

PART C

ANNUAL REPORT
OF THE
MINISTER OF MINES

OF THE PROVINCE OF

BRITISH COLUMBIA

FOR THE

YEAR ENDED 31ST DECEMBER

1937



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1938.

BRITISH COLUMBIA DEPARTMENT OF MINES.

VICTORIA, B.C.

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

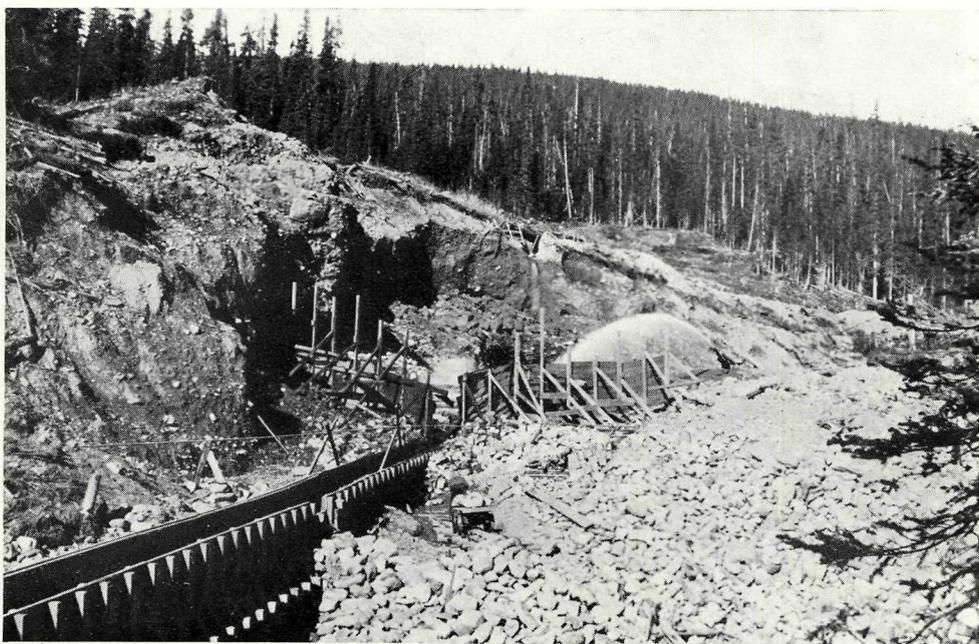
JOHN F. WALKER, *Deputy Minister.*

JAMES DICKSON, *Chief Inspector of Mines.*

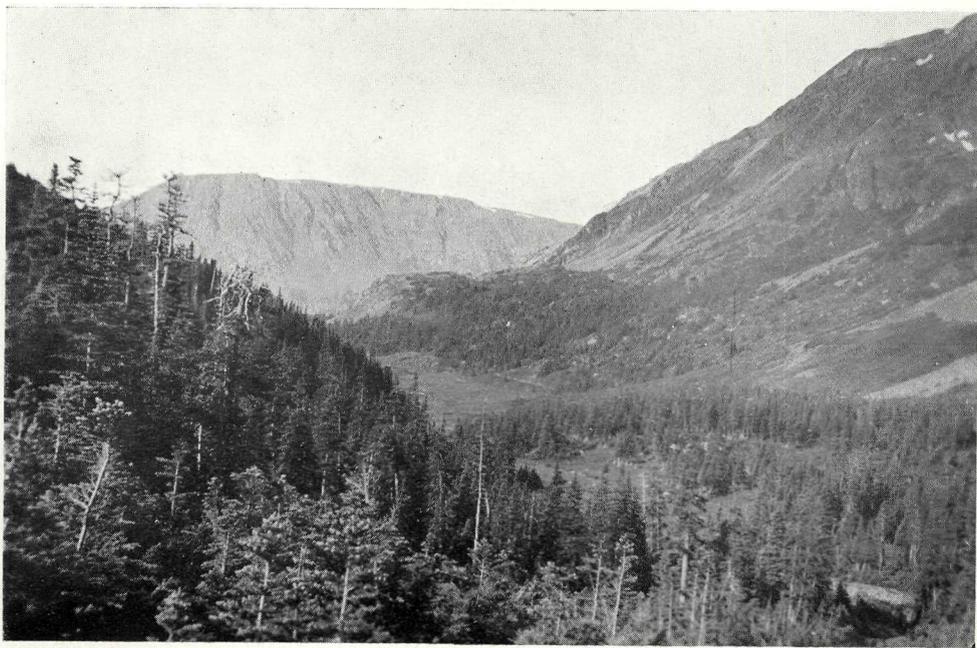
D. E. WHITTAKER, *Provincial Assayer and Analyst.*

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

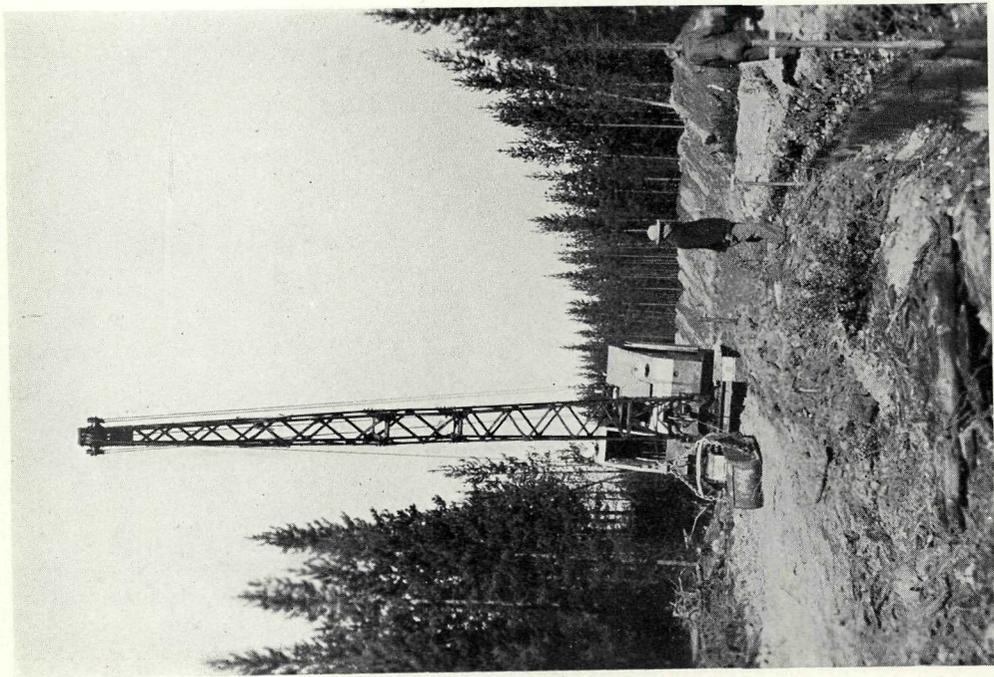
R. J. STEENSON, *Chief Gold Commissioner.*



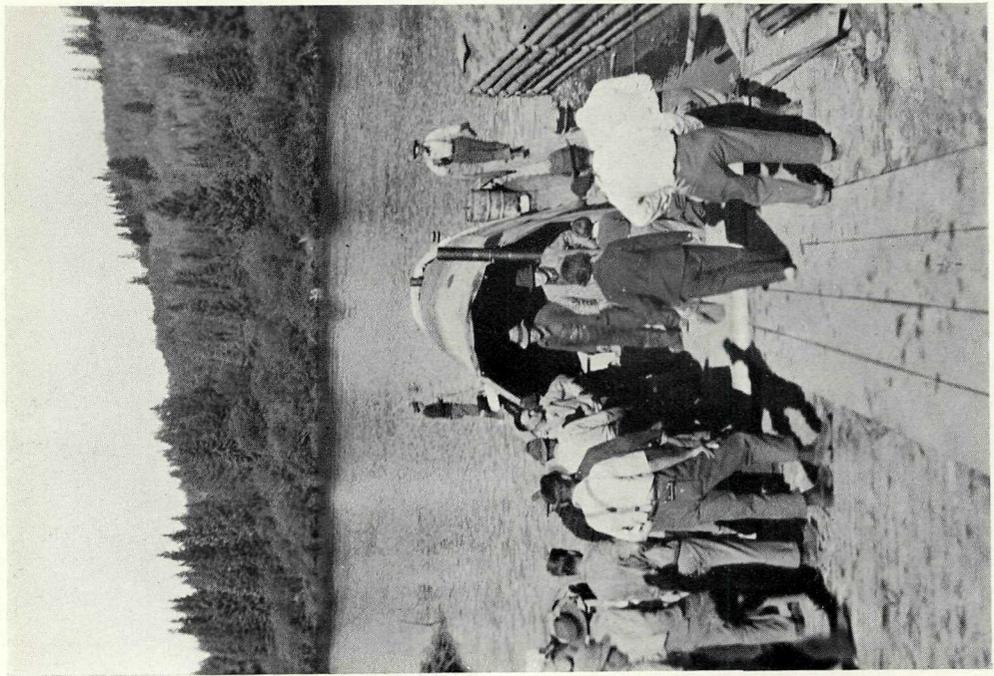
Hydraulic operation of Venture Exploration Co. (East Africa), Ltd., on Harrison Creek.



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.*

This group of twelve claims, owned by J. Bell, Lee Bethurem, and George **Grotto Group.** 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 $\frac{1}{2}$ 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.*

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.

This group, consisting of five claims owned by P. Brusik, 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.

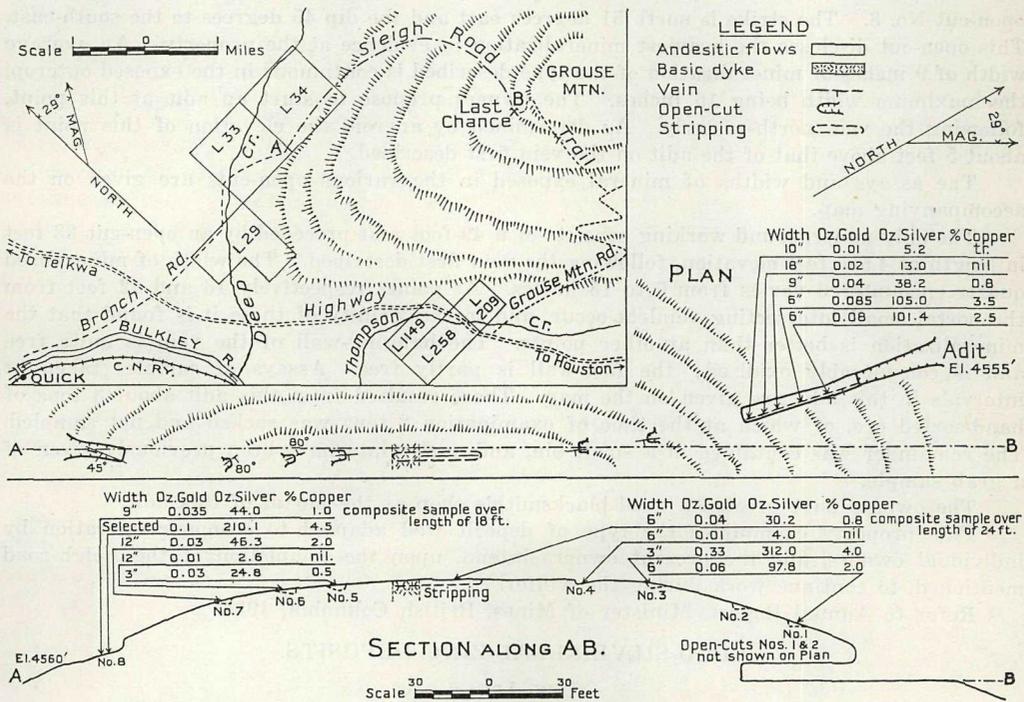
Refer to Annual Report, Minister of Mines, British Columbia, 1928, and Geological Survey, Canada, Memoir 205, 1937.

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-adjointing 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.



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-porphry 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 cobbled 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 cobbled to pieces of $\frac{1}{2}$ - and $\frac{3}{4}$ -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-porphry 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

stopping 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 cobbled 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 cobbled 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.

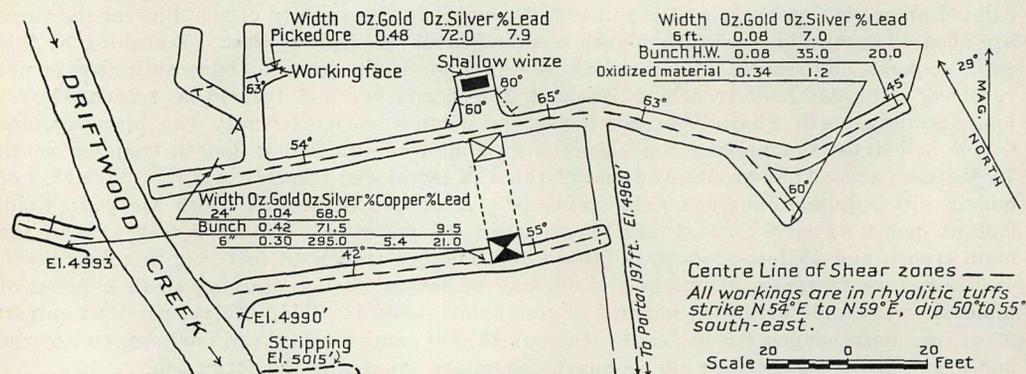
Distant about 2,080 feet from the portal of the working-adit (elevation 4,960 feet) in a direction south 71 degrees east at 5,595 feet elevation, in the bed of a small creek near the top of the east wall of the basin is an exposure by natural agencies. At this point quartz is ribboned through the formation 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 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. Sjolín, 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 $5\frac{1}{2}$ 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.

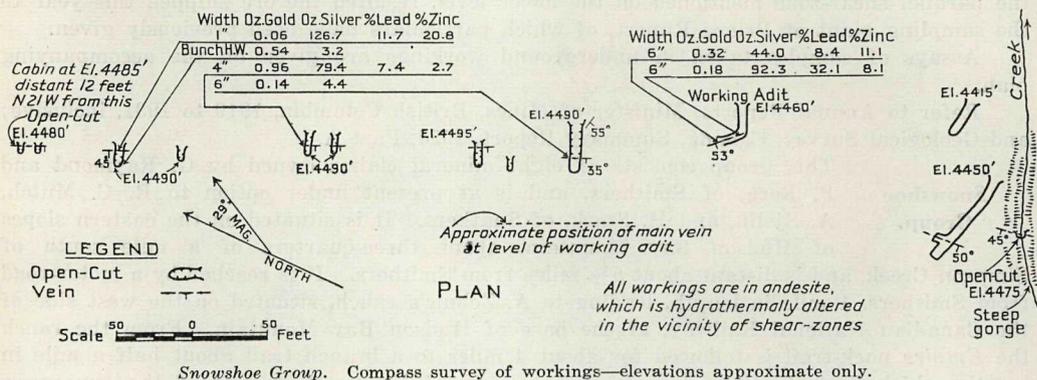
The formation consists of coarse-textured andesitic flow-rocks, dark green in colour, which strike from north to north 16 degrees west and dip east or north-east at steep angles. In the vicinity of the mineral-showings the formation is hydrothermally altered and bleached.

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."

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.

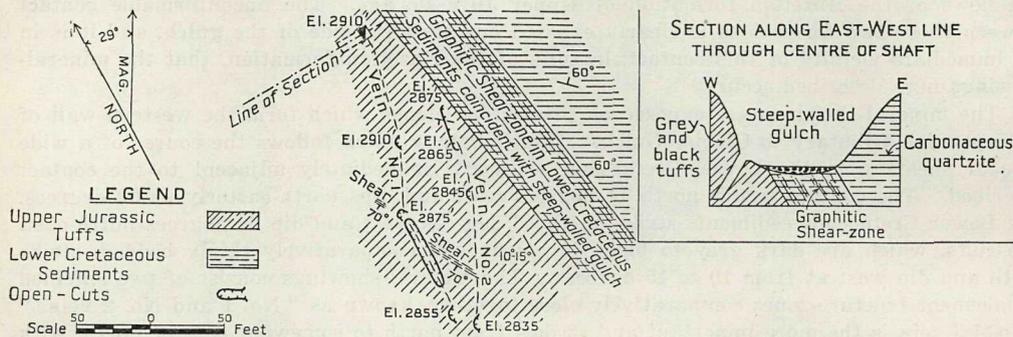
Glacier Gulch is incised in two separate formations, the ages of which have been determined by the Geological Survey of Canada. In the lower part of the gulch are exposed the carbonaceous quartzites and argillites of the Skeena formation of Lower Cretaceous age, which contain seams of anthracite coal. 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-load 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, it 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.

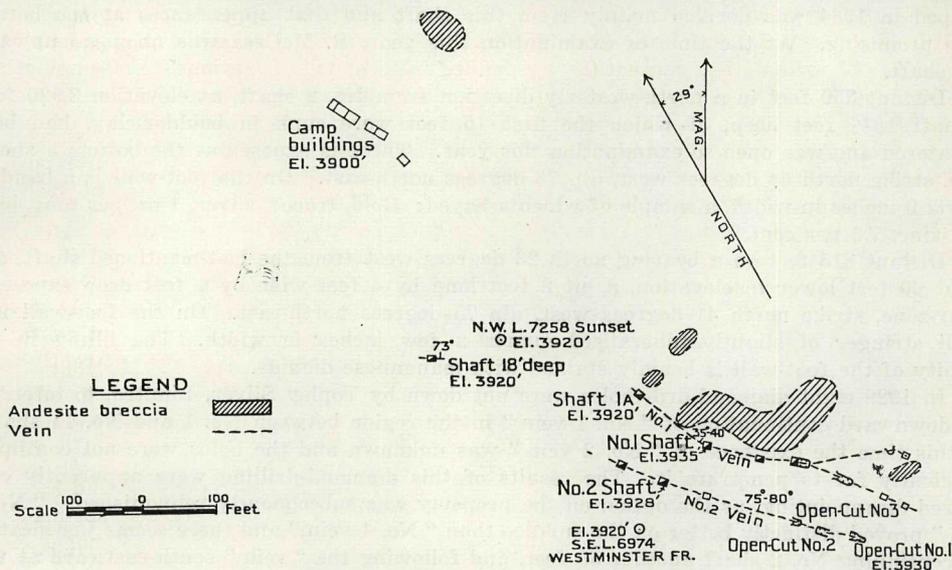
Save for occasional outcrops, the formation is obscured by glacial drift and vegetation, which renders tracing of veins on the surface laborious. This objective is further impeded by inflow of seepage-water in all excavations. Finlay Creek has incised a rocky gorge in the plateau and well exposes the 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.

These groups consist of a number of claims owned by L. B. Warner and
Topley and A. Chisholm, of Smithers, and R. W. Innes, of Topley, and comprise a
Richfield restaking of ground formerly held by Topley Richfield Mining Company,
Groups. 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, occurring 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 cobbled 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.

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

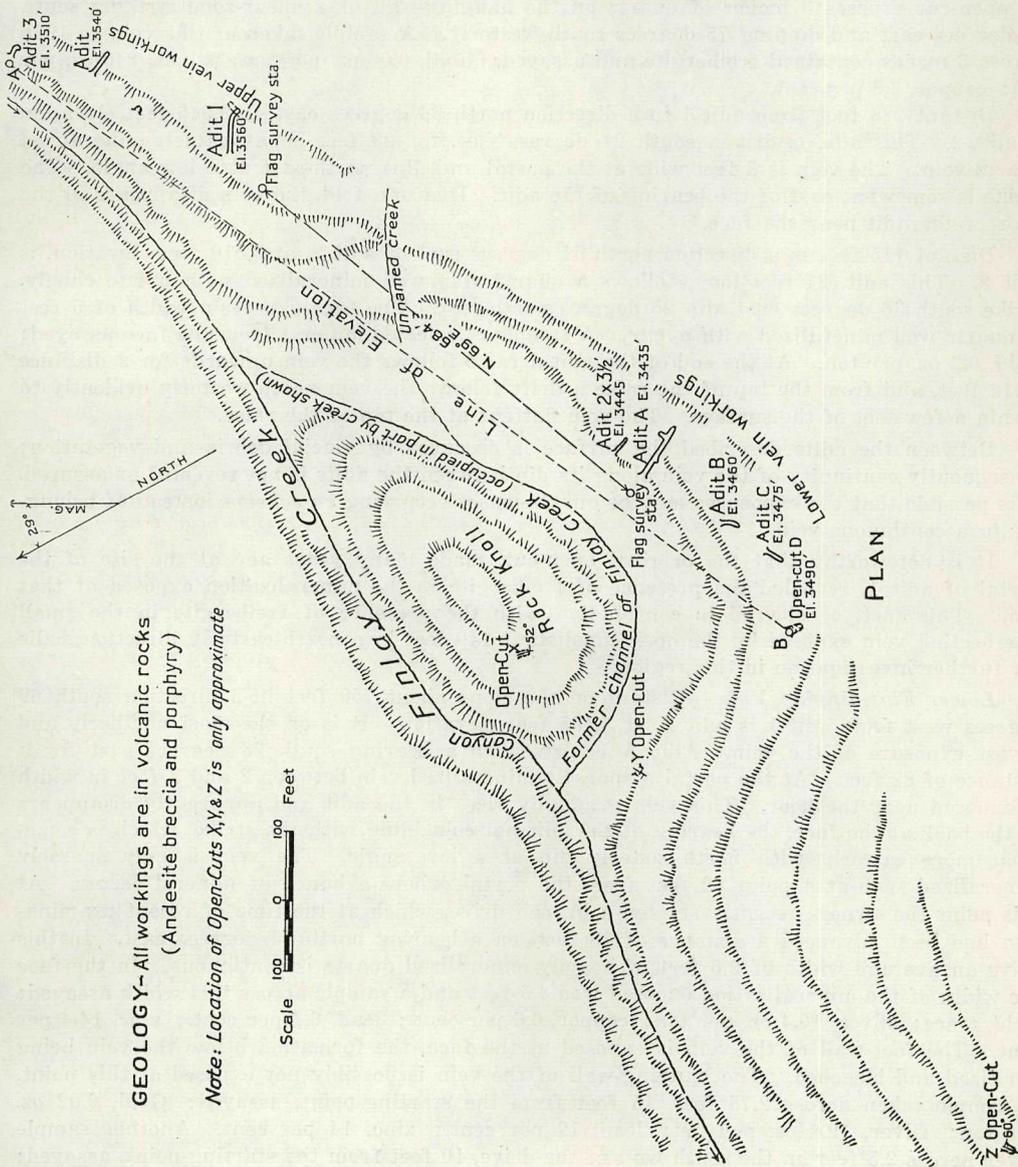
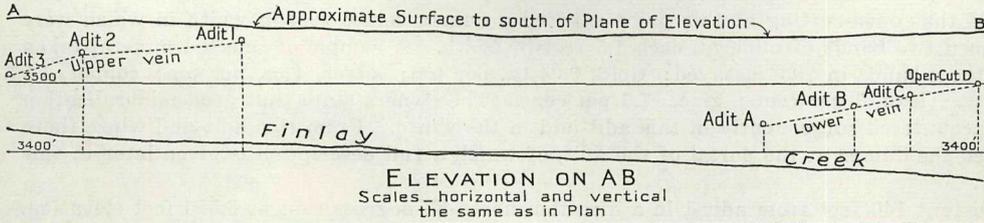
Creek, and a branch motor-road 3 miles in length from the Topley-Babine Lake Road leads to a cabin at the edge of the south rim of the valley at 3,575 feet elevation. The distance from Topley Station is about 7 miles.

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.



GEOLOGY—All workings are in volcanic rocks
(Andesite breccia and porphyry)

Note. Location of Open-Cuts X, Y, & Z is only approximate

Scale 100 0 100 Feet

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 cobbled.

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 horsepower. 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.