

PART B

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.

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

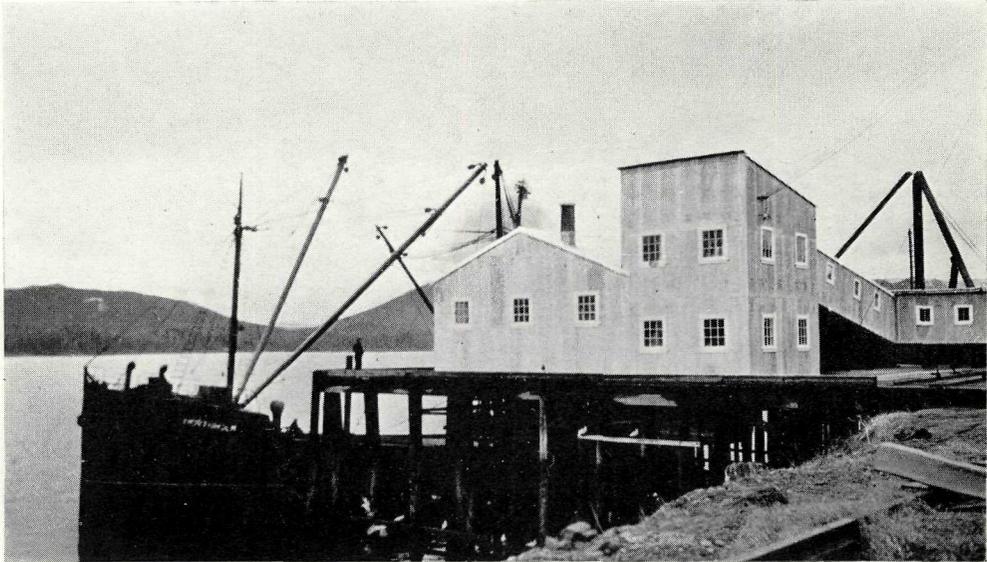
JOHN F. WALKER, *Deputy Minister.*

JAMES DICKSON, *Chief Inspector of Mines.*

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

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

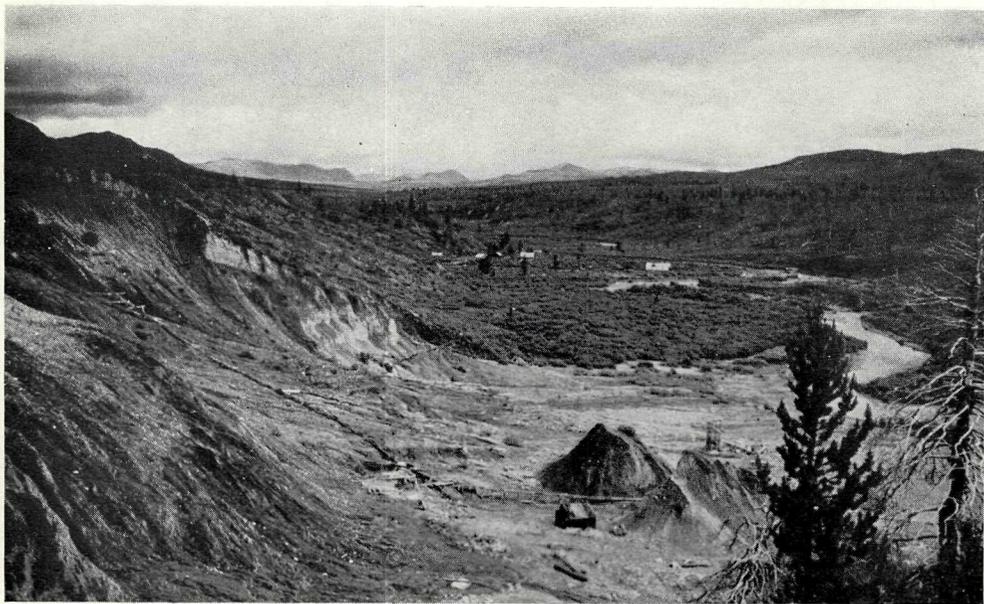
R. J. STEENSON, *Chief Gold Commissioner.*



Government Sampling Plant, Prince Rupert. S.S. Northholm loading First Shipment of Ore for export.



Big Missouri Dam at Cascade Creek, Outlet of Long Lake.



Looking up O'Donnel River Valley, bearing north 39 degrees east from Nathan Murphy's workings. The right limit of the river trough is the approximate left rim of the buried channel rim.



Outcrop on Vollaug Group, McDame Creek Area.

## PART B.

## NORTH-WESTERN MINERAL SURVEY DISTRICT (No. 1).

BY  
JOSEPH T. MANDY.

## SUMMARY.

The steady advance of the mining industry in this district that was evinced in 1936 has continued during 1937. Increased and continued production has been the governing objective, and the year has been featured by the achievement of progressive results in this respect from preparatory developments carried out in 1936. During the year production, especially of gold, has shown an increase, new producers have materialized, and further advance has been made in the laying of a sound foundation for a possible progression of new producing mines in future years.

Activity in silver and base metals has not shown any marked improvement during the year.

During the year, the *B.C. Silver* and *Sebakwe* properties, now consolidated with the Premier Gold Mining holdings and operated by the Silbak-Premier Mines, Limited, have been brought into production. In the northern section, on the Taku River the Polaris-Taku Mining Company, Limited, after considerable exploration and development, completed the construction of a 200-ton-capacity mill on the *Whitewater* group, and brought this property into production in September. Steady progress in construction of the *Big Missouri* underground mill of 750-ton capacity at Stewart has continued, and this property will come into production early in 1938. Also in the Stewart area, the *Dunwell* mine and mill continued production during the season.

In the coastal section, the *Surf Point* and *Edye Pass* properties have been operated by the Reward Mining Company, with production from the *Surf Point* mill. At Surf Inlet the Surf Inlet Consolidated Gold Mines, Limited, has continued mining and milling as well as exploratory development throughout the year.

During the year production has come from fifteen different properties, of which six were milling operations. The construction of a Government sampling plant at Prince Rupert was completed in August. Through the purchase and advantageous marketing of ore systematically mined by prospectors, or produced during the course of preliminary exploration, and by bulk tests, guidance, and advice, it is hoped to speed up increased development and production, especially along the Canadian National Railway's line into Prince Rupert. Since the plant's completion, many prospectors have taken advantage of this service and the scope of its utility has expanded.

There has been much activity in exploration and development of old prospects by well-financed operators, especially in the Portland Canal and McDame Creek areas, also on the pyritic deposits of the Ecstall River near Port Essington, Skeena River, and on the Hidden Creek copper deposits at Anyox.

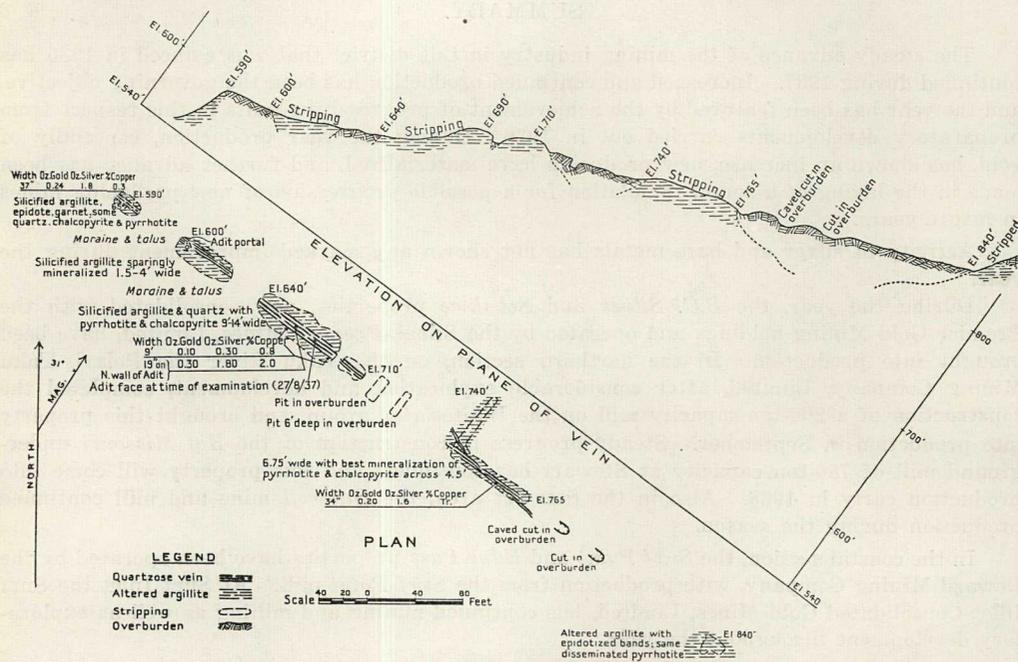
Operations in connection with placer gold have been active, especially in the Atlin area, which will show a substantial increase in output, and promises continued expansion with indications of the application of additional capital for the mechanized operation of new ground. Of interest to placer-miners is the discovery of two large gold nuggets, one from Squaw Creek, Atlin Division, weighing 46 oz. 5 dwt., and the other from Alice Creek, a tributary of Boulder Creek, Turnagain (Little Muddy) River area, weighing 52 oz. 15 dwt.

Prospecting for lode and placer deposits has declined generally, but in some areas has been active and new discoveries of importance have been made in the American Creek area, Portland Canal Mining Division, the Turnagain area, and the Taku River area. Increasing interest has been shown in prospecting for lode deposits in likely gold areas of the interior, such as the McDame Creek section of the Stikine Mining Division.

## LODE-GOLD DEPOSITS.

## BEAR RIVER AREA, STEWART, PORTLAND CANAL.

This group comprises the *Oral M.*, *Muriel S.*, *Ann G.*, *May No. 1.* and *May Oral M. Group. No. 2* mineral claims and fractions, owned by Premier Gold Mining Company, Limited. The claims were staked by the Premier Company during 1935 and 1936 on discoveries made by the company's prospectors at the time exploration was being carried out by the company on the adjoining *Molly B.* molybdenite showings on Indian Reserve No. 19.



Oral M. Group, Portland Canal. Plan and Section.

The claims are located north of the *Gold Axe* group and east of Indian Reserve No. 19, towards the base of the westerly slope of Mount Rainey, on the east side and towards the mouth of the Bear River, about half a mile easterly from the village of Stewart. The property is reached by boat from the Stewart dock to a location on the tide-flats on the east bank of Bear River, determined by the stage of the tide, a distance of about 1 mile. At low water Bear River can be crossed to its east bank by pack-horse from Stewart to the commencement of the trail at the foot of the hill, about 30 feet above sea-level. If a rowboat is used from Stewart dock, the tide-flat and its margin is traversed for about a quarter of a mile to the commencement of the trail. From this point a pack-trail ascends the mountain-slope by a series of switchbacks to the tent-camp at 640 feet elevation, and about three-eighths of a mile from the foot of the hill. From the camp a trail extends about 200 feet north-westerly to the adit-portal at 600 feet elevation.

In the locality of the claims the hill slopes at a general angle of about 20 degrees, and is densely timbered with mainly cedar, hemlock, and spruce trees of appreciable size and is thickly overgrown with underbrush. Longitudinal benched rock ridges and knolls of "roche moutonnée" form, fronted by rock bluffs, are typical topographical features. Glacial overburden of appreciable thickness in the bench and depression areas covers the hill-slope.

The locality is adjacent to a northerly contact of rocks of the Coast Range batholith. Granitic rocks outcrop about 750 feet north of the adit-portal, and the contact strikes north-easterly across the central section of the *Oral M.* and plunges south-easterly under the roof rocks which are argillaceous sediments. The rocks adjacent to the intrusive consist of highly metamorphosed argillite of the Lower Hazelton group. Immediately adjacent to the contact,

and at the base of the hill, the rocks are hybridized and in the main silicified by marginal effects of the intrusive batholith. The marginal absorption-phase is gradually transitional towards the south into a siliceous argillite now containing epidote and spessartite-garnet; this altered rock is definitely banded by the epidote and spessartite. The altered sediments strike north 55 degrees west and dip between 60 and 76 degrees south-westerly.

The mineral deposit consists of an irregular zone of silicification from 3 to 17 feet wide in the altered argillite and is conformable with the attitude of the formation. The zone has been exposed about 750 feet southerly of the batholith contact, and strikes at an obtuse angle to the contact. Silicification in this zone appears to be associated with slight shearing along fractures generally conformable with the bedding of the sediments, and to be best developed in the localities of slightly sheared cross-fractures striking north 26 to 31 degrees east, with a vertical to 45-degree dip north-westerly. Stringers, bands, patches, and small lenses of quartz are irregularly distributed in the zone, especially in the locality of the cross-fractures. The zone is generally mineralized with finely-disseminated pyrrhotite, but in some sections, especially in the areas of cross-fractures, it contains stringers, blebs, and patches of massive pyrrhotite with chalcopyrite across widths of from 2 to 9 feet.

During 1935 and 1936, the zone was explored by stripping and open-cutting and traced on the surface between 590 and 840 feet elevation for a distance of about 640 feet south-easterly from the east boundary of the Indian reserve. During 1936, the zone was also explored by seven diamond-drill holes. In the 1937 season, a contract was let to K. F. Pond, of Stewart, for further exploration by drifting on the zone from an adit at 600 feet elevation. At the time of examination on August 27th, a crew of four men was employed, and the drift had been advanced 131 feet.

At 590 feet elevation on a knoll adjacent to the Indian reserve, stripping for 20 feet exposes silicified argillite with garnet and epidote bands, quartz stringers and patches, mineralized with films and blebs of pyrrhotite and chalcopyrite across a width of 40 inches. At this locality the zone strikes north 54 degrees west and dips 65 degrees south-westerly. A sample across 37 inches assayed: Gold, 0.24 oz. per ton; silver, 1.8 oz. per ton; copper, 0.3 per cent. The continuation of the zone down the face of the bluff to the north-west on the Indian reserve could be seen, but it was inaccessible for examination.

At 600 feet elevation, 40 feet south-easterly of this, slightly silicified argillite with some quartz stringers and sparsely disseminated pyrrhotite and a little chalcopyrite 1.5 to 4 feet wide is exposed in the face of a low bluff by stripping for a length of 55 feet. The adit-portal is in the face of the bluff on the hanging-wall side of the zone.

At 640 feet elevation, 30 feet south-easterly of this, silicified argillite with stringers, bands, and lenses of quartz from 9 to 14 feet wide is exposed by stripping and in the face of a sloping bluff for a length of 108 feet to 710 feet elevation. In this section the zone strikes north 55 degrees west, dips 60 degrees south-westerly, and is generally well-mineralized with stringers, blebs, patches, and disseminated pyrrhotite and some chalcopyrite. Several transverse fractures striking northerly and dipping westerly cut across the zone in this exposure. A composite chip sample for a length of 46 feet along the easterly section of the exposure, and across an average width of 9 feet, assayed: Gold, 0.10 oz. per ton; silver, 0.30 oz. per ton; copper, 0.8 per cent.

South-easterly of this exposure, for a distance of 95 feet, continuity is obscured by deep glacial overburden. Two pits excavated in this had not encountered bed-rock.

At 740 feet elevation, silicified argillite with quartz stringers and bands is exposed for a length of 70 feet by stripping, and in the sloping face of a rock knoll to 765 feet elevation. In the westerly section of the exposure, stringers and bands of quartz are spread across a width of 17 feet, with one main band 2 feet wide converging into the zone from the foot-wall. The lower section of the exposure is very sparsely mineralized, but the upper and more compact section is moderately mineralized across a width of 6.75 feet with films, blebs, and disseminated pyrrhotite and with some chalcopyrite. A chip sample across 34 inches of the best mineralized section assayed: Gold, 0.20 oz. per ton; silver, 1.6 oz. per ton; copper, trace.

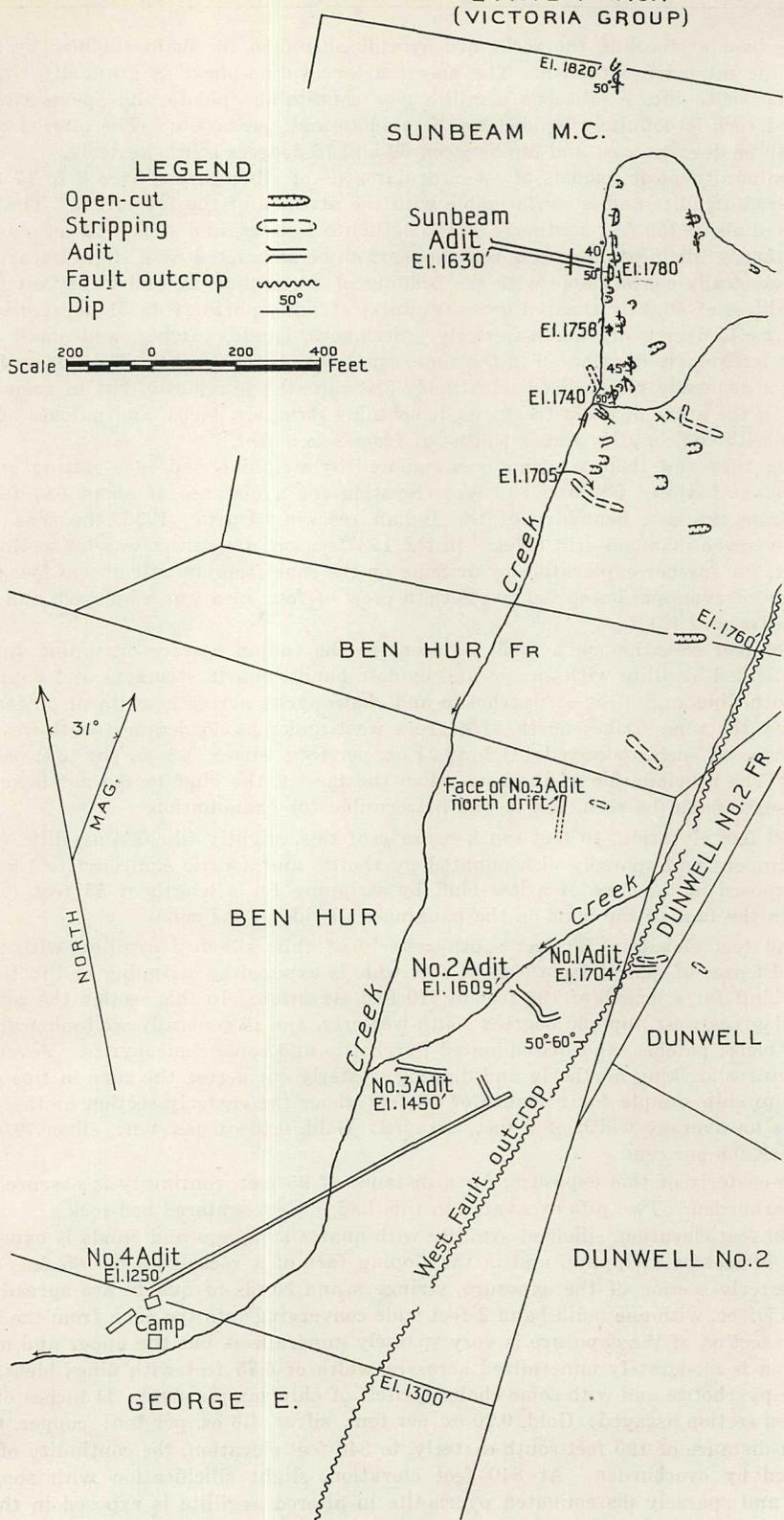
For a distance of 190 feet south-easterly, to 840 feet elevation, the continuity of the zone is obscured by overburden. At 840 feet elevation, slight silicification with some quartz stringers and sparsely disseminated pyrrhotite in altered argillite is exposed in the face of a bluff.

DANDY No.1  
(VICTORIA GROUP)

SUNBEAM M.C.

LEGEND

- Open-cut 
- Stripping 
- Adit 
- Fault outcrop 
- Dip 



Dunwell Mines, Ltd. Main Workings.

At 600 feet elevation an adit has been driven on the zone in a general direction of south 58 degrees east. At the time of examination it had been advanced 131 feet. At the portal the zone strikes north 55 degrees west and dips 65 degrees south-westerly. The adit starts on the hanging-wall and for the first 15 feet veers easterly across the zone to the foot-wall, then gradually angles southerly again to the hanging-wall. At 50 feet from the portal the drift turns northerly at a cross-fracture towards the foot-wall, and continues in the zone to the face. For the first 50 feet from the portal to this fracture the zone is fairly well-defined and composed of silicified argillite with quartz stringers and bands, and mineralized with disseminated pyrrhotite and some chalcopyrite. From this point for 50 feet the silicification and mineralization appears to weaken. For the last 30 feet to the face silicification increases, and quartz stringers and patches are erratically distributed in the zone with disseminated pyrrhotite and some chalcopyrite. A sample across 19 inches of silicification on the north wall of the drift, 113 feet from the portal, assayed: Gold, 0.30 oz. per ton; silver, 1.80 oz. per ton; copper, 2 per cent.

This company, with head office at 101 Pemberton Building, Victoria, was **Dunwell Mines, Ltd. (N.P.L.)**, incorporated in 1922 as a specially limited reorganization of Nass River Lands, Limited, which was incorporated in 1913. The capitalization of the Dunwell Mines, Limited, was originally \$350,000, but this was doubled in 1925, and further increased in 1926 to \$1,000,000, divided into 1,000,000 shares of \$1 par value each, of which 840,000 have been issued. Late in 1933 a debenture issue of \$18,000 was authorized to provide funds for rehabilitation and resumption of operations. The property was originally owned by Stewart Bros. and W. Noble, of Stewart, and in the holdings are now included the claims of the old Stewart Mining and Development Company.

The property consists of twenty-four Crown-granted claims and fractions on which taxes have been paid to December 31st, 1937. The claims are situated on the north side of Glacier Creek, on the thickly-timbered south slope of the "Dunwell" hill towards the confluence of Glacier Creek with the Bear River, at elevations of 1,000 to 2,000 feet. The hill-slope in the locality of the claims is featured by longitudinal bench and ridge areas with an average slope of about 20 degrees and a generally thick overburden of glacial debris, densely overgrown with underbrush between the hemlock, balsam, and cedar trees.

The property is reached by the Stewart-Bear River Motor-road from Stewart dock to the mill and power camp at 200 feet elevation, a distance of 5¼ miles. From this locality a branch motor-road ascends the hill-slope for about 1½ miles to the mine camp at 1,250 feet elevation. This camp is equipped with bunk-house, wash-room, dining-room, kitchen, and office buildings. Branch trails extend to the various workings.

The mineral deposit occurs in a main sheared fault-zone constituting the west fault of the "Portland Canal Fissure Zone" and striking northerly and dipping westerly, with lateral veins carrying silver-lead-zinc mineralization with gold values in places, striking north-westerly and dipping south-westerly. The formation is a series of argillaceous sediments of the Lower Hazelton (Bitter Creek Series) group which strike northerly, dip from 30 to 60 degrees westerly, and are on the westerly limb of an open anticlinal structure. The locality of the workings is about a quarter of a mile east of the easterly contact of the southerly-plunging "Ben Ali" granitic stock, and about 1,000 feet east of the contact of the Bitter Creek argillite with the overlying tuffs, greenstones, and argillites of the Bear River Series. Granitic and grey lamprophyre dykes intrude the formation, and the veins are sometimes associated with the latter.

Early exploration was carried out by the Stewart Mining and Development Company. In 1926 an aerial tramway about 1 mile long and a concentrating-mill of 100 tons daily capacity were constructed. Milling began early in 1927 and ceased later in the same year with the depletion of the then-known ore reserves.

Production from this operation amounted to 27,067 tons of ore, from which was recovered 4,805 oz. gold, 102,199 oz. silver, 1,264,787 lb. lead, and 1,608,634 lb. zinc. Some electrical prospecting by the Radiore Company of Canada, followed by diamond-drilling, was carried out during 1928 and 1929 with negative results. The property remained inactive until worked by lessees in 1932 and 1933, when from small-scale hand-operations about 1,767 tons of ore was produced, yielding 640 oz. gold, 28,653 oz. silver, 4,744 lb. copper, 57,237 lb. lead, and 2,400 lb. of zinc. Subsequent to this, more extended leasing operations by individual partner-

ships and a Stewart syndicate were carried on until the season of 1935, when the property was also operated for four months by the Dunwell Company. Production for this period amounted to 7,139 tons of ore, from which was recovered 1,489 oz. gold, 44,331 oz. silver, 2,184 lb. copper, and 19,553 lb. lead.

In the interval some of the mill machinery was sold to Bralorne Mines, Limited. In 1936 the Welldun Mining, Milling, and Power Company, Limited, composed mainly of Stewart interests, took a four-year lease on the property. This is a private company incorporated in British Columbia on April 17th, 1936, and capitalized at \$20,000, divided into 40,000 shares of 50 cents par value, of which 15,384 shares were reported issued as at July 1st, 1937. The head office of the Welldun Company is at Stewart, and N. E. Nelson, Vancouver, is president. This company reconditioned the mill to a daily milling capacity of 25 tons and operated seasonally until the early winter of 1937. Production from this operation to the end of 1937 amounted to 7,885 tons of ore, from which was recovered 1,702 oz. gold, 49,346 oz. silver, 7,343 lb. copper, and 190,384 lb. lead.

References to the property are contained in the Annual Reports of the Minister of Mines for the years 1920, 1922 to 1929, inclusive, and 1932 to 1936, inclusive. The property is also described in Memoir 159, Geological Survey of Canada, 1929.

Surface exposures on the *Dunwell* have not been sufficiently correlated to definitely identify the vein-structures exposed. One main shear-structure (west fault) with a strike about north and a dip 50 degrees west, extending throughout the length of the property, is indicated. Smaller more or less parallel lateral veins converge towards and join it at acute angles along the strike and dip. The vein-structures are frequently accompanied by pre-mineral lamprophyre dykes. These were probably intruded along already-formed shears and subjected to subsequent stresses; they appear to have had a controlling influence on later mineralizing solutions. Mineralization of the ore-shoots and lenses consists mainly of a quartz-calcite gangue with sphalerite, galena, pyrite, and tetrahedrite. Argentite, ruby silver, native silver, and probably some electrum constitute very high-grade ore in places.

Commercial-grade ore in short shoots or lenses seems to favour intersections of the lateral veins with the main north-south structure, but occurs in both structures. There is no definite evidence to indicate that commercial ore is confined solely to these vein-intersections and their vicinity, and further development may show a wider ore-distribution. Underground mining in the old 1927 operation through No. 4, No. 3, and No. 2 adits was confined principally to one ore-shoot occurring apparently around one such vein-intersection, but in the extensive underground workings and in surface exposures commercial mineralization is indicated at places at appreciable distances north and south of this formerly mined area.

In the northern area of the group on the *Sunbeam* there appears to be a main north-south structure with lateral veins converging towards it in its southerly extension. On the extreme north end of the *Sunbeam* and adjacent to the *Victoria* group south line at 1,820 feet elevation and 570 feet higher than No. 4 adit, an open-cut and incline shaft about 8 feet deep exposes a well-defined vein 6 feet wide which strikes north 10 degrees east to about north, and dips 50 degrees west. This is the so-called "Sunbeam" vein. It is well mineralized in places with galena and sphalerite, and contains an 8-inch stringer mineralized with tetrahedrite and some argentite. This showing is about 200 feet west of the so-called "Dunwell" vein which is probably the northerly continuation of the west fault, but the two structures seem to converge and possibly may join in this area. This locality is about 370 feet higher and about 1,700 feet north of the north end of the No. 3 adit north drift, which is the nearest main underground working. From this point the "Sunbeam" vein is traced south for about 450 feet by a series of pits and cuts along a well-defined depression to 1,780 feet elevation, and shows oxidized vein-material, mineralized in places with pyrite, galena, sphalerite, some tetrahedrite, argentite, and native silver, and generally associated with a grey dyke. In the southern 150 feet of this draw the vein is appreciably sheared, from 3 to 5 feet wide, strikes north and dips 40 to 50 degrees west. In places, a well-mineralized streak 8 to 10 inches wide, in places showing argentite and native silver, occurs on the hanging-wall.

From this locality, lessees in 1932 and 1933 shipped about 100 tons of high-grade ore from shallow cuts and pits, and about 200 tons of possible milling-grade ore still remains on the dumps. The northerly 300 feet which is covered by overburden may contain some continuation of the high-grade ore in this ore-shoot.

The "Sunbeam" vein has been traced a further 150 feet, to 1,758 feet elevation, by two cuts and a short crosscut-adit. These workings are in bad condition for examination, but show oxidized vein-structure and the grey dyke. About 200 feet easterly of the open-cut at an elevation of 1,780 feet, or about 70 feet higher, two oxidized and caved cuts expose what appears to be a more or less parallel structure, dipping 50 degrees west on the east side of a wide felsite dyke. This is known as the "Sulphide" vein.

At 1,630 feet elevation and about 300 feet west of the cuts at 1,780 feet elevation, the "Sunbeam" crosscut adit, bearing south 85 degrees east and about 500 feet long, intersects at about 300 feet a sheared and brecciated siliceous vein, 4 feet in width. This strikes north 10 degrees west, dips 60 degrees west, and is very sparsely mineralized. A short drift shows quartz stringers with very sparse mineralization. At about 170 feet from the portal a barren quartz vein with stringers across 2 feet is also intersected. Further exploration by raising would be required to correlate these veins with the "Sunbeam" and "Sulphide" veins.

At 1,740 feet elevation, 300 feet south of the old lessees' workings, an old cut in the creek-draw is reported to have crosscut two veins striking north and dipping west that may possibly be the southerly continuation of the "Sunbeam" vein. About 40 feet east of this and on the north side of a branch creek-canyon bearing east-west, a short adit exposes crushed and sheared siliceous material in a structure striking north 10 degrees east and dipping 50 degrees west. At intervals for 160 feet north-easterly of this, three cuts expose a vein striking northerly and dipping 45 degrees west, mineralized in places with pyrite, sphalerite, and galena. On the south side of the branch-canyon, at its junction with the main creek-trough a short adit exposes a crushed and distorted quartz vein 4 feet wide. In the main north-south creek-bed about 50 feet southerly of the east-west creek a small exposure of vein-matter well-mineralized with galena, sphalerite, and some argentite is seen. The southerly extension of the vein or veins exposed in the two short adits probably forms a junction in this locality with the vein in the main creek-trough, which is probably the southerly extension of the "Sunbeam" vein. This locality is about 950 feet north of the face of No. 3 adit north drift and from 260 to 300 feet higher in elevation.

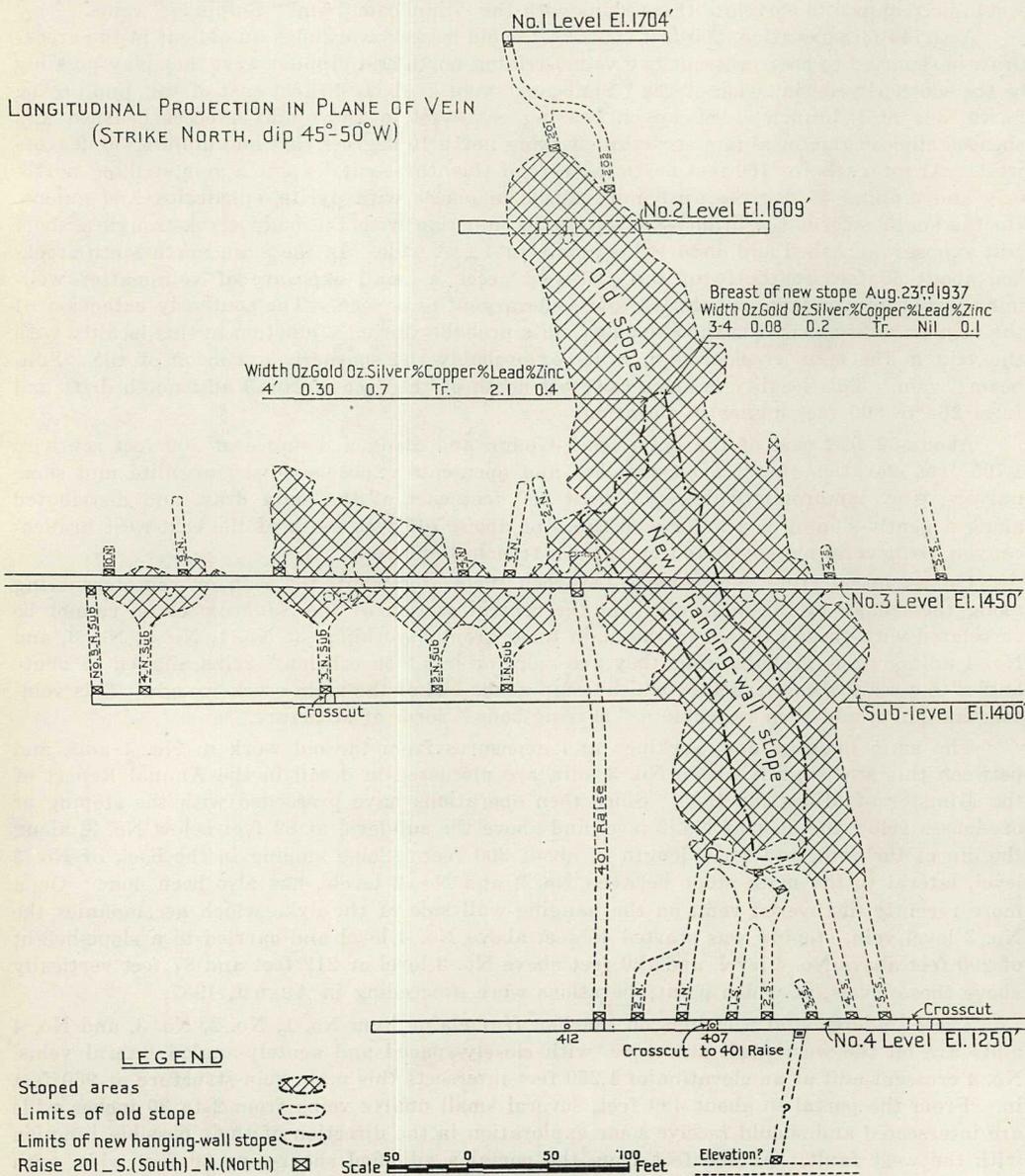
About 60 feet east of the main creek-trough and along a distance of 200 feet south to 1,705 feet elevation, four caved trenches and open-cuts expose oxidized argillite and some narrow, grey lamprophyre dykes. About 300 feet east of the main draw and distributed along a gently-sloping bench for a distance of about 700 feet south of the east-west branch-canyon are several old caved and overgrown trenches and cuts.

Unless intersecting faults have disturbed their alignment, the vein or veins occurring along the trough of the main creek in the central section of the *Sunbeam* claim cannot be correlated with those exposed in the main underground workings of No. 1, No. 2, No. 3, and No. 4 adits. It is probable that they are more or less "en echelon" veins aligned at acute angles to a main shear-structure which occupies the bed of the main creek-trough. This vein-combination would then resemble a "herring-bone" form of structure.

The main underground workings and exposures from the old work in No. 4 adit, and between this and slightly above No. 3 adit, are discussed in detail in the Annual Report of the Minister of Mines for 1933. Since then operations have proceeded with the stoping of ore-lenses below the floor of No. 3 level and above the sub-level at 62 feet below No. 3, along the dip of the vein, and for a length of about 300 feet. Some stoping in the back of No. 3 level, lateral to the main stope between No. 3 and No. 2 levels, has also been done. On a more recently discovered vein, on the hanging-wall side of the dyke which accompanies the No. 3 level vein, stoping was started 45 feet above No. 4 level and carried to a slope-height of 290 feet above No. 4 level, and 120 feet above No. 3 level or 212 feet and 87 feet vertically above these levels, at which point operations were proceeding in August, 1937.

These underground workings on the *Ben Hur* claim from No. 1, No. 2, No. 3, and No. 4 adits are on the west fault structure, with closely-spaced and acutely-angled lateral veins. No. 4 crosscut-adit at an elevation of 1,250 feet intersects this main vein-structure at 960 feet in. From the portal to about 480 feet, several small quartz veins from 2 to 30 inches wide are intersected and should receive some exploration in the direction of their possible junction with the west fault. At 480 feet from the portal a silicified shear-zone 20 feet wide, with some pyrrhotite and arsenopyrite mineralization, is worth exploration. At the end of the crosscut adit a vein has been drifted on for 380 feet north. For the first 220 feet the vein is

3 to 5 feet wide and fairly well-mineralized with galena, sphalerite, and pyrite, and sections of it may possibly make milling-grade ore. At 40 feet along the drift a crosscut-intersection stope and chute entry have been installed. Commencing 69 feet above the drift-level or 94 feet on the dip, the vein has been stoped out for 174 feet on the dip to No. 3 level along a length of about 120 feet. Some milling-grade ore may still remain in the drift-back of the stope. Below the drift-level between station 412 and the main crosscut (a length of about 220 feet) there is a possibility of developing ore along what appears to be the southerly rake of this ore-shoot. North of station 412 the drift continues 160 feet to the face, with the shearing gradually diminishing along the dyke which accompanies the vein. At about 100 feet along the drift north of the main crosscut, a winze reported to be 101 feet deep on the vein and a sub-level were inaccessible for examination.



Dunwell Mines, Ltd. Main Workings.

At 1,450 feet elevation, No. 3 crosscut adit, 200 feet higher in elevation than No. 4 adit, intersects the main vein-structure at about 450 feet from the portal. Near the point of intersection an area about 190 feet in height (vertical) and averaging about 90 feet long was stoped out in 1927 between No. 1, No. 2, and No. 3 south raises along the upward extension of the ore-shoot from No. 4 level through No. 3 level to slightly above No. 2 level. Since workings on No. 3 level were described in detail in the Annual Report of the Minister of Mines for 1933, stoping has been continued and extended south to No. 4 south raise and north to No. 2 north raise for a height of from 15 to 30 feet above the drift-level in these lateral sections. North of this, further stoping has also been done in the back of the drift north of No. 4 north raise for a length of 110 feet and for a height of from 20 to 47 feet. A small amount of stoping was also done in the drift-back north and south of No. 9 north raise for a length of 70 feet, and a few feet above the back.

The new hanging-wall stope on the hanging-wall side of the dyke and directly over and about 50 feet in the hanging-wall of the old main stope at its breast has already been referred to. This is along the junction area of this vein with the west fault. At the time of examination in August, 1937, this stope had advanced about 87 feet above No. 3 level. In the back the vein is 4 feet wide and well-mineralized with pyrite, galena, and sphalerite. A sample on the south side of this stope-breast assayed: Gold, 0.08 oz. per ton; silver, 0.2 oz. per ton; copper, trace; lead, *nil*; zinc, 0.1 per cent. A sample across 4 feet on the north side of the stope-breast assayed: Gold, 0.30 oz. per ton; silver, 0.7 oz. per ton; copper, trace; lead, 2.1 per cent.; zinc, 0.4 per cent. The stope-breast is south of the actual junction of this vein with the main north-south structure and could be extended to the north to the actual junction locality. Further exploration of the junction could be done by raising to No. 2 and No. 1 levels.

No new work has been done in No. 2 and No. 1 adits, and further exploration of intersected structures towards the north would explore possible junctions of these with the west fault on its foot-wall side.

In the southern section of the property, on the *George E.* claim, about 200 feet lower than No. 4 level, there are two old adits on the east and west side of a deep canyon. The canyon probably coincides with the west fault or main north-south structure, and marked shearing with siliceous vein-matter of appreciable width can be seen along its base, especially towards its south end on the *George E.* claim and extending into the Glacier Creek property. The old adits on the east and west sides of the canyon are probably on veins converging laterally towards the west fault on its foot- and hanging-wall sides. The portal of the adit on the east side of the canyon at 1,015 feet elevation was caved.

During the season of 1937, Art Cameron, of Stewart, with one man, carried out leasing operations on the *George E.* vein, which outcrops in the canyon-wall on the east side of the creek and in the creek-bed, about 25 feet north of the east adit portal and at 10 feet higher elevation. At this point an old open-cut along the canyon-wall, 70 to 80 feet above the adit, was excavated for a length of 70 feet to the brow of the canyon at about 100 feet higher elevation. At 1,077 feet elevation, and 10 feet south of the southerly side of this open-cut, a crosscut adit to the east for 16 feet intersects a quartz vein 6 feet wide in the face, striking north 12 degrees west and dipping 48 degrees westerly and mineralized with pyrite and some galena. An old open-cut in the south face of the main canyon open-cut at an elevation of 1,143 feet exposes oxidized vein-material. At an elevation of 1,165 feet, an adit 6 feet long in the south face of the canyon open-cut exposes a vein 18 inches wide striking north 50 degrees west and dipping 60 degrees south-westerly. A sample across 10 inches on the hanging-wall of this vein assayed: Gold, 0.16 oz. per ton; silver, 24.6 oz. per ton; copper, trace; lead, 2.8 per cent.; zinc, 1.2 per cent. It is reported by Cameron that about 25 tons of ore was mined and shipped from the open-cut in the wall of the canyon in the early days.

During the 1937 season, Cameron continued the open-cut in the canyon-wall for a length of about 80 feet along its base. This work exposes a well-defined vein 4 to 5 feet wide, well-mineralized with galena, sphalerite, and pyrite. A sample across 5.1 feet in the hanging-wall of the main vein exposed in the floor of the cut towards its south end, and mineralized with patches and blebs of pyrite, galena, and sphalerite, assayed: Gold, 0.10 oz. per ton; silver, 4 oz. per ton; copper, *nil*; lead, 2.7 per cent.; zinc, 5.4 per cent. A sample across 4.1 feet of the main vein in the floor of the north side of the cut, mineralized with massive galena and

appreciably oxidized, assayed: Gold, 0.46 oz. per ton; silver, 12 oz. per ton; copper, trace; lead, 7.4 per cent.; zinc, 0.2 per cent. From this open-cut A. Cameron mined and shipped to the *Dunwell* mill during the 1937 season 5 tons, which yielded 2 oz. gold, 39 oz. silver, and 865 lb. lead. Further exploration of this vein could be carried out by drifting north to its junction with the foot-wall of the West Fault and by raising and possibly stoping from the adit-level at an elevation of 1,015 feet.

On the west side of the canyon at 1,040 feet elevation and 60 feet north-westerly, an adit has been driven on a vein occurring on the hanging-wall of the west fault. This is about 500 feet long and was started on a vein 4 to 5 feet wide which follows a dyke and strikes north 15 degrees east and dips 50 degrees west. The working is very crooked and appears to trend to the east off the vein at 170 feet from the portal, following a slip. The vein is fairly well mineralized from the portal to the winze, a distance of about 150 feet. At the winze, said to be 57 feet deep, the vein is 3 to 4 feet wide. The main working continues along a slip on a winding course and shows shearing, calcite, and a little pyrite in the face. At 100 feet from the face a small vein is intersected. A crosscut to the west from near the face intersects a vein, which is drifted on north and south for about 100 feet. The vein is 18 inches to 6 feet wide and well mineralized in places. About 35 feet from the start of this drift the vein is 4 to 6 feet wide and well mineralized, and a sample across 5 feet assayed: Gold, 0.5 oz. per ton; silver, 17 oz. per ton; copper, trace; lead, 28 per cent.; zinc, 5 per cent. A small shoot of ore from this showing was mined out by lessees during 1934, and this working has not been examined since that time.

On the *Ben Ali* claim, adjoining the *Ben Hur* on the west, a well-defined sheared quartz vein is exposed in open-cuts and adits along a horizontal length of 350 feet and height of 250 feet. The vein strikes north 40 degrees west, dips 80 degrees south-westerly, and varies from 20 to 48 inches in width. Mineralization consists chiefly of pyrite with some sphalerite and a little chalcopyrite. This ore assays about 0.5 oz. gold and about 1 oz. silver per ton. This deposit and the workings on it are described in the Annual Report of the Minister of Mines for 1933, and mining by lessees has been intermittently carried on up to and including the 1937 season, when only a small tonnage of probable ore was evident in the workings.

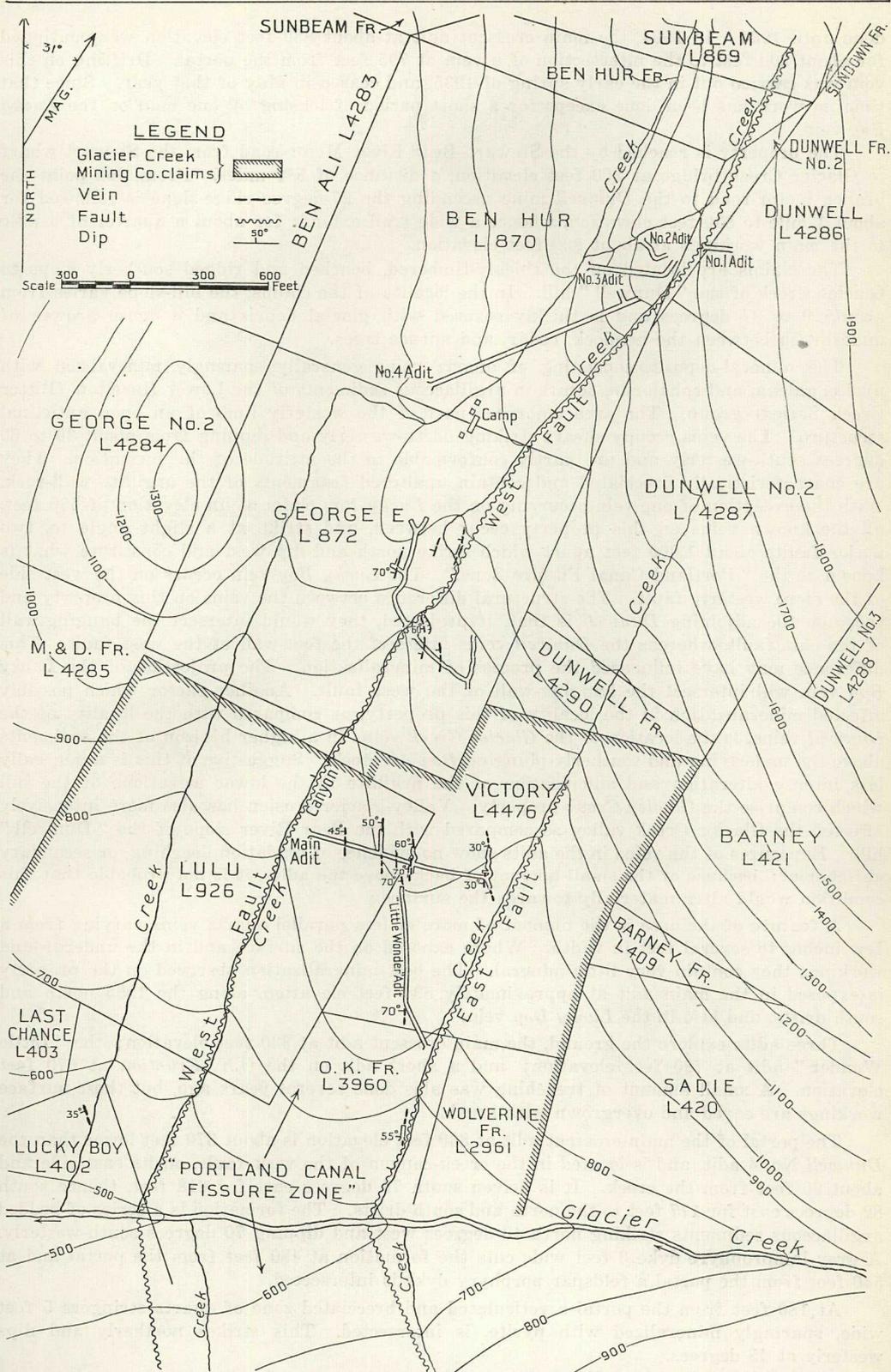
*Conclusion.*—Examinations of the main *Dunwell* vein-exposures and workings have indicated a possible ore-horizon in the known veins of from 300 to 400 feet deep on the dip, raking from north to south. Its preservation in any given locality along the strike and dip of the structure is dependent on the extent of erosion which has effected the topography. In this horizon, mineral concentrations are lenticularly distributed, and appear to favour the localities of junctions of lateral veins with the west fault or with each other. Secondary enrichment of primary sulphides with silver minerals seems also to have occurred in sections of these localities.

In the locality of junctions, the lateral veins appear to be dragged to more obtuse angles of strike relative to the west fault, both on its foot- and hanging-wall sides, suggesting faulting by this structure and possible relation of the veins on the foot- and hanging-wall sides. Along the extension of the lateral veins south-easterly from the foot-wall and north-westerly from the hanging-wall, the lateral vein-fracturing appears to rapidly diminish in intensity.

It is indicated that the possible zonal ore-horizon may be structurally related to and conformable with the southerly plunge of the *Ben Ali* granitic stock, which outcrops about 1,500 feet to the westward of the main *Dunwell* workings.

This company was incorporated in 1909, with a capitalization of 1,000,000 **Glacier Creek Mining Co., Ltd.** shares of 50 cents par value. R. M. Stewart, of Victoria, is president and managing director, and the registered office is at 101 Pemberton Building, Victoria. The property consists of the *Nellie V.*, *Riverside*, *Last Chance*, *Lucky Boy*, *Lulu*, *Victory*, *Micmac*, *Nellie Fraction*, *O.K. Fraction*, and *Wolverine Fraction* Crown-granted claims and fractional claims, totalling 308.81 acres, on which a total of \$115.25 in taxes is due to the end of 1937. It is situated on the north side of Glacier Creek, between 400 and 1,200 feet elevation, about 4½ miles by road from the town of Stewart, and adjoins the *Dunwell* on the south.

Only a very small amount of surface exploration has been done along the vein outcrops. Starting in 1910, intermittent exploration by cross-cutting, drifting, and a small amount of diamond-drilling was done on the property up to about 1925, but in recent years no work was



Glacier Creek Mining Co., Ltd., and Dunwell Mines, Ltd. Main Workings.

done until 1934. In 1934, the main crosscut adit at about 830 feet elevation was continued for about 200 feet to the intersection of a vein at 795 feet from the portal. Drifting on this vein was carried out in the early spring of 1935, and ceased in May of that year. Since that time no work has been done except for a short period of leasing by one man on the *Lucky Boy* vein.

The property is reached by the Stewart-Bear River Motor-road from the Stewart wharf to Glacier Creek bridge at 200 feet elevation, a distance of  $5\frac{1}{4}$  miles. From this point the branch motor-road to the *Dunwell* mine ascending the 27-degree ridge-slope is followed for about 1 mile to 850 feet elevation, whence a wide trail extends for about a quarter of a mile to the main workings at about 830 feet elevation.

The claims are located on the thickly-timbered, benched and ridged southerly slope to Glacier Creek of the "Dunwell" hill. In the locality of the claims, the hill-slope varies from about 10 to 37 degrees and is thickly covered with glacial debris and a dense growth of underbrush between the hemlock, cedar, and spruce trees.

The mineral-deposit, consisting of quartz veins generally sparingly mineralized with pyrite, galena, and sphalerite, occurs in argillaceous sediments of the Lower Hazelton (Bitter Creek Series) group. The area embraces part of the westerly limb of an open anticlinal structure. The veins occupy shears striking north-westerly and dipping from about 30 to 60 degrees south-westerly and are partly conformable to the attitude of the formation. They are characteristically brecciated and contain unaltered fragments of the argillite wall-rock. With the exception of one vein occurring on the *Lucky Boy* claim at an elevation of 560 feet, all the known veins on this property occur between, and strike at a slight angle to, two major faults about 1,000 feet apart which strike north and dip west and constitute what is known as the "Portland Canal Fissure Zone." The *Lucky Boy* vein occurs on the west side of the more westerly fault. The structural difference between the veins on this property and those on the adjoining *Dunwell* is that, if projected, they would intersect the hanging-wall of the east fault, whereas the *Dunwell* veins intersect the foot-wall of the west fault. This difference may have influenced the process of mineralization. The projection of the *Lucky Boy* vein will intersect the hanging-wall of the west fault. Another factor which possibly affected mineralization in the locality of this property, as compared with the locality of the *Dunwell* veins, is the location of the *Glacier Creek* veins in a higher horizon of the sediments above the underlying and southerly-plunging *Ben Ali* stock. Suggestive of this is a generally less intense alteration and silicification of the argillite in the lower elevations of the hill which comprise the *Glacier Creek* property. Valley-glacier erosion has also more intensively affected the *Glacier Creek* valley as compared with the Bear River slope of the "Dunwell" hill. Exposures of the veins in the adits show no evidence of oxidation, leaching, or secondary enrichment; because of the small amount of back above the adits, it is not probable that this condition would alter materially towards the surface.

A feature of the area is the number of more or less parallel quartz veins varying from a few inches to several feet in width. Where exposed on the surface and in the underground workings they contain very little mineral. The best mineralization observed on the property is exposed in the main adit at approximately 830 feet elevation, along the 1935 north and south drifts, and also in the *Lucky Boy* vein.

Three adits explore the ground, the main crosscut adit at 830 feet elevation; the "Little Wonder" adit at 780 feet elevation; and a short adit on the *O.K. Fraction* at 670 feet elevation. A small amount of trenching was also done several years ago, but these surface workings are caved and overgrown with brush.

The portal of the main crosscut adit at 830 feet elevation is about 370 feet lower than the *Dunwell* No. 4 adit, and is located in the creek-canyon of the west fault, on its east side and about 90 feet from the creek. It is driven south 75 degrees east for 618 feet, thence south 82 degrees east for 177 feet to the north and south drifts. The formation is a series of bedded argillaceous sediments striking north 40 degrees west and dipping 70 degrees south-westerly. A grey lamprophyre dyke 3 feet wide cuts the formation at 480 feet from the portal and at 540 feet from the portal a feldspar porphyry dyke is intersected.

At 180 feet from the portal a reticulated and brecciated zone of quartz stringers 5 feet wide, sparingly mineralized with pyrite, is intersected. This strikes northerly and dips westerly at 45 degrees.

At 330 feet from the portal the crosscut intersects a zone of barren and brecciated quartz stringers and bands across a width of from 4 to 5 feet. This strikes northerly and dips 70 degrees westerly and constitutes the so-called "Central" vein. A drift has been driven north on it for 120 feet. In the face of this drift, the zone 6 feet wide strikes north 18 degrees west, dips 50 degrees west, and is composed of barren quartz stringers  $\frac{1}{2}$  to 6 inches wide.

At 390 feet from the portal a well-defined quartz vein 10 inches wide, containing some pyrite, is intersected. At 470 feet from the portal the hanging-wall of a barren crushed zone 27 feet wide is intersected. This strikes north 10 degrees east, dips 60 degrees westerly, and is composed of crushed argillite and dyke-matter with quartz and calcite stringers and veinlets mainly on the hanging- and foot-wall sides. A winding drift and crosscut for 57 feet in a north to north-westerly direction commencing on the foot-wall of this zone exposes crushed argillite with brecciated quartz and calcite stringers across a width of 4 to 4.5 feet, with no evident sulphide mineralization. In places the quartz-calcite gangue shows patches of light greenish coloration from a finely-disseminated nickel-chromium silicate, on account of which this zone is locally named the "Green" vein. At 57 feet from the crosscut, the "Green" vein drift turns to a bearing of north 10 degrees east and continues along the hanging-wall of the zone for 63 feet to the face. The face is turned to a bearing of north 7 degrees west and exposes a few stringers of quartz and calcite, mineralized very sparingly with pyrite and dipping 60 degrees west in crushed argillite.

At 795 feet from the portal, the crosscut intersects an irregular and brecciated quartzose zone 4 to 6 feet wide, generally sparingly mineralized with blebs, stringers, and sparse dissemination of pyrite, sphalerite, and galena, striking about north 20 degrees west, and dipping 30 degrees westerly. A drift south 20 degrees east for 51 feet appears to favour the hanging-wall side of this zone and exposes quartz stringers and pyritized argillite. The following samples were taken in the south drift:—

(1.) Selected sample of the best mineralization: Gold, 0.06 oz. per ton; silver, 0.08 oz. per ton; lead, *nil*; zinc, 2 per cent.

(2.) Muck from the south-drift face: Gold, trace; silver, 0.3 oz. per ton; lead, *nil*; zinc, trace.

A winding northerly drift has been driven along this zone for 198 feet, commencing with a bearing of north 22 degrees east for 39 feet, and varying for the remainder of its length between north 43 degrees west, north 20 degrees east, and north 4 degrees west at the face. It appears to favour the foot-wall and exposes irregular quartz bands, stringers, and patches, irregularly and sparingly mineralized with pyrite, sphalerite, and galena. At 39 feet from the commencement of this north drift a crosscut south 70 degrees west for 15 feet through the zone exposes the best mineralization. A sample for 12 feet along the walls and including the face of this crosscut assayed: Gold, 0.08 oz. per ton; silver, 1 oz. per ton; lead, *nil*; zinc, 4 per cent. A selected sample of the best mineralization contained in the quartz bands and stringers along the north drift assayed: Gold, 0.20 oz. per ton; silver, 5.6 oz. per ton; lead, 4 per cent.; zinc, 4 per cent.

From the face of this main adit to the boundary of the *Victory* and *Barney* claims is about 540 feet. At about 300 feet northerly from the present face of the north drift, the boundary of the *George E.* claim of the *Dunwell* property would be crossed. At about 300 feet southerly from its present face the south drift would break through to the surface. Where the north and south drifts start from the adit the vertical back is about 75 feet. Along the easterly projection of the adit towards the *Barney* claim the surface slopes upward at 15 degrees. On account of these factors, further development in the Glacier Creek Company ground from this adit is comparatively limited. On the other hand, it would offer a convenient site for further depth exploration of the *George E.* showings of the *Dunwell* company, in the favourable location of their intersection with the foot-wall of the west fault. By extension of the *Glacier Creek* north drift from the adit towards the *George E.* workings for a further distance of about 800 feet the vein would be explored further in this direction, and a back of about 200 feet would be developed below the old *George E.* adit on the east side of the creek.

At 780 feet elevation, and about 1,050 feet southerly from the portal of the main adit, the "Little Wonder" adit is located on the west side of the draw of the east fault. The adit is a crosscut driven along a bearing of north 45 degrees west in argillite striking north 15

degrees east and dipping 70 degrees westerly. At about 260 feet it intersects a sheared and crushed zone with some bands and stringers of brecciated quartz and argillite striking north and dipping 70 degrees west. This is drifted on to the north for about 500 feet, and with the exception of two short lenticular quartz bands well-mineralized with pyrite, sphalerite, and galena, it is mainly composed of crushed argillite. The face of the drift exposes the hanging-wall of the zone striking north 5 degrees east and dipping 70 degrees westerly. A crosscut to the east would intersect the foot-wall and explore the full width of the zone. The hanging-wall side of the zone exposed in the face is composed of brecciated argillite with quartz bands and stringers very sparingly mineralized with mainly pyrite. The best mineralization observed occurs in a lenticular quartz band 2 to 18 inches wide starting 90 feet south of the face. Of this, the first 30 feet of length in the adit-floor is well-mineralized across a width of 10 inches. A composite sample of this length (30 feet) across 10 inches in the adit-floor assayed: Gold, 0.28 oz. per ton; silver, 4.6 oz. per ton; lead, 6 per cent.; zinc, 8 per cent. In a small stope 15 feet long and 10 feet high in the roof of the adit a well-mineralized lenticular quartz band pinching out at both ends in crushed argillite is exposed. A composite sample of this lens in the roof of the stope assayed: Gold, 1.84 oz. per ton; silver, 4 oz. per ton; lead, 5 per cent.; zinc, 6 per cent.

A raise reported to be 65 feet high connects this drift with an upper adit reported to be 120 feet long. The latter is also connected with the surface by a raise. The raise to the upper adit is in a dangerous condition and inaccessible for examination. The portal of the upper adit could not be located and has probably caved. The raise from the upper adit to the surface was located amongst the dense underbrush, unguarded, dangerously open, partly caving, and inaccessible for examination. A back of about 110 feet is estimated from the face of the lower adit-drift to the surface.

At the portal of the lower "Little Wonder" adit three dumps of vein-material mineralized with pyrite, sphalerite, and galena, estimated to contain 1, 3, and 15 tons each, have been accumulated. It has not been ascertained from what part or parts of the "Little Wonder" workings this material originated. A composite sample of these dumps assayed: Gold, 0.56 oz. per ton; silver, 2.8 oz. per ton; lead, 5 per cent.; zinc, 6 per cent.

At an elevation of 670 feet, 100 feet above Glacier Creek and about 400 feet south of the "Little Wonder" adit, a practically barren, brecciated, and reticulated quartz zone, 10 feet wide on the hanging-wall of a felsite dyke, outcrops in argillite on the face of a bluff on the west side of the draw of the east fault. This zone strikes north 5 degrees east and dips 55 degrees westerly, and may possibly be correlated with the zone in the "Little Wonder" adit. An adit 60 feet long has been driven on it.

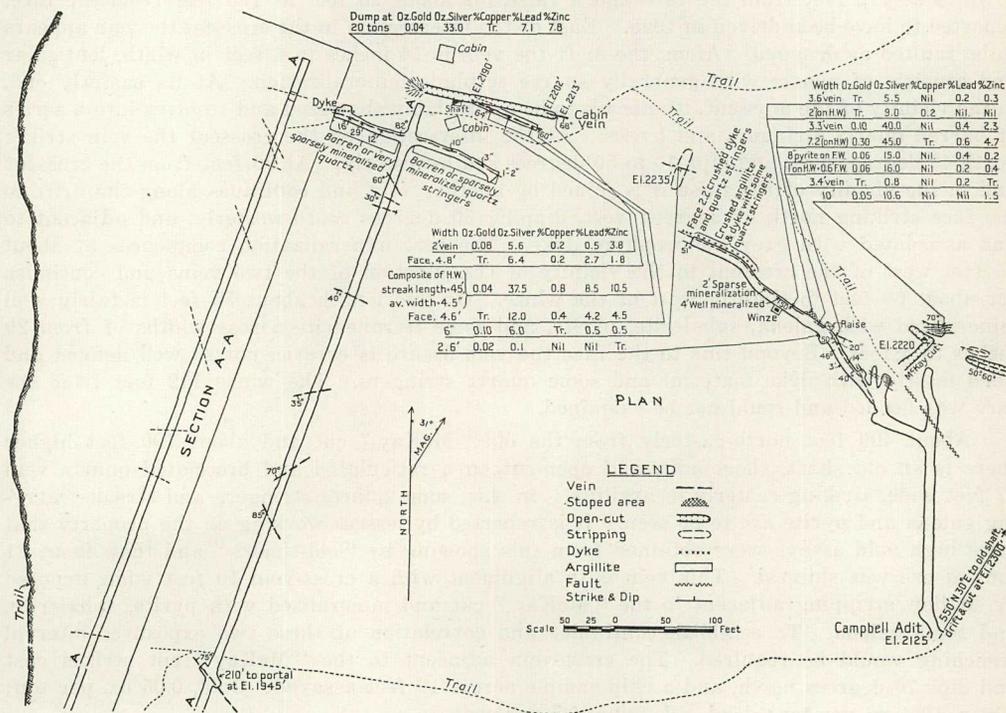
At an elevation of 560 feet, about 100 feet above the bed of Glacier Creek and about 1,400 feet south-west from the "Little Wonder" adit, the *Lucky Boy* vein outcrops in argillite for about 20 feet above the brink of Glacier Creek canyon. This vein is 2.5 feet wide, strikes north 30 degrees west and dips 35 degrees south-west. Continuity at both ends is obscured by overburden. For about 15 feet of its exposed length the vein is mineralized with massive, fine-grained galena and sphalerite across a width of 18 inches, with 12 inches of fair mineralization in a quartz gangue on the hanging-wall. A sample of the 18 inches of solid mineralization assayed: Gold, 0.06 oz. per ton; silver, 23.5 oz. per ton; lead, 58 per cent.; zinc, 16 per cent. A sample of the siliceous material on the hanging-wall across 12 inches assayed: Gold, 0.06 oz. per ton; silver, 7 oz. per ton; lead, 4 per cent.; zinc, 6 per cent.

This company was incorporated in British Columbia on April 4th, 1924, with **Lakeview Mines**, registered office at 101 Pemberton Building, Victoria. It has a capitalization **Ltd. (N.P.L.)** of \$1,000,000, divided into 4,000,000 shares of 25 cents par value, of which 2,743,828 shares are reported to be issued. The holdings consist of *Lakeview No. 1, No. 2, No. 3, and Silver Bell Fraction* Crown-granted mineral claims, totalling 158.17 acres, on which taxes have been paid to December 31st, 1937. The property is located on the north side of Glacier Creek, east of the *Dunwell* holdings, at elevations ranging from about 2,000 to 3,000 feet above sea-level.

The property is reached by the Stewart-Bear River Motor-road from Stewart dock to the Glacier Creek bridge at 200 feet elevation, a distance of  $5\frac{3}{4}$  miles. From here a branch motor-road for about  $1\frac{1}{2}$  miles ascends the 27-degree ridge-slope for about 1 mile to the

Dunwell mine camp at 1,250 feet elevation. From this point a well-constructed 4-foot trail on wagon-road grade extends 1¼ miles to the Lakeview cabin at 2,200 feet elevation.

The claims are situated on the thickly-timbered south slope of the ridge to Glacier Creek, and between about 1,000 and 2,000 feet above the creek. The ridge-slope in the locality of the claims is featured by longitudinal bench and ridge areas with an average slope of from 15 to 20 degrees, and a generally thick overburden of glacial debris and a dense growth of underbrush between the hemlock, balsam, and cedar trees. Argillaceous sediments of the Lower Hazelton (Bitter Creek Series) group on the westerly limb of an open anticlinal structure, intruded by granitic and lamprophyre dykes, underlie the property.



Lakeview Mines, Ltd. Main Workings.

Mineralization consists of quartz veins from about 1 to over 8 feet wide with galena, sphalerite, pyrite, and some grey-copper. The main ("Cabin") vein has a general north-westerly strike and dips about 60 degrees south-westerly. It outcrops in a creek-bed immediately south of the old camp at 2,190 feet elevation. Several years ago a section of this vein was stripped and open-cut for about 100 feet and a shaft sunk in the hanging-wall. In 1928 the shaft was unwatered and crosscuts were driven to the vein at depths of 25 and 45 feet from the collar. The upper crosscut is reported to have intersected promising mineralization, consisting of galena, sphalerite, chalcopyrite, and pyrite, but the vein is reported not to be so well mineralized in the lower crosscut. In the open-cut the vein strikes north 72 degrees west and dips 68 degrees south-westerly. It is from 2 to 4.8 feet wide, and is generally mineralized with pyrite, galena, and sphalerite in a quartz-gangue, with a streak of massive galena and sphalerite mineralization 10 inches wide on the foot-wall. About 1925 a long adit was driven with the objective of intersecting the vein at a depth of 250 feet below the collar of this shaft. Several narrow veins and stringers were cut in this working, and at 760 feet from the portal a vein was intersected, striking north 71 degrees west and dipping from 82 degrees north-easterly to vertical. A drift west for 75 feet exposes erratic, sparsely-mineralized quartz-lenses 12 to 16 inches wide in argillite on the south side of a felsite dyke. A drift east for 90 feet exposes only barren or sparsely-mineralized quartz stringers.

Approximately 500 feet south-easterly from the "Cabin" shaft, a shallow shaft connected with an open-cut known as the "McKay" cut was excavated several years ago. This exposes a well-defined mineralized shear 8 to 10 feet wide containing siliceous lenses, pockets, and stringers well mineralized in places with galena, sphalerite, pyrite, and tetrahedrite across widths of several inches. From these a small tonnage of high-grade ore is reported by lessees to have been shipped several years ago by McKay.

About 300 feet south of these workings and at 95 feet lower elevation, the old "Campbell" adit extends north for 262 feet. At 187 feet from the portal a crosscut to the west intersects a vein at 60 feet. A drift extends westerly along this vein for 250 feet, with a winze at 112 feet from the face and a raise for about 25 feet at 165 feet from the face, reported to have been driven in 1928. East of the intersection in the crosscut the vein appears to be faulted or dragged. Along the drift the vein is 14 inches to 4 feet in width, lenticular and consists of quartz with generally sparse sulphide mineralization. At its easterly end, in the vicinity of the crosscut, it appears to be appreciably shattered and resolves into a series of barren quartz stringers and lenses. At the intersection by the crosscut the vein strikes north 43 degrees west and dips 40 to 50 degrees south-westerly. At 90 feet from the crosscut and in the vicinity of the raise it is joined by another vein and continues along the drift to the face striking north 57 degrees west, dipping 50 degrees south-westerly, and adjacent to and associated with grey lamprophyre dyke. The best mineralization commences at about 75 feet west of the crosscut in the vicinity of the junction of the two veins and continues for about 60 feet to slightly west of the winze. Of this length about 55 feet is fairly well mineralized with galena, sphalerite, pyrite, and some tetrahedrite across widths of from 20 inches to 4 feet. Beyond this to the face the vein-fissure is erratic, not so well defined and filled mostly with dyke material and some quartz stringers. The winze 112 feet from the face was flooded and could not be examined.

About 400 feet north-easterly from the old "McKay" cut and about 100 feet higher there is an old shaft, short adit, and open-cut on a reticulated and brecciated quartz vein 12 feet wide, striking easterly in argillite. In this, some quartz stringers and streaks carrying galena and pyrite are to be seen. It is reported by lessees working on the property that some high gold assays were obtained from this showing by "old-timers" and that about 21 tons of ore was shipped. This vein is in alignment with a cross-vein 10 feet wide, exposed by shallow stripping adjacent to the "McKay" cut and mineralized with pyrite, sphalerite, and some galena. To establish continuity and correlation of these two exposures interval trenching would be required. The cross-vein adjacent to the "McKay" cut strikes east and dips 70 degrees north, and a chip sample across 10 feet assayed: Gold, 0.05 oz. per ton; silver, 10.6 oz. per ton; lead, *nil*; zinc, 1.5 per cent.

Since about 1933 the property has been operated intermittently by lessees, and further exploration in the effort to extract ore of shipping-grade resulted in the first shipment from this operation of about 13 tons, reported by H. D. Rochfort, one of the lessees, to assay about: Gold, 0.32 oz. per ton; silver, 167 oz. per ton; lead, 18 per cent. This ore came from a quartz vein about 50 feet easterly from the old "McKay" cut, where a lens 12 to 18 inches wide, well mineralized with galena, pyrite, and tetrahedrite in a quartz vein up to 4 feet wide, was stripped and open-cut for about 30 feet. This vein strikes north 70 degrees west and dips from 50 to 60 degrees south-westerly.

Work by these lessees was also carried out at that time on the main ("Cabin") vein in the open-cut at 2,190 feet elevation. From this locality a shipment of about 10 tons is reported by H. D. Rochfort to have assayed about: Gold, 0.12 oz. per ton; silver, 62 oz. per ton; lead, 12.9 per cent.

A sample taken by the writer in 1934 across 10 inches of the foot-wall streak in the main ("Cabin") vein open-cut assayed: Gold, 0.02 oz. per ton; silver, 20.15 oz. per ton; lead, 15 per cent.; zinc, 15 per cent. A sample of the hanging-wall side adjacent to this across 4 feet assayed: Gold, 0.04 oz. per ton; silver, 10.5 oz. per ton; lead, *nil*; zinc, 3 per cent. Subsequent work by lessees on the main ("Cabin") vein has centered on the extension of the open-cut for a total length of 137 feet and a drift east on the vein from the floor of the cut for 73 feet. Resultant from this work 10 tons shipped to the *Dunwell* mill is reported by H. D. Rochfort to have assayed about: Gold, 0.16 oz. per ton; silver, 40 oz. per ton; lead, 15 per cent. A further shipment of about 45 tons to the *Dunwell* mill from the main

("Cabin") vein is reported by H. D. Rochfort to have assayed about: Gold, 0.12 oz. per ton; silver, 52.5 oz. per ton; lead, 12 per cent.

On August 25th, 1937, two dumps of broken ore, estimated to contain about 20 tons each, were accumulated at the main ("Cabin") vein workings. An average sample of the dump at the end of the "Cabin" adit track assayed: Gold, 0.04 oz. per ton; silver, 33 oz. per ton; copper, trace; lead, 7.1 per cent.; zinc, 7.8 per cent. The other dump in the vicinity of the cabin was composed of vein-material with similar mineralization to this.

Recent leasing operations were also carried out in the "McKay" cut. A shipment of 6.96 dry tons by A. Cameron, Stewart, to the Prince Rupert sampling plant, reported to be from this locality, assayed: Gold, 0.08 oz. per ton; silver, 30.2 oz. per ton; copper, 0.1 per cent.; lead, 8 per cent.; zinc, 4.2 per cent.; silica, 28 per cent.; iron, 23.5 per cent.; lime, 0.2 per cent.; sulphur, 27 per cent.; arsenic, 0.2 per cent.; antimony, *nil*.

In August, 1937, exploratory development-work was being done by H. D. Rochfort and one man in the "Campbell" adit at 2,125 feet elevation. In this working a section of well-mineralized vein-material about 9 feet west of the raise was being stoped from the drift-back with the object of accumulating shipping-grade ore. The stope had advanced for a length of 10.3 feet and a height of 3 feet above the drift-back. In this section the vein is 3.3 feet wide and fairly well mineralized with pyrite, sphalerite, tetrahedrite, and some galena, with a well-mineralized streak 7.2 inches wide on the hanging-wall. A sample of the vein in the stope-back across 3.3 feet assayed: Gold, 0.10 oz. per ton; silver, 40 oz. per ton; copper, *nil*; lead, 0.4 per cent.; zinc, 2.3 per cent. A sample of the hanging-wall streak across 7.2 inches assayed: Gold, 0.30 oz. per ton; silver, 45 oz. per ton; copper, trace; lead, 0.6 per cent.; zinc, 4.7 per cent.

The following additional samples were taken in this drift:—

(1.) North side, 8.4 feet west of raise, across 1 foot of the vein on the hanging-wall, plus 0.6 foot on the foot-wall, assayed: Gold, 0.06 oz. per ton; silver, 16 oz. per ton; copper, *nil*; lead, 0.2 per cent.; zinc, 0.4 per cent.

(2.) At site of (1), 8 inches of mainly pyrite on the foot-wall assayed: Gold, 0.06 oz. per ton; silver, 15 oz. per ton; copper, *nil*; lead, 0.4 per cent.; zinc, 0.2 per cent.

(3.) South side, opposite raise, across 2.6 feet, assayed: Gold, 0.02 oz. per ton; silver, 0.1 oz. per ton; copper, *nil*; lead, *nil*; zinc, trace.

(4.) North side, 4 feet east of raise, across 3.4 feet of sparsely-mineralized quartz and calcite assayed: Gold, trace; silver, 0.8 oz. per ton; copper, *nil*; zinc, trace; lead, 0.2 per cent.

(5.) North side, 15 feet west of stope, across 3.6 feet of silicified argillite and dyke with quartz stringers and disseminated pyrite, assayed: Gold, trace; silver, 5.5 oz. per ton; copper, *nil*; lead, 0.2 per cent.; zinc, 0.3 per cent.

(6.) At site of (5), 2 inches of mineralization in a streak on the hanging-wall assayed: Gold, trace; silver, 9 oz. per ton; copper, 0.2 per cent.; lead, *nil*; zinc, *nil*.

These samples and assays represent the best-defined and mineralized section of the vein observed in the "Campbell" adit.

Recent work had also been done in the main ("Cabin") vein open-cut and adit at an elevation of 2,190 feet. This had been centered mainly in the driving of the "Cabin" vein adit as a drift south-easterly, starting from the bottom of the cut and extending for 73 feet to the face. This adit is timbered at the portal for a length of 12 feet with no back for this length. Along the drift the back increases to about 10 feet at the face. Projected for 12 feet ahead of this adit face, the back to the floor of the cut would increase to 15.5 feet. At about 17 feet beyond the adit face, the face of the open-cut rises to give a projected back at this point of 20.5 feet to the surface. Easterly from this point for a distance of about 400 feet along the strike of the vein, there is an increasing surface-gradient of only 20 per cent., which does not permit the attainment of any appreciable back at the horizon of the "Cabin" vein adit. It should also be noted that taking into consideration the strike and dip of the "Cabin" and "McKay" veins, and their relation to the topography, these two exposures cannot be correlated definitely. In this respect, however, the possibility of a cross-fault between these workings as indicated in the "Campbell" adit, should be considered.

In the "Cabin" vein drift the vein is well-defined and generally well-mineralized. Starting at 12 feet from the portal and extending for 60 feet along the drift, a band of massive

galena and sphalerite mineralization 0.5 to 8.2 inches wide and averaging 4.5 inches in width, occurs on the hanging-wall. The vein shows shearing and the walls are generally well-defined with a development of gouge, especially on the hanging-wall. In the face of the adit the fissure filling is composed of reticulated quartz veins and stringers and sheared formation 4.6 feet wide with streaks, veinlets, and patches of pyrite, galena, and sphalerite. A sample in the face, across 4.6 feet, assayed: Gold, trace; silver, 12 oz. per ton; copper, 0.4 per cent.; lead, 4.2 per cent.; zinc, 4.5 per cent. A sample across 2 feet, 41 feet from the portal, assayed: Gold, 0.08 oz. per ton; silver, 5.6 oz. per ton; copper, 0.2 per cent.; lead, 4.2 per cent.; zinc, 4.5 per cent. A composite sample of the hanging-wall band in the "Cabin" adit for a length of 45 feet and an average width of 4.5 inches, commencing at 6 feet from the face, assayed: Gold, 0.04 oz. per ton; silver, 37.5 oz. per ton; copper, 0.8 per cent.; lead, 8.5 per cent.; zinc, 10.5 per cent.

Surface continuity of the "Cabin" vein beyond the limits of the open-cut has not been definitely established. About 137 feet south-easterly a trench exposes an undelimited width of 6 inches of mineralized and oxidized quartz, assaying: Gold, 0.10 oz. per ton; silver, 6 oz. per ton; copper, trace; lead, 0.5 per cent.; zinc, 0.5 per cent.

For further exploration of the showings on this property more stripping, trenching, and open-cutting is required to establish surface continuity and possible correlation of the "Cabin" and "McKay" showings in the interval between these workings. Surface continuity of the "Cabin" vein to the west of the "Cabin" workings and of the "McKay" vein to the east of the "McKay" workings could also be investigated by means of stripping, trenching, and open-cutting. Interval trenching, stripping, and open-cutting between the "McKay" workings and the old shaft at 2,300 feet elevation, 550 feet north-easterly, could also be done to establish the possible correlation of the cross-structure at the "McKay" workings with the structure at the old shaft.

Based on the dip of the "Cabin" vein as exposed in the "Cabin" vein surface workings, it is improbable that the vein in the drift off the long crosscut at 1,945 feet elevation can be correlated with this. On the other hand, depth-projection of the "Cabin" vein and strike-correlation indicates its possible relationship with the third structure, 162 feet southerly of the drift. Between these two levels is a vertical back of 237 feet and vein-back of 313 feet. A raise on this structure from the main crosscut adit to the "Cabin" vein shaft would determine possible correlation between the two veins, establish possible depth-continuity of the "Cabin" vein, and would also explore two possible vein-intersection areas indicated as possibly occurring at about 100 and 194 feet along the projection of the raise. Any encouraging mineralization encountered in this work would require additional exploration by sub-level drifting.

From the "Campbell" adit workings, the continuation of the raise and sub-levelling from it would not only further explore the continuity of the mineralization in this section of this vein, but would also establish some clarity in structural relationship between this vein, the exposures in the "McKay" workings, and the possibly intersecting fault.

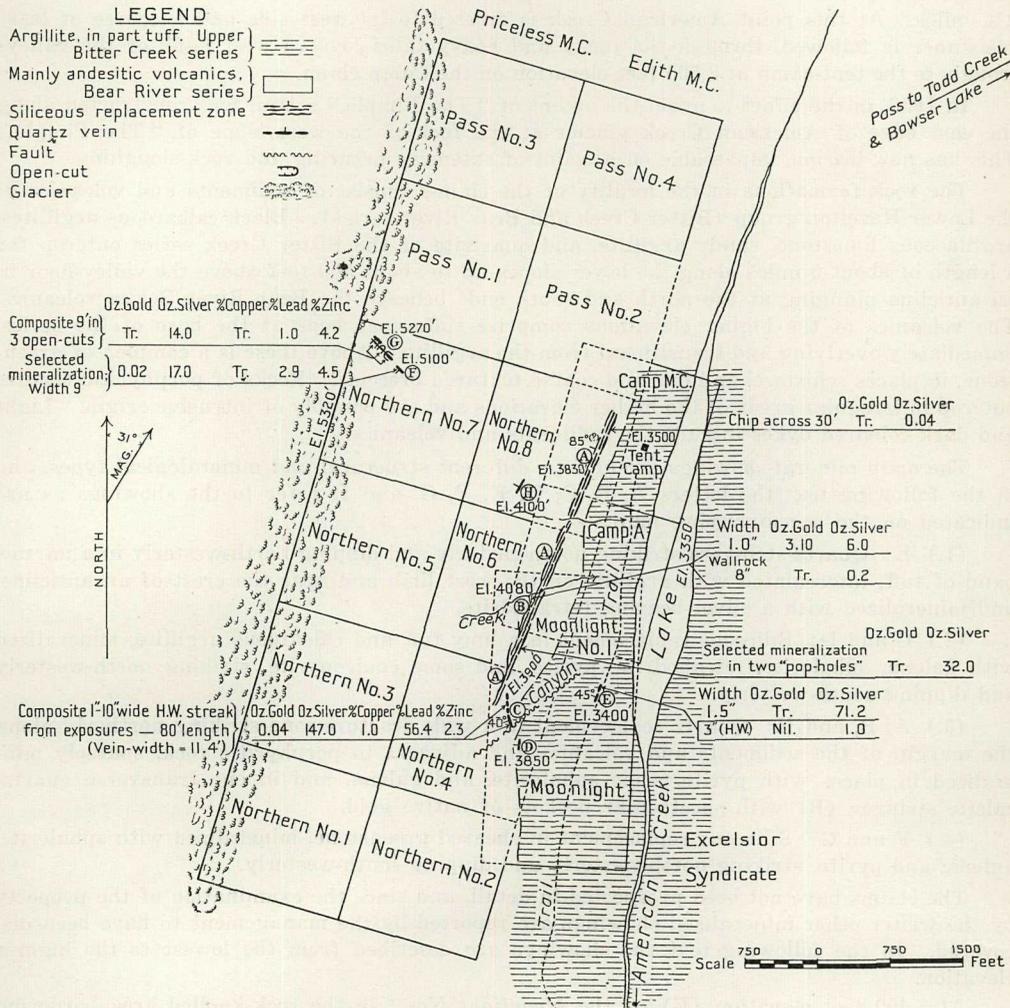
The results so far achieved by exploration of the property indicate that the objective of further exploration would be the possibility of indicating and proving a sufficient tonnage of milling-grade silver-lead-zinc ore to warrant mill-concentrator construction.

The grade of mineralization exposed on the property by exploration to the present time does not indicate the possibility for accumulation of any appreciable quantity of shipping-grade ore to assist appreciably in defraying the cost of further preliminary exploration.

#### AMERICAN CREEK AREA, STEWART, PORTLAND CANAL.

**North-Western Aerial Prospectors, Ltd.** This company was incorporated in British Columbia in 1930, to take over the properties of the North-Western Prospectors Syndicate. The authorized capital is \$50,000, divided into 500 shares of \$100 par value. The head office is at Stewart, B.C., and L. S. Davidson is the president. The property comprises the *Pass No. 1, No. 2, No. 3, No. 4, Northern No. 1, No. 2, No. 3, No. 4, No. 5, No. 6, No. 7, No. 8, Moonlight, Moonlight No. 1, Camp A, and Camp* unsurveyed mineral claims. The claims are situated between 3,300 and 5,400 feet elevation on the west side of American Creek, towards its head, and about 27 miles from seaboard at the Stewart dock. The topography of the area is rugged, and the locality of the claims is above timberline, with only scattered patches of small and gnarled mountain spruce. An extensive glacier

covers the range-crest bordering the valley, and has probably receded in comparatively recent time from the valley-bottom and flanking slopes. In the locality of the claims the hill slopes generally at about 20 degrees from the valley-bottom to the crest of the range, and the slopes are covered with heavy talus, through which vertical rock bluffs protrude. Towards the valley-bottom rock knolls and benched rock ridges fronted by steep grassy slopes are features of the topography.



North-Western Aerial Prospectors, Ltd., American Creek.

The property is reached by the Stewart-Bear River Motor-road from Stewart dock to the confluence of American Creek with the Bear River, at 420 feet elevation, a distance of about 14 miles. From this point a tractor-trail extends up the west side of American Creek for about 3½ miles to the "Mountain Boy" ridge at about 1,000 feet elevation. At this point a trail gradually descends to the moraine and slide-covered valley-bottom at about 800 feet elevation, along which it continues for about 2 miles and then ascends the timbered bench to the old American Mining and Milling cabin at about 1,200 feet elevation. From this point the trail continues for 3 miles to the south margin of the American Creek transverse glacier at 1,750 feet elevation, following in turn the wet valley-bottom, then rising to the top of a muskeg-covered bench and descending again to the wet valley-bottom at the glacier, a total distance of about 8½ miles from the Bear River Motor-road. Formerly the route crossed the

moraine and glacier to its north side at about 2,250 feet elevation. With the rapid recession of the glacier this route has become impassable. At the present time the route crosses American Creek to its east side at the foot of the glacier, and the trail continues up the steep south rock-slope of the bluffy ridge buttressing the glacier-front, and locally termed "The Pimple." This is ascended by a series of short and very steep switchbacks to an elevation of 3,800 feet, a distance of about 1½ miles. From this point the trail gradually descends the north slope of "The Pimple" to the valley-bottom at 3,200 feet elevation, a distance of 2½ miles. At this point American Creek is crossed to its west side and a course of least resistance is followed, through the rocky and heavy talus-covered west flank of the valley-trough, to the tent-camp at 3,500 feet elevation on the *Camp* claim.

In 1936, in the effort to avoid the ascent of "The Pimple," a trail was constructed along the east edge of American Creek glacier at the foot of the west slope of "The Pimple." This has now become impassable on account of extensive fissuring and rock-sloughing.

The rock formations in the locality of the claims consist of sediments and volcanics of the Lower Hazelton group (Bitter Creek and Bear River series). Black calcareous argillites, argillaceous limestone, sandy argillite, and quartzite of the Bitter Creek series outcrop for a length of about 5 miles along the lower slopes up to about 500 feet above the valley-floor in an anticline plunging at the north and south ends beneath the Bear River Series volcanics. The volcanics of the higher elevations comprise tuffaceous beds at the base of the series, immediately overlying and transitional from the argillite. Above these is a complex of greenstone, in places schistose, and fine and coarse textured breccias. Rocks of porphyritic texture outcrop in irregular areas of the higher elevations and are possibly of intrusive origin. Light and dark coloured dykes intrude the sediments and volcanics.

The main mineral-showings are of four different structural and mineralogical types, and in the following text the letters A, B, C, D, E, F, G, and H refer to the showings as are indicated on the accompanying map:—

(1.) E: Quartz stringers striking north-easterly and dipping north-westerly in a narrow band of tuff, intercalated with argillite on the west limb and near the crest of an anticline, and mineralized with a silver-bearing tetrahedrite.

(2.) C and D: Siliceous replacement in a limy tuff and calcareous argillite, mineralized with galena, sphalerite, tetrahedrite, pyrite, and some chalcopyrite, striking north-westerly and dipping south-westerly.

(3.) A, B, and H: Quartz replacement in a wide fracture-zone striking northerly along the margin of the sediments and volcanics and adjacent to porphyritic rock, sparsely mineralized in places with pyrite, some sphalerite, and galena, and in one transverse quartz-calcite stringer (B) with spectacular pockets of native gold.

(4.) F and G: Siliceous replacement in sheared greenstone, mineralized with sphalerite, galena, and pyrite, striking north-westerly and dipping south-westerly.

The claims have not been prospected in detail, and since the examination of the property by the writer other mineralized showings are reported by the management to have been discovered. In the following text the showings are described from the lowest to the highest elevation.

At 3,400 feet elevation (E) on the *Moonlight No. 1* in the rock-knolled area bordering the west side of the valley-bottom three quartz stringers, 1 to 3 inches wide, mineralized in places with blebs and patches of tetrahedrite, galena, and chalcopyrite, outcrop in bands of tuff. Some work has been done on a quartz stringer 1 to 2 inches wide outcropping in a lenticular band of limy tuff about 30 feet wide between narrow beds of calcareous argillite. The argillite strikes north 27 degrees east and dips 40 degrees north-westerly. On the east side of the valley the sediments strike northerly and dip 40 degrees easterly. The quartz stringer strikes north 21 degrees east and dips 45 degrees north-westerly. It has been traced about 100 feet by three shallow open-cuts and two open-cuts 4 feet deep and 50 feet apart. A combined sample of the stringer in the bottom of the two deep cuts across a width of 1.5 inches, mineralized with some tetrahedrite, pyrite, and galena, assayed: Gold, trace; silver, 71.2 oz. per ton. A sample across 3 inches of pyritized tuff on the hanging-wall assayed: Gold, *nil*; silver, 1 oz. per ton. During the 1935 season several sacks of sorted high-grade ore from these stringers were shipped.

At an elevation of 3,900 feet, a limy tuff-bed (C), mineralized with galena, tetrahedrite, some sphalerite, pyrite, and chalcopyrite, occurs slightly west of and just above a vertical bluff that marks the crest of the underlying argillite. Adjacent and paralleling the tuff-bed on the east is a bluffed ridge of porphyritic rock. The mineralized bed occupies the gently-sloping depression between the argillite bluff and the porphyry bluffs. The tuff-bed is appreciably oxidized, the iron oxide resulting mainly from siderite or ankerite. It has been traced for about 270 feet by natural exposure and a series of small open-cuts and "pop-holes," and is best exposed up to a width of 11.4 feet along 80 feet of its southerly section. In this section a streak 1 to 10 inches wide of fairly solid galena with tetrahedrite, sphalerite, and chalcopyrite occurs on both the hanging- and foot-wall, with some cross-veinlets and blebs of mineralization extending into the central portion of the bed. A sample of selected mineralization from the hanging- and foot-wall streak 1 to 10 inches wide along the southerly 80 feet of the exposure assayed: Gold, 0.04 oz. per ton; silver, 147 oz. per ton; copper, 1 per cent.; lead, 56.4 per cent.; zinc, 2.3 per cent. To the north the possible continuity is obscured by talus. To the south, overburden obscures the possible continuity. Further continuity in this direction is possibly prevented by a probable transverse fault striking north 51 degrees east. This is marked by a deep canyon in the argillite to the north-east and a defined depression in the direction of its south-westerly projection in the volcanics. In the bluffs of the north side of the canyon several lamprophyre dykes outcrop, and the fault is further indicated by their abrupt termination and absence in the argillite of the south bluff.

At about an elevation of 3,850 feet and 150 feet southerly of the last exposure of (C) a brecciated quartz vein (D), mineralized with resinous sphalerite, galena, and chalcopyrite, outcrops in argillite along the face of the steep bluff. This was inaccessible for detailed examination, but it is reported by the management to have been traced towards the south for about 150 feet, where it tapers to 2 inches in width and appears to die.

At 4,000 feet elevation and 750 feet northerly from (C) a quartz-replacement zone (A), 50 to 75 feet wide, outcrops in the sediments and volcanics of the Bear River Series adjacent to and westerly of the argillite. Comparatively unaltered sections of the zone suggest replacement in a porphyritic rock that may be intrusive into the sediments. The zone is exposed along a hummocky bench which in places is faced on its east side with abrupt vertical bluffs extending above the adjacent sediments. It strikes north 21 degrees east and appears to dip steeply westerly into the hill. To the north from this point it can be traced by natural exposure for a distance of about 2,500 feet. The continuation of the zone to the south can be seen but was not examined. The zone consists of a network of quartz veins, patches, and stringers, with intervening partly-replaced areas. From the main body many quartz veinlets and stringers strike at acute angles into the hanging- and foot-walls. In places these lateral stringers constitute a network of appreciable width. The rock between the stringers and quartz bands is generally sparsely mineralized with disseminated pyrite. The quartz of the zone is generally "vuggy" or cellular and barren, but a sparse mineralization with pyrite and sphalerite was seen in two small sections. With the exception of a few small "pop-holes" no work has been done on the main zone. A sample of selected mineralization from two "pop-holes" in the central section of the zone, showing sparse mineralization of pyrite with some sphalerite and tetrahedrite, assayed: Gold, trace; silver, 32 oz. per ton. A chip sample across a width of 30 feet of the zone towards its north end assayed: Gold, trace; silver, 0.04 oz. per ton. For preliminary prospecting and sampling of this zone, a series of transverse open-cuts 3 to 4 feet deep would be required.

At 4,080 feet, on the south side of a creek-gulch, spectacular pockets of crystalline, arborescent native gold, were discovered in 1936 in a lateral quartz-calcite stringer (B) branching from the main replacement-zone (A) on its hanging-wall side and outcropping in the face of a small bluff flanking the creek-trough. Three stringers 1 to 4 inches wide, 4 and 15 to 20 feet apart, striking north 16 degrees east and dipping steeply westerly, outcrop in the calcareous tuff of the bluff face. The gold occurs in the central stringer in its exposure in the bluff face between 4,080 feet elevation, 20 feet above the talus and snow-filled creek-bottom, and 4,140 feet elevation at the crest of the bluff. From the crest of the bluff the stringer, 1 to 5 inches wide, can be traced southerly for 50 feet towards the main zone, where it appears to pinch out. Beyond this to the south other stringers outcrop but cannot be definitely correlated with the gold-bearing one. To the north, towards the creek, continuity

is obscured by talus and snow in the creek-trough. In the rock bluff on the north side of the creek the stringer has not been located. In the bluff face on the south side of the creek and just above the talus-slope, the stringer has been opened up by a main open-cut 6 feet wide and about 12 feet long, and in this cut the most spectacular gold-pockets were discovered. Above this and about 15 feet apart two smaller cuts have also been excavated. In the main cut on August 18th the stringer was  $\frac{1}{2}$  to  $1\frac{1}{2}$  inches in width, and consisted of calcite and "vuggy" or honeycomb quartz with sparse mineralization, mainly in the calcite, of galena cubes  $\frac{1}{8}$  inch in diameter, sphalerite, chalcopyrite, and an occasional small branch of arborescent gold. The wall-rock for about 10 inches bordering the stringer showed silicification and disseminated pyrite. A sample of the stringer in the face of the cut, across a width of 1 inch and a height of 3 feet, assayed: Gold, 3.10 oz. per ton; silver, 6 oz. per ton. A sample across 8 inches of the hanging-wall, showing silicification and disseminated pyrite, assayed: Gold, trace; silver, 0.2 oz. per ton.

In late August, 1937, 61.378 dry pounds of selected vein-material from this showing (B) was shipped to the Trail smelter and returned an assay of 387.7975 oz. gold per ton and 164.4 oz. silver per ton. An additional lot of selected high-grade material weighing 55.575 troy ounces was also shipped to Trail and treated as bullion. This was fluxed and melted, and yielded 9.825 oz. of bullion of a fineness of 667.43 parts gold and 287.6 parts silver. Subsequent to the above shipments, additional selected high-grade gold ore is reported by the management to have been mined from the stringer.

At 4,100 feet elevation and about 1,500 feet northerly of (B) a band of quartz and siliceous replacement (H), 3 feet wide, mineralized with pyrite, occurs in an outcrop of porphyritic rock. The band strikes north 21 degrees east, parallel to the zone (A) the dip is not clear, and it can be traced for only about 20 feet, continuity in both directions being obscured by talus.

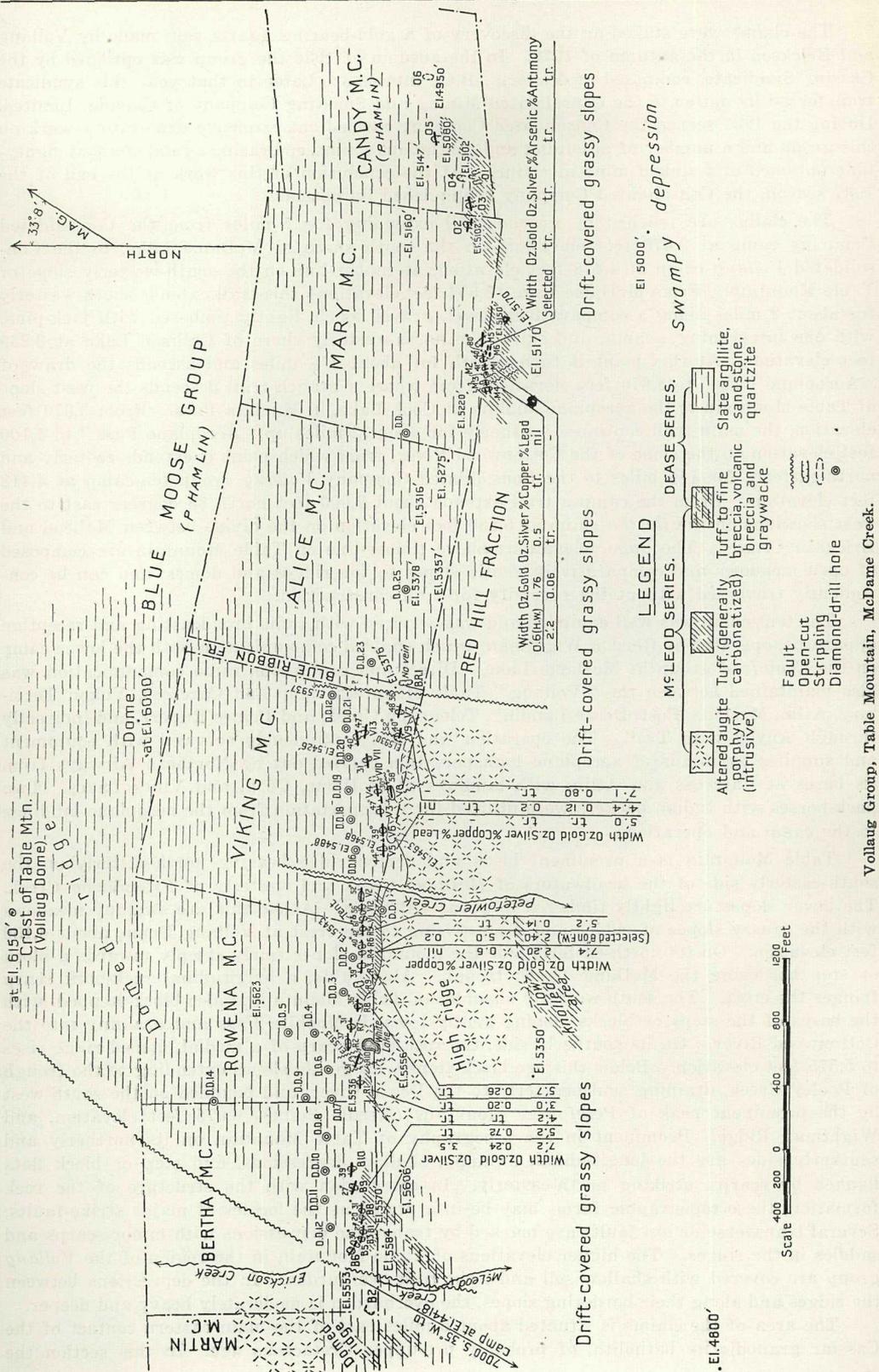
Traversing north-westerly from (H), a wide belt of coarse and fine breccias is crossed to about 5,000 feet elevation. North-westerly from this, sheared greenstones form the bluffs of the range-crest and extend to the extensive glacier which blankets the summit.

At 5,100 feet elevation on the *Northern No. 7*, about 1,725 feet north-westerly from (H), a quartz-replacement zone (F) in sheared greenstone, mineralized with streaks and blebs of resinous sphalerite, some galena and pyrite across 9 feet, outcrops at the base of a vertical bluff. The attitude of the zone is not clear, but it appears to strike north 39 degrees west and dip steeply south-westerly. To the south-east the possible continuity is obscured by talus, and towards the north-west the vertical bluff face does not permit examination.

At the crest of the bluff, between 5,260 and 5,270 feet elevation and about 225 feet north-westerly from (F), three open-cuts (G) along a distance of 60 feet expose a zone with mineralization across 4, 5, and 17 feet, similar to that seen at (F), in sheared greenstone. In these cuts the mineralized zone strikes north 49 degrees west, but the dip is not clear. A composite chip sample from the three open-cuts, representing an aggregate width of 9 feet, assayed: Gold, trace; silver, 14 oz. per ton; copper, trace; lead, 1 per cent.; zinc, 4.2 per cent. The zone can be traced from near the edge of the bluff at its south-east extremity to 20 feet north-westerly of the most westerly cut, a total distance of 80 feet. At its north-westerly end it is not so well defined. This zone cannot be definitely correlated with the showing (F) at the foot of the bluff from which it is offset to the north. Continuity to the south-east is prevented by the inaccessible bluff face and to the north-west is obscured by talus and the adjacent glacier of the summit.

#### MCDAME CREEK AREA.

This group, comprising the *Martin, Bertha, Rowena, Viking, Blue Ribbon Vollaug Group*, *Fraction, Alice, Mary*, and *Sunrise Fraction* mineral claims, is owned by John Vollaug and Hans Erickson, of McDame Creek. The claims are staked from east to west, between about 5,100 and 6,000 feet elevation along the ridged and domed crest of Table Mountain, which flanks the headwaters basin of McDame Creek on the south. The three westerly claims straddle the west shoulder of the mountain, sloping northerly to McDame Creek and southerly to the Cottonwood River and Pooley Creek, tributaries of Dease River. The easterly claims occupy the southerly slope of Table Mountain to Pooley Creek.



The claims were staked on the discovery of a gold-bearing quartz vein made by Vollaug and Erickson in the autumn of 1935. In the autumn of 1936 the group was optioned by the Cassiar Syndicate, composed of Victoria, B.C., interests. Later in that year this syndicate transferred its option to the Consolidated Mining and Smelting Company of Canada, Limited. During the 1937 season the Consolidated Company carried out extensive exploratory-work on this group and a number of adjoining and contiguous claims, embracing a total of about eighty-nine optioned and staked mineral claims. At the conclusion of this work at the end of the 1937 season, the Consolidated Company relinquished its options.

The claims are reached by a good trail extending for 7 miles from the Consolidated Company camp at 3,070 feet elevation, on the south shore of McDame Lake, to the Consolidated *Vollaug* camp at 4,418 feet elevation, at timber-line on the south-westerly slope of Table Mountain. From McDame Lake (3,054 feet elevation) this trail extends south-westerly for about 2 miles along a comparatively level, gravel bench, lightly timbered with jack-pine, with one intervening swamp, and skirts the north-westerly shore of Callison Lake at 3,259 feet elevation. At this point it turns south for about 1½ miles and ascends the draw of "Aeroplane Pass" to 3,670 feet elevation, from where a branch trail descends the west slope of Table Mountain to the aeroplane landing at Cook Lake, in Machita Pass. From 3,670 feet elevation, the main trail continues southerly for about 2 miles up "Aeroplane Pass" to 4,100 feet elevation on the slope of the Cottonwood River, from which point it extends easterly and north-easterly for 1½ miles to the Consolidated Company *Vollaug* group ten-camp at 4,418 feet elevation. From the camp a trail extends about 7,000 feet north 35 degrees east to the west showings on the *Bertha* claim at 5,550 feet elevation on the divide between McLeod and Erickson Creeks. The upper elevations above timber-line on Table Mountain are composed of open meadows and comparatively gentle slopes to the ridges and domes, and can be conveniently traversed without the necessity for trail construction.

The tent-camp was well equipped and was serviced with radio broadcasting and reception apparatus, operated by Gordon Wightman, which enabled communication with the lower camp on the *Crawford* group at McDame Lake. Direct and continuous radio communication was also maintained between the "Vollaug" Table Mountain camp and Carcross, Yukon Territory, Atlin, McDame Post, Dease Landing, Telegraph Creek, and Prince Rupert, and indirectly through Anyox with Trail. The operation was also continuously serviced with equipment and supplies by means of aeroplane transportation carried out by Northern Airways from its bases at Carcross and Atlin, with landings at McDame, Cook, and Vines Lakes. Two pack-horses with Indian packers were utilized for transportation from the aeroplane landings to the camp and operations.

Table Mountain is a prominent block and domed ridge bearing north-easterly on the south-easterly side of the headwaters of McDame Creek and westerly of Friendlison Creek. The lower slopes are lightly timbered to about 4,450 feet. Above this are swampy meadows with the grassy slopes of ridges and domes rising to the crest at Vollaug Dome, about 6,150 feet elevation. On its north-easterly side the mountain slopes fairly steeply towards a block or step bordering the McDame Creek trough. Above this, a longitudinal rock-bluff scarp fringes the crest. The south-westerly shoulder of Table Mountain is also block-stepped, with the bases of the steps or blocks sloping gently towards Machita Pass and draining into the Cottonwood River. On its southerly side, the rock-bluff scarp of a medial, domed ridge rises to 5,575 feet elevation. Below this are block-steps with gentle slopes extending to the trough of Pooley Creek, draining south-easterly to the Dease River, and bounded on the south-west by the prominent peak of Petefowler Mountain (Needle Point), 6,675 feet elevation, and Wightman Ridge. Prominent in the topography of Table Mountain on its northerly and southerly sides are the longitudinal, swampy, shallow depressions, and step or block flats flanked by scarps, striking north-easterly. In correlation with the structure of the rock formation, these topographic forms may be interpreted as the locales of major strike-faults. Several transverse or dip faults are marked by transverse depressions with minor scarps and saddles in the ridges. The higher elevations of Table Mountain in the region of the *Vollaug* group are covered with shallow soil and light rock overburden. In the depressions between the ridges and along their bordering slopes, the overburden is moderately heavy and deeper.

The area of the claims is situated about 6 miles east of the main eastern contact of the Cassiar granodiorite batholith, of probably pre-upper Cretaceous age. In this section the

contact crosses the Dease and Cottonwood Rivers and strikes north about 1 mile west of Petefowler Mountain (Needle Point) to Twin Peaks. Dease series sediments of Palæozoic to possibly Mesozoic age underlie the higher elevations of Table Mountain and embrace its crest at 6,150 feet elevation on Vollaug Dome. A complex of mainly igneous rocks, which on account of their structural and lithological aspects may be correlated with the McLeod series of Mesozoic age, underlie the lower slopes of Table Mountain on its north-westerly, west, and south-westerly sides. On the north-westerly slope these extend from the west side of Erickson Creek gully to McDame and Callison Lakes. On the westerly and south-westerly side of Table Mountain the igneous complex underlies the slopes to Machita Pass and the headwaters of Pooley Creek ("Aeroplane Pass") and extends about 4½ miles south-west to Petefowler Mountain (Needle Point) and Wightman Ridge. To the south-east a broad belt of mainly igneous rocks of the McLeod series, with some sediments, occurs south-east and south of the headwaters of Friendlison Creek, and embraces the rugged area of Ellamadge Mountain ("Greenstone Mountain"), which forms the dividing range between Pooley Creek trough on the west side and Hunter Creek trough on the east.

The Dease series sediments of the higher elevations of Table Mountain in the region of the *Vollaug* group consist of black to brownish and grey thinly-bedded shale and slate; black to greyish calcareous and sandy argillite; buff and grey bedded quartzite, and some thin beds of greyish-brown fine-grained sandstone. On account of the lithological similarity of these sediments with the Dease series occurring in other sections of the McDame Creek area, the sediments underlying the higher elevations of Table Mountain in the locality of the *Vollaug* group have been correlated with the Dease series. In the Table Mountain area they strike generally slightly north of west and dip northerly at moderate angles. Locally they are gently folded, and on the crest the slates and interbedded sandstone dip flatly south with the sandstone exhibiting crumpling and the slates pronounced crenulation. The axial planes of the crenulations incline towards the north.

The igneous rock-complex underlying the higher and lower slopes of Table Mountain encircle the sediments of the crest area on at least three sides. On the higher slopes in the locality of the claims and adjacent to the mineral deposit, they are composed of carbonatized tuffs with rusty outcrops; partly bedded fine-grained agglomerate or volcanic breccia; siliceous graywacke; altered tuffaceous flow-rocks; and fine-textured altered porphyritic rocks. The tuffs are composed of a fine-grained complex of secondary minerals in which calcite is a dominant constituent. Locally, they show a suggestion of bedding and are transitional into fine-grained agglomerate or volcanic breccia and graywacke. The agglomerate or volcanic breccia is composed of rounded to angular fragments of volcanic rock in which "ghosts" of feldspar laths appear. The cementing medium is generally relatively meagre and may be either volcanic dust or flow material. The graywacke is a medium- to fine-grained dark grey to black rock containing abundant dark quartz-grains. Locally it contains pyrite specks or rusty cavities from the oxidation of this mineral.

The tuffaceous flow-rock is highly altered greenstone in which the texture is mostly obliterated by alteration in which carbonatization is dominant. The porphyritic rocks possess a granular texture and no evident flow texture. The materials composing them are mainly formed by alteration, and consist of abundant carbonate, smaller amounts of epidote, chlorite, iron oxide, kaolin, and fine-grained quartz. The carbonate and epidote have replaced feldspar laths, and some quartz suggests recrystallization of original quartz. Other phases are a mainly highly-altered complex of calcite, decomposed feldspar, chlorite, epidote, and kaolin, in which the outlines of original feldspar laths can be discerned. Locally in its areal distribution, the borders of the rock are characterized by bands of clean talcose soapstone up to several feet in thickness. The rock is now a carbonatized greenstone and may have originally been an intrusive possessing the composition of dacite or augite porphyry. The rock of the north peak of Petefowler Mountain is composed of fine flakes of actinolite, with granular aggregates of zoisite, epidote, chlorite with actinolite, and feldspar with some grains of clear orthoclase, probably constituting a basic igneous rock. The south peak of Petefowler Mountain consists mainly of altered andesite.

The contacts of the porphyritic rocks are generally definite and sharp. The margins of the invading rock are fine-textured and dense, with only a small degree of assimilation in

places. Locally the invaded sediments are hardened or silicified, and the cleavage or bedding obscured or obliterated.

In the Table Mountain area, the tuffaceous rocks are distributed in "en echelon" bands or beds intercalated in the flow-rocks or unconformably along the subjacent contacts of the intrusive porphyritic rocks. On account of the lithological similarity this igneous complex is correlated with the McLeod series of other sections of the McDame Creek area.

In the Table Mountain area, especially in the locality of the workings on the *Vollaug* group, the distribution and structural relation of the Dease sediments and the McLeod igneous rocks indicates severe structural complication. Here, the "Vollaug" vein, conforming in attitude to the argillite and slate, occupies the border between the sediments on its hanging-wall and the tuffs, tuffaceous sediments, and subjacent flows and porphyritic rocks on its foot-wall. The Dease sediments overlie the McLeod igneous complex along the strike of the vein. On the crest of the mountain at Vollaug Dome, the slates are pronouncedly crenulated and slightly overturned to the south. On the northerly and southerly slopes of Table Mountain, the projected dip of the Dease sediments also overlies the McLeod series. This structure is not definitely interpreted, but field evidence indicates that it probably resulted from a major thrust-fault striking easterly and dipping northerly, approximately conformable to the bedding, with the "Vollaug" vein now occupying approximately the plane of the thrust. The first north-slope scarp probably marks the locale of a later reverse diagonal fault striking north-easterly and dipping north-westerly, which would elevate the depth-projection of the vein in the north or upthrow block of this fault. Fault breccia occurs on the projection of this fault in the saddle of the west shoulder at the divide between Erickson and McLeod Creeks, and the vein adjacent to the fault on its east or downthrow side is pronouncedly crumpled, dragged to the north and terminates. It has not been located west of this fault. On the northerly slope of Table Mountain, towards the trough of McDame Creek, the scarps and block topography indicate the possible recurrence of normal or reverse parallel longitudinal faulting, possibly along planes of incompetence between the tuffs and crystalline igneous rocks of the McLeod series. On the southerly slope of the mountain toward Pooley Creek the scarped topography also indicates parallel, step longitudinal faulting. Several minor transverse faults and one minor longitudinal wedge-fault dislocate the vein along its strike.

The mineral deposit is a quartz vein that has been traced for 3,400 feet across the *Bertha*, *Rowena*, and *Viking* mineral claims by means of natural outcrops and a series of thirty open-cuts and trenches. In this stretch between cut B6 (5,550 feet elevation) on its west end and cut V7 (5,379 feet elevation) on its east end, which constitutes the westerly section of the workings, the exposed vein varies from 0.5 to 9.5 feet in width and averages 4.9 feet in width. About 120 feet east of cut V7, the easterly continuity is intersected by a transverse fault. At the west end, west of cut B6, the vein terminates at the diagonal fault occupying a saddle in the west shoulder of the mountain at the divide between McLeod and Erickson Creeks.

Along the line of strike for 2,120 feet easterly of cut V7 to 5,150 feet elevation at the south boundary of the *Mary* mineral claim, there are no surface exposures, and in this section the vein-outcrop is probably offset into the *Red Hill Fraction* south of the south boundary of the *Alice* claim. In a series of trenches, cuts, and outcrops at 5,150 feet elevation along the south boundary of the *Mary* claim, quartz stringers varying from 8 inches to 2.2 feet in width are exposed in the cuts, and a few irregular, dense quartz veins and lenses outcrop adjacent to the cuts on the south. East of this, on the slope of Friendlison Creek, there is an increasingly thick covering of overburden, and at the time of examination in July, only quartz stringers 4 to 10 inches in width had been exposed in some of the trenches. The narrow quartz exposures in the stretch east of cut V7 are possibly in alignment with the strike of the structure in the westerly section west of cut V7, and probably represent the dispersal phase of the vein in a wide belt of sediments, tuffaceous sediments, and tuffs. Several small transverse faults and one small longitudinal wedge-fault intersect the vein along its strike and are indicated on the map.

The vein occurs in the plane of a thrust-fault which, at its outcrop, occupies a defined but flat trench on or near the boundary of the McLeod igneous rocks and the Dease sediments, and has resulted in the thrusting of the older sediments over the younger igneous rocks.

The vein outcrops wholly or partly in the argillite. Sediments or partly sediments would constitute the major proportion of the host-rock. The hanging-wall rock is argillite and arenaceous argillite. Along the strike of the vein the footwall-rock varies from argillite to siliceous graywacke, fine-grained agglomerate or volcanic breccia, and carbonatized tuff, with locally adjacent tuffaceous flow-rocks and, in one section, an adjacent stretch of fine-textured, probably intrusive, porphyritic rock. The tuffaceous rocks of the foot-wall appear to be distributed in lenticular "en echelon" beds. Both the immediately adjacent hanging- and foot-wall rocks are pronouncedly crushed and crumpled, and locally, bands of foliated schist and talcose soapstone occur, transitional into greenstone and altered porphyritic rock.

The vein is best defined and more regular in width along a stretch of 2,500 feet of its westerly section. In this section, between cut R1 and V7, a boss-like mass of porphyritic, probably intrusive, rock is adjacent to it on its footwall-side. In the wider areas of argillite, and especially in the carbonatized tuff, it tends to disperse in stringers. This occurs in some short sections along the outcrop of the best-defined west section of the vein, but appears to prevail to a pronounced degree along the projection of the structure in the wide area of sediments of the east section, east of cut V7. Interpretation of this structure indicates a degree of lenticular quartz distribution along the strike of the vein and the dependence of continuity down the dip upon the relative distribution in depth of the sediments and competent tuffs and adjacent crystalline intrusives.

The general strike of the vein is slightly north of west, but in short distances different sections, exclusive of those portions disturbed by faulting, vary in strike between north 74 degrees west and south 86 degrees west. In the undisturbed portions of the vein the dip also varies along short distances between 30 and 61 degrees northerly.

The vein-filling consists of bone-white quartz with some phases tending to a cloudy-dark and blackish discoloration from included black, graphitic argillite particles and streaks. The quartz is generally barren of sulphides, but locally contains a very sparing mineralization of pyrite, chalcopyrite, tetrahedrite, and galena in scattered small blebs. A pronounced ribbon-structure is a typical characteristic of the vein, and fine flakes of native gold occur in the ribbons of some sections. In some sections of the outcrops, the ribboned sections alternate with dense white quartz sections, and occur on both the hanging-wall and foot-wall side or in the central section. Under the magnifying glass, fine veinings of a darker-coloured and glassy quartz can be seen cutting the main quartz mass and each other and frequently parallel the ribboning. This suggests more than one period of quartz deposition. In some of the best-defined sections of the vein the quartz is also frequently interlayered with streaks, bands, and lenticular masses of slate, graphitic argillite, tuffaceous sediments, and carbonatized tuff, from a fraction of an inch to over a foot in width. This suggests that the tendency of the vein to disperse and "stringer-out" prevails also in the more solid sections, and a rapid transition from a confined or compact condition of the vein to a dispersal in stringers could readily occur where control is lacking.

At the time of examination by the writer in July, the vein was being explored by the Consolidated Mining and Smelting Company of Canada, Limited, by means of trenching, stripping, open-cutting, and diamond-drilling, under the direction of McLeod White, assisted by H. S. Fowler. The locations of the diamond-drill holes completed at the time of examination are shown on the map. The following tabulation describes the vein exposures and relative conditions in the various surface workings along the outcrop from west to east, as indicated on the map:—

B2—Elevation 5,590 feet. Trench in argillite. No vein.

B6—Elevation 5,550 feet. Ribboned and sheeted quartz vein 2 feet wide, with bands of slickensided graphitic argillite. Fine gold flakes in the ribbons. Vein somewhat shattered and pronouncedly dragged to north. Hanging-wall badly crushed argillite; foot-wall badly crushed argillite and tuffaceous sediments.

B5—Elevation 5,565 feet. Badly shattered and crumpled ribboned quartz vein and stringers across 1.5 feet. Hanging-wall crushed carbonatized tuff with green patches and streaks of fuchsite. Foot-wall badly crushed slate and arenaceous argillite.

B3—Elevation 5,570 feet. Sheeted and ribboned quartz vein 4 feet in width with inter-layered bands of rock. The vein strikes north 41 degrees west and dips 30 degrees north-

easterly. Hanging-wall crushed and decomposed argillite; foot-wall crushed and decomposed carbonatized tuff.

B1—Elevation 5,570 feet. Sheeted and ribboned quartz vein 7.2 feet wide, with interlayered bands of slate 6 inches in width. Flakes of native gold occur in the ribbons on the hanging-wall side with some specks of chalcopyrite with malachite and azurite. The vein strikes south 83 degrees west and dips 27 degrees towards north. Hanging-wall is crushed and decomposed argillite; foot-wall not exposed. A sample across 7.2 feet assayed: Gold, 0.24 oz. per ton; silver, 3.5 oz. per ton.

In a trench 12 feet long and 1.5 feet deep, 10 feet easterly of B1, the foot-wall section of the vein is exposed.

In an open-cut 108 feet easterly of B1, the vein is 5 feet in width and similar in character, and strikes north 78 degrees west and dips 20 degrees north-easterly.

B8—Elevation 5,568 feet. Sheeted and ribboned quartz vein, strike north 78 degrees west, dip 31 degrees north-easterly, 7 feet wide, with interlayered bands of slate from 6 to 12 inches wide. Fine native gold flakes occur in a ribboned section on the hanging-wall side with some tetrahedrite, malachite, and azurite. Hanging-wall rock is not exposed; foot-wall is a crushed, fine agglomerate or volcanic breccia transitional from a fine-textured carbonatized tuff.

B9—Elevation 5,560 feet. Sheeted and ribboned quartz vein 9.5 feet wide with some, though diminished, interlayered bands of slate. Fine flakes of native gold occur in the ribbons. Blebs of chalcopyrite and tetrahedrite with malachite and azurite also occur. The vein strikes north 49 degrees west and dips at 27 degrees towards north-east. The hanging-wall is crushed argillite; the foot-wall is crushed, fine agglomerate or volcanic breccia. A sample across the vein for 5.2 feet assayed: Gold, 0.72 oz. per ton; silver, trace.

B10—Elevation 5,560 feet. Vein offset from B9 by a possible transverse fault. Quartz vein 1.9 feet wide pronouncedly interlayered with graphitic, arenaceous argillite with quartz stringers. The vein strikes north 87 degrees west and dips at 39 degrees northerly. Hanging-wall is crushed argillite; foot-wall is crushed argillite with fine agglomerate and volcanic breccia bordering it at 30 feet to the south.

For 400 feet east of B10, between B10 and cut R1, the terrain is underlain by mainly carbonatized tuff and argillite. From R1, for about 2,400 feet easterly, the exposed vein is adjacent on its foot-wall side to a boss of intrusive porphyritic rock.

R1—Elevation 5,535 feet. Compact quartz vein 4.2 feet wide with pronounced ribbon-structure and some sparse specks of tetrahedrite. The strike is north 67 degrees west and dip 32 degrees north-easterly. The hanging-wall is crushed argillite; the foot-wall is crushed and decomposed calcareous argillite adjacent on the south to quartzite, graywacke, foliated schist, greenstone, and intrusive porphyritic rock. A sample across 4.2 feet assayed: Gold, trace; silver, trace.

R10—Elevation 5,510 feet. Compact quartz vein 5.1 feet wide; pronounced ribbon-structure on hanging-wall and foot-wall sides. No evident mineralization. Hanging-wall decomposed argillite; foot-wall not exposed, but adjacent are volcanic and intrusive porphyritic rocks.

R2—Elevation 5,513 feet; 140 feet north-easterly from R10. Compact quartz vein 3.9 feet wide with moderate ribbon-structure. No evident mineralization. The strike is north 82 degrees west and dip 37 degrees north. On hanging-wall is micaceous foliated altered rock; on foot-wall is crushed siliceous and calcareous material transitional at 30 feet to the south into graywacke and at 60 feet into greenstone and intrusive porphyritic rock.

R7—Elevation 5,520 feet. Compact quartz vein 3 feet wide, with ribbon-structure across 1.5 feet on the hanging-wall. The strike is north 77 degrees west and dip 31 degrees northerly. The hanging-wall is crushed argillite, the foot-wall is impure quartzite with quartz and calcite stringers, adjacent to greenstone and intrusive porphyritic rock.

R8—Elevation 5,520 feet. Compact quartz vein 3.2 feet wide with defined ribbon-structure. No evident mineralization. The strike is north 77 degrees west and dip 36 degrees northerly. The hanging-wall is crushed calcareous argillite; the foot-wall is impure quartzite adjacent to greenstone and intrusive porphyritic rock. A sample across 3.2 feet assayed: Gold, 0.20 oz. per ton; silver, trace.

R9—Elevation 5,515 feet. A quartz stringer 6 inches wide. The hanging- and foot-wall is composed of crushed and oxidized material.

R3—Elevation 5,530 feet. Well-ribboned quartz vein 5.7 feet in width, slightly inter-layered with argillite. No evident mineralization. The vein strikes north 74 degrees west and dips at 39 degrees north-easterly. The hanging-wall is crushed, calcareous argillite; the foot-wall is impure quartzite with some specks of chalcopryrite and malachite stain, adjacent to greenstone and porphyritic rock. A sample across 5.7 feet assayed: Gold, 0.26 oz. per ton; silver, trace.

R4—Elevation 5,527 feet. Well-ribboned quartz vein 7.4 feet in width, slightly inter-layered with rock. Fine flakes of native gold occur in the ribbons of a section 8 to 12 inches wide on the foot-wall, accompanied by blebs of chalcopryrite, galena, tetrahedrite, and azurite. The vein strikes north 74 degrees west and dips at 39 degrees northerly. The hanging-wall is crushed slate; the foot-wall is crushed impure quartzite, adjacent to a micaceous foliated rock with some talcose soapstone transitional into greenstone and porphyritic, intrusive rock. A sample across 7.4 feet assayed: Gold, 2.20 oz. per ton; silver, 0.6 oz. per ton; copper, *nil*. A selected sample across 8 inches of the ribboned section with azurite, on the foot-wall, assayed: Gold, 2.40 oz. per ton; silver, 5 oz. per ton; copper, 0.2 per cent.

R6—Elevation 5,527 feet. Compact and well-ribboned quartz vein 5.7 feet wide. Some blebs of chalcopryrite with malachite on foot-wall. The vein strikes north 77 degrees west and dips 40 degrees northerly. Hanging- and foot-wall rocks are the same as at R4.

R5—Elevation 5,523 feet. Compact, ribboned quartz vein 7.9 feet in width. In well-ribboned section 3.5 feet wide in centre, fine flakes of native gold occur in some ribbons with chalcopryrite and malachite. The vein strikes south 88 degrees west and dips 42 degrees northerly. The hanging-wall is crushed arenaceous argillite; the foot-wall is crushed siliceous agglomerate with quartz stringers immediately adjacent to the vein. Adjacent to this on the south is micaceous, foliated rock, transitional into greenstone and porphyritic intrusive rock.

V1—Elevation 5,520 feet. Compact, well-ribboned quartz vein, 4 feet in width. The vein strikes north 84 degrees west and dips 61 degrees northerly. The hanging-wall rock is not exposed, but argillite and sandstone occur in the bluffs about 100 feet to the north; the foot-wall is crushed, transitional agglomerate and graywacke adjacent to greenstone and porphyritic rock. Thirty feet east of V1, a pit 3 feet deep shows quartz in the bottom.

V12—Elevation 5,510 feet. Compact, ribboned quartz vein 4 feet in width, well-ribboned across 2 feet on the foot-wall. Fine flakes of native gold occur in the ribbons. Sparse blebs of chalcopryrite and tetrahedrite. The vein strikes north 82 degrees west and dips 56 degrees northerly. The hanging-wall is crushed and decomposed argillite; the foot-wall is the same as at V1.

V2—Elevation 5,500 feet. Well-ribboned quartz vein 5.2 feet wide; interlayered on the hanging-wall with 10 inches of argillite and a band of quartz 12 inches wide. The vein strikes north 87 degrees west and dips 52 degrees northerly. Adjacent to the hanging-wall is arenaceous argillite; adjacent to the foot-wall the rocks are as at V12 and V1. A sample across 5.2 feet assayed: Gold, 0.14 oz. per ton; silver, trace. East of V2 is the draw of a transverse fault.

V5—Elevation 5,468 feet. Compact, well-ribboned quartz vein 5 feet in width. No evident mineralization. The vein strikes north 87 degrees west and dips 44 degrees northerly. The hanging-wall is crushed argillite; the foot-wall is siliceous agglomerate and graywacke adjacent to greenstone. A sample across 5 feet assayed: Gold, trace; silver, trace. East of and between V5 and V6 the vein outcrops along a low medial ridge.

V6—Elevation 5,460 feet. Compact quartz vein 6 feet in width, well-ribboned across 3 feet on the hanging-wall side. No evident mineralization. The vein strikes north 87 degrees west and dips 39 degrees northerly. The hanging-wall is crushed argillite; the foot-wall siliceous agglomerate and graywacke adjacent to greenstone and porphyritic intrusive rock. East of this working to V3, the vein outcrops along the edge of a low medial ridge.

V3—Elevation 5,445 feet. Compact, slightly-ribboned quartz vein 6.8 feet in width, striking north 87 degrees west and dipping 47 degrees northerly. No evident mineralization. The hanging-wall is not exposed but arenaceous argillite and slate are adjacent on the north;

the foot-wall is siliceous agglomerate and graywacke adjacent to greenstone and porphyritic intrusive rock. Easterly of this working to V4, the vein outcrops along the edge of a low medial ridge.

To the south is a small wedge-block fault between a minor longitudinal and two minor transverse faults.

To the east from V3, the continuation of the vein swings north, away from the intrusive rock to the south, in conformity to the slope of a transverse gully.

V4—Elevation 5,435 feet. Deep overburden. Pit down the dip, 8 feet deep at the face. Compact quartz vein 2 feet wide, strike south 86 degrees west, dip 45 degrees northerly. No evident mineralization. The hanging-wall is crushed decomposed argillite; the foot-wall is quartzose agglomerate and graywacke.

V10—Elevation 5,415 feet. Caved trench 2 to 6 feet deep. Some quartz on the dump.

V11—Elevation 5,400 feet. Compact quartz vein 3 feet in width, strike south 86 degrees west, dip 31 degrees northerly. No evident mineralization. The hanging-wall is crushed argillite; the foot-wall is not exposed.

V13—Elevation 5,382 feet. In open-cut, barren, dense, quartz stringer 4 to 12 inches wide, strike north 87 degrees west, dip 40 degrees northerly. The hanging- and foot-wall rock is crushed and decomposed arenaceous argillite. At 25 feet south, in the trench, is a compact well-ribboned quartz vein 2.7 feet wide, strike south 63 degrees west, dip 47 degrees north-westerly. The hanging-wall is crushed and decomposed argillite; the foot-wall is crushed and decomposed agglomerate and graywacke with green streaks of fuchsite.

In the gully of the *Blue Ribbon Fraction*, adjacent to V13 on the east, is a major transverse fault. The continuation of the vein-outcrop in the easterly-adjointing *Alice* claim has not been established. In this section the structure is probably thrown south of the south boundary of the *Alice* and into the southerly-adjointing *Red Hill Fraction*.

V8—Elevation 5,430 feet; 60 feet south of cut V4 and in the downthrow block of the wedge-fault. The cut abuts the angle between the longitudinal fault-plane and the west transverse fault-plane of the block. The longitudinal fault forms the north face of the cut and strikes north 73 degrees east and dips 58 degrees southerly. The transverse fault forms the west wall of the cut and strikes north 25 degrees west and dips north-easterly. The plane of the transverse fault is slickensided and brecciated, and its foot-wall is porphyritic, intrusive rock. The working exposes a compact, well-ribboned quartz vein 9.5 feet in width, strike south 83 degrees west, dip 30 degrees northerly. There is no evident mineralization. The foot-wall of the longitudinal fault is siliceous agglomerate and graywacke. The foot-wall of the vein is siliceous agglomerate and graywacke adjacent to greenstone and porphyritic intrusive rock.

Of interest is the comparison of the compact and well-developed character of the vein in this exposure adjacent to the intrusive on its foot-wall, as opposed to its tendency to rapid dispersal in the exposures farther removed from the intrusive at cuts V4, V10, V11, and V13 in the upthrow block. In view of the fact that the latter represent the continuation of the vein down the dip on the footwall-side of the transverse fault, the marked difference in the character of the vein in these two positions is significant.

V9—Elevation 5,390 feet; 350 feet south-easterly from cut V8 and 215 feet southerly from cut V13. This exposure is in a minor, intertransverse fault-block of the downthrow wedge described under V8, and its significance relative to the V4, V10, V11, and V13 exposures in the upthrow block is similarly indicative. The intertransverse fault-plane strikes north 23 degrees east and dips 52 degrees south-easterly. It abuts on and forms the west side of the cut. The plane of the fault is brecciated and slickensided and its foot-wall is tuffaceous chert adjacent to and intermixed with porphyritic intrusive rock. The vein is offset to the south from its alignment at V8. The vein is compact, well-ribboned quartz 4.4 feet in width, striking north 68 degrees west and dipping 40 degrees north-easterly. On the hanging-wall side, sparse blebs of galena and chalcopyrite with malachite occur. The hanging-wall is crushed, siliceous argillite; the foot-wall is crushed and oxidized. A sample across 4.4 feet assayed: Gold, 0.12 oz. per ton; silver, 0.2 oz. per ton; copper, trace; lead, *nil*.

V7—Elevation 5,368 feet. This exposure is the continuation of the vein from V9 in the intertransverse fault-block of the downthrow wedge, described under V8, and its significance relative to the V4, V10, V11, and V13 exposures in the upthrow block is similarly indicative.

It is a compact quartz vein, 9.1 feet in width, well-ribbed on the hanging-wall and foot-wall sides, striking north 68 degrees west and dipping from 48 to 56 degrees north-easterly. Sparse specks of chalcopyrite with malachite occur on the foot-wall side. The hanging-wall rock is obscured by sloughed soil. The foot-wall is impure quartzite adjacent to greenstone and porphyritic intrusive rock. A sample across 7.1 feet (excluding 2 feet on the hanging-wall) assayed: Gold, 0.80 oz. per ton; silver, trace.

The continuation of the vein to the east is disrupted by a major transverse fault which occupies the gully contiguous to the east of cut V7. The immediate easterly continuation is probably offset south into the *Red Hill Fraction*.

BR1—Elevation 5,370 feet. No vein.

M4—Elevation 5,193 feet. Two dense quartz stringers, 6 and 8 inches wide 17 feet apart, striking respectively north 78 degrees east and north 33 degrees east. Between the stringers are several quartz veinlets. The formation is crushed and oxidized carbonatized tuff.

M3—Elevation 5,193 feet. At the south end of the trench is exposed a compact quartz vein 1.3 feet in width, striking west and dipping 15 degrees north. A width of 7 inches on the hanging-wall is well-ribbed, and fine flakes of native gold occur in the ribbons, with some galena and tetrahedrite blebs. The hanging-wall is crushed carbonatized tuff adjacent to crushed agglomerate and graywacke; the foot-wall rock is not exposed. Two minor transverse faults adjacent on the east and west of the working offset this vein-segment slightly to the north. A sample of the ribbed hanging-wall streak 7 inches in width assayed: Gold, 1.76 oz. per ton; silver, 0.5 oz. per ton; copper, trace; lead, *nil*.

M2—Elevation 5,185 feet. A dense and partly-ribbed quartz vein 14 to 26 inches in width is exposed, striking south 85 degrees west and dipping 27 degrees towards the north. A length of 9 feet of the vein in the west end of the working is crumpled and well-ribbed, with fine flakes of native gold occurring in the ribbons. The hanging-wall is crushed argillite; the foot-wall is crushed, fine agglomerate and carbonatized tuff.

M1—Elevation 5,181 feet. Well-ribbed quartz vein 2.2 feet in width, striking south 62 degrees west and dipping 41 degrees north-westerly. The hanging-wall is crushed argillite; the foot-wall is crushed and oxidized carbonatized tuff. A sample across 2.2 feet assayed: Gold, 0.06 oz. per ton; silver, trace.

M6—Elevation 5,150 feet. A dense quartz stringer 8 inches in width, slightly ribbed and with limonite patches and streaks, is exposed. This stringer strikes south 73 degrees west and dips 40 degrees northerly. The hanging-wall is crushed argillite; the foot-wall is crushed and oxidized carbonatized tuff.

In the centre of a small draw 60 feet south-easterly of this working, a dense, barren quartz vein, 20 inches in width, outcrops in carbonatized tuff for 50 feet, striking south 82 degrees west and dipping 80 degrees north. On a low medial ridge about 25 feet southerly of this, several small, dense and barren quartz stringers and lenses outcrop in quartzite and siliceous greenstone. These quartz bodies differ in type to the "Vollaug" vein and are similar to the quartz bodies occurring in the McDame Creek basin area in the greenstone-tuff phase of the McLeod series. The north rim of this ridge shows siliceous replacement with sparsely disseminated arsenopyrite. A selected sample of this assayed: Gold, trace; silver, trace; arsenic, trace; antimony, trace.

M5—Elevation 5,147 feet. At 29 feet from the portal of the cut a dense white quartz stringer is exposed, striking south-easterly. The hanging-wall is crushed and decomposed arenaceous argillite; the foot-wall is oxidized carbonatized tuff.

O2—Elevation 5,102 feet. For 20 feet from the portal is oxidized, carbonatized tuff with several dense and barren quartz stringers. Beyond this the cut is sloughed.

O3—Elevation 5,107 feet. A ribbed quartz vein 10 inches in width striking north-easterly and dipping north-westerly is exposed. The hanging-wall is crushed siliceous argillite; the foot-wall is crushed and oxidized carbonatized tuff, with a band of soapstone cutting through it at 30 feet from the portal of the cut.

O4—Elevation 5,102 feet. No vein.

O1—Outcrops on a low ridge between O1 and O4, and is exposed in trenches with a band of soapstone along 30 feet of the northerly end of the central trench. No vein.

O5—Elevation 5,080 feet. A dense and barren quartz stringer 6 to 8 inches in width occurs in decomposed argillaceous rock. Greenstone outcrops adjacent to the portal of the incline.

O6—Elevation about 4,960 feet. The pit is in clay and talus and does not reach bed-rock.

On the east of O6, down the flat slope of Friendlison Creek trough, the terrain is covered with an appreciable thickness of overburden. At the time of examination by the writer (July) no work had been done east of O6. Diamond-drilling by the Consolidated Company had, however, progressed east from the locality of cut B6 at the west end of the west section, and was proceeding at a set-up 600 feet north-west of cut M4. Two diamond-drills were being used in the exploratory-work, with the second investigating the dip-continuity of the west section of the "Vollaug" vein along the north slope of Table Mountain, east of Erickson Creek.

On the westerly slope of the west shoulder of Table Mountain, several hundred feet west and south-west of the *Bertha* claim, several irregular bodies of dense, bone-white, barren quartz outcrop in porphyritic intrusive rock adjacent to its easterly contact with quartzite. These are similar in type to the quartz-bodies of the McDame Creek basin area as described in the *Bird*, *Homestake*, and *Crawford* group special reports. They are entirely different in character, attitude, and alignment from the "Vollaug" vein, with which they cannot be correlated.

**Crawford  
Claims.**

F. Crawford and associates, of McDame Creek, own a block of twenty-eight claims and fractions located on the south side of McDame Lake on the north slope of Table Mountain. In 1937 these were optioned by the Consolidated Mining and Smelting Company of Canada, who carried out an extensive programme of exploration by trenching, stripping, open-cutting, and shallow shaft-sinking, with a crew of fourteen men under the direction of McLeod White and Phil Emery.

The claims are reached by a branch trail from the main McDame Creek trail extending for about 3 miles from "Wing's Camp" at 3,475 feet elevation to the north shore of McDame Lake at 3,054 feet elevation. The lake, about a quarter of a mile wide, is crossed by a primitive rowboat to its south shore. The tent-camp is located on a dry gravel bench timbered with jack-pine, fronting and 16 feet above the lake. The freighting of supplies and equipment for this operation and for that of the Consolidated Company on the *Vollaug* group on Table Mountain was continuously carried out throughout the season by Northern Airways, Limited, from its air bases at Atlin and Carcross, and with landings on McDame and Cook Lakes. The McDame Lake camp was equipped with radio broadcasting and receiving apparatus, enabling radio communication with the Table Mountain camp, and from thence direct communication with McDame Post, Dease Landing, Atlin, Carcross, and Prince Rupert, and by relay through the latter three places with Anyox and Trail.

A series of timbered rock knolls and ridges, bearing east-west, parallel to McDame Lake and rising to 300 and 400 feet above the lake, occupies a belt about three-quarters of a mile wide between the lake and the north slope of Table Mountain. The low-lying area between the knolls and ridges is deeply covered with gravel-wash and frequent swamps. The main showings are located on the slopes of the ridges and knolls.

The locality is situated about 6 miles east of the main eastern contact of the Cassiar granodiorite batholith which, in this area, strikes north across the Cottonwood River at Twin Peaks and about a mile west of Petefowler Mountain (Needle Point). The area of the main showings is underlain chiefly by intrusive rocks, with some bands and lenticular areas of tuff of the McLeod Series of possibly Jurassic age. The intrusive rocks vary from fine-grained to granular and coarse diabasic textures, and are possibly composed in part of closely-spaced dykes of varying but generally appreciable width, striking north-easterly. They are altered by carbonatization and development of epidote, chlorite, sericite, and kaolin, but may have originally possessed the composition of dacite and augite porphyry.

White quartz veins, 1 to 9 feet wide, strike north to north-easterly and dip generally steeply south-easterly. They are lenticular and appear to occupy an "en echelon" arrangement of fissuring parallel to the strike of the intrusive belt. The structure suggests an intimate relation between the quartz bodies and the intrusive complex and the possible occurrence of the veins, at least in part, along the contacts of the dyke-phases of these rocks with each other and with narrow included or intercalated bands of tuff. The rock-alteration

already referred to is especially pronounced adjacent to the veins, and in some instances the wall-rocks are appreciably silicified and impregnated with disseminated pyrite. In some veins minute streaks of a dark and glassy quartz can be observed under the magnifying-glass interlacing the white "bone quartz" and intersecting each other, indicating a quartz-filling of at least two succeeding ages. A sparse mineralization of pyrite is locally associated with the glassy, darker quartz streaks.

The veins are generally barren of sulphide mineralization, and where such does occur it is sparingly distributed. Occasional isolated blebs of what is possibly a variety of tennantite, and small blebs of chalcopyrite, also occur. The quartz is frequently vuggy and cellular, and these small cavities probably originate from the decomposition of iron sulphides or included ferruginous carbonate gangue. Sparse particles of native gold up to about the size of rice were observed in quartz cavities in one vein, and also adhering to limonite in cellular quartz on the dump from another vein. The veins are generally rusty and the quartz frequently contains streaks and patches of ankerite. The rusty filament on the quartz and the limonite in the cavities probably originates from both the pyrite and ankerite.

Trenching, stripping, open-cutting, and shallow shaft-sinking was being carried out by the Consolidated Company on the main showings on the *Camp, Porcupine, and Lakeview* claims, and general prospecting of the optioned holdings was also proceeding.

The showings on the *Porcupine* claim occur on the slopes of a rock ridge a short distance easterly of the camp. At 3,090 feet elevation at the foot of this ridge, about 200 feet easterly from the camp, an open-cut exposes two contiguous rusty quartz veins 3 and 2.5 feet wide. The veins outcrop in oxidized carbonatized rock and are separated by a band of decomposed rock, 2 feet wide. The quartz is fractured and contains bands of limonite and ankerite. The veins strike north 88 degrees east and dip 75 degrees south. The southerly vein is naturally exposed for 30 feet in an easterly direction, but further continuity in both directions is obscured by overburden.

At 3,085 feet elevation and 80 feet southerly of this, an open-cut exposes a quartz vein striking south 79 degrees east and dipping 80 degrees southerly, in oxidized and carbonatized tuff. The quartz is rusty and contains some limonite streaks, but no metallic mineralization was observed. It is stripped for a length of 14 feet, and further continuity at both ends is obscured by deep gravel overburden.

At an elevation of 3,110 feet, and 250 feet north 56 degrees east from this, a pit 8 to 10 feet deep has been sunk on a vein 6.6 feet wide. This vein occurs in greenstone, strikes north 79 degrees east and dips 57 degrees south-easterly. The walls of the vein are not well-defined, and the adjacent greenstone shows siliceous replacement and is impregnated with small pyrite crystals for a width of 18 inches on each side of the vein. The main body of the quartz in the vein is bone-white and dense-textured. It contains bands of ankerite and is very sparsely mineralized with isolated blebs of tetrahedrite with some intermixed specks of chalcopyrite. Along the centre of the vein, however, a plane of refracturing is filled for a width of 8 to 10 inches with a dark-coloured glassy quartz mineralized with blebs, streaks, and small patches of crystalline pyrite. A sample of this mineralized centre streak, across 8 to 10 inches, assayed: Gold, trace; silver, trace. A sample of the main body of the "bone" quartz on each side of the centre streak at the bottom of the pit, across a width of 5.5 feet, showing a sparse mineralization of tetrahedrite, chalcopyrite, and some ankerite films, assayed: Gold, trace; silver, 0.6 oz. per ton. A sample of the pyritized and silicified wall-rock across 12 inches of the hanging- and foot-wall sides (total 24 inches) assayed: Gold, trace; silver, trace.

At 3,110 feet elevation, 80 feet north-easterly of this vein and in approximate alignment with its strike, a trench in overburden 18 inches deep exposes a barren, rusty quartz vein 2.5 feet wide. This vein outcrops in a decomposed carbonatized rock, strikes north 73 degrees east and dips 55 degrees south-easterly. At 3,110 feet elevation, 28 feet north 73 degrees east from this, a trench exposes oxidized and sheared rock 20 inches in width, striking north 68 degrees east and dipping steeply south-easterly. At 3,135 feet elevation and 60 feet north-easterly of this, a pit 5 feet deep exposes a width of 2 feet of rusty quartz and oxidized rock striking north 73 degrees east and dipping steeply south-easterly.

At 3,125 feet elevation and 50 feet north-westerly of the second trench at 3,110 feet elevation an open-cut exposes a rusty and fractured quartz vein 5 feet wide, striking south

87 degrees east and dipping vertically. This vein has been stripped for 12 feet in an easterly direction from the cut, and the continuity at both ends of the exposure is obscured by overburden. The quartz contains some ankerite bands and is very sparsely mineralized with an occasional bleb of tetrahedrite and some chalcopyrite. At 60 feet east, in alignment with the strike, a cross-trench 9 feet long, 10 feet deep, and 3 feet wide in overburden does not reach bed-rock.

At 3,075 feet elevation at the base of the southerly slope of this ridge and 200 feet south 67 degrees east from the second-mentioned showing at 3,085 feet elevation, a shaft 10 feet deep exposes a barren quartz vein 20 inches wide at the collar and 10 inches wide at the bottom. This vein occurs in oxidized, carbonatized tuff, strikes south 67 degrees east and dips 65 degrees south-westerly. At 70 feet south-easterly and in approximate alignment, a cross-trench 20 feet long and 3 feet deep has been dug in gravel-wash adjacent to a swampy depression. The gravel and topography at this locality suggests the possible site of an old abandoned stream-channel.

The *Camp* claim showings are located at about 3,080 feet elevation and about 2,000 feet south-easterly from the camp. These are situated in an area of low rock knolls around the base of the south-easterly slope of the "Porcupine" ridge, adjacent to and northerly of a swampy depression and about half a mile south of the east end of McDame Lake. In this locality a white quartz vein 2 feet wide outcrops in altered augite porphyry for a length of about 30 feet along the base and on the south side of a small knoll. The vein strikes north 65 degrees east and dips 50 degrees south-easterly. The quartz is vuggy and cellular and a few specks of gold up to about the size of rice are seen in it, generally in the vugs. Pyrite also occurs very sparingly in small blebs. A selected sample from this vein, showing sparsely distributed pyrite and oxidized material in somewhat vuggy quartz, assayed: Gold, 0.10 oz. per ton; silver, trace.

About 200 feet south-westerly from this exposure across a gravel flat and offset about 50 feet south-east, a well-defined white quartz vein 1 to 3.2 feet wide outcrops in altered augite porphyry at the easterly end of another rock knoll. This vein strikes north 63 degrees east and dips 70 degrees south-easterly. A shaft, 12 feet deep, has been sunk at the north-easterly end of the exposure. In this the vein is 3.2 feet wide at the collar and 2.8 feet wide at the bottom and very sparsely mineralized with an occasional small bleb of tetrahedrite. Beyond this shaft, in a south-easterly direction, the vein has been stripped for 45 feet. At 30 feet along this stripping it diminishes to 12 inches in width, and at 45 feet continues in two stringers 1 and 6 inches wide. To the north-east, beyond the shaft the possible continuity in this direction is obscured by gravel overburden.

About 90 feet north of the first-mentioned vein on this claim, a barren white quartz vein 18 to 20 inches wide in altered augite porphyry is exposed for a length of 15 feet on the north side of the knoll. This vein strikes north 65 degrees east and dips 75 degrees south-easterly. Further continuity in both directions beyond this working is obscured by overburden. A possible continuation of this vein is found about 80 feet to the south-west, where a quartz vein 9 inches in width, striking north 65 degrees east and dipping 75 degrees south-easterly, is exposed in a small open-cut in low ground. A few minute specks of gold were observed in specimens on the dump at this working. About 15 feet south of this cut a lateral quartz stringer, 6 inches wide, outcrops.

The *Lakeview* claim showings are located about 2,500 feet south-westerly of the camp in an area of intrusive rocks and tuff bands, composing ridges and knolls bearing east-west, parallel to the south shore of McDame Lake. In this locality at 3,190 feet elevation on the northerly 30-degree slope of the ridge and about 700 feet southerly of the south shore of McDame Lake, an open-cut exposes a barren white quartz vein 5 feet in width. The vein strikes north 13 degrees east, is slightly rusty, and occurs in an appreciably oxidized rock. The dip is not clear. It is traced by shallow stripping for 15 feet in a southerly direction up the hill-slope, but the further continuity down the slope is obscured by overburden.

About 50 feet southerly from this at 3,240 feet elevation, and offset about 20 feet to the west, a shaft 12 feet deep exposes a quartz vein 8.3 feet wide in an appreciably oxidized and altered rock. This vein strikes north 11 degrees east and dips 75 degrees westerly. For a width of 1.5 feet on the hanging- and foot-wall sides the vein consists of dark quartz with pyrite blebs and siliceous, pyritized wall-rock. A sample of this mineralized section

across 18 inches on the hanging- and foot-walls (total 3 feet) assayed: Gold, trace; silver, trace.

At 3,240 feet elevation and 50 feet southerly, in alignment with the attitude of this vein, a pit 5 feet deep exposes oxidized and decomposed rock with some crushed quartz and a barren quartz stringer 8 inches in width. About 10 feet southerly from this, shallow stripping exposes oxidized and decomposed rock with some crushed quartz.

At an elevation of 3,250 feet on the southerly slope of the ridge and 370 feet southerly from the shaft, two open-cuts on the face of a rock-bluff expose a barren white quartz vein 6 feet in width. Several barren quartz outcrops in oxidized and decomposed rock, which is probably carbonatized tuff, also occur along the southerly base of this ridge. Several hundred feet southerly of the *Lakeview* showings, a series of barren quartz outcrops of appreciable width occupy protruding humps in a low terrain, and are naturally exposed at offset intervals along a general north-easterly bearing for a distance of about 400 feet. An open-cut in one such occurrence exposes an erratic body of dark-banded quartz with some disseminated pyrite in a rock-formation of argillaceous and tuffaceous sediments. These probably represent lenticular bodies of quartz in "en echelon" alignment.

At the conclusion of its exploration during the 1937 season, the Consolidated Mining and Smelting Company of Canada relinquished its option on these claims.

### PLACER-GOLD DEPOSITS.

#### O'DONNELL RIVER.

Field-work in this section during the 1937 season had as its main objective the commencement of a detailed study of the O'Donnel River area for the purpose of outlining a possible old channel or channels and the establishment of their location and continuity. As the majority of mining-work in this area has been and is being carried out in the central section of the main trough, and as this section is indicated as affording information that would assist in the delineation of the various factors governing the problem relative to the whole area, the work was initiated in this section. The following report must be considered as preliminary to the continuance of the work in future field-seasons and subject to modification in relation to factors and evidence that may be accumulated as the study progresses.

O'Donnel River flows into the east side of Atlin Lake about 14 miles south of the town of Atlin. It is about 30 miles long and is the largest stream flowing into Atlin Lake. The many tributaries of its headwaters and of the north side of its lower half drain an appreciable extent of the southerly slopes of the divide between it and the Surprise Lake drainage-trough. On the east it drains the westerly slopes of McMaster and Farnsworth Mountains which form the divide to the headwaters of the Sucker River.

The lower area of the river for about 3 miles from its mouth is underlain by mainly black slate, quartzite, and some schist. Above this, a belt of limestone about 3 miles wide strikes south-easterly across the trough. For the rest of its course to the headwaters the creek-trough is underlain by slate, quartzite, and schist, with some areas of volcanic breccia and calcareous and carbonatized rocks, adjacent on the east in the central section to a granitic boss forming McMaster Mountain.

In the early days of the Atlin camp, some gold was taken out by small hydraulic outfits and by individuals from the main river-valley and from several tributaries. In 1912 rich "pay" was discovered in a pre-Glacial channel or bench buried under a high bench in the central section, about 12½ miles from the mouth, and during 1913 there was a sizable rush to this stream. Considerable hydraulicking, drifting, and sluicing carried out on the bench-ground and in the creek-bed during that year yielded good values from scattered patches. Although an appreciable quantity of gold was extracted, a combination of factors, chief of which were insufficiency of water for hydraulicking and the flat gradient of the river, prevented the hopes for an extensive and sustained output being realized. Since that time small-scale drifting, some shovelling-in, and some spasmodic prospecting have been carried out.

For several years Nathan Murphy has operated continuously by drifting on flat, decomposed bed-rock under the west bench on the *Ethel M.* bench lease and has made satisfactory gold recoveries. During the 1937 season Murphy, with one assistant, reported values averaging about \$1 to the half-yard car, and a total recovery for the season of 33 oz. of gold valued at \$924, recovered from 500 yards of gravel sluiced.

This section is reached by a good motor-road extending for 32 miles from the town of Atlin (elevation 2,200 feet) to Nathan Murphy's camp (elevation 3,220 feet), on the west bench of the river.

In this section, the river has a gradient of about 0.97 per cent. and occupies a trough about 500 to 1,000 feet wide, striking north-easterly between banks composed of 100 to 200 feet of glacial drift and clay. Sections of weathered rim-rock are exposed at intervals along the base of the west bench.

In this section high rim-rock is extensively exposed along the east bank, and although some gold may be found in the remnants of pre-Glacial bench-gravel embayment-patches covering this rim-slope, there seems to be little chance for a main ancient channel to have broken through on this side. On the other hand, the low rim outcropping at intervals along the base of the high bench of the west bank is indicated as the probable east rim of a buried pre-Glacial channel or of an east bench of such a channel buried under the high bench of the west bank. This east rim strikes generally north 33 degrees east and where it has been crosscut from its east to its west side, slopes at varying angles to the west and flat decomposed bed-rock on this (west) side. In the Murphy workings at 625 feet from the adit-portal, the flat, decomposed bed-rock on the west side of the east rim is at 3,052 feet elevation, 17 feet higher than the portal of the adit and 64 feet above the level of O'Donnel River at this point. The old and present drifting operations also indicate that the pre-Glacial stream was of greater extent than the present river. The possibility that the main drift workings in Nathan Murphy's operation under the west bank may be on the site of a bench of the old channel is indicated by the steep westerly plunge of bed-rock at the westerly extremity of several adits, and also by the occurrence of patches of yellow gravel and weathered bed-rock in John Thomson's workings on the east bank of the river, about 1,200 feet north-easterly of Murphy's workings. In Murphy's workings, the bed-rock is flat to about 800 feet from the main adit-portal, where it plunges steeply west. This adit and its lateral workings also indicate that the ancient channel was a wide compound channel; that is, composed of a wavy bed-rock, between the humps of which were several subsidiary channels of varying width, rim-slope, and depth.

This condition would also explain what appeared to be a patchy occurrence of "pay" in the old workings. About thirty-eight or more adits of various lengths have been driven at different elevations along a stretch of about 2 miles of the west limit of this central section of the O'Donnel River in efforts to hit the extension of the flat bed-rock of Murphy's workings. Although some gold has been recovered on both the east and west sides of the east rim, in several of these adits, due to lack of the necessary surveying, they have been too high, too low, or not of sufficient length to reach the objective. It must also be considered that the bed-rock in Murphy's workings may be a bench of the old channel and, if so, it would not be consistently continuous.

The bearing of the east rim of the pre-Glacial channel or its bench in the old and present workings under the west bench, the local outcrop of this rim along the base of the west bench, the slight westerly embayment of this section of the O'Donnel trough and the upstream outcrop of rim-rock, indicates that the east rim of the buried pre-Glacial channel or its bench approaches to approximate coincidence with the west limit of the river-trough at 3,065 feet elevation at the southerly end of the upper canyon, about 1 mile above Murphy's adit. In places along this stretch the present stream has cut across and through the edge of the east rim with its possible pre-Glacial bench and may have produced some concentration of gold in the present creek-trough.

Gold, possibly contained in lenticular bands of stratified inter-Glacial wash of appreciable thickness occurring in the high moraine-bench confining the trough, would also be reconcentrated in the river-trough during its process of cutting-down. About 1,000 feet above the portal of Murphy's main adit, fair values in coarse gold have been recovered by Tom Prpich, from shovelling-in, on flat schist rim-rock under 6 to 8 feet of gravel, on the west bank of the river. The depth to bed-rock in the river-trough of this section is not known, and primitive pumping outfits have been inadequate to remove the water encountered in several attempts at shaft-sinking. The gradient of the O'Donnel River along the distance of about 1 mile above Murphy's adit to the upper canyon is 1.7 per cent. Below this for about  $1\frac{1}{4}$  miles along the river to the upper end of the lower canyon at 2,917 feet elevation, the gradient

of the stream is 0.97 per cent. For the total distance of about 2¼ miles between the two canyons, the composite gradient of the stream is 1.19 per cent., and the trough varies from about 300 to 1,000 feet in width between the confining east and west high benches of glacial moraine.

Above the southerly end of the first canyon, 1 mile above Murphy's adit, outcrops of the east and west rim-rock from 1,500 to 2,000 feet apart, confine the possible extension of the buried pre-Glacial channel along a bearing of north 33 degrees east, on the west side of and paralleling the O'Donnel trough.

At Canyon Creek, 3,115 feet elevation and 3 miles above Murphy's adit, the west side of the east rim crosses the creek at about 400 feet from its confluence with the O'Donnel, and the east side of the west rim at about 1,000 feet westerly from this. In this locality, a defined depression marks the gap between the east and west rim-outcrops, with the central point between the rims at 3,173 feet elevation in the locality of Murphy's refuge-cabin.

Down-stream from Murphy's main adit-workings, the O'Donnel trough swings slightly to the east, away from the down-stream projection of the buried pre-Glacial channel. At about 10,830 feet below Murphy's, at 2,855 feet elevation in the lower creek-canyon and 2,895 feet elevation on the top of the bench, the lower creek-canyon swings due west for three-quarters of a mile and extends across the southerly projection of the bearing of the pre-Glacial channel. Assuming an average gradient of 1 per cent. for the pre-Glacial channel or bench bed-rock as indicated in Murphy's workings, and projecting it from 3,052 feet elevation in Murphy's workings for a distance of 10,830 feet southerly, would place this pre-Glacial bed-rock at 2,944 feet elevation in the locality of the west swing in the lower canyon. In other words, this projection would place this pre-Glacial bed-rock 89 feet above the canyon-bottom and 49 feet above the top of the bench at this point.

Morainal hummocks bordering the margin of the west swing of the canyon and continuing in a line to the east and to the west, blue glacial clay resting on the top of the canyon rock-walls, together with some evidence of glacial grooving and the occurrence of defined "roche moutonnée" along the line of the continued southerly projection of the pre-Glacial bed-rock bearing to Dixie Lake, at 2,822 feet elevation, indicates the possible destruction by transverse glaciation of this old channel weathered bed-rock at some point between Murphy's workings and the west swing of the lower canyon. Should this bed-rock be that of a pre-Glacial bench with a deeper channel bordering it on its west side, it is possible the deeper channel may continue for some distance along the bearing of this southerly projection. Of importance in this consideration, however, is a wide major, transverse U-shaped valley extending north-westerly across this area from the Coast Mountains at the low divide to the headwaters of the Silver Salmon River, and merging to coincidence with the O'Donnel River valley along the course of its lower section to Atlin Lake at 2,200 feet elevation.

Between the Murphy workings and Canyon Creek there is the possibility for a buried subsidiary or tributary old channel bearing north-south along the lower, east slopes of the Laurie Range from the divide to the headwaters of Spruce Creek. In this area a drift-filled depression, striking north-south and occupied by Blind Creek, breaks through the west rim-rock of the O'Donnel old channel, a short distance west of Canyon Creek canyon. Canyon Creek in its present course quite apparently now occupies a youthful, consequent trough east of the centre line of its original valley, and has incised its bed along the fringe of the steep west slope of Melvin Mountain and cut its canyon through the west rim-rock of the O'Donnel old channel. Its old channel-site consequently must lie to the west, buried under the moraine filling the valley-trough, with its entry into the O'Donnel trough at an indicated break-through of the O'Donnel old channel east rim at 3,055 feet elevation in the O'Donnel trough, about 3,550 feet up-stream from Murphy's and about 1,650 feet below the upper canyon. In the upper section of Blind Creek some yellow gravel is exposed under glacial moraine, and in a swamp at 3,402 feet elevation the timbers of an old flooded shaft are located. In 1935, Neil Forbes and partners sank a shaft at 3,412 feet elevation in this locality in glacial moraine with yellow gravel at the bottom, but the shaft was flooded before bed-rock was reached.

In the headwaters area of the O'Donnel River, intermittent individual prospecting has been carried out over a period of years on Feather, Dixie, Slate, Carvell, and McKinley Creeks, and Bull Creek and its tributaries. Coarse gold has been discovered on these creeks and small recoveries have been made by individuals from time to time. No systematic or detailed

investigation of this upper area has as yet been made and its potentiality is unknown. From a small canvas-hose hydraulicking outfit on Bull Creek in 1904, a recovery of 100 oz. of gold is reported in the Annual Report of the Minister of Mines for that year. Between 1914 and 1921, John Noland, of Atlin, sank a shaft 52 feet to bed-rock in the vicinity of the fork of Feather and Dixie Creeks, and drifted 40 feet to the north-east and 160 feet to the south-west. He reports values of about  $\frac{1}{2}$  oz. of fine and coarse gold to the set, for a length of 40 feet south of the shaft. Noland also reports creek wash-gravel in this locality averaging 16 to 17 cents per cubic yard and gravel on "hard-pan" 4 to 6 feet below surface averaging 30 to 35 cents to the yard with gold valued at \$20 per ounce. The ground in this old working is reported by Nolan to be comparatively free from large boulders.

No data covering complete gold recovery in the O'Donnel River area are available, but some very rich patches are reported in the Annual Reports of the Minister of Mines to have been encountered in some of the old workings in the central section. Relative to this, Nathan Murphy cites the following tests, with gold figured at \$15.75 per ounce, of rich ground encountered in drifting under the bench at 400 feet in, in an old adit on the *Gold Hill* bench lease (now the *Grace*), a short distance down-stream from his present workings:—

Test No. 1: One pan, \$89.30.

Test No. 2: Rocking one wheelbarrow (five wheelbarrows to  $\frac{1}{2}$  cubic yard), \$61.40.

Test No. 3: Sluicing one car of gravel ( $\frac{1}{2}$  yard), \$108.50.

Test No. 4: Three pans of gravel, \$115.30.

Various references to the O'Donnel River area are contained in the Annual Reports of the Minister of Mines, British Columbia, for the years 1898, 1899, 1903, 1904, 1906, 1907, 1908, 1910, 1911, 1912, 1913, 1914, 1915, 1917, 1918, 1920, 1921, 1925, 1926, 1929, 1930, 1932, 1933, and in Bulletin No. 1, 1931, "Placer Mining in British Columbia."

#### SPECIAL REPORTS.

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

Stewart-Canal Gold Mines, Limited (N.P.L.).

Atlin Area: Last Chance Group; Snake Creek.

Red Reef Group.

Homestake Group.

Bird No. 1 and No. 2 Mineral Claims.

Hunter Group.

Cornucopia Group.

#### PROGRESS NOTES.

BY

CHARLES GRAHAM.

#### LODE-GOLD DEPOSITS.

##### ATLIN MINING DISTRICT.

##### *Tulsequah District.*

*Polaris-Taku Mining Co., Ltd.*—D. C. Sharpstone, general manager; B. B. Neiding, general superintendent. This is the only lode operation in the Mining Division, and is located on Whitewater Creek, a tributary of Tulsequah River, about 6 miles up from its junction with the Taku River.

This company started active prospecting and development on the property in 1935. Some drilling, open-cutting, and drifting had previously been done by the N. A. Timmins Corporation and the Alaska Juneau Mining Company. The property responded to development under the present management, and a 200-ton mill was erected during the summer and started milling ore on October 15th. Considerable drifting, crosscutting, and raising had been done and several stopes opened.

A 44-room bunk-house, together with a cook-house, dining-room, dry-room, and other buildings for the accommodation of the employees were built.

Additions were made to the Diesel power plant and a 625-k.v.a., 60-cycle, 440-volt hydro-electric plant was installed.

General conditions were good and 120 men are employed. Six miles of road was built from Taku River to the mine. Concentrates have to be stored during the winter as the Taku River is not navigable during the winter months.

#### PORTLAND CANAL MINING DIVISION.

##### *Salmon River Area.*

*Silbak Premier Mines, Ltd.*—B. F. Smith, general manager; J. G. Pearcey, mine superintendent.

Active development has been carried on in the *Sebakwe* and *B.C. Silver* sections; 14,836 feet of drifting and raising having been done and several stopes opened. Diamond-drilling has also been carried on continuously. The mine operated 313 days and produced 201,206 tons of ore, yielding 47,746 oz. gold and 913,510 oz. silver.

*Big Missouri Mine.*—Buena Vista Mining Company, owners; Consolidated Mining and Smelting Company of Canada, Limited, operators. D. S. Campbell, general superintendent; E. James, mine superintendent.

Development consisting of 952 feet of drifting, 245 feet of crosscutting, 2,768 feet of raising, and 753 feet of side-swiping, has been done. The 750-ton mill in course of construction will not be completed until about the end of February, 1938. It is located underground between the 2,100- and 2,300-foot levels on the Salmon River side of the ridge. Eighty thousand tons of rock was excavated for the mill-site, which is approximately 200 feet long, 60 feet wide, and 40 feet high. All storage-bins for raw and fine crushed ore are cut out of solid rock.

All the heavy equipment for the mill was hauled from the townsite over the Missouri Ridge and taken down the Salmon River side of the ridge by sleigh and tractor to the surface tramway between the 2,800- and 2,300-foot levels. The 2,300-foot level had to be widened and heightened to take the machinery. An inclined tramway was used underground to lower the equipment from the 2,300-foot level to the various sections of the mill. The small equipment was taken through the 2,800-foot level and lowered down the tramway.

A ventilating fan of 50,000 cubic feet per minute capacity is being installed to ventilate the mill section.

*Salmon Gold Mines, Ltd.*—Consolidated Mining and Smelting Company of Canada, Limited, operators; D. S. Campbell, general superintendent. The property is on Summit Lake, about 8 miles from the *Big Missouri*. The crosscut adit started in 1936 was extended to intersect the ore-zone, without encountering it. Operations can only be carried on during the summer months. Preparations have been made for an early start in 1938.

*Hercules Group.*—Consolidated Mining and Smelting Company of Canada, Limited, operators. Considerable diamond-drilling has been done from the surface. The 306 drift north in the 2,800-foot level of the *Big Missouri* mine has been extended 217 feet towards the *Hercules* Group.

*Troy Group.*—Lake and McDonald, owners. Some additional prospecting was done on this group during the summer.

Several other groups of prospectors did assessment-work on their claims.

##### *Bear River Area.*

*Stewart Canal Gold Mines.*—J. Haathi, manager. This property adjoins the *Oral M.* Some surface-stripping and a short drift was driven on one of the veins.

*Red Reef.*—This property also adjoins the *Oral M.* Some prospecting was done here.

*Rufus Argenta.*—A contract was let for driving 150 feet of tunnel. This contract was completed during the summer.

##### *American Creek Area.*

*American Boy.*—Some high-grade ore was mined and shipped by leasers from this property.

*Kansas Group.*—Sam Deschamps, owner of the group, made several small shipments of high-grade ore during the year.

*Marmot River Area.*

Several groups of prospectors did assessment-work on their claims.

*Georgia River Area.*

*Georgia River*, Gold Leasers, operators. A Hadsel dry-grinding mill was installed during the spring months. All the equipment for the mill had to be taken up on pack-horses or sleighs. The property is 10 miles from the beach and at 3,200 feet elevation.

Operations were commenced in May. As they had no reserves of broken ore, all mill requirements had to be mined daily. One stope was opened and another was being made ready. There was no ventilation in the stope and instructions were given to have a fan installed.

Operations were suspended at the end of August.

*Queen Charlotte Islands.*

*South Easter Mine.*—Skidegate Gold Mines, Limited. A Hadsel dry-grinding mill was installed at this property. Operations started about the beginning of December, 1936, and were suspended early in 1937.

## SKEENA MINING DIVISION.

*Coast Area.*

*Surf Inlet.*—Surf Inlet Consolidated Gold Mines, Limited; Angus McLeod, superintendent. Active operations have continued throughout the year, principally in the *Pugsley* vein where some new stopes have been opened on the 700-, 800-, and 900-foot levels beyond the old workings. Some development has been carried on in the 1,000-foot level.

A start has been made cleaning up the 900-foot level in the old *Surf* mine across the valley from the *Pugsley*.

*Porcher Island.*

*Surf Point.*—Reward Mining Company, Limited; Alex. Smith, superintendent.

The *Surf Point* mine, formerly operated by the N. A. Timmins Corporation, was acquired by the Reward Mining Company early in the year. The mine operated 299 days, producing 17,043 tons of ore, yielding 2,769 oz. gold and 944 oz. silver. Four hundred and thirty-three feet of development was done.

*Edye Pass Mine.*—Reward Mining Company, Limited. A total of 2,146 feet of development-work was done, the mine working 254 days. Operations were suspended at the end of September.

## COPPER DEPOSITS.

## ANYOX AREA.

The Consolidated Mining and Smelting Company of Canada, Limited, having acquired the property of the Granby Consolidated Mining, Smelting, and Power Company at Anyox, commenced a programme of diamond-drilling adjacent to the old *Hidden Creek* mine early in the summer. Two drills were employed continuously until November, locating some additional ore-bodies.

Preparations are now being made to drift from the old 150-foot level in the *Hidden Creek* mine into the new location for further prospecting.

## SILVER-LEAD DEPOSITS.

## ALICE ARM AREA.

*Esperanza Mining Co., Ltd.*—This company ceased operations early in the year.

*Dolly Varden.*—T. W. Falconer, lessee. One hundred and ninety tons of high-grade ore carrying approximately 32,000 oz. of silver was mined from one of the old glory-holes. The ore was shipped direct to the Tacoma smelter.

## PLACER-GOLD DEPOSITS.

## ATLIN DISTRICT.

All the active operations in the Atlin District are placer. There has been increasing activity with better recoveries during the year; a total of 21,475 oz. of gold having been

recovered. An additional 208 oz. was produced in the Squaw Creek District, making the total placer production for the year in the Atlin Mining Division 21,683 oz.

There were forty-three leases operating; thirty of these are underground operations drifting on bed-rock.

#### *Spruce Creek.*

This is the most important creek in the Division. Nineteen properties are operating on the creek. All are underground operations except the steam-shovel operation of the Columbia Development Company, Limited. Spruce Creek produced 14,516 oz., which was contributed principally by the Colpe Mining Company, Limited, with 8,785 oz., and the Columbia Development Company, Limited, with 3,429 oz. The balance of 2,302 oz. was produced from the other seventeen operations.

Two cases of suspected encroachment on this creek were reported. J. W. Noland, owner of the *Dream* lease adjoining the *Sunlight* lease of the Colpe Mining Company, Limited, requested information regarding the possibility of that company having encroached on the *Dream* lease. The pay-channel apparently strikes into the *Dream* lease from the *Sunlight* lease just above the *Dream* shaft. The working-maps of the Colpe Mining Company, Limited, were examined but did not show any encroachment. The management of the Colpe Mining Company, Limited, claimed that they left from 10 to 25 feet of pillar along the boundary. This could not be checked as the extraction of pillars had begun and this was some distance back from the boundary at time of examination. The information obtained from the maps was given to J. W. Noland.

The Columbia Development Company, Limited, operating steam-shovels on the *Olalla* lease, requested information *re* the possible encroachment from the *Poker* lease, owned by I. Matthews and operated on a lay agreement by A. Siranovich and partners. There being no map of the underground workings of the *Poker* lease, it was necessary to make an approximate survey with a Brunton compass. The result of this survey was given to the manager of the Columbia Development Company, Limited, who expressed himself as satisfied, and the matter was dropped.

*Colpe Mining Co., Ltd.*—Chas. H. Colpe, manager. This is the largest operation in the district, employing seventy-three men, and produced 8,785 oz., valued at \$242,921. Three shafts are operating. In the upper two shafts pillar-extraction is being carried on. The lower or No. 4 shaft, which was sunk on the old *Morse*, *McKechnie* and *Bratt* property acquired by the Colpe interests last year, is advancing up-stream to the *Chance* lease.

Some difficulty was experienced at this property in having the requirements of the "Metalliferous Mines Regulation Act" complied with. A prosecution was launched against the manager for failure to comply with an order of an Inspector, and a conviction secured. This was later appealed, but the Supreme Court upheld the conviction.

At a later visit the operations in the No. 4 shaft were suspended until the requirements of the Act were complied with.

Conditions underground were satisfactory at the last visit.

*Dream Lease.*—J. W. Noland, owner and operator. A shaft has been sunk to bed-rock which was reached at 210 feet. This is the deepest operation in the district. It is the farthest up-stream operation on Spruce Creek. Drifting up-stream along the boundary of the *Sunlight* lease has commenced and they expect to pick up the pay-channel where it apparently swings off the *Sunlight* lease into the *Dream* lease.

*Columbia Development Co., Ltd.*—James Eastman, manager. This is the only surface operation on the creek. Two steam-shovels are engaged, one on stripping overburden and the other on the pay-gravels. Thirty men are employed on two shifts. A total of 3,428 oz., valued at \$96,000, was produced.

*Clydesdale Lease.*—Buchanan and McPherson, owners; McDonald and MacKay, lay-men. This is a bench lease parallel on the north side to the *Chance* lease of the Colpe Mining Company. Five men are engaged working two drives up-stream, single shift. Conditions underground were fairly good.

*Wolf Lease.*—N. LeJure, owner; Malm, Vickstrom, and Johnson, lay-men. Only lay-men employed, working a single drive up-stream on the south side of the *Dorothy* lease of the Colpe Mining Company. Conditions underground were satisfactory.

*Croker Lease.*—I. Matthews, owner; Fred Ohman and partners, lay-men. Five men are employed working two drives into the bench from the bottom of a shaft. Conditions underground were satisfactory.

*Poker and Joker Leases.*—I. Matthews, owner; A. Siranovich and partners, lay-men. Five men are engaged working three drives up-stream and into the bench through the *Poker* lease and extending into the *Joker* lease. Conditions underground were satisfactory. A report was submitted on the suspected encroachment from this lease to the *Olalla* lease.

*Naska Lease and Friendship Fraction.*—Brown and Wright, operators. Five men are engaged on two shifts. They were unable to get the shaft on the *Naska* to bed-rock on account of excess water. An arrangement was made with the owners of the *Sally* lease for drainage rights through the *Sally* bed-rock drain and to drive a drift from the *Sally* shaft to the *Naska* shaft location. A single drive was driven up to the *Naska* shaft and the water drained off through the drain permitting them to get the *Naska* shaft down to bed-rock. Drifting on their own ground is now going ahead.

*Sally Lease.*—L. Shultz, owner; Nelson and Johnson, lay-men. Three men are employed drifting up-stream and are in fairly good ground. It is very coarse gravel and requires to be breast-boarded, the only place in the district requiring this method. There is considerable water running on bed-rock at this point.

*Peterborough Lease.*—Otto Millar and Son, owners and operators. Only the two owners are working, running a single drive into the bench in good ground. Conditions underground were satisfactory.

*Ollala Lease.*—Columbia Development Company, Limited, owners. John Hunjet and partners had started a slope off the *Olalla* lease to reach the lower end of the *Poker* lease, owned by I. Matthews. They started work just below the shovel operations of the Columbia Development Company, apparently without securing the consent of this company. The work has been held up by Court injunction, and the matter is still unsettled.

Several other small operators were engaged on their claims or on lays on the lower end of the creek. These were all visited and conditions generally were found satisfactory.

#### *Boulder Creek.*

*Consolidated Mining and Smelting Co., Ltd.*—Norman Fisher, foreman. This is a hydraulic operation working three shifts and employing twenty men. Conditions in the pit were good; 1,142 oz., value \$31,000, was produced.

#### *McKee Creek.*

*Atlin Gold Mines, Ltd.*—Geo. Adams and partners, lay-men. Six men are employed, all partners in the lay. This is a hydraulic operation working two shifts. Conditions in the pit were good; 153 oz., value \$4,197.86, was produced.

#### *O'Donnel River.*

*Grace M. Lease.*—Murphy and Son, owners and operators. Only the two owners are employed. These men have done considerable underground work over a period of years. Conditions underground were satisfactory.

Several other groups were employed, mainly prospecting. All were visited and conditions generally were satisfactory.

#### *Pine Creek.*

*Bessbrook Lease.*—Gus Boquist, owner and operator. Three men are employed working a single drift up-stream. Working conditions at the face were good.

*Anna C. Lease.*—E. Woodean, owner and operator. Woodean is working alone drifting into the bench. Underground conditions were good.

*Blackbird Lease.*—Kennedy and Watt, owners and operators. These two men are working alone driving up-stream on pay. Conditions underground were good.

*Morning Glory Lease.*—Ole Lovegrin, owner. Lovegrin has given an option to Alex. Smith and associates, who have five men employed. They have done considerable keystone-drilling and expect to get into operation either by hydraulic or drag-line in 1938.

Acheson Brothers have acquired options on Pine Creek and Willow Creek and have done considerable drilling.

Baker and partners are operating a hydraulic. Six men are employed, all partners in the lay. They have ample water but the ground is hard, cemented gravel and does not

break down readily. They produced 193 oz., value \$5,300. There seem to be prospects of considerable activity on Pine Creek in 1938.

*Wilson Creek.*

*Last Chance Lease.*—Peter Nord, owner and operator. A shaft 5 by 6 feet in the clear is being put down and was down 75 feet at time of inspection. Bed-rock is expected to be reached at about 907 feet. The shaft is well timbered and in good shape.

Several groups are engaged in ground-sluicing. Two engineers representing outside interests were looking over the creek and taking up options on a number of leases.

*Wright Creek.*

*Artic and Lynderbergh Leases*—L. Hodges, owner and operator. This is a hydraulic operation employing four men. Water is very scarce and they are further handicapped by boulders and lack of sufficient dumping-ground. They struck some good ground towards the close of the season, producing 343 oz., value \$9,060.

Other groups are ground-sluicing farther up-stream.

*Ruby Creek.*

*Surprise Lake Mining Co.*—Matson and partners, lay-men. This is a hydraulic operation employing six men. They have a good water-supply and are getting good results, producing 636 oz., value \$17,000.

*Farmer Lease.*—E. Turnquist, owner and operator. Turnquist is working alone, drifting into the bench down-stream from his old underground operation.

*Ophir Lease.*—McKay and Morrison, owners and operators. Nothing much was done here during the year.

*Blackstone Lease.*—E. Krumbeigel, owner and operator. A shaft on this property sunk about 160 feet through the lava cap and is now in gravel. Nothing was done this year due to lack of finances.

*Birch Creek.*

There are six different groups on this creek, all ground-sluicing. The only underground operation is not working at present.

*Squaw Creek District.*

Several groups were engaged in ground-sluicing and prospecting on this creek, and produced 208 oz.

The creek was not visited.

Some surface placer operations on McDame and Thibert Creeks were carried on during the summer. This section was not visited.

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