NAME

SUBJECT SPECIAL REPORTS, 1

DEPARTMENT OF MINES AND PETROLEUM RESOURCES

VICTORIA, BRITISH COLUMBIA

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9. Quesnel Mining Co. Ltd.,
   (Standard Group, placer)
10. Manganese Deposits Cowichan Lake
    Vancouver Island

M-1058-8100 (2)

PIONEER GROUP This group of mineral claims is owned by Mrs. J. L. Campbell of Hyder, Alaska. It is located on the west side of Tide Lake at the headwaters of Bowser River on the Nass River drainage slope, about 31 miles by road and trail from seaboard at Stewart, B. C. dock. It is reached by motor-road for 18 miles from the town of Stewart to the Big Missouri mine at 2850 feet elevation and thence by rough, rocky, and hilly pack-horse trail for 13 miles to the cabin at 2720 feet elevation. Reference to the property is contained in the Annual Reports of the Minister of Mines for the years 1927, 1930 and 1933 and Canada Department of Mines' Memoir 175, 1935.

The mineral deposit consists of sheared and pyritized calcareous tuffs and tuffaceous sediments locally containing quartz seams and small lenses mineralized with mainly sphalerite and galena.

During 1929 and 1930, the property was optioned and diamond-drilled by the Consolidated Mining and Smelting Company, of Canada and the option then relinquished. In 1933 a cross-cut adit at 2500 feet elevation was driven in a general north-westerly direction by Jancowski brothers for the purpose of locating a gold value of 8.72 oz. per ton, intersected at comparatively shallow depth in Consolidated diamond-drill hole No. 2, but did not encounter any values.

During 1939, this cross-cut was continued and at 126 feet encountered an irregular shear up to 1.5 feet wide, striking northerly and dipping 75 degrees west. This was drifted on for 27 feet towards the north, in which distance it shows a width up to 3 feet containing some pockets with quartz stringers and small irregular quartz lenses mineralized with disseminated pyrite and massive sphalerite. From this working, two shipments of selected

cobbed ore were made to the Government Sampling Plant and assayed as follows:

Dry tons	Gold oz. per ton	Silver oz. per ton	Copper %	Lead %	Zinc %	Arsenic %	Antimony %	Si %
0.7690	23.92	48.8	nil	3.6	16.5	0.1	nil	50.
1.0163	16.37	39.3	nil	2.33	10.17	nil	nil	49.

At the time of examination (August 28-29th), very litt mineralization was showing in the adit. The following samples were taken from the best-mineralized section:

(1) Face of adit, across 3 feet of sheared, silicified tuff: Gold, trace; silver, 0.4 oz. per ton; copper, nil; lead, nil; zinc, nil; silicia, 53.9 per cent.

(2) Roof of adit, 11 feet from face, selected sample of best mineralization in a pocket 4 feet long; Gold 0.10 oz. per ton; silver, 14.9 oz. per ton; copper, nil; lead, 1.3 per cent; zinc, 14.7 per cent; silica, 56.4 per cent.

(3) Face of crosscut south, 49 feet from adit portal; across 20 inches of quartz with pyrite: Gold, 0.08 oz. per ton; silver, 2.3 oz. per ton; copper, nil; zinc, 0.4 per cent; silica, 76.5 per cent.

Between 2555 feet and 2589 feet elevation on the top of the knoll above the adit, a defined shear, 3.5 feet wide, has been opencut for a length of 40 feet, exposing quartz bands 6 to 15 inches wide mineralized with mainly pyrite. This shear strikes north 76 degrees west and dips 76 degrees southerly. The following samples were taken from these workings:

(1) Open-cut at 2555 feet elevation. Quartz band 11 inches in widt in face centre with disseminated pyrite and some sphalerite: Gold, 0.10 oz. per ton; silver, 6.7 oz. per ton; copper, nil; zinc, 0.4 per cent; silica, 85.0 per cent.

(2) Open-cut at 2570 feet elevation, quartz band for length of 5 feet and 7 inches wide on hanging-wall of shear, mineralized with seams of pyrite: Gold, 0.06 oz. per ton; silver, 2.5 oz. per ton; copper, nil; lead, nil; zinc, nil; silica, 67.0 per c

(3) Open-cut at 2580 feet elevation, quartz band 15 inches wide wi seams of pyrite on hanging-wall of shear: Gold, 0.04 oz. per ton; silver, 3.0 oz. per ton; copper, nil; lead, nil; zinc, nil silica, 74.9 per cent.

(4) Open-cut at 2585 feet elevation, quartz band 9 inches wide wit pyrite seams, on hanging-wall of shear: Gold, 0.08 oz. per ton silver, 6.3 oz. per ton; copper, nil; lead, nil; zinc, nil; silica, 72.6 per cent.

(5) Grab sample of 1/2 ton of cobbed ore north of top open-cut: Gold 0.30 oz. per ton; silver, 17.3 oz. per ton; copper, nil; lead, 2.2 per cent; zinc, 6.8 per cent; silica, 59.1 per cent.

(6) Grab sample of several small piles of cobbed ore south of top cut: Gold, 0.16 oz. per ton; silver, 19.6 oz. per ton; copper, nil; lead, 0.1 per cent; zinc, 0.9 per cent; silica, 77.1 per cent.

RED CLIFF GROUP

by

J. T. Mandy

This group of five Crown-granted claims and two fractions, was optioned by the R. W. Wood and W. R. Wilson estate to H. D. Haywood of Vancouver. It is located on the west side of Bear River, about 1 mile up Lydden Creek and about 15 miles from seaboard at the town of Stewart. The property is reached by motor-road from Stewart for 14 miles to 420 feet elevation and thence by pack-trail for about 2 miles to the tent camp at 1800 feet elevation.

The locality of the claims is underlain by andesitic volcanic rocks of the Middle Hazelton group (Bear River series), locally intruded by irregular areas of augite porphyry. The mineral deposit consists of irregular lenticular areas of silicification of moderate size and up to about 100 feet long and from 4 to 17 feet wide, irregularly mineralized with streaks, patches and dissemination of pyrite, pyrrhotite, chalcopyrite, with which stringers carrying galena and sphalerite, are locally associated.

Several years ago fairly extensive exploration was done by the Red Cliff Mining Company, but no work has been done for a number of years. Reference to the property is contained in the Annual Reports of the Minister of Mines for the years 1908 to 1913 and 1921 and in Geological Survey of Canada Memoirs No. 32 and 175.

During the 1939 season, H. D. Haywood commenced exploration of a small lenticular area of mineralized silicification outcropping in Lydden Creek canyon at 1900 feet elevation on the Montrose claim. Although high-grade gold values in this showing are cited in old reports (1909, p.68), very little work had previously been done on it. This showing was examined for the purpose of determining the possibility for the occurrence of shipping-grade ore.

The showing consists of two adjacent lenses (No.1 and No. 2), of siliceous replacement material on the north side of Lydden Creek canyon. The lenses are irregularly mineralized with mainly pyrite with which is locally associated minor quantities of chalcopyrite and on the foot-wall side, stringers carrying galena and sphalerite. The lenses are isolated and discontinuous and have not been sufficiently explored to determine their possible relation to any defined structure.

The main lens, No.1, outcrops for a length of 35 feet, a height of 30 feet and a width of 10 feet. It strikes about north 10 degrees west and dips 80 degrees westerly. It cannot be traced on the south side of the canyon. At the base of the lens an old adit has been driven north 5 degrees west for 13 feet from where a crosscut extends west for 10 feet. A similar lens, No. 2, outcrops about 30 feet to the north-west of No.1 lens.

To determine the possible occurrence and localization of shipping-grade values, the following samples were taken:

1. No. 2 lens, foot-wall side, a selected sample of gossan assayed: Gold, 3.70 oz. per ton; silver, 2.1 oz. per ton; copper, nil; lead, nil; zinc, nil; silica, 51.6 per cent.

2. No. 2 lens, a selected sample of pyrite occurring in stringers and patches, assayed: Gold, 2.26 oz. per ton; silver, 0.7 oz. per ton; copper, nil; lead, nil; zinc, nil; silica, 44.5 per cent.

3. No. 2 lens, foot-wall side, selected galena from stringers ½ to 1 ½ inches wide: Gold, 5.90 oz. per ton; silver, 4.3 oz. per ton; copper, nil; lead, 44.7 per cent; zinc, 0.4 per cent; silica, 17.6 per cent.

4. No. 2 lens, west end, hanging-wall side, selected pyritized siliceous material with chalcopyrite; Gold, trace; silver, 0.2 oz. per ton; copper, 2.4 per cent; lead, nil; zinc, 0.3 per cent; silica, 62.7 per cent.

~~4. No. 2 lens, west end, hanging-wall side, selected pyritized siliceous material with chalcopyrite; Gold, trace; silver, 0.2 oz. per ton; copper, 2.4 per cent; lead, nil; zinc, 0.3 per cent; silica, 62.7 per cent.~~

5. No.1 lens at top, foot-wall side; selected galena from stringer ½ to 2 inches wide; Gold, 0.62 oz. per ton; silver, 4.0 oz. per ton; copper, nil; lead, 44.4 per cent; zinc, 3.6 per cent; silica, 14.9 per cent.

6. No.1 lens, selected pyrite from face 10 feet wide above adit: Gold, 4.04 oz.per ton; silver, 0.8 oz. per ton; copper, nil; lead, nil; zinc, 0.3 per cent; silica, 34.2 per cent.

7. No.1 lens, selected galena from patch in centre of face above adit; Gold, 3.36 oz. per ton; silver, 1.2 oz. per ton; copper, nil; lead, 20.1 per cent; zinc, nil; silica, 20.4 per cent.

8. No.1 lens, foot-wall side, selected sphalerite from string 6 feet above adit portal: Gold, 0.56 oz. per ton; silver, 0.8 oz. per ton; copper, 1.0 per cent; lead, nil; zinc, 20. per cent; silica, 29.1 per cent.

It must be stressed that these samples do not repres the general mineralization, but are of selected mineralization for the purpose of indicating the type of mineralization that could be selectively mined and cobbed in the process of extrac shipping-grade ore.

Subsequent to this examination, the following shipments were made to the Sampling Plant at Prince Rupert:

Dry tons	Gold oz. per ton	Silver oz. per ton	Copper %	Lead %	Zinc %	Sulphur %	Sil %
1.7995	2.33	10.00	0.2	trace	0.6	7.6	58.4
2.0105	3.83	10.10	trace	trace	0.5	7.1	58.3
0.9920	2.55	11.00	0.4	20.4	6.5	13.0	26.4
0.4465	2.32	10.00	1.0	8.2	22.7	19.9	22.8
0.0301	10.15	3.35	trace				

ANNUAL REPORT OF THE MINISTER OF MINES FOR THE YEAR 1939

Special Report

NASS RIVER MINING SYNDICATE. The Meziadin group of 16 claims, being explored by this Syndicate, is located at the head of Porter Creek, longitude 129 degrees, 28 minutes, latitude 56 degrees, about 10 miles southerly from Meziadin Lake.

The property is about 14 miles by road and 47 miles by trail from Stewart.

The property, staked in 1938 by Owen McFadden, covers ground explored and staked by a Mr. Porter and James Mowat many years ago (previous to 1913) as the Bullion claim and later, about 1922, as the Delnorte group by J. Green and H. Ficklin of Hyder, Alaska.

The syndicate has explored the ground by a series of fifteen open-cuts and some small pop-holes. The property was examined and sampled and a preliminary plan showing the results may be obtained from the Department of Mines, Victoria, upon payment of 50 cents.

(continued on next page)

The Bullion claim is referred to in Canada Department of Mines' Memoir 32 and the Delnorte in the Annual Report of the Minister of Mines for 1922.

The area of the claims is underlain by tuffs and breccias of the upper Bear Series and argillaceous sediments of the lower Nass River formation, upper Hazelton group. The contact of the two formations comprises the showings.

The mineral deposit consists of two zones of pyritized and sheared calcareous volcanic tuffs, in part sedimentary, from 3 to over 20 feet wide. The zones strike northerly and dip vertically and locally contain small silicified sections in which small patches of sphalerite and chalcopyrite some times occur. The Nass Syndicate has explored these zones by a series of 15 open-cuts and some small pop-holes.

The showings were thoroughly sampled to determine the possible occurrence of commercial values. The location and geology of the property, the work and location of the samples taken, is illustrated on the map accompanying this report.

The following is a tabulation of the samples and assay results:

(continued next page)

Open-cut	Sample No.	Width feet	Gold oz. per ton	Silver oz. per ton	Copper %	Lead %	Zinc %	Sul
A	1	20.1	trace	0.1	trace	nil	trace	4.
B	2	22.2	trace	2.1	0.4	nil	0.1	12.
C	3	18.1	trace	0.1	trace	nil	trace	10.
D	4	9.2	nil	nil	trace	nil	0.1	2.
D	5	0.34	0.2	0.6	trace	nil	0.6	(py
D	6	9.6	trace	0.1	trace	nil	trace	4.
E	7	11.7	trace	0.1	trace	nil	trace	4.
F	8	8.8	nil	trace	trace	nil	trace	3.
G	9	6.9	0.02	trace	trace	nil	nil	3.
H	10	12.0	trace	trace	0.2	nil	nil	2.
I	11	16.9	trace	trace	0.1	nil	nil	3.
Mac 2	12	8.4	0.02	trace	trace	nil	2.7	
Mac	13	4.8	0.14	0.8	1.6	nil	1.6	
2A	14	11.2	trace	0.1	trace	nil	nil	5.
2A	15	8.0	0.01	0.1	nil	nil	0.2	
2A	16	17.7	trace	0.1	nil	nil	0.4	
Creek	17	8.4	0.02	trace	trace	nil	2.7	
2B	18	11.1	trace	trace	nil	nil	trace	5.
2B	19	9.0	trace	trace	0.1	nil	nil	6.
2C	20	11.2	trace	0.2	nil	nil	nil	
2C	21	12.8	trace	trace	trace	nil	nil	
2C	22	7.6	0.11	0.3	0.2	nil	0.1	
3A	23	3.0	0.02	0.25	trace			

Special Report

GOLD STRIKE GROUP - This group of five claims is owned by G. Fiva of Alice Arm. The property, discovered in 1938, is situated on the east side of Kinskuch Lake, longitude 129° 20', latitude 55° 40'. It is reached by speeder on the Dolly Varden railway for 12 miles, thence by trail up East Creek for 7 miles to Kinskuch Lake at 3950 feet elevation, thence across the Lake, about 1-¾ miles wide, by a small row-boat to the tent-camp on the east side.

The claims cover the steep terrain on the east side of the head of the lake between 3950 and 5100 feet elevation, adjacent to an extensive glacier. The area of the claims is underlain by andesitic tuffs and porphyritic hornblende diorite.

The mineral deposit comprises a belt of fracturing and shattering in both the tuff and the diorite, about 1000 feet wide, striking north 35 degrees west, diagonally across the lake. Within this area, both the tuffs and the diorite are generally pyritized in varying degree and numerous diagonal quartz veins and stringers striking east to north-easterly and patches of silicification mineralized with pyrite and locally with galena, sphalerite and chalcopyrite also occur and can be traced for varying distances up to about 200 feet.

Some of the areas of more pronounced silicification and pyritization and some of the quartz veins have been explored by shallow open-cuts. In order to determine the possible occurrence of commerical values, the following samples were taken:

(1) Gold Strike No.2, 5100 feet elevation, chip sample of a typical heavily-pyritized section 10 feet long by 4 feet wide; Gold, trace; silver, trace; copper, nil

(2) Gold Strike No.2, from 5000 to 5100 feet elevation, chip sample of typical pyritized and silicified porphyritic hornblende diorite, across about 80 feet; Gold, nil; silver, nil; copper, nil.

(3) Gold Strike No.2, from 5000 to 5100 feet elevation, chip sample of typical pyritized and silicified tuff about 60 feet wide, adjacent to 2: Gold, nil; silver, nil; copper, nil.

(4) Elevation 4475 feet, north-east cut, 300 feet north 60 degrees east from 15, across a width of 39 inches of reticulated quartz veins; Gold, 0.02 oz. per ton; silver, 0.4 oz. per ton; copper, nil.

(5) Elevation 4475 feet, 30 feet south-west of 4. Sample across quartz vein 13 inches wide in open-cut: Gold, trace; silver, trace; copper, nil.

(6) Elevation 4475 feet, 21 feet south-westerly of 4, sample across 39 inches of mineralized, silicified rock: Gold, 0.34 oz. per ton; silver, 0.1 oz. per ton; copper, nil.

(7) Gold Bar claim, 4090 feet elevation at face of bluff, composite sample of quartz vein 14 inches wide for length of 11 feet: Gold, 0.06 oz. per ton; silver, 0.8 oz. per ton; copper, 0.3 per cent.

(8) Gold Bar claim, 4090 feet elevation, cross-vein adjacent to 7, sample across width of 2.3 feet: Gold, 0.12 oz. per ton; silver, 1.0 oz. per ton; copper, 1.0 per cent.

(9) Gold Bar claim, 4270 feet elevation, sample across 21 inches of silicified and pyritized porphyritic diorite in small cut: Gold, nil; silver, nil.

(10) Gold Bar claim, 65 feet northerly from 9, open-cut exposing silicified and pyritized porphyritic diorite; sample across 11.5 feet: Gold, nil; silver, nil: copper, nil.

(11) Gold Bar claim, 4250 feet elevation, sample across 38 inches of sheared, pyritized quartzose replacement traced for 125 feet: Gold,

(12) Gold Bar claim, 4220 feet elevation, outcrop of silicified and pyritized porphyritic diorite; sample across 8 feet: Gold, nil; silver, nil; copper, nil.

(13) Gold Bar claim, 4220 feet elevation; check sample on 12: Gold, nil; silver, nil; copper, nil.

(14) Gold Bar claim, 4220 feet elevation, selected sample of pyritized siliceous material at location of 12 and 13, across 10 feet: Gold, 0.02 oz. per ton; silver, 1.4 oz. per ton; copper, trace.

(15) Gold Bar claim, "High-grade" cut, 4375 feet elevation, east from 13: sample across foot-wall side of reticulated quartz vein for 5½ inches width: Gold, 0.06 oz. per ton; silver, 0.8 oz. per ton; copper, nil.

(16) Gold Bar claim, about 500 feet south 38 degrees east from 1, chip sample for length of 18 feet and a height of 6 feet on face of bluff: Gold, trace; silver, trace; copper, nil.

(17) Gold Strike claim, 3952 feet elevation: sample of best exposures of pyritized porphyritic diorite and pyrite stringers, along lake-beach 300 feet north of glacier: Gold, trace; silver, trace; copper, nil.

(18) Gold Strike No.2(?), 4200 feet elevation. Sample of massive chalcopyrite across width of 10 inches in vertical vein striking north 65 degrees east: Gold, 0.10 oz. per ton; silver, 2.2 oz. per ton; copper, 19.5 per cent.

(19) Gold Strike No.2(?), 100 feet south-westerly of 18; selected sample of stringers and patches of massive granular pyrite: Gold, trace; silver, trace; copper, nil.

(20) Gold Strike No.2(?), 60 feet south-westerly of 19. Sample across 9 feet of pyritized porphyritic diorite: Gold, 0.02 oz. per ton; silver, trace; copper, nil.

COLUMARIO CONSOLIDATED GOLD MINES, LIMITED

This company, which operated a property in the vicinity of Usk, has been inactive for several years. Reference to the property is contained in the Annual Reports of the Minister of Mines for the years 1927 to 1936.

The mineral deposit consists of narrow quartz veins mineralized with pyrite and chalcopyrite in pockets or small lenses, carrying gold values. The locality is underlain by andesitic volcanics close to a spur of granodiorite from the Coast Range batholith. The volcanics are locally hybridized and partially digested in the granodiorite. On approaching the intrusive contact both horizontally and vertically, the veins and mineralization diminish and do not penetrate the granodiorite.

During 1939, the property was leased by W.W. Duncan and associates of Usk, with the objective of selectively mining shipping-grade ore from certain sections of the old workings.

The property was examined for the purpose of determining this possibility and directing attention to the most favourable sections.

The following samples were taken:

(1) Dump of quartz and fines impounded from sluicing at portal of No. 4 adit; Gold, 10.38 oz. per ton; silver, 1.2 oz. per ton; copper, 0.7 per cent.

(2) 5 sacks of screened and washed material from location of 1: Gold, 0.32 oz. per ton; silver, 0.9 oz.

copper, 0.6 per cent.

(3) 3/4 sack of screened and washed material at locality of 2: Gold, 0.66 oz. per ton; silver, 1.90 oz. per ton; copper, 0.30 per cent.

(4) 7 sacks of sorted and cobbed ore from pocket at portal of No. 4 adit: Gold, 6.58 oz. per ton; silver, 17.8 oz. per ton; copper, nil.

(5) No. 4 adit vein, 3rd level, 432 stopel sample of possible cobbed grade from lens 8 feet long and 14 inches wide: Gold, 1.64 oz. per ton; silver, 8.00 oz. per ton; copper, 8.50 per cent; silica, 33.4 per cent; sulphur, 21.1 per cent.

(6) No. 6 vein, No. 1 raise, sample of average width of 12 inches on hanging-wall side: Gold, 0.76 oz. per ton; silver, 1.80 oz. per ton; copper, 1.10 per cent; silica, 47.30 per cent; sulphur, 12.1 per cent.

(7) No. 6 vein, No. 2 level, 35 feet from portal, oxidized material in roof above floor stope: Gold, 5.90 oz. per ton; silver, 15.70 oz. per ton; copper, trace; silica, 66.4 per cent; sulphur, 6.5 per cent.

(8) Sample of 7 sacks cobbed ore, No. 6 vein, No. 2,level; Gold, 0.86 oz. per ton; silver, 2.30 oz. per ton; copper, 1.0 per cent; silica, 65.8 per cent; sulphur, 9.70 per cent.

(9) Screened fines from cobbing at portal NO. 2 level, No. 6 vein: Gold, 0.72 oz. per ton; silver, 2.10 oz.

per ton; copper, 9.90 per cent; silica, 54.60 per cent; sulphur, 14.0 per cent.

(10) No. 7 vein, washed and screened material: Gold, 1.04 oz. per ton; silver, 2.8 oz. per ton; silica, 53.1 per cent.

(11) No. 7 vein, tailing from washing and screenings; Gold, 0.16 oz. per ton; silver, 0.4 oz. per ton; silica, 81.8 per cent.

(12) No. 7 vein, oxidized material in roof of drift, 40 feet from portal: Gold, 1.26 oz. per ton; silver 1.7 oz. per ton; silica, 46.6 per cent.

(13) No. 7 vein, oxidized material in roof of drift, 60 feet from portal: Gold, 1.52 oz. per ton; silver, 7.9 oz. per ton; silica, 56.0 per cent.

(14) No. 4 vein, 10 feet above portal of adit, selected pyrite and iron oxide: Gold, 0.52 oz. per ton; silver, 2.0 oz. per ton.

During the year, the following shipments were made from this property to the Government Sampling Plant at Prince Rupert:

Dry tons	Gold oz. per ton	Silver oz. per ton	Copper %	Sulphur %	Silica %
0.0080 (test)	0.51	0.50	nil	16.5	64.2
0.0140 "	0.90	1.18			
0.0065 "	2.37	6.59			
0.0030 "	1.74	6.40			
0.0035 "	2.07	6.70			
0.0077 "	0.57	1.57			
0.0030 "	0.29	1.47			
0.0040 "	0.76	4.72	10.29		
0.0590 "	3.68	8.30	1.80	24.5	46.0
0.0635 "	1.69	4.10	nil	18.6	41.0
1.3965 "	1.98	2.90	1.45	14.0	61.2
2.4970 "	2.00	6.00	1.80	10.3	66.5
1.9707 "	1.205	3.20	0.30	13.6	54.4

COPPER KING

by

M.S. Hedley

REFERENCES: Annual Reports of the Minister of Mines, British Columbia, 1898, 1924, 1929, 1930 and 1935.

This property of nine Crown-granted claims and fractions is owned by Baroness Sartorio of Kamloops and is under option to James T. McKelvie and brothers of Grand Forks. It is 16 miles west of Kamloops and adjoins the highway on the north-side of Cherry Creek. The workings on the Copper King are at an elevation of about 2,000 feet, 300 feet higher in elevation than the highway.

The ground is broken by bluffs and rises steeply from the valley to the workings, north-westerly of which the rise is gradual to Roper Hill. The country is dry and timber scarce. A short section of road leads from the mine ore-bin to the highway, and 1½ miles westerly another short section leads to the mill. Shipments are made from Cherry Creek siding on the Canadian Pacific Railway.

Mineralization is in a body of quartz-diorite that extends from Cherry Creek at this point to Kamloops Lake. It is intrusive into rocks of the Nicola series which are exposed to the south. The rock is somewhat variable as to grain and colour and in the workings it is commonly reddish and medium in texture.

Magnetite and epidote occur in bands and patches and there is some carbonate veining, but these minerals do not

appear to be related to the copper mineralization. Chalcopyrite and bornite occur in films, disseminations and rare veinlets in the quartz- diorite; tetrahedrite is rare.

The property was staked in 1897 and a 25-foot vertical shaft was sunk, which in later sinking was reported to have passed out of the "vein" matter. During the next three years the lower adit-level was driven and an intermediate level was driven from the shaft. Production prior to 1929 amounted to 1036 tons, containing an average of 0.115 oz. gold per ton; less than 10 oz. in silver per ton, and 6.15 per cent copper. These figures are believed to represent the entire tonnage, almost all of which was shipped in 1904.

In 1929 H.R. Graham of Kamloops shipped four cars of ore , a total of 163 tons, which averaged 0.601 oz. gold per ton; 1.3 oz. silver per ton, and 5.45 per cent copper; t is ore was taken from the old stope above the intermediate level. Another shipment of 141 tons in 1929 averaged 0.15 oz. gold per ton; 1.3 oz. silver per ton, and 2.3 per cent copper.

In 1937 McKelvie Brothers of Grand Forks optioned the property and during the next year carried the old stopes to the surface, drove a second raise and stoped above a small sub-level. Ore shipped to the Tacoma smelter in 1938 amounted to 712 tons with an average content of 0.557 oz. gold per ton; 0.98 oz. silver per ton, and 5.12 per cent copper. The 35-ton

mill from the Jenny Long property near Stump Lake was purchased and put in operation late in 1938 and 15 tons of concentrates shipped to the smelter. During 1939 245 tons of concentrates were shipped which averaged about 21 per cent copper; 3 oz. silver per ton, and 1.5 oz. gold per ton. Thirty-six tons of ore were also shipped.

The workings are somewhat complex, as reference to the plan and section will show. The adit-level is nearly 600 feet in total length, with an additional 50 feet or more of crosscuts. An intermediate level, 59 feet above the face of the adit, was driven from the original shaft a total length of 130 feet or more, and a connecting raise was driven from the adit. A second raise connects with a short sub-level 27 feet above the adit and mining has been conducted entirely above this sub-level.

The ore-zone, as determined by current mining practice, is as much as 30 feet wide and 130 feet long, with problematical extensions. It is neither a vein nor a shear-zone but rather a locus of deposition of bornite and chalcopyrite as disseminated grains, tiny veinlets and rarely as fracture-fillings as much as several inches in width, all in relatively unaltered quartz-diorite. Tetrahedrite is sparingly present in fractures and may belong to a later generation. A prominent near-vertical fracture or series of fractures runs longitudinally through the workings

in a direction about north 20 degrees east, but is only locally mineralized and does not appear to have served as a channel-way of more than minor importance. A few fractures at large angles to these do not appear to have produced displacement.

Microscopic examination of the quartz-diorite shows the red colour to be due to much fine iron-oxide dust; of two thin sections studied one showed marked sericitization of the feldspars and the other extremely little, although both were from the ore-zone. Disseminated sulphide, whether chalcopyrite or bornite, suggests an original constituent of the rock, and veinlets of these minerals commonly show no continuity or connection with one another. Walls of the ore-zone are assay boundaries and continuations are uncertain.

Only a local and minute amount of mineralization is to be seen in the adit-level, but the possibility of finding ore on that level is not disproved. Ore stoped from the sub-level, consisting principally of a stringer of bornite, has no relation to the main central break which formerly was considered to be the "vein". There is a seemingly northward rake to this mineralization that may provide mineable ground somewhat east of the north-eastermost point reached by the adit.

At mid-December there was a crew of seven men at the prospect and the mill was operating about two weeks a month.

IRON CAP

This group of eight located claims, formerly known as the O.K. group, is owned by Nick Forsberg and associates of Barriere. It is in the valley of Birk Creek one half to 1½ miles from Carl Johnson's ranch at the end of the North Barriere Lake road. A good pack-horse trail follows the creek.

The valley of Birk Creek is steep-walled and heavily covered with timber. The rocks comprise a sedimentary series that dips flatly to the south; the beds are in many places horizontal and the greatest observed dip is 30 degrees. They are dominantly argillaceous to silty sediments and are altered locally to light grey phyllites and to sericitic and chloritic schists; one limestone horizon is noted, and some fine quartz-pebble conglomerate or grit.

Pyritic replacement is seen in a number of places, and follows bedded zones in which there is a more than average degree of schistosity; much of this mineralization has a siliceous base. Irregular vein-like bodies and vague, formless masses of quartz are common, but the quartz is as a rule barren or nearly so. In these deposits, which vary in thickness from a fraction of an inch to several feet, pyrite is the dominant mineral, and locally constitutes 30% of the rock mass; other sulphides, present in variable proportions and minor amount, include chalcopyrite, sphalerite, galena and pyrrhotite. Gold and silver values are low. A total of ten short adits

and one adit 160 feet in length are driven on both sides of the creek, not far from an old camp-site at an elevation of about 2,500 feet 1¼ miles from the ranch. These adits all explore bedded pyritic mineralization of replacement type and will be described briefly.

(1.) One thousand feet up stream from the old camp an adit is driven southward 50 feet in the south bank of Birk Creek. Green chlorite schist dips flatly to the south and is, throughout the body of the adit, bleached and mineralized with streaks up to 10 inches thick of pyrite and small amounts of spalerite, galena and chalcopyrite. A sample moiled across 40 inches of quite heavily mineralized material assayed: Gold, 0.02 oz. per ton; silver, trace; copper, 0.9 per cent; lead, 0.7 per cent; zinc, 1.3 per cent.

Some 150 feet farther upstream at the same general horizon are mineralized bands, up to 12 inches in width, poorly exposed across several feet. A sample of one of the better bands, 10 inches thick, assayed: Gold, trace; silver, 0.8 oz. per ton; lead, 0.7 per cent; zinc, 5.7 per cent.

(2.) At the old camp site, on the south bank of the creek, is a natural bluff 20 to 30 feet high and some 200 feet in length. The gently dipping rocks here exposed consist of chlorite schists below limestone and calcareous schists which are in turn overlain by quartz-pebble conglomerate or grit. There has been considerable silicification

and injection with irregular and discontinuous masses of quartz. Pyritic mineralization, including minor amounts of sphalerite, galena and chalcopyrite, occurs in bedded seams and locally in minor amounts in the quartz masses. These seams are locally abundant over widths of several feet and some but not all occur preferentially in silicified limestone. Five short adits explore the mineralization in and just above the bluff.

(a.) Nine hundred feet downstream from the camp is a 12-foot adit driven in the south bank of the creek. The adit follows a heavily pyritic band containing a little chalcopyrite and from a few inches to 26 inches in thickness.

(b.) North-east of the camp and 375 feet vertically above it are two adits in locally schistose, calcareous argillite that dips 16 to 18 degrees southward. One adit is driven north 30 feet and exposes a 12-foot thickness of bedded pyritic mineralization in numerous single bands as much as 10 inches in thickness. Besides pyrite there are minor amounts of pyrrhotite, chalcopyrite and traces of sphalerite and galena. Two samples moiled across a width of 7½ feet near the faceassayed nil in gold and silver and a trace and 0.2 per cent copper.

A second adit, 50 feet south-east of the first, is driven 15 feet eastward in grey calcareous to quartzose phyllites in the footwall of a 2½-foot band of massive pyrite replacement. Similar bands of pyrite 5 feet and 1 foot thick

are 8 and 11 feet above the adit respectively. Irregular masses of barren quartz are found in this general vicinity, and a fault-zone between the adits is accompanied by irregular quartz.

(5.) North of the camp-site and 180 feet vertically above it is a caved short adit within which there is said to be a shallow winze. Material on the dump, not seen in place but reported to have come from the winze, consists of silvery chloritic schist and contains considerable siliceous mineralization including pyrite and less sphalerite, chalcopyrite and galena. A sample of some of the better of this material assayed: Gold, 0.02 oz. per ton; silver, 1.6 oz. per ton; copper, 0.8 per cent; lead, 2.7 per cent; zinc, 8.5 per cent. Width and attitude of this mineralization are unknown, but the formation here dips nearly 30 degrees southward.

An adit 80 feet lower in elevation on the steep hillside has been driven northward 160 feet to reach well north of the upper adit. The bedding is horizontal or nearly so, and it is clear that this adit has been driven too low to intersect the mineralized zone above, which dips flatter than the hillside.

Much pyrite is seen in the rocks for 50 feet stratigraphically above the upper adit.

(6.) One half mile from Johnson's ranch, on the north bank of the creek, are some poorly exposed showings in flatly dipping sericitic schist. Some stripping indicates pyritic

bands over a width of more than 3 feet but does not prove full width or extent. A sample of an 8-inch band of pyritic mineralization assayed: Gold, trace; silver, 0.6 oz. per ton; copper, 1.6 per cent; lead, 0.8 per cent; zinc, 6.6 per cent.

1939

EHLINGER GROUP

by

R.J. Macconachie

The Ehlinger group includes sixteen claims as shown on the accompanying plan, held by right of location by John J. Ehlinger of Spokane, Washington. The property is 7 miles eastward from Wasa, a station on the Canadian Pacific Railway, and is reached from that point by a reasonably good truck-road, Topographic relief is marked and elevations vary from 3800 feet the camp to approximately 6000 feet at the highest points on the claims. Glaciation, later erosive action and a consequent gener heavy cover of overburden has reduced surface irregularities and permits of easy access to all parts of the property; various trails lead from the cabin to the scattered showings. Until recently the claims in this group were held by several owners as smaller individual holdings and, as a result, development-work has been undertaken at widely separated locations.

The camp, which consists of one cabin adequate for two men, is beside the road, on the Emily claim. Domestic water is obtained from a small, year-round spring. A considerable water-supply is available from Lewis Creek which flows westerly across the property and falls in the course of this creek, on the Frances claim, provides opportunity for small power-development. Timber on the claims is plentiful and suitable for all mining or construction needs.

The surface is generally underlain by quartzites and argillite placed tentatively as members of the Fort Steele serie of Pre-Cambrian age. The quartzites are characteristically whit to grey or pale-brown in colour and massive, with bedding dis-

to black in colour, typically veined with narrow stringers or quartz and calcite. These two members apparently represent phases of continuous deposition as, in at least one instance, a definitel; transitionary margin was noted between them. Outcrops of argillit are marked conspicuously by black staining at the surface which is the result of decomposition and disintegration. At one locatio in the Wanda 3 workings, another metamorphic rock type was noted. This is greenstone, probably tuffaceous in origin, but so highly altered that positive identification is impossible from the hand specimen. This rock is chloritized, even-grained, massive though heavily sheared in places, and displays no evidence of bedding. Exposures of igneous rocks are rare in the present development and those seen were syenite dykes. The age of these dykes is from late Cretaceous to early Tertiary, according to M.M.A. Rice of the Geological Survey of Canada in his report on the Cranbrook Map Are Memoir 207. As exposed on this property these intrusives, typically pale-green, pink or grey in colour, carry a small amount of disseminated pyrite and pyrrhotite and seldom exceed a few feet in width. The occurrences under investigation consist principally of sulphide mineralization in irregular quartz veins a concentrations of quartz stringers at, or near, the quartzite-argillite contact. Commonly on the argillite side of the contact, the quartz may be disseminated as stringers along the bedding-plan and shearing of this member for several feet from the main quartz l Sulphide mineralization consists principally of pyrite, galena and copyrite. From the small amount of development-work it is not pos to draw definite conclusions but, from various exposures where gal is predominant and others where chalcopyrite and pyrite occur almo

ization, one essentially of galena--silver association, the other chalcopyrite--gold, with an overlapping of pyritic deposition.

Description of Workings.

Detailed examination was made of each of the exposures. On the Golden Fleece claim the workings consist of two adits driven to explore an irregular shearing, in quartzite, which strikes north 50 degrees west, and dips 50 degrees south-westward. This rock is typically fine-grained, white to light-brown in colour and massive. The maximum width of the shearing, 86 inches, is exposed at the face of the upper adit, 64 feet from the portal, at an elevation of 5100 feet. Characteristically the shearing is well silicified but mineralized with only sparse disseminations and irregular bunchy concentrations of chalcopyrite, malachite and azurite. The best concentration of such mineralization is 33 feet from the portal where a small side-swipe exposes a 4 to 6 inch width on the foot-wall of the shearing. A sample taken here across 7 inches assayed: Gold, trace; silver, 0.4 oz. per ton; copper, 5.7 per cent. Two samples taken at the face returned the following assays:

Across 36 inches of quartzite, slightly silicified and slightly mineralized with chalcopyrite, on footwall side of the shear: Gold, nil; silver, nil; copper, 0.4 per cent.

Across 50 inches of quartzite, slightly silicified, no visible sulphide miner lization, remainer of width of shearing to hanging-wall: Gold, nil; silver, nil; copper, trace.

The lower adit, a crosscut at elevation 5060 feet, driven north 65 degrees east for 80 feet in massive white quartzite, appears to lie under the foot-wall of the shearing and to be directed away

from any intersection with the sheer. The quartzite in this adit is fractured along planes which strike north 20 degrees west dip almost vertically. This working is not shown on the accompanying sketch-map.

No igneous rocks are exposed in either of these workings, and the nearest outcrop is 800 feet up the 35-degree slope above the upper adit, at an elevation of 5460 feet. Here a small exposure of syenite is not sufficiently well exposed to permit accurate determination of its relation to the mineralization exposed in the adit.

On the Stanley claim, immediately to the east of the Golden Fleece claim, several small workings expose silicification and quartz mineralization. The quartz is slightly mineralized with galena and chalcopyrite. A syenite intrusion, probably a sill, follows the general plane of weakness at the contact of the two sedimentary members. The best exposure is in a short adit, No. 1, at 5200 feet elevation, which has been driven south 50 degrees west for 60 feet. At the portal a 3-foot width of quartz is exposed. This vein-structure is flat and is overlain by dark-grey argillite, heavily sheared, which is well exposed on the surface above the adit. Below the quartz the syenite sill is exposed. The adit is driven in this rock to the face where, almost on the floor, a quartz stringer is exposed. The stringer has a width of 1 to 3 inches and is mineralized with a very small amount of chalcopyrite. Below it lies t typical white, massive quartzite. The syenite apparently strikes north 35 degrees west, dips 30 degrees north-eastward and has a width of approximately 30 feet. It is assumed that the strike

and dip of the sill at this point may be taken as those of the vein and of the original contact between the argillite and the quartzite. The evidence here suggests that the quartz mineralization was later than the intrusion of the syenite. A sample taken at the portal, across 26 inches of quartz which contained a very small amount of galena, assayed: Gold, nil; silver, nil; lead, 0.2 per cent.

Close to this adit two others have been driven and two open cuts made in an attempt to expose further the occurrence of quartz at or near the argillite-quartzite contact. This additional work shows that the quartz may be at the contact or within the argillite at a few feet from the quartzite or entirely lacking. In one of these two open cuts a width of 60 inches of quartz lies entirely within heavily sheared argillite. Here the vein strikes north 55 degrees west, dips 20 degrees north-eastward. Sulphide mineralization, generally sparse, confined to minute amounts of chalcopyrite and galena. A sample taken here across 34 inches of quartz which contained a very small amount of galena, assayed: Gold, trace; silver, 0.4 oz. per ton; lead, 01 per cent.

Northward from these workings on the Stanley claim further exploration of a similar condition has been undertaken on the Tiger claim. Here, at an elevation of 4785 feet, an adit has been driven 206 feet easterly and, near the face, north-easterly. This working is shown on the accompanying sketch-map in dotted outline. For the first 70 feet the walls are of compact, white quartzite which strikes north 85 degrees west, dips 25 degrees northward and in which there is no indication of quartz vein or mineralization. At 70 feet a contact with argillite strikes north-east, dips 40 degrees north-westward. The argillite is heavily sheared and bedding is entirely

intersected at the floor; this strikes north 15 degrees east, dips 55 degrees westward. This dyke is irregular in dip, and is exposed along the walls of the adit for 30 feet before it disappears in the back. In this length the most noticeable characteristic of this intrusive is its squeezed appearance which suggests that there was local movement before complete consolidation of the rock. From 155 feet to 184 feet from the portal there is exposed in argillite an irregular width of quartz, from 12 to 60 inches, which strikes north 65 degrees, west, dips 25 degrees northeastward. In this quartz there is a slight dissemination of galena. At 184 feet another exposure of badly decomposed syenite is shown in the back of the adit. This member strikes due east, dips 50 degrees northward. From this point to the face at 206 feet the working becomes a winze as it follows the argillite and quartz occurrence as the latter assumes the dip of the syenite. The foot-wall of the syenite sill forms the back of the winze. There is less galena in the quartz at the bottom of the winze than at the top. A sample taken at the bottom across 50 inches of quartz stringers and irregular quartz dissemination in argillite, slightly mineralized with galena and sphalerite, assayed: Gold, trace; silver, 0.2 oz. per ton; lead, nil. Although at this location there is little direct evidence as to the relative ages of the syenite and the quartz mineralization, there is a well-defined fracturing in the igneous rock at 184 feet in which there is no quartz, which suggests that the quartz deposition was prior to the syenite intrusion.

Seventy feet due east from and 38 feet above the portal of this adit is an underground working which has been driven for 15 feet on a bearing of north 40 degrees east. The first 5 feet have been driven horizontally; the last 10 as a winze so that the floor at the face of the working is 5 feet below the floor at the portal. This

development exposes disseminated quartz and quartz stringers slightly mineralized with galena, in argillite. In one place, on the north-westerly wall, a 2-inch stringer of quartz widens to 7 inches and is here well-mineralized with galena. The quartz stringer-zone strikes generally north 75 degrees east, dips 40 degrees northward. A sample taken at the bottom of the winze, assayed: Gold, 0.02 oz. per ton; silver, 2.2 oz. per ton; lead, 10.5 per cent. This sample was taken across 40 inches of disseminated quartz in argillite and included bunches of strong mineralization by galena and small amounts of sphalerite.

Close to this working, in a south-easterly direction, two small open-cuts expose what is taken as extension of the same types of quartz deposition in argillites proximal to the syenite intrusive. The principal point of interest in this work is an exposure where the main concentration of quartz lies in argillite at a distance of 30 inches below the foot-wall of the syenite sill. Within this 30 inches the argillite is little silicified and carries only a few bedded quartz stringers. In this case the quartz mineralization may be either earlier or later than the syenite intrusion; the principal information available is negative, namely, that the syenite is not directly responsible for the quartz mineralization.

The workings on the Wanda B claim are slightly south of east and 4200 feet from the Tye workings. A vertical shaft has been collared at an elevation of 5330 feet and sunk 67 feet on an irregular zone of silicification in greenstone. With no defined walls, the width of this zone varied from a few inches to 4 feet; mineralization with galena and chalcopyrite is rare and when present is definitely sparse. The greenstone, probably originally an andesitic tuff, is characteristically fine-grained, dense and little sheared. From the

bottom of the shaft a working has been driven 28 feet on a bearing north 15 degrees east. A sample taken at the bottom of the shaft across 8 inches, which included the only quartz seen at this horizon, assayed: Gold, 0.02 oz. per ton; silver, 0.4 oz. per ton; lead, 0.2 per cent. In this sample there was a very small amount of galena and sphalerite.

Easterly from the shaft at an elevation of 5230 feet is an adit 150 feet which has been driven 213 feet westerly to a point below the bottom of the shaft. In this working the rocks consist of thinly-bedded black argillite and quartzite and heavily-sheared greenstone. Quartz stringers are concentrated principally in greenstone. No sulphide mineralization was seen although small amounts may be present and visible on close examination.

Workings on the Larchwood claim are 1200 feet north-westwar from the Wanda B workings. Here again the condition which has attracted attention is silicification and quartz concentrations at and near the contact of argillites and quartzite. Much of the "quart is poorly-defined and is properly termed silicification rather than vein matter. In contrast to other occurrences on the property, quart confined principally to the quartzite members and disappears or is present in only small amounts when it attempts to leave that formatio and enter the argillites. The development consists of three adits at elevations of 5450, 5430 and 5350 feet respectively. The upper one, No. 1, is 30 feet long, on a bearing north 70 degrees west. At the portal, argillite seamed by quartz stringers, dips flatly to the west ward. Fine-grained, light-brown to grey quartzite overlies the argil ite and in this rock the adit follows a 3-foot width of barren quartz which dips to 50 degrees southward. At the face a winze has been sun

on this occurrence for 30 feet. Within 3 feet of the collar of the winze the contact between the quartzites and the argillite is intersected and the quartz cuts off abruptly. From this point downward in the winze there are only minor and irregular stringers of quartz. A sample taken across 36 inches of barren quartz, at 8 feet from the portal, assayed: Gold, nil; silver, nil.

At 5430 feet elevation, slightly northward from the No. 1 adit, a second, No. 2, has been driven south-westward for 90 feet. Here the work has exposed quartzite similar to that in No. 1 but toward the face shearing is more pronounced than any seen in the other adit. From within this working a winze has been sunk vertically for 32 feet on a narrow width of quartz which, at the adit-level, appears to be confined within a vertical fissure which strikes south 75 degrees east. At the collar of the winze the quartz is mineralized with a small amount of galena distributed in patches. Down the winze the quartzite lies between alternate horizontal bands of argillite and argillaceous quartzite. In the less competent bands there is no definition of quartz and accurate terminology would place it as irregular silicification rather than as vein-quartz. A sample taken at the top of the winze, across 13 inches of quartz, slightly mineralized by galena, assayed: Gold, trace; silver, 0.4 oz. per ton.

No. 3 adit is 150 feet eastward from No. 2, at an elevation of 5350 feet, it has been driven south 60 degrees west for 250 feet. For 80 feet this working is in fine-grained, light-brown quartzite; from there onwards there is a gradual change in some places. The strike of this latter formation is north 60 degrees east, the dip, 30 to 40 degrees north-westward. In this working there is a small amount of bunchy quartz but no vein-structure [illegible] sulphide mineral-

The principal development on the property has been undertaken on the Emily claim. Here, faced up at an elevation of 3910 feet, a drift was started on a strong, bedded shearing in fine to medium-grained, light to dark-grey quartzites. The shearing strikes north 20 to 50 degrees west, dips 30 to 60 degrees north-eastward; the distance between the walls varies up to as much as 10 feet. With in the walls, however, silicification or replacement by quartz is not complete and there is often a considerable proportion of the widt which is either unsilicified or only weakly affected. Mineralizatior with chalcopyrite, and very small amounts of pyrrhotite and pyrite, is disseminated irregularly in the sections best silicified. Develo ment was carried as a drift for only 37 feet; from this point to the face at 163 feet it was continued as an incline on the shear. The elevation at the face is 3884 feet. Near the face the shear appears to narrow to less than 3 feet in width although there may be additio al width not exposed by the present development. At 39 feet from the portal a winze was sunk for 10 feet on a slope of 50 degrees, and a bearing of north 80 degrees east. Better than usual concentration of mineralization on the wall of the main incline prompted this work. Fractures older than the main shear, are prominent and strike parall with the main shear but dip at 25 to 30 degrees south-westward. Samp taken from this working were as follows:

At portal plus 7 feet, easterly wall, across 31 inches of quartzite slightly stained copper: Gold, nil; silver, nil; copper, 0. per cent.

At portal plus 27 feet, westerly wall, across 61 inches of quartzite slightly stained by copper; measured from hanging-wall of shear: Gold, nil; silver, nil; copper, nil.

which contains a small amount of chalcopyrite; below previous samples to foot-wall of the shear: Gold, nil; silver, nil; copper, 0.1 per cent.

At face of branch winze sunk from portal plus 39 feet, across 50 inches of silicified quartzite stained by copper; measured from foot-wall of the shear: Gold, nil; silver, nil; copper, 0.1 per cent.

Above previous sample, across 14 inches of quartzite to han ing wall of shear: Gold, trace; silver, trace; copper, trace.

At portal plus 87 feet, easterly wall, across 37 inches silicified quartzite which contains a letter pyrrhotite: Gold, nil; silver, nil; copper, nil.

At portal plus 127 feet, easterly wall, across 40 inches silicified quartzite which contains a little pyrrhotite and a very li malachite: Gold, trace; silver, trace; copper, 0.5 per cent.

At portal plus 163 feet, i.e. at face, across 32 inches of silicified quartzite stained by copper: Gold, nil; silver, nil; copp nil.

Select sample of mineralization from small ore-pile at port which contains chalcopyrite: Gold, 0.02 oz. per ton; silver, 0.8 oz. per ton; copper, 4.7 per cent.

In the course of examination particular attention was given to the relation between the syenite dykes and the quartz-sulphide min eralization, as, locally, there has been some impression that the intrusives are directly responsible for the mineralization. By these observations, particularly on the Stanley and Tiger claims, it appear that the intrusions of syenite and the deposition of quartz were prob ably contemporaneous or nearly so. In all probability, both originat with the same magma and followed the same general lines of structural

weakness. Under this assumption it remains possible to regard the dykes as guides to locations at which there may have been structural conditions suitable to the deposition of vein mineralization but the dykes are probably of little or no use as guides to type or quality of quartz-sulphide mineralization.

1937

QUESNEL MINING COMPANY, LIMITED. This company, of which J.G.G. Kerry, of the firm of Kerry & Chase, Montreal, is president, and Chas. S. Buck, manager, holds 21 placer-mining leases situated on the south bank of the Cariboo River (formerly named the North Fork of the Quesnel River), and extending south of the river in the region contiguous to Spanish Creek. The property includes that formerly named the Standard Group.

The property is 8 miles from Likely. The company's camp buildings are at Spanish Creek beside the Likely-Keithley motor-road.

Spanish Creek flowing almost due north has incised a rock-canyon half a mile long on the west side of its former channel which now lies deeply buried in the east bank of the creek. Half a mile below the canyon, the creek joins the Cariboo River.

West of the point of mergence of the valleys of Spanish Creek and the Cariboo River, extensive benches flank the south bank of the latter at heights of 45 feet, 115 feet, and 165 feet respectively above river-level.

The region is well covered with timber and vegetation.

Schistose sediments of the Cariboo series, of Precambrian age, which according to Bowman, underlie the Richfield formation of this series, are well exposed in the hydraulic pit; in the gorge of Spanish Creek; and at several points near the mergence of the valleys of Spanish Creek and the Cariboo River. Where exposed in the hydraulic pit, the black fissile argillaceous rocks strike north 15 degrees west and dip 25 degrees south-westward. They contain numerous cubes of pyrite and many quartz veins varying in width from a few inches to several feet. Quartz veins mineralized with pyrite and some galena are exposed in the bed of the river and on its north bank beyond the limits of this property. On the north side of the river, the formation is invaded by acidic intrusives.

There are two different buried channels on this property:-

(a) A segment of a former channel of the Cariboo River lies buried in the south bank and close to the present river. The company has commenced hydraulic operations at the down-stream end of this channel-segment, where it is cut by the present river, and it has been proved that at this point the bed-rock of the former channel is about 12 feet above the high-water level of the Cariboo River.

(b) A former channel of Spanish Creek, lies buried in the east bank of the creek. This was formerly covered by leases known as the Standard Group, and has engaged attention at different times for many years past. A description of it will be found in the Annual Report, Minister of Mines, British Columbia, 1924, pages 119-124, and also in Geological Survey, Canada, Summary Report 1932, Part A 1, pages 109, 110, and 111. No further reference is made to it in this report, as the present operations of this company are not concerned with it. Historical particulars given herein relate solely to the first-mentioned channel.

The earliest authentic record of work on the buried river-channel dates from about the year 1914, when a man named Polero apparently perceiving that a former channel lay buried in the south bank of the Cariboo River, drove two adits, known as Polero Nos. 1 and 2, through rim-rock 410 feet apart at respective heights of 22 feet and 15 feet above river-level. These reached the buried channel at respective distances of 135 feet and 65 feet. No. 1 adit is but 40 feet up-stream from the face of the hydraulic pit and is about 10 feet above the bed-rock of the buried channel. No. 2 adit, distant 410 feet in an up-stream direction, is about at bed-rick level. A considerable yardage of gravel was mined in both these adits and, although there is no authentic record of the

actual recovery of gold, it is rumoured that this was good. It was disclosed by hydraulicking at the down-stream end of the buried channel-segment that either Polero or an earlier miner drove another adit from the river's edge on the buried channel bed-rock, extracting the bed-rock pay-gravel for the entire length of the hydraulic pit, a distance of approximately 400 feet. It is understood, that at the time of hydraulicking it was apparent that this adit was connected with the down-stream rim-rock adit-crosscut driven by Polero, so that he may have driven both workings.

In 1932 three leases covering the region under description were acquired by Ruby Gold Mines, Limited, a private company. Under the management of G.W. Branston, the Polero adit adjoining the present hydraulic pit was cleaned out, and it was decided to prospect the ground thoroughly by underground operations, as the depth of the old channel bed-rock was unknown to these operators. A washing-plant was accordingly constructed, but for unknown reasons, operations were subsequently discontinued, and the property lay idle until it was acquired by the present company in 1936. In that year an excellent water-right was acquired on Spanish Creek, and a large force of men was employed in constructing flume and pipe-line of liberal capacity from the diversion point on Spanish Creek to the hydraulic pit. The total head of water available is approximately 320 feet, but as the pipe line discharges into a

flume 150 feet above the hydraulic pit, less than half the available head is utilized. Hydraulic operations, utilizing two monitors, one with an 8-inch nozzle, and the other with a 7-inch nozzle, were commenced in 1937 under the management of Charles S. Buck, and continued in 1938. For unknown reasons, the property was inactive in May, 1939, although, it is understood, that the results of hydraulicking to that date were satisfactory.

Exposure of Channel. An excellent exposure is afforded by the hydraulic pit at the down-stream end of the buried channel-segment, at the point where the latter is cut by the Cariboo River. Bed-rock and both rock-rims of the channel are exposed for a length of upwards of 400 feet. The bed-rock was about 12 feet above river-level (approximately high-water level) on May 15th.

The likelihood of gold being retained by the natural riffling of the bed-rock across the channel is striking.

The rims of the channel slope inward about 20 degrees, and the distance from rim to rim, 20 feet above the centre-line of the channel, is about 240 feet. Such a cross-section does not indicate quick cutting. The vertical depth of bed-rock below the flat which flanks the river at this point, and forms the top of the valley-rim is, 150 feet.

About 6 feet of coarse river-gravel with numerous glacial boulders, some of which are large, overlies bed-rock. The boulders consist partly of quartz, and partly of gneissic rocks which are known to outcrop on Rollie Creek to the north-east. Overlying bed-rock gravel are strata of well-sorted flat-lying gravel containing pebbles averaging about 4 inches in width. These are overlain by 20 feet of boulder-clay, the boulders occurring mainly at the bottom of the clay. Overlying the clay is 10 to 12 feet of post-Glacial well-sorted gravel.

The gold is stated to vary from coarse to fine, one nugget weighing 2 ounces, and several others having a value of upwards of $5.00 being recovered.

The cross-section of the channel is not discordant with pre-Glacial cutting, but from the pot-holing apparent in the bed-rock and the nature of the bed-rock gravel, it is apparent that if incised in pre-Glacial time, it was subsequently occupied by Pleistocene waters.

Hydraulicking exposed the fact that an earlier miner had drifted the bed-rock pay-gravel, as the timbers of an adit running from the mouth to the face of the pit were uncovered. This fact considered in conjunction with the total recovery stated to have been made from the pit, emphasizes the justification for continuing operations.

Underground Workings. In addition to the adit revealed by hydraulicking, underground workings consist of two short adits Nos. 1 and 2 driven by Polero about the year 1914 through the rim-rock separating the Cariboo River from its former channel. No. 1 adit is driven 22 feet above river-level (on May 15th, 1939), and 40 feet up-stream from the face of the hydraulic pit. For the first 135 feet it encountered rim-rock, thereafter passing into channel-gravel. The workings in gravel are now inaccessible, but are stated to be connected with the adit on bed-rock disclosed by hydraulicking, which may have been driven by Polero subsequent to adit No. 1, after he perceived that the latter was above bed-rock. The alleged good recovery may have been mainly from the adit following bed-rock.

As determined by pacing in steep terrain, No. 2 adit, is approximately 410 feet up-stream from No. 1 adit, and 15 feet above river-level (as on May 15th). For the first 65 feet it is driven in rim-rock, and thereafter passes into channel-gravel, in which are some old workings now unsafe.

Up-stream from No. 2 Polero adit for about 1000 feet, rock is exposed at a number of points on the steep river-valley slope up to about 50 feet above river-level. Subsequently, up-stream, the river-valley slope is composed of gravel, which rests on a low-lying rim-rock, which can be seen at a few points.

Between 1800 feet and 2783 feet up-stream from Polero No. 2 adit, there is a bench 45 feet above river-level, varying in width from 75 feet to 200 feet. The overlying gravel has been completely mined by early workers over a length of 983 feet and a width varying from 75 feet to 192 feet. It is not known at what depth these old workings are underlain by rock.

The inference drawn from these exposures is that the buried channel lies intact adjacent to the Cariboo River for a distance of approximately 1350 feet up-stream from the face of the hydraulic pit. Farther up-stream for about 750 feet to the down-stream end of the old workings, the north rim has been eroded but the bed-rock gravel may be preserved. Up-stream from the up-stream end of the old workings, the continuation of the former channel probably lies on the north side of the river.

The significence of the old workings is not apparent, and is indeterminate from field examination. They are certainly either workings on the bed-rock of the former channel, or they are a mined post-Glacial concentration on a false bed-rock overlying the channel. If the former, then bed-rock gravel has been mined in this section; if the latter, then the bed-rock gravel of the buried channel may still lie largely intact below.

The section of the buried channel, uncovered by the hydraulic pit, indicates that it may have been incised in pre-Glacial time, but if so, the character of the material now overlying the pot-holed bed-rock portrays the fact that it was occupied, subsequently, by a powerful stream in Pleistocene time, which effected re-sorting. From the recovery of gold which, it is understood, resulted from hydraulicking it seems that the up-stream part of the channel well warrants investigation. In this particular area the age of the channel does not appear of such importance as elsewhere from the commercial standpoint, because it is definitely known that in this region, the glacial debris contains unusually coarse gold, and that shattered rock detritus containing coarse detrital gold has escaped glaciation at several widely-separated points which is unusual in the Cariboo district. For this reason, the re-sorting of such material by waters of any age is likely to form rich placer deposits, although they are likely to be "spotty". The false bed-rock deposits on the Cariboo River down-stream from Spanish Creek, were extensively worked by the earliest miners, and still engage attention.

At least one additional adit driven through the rim-rock from Polero No. 2 adit would assist in verifying the position of the buried channel, and in checking the inferences drawn

from present exposures, as to the probable length and exact position of the buried channel-segment. Nearness to the river is of high practical importance, inasmuch as if situated close to the river, hydraulicking operations can be rendered independent of bed-rock grades by adopting the obvious expedient of transverse hydraulicking. The latter, moreover, enables simultaneous hydraulicking at several different points. Should the course of the buried channel lie far south of the river, greater difficulties are presented.

COPY

No. 10
(7 maps)

MANGANESE DEPOSITS

COWICHAN LAKE

VANCOUVER ISLAND

Several manganese deposits are known in the Cowichan valley area on Vancouver Island. A map (Fig. 1) at the scale of two inches to one mile, accompanying this report, shows the area and its position relative to the principal points in south-western British Columbia. The Hill 60 deposit was discovered in 1918, and from it, in 1919 and 1920, manganese ore reported to total 1,117 tons was shipped to the Bilrowe Alloys Company at Tacoma, Washington. At the time when the work was being done on the Hill 60 property there was also some interest in the Black Prince Group on Shaws Creek and the Cottonwood group on Cottonwood Creek. The Shaws Creek deposit is now staked as the Manganese group and some surface work was done there in the 1939 season. It is also reported that some work was done by the owners on the Hill 60 property in the past two or three years. Other than these activities there seems to have been very little interest in manganese occurrences in the area for almost twenty years. References to the earlier activity will be found in the following publications:- Annual Report, Department of Mines, British Columbia: 1918, pages 296-298; 1919, pages 237, 238; 1920, page 24: Munitions Resources Commission, Canada, Final Report, pages 90-95: "Manganese Deposits of Canada", Geological Survey, Economic Geology Series No. 12, pages 115-119.

Because war-time conditions might make it very desirable to secure a source of manganese ore in Canada the writer was instructed to investigate the deposits in the Cowichan Lake area and to search for further deposits. This work was carried out from September 28th to November 4th, 1939. The crew assigned consisted of ten young men who had received training at the Dominion-Provincial Mining Training Project at Cowichan Lake from June to early September. The young men were willing and able, and cheerfully carried out the work assigned. A camp, situated at the Forest Experimental Station, on the south side of Cowichan Lake, was used for a base, and was occupied by the 10 trainees and the cook on September 28th. In the course of the work parties occupied camps at four different points. The usual wet fall climate of this area, with snow toward the end of the period, hampered the work somewhat.

The first work undertaken was at the Hill 60 property where the old cuts were cleaned out and some were enlarged. Trenching and stripping were also done looking for extensions of the deposit. While this work was in progress an effort was made to outline the favourable rocks nearby and farther west, and a more intensive search was made for manganese in what were regarded as the more favourable sections. Efforts to find bog manganese on the slopes below the known lode deposits were unsuccessful. Manganese oxide and silicate were found in place about 4,000 feet west of the principal Hill 60 workings and still farther west a discovery was made near Wilson Brook. Stripping and trenching were done to explore these

discoveries. Further work of the same nature was done on deposits which had been discovered on Meade Creek by one of the Mining Training Parties. The Cottonwood deposit which is on Widow Creek (a tributary of Cottonwood Creek) was also explored by stripping and trenching, and traverses for reconnaissance mapping were made as far west as a point between Mackay and Shaws Creeks. The writer visited the Shaws Creek deposit. The results of this work are incorporated in this report and the accompanying maps.

The manganese deposits occur in cherty tuffs, often closely associated with jasper. Manganese occurs as oxide, silicate, and carbonate, and as a hard, fine-grained mineral of light yellow colour, which has not yet been identified. The oxide, undoubtedly derived from the other minerals, is found in the weathered zone, forming a coating from a fraction of an inch to a few inches thick around cores containing the other minerals. The oxide also occurs filling small cracks which vein the unweathered rock, and as the principal residual material in completely weathered zones. The area has been glaciated and the weathered zones are generally shallow, accordingly the residual oxide rarely extends to a depth of 2 or 3 feet.

The ore shipped from the Hill 60 property came principally from the big pit from which practically all the oxide was mined. Black rock at points on the sides, and lying broken in the pit, is material, containing rhodonite and the yellow mineral, on which a thin coating of oxide has formed. It seems probable that closely spaced, steeply dipping joints to be seen in the walls of the pit, have favoured oxidation to a depth greater than is indicated at

other known deposits in the area. The maximum vertical range in the pit is about 35 feet but as the slope of the natural surface was steep, the bottom of the pit probably averaged 10 to 15 feet from the surface. An adit, crosscuts below the western end of the pit and about 10 feet below the deepest point, reveals surprisingly little oxide even in the cracks.

Study of the various deposits made it apparent that if an appreciable tonnage of manganese ore in bodies of workable size was found in the area, it would most probably be of manganese silicate, with some possibility of carbonate deposits, whereas oxide ore would probably be limited to small superficial occurrences. The following assays, presumably representing the range of material which was exposed at the surface (and therefore largely oxide) on the Hill 60 and Shaws Creek properties, are copied from the Munitions Resources Commission Report, pages 93 and 95:

Property	Sample No.	Metallic Manganese Per Cent.	Silica Per Cent.
Black Prince (Shaws Creek)	1	22.9	57.24
	5	40.8	50.18
	Lot 1 Test Shipment	22.09	58.16
Hill 60	1	15.88	62.84
	2	23.15	49.60
	3	57.15	18.04
	B	32.90	41.60
	R	46.50	18.90
	U	34.68	32.0

The following assays are from samples taken by the writer. The oxide was eliminated as far as possible in the field, by selection and cobbing. It was not possible to eliminate all the oxide, but the assays should give an indication of the probable manganese content of primary mineralisation.

No.	Description	Manganese Per Cent.
6007-C	Jasper from Hill 60	7.0
6018-C	Black, fine-grained rock, containing some pink silicate and some brown carbonate replacing host rock along fractures - from Cottonwood deposit	13.8
6015-C	Silicified rock containing pink silicate and a little of the yellow material - Cottonwood deposit	21.2
6014-C	Banded yellow mineral, pink silicate and unreplaced host rock - west of Hill 60	21.9
6013-C	Selected yellow mineral with unreplaced cherty host rock - west of Hill 60	16.7
6005-C	Selected pink silicate with some quartz - Hill 60-A	29.9
6016-C) 6017-C)	Brown carbonate replacing dark grey brown rock - Cottonwood deposit	41.0 42.5

Cowichan Lake, about 18 miles long, occupies the upper end of a valley which was widened and deepened by glaciation. The lake is drained to the east by Cowichan River into Cowichan Bay. In the area in which manganese deposits are known to occur, the valley has a width of 1½ to about 3 miles. The lake surface is

about 550 feet above sea-level, and the north wall of the valley rises steeply to elevations between 2,000 and 3,000 feet. The parallel Chemainus River Valley, farther north, forms the other boundary of a ridge which has a very uniform summit at the eastern end and rises at the western end to more rugged summits at elevations from 4,000 to 4,500 feet. Steep tributary valleys cut into the southern side of the ridge, particularly at the eastern end of the area, and in the western half Shaws Creek, Mackay Creek, and Cottonwood Creek, occupy wider valleys of low gradient.

The depth of overburden varies greatly, ranging from deep accumulations of drift at the sides of the valley and the outlets of branch creeks to a very thin cover on the steep slopes and on spurs of the main ridge. Much of the area was heavily forested, but at the eastern end and at Cottonwood Creek the timber has been largely logged and burned off. Logging is in progress on Shaws and Mackay Creeks.

The public highway runs along the north side of the valley from the Island Highway, two miles north of Duncan, to the village of Lake Cowichan, at the foot of the lake, a distance of about 17 miles, and continues along the north side of the lake to Youbou, about 9 miles from Lake Cowichan. The Esquimalt and Nanaimo and the Canadian National Railways have branch lines running up the valley to Lake Cowichan and the Canadian National line continues along the north side to the head of the lake. A logging railway extends up Shaws Creek for some miles, and is

being continued northward as logging progresses. A logging railway is also being built up Mackay Creek. The railway lines are devoted almost entirely to handling freight, principally logs and timber. Busses and trucks serve the communities along the highway and there is daily boat service for passengers on the lake. Logging roads furnish access to parts of the area and there are fair trails up Mackay and Cottonwood Creeks, and a rather poor trail up Meade Creek. Dense second-growth timber and debris in some of the logged or burned areas make travelling difficult.

The area lies within the Esquimalt and Nanaimo Railway Land Grant. Rights in the base metals were transferred to the railway company with the surface rights and accordingly the owners of surface rights may claim a royalty on base metal produced on claims within this area.

The area referred to in this report is included in various maps published by the British Columbia Department of Lands. The map in two sheets, at two inches to one mile, with topography indicated by 500-foot contours, accompanying this report, is reproduced from parts of three sheets of the Forest Branch (Department of Lands) maps covering the Esquimalt and Nanaimo Railway Land Grant. Memoir No. 13 of the Geological Survey, Canada, published in 1912, is accompanied by a map at six miles to one inch, on which the general geology of the area is indicated. The Duncan Sheet, at one inch to two miles, which

accompanies Memoir No. 96, published in 1917, covers the eastern end of the area, indicating the geology on a topographic base with 100-foot contours.

In the course of the Mining Training Project in the summer of 1939, the geology of various parts of the area surrounding Cowichan Lake was mapped under the direction of Professor Gordon Davis, using the Forest Branch map as the base. This mapping did not separate the tuffaceous sediments from the volcanic rocks of the Vancouver group.

Davis' geological mapping in the area referred to in this report, is reproduced on the two-sheet map mentioned previously. Some extensions to the sections mapped have been incorporated and where possible the tuffaceous sediments (Sicker series) have been outlined, based on mapping done from September 28th to November 4th, 1939, under the direction of the writer. Most of the traverses on which this added information is based were made by the young men who had received their training during the summer. The geological mapping is of a reconnaissance nature and in much of the area the various members of the Vancouver group are not differentiated. No effort was made to separate the volcanics of the Sicker series from the Vancouver volcanics and only in some parts of the area are Sicker series sediments differentiated from the Vancouver and the Sicker volcanics. The topographical base map, with 500-foot contours, is inadequate for the requirements of satisfactory mapping.

Manganese-bearing float has been reported from points south of the Cowichan valley and the writer was told of an occurrence near Skutz falls, thought to be in place, but not of commercial interest. All the known occurrences on which work has been done are north of the valley in tuffaceous sediments, apparently Clapp's Sicker sediments, which Clapp and Cooke place as probably younger than the Vancouver volcanic group and of Jurassic age. (Geological Survey, Canada, Memoirs 13 and 96.) The contacts of the Sicker sediments with the volcanic rocks are usually drift-covered. The rocks have been folded and faulted, the axes of folding and faulting being principally parallel with the trend of Cowichan valley, or from 55 degrees to 65 degrees west of north. Intrusive rocks, Saanich granodiorite, cut across the strike of the Sicker series. These conditions make it difficult to determine whether or not the manganese deposits are restricted to a limited stratigraphic range in the Sicker sediments. The Sicker series was recognised by Clapp from Moresby Island, on the east coast of Vancouver Island to about the west end of Cowichan Lake, and north as far as Nanoose Bay, interrupted of course, by other rocks.

In Memoir 96 (page 52) Clapp says that the Sicker sediments are at least from 2,000 to 3,000 feet thick, and the underlying volcanics of the same series have a maximum thickness of about 3,700 feet. In the more detailed description of the Sicker sediments in the same Memoir (page 136) C.H. Cooke mentions jasper lying directly on the amygdaloidal surface of a flow

(Sicker volcanic) in the canyon west of Coronation Mountain and states (page 142) that the jasper is simply a ferruginous chert. Cooke places the jasper and cherty tuffs among the lower members of the Sicker sediments, being succeeded by softer tuffs which are in turn succeeded by slates that in some localities have been rendered schistose.

Most of the known manganese occurrences in the area are close to or in contact with jasper. At various points beds or lenses of jasper and ferruginous slate, from half an inch to 2 or 3 inches thick, are interbedded with grey cherty tuff but where the jasper is well exposed it is not traceable continuously for any great distance. At the Hill 60 deposit where the most extensive exposures were found, bodies of jasper are from a feet or two to twenty feet in thickness, but they are irregular in outline and appear to be masses of comparatively short length. This is probably because they are in faulted ground; otherwise it would appear that they must have been formed by the alteration of some other rock, possibly by replacing masses of limestone. The writer did not see any limestone in the Sicker sediments and Cooke mentions only one occurrence of limestone, a thin bed in the softer cherty tuffs, but he does say that most of the soft cherty tuffs contain calcium carbonate. Cooke, however, says definitely that the cherty tuffs and jasper were laid down as such and were not formed by silicification of softer rocks.

There is evidence of the introduction of quartz at most of the manganese occurrences where host rocks are cut by numerous narrow quartz-filled fractures. Some sulphide mineralization is also to be observed. The contrast developed on weathered surfaces, frequently brings out the fact that manganese occurs in small lenses parallel with the bedding of the enclosing cherty tuffs and jasper. Individual lenses are usually less than two inches thick but may be so closely spaced that they constitute 50 per cent. or more of the rock, for widths from a few inches to several feet. Freshly broken, unweathered material, also indicates masses of pink siliceous material consisting of rhodonite and presumably of fine-grained quartz. Some of the masses are as wide as two or three feet. The pink silicate is also seen veining the rock and replacing it along the sides of fractures, a similar relationship was also observed for buff-coloured carbonate at the Cottonwood deposit. This buff-coloured mineral apparently consists largely of manganese carbonate and is seen replacing fine-grained, black, cherty rock. At most of the deposits there is a fine-grained siliceous material of a light yellow colour (Bementite ?). It is frequently intimately associated with the pink silicate and the two with fine-grained colourless silica form a banded rock, the banding is assumed to be parallel with the bedding of the wall-rock. The deposits consist of interleaved lenses or lamellae of short length, rather than continuous layers of any one mineral. The pink silicate is observed to vein and probably to replace the yellow silicate. The yellow silicate

in turn is seen to have replaced the jasper. Several thick bodies containing considerable amounts of manganese-bearing minerals, and otherwise markedly differing from the host-rock, appear to pass by transition, along the strike, into the more normal country-rock; at least there is no structural break exposed. The manganese-bearing bodies appear to be irregular, rudely lenticular masses, having the long dimensions approximately parallel with the bedding of the enclosing rocks.

The known occurrences are short in relation to their thickness. Little is known about the depth except from the workings at the Hill 60 property and the exposure in the canyon. However, as the manganese mineralisation appears to be generally parallel with the bedding and, as in the eastern half of the area the bedding planes stand steeply, it seems reasonable to assume that the dimension down the dip of the beds will be comparable with that along the strike. This assumption is confirmed to a degree by the workings on the Hill 60 property and the canyon.

The apparent bedded nature of the deposits and the abundance of quartz veinlets probably supply the local evidence in support of one theory of deposition, namely, that the primary manganese is of sedimentary origin and has been converted to rhodonite by silicification. In Memoir 13 Clapp suggested that the cherty tuffs had been silicified but in Memoir 96 Cooke states that they were laid down as such, and were not the result of regional silicification, his argument appears to have been accepted by Clapp. The theory that the manganese silicates were

developed by the silicification of manganese minerals deposited during sedimentation, does not appear to be in accordance with the following observations.

(a) The manganese-bearing bodies are irregular in outline, and generally widely spaced and, although their longer axes are approximately parallel with the bedding planes, the bodies are short relative to their thickness.

(b) Some of the lenses are 1 feet to 2½ feet thick consisting largely of manganese silicate without observable bedding.

The development of such bodies does not seem to be explained reasonably by sedimentation.

(c) Megascopic examination indicates that the manganese silicates and carbonate vein and replace earlier rock minerals.

The manner of deposition and the relation of the deposits to the host-rock are not clearly indicated, though microscopic study may throw further light on the matter. These points are of considerable interest in determining future policy in regard to the deposits.

The primary mineralization, consisting of manganese silicate associated with quartz or crystalline silica, is probably of no present economic interest unless means of concentration can be developed. Carbonate ore of good grade appears to have a greater chance of proving useful economically. The discovery of carbonate ore running 40 per cent. manganese in

the Cottonwood deposit is therefore of some interest. This deposit is incompletely delineated on the surface but the carbonate is exposed across an apparent width of 6 or 8 feet and may extend for some distance along the strike.

The nature of the known occurrences in the eastern part of the area, with the inaccessibility of the Meade Creek occurrences, render that part of the area of less present interest than the territory from the Widow Creek fork of Cottonwood Creek westward to Shaws Creek. Parts of this section are much more ready of access and are already provided with means of transportation or could be provided more cheaply than could Meade Creek for example. The Shaws Creek and Cottonwood Creek deposits have larger areas of manganese-bearing rock exposed than are known at present at the other deposits and this fact also served to make this part of the area of greater current interest than the eastern section.

Probably there are substantial sections underlain by favourable rocks, lying between the Shaws Creek and Cottonwood Creek manganese deposits. This part of the area is more rugged than the eastern section, and owing to the lateness of the season could not be examined and prospected. There is a fair trail up the main fork of the Cottonwood. A trail runs up Mackay Creek and over the divide to Jump Creek, and a logging railway is being built up Mackay Creek. The logging railway on Shaws Creek will probably be within three-quarters of a mile from the manganese deposit in the near future. This part of the area is accordingly not difficult of access and could be prospected during the summer season.

The approximate positions of the known manganese occurrences are shown by index numbers in circles on the large-scale map accompanying this report. Plans at scales of 1 inch to 20 feet, and 1 inch to 50 feet, also accompany this report and supply information concerning five of the occurrences. The following notes give salient points concerning the various deposits.

(1) Shaws Creek deposit, situated about 5½ miles north of Cowichan Lake. The workings consist of strippings and open-cuts (see plan) reached by a rough trail about two-thirds of a mile in length leading from an old cabin on the west side of Shaws Creek. The cuts are at approximately 1,900 feet elevation which is about 500 feet higher than the cabin. The cuts are understood to be in ground covered by the claims Manganese, and Manganese Nos. 1, 2, and 3, recorded in the names of A.W. Wylie, R.A. Wylie, and R.W. Wylie. The claims are within Block 110, Crown-granted timber land. It is reported that ownership of the timber land carries rights in respect of base metals, and that the owner could charge a royalty on base metals produced. The timber is being logged by Industrial Timber Mills Ltd. The logging company operates a railway which is being extended up Shaws Creek. At the middle of October the track had reached a point about 1¼ miles south of the cabin, grading extended farther north, and the end of slashing was about three quarters of a mile south of the cabin. The Shaws Creek deposit has been incompletely explored by trenching and stripping. Some of the

trenches from 1½ to 2½ feet deep have not exposed bed-rock. The bed-rock, consisting of jasper and cherty tuffs, has been folded and faulted. Some of the manganese-bearing rock lies almost horizontally and some dips west of north at angles up to 60 degrees. Samples taken by the writer ranged from 13.9 to 29.9 per cent. manganese. Oxide ore of somewhat higher grade could doubtless be selected.

(2) The principal Cottonwood Creek showing is west of Widow Creek (a tributary of Cottonwood) about 3 miles by trail from Cottonwood Creek and about 4½ miles from the Canadian National Railway near the mouth of Cottonwood Creek. Up the latter creek and for about a mile up Widow Creek the trail follows an abandoned logging railway grade. The showings, about a quarter of a mile northwest from the main trail, and 500 feet higher than it, are at about 2,750 feet elevation.

Stripping and some trenching, (see plan), done under the writer's direction, exposed quartz, manganese silicate, and some carbonate replacing dark, fine-grained, cherty, rock. Samples of this material ranged from 13.8 to 21.2 per cent. manganese. At the north-east corner, a mass of brown carbonate rock is exposed with an indicated width of 6 feet or so. Samples of this material assayed 41.0 per cent. to 42.5 per cent. manganese. The deposit is incompletely exposed.

(3) On a branch creek about 200 yards east of Widow Creek, a band 1½ to 2 feet wide, containing a good deal of manganese silicate, is exposed at two points, about 100 feet apart. This occurrence is at approximately 2,175 feet elevation and has had no work done on it. The immediate wall-rock is jasper impregnated with pyrite.

(4) Meade Creek. Outcrops of manganese-bearing rock were discovered at three points east of Meade Creek during the summer mining training project, and stripping was done at two of the discoveries which are about 250 feet apart. Some further work was done in October. Widths here are usually less than 3 feet and often less than 2 feet; the manganese oxide gave way to silicate at shallow depth. These exposures are at elevations from 2,775 to 2,900 feet, and more than five miles by rough trail from the main road.

(5) The Wilson Brook discovery at approximately 3,100 feet elevation, is about two-thirds of a mile south-east of a trapper's cabin on Wilson Brook. There are two irregularly lenticular masses each from a few inches to a foot wide and about 20 feet long.

(6) About 4,000 feet west of the Hill 60 workings boulders of tuffaceous sediments partly replaced by pink manganese silicate and the yellow mineral were discovered on a bare spur, at approximately 1,700 feet elevation, half a mile north of the main road. Overburden is several feet deep. Down the slope from the boulders similar material was found in place up to 4½ feet in width. A source of the boulders up the slope was not discovered. The bed-rock is shattered where exposed and it appears that there has been some faulting. A sample containing a good deal of the yellow mineral and very little of the pink silicate assayed 16.7 per cent. manganese, and one estimated to contain about equal parts of the yellow mineral, pink manganese silicate, and unreplaced wall-rock, assayed 21.9 per cent. manganese.

(7) Hill 60-A. North-west, across the head of the canyon from the main Hill 60 workings, several old cuts expose manganese silicate mineralization, replacing cherty tuffs (see plan). The mineralized band is slightly offset where cut, by an andesite dyke, and by a fault, in one cut. The cuts, separated by moderate distances, do not show very good alignment and it may be assumed that the ground between them has been disturbed. The depth of overburden and the faulting prevented tracing the manganese-bearing rock farther. This occurrence is different in character from the main Hill 60 showing, and appears to be at a different horizon in the Sicker series.

(8) Hill 60-B. A large pit from which the Hill 60 ore was mined, a smaller pit nearby, and an adit which crosscuts under the western end of the big pit are the main workings at the Hill 60 property (see plan). A short adit has been driven in the canyon some distance to the west and there are shallow cuts and strippings both east and west of the main workings. These workings are understood to be on the Hill 60 claim. The Crown-granted claims Hill 60 and Hill 60 No. 2, which had reverted to the Crown, were acquired by W.R. Wylie of Vancouver in 1938. A branch road runs north-west from a point on the highway, a little less than seven miles east of Lake Cowichan. From the end of the branch road a trail may be followed about 1½ miles to the workings. From the short adit on the side of the canyon there are strippings and trenches distributed through a distance of 1,200 feet to the east. The longer adit is at about 2,515 feet elevation and the top of the big pit, at about 2,760 feet elevation.

The steep escarpment, on the north side of a spur running west into the canyon, marks a fault which can be followed for about 200 feet east of the canyon where it is covered with overburden. The main fault strikes almost due east but some strands diverge east of south. It is thought that a strand may continue east past the principal workings in a shallow draw. The big pit is in or alongside a considerable mass of jasper, other masses of jasper are found to the west along the fault, the short adit in the canyon, is in such a mass. Practically all the ore shipped must have come from the big pit. All the oxide ore was apparently mined and it is reported that the oxide gave way to the pink silicate at a depth of about 15 feet. Some manganese silicate remains in the north-east and south-west corners of the big pit, but none was observed in the adit and surprisingly little oxide was seen there. It is possible that at the elevation of the adit more silicate would be found below the center of the big pit. Thin coatings of manganese oxide have formed on the broken rock in the pit and on the dumps. There are scattered occurrences of oxide in the shallow surface workings, the best showing being about 600 feet east from the big pit.

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Mining Engineer

Vancouver, B.C.
December 15th, 1939