-westerly into Hankin (Phillips) Creek, on the north side at an elevation of 1,850 feet, surface-stripping exposes for a length of 12 feet along its strike a fissure of an average width of 2 feet, striking north 22 degrees east, dipping at from 28 to 42 degrees north-westerly. The host-rock is andesite, which is intruded by a boss of granodiorite at a point 30 feet west of the exposure. The vein-filling consists of bands of quartz separated by bands of andesite. A band of quartz on the hanging-wall, 8 inches in width, is well mineralized with chalcocite and malachite-staining. Similar mineralization in the remaining width of the fissure is patchy. Chalcocite, accompanied by malachite-staining, forms practically the sole mineral present, save that free gold occurs at some points. The walls are free, likewise the individual bands of quartz. Beyond the limits of the exposure heavy overburden conceals, in both directions, the region in which the continuation of the fissure might be expected. Continuation in a south-westerly direction is, however, a matter of some uncertainty as the dip of the fissure closely coincides with the slope of the mountain, and consequently removal of the vein-filling by erosion is a possibility which should be investigated. At the north-west extremity of the exposure a fault striking apparently in the same direction as the fissure, and dipping in the same direction but at a steeper angle of 55 degrees, is revealed in immediate proximity to it. Consequently continuity of the fissure in this direction is also a matter for investigation.

Distant 30 feet due west of the centre of the surface exposure described, and 15 feet below it, an adit 52 feet long is driven for the first 26 feet on a bearing north 22 degrees east, and thereafter on a bearing north 70 degrees east. For the first 30 feet this adit cuts a boss of granodiorite (which is also exposed on the surface in the vicinity of the portal) and subsequently andesite, save that a small dyke from the boss follows parallel to the fissure previously described. This dyke is apparently involved in the fault exposed at the face of the adit, which is doubtless the hanging-wall of the fault-zone, the foot-wall of which, exposed on the surface, has been previously described. It should be understood, however, that heavy overburden conceals the full width of the fault-zone on the surface. Should the strike of the fault prove identical with that of the fissure, it is apparent from the topography that, irrespective of the question of recovery of the dislocated part, prospects of a very considerable extent of the undislocated part above the horizon of intersection of fissure and fault are good. If, however, the strike of the fault is not parallel to that of the fissure, then termination beyond the surface exposure and north-west of the latter may occur. Continuation of the adit to the foot-wall of the fault-zone will doubtless throw light on the matter.

At the time of examination in May, the owner, by mining only the band of quartz described on the hanging-wall of the fissure, had accumulated a small dump of an estimated volume of about 2 tons of largely unculled vein-matter. A grab sample of this dump assayed: Gold, 0.01 oz. per ton; silver, 2 oz. per ton; copper, 3.7 per cent. Another sample of selected material assayed: Gold, 0.20 oz. per ton; silver, 6.4 oz. per ton; copper, 15.6 per cent.

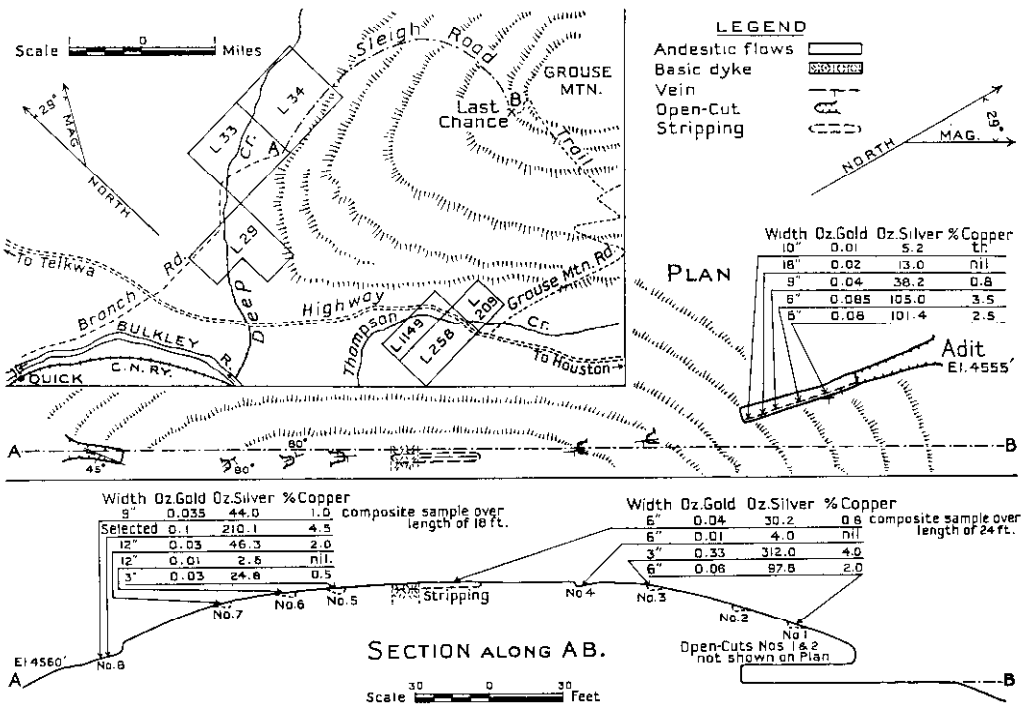
Refer to Annual Report, Minister of Mines, British Columbia, 1928, and Geological Survey, Canada, Memoir 205, 1937.

SILVER-COPPER DEPOSITS.

GROUSE MOUNTAIN.

Last Chance Claims.

Two adjoining claims are owned by J. G. Donaldson, J. Oakes, and K. Nysven, of Telkwa, who also own a third non-adjoining claim which is not described herein. The property is situated on the upper north-western slopes of Grouse Mountain, and is at present reached by a branch trail, 1½ miles in length, from the Grouse Mountain Wagon-road. This latter leaves the highway at Pre-emption Lot 258 (Low's ranch), and switchbacks up the southern slopes of Grouse Mountain, and the distance to the property by this route from Pre-emption Lot 258 is about 5 miles. The branch trail leads to a cabin on the summit of the mountain at 2,685 feet elevation, and thence descends the north-western slopes for about half a mile to the adit at 4,555 feet elevation. By the route described the distance from the property to Quick, on the Canadian National Railway, the nearest shipping-point, is about 13 miles. As the owners intend making a shipment to the sampling plant at Prince Rupert, a sleigh-road shown on the map on the northern slopes of the mountain, and connecting the property with the existing road system on Deep Creek, is being built. This will avoid the adverse grade on the present route and reduce the distance from the property to Quick to about 8 miles.



Last Chance. Plan and section of workings.

In the vicinity of the mineral-showings the mountain-side slopes at about 16 degrees, is well timbered, and covered with a shallow mantle of glacial drift, through which small outcrops of the formation emerge at several points. The topography and strike of the two chief veins are such that both can be developed by adits at the point of lowest exposure.

The formation in the vicinity of the mineral-showings consists of greenish-coloured, andesitic flow-rocks of fine-grained texture, save at one point (open-cut No. 8), where a rock of medium-grained texture is exposed. The formation is intruded by a small basic dyke or tongue at one point. The latter is magnetic and contains material amounts of a reddish-coloured apatite. The contact-planes of the flow-rocks are exposed only at the portal of the adit, where the strike is north 70 degrees east and dip south-easterly. Small quartz veins varying in width from mere stringers to 19 inches, of which two are of chief importance, occur in the andesite. Smaller intersecting veins are present. In all cases the sulphide

mineralization is essentially tetrahedrite, with a certain amount of pyrite and azurite staining. One of the two chief veins strikes from north to somewhat east of north, with steep easterly dip; the other, that exposed at one point only, strikes north 51 degrees east and dips south-east at 45 degrees. The walls of the veins are either entirely or mainly free, and the ore stringers can readily be stripped and hand-sorted to shipping grade. The resulting product is illustrated by a grab sample taken of about 1 ton of ore mined by the owners. This assayed: Gold, 0.10 oz. per ton; silver, 119 oz. per ton; copper, 3.5 per cent.

The property was discovered in 1935 by J. Oakes, who, together with his associate owners, has carried out all the work accomplished to date.

The vein striking from north to somewhat east of north has been exposed by five small open-cuts, and one stripping over a horizontal distance of 215 feet and vertical range of 40 feet. Distant 180 feet southerly from its most northern exposure the vein is interrupted, but not apparently dislocated, by a small coarse-grained basic dyke or tongue 10 feet in width. Open-cut No. 5, 23 feet southerly from the dyke, exposes the vein apparently in place. Open-cuts Nos. 6 and 7 expose two different small veins apparently. In both cases the strike is from north to somewhat west of north, but in the former case the dip is westerly, and in the latter case easterly.

The second of the two chief veins is exposed for a length of 18 feet along its strike by open-cut No. 8. The strike is north 51 degrees east and the dip 45 degrees to the south-east. This open-cut discloses the heaviest mineralization in evidence at the property. An average width of 9 inches of mineralization of the type described is continuous in the exposed outcrop, the maximum width being 15 inches. The owners propose to start an adit at this point, following the vein north-easterly. As determined by aneroid the elevation of this point is about 5 feet above that of the adit on the vein first described.

The assays and widths of mineral exposed in the various open-cuts are given on the accompanying map.

The only underground working consists of a 49-foot adit preceded by an open-cut 33 feet in length at 4,555 feet elevation, following the vein first described. The width of mineralized quartz encountered varies from 6 to 15 inches. At points respectively 16 and 42 feet from the portal small intersecting veinlets occur, and in the vicinity of these it is found that the mineralization is better than at other points. The hanging-wall of the vein is quite free and is considerably oxidized; the foot-wall is partly free. Assays of samples taken at intervals in this adit are given on the map. There resulted from this adit about 3 tons of hand-sorted ore, of which at the time of examination 2 tons was sacked and not sampled. The remainder was contained in a small bin, and particulars have been previously given of a grab sample.

The owners have erected a good blacksmith's shop at the portal of this adit.

This property exemplifies the type of deposit well adapted to economic operation by individual owners, and the present owners intend, upon the completion of the sleigh-road mentioned, to continue work during the winter.

Refer to Annual Report, Minister of Mines, British Columbia, 1935.

GOLD-SILVER-LEAD-ZINC DEPOSITS.

Usk Area.*

Silver Bow Group.

This property, consisting of the following mineral claims: *Terrace Nos. 1* and *2, Silver Cliff Nos. 1* and *2, Silver Bow No. 2, Blue Hen, I.M.N.*, and *S. and N.*, is owned by A. L. Clore and G. Little, of Terrace. The property is situated on the westerly slope of Kleanza Mountain on the east side of the Skeena River. It is reached by a good but steep pack-trail 2 miles in length, which leaves the Terrace–Usk Highway at Edgar Creek, distant 7 miles from Usk Station and 10 miles from Terrace Station on the Canadian National Railway. The wide pack-trail, with many switchbacks, ascends the steep westerly slope of Kleanza Mountain to the cabin at 2,225 feet elevation and about 200 feet northerly from Clore Creek.

The showings are located on the *Blue Hen* and *Silver Bow No. 2* claims between elevations of about 2,225 and 2,325 feet on the 25- to 36-degree westerly slope of the mountain to Clore Creek. Clore Creek occupies a narrow, youthful, deeply-canyoned and steep rock

* By Douglas Lay and J. T. Mandy.

trough which flows easterly into Edgar Creek. The locality of the deposits is thickly timbered, and, except in the southerly section bordering the rock bluffs of Clore Creek Canyon, is covered with several feet of glacial clay and overburden. Northerly from Clore Creek Canyon occasional rock bluffs, 10 to 20 feet high, outcrop through the overburden. The showings extend from 2,350 feet elevation at Clore Creek for a distance of 900 feet north to 2,210 feet elevation, and over a width of 275 feet.

Coarse-textured granitic rocks of the Coast Range batholith outcrop at the base of the mountain along the highway and extend to the vicinity of the showings, where, however, they exhibit a finer texture and increasing evidence of hybridization through magmatic absorption of andesitic roof-rocks. In one section, at the northerly extremity of the showings, there is a small area of greenstone about 110 feet long that might be classified as a small inclusion. The locality of the mineral-showings can be classified as a granitic roof-absorption area. Feldspar-porphyry dykes intrude the formation. Deep glacial grooving, striations, and "roche moutonee" forms of exposed bench-bluff surfaces in the vicinity of the mineral exposures are definite evidence of glacial action at the higher elevations.

The mineral deposits consist of a series of discontinuous, lenticular, white quartz veins varying from a few inches to 3 feet in width, occurring *en echelon* in a generally hybrid granitic rock. Fracturing has not been intense and evidence of shearing or movement along the plane of the veins is generally lacking. A characteristic feature is the interruption of both the vertical and horizontal continuity of the veins at their contacts with joint-planes. The veins strike generally northerly and dip from 35 to 60 degrees easterly.

The majority of the quartz-vein exposures are barren of sulphide mineralization or only very sparsely mineralized. Four widely-separated exposures show possible lengths up to about 20 feet well mineralized with galena, sphalerite, pyrite, and some chalcopyrite. In two of these instances exploration at about 20 feet vertically below the mineralized outcrop shows practically barren quartz.

The property was discovered in 1925 by A. Clore, who with his then co-owner, W. E. Vanmeter, in that and the following year carried out much surface prospecting and some underground development. Painstaking prospecting has since continued under the present ownership, and two separate lots were shipped to the sampling plant at Prince Rupert during the year. Of these, one lot, 14,836 lb. dry weight, assayed: Gold, 0.173 oz. per ton; silver, 41.6 oz. per ton; copper, 1.1 per cent.; lead, 21.2 per cent.; zinc, 13 per cent. The other lot, 10,376 lb. dry weight, assayed: Gold, 0.15 oz. per ton; silver, 15 oz. per ton; copper, 1.6 per cent.; lead, 15 per cent.; zinc, 14 per cent.

At 2,260 feet elevation on the *Blue Hen* claim and about 400 feet north-easterly from the cabin an open-cut 18 feet in length exposes a lenticular quartz vein striking north 10 degrees east and dipping 45 degrees easterly, in epidotized greenstone. At the northerly end of the cut the vein is 2 inches wide, swells to a width of 3 feet in the centre, and is 2 feet wide in the south face. The widening is produced by the development of three main quartz-bands from 2 to 7 inches wide. Intersecting joint-planes interrupt continuity of the bands, but the hanging-wall fracture continues in the northerly and southerly extremities of the cut. In the centre of the cut a cross-fracture or spur well mineralized with galena across 8 inches cuts through the vein. It extends wedge-shaped into the hanging-wall for a length of 2 feet, and into the foot-wall for a length of 3 feet, at which point it is cut off by a joint-plane. The exposure in this open-cut is well mineralized across an aggregate width of 12 inches in a total average structure-width of 2.5 feet. Mineralization consists of galena, sphalerite, pyrite, and chalcopyrite in patches and streaks. A sample, representing the best mineralization that could be cobbed from an aggregate width of 12 inches along the total length of 18 feet exposed in the cut, assayed: Gold, 0.10 oz. per ton; silver, 20 oz. per ton; copper, 2.6 per cent.; lead, 20.2 per cent.; zinc, 12.3 per cent.

From this cut, equivalent to a total volume of about 187.5 cubic feet, A. L. Clore has extracted sixty-five sacks of sorted ore representing a volume of about 43.5 cubic feet and a weight of about 4.55 tons cobbed to pieces of ½- and ¾-inch diameter.

A pit 4.5 feet deep at elevation 2,265 feet located 87 feet south 20 degrees west from this cut exposes the probable southerly continuity of the *Blue Hen* vein. In this exposure the host-rock is strongly granitic and the vein 14 to 21 inches wide. It is composed of a hanging-wall quartz-band 4 inches in width, with intervening quartz stringers. Only very sparse

mineralization of pyrite and some galena is evident. The vein in this pit strikes north 15 degrees east and dips 62 degrees easterly. At 20 feet southerly from this pit, stripping through 18 inches of overburden exposes granitic formation but no vein. At 2,330 feet elevation, about 75 feet farther south and in alignment with the strike of the *Blue Hen* vein, stripping exposes hybrid granitic rock.

At 2,210 feet elevation and 106 feet north 20 degrees east from the *Blue Hen* cut, the *Blue Hen* vein is exposed crossing the brow of a small bluff. Here it cuts through a felsite dyke striking north 35 degrees east and dipping 45 degrees south-easterly. The outcrop is oxidized and at its intersection with the dyke contains much crushed and decomposed dyke material. At the foot of the bluff an open-cut 36 feet long has been excavated through talus and decomposed hybrid granitic rock. At the end of the open-cut a crosscut adit 9 feet long intersects the vein, which is thereafter followed by a drift bearing south 16 degrees east for 30 feet, with the vein gradually veering into the east wall. At 39 feet from the portal of the adit a crosscut 10 feet long bearing south 36 degrees east penetrates the hanging-wall of the vein and extends into the formation. At this point a drift 10 feet long bearing south 20 degrees west along the strike of the vein exposes two quartz stringers 1 inch wide, mineralized with a few specks of pyrite and sphalerite in a structure of dispersed and weak fracturing. This is characteristic of the vein-exposure in the total length of the adit. The formation in the adit is a highly-metamorphosed and partly-hybridized greenstone. A blacksmith's shop is located at the portal of the *Blue Hen* adit.

At 2,225 feet elevation and about 200 feet westerly of the *Blue Hen* adit an open-cut 18 feet high into the 36-degree hill-slope exposes a barren white quartz vein 20 inches wide striking north and dipping 42 degrees east. In the face of the cut, about 10 feet east of this vein, is a barren white quartz-lens 12 inches wide. An open-cut 20 feet north discloses a barren quartz vein 6 inches wide. The formation in these cuts is a hybrid granitic rock.

At 2,275 feet elevation, about 150 feet southerly from the last-mentioned cut and 250 feet north 5 degrees east from the cabin, an open-cut in hybrid granitic rock exposes a barren quartz vein 14 to 21 inches wide striking north 35 degrees west and dipping 62 degrees north-easterly. This showing is about 326 feet south 20 degrees west from the *Blue Hen* adit and cannot be correlated with any of the previously-described showings.

At 2,375 feet elevation, about 250 feet southerly from the last-described showing and about 150 feet north 70 degrees east from the cabin, a quartz vein outcrops on the brow of a bluff ridge in basic hybrid granitic rock. The vein strikes north 26 degrees west and dips 74 degrees north-easterly. An open-cut 20 feet long commencing in talus intersects a feldspar-porphyry dyke, 8 to 10 feet wide, lying adjacent to the foot-wall of the vein. The hanging-wall of the vein is well defined and at its intersection by the open-cut a width of 4.7 feet of barren quartz is exposed on the south side, diminishing to a few stringers on the north side branching from the well-defined hanging-wall. At the face of the cut a drift for 10 feet to the south shows the quartz diminishing to a width of 12 inches in the face. An open-cut in feldspar porphyry adjacent to the adit on the south exposes a barren quartz segregation-lens 2.5 feet wide. Stripping about 30 feet north of the adit exposes hybrid granitic rock, but no vein.

At 2,300 feet elevation, and 150 feet south 15 degrees west from the last showing and about 150 feet south 46 degrees east of the cabin, a quartz vein 8 inches wide striking north 24 degrees west and dipping 55 degrees north-easterly outcrops at the brow of a bluff in a hybrid granitic host-rock. In a shaft (*Silver Bow* No. 1 shaft) 17 feet deep sunk on this vein it is exposed for 14 feet down the southerly side, at which point continuity is interrupted by a joint-plane. On the north side the vein appears to have been open-cut, but snow obscured examination in this direction. As exposed for the depth of 14 feet on the south side of the shaft the vein contains an average width of 0.45 foot of quartz well mineralized with iron oxide, galena, and sphalerite in a structure-width of 12 inches. A composite sample of four cuts spaced down the 14-foot depth of the south side of the shaft and representing an average width of 0.4 feet assayed: Gold, 0.20 oz. per ton; silver, 13 oz. per ton; copper, 0.5 per cent.; lead, 7 per cent.; zinc, 2.5 per cent. It would appear that the mineralization represented by this sample could be cobbed to about a 50-per-cent. better grade. A dump of about ½ ton of well-mineralized vein-matter is located at the collar of the shaft. Constructive, shallow stripping could be done along the southerly continuity adjacent to the shaft. Open-cut

stoping of possible shipping-grade ore could also be readily carried out on the south face of the shaft.

At 2,330 feet elevation, 75 feet south 30 degrees east from the shaft, an open-cut exposes two quartz-bands, 1 to 4 and 8 inches wide respectively, in hybrid granitic rock. These strike north 30 degrees west and are mineralized with a speck or two of galena and some iron oxide. At 2,375 feet elevation and about 100 feet south-easterly from the last exposure an open-cut exposes a barren quartz stringer, 2 inches wide, in granitic rock. The exposures in the last two-described cuts probably represent the continuation of the vein exposed in the *Silver Bow* No. 1 shaft 175 feet to the north-west.

At 2,350 feet elevation, 15 feet south-west of and immediately below the last-described cut and south 30 degrees east from the cabin, a quartz vein outcrops intermittently along the bluff-face sloping precipitously to Clore Creek and adjacent to the trail. The formation is a hybrid granitic rock and the vein strikes north 14 degrees west and dips from 35 to 45 degrees north-easterly. A shaft (*Silver Bow* main shaft) 25 feet deep has been sunk on the vein at this point. On the south side of the shaft the vein varies from 2 inches wide at the collar to about 12 inches at the shaft-bottom and is offset about 18 inches easterly in two places by intersecting joint-planes. The vein on the south side of the shaft is generally barren white quartz or only very sparsely mineralized. On the north wall of the shaft the vein varies from 1 to 18 inches in width and averages 5.3 inches in width. It is well mineralized from 4 feet from the bottom for a dip-length of 12.2 feet up the north side of the shaft. Above this to the collar the vein carries fair but patchy mineralization across an average width of 7 inches. At the bottom of the shaft it is offset about 2 feet easterly by a cross-joint, but can be seen continuing into the floor of a short crosscut which extends for about 30 feet, bearing north 66 degrees east from the bottom of the shaft. A composite sample representing the best mineralization exposed on the north wall of this shaft for a dip-length of 12.2 feet and across an average width of 7 inches assayed: Gold, 0.04 oz. per ton; silver, 25 oz. per ton; lead, 15.1 per cent.; zinc, 5 per cent. For shipping purposes this could probably be cobbed to a better grade. To indicate the possibility for shipping-grade ore from the vein exposed in the *Silver Bow* main shaft, it is significant that from a total shaft volume of 1,575 cubic feet, thirty-five sacks (2.5 tons) or 23.5 cubic feet of closely sorted and cobbed ore was extracted, representing 1 cubic foot of sorted ore from 67 cubic feet of shaft excavation.

North of the shaft a narrow band of quartz can be traced for about 30 feet along the face of the bluff adjacent to the trail. About 75 feet northerly an open-cut in granitic rock failed to locate the vein. About 60 feet southerly from the shaft a quartz-outcrop in the trail indicates the continuation of the *Silver Bow* vein in this direction. At 2,350 feet elevation, about 125 feet south-westerly from the shaft, it can be seen crossing a branch of Clore Creek, where a length of 20 feet, 2 to 7 inches wide, fairly well mineralized with galena and sphalerite, is exposed along a bluff-face. The vein strikes north 21 degrees west and dips 60 degrees north-easterly. A composite sample of the best mineralization along the outcrop-length of 20 feet and an average width of 7 inches assayed: Gold, 0.04 oz. per ton; silver, 50 oz. per ton; lead, 21.4 per cent.; zinc, 14.2 per cent.

A short crosscut into the bluff-face at this point intersects the vein, showing barren quartz at about 20 feet below the outcrop. A drift off the crosscut bearing south 21 degrees east for 18 feet exposes a vein-width of 2 to 6 inches of barren quartz. In the face of the drift the vein is 6 inches wide and composed of barren quartz between free walls. The formation in the crosscut and drift is hybrid granitic rock. No further tracing of the *Silver Bow* vein in a southerly direction has been done.

Adjoining the *Silver Bow* group and at an appreciably higher altitude are other holdings of the *Silver Bow* owners which may contain some possibilities for shipping-grade ore. Snow conditions prevented an examination of the showings on these holdings.

Refer to Annual Reports, Minister of Mines, British Columbia, 1925 and 1926; Geological Survey, Canada, Memoir 205, 1937.

SMITHERS AREA.

Skookum and Elk (formerly Silver King). Twelve mineral claims, *Skookum Nos. 1* to *6*, inclusive, and *Elk Nos. 1* to *6*, inclusive, covering all important mineral-showings and underground workings of the property formerly named the *Silver King* group, are owned by Jens Baker and associates, of Smithers. The property is situated at the head of Driftwood Creek in the Babine Mountains, distant about 19½ miles by motor-road and pack-trail from Smithers. The Driftwood Creek Road, by which the property is reached, branches from the Telkwa–Hazelton Road at a point 5½ miles from Smithers, and follows the creek to within 5 miles of the property, to which point it is now passable for motor traffic. The remaining distance is by pack-trail to the cabin in a stand of timber at 4,885 feet elevation.

The property is situated in the large basin at the head of Driftwood Creek, and both underground workings and surface showings lie above timber-line at elevations of between 4,960 and 6,785 feet at the head of this basin. The width of the basin near its head is upwards of 1,000 feet. From the floor the mountain-slopes, which are precipitous in places, rise sharply at the head and on both sides. Driftwood Creek cascades through a gorge carved in the head of the basin on the west side. The portal of the working-adit is situated immediately east of the creek at the lower end of this gorge, virtually on the floor of the basin. The floor of the basin is overlain with glacial drift, on which grows quite thick brush, so that the formation is obscured. The glacial drift is thin and vegetation sparse at points a little above the basin, and the formation is either bare, or well exposed, at higher elevations.

A detailed account of the surrounding geology will be found in Geological Survey of Canada Summary Report, 1924, Part A. In the region of the mineral-showings the formation consists of intercalated tuffs and volcanic flow-rocks of the Hazelton formation. In the working-adit the formation consists of rhyolitic tuffs of fairly coarse texture striking north 54 degrees east and dipping south-east at from 50 to 55 degrees. Quartz-lenses are contained in shear-zones of variable width up to an observed maximum of 6 feet. These quartz-lenses vary greatly in width from mere stringers up to a maximum of 6 feet. To date only one shear-zone has been investigated for any material distance along its strike and dip, and in this the quartz-lenses did not prove continuous. The strike of the shear-zone investigated is variable, but is in main north 71 degrees west, with a dip of from 45 degrees to 65 degrees northerly. There are several branching shear-zones and one adjacent parallel shear-zone. The quartz-lenses contain a patchy sulphide mineralization of galena, sphalerite, tetrahedrite, chalcopyrite, and pyrite. In the working-adit (4,960 feet elevation), which explores a shear-zone at a vertical depth of only about 50 feet below the surface, oxidation is prevalent, at some points intense, and material amounts of native silver and native copper are present in the mineralization mentioned, and are indicated as being of secondary origin due to the circulation of supergene solutions.

Material gold values are present and silver values per unit of base metal are unusually high. These features are invariably exhibited by all exposures, and justify persistent investigation beyond that accomplished to date. The grade of product obtainable by selective mining and hand-sorting is illustrated by the particulars of shipments given in the body of this report. The siliceous nature of the ore also commands a favourable smelting rate.

The original owner of the property, Patrick J. Higgins, prior to 1919 drove the adit at 4,993 feet elevation on the west side of Driftwood Creek, and that on the east side of the creek at 4,990 feet elevation a distance of 30 feet. In 1919 the property was optioned by a Seattle syndicate, which continued the latter adit to its present face, and then allowed its option to lapse. In 1922 W. Foley and E. Lee, under an agreement with the owner, drove an adit at 5,310 feet a distance of 185 feet in the east wall of the basin. This working is known as the "Foley tunnel." In 1925 the property was acquired by the Babine Silver King Mining Company, Limited, which drove the working-adit at 4,960 feet elevation and carried out most of the work shown on the plan at this level. In 1927 a shipment of 7 tons of hand-sorted ore was made, containing: Gold, 2 oz.; silver, 627 oz.; copper, 200 lb.; lead, 642 lb.; zinc, 653 lb. In 1930 the property was acquired by Omineca Silver King Mining Company, Limited, but subsequent to 1927 no material amount of development-work was carried out until 1937, when the property lapsed and was restaked by Jens Baker for

himself and his associates. On acquiring the property, Jens Baker, working practically single-handed, accomplished much hard and useful work, completing the raise between the two adits shown on the plan, and making a shipment of 19,491.8 lb. dry weight of hand-sorted ore to the sampling plant at Prince Rupert. This shipment assayed: Gold, 0.31 oz. per ton; silver, 70.5 oz. per ton; copper, 1.2 per cent.; lead, 3.6 per cent.; zinc, 2.7 per cent.

For the most part, surface showings are situated at widely-separated points and only their approximate position can be given. One group of closely-adjacent exposures lies without the basin at 6,785 feet elevation, distant about 2,750 feet to 3,000 feet in a direction about north 69 degrees east of the adit at 4,960 feet elevation. These are situated on a flat-topped spur of Cronin Mountain, close to the summit, and within 150 feet of the precipitous eastern slope of the spur. There is no glacial overlie at this elevation, and the formation is bare save for a little shattered rock-detritus. The formation consists of intercalated andesitic flow-rocks and rhyolitic tuffs, which in the vicinity of the mineral-showings are sheared vertically, the shear-planes trending north 56 degrees west. Trenching at this point exposes occurrences of quartz containing high-grade mineral, but continuity is not revealed. The depth of trenching is about 2 feet and width 4 feet. One trench 40 feet long trending north 24 degrees east has at its north-eastern extremity two branches, one 6 feet in length trending north 37 degrees west, and one 22 feet in length trending south 73 degrees east. At the south-east end of this last-mentioned trench a width of 12 inches of quartz with sulphide mineralization is exposed. A sample across this width assayed: Gold, 0.08 oz. per ton; silver, 22 oz. per ton; copper, 0.8 per cent. Distant 6 feet west of the main trench and 15 feet from its southern end, another trench 18 feet long trending north 46 degrees west exposes quartz over a distance of several feet, containing small bunches of mineral. A sample of picked mineral at this point assayed: Gold, 0.24 oz. per ton; silver, 92 oz. per ton; copper, 2.5 per cent. Distant 35 feet south-west of the northern end of the last-mentioned trench, discontinuous quartz-lenses are exposed in the formation.

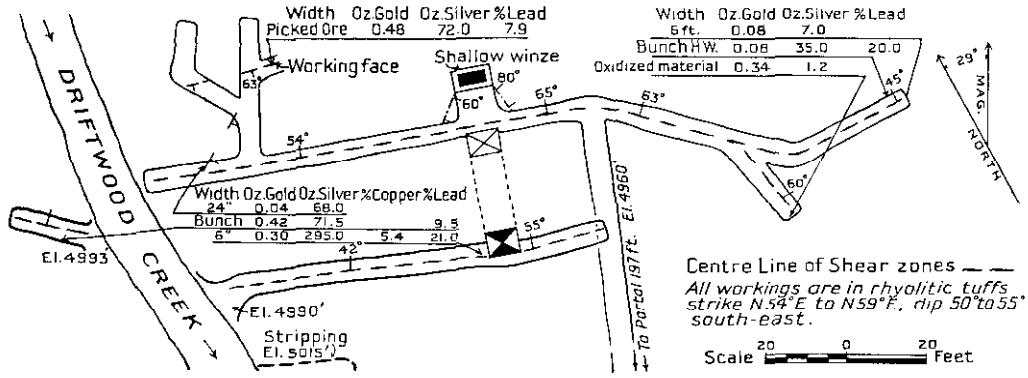
Distant about 2,080 feet from the portal of the working-adit (elevation 4,960 feet) in a direction south 71 degrees east at 5,595 feet elevation, in the bed of a small creek near the top of the east wall of the basin is an exposure by natural agencies. At this point quartz is ribboned through the formation of rhyolitic tuffs over a width of 8 feet, and a bunch of mineral shows at one point. A sample of this assayed: Gold, 0.20 oz. per ton; silver, 70 oz. per ton; lead, 3.4 per cent. Strike and dip are not revealed by the exposure.

Distant about 1,190 feet in a direction south 81 degrees east from the portal of the working-adit (elevation 4,960 feet) at 5,380 feet elevation in the steep east wall of the basin, one small open-cut and natural agencies expose in rhyolitic tuffs a quartz vein upwards of 4 feet in width with a smaller branch on the foot-wall. The main exposure of quartz can be traced up the wall of the basin for about 50 to 5,420 feet elevation, where it appears to end abruptly. At the lowest point of exposure it is sparsely mineralized, and a sample of selected mineral assayed: Gold, 0.26 oz. per ton; silver, 163 oz. per ton; copper, 3 per cent. Below this the vein cannot be traced on the surface owing to detritus and vegetation. The strike of the vein is north 21 degrees west and it dips to the north-east at from 60 to 80 degrees.

Underground workings include the " Foley tunnel " at 5,310 feet elevation, the purpose of which was the penetration of the vein last described at this horizon. The portal of this adit is distant 123 feet in a direction north 46 degrees west from, and 70 feet below, the lowest point of the surface exposure. The total length of the adit is 185 feet, and the average bearing is due east, although there are three bends. For the first 46 feet the bearing is south 71 degrees east, and a branch drive at this point follows for 14 feet a bearing of south 19 degrees west, exposing immediately adjacent to the main adit a sparsely mineralized vein 2.75 feet wide. Intersecting this is a small stringer striking approximately due east and west and dipping north. The former vein may be the downward continuation of that sought, and some further investigation at this point would seem justified, but it is to be borne in mind that, inasmuch as the quartz vein sought is seen to end on the surface but a short distance above the lowest point of exposure, the downward extension may not be material. For its remaining distance the adit discloses nothing noteworthy.

Other underground workings all explore the same shear-zone. Of these two are adit-drifts, situated closely adjacent, one on each side of the gorge in which Driftwood Creek is

contained in this region. Both are at creek-level; that on the west side is at 4,993 feet elevation and that on the east side at 4,990 feet elevation. The adit at 4,993 feet is 19 feet in length and is driven in the steep west wall of the basin. It follows a quartz-lens of maximum width 2½ feet, which narrows to a small stringer in the face. A bunch of high-grade mineral shows at one point. The adit at elevation 4,990 feet is 96.8 feet in length and follows a shear-zone striking south 72 degrees east directly across the floor of Driftwood Creek basin. The depth of this adit below the surface is only 25 feet. Stringers and patches of high-grade mineral are exposed in this working at several points, but material continuity is not exhibited. There is much evidence of oxidation. It is reported that originally the maximum width of quartz encountered was between 2½ and 3 feet. No work has been done in this adit, or in that on the west side of the creek, of any consequence, for many years.



Skookum and Elk Groups (formerly Silver King). Plan of principal workings.

The lowest or working adit at 4,960 feet elevation is for the first 254 feet of its length a crosscut. Its portal, immediately adjacent to the east bank of Driftwood Creek, is situated on the gently-sloping floor of the basin just below its head. Westerly and easterly drifts at the end of the crosscut are only about 50 feet below the surface. At points 125, 150, and 207 feet from the portal, the adit passed through small stringers of quartz contained in shear-zones, the last-mentioned stringer being 10 inches in width, and originally mineral was noted in it by the writer. After penetration the main shear-zone is followed westerly for 113 feet and easterly for 83.5 feet. When this adit was driven originally, it was reported that only for a length of about 35 feet in the drifts in the vicinity of the end of the crosscut was mineralization continuous. Elsewhere in both directions only scattered patches of mineral were found. From the region mentioned resulted the 7 tons of hand-sorted ore shipped in 1937, particulars of which have been previously given. At 28 feet along the westerly drift a diverging stringer of quartz was originally followed northward a distance of 15 feet, and a stringer of quartz trending parallel to the main shear-zone was encountered. Subsequently a shallow winze was sunk at this point, the results of which are not known as it is now filled with water. At 89 feet westerly from the crosscut another diverging stringer was followed northwards for 24 feet, and at this point a shear-zone containing high-grade mineral striking approximately parallel to the main shear-zone but dipping in the opposite direction was intersected, and is now being followed south-easterly by the present operator. The total width of this shear-zone is 3 feet.

Westerly driving on the main west drift discloses a shear-zone striking about north 71 degrees west and dipping north-east at from 54 to 65 degrees. The maximum width of the shear-zone is 5 feet. Originally the greatest width of the quartz-lens encountered near the crosscut to this shear-zone was reported as being 1.5 feet. East of the crosscut the strike of the shear-zone varies as shown on the plan. The face of the eastward drive shows a width of 6 feet of quartz and decomposed rock formation, and on the hanging-wall is a bunch of mineral. At 36 feet from the crosscut an intersecting shear-zone, intensely oxidized, was encountered and followed southerly for a distance of 23 feet. The highly-oxidized material in the face of this working showed material gold values upon assay.

There is much evidence of oxidation on this level, and the presence of native silver and native copper in the mineralization at various points is evidently due to the circulation of supergene solutions.

The present operator put a raise through at the point shown on the plan from this level to the upper adit. The distance on the dip from level to level proved to be 46 feet, and it is understood that continuous mineral was not encountered. From this working, and the parallel shear-zone mentioned on the lower level, resulted the ore shipped this year to the sampling plant at Prince Rupert, of which particulars have been previously given.

Assays of samples taken in underground workings are given on the accompanying plan.

Refer to Annual Reports, Minister of Mines, British Columbia, 1919 to 1931, inclusive; and Geological Survey, Canada, Summary Report, 1924, Part A.

Snowshoe Group.

This group consists of eight mineral claims owned by G. Raymond and P. Berg, of Smithers, and is at present under option to R. C. Mutch, A. Sjolin, and H. Stork, of Smithers. It is situated on the eastern slopes of Hudson Bay Mountain, about three-quarters of a mile south of Simpson Creek, and is distant about 5½ miles from Smithers. It is reached by a motor-road from Smithers, 1 mile in length, leading to A. Zobnic's ranch, situated on the west side of the Canadian National Railway, at the base of Hudson Bay Mountain. From the ranch the *Empire* pack-trail is followed for about 4 miles to a branch trail about half a mile in length, which leads to the cabin on the property at the northern end of the exposures, at 4,485 feet elevation.

The mineral-showings are on a well-timbered gentle slope which steepens sharply immediately above and below them. At the southern extremity of the showings an unnamed creek flowing north-easterly parallel to Simpson Creek has incised a rocky gorge, and the topography becomes rugged. In the vicinity of the gorge the formation is well exposed, and also outcrops at several points north of this, but is mainly obscured by a shallow mantle of glacial debris and vegetation in the region of the more northerly mineral exposures.

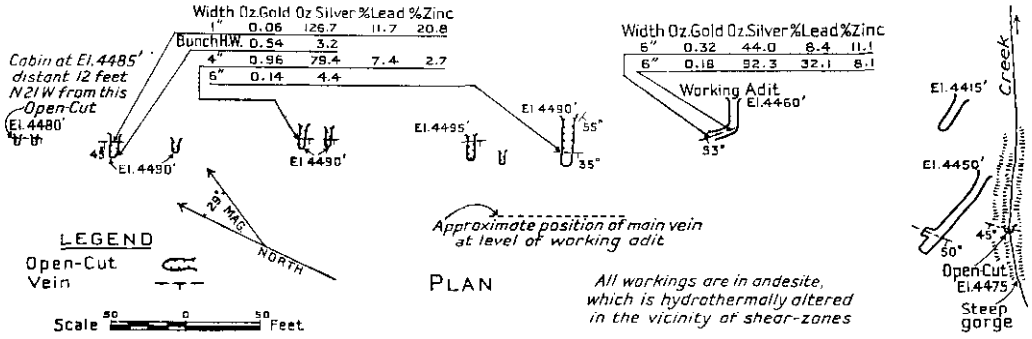
The formation consists of coarse-textured andesitic flow-rocks, dark green in colour, which strike from north to north 16 degrees west and dip east or north-east at steep angles. In the vicinity of the mineral-showings the formation is hydrothermally altered and bleached.

Narrow stringers of mineral of an observed maximum width of 6 inches occur in three shear-zones, of which two may be one and the same, of north-westerly strike and south-westerly dip. Mineralization consists of galena, sphalerite, tetrahedrite, arsenopyrite, pyrite, and quartz, but all these minerals are not present in each exposure. One shear-zone has been exposed for a distance of 370 feet along its strike and may continue much farther, possibly coinciding with a shear-zone exposed at a point 300 feet distant. The formation in the vicinity of the shear-zones is at most points hydrothermally altered and bleached and more or less pyritized. At some points the zone of silicification extends over a width of several feet, and the tendency to form replacement ore-bodies is marked. Although the stringers of mineral are narrow, the walls are free, and the mode of occurrence lends itself to selective mining methods. The product obtainable by such methods followed by hand-sorting is illustrated by a grab sample of a pile of about 3 tons of ore obtained by the optionees, which assayed: Gold, 0.16 oz. per ton; silver, 173.7 oz. per ton; copper, 0.1 per cent.; lead, 21 per cent.; zinc, 8.9 per cent. But little evidence has been obtained to date as to the continuity of the mineralization, as development to that end has only just been commenced.

The property was discovered in 1928 by the present owners, who subsequently carried out the development described herein.

One shear-zone, strike north 26 degrees west, dip 35 to 45 degrees south-westerly, is exposed by eight open-cuts, all between elevations of 4,480 and 4,490 feet, for a distance of 370 feet along its strike. Many of the open-cuts had caved at the time of examination, and mineral is not exposed in some, but the hanging-wall of the shear-zone is exposed by all save one, which is off the strike. Most open-cuts show alteration and silicification of the formation, with manganese-staining, and a certain amount of pyritization. This tendency to form replacement ore-bodies is most strongly in evidence at the southerly open-cut at 4,490 feet elevation. This open-cut is 25 feet in length, followed by an adit 8 feet long. It exposes a

zone of shearing striking north 26 degrees west and dipping 35 degrees south-westerly, and a small branch shear-zone, strike north 79 degrees east, dip 55 degrees south-easterly. In the main shear-zone is a width of 6 inches of quartz and arsenopyrite. On the foot-wall the formation is intensely silicified over a width of several feet, and there is a considerable amount of manganese-staining. There is every indication that this shear-zone continues strongly south-east of this point.



Snowshoe Group. Compass survey of workings—elevations approximate only.

Distant 129 feet south-easterly from the last-mentioned exposure, at 4,460 feet elevation, an adit penetrates a shear-zone strike north 41 degrees west, dip 50 degrees south-westerly at 22 feet, and follows it north-westerly for 9 feet. The total exposed length of the shear-zone at this point is 14 feet, and a stringer of mineral 6 inches in width consisting of galena, sphalerite, arsenopyrite, pyrite, and quartz is continuous for this distance. It is stated that mineralization was strongest at the point of intersection and seemed likely to increase in width in a downward direction, and a shallow winze, filled with water at the time of examination, was sunk in the north-west drift. It is, however, the intention of the optionees to continue the north-west drift in the hope that it will yield mineral that can be hand-sorted to shipping grade. Further, this shear-zone seems likely to intersect that first described in a region where there is strong evidence of a tendency to form a replacement ore-body. From this working the optionees obtained, in addition to the 3 tons of ore previously mentioned, about 1 ton of roughly-sorted mineral, a grab sample of which assayed: Gold, 0.10 oz. per ton; silver, 48.5 oz. per ton; lead, 9.3 per cent.; zinc, 17.3 per cent.

Distant about 280 feet in a southerly direction from the most southerly open-cut on the shear-zone first described, an adit is driven a distance of 66 feet in an almost due west direction. This adit is immediately adjacent to and on the north side of the gorge previously mentioned, and at 53 feet from the portal penetrates a shear-zone, strike north 11 degrees west, dip 50 to 55 degrees south-westerly, showing no material amount of mineral. This adit is at 4,450 feet elevation, and the shear-zone it penetrates is presumably the same as that exposed by an open-cut in the gorge, 40 feet distant from the portal at 4,475 feet elevation. This shear-zone is possibly the continuation of the first one described.

Distant 55 feet in a direction north 46 degrees east from the portal of the adit last described, another adit, at 4,415 feet elevation, preceded by an open-cut 13 feet in length, is driven a distance of 12 feet on a bearing north 71 degrees west. Nothing noteworthy is disclosed and its objective is not apparent.

Assays of samples taken from surface showings and underground workings are given on the accompanying plan.

Refer to Annual Reports, Minister of Mines, British Columbia, 1928 and 1929; also to Bulletin No. 3, 1932, "Lode-Gold Developments in British Columbia during 1932."

Glacier Gulch Group.

This group consists of thirteen claims owned by S. F. Campbell, Grover Loveless, and Wesley Banta, of Smithers. These claims embrace areas on both sides of Glacier Gulch, on the eastern slopes of Hudson Bay Mountain, but the showings described herein are those situated on the north side of the gulch, and are quite distinct from the auriferous tetradymite mineralization on the south side, on which effort has hitherto been mainly concentrated.

The property is reached by a motor-road 2 miles in length, which branches from the highway near Lake Kathlyn flag-station on the Canadian National Railway, and follows the south side of Glacier Gulch to the camp buildings situated on the floor of the gulch at 2,440 feet elevation. The distance from Smithers to the camp buildings is 6 miles. A foot-trail half a mile in length leads across the gulch from the camp and switchbacks up the steep north wall of the gulch to the mineral-showings.

Glacier Gulch, trending north-easterly, is an outstanding topographic feature of Hudson Bay Mountain, constituting a long and deep gash which affords a clear insight into the geology. As the head of the gulch is approached, the width narrows to about 500 feet, the walls steepen, and become precipitous, and the gulch is abruptly terminated at its head by a rock wall, which rises almost vertically to a height of 500 feet, and is capped by Lake Kathlyn Glacier. Twin waterfalls cascade down on each side of this rock wall, uniting at the bottom to form Glacier Creek. The walls of the gulch and the benches on its floor are well timbered, and the whole setting is one of great natural beauty, constituting one of the scenic spots of the neighbourhood.

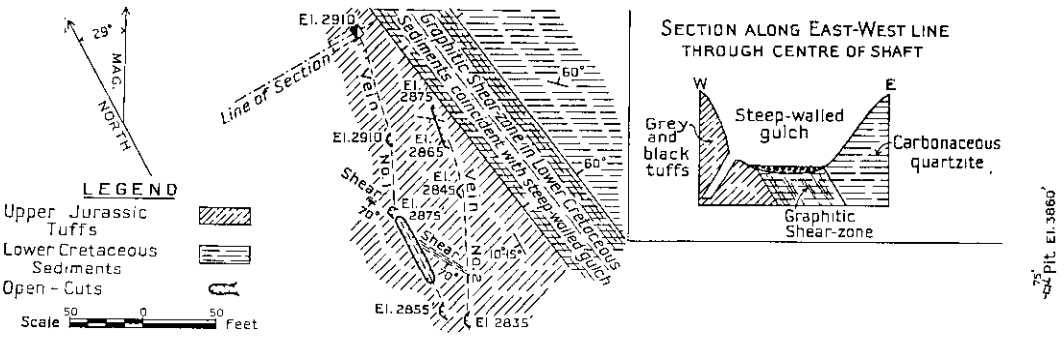
Glacier Gulch is incised in two separate formations, the ages of which have been determined by the Geological Survey of Canada. In the lower part of the gulch are exposed the carbonaceous quartzites and argillites of the Skeena formation of Lower Cretaceous age, which contain seams of anthracite coal. In the upper part of the gulch are exposed tuffs and flows of the Hazelton formation of Upper Jurassic age. The unconformable contact between these two formations is clearly exposed on the north side of the gulch, and it is in the immediate vicinity of this contact, in tuffs of the Hazelton formation, that the mineral-showings here described occur.

The mineral-showings are exposed on precipitous slopes which form the western wall of a steep gulch tributary to Glacier Gulch. This tributary gulch follows the course of a wide zone of shearing in the Lower Cretaceous sediments immediately adjacent to the contact described. The contact trends north 11 degrees west and dips north-easterly at 60 degrees. The Lower Cretaceous sediments strike north 46 degrees west and dip 60 degrees north-east. The tuffs, which are dark grey to black in colour and comparatively thinly bedded, strike north and dip west at from 10 to 15 degrees. The mineral-showings consist of two silicified replacement fracture-zones comparatively close together, known as "No. 1 and No. 2 veins." "No. 1" vein is the more important and strikes from north to somewhat east of north, with a dip to the west varying from 57 to 75 degrees. Mineralization is somewhat irregular, and although chiefly confined to the main fracture on the hanging-wall, 18 inches in width, also extends into the foot-wall in the form of narrow bands occupying jointing, bedding-planes, and cracks in the silicified formation. The greatest observed width of this type of mineralization is 8 feet. The walls are in part frozen. Mineralization consists of a close association of sphalerite, arsenopyrite, pyrrhotite, pyrite, and a certain amount of galena and tetrahedrite, but all these minerals are not present in all exposures. Sampling indicated that somewhat pronounced gold values are associated with the arsenopyrite. "No. 2 vein," strike north 46 degrees west, dip 30 degrees south-west, has a maximum observed width of 2 feet. At the chief exposure the mineralization is mainly sphalerite, accompanied at some points by pyrrhotite and hornblende, indicative of high-temperature conditions at the time of formation.

After discovery by the owners, much open-cutting and surface prospecting was carried out by them during the years 1926 and 1927. In 1928 an option on the property was acquired by F. H. Taylor, who, after sinking a shaft in "No. 1 vein" to a stated depth of 35 feet, relinquished the option. Work was then resumed by the owners, who by hand-sorting the dump from the shaft mentioned accumulated upwards of 10 tons of zinckiferous vein-matter. Following the discovery by the owners of the tetradymite mineralization on the south side of Glacier Gulch, their attention was diverted to the latter for some years, and it was not until the present year that their interest was revived in the showings herein described. This year they commenced mining in open-cuts on both "veins" at the north end of the exposures, aiming to secure a minimum car-lot of 25 tons of zinc ore, which to be saleable as such must contain a zinc content of at least 30 per cent.

Owing to the precipitous nature of the region at some points, only the approximate horizontal ranges covered by open-cutting can be given, and continuity within the ranges stated, although quite possible, cannot be regarded as having been definitely established.

"No. 1 vein" is exposed by the open-cuts shown on the plan and by natural agencies over a horizontal distance of about 225 feet and over a vertical range of about 65 feet. The most northerly point of open-cutting, where mineralization is heaviest and where mining was going forward at the time of examination, is immediately south and adjoining the collar of the shaft at 2,910 feet elevation. A fairly compact band of mineral of the kind described, 18 inches in width, striking here approximately north and south, just above the shaft dips at 75 degrees to the west, flattens to 57 degrees at the level of the collar of the shaft, and splits into a number of smaller bands both north and south of the shaft. Quartz accompanies the mineralization and the formation between the individual bands is much silicified. The greatest width of an individual band in this zone of fracturing and replacement is 9 inches, but most are from 2 to 3 inches in width. The maximum width of the zone is 8 feet. All remaining open-cuts on this "vein" are situated south of this and their position is shown on the plan. None have received any attention for several years and have sloughed in, but all expose bands of mineral. One, 50 feet in length, exposes the "vein" for this distance, and as far as could be determined mineralization is continuous, although varying in width. At the lower end of this open-cut a band 12 inches in width consists of chiefly arsenopyrite and sphalerite, and a sample across this width assayed: Gold, 0.32 oz. per ton; silver, 0.4 oz. per ton. At the upper end a band 10 inches in width assayed: Gold, 0.31 oz. per ton; silver, 0.2 oz. per ton. This latter band consisted of arsenopyrite and pyrrhotite.



Glacier Gulch Group. Plan and section of workings on north side of Glacier Gulch.

"No. 2 vein" is exposed by the open-cuts shown on the plan over a horizontal distance of about 175 feet and vertical range of 40 feet. The chief open-cut, at 2,875 feet elevation, is the most northerly, and from it mineral was being mined at the time of examination. This open-cut, which is only 70 feet distant from the shaft on "No. 1 vein," is 28 feet in length, and the mineralized fracture varies from 18 inches to 2 feet in width, with frozen walls. Mineralization reaches a maximum width of 12 inches, and consists largely of sphalerite for a length of 20 feet. At some points this mineral is accompanied by hornblende and pyrrhotite. For the remaining length of the open-cut mineralization is sparse and quartzose. A sample of selected mineral from this open-cut, representing the product that was being mined and sacked, assayed: Gold, 0.10 oz. per ton; silver, 1 oz. per ton; lead, *nil;* zinc, 48.8 per cent. A sample of pyrrhotite and hornblende assayed: Gold, 0.03 oz. per ton; silver, trace. Distant 30 feet in a south-westerly direction, an open-cut at 2,845 feet elevation exposes a band of sphalerite a few inches in width. Between this point and the remaining open-cuts the region is precipitous and inaccessible. The most southerly open-cut at 2,835 feet elevation exposes a width of 8 inches of mineralization containing some galena, and assaying: Gold, trace; silver, 18 oz. per ton; lead, 3.7 per cent.; zinc, 11.2 per cent.

The only underground working is the shaft previously mentioned as having been sunk in "No. 1 vein" to a stated depth of 35 feet. At the time of recent examination it was, however, filled with water to within 12½ feet of the collar. It was examined by the writer in 1928 to a depth of 23 feet, but not subsequently. It is sunk at the point of heaviest mineralization. Originally at this point a band of associated sphalerite, galena, tetrahedrite, arsenopyrite, pyrrhotite, pyrite, and quartz 18 inches in width was exposed. A sample taken in 1928 across this width assayed: Gold, 0.04 oz. per ton; silver, 179 oz. per ton; copper, 0.3 per cent.; lead, 12.6 per cent.; zinc, 16.8 per cent. This band narrowed in depth and at 23 feet

a width of 9 inches only of mineral was exposed. This consisted almost entirely of pyrrhotite, and a sample of it assayed: Gold, 0.06 oz. per ton; silver, 0.6 oz. per ton. At this point, however, is was doubtful if the walls of the fracture were fully exposed. At a depth of 12.5 feet a drift has been advanced to a point 11 feet north of the centre of the shaft, and a width of 18 inches of associated arsenopyrite, pyrrhotite, pyrite, sphalerite, galena, and quartz is continuous in the drift and also is exposed in the shaft. A sample across 18 inches in the face of the drift assayed: Gold, 0.20 oz. per ton; silver, 6.8 oz. per ton; lead, 2 per cent.; zinc, 5.4 per cent. A sample of arsenopyrite only near the shaft assayed: Gold, 1.05 oz. per ton; silver, 5.6 oz. per ton. Another sample of pyrrhotite only at this point assayed: Gold, 0.26 oz. per ton; silver, 0.6 oz. per ton.

There is reason to believe that the mineralization in the tuffs is younger than the Lower Cretaceous sediments, in view of the alteration of the coal-seams to anthracite, and also because of the presence of pyrrhotite in the form of nodules in one coal-seam. The question therefore arises, if the carbonaceous sediments have influenced precipitation of sulphides at the point of actual contact with the tuffs, "No. 1 vein" can be traced on the surface to a point 35 feet north of the shaft, and a little further prospecting might yield further information on this point.

At the time of recent examination the owners were, as mentioned, engaged in mining on the surface immediately south of the shaft in "No. 1 vein" and in the most northerly open-cut on "No. 2 vein," and cobbing out a highly-zinckiferous product, aiming to reach the minimum zinc content of 30 per cent. necessary to constitute saleable zinc ore. Galena was included in sorting, but arsenopyrite and pyrrhotite were rejected with the waste. There was on hand an estimated weight of 15 tons contained in 265 sacks which had been sewn. A grab sample obtained from fourteen sacks selected at random assayed: Gold, 0.14 oz. per ton; silver, 20.2 oz. per ton; lead, 1 per cent.; zinc, 26.3 per cent. It is not, of course, suggested that this grab sample is necessarily a fair sample of the sacked material.

The owners contemplate erecting a small aerial tramway to deliver this sacked product to a point at the end of the motor-road to the property.

Refer to the Annual Reports, Minister of Mines, British Columbia, 1926 to 1929, inclusive.

Topley Area.

Much painstaking work has been accomplished by a few prospectors during recent years, in face of considerable difficulty, resulting in new discoveries of mineral and affording much additional and useful information.

From recent examinations it is evident that fracturing is more widespread in the area than was formerly supposed, and although the mantle of glacial debris and vegetation impedes prospecting, experience has taught the well-informed just where to search with the greatest likelihood of success.

The type of deposit exemplified at several properties recently examined and now under operation by individuals is that of mineralized lenticular quartz veins occurring mainly on the foot-wall of shear-zones in andesitic breccias and porphyries. The filling of the shear-zones, in addition to the quartz veins, consists of pyritized, bleached, and sheared formation. The evidence of replacement mineralization is persistent and suggests that at some points commercial mineralization of considerable width may be found. The width of the quartz veins varies from a few inches to several feet. In some cases the veins are heavily mineralized; in other cases only sparsely so. The mineralization consists of sphalerite, galena, chalcopyrite, pyrite, tetrahedrite, and specularite, although all these minerals are not always present together.

The association of minerals is intimate. Silver values in some cases are high; gold values are usually present to some extent, but rarely pronounced. Most veins contain some rhodochrosite, the oxidation of which results in the characteristic bluish-black staining of manganese dioxide, which is most prevalent on the foot-wall of the shear-zones. Post-mineral movement has left vein-walls for the most part free, a feature which facilitates selective mining. Although no great continuity of commercial mineralization has yet been proved, it is to be borne in mind that only a relatively small amount of development has taken place as yet. It seems possible that mineralization in this area may be genetically associated with concealed satellites of the Central batholith.

The fact that this area in which activities centre is only about 7 miles from Topley Station, and is well served with motor-roads, encourages the hope that the construction of the sampling plant at Prince Rupert may induce prospectors to persist in their efforts to uncover mineral of shipping grade. The necessity of close hand-sorting is, however, apparent; likewise that of frequent sampling of any discoveries, as silver values vary quite widely at different points.

Detailed information as to the geology of the area is given in Geological Survey, Canada, Summary Report, 1928, Part A, pages 50 to 77.

Golden Eagle Group.

This group, owned by D. Heenan, of Topley, and the estate of the late C. Matheson, is at present under option to B. McCrea, of Topley. The group consisted originally of five claims, but it is understood that *No. One* claim has now been permitted to lapse. The claims were surveyed in 1928 but have not been Crown-granted. The property is reached by a branch motor-road from the Topley–Babine Lake Road, the distance from Topley being about 7 miles.

Owing to the fact that the many open-cuts and shallow shafts at this property rapidly fill with seepage-water, due to the flat topography, only a very few were open to examination this year. This report is consequently compiled largely from previous knowledge of the property, supplemented by a pace and compass survey made to correlate the various exposures. It is to be noted further that examination rendered evident that the shipments noted below have seriously depleted formerly-existing surface showings. Additional mineral can only be disclosed by continuation of surface prospecting or underground development. It is considered that intelligent development is warranted.

The property lies south of Finlay Creek between Huckleberry (formerly named "McCrea") and Tachek (formerly named "Black") Mountains at an elevation of about 3,900 feet. The ground is comparatively flat, sloping gently toward Finlay Creek. Elevations within the area embracing the more important showings and underground workings differ by a few feet only.

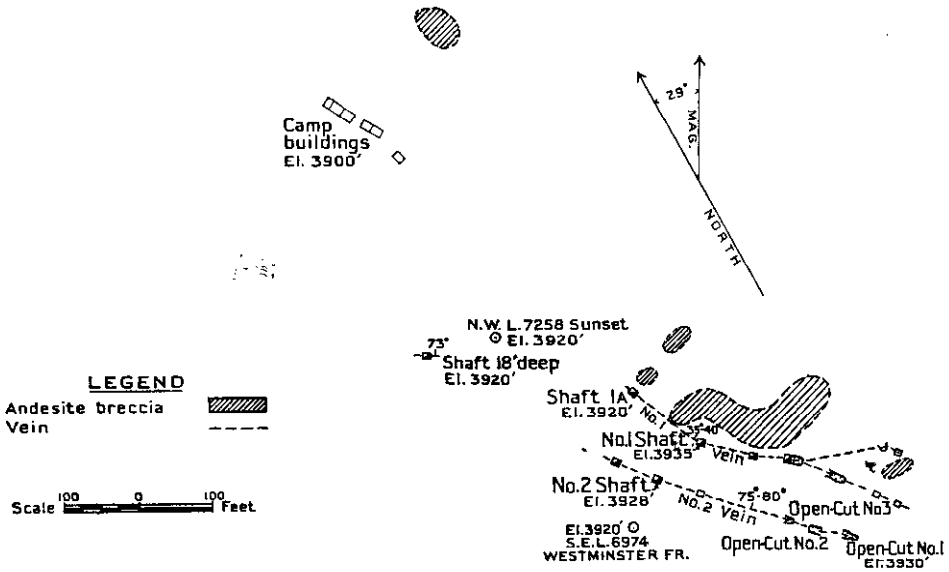
Save for occasional outcrops, the formation is obscured by glacial drift and vegetation, which renders tracing of veins on the surface laborious. This objective is further impeded by inflow of seepage-water in all excavations. Finlay Creek has incised a rocky gorge in the plateau and well exposes the formation underlying the region. This consists mainly of andesitic breccia, which also outcrops near the workings. To the north-west just without the confines of the property, the ground falls away sharply to Finlay Creek, which has incised a valley about 150 feet deep. This is of importance, inasmuch as, should developments at any time warrant such, a site for an adit could readily be found, as Finlay Creek in this region is 370 feet lower in elevation than the area containing the chief surface showings and underground workings. An extensive bush fire passed through the Topley area about fifteen years ago, and it is covered with standing dead timber, windfalls, and second-growth timber.

There are two more or less parallel shear-zones, about 70 feet apart, and one intersecting shear-zone, exposed within a flat area in size 350 by 130 feet, which lies at an elevation of approximately 3,930 feet. Distant about 325 feet in a north-westerly direction from the area mentioned, a shaft 18 feet deep exposes another shear-zone which may be the north-westerly continuation of the more southerly of those mentioned. Distant 815 feet north-westerly from the 18-foot shaft, a pit exposes a shear-zone. It seems quite possible that further prospecting may disclose the existence of additional shear-zones.

These shear-zones occur in andesitic breccia; are from 2 to 5 feet in width, strike north-westerly, and dip north-easterly at from 30 to 75 degrees. On the foot-walls of the shear-zones occur lenticular quartz veins varying in width from a few inches to 18 inches. These veins are at some points heavily mineralized; at others sparingly so. The mineralization consists of sphalerite, galena, chalcopyrite, pyrite, and freibergite, and contains high silver values (the highest of any property in this area) and appreciable gold values. A certain amount of rhodochrosite is present in the veins, and the oxidation of this mineral results in the characteristic bluish-black staining due to manganese dioxide and most prevalent on the foot-wall of the shear-zones. Owing to post-mineral movement, the walls of the quartz veins are for the most part free, a feature which facilitates selective mining. The remaining width of the shear-zones is occupied by pyritized, bleached, and sheared formation. In the latter veinlets of mineral frequently occur. Although so far commercial ore has been

confined to the lenticular quartz veins, a marked *tendency* is exhibited to form replacement ore-bodies, a feature also shown at neighbouring properties, which encourages the hope that such may be found.

The property was discovered by D. Heenan and the late G. Matheson in 1927. In 1928 a shipment of 2 tons was made which contained 291 oz. silver and 259 lb. lead, and the property was optioned by Topley Silver, Limited. At this time the existence of only one shear-zone was known, and the company, after sinking a shaft to a depth of 140 feet and carrying out some diamond-drilling, which apparently proved disappointing, relinquished its option in 1929. The owners continued surface prospecting and very shortly discovered another and more promising shear-zone south of that previously investigated, and about 70 feet distant. In 1932 an option on the property was taken by T. D. Picard, and payments due under this option were made, although no material amount of work was carried out by the optionee, who subsequently relinquished the option. Prospecting was continued by the owners, and in 1934 a shipment of 17 dry tons was made, assaying as per smelter returns:



Golden Eagle Group. Pace and compass survey of workings. Elevations approximate only.

Gold, 0.135 oz. per ton; silver, 199.2 oz. per ton; lead (wet), 17.7 per cent.; zinc, 11 per cent. During the present year an option was obtained by B. McCrea, of Topley, and at the time of examination two men were employed in unwatering and cleaning out certain of the more important shafts and open-cuts with a view to facilitate examination.

The surface showings are exposed by open-cuts on the shear-zones previously described. The strike of the parallel shear-zones is north-westerly. The more northerly, known as "No. 1 vein," has a dip of 35 to 40 degrees north-easterly, and the more southerly, known as "No. 2 vein," dips about 75 degrees north-easterly. Most of the open-cuts and pits on these parallel shear-zones originally exposed stringers of high-grade mineral consisting of an association of sphalerite, galena, chalcopyrite, pyrite, and freibergite, varying in width from an inch or two up to 18 inches, but, as mentioned, shipments therefrom greatly impoverished them. The following samples taken in 1929 illustrate the character of mineral originally present: From open-cut No. 1 a sample across 9 inches assayed: Gold, 0.20 oz. per ton; silver, 374 oz. per ton; lead, 10 per cent.; copper, 1.8 per cent.; zinc, 30 per cent. From open-cut No. 2 a sample across 18 inches assayed: Gold, 0.14 oz. per ton; silver, 288 oz. per ton; copper, 1.2 per cent.; lead, 25 per cent.; antimony, 0.5 per cent. From open-cut No. 3 a sample of selected ore from the dump assayed: Gold, 0.08 oz. per ton; silver, 212 oz. per ton; lead, 22.2 per cent.; zinc, 9.2 per cent. Mineralization was stronger in "No. 2 vein" than in "No. 1 vein."

The more northerly, or "No. 1 vein," is developed by two shafts, now filled with water, 114 feet apart. Of these, No. 1 shaft follows the "vein" downward, it is stated, for a

distance of 140 feet, but it has not been examined by the writer below a depth of 75 feet. When examined at this point in 1928, a stringer of quartz, 1 foot in width, was well mineralized with galena, sphalerite, pyrite, and some tetrahedrite. Distant 114 feet on a bearing north 24 degrees west from No. 1 shaft, a shaft marked 1A on sketch is sunk to a stated depth of 35 feet, and from this shaft was obtained, it is stated, the shipment made in 1928 consisting of 2 tons previously mentioned. This shaft has never been examined by the writer. The elevation of No. 1 shaft is 3,935 feet; that of No. 1A shaft 3,920 feet. Distant 79 feet on a bearing south 21 degrees west of No. 1 shaft is No. 2 shaft, the elevation of which is 3,928 feet. This was filled with water at the time of recent examination, but it is stated that it is sunk to a depth of 50 feet. It has not been examined by the writer below a depth of 21 feet. Up to this point the shaft followed a quartz vein dipping north-east at 70 degrees. At a depth of 21 feet the total width of the shear-zone was 5.2 feet, of which a width of 6 inches on the foot-wall consisted of the mineralization characteristic of this property; the remainder consisted of quartz and sheared formation. It is stated that the ore shipped in 1934 was derived mainly from this shaft and that appearances at the bottom were promising. At the time of examination this year, B. McCrea was about to unwater this shaft.

Distant 350 feet in a north-westerly direction from No. 2 shaft, at elevation 3,920 feet, a shaft 18½ feet deep, of which the first 15 feet were sunk in boulder-clay, had been unwatered and was open to examination this year. There is exposed at the bottom a shear-zone, strike north 64 degrees west, dip 73 degrees north-east. On the foot-wall is a band of quartz 9 inches in width, a sample of which assayed: Gold, trace; silver, 1 oz. per ton; lead, *nil;* zinc, 7.3 per cent.

Distant 815 feet on a bearing north 23 degrees west from the last-mentioned shaft, and about 60 feet lower in elevation, a pit 8 feet long by 4 feet wide by 4 feet deep exposes a shear-zone, strike north 41 degrees west, dip 75 degrees north-east. On the foot-wall is a small stringer of slightly-mineralized quartz a few inches in width. The filling in the vicinity of the foot-wall is heavily stained with manganese dioxide.

In 1929 eight diamond-drill holes were put down by Topley Silver, Limited, to intercept the downward continuation of "No. 1 vein" in the region between No. 1 and No. 1A shafts. At this time the existence of "No. 2 vein" was unknown and the holes were not continued sufficiently far to penetrate it. The results of this diamond-drilling were apparently considered disappointing, as the option on the property was subsequently relinquished. "No. 2 vein" proved distinctly better on the surface than "No. 1 vein," and there seems justification for continuing No. 2 shaft another 50 feet, and following the "vein" south-eastward at this depth under the fine showings of ore originally exposed in open-cuts Nos. 1, 2, and 3.

Refer to the Annual Reports, Minister of Mines, British Columbia, 1927 to 1932, inclusive, and 1934; also to Geological Survey, Canada, Summary Report, 1928, Part A, pages 56 to 77; and to Geological Survey, Canada, Paper 36–20, 1936, pages 152 and 153.

Topley and Richfield Groups.

These groups consist of a number of claims owned by L. B. Warner and A. Chisholm, of Smithers, and R. W. Innes, of Topley, and comprise a restaking of ground formerly held by Topley Richfield Mining Company, Limited. These groups cover the former *Reno, Gold Tip, Last Chance, Victor, Elm, North Star, Red Top, Silver Tip, Dubby, Topley, Smokey, Frances,* and *Viola* mineral claims. This report relates only to new discoveries of the present owners, as the earlier operations are described in publications cited below. The property is connected with Topley Station by a motor-road about 8 miles in length.

The claims are situated on the rolling Nechako Plateau, which is broken by many draws. The area is overlain by glacial drift and covered with dead standing timber, windfalls, and second-growth timber. Outcrops of the prevailing formation, which consists of fragmental volcanics, are infrequent.

The new discovery, situated about 1,000 feet easterly from the original workings, consists of a shear-zone about 5 feet in width, in andesitic breccia, striking from north to north-east and dipping 45 degrees easterly. The extent of this shear-zone along its strike is possibly considerable, as a shear-zone exposed some 300 feet south-west may be the same. The swampy nature of the region in the line of strike renders tracing on the surface difficult. Within the shear-zone is a well-mineralized, lenticular quartz vein having a maximum

observed width of 2 feet. Mineralization consists of sphalerite, galena, chalcopyrite, and pyrite in somewhat intimate association, and contains noteworthy gold values.

The property was originally discovered by the late F. H. Taylor in 1926, optioned in that year by the Standard Silver Lead Mining Company, Limited, which company relinquished its option in 1927. The same year the property was acquired by Topley Richfield Mining Company, Limited, and extensive operations were carried out by this company in 1928 and 1929. This company finally suspended operations in the autumn of 1929, and subsequently allowed its holdings to lapse, when they were restaked by the present owners. By painstaking prospecting, R. W. Innes subsequently discovered east of the earlier workings a shear-zone containing noteworthy gold values, which is now under development.

At a point distant about 1,000 feet easterly from the original workings, at 3,860 feet elevation, the shear-zone was exposed by open-cut, and at this point a shaft is sunk following the pitch of the vein to a depth of 35 feet. The mineralization proving better on the south than on the north side of the shaft, a drift was run southward at the bottom a distance of 25 feet. At this point a fault, striking north 79 degrees west and dipping 85 degrees north-easterly, was disclosed. The formation at this point is bent westwards, indicating movement in this direction. The horizontal striations indicate slight movement only. When the fault was encountered it was first followed south-eastwards a distance of 24 feet, and at this point the working was deflected from the fault for a distance of 15 feet on a bearing north 71 degrees east. The fault was then followed a distance of 33 feet north-westerly from the point at which it was first encountered. Subsequently, a quartz-band, strike south-westerly, dip south-easterly, occuring within the fault where the latter was first encountered, was followed south-westerly a distance of 25 feet. Well-mineralized quartz 15 inches in width was encountered immediately beyond the fault, a sample across this width assaying: Gold, 0.46 oz. per ton; silver, 10 oz. per ton; copper, 1 per cent.; lead, *nil;* zinc, 2.8 per cent. Although the mineralization becomes weaker along this working, there is no doubt that the south-westerly working follows the recovered part of the vein south of the faulting, which is incipient only and has merely bent the vein without actual dislocation. The continuation of this south-west drive seems warranted, as it is known, from surface prospecting south-west of this point, that continuation of the shear-zone in this direction is likely. A sample taken in a drift at a point 12 feet south of the shaft across a width of 21 inches assayed: Gold, 0.10 oz. per ton; silver, 6.4 oz. per ton; copper, 0.8 per cent.; lead, trace; zinc, 3.9 per cent.

From the shaft and workings therefrom there has been accumulated a dump of vein material consisting of sphalerite, galena, pyrite, and chalcopyrite in a quartz gangue. This was sampled in two parts as one part was obviously better than the other. The better part has a volume of approximately 219 cubic feet and an estimated weight of approximately 15 tons. A grab sample of it assayed: Gold, 0.16 oz. per ton; silver, 16 oz. per ton; copper, 1.8 per cent.; lead, *nil;* zinc, 5.2 per cent. A sample of selected mineral from this part of the dump assayed: Gold, 0.46 oz. per ton; silver, 28 oz. per ton; copper, 3 per cent.; lead, 3.1 per cent.; zinc, 10.7 per cent. The remaining part of this dump has a volume of approximately 515 cubic feet and an estimated weight of approximately 32 tons. A grab sample of it assayed: Gold, 0.22 oz. per ton; silver, 9 oz. per ton; copper, 1.5 per cent.; lead, *nil;* zinc, 3.6 per cent. A sample of selected material from this part of the dump assayed: Gold, 0.26 oz. per ton; silver, 9 oz. per ton; copper, 4.8 per cent.; lead, *nil;* zinc, 11.2 per cent. Both parts of this dump could be cobbed to better grade, although the association of quartz and sulphides is somewhat intimate. The motor-road from Topley extends to the collar of the shaft.

Refer to Annual Reports, Minister of Mines, British Columbia, 1926 to 1929, inclusive; also to Bulletin No. 1, 1929, "Summary of Mining Operations for Six Months ended June 30th"; and to Geological Survey, Canada, Summary Report, 1928, Part A, pages 71 to 74; also Geological Survey, Canada, 1936, Paper 36–20, page 154.

Gold (formerly Cup) Group.

This group consists of sixteen claims owned by L. H. Kenney, Alex. Chisholm, and F. Simonds, of Smithers, and Matthew Sam, of Topley, and is a restaking of the *Cup* group, covering the area formerly occupied by the *George, Cup, Maple Fraction, Trunk, Hat, Dog,* and *Sam* mineral claims, and certain additional ground. The property is situated mainly on the left bank of Finlay

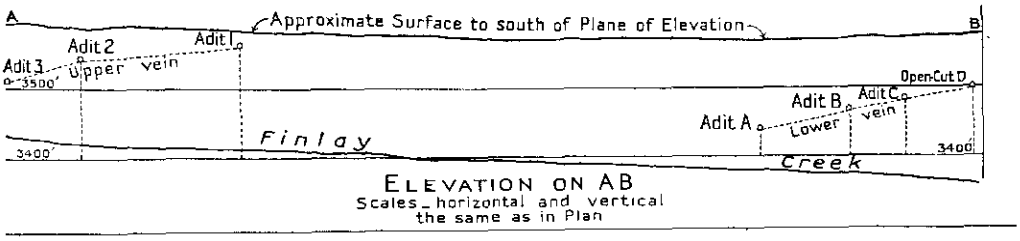
Creek, and a branch motor-road 3 miles in length from the Topley–Babine Lake Road leads to a cabin at the edge of the south rim of the valley at 3,575 feet elevation. The distance from Topley Station is about 7 miles.

The surface showings and underground workings lie at elevations of between 3,345 and 3,560 feet, and are all situated south of Finlay Creek within the steep-walled valley incised by this creek to a depth of about 150 feet in the broken Nechako Plateau. The creek occupies a rocky gorge with vertical walls from a few feet to 50 feet in height, from the top of which the valley-rims rise more gradually. In the central part of the property a large steep-sided rock knoll rises sharply from the left bank of the creek, and between this knoll and the south slope of the valley is a wide and deep crescent-shaped gulch, which marks the course of a former channel of Finlay Creek. The lower part of this gulch is now occupied by a small unnamed creek. In the gorge of Finlay Creek and on the rock knoll mentioned, the formation, consisting of andesitic breccia, is well exposed and also outcrops at lower points on the south slope of the valley, but elsewhere is largely obscured by glacial debris. The area is covered with dead standing timber, windfalls, and second-growth timber. Save for occasional rock bluffs and individual mountain-masses, the formation is similarly veiled on the Nechako Plateau, over which extensive bush fires swept about 15 years ago.

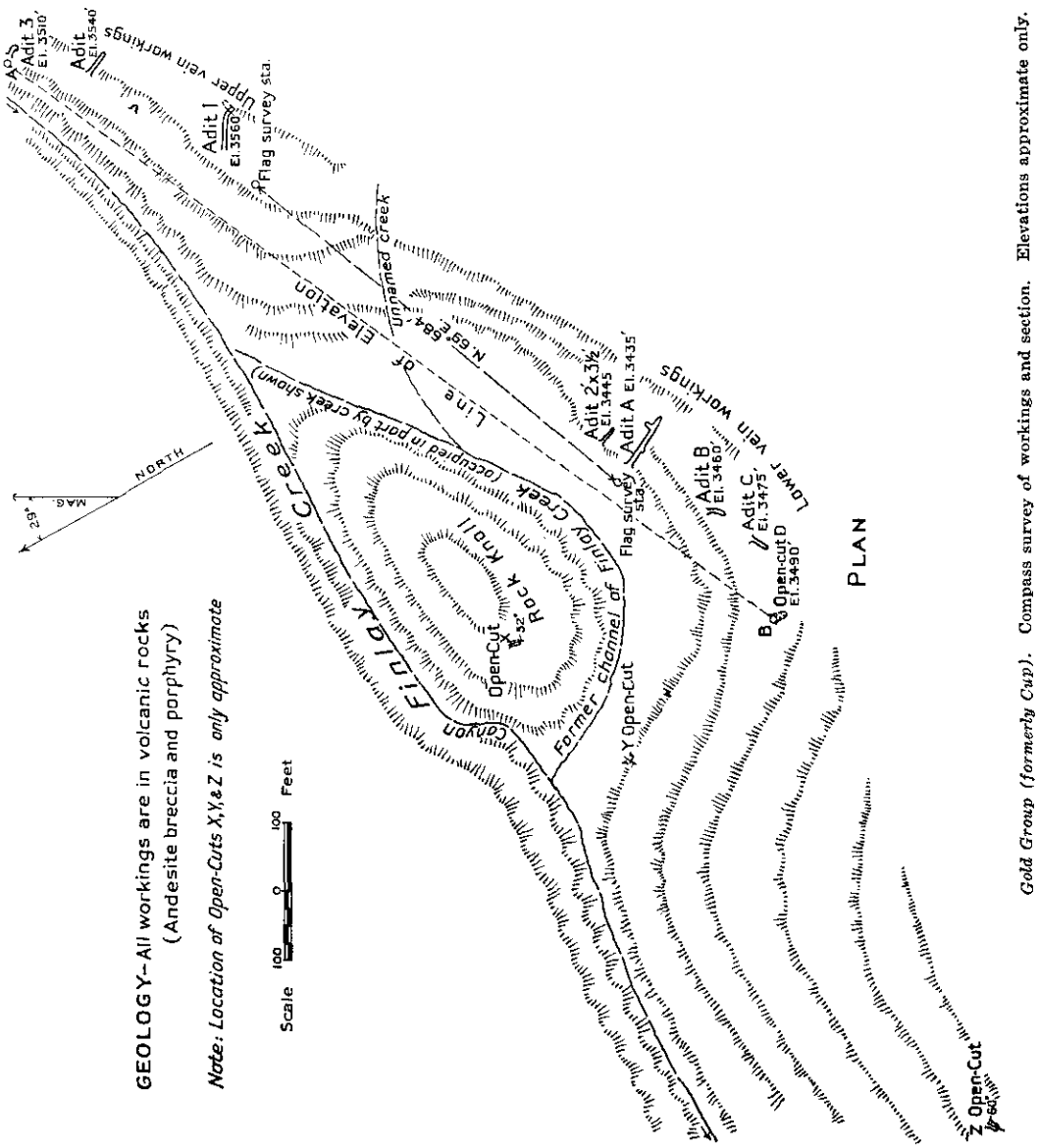
Of chief importance are two approximately parallel flat-dipping quartz veins, about 125 feet apart in elevation and 685 feet apart horizontally. Vein-exposures mainly vary in width from about 3 feet to a maximum of 6 feet, but a few are under 1 foot in width. These veins are exposed in intermittent outcrop along their dips on the steep south slope of the valley. They strike mainly south-easterly and dip north-easterly at low angles up to a maximum of 30 degrees. Being flat-dipping, warped, tabular deposits, their strike and dip vary locally. Exposures in the case of each vein are intermittent and the regions between outcrops being obscured by glacial drift or talus, it is consequently possible that the occurrence is that of two approximately parallel series of quartz-lenses *en echelon*, rather than of two continuous veins. Four additional veins are exposed by open-cuts. Of these, one small steeply-dipping vein with south-easterly strike may intersect the upper of the two flat-dipping veins. The remaining three veins strike north-easterly, are exposed by open-cuts, and are referred to in the text and plan as X, Y, and Z. Still another vein is stated to occur in the western part of the property and to be exposed by an adit now caved. In the case of all exposures the host-rock is andesite breccia or andesite porphyry. The vein-walls are free, due to post-mineral movement. Near the walls the formation is pyritized and bleached and contains locally veinlets of mineral. Most exposures show some manganese-staining. Mineralization consists of sphalerite, galena, and some specularite and malachite, but all these minerals are not present in every exposure. All, save the upper and lower flat-dipping veins, are exposed at one point only. The mineralization described is present in both the flat-dipping veins. In the lower of these a noteworthy amount of tetrahedrite is present, but it is not the silver-rich variety of this mineral (freibergite) apparently. Occasional samples of the upper vein indicate the presence of freibergite, and this mineral is also present in the small intersecting vein in the vicinity. In the case of both the flat-dipping quartz veins, the silver ratio (that is, the ounces of silver per unit of base metal) is low, under 0.5. In the case of the upper vein, however, some of the pyrite carries noteworthy amounts of gold. Average gold contents of hand-sorted ore vary from 0.02 oz. per ton in the case of the lower vein to 0.04 oz. per ton in the case of the upper vein. Mineralization in the lower vein is comparatively heavy at the present point of investigation in the branch from adit A. In the upper vein, mineralization is good at two points—namely, in adits 1 and 3.

The property was discovered by Matthew Sam, one of the present owners, and optioned by F. B. Chettleburgh in 1924. This option was subsequently relinquished, and in 1927 an option was acquired by Topley Consolidated Mining and Development Company, Limited, and relinquished by this company after it had carried out a certain amount of underground work. The owner then continued painstaking prospecting, making additional discoveries, and in 1934 the property was optioned by B. McCrea, but was apparently allowed to lapse in 1935, when it was restaked by the present owners, who have since done a considerable amount of underground development and made new discoveries of mineralization.

To facilitate reference, numbers or letters have been assigned to the various workings by the writer. In the case of the flat-dipping quartz veins the surface showings consist of intermittent, short parts of vein-outcrops, the continuation of which is entirely obscured by glacial debris, talus, or vegetation. At each surface exposure of these veins an adit has been driven following the veins into the valley-slope.



ELEVATION ON AB
Scales horizontal and vertical the same as in Plan



GEOLOGY—All workings are in volcanic rocks (Andesite breccia and porphyry)

Note: Location of Open-Cuts X, Y, & Z is only approximate

Gold Group (formerly Cup). Compass survey of workings and section. Elevations approximate only.

Upper Flat-dipping Vein.—In the eastern part of the property, just below the top of the valley-rim at 3,560 feet elevation, a timbered open-cut 40 feet in length, followed by an adit 10 feet in length, is driven on a bearing south 58 degrees east. This working is referred to as adit 1. It is stated by the owners that at the end of this adit a winze is sunk following the vein downwards for a dip of 30 feet. At the time of recent examination, however, this adit was obstructed by ice and the winze was full of water. It is known from examination in 1934 that open-cutting at this point exposed a quartz vein 6 feet in width in which were contained two bands of mineral, each 1.5 feet in width. A sample of selected mineral taken from these bands in 1934 assayed: Gold, 0.04 oz. per ton; silver, 4 oz. per ton; copper, 1.5 per cent.; lead, 7 per cent.; zinc, 17.5 per cent. The owners state that good mineralization was encountered subsequently in this adit and in the winze. From this adit and winze there resulted the dumps at the portal of the adit, of which a full description is given later in this report.

Distant 140 feet from adit 1 in a direction north 53 degrees east at 3,550 feet elevation, an open-cut exposes 3 inches of quartz on the hanging-wall of a shear-zone striking south 11 degrees east and dipping 75 degrees south-westerly. A sample taken of this vein in 1928 across 3 inches contained freibergite and assayed: Gold, 0.06 oz. per ton; silver, 246 oz. per ton; copper, 2.8 per cent.

Distant 225 feet from adit 1 in a direction north 56 degrees east at 3,540 feet elevation is adit 2. This adit is driven south 21 degrees east for 39 feet on a sparsely-mineralized quartz vein. The vein is 3 feet wide at the portal and dips north-east at a low angle. The strike is somewhat east of the bearing of the adit. Due to a fold, the vein disappears in the floor of the adit near the face.

Distant 115 feet in a direction north 51 degrees east of adit 2, at 3,510 feet elevation, is adit 3. This adit, 21 feet long, follows a quartz vein well mineralized with pyrite chiefly, strike south 36 degrees east, dip 25 degrees north-east. The face exposes a width of 5 feet of quartz well mineralized with pyrite. A sample of selected mineral from the face assayed: Gold, 0.2 oz. per ton. At the end of the adit a raise follows the vein upwards for a distance of 12 feet, and from the top of the raise a drift follows the vein north-westerly evidently to within a few feet of the surface. The vein flattens at the top of the raise.

Between the adits described the surface is obscured by glacial debris and vegetation; consequently continuity of the vein along its dip between the adits is not revealed or assured. It is possible that the exposures may be quartz-lenses occurring *en echelon* instead of belonging to a continuous vein.

It is noteworthy that the original open-cut, made many years ago at the site of the portal of adit 1, revealed the presence of freibergite in the mineralization exposed at that time. This fact, considered in conjunction with the presence of freibergite in the small intersecting vein exposed by the open-cut distant 140 feet in a north-easterly direction, calls for further investigation in this region.

Lower Flat-dipping Vein.—Distant on the slope about 750 feet in a direction south 69 degrees west from adit 1 is adit A at 3,435 feet elevation. It is on the most northerly and lowest exposure of the vein. Adit A is driven on a bearing south 28 degrees east for a distance of 82 feet. At the portal a sparsely-mineralized vein between 2 and 3 feet in width is exposed near the floor. This vein gradually rises in the adit and apparently disappears in the back at the face, the bearing of the adit not coinciding with the strike, which is somewhat more easterly with north-easterly dip at a low angle. The vein is only sparsely mineralized save at a point 62 feet from the portal, where a bunch of mineral occurs. At this point the owners recently started a branch drive, which at the time of recent examination had been advanced a distance of 18 feet, on a bearing north 74 degrees east. In this drive an average width of 2.5 feet of heavily-mineralized quartz is continuous. In the face the width of the mineralization exposed was 4.5 feet and a sample across this width assayed: Gold, trace; silver, 10.4 oz. per ton; copper, 0.6 per cent.; lead, 6.4 per cent.; zinc, 14.4 per cent. The foot-wall of the vein is exposed at the face, the formation below the vein being pyritized and bleached. The hanging-wall of the vein is possibly not exposed at this point. A sample taken across 2.75 feet, 15 feet from the starting-point, assayed: Gold, 0.02 oz. per ton; silver, 12.2 oz. per ton; lead, 12 per cent.; zinc, 14 per cent. Another sample taken across 2.5 feet on the south wall of the drive, 10 feet from the starting-point, assayed:

Gold, 0.02 oz. per ton; silver, 5.8 oz. per ton; lead, 21 per cent.; zinc, 8 per cent. The mineralization in this drive consists of sphalerite, galena, pyrite, chalcopyrite, tetrahedrite, and some specularite. The tetrahedrite is not, however, the silver-rich variety of this mineral (freibergite), as a sample taken from a small band showing a material amount of mineral deemed from examination in the field to be tetrahedrite assayed: Gold, 0.06 oz. per ton; silver, 43 oz. per ton; copper, 5.9 per cent.; lead, 16 per cent.; zinc, 10 per cent. At 31 feet from the portal of the main adit a branch drive follows the vein a few feet south-westerly.

At a point 65 feet in a north-easterly direction from the portal of adit A, at 3,445 feet elevation, an adit of cross-sectional dimensions about 2 by 3.5 feet is driven 31 feet on a bearing south 21 degrees east. It reaches the hanging-wall of the vein at a point 21 feet from the portal and for the remaining distance follows the hanging-wall upwards, without apparently penetrating the vein. The motive for this working is not clear.

Distant 115 feet in a direction south 64 degrees west from the portal of adit A, at 3,460 feet elevation, adit B is driven a total distance of 30 feet. For the first 9.5 feet this adit is driven on a bearing south 19 degrees west, cutting across a quartz vein, sparsely mineralized, and 15 inches in width. Thereafter the adit is deflected on a bearing south 49 degrees west following the strike of this vein, which dips south-east at a low angle and pinches to a mere gouge-seam at the face.

Distant 63 feet in a direction south 89 degrees west from adit B, at elevation 3,475 feet, adit C is driven for 31 feet on a bearing south 57 degrees west, following an almost horizontal vein, sparsely mineralized, the width of which increases from 9 inches near the portal to 3.5 feet at the face. A sample taken at the face across a width of 2 feet, including the best mineralization, assayed: Gold, trace; silver, 0.6 oz. per ton; lead, 1.6 per cent.; zinc, 6.2 per cent. Continuation of this adit gives promise of encountering a heavier mineralization. Distant 136 feet due west of adit C at elevation 3,490 feet is open-cut D, which was entirely caved at the time of recent examination.

Between the adits described the surface is obscured by glacial debris and vegetation; consequently continuity of the vein between the adits is not revealed or assured, and, as in the case of the upper vein, exposures may be quartz-lenses occurring *en echelon* instead of one continuous vein.

At the portal of adit A, resulting from the north-easterly drive from this adit, there had been accumulated on June 10th a dump of vein-matter of an estimated volume of 25.6 cubic feet, equivalent to about 2½ tons. A grab sample of this dump assayed: Gold, 0.02 oz. per ton; silver, 10.2 oz. per ton; lead, 23 per cent.; zinc, 12 per cent. A sample of selected pyrite only from this dump assayed: Gold, 0.02 oz. per ton; silver, 3.2 oz. per ton. A sample of selected pieces of sphalerite only from this dump assayed: Gold, 0.02 oz. per ton; silver, 3.8 oz. per ton.

At the portal of adit 1, resulting from the advancement of this adit and the winze sunk therefrom, there had been accumulated on June 10th:—

(*a.*) One "first-class" dump having a volume of approximately 180 cubic feet and an estimated weight of 18 tons. A grab sample of this assayed: Gold, 0.04 oz. per ton; silver, 11.4 oz. per ton; copper, 2 per cent.; lead, 16 per cent.; zinc, 16 per cent. The grade of this could be considerably improved by further cobbing.

(*b.*) One "second-class" dump of estimated volume 252 cubic feet and weight about 17 tons. This consisted of quartzose material with a certain amount of sulphides, which could hardly be culled to material of shipping-grade, and it was therefore not sampled as a whole. Part of it, possibly about 5 tons, consists of pyrite-rich material resulting, it is understood, mainly from the lower part of the winze. A grab sample of this assayed: Gold, 0.08 oz. per ton; silver, 1.6 oz. per ton; lead, *nil;* zinc, trace.

(*c.*) A few piles of zinckiferous vein material, totalling possibly 4 to 5 tons, from which some of the sulphides might be cobbed.

Veins X, Y, and Z.—These veins are new discoveries made during the year, and all can be developed by adit-workings.

Vein X is exposed by an open-cut at 3,385 feet elevation on the upper western slopes of the rock knoll previously mentioned, which lies between the present and a former channel of Finlay Creek in this region. This cut is distant approximately 310 feet north 28 degrees west of the portal of adit A. The host-rock is andesite breccia which is hydrothermally

altered in the vicinity of the vein. The vein, strike north 14 degrees east, dip 52 degrees south-easterly, has been stripped for a distance of 15 feet, showing an average width of about 1 foot. It is much stained with manganese dioxide, obscuring the mineralization, which varies from 5 to 10 inches and consists of quartz sphalerite, galena, and pyrite. A sample of the best mineralization showing at various points of the exposure assayed: Gold, trace; silver, 0.4 oz. per ton; copper, trace; lead, 1 per cent.; zinc, 0.3 per cent.

Vein Y is exposed by an open-cut at a point distant 435 feet north 66 degrees west of the portal of adit A at 3,345 feet elevation. This open-cut is about 15 feet above Finlay Creek and exposes a shear-zone 11 feet in width, striking south 59 degrees west. The foot-wall dips north-west at about 60 degrees, but the hanging-wall is vertical or nearly so. On the foot-wall there is a band of mineralization 6 inches in width showing galena, sphalerite, chalcopyrite, and malachite. On the hanging-wall is a narrow band of mineral about 2 inches in width, consisting of mainly galena and sphalerite. Between the mineralized bands the shear-zone is only sparsely mineralized. A sample of the foot-wall band assayed: Gold, trace; silver, 6.2 oz. per ton; copper, 1.3 per cent.; lead, 30.9 per cent.; zinc, 5.4 per cent. A sample of the hanging-wall band assayed: Gold, trace; silver, 4 oz. per ton; lead, 25 per cent.; zinc, 0.1 per cent. A chip sample across the shear-zone between the bands assayed: Gold, trace; silver, trace.

Vein Z is exposed by an open-cut situated on the upper steep slopes of Finlay Creek Valley at a point approximately 1,100 feet due west of the portal of adit A and at the same elevation. The open-cut exposes a vein, strike south 49 degrees west, dip about 60 degrees south-east, of 2.5 feet average width for a length of 15 feet. The vein-filling consists of a quartz-lens of a maximum width of 18 inches, and hydrothermally altered formation. Much oxidation is present on the walls of the vein. The quartz-lens is well mineralized with sphalerite, galena, and chalcopyrite. Much green sphalerite is present. A sample of the best mineral exposed assayed: Gold, trace; silver, 4.8 oz. per ton; copper, 1 per cent.; lead, 1.9 per cent.; zinc, 14.2 per cent. A composite sample of three cuts across an average width of 18 inches over a length of 6 feet assayed: Gold, trace; silver, 3.4 oz. per ton; copper, 0.5 per cent.; lead, 2.1 per cent.; zinc, 9.8 per cent.

In the western part of the property, at 3,385 feet elevation, an adit, blocked by a cave at the time of examination, is driven on a bearing south 39 degrees west a stated distance of 35 feet, following, it is stated, a quartz vein.

Refer to the Annual Reports, Minister of Mines, British Columbia, 1924, 1927, 1928, and 1930; and Geological Survey, Canada, Summary Report, 1928, Part A; also Geological Survey, Canada, 1936, Paper 36–20.

SPECIAL REPORTS.

Typewritten copies at 25 cents each are available to those who specially request reports on the following properties:—

Silver Mitts Group, Usk.
Toulon Group, Bornite Mountain.
Three Star Group, Topley.
Maple Leaf Group, Topley.
Silver King and No. 1 Fraction, Topley.

PROGRESS NOTES.

LODE OPERATIONS.

BY

CHARLES GRAHAM.

Zymoetz River Area.

Dardenelles Group.—Omineca Gold Quartz Mines, Limited; Fred Wells, president. An adit is being driven to intersect the surface showings. Power is supplied by a compressor driven by a Pelton wheel.

Zymoetz Group.—T. M. Turner, of Terrace, shipped to the sampling plant at Prince Rupert, 1,496 dry pounds, assaying: Gold, 1.29 oz. per ton; silver, 1.56 oz. per ton; copper, trace; lead, *nil;* zinc, 7.8 per cent.

Smithers Area.

Glacier Gulch Group.—Campbell, Lovelace, and Banta, owners. A car-load was mined from the surface showings and sent to Trail.

Rainbow Group.—F. H. Johnson, of Smithers, shipped from this property in the Babine Mountains to the sampling plant at Prince Rupert 1,426 dry pounds, assaying: Gold, 1.18 oz. per ton; silver, 30 oz. per ton; copper, 10 per cent.

Aiken Lake Area.

Croydon Group.—Consolidated Mining and Smelting Company of Canada, Limited; J. Brunland, superintendent. It is reported that twenty-five men were employed in prospecting and open-cutting on this group.

BY

THOMAS R. JACKSON.

Cariboo Area.

Cariboo Gold Quartz Mining Co., Ltd.—R. R. Rose, general manager; R. E. Vear, general superintendent; L. Walker, mine superintendent; C. Boulding, mill superintendent. A strike occurred at this mine on May 25th and caused a total suspension of mining until July 15th, when work was resumed on a limited scale, the normal tonnage of 225 tons again being reached in the middle of August. In September milling capacity was raised to 250 tons per day.

During 1937 the tonnage mined and milled was 69,324 tons, and this produced 29,293 oz. gold and 2,282 oz. silver. There were 319 men employed at the end of the year.

Crosscutting, drifting, and raising to the extent of 6,550 feet and 5,331 feet of diamond-drilling was done during the year. No. 2 shaft was sunk to the 1,900 level; in No. 1 shaft development is being carried on in the 1,600 and 1,700 levels. Both shafts are equipped with double-drum electric-driven hoists.

Island Mountain Mines Co., Ltd.—M. D. Banghart, general manager; F. H. Munn, superintendent; H. Hewitt, mine manager; E. Johnson, mill superintendent. This mine operated throughout the year with the exception of the period May 15th to August 1st, when work was suspended due to labour trouble.

The mill has a capacity of 110 tons per day and during the year 13,875 oz. gold and 2,359 oz. silver was produced.

There were 110 men employed at the end of the year. Stoping was carried on above the main adit and development was from the 500-foot shaft sunk below this level.

Natural ventilation above the main adit is adequate and the ventilation below this level is by means of fans; raises have now been completed which provide a second exit from the lowest level.

During the year 3,151 feet of drifting, 3,594 feet of crosscutting, 1,328 feet of raising, and 12,374 feet of diamond-drilling was done.

Cariboo Hudson Gold Mines, Ltd.—Fred Wells, managing director; Eric Hansen, manager. This mine is situated 21 miles east of Barkerville and is reached by means of 14 miles of automobile-road and 7 miles of tractor-road.

Over 2,000 feet of drivage has been done and a winze has been sunk from the main level. Thirty men were employed throughout the year.

Cariboo Consolidated Mining Co., Ltd.—O. C. Thomson, managing director; Harold Hawkinson, mine manager. This mine is situated 3 miles from Wells and the main adit has been driven 1,200 feet from the portal, using hand steel only. Eight men were employed.

Quesnelle Quartz Mining Co., Ltd.—Russell Ross, general manager. This mine is located on Hixon Creek, about 4 miles east of the Quesnel–Fort George Highway, and development-work was carried on until October, when underground work was stopped pending the construction of a 25-ton-capacity mill; this had not been started at the end of the year.

Fifteen men were employed and 412 feet of drifting, 343 feet of crosscutting, and 68 feet of sinking was done.

Colgrove Charmwood, Ltd.—Some intermittent underground work was done during the year and a slope driven about 50 yards from the surface. A small experimental mill was also built.

Tungsten Deposits.

Columbia Tungstens Co., Ltd.—Donald F. Fraser, general manager; A. E. Pike, mine manager. This mine, about 6 miles from Wells, operated most of the year with a crew of ten men. A small mill was built and 100 tons of ore mined and milled, this yielding 1.5 tons of sheelite concentrates. During the year 211 feet of drifting, 26 feet of crosscutting, and 109 feet of diamond-drilling was done.

PLACER OPERATIONS.

BY

CHARLES GRAHAM.

Tom Creek.

Tom Creek Placers, Ltd.—This is a surface placer operation using a steam-shovel. Twenty-two men are employed and they are operating two shifts.

Harrison Creek.

Venture Exploration Co. (East Africa), Ltd.—H. McN. Fraser, manager; E. Gibbons, superintendent. This is a hydraulic operation working three shifts and employing twenty-six men. A flume 2 miles long was built to Humphrey Creek to furnish additional water.

Vital Creek.

Venture Exploration Co. (East Africa), Ltd.—Fred Martin, mine superintendent. This is the only underground operation in the area. It is a bed-rock operation reached by a shaft 90 feet deep.

Germansen River Area—Germansen Creek.

Venture Exploration Co. (East Africa), Ltd.—H. McN. Fraser, manager. This is a hydraulic operation. There are two pits on the west bank of Germansen River. These were not operating on account of shortage of water. One hundred and eight men were employed in construction and road-making.

A flume and ditch is being built to bring water from Germansen Lake a distance of approximately 11 miles. A drag-line scraper is being used in the ditch section. A sawmill has been built on the Omineca River to furnish lumber for the flume and for camp-construction. A fine camp is under construction. A road has been built from Germansen Landing on the Omineca River to the main camp and then up the west bank of Germansen River, crosses the river and connects with the road from Germansen Lake built by the Consolidated Mining and Smelting Co. There is now a road connection from Fort St. James to Germansen Landing on the Omineca, a distance of approximately 140 miles. Supplies can now be taken from Fort St. James by truck. The ditch and flume will be ready for operation in the 1938 season.

Germansen Mines, Ltd.—A. A. McCorkell, manager. This is a hydraulic operation employing about ten men.

Slate Creek.

Consolidated Mining and Smelting Co.—W. M. Ogilvie, manager. This is a drag-line operation employing thirty-six men and working three shifts. A tractor bulldozer is used to break the ground into the pit to the scraper. This has greatly increased the yardage which the drag-line can handle.

Manson Creek.

Northern Gold Placers, Inc.—R. D. Adams, manager. This is a shovel operation on the left bank of Manson Creek and employing sixteen men. Four men were engaged in sinking small prospect shafts.

Sam Rosetti and two partners are operating a small hydraulic pit farther down-stream. They were very short of water.

Lost Creek.

Lost Creek Placer Gold, Ltd.—Bert McDonald, manager. This is a surface operation using a shovel which can be used either as a shovel or drag-line. They lack sufficient water for sluicing the amount of gravels which the shovel can handle. Four men were engaged in sinking short test-pits to bed-rock.

Dunsmore Gold Mines, Ltd.—J. M. Dunsmore, manager. This is the only underground operation in the Manson Creek area and was employing nineteen men. A 2-compartment shaft has been sunk to bed-rock and connection made from the bottom of the shaft to an old bed-rock tunnel driven twenty-three years ago, which when cleaned up will furnish a second exit as well as furnishing ventilation. This was all the work done at the time of inspection. Drifting on bed-rock was to commence as soon as possible. A steam-boiler and hoist is used for power.

A self-dumping cage is being installed in the shaft and the gravel will be dumped over a grizzly at the surface, so that only the fine gravels will reach the sluice-boxes. A 450-gallon pump has been installed to furnish water for sluicing.

BY

THOMAS R. JACKSON.

Cariboo Area.

Bullion Placers, Ltd.—Ray F. Sharpe, general manager; George Bard, manager. Employing one 10-inch monitor on bed-rock gravels, and one 6-inch monitor on upper gravels in the *Bullion* pit, and one 10-inch monitor in the *South Fork* pit, the management estimated that 1,100,000 cubic yards were piped off in the former pit and 300,000 cubic yards (overburden) in the latter pit, the water-consumption being 23½ million tons. This expansion was possible owing to the additional supplies of water rendered available. Water from Jacobie (formerly named Eight-mile) Lake now flows by gravity in a newly-constructed ditch-line to the Morehead Lake watershed. From Little and Prior (formerly named Long Lake) Lakes, water is now pumped by Diesel-powered pumps consuming respectively 120 and 180 horse-power. The pumping-head is in both these cases about 61 feet, and the water so pumped passes to the main pooling reservoir (420 feet higher than the *Bullion* bed-rock).

Much drilling was carried out during the year—Keystone-drilling to delimit the channel up-stream, and Airplane-drilling in connection with bank-blasting to promote safety.

A weight of 130 tons of additional steel riffles was added to the sluice-flume. Sixty men were employed.

Consolidated Gold Alluvials of B.C., Ltd.—A. M. Richmond, general manager; E. E. Mason, mine manager. This operation is at Wingdam and consists of two shafts known as the *Sanderson* and *Melvin* shafts. These were formerly separate workings, but during 1937 the workings were connected by means of a raise from the *Melvin* shaft-workings.

The *Sanderson* shaft and workings are wholly in gravel, but the *Melvin* shaft was sunk in the rim-rock, beyond the gravel deposit, to a depth of 280 feet and some 60 feet below the bottom of the original channel of Lightning Creek.

The main levels are driven in the rock below the original channel and 3-inch diamond-drill holes are put up from this level to the gravel-bed for dewatering purposes at regular intervals. This system has been carried on for a total distance of 3,200 feet and two raises have been put up into the gravel.

During 1937 the Sanderson workings produced 52,150 cubic yards of gravel and the Melvin workings 1,821 cubic yards. There were 186 men employed at the end of the year. The gravel from both mines is now hoisted at the Melvin shaft, where a new washing and recovery plant with a rated capacity of 300 cubic yards per day was constructed. At the end of the year this plant was handling 200 cubic yards daily.

Quesnel Mining Co., Ltd.—Charles S. Buck, manager. Two monitors at 80 lb. pressure are in use at this operation, where twenty-four men are employed.

Moose Hydraulic Placers.—Thomas Comer, manager. One monitor at 40 lb. pressure is in use and three men were employed.

Placers Engineers, Ltd.—Ernest F. Lang, manager. Three monitors at 80 lb. pressure are in use at this operation, where fourteen men are employed.

Sangdang Gold Placers.—Wm. M. Hong, general manager. Two monitors are in use at this operation with a pressure of 90 lb. and twenty-two men are employed.

Lowhee Mining Co., Ltd.—C. H. Lea, general manager. This operation is worked by two monitors at 80 lb. pressure and sixteen men are employed.

Ketch and McDougall Gold Placers.—R. H. McDougall, general manager. This operation is worked with one monitor at 70 lb. pressure and fifteen men are employed.

Eastman Red Gulch Placers, Ltd.—H. F. Eastman, manager. This placer is worked by two monitors at 50 lb. pressure and seven men are employed.

Slade Cariboo Gold Placers, Ltd.—Maury Caldwell, manager. This placer is worked by one monitor at 80 lb. pressure and eight men are employed.

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ILLUSTRATIONS.

VICTORIA, B.C.:
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1938.

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The Annual Report of the Minister of Mines is now issued in parts as follows:—

Part A.—THE MINING INDUSTRY (STATISTICAL REVIEW). John F. Walker.

Part B.—NORTH-WESTERN MINERAL SURVEY DISTRICT (No. 1). Joseph T. Mandy.

Part C.—NORTH-EASTERN MINERAL SURVEY DISTRICT (No. 2). Douglas Lay.

Part D.—SOUTHERN AND CENTRAL MINERAL SURVEY DISTRICTS (NOS. 3 AND 4). M. S. Hedley.

Part E.—EASTERN MINERAL SURVEY DISTRICT (No. 5). H. Sargent.

Part F.—WESTERN MINERAL SURVEY DISTRICT (No. 6). B. T. O'Grady.

Part G.—INSPECTION OF MINES. James Dickson.

PART B

ANNUAL REPORT

OF THE

MINISTER OF MINES

OF THE PROVINCE OF

BRITISH COLUMBIA

FOR THE

YEAR ENDED 31ST DECEMBER

1937

PRINTED BY
AUTHORITY OF THE LEGISLATIVE ASSEMBLY.

VICTORIA, B.C.:
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1938.

BRITISH COLUMBIA DEPARTMENT OF MINES.

VICTORIA, B.C.

Hon. W. J. ASSELSTINE, *Minister.*

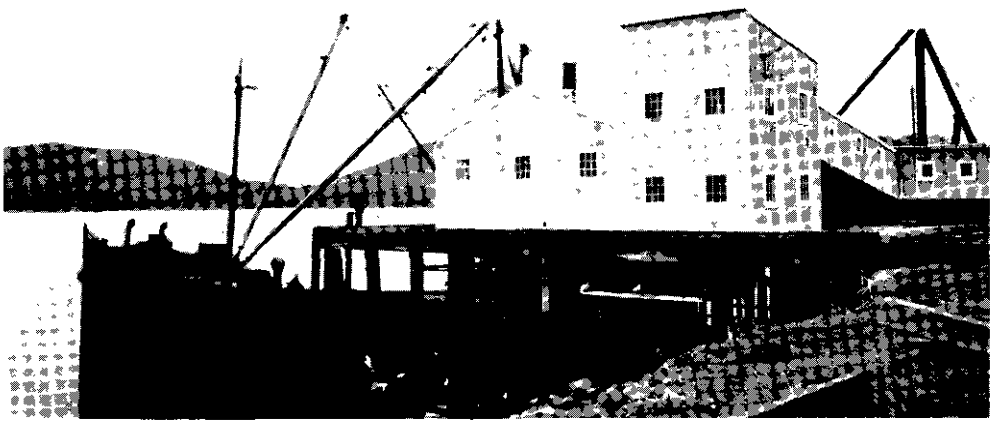
JOHN F. WALKER, *Deputy Minister.*

JAMES DICKSON, *Chief Inspector of Mines.*

D. E. WHITTAKER, *Chief Assayer and Analyst.*

P. B. FREELAND, *Chief Mining Engineer.*

R. J. STEENSON, *Chief Gold Commissioner.*



Government Sampling Plant, Prince Rupert. S.S. Northholm loading First Shipment of Ore for export.

Big Missouri Dam at Cascade Creek, Outlet of Long Lake.

Looking up O'Donnel River Valley, bearing north 39 degrees east from Nathan Murphy's workings. The right limit of the river trough is the approximate left rim of the buried channel rim.

Outcrop on Vullaug Group, McDame Creek Area.

PART B.

NORTH-WESTERN MINERAL SURVEY DISTRICT (No. 1).

BY
JOSEPH T. MANDY.

SUMMARY.

The steady advance of the mining industry in this district that was evinced in 1936 has continued during 1937. Increased and continued production has been the governing objective, and the year has been featured by the achievement of progressive results in this respect from preparatory developments carried out in 1936. During the year production, especially of gold, has shown an increase, new producers have materialized, and further advance has been made in the laying of a sound foundation for a possible progression of new producing mines in future years.

Activity in silver and base metals has not shown any marked improvement during the year.

During the year, the *B.C. Silver* and *Sebakwe* properties, now consolidated with the Premier Gold Mining holdings and operated by the Silbak-Premier Mines, Limited, have been brought into production. In the northern section, on the Taku River the Polaris-Taku Mining Company, Limited, after considerable exploration and development, completed the construction of a 200-ton-capacity mill on the *Whitewater* group, and brought this property into production in September. Steady progress in construction of the *Big Missouri* underground mill of 750-ton capacity at Stewart has continued, and this property will come into production early in 1938. Also in the Stewart area, the *Dunwell* mine and mill continued production during the season.

In the coastal section, the *Surf Point* and *Edye Pass* properties have been operated by the Reward Mining Company, with production from the *Surf Point* mill. At Surf Inlet the Surf Inlet Consolidated Gold Mines, Limited, has continued mining and milling as well as exploratory development throughout the year.

During the year production has come from fifteen different properties, of which six were milling operations. The construction of a Government sampling plant at Prince Rupert was completed in August. Through the purchase and advantageous marketing of ore systematically mined by prospectors, or produced during the course of preliminary exploration, and by bulk tests, guidance, and advice, it is hoped to speed up increased development and production, especially along the Canadian National Railway's line into Prince Rupert. Since the plant's completion, many prospectors have taken advantage of this service and the scope of its utility has expanded.

There has been much activity in exploration and development of old prospects by well-financed operators, especially in the Portland Canal and McDame Creek areas, also on the pyritic deposits of the Ecstall River near Port Essington, Skeena River, and on the Hidden Creek copper deposits at Anyox.

Operations in connection with placer gold have been active, especially in the Atlin area, which will show a substantial increase in output, and promises continued expansion with indications of the application of additional capital for the mechanized operation of new ground. Of interest to placer-miners is the discovery of two large gold nuggets, one from Squaw Creek, Atlin Division, weighing 46 oz. 5 dwt., and the other from Alice Creek, a tributary of Boulder Creek, Turnagain (Little Muddy) River area, weighing 52 oz. 15 dwt.

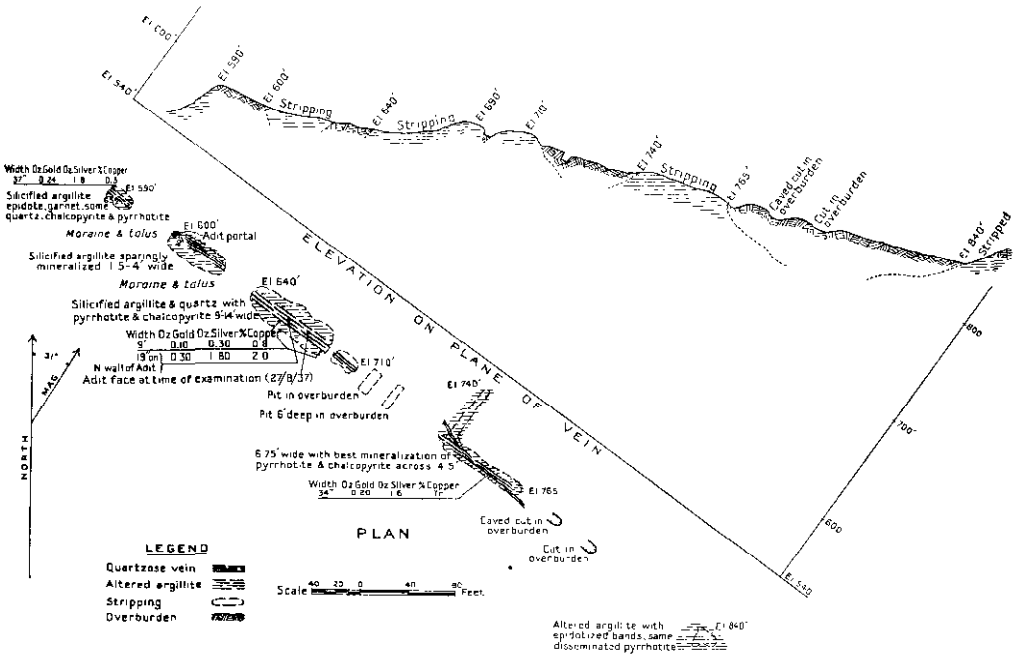
Prospecting for lode and placer deposits has declined generally, but in some areas has been active and new discoveries of importance have been made in the American Creek area, Portland Canal Mining Division, the Turnagain area, and the Taku River area. Increasing interest has been shown in prospecting for lode deposits in likely gold areas of the interior, such as the McDame Creek section of the Stikine Mining Division.

LODE-GOLD DEPOSITS.

Bear River Area, Stewart, Portland Canal.

Oral M. Group.

This group comprises the *Oral M.*, *Muriel S.*, *Ann G.*, *May No. 1*, and *May No. 2* mineral claims and fractions, owned by Premier Gold Mining Company, Limited. The claims were staked by the Premier Company during 1935 and 1936 on discoveries made by the company's prospectors at the time exploration was being carried out by the company on the adjoining *Molly B.* molybdenite showings on Indian Reserve No. 19.



Oral M. Group, Portland Canal. Plan and Section.

The claims are located north of the *Gold Axe* group and east of Indian Reserve No. 19, towards the base of the westerly slope of Mount Rainey, on the east side and towards the mouth of the Bear River, about half a mile easterly from the village of Stewart. The property is reached by boat from the Stewart dock to a location on the tide-flats on the east bank of Bear River, determined by the stage of the tide, a distance of about 1 mile. At low water Bear River can be crossed to its east bank by pack-horse from Stewart to the commencement of the trail at the foot of the hill, about 30 feet above sea-level. If a rowboat is used from Stewart dock, the tide-flat and its margin is traversed for about a quarter of a mile to the commencement of the trail. From this point a pack-trail ascends the mountain-slope by a series of switchbacks to the tent-camp at 640 feet elevation, and about three-eighths of a mile from the foot of the hill. From the camp a trail extends about 200 feet north-westerly to the adit-portal at 600 feet elevation.

In the locality of the claims the hill slopes at a general angle of about 20 degrees, and is densely timbered with mainly cedar, hemlock, and spruce trees of appreciable size and is thickly overgrown with underbrush. Longitudinal benched rock ridges and knolls of "roche moutonnée" form, fronted by rock bluffs, are typical topographical features. Glacial overburden of appreciable thickness in the bench and depression areas covers the hill-slope.

The locality is adjacent to a northerly contact of rocks of the Coast Range batholith. Granitic rocks outcrop about 750 feet north of the adit-portal, and the contact strikes north-easterly across the central section of the *Oral M.* and plunges south-easterly under the roof rocks which are argillaceous sediments. The rocks adjacent to the intrusive consist of highly metamorphosed argillite of the Lower Hazelton group. Immediately adjacent to the contact,

and at the base of the hill, the rocks are hybridized and in the main silicified by marginal effects of the intrusive batholith. The marginal absorption-phase is gradually transitional towards the south into a siliceous argillite now containing epidote and spessartite-garnet; this altered rock is definitely banded by the epidote and spessartite. The altered sediments strike north 55 degrees west and dip between 60 and 76 degrees south-westerly.

The mineral deposit consists of an irregular zone of silicification from 3 to 17 feet wide in the altered argillite and is conformable with the attitude of the formation. The zone has been exposed about 750 feet southerly of the batholith contact, and strikes at an obtuse angle to the contact. Silicification in this zone appears to be associated with slight shearing along fractures generally conformable with the bedding of the sediments, and to be best developed in the localities of slightly sheared cross-fractures striking north 26 to 31 degrees east, with a vertical to 45-degree dip north-westerly. Stringers, bands, patches, and small lenses of quartz are irregularly distributed in the zone, especially in the locality of the cross-fractures. The zone is generally mineralized with finely-disseminated pyrrhotite, but in some sections, especially in the areas of cross-fractures, it contains stringers, blebs, and patches of massive pyrrhotite with chalcopyrite across widths of from 2 to 9 feet.

During 1935 and 1936, the zone was explored by stripping and open-cutting and traced on the surface between 590 and 840 feet elevation for a distance of about 640 feet south-easterly from the east boundary of the Indian reserve. During 1936, the zone was also explored by seven diamond-drill holes. In the 1937 season, a contract was let to K. F. Pond, of Stewart, for further exploration by drifting on the zone from an adit at 600 feet elevation. At the time of examination on August 27th, a crew of four men was employed, and the drift had been advanced 131 feet.

At 590 feet elevation on a knoll adjacent to the Indian reserve, stripping for 20 feet exposes silicified argillite with garnet and epidote bands, quartz stringers and patches, mineralized with films and blebs of pyrrhotite and chalcopyrite across a width of 40 inches. At this locality the zone strikes north 54 degrees west and dips 65 degrees south-westerly. A sample across 37 inches assayed: Gold, 0.24 oz. per ton; silver, 1.8 oz. per ton; copper, 0.3 per cent. The continuation of the zone down the face of the bluff to the north-west on the Indian reserve could be seen, but it was inaccessible for examination.

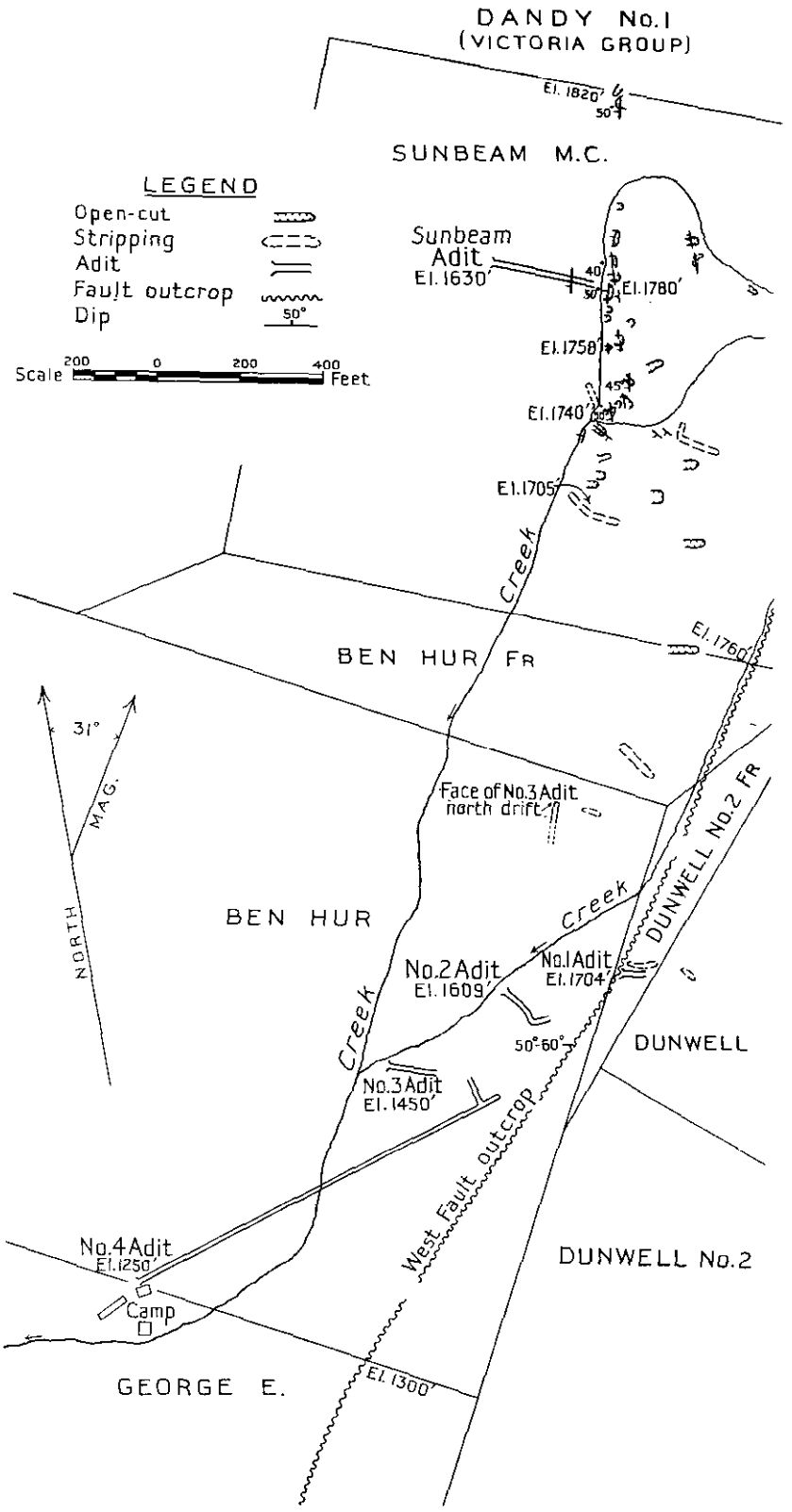
At 600 feet elevation, 40 feet south-easterly of this, slightly silicified argillite with some quartz stringers and sparsely disseminated pyrrhotite and a little chalcopyrite 1.5 to 4 feet wide is exposed in the face of a low bluff by stripping for a length of 55 feet. The adit-portal is in the face of the bluff on the hanging-wall side of the zone.

At 640 feet elevation, 30 feet south-easterly of this, silicified argillite with stringers, bands, and lenses of quartz from 9 to 14 feet wide is exposed by stripping and in the face of a sloping bluff for a length of 108 feet to 710 feet elevation. In this section the zone strikes north 55 degrees west, dips 60 degrees south-westerly, and is generally well-mineralized with stringers, blebs, patches, and disseminated pyrrhotite and some chalcopyrite. Several transverse fractures striking northerly and dipping westerly cut across the zone in this exposure. A composite chip sample for a length of 46 feet along the easterly section of the exposure, and across an average width of 9 feet, assayed: Gold, 0.10 oz. per ton; silver, 0.30 oz. per ton; copper, 0.8 per cent.

South-easterly of this exposure, for a distance of 95 feet, continuity is obscured by deep glacial overburden. Two pits excavated in this had not encountered bed-rock.

At 740 feet elevation, silicified argillite with quartz stringers and bands is exposed for a length of 70 feet by stripping, and in the sloping face of a rock knoll to 765 feet elevation. In the westerly section of the exposure, stringers and bands of quartz are spread across a width of 17 feet, with one main band 2 feet wide converging into the zone from the foot-wall. The lower section of the exposure is very sparsely mineralized, but the upper and more compact section is moderately mineralized across a width of 6.75 feet with films, blebs, and disseminated pyrrhotite and with some chalcopyrite. A chip sample across 34 inches of the best mineralized section assayed: Gold, 0.20 oz. per ton; silver, 1.6 oz. per ton; copper, trace.

For a distance of 190 feet south-easterly, to 840 feet elevation, the continuity of the zone is obscured by overburden. At 840 feet elevation, slight silicification with some quartz stringers and sparsely disseminated pyrrhotite in altered argillite is exposed in the face of a bluff.



Dunwell Mines, Ltd. Main Workings.

At 600 feet elevation an adit has been driven on the zone in a general direction of south 58 degrees east. At the time of examination it had been advanced 131 feet. At the portal the zone strikes north 55 degrees west and dips 65 degrees south-westerly. The adit starts on the hanging-wall and for the first 15 feet veers easterly across the zone to the foot-wall, then gradually angles southerly again to the hanging-wall. At 50 feet from the portal the drift turns northerly at a cross-fracture towards the foot-wall, and continues in the zone to the face. For the first 50 feet from the portal to this fracture the zone is fairly well-defined and composed of silicified argillite with quartz stringers and bands, and mineralized with disseminated pyrrhotite and some chalcopyrite. From this point for 50 feet the silicification and mineralization appears to weaken. For the last 30 feet to the face silicification increases, and quartz stringers and patches are erratically distributed in the zone with disseminated pyrrhotite and some chalcopyrite. A sample across 19 inches of silicification on the north wall of the drift, 113 feet from the portal, assayed: Gold, 0.30 oz. per ton; silver, 1.80 oz. per ton; copper, 2 per cent.

Dunwell Mines, Ltd. (N.P.L.). This company, with head office at 101 Pemberton Building, Victoria, was incorporated in 1922 as a specially limited reorganization of Nass River Lands, Limited, which was incorporated in 1913. The capitalization of the Dunwell Mines, Limited, was originally $350,000, but this was doubled in 1925, and further increased in 1926 to $1,000,000, divided into 1,000,000 shares of $1 par value each, of which 840,000 have been issued. Late in 1933 a debenture issue of $18,000 was authorized to provide funds for rehabilitation and resumption of operations. The property was originally owned by Stewart Bros. and W. Noble, of Stewart, and in the holdings are now included the claims of the old Stewart Mining and Development Company.

The property consists of twenty-four Crown-granted claims and fractions on which taxes have been paid to December 31st, 1937. The claims are situated on the north side of Glacier Creek, on the thickly-timbered south slope of the " Dunwell " hill towards the confluence of Glacier Creek with the Bear River, at elevations of 1,000 to 2,000 feet. The hill-slope in the locality of the claims is featured by longitudinal bench and ridge areas with an average slope of about 20 degrees and a generally thick overburden of glacial debris, densely overgrown with underbrush between the hemlock, balsam, and cedar trees.

The property is reached by the Stewart–Bear River Motor-road from Stewart dock to the mill and power camp at 200 feet elevation, a distance of 5¾ miles. From this locality a branch motor-road ascends the hill-slope for about 1½ miles to the mine camp at 1,250 feet elevation. This camp is equipped with bunk-house, wash-room, dining-room, kitchen, and office buildings. Branch trails extend to the various workings.

The mineral deposit occurs in a main sheared fault-zone constituting the west fault of the " Portland Canal Fissure Zone " and striking northerly and dipping westerly, with lateral veins carrying silver-lead-zinc mineralization with gold values in places, striking north-westerly and dipping south-westerly. The formation is a series of argillaceous sediments of the Lower Hazelton (Bitter Creek Series) group which strike northerly, dip from 30 to 60 degrees westerly, and are on the westerly limb of an open anticlinal structure. The locality of the workings is about a quarter of a mile east of the easterly contact of the southerly-plunging " Ben Ali " granitic stock, and about 1,000 feet east of the contact of the Bitter Creek argillite with the overlying tuffs, greenstones, and argillites of the Bear River Series. Granitic and grey lamprophyre dykes intrude the formation, and the veins are sometimes associated with the latter.

Early exploration was carried out by the Stewart Mining and Development Company. In 1926 an aerial tramway about 1 mile long and a concentrating-mill of 100 tons daily capacity were constructed. Milling began early in 1927 and ceased later in the same year with the depletion of the then-known ore reserves.

Production from this operation amounted to 27,067 tons of ore, from which was recovered 4,805 oz. gold, 102,199 oz. silver, 1,264,787 lb. lead, and 1,608,634 lb. zinc. Some electrical prospecting by the Radiore Company of Canada, followed by diamond-drilling, was carried out during 1928 and 1929 with negative results. The property remained inactive until worked by lessees in 1932 and 1933, when from small-scale hand-operations about 1,767 tons of ore was produced, yielding 640 oz. gold, 28,653 oz. silver, 4,744 lb. copper, 57,237 lb. lead, and 2,400 lb. of zinc. Subsequent to this, more extended leasing operations by individual partner-

ships and a Stewart syndicate were carried on until the season of 1935, when the property was also operated for four months by the Dunwell Company. Production for this period amounted to 7,139 tons of ore, from which was recovered 1,489 oz. gold, 44,331 oz. silver, 2,184 lb. copper, and 19,553 lb. lead.

In the interval some of the mill machinery was sold to Bralorne Mines, Limited. In 1936 the Welldun Mining, Milling, and Power Company, Limited, composed mainly of Stewart interests, took a four-year lease on the property. This is a private company incorporated in British Columbia on April 17th, 1936, and capitalized at $20,000, divided into 40,000 shares of 50 cents par value, of which 15,384 shares were reported issued as at July 1st, 1937. The head office of the Welldun Company is at Stewart, and N. E. Nelson, Vancouver, is president. This company reconditioned the mill to a daily milling capacity of 25 tons and operated seasonally until the early winter of 1937. Production from this operation to the end of 1937 amounted to 7,885 tons of ore, from which was recovered 1,702 oz. gold, 49,346 oz. silver, 7,343 lb. copper, and 190,384 lb. lead.

References to the property are contained in the Annual Reports of the Minister of Mines for the years 1920, 1922 to 1929, inclusive, and 1932 to 1936, inclusive. The property is also described in Memoir 159, Geological Survey of Canada, 1929.

Surface exposures on the *Dunwell* have not been sufficiently correlated to definitely identify the vein-structures exposed. One main shear-structure (west fault) with a strike about north and a dip 50 degrees west, extending throughout the length of the property, is indicated. Smaller more or less parallel lateral veins converge towards and join it at acute angles along the strike and dip. The vein-structures are frequently accompanied by pre-mineral lamprophyre dykes. These were probably intruded along already-formed shears and subjected to subsequent stresses; they appear to have had a controlling influence on later mineralizing solutions. Mineralization of the ore-shoots and lenses consists mainly of a quartz-calcite gangue with sphalerite, galena, pyrite, and tetrahedrite. Argentite, ruby silver, native silver, and probably some electrum constitute very high-grade ore in places.

Commercial-grade ore in short shoots or lenses seems to favour intersections of the lateral veins with the main north-south structure, but occurs in both structures. There is no definite evidence to indicate that commercial ore is confined solely to these vein-intersections and their vicinity, and further development may show a wider ore-distribution. Underground mining in the old 1927 operation through No. 4, No. 3, and No. 2 adits was confined principally to one ore-shoot occurring apparently around one such vein-intersection, but in the extensive underground workings and in surface exposures commercial mineralization is indicated at places at appreciable distances north and south of this formerly mined area.

In the northern area of the group on the *Sunbeam* there appears to be a main north-south structure with lateral veins converging towards it in its southerly extension. On the extreme north end of the *Sunbeam* and adjacent to the *Victoria* group south line at 1,820 feet elevation and 570 feet higher than No. 4 adit, an open-cut and incline shaft about 8 feet deep exposes a well-defined vein 6 feet wide which strikes north 10 degrees east to about north, and dips 50 degrees west. This is the so-called " Sunbeam " vein. It is well mineralized in places with galena and sphalerite and contains an 8-inch stringer mineralized with tetrahedrite and some argentite. This showing is about 200 feet west of the so-called " Dunwell " vein which is probably the northerly continuation of the west fault, but the two structures seem to converge and possibly may join in this area. This locality is about 370 feet higher and about 1,700 feet north of the north end of the No. 3 adit north drift, which is the nearest main underground working. From this point the " Sunbeam " vein is traced south for about 450 feet by a series of pits and cuts along a well-defined depression to 1,780 feet elevation, and shows oxidized vein-material, mineralized in places with pyrite, galena, sphalerite, some tetrahedrite, argentite, and native silver, and generally associated with a grey dyke. In the southern 150 feet of this draw the vein is appreciably sheared, from 3 to 5 feet wide, strikes north and dips 40 to 50 degrees west. In places, a well-mineralized streak 8 to 10 inches wide, in places showing argentite and native silver, occurs on the hanging-wall.

From this locality, lessees in 1932 and 1933 shipped about 100 tons of high-grade ore from shallow cuts and pits, and about 200 tons of possible milling-grade ore still remains on the dumps. The northerly 300 feet which is covered by overburden may contain some continuation of the high-grade ore in this ore-shoot.

The " Sunbeam " vein has been traced a further 150 feet, to 1,758 feet elevation, by two cuts and a short crosscut-adit. These workings are in bad condition for examination, but show oxidized vein-structure and the grey dyke. About 200 feet easterly of the open-cut at an elevation of 1,780 feet, or about 70 feet higher, two oxidized and caved cuts expose what appears to be a more or less parallel structure, dipping 50 degrees west on the east side of a wide felsite dyke. This is known as the " Sulphide " vein.

At 1,630 feet elevation and about 300 feet west of the cuts at 1,780 feet elevation, the " Sunbeam " crosscut adit, bearing south 85 degrees east and about 500 feet long, intersects at about 300 feet a sheared and brecciated siliceous vein, 4 feet in width. This strikes north 10 degrees west, dips 60 degrees west, and is very sparsely mineralized. A short drift shows quartz stringers with very sparse mineralization. At about 170 feet from the portal a barren quartz vein with stringers across 2 feet is also intersected. Further exploration by raising would be required to correlate these veins with the " Sunbeam " and " Sulphide " veins.

At 1,740 feet elevation, 300 feet south of the old lessees' workings, an old cut in the creek-draw is reported to have crosscut two veins striking north and dipping west that may possibly be the southerly continuation of the " Sunbeam " vein. About 40 feet east of this and on the north side of a branch creek-canyon bearing east-west, a short adit exposes crushed and sheared siliceous material in a structure striking north 10 degrees east and dipping 50 degrees west. At intervals for 160 feet north-easterly of this, three cuts expose a vein striking northerly and dipping 45 degrees west, mineralized in places with pyrite, sphalerite, and galena. On the south side of the branch-canyon, at its junction with the main creek-trough a short adit exposes a crushed and distorted quartz vein 4 feet wide. In the main north-south creek-bed about 50 feet southerly of the east-west creek a small exposure of vein-matter well-mineralized with galena, sphalerite, and some argentite is seen. The southerly extension of the vein or veins exposed in the two short adits probably forms a junction in this locality with the vein in the main creek-trough, which is probably the southerly extension of the " Sunbeam " vein. This locality is about 950 feet north of the face of No. 3 adit north drift and from 260 to 300 feet higher in elevation.

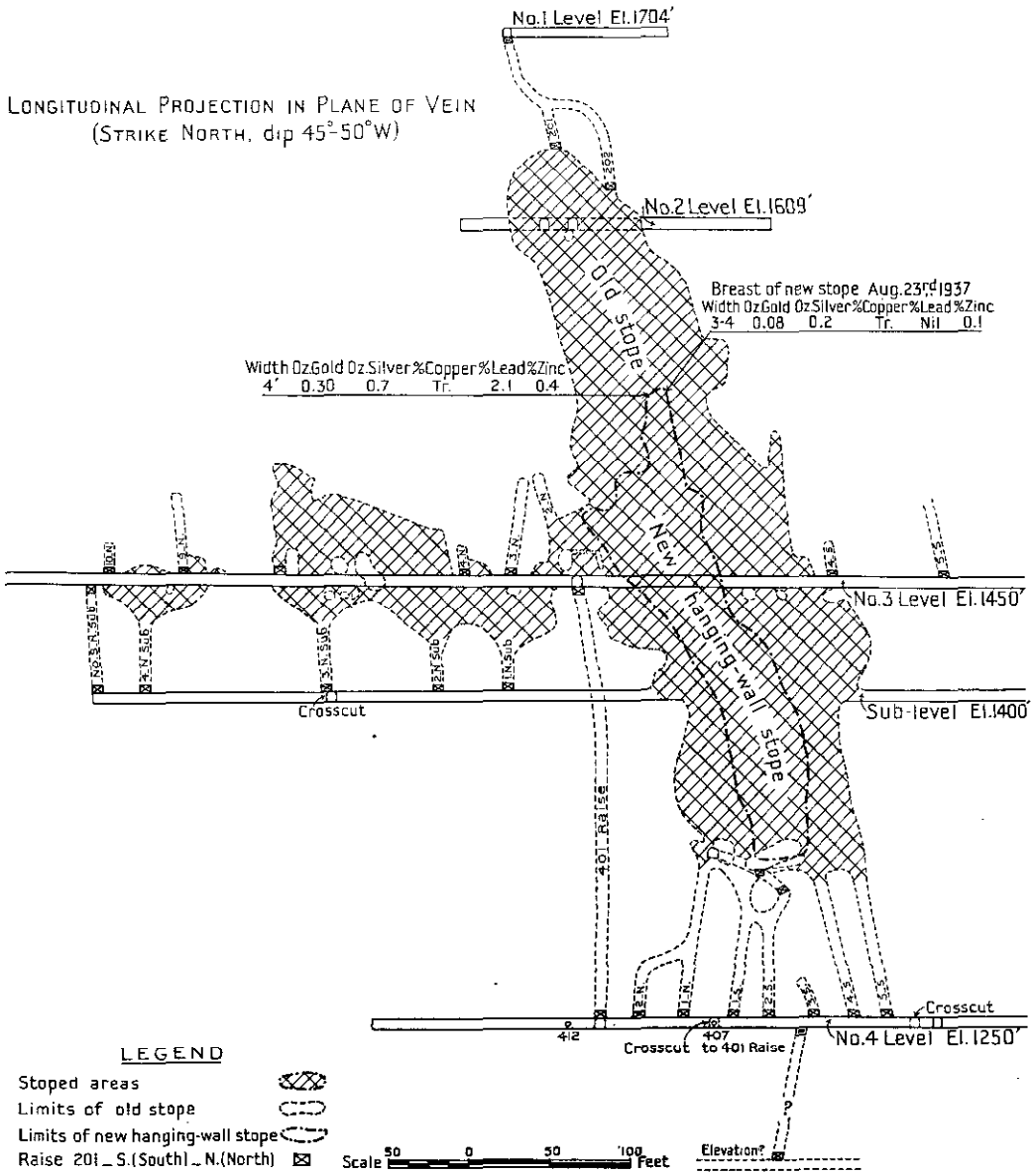
About 60 feet east of the main creek-trough and along a distance of 200 feet south to 1,705 feet elevation, four caved trenches and open-cuts expose oxidized argillite and some narrow, grey lamprophyre dykes. About 300 feet east of the main draw and distributed along a gently-sloping bench for a distance of about 700 feet south of the east-west branch-canyon are several old caved and overgrown trenches and cuts.

Unless intersecting faults have disturbed their alignment, the vein or veins occurring along the trough of the main creek in the central section of the *Sunbeam* claim cannot be correlated with those exposed in the main underground workings of No. 1, No. 2, No. 3, and No. 4 adits. It is probable that they are more or less " en echelon " veins aligned at acute angles to a main shear-structure which occupies the bed of the main creek-trough. This vein-combination would then resemble a " herring-bone " form of structure.

The main underground workings and exposures from the old work in No. 4 adit, and between this and slightly above No. 3 adit, are discussed in detail in the Annual Report of the Minister of Mines for 1933. Since then operations have proceeded with the stoping of ore-lenses below the floor of No. 3 level and above the sub-level at 62 feet below No. 3, along the dip of the vein, and for a length of about 300 feet. Some stoping in the back of No. 3 level, lateral to the main stope between No. 3 and No. 2 levels, has also been done. On a more recently discovered vein, on the hanging-wall side of the dyke which accompanies the No. 3 level vein, stoping was started 45 feet above No. 4 level and carried to a slope-height of 290 feet above No. 4 level, and 120 feet above No. 3 level or 212 feet and 87 feet vertically above these levels, at which point operations were proceeding in August, 1937.

These underground workings on the *Ben Hur* claim from No. 1, No. 2, No. 3, and No. 4 adits are on the west fault structure, with closely-spaced and acutely-angled lateral veins. No. 4 crosscut-adit at an elevation of 1,250 feet intersects this main vein-structure at 960 feet in. From the portal to about 480 feet, several small quartz veins from 2 to 30 inches wide are intersected and should receive some exploration in the direction of their possible junction with the west fault. At 480 feet from the portal a silicified shear-zone 20 feet wide, with some pyrrhotite and arsenopyrite mineralization, is worth exploration. At the end of the crosscut adit a vein has been drifted on for 380 feet north. For the first 220 feet the vein is

3 to 5 feet wide and fairly well-mineralized with galena, sphalerite, and pyrite, and sections of it may possibly make milling-grade ore. At 40 feet along the drift a crosscut-intersection stope and chute entry have been installed. Commencing 69 feet above the drift-level or 94 feet on the dip, the vein has been stoped out for 174 feet on the dip to No. 3 level along a length of about 120 feet. Some milling-grade ore may still remain in the drift-back of the stope. Below the drift-level between station 412 and the main crosscut (a length of about 220 feet) there is a possibility of developing ore along what appears to be the southerly rake of this ore-shoot. North of station 412 the drift continues 160 feet to the face, with the shearing gradually diminishing along the dyke which accompanies the vein. At about 100 feet along the drift north of the main crosscut, a winze reported to be 101 feet deep on the vein and a sub-level were inaccessible for examination.



Dunwell Mines, Ltd. Main Workings.

At 1,450 feet elevation, No. 3 crosscut adit, 200 feet higher in elevation than No. 4 adit, intersects the main vein-structure at about 450 feet from the portal. Near the point of intersection an area about 190 feet in height (vertical) and averaging about 90 feet long was stoped out in 1927 between No. 1, No. 2, and No. 3 south raises along the upward extension of the ore-shoot from No. 4 level through No. 3 level to slightly above No. 2 level. Since workings on No. 3 level were described in detail in the Annual Report of the Minister of Mines for 1933, stoping has been continued and extended south to No. 4 south raise and north to No. 2 north raise for a height of from 15 to 30 feet above the drift-level in these lateral sections. North of this, further stoping has also been done in the back of the drift north of No. 4 north raise for a length of 110 feet and for a height of from 20 to 47 feet. A small amount of stoping was also done in the drift-back north and south of No. 9 north raise for a length of 70 feet, and a few feet above the back.

The new hanging-wall stope on the hanging-wall side of the dyke and directly over and about 50 feet in the hanging-wall of the old main stope at its breast has already been referred to. This is along the junction area of this vein with the west fault. At the time of examination in August, 1937, this stope had advanced about 87 feet above No. 3 level. In the back the vein is 4 feet wide and well-mineralized with pyrite, galena, and sphalerite. A sample on the south side of this stope-breast assayed: Gold, 0.08 oz. per ton; silver, 0.2 oz. per ton; copper, trace; lead, *nil;* zinc, 0.1 per cent. A sample across 4 feet on the north side of the stope-breast assayed: Gold, 0.30 oz. per ton; silver, 0.7 oz. per ton; copper, trace; lead, 2.1 per cent.; zinc, 0.4 per cent. The stope-breast is south of the actual junction of this vein with the main north-south structure and could be extended to the north to the actual junction locality. Further exploration of the junction could be done by raising to No. 2 and No. 1 levels.

No new work has been done in No. 2 and No. 1 adits, and further exploration of intersected structures towards the north would explore possible junctions of these with the west fault on its foot-wall side.

In the southern section of the property, on the *George E.* claim, about 200 feet lower than No. 4 level, there are two old adits on the east and west side of a deep canyon. The canyon probably coincides with the west fault or main north-south structure, and marked shearing with siliceous vein-matter of appreciable width can be seen along its base, especially towards its south end on the *George E.* claim and extending into the Glacier Creek property. The old adits on the east and west sides of the canyon are probably on veins converging laterally towards the west fault on its foot- and hanging-wall sides. The portal of the adit on the east side of the canyon at 1,015 feet elevation was caved.

During the season of 1937, Art Cameron, of Stewart, with one man, carried out leasing operations on the *George E.* vein, which outcrops in the canyon-wall on the east side of the creek and in the creek-bed, about 25 feet north of the east adit portal and at 10 feet higher elevation. At this point an old open-cut along the canyon-wall, 70 to 80 feet above the adit, was excavated for a length of 70 feet to the brow of the canyon at about 100 feet higher elevation. At 1,077 feet elevation, and 10 feet south of the southerly side of this open-cut, a crosscut adit to the east for 16 feet intersects a quartz vein 6 feet wide in the face, striking north 12 degrees west and dipping 48 degrees westerly and mineralized with pyrite and some galena. An old open-cut in the south face of the main canyon open-cut at an elevation of 1,143 feet exposes oxidized vein-material. At an elevation of 1,165 feet, an adit 6 feet long in the south face of the canyon open-cut exposes a vein 18 inches wide striking north 50 degrees west and dipping 60 degrees south-westerly. A sample across 10 inches on the hanging-wall of this vein assayed: Gold, 0.16 oz. per ton; silver, 24.6 oz. per ton; copper, trace; lead, 2.8 per cent.; zinc, 1.2 per cent. It is reported by Cameron that about 25 tons of ore was mined and shipped from the open-cut in the wall of the canyon in the early days.

During the 1937 season, Cameron continued the open-cut in the canyon-wall for a length of about 80 feet along its base. This work exposes a well-defined vein 4 to 5 feet wide, well-mineralized with galena, sphalerite, and pyrite. A sample across 5.1 feet in the hanging-wall of the main vein exposed in the floor of the cut towards its south end, and mineralized with patches and blebs of pyrite, galena, and sphalerite, assayed: Gold, 0.10 oz. per ton; silver, 4 oz. per ton; copper, *nil;* lead, 2.7 per cent.; zinc, 5.4 per cent. A sample across 4.1 feet of the main vein in the floor of the north side of the cut, mineralized with massive galena and

appreciably oxidized, assayed: Gold, 0.46 oz. per ton; silver, 12 oz. per ton; copper, trace; lead, 7.4 per cent.; zinc, 0.2 per cent. From this open-cut A. Cameron mined and shipped to the *Dunwell* mill during the 1937 season 5 tons, which yielded 2 oz. gold, 39 oz. silver, and 865 lb. lead. Further exploration of this vein could be carried out by drifting north to its junction with the foot-wall of the West Fault and by raising and possibly stoping from the adit-level at an elevation of 1,015 feet.

On the west side of the canyon at 1,040 feet elevation and 60 feet north-westerly, an adit has been driven on a vein occurring on the hanging-wall of the west fault. This is about 500 feet long and was started on a vein 4 to 5 feet wide which follows a dyke and strikes north 15 degrees east and dips 50 degrees west. The working is very crooked and appears to trend to the east off the vein at 170 feet from the portal, following a slip. The vein is fairly well mineralized from the portal to the winze, a distance of about 150 feet. At the winze, said to be 57 feet deep, the vein is 3 to 4 feet wide. The main working continues along a slip on a winding course and shows shearing, calcite, and a little pyrite in the face. At 100 feet from the face a small vein is intersected. A crosscut to the west from near the face intersects a vein, which is drifted on north and south for about 100 feet. The vein is 18 inches to 6 feet wide and well mineralized in places. About 35 feet from the start of this drift the vein is 4 to 6 feet wide and well mineralized, and a sample across 5 feet assayed: Gold, 0.5 oz. per ton; silver, 17 oz. per ton; copper, trace; lead, 28 per cent.; zinc, 5 per cent. A small shoot of ore from this showing was mined out by lessees during 1934, and this working has not been examined since that time.

On the *Ben Ali* claim, adjoining the *Ben Hur* on the west, a well-defined sheared quartz vein is exposed in open-cuts and adits along a horizontal length of 350 feet and height of 250 feet. The vein strikes north 40 degrees west, dips 80 degrees south-westerly, and varies from 20 to 48 inches in width. Mineralization consists chiefly of pyrite with some sphalerite and a little chalcopyrite. This ore assays about 0.5 oz. gold and about 1 oz. silver per ton. This deposit and the workings on it are described in the Annual Report of the Minister of Mines for 1933, and mining by lessees has been intermittently carried on up to and including the 1937 season, when only a small tonnage of probable ore was evident in the workings.

Conclusion.—Examinations of the main Dunwell vein-exposures and workings have indicated a possible ore-horizon in the known veins of from 300 to 400 feet deep on the dip, raking from north to south. Its preservation in any given locality along the strike and dip of the structure is dependent on the extent of erosion which has effected the topography. In this horizon, mineral concentrations are lenticularly distributed, and appear to favour the localities of junctions of lateral veins with the west fault or with each other. Secondary enrichment of primary sulphides with silver minerals seems also to have occurred in sections of these localities.

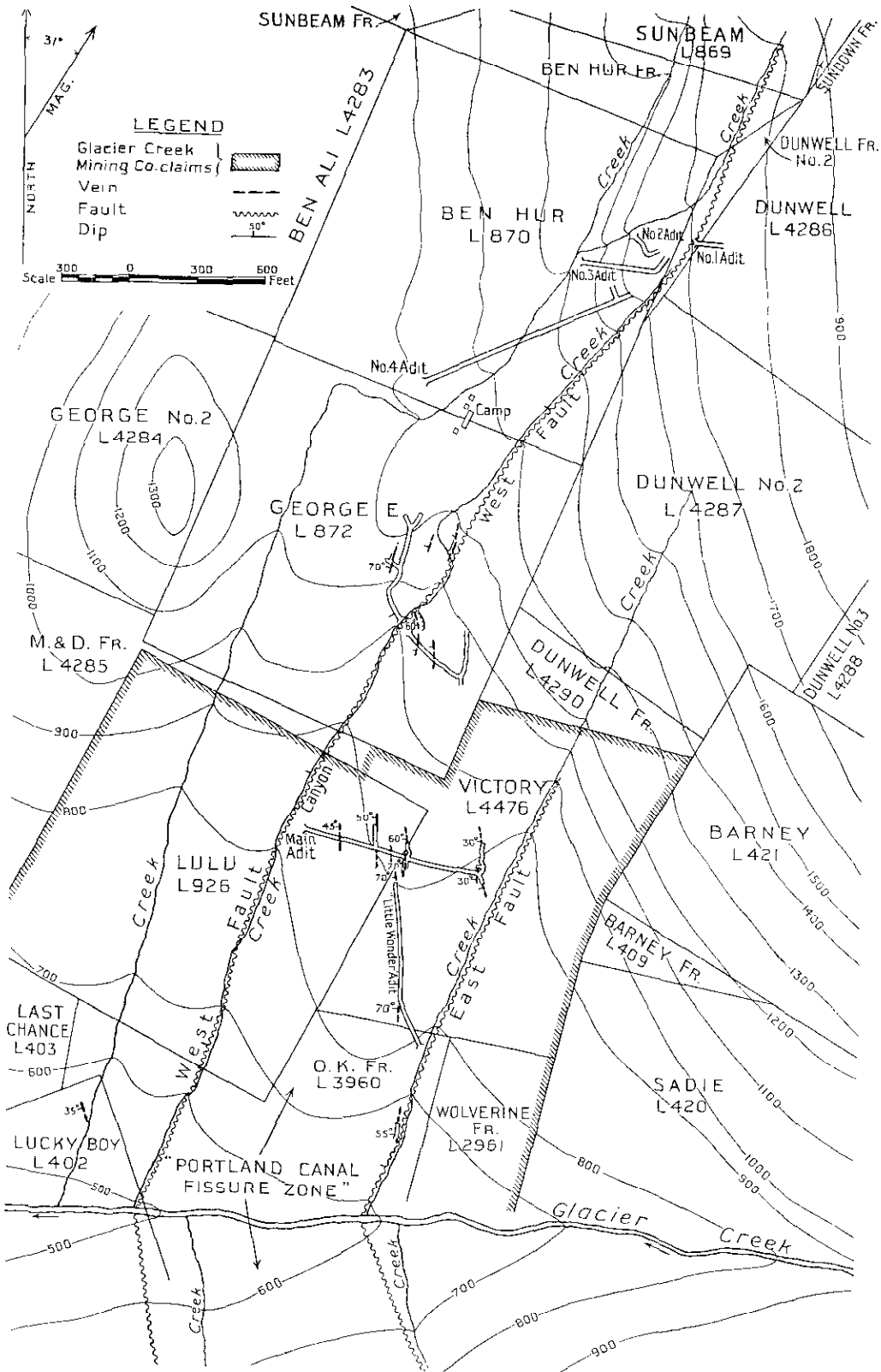
In the locality of junctions, the lateral veins appear to be dragged to more obtuse angles of strike relative to the west fault, both on its foot- and hanging-wall sides, suggesting faulting by this structure and possible relation of the veins on the foot- and hanging-wall sides. Along the extension of the lateral veins south-easterly from the foot-wall and north-westerly from the hanging-wall, the lateral vein-fracturing appears to rapidly diminish in intensity.

It is indicated that the possible zonal ore-horizon may be structurally related to and conformable with the southerly plunge of the *Ben Ali* granitic stock, which outcrops about 1,500 feet to the westward of the main *Dunwell* workings.

Glacier Creek Mining Co., Ltd.

This company was incorporated in 1909, with a capitalization of 1,000,000 shares of 50 cents par value. R. M. Stewart, of Victoria, is president and managing director, and the registered office is at 101 Pemberton Building, Victoria. The property consists of the *Nellie V.*, *Riverside*, *Last Chance*, *Lucky Boy*, *Lulu*, *Victory*, *Micmac*, *Nellie Fraction*, *O.K. Fraction*, and *Wolverine Fraction* Crown-granted claims and fractional claims, totalling 308.81 acres, on which a total of $115.25 in taxes is due to the end of 1937. It is situated on the north side of Glacier Creek, between 400 and 1,200 feet elevation, about 4½ miles by road from the town of Stewart, and adjoins the *Dunwell* on the south.

Only a very small amount of surface exploration has been done along the vein outcrops. Starting in 1910, intermittent exploration by cross-cutting, drifting, and a small amount of diamond-drilling was done on the property up to about 1925, but in recent years no work was



Glacier Creek Mining Co., Ltd., and Dunwell Mines, Ltd. Main Workings.

done until 1934. In 1934, the main crosscut adit at about 830 feet elevation was continued for about 200 feet to the intersection of a vein at 795 feet from the portal. Drifting on this vein was carried out in the early spring of 1935, and ceased in May of that year. Since that time no work has been done except for a short period of leasing by one man on the *Lucky Boy* vein.

The property is reached by the Stewart–Bear River Motor-road from the Stewart wharf to Glacier Creek bridge at 200 feet elevation, a distance of 5¾ miles. From this point the branch motor-road to the *Dunwell* mine ascending the 27-degree ridge-slope is followed for about 1 mile to 850 feet elevation, whence a wide trail extends for about a quarter of a mile to the main workings at about 830 feet elevation.

The claims are located on the thickly-timbered, benched and ridged southerly slope to Glacier Creek of the "Dunwell" hill. In the locality of the claims, the hill-slope varies from about 10 to 37 degrees and is thickly covered with glacial debris and a dense growth of underbrush between the hemlock, cedar, and spruce trees.

The mineral-deposit, consisting of quartz veins generally sparingly mineralized with pyrite, galena, and sphalerite, occurs in argillaceous sediments of the Lower Hazelton (Bitter Creek Series) group. The area embraces part of the westerly limb of an open anticlinal structure. The veins occupy shears striking north-westerly and dipping from about 30 to 60 degrees south-westerly and are partly conformable to the attitude of the formation. They are characteristically brecciated and contain unaltered fragments of the argillite wall-rock. With the exception of one vein occurring on the *Lucky Boy* claim at an elevation of 560 feet, all the known veins on this property occur between, and strike at a slight angle to, two major faults about 1,000 feet apart which strike north and dip west and constitute what is known as the "Portland Canal Fissure Zone." The *Lucky Boy* vein occurs on the west side of the more westerly fault. The structural difference between the veins on this property and those on the adjoining *Dunwell* is that, if projected, they would intersect the hanging-wall of the east fault, whereas the *Dunwell* veins intersect the foot-wall of the west fault. This difference may have influenced the process of mineralization. The projection of the *Lucky Boy* vein will intersect the hanging-wall of the west fault. Another factor which possibly affected mineralization in the locality of this property, as compared with the locality of the *Dunwell* veins, is the location of the *Glacier Creek* veins in a higher horizon of the sediments above the underlying and southerly-plunging *Ben Ali* stock. Suggestive of this is a generally less intense alteration and silicification of the argillite in the lower elevations of the hill which comprise the *Glacier Creek* property. Valley-glacier erosion has also more intensively affected the Glacier Creek valley as compared with the Bear River slope of the "Dunwell" hill. Exposures of the veins in the adits show no evidence of oxidation, leaching, or secondary enrichment; because of the small amount of back above the adits, it is not probable that this condition would alter materially towards the surface.

A feature of the area is the number of more or less parallel quartz veins varying from a few inches to several feet in width. Where exposed on the surface and in the underground workings they contain very little mineral. The best mineralization observed on the property is exposed in the main adit at approximately 830 feet elevation, along the 1935 north and south drifts, and also in the *Lucky Boy* vein.

Three adits explore the ground, the main crosscut adit at 830 feet elevation; the "Little Wonder" adit at 780 feet elevation; and a short adit on the *O.K. Fraction* at 670 feet elevation. A small amount of trenching was also done several years ago, but these surface workings are caved and overgrown with brush.

The portal of the main crosscut adit at 830 feet elevation is about 370 feet lower than the *Dunwell* No. 4 adit, and is located in the creek-canyon of the west fault, on its east side and about 90 feet from the creek. It is driven south 75 degrees east for 618 feet, thence south 82 degrees east for 177 feet to the north and south drifts. The formation is a series of bedded argillaceous sediments striking north 40 degrees west and dipping 70 degrees south-westerly. A grey lamprophyre dyke 3 feet wide cuts the formation at 480 feet from the portal and at 540 feet from the portal a feldspar porphyry dyke is intersected.

At 180 feet from the portal a reticulated and brecciated zone of quartz stringers 5 feet wide, sparingly mineralized with pyrite, is intersected. This strikes northerly and dips westerly at 45 degrees.

At 330 feet from the portal the crosscut intersects a zone of barren and brecciated quartz stringers and bands across a width of from 4 to 5 feet. This strikes northerly and dips 70 degrees westerly and constitutes the so-called "Central" vein. A drift has been driven north on it for 120 feet. In the face of this drift, the zone 6 feet wide strikes north 18 degrees west, dips 50 degrees west, and is composed of barren quartz stringers ½ to 6 inches wide.

At 390 feet from the portal a well-defined quartz vein 10 inches wide, containing some pyrite, is intersected. At 470 feet from the portal the hanging-wall of a barren crushed zone 27 feet wide is intersected. This strikes north 10 degrees east, dips 60 degrees westerly, and is composed of crushed argillite and dyke-matter with quartz and calcite stringers and veinlets mainly on the hanging- and foot-wall sides. A winding drift and crosscut for 57 feet in a north to north-westerly direction commencing on the foot-wall of this zone exposes crushed argillite with brecciated quartz and calcite stringers across a width of 4 to 4.5 feet, with no evident sulphide mineralization. In places the quartz-calcite gangue shows patches of light greenish coloration from a finely-disseminated nickel-chromium silicate, on account of which this zone is locally named the "Green" vein. At 57 feet from the crosscut, the "Green" vein drift turns to a bearing of north 10 degrees east and continues along the hanging-wall of the zone for 63 feet to the face. The face is turned to a bearing of north 7 degrees west and exposes a few stringers of quartz and calcite, mineralized very sparingly with pyrite and dipping 60 degrees west in crushed argillite.

At 795 feet from the portal, the crosscut intersects an irregular and brecciated quartzose zone 4 to 6 feet wide, generally sparingly mineralized with blebs, stringers, and sparse dissemination of pyrite, sphalerite, and galena, striking about north 20 degrees west, and dipping 30 degrees westerly. A drift south 20 degrees east for 51 feet appears to favour the hanging-wall side of this zone and exposes quartz stringers and pyritized argillite. The following samples were taken in the south drift:—

(1.) Selected sample of the best mineralization: Gold, 0.06 oz. per ton; silver, 0.08 oz. per ton; lead, *nil;* zinc, 2 per cent.

(2.) Muck from the south-drift face: Gold, trace; silver, 0.3 oz. per ton; lead, *nil;* zinc, trace.

A winding northerly drift has been driven along this zone for 198 feet, commencing with a bearing of north 22 degrees east for 39 feet, and varying for the remainder of its length between north 43 degrees west, north 20 degrees east, and north 4 degrees west at the face. It appears to favour the foot-wall and exposes irregular quartz bands, stringers, and patches, irregularly and sparingly mineralized with pyrite, sphalerite, and galena. At 39 feet from the commencement of this north drift a crosscut south 70 degrees west for 15 feet through the zone exposes the best mineralization. A sample for 12 feet along the walls and including the face of this crosscut assayed: Gold, 0.08 oz. per ton; silver, 1 oz. per ton; lead, *nil;* zinc, 4 per cent. A selected sample of the best mineralization contained in the quartz bands and stringers along the north drift assayed: Gold, 0.20 oz. per ton; silver, 5.6 oz. per ton; lead, 4 per cent.; zinc, 4 per cent.

From the face of this main adit to the boundary of the *Victory* and *Barney* claims is about 540 feet. At about 300 feet northerly from the present face of the north drift, the boundary of the *George E.* claim of the *Dunwell* property would be crossed. At about 300 feet southerly from its present face the south drift would break through to the surface. Where the north and south drifts start from the adit the vertical back is about 75 feet. Along the easterly projection of the adit towards the *Barney* claim the surface slopes upward at 15 degrees. On account of these factors, further development in the Glacier Creek Company ground from this adit is comparatively limited. On the other hand, it would offer a convenient site for further depth exploration of the *George E.* showings of the *Dunwell* company, in the favourable location of their intersection with the foot-wall of the west fault. By extension of the *Glacier Creek* north drift from the adit towards the *George E.* workings for a further distance of about 800 feet the vein would be explored further in this direction, and a back of about 200 feet would be developed below the old *George E.* adit on the east side of the creek.

At 780 feet elevation, and about 1,050 feet southerly from the portal of the main adit, the "Little Wonder" adit is located on the west side of the draw of the east fault. The adit is a crosscut driven along a bearing of north 45 degrees west in argillite striking north 15

degrees east and dipping 70 degrees westerly. At about 260 feet it intersects a sheared and crushed zone with some bands and stringers of brecciated quartz and argillite striking north and dipping 70 degrees west. This is drifted on to the north for about 500 feet, and with the exception of two short lenticular quartz bands well-mineralized with pyrite, sphalerite, and galena, it is mainly composed of crushed argillite. The face of the drift exposes the hanging-wall of the zone striking north 5 degrees east and dipping 70 degrees westerly. A crosscut to the east would intersect the foot-wall and explore the full width of the zone. The hanging-wall side of the zone exposed in the face is composed of brecciated argillite with quartz bands and stringers very sparingly mineralized with mainly pyrite. The best mineralization observed occurs in a lenticular quartz band 2 to 18 inches wide starting 90 feet south of the face. Of this, the first 30 feet of length in the adit-floor is well-mineralized across a width of 10 inches. A composite sample of this length (30 feet) across 10 inches in the adit-floor assayed: Gold, 0.28 oz. per ton; silver, 4.6 oz. per ton; lead, 6 per cent.; zinc, 8 per cent. In a small stope 15 feet long and 10 feet high in the roof of the adit a well-mineralized lenticular quartz band pinching out at both ends in crushed argillite is exposed. A composite sample of this lens in the roof of the stope assayed: Gold, 1.84 oz. per ton; silver, 4 oz. per ton; lead, 5 per cent.; zinc, 6 per cent.

A raise reported to be 65 feet high connects this drift with an upper adit reported to be 120 feet long. The latter is also connected with the surface by a raise. The raise to the upper adit is in a dangerous condition and inaccessible for examination. The portal of the upper adit could not be located and has probably caved. The raise from the upper adit to the surface was located amongst the dense underbrush, unguarded, dangerously open, partly caving, and inaccessible for examination. A back of about 110 feet is estimated from the face of the lower adit-drift to the surface.

At the portal of the lower "Little Wonder" adit three dumps of vein-material mineralized with pyrite, sphalerite, and galena, estimated to contain 1, 3, and 15 tons each, have been accumulated. It has not been ascertained from what part or parts of the "Little Wonder" workings this material originated. A composite sample of these dumps assayed: Gold, 0.56 oz. per ton; silver, 2.8 oz. per ton; lead, 5 per cent.; zinc, 6 per cent.

At an elevation of 670 feet, 100 feet above Glacier Creek and about 400 feet south of the "Little Wonder" adit, a practically barren, brecciated, and reticulated quartz zone, 10 feet wide on the hanging-wall of a felsite dyke, outcrops in argillite on the face of a bluff on the west side of the draw of the east fault. This zone strikes north 5 degrees east and dips 55 degrees westerly, and may possibly be correlated with the zone in the "Little Wonder" adit. An adit 60 feet long has been driven on it.

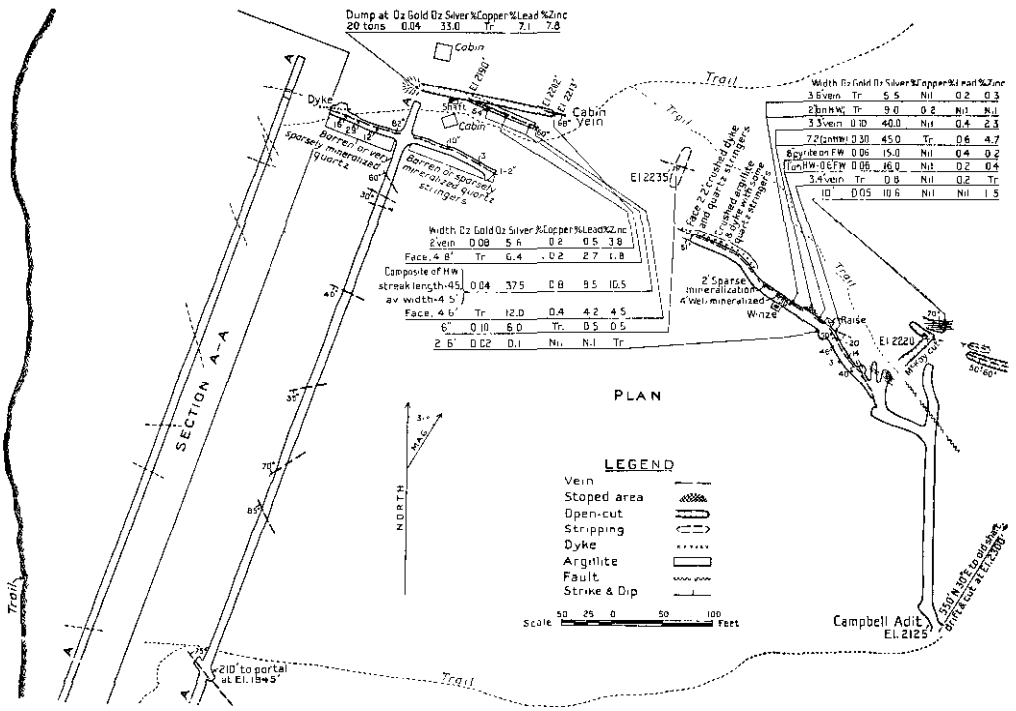
At an elevation of 560 feet, about 100 feet above the bed of Glacier Creek and about 1,400 feet south-west from the "Little Wonder" adit, the *Lucky Boy* vein outcrops in argillite for about 20 feet above the brink of Glacier Creek canyon. This vein is 2.5 feet wide, strikes north 30 degrees west and dips 35 degrees south-west. Continuity at both ends is obscured by overburden. For about 15 feet of its exposed length the vein is mineralized with massive, fine-grained galena and sphalerite across a width of 18 inches, with 12 inches of fair mineralization in a quartz gangue on the hanging-wall. A sample of the 18 inches of solid mineralization assayed: Gold, 0.06 oz. per ton; silver, 23.5 oz. per ton; lead, 58 per cent.; zinc, 16 per cent. A sample of the siliceous material on the hanging-wall across 12 inches assayed: Gold, 0.06 oz. per ton; silver, 7 oz. per ton; lead, 4 per cent.; zinc, 6 per cent.

Lakeview Mines, Ltd. (N.P.L.). This company was incorporated in British Columbia on April 4th, 1924, with registered office at 101 Pemberton Building, Victoria. It has a capitalization of $1,000,000, divided into 4,000,000 shares of 25 cents par value, of which 2,743,828 shares are reported to be issued. The holdings consist of *Lakeview No. 1, No. 2, No. 3,* and *Silver Bell Fraction* Crown-granted mineral claims, totalling 158.17 acres, on which taxes have been paid to December 31st, 1937. The property is located on the north side of Glacier Creek, east of the *Dunwell* holdings, at elevations ranging from about 2,000 to 3,000 feet above sea-level.

The property is reached by the Stewart–Bear River Motor-road from Stewart dock to the Glacier Creek bridge at 200 feet elevation, a distance of 5¾ miles. From here a branch motor-road for about 1½ miles ascends the 27-degree ridge-slope for about 1 mile to the

Dunwell mine camp at 1,250 feet elevation. From this point a well-constructed 4-foot trail on wagon-road grade extends 1¼ miles to the *Lakeview* cabin at 2,200 feet elevation.

The claims are situated on the thickly-timbered south slope of the ridge to Glacier Creek, and between about 1,000 and 2,000 feet above the creek. The ridge-slope in the locality of the claims is featured by longitudinal bench and ridge areas with an average slope of from 15 to 20 degrees, and a generally thick overburden of glacial debris and a dense growth of underbrush between the hemlock, balsam, and cedar trees. Argillaceous sediments of the Lower Hazelton (Bitter Creek Series) group on the westerly limb of an open anticlinal structure, intruded by granitic and lamprophyre dykes, underlie the property.



Lakeview Mines, Ltd. Main Workings.

Mineralization consists of quartz veins from about 1 to over 8 feet wide with galena, sphalerite, pyrite, and some grey-copper. The main (" Cabin ") vein has a general north-westerly strike and dips about 60 degrees south-westerly. It outcrops in a creek-bed immediately south of the old camp at 2,190 feet elevation. Several years ago a section of this vein was stripped and open-cut for about 100 feet and a shaft sunk in the hanging-wall. In 1928 the shaft was unwatered and crosscuts were driven to the vein at depths of 25 and 45 feet from the collar. The upper crosscut is reported to have intersected promising mineralization, consisting of galena, sphalerite, chalcopyrite, and pyrite, but the vein is reported not to be so well mineralized in the lower crosscut. In the open-cut the vein strikes north 72 degrees west and dips 68 degrees south-westerly It is from 2 to 4.8 feet wide, and is generally mineralized with pyrite, galena, and sphalerite in a quartz-gangue, with a streak of massive galena and sphalerite mineralization 10 inches wide on the foot-wall. About 1925 a long adit was driven with the objective of intersecting the vein at a depth of 250 feet below the collar of this shaft. Several narrow veins and stringers were cut in this working, and at 760 feet from the portal a vein was intersected, striking north 71 degrees west and dipping from 82 degrees north-easterly to vertical. A drift west for 75 feet exposes erratic, sparsely-mineralized quartz-lenses 12 to 16 inches wide in argillite on the south side of a felsite dyke. A drift east for 90 feet exposes only barren or sparsely-mineralized quartz stringers.

Approximately 500 feet south-easterly from the "Cabin" shaft, a shallow shaft connected with an open-cut known as the "McKay" cut was excavated several years ago. This exposes a well-defined mineralized shear 8 to 10 feet wide containing siliceous lenses, pockets, and stringers well mineralized in places with galena, sphalerite, pyrite, and tetrahedrite across widths of several inches. From these a small tonnage of high-grade ore is reported by lessees to have been shipped several years ago by McKay.

About 300 feet south of these workings and at 95 feet lower elevation, the old "Campbell" adit extends north for 262 feet. At 187 feet from the portal a crosscut to the west intersects a vein at 60 feet. A drift extends westerly along this vein for 250 feet, with a winze at 112 feet from the face and a raise for about 25 feet at 165 feet from the face, reported to have been driven in 1928. East of the intersection in the crosscut the vein appears to be faulted or dragged. Along the drift the vein is 14 inches to 4 feet in width, lenticular and consists of quartz with generally sparse sulphide mineralization. At its easterly end, in the vicinity of the crosscut, it appears to be appreciably shattered and resolves into a series of barren quartz stringers and lenses. At the intersection by the crosscut the vein strikes north 43 degrees west and dips 40 to 50 degrees south-westerly. At 90 feet from the crosscut and in the vicinity of the raise it is joined by another vein and continues along the drift to the face striking north 57 degrees west, dipping 50 degrees south-westerly, and adjacent to and associated with grey lamprophyre dyke. The best mineralization commences at about 75 feet west of the crosscut in the vicinity of the junction of the two veins and continues for about 60 feet to slightly west of the winze. Of this length about 55 feet is fairly well mineralized with galena, sphalerite, pyrite, and some tetrahedrite across widths of from 20 inches to 4 feet. Beyond this to the face the vein-fissure is erratic, not so well defined and filled mostly with dyke material and some quartz stringers. The winze 112 feet from the face was flooded and could not be examined.

About 400 feet north-easterly from the old "McKay" cut and about 100 feet higher there is an old shaft, short adit, and open-cut on a reticulated and brecciated quartz vein 12 feet wide, striking easterly in argillite. In this, some quartz stringers and streaks carrying galena and pyrite are to be seen. It is reported by lessees working on the property that some high gold assays were obtained from this showing by "old-timers" and that about 21 tons of ore was shipped. This vein is in alignment with a cross-vein 10 feet wide, exposed by shallow stripping adjacent to the "McKay" cut and mineralized with pyrite, sphalerite, and some galena. To establish continuity and correlation of these two exposures interval trenching would be required. The cross-vein adjacent to the "McKay" cut strikes east and dips 70 degrees north, and a chip sample across 10 feet assayed: Gold, 0.05 oz. per ton; silver, 10.6 oz. per ton; lead, *nil;* zinc, 1.5 per cent.

Since about 1933 the property has been operated intermittently by lessees, and further exploration in the effort to extract ore of shipping-grade resulted in the first shipment from this operation of about 13 tons, reported by H. D. Rochfort, one of the lessees, to assay about: Gold, 0.32 oz. per ton; silver, 167 oz. per ton; lead, 18 per cent. This ore came from a quartz vein about 50 feet easterly from the old "McKay" cut, where a lens 12 to 18 inches wide, well mineralized with galena, pyrite, and tetrahedrite in a quartz vein up to 4 feet wide, was stripped and open-cut for about 30 feet. This vein strikes north 70 degrees west and dips from 50 to 60 degrees south-westerly.

Work by these lessees was also carried out at that time on the main ("Cabin") vein in the open-cut at 2,190 feet elevation. From this locality a shipment of about 10 tons is reported by H. D. Rochfort to have assayed about: Gold, 0.12 oz. per ton; silver, 62 oz. per ton; lead, 12.9 per cent.

A sample taken by the writer in 1934 across 10 inches of the foot-wall streak in the main ("Cabin") vein open-cut assayed: Gold, 0.02 oz. per ton; silver, 20.15 oz. per ton; lead, 15 per cent.; zinc, 15 per cent. A sample of the hanging-wall side adjacent to this across 4 feet assayed: Gold, 0.04 oz. per ton; silver, 10.5 oz. per ton; lead, *nil;* zinc, 3 per cent. Subsequent work by lessees on the main ("Cabin") vein has centered on the extension of the open-cut for a total length of 137 feet and a drift east on the vein from the floor of the cut for 73 feet. Resultant from this work 10 tons shipped to the *Dunwell* mill is reported by H. D. Rochfort to have assayed about: Gold, 0.16 oz. per ton; silver, 40 oz. per ton; lead, 15 per cent. A further shipment of about 45 tons to the *Dunwell* mill from the main

(" Cabin ") vein is reported by H. D. Rochfort to have assayed about: Gold, 0.12 oz. per ton; silver, 52.5 oz. per ton; lead, 12 per cent.

On August 25th, 1937, two dumps of broken ore, estimated to contain about 20 tons each, were accumulated at the main (" Cabin ") vein workings. An average sample of the dump at the end of the " Cabin " adit track assayed: Gold, 0.04 oz. per ton; silver, 33 oz. per ton; copper, trace; lead, 7.1 per cent.; zinc, 7.8 per cent. The other dump in the vicinity of the cabin was composed of vein-material with similar mineralization to this.

Recent leasing operations were also carried out in the " McKay " cut. A shipment of 6.96 dry tons by A. Cameron, Stewart, to the Prince Rupert sampling plant, reported to be from this locality, assayed: Gold, 0.08 oz. per ton; silver, 30.2 oz. per ton; copper, 0.1 per cent.; lead, 8 per cent.; zinc, 4.2 per cent.; silica, 28 per cent.; iron, 23.5 per cent.; lime, 0.2 per cent.; sulphur, 27 per cent.; arsenic, 0.2 per cent.; antimony, *nil.*

In August, 1937, exploratory development-work was being done by H. D. Rochfort and one man in the " Campbell " adit at 2,125 feet elevation. In this working a section of well-mineralized vein-material about 9 feet west of the raise was being stoped from the drift-back with the object of accumulating shipping-grade ore. The stope had advanced for a length of 10.3 feet and a height of 3 feet above the drift-back. In this section the vein is 3.3 feet wide and fairly well mineralized with pyrite, sphalerite, tetrahedrite, and some galena, with a well-mineralized streak 7.2 inches wide on the hanging-wall. A sample of the vein in the stope-back across 3.3 feet assayed: Gold, 0.10 oz. per ton; silver, 40 oz. per ton; copper, *nil;* lead, 0.4 per cent.; zinc, 2.3 per cent. A sample of the hanging-wall streak across 7.2 inches assayed: Gold, 0.30 oz. per ton; silver, 45 oz. per ton; copper, trace; lead, 0.6 per cent.; zinc, 4.7 per cent.

The following additional samples were taken in this drift:—

(1.) North side, 8.4 feet west of raise, across 1 foot of the vein on the hanging-wall, plus 0.6 foot on the foot-wall, assayed: Gold, 0.06 oz. per ton; silver, 16 oz. per ton; copper, *nil;* lead, 0.2 per cent.; zinc, 0.4 per cent.

(2.) At site of (1), 8 inches of mainly pyrite on the foot-wall assayed: Gold, 0.06 oz. per ton; silver, 15 oz. per ton; copper, *nil;* lead, 0.4 per cent.; zinc, 0.2 per cent.

(3.) South side, opposite raise, across 2.6 feet, assayed: Gold, 0.02 oz. per ton; silver, 0.1 oz. per ton; copper, *nil;* lead, *nil;* zinc, trace.

(4.) North side, 4 feet east of raise, across 3.4 feet of sparsely-mineralized quartz and calcite assayed: Gold, trace; silver, 0.8 oz. per ton; copper, *nil;* zinc, trace; lead, 0.2 per cent.

(5.) North side, 15 feet west of stope, across 3.6 feet of silicified argillite and dyke with quartz stringers and disseminated pyrite, assayed: Gold, trace; silver, 5.5 oz. per ton; copper, *nil;* lead, 0.2 per cent.; zinc, 0.3 per cent.

(6.) At site of (5), 2 inches of mineralization in a streak on the hanging-wall assayed: Gold, trace; silver, 9 oz. per ton; copper, 0.2 per cent.; lead, *nil;* zinc, *nil.*

These samples and assays represent the best-defined and mineralized section of the vein observed in the " Campbell " adit.

Recent work had also been done in the main (" Cabin ") vein open-cut and adit at an elevation of 2,190 feet. This had been centered mainly in the driving of the " Cabin " vein adit as a drift south-easterly, starting from the bottom of the cut and extending for 73 feet to the face. This adit is timbered at the portal for a length of 12 feet with no back for this length. Along the drift the back increases to about 10 feet at the face. Projected for 12 feet ahead of this adit face, the back to the floor of the cut would increase to 15.5 feet. At about 17 feet beyond the adit face, the face of the open-cut rises to give a projected back at this point of 20.5 feet to the surface. Easterly from this point for a distance of about 400 feet along the strike of the vein, there is an increasing surface-gradient of only 20 per cent., which does not permit the attainment of any appreciable back at the horizon of the " Cabin " vein adit. It should also be noted that taking into consideration the strike and dip of the " Cabin " and " McKay " veins, and their relation to the topography, these two exposures cannot be correlated definitely. In this respect, however, the possibility of a cross-fault between these workings as indicated in the " Campbell " adit, should be considered.

In the " Cabin " vein drift the vein is well-defined and generally well-mineralized. Starting at 12 feet from the portal and extending for 60 feet along the drift, a band of massive

galena and sphalerite mineralization 0.5 to 8.2 inches wide and averaging 4.5 inches in width, occurs on the hanging-wall. The vein shows shearing and the walls are generally well-defined with a development of gouge, especially on the hanging-wall. In the face of the adit the fissure filling is composed of reticulated quartz veins and stringers and sheared formation 4.6 feet wide with streaks, veinlets, and patches of pyrite, galena, and sphalerite. A sample in the face, across 4.6 feet, assayed: Gold, trace; silver, 12 oz. per ton; copper, 0.4 per cent.; lead, 4.2 per cent.; zinc, 4.5 per cent. A sample across 2 feet, 41 feet from the portal, assayed: Gold, 0.08 oz. per ton; silver, 5.6 oz. per ton; copper, 0.2 per cent.; lead, 4.2 per cent.; zinc, 4.5 per cent. A composite sample of the hanging-wall band in the "Cabin" adit for a length of 45 feet and an average width of 4.5 inches, commencing at 6 feet from the face, assayed: Gold, 0.04 oz. per ton; silver, 37.5 oz. per ton; copper, 0.8 per cent.; lead, 8.5 per cent.; zinc, 10.5 per cent.

Surface continuity of the "Cabin" vein beyond the limits of the open-cut has not been definitely established. About 137 feet south-easterly a trench exposes an undelimited width of 6 inches of mineralized and oxidized quartz, assaying: Gold, 0.10 oz. per ton; silver, 6 oz. per ton; copper, trace; lead, 0.5 per cent.; zinc, 0.5 per cent.

For further exploration of the showings on this property more stripping, trenching, and open-cutting is required to establish surface continuity and possible correlation of the "Cabin" and "McKay" showings in the interval between these workings. Surface continuity of the "Cabin" vein to the west of the "Cabin" workings and of the "McKay" vein to the east of the "McKay" workings could also be investigated by means of stripping, trenching, and open-cutting. Interval trenching, stripping, and open-cutting between the "McKay" workings and the old shaft at 2,300 feet elevation, 550 feet north-easterly, could also be done to establish the possible correlation of the cross-structure at the "McKay" workings with the structure at the old shaft.

Based on the dip of the "Cabin" vein as exposed in the "Cabin" vein surface workings, it is improbable that the vein in the drift off the long crosscut at 1,945 feet elevation can be correlated with this. On the other hand, depth-projection of the "Cabin" vein and strike-correlation indicates its possible relationship with the third structure, 162 feet southerly of the drift. Between these two levels is a vertical back of 237 feet and vein-back of 313 feet. A raise on this structure from the main crosscut adit to the "Cabin" vein shaft would determine possible correlation between the two veins, establish possible depth-continuity of the "Cabin" vein, and would also explore two possible vein-intersection areas indicated as possibly occurring at about 100 and 194 feet along the projection of the raise. Any encouraging mineralization encountered in this work would require additional exploration by sub-level drifting.

From the "Campbell" adit workings, the continuation of the raise and sub-levelling from it would not only further explore the continuity of the mineralization in this section of this vein, but would also establish some clarity in structural relationship between this vein, the exposures in the "McKay" workings, and the possibly intersecting fault.

The results so far achieved by exploration of the property indicate that the objective of further exploration would be the possibility of indicating and proving a sufficient tonnage of milling-grade silver-lead-zinc ore to warrant mill-concentrator construction.

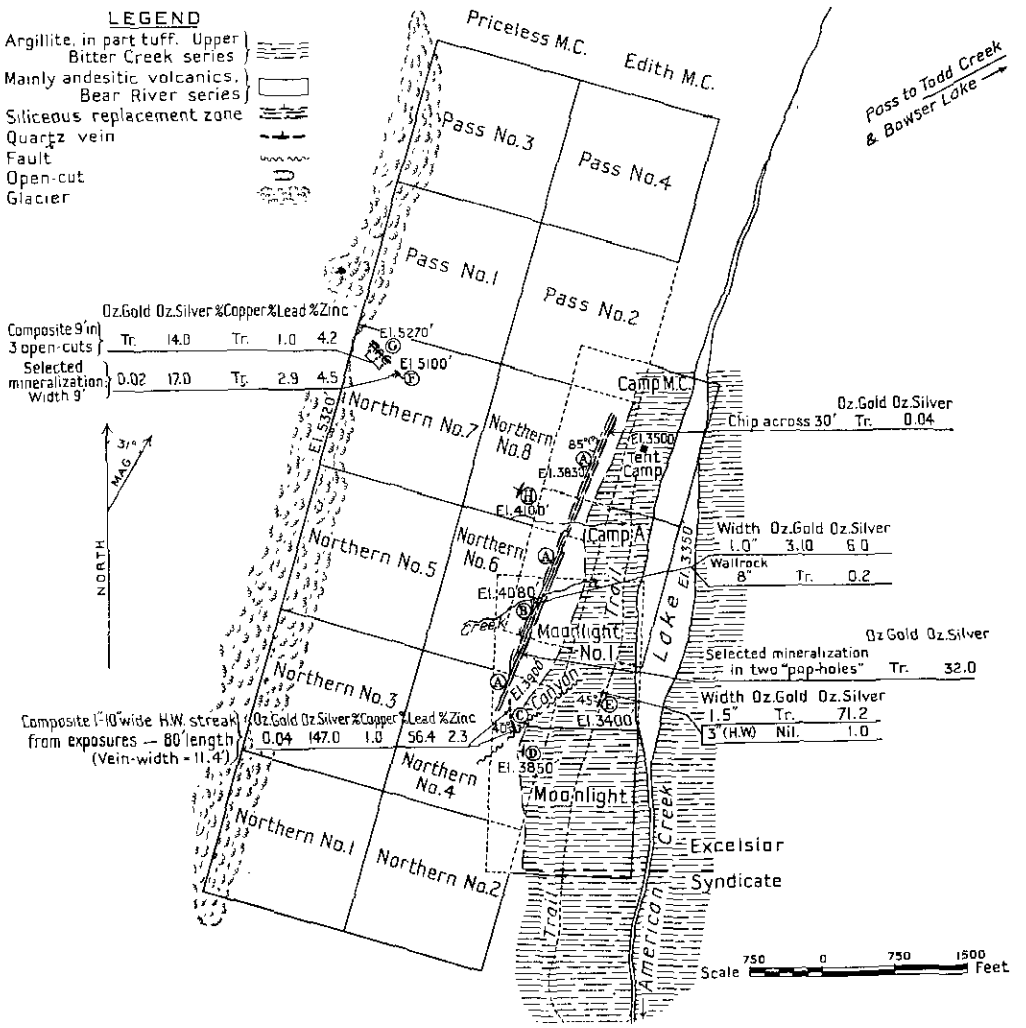
The grade of mineralization exposed on the property by exploration to the present time does not indicate the possibility for accumulation of any appreciable quantity of shipping-grade ore to assist appreciably in defraying the cost of further preliminary exploration.

American Creek Area, Stewart, Portland Canal.

North-Western Aerial Prospectors, Ltd.

This company was incorporated in British Columbia in 1930, to take over the properties of the North-Western Prospectors Syndicate. The authorized capital is $50,000, divided into 500 shares of $100 par value. The head office is at Stewart, B.C., and L. S. Davidson is the president. The property comprises the *Pass No. 1, No. 2, No. 3, No. 4, Northern No. 1, No. 2, No. 3, No. 4, No. 5, No. 6, No. 7, No. 8, Moonlight, Moonlight No. 1, Camp A,* and *Camp* unsurveyed mineral claims. The claims are situated between 3,300 and 5,400 feet elevation on the west side of American Creek, towards its head, and about 27 miles from seaboard at the Stewart dock. The topography of the area is rugged, and the locality of the claims is above timber-line, with only scattered patches of small and gnarled mountain spruce. An extensive glacier

covers the range-crest bordering the valley, and has probably receded in comparatively recent time from the valley-bottom and flanking slopes. In the locality of the claims the hill slopes generally at about 20 degrees from the valley-bottom to the crest of the range, and the slopes are covered with heavy talus, through which vertical rock bluffs protrude. Towards the valley-bottom rock knolls and benched rock ridges fronted by steep grassy slopes are features of the topography.



North-Western Aerial Prospectors, Ltd., American Creek.

The property is reached by the Stewart–Bear River Motor-road from Stewart dock to the confluence of American Creek with the Bear River, at 420 feet elevation, a distance of about 14 miles. From this point a tractor-trail extends up the west side of American Creek for about 3½ miles to the "Mountain Boy" ridge at about 1,000 feet elevation. At this point a trail gradually descends to the moraine and slide-covered valley-bottom at about 800 feet elevation, along which it continues for about 2 miles and then ascends the timbered bench to the old American Mining and Milling cabin at about 1,200 feet elevation. From this point the trail continues for 3 miles to the south margin of the American Creek transverse glacier at 1,750 feet elevation, following in turn the wet valley-bottom, then rising to the top of a muskeg-covered bench and descending again to the wet valley-bottom at the glacier, a total distance of about 8½ miles from the Bear River Motor-road. Formerly the route crossed the

moraine and glacier to its north side at about 2,250 feet elevation. With the rapid recession of the glacier this route has become impassable. At the present time the route crosses American Creek to its east side at the foot of the glacier, and the trail continues up the steep south rock-slope of the bluffy ridge buttressing the glacier-front, and locally termed "The Pimple." This is ascended by a series of short and very steep switchbacks to an elevation of 3,800 feet, a distance of about 1½ miles. From this point the trail gradually descends the north slope of "The Pimple" to the valley-bottom at 3,200 feet elevation, a distance of 2½ miles. At this point American Creek is crossed to its west side and a course of least resistance is followed, through the rocky and heavy talus-covered west flank of the valley-trough, to the tent-camp at 3,500 feet elevation on the *Camp* claim.

In 1936, in the effort to avoid the ascent of "The Pimple," a trail was constructed along the east edge of American Creek glacier at the foot of the west slope of "The Pimple." This has now become impassable on account of extensive fissuring and rock-sloughing.

The rock formations in the locality of the claims consist of sediments and volcanics of the Lower Hazelton group (Bitter Creek and Bear River series). Black calcareous argillites, argillaceous limestone, sandy argillite, and quartzite of the Bitter Creek series outcrop for a length of about 5 miles along the lower slopes up to about 500 feet above the valley-floor in an anticline plunging at the north and south ends beneath the Bear River Series volcanics. The volcanics of the higher elevations comprise tuffaceous beds at the base of the series, immediately overlying and transitional from the argillite. Above these is a complex of greenstone, in places schistose, and fine and coarse textured breccias. Rocks of porphyritic texture outcrop in irregular areas of the higher elevations and are possibly of intrusive origin. Light and dark coloured dykes intrude the sediments and volcanics.

The main mineral-showings are of four different structural and mineralogical types, and in the following text the letters A, B, C, D, E, F, G, and H refer to the showings as are indicated on the accompanying map:—

(1.) E: Quartz stringers striking north-easterly and dipping north-westerly in a narrow band of tuff, intercalated with argillite on the west limb and near the crest of an anticline, and mineralized with a silver-bearing tetrahedrite.

(2.) C and D: Siliceous replacement in a limy tuff and calcareous argillite, mineralized with galena, sphalerite, tetrahedrite, pyrite, and some chalcopyrite, striking north-westerly and dipping south-westerly.

(3.) A, B, and H: Quartz replacement in a wide fracture-zone striking northerly along the margin of the sediments and volcanics and adjacent to porphyritic rock, sparsely mineralized in places with pyrite, some sphalerite, and galena, and in one transverse quartz-calcite stringer (B) with spectacular pockets of native gold.

(4.) F and G: Siliceous replacement in sheared greenstone, mineralized with sphalerite, galena, and pyrite, striking north-westerly and dipping south-westerly.

The claims have not been prospected in detail, and since the examination of the property by the writer other mineralized showings are reported by the management to have been discovered. In the following text the showings are described from the lowest to the highest elevation.

At 3,400 feet elevation (E) on the *Moonlight No. 1* in the rock-knolled area bordering the west side of the valley-bottom three quartz stringers, 1 to 3 inches wide, mineralized in places with blebs and patches of tetrahedrite, galena, and chalcopyrite, outcrop in bands of tuff. Some work has been done on a quartz stringer 1 to 2 inches wide outcropping in a lenticular band of limy tuff about 30 feet wide between narrow beds of calcareous argillite. The argillite strikes north 27 degrees east and dips 40 degrees north-westerly. On the east side of the valley the sediments strike northerly and dip 40 degrees easterly. The quartz stringer strikes north 21 degrees east and dips 45 degrees north-westerly. It has been traced about 100 feet by three shallow open-cuts and two open-cuts 4 feet deep and 50 feet apart. A combined sample of the stringer in the bottom of the two deep cuts across a width of 1.5 inches, mineralized with some tetrahedrite, pyrite, and galena, assayed: Gold, trace; silver, 71.2 oz. per ton. A sample across 3 inches of pyritized tuff on the hanging-wall assayed: Gold, *nil;* silver, 1 oz. per ton. During the 1935 season several sacks of sorted high-grade ore from these stringers were shipped.

At an elevation of 3,900 feet, a limy tuff-bed (C), mineralized with galena, tetrahedrite, some sphalerite, pyrite, and chalcopyrite, occurs slightly west of and just above a vertical bluff that marks the crest of the underlying argillite. Adjacent and paralleling the tuff-bed on the east is a bluffed ridge of porphyritic rock. The mineralized bed occupies the gently-sloping depression between the argillite bluff and the porphyry bluffs. The tuff-bed is appreciably oxidized, the iron oxide resulting mainly from siderite or ankerite. It has been traced for about 270 feet by natural exposure and a series of small open-cuts and "pop-holes," and is best exposed up to a width of 11.4 feet along 80 feet of its southerly section. In this section a streak 1 to 10 inches wide of fairly solid galena with tetrahedrite, sphalerite, and chalcopyrite occurs on both the hanging- and foot-wall, with some cross-veinlets and blebs of mineralization extending into the central portion of the bed. A sample of selected mineralization from the hanging- and foot-wall streak 1 to 10 inches wide along the southerly 80 feet of the exposure assayed: Gold, 0.04 oz. per ton; silver, 147 oz. per ton; copper, 1 per cent.; lead, 56.4 per cent.; zinc, 2.3 per cent. To the north the possible continuity is obscured by talus. To the south, overburden obscures the possible continuity. Further continuity in this direction is possibly prevented by a probable transverse fault striking north 51 degrees east. This is marked by a deep canyon in the argillite to the north-east and a defined depression in the direction of its south-westerly projection in the volcanics. In the bluffs of the north side of the canyon several lamprophyre dykes outcrop, and the fault is further indicated by their abrupt termination and absence in the argillite of the south bluff.

At about an elevation of 3,850 feet and 150 feet southerly of the last exposure of (C) a brecciated quartz vein (D), mineralized with resinous sphalerite, galena, and chalcopyrite, outcrops in argillite along the face of the steep bluff. This was inaccessible for detailed examination, but it is reported by the management to have been traced towards the south for about 150 feet, where it tapers to 2 inches in width and appears to die.

At 4,000 feet elevation and 750 feet northerly from (C) a quartz-replacement zone (A), 50 to 75 feet wide, outcrops in the sediments and volcanics of the Bear River Series adjacent to and westerly of the argillite. Comparatively unaltered sections of the zone suggest replacement in a porphyritic rock that may be intrusive into the sediments. The zone is exposed along a hummocky bench which in places is faced on its east side with abrupt vertical bluffs extending above the adjacent sediments. It strikes north 21 degrees east and appears to dip steeply westerly into the hill. To the north from this point it can be traced by natural exposure for a distance of about 2,500 feet. The continuation of the zone to the south can be seen but was not examined. The zone consists of a network of quartz veins, patches, and stringers, with intervening partly-replaced areas. From the main body many quartz veinlets and stringers strike at acute angles into the hanging- and foot-walls. In places these lateral stringers constitute a network of appreciable width. The rock between the stringers and quartz bands is generally sparsely mineralized with disseminated pyrite. The quartz of the zone is generally "vuggy" or cellular and barren, but a sparse mineralization with pyrite and sphalerite was seen in two small sections. With the exception of a few small "pop-holes" no work has been done on the main zone. A sample of selected mineralization from two "pop-holes" in the central section of the zone, showing sparse mineralization of pyrite with some sphalerite and tetrahedrite, assayed: Gold, trace; silver, 32 oz. per ton. A chip sample across a width of 30 feet of the zone towards its north end assayed: Gold, trace; silver, 0.04 oz. per ton. For preliminary prospecting and sampling of this zone, a series of transverse open-cuts 3 to 4 feet deep would be required.

At 4,080 feet, on the south side of a creek-gulch, spectacular pockets of crystalline, arborescent native gold, were discovered in 1936 in a lateral quartz-calcite stringer (B) branching from the main replacement-zone (A) on its hanging-wall side and outcropping in the face of a small bluff flanking the creek-trough. Three stringers 1 to 4 inches wide, 4 and 15 to 20 feet apart, striking north 16 degrees east and dipping steeply westerly, outcrop in the calcareous tuff of the bluff face. The gold occurs in the central stringer in its exposure in the bluff face between 4,080 feet elevation, 20 feet above the talus and snow-filled creek-bottom, and 4,140 feet elevation at the crest of the bluff. From the crest of the bluff the stringer, 1 to 5 inches wide, can be traced southerly for 50 feet towards the main zone, where it appears to pinch out. Beyond this to the south other stringers outcrop but cannot be definitely correlated with the gold-bearing one. To the north, towards the creek, continuity

is obscured by talus and snow in the creek-trough. In the rock bluff on the north side of the creek the stringer has not been located. In the bluff face on the south side of the creek and just above the talus-slope, the stringer has been opened up by a main open-cut 6 feet wide and about 12 feet long, and in this cut the most spectacular gold-pockets were discovered. Above this and about 15 feet apart two smaller cuts have also been excavated. In the main cut on August 18th the stringer was ½ to 1½ inches in width, and consisted of calcite and "vuggy" or honeycomb quartz with sparse mineralization, mainly in the calcite, of galena cubes ⅛ inch in diameter, sphalerite, chalcopyrite, and an occasional small branch of arborescent gold. The wall-rock for about 10 inches bordering the stringer showed silicification and disseminated pyrite. A sample of the stringer in the face of the cut, across a width of 1 inch and a height of 3 feet, assayed: Gold, 3.10 oz. per ton; silver, 6 oz. per ton. A sample across 8 inches of the hanging-wall, showing silicification and disseminated pyrite, assayed: Gold, trace; silver, 0.2 oz. per ton.

In late August, 1937, 61.378 dry pounds of selected vein-material from this showing (B) was shipped to the Trail smelter and returned an assay of 387.7975 oz. gold per ton and 164.4 oz. silver per ton. An additional lot of selected high-grade material weighing 55.575 troy ounces was also shipped to Trail and treated as bullion. This was fluxed and melted, and yielded 9.825 oz. of bullion of a fineness of 667.43 parts gold and 287.6 parts silver. Subsequent to the above shipments, additional selected high-grade gold ore is reported by the management to have been mined from the stringer.

At 4,100 feet elevation and about 1,500 feet northerly of (B) a band of quartz and siliceous replacement (H), 3 feet wide, mineralized with pyrite, occurs in an outcrop of porphyritic rock. The band strikes north 21 degrees east, parallel to the zone (A) the dip is not clear, and it can be traced for only about 20 feet, continuity in both directions being obscured by talus.

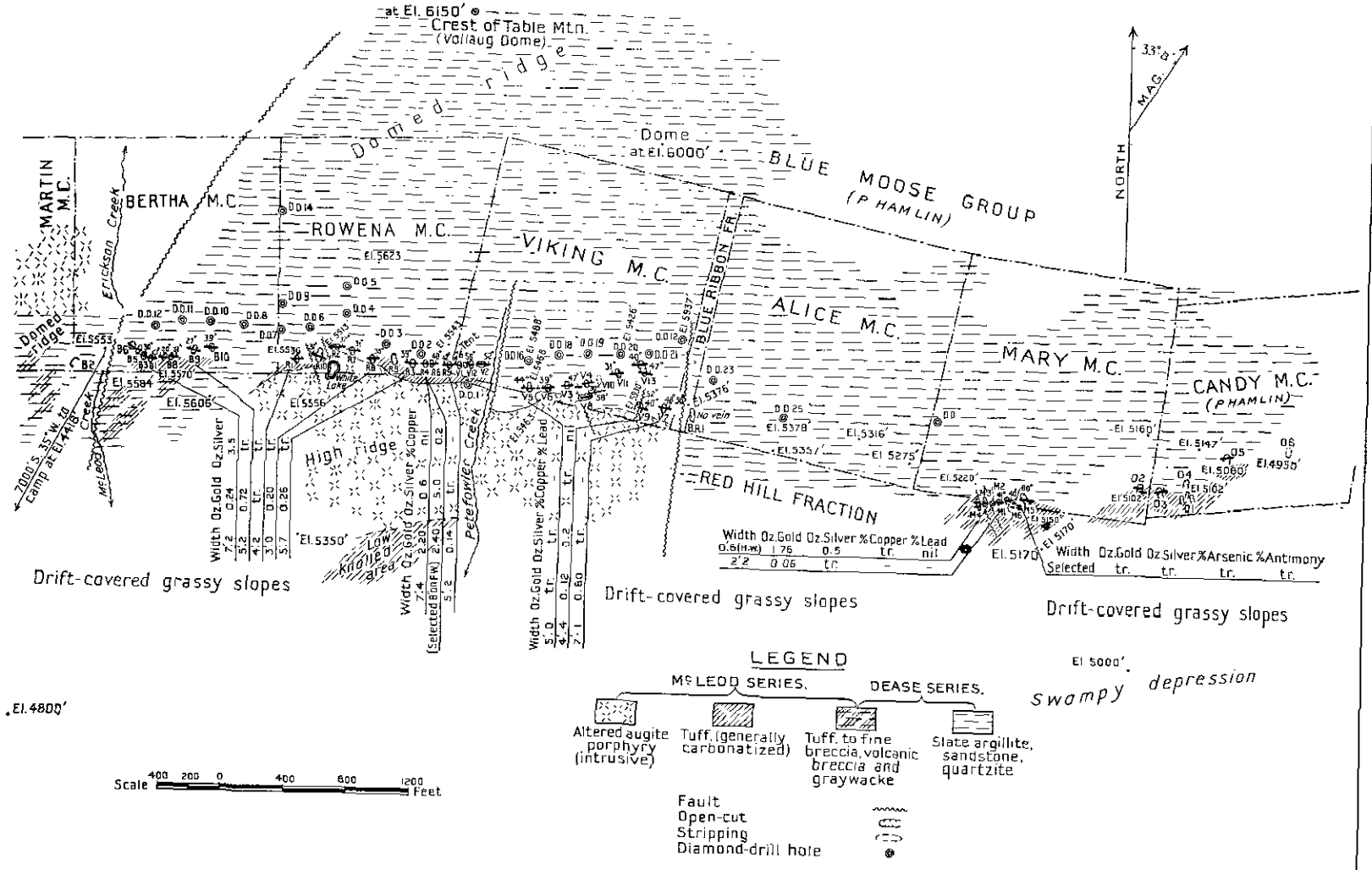
Traversing north-westerly from (H), a wide belt of coarse and fine breccias is crossed to about 5,000 feet elevation. North-westerly from this, sheared greenstones form the bluffs of the range-crest and extend to the extensive glacier which blankets the summit.

At 5,100 feet elevation on the *Northern No. 7*, about 1,725 feet north-westerly from (H), a quartz-replacement zone (F) in sheared greenstone, mineralized with streaks and blebs of resinous sphalerite, some galena and pyrite across 9 feet, outcrops at the base of a vertical bluff. The attitude of the zone is not clear, but it appears to strike north 39 degrees west and dip steeply south-westerly. To the south-east the possible continuity is obscured by talus, and towards the north-west the vertical bluff face does not permit examination.

At the crest of the bluff, between 5,260 and 5,270 feet elevation and about 225 feet north-westerly from (F), three open-cuts (G) along a distance of 60 feet expose a zone with mineralization across 4, 5, and 17 feet, similar to that seen at (F), in sheared greenstone. In these cuts the mineralized zone strikes north 49 degrees west, but the dip is not clear. A composite chip sample from the three open-cuts, representing an aggregate width of 9 feet, assayed: Gold, trace; silver, 14 oz. per ton; copper, trace; lead, 1 per cent.; zinc, 4.2 per cent. The zone can be traced from near the edge of the bluff at its south-east extremity to 20 feet north-westerly of the most westerly cut, a total distance of 80 feet. At its north-westerly end it is not so well defined. This zone cannot be definitely correlated with the showing (F) at the foot of the bluff from which it is offset to the north. Continuity to the south-east is prevented by the inaccessible bluff face and to the north-west is obscured by talus and the adjacent glacier of the summit.

McDame Creek Area.

Vollaug Group. This group, comprising the *Martin*, *Bertha*, *Rowena*, *Viking*, *Blue Ribbon Fraction*, *Alice*, *Mary*, and *Sunrise Fraction* mineral claims, is owned by John Vollaug and Hans Erickson, of McDame Creek. The claims are staked from east to west, between about 5,100 and 6,000 feet elevation along the ridged and domed crest of Table Mountain, which flanks the headwaters basin of McDame Creek on the south. The three westerly claims straddle the west shoulder of the mountain, sloping northerly to McDame Creek and southerly to the Cottonwood River and Pooley Creek, tributaries of Dease River. The easterly claims occupy the southerly slope of Table Mountain to Pooley Creek.



Vollaug Group, Table Mountain, McDame Creek.

The claims were staked on the discovery of a gold-bearing quartz vein made by Vollaug and Erickson in the autumn of 1935. In the autumn of 1936 the group was optioned by the Cassiar Syndicate, composed of Victoria, B.C., interests. Later in that year this syndicate transferred its option to the Consolidated Mining and Smelting Company of Canada, Limited. During the 1937 season the Consolidated Company carried out extensive exploratory-work on this group and a number of adjoining and contiguous claims, embracing a total of about eighty-nine optioned and staked mineral claims. At the conclusion of this work at the end of the 1937 season, the Consolidated Company relinquished its options.

The claims are reached by a good trail extending for 7 miles from the Consolidated Company camp at 3,070 feet elevation, on the south shore of McDame Lake, to the Consolidated *Vollaug* camp at 4,418 feet elevation, at timber-line on the south-westerly slope of Table Mountain. From McDame Lake (3,054 feet elevation) this trail extends south-westerly for about 2 miles along a comparatively level, gravel bench, lightly timbered with jack-pine, with one intervening swamp, and skirts the north-westerly shore of Callison Lake at 3,259 feet elevation. At this point it turns south for about 1½ miles and ascends the draw of "Aeroplane Pass" to 3,670 feet elevation, from where a branch trail descends the west slope of Table Mountain to the aeroplane landing at Cook Lake, in Machita Pass. From 3,670 feet elevation, the main trail continues southerly for about 2 miles up "Aeroplane Pass" to 4,100 feet elevation on the slope of the Cottonwood River, from which point it extends easterly and north-easterly for 1½ miles to the Consolidated Company *Vollaug* group ten-camp at 4,418 feet elevation. From the camp a trail extends about 7,000 feet north 35 degrees east to the west showings on the *Bertha* claim at 5,550 feet elevation on the divide between McLeod and Erickson Creeks. The upper elevations above timber-line on Table Mountain are composed of open meadows and comparatively gentle slopes to the ridges and domes, and can be conveniently traversed without the necessity for trail construction.

The tent-camp was well equipped and was serviced with radio broadcasting and reception apparatus, operated by Gordon Wightman, which enabled communication with the lower camp on the *Crawford* group at McDame Lake. Direct and continuous radio communication was also maintained between the "Vollaug" Table Mountain camp and Carcross, Yukon Territory, Atlin, McDame Post, Dease Landing, Telegraph Creek, and Prince Rupert, and indirectly through Anyox with Trail. The operation was also continuously serviced with equipment and supplies by means of aeroplane transportation carried out by Northern Airways from its bases at Carcross and Atlin, with landings at McDame, Cook, and Vines Lakes. Two pack-horses with Indian packers were utilized for transportation from the aeroplane landings to the camp and operations.

Table Mountain is a prominent block and domed ridge bearing north-easterly on the south-easterly side of the headwaters of McDame Creek and westerly of Friendlison Creek. The lower slopes are lightly timbered to about 4,450 feet. Above this are swampy meadows with the grassy slopes of ridges and domes rising to the crest at Vollaug Dome, about 6,150 feet elevation. On its north-easterly side the mountain slopes fairly steeply towards a block or step bordering the McDame Creek trough. Above this, a longitudinal rock-bluff scarp fringes the crest. The south-westerly shoulder of Table Mountain is also block-stepped, with the bases of the steps or blocks sloping gently towards Machita Pass and draining into the Cottonwood River. On its southerly side, the rock-bluff scarp of a medial, domed ridge rises to 5,575 feet elevation. Below this are block-steps with gentle slopes extending to the trough of Pooley Creek, draining south-easterly to the Dease River, and bounded on the south-west by the prominent peak of Petefowler Mountain (Needle Point), 6,675 feet elevation, and Wightman Ridge. Prominent in the topography of Table Mountain on its northerly and southerly sides are the longitudinal, swampy, shallow depressions, and step or block flats flanked by scarps, striking north-easterly. In correlation with the structure of the rock formation, these topographic forms may be interpreted as the locales of major strike-faults. Several transverse or dip faults are marked by transverse depressions with minor scarps and saddles in the ridges. The higher elevations of Table Mountain in the region of the *Vollaug* group are covered with shallow soil and light rock overburden. In the depressions between the ridges and along their bordering slopes, the overburden is moderately heavy and deeper.

The area of the claims is situated about 6 miles east of the main eastern contact of the Cassiar granodiorite batholith, of probably pre-upper Cretaceous age. In this section the

contact crosses the Dease and Cottonwood Rivers and strikes north about 1 mile west of Petefowler Mountain (Needle Point) to Twin Peaks. Dease series sediments of Palæozoic to possibly Mesozoic age underlie the higher elevations of Table Mountain and embrace its crest at 6,150 feet elevation on Vollaug Dome. A complex of mainly igneous rocks, which on account of their structural and lithological aspects may be correlated with the McLeod series of Mesozoic age, underlie the lower slopes of Table Mountain on its north-westerly, west, and south-westerly sides. On the north-westerly slope these extend from the west side of Erickson Creek gully to McDame and Callison Lakes. On the westerly and south-westerly side of Table Mountain the igneous complex underlies the slopes to Machita Pass and the headwaters of Pooley Creek (" Aeroplane Pass ") and extends about 4½ miles south-west to Petefowler Mountain (Needle Point) and Wightman Ridge. To the south-east a broad belt of mainly igneous rocks of the McLeod series, with some sediments, occurs south-east and south of the headwaters of Friendlison Creek, and embraces the rugged area of Ellamadge Mountain (" Greenstone Mountain "), which forms the dividing range between Pooley Creek trough on the west side and Hunter Creek trough on the east.

The Dease series sediments of the higher elevations of Table Mountain in the region of the *Vollaug* group consist of black to brownish and grey thinly-bedded shale and slate; black to greyish calcareous and sandy argillite; buff and grey bedded quartzite, and some thin beds of greyish-brown fine-grained sandstone. On account of the lithological similarity of these sediments with the Dease series occurring in other sections of the McDame Creek area, the sediments underlying the higher elevations of Table Mountain in the locality of the *Vollaug* group have been correlated with the Dease series. In the Table Mountain area they strike generally slightly north of west and dip northerly at moderate angles. Locally they are gently folded, and on the crest the slates and interbedded sandstone dip flatly south with the sandstone exhibiting crumpling and the slates pronounced crenulation. The axial planes of the crenulations incline towards the north.

The igneous rock-complex underlying the higher and lower slopes of Table Mountain encircle the sediments of the crest area on at least three sides. On the higher slopes in the locality of the claims and adjacent to the mineral deposit, they are composed of carbonatized tuffs with rusty outcrops; partly bedded fine-grained agglomerate or volcanic breccia; siliceous graywacke; altered tuffaceous flow-rocks; and fine-textured altered porphyritic rocks. The tuffs are composed of a fine-grained complex of secondary minerals in which calcite is a dominant constituent. Locally, they show a suggestion of bedding and are transitional into fine-grained agglomerate or volcanic breccia and graywacke. The agglomerate or volcanic breccia is composed of rounded to angular fragments of volcanic rock in which " ghosts " of feldspar laths appear. The cementing medium is generally relatively meagre and may be either volcanic dust or flow material. The graywacke is a medium- to fine-grained dark grey to black rock containing abundant dark quartz-grains. Locally it contains pyrite specks or rusty cavities from the oxidation of this mineral.

The tuffaceous flow-rock is highly altered greenstone in which the texture is mostly obliterated by alteration in which carbonatization is dominant. The porphyritic rocks possess a granular texture and no evident flow texture. The materials composing them are mainly formed by alteration, and consist of abundant carbonate, smaller amounts of epidote, chlorite, iron oxide, kaolin, and fine-grained quartz. The carbonate and epidote have replaced feldspar laths, and some quartz suggests recrystallization of original quartz. Other phases are a mainly highly-altered complex of calcite, decomposed feldspar, chlorite, epidote, and kaolin, in which the outlines of original feldspar laths can be discerned. Locally in its areal distribution, the borders of the rock are characterized by bands of clean talcose soapstone up to several feet in thickness. The rock is now a carbonatized greenstone and may have originally been an instrusive possessing the composition of dacite or augite porphyry. The rock of the north peak of Petefowler Mountain is composed of fine flakes of actinolite, with granular aggregates of zoisite, epidote, chlorite with actinolite, and feldspar with some grains of clear orthoclase, probably constituting a basic igneous rock. The south peak of Petefowler Mountain consists mainly of altered andesite.

The contacts of the porphyritic rocks are generally definite and sharp. The margins of the invading rock are fine-textured and dense, with only a small degree of assimilation in

places. Locally the invaded sediments are hardened or silicified, and the cleavage or bedding obscured or obliterated.

In the Table Mountain area, the tuffaceous rocks are distributed in " en echelon " bands or beds intercalated in the flow-rocks or unconformably along the subjacent contacts of the intrusive porphyritic rocks. On account of the lithological similarity this igneous complex is correlated with the McLeod series of other sections of the McDame Creek area.

In the Table Mountain area, especially in the locality of the workings on the *Vollaug* group, the distribution and structural relation of the Dease sediments and the McLeod igneous rocks indicates severe structural complication. Here, the " Vollaug " vein, conforming in attitude to the argillite and slate, occupies the border between the sediments on its hanging-wall and the tuffs, tuffaceous sediments, and subjacent flows and porphyritic rocks on its foot-wall. The Dease sediments overlie the McLeod igneous complex along the strike of the vein. On the crest of the mountain at Vollaug Dome, the slates are pronouncedly crenulated and slightly overturned to the south. On the northerly and southerly slopes of Table Mountain, the projected dip of the Dease sediments also overlies the McLeod series. This structure is not definitely interpreted, but field evidence indicates that it probably resulted from a major thrust-fault striking easterly and dipping northerly, approximately conformable to the bedding, with the " Vollaug " vein now occupying approximately the plane of the thrust. The first north-slope scarp probably marks the locale of a later reverse diagonal fault striking north-easterly and dipping north-westerly, which would elevate the depth-projection of the vein in the north or upthrow block of this fault. Fault breccia occurs on the projection of this fault in the saddle of the west shoulder at the divide between Erickson and McLeod Creeks, and the vein adjacent to the fault on its east or downthrow side is pronouncedly crumpled, dragged to the north and terminates. It has not been located west of this fault. On the northerly slope of Table Mountain, towards the trough of McDame Creek, the scarps and block topography indicate the possible recurrence of normal or reverse parallel longitudinal faulting, possibly along planes of incompetence between the tuffs and crystalline igneous rocks of the McLeod series. On the southerly slope of the mountain toward Pooley Creek the scarped topography also indicates parallel, step longitudinal faulting. Several minor transverse faults and one minor longitudinal wedge-fault dislocate the vein along its strike.

The mineral deposit is a quartz vein that has been traced for 3,400 feet across the *Bertha, Rowena,* and *Viking* mineral claims by means of natural outcrops and a series of thirty open-cuts and trenches. In this stretch between cut B6 (5,550 feet elevation) on its west end and cut V7 (5,379 feet elevation) on its east end, which constitutes the westerly section of the workings, the exposed vein varies from 0.5 to 9.5 feet in width and averages 4.9 feet in width. About 120 feet east of cut V7, the easterly continuity is intersected by a transverse fault. At the west end, west of cut B6, the vein terminates at the diagonal fault occupying a saddle in the west shoulder of the mountain at the divide between McLeod and Erickson Creeks.

Along the line of strike for 2,120 feet easterly of cut V7 to 5,150 feet elevation at the south boundary of the *Mary* mineral claim, there are no surface exposures, and in this section the vein-outcrop is probably offset into the *Red Hill Fraction* south of the south boundary of the *Alice* claim. In a series of trenches, cuts, and outcrops at 5,150 feet elevation along the south boundary of the *Mary* claim, quartz stringers varying from 8 inches to 2.2 feet in width are exposed in the cuts, and a few irregular, dense quartz veins and lenses outcrop adjacent to the cuts on the south. East of this, on the slope of Friendlison Creek, there is an increasingly thick covering of overburden, and at the time of examination in July, only quartz stringers 4 to 10 inches in width had been exposed in some of the trenches. The narrow quartz exposures in the stretch east of cut V7 are possibly in alignment with the strike of the structure in the westerly section west of cut V7, and probably represent the dispersal phase of the vein in a wide belt of sediments, tuffaceous sediments, and tuffs. Several small transverse faults and one small longitudinal wedge-fault intersect the vein along its strike and are indicated on the map.

The vein occurs in the plane of a thrust-fault which, at its outcrop, occupies a defined but flat trench on or near the boundary of the McLeod igneous rocks and the Dease sediments, and has resulted in the thrusting of the older sediments over the younger igneous rocks.

The vein outcrops wholly or partly in the argillite. Sediments or partly sediments would constitute the major proportion of the host-rock. The hanging-wall rock is argillite and arenaceous argillite. Along the strike of the vein the footwall-rock varies from argillite to siliceous graywacke, fine-grained agglomerate or volcanic breccia, and carbonatized tuff, with locally adjacent tuffaceous flow-rocks and, in one section, an adjacent stretch of fine-textured, probably intrusive, porphyritic rock. The tuffaceous rocks of the foot-wall appear to be distributed in lenticular "en echelon" beds. Both the immediately adjacent hanging- and foot-wall rocks are pronouncedly crushed and crumpled, and locally, bands of foliated schist and talcose soapstone occur, transitional into greenstone and altered porphyritic rock.

The vein is best defined and more regular in width along a stretch of 2,500 feet of its westerly section. In this section, between cut R1 and V7, a boss-like mass of porphyritic, probably intrusive, rock is adjacent to it on its footwall-side. In the wider areas of argillite, and especially in the carbonatized tuff, it tends to disperse in stringers. This occurs in some short sections along the outcrop of the best-defined west section of the vein, but appears to prevail to a pronounced degree along the projection of the structure in the wide area of sediments of the east section, east of cut V7. Interpretation of this structure indicates a degree of lenticular quartz distribution along the strike of the vein and the dependence of continuity down the dip upon the relative distribution in depth of the sediments and competent tuffs and adjacent crystalline intrusives.

The general strike of the vein is slightly north of west, but in short distances different sections, exclusive of those portions disturbed by faulting, vary in strike between north 74 degrees west and south 86 degrees west. In the undisturbed portions of the vein the dip also varies along short distances between 30 and 61 degrees northerly.

The vein-filling consists of bone-white quartz with some phases tending to a cloudy-dark and blackish discoloration from included black, graphitic argillite particles and streaks. The quartz is generally barren of sulphides, but locally contains a very sparing mineralization of pyrite, chalcopyrite, tetrahedrite, and galena in scattered small blebs. A pronounced ribbon-structure is a typical characteristic of the vein, and fine flakes of native gold occur in the ribbons of some sections. In some sections of the outcrops, the ribboned sections alternate with dense white quartz sections, and occur on both the hanging-wall and foot-wall side or in the central section. Under the magnifying glass, fine veinings of a darker-coloured and glassy quartz can be seen cutting the main quartz mass and each other and frequently parallel the ribboning. This suggests more than one period of quartz deposition. In some of the best-defined sections of the vein the quartz is also frequently interlayered with streaks, bands, and lenticular masses of slate, graphitic argillite, tuffaceous sediments, and carbonatized tuff, from a fraction of an inch to over a foot in width. This suggests that the tendency of the vein to disperse and "stringer-out" prevails also in the more solid sections, and a rapid transition from a confined or compact condition of the vein to a dispersal in stringers could readily occur where control is lacking.

At the time of examination by the writer in July, the vein was being explored by the Consolidated Mining and Smelting Company of Canada, Limited, by means of trenching, stripping, open-cutting, and diamond-drilling, under the direction of McLeod White, assisted by H. S. Fowler. The locations of the diamond-drill holes completed at the time of examination are shown on the map. The following tabulation describes the vein exposures and relative conditions in the various surface workings along the outcrop from west to east, as indicated on the map:—

B2—Elevation 5,590 feet. Trench in argillite. No vein.

B6—Elevation 5,550 feet. Ribboned and sheeted quartz vein 2 feet wide, with bands of slickensided graphitic argillite. Fine gold flakes in the ribbons. Vein somewhat shattered and pronouncedly dragged to north. Hanging-wall badly crushed argillite; foot-wall badly crushed argillite and tuffaceous sediments.

B5—Elevation 5,565 feet. Badly shattered and crumpled ribboned quartz vein and stringers across 1.5 feet. Hanging-wall crushed carbonatized tuff with green patches and streaks of fuchsite. Foot-wall badly crushed slate and arenaceous argillite.

B3—Elevation 5,570 feet. Sheeted and ribboned quartz vein 4 feet in width with interlayered bands of rock. The vein strikes north 41 degrees west and dips 30 degrees north-

easterly. Hanging-wall crushed and decomposed argillite; foot-wall crushed and decomposed carbonatized tuff.

B1—Elevation 5,570 feet. Sheeted and ribboned quartz vein 7.2 feet wide, with interlayered bands of slate 6 inches in width. Flakes of native gold occur in the ribbons on the hanging-wall side with some specks of chalcopyrite with malachite and azurite. The vein strikes south 83 degrees west and dips 27 degrees towards north. Hanging-wall is crushed and decomposed argillite; foot-wall not exposed. A sample across 7.2 feet assayed: Gold, 0.24 oz. per ton; silver, 3.5 oz. per ton.

In a trench 12 feet long and 1.5 feet deep, 10 feet easterly of B1, the foot-wall section of the vein is exposed.

In an open-cut 108 feet easterly of B1, the vein is 5 feet in width and similar in character, and strikes north 78 degrees west and dips 20 degrees north-easterly.

B8—Elevation 5,568 feet. Sheeted and ribboned quartz vein, strike north 78 degrees west, dip 31 degrees north-easterly, 7 feet wide, with interlayered bands of slate from 6 to 12 inches wide. Fine native gold flakes occur in a ribboned section on the hanging-wall side with some tetrahedrite, malachite, and azurite. Hanging-wall rock is not exposed; foot-wall is a crushed, fine agglomerate or volcanic breccia transitional from a fine-textured carbonatized tuff.

B9—Elevation 5,560 feet. Sheeted and ribboned quartz vein 9.5 feet wide with some, though diminished, interlayered bands of slate. Fine flakes of native gold occur in the ribbons. Blebs of chalcopyrite and tetrahedrite with malachite and azurite also occur. The vein strikes north 49 degrees west and dips at 27 degrees towards north-east. The hanging-wall is crushed argillite; the foot-wall is crushed, fine agglomerate or volcanic breccia. A sample across the vein for 5.2 feet assayed: Gold, 0.72 oz. per ton; silver, trace.

B10—Elevation 5,560 feet. Vein offset from B9 by a possible transverse fault. Quartz vein 1.9 feet wide pronouncedly interlayered with graphitic, arenaceous argillite with quartz stringers. The vein strikes north 87 degrees west and dips at 39 degrees northerly. Hanging-wall is crushed argillite; foot-wall is crushed argillite with fine agglomerate and volcanic breccia bordering it at 30 feet to the south.

For 400 feet east of B10, between B10 and cut R1, the terrain is underlain by mainly carbonatized tuff and argillite. From R1, for about 2,400 feet easterly, the exposed vein is adjacent on its foot-wall side to a boss of intrusive porphyritic rock.

R1—Elevation 5,535 feet. Compact quartz vein 4.2 feet wide with pronounced ribbon-structure and some sparse specks of tetrahedrite. The strike is north 67 degrees west and dip 32 degrees north-easterly. The hanging-wall is crushed argillite; the foot-wall is crushed and decomposed calcareous argillite adjacent on the south to quartzite, graywacke, foliated schist, greenstone, and intrusive porphyritic rock. A sample across 4.2 feet assayed: Gold, trace; silver, trace.

R10—Elevation 5,510 feet. Compact quartz vein 5.1 feet wide; pronounced ribbon-structure on hanging-wall and foot-wall sides. No evident mineralization. Hanging-wall decomposed argillite; foot-wall not exposed, but adjacent are volcanic and intrusive porphyritic rocks.

R2—Elevation 5,513 feet; 140 feet north-easterly from R10. Compact quartz vein 3.9 feet wide with moderate ribbon-structure. No evident mineralization. The strike is north 82 degrees west and dip 37 degrees north. On hanging-wall is micaceous foliated altered rock; on foot-wall is crushed siliceous and calcareous material transitional at 30 feet to the south into graywacke and at 60 feet into greenstone and intrusive porphyritic rock.

R7—Elevation 5,520 feet. Compact quartz vein 3 feet wide, with ribbon-structure across 1.5 feet on the hanging-wall. The strike is north 77 degrees west and dip 31 degrees northerly. The hanging-wall is crushed argillite, the foot-wall is impure quartzite with quartz and calcite stringers, adjacent to greenstone and intrusive porphyritic rock.

R8—Elevation 5,520 feet. Compact quartz vein 3.2 feet wide with defined ribbon-structure. No evident mineralization. The strike is north 77 degrees west and dip 36 degrees northerly. The hanging-wall is crushed calcareous argillite; the foot-wall is impure quartzite adjacent to greenstone and intrusive porphyritic rock. A sample across 3.2 feet assayed: Gold, 0.20 oz. per ton; silver, trace.

R9—Elevation 5,515 feet. A quartz stringer 6 inches wide. The hanging- and foot-wall is composed of crushed and oxidized material.

R3—Elevation 5,530 feet. Well-ribboned quartz vein 5.7 feet in width, slightly interlayered with argillite. No evident mineralization. The vein strikes north 74 degrees west and dips at 39 degrees north-easterly. The hanging-wall is crushed, calcareous argillite; the foot-wall is impure quartzite with some specks of chalcopyrite and malachite stain, adjacent to greenstone and porphyritic rock. A sample across 5.7 feet assayed: Gold, 0.26 oz. per ton; silver, trace.

R4—Elevation 5,527 feet. Well-ribboned quartz vein 7.4 feet in width, slightly interlayered with rock. Fine flakes of native gold occur in the ribbons of a section 8 to 12 inches wide on the foot-wall, accompanied by blebs of chalcopyrite, galena, tetrahedrite, and azurite. The vein strikes north 74 degrees west and dips at 39 degrees northerly. The hanging-wall is crushed slate; the foot-wall is crushed impure quartzite, adjacent to a micaceous foliated rock with some talcose soapstone transitional into greenstone and porphyritic, instrusive rock. A sample across 7.4 feet assayed: Gold, 2.20 oz. per ton; silver, 0.6 oz. per ton; copper, *nil.* A selected sample across 8 inches of the ribboned section with azurite, on the foot-wall, assayed: Gold, 2.40 oz. per ton; silver, 5 oz. per ton; copper, 0.2 per cent.

R6—Elevation 5,527 feet. Compact and well-ribboned quartz vein 5.7 feet wide. Some blebs of chalcopyrite with malachite on foot-wall. The vein strikes north 77 degrees west and dips 40 degrees northerly. Hanging- and foot-wall rocks are the same as at R4.

R5—Elevation 5,523 feet. Compact, ribboned quartz vein 7.9 feet in width. In well-ribboned section 3.5 feet wide in centre, fine flakes of native gold occur in some ribbons with chalcopyrite and malachite. The vein strikes south 88 degrees west and dips 42 degrees northerly. The hanging-wall is crushed arenaceous argillite; the foot-wall is crushed siliceous agglomerate with quartz stringers immediately adjacent to the vein. Adjacent to this on the south is micaceous, foliated rock, transitional into greenstone and porphyritic intrusive rock.

V1—Elevation 5,520 feet. Compact, well-ribboned quartz vein, 4 feet in width. The vein strikes north 84 degrees west and dips 61 degrees northerly. The hanging-wall rock is not exposed, but argillite and sandstone occur in the bluffs about 100 feet to the north; the foot-wall is crushed, transitional agglomerate and graywacke adjacent to greenstone and porphyritic rock. Thirty feet east of V1, a pit 3 feet deep shows quartz in the bottom.

V12—Elevation 5,510 feet. Compact, ribboned quartz vein 4 feet in width, well-ribboned across 2 feet on the foot-wall. Fine flakes of native gold occur in the ribbons. Sparse blebs of chalcopyrite and tetrahedrite. The vein strikes north 82 degrees west and dips 56 degrees northerly. The hanging-wall is crushed and decomposed argillite; the foot-wall is the same as at V1.

V2—Elevation 5,500 feet. Well-ribboned quartz vein 5.2 feet wide; interlayered on the hanging-wall with 10 inches of argillite and a band of quartz 12 inches wide. The vein strikes north 87 degrees west and dips 52 degrees northerly. Adjacent to the hanging-wall is arenaceous argillite; adjacent to the foot-wall the rocks are as at V12 and V1. A sample across 5.2 feet assayed: Gold, 0.14 oz. per ton; silver, trace. East of V2 is the draw of a transverse fault.

V5—Elevation 5,468 feet. Compact, well-ribboned quartz vein 5 feet in width. No evident mineralization. The vein strikes north 87 degrees west and dips 44 degrees northerly. The hanging-wall is crushed argillite; the foot-wall is siliceous agglomerate and graywacke adjacent to greenstone. A sample across 5 feet assayed: Gold, trace; silver, trace. East of and between V5 and V6 the vein outcrops along a low medial ridge.

V6—Elevation 5,460 feet. Compact quartz vein 6 feet in width, well-ribboned across 3 feet on the hanging-wall side. No evident mineralization. The vein strikes north 87 degrees west and dips 39 degrees northerly. The hanging-wall is crushed argillite; the foot-wall siliceous agglomerate and graywacke adjacent to greenstone and porphyritic intrusive rock. East of this working to V3, the vein outcrops along the edge of a low medial ridge.

V3—Elevation 5,445 feet. Compact, slightly-ribboned quartz vein 6.8 feet in width, striking north 87 degrees west and dipping 47 degrees northerly. No evident mineralization. The hanging-wall is not exposed but arenaceous argillite and slate are adjacent on the north;

the foot-wall is siliceous agglomerate and graywacke adjacent to greenstone and porphyritic intrusive rock. Easterly of this working to V4, the vein outcrops along the edge of a low medial ridge.

To the south is a small wedge-block fault between a minor longitudinal and two minor transverse faults.

To the east from V3, the continuation of the vein swings north, away from the intrusive rock to the south, in conformity to the slope of a transverse gully.

V4—Elevation 5,435 feet. Deep overburden. Pit down the dip, 8 feet deep at the face. Compact quartz vein 2 feet wide, strike south 86 degrees west, dip 45 degrees northerly. No evident mineralization. The hanging-wall is crushed decomposed argillite; the foot-wall is quartzose agglomerate and graywacke.

V10—Elevation 5,415 feet. Caved trench 2 to 6 feet deep. Some quartz on the dump.

V11—Elevation 5,400 feet. Compact quartz vein 3 feet in width, strike south 86 degrees west, dip 31 degrees northerly. No evident mineralization. The hanging-wall is crushed argillite; the foot-wall is not exposed.

V13—Elevation 5,382 feet. In open-cut, barren, dense, quartz stringer 4 to 12 inches wide, strike north 87 degrees west, dip 40 degrees northerly. The hanging- and foot-wall rock is crushed and decomposed arenaceous argillite. At 25 feet south, in the trench, is a compact well-ribboned quartz vein 2.7 feet wide, strike south 63 degrees west, dip 47 degrees north-westerly. The hanging-wall is crushed and decomposed argillite; the foot-wall is crushed and decomposed agglomerate and graywacke with green streaks of fuchsite.

In the gully of the *Blue Ribbon Fraction*, adjacent to V13 on the east, is a major transverse fault. The continuation of the vein-outcrop in the easterly-adjoining *Alice* claim has not been established. In this section the structure is probably thrown south of the south boundary of the *Alice* and into the southerly-adjoining *Red Hill Fraction*.

V8—Elevation 5,430 feet; 60 feet south of cut V4 and in the downthrow block of the wedge-fault. The cut abuts the angle between the longitudinal fault-plane and the west transverse fault-plane of the block. The longitudinal fault forms the north face of the cut and strikes north 73 degrees east and dips 58 degrees southerly. The transverse fault forms the west wall of the cut and strikes north 25 degrees west and dips north-easterly. The plane of the transverse fault is slickensided and brecciated, and its foot-wall is porphyritic, intrusive rock. The working exposes a compact, well-ribboned quartz vein 9.5 feet in width, strike south 83 degrees west, dip 30 degrees northerly. There is no evident mineralization. The foot-wall of the longitudinal fault is siliceous agglomerate and graywacke. The foot-wall of the vein is siliceous agglomerate and graywacke adjacent to greenstone and porphyritic intrusive rock.

Of interest is the comparison of the compact and well-developed character of the vein in this exposure adjacent to the intrusive on its foot-wall, as opposed to its tendency to rapid dispersal in the exposures farther removed from the intrusive at cuts V4, V10, V11, and V13 in the upthrow block. In view of the fact that the latter represent the continuation of the vein down the dip on the footwall-side of the transverse fault, the marked difference in the character of the vein in these two positions is significant.

V9—Elevation 5,390 feet; 350 feet south-easterly from cut V8 and 215 feet southerly from cut V13. This exposure is in a minor, intertransverse fault-block of the downthrow wedge described under V8, and its significance relative to the V4, V10, V11, and V13 exposures in the upthrow block is similarly indicative. The intertransverse fault-plane strikes north 23 degrees east and dips 52 degrees south-easterly. It abuts on and forms the west side of the cut. The plane of the fault is brecciated and slickensided and its foot-wall is tuffaceous chert adjacent to and intermixed with porphyritic intrusive rock. The vein is offset to the south from its alignment at V8. The vein is compact, well-ribboned quartz 4.4 feet in width, striking north 68 degrees west and dipping 40 degrees north-easterly. On the hanging-wall side, sparse blebs of galena and chalcopyrite with malachite occur. The hanging-wall is crushed, siliceous argillite; the foot-wall is crushed and oxidized. A sample across 4.4 feet assayed: Gold, 0.12 oz. per ton; silver, 0.2 oz. per ton; copper, trace; lead, *nil*.

V7—Elevation 5,368 feet. This exposure is the continuation of the vein from V9 in the intertransverse fault-block of the downthrow wedge, described under V8, and its significance relative to the V4, V10, V11, and V13 exposures in the upthrow block is similarly indicative.

It is a compact quartz vein, 9.1 feet in width, well-ribboned on the hanging-wall and foot-wall sides, striking north 68 degrees west and dipping from 48 to 56 degrees north-easterly. Sparse specks of chalcopyrite with malachite occur on the foot-wall side. The hanging-wall rock is obscured by sloughed soil. The foot-wall is impure quartzite adjacent to greenstone and porphyritic intrusive rock. A sample across 7.1 feet (excluding 2 feet on the hanging-wall) assayed: Gold, 0.80 oz. per ton; silver, trace.

The continuation of the vein to the east is disrupted by a major transverse fault which occupies the gully contiguous to the east of cut V7. The immediate easterly continuation is probably offset south into the *Red Hill Fraction.*

BR1—Elevation 5,370 feet. No vein.

M4—Elevation 5,193 feet. Two dense quartz stringers, 6 and 8 inches wide 17 feet apart, striking respectively north 78 degrees east and north 33 degrees east. Between the stringers are several quartz veinlets. The formation is crushed and oxidized carbonatized tuff.

M3—Elevation 5,193 feet. At the south end of the trench is exposed a compact quartz vein 1.3 feet in width, striking west and dipping 15 degrees north. A width of 7 inches on the hanging-wall is well-ribboned, and fine flakes of native gold occur in the ribbons, with some galena and tetrahedrite blebs. The hanging-wall is crushed carbonatized tuff adjacent to crushed agglomerate and graywacke; the foot-wall rock is not exposed. Two minor transverse faults adjacent on the east and west of the working offset this vein-segment slightly to the north. A sample of the ribboned hanging-wall streak 7 inches in width assayed: Gold, 1.76 oz. per ton; silver, 0.5 oz. per ton; copper, trace; lead, *nil.*

M2—Elevation 5,185 feet. A dense and partly-ribboned quartz vein 14 to 26 inches in width is exposed, striking south 85 degrees west and dipping 27 degrees towards the north. A length of 9 feet of the vein in the west end of the working is crumpled and well-ribboned, with fine flakes of native gold occurring in the ribbons. The hanging-wall is crushed argillite; the foot-wall is crushed, fine agglomerate and carbonatized tuff.

M1—Elevation 5,181 feet. Well-ribboned quartz vein 2.2 feet in width, striking south 62 degrees west and dipping 41 degrees north-westerly. The hanging-wall is crushed argillite; the foot-wall is crushed and oxidized carbonatized tuff. A sample across 2.2 feet assayed: Gold, 0.06 oz. per ton; silver, trace.

M6—Elevation 5,150 feet. A dense quartz stringer 8 inches in width, slightly ribboned and with limonite patches and streaks, is exposed. This stringer strikes south 73 degrees west and dips 40 degrees northerly. The hanging-wall is crushed argillite; the foot-wall is crushed and oxidized carbonatized tuff.

In the centre of a small draw 60 feet south-easterly of this working, a dense, barren quartz vein, 20 inches in width, outcrops in carbonatized tuff for 50 feet, striking south 82 degrees west and dipping 80 degrees north. On a low medial ridge about 25 feet southerly of this, several small, dense and barren quartz stringers and lenses outcrop in quartzite and siliceous greenstone. These quartz bodies differ in type to the "Vollaug" vein and are similar to the quartz bodies occurring in the McDame Creek basin area in the greenstone-tuff phase of the McLeod series. The north rim of this ridge shows siliceous replacement with sparsely disseminated arsenopyrite. A selected sample of this assayed: Gold, trace; silver, trace; arsenic, trace; antimony, trace.

M5—Elevation 5,147 feet. At 29 feet from the portal of the cut a dense white quartz stringer is exposed, striking south-easterly. The hanging-wall is crushed and decomposed arenaceous argillite; the foot-wall is oxidized carbonatized tuff.

O2—Elevation 5,102 feet. For 20 feet from the portal is oxidized, carbonatized tuff with several dense and barren quartz stringers. Beyond this the cut is sloughed.

O3—Elevation 5,107 feet. A ribboned quartz vein 10 inches in width striking north-easterly and dipping north-westerly is exposed. The hanging-wall is crushed siliceous argillite; the foot-wall is crushed and oxidized carbonatized tuff, with a band of soapstone cutting through it at 30 feet from the portal of the cut.

O4—Elevation 5,102 feet. No vein.

O1—Outcrops on a low ridge between O1 and O4, and is exposed in trenches with a band of soapstone along 30 feet of the northerly end of the central trench. No vein.

O5—Elevation 5,080 feet. A dense and barren quartz stringer 6 to 8 inches in width occurs in decomposed argillaceous rock. Greenstone outcrops adjacent to the portal of the incline.

O6—Elevation about 4,960 feet. The pit is in clay and talus and does not reach bed-rock.

On the east of O6, down the flat slope of Friendlison Creek trough, the terrain is covered with an appreciable thickness of overburden. At the time of examination by the writer (July) no work had been done east of O6. Diamond-drilling by the Consolidated Company had, however, progressed east from the locality of cut B6 at the west end of the west section, and was proceeding at a set-up 600 feet north-west of cut M4. Two diamond-drills were being used in the exploratory-work, with the second investigating the dip-continuity of the west section of the "Vollaug" vein along the north slope of Table Mountain, east of Erickson Creek.

On the westerly slope of the west shoulder of Table Mountain, several hundred feet west and south-west of the *Bertha* claim, several irregular bodies of dense, bone-white, barren quartz outcrop in porphyritic intrusive rock adjacent to its easterly contact with quartzite. These are similar in type to the quartz-bodies of the McDame Creek basin area as described in the *Bird, Homestake,* and *Crawford* group special reports. They are entirely different in character, attitude, and alignment from the "Vollaug" vein, with which they cannot be correlated.

Crawford Claims.

F. Crawford and associates, of McDame Creek, own a block of twenty-eight claims and fractions located on the south side of McDame Lake on the north slope of Table Mountain. In 1937 these were optioned by the Consolidated Mining and Smelting Company of Canada, who carried out an extensive programme of exploration by trenching, stripping, open-cutting, and shallow shaft-sinking, with a crew of fourteen men under the direction of McLeod White and Phil Emery.

The claims are reached by a branch trail from the main McDame Creek trail extending for about 3 miles from "Wing's Camp" at 3,475 feet elevation to the north shore of McDame Lake at 3,054 feet elevation. The lake, about a quarter of a mile wide, is crossed by a primitive rowboat to its south shore. The tent-camp is located on a dry gravel bench timbered with jack-pine, fronting and 16 feet above the lake. The freighting of supplies and equipment for this operation and for that of the Consolidated Company on the *Vollaug* group on Table Mountain was continuously carried out throughout the season by Northern Airways, Limited, from its air bases at Atlin and Carcross, and with landings on McDame and Cook Lakes. The McDame Lake camp was equipped with radio broadcasting and receiving apparatus, enabling radio communication with the Table Mountain camp, and from thence direct communication with McDame Post, Dease Landing, Atlin, Carcross, and Prince Rupert, and by relay through the latter three places with Anyox and Trail.

A series of timbered rock knolls and ridges, bearing east-west, parallel to McDame Lake and rising to 300 and 400 feet above the lake, occupies a belt about three-quarters of a mile wide between the lake and the north slope of Table Mountain. The low-lying area between the knolls and ridges is deeply covered with gravel-wash and frequent swamps. The main showings are located on the slopes of the ridges and knolls.

The locality is situated about 6 miles east of the main eastern contact of the Cassiar granodiorite batholith which, in this area, strikes north across the Cottonwood River at Twin Peaks and about a mile west of Petefowler Mountain (Needle Point). The area of the main showings is underlain chiefly by intrusive rocks, with some bands and lenticular areas of tuff of the McLeod Series of possibly Jurassic age. The intrusive rocks vary from fine-grained to granular and coarse diabasic textures, and are possibly composed in part of closely-spaced dykes of varying but generally appreciable width, striking north-easterly. They are altered by carbonatization and development of epidote, chlorite, sericite, and kaolin, but may have originally possessed the composition of dacite and augite porphyry.

White quartz veins, 1 to 9 feet wide, strike north to north-easterly and dip generally steeply south-easterly. They are lenticular and appear to occupy an "en echelon" arrangement of fissuring parallel to the strike of the intrusive belt. The structure suggests an intimate relation between the quartz bodies and the intrusive complex and the possible occurrence of the veins, at least in part, along the contacts of the dyke-phases of these rocks with each other and with narrow included or intercalated bands of tuff. The rock-alteration

already referred to is especially pronounced adjacent to the veins, and in some instances the wall-rocks are appreciably silicified and impregnated with disseminated pyrite. In some veins minute streaks of a dark and glassy quartz can be observed under the magnifying-glass interlacing the white "bone quartz" and intersecting each other, indicating a quartz-filling of at least two succeeding ages. A sparse mineralization of pyrite is locally associated with the glassy, darker quartz streaks.

The veins are generally barren of sulphide mineralization, and where such does occur it is sparingly distributed. Occasional isolated blebs of what is possibly a variety of tennantite, and small blebs of chalcopyrite, also occur. The quartz is frequently vuggy and cellular, and these small cavities probably originate from the decomposition of iron sulphides or included ferruginous carbonate gangue. Sparse particles of native gold up to about the size of rice were observed in quartz cavities in one vein, and also adhering to limonite in cellular quartz on the dump from another vein. The veins are generally rusty and the quartz frequently contains streaks and patches of ankerite. The rusty filament on the quartz and the limonite in the cavities probably originates from both the pyrite and ankerite.

Trenching, stripping, open-cutting, and shallow shaft-sinking was being carried out by the Consolidated Company on the main showings on the *Camp*, *Porcupine*, and *Lakeview* claims, and general prospecting of the optioned holdings was also proceeding.

The showings on the *Porcupine* claim occur on the slopes of a rock ridge a short distance easterly of the camp. At 3,090 feet elevation at the foot of this ridge, about 200 feet easterly from the camp, an open-cut exposes two contiguous rusty quartz veins 3 and 2.5 feet wide. The veins outcrop in oxidized carbonatized rock and are separated by a band of decomposed rock, 2 feet wide. The quartz is fractured and contains bands of limonite and ankerite. The veins strike north 88 degrees east and dip 75 degrees south. The southerly vein is naturally exposed for 30 feet in an easterly direction, but further continuity in both directions is obscured by overburden.

At 3,085 feet elevation and 80 feet southerly of this, an open-cut exposes a quartz vein striking south 79 degrees east and dipping 80 degrees southerly, in oxidized and carbonatized tuff. The quartz is rusty and contains some limonite streaks, but no metallic mineralization was observed. It is stripped for a length of 14 feet, and further continuity at both ends is obscured by deep gravel overburden.

At an elevation of 3,110 feet, and 250 feet north 56 degrees east from this, a pit 8 to 10 feet deep has been sunk on a vein 6.6 feet wide. This vein occurs in greenstone, strikes north 79 degrees east and dips 57 degrees south-easterly. The walls of the vein are not well-defined, and the adjacent greenstone shows siliceous replacement and is impregnated with small pyrite crystals for a width of 18 inches on each side of the vein. The main body of the quartz in the vein is bone-white and dense-textured. It contains bands of ankerite and is very sparsely mineralized with isolated blebs of tetrahedrite with some intermixed specks of chalcopyrite. Along the centre of the vein, however, a plane of refracturing is filled for a width of 8 to 10 inches with a dark-coloured glassy quartz mineralized with blebs, streaks, and small patches of crystalline pyrite. A sample of this mineralized centre streak, across 8 to 10 inches, assayed: Gold, trace; silver, trace. A sample of the main body of the "bone" quartz on each side of the centre streak at the bottom of the pit, across a width of 5.5 feet, showing a sparse mineralization of tetrahedrite, chalcopyrite, and some ankerite films, assayed: Gold, trace; silver, 0.6 oz. per ton. A sample of the pyritized and silicified wall-rock across 12 inches of the hanging- and foot-wall sides (total 24 inches) assayed: Gold, trace; silver, trace.

At 3,110 feet elevation, 80 feet north-easterly of this vein and in approximate alignment with its strike, a trench in overburden 18 inches deep exposes a barren, rusty quartz vein 2.5 feet wide. This vein outcrops in a decomposed carbonatized rock, strikes north 73 degrees east and dips 55 degrees south-easterly. At 3,110 feet elevation, 28 feet north 73 degrees east from this, a trench exposes oxidized and sheared rock 20 inches in width, striking north 68 degrees east and dipping steeply south-easterly. At 3,135 feet elevation and 60 feet north-easterly of this, a pit 5 feet deep exposes a width of 2 feet of rusty quartz and oxidized rock striking north 73 degrees east and dipping steeply south-easterly.

At 3,125 feet elevation and 50 feet north-westerly of the second trench at 3,110 feet elevation an open-cut exposes a rusty and fractured quartz vein 5 feet wide, striking south

87 degrees east and dipping vertically. This vein has been stripped for 12 feet in an easterly direction from the cut, and the continuity at both ends of the exposure is obscured by overburden. The quartz contains some ankerite bands and is very sparsely mineralized with an occasional bleb of tetrahedrite and some chalcopyrite. At 60 feet east, in alignment with the strike, a cross-trench 9 feet long, 10 feet deep, and 3 feet wide in overburden does not reach bed-rock.

At 3,075 feet elevation at the base of the southerly slope of this ridge and 200 feet south 67 degrees east from the second-mentioned showing at 3,085 feet elevation, a shaft 10 feet deep exposes a barren quartz vein 20 inches wide at the collar and 10 inches wide at the bottom. This vein occurs in oxidized, carbonatized tuff, strikes south 67 degrees east and dips 65 degrees south-westerly. At 70 feet south-easterly and in approximate alignment, a cross-trench 20 feet long and 3 feet deep has been dug in gravel-wash adjacent to a swampy depression. The gravel and topography at this locality suggests the possible site of an old abandoned stream-channel.

The *Camp* claim showings are located at about 3,080 feet elevation and about 2,000 feet south-easterly from the camp. These are situated in an area of low rock knolls around the base of the south-easterly slope of the "Porcupine" ridge, adjacent to and northerly of a swampy depression and about half a mile south of the east end of McDame Lake. In this locality a white quartz vein 2 feet wide outcrops in altered augite porphyry for a length of about 30 feet along the base and on the south side of a small knoll. The vein strikes north 65 degrees east and dips 50 degrees south-easterly. The quartz is vuggy and cellular and a few specks of gold up to about the size of rice are seen in it, generally in the vugs. Pyrite also occurs very sparingly in small blebs. A selected sample from this vein, showing sparsely distributed pyrite and oxidized material in somewhat vuggy quartz, assayed: Gold, 0.10 oz. per ton; silver, trace.

About 200 feet south-westerly from this exposure across a gravel flat and offset about 50 feet south-east, a well-defined white quartz vein 1 to 3.2 feet wide outcrops in altered augite porphyry at the easterly end of another rock knoll. This vein strikes north 63 degrees east and dips 70 degrees south-easterly. A shaft, 12 feet deep, has been sunk at the north-easterly end of the exposure. In this the vein is 3.2 feet wide at the collar and 2.8 feet wide at the bottom and very sparsely mineralized with an occasional small bleb of tetrahedrite. Beyond this shaft, in a south-easterly direction, the vein has been stripped for 45 feet. At 30 feet along this stripping it diminishes to 12 inches in width, and at 45 feet continues in two stringers 1 and 6 inches wide. To the north-east, beyond the shaft the possible continuity in this direction is obscured by gravel overburden.

About 90 feet north of the first-mentioned vein on this claim, a barren white quartz vein 18 to 20 inches wide in altered augite porphyry is exposed for a length of 15 feet on the north side of the knoll. This vein strikes north 65 degrees east and dips 75 degrees south-easterly. *Further continuity in both directions beyond this working is obscured* by overburden. A possible continuation of this vein is found about 80 feet to the south-west, where a quartz vein 9 inches in width, striking north 65 degrees east and dipping 75 degrees south-easterly, is exposed in a small open-cut in low ground. A few minute specks of gold were observed in specimens on the dump at this working. About 15 feet south of this cut a lateral quartz stringer, 6 inches wide, outcrops.

The *Lakeview* claim showings are located about 2,500 feet south-westerly of the camp in an area of intrusive rocks and tuff bands, composing ridges and knolls bearing east-west, parallel to the south shore of McDame Lake. In this locality at 3,190 feet elevation on the northerly 30-degree slope of the ridge and about 700 feet southerly of the south shore of McDame Lake, an open-cut exposes a barren white quartz vein 5 feet in width. The vein strikes north 13 degrees east, is slightly rusty, and occurs in an appreciably oxidized rock. The dip is not clear. It is traced by shallow stripping for 15 feet in a southerly direction up the hill-slope, but the further continuity down the slope is obscured by overburden.

About 50 feet southerly from this at 3,240 feet elevation, and offset about 20 feet to the west, a shaft 12 feet deep exposes a quartz vein 8.3 feet wide in an appreciably oxidized and altered rock. This vein strikes north 11 degrees east and dips 75 degrees westerly. *For a width of 1.5 feet on the hanging- and foot-wall sides the vein consists of dark quartz* with pyrite blebs and siliceous, pyritized wall-rock. A sample of this mineralized section

across 18 inches on the hanging- and foot-walls (total 3 feet) assayed: Gold, trace; silver, trace.

At 3,240 feet elevation and 50 feet southerly, in alignment with the attitude of this vein, a pit 5 feet deep exposes oxidized and decomposed rock with some crushed quartz and a barren quartz stringer 8 inches in width. About 10 feet southerly from this, shallow stripping exposes oxidized and decomposed rock with some crushed quartz.

At an elevation of 3,250 feet on the southerly slope of the ridge and 370 feet southerly from the shaft, two open-cuts on the face of a rock-bluff expose a barren white quartz vein 6 feet in width. Several barren quartz outcrops in oxidized and decomposed rock, which is probably carbonatized tuff, also occur along the southerly base of this ridge. Several hundred feet southerly of the *Lakeview* showings, a series of barren quartz outcrops of appreciable width occupy protruding humps in a low terrain, and are naturally exposed at offset intervals along a general north-easterly bearing for a distance of about 400 feet. An open-cut in one such occurrence exposes an erratic body of dark-banded quartz with some disseminated pyrite in a rock-formation of argillaceous and tuffaceous sediments. These probably represent lenticular bodies of quartz in "en echelon" alignment.

At the conclusion of its exploration during the 1937 season, the Consolidated Mining and Smelting Company of Canada relinquished its option on these claims.

PLACER-GOLD DEPOSITS.

O'Donnel River.

Field-work in this section during the 1937 season had as its main objective the commencement of a detailed study of the O'Donnel River area for the purpose of outlining a possible old channel or channels and the establishment of their location and continuity. As the majority of mining-work in this area has been and is being carried out in the central section of the main trough, and as this section is indicated as affording information that would assist in the delineation of the various factors governing the problem relative to the whole area, the work was initiated in this section. The following report must be considered as preliminary to the continuance of the work in future field-seasons and subject to modification in relation to factors and evidence that may be accumulated as the study progresses.

O'Donnel River flows into the east side of Atlin Lake about 14 miles south of the town of Atlin. It is about 30 miles long and is the largest stream flowing into Atlin Lake. The many tributaries of its headwaters and of the north side of its lower half drain an appreciable extent of the southerly slopes of the divide between it and the Surprise Lake drainage-trough. On the east it drains the westerly slopes of McMaster and Farnsworth Mountains which form the divide to the headwaters of the Sucker River.

The lower area of the river for about 3 miles from its mouth is underlain by mainly black slate, quartzite, and some schist. Above this, a belt of limestone about 3 miles wide strikes south-easterly across the trough. For the rest of its course to the headwaters the creek-trough is underlain by slate, quartzite, and schist, with some areas of volcanic breccia and calcareous and carbonatized rocks, adjacent on the east in the central section to a granitic boss forming McMaster Mountain.

In the early days of the Atlin camp, some gold was taken out by small hydraulic outfits and by individuals from the main river-valley and from several tributaries. In 1912 rich "pay" was discovered in a pre-Glacial channel or bench buried under a high bench in the central section, about 12½ miles from the mouth, and during 1913 there was a sizable rush to this stream. Considerable hydraulicking, drifting, and sluicing carried out on the bench-ground and in the creek-bed during that year yielded good values from scattered patches. Although an appreciable quantity of gold was extracted, a combination of factors, chief of which were insufficiency of water for hydraulicking and the flat gradient of the river, prevented the hopes for an extensive and sustained output being realized. Since that time small-scale drifting, some shovelling-in, and some spasmodic prospecting have been carried out.

For several years Nathan Murphy has operated continuously by drifting on flat, decomposed bed-rock under the west bench on the *Ethel M.* bench lease and has made satisfactory gold recoveries. During the 1937 season Murphy, with one assistant, reported values averaging about $1 to the half-yard car, and a total recovery for the season of 33 oz. of gold valued at $924, recovered from 500 yards of gravel sluiced.

This section is reached by a good motor-road extending for 32 miles from the town of Atlin (elevation 2,200 feet) to Nathan Murphy's camp (elevation 3,220 feet), on the west bench of the river.

In this section, the river has a gradient of about 0.97 per cent. and occupies a trough about 500 to 1,000 feet wide, striking north-easterly between banks composed of 100 to 200 feet of glacial drift and clay. Sections of weathered rim-rock are exposed at intervals along the base of the west bench.

In this section high rim-rock is extensively exposed along the east bank, and although some gold may be found in the remnants of pre-Glacial bench-gravel embayment-patches covering this rim-slope, there seems to be little chance for a main ancient channel to have broken through on this side. On the other hand, the low rim outcropping at intervals along the base of the high bench of the west bank is indicated as the probable east rim of a buried pre-Glacial channel or of an east bench of such a channel buried under the high bench of the west bank. This east rim strikes generally north 33 degrees east and where it has been crosscut from its east to its west side, slopes at varying angles to the west and flat decomposed bed-rock on this (west) side. In the Murphy workings at 625 feet from the adit-portal, the flat, decomposed bed-rock on the west side of the east rim is at 3,052 feet elevation, 17 feet higher than the portal of the adit and 64 feet above the level of O'Donnel River at this point. The old and present drifting operations also indicate that the pre-Glacial stream was of greater extent than the present river. The possibility that the main drift workings in Nathan Murphy's operation under the west bank may be on the site of a bench of the old channel is indicated by the steep westerly plunge of bed-rock at the westerly extremity of several adits, and also by the occurrence of patches of yellow gravel and weathered bed-rock in John Thomson's workings on the east bank of the river, about 1,200 feet north-easterly of Murphy's workings. In Murphy's workings, the bed-rock is flat to about 800 feet from the main adit-portal, where it plunges steeply west. This adit and its lateral workings also indicate that the ancient channel was a wide compound channel; that is, composed of a wavy bed-rock, between the humps of which were several subsidiary channels of varying width, rim-slope, and depth.

This condition would also explain what appeared to be a patchy occurrence of " pay " in the old workings. About thirty-eight or more adits of various lengths have been driven at different elevations along a stretch of about 2 miles of the west limit of this central section of the O'Donnel River in efforts to hit the extension of the flat bed-rock of Murphy's workings. Although some gold has been recovered on both the east and west sides of the east rim, in several of these adits, due to lack of the necessary surveying, they have been too high, too low, or not of sufficient length to reach the objective. It must also be considered that the bed-rock in Murphy's workings may be a bench of the old channel and, if so, it would not be consistently continuous.

The bearing of the east rim of the pre-Glacial channel or its bench in the old and present workings under the west bench, the local outcrop of this rim along the base of the west bench, the slight westerly embayment of this section of the O'Donnel trough and the upstream outcrop of rim-rock, indicates that the east rim of the buried pre-Glacial channel or its bench approaches to approximate coincidence with the west limit of the river-trough at 3,065 feet elevation at the southerly end of the upper canyon, about 1 mile above Murphy's adit. In places along this stretch the present stream has cut across and through the edge of the east rim with its possible pre-Glacial bench and may have produced some concentration of gold in the present creek-trough.

Gold, possibly contained in lenticular bands of stratified inter-Glacial wash of appreciable thickness occurring in the high moraine-bench confining the trough, would also be reconcentrated in the river-trough during its process of cutting-down. About 1,000 feet above the portal of Murphy's main adit, fair values in coarse gold have been recovered by Tom Prpich, from shovelling-in, on flat schist rim-rock under 6 to 8 feet of gravel, on the west bank of the river. The depth to bed-rock in the river-trough of this section is not known, and primitive pumping outfits have been inadequate to remove the water encountered in several attempts at shaft-sinking. The gradient of the O'Donnel River along the distance of about 1 mile above Murphy's adit to the upper canyon is 1.7 per cent. Below this for about 1¼ miles along the river to the upper end of the lower canyon at 2,917 feet elevation, the gradient

of the stream is 0.97 per cent. For the total distance of about 2¼ miles between the two canyons, the composite gradient of the stream is 1.19 per cent., and the trough varies from about 300 to 1,000 feet in width between the confining east and west high benches of glacial moraine.

Above the southerly end of the first canyon, 1 mile above Murphy's adit, outcrops of the east and west rim-rock from 1,500 to 2,000 feet apart, confine the possible extension of the buried pre-Glacial channel along a bearing of north 33 degrees east, on the west side of and paralleling the O'Donnel trough.

At Canyon Creek, 3,115 feet elevation and 3 miles above Murphy's adit, the west side of the east rim crosses the creek at about 400 feet from its confluence with the O'Donnel, and the east side of the west rim at about 1,000 feet westerly from this. In this locality, a defined depression marks the gap between the east and west rim-outcrops, with the central point between the rims at 3,173 feet elevation in the locality of Murphy's refuge-cabin.

Down-stream from Murphy's main adit-workings, the O'Donnel trough swings slightly to the east, away from the down-stream projection of the buried pre-Glacial channel. At about 10,830 feet below Murphy's, at 2,855 feet elevation in the lower creek-canyon and 2,895 feet elevation on the top of the bench, the lower creek-canyon swings due west for three-quarters of a mile and extends across the southerly projection of the bearing of the pre-Glacial channel. Assuming an average gradient of 1 per cent. for the pre-Glacial channel or bench bed-rock as indicated in Murphy's workings, and projecting it from 3,052 feet elevation in Murphy's workings for a distance of 10,830 feet southerly, would place this pre-Glacial bed-rock at 2,944 feet elevation in the locality of the west swing in the lower canyon. In other words, this projection would place this pre-Glacial bed-rock 89 feet above the canyon-bottom and 49 feet above the top of the bench at this point.

Morainal hummocks bordering the margin of the west swing of the canyon and continuing in a line to the east and to the west, blue glacial clay resting on the top of the canyon rock-walls, together with some evidence of glacial grooving and the occurrence of defined "roche moutonnée" along the line of the continued southerly projection of the pre-Glacial bed-rock bearing to Dixie Lake, at 2,822 feet elevation, indicates the possible destruction by transverse glaciation of this old channel weathered bed-rock at some point between Murphy's workings and the west swing of the lower canyon. Should this bed-rock be that of a pre-Glacial bench with a deeper channel bordering it on its west side, it is possible the deeper channel may continue for some distance along the bearing of this southerly projection. Of importance in this consideration, however, is a wide major, transverse U-shaped valley extending north-westerly across this area from the Coast Mountains at the low divide to the headwaters of the Silver Salmon River, and merging to coincidence with the O'Donnel River valley along the course of its lower section to Atlin Lake at 2,200 feet elevation.

Between the Murphy workings and Canyon Creek there is the possibility for a buried subsidiary or tributary old channel bearing north-south along the lower, east slopes of the Laurie Range from the divide to the headwaters of Spruce Creek. In this area a drift-filled depression, striking north-south and occupied by Blind Creek, breaks through the west rim-rock of the O'Donnel old channel, a short distance west of Canyon Creek canyon. Canyon Creek in its present course quite apparently now occupies a youthful, consequent trough east of the centre line of its original valley, and has incised its bed along the fringe of the steep west slope of Melvin Mountain and cut its canyon through the west rim-rock of the O'Donnel old channel. Its old channel-site consequently must lie to the west, buried under the moraine filling the valley-trough, with its entry into the O'Donnel trough at an indicated break-through of the O'Donnel old channel east rim at 3,055 feet elevation in the O'Donnel trough, about 3,550 feet up-stream from Murphy's and about 1,650 feet below the upper canyon. In the upper section of Blind Creek some yellow gravel is exposed under glacial moraine, and in a swamp at 3,402 feet elevation the timbers of an old flooded shaft are located. In 1935, Neil Forbes and partners sank a shaft at 3,412 feet elevation in this locality in glacial moraine with yellow gravel at the bottom, but the shaft was flooded before bed-rock was reached.

In the headwaters area of the O'Donnel River, intermittent individual prospecting has been carried out over a period of years on Feather, Dixie, Slate, Carvell, and McKinley Creeks, and Bull Creek and its tributaries. Coarse gold has been discovered on these creeks and small recoveries have been made by individuals from time to time. No systematic or detailed

investigation of this upper area has as yet been made and its potentiality is unknown. From a small canvas-hose hydraulicking outfit on Bull Creek in 1904, a recovery of 100 oz. of gold is reported in the Annual Report of the Minister of Mines for that year. Between 1914 and 1921, John Noland, of Atlin, sank a shaft 52 feet to bed-rock in the vicinity of the fork of Feather and Dixie Creeks, and drifted 40 feet to the north-east and 160 feet to the south-west. He reports values of about ½ oz. of fine and coarse gold to the set, for a length of 40 feet south of the shaft. Noland also reports creek wash-gravel in this locality averaging 16 to 17 cents per cubic yard and gravel on "hard-pan" 4 to 6 feet below surface averaging 30 to 35 cents to the yard with gold valued at $20 per ounce. The ground in this old working is reported by Nolan to be comparatively free from large boulders.

No data covering complete gold recovery in the O'Donnel River area are available, but some very rich patches are reported in the Annual Reports of the Minister of Mines to have been encountered in some of the old workings in the central section. Relative to this, Nathan Murphy cites the following tests, with gold figured at $15.75 per ounce, of rich ground encountered in drifting under the bench at 400 feet in, in an old adit on the *Gold Hill* bench lease (now the *Grace*), a short distance down-stream from his present workings:—

Test No. 1: One pan, $89.30.

Test No. 2: Rocking one wheelbarrow (five wheelbarrows to ½ cubic yard), $61.40.

Test No. 3: Sluicing one car of gravel (½ yard), $108.50.

Test No. 4: Three pans of gravel, $115.30.

Various references to the O'Donnel River area are contained in the Annual Reports of the Minister of Mines, British Columbia, for the years 1898, 1899, 1903, 1904, 1906, 1907, 1908, 1910, 1911, 1912, 1913, 1914, 1915, 1917, 1918, 1920, 1921, 1925, 1926, 1929, 1930, 1932, 1933, and in Bulletin No. 1, 1931, "Placer Mining in British Columbia."

SPECIAL REPORTS.

Typewritten copies at 25 cents each are available to those who specially request reports on the following properties:—

Stewart-Canal Gold Mines, Limited (N.P.L.).
Atlin Area: Last Chance Group; Snake Creek.
Red Reef Group.
Homestake Group.
Bird No. 1 and No. 2 Mineral Claims.
Hunter Group.
Cornucopia Group.

PROGRESS NOTES.

BY

CHARLES GRAHAM.

LODE-GOLD DEPOSITS.

ATLIN MINING DISTRICT.

Tulsequah District.

Polaris-Taku Mining Co., Ltd.—D. C. Sharpstone, general manager; B. B. Neiding, general superintendent. This is the only lode operation in the Mining Division, and is located on Whitewater Creek, a tributary of Tulsequah River, about 6 miles up from its junction with the Taku River.

This company started active prospecting and development on the property in 1935. Some drilling, open-cutting, and drifting had previously been done by the N. A. Timmins Corporation and the Alaska Juneau Mining Company. The property responded to development under the present management, and a 200-ton mill was erected during the summer and started milling ore on October 15th. Considerable drifting, crosscutting, and raising had been done and several stopes opened.

A 44-room bunk-house, together with a cook-house, dining-room, dry-room, and other buildings for the accommodation of the employees were built.

Additions were made to the Diesel power plant and a 625-k.v.a., 60-cycle, 440-volt hydro-electric plant was installed.

General conditions were good and 120 men are employed. Six miles of road was built from Taku River to the mine. Concentrates have to be stored during the winter as the Taku River is not navigable during the winter months.

Portland Canal Mining Division.

Salmon River Area.

Silbak Premier Mines, Ltd.—B. F. Smith, general manager; J. G. Pearcey, mine superintendent.

Active development has been carried on in the *Sebakwe* and *B.C. Silver* sections; 14,836 feet of drifting and raising having been done and several stopes opened. Diamond-drilling has also been carried on continuously. The mine operated 313 days and produced 201,206 tons of ore, yielding 47,746 oz. gold and 913,510 oz. silver.

Big Missouri Mine.—Buena Vista Mining Company, owners; Consolidated Mining and Smelting Company of Canada, Limited, operators. D. S. Campbell, general superintendent; E. James, mine superintendent.

Development consisting of 952 feet of drifting, 245 feet of crosscutting, 2,768 feet of raising, and 753 feet of side-swiping, has been done. The 750-ton mill in course of construction will not be completed until about the end of February, 1938. It is located underground between the 2,100- and 2,300-foot levels on the Salmon River side of the ridge. Eighty thousand tons of rock was excavated for the mill-site, which is approximately 200 feet long, 60 feet wide, and 40 feet high. All storage-bins for raw and fine crushed ore are cut out of solid rock.

All the heavy equipment for the mill was hauled from the townsite over the Missouri Ridge and taken down the Salmon River side of the ridge by sleigh and tractor to the surface tramway between the 2,800- and 2,300-foot levels. The 2,300-foot level had to be widened and heightened to take the machinery. An inclined tramway was used underground to lower the equipment from the 2,300-foot level to the various sections of the mill. The small equipment was taken through the 2,800-foot level and lowered down the tramway.

A ventilating fan of 50,000 cubic feet per minute capacity is being installed to ventilate the mill section.

Salmon Gold Mines, Ltd.—Consolidated Mining and Smelting Company of Canada, Limited, operators; D. S. Campbell, general superintendent. The property is on Summit Lake, about 8 miles from the *Big Missouri*. The crosscut adit started in 1936 was extended to intersect the ore-zone, without encountering it. Operations can only be carried on during the summer months. Preparations have been made for an early start in 1938.

Hercules Group.—Consolidated Mining and Smelting Company of Canada, Limited, operators. Considerable diamond-drilling has been done from the surface. The 306 drift north in the 2,800-foot level of the *Big Missouri* mine has been extended 217 feet towards the *Hercules* Group.

Troy Group.—Lake and McDonald, owners. Some additional prospecting was done on this group during the summer.

Several other groups of prospectors did assessment-work on their claims.

Bear River Area.

Stewart Canal Gold Mines.—J. Haathi, manager. This property adjoins the *Oral M.* Some surface-stripping and a short drift was driven on one of the veins.

Red Reef.—This property also adjoins the *Oral M.* Some prospecting was done here.

Rufus Argenta.—A contract was let for driving 150 feet of tunnel. This contract was completed during the summer.

American Creek Area.

American Boy.—Some high-grade ore was mined and shipped by leasers from this property.

Kansas Group.—Sam Deschamps, owner of the group, made several small shipments of high-grade ore during the year.

Marmot River Area.

Several groups of prospectors did assessment-work on their claims.

Georgia River Area.

Georgia River, Gold Leasers, operators. A Hadsel dry-grinding mill was installed during the spring months. All the equipment for the mill had to be taken up on pack-horses or sleighs. The property is 10 miles from the beach and at 3,200 feet elevation.

Operations were commenced in May. As they had no reserves of broken ore, all mill requirements had to be mined daily. One stope was opened and another was being made ready. There was no ventilation in the stope and instructions were given to have a fan installed.

Operations were suspended at the end of August.

Queen Charlotte Islands.

South Easter Mine.—Skidegate Gold Mines, Limited. A Hadsel dry-grinding mill was installed at this property. Operations started about the beginning of December, 1936, and were suspended early in 1937.

SKEENA MINING DIVISION.

Coast Area.

Surf Inlet.—Surf Inlet Consolidated Gold Mines, Limited; Angus McLeod, superintendent. Active operations have continued throughout the year, principally in the *Pugsley* vein where some new stopes have been opened on the 700-, 800-, and 900-foot levels beyond the old workings. Some development has been carried on in the 1,000-foot level.

A start has been made cleaning up the 900-foot level in the old *Surf* mine across the valley from the *Pugsley*.

Porcher Island.

Surf Point.—Reward Mining Company, Limited; Alex. Smith, superintendent.

The *Surf Point* mine, formerly operated by the N. A. Timmins Corporation, was acquired by the Reward Mining Company early in the year. The mine operated 299 days, producing 17,043 tons of ore, yielding 2,769 oz. gold and 944 oz. silver. Four hundred and thirty-three feet of development was done.

Edye Pass Mine.—Reward Mining Company, Limited. A total of 2,146 feet of development-work was done, the mine working 254 days. Operations were suspended at the end of September.

COPPER DEPOSITS.

ANYOX AREA.

The Consolidated Mining and Smelting Company of Canada, Limited, having acquired the property of the Granby Consolidated Mining, Smelting, and Power Company at Anyox, commenced a programme of diamond-drilling adjacent to the old *Hidden Creek* mine early in the summer. Two drills were employed continuously until November, locating some additional ore-bodies.

Preparations are now being made to drift from the old 150-foot level in the *Hidden Creek* mine into the new location for further prospecting.

SILVER-LEAD DEPOSITS.

ALICE ARM AREA.

Esperanza Mining Co., Ltd.—This company ceased operations early in the year.

Dolly Varden.—T. W. Falconer, lessee. One hundred and ninety tons of high-grade ore carrying approximately 32,000 oz. of silver was mined from one of the old glory-holes. The ore was shipped direct to the Tacoma smelter.

PLACER-GOLD DEPOSITS.

ATLIN DISTRICT.

All the active operations in the Atlin District are placer. There has been increasing activity with better recoveries during the year; a total of 21,475 oz. of gold having been

recovered. An additional 208 oz. was produced in the Squaw Creek District, making the total placer production for the year in the Atlin Mining Division 21,683 oz.

There were forty-three leases operating; thirty of these are underground operations drifting on bed-rock.

Spruce Creek.

This is the most important creek in the Division. Nineteen properties are operating on the creek. All are underground operations except the steam-shovel operation of the Columbia Development Company, Limited. Spruce Creek produced 14,516 oz., which was contributed principally by the Colpe Mining Company, Limited, with 8,785 oz., and the Columbia Development Company, Limited, with 3,429 oz. The balance of 2,302 oz. was produced from the other seventeen operations.

Two cases of suspected encroachment on this creek were reported. J. W. Noland, owner of the *Dream* lease adjoining the *Sunlight* lease of the Colpe Mining Company, Limited, requested information regarding the possibility of that company having encroached on the *Dream* lease. The pay-channel apparently strikes into the *Dream* lease from the *Sunlight* lease just above the *Dream* shaft. The working-maps of the Colpe Mining Company, Limited, were examined but did not show any encroachment. The management of the Colpe Mining Company, Limited, claimed that they left from 10 to 25 feet of pillar along the boundary. This could not be checked as the extraction of pillars had begun and this was some distance back from the boundary at time of examination. The information obtained from the maps was given to J. W. Noland.

The Columbia Development Company, Limited, operating steam-shovels on the *Olalla* lease, requested information *re* the possible encroachment from the *Poker* lease, owned by I. Matthews and operated on a lay agreement by A. Siranovich and partners. There being no map of the underground workings of the *Poker* lease, it was necessary to make an approximate survey with a Brunton compass. The result of this survey was given to the manager of the Columbia Development Company, Limited, who expressed himself as satisfied, and the matter was dropped.

Colpe Mining Co., Ltd.—Chas. H. Colpe, manager. This is the largest operation in the district, employing seventy-three men, and produced 8,785 oz., valued at $242,921. Three shafts are operating. In the upper two shafts pillar-extraction is being carried on. The lower or No. 4 shaft, which was sunk on the old *Morse*, McKechnie and Bratt property acquired by the Colpe interests last year, is advancing up-stream to the *Chance* lease.

Some difficulty was experienced at this property in having the requirements of the "Metalliferous Mines Regulation Act" complied with. A prosecution was launched against the manager for failure to comply with an order of an Inspector, and a conviction secured. This was later appealed, but the Supreme Court upheld the conviction.

At a later visit the operations in the No. 4 shaft were suspended until the requirements of the Act were complied with.

Conditions underground were satisfactory at the last visit.

Dream Lease.—J. W. Noland, owner and operator. A shaft has been sunk to bed-rock which was reached at 210 feet. This is the deepest operation in the district. It is the farthest up-stream operation on Spruce Creek. Drifting up-stream along the boundary of the *Sunlight* lease has commenced and they expect to pick up the pay-channel where it apparently swings off the *Sunlight* lease into the *Dream* lease.

Columbia Development Co., Ltd.—James Eastman, manager. This is the only surface operation on the creek. Two steam-shovels are engaged, one on stripping overburden and the other on the pay-gravels. Thirty men are employed on two shifts. A total of 3,428 oz., valued at $96,000, was produced.

Clydesdale Lease.—Buchanan and McPherson, owners; McDonald and MacKay, lay-men. This is a bench lease parallel on the north side to the *Chance* lease of the Colpe Mining Company. Five men are engaged working two drives up-stream, single shift. Conditions underground were fairly good.

Wolf Lease.—N. LeJure, owner; Malm, Vickstrom, and Johnson, lay-men. Only lay-men employed, working a single drive up-stream on the south side of the *Dorothy* lease of the Colpe Mining Company. Conditions underground were satisfactory.

Croker Lease.—I. Matthews, owner; Fred Ohman and partners, lay-men. Five men are employed working two drives into the bench from the bottom of a shaft. Conditions underground were satisfactory.

Poker and Joker Leases.—I. Matthews, owner; A. Siranovich and partners, lay-men. Five men are engaged working three drives up-stream and into the bench through the *Poker* lease and extending into the *Joker* lease. Conditions underground were satisfactory. A report was submitted on the suspected encroachment from this lease to the *Olalla* lease.

Naska Lease and Friendship Fraction.—Brown and Wright, operators. Five men are engaged on two shifts. They were unable to get the shaft on the *Naska* to bed-rock on account of excess water. An arrangement was made with the owners of the *Sally* lease for drainage rights through the *Sally* bed-rock drain and to drive a drift from the *Sally* shaft to the *Naska* shaft location. A single drive was driven up to the *Naska* shaft and the water drained off through the drain permitting them to get the *Naska* shaft down to bed-rock. Drifting on their own ground is now going ahead.

Sally Lease.—L. Shultz, owner; Nelson and Johnson, lay-men. Three men are employed drifting up-stream and are in fairly good ground. It is very coarse gravel and requires to be breast-boarded, the only place in the district requiring this method. There is considerable water running on bed-rock at this point.

Peterborough Lease.—Otto Millar and Son, owners and operators. Only the two owners are working, running a single drive into the bench in good ground. Conditions underground were satisfactory.

Ollala Lease.—Columbia Development Company, Limited, owners. John Hunjet and partners had started a slope off the *Olalla* lease to reach the lower end of the *Poker* lease, owned by I. Matthews. They started work just below the shovel operations of the Columbia Development Company, apparently without securing the consent of this company. The work has been held up by Court injunction, and the matter is still unsettled.

Several other small operators were engaged on their claims or on lays on the lower end of the creek. These were all visited and conditions generally were found satisfactory.

Boulder Creek.

Consolidated Mining and Smelting Co., Ltd.—Norman Fisher, foreman. This is a hydraulic operation working three shifts and employing twenty men. Conditions in the pit were good; 1,142 oz., value $31,000, was produced.

McKee Creek.

Atlin Gold Mines, Ltd.—Geo. Adams and partners, lay-men. Six men are employed, all partners in the lay. This is a hydraulic operation working two shifts. Conditions in the pit were good; 153 oz., value $4,197.86, was produced.

O'Donnel River.

Grace M. Lease.—Murphy and Son, owners and operators. Only the two owners are employed. These men have done considerable underground work over a period of years. Conditions underground were satisfactory.

Several other groups were employed, mainly prospecting. All were visited and conditions generally were satisfactory.

Pine Creek.

Bessbrook Lease.—Gus Boquist, owner and operator. Three men are employed working a single drift up-stream. Working conditions at the face were good.

Anna C. Lease.—E. Woodean, owner and operator. Woodean is working alone drifting into the bench. Underground conditions were good.

Blackbird Lease.—Kennedy and Watt, owners and operators. These two men are working alone driving up-stream on pay. Conditions underground were good.

Morning Glory Lease.—Ole Lovegrin, owner. Lovegrin has given an option to Alex. Smith and associates, who have five men employed. They have done considerable keystone-drilling and expect to get into operation either by hydraulic or drag-line in 1938.

Acheson Brothers have acquired options on Pine Creek and Willow Creek and have done considerable drilling.

Baker and partners are operating a hydraulic. Six men are employed, all partners in the lay. They have ample water but the ground is hard, cemented gravel and does not

break down readily. They produced 193 oz., value $5,300. There seem to be prospects of considerable activity on Pine Creek in 1938.

Wilson Creek.

Last Chance Lease.—Peter Nord, owner and operator. A shaft 5 by 6 feet in the clear is being put down and was down 75 feet at time of inspection. Bed-rock is expected to be reached at about 907 feet. The shaft is well timbered and in good shape.

Several groups are engaged in ground-sluicing. Two engineers representing outside interests were looking over the creek and taking up options on a number of leases.

Wright Creek.

Artic and Lynderbergh Leases—L. Hodges, owner and operator. This is a hydraulic operation employing four men. Water is very scarce and they are further handicapped by boulders and lack of sufficient dumping-ground. They struck some good ground towards the close of the season, producing 343 oz., value $9,060.

Other groups are ground-sluicing farther up-stream.

Ruby Creek.

Surprise Lake Mining Co.—Matson and partners, lay-men. This is a hydraulic operation employing six men. They have a good water-supply and are getting good results, producing 636 oz., value $17,000.

Farmer Lease.—E. Turnquist, owner and operator. Turnquist is working alone, drifting into the bench down-stream from his old underground operation.

Ophir Lease.—McKay and Morrison, owners and operators. Nothing much was done here during the year.

Blackstone Lease.—E. Krumbeigel, owner and operator. A shaft on this property sunk about 160 feet through the lava cap and is now in gravel. Nothing was done this year due to lack of finances.

Birch Creek.

There are six different groups on this creek, all ground-sluicing. The only underground operation is not working at present.

Squaw Creek District.

Several groups were engaged in ground-sluicing and prospecting on this creek, and produced 208 oz.

The creek was not visited.

Some surface placer operations on McDame and Thibert Creeks were carried on during the summer. This section was not visited.

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ILLUSTRATIONS.

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1938.

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The Annual Report of the Minister of Mines is now issued in parts as follows:—

Part A.—THE MINING INDUSTRY (STATISTICAL REVIEW). John F. Walker.

Part B.—NORTH-WESTERN MINERAL SURVEY DISTRICT (No. 1). Joseph T. Mandy.

Part C.—NORTH-EASTERN MINERAL SURVEY DISTRICT (No. 2). Douglas Lay.

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Part E.—EASTERN MINERAL SURVEY DISTRICT (No. 5). H. Sargent.

Part F.—WESTERN MINERAL SURVEY DISTRICT (No. 6). B. T. O'Grady.

Part G.—INSPECTION OF MINES. James Dickson.

PART A

ANNUAL REPORT

OF THE

MINISTER OF MINES

OF THE PROVINCE OF

BRITISH COLUMBIA

FOR THE

YEAR ENDED 31ST DECEMBER

1937

PRINTED BY
AUTHORITY OF THE LEGISLATIVE ASSEMBLY.

VICTORIA, B.C.:
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1938.

BRITISH COLUMBIA DEPARTMENT OF MINES.

VICTORIA, B.C.

Hon. W. J. ASSELSTINE, *Minister.*

JOHN F. WALKER, *Deputy Minister.*

JAMES DICKSON, *Chief Inspector of Mines.*

D. E. WHITTAKER, *Chief Assayer and Analyst.*

P. B. FREELAND, *Chief Mining Engineer.*

R. J. STEENSON, *Chief Gold Commissioner.*

To His Honour ERIC WERGE HAMBER,
Lieutenant-Governor of the Province of British Columbia.

MAY IT PLEASE YOUR HONOUR:

The Annual Report of the Mining Industry of the Province for the year 1937 is herewith respectfully submitted.

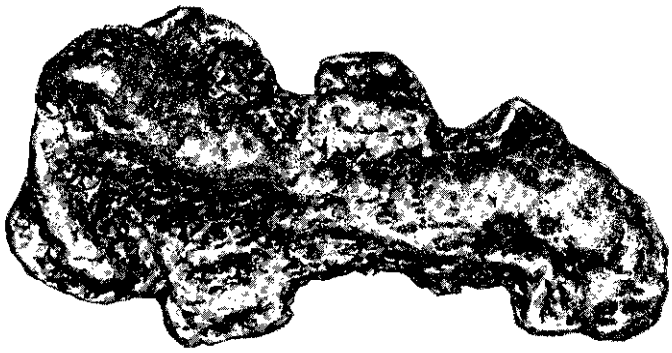
W. J. ASSELSTINE,
Minister of Mines.

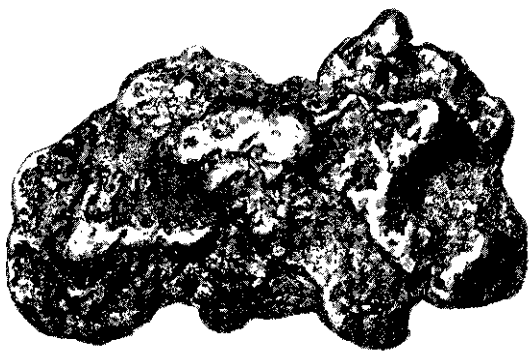
Minister of Mines' Office,
April, 1938.

Gold nugget weighing 52 oz. 15 dwt., found on Vern Shea claim on a tributary of Boulder Creek in the Turnagain River area east of Dease Lake. Discovered by Vern Shea in 1937, and now in the possession of the Department of Mines, British Columbia. (Illustration one-half natural size.)

Crystalline gold from the Zeballos area, presented to the Department of Mines by the late Albert Bloom. (Illustration natural size.)

Gold nugget weighing 46 oz. 5 dwt. from Discovery claim on Squaw Creek in the Atlin Mining Division. Found by E. Peterson and Barney Turbitt in 1937. (Illustration one-half natural size.)





PART A.

THE MINING INDUSTRY.

BY

JOHN F. WALKER.

The value of mine production in 1937 was $74,475,902, an increase of $20,393,935 over 1936. The increase is largely due to abnormally high base-metal prices prevailing throughout the greater part of the year. This is clearly shown in the case of lead, where the volume increase amounted to 10.9 per cent. and the value increase 44.8 per cent. All phases of the mining industry have shown increases in both volume and value.

Lead production has again stepped into the lead, with an all-time record in volume of 419,118,371 lb., valued at $21,416,949, this being the greatest value attained in the history of mining in the Province for any one metal or material in a single year.

Both lode and placer gold have again shown appreciable increases, and once again a new record has been established with an output of 514,934 oz., valued at $17,680,972.

Zinc production, which in 1936 fell slightly below the 1935 volume record, has again shown an appreciable increase, and established a new all-time record with a production of 291,192,278 lb., valued at $14,274,245. This shows an increase of 14.4 per cent. in volume and 69.1 per cent. in value.

Coal, valued at $6,139,920, shows a smaller increase over 1936 than did the production in 1936 over 1935.

Copper, which in 1936 had decreased both in volume and in value to the lowest point since 1900, has, with the return of Britannia to full capacity and the reopening of *Copper Mountain*, shown an even better recovery during 1937 than was anticipated. Volume production increased 121.4 per cent. and value production 205.5 per cent. The latter, however, was due to abnormally high prices for copper.

Silver production in volume was the greatest in the history of the Province, with an output of 11,308,685 oz., valued at $5,075,451. The value is considerably below that of the peak year of 1926, when 10,748,556 oz. was valued at $6,675,606. The record volume production clearly shows that silver in British Columbia to-day is a by-product, and largely dependent upon the production of base metals.

Non-metallic minerals and structural materials as groups show substantial increases in value of 31 to 37 per cent., and only in a few individual items in each group has there been any decrease. The steady increase in the value of these materials is a healthy sign.

The total number of shipping-mines increased from 168 to 185, those shipping over 100 tons increasing from 70 to 113.

The number of men employed increased from 14,180 to 16,129, the greatest number employed in any year; and wages and salaries increased from $17,917,221 to $21,349,690, the greatest amount ever paid out in any year.

Dividends increased from $10,513,705 in 1936 to an all-time record of $15,085,293 in 1937. These figures do not include dividends paid by Howe Sound Mining and Smelting Company, parent company of the Britannia Mining and Smelting Company.

During the past four years new tables have been compiled, the first of which, Table No. I., appeared in the 1933 Annual Report.

For the 1934 Annual Report, Table No. VI. (now Table No. VII.), which formerly tabulated the yield of placer gold only, was drawn up to show both placer- and lode-gold values. This facilitates a rapid view of the total gold production of the Province. Another table introduced in 1934, No. XXII., includes "Mining Companies employing an Average of Ten or more Men." Incorporated in this table, additional data are presented showing the number of operating days at mine and mill, and also tonnage mined and milled. A subsection of the table shows operating days and average men employed at non-shipping mines employing ten or more men.

Table No. II. was added to the Annual Report for 1936. It gives the average metal prices used in compiling Provincial production for the years 1901 to date, for gold, silver, copper, lead, and zinc.

Table No. IX. has been subdivided into three parts—IX.A, IX.B, and IX.C—to facilitate reference, and IX.D, IX.E, IX.F have been added to show similar data for the period 1900–1937, inclusive.

Table No. VIII. has been extended to cover a period of five years' production from mining divisions and districts in place of the three-year period formerly given.

Table No. XVII., appearing for the first time in the 1936 Annual Report, has been amended to show dividends paid from 1919 to date. The information in this table has been obtained from departmental files, operators, and trade journals, and while in general accurate, there may be slight differences in isolated instances.

Table No. XVIII., also a new table introduced in 1936, sets forth capital employed, salaries and wages, amount expended on fuel and electricity, and process supplies for the year 1937, with comparative figures for 1936. The table shows details of such subjects by districts, under the various classes of mining. The totals are those obtained from all returns made to the Department on the subject, but there are some returns not received in time to be included in the totals, nor does it take into account the amounts expended in the large number of small operations conducted by one or two individuals or prospectors.

Table No. XIX. is a former table enlarged to show a period from 1901 to 1937, inclusive, covering tonnage, number of mines, number of mines shipping over 100 tons, and net value to shipper of lode-minerals. A new feature in the table also is the gross value of lode-minerals produced. It will be observed that the "net value" is not given for the years previous to 1926; such was not given on returns filed by operators.

Table No. XX. is a former table showing number of men employed in the mining industry. Formerly the table gave the current year and one comparative year, but the present table covers the period 1901 to 1937, inclusive.

GENERAL SITUATION.

It is as difficult to forecast the value of the mining industry for 1938 as it was for 1937. At the time of writing the forecast for 1936 base-metal prices were skyrocketting, and far above normal. At the present time base-metal prices are below what may be considered a fair average, and it is very difficult to estimate the possibility of prices rising before the end of the year to a level which will allow a fair average for the year.

It is anticipated that lode gold will again show an increase in volume. It appears reasonably certain that gold will again take first place in the mining industry during 1938, and will exceed lead in value, though it is unlikely that the value of production will be equal to that of lead for 1937.

Placer gold should show a further increase in volume and value production, and it is interesting to note that more interest is being taken in placer-mining in British Columbia in 1938 than for many years.

Silver production may show a decrease, and it is impossible to predict what may happen to the price for the metal before the year is out.

Copper should show a very large gain in volume, due to return to capacity production of Britannia, and an anticipated full year's operation at the *Copper Mountain* property of Granby Consolidated Mining, Smelting, and Power Company. While the average copper price for 1938 is likely to be considerably below that for 1937, the volume increase is anticipated to be large enough to show a value increase for the year, even at a lower metal price.

Lead production, due to a much lower price for the metal, may show a slight decrease in volume, and it is reasonably certain that there will be an appreciable decrease in value, as on the basis of 1937 volume production 1 cent a pound means a difference in value of over $4,000,000.

Zinc production may also show a slight decrease in volume, due to lower metal prices, and it is almost certain that the decrease in value will be considerable, as the metal is at present selling at almost 2 cents less per pound than the average price attained in 1937. A 1-cent variation in price based on last year's volume means a difference in value of close to $3,000,000.

Coal may be expected to show a slight increase in volume and value.

Structural materials should show a further increase in 1938.

In preparing the foregoing estimate, it is assumed that no major disaster will affect the mining industry or any of the larger producers. If the industry functions smoothly throughout the year, it is anticipated that while the value of mine products will not be as great as in 1937, the industry will have had a very good year.

During the past year the *Whitewater* property of Polaris-Taku Mining Company, Limited, was brought into production in the far north-western part of the Province. The *Big Missouri* mill, under construction during the past year, has been brought into production at the time of writing. Placer-mining in the Atlin area has shown an improvement, and generally greater interest is being shown in mining in the far north-west part of the Province.

The Manson section in the North-eastern Mineral Survey District was very active during the past year, and it is anticipated that increased activity will take place in placer-mining in that area during the coming season.

It is anticipated that development in respect to lode-gold properties in the Cariboo district will reach greater proportions than during the boom period of a few years ago. Placer-mining in the Cariboo area is again increasing in importance, and during the past year more than 1,000,000 cubic yards of dirt was hydraulicked at the *Bullion* mine. It is likely that several dredging possibilities will be investigated within the area during the coming season.

In the Southern and Central Mineral Survey District, the Hedley Camp continues to attract the greatest amount of attention. The reopening of the *Copper Mountain* property of the Granby Consolidated Mining, Smelting, and Power Company, is creating an interest in the Princeton area.

In the Eastern Mineral Survey District the drop in base-metal prices has affected the interest that was being revived in the old Slocan area. However, there are sufficient mineral showings throughout this district to attract attention at almost any time.

In the Western Mineral Survey District the most important event of the year was the development in the Zeballos area of the west coast of Vancouver Island. During the coming season a great deal of interest will be shown in lode-gold prospecting and development, not only in the Zeballos area but in other places on the west coast of the Island.

The property of Pacific Nickel Mines, Limited, the old B.C. Nickel Mine, has not yet been brought into production, but the prospects appear brighter than at this time last year.

GOLD PURCHASING.

Late in 1935 the Department of Finance, co-operating with the Department of Mines, undertook to purchase small lots of placer gold under 2 oz. in weight from the individual placer-miner. The Gold Commissioners throughout the Province have paid a cash price of $28 per ounce for clean gold, and have purchased dirty gold and amalgam on a deferred-payment basis. During 1936, 1,470 lots of gold were received by the Department through the Gold Commissioners, of an aggregate value of some $50,000. In 1937 purchases increased slightly to 1,657 lots, valued at approximately $52,250. The total price paid is almost exactly the same as that received from the Royal Canadian Mint, except for the Mint's handling charges of 1 per cent. Considering that the individual miner has received about $10,000 to $12,000 more per annum than had he sold through the ordinary channels, this service is believed to be well justified.

DEPARTMENT LABORATORIES.

During 1936 the Assay Office was equipped with a new electric furnace and drying-oven and other accessories to bring it thoroughly up to date. The laboratories of the Mineralogical Branch were equipped for the first time in the history of the Department with the finest microscopic equipment available. The work of the technical staff, by reason of this new equipment, has not only been increased in value, but the Department can offer a greater service to the public in the examination of mill products, etc., than heretofore. The laboratory in 1937 was equipped for research-work in respect to non-metallic and structural materials, where preliminary investigations may be made preparatory to more intensive work in the well-equipped laboratories of the Department of Mines in Ottawa.

LECTURES TO PROSPECTORS.

A series of fourteen lectures on geology and mining, prepared by the Provincial Mineralogist in 1934, was again presented during the winter of 1937–38 by the Mining Engineers and other instructors at the following centres throughout the Province:—

Bull River Bridge, Burnaby (2), Canyon, Creston, Grand Forks, Greenwood, Kitchener, Nanaimo, Premier, Princeton, Revelstoke, Slocan, Vancouver (6), Victoria, Wynndel, and Yahk.

The estimated total average attendance at the lectures prior to the completion of the course was 660. This work was carried out in conjunction with the Department of Education. This series of lectures has been presented for four consecutive seasons, and it is now time that a new course be prepared. It is hoped that a new series of lectures can be prepared for the 1938–39 season. The brochure, "Elementary Geology Applied to Prospecting," is now in its second edition of 4,000 copies. It may be obtained from the Department at a nominal charge of 35 cents.

The preparation of rock and mineral sets comprising about fifty minerals and rocks commonly found in British Columbia has been going ahead for some time, and distribution started about the end of 1936. A nominal charge of 50 cents a set is made. Distribution has been confined to residents of British Columbia, as the Department has been unable to cope with the demand from other places. However, it is hoped that in the near future this restriction may be raised.

PLACER-MINING CAMPS.

The Provincial Government Department of Labour created in 1935 a plan whereby unmarried, physically fit unemployed men between the ages of 21 and 25 years were given an opportunity to learn placer-mining. In 1936 the age-limit was reduced, permitting younger men to enrol. Instruction was carried out under the direction of the Chief Mining Engineer.

In 1937 about 255 young men between the ages of 18 and 25 were given instruction in placer-mining, woodcraft, camp cooking, building cabins, whipsawing lumber, etc., during the summer months at the Nanaimo and Emory Creek camps.

After the first training period of six weeks, those who desired to prospect for gold were given their fare, as well as a grub-stake and a special reduced cost on equipment, to certain areas where, in the opinion of the Department, there was a chance of discovering gold.

A large number of trainees availed themselves of this opportunity, and in the Quesnel area, where most of them went, the Department appointed an engineer-overseer familiar with the area to assist them in locating ground, etc. This scheme worked well because the results of the plan were reported to the Department by the engineer; whereas in former years, the trainees were asked to report, and very few of them took the trouble to do this.

The thorough training in outdoor work fitted these young men to apply for jobs in the mines, of any description, as well as forestry, so that the future holds considerable hope; whereas beforehand the youths had no idea of any occupation outside of city limits.

Some of the larger mining companies kindly co-operated to the extent of giving some of these young men jobs in the mines and smelters after training, which is one of the main objects of the plan.

GEOLOGICAL SURVEY OF CANADA.

By an arrangement made at the time the Province of British Columbia entered Confederation, all geological investigations and mapping in the Province were to be carried on by the Geological Survey of Canada; this agreement has been fully adhered to by the Dominion Government and has proved of great benefit to the mining industry of the Province. Each year several geological parties are kept in the field and in the aggregate a vast amount of information is made available to the prospector and the mining engineer in the many excellent reports and maps covering British Columbia which have been issued by the Geological Survey of Canada.

For some years a branch office of the Geological Survey has been maintained in Vancouver, where copies of maps and reports on British Columbia can be obtained. The officer in charge of the British Columbia office is W. E. Cockfield, and the address is 305 Federal Building, Vancouver, B.C.

In 1936 a reorganization of several departments in the Federal Government was effected, and the Department of Mines and Resources created. One of the main branches of this Department is that of Mines and Geology, with sub-branches known as the Bureau of Geology and Topography and the Bureau of Mines. The Geological Survey of Canada and the Topographical Survey are now a part of the Bureau of Geology and Topography. During the season of 1937 the Bureau of Geology and Topography had the following officers employed on field work in British Columbia:—

GEOLOGICAL PARTIES.

1. F. H. McLearn studied the stratigraphy and fauna of the Triassic in the foot-hills of the Rocky Mountains along Peace River.

2. E. D. Kindle examined the mineral deposits north of Hazelton, in an area tributary to the Prince Rupert branch of the Canadian National Railways.

3. J. E. Armstrong completed the mapping of the geology of the west half of the Fort Fraser map-area (longs. 125°–126°, lats. 54°–55°).

4. J. G. Gray completed the mapping of the geology of the east half of the Fort Fraser map-area (longs. 124°–125°, lats. 54°–55°).

5. A. H. Lang completed the mapping of the Keithley Creek area (longs. 121°–121° 30′, lats. 52° 45′–53°) and of the Swift River area (longs. 121° 30′–122°, lats 52° 45′–53°).

6. C. E. Cairnes began detailed study and mapping of the Tyaughton area, Bridge River district.

7. H. M. A. Rice continued the study and mapping of the east half Nelson map-area (longs. 116°–117°, lats. 49°–50°).

8. D. A. McNaughton completed the study and mapping of the Hedley map-area (longs. 120°–120° 30′, lats. 49° 15′–49° 30′).

9. W. E. Cockfield assisted by W. E. Snow commenced study and mapping in the Hope area (longs. 120°–122°, lats. 49°–50°).

TOPOGRAPHICAL PARTIES.

C. H. Smith and R. J. Parlee mapped an area of 132 square miles, including Hudson Bay Mountain, for publication on a scale of 1 inch to 1 mile with 100-foot contours.

C. H. Smith and R. J. Parlee mapped, for publication on 1 inch to 4 miles with 500-foot contours, 75 per cent. of the Tatlatui sheet (lats. 56°–57°, longs. 126°–128°).

H. A. S. West and K. G. Francis mapped 22 per cent. of the Nass River sheet (lats. 56°–57°, longs. 128°–130°) for publication on 1 inch to 4 miles with 500-foot contours.

N. E. McConnell mapped 2,400 square miles included in the Big Bend area for publication on 1 inch to 4 miles with 500-foot contours.

METHOD OF COMPUTING PRODUCTION.

The total mine output of the Province consists of the outputs of metalliferous minerals, coal, structural materials, and miscellaneous metals, minerals, and materials, valued at standard recognized prices in Canadian funds.

In the Annual Report for 1925 some changes were made in the methods used in previous years in computing and valuing the products of the industry, but in order to facilitate comparisons with former years the same general style of tables was adhered to. The methods used in the 1925 Annual Report have been followed in subsequent Annual Reports, with the addition of new tables.

The following notes explain the methods used:—

(1.) From the certified returns of lode mines of ore and concentrate shipments made during the full calendar year by the producers the net recovered metal contents have been determined by deducting from the "assay value content" necessary corrections for smelting and refining losses.

In making comparisons of production figures with previous years, it should be remembered that prior to 1925 in the Annual Reports the total metal production, with the exception of copper, was determined by taking the assay value content of all ores shipped; deductions for slag losses were made by taking varying percentages off the metal prices.

(2.) Gold-placer returns are received from operators giving production in crude ounces recovered; these are converted to fine-gold ounces by dividing the crude-ounce value by the

old standard price of gold. The fine-gold content is then valued at the yearly average price of gold, which in 1936 was $35.03 per ounce. On this basis the average crude-gold value per ounce was $28.80 on Provincial placer-gold production.

(3.) The prices used in valuing the different metals are: For gold, the average price for the year; for silver, the average New York metal-market price for the year; for lead, the average London metal-market price for the year; and for zinc, the average London metal-market price for the year. As in 1936, copper in 1937 is valued at the average London metal-market price. Prior to 1932 copper was valued at the average New York price. The change was made because very little copper was being marketed in the United States on account of high tariff charges against importations from foreign countries. The bulk of the lead and zinc production of the Province is sold on the basis of the London prices of these metals and they are therefore used. The New York, St. Louis, and Montreal lead- and zinc-market prices differ materially from the London prices of these metals and are not properly applicable to the valuing of the British Columbia production.

By agreement with the Dominion Bureau of Statistics and the Provincial Statistical Bureaus, the following procedure of taking care of the exchange fluctuations has been agreed upon:—

(*a*.) Silver to be valued at the average New York price, adjusted to Canadian funds at the average exchange rate.

(*b*.) Lead, zinc, and copper to be valued at London prices, adjusted to Canadian funds at the average exchange rate.

(4.) In 1926 a change was made in computing coal and coke statistics. The practice in former years had been to list coal and coke production (in part) as primary mineral production. Only the coke made in bee-hive ovens was so credited; that made in by-product ovens was not listed as coke, but the coal used in making this coke was credited as coal production. The result was that the coke-production figures were incomplete. Starting with the 1926 Annual Report, the standard practice of the Bureau of Statistics, Ottawa, has been adopted. This consists of crediting all coal produced, including that used in making coke, as primary mine production. Coke-making is considered a manufacturing industry. As it is, however, of interest to the mining industry, a table included in the Report shows the total coke produced in the Province, together with by-products, and the values given by the producers. This valuation of coke is not, of course, included in the total gross mine production of the Province.

From 1918 to 1930 coal production was valued at $5 per long ton. In 1931 the price used was $4.50, and from 1932 on the price used has been $4.25 per long ton. In making comparisons with former years the decline in dollar value is accentuated by this lowered price.

INDEX TO TABLES.

TABLE I.—British Columbia Mine Production, 1936 and 1937.

	Quantity, 1936.	Quantity, 1937.	Value, 1936.	Value, 1937.	Per Cent. Increase (+) or Decrease (—). Quantity.	Value.
Metallics.			$	$		
Bismuth			357,007		—100.0	—100.0
Cadmium			468,170	715,747		+ 52.9
Copper lb.	20,806,672	46,057,584	1,971,848	6,023,411	+121.4	+205.5
Gold, lode* oz.	404,472	460,781	14,168,654	16,122,727	+ 13.9	+ 13.8
Gold, placer* oz.	43,389	54,153	1,249,940	1,558,245	+ 24.8	+ 24.7
Lead lb.	377,971,618	419,118,371	14,790,029	21,416,949	+ 10.9	+ 44.8
Platinum oz.	23	22	930	1,066	— 4.4	+ 14.6
Silver oz.	9,521,015	11,308,685	4,296,548	5,075,451	+ 18.7	+ 18.1
Zinc lb.	254,581,393	291,192,278	8,439,373	14,274,245	+ 14.4	+ 69.1
Others			49,971	37,753		— 24.5
Totals			45,792,470	65,225,594		+ 42.4
Fuel.						
Coal (2,240 lb.) tons	1,346,471	1,444,687	5,722,502	6,139,920	+ 7.3	+ 7.3
Non-metallics.						
Diatomaceous earth			350	1,346		+284.6
Fluxes—limestone, quartz tons	17,592	22,089	14,555	18,032	+ 25.2	+ 23.9
Gypsum products, gypsite			124,425	151,175		+ 21.5
Iron oxides, mica			4,000	1,280		— 68.0
Slate and green rock granules; talc tons	268	186	2,809	2,790	— 30.6	— 00.7
Sodium carbonate, magnesium sulphate tons	845	1,013	15,389	17,030	+ 19.9	+ 10.7
Sulphur† tons	64,896	88,369	608,790	820,398	+ 36.2	+ 34.8
Totals			770,318	1,012,051		+ 31.4
Clay Products and other Structural Materials.						
Clay Products.						
Brick—						
Common No.	3,327,061	5,291,044	46,437	75,334	+ 59.0	+ 62.2
Face, paving, sewer brick No.	564,788	995,600	19,613	35,147	+ 76.3	+ 79.2
Firebrick, blocks			115,121	126,115		+ 9.6
Fireclay tons	567	694	7,657	9,986	+ 22.4	+ 30.4
Structural tile—hollow blocks			33,444	23,497		— 29.7
Drain-tile, sewer-pipe No.	712,745	784,491	54,179	68,707	+ 10.7	+ 26.8
Pottery—glazed or unglazed			2,875	9,578		+233.1
Bentonite; other clay products			1,961	2,932		+ 49.5
Totals			281,287	351,296		+ 24.9
Other Structural Materials.						
Cement			516,931	623,725		+ 20.7
Lime and limestone tons	72,591	71,293	137,158	143,124	— 1.8	+ 4.4
Sand and gravel			477,897	552,634		+ 15.6
Stone—building, pulp-stones tons	5,890	6,079	175,226	132,524	+ 3.2	— 24.7
Rubble, riprap, crushed rock tons	333,348	343,587	208,178	295,034	+ 3.7	+ 41.7
Totals			1,515,390	1,747,041		+ 15.3
Total value in Canadian funds			54,081,967	74,475,902		+ 37.7

* Canadian funds.

† Sulphur content of pyrites shipped, estimated sulphur contained in sulphuric acid made from waste smelter-gases, and elemental sulphur.

TABLE II.—AVERAGE METAL PRICES USED IN COMPILING VALUE OF PROVINCIAL PRODUCTION OF GOLD, SILVER, COPPER, LEAD, AND ZINC.

Year.	Gold, Fine Ounce.	Silver, Fine Ounce.	Copper, Lb.	Lead, Lb.	Zinc, Lb.
	$	Cents.	Cents.	Cents.	Cents.
1901	20.67	56.002 N.Y.	16.11 N.Y.	2.577 N.Y.	.....
1902	.....	49.55 ,,	11.70 ,,	3.66 ,,	.....
1903	.....	50.78 ,,	13.24 ,,	3.81 ,,	.....
1904	.....	53.36 ,,	12.82 ,,	3.88 ,,	.....
1905	.....	51.33 ,,	15.59 ,,	4.24 ,,	.....
1906	.....	63.45 ,,	19.28 ,,	4.81 ,,	.....
1907	.....	62.06 ,,	20.00 ,,	4.80 ,,	.....
1908	.....	50.22 ,,	13.20 ,,	3.78 ,,	.....
1909	.....	48.93 ,,	12.98 ,,	3.85 ,,	.....
1910	.....	50.812 ,,	12.738 ,,	4.00 ,,	4.60 E. St. L.
1911	.....	50.64 ,,	12.38 ,,	3.98 ,,	4.90 ,,
1912	.....	57.79 ,,	16.341 ,,	4.024 ,,	5.90 ,,
1913	.....	56.80 ,,	15.27 ,,	3.93 ,,	4.80 ,,
1914	.....	52.10 ,,	13.60 ,,	3.50 ,,	4.40 ,,
1915	.....	47.20 ,,	17.28 ,,	4.17 ,,	11.25 ,,
1916	.....	62.38 ,,	27.202 ,,	6.172 ,,	10.88 ,,
1917	.....	77.35 ,,	27.18 ,,	7.91 ,,	7.566 ,,
1918	.....	91.93 ,,	24.53 ,,	6.67 ,,	6.94 ,,
1919	.....	105.57 ,,	18.70 ,,	5.19 ,,	6.24 ,,
1920	.....	95.80 ,,	17.45 ,,	7.16 ,,	6.52 ,,
1921	.....	59.52 ,,	12.50 ,,	4.09 ,,	3.95 ,,
1922	.....	64.14 ,,	13.38 ,,	5.16 ,,	4.86 ,,
1923	.....	61.63 ,,	14.42 ,,	6.54 ,,	5.62 ,,
1924	.....	63.442 ,,	13.02 ,,	7.287 ,,	5.39 ,,
1925	.....	69.065 ,,	14.042 ,,	7.848 Lond.	7.892 Lond.
1926	.....	62.107 ,,	13.795 ,,	6.751 ,,	7.409 ,,
1927	.....	56.37 ,,	12.92 ,,	5.256 ,,	6.194 ,,
1928	.....	58.176 ,,	14.570 ,,	4.575 ,,	5.493 ,,
1929	.....	52.993 ,,	18.107 ,,	5.050 ,,	5.385 ,,
1930	.....	38.154 ,,	12.982 ,,	3.927 ,,	3.599 ,,
1931	.....	28.700 ,,	8.116 ,,	2.710 ,,	2.554 ,,
1932	23.47	31.671 ,,	6.380 Lond.	2.113 ,,	2.405 ,,
1933	28.60	37.832 ,,	7.454 ,,	2.391 ,,	3.210 ,,
1934	34.50	47.461 ,,	7.419 ,,	2.436 ,,	3.044 ,,
1935	35.19	64.790 ,,	7.795 ,,	3.133 ,,	3.099 ,,
1936	35.03	45.127 ,,	9.477 ,,	3.913 ,,	3.315 ,,
1937	**34.99**	**44.881** ,,	**13.078** ,,	**5.110** ,,	**4.902** ,,
Average 1933–37 (inclusive)	33.66	48.018 ,,	9.044 ,,	3.396 ,,	3.514 ,,

NOTE.—In making comparisons with average prices used prior to 1926, it should be remembered that deductions were made from the average prices as a means of adjustment between the "assay value content" of ores shipped instead of allowing percentage losses in smelting operations. The price of copper prior to 1926 was taken at "net"; silver, at 95 per cent.; lead, at 90 per cent.; and zinc, at 85 per cent. Subsequent to 1926 (inclusive) prices are true averages, and adjustments are made on the metal content of ores for loss in smelting and refining.

TABLE III.—TOTAL PRODUCTION FOR ALL YEARS UP TO AND INCLUDING 1937.

Gold, placer	$84,260,944*
Gold, lode	207,936,443*
Silver	129,026,600
Copper	292,103,616
Lead	237,689,431
Zinc	142,124,138
Coal and coke	372,513,077
Structural materials	74,965,889
Miscellaneous minerals, etc.	13,200,373
Total	$1,553,820,511

* Canadian funds.

TABLE IV.—PRODUCTION FOR EACH YEAR FROM 1852 TO 1937 (INCLUSIVE).

1852 to 1895 (inclusive)	$94,547,241	1918	$41,782,474
1896	7,507,956	1919	33,296,313
1897	10,455,268	1920	35,543,084
1898	10,906,861	1921	28,066,641
1899	12,393,131	1922	35,162,843
1900	16,344,751	1923	41,304,320
1901	20,086,780	1924	48,704,604
1902	17,486,550	1925	61,492,242
1903	17,495,954	1926	67,188,842
1904	18,977,359	1927	60,729,358
1905	22,461,325	1928	65,372,586
1906	24,980,546	1929	68,245,443
1907	25,882,560	1930	55,391,993
1908	23,851,277	1931	34,883,181
1909	24,443,025	1932	*28,798,406
1910	26,377,066	1933	*32,602,672
1911	23,499,072	1934	*42,305,297
1912	32,440,800	1935	*48,821,239
1913	30,296,398	1936	*54,081,967
1914	26,388,825	1937	*74,475,902
1915	29,447,508		
1916	42,290,462	Total	$1,553,820,511
1917	37,010,392		

* Canadian funds.

TABLE V.—QUANTITIES AND VALUE OF MINE PRODUCTS FOR 1935, 1936, AND 1937.

Description.	1935.		1936.		1937.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
Gold, placer* oz.	30,929	$895,058	43,389	$1,249,940	54,153	$1,558,245
Gold, lode* oz.	365,244	12,852,936	404,472	14,168,654	460,781	16,122,727
Silver oz.	9,251,544	5,994,075	9,521,015	4,296,548	11,308,685	5,075,451
Copper lb.	38,791,127	3,023,768	20,806,672	1,971,848	46,057,584	6,023,411
Lead lb.	344,268,444	10,785,930	377,971,618	14,790,029	419,118,371	21,416,949
Zinc lb.	256,239,446	7,940,860	254,581,393	8,439,373	291,192,278	14,274,245
Coal tons, 2,240 lb.	1,187,968	5,048,864	1,346,471	5,722,502	1,444,687	6,139,920
Structural materials		1,238,717		1,796,677		2,098,337
Miscellaneous metals and minerals		1,041,031		1,646,396		1,766,617
Totals		$48,821,239		$54,081,967		$74,475,902

* Canadian funds.

TABLE VI.—Production of Lode Gold, Silver, Copper, Lead, and Zinc.

Year.	Gold.		Silver.		Copper.		Lead.		Zinc.		Total Value.
	Oz.	Value.	Oz.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	
		$		$		$		$		$	$
1887			17,690	17,331			204,800	9,216			26,547
1888			79,780	75,000			674,500	29,813			104,813
1889			53,192	47,873			165,100	6,498			54,371
1890			70,427	73,948							73,948
1891			4,500	4,000							4,000
1892			77,160	66,935			808,420	33,064			99,999
1893	1,170	23,404	227,000	195,000			2,135,023	78,996			297,400
1894	6,252	125,014	746,379	470,219	324,680	16,234	5,662,523	169,875			781,342
1895	39,264	785,271	1,496,522	977,229	952,840	47,642	16,475,464	532,255			2,342,397
1896	62,259	1,244,180	3,135,343	2,100,689	3,818,556	190,926	24,199,977	721,384			4,257,179
1897	106,141	2,122,820	5,472,971	3,272,836	5,325,180	266,258	38,841,135	1,390,517			7,052,431
1898	110,061	2,201,217	4,292,401	2,375,841	7,271,678	874,781	31,693,559	1,077,581			6,529,420
1899	138,315	2,857,573	2,939,413	1,663,708	7,722,591	1,351,453	21,862,436	878,870			6,751,604
1900	167,153	3,453,381	3,958,175	2,309,200	9,997,080	1,615,289	63,358,621	2,691,887			10,069,757
1901	210,384	4,348,603	5,151,333	2,884,745	27,603,746	4,446,963	51,582,906	2,002,733			13,683,044
1902	236,491	4,888,269	3,917,917	1,941,328	29,636,057	3,446,673	22,536,381	824,832			11,101,102
1903	232,831	4,812,616	2,996,204	1,521,472	34,359,921	4,547,535	18,089,283	689,744			11,571,367
1904	222,042	4,589,608	3,222,481	1,719,516	35,710,128	4,578,037	36,646,244	1,421,874			12,309,035
1905	238,660	4,933,102	3,439,417	1,971,818	37,692,251	5,876,222	56,580,703	2,399,022			15,180,164
1906	224,027	4,630,639	2,990,262	1,897,320	42,990,488	8,288,565	52,408,217	2,667,578			17,484,102
1907	196,179	4,055,020	2,745,448	1,703,825	40,832,720	8,166,544	47,738,703	2,291,458			16,216,847
1908	255,582	5,282,880	2,631,389	1,321,483	47,274,614	6,240,249	43,195,733	1,632,799			14,477,411
1909	238,224	4,924,090	2,532,742	1,239,270	45,597,245	5,918,522	44,396,346	1,709,259	8,500,000	400,000	14,191,141
1910	267,701	5,533,380	2,450,241	1,245,016	38,243,934	4,871,512	34,658,746	1,386,350	4,184,192	192,473	13,228,731
1911	228,617	4,725,513	1,892,364	958,293	36,927,656	4,571,644	26,872,397	1,069,521	2,634,544	129,092	11,454,063
1912	257,496	5,322,442	3,132,108	1,810,045	51,456,537	8,408,513	44,871,454	1,805,627	5,358,280	316,139	17,662,766
1913	272,254	5,627,490	3,465,856	1,968,606	46,460,305	7,094,489	55,364,677	2,175,832	6,758,768	324,421	17,190,838
1914	247,170	5,109,004	3,602,180	1,876,736	45,009,699	6,121,319	50,625,048	1,771,877	7,866,467	346,125	15,225,061
1915	250,021	5,167,934	3,366,506	1,588,991	56,918,405	9,835,500	46,503,590	1,939,200	12,982,440	1,460,524	19,992,149
1916	221,932	4,587,334	3,301,923	2,059,739	65,379,364	17,784,494	48,727,516	3,007,462	37,168,980	4,043,985	31,483,014
1917	114,523	2,367,190	2,929,216	2,265,749	59,007,565	16,038,256	37,307,465	2,951,020	41,848,513	3,166,259	26,788,474
1918	164,674	3,403,812	3,498,172	3,215,870	61,483,754	15,143,449	43,899,661	2,928,107	41,772,916	2,899,040	27,590,278
1919	152,426	3,150,645	3,403,119	3,592,673	42,459,339	7,939,896	29,475,968	1,526,855	56,737,651	3,540,429	19,750,498
1920	120,048	2,481,392	3,377,849	3,235,980	44,887,676	7,832,899	39,331,218	2,816,115	47,208,268	3,077,979	19,444,365
1921	135,663	2,804,154	2,673,389	1,591,201	39,036,993	4,879,624	41,402,288	1,693,354	49,419,372	1,952,065	12,920,398
1922	197,856	4,089,684	7,101,311	4,554,781	32,359,896	4,829,754	67,447,985	3,480,316	57,146,548	2,777,322	19,231,857
1923	179,245	3,704,994	6,032,986	3,718,129	57,720,290	8,323,266	96,663,152	6,321,770	58,343,462	3,278,903	25,347,062
1924	247,716	5,120,535	8,341,768	5,292,184	64,845,393	8,442,870	170,384,481	12,415,917	79,130,970	4,266,741	35,538,247
1925	209,719	4,335,269	7,654,844	5,286,818	72,306,432	10,153,269	237,899,199	18,670,329	98,257,099	7,754,450	46,200,135
1926	201,427	4,163,859	10,748,556	6,675,606	89,339,768	12,324,421	263,023,937	17,757,535	142,876,947	10,586,610	51,508,031
1927	178,001	3,679,601	10,470,185	5,902,043	89,202,871	11,525,011	282,996,423	14,874,292	145,225,443	8,996,135	44,977,082
1928	188,087	3,888,097	10,627,167	6,182,461	97,908,316	14,265,242	305,140,792	13,961,412	181,763,147	9,984,613	48,281,825
1929	145,339	3,004,419	9,918,800	5,256,270	101,483,857	18,375,682	302,346,268	15,269,696	172,096,841	9,268,792	51,174,859
1930	160,778	3,323,576	11,289,171	4,307,270	90,421,545	11,738,525	319,199,752	12,535,931	250,287,306	9,010,093	40,915,395
1931	146,039	3,018,894	7,524,320	2,247,514	63,194,299	5,289,363	248,783,508	6,742,282	205,071,247	5,237,520	22,535,573
1932	181,564	4,261,307*	7,130,838	2,258,453	49,841,009	3,179,956	254,488,952	5,378,878	192,120,091	4,621,641	19,700,235
1933	223,529	6,392,929*	7,006,406	2,650,720	42,608,002	3,176,341	271,606,071	6,495,731	195,963,751	6,291,416	25,007,137
1934	297,130	10,250,985*	8,572,916	4,068,792	48,084,658	3,567,401	347,366,967	8,461,859	247,926,844	7,546,893	33,895,930
1935	365,244	12,852,936*	9,251,544	5,994,075	38,791,127	3,023,768	344,268,444	10,785,930	256,239,446	7,940,860	40,597,569
1936	404,472	14,168,654*	9,521,015	4,296,548	20,806,672	1,971,848	377,971,618	14,790,029	254,581,393	8,439,373	43,666,452
1937	460,781	16,122,727*	11,308,685	5,075,451	46,057,584	6,023,411	419,118,371	21,416,949	291,192,278	14,274,245	62,912,783
Totals	8,904,487	207,936,443	231,791,581	129,026,600	1,969,351,721	292,103,616	5,387,016,022	237,689,431	3,150,663,204	142,124,138	1,008,880,228

* Canadian funds.

TABLE VII.—Value of Gold Production to Date.

Year.	Placer.	Lode.	Total.
1858–1862	$9,871,634		$9,871,634
1863–1867	16,283,592		16,283,592
1868–1872	9,895,318		9,895,318
1873–1877	9,019,201		9,019,201
1878–1882	5,579,911		5,579,911
1883–1887	3,841,515		3,841,515
1888–1892	2,525,426		2,525,426
1893	356,131	$23,404	379,535
1894	405,516	125,014	530,530
1895	481,683	785,271	1,266,954
1896	544,026	1,244,180	1,788,206
1897	513,520	2,122,820	2,636,340
1898	643,346	2,201,217	2,844,563
1899	1,344,900	2,857,573	4,202,473
1900	1,278,724	3,453,381	4,732,105
1901	970,100	4,348,603	5,318,703
1902	1,073,140	4,888,269	5,961,409
1903	1,060,420	4,812,616	5,873,036
1904	1,115,300	4,589,608	5,704,908
1905	969,300	4,933,102	5,902,402
1906	948,400	4,630,639	5,579,039
1907	828,000	4,055,020	4,883,020
1908	647,000	5,282,880	5,929,880
1909	477,000	4,924,090	5,401,090
1910	540,000	5,533,380	6,073,380
1911	426,000	4,725,513	5,151,513
1912	555,500	5,322,442	5,877,942
1913	510,000	5,627,490	6,137,490
1914	565,000	5,109,004	5,674,004
1915	770,000	5,167,934	5,937,934
1916	580,500	4,587,334	5,167,834
1917	496,000	2,367,190	2,863,190
1918	320,000	3,403,812	3,723,812
1919	286,500	3,150,645	3,437,145
1920	221,600	2,481,392	2,702,992
1921	233,200	2,804,154	3,037,354
1922	368,800	4,089,684	4,458,484
1923	420,000	3,704,994	4,124,994
1924	420,750	5,120,535	5,541,285
1925	280,092	4,335,269	4,615,361
1926	355,503	4,163,859	4,519,362
1927	156,247	3,679,601	3,835,848
1928	143,208	3,888,097	4,031,305
1929	118,711	3,004,419	3,123,130
1930	152,235	3,323,576	3,475,811
1931	291,992	3,018,894	3,310,886
1932	395,542	4,261,307	4,656,849*
1933	562,787	6,392,929	6,955,716*
1934	714,431	10,250,985	10,965,416*
1935	895,058	12,852,936	13,747,994*
1936	1,249,940	14,168,654	15,418,594*
1937	1,558,245	16,122,727	17,680,972*
Totals	$84,260,944	$207,936,443	$292,197,387

* Canadian funds.

TABLE VIII.—Output of Mine Products by Districts and Divisions, 1933, 1934, 1935, 1936, and 1937.

Names.	Divisions.					Districts.				
	1933.	1934.	1935.	1936.	1937.	1933.	1934.	1935.	1936.	1937.
North-western District (No. 1)						$5,097,666	$5,239,054	$4,543,389	$2,904,200	$3,273,581
Atlin, Stikine, and Liard*	$279,402	$307,313	$406,378	$549,047	$663,570					
Nass River†	2,878,808	3,088,657	2,221,212	61,834						
Portland Canal	1,841,862	1,700,724	1,636,954	2,053,210	2,213,728					
Skeena, Queen Charlotte, and Bella Coola	97,594	142,360	278,845	240,109	396,283					
North-eastern District (No. 2)						474,293	780,122	1,717,546	1,998,344	2,418,194
Cariboo and Quesnel	418,378	690,886	1,618,191	1,867,539	2,275,097					
Omineca and Peace River	55,915	89,736	99,355	130,805	143,097					
Central District (No. 3)						243,863	619,036	564,441	632,040	620,109
Nicola and Vernon	133,146	214,798	315,550	194,490	255,320					
Yale, Ashcroft, and Kamloops	104,776	404,238	248,891	437,550	364,789					
Clinton‡	5,941									
Southern District (No. 4)						1,085,336	1,207,845	2,330,201	2,689,497	4,341,050
Grand Forks, Greenwood, and Osoyoos	450,514	694,414	1,799,685	2,118,630	2,643,559					
Similkameen	634,822	513,431	530,516	570,867	1,697,491					
Eastern District (No. 5)						17,875,958	24,828,234	28,994,311	33,258,173	48,020,055
Fort Steele	15,955,987	20,042,528	23,067,831	27,089,325	39,507,405					
Windermere and Golden	424,939	1,360,312	530,863	12,513	16,770					
Ainsworth	21,413	48,246	215,104	55,962	268,820					
Slocan and Slocan City	30,296	84,719	406,133	194,696	667,696					
Nelson and Arrow Lake	759,537	1,496,843	1,991,723	3,051,401	4,267,950					
Trail Creek	669,017	1,786,961	2,582,959	2,742,916	3,224,300					
Revelstoke and Lardeau	14,769	8,625	199,698	111,460	67,114					
Western District (No. 6)						7,825,556	9,631,006	10,671,351	12,599,713	15,802,913
Nanaimo, Alberni, Clayoquot, Quatsino, and Victoria	3,043,331	2,965,047	3,262,171	3,881,722	4,463,293					
Vancouver, New Westminster, and Lillooet	4,782,225	6,466,377	7,172,367	8,303,079	11,069,818					
Yale, Ashcroft, and Clinton		199,582	236,813	414,912						
Totals§	$32,602,672	$42,305,297	$48,821,239	$54,081,967	$74,475,902	$32,602,672	$42,305,297	$48,821,239	$54,081,967	$74,475,902

* Liard Mining Division combined with Stikine Mining Division from and including 1937.

† Nass River Mining Division combined with Portland Canal Mining Division from and including 1937.

‡ Yale, Ashcroft, and Clinton Mining Divisions included in No. 6 District (Mainland section) from and including 1934. § Canadian funds.

TABLE IX.A.—Detail of Placer Gold, Lode Gold, and Silver in 1936 and 1937.

Districts and Divisions.	Year.	Tons.	Gold—Placer.		Gold—Lode.		Silver.	
			Ounces.	Value.	Ounces.	Value.	Ounces.	Value.
				$		$		$
North-western District (No. 1):								
Atlin	1936	6	18,423	530,726	2	70	934	421
	1937	.....	**21,683**	**623,925**	.....	.....	.....	.....
Bella Coola	1936	.....	.....	.....	.....	.....	.....	.....
	1937	.....	.....	.....	.....	.....	.....	.....
Liard	1936	.....	228	6,568	.....	.....	.....	.....
	1937	.....	.....	.....	.....	.....	.....	.....
Nass River	1936	6,645	.....	.....	221	7,742	24,997	11,280
	1937	.....	.....	.....	.....	.....	.....	.....
Portland Canal	1936	197,247	.....	.....	44,188	1,547,906	1,044,049	471,148
	1937	**208,012**	**8**	**230**	**48,883**	**1,710,416**	**1,006,049**	**451,525**
Queen Charlotte	1936	5,096	65	1,872	20	700	7	3
	1937	.....	**63**	**1,813**	.....	.....	.....	.....
Skeena*	1936	19,327	26	749	4,844	169,685	1,433	647
	1937	**19,621**	**3**	**86**	**7,175**	**251,053**	**3,002**	**1,347**
Stikine	1936	.....	216	6,222	.....	.....	.....	.....
	1937	.....	**714**	**20,545**	.....	.....	.....	.....
North-eastern District (No. 2):								
Cariboo	1936	95,409	11,980	345,117	36,765	1,287,878	4,657	2,102
	1937	**103,231**	**16,329**	**469,865**	**43,198**	**1,511,498**	**4,675**	**2,098**
Omineca	1936	10	1,775	51,134	7	245	3,205	1,446
	1937	**30**	**3,076**	**88,511**	**4**	**140**	**1,151**	**517**
Peace River	1936	.....	332	9,564	.....	.....	.....	.....
	1937	.....	**106**	**3,050**	.....	.....	.....	.....
Quesnel	1936	.....	7,211	207,733	.....	.....	.....	.....
	1937	.....	**8,800**	**253,219**	.....	.....	.....	.....
Central District (No. 3):								
Kamloops	1936	18,343	166	4,782	7,021	245,946	19,405	8,757
	1937	**13,408**	**196**	**5,640**	**4,787**	**167,497**	**1,322**	**593**
Nicola	1936	18,889	.....	.....	1,086	38,043	28,411	12,821
	1937	**10,430**	**2**	**57**	**617**	**21,588**	**13,234**	**5,940**
Vernon	1936	41	110	3,169	48	1,681	361	163
	1937	**2,871**	**170**	**4,892**	**1,198**	**41,918**	**2,011**	**902**
Southern District (No. 4):								
Grand Forks	1936	494	9	259	1,061	37,167	18,361	8,286
	1937	**1,601**	**10**	**288**	**933**	**32,649**	**3,207**	**1,439**
Greenwood	1936	22,957	135	3,889	5,905	206,852	728,047	328,546
	1937	**41,000**	**152**	**4,374**	**3,286**	**114,977**	**665,953**	**298,886**
Osoyoos	1936	115,190	2	58	39,555	1,385,612	28,981	13,078
	1937	**188,259**	.....	.....	**55,214**	**1,931,938**	**57,761**	**25,924**
Similkameen	1936	8	102	2,938	4	140	2	1
	1937	**444,552**	**80**	**2,302**	**2,102**	**73,549**	**58,436**	**26,227**
Eastern District (No. 5):								
Ainsworth	1936	766	2	58	1	35	21,056	9,502
	1937	**59,623**	**1**	**29**	**64**	**2,239**	**83,234**	**37,356**
Arrow Lake	1936	.....	2	58	.....	.....	.....	.....
	1937	.....	.....	.....	.....	.....	.....	.....
Fort Steele	1936	1,901,477	657	18,927	.....	.....	7,068,195	3,189,664
	1937	**2,219,755**	**836**	**24,056**	**65**	**2,274**	**8,267,901**	**3,710,717**
Golden	1936	.....	4	115	.....	.....	.....	.....
	1937	.....	**9**	**259**	.....	.....	.....	.....
Lardeau	1936	102,872	29	835	2,749	96,298	1,416	639
	1937	**8,182**	**1**	**29**	**285**	**9,972**	**32,937**	**14,782**
Nelson	1936	209,927	160	4,609	81,614	2,858,938	121,111	54,654
	1937	**275,241**	**282**	**8,114**	**111,710**	**3,908,733**	**198,609**	**89,138**
Revelstoke	1936	102	79	2,276	**6**	210	6,742	3,042
	1937	**114**	**97**	**2,791**	.....	.....	**4,469**	**2,006**
Slocan	1936	11,677	1	29	54	1,892	226,661	102,285
	1937	**54,718**	.....	.....	**117**	**4,094**	**523,537**	**234,969**
Slocan City	1936	37	.....	.....	63	2,207	509	230
	1937	**4,933**	**1**	**29**	**23**	**805**	**18,998**	**8,526**
Trail Creek	1936	15,823	151	4,350	10,415	364,837	10,627	4,796
	1937	**25,000**	.....	.....	**9,390**	**328,556**	**149,821**	**67,241**
Windermere	1936	.....	15	432	.....	.....	.....	.....
	1937	**1**	**17**	**489**	.....	.....	**13**	**6**
Western District (No. 6):								
Alberni	1936	207	.....	.....	53	1,856	6	3
	1937	.....	.....	.....	.....	.....	.....	.....
Ashcroft	1936	.....	278	8,009	.....	.....	.....	.....
	1937	.....	**451**	**12,978**	.....	.....	.....	.....
Clayoquot	1936	33	.....	.....	311	10,894	112	50
	1937	**476**	.....	.....	**3,183**	**111,373**	**1,360**	**610**
Clinton	1936	12,352	322	9,276	8,553	299,612	13,038	5,884
	1937	**11,016**	**355**	**10,215**	**5,356**	**187,407**	**7,837**	**3,517**
Lillooet	1936	385,546	618	17,803	145,505	5,097,040	53,939	24,341
	1937	**335,146**	**544**	**15,941**	**148,876**	**5,209,171**	**52,955**	**23,767**
Nanaimo	1936	270	3	86	61	2,137	209	94
	1937	**525**	**1**	**29**	**39**	**1,365**	**37**	**17**
New Westminster	1936	.....	84	2,420	.....	.....	.....	.....
	1937	.....	**88**	**2,532**	.....	.....	.....	.....
Quatsino	1936	.....	.....	.....	.....	.....	.....	.....
	1937	.....	.....	.....	.....	.....	.....	.....
Vancouver	1936	1,314,609	113	3,255	14,197	497,321	90,822	40,985
	1937	**2,122,131**	.....	.....	**14,215**	**497,383**	**150,162**	**67,395**
Victoria	1936	.....	37	1,066	.....	.....	.....	.....
	1937	.....	**3**	**86**	.....	.....	.....	.....
Yale	1936	1,161	54	1,556	163	5,710	3,722	1,680
	1937	**370**	**65**	**1,871**	**61**	**2,134**	**14**	**6**
Totals	1936	4,456,521	43,389	†1,249,940	404,472	14,168,654	9,521,015	4,296,548
	1937	**6,145,254**	**54,153**	**†1,558,245**	**480,781**	**16,122,727**	**11,308,685**	**5,075,451**

* Includes all shipments to Government sampling plant at Prince Rupert during 1937; individual shippers are listed in List of Mines Shipping.

† Includes placer gold purchased by Gold Commissioners from "snipers" and others, and in many instances was not obtained in the mining division where sold, but disposed of at the most convenient place.

TABLE IX.B.—PRODUCTION IN DETAIL OF COPPER, LEAD, AND ZINC IN 1936 AND 1937.

DISTRICTS AND DIVISIONS.	YEAR.	COPPER.		LEAD.		ZINC.	
		Pounds.	Value.	Pounds	Value.	Pounds.	Value.
			$		$		$
North-western District (No. 1):							
Atlin	1936	.....	.....	1,135	45	.....	.....
	1937	.....	.....	.....	.....	.....	.....
Bella Coola	1936	.....	.....	.....	.....	.....	.....
	1937	.....	.....	.....	.....	.....	.....
Liard	1936	.....	.....	.....	.....	.....	.....
	1937	.....	.....	.....	.....	.....	.....
Nass River	1936	450,615	42,705	2,751	107	.....	.....
	1937	.....	.....	.....	.....	.....	.....
Portland Canal	1936	873	82	864,074	33,811	.....	.....
	1937	**15,485**	**2,025**	**943,871**	**48,232**	.....	.....
Queen Charlotte	1936	.....	.....	.....	.....	.....	.....
	1937	.....	.....	.....	.....	.....	.....
Skeena	1936	7,354	697	.....	.....	.....	.....
	1937	**62,576**	**8,184**	.....	.....	.....	.....
Stikine	1936	.....	.....	.....	.....	.....	.....
	1937	.....	.....	.....	.....	.....	.....
North-eastern District (No. 2):							
Cariboo	1936	.....	.....	163	6	.....	.....
	1937	.....	.....	**144**	**7**	**41**	**2**
Omineca	1936	.....	.....	606	24	954	32
	1937	.....	.....	**5,215**	**267**	**11,547**	**566**
Peace River	1936	.....	.....	.....	.....	.....	.....
	1937	.....	.....	.....	.....	.....	.....
Quesnel	1936	.....	.....	.....	.....	.....	.....
	1937	.....	.....	.....	.....	.....	.....
Central District (No. 3):							
Kamloops	1936	31,803	3,014	34,330	1,343	25,475	844
	1937	**27,925**	**3,652**	**6,835**	**349**	**738**	**36**
Nicola	1936	24,908	2,361	353,813	13,845	106,177	3,520
	1937	**183,410**	**23,986**	**183,410**	**9,372**	**4,823**	**237**
Vernon	1936	.....	.....	431	17	228	8
	1937	.....	.....	**384**	**20**	.....	.....
Southern District (No. 4):							
Grand Forks	1936	.....	.....	1,078	42	10,731	356
	1937	**4,801**	**628**	**1,470**	**75**	**1,637**	**80**
Greenwood	1936	158,164	14,989	567,444	22,204	693,859	23,001
	1937	**469,980**	**61,464**	**498,023**	**25,449**	**730,420**	**35,805**
Osoyoos	1936	307,229	29,116	15,407	603	967	32
	1937	**483,293**	**63,205**	**31,854**	**1,628**	.....	.....
Similkameen	1936	.....	.....	.....	.....	.....	.....
	1937	**7,692,756**	**1,006,059**	.....	.....	.....	.....
Eastern District (No. 5):							
Ainsworth	1936	.....	.....	814,475	31,870	7,065	234
	1937	.....	.....	**2,289,536**	**116,995**	**2,085,383**	**102,225**
Arrow Lake	1936	.....	.....	.....	.....	.....	.....
	1937	.....	.....	.....	.....	.....	.....
Fort Steele	1936	.....	.....	360,362,863	14,100,999	232,818,066	7,717,919
	1937	.....	.....	**405,373,908**	**20,714,607**	**266,176,726**	**13,047,983**
Golden	1936	.....	.....	.....	.....	.....	.....
	1937	.....	.....	.....	.....	.....	.....
Lardeau	1936	.....	.....	.....	.....	.....	.....
	1937	.....	.....	**170,375**	**8,706**	**112,600**	**5,520**
Nelson	1936	6,130	581	1,709,355	66,887	1,043,278	34,584
	1937	.....	.....	**2,824,882**	**144,351**	**1,490,845**	**73,081**
Revelstoke	1936	.....	.....	86,519	3,386	.....	.....
	1937	.....	.....	**86,640**	**4,427**	.....	.....
Slocan	1936	.....	.....	1,408,291	55,106	993,479	32,934
	1937	.....	.....	**2,895,724**	**147,972**	**5,507,449**	**269,975**
Slocan City	1936	.....	.....	244	10	90	3
	1937	.....	.....	**15,728**	**804**	**10,647**	**522**
Trail Creek*	1936	311,600	29,530	11,242,020	439,900	18,256,826	605,214
	1937	**4,679,784**	**612,022**	**3,315,682**	**169,431**	**15,059,380**	**738,211**
Windermere	1936	.....	.....	.....	.....	.....	.....
	1937	.....	.....	**1,247**	**64**	**42**	**2**
Western District (No. 6):							
Alberni	1936	.....	.....	.....	.....	.....	.....
	1937	.....	.....	.....	.....	.....	.....
Ashcroft	1936	.....	.....	.....	.....	.....	.....
	1937	.....	.....	.....	.....	.....	.....
Clayoquot	1936	.....	.....	164	6	.....	.....
	1937	**165**	**22**	**4,169**	**213**	.....	.....
Clinton	1936	27,672	2,623	133	5	.....	.....
	1937	**16,969**	**2,219**	.....	.....	.....	.....
Lillooet	1936	.....	.....	26,105	1,022	.....	.....
	1937	.....	.....	**19,302**	**986**	.....	.....
Nanaimo	1936	961	91	.....	.....	.....	.....
	1937	**1,229**	**161**	.....	.....	.....	.....
New Westminster	1936	.....	.....	.....	.....	.....	.....
	1937	.....	.....	.....	.....	.....	.....
Quatsino	1936	.....	.....	.....	.....	.....	.....
	1937	.....	.....	.....	.....	.....	.....
Vancouver	1936	19,479,363	1,846,059	472,233	18,478	624,198	20,692
	1937	**32,418,185**	**4,239,781**	**449,972**	**22,894**	.....	.....
Victoria	1936	.....	.....	.....	.....	.....	.....
	1937	.....	.....	.....	.....	.....	.....
Yale	1936	.....	.....	7,986	313	.....	.....
	1937	**26**	**3**	.....	.....	.....	.....
Totals	1936	20,806,672	1,971,848	377,971,618	14,790,029	254,581,393	8,439,373
	1937	**46,057,584**	**6,023,411**	**419,118,371**	**21,416,949**	**291,192,278**	**14,274,245**

* Includes zinc and lead recovered from slag and reclaimed slags which cannot be credited to individual mines.

TABLE IX.c.—PRODUCTION VALUE OF PLACER GOLD, LODE GOLD, SILVER, COPPER, LEAD, ZINC IN 1936 AND 1937.

DISTRICTS AND DIVISIONS.	MINING DIVISION TOTAL.		DISTRICT TOTAL.	
	1936.	1937.	1936.	1937.
	$	$	$	$
North-western District (No. 1)	.....	.....	2,833,186	3,119,381
Atlin	531,262	623,925	.....	.....
Bella Coola	.....	.....	.....	.....
Liard	6,568	.....	.....	.....
Nass River	61,834	.....	.....	.....
Portland Canal	2,052,947	2,212,428	.....	.....
Queen Charlotte	2,575	1,813	.....	.....
Skeena	171,778	260,670	.....	.....
Stikine	6,222	20,545	.....	.....
North-eastern District (No. 2)	.....	.....	1,905,281	2,329,740
Cariboo	1,635,103	1,983,470	.....	.....
Omineca	52,881	90,001	.....	.....
Peace River	9,564	3,050	.....	.....
Quesnel	207,733	253,219	.....	.....
Central District (No. 3)	.....	.....	340,314	286,680
Kamloops	264,686	177,767	.....	.....
Nicola	70,590	61,181	.....	.....
Vernon	5,038	47,732	.....	.....
Southern District (No. 4)	.....	.....	2,077,169	3,706,943
Grand Forks	46,110	35,156	.....	.....
Greenwood	599,481	540,955	.....	.....
Osoyoos	1,428,499	2,022,695	.....	.....
Similkameen	3,079	1,108,137	.....	.....
Eastern District (No. 5)	.....	.....	29,840,075	44,614,108
Ainsworth	41,699	258,844	.....	.....
Arrow Lake	58	.....	.....	.....
Fort Steele	25,027,509	37,499,637	.....	.....
Golden	115	259	.....	.....
Lardeau	97,772	39,009	.....	.....
Nelson	3,020,253	4,223,417	.....	.....
Revelstoke	8,914	9,224	.....	.....
Slocan	192,246	657,010	.....	.....
Slocan City	2,450	10,686	.....	.....
Trail Creek	1,448,627	1,915,461	.....	.....
Windermere	432	561	.....	.....
Western District (No. 6)	.....	.....	7,920,367	10,414,176
Alberni	1,859	.....	.....	.....
Ashcroft	8,009	12,978	.....	.....
Clayoquot	10,950	112,218	.....	.....
Clinton	317,400	203,358	.....	.....
Lillooet	5,140,206	5,249,865	.....	.....
Nanaimo	2,408	1,572	.....	.....
New Westminster	2,420	2,532	.....	.....
Quatsino	.....	.....	.....	.....
Vancouver	2,426,790	4,827,553	.....	.....
Victoria	1,066	86	.....	.....
Yale	9,259	4,014	.....	.....
Totals	44,916,392	64,471,028	44,916,392	64,471,028

NOTE.—From and including 1937 the Liard Mining Division is combined with Stikine Mining Division. From and including 1937 the Nass River Mining Division is combined with Portland Canal Mining Division.

TABLE IX.D.—PRODUCTION OF PLACER GOLD, LODE GOLD, AND SILVER, 1900–1937.

DISTRICTS AND DIVISIONS.	GOLD—PLACER.		GOLD—LODE.		SILVER.	
	Ounces.	Value.	Ounces.	Value.	Ounces.	Value.
North-western District (No. 1):		$		$		$
Atlin*	502,926	10,946,957	17,791	370,019	52,453	32,290
Bella Coola	5	104	.....	.....	.....	.....
Liard	14,356	285,770	.....	.....	.....	.....
Nass River	175	3,500	124,395	2,765,216	8,175,679	5,604,918
Portland Canal	8	230	1,479,005	33,546,515	36,966,701	20,047,800
Queen Charlotte	1,410	31,274	1,953	41,174	29,413	16,916
Skeena	2,092	42,950	348,529	7,534,156	190,846	147,688
Stikine	8,696	188,994	.....	.....	.....	.....
District totals	529,668	11,499,779	1,971,673	44,257,080	45,415,092	25,849,612
North-eastern District (No. 2):						
Cariboo†	1,860,487	37,442,822	135,330	4,688,808	16,083	8,117
Omineca	25,511	576,190	8,254	182,792	2,239,897	1,411,386
Peace River	3,394	73,072	.....	.....	.....	.....
Quesnel‡	588,460	11,915,539	.....	.....	.....	.....
District totals	2,477,852	50,007,623	143,584	4,871,600	2,255,980	1,419,503
Central District (No. 3):						
Kamloops	2,354	53,408	30,560	1,003,667	277,711	165,794
Nicola	228	4,592	7,932	212,100	233,155	112,935
Vernon	1,114	24,696	3,491	111,677	5,024	2,696
District totals	3,696	82,696	41,983	1,327,444	515,890	281,425
Southern District (No. 4):						
Grand Forks	624	12,871	163,807	3,525,880	1,937,123	853,504
Greenwood	2,777	63,444	895,829	18,903,842	14,678,175	7,994,148
Osoyoos	161	3,274	734,485	16,985,506	384,668	271,067
Similkameen	5,640	116,230	25,946	566,548	821,693	439,872
District totals	9,202	195,819	1,820,067	39,981,776	17,821,659	9,558,591
Eastern District (No. 5):						
Ainsworth	169	4,404	1,841	37,355	6,456,728	3,902,504
Arrow Lake	107	2,362	161	3,383	13,606	10,487
Fort Steele	14,275	310,215	2,313	48,991	87,098,275	44,587,703
Golden	187	4,131	6	124	388,762	197,445
Lardeau	863	19,784	18,400	502,432	137,062	77,726
Nelson	2,236	51,268	708,273	18,920,208	3,461,549	1,954,290
Revelstoke	3,523	71,761	12	335	50,097	31,309
Slocan	1	20	3,801	82,776	35,220,636	21,647,881
Slocan City	14	375	1,462	35,080	3,345,052	1,960,050
Trail Creek	377	10,340	2,565,212	54,115,050	3,151,404	1,776,478
Trout Lake	861	17,137	5,502	113,725	1,920,701	1,030,840
Windermere	215	5,102	64	1,323	705,682	503,498
District totals	22,828	496,908	3,307,047	73,860,782	141,949,554	77,680,211
Western District (No. 6):						
Alberni	266	5,503	386	12,783	1,553	911
Ashcroft	9,011	192,964	8,476	289,680	16,804	9,513
Clayoquot	1,308	26,436	4,977	158,995	26,886	18,475
Clinton	7,101	150,519	15,533	543,325	23,180	10,731
Lillooet§	88,191	1,783,270	830,022	26,288,824	225,458	108,750
Nanaimo	215	4,414	66,657	1,380,412	512,533	295,643
New Westminster	1,013	25,499	.....	.....	268	167
Quatsino	233	4,902	59	1,219	4,245	2,157
Vancouver	113	3,255	186,005	4,775,869	2,703,966	1,568,989
Victoria	419	9,153	35,348	730,644	734,273	399,092
Yale	7,300	148,970	3,379	75,508	6,463	3,240
District totals	115,170	2,354,885	1,150,842	34,257,259	4,255,629	2,417,668
Provincial totals	3,158,416	64,637,710	8,435,196	198,555,941	212,213,804	117,207,010

NOTE.—From and including 1937 the Liard Mining Division is combined with Stikine Mining Division. From and including 1937 the Nass River Mining Division is combined with Portland Canal Mining Division. From and including 1931 the Trout Lake Mining Division was combined with Lardeau Mining Division.

* Atlin totals include estimated placer gold production from and including 1898.

† Cariboo totals include estimated placer gold production from and including 1858.

‡ Quesnel totals include estimated placer gold production from and including 1858.

§ Lillooet totals include estimated placer gold production from and including 1874.

TABLE IX.E.—PRODUCTION OF COPPER, LEAD, AND ZINC, 1900–1937.

DISTRICTS AND DIVISIONS.	COPPER.		LEAD.		ZINC.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
North-western District (No. 1):		$		$		$
Atlin	83,161	11,949	109,945	7,036	.....	.....
Bella Coola	.....	.....	.....	.....	.....	.....
Liard	.....	.....	.....	.....	.....	.....
Nass River	645,243,514	96,155,780	50,148	2,621	.....	.....
Portland Canal	3,896,535	579,889	19,715,958	883,884	1,867,664	110,254
Queen Charlotte	1,457,541	276,471	.....	.....	.....	.....
Skeena	5,519,374	869,684	.....	.....	.....	.....
Stikine	.....	.....	.....	.....	.....	.....
District totals	656,200,125	97,893,773	19,876,051	893,541	1,867,664	110,254
North-eastern District (No. 2):						
Cariboo	.....	.....	656	30	492	16
Omineca	6,050,228	1,338,025	5,851,278	332,835	3,789,588	242,884
Peace River	.....	.....	.....	.....	.....	.....
Quesnel	.....	.....	.....	.....	.....	.....
District totals	6,050,228	1,338,025	5,851,934	332,865	3,790,080	242,900
Central District (No. 3):						
Kamloops	5,501,399	994,996	367,164	20,687	406,758	25,981
Nicola	536,304	103,443	2,093,087	84,426	227,061	7,358
Vernon	614	89	5,451	262	2,442	137
District totals	6,038,317	1,098,528	2,465,702	105,375	636,261	33,476
Southern District (No. 4):						
Grand Forks	47,130,210	7,326,228	413,585	13,311	550,056	13,956
Greenwood	393,266,838	63,089,104	5,718,024	247,655	4,166,798	143,471
Osoyoos	825,307	99,570	198,692	5,711	4,516	142
Similkameen	106,569,002	15,534,529	235,461	8,907	63,720	2,596
District totals	547,791,357	86,049,431	6,567,762	275,584	4,785,090	160,165
Eastern District (No. 5):						
Ainsworth	10,175	1,201	120,777,767	5,955,091	33,642,519	1,006,110
Arrow Lake	216,034	41,651	24,734	1,564	140	4
Fort Steele	28,592	6,193	4,656,203,605	205,462,502	2,779,224,585	122,309,436
Golden	10,822	1,949	54,189,305	1,717,514	53,392,821	1,750,033
Lardeau	155	12	725,419	36,518	154,386	8,485
Nelson	5,685,261	889,008	42,812,416	1,983,422	17,634,671	1,232,038
Revelstoke	683	124	939,741	55,885	8,093	469
Slocan	3,284	636	284,700,594	13,704,430	158,309,695	10,809,993
Slocan City	.....	.....	5,678,061	235,155	558,889	34,723
Trail Creek	109,928,451	16,635,038	14,631,700	612,235	78,021,068	2,824,815
Trout Lake	5,439	773	8,502,337	334,396	62,705	4,233
Windermere	46,556	8,641	13,798,509	829,410	592,765	33,011
District totals	115,935,452	17,585,226	5,202,984,188	230,928,122	3,121,602,337	140,013,350
Western District (No. 6):						
Alberni	309,284	50,894	263	8	.....	.....
Ashcroft	633,775	155,721	99	4	.....	.....
Clayoquot	1,099,828	200,304	4,333	219	.....	.....
Clinton	54,298	5,580	193	7	.....	.....
Lillooet	.....	.....	60,228	2,470	.....	.....
Nanaimo	20,041,150	3,173,243	.....	.....	.....	.....
New Westminster	21,712	5,897	.....	.....	.....	.....
Quatsino	174,642	27,693	.....	.....	.....	.....
Vancouver	537,581,822	78,760,667	6,750,424	236,510	17,981,772	563,988
Victoria	20,505,022	3,049,770	.....	.....	.....	.....
Yale	26	3	12,088	541	.....	.....
District totals	580,421,559	85,429,772	6,827,628	239,759	17,981,772	563,988
Provincial totals	1,912,437,038	289,394,755	5,244,573,265	232,775,246	3,150,663,204	141,124,133

NOTE.—From and including 1937 the Liard Mining Division is combined with Stikine Mining Division. From and including 1937 the Nass River Mining Division is combined with Portland Canal Mining Division. From and including 1931 the Trout Lake Mining Division was combined with Lardeau Mining Division.

TABLE IX.F.—PRODUCTION VALUE OF PLACER GOLD, LODE GOLD, SILVER, COPPER, LEAD AND ZINC, BY MINING DIVISIONS AND DISTRICTS, 1900–1937.

DISTRICTS AND DIVISIONS.	Mining Division Total.	District Total.
	$	$
North-western District (No. 1)	.....	180,504,039
Atlin*	11,368,251	.....
Bella Coola	104	.....
Liard	285,770	.....
Nass River	104,532,035	.....
Portland Canal	55,168,572	.....
Queen Charlotte	365,835	.....
Skeena	8,594,478	.....
Stikine	188,994	.....
North-eastern District (No. 2)	.....	58,212,516
Cariboo†	42,139,793	.....
Omineca	4,084,112	.....
Peace River	73,072	.....
Quesnel‡	11,915,539	.....
Central District (No. 3)	.....	2,928,944
Kamloops	2,264,533	.....
Nicola	524,854	.....
Vernon	139,557	.....
Southern District (No. 4)	.....	136,221,366
Grand Forks	11,745,750	.....
Greenwood	90,441,664	.....
Osoyoos	17,365,270	.....
Similkameen	16,668,682	.....
Eastern District (No. 5)	.....	540,564,599
Ainsworth	10,906,665	.....
Arrow Lake	59,451	.....
Fort Steele	372,725,040	.....
Golden	3,671,196	.....
Lardeau	644,957	.....
Nelson	25,030,234	.....
Revelstoke	159,883	.....
Slocan	46,245,745	.....
Slocan City	2,265,383	.....
Trail Creek	75,973,956	.....
Trout Lake	1,501,104	.....
Windermere	1,380,985	.....
Western District (No. 6)	.....	125,263,331
Alberni	70,099	.....
Ashcroft	647,882	.....
Clayoquot	404,429	.....
Clinton	710,162	.....
Lillooet§	28,183,314	.....
Nanaimo	4,853,712	.....
New Westminster	31,563	.....
Quatsino	35,971	.....
Vancouver	85,909,278	.....
Victoria	4,188,659	.....
Yale	228,262	.....
Provincial totals	1,043,694,795	1,043,694,795

NOTE.—From and including 1937 the Liard Mining Division is combined with Stikine Mining Division. From and including 1937 the Nass River Mining Division is combined with Portland Canal Mining Division. From and including 1931 the Trout Lake Mining Division was combined with Lardeau Mining Division.

* Atlin totals include estimated placer gold production from and including 1898.

† Cariboo totals include estimated placer gold production from and including 1858.

‡ Quesnel totals include estimated placer gold production from and including 1858.

§ Lillooet totals include estimated placer gold production from and including 1874.

TABLE X.—Production in Detail of Structural Materials, 1937.

District and Division.	Cement.	Lime and Limestone.	Building-stone.	Riprap and Crushed Rock.	Sand and Gravel.	Brick (Common).	Face, Paving, and Sewer Brick.	Firebrick, Blocks.	Fireclay.	Structural Tile, Hollow.	Drain-tile and Sewer-pipe.	Pottery, Glazed or Unglazed.	Other Clay Products.	Divisions.	Districts.
	$	$	$	$	$	$	$	$	$	$	$	$	$	$	$
North-western District (No. 1)															152,920
Atlin and Stikine				11,150	7,950									19,100	
Portland Canal				700	600									1,300	
Skeena and Queen Charlotte				94,018	13,783									107,801	
Bella Coola		12,900		3,605	8,214									24,719	
North-eastern District (No. 2)															67,233
Cariboo and Quesnel				6,851	29,533									36,384	
Omineca and Peace River				21,205	9,644									30,849	
Central District (No. 3)															61,075
Nicola, Vernon, and Kamloops			3,700	6,234	45,311	3,842				1,605	383			61,075	
Southern District (No. 4)															38,359
Grand Forks and Greenwood					6,150									6,150	
Osoyoos		2,299		892	21,512									24,703	
Similkameen				745	5,944								817	7,506	
Eastern District (No. 5)															166,810
Fort Steele				8,194	47,546									55,740	
Windermere and Golden				100	15,850									15,950	
Ainsworth			2,110		7,866									9,976	
Slocan and Slocan City															
Nelson			7,875	1,675	30,851									40,401	
Trail Creek				1,050	24,812									25,862	
Revelstoke				5,197	13,684									18,881	
Western District (No. 6)															1,611,940
Nanaimo and Alberni		115,536	45,867	9,777	19,994	10,350								201,524	
Victoria and Quatsino	570,913	12,216		3,104	45,519	18,202	349			6,254	6,391	3,322	433	666,703	
Lillooet				13,025	7,737									20,762	
Yale		173			1,283									1,456	
Clinton															
Ashcroft				5,020	537									5,557	
Vancouver	52,812		72,972	46,977	94,486									267,247	
New Westminster				55,515	93,828	42,940	34,798	126,115	9,986	15,638	61,933	6,256	1,682	448,691	
Totals	623,725	143,124	132,524	295,034	552,634	75,334	35,147	126,115	9,986	23,497	68,707	9,578	2,932	2,098,337	2,098,337

TABLE XI.—PRODUCTION IN DETAIL OF MISCELLANEOUS METALS, MINERALS, AND MATERIALS, 1937.

District and Division.	Cadmium.	Diatomite.	Flux (Limestone and Quartz).	Gypsum Products.	Mica.	Platinum.	Slate and Rock Granules.	Soda and Magnesium Sulphate.	Sulphur (Elemental) and Sulphur Content of Pyrite and Sulphuric Acid Manufactured.	Others.	Division Totals.	District Totals.
	$	$	$	$	$	$	$	$	$	$	$	$
North-western District (No. 1)												1,280
Atlin and Stikine												
Portland Canal												
Skeena and Queen Charlotte					1,280						1,280	
North-eastern District (No. 2)												2,024
Cariboo and Quesnel		1,346				678					2,024	
Omineca and Peace River												
Central District (No. 3)												164,931
Nicola, Vernon, and Kamloops				150,475				14,456			164,931	
Southern District (No. 4)												14,288
Grand Forks and Greenwood			13,900								13,900	
Osoyoos and Similkameen						388					388	
Eastern District (No. 5)												1,287,809
Fort Steele				700							700	
Windermere and Golden												
Ainsworth												
Slocan and Slocan City												
Nelson and Arrow Lake			4,132								4,132	
Trail Creek and Revelstoke	715,747								567,230		1,282,977	
Western District (No. 6)												296,285
Nanaimo and Alberni												
Victoria and Quatsino							2,790				2,790	
Lillooet and Clinton								2,574			2,574	
Yale and Ashcroft										37,753	37,753	
Vancouver and New Westminster									253,168		253,168	
Totals	715,747	1,346	18,032	151,175	1,280	1,066	2,790	17,030	820,398	37,753	1,766,617	1,766,617

NOTE.—Approximately 24 tons of rock magnesite were mined near Marysville and used for experimental purposes at Trail smelter. No commercial quantity of antimony was produced in 1937, but it is quite possible that commercial production will commence at Trail in 1938.

TABLE XII.—British Columbia Mine Production, 1895–1937.

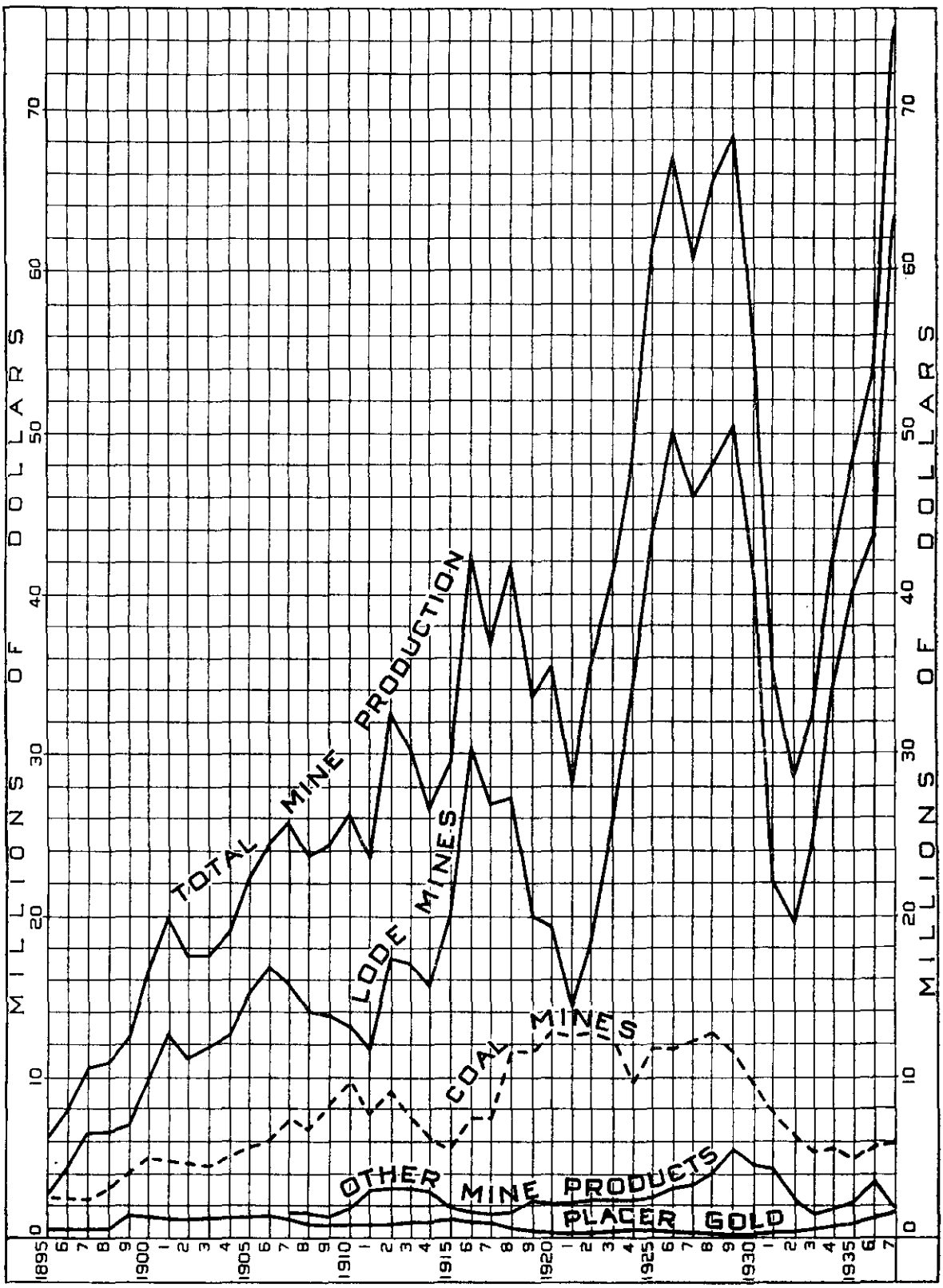


TABLE XIII.—Production of Lode Mines in British Columbia, 1913–1937.

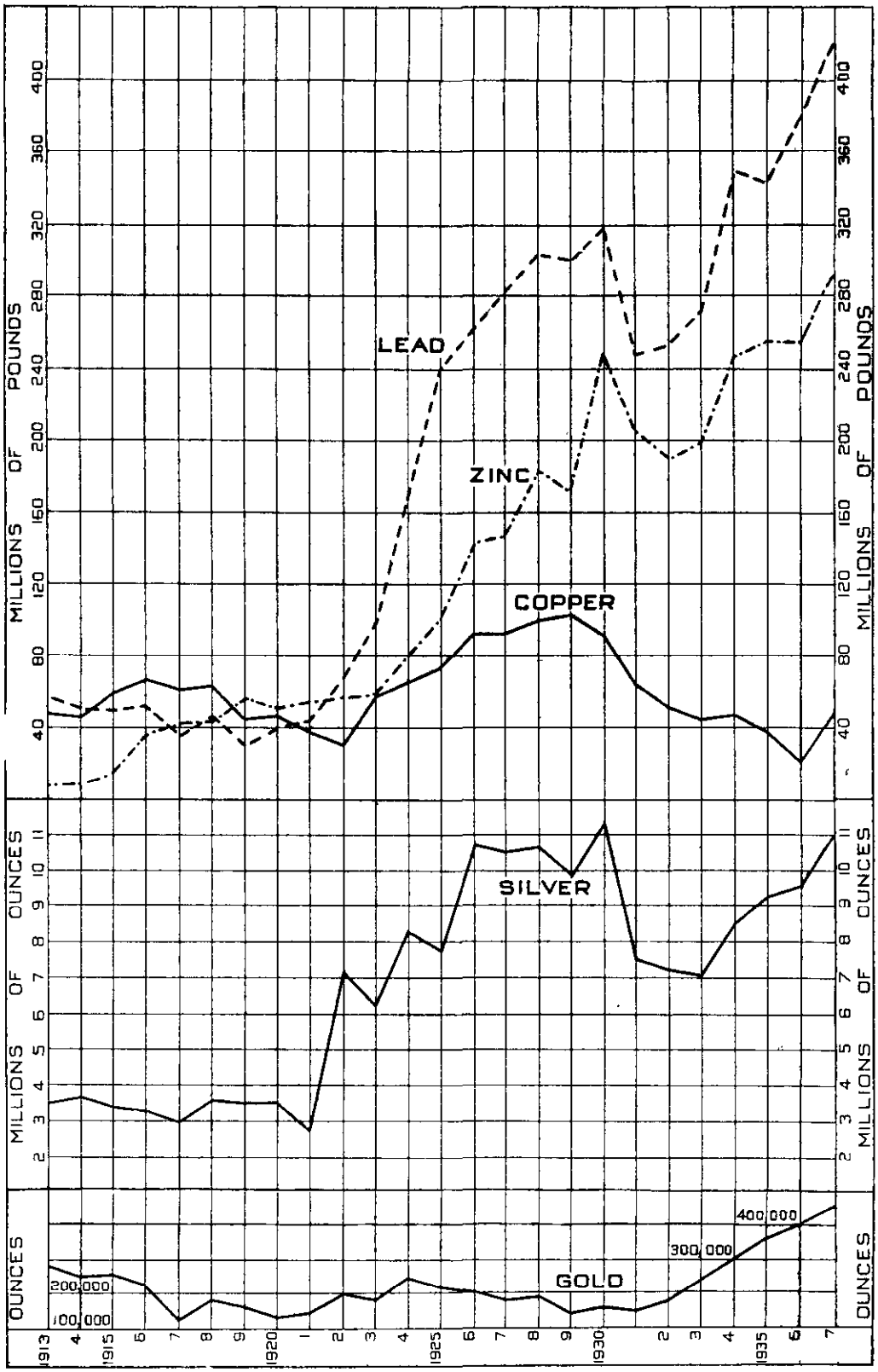


TABLE XIV.—Coal Production per Year to Date.*

	Tons (2,240 lb.)	Value		Tons (2,240 lb.)	Value
1836–1885	3,029,011	$9,468,557	1912	2,628,804	$9,200,814
1886	326,636	979,908	1913	2,137,483	7,481,190
1887	413,360	1,240,080	1914	1,810,967	6,338,385
1888	489,301	1,467,903	1915	1,611,129	5,638,952
1889	579,830	1,739,490	1916	2,084,093	7,294,325
1890	678,140	2,034,420	1917	2,149,975	7,524,913
1891	1,029,097	3,087,291	1918	2,302,245	11,511,225
1892	826,335	2,479,005	1919	2,267,541	11,337,705
1893	978,294	2,934,882	1920	2,595,125	12,975,625
1894	1,012,953	3,038,859	1921	2,483,995	12,419,975
1895	939,654	2,818,962	1922	2,511,843	12,559,215
1896	896,222	2,688,666	1923	2,453,223	12,266,115
1897	882,854	2,648,562	1924	1,939,526	9,697,630
1898	1,135,865	3,407,595	1925	2,328,522	11,642,610
1899	1,306,324	3,918,972	1926	2,330,036	11,650,180
1900	1,439,595	4,318,785	1927	2,453,827	12,269,135
1901	1,460,331	4,380,993	1928	2,526,702	12,633,510
1902	1,397,394	4,192,182	1929	2,251,252	11,256,260
1903	1,168,194	3,504,582	1930	1,887,130	9,435,650
1904	1,253,628	3,760,884	1931	1,707,590	7,684,155
1905	1,384,312	4,152,936	1932	1,534,975	6,523,644
1906	1,517,303	4,551,909	1933	1,264,746	5,375,171
1907	1,800,067	6,300,235	1934	1,347,090	5,725,133
1908	1,677,849	5,872,472	1935	1,187,968	5,048,864
1909	2,006,476	7,022,666	1936	1,346,471	5,722,502
1910	2,800,046	9,800,161	1937	1,444,687	6,139,920
1911	2,193,062	7,675,717			
			Totals	87,209,078	$346,839,477

* For all years to 1925 (inclusive) figures are net coal production and do not include coal made into coke; subsequent figures are entire coal production, including coal made into coke.

TABLE XV.—Coke Production from Bee-hive Ovens in British Columbia from 1895 to 1925.

	Tons (2,240 lb.)	Value		Tons (2,240 lb.)	Value
1895–97	19,396	$96,980	1913	286,045	$1,716,270
1898 (estimated)	35,000	175,000	1914	234,577	1,407,462
1899	34,251	171,255	1915	245,871	1,475,226
1900	85,149	425,745	1916	267,725	1,606,350
1901	127,081	635,405	1917	159,905	959,430
1902	128,015	640,075	1918	188,967	1,322,769
1903	165,543	827,715	1919	91,133	637,966
1904	238,428	1,192,140	1920	67,792	474,544
1905	271,785	1,358,925	1921	59,434	416,038
1906	199,227	996,135	1922	45,835	320,845
1907	222,913	1,337,478	1923	58,919	412,433
1908	247,399	1,484,394	1924	30,615	214,305
1909	258,703	1,552,218	1925	75,185	526,295
1910	218,029	1,308,174			
1911	66,005	396,030	Totals	4,393,255	$25,673,600
1912	264,333	1,585,998			

TABLE XVI.—Coke and By-products Production of British Columbia, 1936 and 1937.

Description.	1936.		1937.	
	Quantity.	Value.	Quantity.	Value.
Coal used in making coke, long tons	112,348	$436,595	148,348	$570,250
Coke made in bee-hive ovens, long tons	30,370	$191,843	43,215	$277,726
Coke made in by-product ovens, long tons	.....	.....	.....	.....
Coke made in gas plants, long tons	43,632	138,787	52,813	330,821
Total coke made, long tons	74,002	$330,630	96,028	$608,547
Gas made, purchased, and sold	.....	1,422,783	.....	1,746,047
Tar produced	.....	38,872	.....	46,698
Other by-products	.....	.....	.....	.....
Total production value of coke industry	.....	$1,792,285	.....	$2,401,292

TABLE XVII.—Dividends paid by Mining Companies, 1897–1937.

Lode-gold Mines.

Company or Mine.	Locality.	Class.	Amount paid.
Arlington	Erie	Gold	$43,958
Athabasca	Nelson	Gold	25,000
Bralorne	Bridge River	Gold	2,421,400
Belmont-Surf Inlet	Princess Royal Island	Gold	1,437,500
Cariboo Gold Quartz	Wells	Gold	266,661
Cariboo-McKinney	Camp McKinney	Gold	565,588
Canadian Pacific Exploration	Nelson	Gold	37,500
Centre Star	Rossland	Gold	472,255
Fairview Amalgamated	Oliver	Gold	2,668
Fern	Nelson	Gold	15,000
Goodenough	Ymir	Gold	13,931
Island Mountain	Wells	Gold	157,608
I.X.L.	Rossland	Gold	131,633
Jewel-Denero	Greenwood	Gold	11,751
Le Roi Mining Co.	Rossland	Gold	1,475,000
Le Roi No. 2	Rossland	Gold	1,574,640
Lorne	Bridge River	Gold	20,450
Nickel Plate	Hedley	Gold	3,423,191
Pioneer	Bridge River	Gold	6,006,068
Poorman	Nelson	Gold	25,000
Premier	Premier	Gold	19,658,075
Queen	Sheep Creek	Gold	85,000
Relief	Erie	Gold	5,000
Reno	Sheep Creek	Gold	700,440
Sheep Creek Mines, Ltd.	Sheep Creek	Gold	300,000
Sunset No. 2	Rossland	Gold	115,007
War Eagle	Rossland	Gold	1,245,250
Motherlode	Sheep Creek	Gold	162,500
Ymir Gold	Ymir	Gold	300,000
Ymir Yankee Girl	Ymir	Gold	133,501
Miscellaneous mines		Gold	23,530
Total, lode-gold mines			$40,855,105

The gold-copper properties of Rossland are included in this table.

Silver-lead-zinc Mines.

Antoine	Rambler	Silver-lead-zinc	$10,000
Beaverdell-Wellington	Beaverdell	Silver-lead-zinc	97,200
Bell	Beaverdell	Silver-lead-zinc	476,297
Bosun (Rosebery-Surprise)	New Denver	Silver-lead-zinc	27,500
Capella	New Denver	Silver-lead-zinc	5,500
Consolidated Mining and Smelting Co. of Canada, Ltd.	Trail	Silver-lead-zinc	71,624,514
Couverapee	Field	Silver-lead-zinc	5,208
Duthie Mines, Ltd.	Smithers	Silver-lead-zinc	50,000
Florence Silver	Ainsworth	Silver-lead-zinc	35,398
Goodenough	Cody	Silver-lead-zinc	45,668
H.B. Mining Co.	Hall Creek	Silver-lead-zinc	8,904
Highland Lass, Ltd.	Beaverdell	Silver-lead-zinc	132,464
Highland Bell, Ltd.	Beaverdell	Silver-lead-zinc	67,487
Horn Silver	Similkameen	Silver-lead-zinc	6,000
Idaho-Alamo	Sandon	Silver-lead-zinc	400,000
Iron Mountain (Emerald)	Salmo	Silver-lead-zinc	20,000
Jackson	Retallack	Silver-lead-zinc	20,000
Last Chance	Three Forks	Silver-lead-zinc	213,109
Lone Batchelor	Sandon	Silver-lead-zinc	50,000
Lucky Jim	Three Forks	Silver-lead-zinc	80,000
Mercury	Sandon	Silver-lead-zinc	6,000
Meteor	Slocan City	Silver-lead-zinc	10,257
Carried forward			$73,391,446

TABLE XVII.—DIVIDENDS PAID BY MINING COMPANIES, 1897–1937—*Continued.*

Silver-lead-zinc Mines—Continued.

Company or Mine.	Locality.	Class.	Amount paid.
Brought forward			$73,391,446
Monitor and Ajax	Three Forks	Silver-lead-zinc	27,500
Mountain Con	Cody	Silver-lead-zinc	71,387
McAllister	Three Forks	Silver-lead-zinc	40,894
Noble Five	Cody	Silver-lead-zinc	72,859
North Star	Kimberley	Silver-lead-zinc	496,901
No. One	Sandon	Silver-lead-zinc	6,754
Ottawa	Slocan City	Silver-lead-zinc	107,928
Payne	Sandon	Silver-lead-zinc	1,438,000
Providence	Greenwood	Silver-lead-zinc	33,810
Queen Bess	Alamo	Silver-lead-zinc	25,000
Rambler-Cariboo	Rambler	Silver-lead-zinc	575,000
Reco	Cody	Silver-lead-zinc	332,492
Ruth Mines, Ltd.	Sandon	Silver-lead-zinc	165,000
St. Eugene	Moyie	Silver-lead-zinc	566,000
Silversmith	Sandon	Silver-lead-zinc	725,000
Slocan Silver	Alamo	Silver-lead-zinc	11,600
Slocan Star	Sandon	Silver-lead-zinc	567,500
Spokane-Trinket	Ainsworth	Silver-lead-zinc	9,564
Standard Silver Lead	Silverton	Silver-lead-zinc	2,700 000
Sunset and Trade Dollar	Retallack	Silver-lead-zinc	88,000
Utica	Kaslo	Silver-lead-zinc	64,000
Wallace Mines, Ltd. (*Sally*)	Beaverdell	Silver-lead-zinc	135,000
Washington	Rambler Station	Silver-lead-zinc	38,000
Whitewater	Retallack	Silver-lead-zinc	592,515
Miscellaneous mines		Silver-lead-zinc	70,237
Total, silver-lead-zinc mines			$82,352,387

Copper Mines.

Britannia M. & S. Co.*	Britannia Beach	Copper	$6,552,578
Canada Copper Corporation	Greenwood	Copper	615,399
Cornell	Texada Island	Copper	8,500
Granby Cons. M.S. & P. Co.†	Anyox	Copper	8,025,471
Marble Bay	Texada Island	Copper	175,000
Hall Mines	Nelson	Copper	160,000
Miscellaneous mines		Copper	260,770
Total, copper mines			$15,797,718

* The Howe Sound Company is the holding company for the *Britannia* mine in British Columbia and other mines in Mexico and the State of Washington. Dividends paid by the Howe Sound Company are therefore derived from all operations, and in the foregoing table the dividends credited to the *Britannia* mine have been paid by the Britannia Mining and Smelting Company, Limited, none being credited subsequent to 1930. In making comparison with yearly totals the amounts credited to the Howe Sound Company have been deducted for the years shown, so the total in the annual report concerned will show the higher figure.

† The amount shown to the credit of the Granby Consolidated Mining, Smelting, and Power Company, Limited, does not include the sum of $6,749,996 paid by the company during 1935 and 1936 as a distribution or repayment of capital, subsequent to the closing-down of its operations at Anyox and the company going into voluntary liquidation. Operations ceased at Anyox in August, 1935. The company since that date has revived its business charter and is conducting operations at Allenby, B.C.

The term " Miscellaneous " noted in each class of dividend covers all payments of $5,000 and under, together with payments made by companies or individuals requesting that the item be not disclosed.

In compiling the foregoing table of dividends paid, the Department wishes to acknowledge the kind assistance given by companies, individuals, and trade journals in giving information on the subject.

TABLE XVII.—DIVIDENDS PAID BY MINING COMPANIES, 1897–1937—*Continued.*

Coal.

Wellington Collieries, Ltd., Nanaimo	$16,000,000
Crow's Nest Pass Coal Co., Ltd., Fernie	12,012,807
Total	$28,012,807

Miscellaneous and Structural.

Various	$1,455,229

Aggregate of all Classes.

Lode-gold mining	$40,855,105
Silver-lead-zinc mining	82,352,387
Copper-mining	15,797,718
Coal-mining	28,012,807
Miscellaneous and structural	1,455,229
Total	$168,473,246

Dividends paid Yearly, 1919 to 1937, inclusive.

Year.	Amount paid.	Year.	Amount paid.
1919	$2,494,283	1930	$10,543,500
1920	1,870,296	1931	4,650,857
1921	736,629	1932	2,786,958
1922	3,174,756	1933	2,471,735
1923	2,983,570	1934	4,745,905
1924	2,977,276	1935	7,386,070
1925	5,853,419	1936	10,513,705
1926	8,011,137	1937	15,085,293
1927	8,816,681		
1928	9,572,536	Total	$115,937,724
1929	11,263,118		

Dividends paid during 1936 and 1937.

	1936.	1937.
Beaverdell-Wellington	$18,000	$18,000
Bell Mines, Ltd.	25,403	
Bralorne Mines, Ltd.	561,150	935,250
Cariboo Gold Quartz Mines, Ltd.	133,331	133,330
The Consolidated Mining and Smelting Co. of Canada, Ltd.	6,515,943	11,413,189
Crow's Nest Pass Coal Co., Ltd.	434,826	279,351
Fairview Amalgamated Gold Mines		2,668
Highland Bell, Ltd.	14,803	52,634
Island Mountain Mines, Ltd.	105,072	52,536
Pioneer Gold Mines of B.C., Ltd.	1,401,400	875,875
Premier Gold Mining Co., Ltd.	800,000	800,000
Reno Gold Mines, Ltd.	219,157	225,600
Sheep Creek Gold Mines, Ltd.	112,500	187,500
Ymir Yankee Girl Mines, Ltd.	111,250	22,251
Others	60,870	87,109
Totals	$10,513,705	$15,085,293

TABLE XVIII.—CAPITAL EMPLOYED, SALARIES AND WAGES, FUEL AND ELECTRICITY, AND PROCESS SUPPLIES, 1937.

Mineral Survey District and Class.	Capital employed.	Salaries and Wages.	Fuel and Electricity.	Process Supplies.
	$	$	$	$
No. 1, North-western—				
Lode-mining	5,852,347	930,958	116,230	405,314
Placer-mining	92,156	179,823	15,781	30,991
Coal-mining				
Miscellaneous and structural	356,356	19,695	22,049	2,002
Totals	6,300,859	1,130,476	154,060	438,307
No. 2, North-eastern—				
Lode-mining	3,177,131	640,769	67,292	140,804
Placer-mining	4,269,000	510,471	37,240	34,679
Coal, miscellaneous, and structural	3,000	27,784	1,537	1,303
Totals	7,449,131	1,179,024	106,069	176,786
No. 3, Central—				
Lode-mining	436,520	90,893	13,393	21,252
Placer-mining	100,216	25,891	104	1,307
Coal and miscellaneous	369,872	141,889	17,105	48,499
Structural	24,056	5,202	851	25
Totals	930,664	263,875	31,453	71,083
No. 4, Southern—				
Lode-mining	10,104,574	1,506,582	213,411	544,446
Placer-mining	64,440	10,853	361	85
Coal-mining	1,271,196	372,806	46,955	57,943
Miscellaneous		8,610	7,781	
Structural		700	847	40
Totals	11,440,210	1,899,551	269,355	602,514
No. 5, Eastern—				
Lode-mining	61,384,608	8,975,921	1,824,703	2,742,965
Placer-mining	44,375	28,291	927	5,537
Coal-mining	6,047,973	824,290	27,832	275,000
Miscellaneous	506,280	71,737	1,807	4,703
Structural	21,150	3,914	686	250
Totals	68,004,386	9,904,153	1,855,955	3,028,455
No. 6, Western—				
Lode-mining	19,444,588	3,479,995	298,866	1,703,171
Placer-mining	34,864	3,608	164	5
Coal-mining	17,552,157	2,614,303	221,831	780,748
Miscellaneous	12,465,171	422,740	42,936	9,419
Structural	1,898,611	451,965	85,622	34,842
Totals	51,395,391	6,972,611	649,419	2,528,185
Grand totals, 1937	145,520,641	21,349,690	3,066,311	6,845,330
Grand totals, 1936	142,663,065	17,887,619	2,724,144	4,434,501
Grand totals, 1935	143,289,953	16,753,367	2,619,639	4,552,730

NOTE.—The above figures, compiled from returns on the subject made by companies and individuals, illustrate the amount of capital employed in the mining industry in 1937, the amount of money distributed in salaries and wages, fuel and electricity, and process supplies (explosives, chemicals, drill-steel, lubricants, etc.).

Capital employed includes: Present cash value of the land (excluding minerals); present value of buildings, fixtures, machinery, tools, and other equipment; inventory value of materials on hand, ore in process, fuel and miscellaneous supplies on hand; inventory value of finished products on hand; operating capital (cash, bills and accounts receivable, prepaid expenses, etc.).

A special survey was made covering the mining industry for 1937 and the following data were compiled from all returns received, and is additional to the statistics set forth in Table XVIII. It should also be kept in mind that in the aggregate a substantial amount can be credited to individuals who do not make a return to the Department.

Origin.	Machinery.	Building Materials.	Food Supplies.	Totals.
	$	$	$	$
Canada	2,090,647	616,930	1,491,095	4,198,672
United States	526,399	31,359	.....	557,758
Great Britain	172,456	.....	.....	172,456
Others	19,072	.....	.....	19,072
Totals	2,808,574	648,289	1,491,095	4,947,958

TABLE XIX.—Tonnage, Number of Mines, Net and Gross Value of Lode Minerals, 1901–1937.

District.	Year.	Tonnage.	No. of Shipping-mines.	No. of Mines Shipping over 100 Tons.	Net Value to Shipper of Lode Minerals produced.	Gross Value of Lode Minerals produced.
	1901	920,416	119	78	.....	$14,100,282
	1902	998,999	124	75	.....	11,581,153
	1903	1,286,176	125	74	.....	12,103,237
	1904	1,461,609	142	76	.....	12,909,035
	1905	1,706,679	146	79	.....	15,980,164
	1906	1,963,872	154	77	.....	18,484,102
	1907	1,804,114	147	72	.....	17,316,847
	1908	2,083,606	108	59	.....	15,847,411
	1909	2,057,713	89	52	.....	15,451,141
	1910	2,216,428	83	50	.....	14,728,731
	1911	1,770,755	80	45	.....	11,454,063
	1912	2,688,532	86	51	.....	17,662,766
	1913	2,663,809	110	58	.....	17,190,838
	1914	2,175,971	98	56	.....	15,225,061
	1915	2,690,110	132	59	.....	19,992,149
	1916	3,188,865	169	81	.....	31,483,014
	1917	2,761,579	193	87	.....	26,788,474
	1918	2,892,849	175	80	.....	27,590,278
	1919	2,112,975	144	74	.....	19,750,498
	1920	2,178,187	121	60	.....	19,444,365
	1921	1,562,645	80	35	.....	12,920,398
	1922	1,573,186	98	33	.....	19,227,857
	1923	2,421,839	77	28	.....	25,347,092
	1924	3,397,105	86	37	.....	35,538,247
	1925	3,849,269	102	40	.....	46,200,135
	1926	4,775,073	138	55	$38,558,613	51,508,031
	1927	5,416,021	132	52	27,750,364	44,977,082
	1928	6,241,310	110	49	29,070,075	48,281,825
	1929	6,977,681	106	48	34,713,887	51,174,859
	1930	6,803,846	68	32	21,977,688	40,915,395
	1931	5,549,103	44	22	9,513,931	22,535,573
	1932	4,340,158	75	29	7,075,393	19,700,235
	1933	4,030,778	109	47	13,976,368	25,007,137
	1934	5,087,334	145	69	20,243,278	33,895,930
	1935	4,916,149	177	72	25,407,914	40,597,569
	1936	4,456,521	168	70	29,975,608	43,666,452
No. 1 District	**1937**	**227,643**	**13**	**7**	**1,979,099**	**2,472,782**
No. 2 District	**1937**	**103,261**	**5**	**2**	**1,513,485**	**1,515,095**
No. 3 District	**1937**	**26,709**	**7**	**5**	**192,074**	**276,091**
No. 4 District	**1937**	**675,412**	**35**	**25**	**2,965,557**	**3,699,979**
No. 5 District	**1937**	**2,642,565**	**108**	**62**	**29,104,366**	**44,578,312**
No. 6 District	**1937**	**2,469,664**	**17**	**12**	**9,008,279**	**10,370,524**
Totals	1937	6,145,254	185	113	$44,762,860	$62,912,783
Grand totals	1901–1937	119,166,522	.....	....	.....	979,490,209

TABLE XX.—MEN EMPLOYED IN THE MINING INDUSTRY OF BRITISH COLUMBIA, 1901–1937.

District.	Year.	Placer-mining.	Lode-mining.			In Concentrators.	In Smelters.	Coal-mining.			Structural Materials.		Miscellaneous.	Total.
			Under.	Above.	Total.			Under.	Above.	Total.	Quarries and Pits.	Plants.		
	1901	.....	2,736	1,212	3,948	.....	.....	3,041	931	3,974	.....	.....	.....	7,922
	1902	.....	2,219	1,126	3,345	.....	.....	3,101	910	4,011	.....	.....	.....	7,356
	1903	.....	1,662	1,088	2,750	.....	.....	3,137	1,127	4,264	.....	.....	.....	7,014
	1904	.....	2,143	1,163	3,306	.....	.....	3,278	1,175	4,453	.....	.....	.....	7,759
	1905	.....	2,470	1,240	3,710	.....	.....	3,127	1,280	4,407	.....	.....	.....	8,117
	1906	.....	2,680	1,303	3,983	.....	.....	3,415	1,390	4,805	.....	.....	.....	8,788
	1907	.....	2,704	1,239	3,943	.....	.....	2,862	907	3,769	.....	.....	.....	7,712
	1908	.....	2,567	1,127	3,694	.....	.....	4,432	1,641	6,073	.....	.....	.....	9,767
	1909	.....	2,184	1,070	3,254	.....	.....	4,713	1,705	6,418	.....	.....	.....	9,672
	1910	.....	2,472	1,237	3,709	.....	.....	5,903	1,855	7,758	.....	.....	.....	11,467
	1911	.....	2,435	1,159	3,594	.....	.....	5,212	1,661	6,873	.....	.....	.....	10,467
	1912	.....	2,472	1,364	3,837	.....	.....	5,275	1,855	7,130	.....	.....	.....	10,967
	1913	.....	2,773	1,505	4,278	.....	.....	4,950	1,721	6,671	.....	.....	.....	10,949
	1914	.....	2,741	1,433	4,174	.....	.....	4,267	1,465	5,732	.....	.....	.....	9,906
	1915	.....	2,709	1,435	4,144	.....	.....	3,708	1,283	4,991	.....	.....	.....	9,135
	1916	.....	3,357	2,036	5,393	.....	.....	3,694	1,366	5,060	.....	.....	.....	10,453
	1917	.....	3,290	2,198	5,488	.....	.....	3,760	1,410	5,170	.....	.....	.....	10,658
	1918	.....	2,626	1,764	4,390	.....	.....	3,658	1,769	5,247	.....	.....	.....	9,637
	1919	.....	2,513	1,746	4,259	.....	.....	4,145	1,821	5,966	.....	.....	.....	10,225
	1920	.....	2,074	1,605	3,679	.....	.....	4,191	2,158	6,349	.....	.....	.....	10,028
	1921	.....	1,355	975	2,330	.....	.....	4,722	2,163	6,885	.....	.....	.....	9,215
	1922	.....	1,510	1,239	2,749	.....	.....	4,712	1,932	6,644	.....	.....	.....	9,393
	1923	.....	2,102	1,516	3,618	.....	.....	4,342	1,807	6,149	.....	.....	.....	9,767
	1924	.....	2,353	1,680	4,033	.....	.....	3,894	1,524	5,418	.....	.....	.....	9,451
	1925	.....	2,298	2,840	5,138	.....	.....	3,828	1,615	5,443	.....	.....	.....	10,581
	1926	299	2,606	1,735	4,341	808	2,461	3,757	1,565	5,322	493	324	124	14,172
	1927	415	2,671	1,916	4,587	854	2,842	3,646	1,579	5,225	647	138	122	14,830
	1928	355	2,707	2,469	5,176	911	2,748	3,814	1,520	5,334	412	368	120	15,424
	1929	341	2,926	2,052	4,978	966	2,948	3,675	1,353	5,028	492	544	268	15,565
	1930	425	2,316	1,260	3,576	832	3,197	3,389	1,256	4,645	843	344	170	14,032
	1931	688	1,463	834	2,297	581	3,157	2,957	1,125	4,082	460	526	380	12,171
	1932	874	1,355	900	2,255	542	2,036	2,628	980	3,608	536	329	344	10,524
	1933	1,134	1,786	1,335	3,121	531	2,436	2,241	853	3,094	376	269	408	11,369
	1934	1,122	2,796	1,729	4,525	631	2,890	2,050	843	2,893	377	187	360	12,985
	1935	1,291	2,740	1,497	4,237	907	2,771	2,145	826	2,971	536	270	754	13,737
	1936	1,124	2,959	1,840	4,799	720	2,678	2,015	799	2,814	931	288	825	14,179
No. 1 District	**1937**	**284**	**287**	**270**	**557**	**61**	.....	.....	.....	.....	**66**	**4**	**2**	**974**
No. 2 District	**1937**	**910**	**254**	**119**	**373**	**23**	.....	**10**	**4**	**14**	**57**	**1**	**2**	**1,380**
No. 3 District	**1937**	**28**	**49**	**42**	**91**	**9**	.....	**67**	**33**	**100**	**90**	**4**	.....	**322**
No. 4 District	**1937**	**32**	**426**	**271**	**697**	**304**	.....	**258**	**131**	**389**	**49**	.....	**1**	**1,472**
No. 5 District	**1937**	**57**	**1,361**	**652**	**2,013**	**453**	**3,027**	**462**	**166**	**628**	**133**	**2**	**687**	**7,000**
No. 6 District	**1937**	**80**	**1,226**	**464**	**1,690**	**318**	.....	**1,489**	**533**	**2,022**	**329**	**316**	**248**	**4,981**
Totals	**1937**	**1,371**	**3,603**	**1,818**	**5,421**	**1,168**	**3,027**	**2,286**	**867**	**3,153**	**724**	**327**	**938**	**16,129**

TABLE XXI.—METALLIFEROUS MINES SHIPPING IN 1937.

Mine or Group.	Location of Mine or Mill.	Owner or Agent.	Rated Daily Capacity.		Operating at.	Date of First Operation.	Process.	Character of Ore.
			1936.	1937.				
			Tons.	Tons.	Tons.			
Dolly Varden	Alice Arm	T. W. Falconer, Alice Arm						Silver, gold, lead.
Esperanza	Alice Arm	Esperanza Mines, Ltd., Victoria	20	*20	*20	1936	Flotation	Silver, gold, lead.
Glacier Creek	Glacier Creek	Glacier Creek Mining Co., Victoria						Silver, gold, lead.
Granby Point	Anyox	Kark Eklund, leaser, Anyox						Silver, gold, lead.
Georgia River	Stewart	Gold Leasers, Ltd., Vancouver		*30	*30	1937	Concentration	Gold, silver, lead.
Mountain Boy	American Creek	B. T. McDonald, Stewart						Silver, copper, lead.
Northwestern	Stewart	Northwestern Aerial Prospecting Co., Vancouver						Gold, silver.
Ontario	American Creek	S. Deschamps, Stewart						Silver, gold, lead.
Silbak-Premier	Stewart	Silbak Premier Mines, Ltd., Vancouver	500	500	500	July, 1922	Flotation; concentration	Gold, silver, lead, copper.
Welldun	Stewart	Welldun M.M. & Power Co., Stewart	20	20	†20	1927	Flotation; concentration	Gold, silver, lead, copper.
Edye Pass	Refuge Bay	Reward Mining Co., Vancouver						Gold, silver.
Surf Inlet	Surf Inlet	Surf Inlet Cons. Gold Mines, Ltd., Vancouver	75	75	75	Aug., 1937	Table concentration; flotation	Gold, silver, copper.
Surf Point	Porcher Island	Reward Mining Co., Ltd., Vancouver	22	25	25	July, 1933	Flotation	Gold, silver.
Cariboo Gold	Wells	Cariboo Gold Quartz Mining Co., Ltd., Vancouver	200	250	250	Jan., 1933	Cyanidation	Gold, silver.
Island Mountain	Wells	Island Mountain Mines, Ltd., Wells	125	110	100	Nov., 1934	Cyanidation	Gold, silver.
Rand Group	Barkerville	Joseph Wendle, Barkerville						Gold, silver, lead, zinc.
Glacier Gulch	Smithers	W. Banta, G. Loveless, and S. F. Campbell, Smithers						Gold, silver, lead, zinc.
Silver Cup	New Hazelton	J. E. McLeod, c/o McLean, Philpott & Co., Vancouver						Silver, lead, zinc.
Driftwood	Babine Mountain	Yens Baker, Smithers						Silver, gold.
Silver Bow Group	Usk	G. Little and A. Clore, Terrace						Gold, silver, lead, copper, zinc.
Copper King	Kamloops	J. F. McKelvie, Kamloops						Gold, silver, copper.
Homestake	Kamloops	Kamloops Homestake Mines, Ltd., Vancouver	50	50	†50	Oct., 1935	Flotation	Gold, silver, lead.
Lookout	Boulder	Norman Hunsbedt, Vavenby						Silver, lead.
Windpass	Dunn Lake	Windpass Gold Mining Co., Ltd., Vancouver	50	50	50	Mar., 1934	Flotation	Gold, silver, copper.
Nicola	Stump Lake	Nicola Mines & Metals, Ltd., Vancouver	60	60	60	1929	Flotation	Gold, silver, lead, copper.
Kalamalka	Lavington	Kalamalka Gold Mines, Ltd., Vernon						Gold, silver.
Skookum	Vernon	W. M. McNiven, 829 Pender Street West, Vancouver						Gold, silver, lead.

* Intermittent. † Idle at present.

TABLE XXI.—METALLIFEROUS MINES SHIPPING IN 1937—*Continued.*

Mine or Group.	Location of Mine or Mill.	Owner or Agent.	Rated Daily Capacity.		Operating at.	Date of First Operation.	Process.	Character of Ore.
			1936.	1937.				
			Tons.	Tons.	Tons.			
Amandy	Jewel Lake	E. C. Henniger, Grand Forks						Gold, silver.
Bay	Greenwood	J. Strieder and J. Klinosky, leasers, Greenwood						Gold, silver.
Beaver	Greenwood	Beaver Silver Mines, Ltd., Vancouver						Silver, lead, zinc.
Beaver	Greenwood	Hilmer Nordman, leaser, Beaverdell						Silver, lead, zinc.
Brooklyn	Greenwood	W. E. McArthur, Greenwood						Gold, silver, copper.
Carmi	Greenwood	J. Kerr, Carmi						Gold, silver.
Elkhorn	Greenwood	F. Jaubin and J. Strieder, Greenwood						Gold, silver, lead, zinc.
Dentonia	Greenwood	Dentonia Mines, Ltd., Vancouver	100	100	‡100	April, 1934	Flotation; cyanidation	Gold, silver, lead.
Granby	Phoenix	W. E. McArthur, Greenwood	50	50	50	Sept., 1936	Flotation	Gold, silver, copper.
Greenwood Gold	Boundary Falls	Greenwood Gold Mines, Ltd., Vancouver						Gold, silver, lead, zinc.
Highland Bell	Greenwood	Highland Bell, Ltd., Penticton						Gold, silver, lead, zinc.
Mabel	Greenwood	G. H. Worthington, 456 Broadway West., Vancouver						Gold, silver.
Mogul	Greenwood	C. Sherdahl and S. Bergland, Westbridge						Gold, silver.
North Star	Greenwood	Greenbridge Gold Mines, Ltd., Calgary, Alta.						Gold, silver, lead.
Number Seven	Greenwood	W. E. McArthur, Greenwood						Gold, silver, lead.
Peterson	Westbridge	F. O. Peterson, Westbridge						Gold, silver.
Rosemont	Beaverdell	W. R. Fowler, Beaverdell						Gold, silver.
Sally	Beaverdell	Sally Mines, Ltd., Penticton						Gold, silver, lead, zinc.
Tiger	Beaverdell	J. L. Nordman & Partner, Beaverdell						Silver, lead, zinc.
Waterloo	Greenwood	F. Nesbit, Edgewood						Silver, lead, zinc.
Wellington	Beaverdell	Beaverdell-Wellington Syndicate, Greenwood						Gold, silver, lead, zinc.
Athelstan	Grand Forks	W. E. McArthur, Greenwood						Gold, silver.
City of Paris	Grand Forks	H. M. Brinkman, Grand Forks						Gold, silver, lead, zinc.
B.C.	Denoro	A. Docksteader and E. Vant, Grand Forks						Silver, copper.
Little Bertha	Grand Forks	J. J. Herman and Associates, Grand Forks						Gold, silver.
Union	Granby River	Leasers from J. F. McCarthy						Gold, silver, lead.
Yankee Boy	Grand Forks	Riegel Mines, Ltd., Grand Forks						Gold, silver.
Fairview Amalgamated	Osoyoos	Fairview Amalgamated Gold Mines, Ltd., Vancouver	100	150	150	Aug., 1935	Amalgamation; blanket-tables; flotation	Gold, silver, copper, lead.
Gold Mountain	Hedley	Gold Mountain Mines, Ltd., Vancouver		§50	§50	Jan., 1937	Flotation	Gold, silver, lead.
Gold Standard	Oro Fino Mountain	Gold Standard Mining Co., Ltd., Penticton						Gold, silver.
Golden Cache	Osoyoos	R. H. Carmichael, Similkameen						Gold, silver.
Grandora	Oliver	Grandora Mines, Ltd., Vancouver	40	40	40	Jan., 1935	Amalgamation; cyanidation	Gold, silver.
Hedley Mascot	Hedley	Hedley Mascot Gold Mines, Ltd., Vancouver	150	170	175	May, 1936	Flotation	Gold, silver, copper.

‡ Mill dismantled and moved to Durango; cyanide plant still on ground. § Closed down April, 1927.

			Tons.	Tons.	Tons.			
Kelowna Exploration	Hedley	Kelowna Exploration Co., Ltd., Hedley	200	200	200	Sept., 1934	Cyanidation; flotation	Gold, silver, copper.
Osoyoos	Osoyoos	Osoyoos Mines, Ltd., Calgary, Alta.	50	50	50	Mar., 1936	Table concentration; flotation; cyanidation	Gold, silver, copper.
Copper Mountain	Allenby	Granby Con. M.S. & Power Co., Ltd., Vancouver		3,000	3,000	1920; resumed in 1937	Flotation	Copper, silver, gold.
Anderson	Sawmill Creek	J. J. Rollheiser, Kimberley						Gold, silver, lead.
Midway	Moyie	Movie Gold Mines, Ltd., Moyie						Gold, silver.
Birdie L.	*Marysville*	*Fred Bird, Marysville*						Gold, silver, lead.
Burt	Galloway	R. D. Powelson, Galloway						Silver, lead, zinc.
Sullivan	Kimberley	Consolidated Mining & Smelting Co. of Canada, Ltd., Trail	6,000	6,000	6,000	Aug., 1923	Flotation	Silver, lead, zinc.
Cave	Lake Windermere	H. S. Grainger, Wilmer						Silver, lead, zinc.
Banker	Ainsworth	Ainsworth Mines, Ltd., Ainsworth						Silver, lead.
Banker	*Ainsworth*	H. Glegerich, Kaslo						Silver, lead.
Caledonia	Blaylock	Geo. E. McCready, Retallack						Silver, lead.
Cork-Province	Zwicky	Leasers from Cork-Province Mines, Ltd., Kaslo						Silver, lead, zinc.
Crescent and Eden	Ainsworth	R. Sherraden, Ainsworth						Silver, lead.
Crowe Fledgling	Ainsworth	W. E. Lane, Ainsworth						Silver, lead.
Eureka	Kaslo (Lyle Creek)	Leasers, Kaslo; H. E. Singel						Silver, lead.
Fourth of July	Kaslo	Leasers, Kaslo						*Silver, lead.*
Jewel	Ainsworth	Carl M. Mohr, Ainsworth						Silver, lead.
Krao	Ainsworth	Leasers from Krao Mines, Ltd., Kaslo						Silver, lead, zinc.
Lady of the Lake	Ainsworth	Leasers, S. Romer and A. Prestmo, Ainsworth						Silver, lead.
St. Patrick	Argenta	J. T. McGregor, 515 Royal Bank Bldg., Vancouver						Silver, lead, zinc.
Whitewater	Whitewater	Whitewater Mines, Ltd., Vancouver		*125	*125	1927	Table concentration; flotation	Silver, lead, zinc.
Canadian	Sandon	Basal Mines, Ltd., Vancouver						Silver, lead, zinc.
Black Colt	Sandon	A. McGillivray, Sandon						Silver, lead, zinc.
Bosun	New Denver	G. H. Stavert and V. Celanti, Silverton						Silver, lead, zinc.
Bosun	New Denver	J. Zambon and J. Beber, New Denver						Silver, lead, zinc.
Galena Farm	Silverton	Galena Farm Cons. Mines, Ltd., leasers						Silver, lead, zinc.
Hewitt	Silverton	Galena Farm Cons. Mines, Ltd., leasers						Silver, lead, zinc.
Hinckley	Sandon	G. H. Murhard, Sandon						Silver, lead.
Jackson	Retallack	Jackson Mines, Ltd., Vancouver, leasers						Silver, lead, zinc.
Lucky Jim	Zincton	Lucky Jim Lead & Zinc Co., Ltd., Vancouver	200	200	†200	1927	Concentration; flotation	Silver, lead, zinc.
Lucky Thought	Silverton	H. V. Dewis, Silverton						Silver, lead, zinc.
McAllister	Three Forks	Denver Mining Syndicate, New Denver						Silver, gold.
Mammoth and Standard	New Denver	Western Exploration Co., Silverton	150	150	150	July, 1935	Table concentration; flotation	Silver, lead, zinc.
Mercury	Sandon	Sam Marzoli, Sandon						Silver, lead, zinc.
Molly Hughes	New Denver	Slocan Idaho Mines Corp., 509 Hutton Bldg., Spokane, Wash.						Silver, lead, zinc.

*Intermittent. † Idle at present.

TABLE XXI.—METALLIFEROUS MINES SHIPPING IN 1937—*Continued.*

Mine or Group.	Location of Mine or Mill.	Owner or Agent.	Rated Daily Capacity.		Operating at.	Date of First Operation.	Process.	Character of Ore.
			1936.	1937.				
			Tons.	Tons.	Tons.			
Mountain Chief	Silverton	J. Cechelero, New Denver						Silver, lead, zinc.
Noble Five	Cody	Noble Five Mines, Ltd., Nelson	100	*100	*100	1920	Table concentration; flotation	Silver, lead, zinc.
Number One	Sandon	J. M. Harris and F. T. Kelly, Sandon						Silver, lead, zinc.
Palmita	Alamo	C. Cunningham, Alamo						Silver, lead.
Queen Bess	Alamo	C. Cunningham, Alamo						Silver, lead, zinc.
Rambler-Cariboo	Retallack	Ross Mining Syndicate, Nelson						Silver, lead, zinc.
Rio	Silverton	J. H. Pendry, New Denver						Silver, lead, zinc.
Ruth Hope	Sandon	Leasers from Ruth Hope Mining Co., Ltd., Vancouver	100	100	†100	1927	Table concentration; flotation	Silver, lead, zinc.
Slocan Monitor	Three Forks	Leasers from Slocan Monitor Mines, Ltd., Vancouver						Silver, lead, zinc.
Sovereign	Alamo	Leasers, E. J. Vandergrift, agent, New Denver						Silver, lead, zinc.
Springfield	Sandon	*P. Chmelar, Sandon*						*Silver, lead, zinc.*
Victor	Sandon	E. Doney, lessee, Sandon						Silver, lead, zinc.
Slocan Arlington	Slocan	Slocan Arlington Mines Development Co., Penticton						Silver, lead, zinc.
Lakeview	Slocan City	Lakeview Mining Syndicate, Slocan City		10	10	1937	Concentration	Silver, lead, zinc.
L.T.	Springer Creek	D. B. O'Neail, Slocan City						Silver, lead, zinc.
Morning Star	Springer Creek	P. W. Munro and Scovil, leasers, Slocan						Silver, lead, zinc.
Ottawa	Springer Creek	Ottawa Silver Mining & Milling Co., 401 Sherwood Bldg., Spokane, Wash.		*100	*100	1937	Concentration	Silver, lead, zinc.
Port Hope	Slocan City	H. L. Fife, Slocan						Silver, gold.
Riverside	Slocan City	T. Elsmore, Silverton						Silver, lead, zinc.
Arlington	Erie Creek	R. O. Oscarson, leaser, Erie						Gold, silver, lead.
Athabasca	Nelson	Noble Five Mines, Ltd., Nelson						Gold, silver, lead.
Bayonne	Tye	Bayonne Cons. Mines, Ltd., Vancouver	50	50	50	Nov., 1936	Cyanidation	Gold, silver.
Bear	Hall Creek	C. Peterson and T. A. Mighton, Trail						Gold, silver.
Black Cock	Ymir	Blackcock Mines, Ltd., Calgary, Alta.						Gold, silver, lead, zinc.
Boadicea	Nelson	Leasers, Nelson						Silver, lead.
California	Nelson	Leasers, Alex. Poelzer *et al.*, Nelson						Gold, silver, lead, zinc.
Clubine Comstock	Boulder Creek	Clubine Comstock Gold Mines, Ltd., Nelson						Gold, silver.
Daylight	Nelson	Peter Rolick, Nelson						Gold, silver.
Euphrates	Nelson	General Lee Mining & Milling Co., Ltd., 300 Insurance Bldg., Seattle, Wash.						Gold, silver, lead, zinc.
Florence	Salmo	R. Sapples and C. Peterson, Salmo						Silver, lead, zinc.

* *Intermittent.* † *Idle at present.*

			Tons.	Tons.	Tons.			
Gold Fern	Nelson	Gold Fern Mines, Ltd., Nelson	.....	.....	.....	.....	.....	Gold, silver.
Granite Poorman	Taghum	Livingstone Mining Co., Ltd., Blewett	30	30	30	Sept., 1934	Amalgamation; concentration	Gold, silver.
Harriet	Erie	C. A. Cawley and Associates, Salmo	.....	.....	.....	.....	.....	Gold, silver.
Howard	Nelson	Durango Mines, Ltd., Vancouver	.....	100	100	1937	Flotation	Gold, silver, lead, zinc.
Keystone	Erie	Dufferin Golds, Ltd., Vancouver	.....	.....	.....	.....	.....	Gold, silver, lead, zinc.
Kootenay Belle	Sheep Creek	Kootenay Belle Gold Mines, Ltd., Vancouver	100	100	100	Oct., 1934	Cyanidation	Gold, silver.
Kootenay Ore Hill	Sheep Creek	Kootenay Ore Hill Gold Mines, Ltd., Vancouver	15	*15	*15	Dec., 1936	Concentration	Gold, silver, lead, zinc.
Lakeview	Sanca	R. J. Long, Creston	.....	.....	.....	.....	.....	Silver, lead, zinc.
Lone Silver	Salmo	Lone Silver Gold Mines, Ltd., Vancouver	.....	.....	.....	.....	.....	Silver, gold, lead, zinc.
Myrtle	Ymir	H. Brown, Ymir	.....	.....	.....	.....	.....	Gold, silver.
Nevada	Nelson	J. A. and M. Armes, Vancouver	.....	.....	.....	.....	.....	Silver, gold, lead, zinc.
Perrier	Nelson	Perrier Gold Mines, Ltd., Nelson	50	*50	*50	1936	Amalgamation; flotation	Gold, silver, lead, zinc.
Queen	Salmo	O. Gowing and L. J. Penny, Rossland	.....	.....	.....	.....	.....	Gold, silver.
Relief Arlington	Erie	Relief Arlington Mines, Ltd., Erie	75	75	75	1933	Amalgamation; flotation; cyanidation	Gold, silver.
Reno	Sheep Creek	Reno Gold Mines, Ltd., Vancouver	120	120	120	Dec., 1932	Cyanidation	Gold, silver.
Shamrock	Erie	Godfrey Birtsch, Erie	.....	.....	.....	.....	.....	Gold, silver, lead, zinc.
Sheep Creek	Sheep Creek	Sheep Creek Gold Mines, Ltd., Vancouver	150	150	150	May, 1935	Cyanidation	Gold, silver.
Silver King	Nelson	Joe Pavich, lessor, Nelson	.....	.....	.....	.....	.....	Silver, lead, zinc.
Spokane	Tye	R. M. and K. K. Laib, Bayonne	.....	.....	.....	.....	.....	Gold, silver, lead, zinc.
Spotted Horse	Porto Rico	R. I. McKenna *et al.*, leasers, Nelson	.....	.....	.....	.....	.....	Gold, silver.
Starlight	Nelson	J. Poje, Box 328, Nelson	.....	.....	.....	.....	.....	Gold, silver.
Venus-Juno	Nelson	Leasers from R. Heddle, Nelson	.....	.....	.....	.....	.....	Gold, silver.
Centre Star	Ymir	Wesko Mines, Ltd., Vancouver	100	100	100	Oct., 1936	Flotation; cyanidation	Gold, silver, lead, zinc.
Wilcox	Ymir	Wilcox Mining Syndicate, Ymir	20	20	20	1933	Amalgamation	Gold, silver, lead, zinc.
Yankee Girl	Ymir	Ymir Yankee Girl Gold Mines, Ltd., Vancouver	100	100	100	Dec., 1934	Cyanidation; flotation	Gold, silver, lead, zinc.
Ymir Con.	Ymir	Ymir Cons. Gold Mines, Ltd., Vancouver	100	100	100	July, 1935	Amalgamation; flotation	Gold, silver, lead, zinc.
Elmes	Rossland	Harold S. Elmes, Rossland	.....	.....	.....	.....	.....	Gold, silver.
Evening Star	Rossland	J. Heap, J. Barnes, and H. D. Griswold, Rossland	.....	.....	.....	.....	.....	Gold, silver.
Gold Drip	Rossland	C. Ritchie, Rossland	.....	.....	.....	.....	.....	Gold, silver.
Iron Colt	Rossland	P. Krpan and J. Radosevick, leasers, Rossland	.....	.....	.....	.....	.....	Gold, silver.
I.X.L.	Rossland	I.X.L. Lessors, Ltd., Rossland	.....	.....	.....	.....	.....	Gold, silver.
Mayflower	Rossland	Chas. Adams, Rossland	.....	.....	.....	.....	.....	Gold, silver, lead, zinc.
Midnight	Rossland	Midnight Syndicate, Rossland	.....	.....	.....	.....	.....	Gold, silver.
Monday	Rossland	B. P. Stinson, Rossland	.....	.....	.....	.....	.....	Gold, silver.
O.K.	O.K. Mountain	O.K. Leasing Co., Box 522, Rossland	.....	.....	.....	.....	.....	Gold, silver.
Silverine	Rossland	A. O. Fried and M. Penny, Rossland	.....	.....	.....	.....	.....	Gold, silver.
Snowdrop	Rossland	C. Penny, Rossland	.....	.....	.....	.....	.....	Gold.
Union	Rossland	Brown & Levis, 20 Marlboro Apt., Calgary, Alta.	.....	.....	.....	.....	.....	Gold, silver, lead, zinc.
Velvet	Rossland	Velvet Gold Mining Co. and Velvet Gold Copper Mines, Inc., Seattle, Wash.	100	*100	*100	Dec., 1935	Flotation	Gold, silver, copper.

* Intermittent.

TABLE XXI.—METALLIFEROUS MINES SHIPPING IN 1937—*Continued.*

Mine or Group.	Location of Mine or Mill.	Owner or Agent.	Rated Daily Capacity.		Operating at	Date of First Operation.	Process.	Character of Ore.
			1936.	1937.				
			Tons.	Tons.	Tons.			
Rossland properties	Rossland	Leasers from Cons. M. & S. Co., Trail	.....	.....	.....	.....	.....	Gold, silver, copper.
Allco	Albert Canyon	Allco Silver Mines, Ltd., Vancouver	.....	.....	.....	.....	.....	Silver, lead.
Meridian	Camborne	Meridian Mining Co., Ltd., Vancouver	100	*100	†100	Jan., 1935	Flotation	Gold, silver.
Silver Cup	Ferguson	Silver Cup Mining & Milling Co., Ltd., Vancouver	.....	40	40	Aug., 1937	Flotation	Gold, silver, lead, zinc.
Spider	Camborne	Spider Mining Co., Camborne	.....	.....	.....	.....	.....	Gold, silver, lead, zinc.
True Fissure	Ferguson	New True Fissure Mining & Milling Co., Guaranty Trust Bldg., Windsor, Ont.	.....	50	50	Oct., 1937	Flotation	Gold, silver, lead, zinc.
Privateer	Zeballos	Privateer Mine, Ltd., Victoria	.....	.....	.....	.....	.....	Gold, silver,copper, lead.
White Star	Zeballos	L. R. Brown, Zeballos	.....	.....	.....	.....	.....	Gold, silver, lead.
Danzig	Nootka	Danzig Mines, Ltd., Seattle, Wash.	.....	.....	.....	.....	.....	Gold, silver.
Vidette	Savona	Vidette Gold Mines, Ltd., Vancouver	70	60	60	Dec., 1933	Flotation	Gold, silver, copper.
Abco	Ahousat	Abco Mines, Ltd., Vancouver	.....	.....	.....	.....	.....	Gold, silver.
St. Joseph	Lasqueti Island	St. Joseph Mines Co., Lasqueti Island	.....	.....	.....	.....	.....	Gold, silver, copper.
Bralorne	Bridge River	Bralorne Mines, Ltd., Vancouver	450	475	475	Feb., 1932	Amalgamation; flotation	Gold, silver.
Congress	Bridge River	Congress Gold Mines, Ltd., and leased to Bealmore Mining & Milling Co., Vancouver	.....	.....	.....	.....	.....	Gold, silver.
Minto	Bridge River	Minto Gold Mines, Ltd.	120	*120	†120	Dec., 1934	Amalgamation; flotation	Gold, silver, lead.
Pioneer	Bridge River	Pioneer Gold Mines of B.C., Ltd., Vancouver	300	300	300	Feb., 1928	Cyanidation	Gold, silver.
Wayside	Bridge River	Wayside Cons. Gold Mines, Ltd., and leased to Bealmore Mining & Milling Co., Ltd.	100	*100	†100	Nov., 1934	Flotation; cyanidation	Gold, silver.
Ashloo	Squamish	Ashloo Gold Mines, Ltd., Vancouver	25	25	25	Sept., 1936	Table concentration; flotation	Gold, silver, copper.
Britannia	Britannia Beach	Britannia Mining & Smelting Co., Ltd., Britannia Beach	3,600	6,000	6,000	Jan., 1923	Flotation	Copper, gold, silver.
Aufeas	Hope	H. L. Woods, Hope	.....	.....	.....	.....	.....	Gold, silver, copper.
Home Gold	Jessica	Home Gold Mining Co., Ltd., Vancouver	.....	.....	.....	.....	.....	Gold, silver.
K.V. Gold	Jessica	Kettle Valley Gold Mines, Ltd., c/o McLean, c/o Williams, Manson & Rae, 716 Hall Bldg., Vancouver	.....	.....	.....	.....	.....	Gold, silver.

* Intermittent. † Idle at present.

TABLE XXII.—Mining Companies employing an Average of Ten or more Men during 1937.

Shipping Mines.

Name of Mine or Company.	Days Operating.		Average Number of Men.		Tonnage.	
	Mine.	Mill.	Mine.	Mill.	Mined.	Milled.
Welldun	233	187	4	7	2,311	2,226
Esperanza	117	110	9	6	2,220	2,220
Silbak Premier	365	365	174	32	201,206	201,206
Edye Pass	254	.....	15	.....	100	.....
Surf Point	299	299	26	11	17,043	7,140
Surf Inlet	364	338	25	6	14,383	12,432
Cariboo Gold Quartz	283	283	161	13	69,324	69,324
Island Mountain	282	282	80	13	33,903	33,903
Windpass	299	299	28	6	13,180	13,180
Nicola	.....	.....	15	2	10,430	10,430
Kalamalka	156	.....	11	.....	2,742	.....
Dentonia	*Nil*	213	7	8	.....	17,727
Granby (Phoenix)	313	339	11	6	15,376	15,376
Greenwood Gold	163	.....	12	.....	114	.....
Highland Bell	286	.....	31	.....	3,411	3,411
Wellington (Beaverdell)	298	.....	22	.....	956	970
Fairview Amalgamated	340	334	34	8	34,885	34,885
Gold Mountain	120	103	40	10	6,500	6,500
Hedley Mascot	334	352	36	32	61,025	59,115
Kelowna Exploration	327	365	117	65	77,858	77,887
Osoyoos	.....	.....	20	7	7,240	7,240
Granby (Copper Mountain)	250	196	265	171	452,352	444,552
Sullivan	300	341	654	260	2,227,123	2,219,576
Whitewater	.....	.....	8	2	56,180	56,180
Lucky Jim	.....	.....	17	2	12,100	12,100
Mammoth	241	243	91	16	25,008	34,705
Standard	241	.....	12	.....	3,861	.....
Noble Five	314	73	25	10	3,249	3,249
Ottawa	300	45	15	2	375	375
Bayonne	365	365	35	10	15,934	15,934
Clubine Comstock	365	.....	16	.....	998	.....
Dufferin Golds	120	.....	12	.....	63	.....
Durango	350	.....	31	.....	650	.....
Euphrates	296	.....	14	.....	104	.....
Granite-Poorman	289	289	21	2	2,487	2,403
Kootenay Belle	335	365	87	10	41,600	39,935
Kootenay Ore Hill	344	118	10	3	974	974
Relief Arlington	365	365	82	19	37,851	26,822
Reno	365	365	95	23	45,978	45,984
Sheep Creek	341	358	64	9	54,243	54,243
Wesko (Centre Star)	360	353	61	16	34,633	34,633
Wilcox	240	180	8	2	2,440	2,440
Goodenough & Ymir	358	244	24	3	9,302	8,702
Ymir Yankee Girl	365	365	78	16	39,356	39,356
Velvet	142	132	15	24	7,948	7,948
True Fissure	38	30	14	5	2,059	1,604
Silver Cup	.....	64	.....	25	1,486	1,486
Privateer	307	.....	15	.....	422	.....
Vidette	335	304	86	6	11,074	11,016
Bralorne	365	365	346	18	170,686	170,686
Minto	345	348	35	8	32,556	32,556
Pioneer	311	365	215	27	147,876	130,864
Ashloo	270	268	12	7	6,056	6,056
Britannia	360	353	695	289	2,116,075	2,116,075
B.C. Nickel Mines, Ltd.	303	.....	15	.....	.....	.....

TABLE XXII.—Mining Companies employing an Average of Ten or more Men during 1937—*Continued.*

Non-shipping Mines.

Name of Mine or Company.	Days Operating.		Average Number of Men.		Tonnage.	
	Mine.	Mill.	Mine.	Mill.	Mined.	Milled.
Polaris-Taku Mining Co., Ltd.*	364	61	94	7	8,831	8,831
Cons. M. & S. Co. (Anyox)	61		40			
Big Missouri	365		55			
Cons. M. & S. (McDame Creek)	220		12			
Cariboo Hudson Gold Mines, Ltd.	365		25			
Cons. M. & S. Co. (Aiken Lake)	306		19			
Riegel Mines, Ltd. (Providence)	365		16			
Golden Zone, Osoyoos	365		10			
Hedley Amalgamated	162		12			
Utica Mines (1937), Ltd.	265		10			
St. Eugene Extension Mines, Ltd.	199		14			
Base Metals Mining Corp., Ltd.	255		25			
Gold Belt Mining Co., Ltd.	350		39			
Reeves MacDonald Mines, Ltd.	300		22			
Salmo-Malartic Mines, Ltd.	311		10			
Silver Ridge Mining Co., Ltd.	210		11			
Spud Valley Gold Mines, Ltd.	61		25			
Zeballos Gold Peak Mines, Ltd.	102		15			
Taylor Windfall Gold Mining Co.	216		15			
B.R.X. (1935) Cons. Mines, Ltd.	312		20			
Manitou Mining Co., Ltd.	350		19			
Pacific Eastern Gold, Ltd.	173		33			
Gem Gold Mines, Ltd.	92		28			

* No shipments made until 1938.

SYNOPSIS OF MINING LAWS OF B.C.

Mineral Act and Placer-mining Act.

The mining laws of British Columbia are very liberal in their nature and compare favourably with those of any other part of the world. The terms under which both lode and placer claims and placer leaseholds are held are such that a prospector is greatly encouraged in his work, and the titles, especially for mineral claims and placer-mining leaseholds, are perfect. The fees required to be paid are as small as possible, consistent with a proper administration of the mining industry, and are generally lower than those commonly imposed elsewhere. Provision is also made for the formation of mining partnerships practically without expense, and a party of miners is enabled to take advantage of these sections of the Acts so that such miners may work their claims jointly.

Placer-mining leases are granted for a period of twenty years and are approximately 80 acres in size. On a lode claim of 51 acres the expenditure of $500 in work, which may be spread over five years, is required to obtain a Crown grant, and surface rights are obtainable at a small figure, in no case exceeding $5 per acre.

The following synopsis of the mining laws will be found sufficient to enable the miner or intending investor to obtain a general knowledge of their scope and requirements; for particulars, however, the reader is referred to the Acts relating to mining, which may be obtained from any Mining Recorder, or from the Department of Mines or the King's Printer, Victoria, B.C.

Free Miners' Certificates.

Any person over the age of 18, and any joint-stock company, may obtain a free miner's certificate on payment of the required fee.

The fee to an individual for a free miner's certificate is $5 for one year. To a joint-stock company having a capital of $100,000, or less, the fee for a year is $50; if capitalized beyond this, the fee is $100.

The free miners' certificates run from date of issue and expire on the 31st day of May next after its date, or some subsequent 31st day of May (that is to say, a certificate may be taken out a year or more in advance if desired). Certificates may be obtained for any part of a year, terminating on May 31st, for a proportionately less fee.

The possession of this certificate entitles the holder to enter upon all lands of the Crown, and upon any other lands on which the right to so enter is not specially reserved, for the purpose of prospecting for minerals, locating claims, and mining.

A free miner can only hold, by location, one mineral claim on the same vein or lode, but may acquire others by purchase. Under the "Placer-mining Act," a free miner may locate one placer claim or leasehold in his own name and one placer claim or leasehold for each of two free miners for whom he acts as agent, on any separate creek, river-bed, bar or dry diggings. Other placer claims or leaseholds may be acquired by purchase.

In the event of a free miner allowing his certificate to lapse, his mining property (if not Crown-granted) reverts to the Crown (subject to the conditions set out in the next succeeding paragraph), but where other free miners are interested as partners or co-owners the interest of the defaulter becomes vested in the continuing co-owners or partners *pro rata*, according to their interests.

Six months' extension of time within which to revive title in mining property which has been forfeited through the lapse of a free miner's certificate is allowed. This privilege is given only if the holder of the property obtains a special free miner's certificate within six months after the 31st of May on which his ordinary certificate lapsed. The fee for this special certificate in the case of a person is $15 and in that of a company $300.

It is not necessary for a shareholder, as such, in an incorporated mining company to be the holder of a free miner's certificate.

Mineral Claims.

Mineral claims are located and held under the provisions of the "Mineral Act."

A mineral claim is a piece of land not exceeding in area fifty-one and sixty-five one-hundredths acres. The angles must be right angles unless the boundaries, or one of them, are the same as those of a previously recorded claim.

No special privileges are allowed for the discovery of new mineral claims or districts.

A mineral claim is located by erecting three "legal posts," which are stakes having a height of not less than 4 feet above ground and squared 4 inches at least on each face for not less than a foot from the top. A tree-stump so cut and squared also constitutes a legal post. A cairn of stones not less than 4 feet in height and not less than 1 foot in diameter 4 feet above the ground may also be used as a legal post.

The "discovery post" is placed at the point where the mineral in place is discovered.

Nos. 1 and 2 posts are placed as near as possible on the line of the ledge or vein, shown by the discovery post, and mark the boundaries of the claim. Upon each of these three posts must be written the name of the claim, the name of the locator, and the date of location. On No. 1 post, in addition, the following must be written: "Initial post. Direction of Post No. 2 [*giving approximate compass bearing*] ——— feet of this claim lie on the right and ——— feet on the left of the line from No. 1 to No. 2 posts."

The location-line between Nos. 1 and 2 posts must be distinctly marked—in a timbered locality by blazing trees and cutting underbrush, and in bare country by monuments of earth or rock not less than 2 feet in diameter at the base, and at least 2 feet high—so that the line can be distinctly seen.

Mineral claims must be recorded in the Mining Recorder's office for the mining division in which they are situate within fifteen days from the date of location, one day extra being allowed for each 10 miles of distance from the recording office after the first 10 miles. If a claim is not recorded in time it is deemed abandoned and open for relocation, but if the original locator wishes to relocate he can only do so by permission of the Gold Commissioner of the district and upon the payment of a fee of $10. This applies also to a claim abandoned for any reason whatever.

Mineral claims are, until the Crown grant is issued, held practically on a yearly lease, a condition of which is that during such year assessment-work be performed on the same to the value of at least $100, or a payment of such sum be made to the Mining Recorder. Such assessments must be recorded before the expiration of the year, or the claim is deemed abandoned. If, however, the required assessment-work has been performed within the year, but not recorded within that time, a free miner may, within thirty days thereafter, record such assessment-work upon payment of an additional fee of $10. The actual cost of the survey of a mineral claim, to an amount not exceeding $100, may also be recorded as assessment-work. If, during any year, work is done to a greater extent than the required $100, any further sum of $100—but not less—may be recorded and counted as further assessments; such excess work must be recorded during the year in which it is performed. All work done on a mineral claim between the time of its location and recording may be counted as work done during the first period of one year from the recording. As soon as assessment-work to the extent of $500 is recorded and a survey made of the claim, the owner of a mineral claim is entitled to a Crown grant on payment of a fee of $25, and giving the necessary notices required by the Act. Liberal provisions are also made in the Act for obtaining mill-sites and other facilities in the way of workings and drains for the better working of claims.

Placer Claims.

Placer-mining is governed by the "Placer-mining Act," and by the interpretation clause its scope is defined as "the mining of any natural stratum or bed of earth, gravel, or cement mined for gold or other precious minerals or stones." Placer claims are of four classes, as follows:—

"'Creek diggings': any mine in the bed of any stream or ravine:

"'Bar diggings': any mine between high- and low-water marks on a river, lake, or other large body of water:

"'Dry diggings': any mine over which water never extends:

"'Precious-stone diggings': any deposit of precious stones, whether in veins, beds, or gravel deposits."

The following provisions as to extent of the various classes of claims are made by the Act:—

"In 'creek diggings' a claim shall be two hundred and fifty feet long, measured in the direction of the general course of the stream, and shall extend in width one thousand feet, measured from the general course of the stream five hundred feet on either side of the centre thereof:

"In 'bar diggings' a claim shall be:—

"(*a.*) A piece of land not exceeding two hundred and fifty feet square on any bar which is covered at high water; or

"(*b.*) A strip of land two hundred and fifty feet long at high-water mark, and in width extending from high-water mark to extreme low-water mark:

"In 'dry diggings' a claim shall be two hundred and fifty feet square."

The following provision is made for new discoveries of placer-mining ground:—

"If any free miner, or party of free miners, discovers a new locality for the prosecution of placer-mining and such discovery be established to the satisfaction of the Gold Commissioner, placer claims of the following sizes shall be allowed to such discoverers, namely:—

"To one discoverer, one claim..... 600 feet in length;

"To a party of two discoverers, two claims amounting together to.....1,000 feet in length;

"And to each member of a party beyond two in number, a claim of the ordinary size only.

"The width of such claims shall be the same as ordinary placer claims of the same class: Provided that where a discovery claim has been established in any locality no further discovery shall be allowed within five miles therefrom, measured along the watercourses."

Every placer claim shall be as nearly as possible rectangular in form, and marked by four legal posts at the corners thereof, firmly fixed in the ground. On each of such posts shall be written the name of the locator, the number and date of issue of his free miner's certificate, the date of the location, and the name given to the claim. In timbered localities boundary-lines of a placer claim shall be blazed so that the posts can be distinctly seen, underbrush cut, and the locator shall also erect legal posts not more than 125 feet apart on all boundary-lines. In localities where there is no timber or underbrush, monuments of earth and rock, not less than 2 feet high and 2 feet in diameter at base, may be erected in lieu of the last-mentioned legal posts, but not in the case of the four legal posts marking the corners of the claim.

A placer claim must be recorded in the office of the Mining Recorder for the mining division within which the same is situate, within fifteen days after the location thereof, if located within 10 miles of the office of the Mining Recorder by the most direct means of travel. One additional day shall be allowed for every 10 miles additional or fraction thereof. The number of days shall be counted inclusive of the days upon which such location was made, but exclusive of the day of application for record. The application for such record shall be under oath and in the form set out in the Schedule to the Act. A claim which shall not have been recorded within the prescribed period shall be deemed to have been abandoned.

To hold a placer claim for more than one year it must be rerecorded before the expiration of the record or rerecord.

A placer claim must be worked by the owner, or some one on his behalf, continuously, as far as practicable, during working-hours. If work is discontinued for a period of seven days, except during the close season, lay-over, leave of absence, sickness, or for some other reason to the satisfaction of the Gold Commissioner, the claim is deemed abandoned.

Lay-overs are declared by the Gold Commissioner upon proof being given to him that the supply of water is insufficient to work the claim. Under similar circumstances he has also the power to declare a close season, by notice in writing and published in the Gazette, for all or any claims in his district. Tunnel and drain licences are also granted by him on the person applying giving security for any damage that may arise. Grants of right-of-way for the construction of tunnels or drains across other claims are also granted on payment of a fee of $25, the owner of the claims crossed having the right for tolls, etc., on the tunnel or drain which may be constructed. These tolls, however, are, so far as the amount goes, under the discretion of the Gold Commissioner.

Co-owners and Partnerships.

In both the "Mineral" and "Placer-mining" Acts provision is made for the formation of mining partnerships, both of a general and limited liability character. These are extensively taken advantage of and have proved very satisfactory in their working. Should a co-owner fail or refuse to contribute his proportion of the expenditure required as assessment-work on a claim he may be "advertised out," and his interest in the claim shall become vested in his co-owners who have made the required expenditure, *pro rata* according to their former interests.

It should not be forgotten that if any co-owner permits his free miner's certificate to lapse, the title of his associates is not prejudiced, but his interest reverts to the remaining co-owners; provided that said co-owner has not taken advantage of the six months' period of grace allowed for the taking-out of a special free miner's certificate, thus reviving the title to his interest.

Placer-mining Leases.

Leases of unoccupied Crown lands approximately 80 acres in extent may be granted by the Gold Commissioner of the district after location has been made by staking along a "location-line" not more than one-half a mile (2,640 feet) in length. In this line one bend, or change of direction, is permitted. Where a straight line is followed two posts only are necessary—namely, an "initial post" and a "final post." Where there is a change of direction a legal post must be placed to mark the point of the said change. The leasehold is allowed a width not in excess of one-quarter mile (1,320 feet), and the locator, both on his "initial post" and in his notice of intention to apply, which is posted at the office of the Mining Recorder, is required to state how many feet are included in the location to the right and how many feet to the left of the location-line.

That section of the Act dealing with the staking of placer-mining leases follows:—

"105. (1.) For the purpose of locating a placer leasehold, a line to be known as the 'location-line' shall be marked on the ground by placing a legal post at each end, one post to be known as the 'Initial Post' and the other as the 'Final Post.' The direction of the location-line may change at not more than one point throughout its length, and an intermediate legal post shall be placed at the point at which the direction changes. The total length of the location-line, following its change of direction (if any), shall not exceed two thousand six hundred and forty feet.

"(2.) Upon the initial post and the final post shall be written the words 'Initial Post' and 'Final Post' respectively, together with the name of the locator and the date of the location. On the initial post shall also be written the approximate compass-bearing of the final post, and a statement of the number of feet of the leasehold lying on the right and on the left of the location-line, as viewed from the initial post, not exceeding in the aggregate a width of thirteen hundred and twenty feet, thus: 'Direction of Final Post, . feet of this claim lie on the right and feet on the left of the location-line.' In addition to the foregoing, where there is a change of direction in the location-line as marked on the ground, the number '1' shall be written on the initial post; the number '2' shall be written on the intermediate post; and the number '3' shall be written on the final post. There also shall be affixed to the initial post a notice to the following effect, namely: 'Application will be made under the "Placer Mining Act" for a lease of the ground within this location.'

"(3.) The location-line shall at the time of location be marked between the legal posts throughout its length so that it can be distinctly seen; in a timbered locality, by blazing trees and cutting underbrush, and in a locality where there is neither timber nor underbrush, by placing legal posts or monuments of earth or stones not less than two feet high and not less than two feet in diameter at the base, so that the location-line can be distinctly seen.

"(4.) Where, from the nature or shape of the surface of the ground, it is impracticable to mark the location-line of a leasehold as provided by this section, the leasehold may be located by placing legal posts as witness-posts, as near as possible to the location-line, and writing on each witness-post the distance and compass-bearing of some designated point on the location-line from the witness-post; and the distances and compass-bearing so written on the witness-posts shall be set out in the application for the lease and in any lease granted thereon.

"(5.) The locator shall, within thirty days after the date of the location, post a notice in Form I in the office of the Mining Recorder, which notice shall set out:—

"(*a.*) The name of the intending applicant or each applicant if more than one, and the numbers of their free miners' certificates:

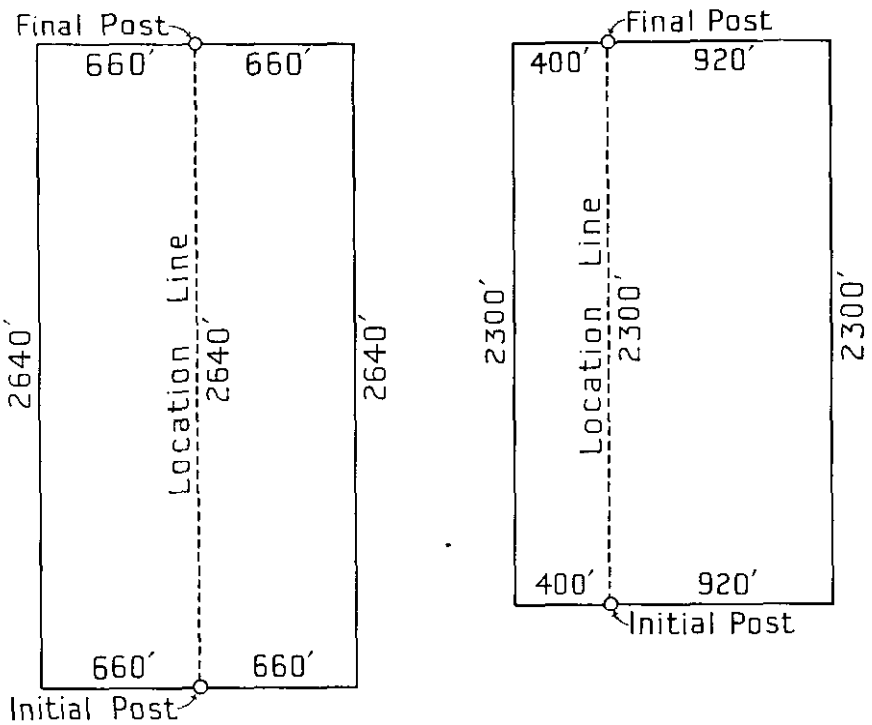
"(*b.*) The date of the location:

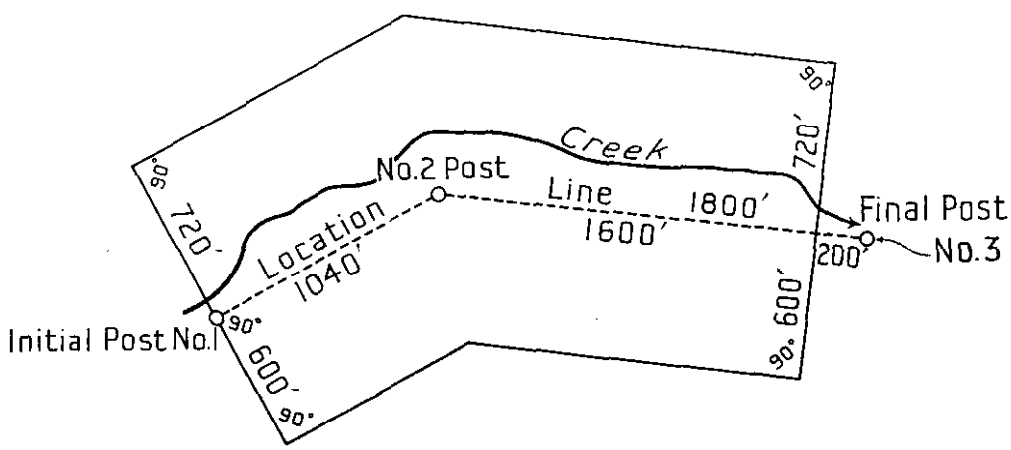
"(*c.*) The number of feet lying to the right and left of the location-line, and the approximate area or size of the ground.

The words written on the initial post and final post shall be set out in full in the notice; and as accurate a description as possible of the ground to be acquired shall be given, having special reference to any prior locations it may join, and the general locality of the ground to be acquired."

EXAMPLES OF VARIOUS METHODS OF LAYING OUT PLACER LEASEHOLDS.

Showing Areas secured with Location-lines of Various Lengths.





Another provision is that there must be affixed to the "initial post" and to the "final post" a numbered metal identification tag furnished by the Mining Recorder with each free miner's certificate issued. These tags may be attached to the posts, or placed in a container within a cairn, either at the time of location or some time during the succeeding year, but must be so placed before the Mining Recorder will grant the first certificate of work in respect of the leasehold.

The annual rental on a placer-mining lease is $30, and the amount to be expended annually on development-work is $250.

Authority also has been given for the granting of special placer-mining leases in locations other than has been defined.

For more detailed information the reader is referred to the complete "Placer-mining Act," which may be obtained from the King's Printer, Victoria, B.C.

Table of Fees, Mineral Act and Placer-mining Act.

Individual free miner's certificate, annual fee	$5.00
Company free miner's certificate (capital $100,000 or less), annual fee	50.00
Company free miner's certificate (capital over $100,000), annual fee	100.00
Recording mineral or placer claim	2.50
Recording certificate of work, mineral claim	2.50
Rerecord of placer claim	2.50
Recording lay-over	2.50
Recording abandonment, mineral claim	10.00
Recording abandonment, placer claim	2.50
Recording any affidavit under three folios	2.50
Per folio over three, in addition	.30
Records in "Records of Conveyances," same as affidavits.	
Filing documents, "Mineral Act"	.25
Filing documents, "Placer-mining Act"	1.00
Recording certificate of work, placer-mining lease	2.50
For Crown grant of mineral rights under "Mineral Act"	25.00
For Crown grant of surface rights of mineral claim under "Mineral Act"	10.00
For every lease under "Placer-mining Act"	5.00

Provisional Free Miners' Certificates (Placer) Act.

This Act provides for the issuance of "provisional free miners' certificates" for the locating, recording, representing, and working of placer claims of a size, and according to the terms, and in the manner set out in Parts II. and III. of the "Placer-mining Act." Any person over 18 years of age who has resided in the Province continuously for a period of not less than six months prior to date of his application may, on application accompanied by a statutory declaration or other satisfactory evidence as to his age and period of residence in the Province, obtain from any Gold Commissioner or Mining Recorder a provisional free miner's certificate. No fees are payable in respect of such certificate, and it abolishes the fees payable in respect of the recording or rerecording of placer claims, but no record or rerecord of a claim shall be granted for a longer period than one year without the payment of fees. It should be pointed out that the provisional free miner's certificate does not carry the privileges of an ordinary free miner's certificate as to the staking and working of placer-mining leases or mineral claims.

The Act also gives the Lieutenant-Governor in Council, as a means of unemployment relief, power to make provision for the establishment, equipment, maintenance, and operation of one or more placer training camps at suitable locations, at which unemployed persons who hold provisional free miners' certificates and are British subjects may acquire knowledge and training in the art of placer-mining and may be afforded gainful work in the recovery of minerals by placer-mining. Reserves for the location of such camps shall not exceed one mile in length by one-half mile in width, and the right is given to enter into agreements with private holders under the Act for the development of their ground by means of unemployment relief camps.

Department of Mines Act, 1937.

The "Department of Mines Act" empowers the Minister of Mines to organize the Department or to reorganize it from time to time to meet changing conditions in the mining industry. It provides for examination and certification of assayers; for the conducting of short courses of lectures in practical geology and mineralogy; and for the purchase of ore from the Provincial sampling plants. The said Act also provides for the expenditure of public moneys for the construction, reconstruction, or repair of trails, roads, and bridges to facilitate the exploration of the mineral resources of any mining district, or in the operation and development of any mining property.

Iron and Steel Bounties Act, 1929.

The Lieutenant-Governor in Council may enter into an agreement with any person whereby the Crown will pay to that person, out of the Consolidated Revenue Fund, bounties on pig-iron and steel shapes when manufactured within the Province, as follows:—

(*a.*) In respect of pig-iron manufactured from ore, on the proportion produced from ore mined in the Province, a bounty not to exceed three dollars per ton of two thousand pounds:

(*b.*) In respect of pig-iron manufactured from ore, on the proportion produced from ore mined outside the Province, a bounty not to exceed one dollar and fifty cents per ton of two thousand pounds:

(*c.*) In respect of steel shapes of commercial utility manufactured in the Province, a bounty not to exceed one dollar per ton of two thousand pounds.

Bounty, as on pig-iron under this Act, may be paid upon the molten iron from ore which in the electric furnace, Bessemer or other furnace, enters into the manufacture of steel by the process employed in such furnace; the weight of such iron to be ascertained from the weight of the steel so manufactured.

Bounty on steel shapes under this Act shall be paid only upon such steel shapes as are manufactured in a rolling-mill having a rated productive capacity per annum of at least twenty thousand tons of two thousand pounds per ton.

Phosphate-mining Act, 1925.

This Act takes the mineral tricalcium phosphate out of the "Mineral Act" for the purpose of administration. This is done to make possible the staking of phosphate claims one mile square in area.

Any person desirous of securing a licence to prospect for phosphate is required to stake the land he may wish to acquire and work; and after such staking shall post in the office of the Gold Commissioner for the mining division in which the land is situated a notice of his intention to apply for a licence. Then the applicant is required to make application in writing to such Gold Commissioner for a prospecting licence over the land for any term not exceeding one year. The Gold Commissioner shall forward this application to the Hon. the Minister of Mines, who may grant to the applicant a prospecting licence. Application shall be accompanied by a licence fee of $100. The land to be acquired shall be of a rectangular shape and shall not exceed 640 acres for each licence, measuring 80 chains by 80 chains, and boundary-lines shall be run true north and south and true east and west. A renewal of the licence may be obtained for a second period of one year upon payment of further licence fee of $100, and furnishing proof that he has explored for phosphate and has expended not less than $50 in such exploration-work. An extension of the term for a third period of one year may be granted upon like conditions and terms. Provision is made for the payment of $150 in cash in lieu of exploration-work. The cost of the survey of the land, not being less than $150, can be counted as exploration-work. If during any one year work is done to a greater extent than the required $50—but not less—same may be applied as work for any subsequent year that the licence remains in force.

The Lieutenant-Governor in Council may grant a lease of the land covered by a prospecting licence to any licensee who during the existence of his licence, or within thirty days following the expiry of same, gives satisfactory evidence that he has discovered phosphate on such lands. He shall at the same time pay a sum sufficient to cover the first annual rental and also shall have expended not less than $50 per licence in exploration-work during the

term of the last renewal licence or tender in lieu thereof the sum of $50 per licence. Such lease shall be granted for a term of five years, renewable for three years, and for a further three years after the expiry of the first renewal. A lease shall not be issued until the land has been surveyed by an authorized land surveyor. An annual rental rate of 15 cents per acre shall be payable under said lease.

The lease provides for the expenditure of not less than $100 per annum in the development of a mine, or the payment of $100 in lieu of such development-work. Excess work done in any one year may be applied as work to subsequent years. Provision is also made for the purchase of phosphate-mining rights.

Metalliferous Mines Regulation Act.

At the 1935 session of the Provincial Legislature "An Act to amend and consolidate the Enactments regulating the Working of Metalliferous Mines, Quarries, and Metallurgical Works" was passed. This Act is known as the "Metalliferous Mines Regulation Act," and, in its general tone, its clear purpose is to maintain the highest standard in respect of safety and of healthy conditions, both on the surface and underground in mining operations. The idea is to not only assure, as far as practicable, the protection of workmen against injury, but to establish those conditions best calculated to safeguard the health of the men employed. The Act also provides for the drafting of regulations, if such are found necessary, for the protection of men who are working under conditions which may lead to pulmonary disability.

This Act may be divided into six parts, as follows:—

(1.) Administration:
(2.) Duties of owners, managers, and others:
(3.) Special Rules for protection of miners:
(4.) General Rules, having reference to: (*a*) Employees; (*b*) Ventilation; (*c*) Explosives and blasting; (*d*) Fire-protection; (*e*) Connection between mines; (*f*) Mine signals; (*g*) Aid to injured; (*h*) Prevention of dust; (*i*) Handling of water; (*j*) Sanitation; (*k*) Protection of working-places, shafts, winzes, raises, etc.; (*l*) Ladder-ways; (*m*) Shaft equipment and operation; (*n*) Testing of brakes; (*o*) Haulage; (*p*) Protection from machinery; (*q*) Electrical installations:
(5.) General Rules for quarries:
(6.) Supplemental.

SUMMARY OF ACTS SPECIALLY RELATING TO MINING.

(The complete Acts may be obtained from the King's Printer, Victoria, B.C.)

Mining Licences under the Coal and Petroleum Act.

Any person desiring to prospect for coal, petroleum, or natural gas upon any unsurveyed unreserved lands in which these resources are held by the Crown may acquire a licence to do so over a rectangular block of land not exceeding 640 acres, of which the boundaries shall run due north and south and east and west, and no side shall exceed 80 chains (1 mile) in length. Before entering into possession of the said lands he shall place at the corner of such block a legal stake, or initial post, and shall inscribe thereon his name and the angle represented by such post, thus: "A. B.'s N.E. corner," or as the case may be, and shall post in a conspicuous place upon the said land, and also in the Government office of the land recording district, notice of his intention to apply, as well as publishing the same in the B.C. Gazette and local newspaper once each week for four consecutive weeks. If the area applied for is surveyed no staking is required, but the same procedure with regard to advertising notice of intention to apply is necessary.

The application for said licence shall be in writing, in duplicate, and shall contain the best written description possible, with a diagram of the land sought to be acquired, and shall be accompanied with a fee of $100. The application shall be made to the Commissioner of Lands for the district, and by him forwarded to the Minister of Lands, who will grant such licence—provided no reasons arise to the contrary—for a period not to exceed one year, and at the expiration of the first year an extension of such licence may be granted for a second or third year at a fee of $100.

Where coal is discovered during the existence of licence or within thirty days after expiration, the land held under licence, having been surveyed and licence conditions fulfilled, may be leased for five years at rental of 15 cents an acre, subject to renewals for five successive periods of three years each, renewal fee being $100 for each lease, in addition to annual rental.

Lessees, on showing continuous work has been done and reasonable expenditure made for development, may, after carrying out the provisions of the lease, purchase at $20 per acre where surface is available, or $15 per acre for under-surface rights where surface is not available. Lands under the sea may be purchased at $15 per acre. Provided also that, in addition to the rental or purchase price, there shall be paid to the Government as a royalty 2½ cents a barrel (35 imperial gallons) of crude petroleum raised or gotten from such land. (*See* chapter 162, R.S.B.C. 1924.)

Taxation Act.

A preliminary note is essential to the understanding of this Act. As the law has stood, a Crown-granted mineral claim on which taxes were in arrears for a number of years was offered for sale by the Government at a *tax* sale, with arrears of taxes plus interest and charges and Crown-grant fees as an upset price. If no sale was made the property remained in the hands of the Assessor until desired by some one, when it could only be purchased by tender. It was not open to location under the "Mineral Act" and a prospector had no protection, and to relieve the situation an amending Act was passed.

Under the amended Act such reverted Crown-granted mineral claim may be obtained by any person under a lease for one year upon payment of $25, and a renewal of such lease may be granted upon payment of further $25 for a further period of one year, but no longer. During the period of such lease the lessee has the right to enter, prospect, and mine on such mineral claim, save for coal, petroleum, and natural gas, and during such time the lessee has the option to purchase such Crown-granted mineral claim upon payment of all taxes, costs, and interest which remained due and unpaid on such claim on the date of its forfeiture to the Crown, together with an amount equal to all taxes and interest which, except for its forfeiture to the Crown, would have been payable in respect thereof from the date of the lease to the date of application for a Crown grant. If, however, the lessee establishes to the satisfaction of the Gold Commissioner that he has expended upon the claim in mining-development work a sum of not less than $200 a year during the continuance of the lease,

then the payment of the sum in respect of taxes and penalties from the date of the lease to the date of application for a Crown grant shall not be required. Provision also is made for the grouping of adjoining claims, not exceeding eight in number, and the performing on one of such claims mining-development work for all of the claims.

A person may obtain a lease, or interest in a lease, of eight such claims in the same mining division.

Such leases are not transferable and are subject to the rights any person may already hold to any portion of the surface of such Crown-granted mineral claim.

Taxation of Mines.

Crown-granted mineral claims are subject to a tax of 25 cents per acre. The tax becomes due on April 1st in each year, and if unpaid on the following June 30th is deemed to be delinquent.

All mines, other than coal, are subject to an output tax (payable quarterly) of 2 per cent. on gross value of mineral, less cost of transportation from mine to reduction-works and the cost of treating same at reduction-works or on the mining premises.

Any such mine, not realizing on ore shipments a market value of $5,000 in any one year, is entitled to a refund of the output tax paid.

All mines are subject to a tax upon income, subject to the exemptions and allowances given in the "Income Tax Act"; provided, in the case of those mines paying an output tax, that an income tax is only collected if such tax prove greater than the output tax, and the output tax is then regarded as part payment of the income tax.

In addition to the ordinary working expenses, mines are allowed to deduct from their income a charge for:—

(1.) Development—being such proportion of this capital expenditure as is ascertained to be chargeable to the year's operation:
(2.) Depreciation of buildings and plant:
(3.) Depletion—being such proportion of the capital cost of the mine as, being a wasting asset, is ascertained to be chargeable to the year's operation.

The above-mentioned charges are allowable at the discretion of the Minister of Finance, subject, however, to an appeal to the Lieutenant-Governor in Council.

The rate of income tax varies from 1 per cent. up to a maximum of 10 per cent. on incomes of $19,000 and over.

Coal is subject to a tax of 10 cents per ton of 2,240 lb., except coal shipped to coke-ovens within the Province. Tax payable monthly.

Coke is subject to a tax of 10 cents per ton of 2,240 lb., except in respect of coke produced from coal upon which this tax has already been paid. Tax payable monthly.

Coal land from which coal is being mined (Class A) is taxed at 1 per cent. upon the assessed value, in addition to any other tax.

Unworked coal land, known as "Coal Land, Class B," is subject to a tax of 2 per cent. upon the assessed value.

For further particulars *see* the "Taxation Act," also the "Public Schools Act," which are obtainable from the King's Printer, Victoria, B.C.

ASSAY OFFICE.

BY

D. E. WHITTAKER.

During the year 1937 there were made by the staff in the Government Assay Office, 6,410 assays or quantitative determinations and 361 analyses; of these the majority were for the Department of Mines or for the other departments, for which no fees were received.

The fees collected by the office were as follows:—

Fees for analyses	$77.00
Fees for assaying	74.50
Fees for assayers' examinations	150.00
Total cash receipts	$301.50

Determinations and examinations made for other Government departments, for which no fees were collected:—

Attorney-General's Department	$1,158.00
Agricultural Department	2,513.00
Board of Health	680.00
Other Departments	185.00
Treasury	1,654.00
Forest Branch	405.00
	$6,595.00
Value of work done outside of Mines Department work	$6,896.50

One thousand six hundred and fifty-four lots of gold were received from the Gold Commissioners, who are purchasing amounts up to 2 oz. to aid the prospector in disposing of his gold.

FREE DETERMINATIONS.

In addition to the above quantitative work, 476 qualitative determinations, or tests, were made in connection with the identification and classification of rocks or minerals sent to the Assay Office for a report; for these no fees were charged, as it is the established custom of the Department to examine and test qualitatively, without charge, samples of minerals sent in from any part of the Province, and to give a report on the same. This has been done for the purpose of encouraging the search for new or rare minerals and ores, and to assist prospectors and others in the discovery of new mining districts, by enabling them to have determined, free of cost, the nature and probable value of any rock they may find. In making these free determinations, the Department asks that the locality from which the sample was obtained be given by the sender.

EXAMINATIONS FOR ASSAYERS.

The writer has the honour, as Secretary, to submit the Annual Report for the year 1937 of the Board of Examiners for Certificates of Competency and Licence to practise Assaying in British Columbia, as established under the "Department of Mines Act, 1934."

A meeting of the Board was held on April 17th and December 6th. Three candidates applied for examination on April 17th and two passed the examination. Three candidates applied for examination on December 6th and two passed the examination. The Board recommended that certificates be issued to the above-mentioned four candidates.

GOLD COMMISSIONERS AND MINING RECORDERS.

The following list shows the Gold Commissioners and Mining Recorders of the Province:—

Mining Division.	Location of Office.	Gold Commissioner.	Mining Recorder.	Deputy Recorder.
Atlin	Atlin	H. F. Glassey	H. F. Glassey	G. H. Hallett.
Sub-office	Telegraph Creek			T. S. Dalby.
Sub-office	Haines (U.S.)		(Com. for taking Affidavits)	B. A. Barnett.
Sub-office	Squaw Creek via Atlin			Mrs. F. Muncaster.
Sub-office	Tulsequah			H. L. Fraser.
Sub-office	Juneau (U.S.)		(Com. for taking Affidavits)	Harold E. Brown.
Stikine	Telegraph Creek	T. S. Dalby	T. S. Dalby	
Sub-office	Boundary via Telegraph Creek			Duncan Miller.
Sub-office	Burns Lake			F. E. Trousdell.
Sub-office	McDame Creek			R. J. Meek.
Sub-office	Fort St. John			F. W. Beatton.
Sub-office	Dease Lake Townsite			L. S. McBride.
Skeena	Prince Rupert	N. A. Watt	N. A. Watt	A. J. Lancaster.
Sub-office	Kitimat			Chas. E. Moore.
Sub-office	Copper River			L. G. Skinner.
Sub-office	Terrace			O. T. Sundal.
Sub-office	Stewart (Portland Canal)			H. W. Dodd.
Sub-office	Rosswood			Mrs. Alberta Smith.
Sub-office	Kimsquit			Percy Gadsden.
Portland Canal	Stewart	N. A. Watt (at Prince Rupert)	H. W. Dodd	
Sub-office	Anyox			W. Eve.
Sub-office	Alice Arm			Mrs. L. Cummings.
Bella Coola	Prince Rupert	N. A. Watt	N. A. Watt	A. J. Lancaster.
Sub-office	Bella Coola			C. A. Brynildsen.
Sub-office	Ocean Falls			Geo. H. Hill.
Sub-office	Kimsquit			Percy Gadsden.
Queen Charlotte	Queen Charlotte	N. A. Watt	D. T. R. McColl, M.D.	
Sub-office	Jedway			W. T. Reavley.
Sub-office	Massett			J. C. Frizzell.
Sub-office	Lockeport			
Omineca	Smithers	H. B. Campbell	H. B. Campbell	
Sub-office	Fort Grahame			L. T. Kempple.
Sub-office	Bella Coola			C. A. Brynildsen.
Sub-office	Finlay Forks			A. MacKinnon.
Sub-office	Fort St. James			Mrs. A. Kynoch.
Sub-office	Manson Creek			W. B. Steele.
Sub-office	Telkwa			T. J. Thorp.
Sub-office	Prince George			Geo. Milburn.
Sub-office	Hudson Hope			F. F. Monteith.
Sub-office	Kimsquit			Percy Gadsden.
Sub-office	Fort St. John			F. W. Beatton.
Sub-office	Whitewater (Finlay River) via Fort Grahame			James Ware.
Sub-office	Cedarvale			John Thompson.
Sub-office	Terrace			O. T. Sundal.
Sub-office	Fort Fraser			J. D. Moore.
Sub-office	Vanderhoof			Geo. Ogsdon.
Sub-office	Pacific			T. H. McCubbin.
Sub-office	Hazelton			Andrew Grant.
Sub-office	Burns Lake			F. E. Trousdell.
Sub-office	Usk			Jas. L. Bethurem.
Sub-office	Takla Landing			Mrs. Wilhemina Aiken.
Sub-office	Copper River			L. G. Skinner.
Peace River	Fort St. John	H. B. Campbell (at Smithers)	F. W. Beatton	
Sub-office	Fort Nelson			J. S. Clark.
Sub-office	Prince George			G. Milburn.

GOLD COMMISSIONERS AND MINING RECORDERS—*Continued.*

Mining Division.	Location of Office.	Gold Commissioner.	Mining Recorder.	Deputy Recorder.
Peace River—*Con.*				
Sub-office	Finlay Forks			A. MacKinnon.
Sub-office	Hudson Hope			F. F. Monteith.
Sub-office	Pouce Coupe			M. S. Morrell.
Cariboo	Barkerville	J. P. Scarlett	J. P. Scarlett	Miss L. D. Boyd.
Sub-office	Quesnel			E. C. Lunn.
Sub-office	Prince George			Geo. Milburn.
Sub-office	McBride			R. McKinlay.
Sub-office	Fort McLeod			J. E. McIntyre.
Quesnel	Williams Lake	L. C. Maclure	L. C. Maclure	
Sub-office	Quesnel			E. C. Lunn.
Sub-office	Likely			A. Morrison.
Sub-office	Barkerville			J. P. Scarlett.
Sub-office	Horsefly			A. B. Campbell.
Sub-office	Keithley Creek			Wm. Lowden.
Sub-office	Hanceville			E. R. Hance.
Sub-office	Tatla Lake			David Lloyd.
Clinton	Clinton	R. J. A. Dorrell	R. J. A. Dorrell	
Sub-office	Taseko River			Leslie MacAdams.
Sub-office	Williams Lake			L. C. Maclure.
Sub-office	Haylmore via Gold Bridge			W. Haylmore.
Sub-office	Tatla Lake			David Lloyd.
Sub-office	Hanceville			E. R. Hance.
Kamloops	Kamloops	P. H. McCurrach	P. H. McCurrach	D. G. Dalgleish.
Sub-office	Chu Chua			George M. Fennell.
Sub-office	Vavenby			H. Finley.
Sub-office	Salmon Arm			A. P. Suckling.
Ashcroft	Ashcroft	P. H. McCurrach (at Kamloops)	W. F. Knowlton	
Sub-office	Lytton			H. Elgie.
Nicola	Merritt	P. H. McCurrach (at Kamloops)	A. G. Freeze	
Yale	Hope	P. H. McCurrach (at Kamloops)	H. Beech	
Sub-office	Lytton			H. Elgie.
Similkameen	Princeton	Chas. Nichols	Chas. Nichols	
Sub-office	Hedley			John Love.
Vernon	Vernon	R. M. McGusty	R. M. McGusty	F. H. C. Wilson.
Sub-office	Kelowna			C. W. Dickson.
Greenwood	Greenwood	L. A. Dodd	L. A. Dodd	
Sub-office	Kettle Valley			G. B. Gane.
Sub-office	Beaverdell			T. W. Clarke.
Sub-office	Oliver			W. H. Laird.
Grand Forks	Grand Forks	E. Harrison	E. Harrison	
Osoyoos	Penticton	W. R. Dewdney	W. R. Dewdney	
Sub-office	Keremeos			L. S. Coleman.
Sub-office	Hedley			John Love.
Sub-office	Oliver			W. H. Laird.
Golden	Golden	A. W. Anderson	A. W. Anderson	C. J. Dainard.
Windermere	Windermere	A. W. Anderson (at Golden)	A. M. Chisholm	
Fort Steele	Cranbrook	J. E. Kennedy	J. E. Kennedy	A. A. Robertson.
Sub-office	Fernie			J. R. Nolan.
Ainsworth	Kaslo	Claude MacDonald	W. M. H. Dunn	
Sub-office	Trout Lake			R. McPherson.
Sub-office	Poplar Creek			A. Robb.
Slocan	New Denver	Claude MacDonald (at Kaslo)	Frank Broughton	
Sub-office	Sandon			H. Bradbury.
Slocan City	Slocan	Claude MacDonald	T. McNeish	W. E. Graham.
Nelson	Nelson	J. Cartmel	J. Cartmel	J. A. Stewart.
Sub-office	Creston			R. H. Hassard.
Sub-office	Ymir			Wm. Clark.
Sub-office	Salmo			M. C. Donaldson.
Arrow Lake	Nakusp	J. Cartmel (at Nelson)	N. A. Herridge	
Revelstoke	Revelstoke	Wynfield Maxwell	W. Maxwell	W. G. Fleming.

GOLD COMMISSIONERS AND MINING RECORDERS—*Continued.*

Mining Division.	Location of Office.	Gold Commissioner.	Mining Recorder.	Deputy Recorder.
Lardeau	Beaton	Wynfield Maxwell (at Revelstoke)	Stephen Rowe	
Sub-office	Trout Lake			R. McPherson.
Trail Creek	Rossland	W. H. Reid	W. H. Reid	
Nanaimo	Nanaimo	C. L. Monroe	C. L. Monroe	W. H. Cochrane.
Sub-office	Ladysmith			J. A. Knight.
Sub-office	Alert Bay			Jos. Howe.
Sub-office	Vananda			Henry Carter.
Sub-office	Shoal Bay, Thurlow P.O.			C. C. Thompson.
Sub-office	Granite Bay			H. J. Bull.
Sub-office	Cumberland			S. B. Hamilton.
Sub-office	Zeballos			Geo. Nicholson.
Sub-office	Alberni			W. H. Boothroyd.
Alberni	Alberni	W. H. Boothroyd	W. H. Boothroyd	G. C. Rolf.
Clayoquot	Tofino	W. H. Boothroyd (at Alberni)	C. W. Sharp	
Sub-office	Zeballos			Geo. Nicholson.
Sub-office	Alberni			W. H. Boothroyd.
Sub-office	Nanaimo			C. L. Monroe.
Quatsino	Quatsino	W. H. Boothroyd (at Alberni)	Ed. Evenson	
Victoria	Victoria	R. J. Steenson	P. J. Mulcahy	
New Westminster	New Westminster	A. P. Grant	A. B. Gray	
Sub-office	Chilliwack			C. N. Tingle.
Vancouver	Vancouver	A. S. Tyrer	R. A. Burgoyne	
Sub-office	Alert Bay			Jos. Howe.
Sub-office	Powell River			A. C. Sutton.
Sub-office	Shoal Bay, Thurlow P.O.			C. C. Thompson.
Lillooet	Lillooet	L. J. Price	L. J. Price	T. B. Williams.
Sub-office	Haylmore via Gold Bridge			W. Haylmore.
Sub-office	Taseko River			Leslie MacAdams.

GOLD COMMISSIONERS' AND MINING RECORDERS' OFFICE STATISTICS, 1937.

District and Division.	Free Miners' Certificates.			Lode-mining.					Placer-mining.				Revenue.		Total.	
	Individual.	Company.	Special.	Mineral Claims recorded.	Certificates of Work.	Bills of Sale, etc.	Certificates of Improvements.	Leases of Re-verted Crown-granted Mineral Claims.	Placer Claims recorded.	Placer Leases recorded (Bench, Creek, and Dredging).	Certificates of Work, Placer Leases.	Bills of Sale, etc.	Free Miners' Certificates.	General.	Mining Divisions.	Districts.
North-western District (No. 1)																**$22,203.45**
Atlin	335	5	4	17	43	2	1		78	45	161	55	$1,934.50	$8,219.25	$10,153.75	
Bella Coola	46			34	2					1	1		167.50	147.50	315.00	
Portland Canal	165	5		187	698	31	5				1	4	1,410.25	3,113.50	4,523.75	
Queen Charlotte	30			26	11	2			4	5			112.25	137.25	249.50	
Skeena	102		1	72	168	22		21	2	4			433.75	1,270.75	1,704.50	
Stikine	204		1	334	203	87				24	37	16	1,013.00	4,243.95	5,256.95	
North-eastern District (No. 2)																**64,696.91**
Cariboo	411	17	3	693	976	82	53		52	145	443	154	3,652.75	29,439.25	33,092.00	
Omineca	544	13	2	336	681	137	24	10	18	137	224	81	3,419.25	13,967.77	17,387.02	
Peace River											3			87.50	87.50	
Quesnel	334	3	2	179	258	36	1		37	47	193	60	1,697.00	12,433.39	14,130.39	
Central District (No. 3)																**11,965.90**
Kamloops	502	2	1	285	292	41	16	12	22	2	30	9	2,561.50	3,390.55	5,952.05	
Nicola	59			169	95	65							254.25	885.85	1,140.10	
Vernon	267	4		135	103	40		3	24	37	28	26	1,471.00	3,402.75	4,873.75	
Southern District (No. 4)																**19,805.45**
Grand Forks	91		1	80	70	11		30	11	3	3	11	408.50	1,381.75	1,790.25	
Greenwood	156	3	6	99	247	20		28	3	9	22	10	1,316.50	2,721.80	4,038.30	
Osoyoos	219	8		528	456	113	23	32					1,730.25	4,752.55	6,482.80	
Similkameen	345	3		326	256	49		11	13	32	93	15	1,708.75	5,785.35	7,494.10	
Eastern District (No. 5)																**31,310.15**
Ainsworth	125	9		106	238	30	5	17	3				1,275.75	1,510.85	2,786.60	
Arrow Lake	19			13	8								95.00	52.75	147.75	
Fort Steele	302	3		274	232	33	15	3	8	15	97	27	1,643.75	5,737.85	7,381.60	
Golden	59	5	1	34	44	28			1	6	4	2	611.75	477.00	1,088.75	
Lardeau	81	1		130	102	29							415.95	622.25	1,038.20	
Nelson	500	13	3	302	844	83	9	31	24	6	13	11	3,647.25	5,310.55	8,957.80	
Revelstoke	120	4	3	110	52	21		9	2	28	37	47	825.50	3,920.00	4,745.50	
Slocan	50	2		40	60	7							412.00	476.50	888.50	
Slocan City	47			52	113	10	3						232.75	1,066.50	1,299.25	
Trail Creek	138	9	1	32	29	6		15					1,417.25	569.45	1,986.70	
Windermere	67	2		45	90	7			3				412.00	577.50	989.50	
Western District (No. 6)																**65,924.81**
Alberni	51	2	1	17	85	1	2	46		3	1		381.75	1,798.50	2,180.25	
Ashcroft	122	2		120	193	30			7	8	12	15	704.30	2,034.20	2,738.50	
Clayoquot	148			740	383	118	2	23	3	3			582.50	3,681.25	4,263.75	
Clinton	144	2	1	148	382	89	8		19	3	18	9	831.50	2,972.90	3,804.40	
Lillooet	551	30		663	1,612	178	113	3	3	11	33	8	4,699.75	9,551.85	14,251.60	
Nanaimo	93		1	85	49	10		7					392.00	360.00	752.00	
New Westminster	136	1	2	191	238	21		7	2	9	4	2	658.75	1,779.00	2,437.75	
Quatsino	34			69	44	4							160.25	187.50	347.75	
Vancouver	1,674	150	24	214	292	64	21						20,089.50	3,417.70	23,507.20	
Victoria	272	11	10	41	38	14		2	5	8	12	10	2,071.50	3,795.36	5,866.86	
Yale	178	9	2	356	413	106			22	4	18	4	1,689.00	4,085.75	5,774.75	
Totals	8,721	318	70	7,282	10,100	1,627	301	310	366	595	1,488	576	$66,540.75	$149,365.92	$215,906.67	**$215,906.67**

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The Annual Report of the Minister of Mines is now issued in parts as follows:—

Part A.—THE MINING INDUSTRY (STATISTICAL REVIEW). John F. Walker.

Part B.—NORTH-WESTERN MINERAL SURVEY DISTRICT (No. 1). Joseph T. Mandy.

Part C.—NORTH-EASTERN MINERAL SURVEY DISTRICT (No. 2). Douglas Lay.

Part D.—SOUTHERN AND CENTRAL MINERAL SURVEY DISTRICTS (NOS. 3 AND 4). M. S. Hedley.

Part E.—EASTERN MINERAL SURVEY DISTRICT (No. 5). H. Sargent.

Part F.—WESTERN MINERAL SURVEY DISTRICT (No. 6). B. T. O'Grady.

Part G.—INSPECTION OF MINES. James Dickson.