

ANNUAL REPORT
OF THE
MINISTER OF MINES
OF THE PROVINCE OF
BRITISH COLUMBIA
FOR THE
YEAR ENDED 31ST DECEMBER

1934



PRINTED BY
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VICTORIA, B.C. :
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1935.

To His Honour J. W. FORDHAM JOHNSON,
Lieutenant-Governor of the Province of British Columbia.

MAY IT PLEASE YOUR HONOUR:

The Annual Report of the Mining Industry of the Province for the year 1934 is herewith respectfully submitted.

G. S. PEARSON,
Minister of Mines.

Minister of Mines' Office,
April, 1935.



Portland Canal Area, showing the Town of Stewart, Premier Mine, and Aerial Tramway. A view of part of the 7½- by 12-foot relief model of this district, by the late Norman H. Hawkins, now in the Department of Mines Museum, Victoria.

CONTENTS.

THE MINING INDUSTRY. John F. Walker	Part A.
SYNOPSIS OF MINING LAWS OF B.C. Robert Dunn	Part A.
ASSAY OFFICE. D. E. Whittaker	Part A.
NORTH-WESTERN MINERAL SURVEY DISTRICT (No. 1). Joseph T. Mandy	Part B.
NORTH-EASTERN MINERAL SURVEY DISTRICT (No. 2). Douglas Lay	Part C.
SOUTHERN AND CENTRAL MINERAL SURVEY DISTRICTS (Nos. 3 AND 4). P. B. Freeland.....	Part D.
EASTERN MINERAL SURVEY DISTRICT (No. 5). B. T. O'Grady	Part E.
WESTERN MINERAL SURVEY DISTRICT (No. 6). A. M. Richmond	Part F.
INSPECTION OF MINES. James Dickson	Part G.
REPORT OF EXAMINERS FOR COAL-MINE OFFICIALS. James Strang	Part G.
GOVERNMENT MINE-RESCUE STATIONS. J. D. Stewart, John Thomson, Alfred Gould, and John T. Puckey	Part G.
INSPECTION OF COAL-MINES. Geo. O'Brien, John G. Biggs, Thomas R. Jackson, Charles Graham, and John MacDonald	Part G.
INSPECTION OF QUARRIES. James Strang, Geo. O'Brien, John G. Biggs, and Chas. Graham	Part G.
INSPECTION OF METALLIFEROUS MINES. James Dickson, Thos. R. Jackson, James Strang, John G. Biggs, Charles Graham, and H. E. Miard	Part G.

BRITISH COLUMBIA DEPARTMENT OF MINES.

VICTORIA, B.C.

HON. GEORGE S. PEARSON - - - - - *Minister of Mines.*
 ROBERT DUNN - - - - - *Deputy Minister.*
 JOHN F. WALKER - - - - - *Provincial Mineralogist.*
 D. E. WHITTAKER - - - - - *Provincial Assayer and Analyst.*
 JAMES DICKSON - - - - - *Chief Inspector of Mines.*

Resident Mining Engineers.

J. T. MANDY, No. 1 District, Prince Rupert.	P. B. FREELAND	{ No. 3 District, Penticton.
DOUGLAS LAY, No. 2 District, Hazelton.		{ No. 4 District, Penticton.
B. T. O'GRADY, No. 5 District, Nelson.		
A. M. RICHMOND, No. 6 District, Vancouver.		

District Inspectors.

GEO. O'BRIEN, Nanaimo.	JOHN G. BIGGS, Princeton.
T. R. JACKSON, Nanaimo.	CHAS. GRAHAM, Prince Rupert.
JOHN McDONALD, Fernie.	
JAS. STRANG, <i>Inspector and Examiner</i> , Victoria.	
H. E. MIARD, <i>Inspector and Examiner</i> , Fernie and Nelson.	

Mine-rescue Station Instructors.

J. D. STEWART, Nanaimo.	A. GOULD, Princeton.
J. L. BROWN, Cumberland.	J. T. PUCKEY, Fernie.

PART A.

THE MINING INDUSTRY.

BY

JOHN F. WALKER.

The mining industry during 1934 recovered to an appreciable extent the loss in value sustained between the peak year of 1929 and the low of 1932. The value of mine production declined from \$68,245,448 in 1929 to \$28,798,406 in 1932, a loss in three years of \$39,447,037. During 1933 the value of mine production increased \$3,804,266 to \$32,602,672, and in 1934 it increased a further \$9,702,625 to \$42,305,297. The low point apparently was reached in the first six months of 1933, when the estimated value for this period was \$12,887,984. Subtracting the estimated value for the first six months from the actual value of mine production for the year, it is found that the production for the last six months of 1933 was about \$19,719,688. The estimated production for the first six months of 1934 was \$20,697,827, and, subtracting this figure from the final value for the year, it is found that the production for the last six months was about \$21,607,470. It is apparent that the greater part of the recovery to date took place in the latter part of 1933, since when the industry has progressed slowly but steadily.

Gold production accounted for by far the greatest increase in value for any one metal or material in 1934, followed in order by lead, silver, zinc, copper, coal, and miscellaneous metals, minerals, and materials. The output of structural materials showed a slight decline in value.

Gold production established an all-time high in both volume and value. Lead established an all-time high in volume production and zinc fell just short of the all-time high volume production attained in 1930.

During the year some of the larger operations brought their production back to capacity, several operations increased their milling capacity, and a number of properties were brought into production.

The number of shipping metalliferous mines increased from 109 in 1933 to 145 in 1934, and those shipping over 100 tons increased from 47 to 69.

It is estimated that during the year 12,985 men were employed in all branches of the mining industry. This is an increase of 1,616 over the number employed in 1933.

The following list shows the dividends declared by companies engaged in the mining industry in the Province during 1933 and 1934:—

Company.	1933.	1934.
The Consolidated Mining and Smelting Co. of Canada, Ltd.	\$975,807	\$1,952,794
Premier Gold Mining Co., Ltd.	650,985	600,000
Howe Sound Co.*	562,749	1,421,373
Bell	13,800	29,401
Crow's Nest Pass Coal Co., Ltd.	12,091	248,472
Pioneer Gold Mines of B.C., Ltd.	735,735	1,226,225
Bralorne Mines, Ltd. ....	.....	625,000
Highland Lass, Ltd.	21,564	46,208
Others	61,753	17,805
Totals	\$3,034,484	\$6,167,278

Details of production, etc., of the mining industry are set out in Tables Nos. 1 to 17.

GENERAL SITUATION.

With the close of 1934 it is evident that the mineral industry of the Province is approaching more stable conditions and that an increase in 1935 comparable to that of 1934 is not to be expected. The fact that mine production for the past eighteen months has been very steady is

* The Howe Sound Company is the holding company for the *Britannia* mine in British Columbia and the *El Potosi* and *Calera* mines in Mexico. Dividends paid by this company are therefore derived from the profits on operation of all three mines, so that only part of the dividends paid, as shown, can be credited to the *Britannia* mine.

sufficient reason for such a statement. However, to forecast future production even for the present year, under existing, rapidly changing world conditions, is a matter of considerable speculation. Such a forecast is considered to be of sufficient importance to merit the attempt which may be best accomplished by treating the major branches of the industry separately.

With the bringing into production of a number of old and new gold properties and increased production in some of the established mines, it is reasonable to anticipate increased volume. The present price of gold is slightly higher than the average price for 1934 and there seems every reason to believe that the average price for 1935 will be higher than that for 1934. Therefore, with an increased production for gold and an increase in value, it is anticipated that the value of gold production in 1935 will be appreciably higher than in 1934.

In the case of silver it is interesting to note that the past records in volume and also value production have not been due to extremely high prices for the metal and that production was fairly steady from 1896 to 1921 in spite of wide fluctuations in price. The sudden rise in the volume of silver produced came in 1922 with the sudden rise in the production of lead and zinc, and the future of silver volume production will depend largely on the markets for the base metals. However, silver camps such as the Slocan respond to the rise and fall in the price for the metal. It is worthy of note that in the peak years of silver production in the Slocan the value of lead produced was not far below that of silver. Under existing conditions, little or nothing can be obtained for the lead content of these ores, so that for the immediate future production will have to be estimated on the silver content only. Even under such conditions an appreciable increase in silver production may be anticipated. The price of silver at the close of the year is appreciably higher than the average price throughout the year, and it is anticipated that the average price for 1935 will probably be somewhat higher than the price at the close of the year.

Copper production in 1935, so far as it can be foreseen, is likely to show a marked decline, due to the announcement that the Granby operation at Anyox will probably be closed down some time during the year.

The volume of lead production is likely to remain about the same. The present price of the metal is low beyond reason, and while the price of 1926 may never again be reached, a reasonable appreciation in value should be attained within the next few years. The price of the metal at the close of the year was lower than the average price for the year, and it is anticipated that a slight increase in the price of lead may be realized during 1935.

While it is anticipated that the volume of zinc will be maintained, due to a demand for electrolytic zinc, and the position which the British Columbia metal has won in world markets in spite of keen competition, it is not anticipated that any appreciable increase in the price of the metal will be realized.

Coal has shown in 1934 an increase of 6.5 per cent. over 1933, and if 1935 shows a slight increase, it seems to be a reasonable estimate.

Structural materials should by the end of the year show a marked increase in production.

Miscellaneous metals and materials are not expected to show the marked increase in 1935 over 1934 which has been achieved in 1934 as compared with 1933, but a slight increase is considered reasonable.

During the last eighteen months there is an apparent increase in production of a million dollars for every six months. If this increase is maintained throughout 1935 the estimated value of the mineral production will be about \$44,500,000. It is obvious from the foregoing that several things must be considered in arriving at an estimate of the mineral production for 1935. The closing-down of the Granby operation at Anyox, if effected, may mean a loss to the mining industry of from \$2,000,000 to \$3,000,000. It is anticipated, however, that this loss will be more than offset by the increased value of gold production, and that therefore the estimate of \$44,500,000 for the year would seem to be within reason.

METHOD OF COMPUTING PRODUCTION.

The total mine production of the Province consists of the outputs of metalliferous minerals, coal, structural materials, and miscellaneous metals, minerals, and materials, valued at standard recognized prices in Canadian funds.

In the Annual Report for 1925 some changes were made in the methods used in previous years in computing and valuing the products of the industry, but in order to facilitate com-

parisons with former years the same general style of tables was adhered to. The methods used in the 1925 Annual Report have been followed in subsequent Annual Reports, with the addition of new tables, the first of which, Table No. I., appeared in the 1933 Annual Report, in order to present additional or more informative data.

For the 1934 Annual Report, Table VI., which formerly tabulated the yield of placer gold only, has been drawn up to show both placer- and lode-gold values. This will facilitate a rapid view of the total gold production of the Province. Another new table, No. XVII., includes "Mining Companies employing an Average of Ten or more Men." Incorporated in this table, additional data are presented showing the number of operating days at mine and mill, and also tonnage mined and milled. A subsection of the table shows operating days and average men employed at non-shipping mines employing ten or more men.

Table I. presents in summary form the mine statistics of the Province in a form that permits ready comparisons being made with tables of similar design presented annually by the Dominion Bureau of Statistics and other Provincial Statistical Bureaus.

An important change is made in Table I. for 1934, which embodies comparative figures for 1933. In Table I. of the 1933 Annual Report, which also gave comparative figures for 1932, gold production as set forth is valued at the old standard price of \$20.671834 per fine ounce, and placer gold value converted to fine ounces at that figure also. In order to show the value of gold in Canadian funds, the calculated so-called "premium" was shown in the table as "Exchange equalization on gold." Commencing with the 1934 Annual Report, all gold will be valued at the yearly average of the current price of gold per fine ounce in Canadian funds.

In the 1934 Annual Report all tables in which the value of gold enters and covering production for the years 1932, 1933, and 1934 are shown with production valued at the yearly average price of gold and not the old standard price. The only tables not brought up to date in this regard are Tables VII. and VIII. but these will be corrected in the 1935 Annual Report.

The following notes explain the methods used:—

(1.) From the certified returns of lode mines of ore and concentrate shipments made during the full calendar year by the producers the net recovered metal contents have been determined by deducting from the "assay value content" necessary corrections for smelting and refining losses.

In making comparisons of production figures with previous years, it should be remembered that prior to 1925 in the Annual Reports the total metal production, with the exception of copper, was determined by taking the assay value content of all ores shipped; deductions for slag losses were made by taking varying percentages off the metal prices.

(2.) Gold-placer returns are received from the operators in dollars and the dollar value for the years 1932, 1933, and 1934 were converted to fine ounces at \$20.67; previously the price of \$17 an ounce, which is believed to represent the average value of placer gold throughout the Province, at the old valuation of gold, was used to convert the dollar value to ounces.

(3.) The prices used in valuing the different metals are: For gold, the average price for the year; for silver, the average New York metal-market price for the year; for lead, the average London metal-market price for the year; and for zinc, the average London metal-market price for the year. As in 1933, copper in 1934 is valued at the average London metal-market price. Prior to 1932 copper was valued at the average New York price. The change was made because very little copper was being marketed in the United States on account of high tariff charges against importations from foreign countries. The bulk of the lead and zinc production of the Province is sold on the basis of the London prices of these metals and they are therefore used. The New York, St. Louis, and Montreal lead- and zinc-market prices differ materially from the London prices of these metals and are not properly applicable to the valuing of the British Columbia production.

By agreement with the Dominion Bureau of Statistics and the Provincial Statistical Bureaus, the following procedure of taking care of the exchange fluctuations has been agreed upon:—

- (a.) Silver to be valued at the average New York price, adjusted to Canadian funds at the average exchange rate.
- (b.) Lead, zinc, and copper to be valued at London prices, adjusted to Canadian funds at the average exchange rate.

The following table shows the average metal-market prices from 1930 to 1934 in Canadian funds:—

AVERAGE METAL-MARKET PRICES FOR 1930, 1931, 1932, 1933, AND 1934.

Year.	Silver (New York).	COPPER.		LEAD.		ZINC.	
		London.	New York.	London.	New York.	London.	St. Louis.
	Cents per Oz.	Cents per Lb.	Cents per Lb.	Cents per Lb.	Cents per Lb.	Cents per Lb.	Cents per Lb.
1930.....	* 38.154	.....	* 12.982	* 3.9273	5.517	* 3.5999	4.556
1931.....	* 28.700	.....	* 8.116	* 2.7101	4.243	* 2.554	3.640
1932.....	* 31.671	* 6.3802	5.555	* 2.1136	3.180	* 2.4056	2.876
1933.....	* 37.8328	* 7.4548	7.025	* 2.3916	3.869	* 3.2105	4.029
1934.....	* 47.461	* 7.419	7.271	* 2.486	3.860	* 3.044	4.158

* Prices used in compiling total metal valuations in 1930, 1931, 1932, 1933, and 1934 Annual Reports. Gold average price in 1934 was \$34.50; in 1933, \$28.60; and in 1932 was \$23.47.

(4.) In 1926 a change was made in computing coal and coke statistics. The practice in former years had been to list coal and coke production (in part) as primary mineral production. Only the coke made in bee-hive ovens was so credited; that made in by-product ovens was not listed as coke, but the coal used in making this coke was credited as coal production. The result was that the coke-production figures were incomplete. Starting with the 1926 Annual Report, the standard practice of the Bureau of Statistics, Ottawa, has been adopted. This consists of crediting all coal produced, including that used in making coke, as primary mine production. Coke-making is considered a manufacturing industry. As it is, however, of interest to the mining industry, a table included in the Report shows the total coke produced in the Province, together with by-products, and the values given by the producers. This valuation of coke is not, of course, included in the total gross mine production of the Province.

From 1918 to 1930 coal production was valued at \$5 per long ton. In 1931 the price used was \$4.50, and in 1932, 1933, and 1934 the price used has been \$4.25 per long ton. In making comparisons with former years the decline in dollar value is accentuated by this lowered price.

TABLE I.—BRITISH COLUMBIA MINE PRODUCTION, 1933 AND 1934.

	Quantity, 1933.	Quantity, 1934.	Value, 1933.	Value, 1934.	PER CENT. INCREASE (+) OR DECREASE (-).	
					Quantity.	Value.
METALLICS.						
Bismuth.....			\$ 77,796	\$ 297,771	.....	+282.8
Cadmium.....			78,733	91,019	.....	+ 15.6
Copper.....lb.	42,608,002	48,084,658	3,176,341	3,567,401	+ 12.9	+ 12.3
Gold, lode*.....oz.	223,529	297,130	6,392,929	10,250,985	+ 32.9	+ 60.4
Gold, placer*.....oz.	23,928	25,181	562,787	714,431	+ 5.2	+ 26.9
Lead.....lb.	271,606,071	347,366,967	6,495,731	8,461,859	+ 27.9	+ 30.3
Platinum.....oz.	40	53	1,400	2,051	+ 32.5	+ 46.5
Silver.....oz.	7,006,406	8,572,916	2,650,720	4,068,792	+ 22.4	+ 53.5
Zinc.....lb.	195,963,751	247,926,844	6,291,416	7,546,893	+ 26.5	+ 19.9
Totals.....			25,727,853	35,001,202	.....	+ 36.4
FUEL.						
Coal (2,240 lb.).....tons	1,264,746	1,347,090	5,375,171	5,725,133	+ 6.5	+ 6.5
NON-METALLICS.						
Diatomaceous earth.....			410	287	.....	- 30.0
Fluxes—limestone, quartz.....tons	63,954	63,863	130,818	89,732	- 0.14	- 31.4
Gypsum products, gypsite.....tons			46,004	87,982	.....	+ 91.2
Iron oxide.....			1,485	1,600	.....	+ 7.7
Mica.....			853	2,045	.....	+139.7
Phosphate, dolomite, volcanic ash			4,670	2,318	.....	- 50.4
Slate (crushed), talc.....tons	317	484	4,572	7,187	+ 52.7	+ 57.2
Sodium carbonate, magnesium sulphate.....tons	378	506	3,350	7,281	+ 33.9	+117.3
Sulphur†.....tons	30,010	37,367	282,078	361,812	+ 24.5	+ 28.3
Totals.....			474,240	560,243	.....	+ 18.1
CLAY PRODUCTS AND OTHER STRUCTURAL MATERIALS.						
<i>Clay Products.</i>						
Brick—						
Common.....No.	2,449,386	2,765,307	32,866	35,122	+ 12.9	+ 6.9
Face, paving, sewer brick.....No.	290,547	180,610	8,626	6,815	- 37.8	- 20.9
Firebrick, blocks.....			69,994	81,864	.....	+ 18.5
Fireclay.....tons	1,024	513	7,993	7,737	- 40.0	- 3.2
Structural tile—hollow blocks.....			6,824	9,549	.....	+ 39.9
Drain-tile, sewer-pipe.....No.	603,115	569,297	41,335	42,440	- 5.6	+ 2.7
Pottery—glazed or unglazed.....			5,680	7,171	.....	+ 26.3
Bentonite; other clay products.....			2,390	2,512	.....	+ 5.1
Totals.....			174,808	193,224	.....	+ 10.5
<i>Other Structural Materials.</i>						
Cement.....			225,342	232,009	.....	+ 2.9
Lime and limestone.....tons	49,787	62,124	189,116	195,363	+ 30.8	+ 3.3
Sand and gravel.....			261,313	249,129	.....	- 4.7
Stone—building, grindstones.....tons	2,337	3,099	38,414	56,491	+ 32.6	+ 47.0
Rubble, riprap, crushed rock.....tons	150,086	100,428	136,415	92,503	- 33.0	- 32.2
Totals.....			850,600	825,495	.....	- 2.9
Total value in Canadian funds.....			32,602,672	42,305,297	.....	+ 29.8

* Canadian funds.

† Sulphur content of pyrites shipped and estimated sulphur contained in sulphuric acid made from waste smelter-gases.

TABLE II.—TOTAL PRODUCTION FOR ALL YEARS UP TO AND INCLUDING 1934.

Gold, placer	\$80,553,701*
Gold, lode	164,792,126*
Silver	113,660,526
Copper	281,084,589
Lead	190,696,523
Zinc	111,469,660
Coal and coke	355,601,791
Structural materials	69,832,158
Miscellaneous minerals, etc.	8,746,329
Total	\$1,376,437,403

* Canadian funds.

TABLE III.—PRODUCTION FOR EACH YEAR FROM 1852 TO 1934 (INCLUSIVE).

1852 to 1895 (inclusive)	\$94,547,241	1916	\$42,290,462
1896	7,507,956	1917	37,010,392
1897	10,455,268	1918	41,782,474
1898	10,906,861	1919	33,296,313
1899	12,393,131	1920	35,543,084
1900	16,344,751	1921	28,066,641
1901	20,086,780	1922	35,158,843
1902	17,486,550	1923	41,304,320
1903	17,495,954	1924	48,704,604
1904	18,977,359	1925	61,492,242
1905	22,461,325	1926	67,188,842
1906	24,980,546	1927	60,729,358
1907	25,882,560	1928	65,372,583
1908	23,851,277	1929	68,245,443
1909	24,443,025	1930	55,391,993
1910	26,377,066	1931	34,883,181
1911	23,499,072	1932	*28,798,406
1912	32,440,800	1933	*32,602,672
1913	30,296,398	1934	*42,305,297
1914	26,388,825		
1915	29,447,508	Total	\$1,376,437,403

* Canadian funds.

TABLE IV.—QUANTITIES AND VALUE OF MINE PRODUCTS FOR 1932, 1933, AND 1934.

Description.	1932.		1933.		1934.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
Gold, placer* .....oz.	20,400	\$395,542	23,928	\$562,787	25,181	\$714,431
Gold, lode* .....oz.	181,564	4,261,307	223,529	6,392,929	297,130	10,250,985
Silver .....oz.	7,130,838	2,258,453	7,006,406	2,650,720	8,572,916	4,068,792
Copper .....lb.	49,841,009	3,179,956	42,608,002	3,176,341	48,084,658	3,567,401
Lead .....lb.	254,488,952	5,378,878	271,606,071	6,495,731	347,366,967	8,461,859
Zinc .....lb.	192,120,091	4,621,641	195,963,751	6,291,416	247,926,844	7,546,898
Coal .....tons, 2,240 lb.	1,534,975	6,523,644	1,264,746	5,375,171	1,347,090	5,725,133
Structural materials		1,698,839		1,024,045		1,017,141
Miscellaneous metals and minerals		480,146		633,532		952,662
Totals		\$28,798,406		\$32,602,672		\$42,305,297

* Canadian funds.

TABLE V.—PRODUCTION OF LOSE GOLD, SILVER, COPPER, LEAD, AND ZINC.

Year.	GOLD.		SILVER.		COPPER.		LEAD.		ZINC.		Total Value.
	Oz.	Value.	Oz.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	
1887		\$	17,690	\$				\$			\$
1888			79,780								
1889			53,192								
1890			70,427								
1891			4,900								
1892			77,160								
1893			227,000								
1894	1,170	23,404	227,000	195,000							
1895	6,252	125,014	746,379	470,219	324,680	16,234	5,682,523	169,875	78,996	808,420	33,064
1896	39,264	785,271	1,496,522	977,229	952,840	47,642	16,475,464	532,255	169,875	2,135,023	78,996
1897	62,259	1,244,180	3,135,343	2,100,689	3,818,556	190,926	24,199,977	721,384	169,875	16,475,464	169,875
1898	106,141	2,122,820	5,472,971	3,272,836	5,325,180	266,258	38,841,195	1,390,517	721,384	24,199,977	721,384
1899	110,061	2,201,217	4,292,401	2,375,841	7,271,678	874,781	31,693,559	1,077,581	1,390,517	38,841,195	1,390,517
1900	138,315	2,857,573	2,939,413	1,663,708	7,722,591	1,351,453	21,862,436	878,870	1,077,581	31,693,559	874,781
1901	167,153	3,453,381	3,958,175	2,309,200	9,997,080	1,615,289	63,358,621	2,691,887	878,870	21,862,436	1,351,453
1902	210,384	4,348,603	5,151,333	2,884,745	27,603,746	4,446,963	51,582,906	2,002,733	2,691,887	63,358,621	1,615,289
1903	236,491	4,888,269	3,917,917	1,941,328	29,636,057	3,446,673	22,536,381	824,832	2,002,733	51,582,906	4,446,963
1904	232,831	4,812,616	2,996,204	1,521,472	34,359,921	4,547,535	18,089,283	689,744	824,832	22,536,381	3,446,673
1905	222,042	4,589,608	3,222,481	1,719,516	35,710,128	4,578,087	36,646,244	1,421,874	689,744	18,089,283	4,547,535
1906	238,660	4,933,102	3,439,417	1,971,818	37,692,251	5,876,222	56,580,703	2,399,022	1,421,874	36,646,244	4,578,087
1907	224,027	4,630,639	2,990,262	1,897,320	42,990,488	8,288,565	52,408,217	2,667,578	2,399,022	56,580,703	5,876,222
1908	196,179	4,055,020	2,745,448	1,703,825	40,832,720	8,166,544	47,738,703	2,291,458	2,667,578	42,990,488	8,288,565
1909	255,582	5,282,880	2,631,889	1,321,483	47,274,614	6,240,249	43,195,733	1,632,799	2,291,458	47,738,703	8,166,544
1910	238,224	4,924,090	2,532,742	1,239,270	45,597,245	5,918,522	44,396,346	1,709,259	1,632,799	43,195,733	6,240,249
1911	267,701	5,533,380	2,450,241	1,245,016	38,243,934	4,871,512	34,658,746	1,386,350	1,709,259	44,396,346	5,918,522
1912	228,617	4,725,513	1,892,364	958,293	36,927,656	4,571,644	26,872,397	1,069,521	1,386,350	34,658,746	4,871,512
1913	257,496	5,322,442	3,132,108	1,810,045	51,456,537	8,408,513	44,871,454	1,805,627	1,069,521	26,872,397	4,571,644
1914	272,254	5,627,490	3,465,356	1,968,606	46,460,305	7,094,489	55,364,677	2,175,832	1,805,627	44,871,454	8,408,513
1915	247,170	5,109,004	3,602,180	1,876,736	45,009,699	6,121,319	50,625,048	1,771,877	2,175,832	55,364,677	7,094,489
1916	250,021	5,167,934	3,366,506	1,588,991	56,918,405	9,835,500	46,503,590	1,939,200	1,771,877	46,503,590	6,121,319
1917	221,932	4,587,334	3,301,923	2,059,739	65,379,364	17,784,494	48,727,516	3,007,462	1,939,200	46,503,590	9,835,500
1918	114,523	2,367,190	2,929,216	2,265,749	59,007,565	16,038,256	37,307,465	2,951,020	3,007,462	48,727,516	17,784,494
1919	164,674	3,403,812	3,498,172	3,215,870	61,483,754	15,143,449	43,899,661	2,928,107	2,951,020	37,307,465	16,038,256
1920	152,426	3,150,645	3,403,119	3,592,673	42,459,339	7,939,896	29,475,968	1,526,855	2,928,107	43,899,661	15,143,449
1921	120,048	2,481,392	3,377,849	3,235,980	44,887,676	7,832,899	39,331,218	2,816,115	1,526,855	29,475,968	7,939,896
1922	135,663	2,804,154	2,673,389	1,591,201	39,036,993	4,879,624	41,402,288	1,693,354	2,816,115	44,887,676	7,832,899
1923	197,856	4,089,684	7,101,311	4,554,781	32,359,896	4,329,754	67,447,985	3,480,316	1,693,354	39,036,993	4,879,624
1924	179,245	3,704,994	6,032,986	3,718,129	57,720,290	8,323,266	96,663,152	6,321,770	3,480,316	32,359,896	4,329,754
1925	247,716	5,120,535	8,241,768	5,292,184	64,845,393	8,442,870	170,384,481	12,415,917	6,321,770	57,720,290	8,323,266
1926	209,719	4,335,289	7,854,844	5,286,818	72,306,432	10,153,269	237,899,199	18,670,329	12,415,917	64,845,393	8,442,870
1927	201,427	4,163,859	10,748,556	6,675,606	89,339,768	12,324,421	263,023,937	17,757,535	18,670,329	72,306,432	10,153,269
1928	178,001	3,679,601	10,470,135	5,902,043	89,202,871	11,525,011	232,996,423	14,874,292	17,757,535	89,339,768	12,324,421
1929	188,087	3,888,097	10,627,167	6,182,461	97,908,316	14,265,242	305,140,792	13,961,412	14,874,292	89,202,871	11,525,011
1930	145,339	3,004,410	9,918,800	5,256,270	101,483,857	18,375,682	302,346,268	15,269,696	13,961,412	97,908,316	14,265,242
1931	160,779	3,323,576	11,269,171	4,307,270	90,421,545	11,738,525	319,199,752	12,535,931	15,269,696	101,483,857	18,375,682
1932	146,059	3,018,894	7,524,320	2,247,514	63,194,299	5,289,363	248,783,508	6,742,282	12,535,931	90,421,545	11,738,525
1933	181,564	*4,261,307	7,130,838	2,258,453	49,841,009	3,179,956	254,488,952	5,378,878	6,742,282	63,194,299	5,289,363
1934	223,529	*6,392,929	7,006,496	2,650,720	42,608,002	3,176,341	271,606,071	6,495,731	5,378,878	49,841,009	3,179,956
1934	297,130	*10,250,985	8,572,916	4,068,792	48,084,658	3,567,401	347,366,967	8,461,859	6,495,731	42,608,002	3,176,341
Totals.....	7,673,990	*164,792,126	201,710,337	113,660,526	1,863,696,338	281,084,589	4,245,657,589	190,696,523	2,350,630,087	111,469,660	861,703,424

* Canadian funds.

TABLE VI.—VALUE OF GOLD PRODUCTION TO DATE.

Year.	Placer.	Lode.	Total.
1858-1862.....	\$9,871,634	.....	\$9,871,634
1863-1867.....	16,283,592	.....	16,283,592
1868-1872.....	9,895,318	.....	9,895,318
1873-1877.....	9,019,201	.....	9,019,201
1878-1882.....	5,579,911	.....	5,579,911
1883-1887.....	3,841,515	.....	3,841,515
1888-1892.....	2,525,426	.....	2,525,426
1893.....	356,131	\$23,404	379,535
1894.....	405,516	125,014	530,530
1895.....	481,683	785,271	1,266,954
1896.....	544,026	1,244,180	1,788,206
1897.....	513,520	2,122,820	2,636,340
1898.....	643,346	2,201,217	2,844,563
1899.....	1,344,900	2,857,573	4,202,473
1900.....	1,278,724	3,453,381	4,732,105
1901.....	970,100	4,348,603	5,318,703
1902.....	1,073,140	4,888,269	5,961,409
1903.....	1,060,420	4,812,616	5,873,036
1904.....	1,115,300	4,589,608	5,704,908
1905.....	969,300	4,933,102	5,902,402
1906.....	948,400	4,630,639	5,579,039
1907.....	828,000	4,055,020	4,883,020
1908.....	647,000	5,282,880	5,929,880
1909.....	477,000	4,924,090	5,401,090
1910.....	540,000	5,533,380	6,073,380
1911.....	426,000	4,725,513	5,151,513
1912.....	555,500	5,322,442	5,877,942
1913.....	510,000	5,627,490	6,137,490
1914.....	565,000	5,109,004	5,674,004
1915.....	770,000	5,167,934	5,937,934
1916.....	580,500	4,587,334	5,167,834
1917.....	496,000	2,367,190	2,863,190
1918.....	320,000	3,403,812	3,723,812
1919.....	286,500	3,150,645	3,437,145
1920.....	221,600	2,481,392	2,702,992
1921.....	233,200	2,804,154	3,037,354
1922.....	364,800	4,089,684	4,454,484
1923.....	420,000	3,704,994	4,124,994
1924.....	420,750	5,120,535	5,541,285
1925.....	280,092	4,335,269	4,615,361
1926.....	355,503	4,163,859	4,519,362
1927.....	156,247	3,679,601	3,835,848
1928.....	143,208	3,888,097	4,031,305
1929.....	118,711	3,004,410	3,123,130
1930.....	152,235	3,323,576	3,475,811
1931.....	291,992	3,018,894	3,310,886
1932.....	395,542	4,261,307	4,656,849*
1933.....	562,787	6,392,929	6,955,716*
1934.....	714,431	10,250,985	10,965,416*
Totals.....	\$80,553,701	\$164,792,126	\$245,345,827

* Canadian funds.

TABLE VII.—OUTPUT OF MINE PRODUCTS BY DISTRICTS AND DIVISIONS.

Names.	DIVISIONS.			DISTRICTS.		
	1932.	1933.	1934.	1932.	1933.	1934.
	\$	\$	\$	\$	\$	\$
North-western District (No. 1).....				4,895,770	4,576,758	4,456,196
Atlin, Stikine, and Liard.....	152,944	202,003	184,510			
Nass River.....	2,600,927	3,844,067	3,022,821			
Portland Canal.....	2,098,713	1,459,119	1,159,406			
Skeena, Queen Charlotte, and Bella Coola.....	43,186	71,569	89,459			
North-eastern District (No. 2).....				185,595	356,409	485,733
Cariboo and Quesnel.....	147,910	307,670	421,817			
Omineca and Peace River.....	37,685	48,739	63,916			
Central District (No. 3).....				289,084	232,226	481,288
Nicola and Vernon.....	120,692	131,516	186,920			
Yale, Ashcroft, and Kamloops.....	156,234	96,235	294,368			
Clinton*.....	12,158	4,475				
Southern District (No. 4).....				1,517,603	1,039,128	1,082,908
Grand Forks, Greenwood, and Osoyoos.....	759,803	406,299	573,470			
Similkameen.....	757,800	632,829	509,438			
Eastern District (No. 5).....				14,487,063	17,608,731	23,897,731
Fort Steele.....	13,834,116	15,951,647	20,053,239			
Windermere and Golden.....	18,323	424,635	1,359,553			
Ainsworth.....	21,761	21,214	47,422			
Slocan and Slocan City.....	9,883	30,051	81,258			
Nelson and Arrow Lake.....	267,132	573,854	971,606			
Trail Creek.....	303,348	594,730	1,398,328			
Revelstoke and Lardeau.....	32,500	12,600	6,325			
Western District (No. 6).....				6,866,503	6,861,234	7,506,324
Nanaimo, Alberni, Clayoquot, Quatsino, and Victoria (Van- couver Island).....	4,015,717	3,042,605	2,959,804			
Vancouver, New Westminster, and Lillooet.....	2,850,786	3,818,629	4,415,291			
Yale, Ashcroft, and Clinton (Mainland).....			131,229			
Totals.....	28,241,618	30,674,486	37,910,180	28,241,618	30,674,486	37,910,180†

* Yale, Ashcroft, and Clinton Mining Divisions included in No. 6 District (Mainland section) from and including 1934.

† Gold production included in totals in above table is valued at old standard price of \$20.671834.

TABLE VIII.—PRODUCTION IN DETAIL OF PLACER GOLD, LODE

DISTRICTS AND DIVISIONS.	YEAR.	TONS.	GOLD—PLACER.		GOLD—LODE.		SILVER.	
			Ounces.	Value.	Ounces.	Value.	Ounces.	Value.
				\$		\$		\$
North-western District (No. 1)								
Atlin.....	1933	30	11,299	192,083	103	2,129	64	24
	1934	1	10,039	170,663	58	1,199	38	16
Stikine.....	1933		251	4,267				
	1934		376	6,392				
Liard.....	1933		200	3,400				
	1934		314	5,338				
Nass River.....	1933	1,540,187			4,382	90,594	237,854	97,553
	1934	1,889,748			4,761	98,419	280,026	132,908
Portland Canal.....	1933	187,164			50,089	1,035,432	1,029,606	389,520
	1934	158,857			39,146	809,219	687,261	326,181
Skeena.....	1933	1,629	76	1,292	1,298	26,832	357	135
	1934	5,729	62	1,054	3,693	76,341	1,314	624
Queen Charlotte.....	1933	400	65	1,105	53	1,096	25	10
	1934		98	1,666				
Bella Coola.....	1933		2	34				
	1934							
North-eastern District (No. 2)								
Cariboo.....	1933	19,769	4,897	83,249	7,660	158,346	823	311
	1934	30,554	3,848	65,416	11,553	245,023	1,333	633
Quesnel.....	1933		2,772	47,124				
	1934		5,356	91,086				
Omineca.....	1933	26	699	11,883	82	1,695	15	6
	1934	2,353	1,365	23,205	547	11,307	4,523	2,149
Peace River.....	1933		300	5,160				
	1934		240	4,080				
Central District (No. 3)								
Nicola.....	1933	9			34	703	1,053	398
	1934	6,095			777	16,062	25,182	11,352
Vernon.....	1933	390	63	1,071	119	2,450	18	7
	1934	3,159	68	1,156	1,183	24,455	118	56
Kamloops.....	1933	43	240	4,233	194	4,010		
	1934	11,316	155	2,835	7,819	161,633	494	235
Southern District (No. 4)								
Grand Forks.....	1933	3,720			3,144	64,992	3,005	1,137
	1934	322			540	11,163	11,691	5,549
Greenwood.....	1933	3,627	250	4,250	427	8,827	558,472	211,286
	1934	29,808	162	2,754	4,339	89,695	631,254	299,599
Osoyoos.....	1933	2,605			1,799	37,189	2,695	1,020
	1934	8,718	2	34	3,732	77,147	3,649	1,732
Similkameen.....	1933		300	5,100				
	1934	431	346	5,822	3	62	4,896	2,324
Eastern District (No. 5)								
Fort Steele.....	1933	1,401,101	652	11,084	12	248	4,021,950	1,862,112
	1934	1,744,179	804	13,668	11	227	6,375,663	3,025,953
Windermere.....	1933		35	593				
	1934		37	629				
Golden.....	1933	35,612	11	187			53,846	20,371
	1934	94,890	32	544			170,239	80,797
Ainsworth.....	1933		32	544				
	1934	3,358	49	833	20	413	34,108	16,188
Socan.....	1933	783			12	248	47,240	17,872
	1934	1,905			37	765	96,431	45,767
Slocan City.....	1933	23			19	393	638	241
	1934	311	9	153	207	4,279	379	417
Nelson.....	1933	44,051	152	2,584	23,289	481,427	48,334	18,286
	1934	51,865	154	2,618	37,849	782,408	104,395	49,547
Arrow Lake.....	1933		7	119				
	1934	5	2	34	4	83	380	180
Trail Creek.....	1933	11,960	71	1,207	9,313	192,517	12,273	4,643
	1934	43,088	88	1,466	28,033	579,494	40,850	19,388
Revelstoke.....	1933		281	4,777				
	1934		35	595				
Lardeau.....	1933	1	50	850	2	41	2	1
	1934	1	163	2,771	3	62	3	2
Western District (No. 6)								
Nanaimo.....	1933	2	4	68	2	41	7	3
	1934	75	9	153	39	744	122	58
Alberni.....	1933		25	425				
	1934	40	4	68	116	2,398	23	11
Clayoquot.....	1933	29	15	255	49	1,013	31	12
	1934	48	19	323	166	3,432	189	89
Quatsino.....	1933							
	1934		6	102				
Victoria.....	1933		38	646				
	1934		407	6,919	108,298	2,238,718	24,668	9,333
Lillooet.....	1933	154,242	434	7,378	133,716	2,764,155	32,076	15,224
	1934	230,997	225	3,825				
Clinton*.....	1933	3,330	247	4,199	745	15,401	945	449
	1934	657	320	5,440	330	6,822	638	241
Ashcroft*.....	1933	7,217	248	4,216	3,597	74,357	6,880	3,265
	1934		105	1,785				
Yale*.....	1933	140	192	3,264	39	744	7	3
	1934		107	1,819				
New Westminster.....	1933		184	3,128				
	1934							
Vancouver.....	1933	622,718			12,819	264,992	42,792	16,189
	1934	759,702			14,103	291,535	57,942	27,499
Totals.....	1933	4,030,778	23,928	406,776	223,529	4,620,754	7,006,406	2,650,720
	1934	5,087,334	25,181	428,077	297,130	6,142,222	8,572,916	4,088,792

* Previous to 1934 Yale, Ashcroft, and Clinton included in No. 3 (Central) District.

GOLD, SILVER, COPPER, LEAD, AND ZINC IN 1933 AND 1934.

COPPER.		LEAD.		ZINC.		TOTALS FOR DIVISIONS.		TOTALS FOR DISTRICTS
Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	1933.	1934.	1934.
	\$		\$		\$	\$	\$	\$
						194,236		4,404,335
						4,267	171,880	
						3,400	6,382	
							5,338	
34,416,459	2,565,678					2,753,815	2,981,812	
37,070,908	2,750,290							
29,749	2,218	731,435	17,493	2,400	77	1,444,740	1,159,406	
6,519	484	725,164	17,665	192,406	5,857			
53	4					28,263		
293	22					2,211	78,041	
						34	1,866	
								443,128
						241,906	311,072	
						47,124	91,086	
		5,556	135	3,089	94	13,584	36,890	
						5,100	4,080	
								227,141
		7,762	186	1,206	39	1,326	33,594	
		178,223	4,342	40,681	1,236	3,537	25,667	
						8,806	167,880	
848	63							524,810
45,525	3,377							
		7,215	172	16,498	529	66,830	16,712	
		381,175	9,116	516,262	16,575	250,054	419,383	
		446,652	10,880	540,565	16,455			
		112	3			38,212	78,947	
460	34					5,100	9,568	
		44,191	1,077	7,339	223			20,448,319
		260,369,484	6,226,996	180,116,689	5,782,045	13,888,055	17,337,048	
		322,000,000	7,843,920	212,000,000	6,453,280	595	629	
		8,108,250	193,917	6,270,700	201,321	415,796	1,351,924	
		19,897,850	484,707	25,817,204	785,876	544	30,952	
		344,068	8,382	168,718	5,136		29,417	
		329,095	7,871	106,716	3,426		76,384	
		724,011	17,637	401,286	12,215	634	4,874	
		294	7	577	18			
		698,904	16,715	987,070	31,689	550,701	956,292	
9,001	668	1,922,050	46,821	2,438,576	74,230	119	305	
		175	4	140	4			
331,514	24,713	486	12	825	27	223,119	686,481	
1,160,568	86,103					4,777	595	
		46	1			893	2,835	
								4,167,711
						112	955	
						425	2,477	
						1,280	3,844	
						102	646	
		250	6			2,254,970	2,786,763	
						3,825	20,319	
3,644	270					12,515	82,404	
158	12					1,785	4,011	
7,624	566							
						1,819	3,128	
7,829,221	583,653	972,107	23,249	7,945,435	255,088	1,143,171	1,263,164	
8,780,118	725,587	1,078,683	26,276	6,316,263	192,297			
42,608,002	3,176,341	271,606,071	6,495,731	195,963,751	6,291,416	23,641,738		
48,084,858	3,567,401	347,366,967	8,461,859	247,826,844	7,546,893	30,215,244	30,215,244	

Gold production in above table is valued at old standard price of \$20.671834.

TABLE IX.—COAL PRODUCTION PER YEAR TO DATE.*

	Tons (2,240 lb.)	Value.		Tons (2,240 lb.)	Value.
1836-1885.....	3,029,011	\$9,468,557	1911.....	2,193,062	\$7,675,717
1886.....	326,636	979,908	1912.....	2,628,804	9,200,814
1887.....	413,360	1,240,080	1913.....	2,137,483	7,481,190
1888.....	489,301	1,467,903	1914.....	1,810,967	6,338,385
1889.....	579,830	1,739,490	1915.....	1,611,129	5,638,952
1890.....	678,140	2,034,420	1916.....	2,084,093	7,294,825
1891.....	1,029,097	3,087,291	1917.....	2,149,975	7,524,913
1892.....	826,335	2,479,005	1918.....	2,302,245	11,511,225
1893.....	978,294	2,934,882	1919.....	2,267,541	11,337,705
1894.....	1,012,953	3,038,859	1920.....	2,595,125	12,975,625
1895.....	930,654	2,818,962	1921.....	2,483,995	12,419,975
1896.....	896,222	2,688,666	1922.....	2,511,843	12,559,215
1897.....	882,854	2,648,562	1923.....	2,453,223	12,266,115
1898.....	1,135,865	3,407,595	1924.....	1,939,528	9,697,630
1899.....	1,306,324	3,918,972	1925.....	2,325,522	11,642,610
1900.....	1,439,595	4,318,785	1926.....	2,350,036	11,650,180
1901.....	1,460,331	4,380,993	1927.....	2,453,827	12,269,135
1902.....	1,397,394	4,192,182	1928.....	2,526,702	12,633,510
1903.....	1,168,194	3,504,582	1929.....	2,251,252	11,256,260
1904.....	1,253,628	3,700,884	1930.....	1,887,130	9,435,650
1905.....	1,384,312	4,152,936	1931.....	1,707,590	7,684,155
1906.....	1,517,303	4,551,909	1932.....	1,534,975	6,523,644
1907.....	1,800,067	6,300,235	1933.....	1,264,746	5,375,171
1908.....	1,677,849	5,872,472	1934.....	1,347,090	5,725,133
1909.....	2,006,476	7,022,666			
1910.....	2,800,046	9,800,161	Totals.....	83,229,952	\$329,928,191

* For all years to 1925 (inclusive) figures are net coal production and do not include coal made into coke; subsequent figures are entire coal production, including coal made into coke.

TABLE X.—COKE PRODUCTION FROM BEE-HIVE OVENS IN BRITISH COLUMBIA FROM 1895 TO 1925.

	Tons (2,240 lb.)	Value.		Tons (2,240 lb.)	Value.
1895-97.....	19,396	\$96,980	1913.....	286,045	\$1,716,270
1898 (estimated).....	35,000	175,000	1914.....	234,577	1,407,462
1899.....	34,251	171,255	1915.....	245,871	1,475,226
1900.....	85,149	425,745	1916.....	267,725	1,606,350
1901.....	127,081	635,405	1917.....	159,905	959,430
1902.....	123,015	640,075	1918.....	188,967	1,322,769
1903.....	165,543	827,715	1919.....	91,138	637,966
1904.....	238,428	1,192,140	1920.....	67,792	474,544
1905.....	271,785	1,358,925	1921.....	59,434	416,038
1906.....	199,227	996,135	1922.....	45,835	320,845
1907.....	222,913	1,337,478	1923.....	58,919	412,433
1908.....	247,399	1,484,394	1924.....	30,615	214,305
1909.....	258,703	1,552,218	1925.....	75,185	526,295
1910.....	218,029	1,308,174			
1911.....	66,005	396,030	Totals.....	4,393,255	\$25,673,600
1912.....	264,333	1,585,998			

TABLE XI.—COKE AND BY-PRODUCTS PRODUCTION OF BRITISH COLUMBIA, 1933 AND 1934.

Description.	1933.		1934.	
	Quantity.	Value.	Quantity.	Value.
Coal used in making coke, long tons.....	95,907	\$554,152	126,256	\$644,167
Coke made in bee-hive ovens, long tons.....	5,445	\$44,813	22,182	\$154,182
Coke made in by-product ovens, long tons.....	21,667	213,750	20,996	213,653
Coke made in gas plants, long tons.....	30,802	214,454	28,614	197,997
Total coke made, long tons.....	57,914	\$473,017	71,792	\$565,832
Gas produced.....		1,473,433		1,439,287
Tar produced.....		11,270		43,266
Other by-products.....		38,006		4,976
Total production value of coke industry.....		\$1,995,726		\$2,053,361

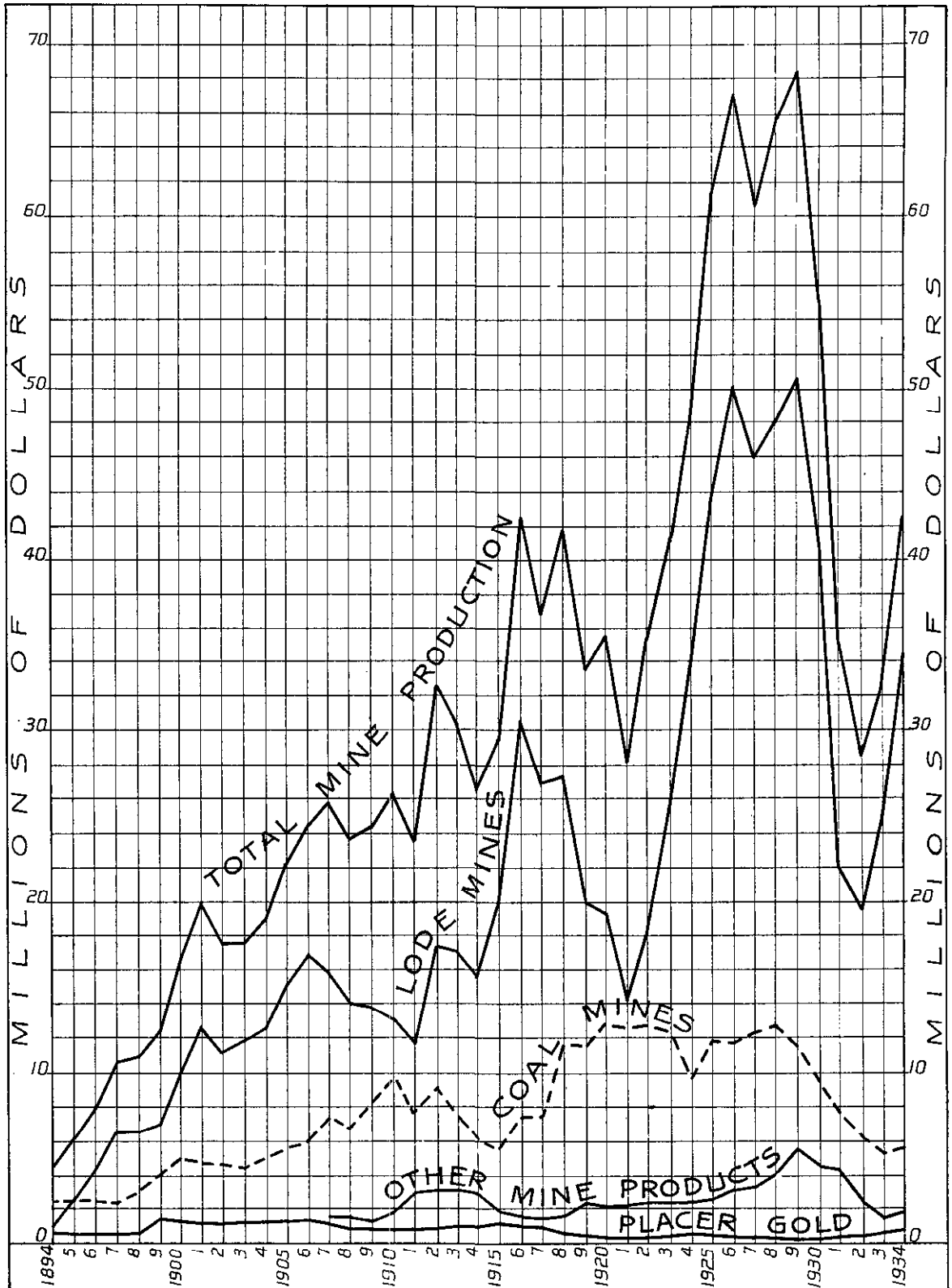
TABLE XII.—PRODUCTION IN DETAIL OF STRUCTURAL MATERIALS, 1934.

District and Division.	Cement.	Lime and Limestone.	Building-stone.	Riprap and Crushed Rock.	Sand and Gravel.	Brick (Common).	Face, Paving, and Sewer Brick.	Firebrick Blocks.	Fireclay.	Structural Tile, Hollow.	Drain-tile and Sewer-pipe.	Pottery, Glazed or Unglazed.	Other Clay Products.	Divisions.	Districts.
	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
North-western District (No. 1).....															10,652
Atlin, Iard, and Stikine.....				400	500									900	
Nass River.....															
Portland Canal.....															
Skeena and Queen Charlotte.....				260	3,960									4,220	
Bella Coola.....		1,779			3,753									5,532	
North-east District (No. 2).....															28,091
Cariboo and Quesnel.....				149	17,831			319	720				53	19,072	
Omineca and Peace River.....				8	9,011									9,019	
Central District (No. 3).....															53,430
Nicola, Vernon, and Kamloops.....			3,400	10,250	34,503	3,525	10			1,467	275			53,430	
Southern District (No. 4).....															23,737
Grand Forks and Greenwood.....					3,725	3,732								7,457	
Osoyoos.....		836		288	11,919									13,043	
Similkameen.....				650	2,587									3,237	
Eastern District (No. 5).....															76,843
Fort Steele.....			421	19,334	9,055									28,810	
Windermere and Golden.....				2,000	5,000									7,000	
Alnsworth.....				2,348	14,122									16,470	
Slocan and Slocan City.....															
Nelson.....		1,800	5,835	2,090	3,266									12,991	
Trail Creek.....				800	7,877									8,677	
Revelstoke.....				1,500	1,395									2,895	
Western District (No. 6).....															824,388
Nanaimo and Alberni.....		186,038	26,205	553	8,006	3,238								224,040	
Victoria and Quatsino.....	216,995	4,910		1,529	26,073	8,435	280			873	6,514	2,750	544	268,903	
Lillooet.....				1,115	4,077									5,192	
Yale.....				5,852	3,107									8,959	
Clinton.....															
Ashcroft.....				2,550	7,234									9,784	
Vancouver.....	15,014		20,650	22,697	33,873									92,216	
New Westminster.....				18,130	38,253	16,192	6,525	81,545	7,017	7,209	33,660	4,426	337	215,294	
Totals.....	232,009	195,363	56,491	92,503	249,129	35,122	6,815	81,864	7,737	9,549	42,449	7,176	934	1,017,141	1,017,141

TABLE XIII.—PRODUCTION IN DETAIL OF MISCELLANEOUS METALS, MINERALS, AND MATERIALS, 1934.

District and Division.	Bentonite.	Bismuth.	Cadmium.	Diatomite and Volcanic Ash.	Dolomite.	Flux (Limestone and Quartz).	Gypsum and Gypsite.	Iron (Bog).	Mica.	Platinum.	Crushed Slate.	Soda and Magnesium Sulphate.	Sulphur Content of Pyrite and Sulphuric Acid manufactured.	Talc.	Division Totals.	District Totals.
North-western District (No. 1).....	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	41,209
Atlin, Liard, and Stikine.....																
Nass River.....						41,209									41,209	
Portland Canal.....																
Skeena and Queen Charlotte.....																
Bella Coola.....																
North-eastern District (No. 2).....																587
Cariboo and Quesnel.....				587												587
Omineca and Peace River.....																
Central District (No. 3).....																96,120
Nicola and Vernon.....									2,045						2,045	
Kamloops.....							87,695					6,380			94,075	
Southern District (No. 4).....																41,557
Grand Forks and Greenwood.....						37,928									37,928	
Osoyoos.....																
Similkameen.....	1,578									2,051					3,629	
Eastern District (No. 5).....																705,188
Fort Steele.....																
Windermere and Golden.....																
Ainsworth.....																
Slocan and Slocan City.....																
Nelson and Arrow Lake.....					2,018										2,018	
Trail Creek.....		297,771	91,019										314,380		703,170	
Revelstoke.....																
Western District (No. 6).....																68,001
Nanaimo.....						10,595									10,595	
Victoria and Quatsino.....											6,135		550		6,685	
Lillooet.....													502		502	
Yale and Asheroff.....																
Clinton.....							287					900			1,187	
Vancouver.....								1,600							49,032	
New Westminster.....																
Totals.....	1,578	297,771	91,019	587	2,018	89,732	87,982	1,600	2,045	2,051	6,135	7,280	361,812	1,052	952,662	952,662

BRITISH COLUMBIA MINE PRODUCTION, 1894-1934.



Production in above graph is valued in Canadian funds.

PRODUCTION OF LODE MINES IN BRITISH COLUMBIA, 1912-1934.

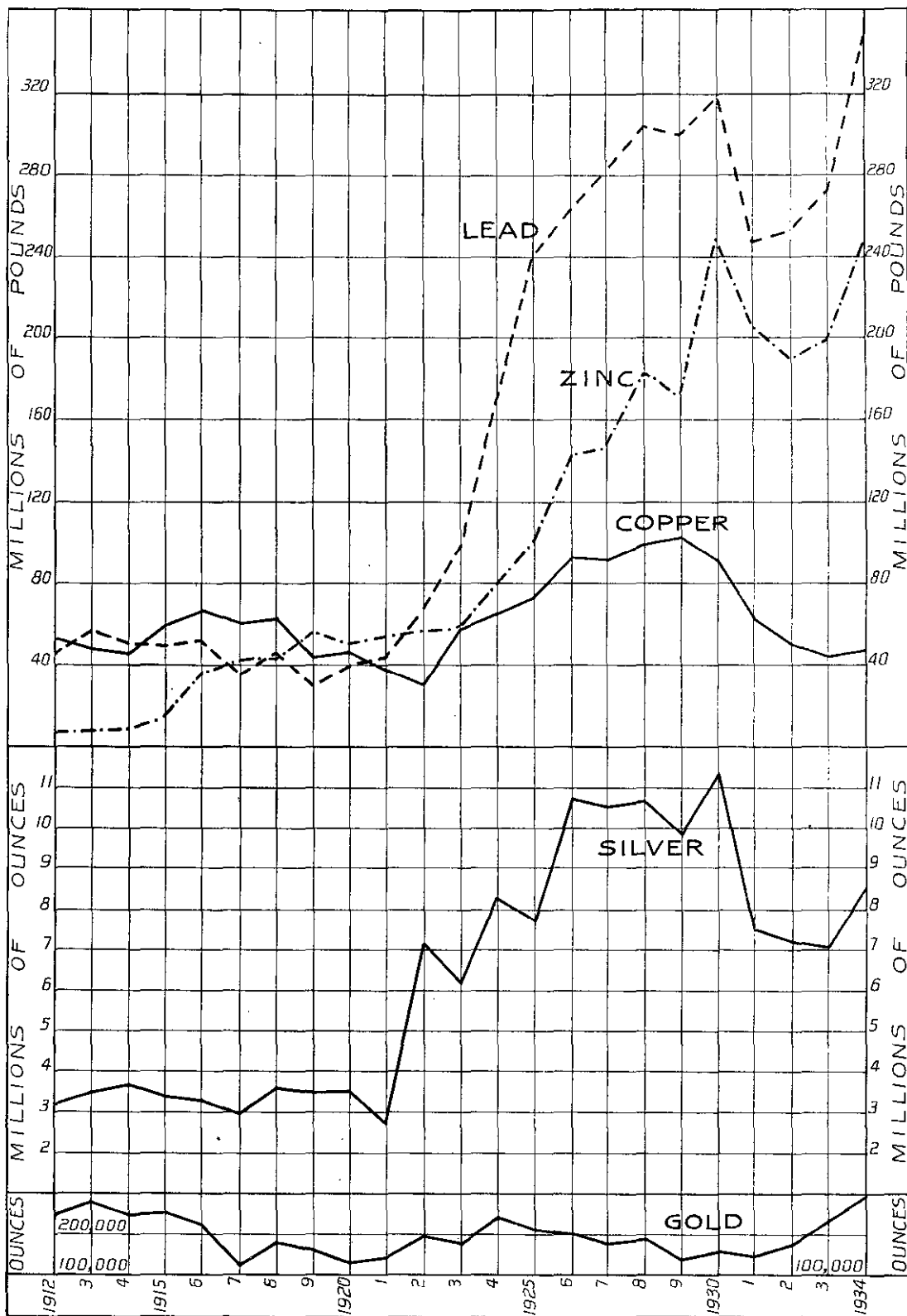


TABLE XIV.—MEN EMPLOYED IN THE MINING INDUSTRY OF BRITISH COLUMBIA, 1934.

District.	Placer-mining.	LODE-MINING.			In Concentrators.	In Smelters.	COAL-MINING.			STRUCTURAL MATERIALS.		Miscellaneous.	Total.
		Under.	Above.	Total.			Under.	Above.	Total.	Quarries.	Plants.		
No. 1.....	262	584	234	818	115	350	.....	.....	.....	8	.....	12	1,565
No. 2.....	460	186	119	805	15	.....	9	2	11	22	.....	3	816
No. 3.....	60	62	41	103	13	.....	75	34	109	60	5	5	355
No. 4.....	55	249	176	425	54	.....	252	181	383	21	3	9	950
No. 5.....	180	896	480	1,376	344	2,540	551	203	754	36	2	103	5,335
No. 6.....	105	819	679	1,498	90	.....	1,163	473	1,636	230	177	228	3,964
Totals													
1934.....	1,122	2,796	1,729	4,525	631	2,890	2,050	843	2,893	377	187	300	12,985
1933.....	1,134	1,786	1,335	3,121	531	2,436	2,241	853	3,094	376	269	408	11,369

TABLE XV.—TONNAGE, NUMBER OF MINES, AND NET VALUE OF LODE MINERALS, 1934.

District.	Tonnage.	No. of Shipping Mines, 1934.	No. of Mines shipping over 100 Tons.	Net Value to Shipper of Lode Minerals produced.
No. 1.....	2,054,332	11	6	\$3,038,306
No. 2.....	32,912	5	3	429,250
No. 3.....	20,570	4	3	323,378
No. 4.....	39,279	29	15	535,218
No. 5.....	1,939,592	78	34	10,300,114
No. 6.....	1,000,849	18	8	5,617,012
Totals.....	5,087,334	145	69	\$20,243,278

TABLE XVI.—METALLIFEROUS MINES SHIPPING IN 1934.

Mine or Group.	Location of Mine or Mill.	Owner or Agent.	RATED DAILY CAPACITY.		Operating at.	Date of First Operation.	Process.	Character of Ore.
			1933.	1934.				
Engineer.....	Atlin.....	R. H. Brooks, Atlin, leaser from Mining Corp. of Can., Ltd., Toronto	Tons. 50	Tons. 50	Tons. *	1925	Amalgamation; concentration.	Gold.
Bonanza.....	Anyox.....	Granby Cons. M.S. & P. Co., Ltd. }	5,200	5,200	5,200	Jan., 1924	Flotation.....	Copper, gold, silver.
Hidden Creek.....	Anyox.....	Granby Cons. M.S. & P. Co., Ltd. }						
Granby Point.....	Anyox.....	Granby Cons. M.S. & P. Co., Ltd. }						
Dunwell.....	Stewart.....	Dunwell Mines, Ltd., Victoria.....	100	30	30	1927	Flotation; concentration.....	Gold.
Joker.....	Stewart.....	John Hovland, Stewart.....						Silver, gold.
Premier.....	Stewart.....	Premier Gold Mining Co., Ltd., Vancouver	500	500	500	July, 1922	Flotation.....	Gold.
United Empire.....	Stewart.....	United Empire Gold and Silver Mining Co., Ltd., Vancouver						Silver, gold, lead.
Eddy Pass.....	Refuge bay.....	F. J. Patterson, Refuge bay.....						Gold, silver.
Princess Royal.....	Surf inlet.....	Princes Royal Gold Mines, Ltd., Vancouver		100	†	August, 1917	Flotation; concentration.....	Gold.
Surf Point.....	Porcher island.....	N. A. Timmins, Inc., Porcher island	20	20	20	July, 1933	Flotation.....	Gold.
Cariboo Gold.....	Wells.....	Cariboo Gold Quartz Mining Co., Ltd., Vancouver	100	100	100	Jan., 1933	Cyanidation.....	Gold.
Island Mountain.....	Wells.....	Island Mountain Mines, Ltd., Vancouver		50	50	Nov., 1934	Cyanidation.....	Gold.
Columarlo.....	Usk.....	Columarlo Consolidated Gold Mines, Ltd., Toronto, Ont.		100	50*	Sept., 1934	Flotation.....	Gold.
Glacier Gulch.....	Smithers.....	Wilson Mining and Investment Co., Ltd., Vancouver						Gold, silver.
Golden Eagle.....	Topley.....	C. Matheson and D. Heenan, Topley						Gold, silver.
Nicola.....	Stump lake.....	Nicola Mines and Metals, Ltd., Vancouver	100	50	50*	1929	Flotation.....	Silver, lead, zinc.
Windpass.....	Black Pool.....	Windpass Gold Mining Co., Ltd., Vancouver		40	40	March, 1934	Flotation.....	
Bluehawk.....	Wilson's Landing.....	Bluehawk (Kelowna) Gold Mines Syndicate, Victoria						Gold, silver.
Pre Cambrian.....	Ewings Landing.....	Pre Cambrian Gold Mines, Seattle.....		25	25	1934	Flotation.....	Gold, silver.
Athelstan.....	Grand Forks.....	W. E. McArthur, Jr., Greenwood.....						Gold, silver.
Molly Gibson.....	Grand Forks.....	Oscar Anderson, Rossland.....						Gold, silver.
Union.....	Granby river.....	J. F. McCarthy, Grand Forks.....		200	200‡	Jan., 1930	Cyanidation.....	Gold.
Dividend.....	Osoyoos.....	Chas. S. Antonson.....						Gold.
Grandoro.....	Oro Fino mountain.....	Grandoro Mines, Ltd., Penticton.....						Gold.
Morning Star.....	Osoyoos.....	Morning Star (Fairview) Gold Mines, Ltd., Vancouver						Gold.

* Idle at present.

† Princess Royal mill under reconstruction.

‡ Tailings re-treated.

			Tons.	Tons.	Tons.			
Twin Lakes.....	Osoyoos.....	Twin Lakes Gold Mining Co., Ltd., Penticton	.....	40	40	March, 1934	Amalgamation; concentration.	Gold.
Victoria.....	Fairview.....	Victoria Fairview Mines. Ltd., Van- couver	.....	.....	.....	.....	.....	Gold.
Mak Siccar.....	Similkameen.....	Mak Siccar Gold Mines, Ltd., Van- couver	.....	.....	.....	.....	.....	Gold.
Silver King.....	Tulameen.....	Murray Mining Co., Ltd., Tulameen.	.....	.....	.....	.....	.....	Silver, lead.
Bay.....	Greenwood.....	W. E. McArthur, Jr., Greenwood.....	.....	.....	.....	.....	.....	Gold, silver.
Beaver.....	Greenwood.....	Beaver Silver Mines, Ltd., Vancouver	.....	.....	.....	.....	.....	Silver, lead zinc.
Bell.....	Greenwood.....	Bell Mine, Ltd., Penticton.....	.....	.....	.....	.....	.....	Silver, lead zinc.
Butcher Boy.....	Carmi.....	Carmi Gold Mines, Ltd., Carmi.....	.....	.....	.....	.....	.....	Gold, silver.
Carmi.....	Carmi.....	Carmi Gold Mines, Ltd., Carmi.....	.....	.....	.....	.....	.....	Gold, silver.
Dentonia.....	Greenwood.....	Dentonia Mines, Ltd., Calgary.....	100	100	135	April, 1934	Flotation.....	Gold, silver.
Dynamo.....	Greenwood.....	Dynamo Mining and Milling Co., Ltd., Vancouver	.....	.....	.....	.....	.....	Gold, silver.
Highland Lass.....	Beaverdell.....	Highland Lass, Ltd., Kelowna.....	.....	.....	.....	.....	.....	Silver, lead, zinc.
Imperial.....	Greenwood.....	Imperial Leasing Syndicate, Rock Creek	.....	.....	.....	.....	.....	Silver, lead, zinc.
Nonesuch.....	Greenwood.....	J. E. Taylor, Vancouver.....	.....	.....	.....	.....	.....	Silver, gold.
North Star.....	Greenwood.....	W. E. McArthur, Jr., and Hy. Fritz, Greenwood	.....	.....	.....	.....	.....	Silver, gold.
Number Seven.....	Greenwood.....	W. E. McArthur, Jr., and Hy. Fritz, Greenwood	.....	.....	.....	.....	.....	Silver, gold.
Sally.....	Beaverdell.....	Sally Mines, Ltd., Penticton.....	.....	.....	.....	.....	.....	Silver, gold.
Sunnyside.....	Greenwood.....	Robt. Forshaw, Greenwood.....	.....	.....	.....	.....	.....	Silver, zinc, lead.
Superior.....	Jewel lake.....	Superior Gold Mines, Ltd., Van- couver	.....	50	50	Nov., 1934	Flotation.....	Gold, silver.
Tiger.....	Beaverdell.....	J. L. Nordman and Partners, leasers, Beaverdell	.....	.....	.....	.....	.....	Silver, zinc, lead.
Waterloo.....	Lightning peak.....	Waterloo Gold Mines, Ltd., Pen- ticton	.....	.....	.....	.....	.....	Silver, lead, zinc.
Wellington.....	Beaverdell.....	Beaverdell Wellington Syndicate, Ltd., Greenwood	.....	.....	.....	.....	.....	Silver, zinc, lead.
Winner.....	Greenwood.....	Walters, Williamson, and Wanke, Greenwood	.....	.....	.....	.....	.....	Silver gold.
Lucky Thought.....	Ainsworth.....	H. V. Dewis, Silvertown.....	.....	.....	.....	.....	.....	Silver, gold.
Whitewater.....	Kaslo creek.....	Ross Mining Syndicate, Retallack....	.....	125	*	1927	Wet concentration; flotation.....	Silver, lead, zinc.
Chiefton.....	Cariboo creek.....	S. J. Johnson, Burton.....	.....	.....	.....	.....	.....	Silver, lead, zinc.
Dibble.....	Fort Steele.....	C/o Wittichen's, Ltd., Calgary.....	.....	.....	.....	.....	.....	Silver, gold.
Sullivan.....	Kimberley.....	Cons. M. & S. Co. of Canada, Ltd., Trail	6,000	6,000	6,000	August, 1923	Wet concentration; flotation.....	Silver, lead, zinc.
Monarch.....	Field.....	Base Metals Mining Corp., Field.....	300	300	*	Nov., 1929	Wet concentration; flotation.....	Silver, zinc, lead.

* Idle at present.

TABLE XVI.—METALLIFEROUS MINES SHIPPING IN 1934—Continued.

Mine or Group.	Location of Mine or Mill.	Owner or Agent.	RATED DAILY CAPACITY.		Operating at.	Date of First Operation.	Process.	Character of Ore.
			1933.	1934.				
			Tons.	Tons.	Tons.			
Kilo.....	Slocan City.....	C.Q. Mining Co., Vancouver.....						Gold, silver.
Smeralda.....	Slocan City.....	Roy F. Ainslie, Slocan City.....						Silver, lead zinc.
Winslow.....	Lardeau.....	E. H. McDaniel, Nelson.....						Gold, silver.
Best.....	Slocan.....	M. M. McCune, leaser; H. Giegerich, agent, Kaslo.....						Silver, lead, zinc.
Black Colt.....	Sandon.....	E. J. Vandergrift, agent, New Denver.....						Silver, lead, zinc.
Bosun.....	New Denver.....	C. J. Campbell, Vancouver.....						Silver, lead, zinc.
Canadian.....	Slocan.....	C. Calgare, Sandon.....						Silver, lead, zinc.
Early Bird.....	Slocan.....	Jas. Woods, Sandon.....						Silver, lead, zinc.
Howard Frac.....	Slocan.....	H. L. Harbour, Nelson.....						Silver.
Ivanhoe.....	Slocan.....	J. A. Black, Sandon.....						Silver, lead, zinc.
Jackson and Dublin Queen	Whitewater.....	Jackson Mines, Ltd., Vancouver.....						Silver, lead, zinc.
Mammoth.....	Kaslo.....	Western Exploration Co., Ltd., Silverton.....						Silver, lead, zinc.
Meteor.....	Slocan.....	Meteor Mining Co., Slocan City.....						Silver, gold.
Molly Hughes.....	New Denver.....	Molly Hughes Syndicate, Spokane.....						Silver, lead, zinc.
Mountain Chief.....	Slocan.....	J. Checkelero, Sandon.....						Silver, lead, zinc.
Palmita.....	Slocan.....	E. J. Vandergrift, agent, New Denver.....						Silver, lead, zinc.
Rio.....	Slocan.....	W. R. Roberts, Sandon.....						Silver, lead, zinc.
Silversmith.....	Sandon.....	Silversmith Mines, Ltd., Seattle.....	150		*	1922	Wet concentration; flotation.....	Silver, lead, zinc.
Skylark and Ranger	Lemon creek.....	W. E. Graham, Slocan.....						Silver, gold.
Standard.....	Sandon.....	Western Exploration Co., Silverton.....						Silver, lead, zinc.
Victor.....	Slocan.....	E. Doney & Son, Sandon.....						Silver, lead, zinc.
Wellington.....	Slocan.....	S. Marzoli, Sandon.....						Silver, lead, zinc.
Alma N.....	Nelson.....	Alma N. Mining Co., Tacoma.....						Gold, silver.
Arlington.....	Erie.....	Godfrey Bitsch, Nelson.....						Gold, silver.
Arlington.....	Erie.....	Oscarson Bros., Erie.....						Gold, silver.
Athabasca.....	Nelson.....	Noble Five Mines, Ltd., Nelson.....		25	*	1920	Amalgamation; cyanidation.....	Gold, silver.
Boulder City.....	Salmo.....	Clubine Comstock Gold Mines, Ltd., Nelson.....						Gold, silver.
Bunker Hill.....	Nelway.....	Bunker Hill Gold Mines, Ltd., Nelson.....						Gold, silver.
California.....	Toad mountain.....	W. J. Turner, Nelson.....						Gold, silver.
Dundee.....	Ymir.....	Ymir Dundee Gold Mining Co., Ltd., Nelson.....						Gold, silver.

* Idle at present.

			Tons.	Tons.	Tons.			
Euphrates.....	Nelson.....	Euphrates Mining Co., Nelson.....						Gold, silver.
Gold Belt.....	Sheep creek.....	Gold Belt Mining Co., Ltd., Nelson.....						Gold, silver.
Golden Eagle.....	Sandy creek.....	B. A. Pickering, Nelson.....						Gold, silver.
Gold Hill.....	Erie.....	Louis Matassa, Erie.....						Gold, silver.
Gold King.....	Gray creek.....	H. W. Robertson, Nelson.....						Gold, silver.
Goodenough.....	Ymir.....	Ymir Gold Mines, Ltd., Vancouver.....						Gold, silver.
Goodenough and Ymir.....	Ymir.....	Ymir Cons. Gold Mines, Ltd., Vancouver.....						Gold, silver.
Good Hope.....	Nelson.....	Coles, Baxter, and Foster, Nelson.....						Gold, silver.
Granite-Poorman.....	Taghum.....	Livingstone Mining Co., Taghum.....		60	30	Sept., 1934	Amalgamation; concentration.....	Gold, silver.
Great Eastern.....	Nelson.....	John Sheplak, leaser, Nelson.....						Gold, silver.
Keystone.....	Erie.....	Fred Golightly, Erie.....						Gold, silver.
Kootenay Belle.....	Sheep creek.....	Kootenay Belle Gold Mines, Ltd., Vancouver.....		60	30	Oct., 1934	Amalgamation (blanket); flotation.....	Gold, silver.
Last Chance.....	Nelson.....	Assoc. Gold Mines, c/o K. Buell, Trail.....						Gold, silver.
Myrtle.....	Ymir.....	H. Brown and S. A. Curwen, Ymir.....						Gold, silver.
Nevada.....	Nelson.....	M. A. Tuck, Vancouver.....						Gold, silver.
Perrier.....	Cottonwood creek.....	Leaser; Perrier Gold Mines, Ltd., Nelson.....		50				Gold, silver.
Petersen.....	Ymir.....	Nels Petersen, Ymir.....						Gold, silver.
Porto Rico.....	Nelson.....	B. A. Pickering, Nelson.....						Gold, silver.
Reno.....	Sheep creek.....	Reno Gold Mines, Ltd., Nelson.....	100	100	100	Dec., 1932	Cyanidation.....	Gold.
Royal Canadian.....	Nelson.....	M. A. Tuck, Vancouver.....						Gold, silver.
Salmo-Malartic.....	Nelson.....	Salmo-Malartic Mines, Ltd., Toronto.....						Gold, silver.
Sanca.....	Ginols Landing.....	Canada Smelters, Ltd., Sanca.....						Gold, silver.
Second Chance.....	Erie.....	O. Mazerall and C. Peterson, Salmo.....						Gold, silver.
Second Relief.....	Erie.....	Relief Arlington Mines, Ltd., Erie.....	40	40	40	1933	Amalgamation; flotation.....	Gold, silver.
Wilcox.....	Ymir.....	Wilcox Mining Syndicate, Rossland.....	20	20	10	1933	Amalgamation; 10-stamp.....	Gold.
Yankee Girl.....	Ymir.....	Ymir-Yankee Girl Gold Mines, Ltd., Ymir.....		100	50	Dec., 1934	Cyanidation; flotation.....	Gold, silver.
Chff.....	4-Mile creek.....	S. J. Hackney, Rossland.....						Gold, silver.
Evening Star.....	Rossland.....	James Heap, Rossland.....						Gold, silver.
Georgia.....	Rossland.....	C. E. Fraser, Rossland.....						Gold, silver.
Gold Drip.....	O.K. mountain.....	M. Penney, Rossland.....						Gold, silver.
Hattie.....	Rossland.....	C. Hutton, M. Hoyte, lessees, Rossland.....						Gold, silver.
I.X.L.....	Rossland.....	I.X.L. Lessors, Ltd., Rossland.....						Gold, silver.
Jumbo.....	Rossland.....	Jumbo Leasing Syndicate, Rossland.....						Gold, silver.
Midnight.....	Rossland.....	Midnight Syndicate, Rossland.....						Gold, silver.
Mighty Midas.....	Violin lake.....	M. M. Butorac, Trail.....						Gold, silver.
Nest Egg.....	Rossland.....	Emmanuel Triggs, Rossland.....						Gold, silver.

* Idle at present.

TABLE XVI.—METALLIFEROUS MINES SHIPPING IN 1934—Continued.

Mine or Group.	Location of Mine or Mill.	Owner or Agent.	RATED DAILY CAPACITY.		Operating at.	Date of First Operation.	Process.	Character of Ore.
			1933.	1934.				
O.K.	O.K. mountain	O.K. Leasing Syndicate, Rossland	Tons.	Tons.	Tons.			Gold, silver.
Silverine	Rossland	Alf. O. Fried, Rossland						Gold, silver.
Spring Creek	Trail Creek	T. H. Sargeant, Trail						Gold, silver.
Velvet	Rossland	Velvet Gold Mining Co., Seattle		50	50	1934	Concentration	Gold, silver.
Rossland properties	Rossland	Leasers from Cons. M. & S. Co. of Canada, Trail				§	Concentration	Gold, silver, copper.
Vancouver Island	China creek	Vancouver Island Gold Mines, Ltd., Vancouver						Gold, silver.
Vidette	Savona	Vidette Gold Mines, Ltd., Vancouver	40	40	35	Dec., 1933	Flotation	Gold, silver.
Danzig	Nootka sound	Danzig Mines, Ltd., Nootka						Gold, silver.
Golden Peak	Ceepeecee	Albert Bloom, Ceepeecee						Gold, silver.
Kennedy Lake	Kennedy Lake	Kennedy Lake Gold Mines, Ltd., Victoria						Gold, silver.
Privateer	Zeballos river	A. Bird and Partners, Ceepeecee						Gold, silver.
Grange	Kelly creek	Grange Mines, Ltd. Vancouver		60	50	Jan., 1934	Amalgamation; flotation	Gold, silver.
Taylor-Windfall	Taseko lake	Taylor Windfall Gold Mining Co., Ltd., Vancouver		5	5	August, 1934	Amalgamation; flotation	Gold, silver.
Bralorne	Cadwallader creek	Bralorne Mines Ltd., Vancouver	225	500	450	Feb., 1932	Amalgamation; flotation	Gold, silver.
Goldside	Taylor basin	Goldside Mines, Ltd., Vancouver						Gold, silver.
Minto	Bridge River	Minto Gold Mines, Ltd., Vancouver		50-75	60	Dec., 1934	Amalgamation; flotation	Gold, silver.
Pioneer	Cadwallader creek	Pioneer Gold Mines of B.C., Ltd., Vancouver	300	400	410	Feb., 1928	Cyanidation (first mill in 1900)	Gold, silver.
Wayside	Bridge River	Wayside Consolidated Gold Mines, Ltd., Vancouver		50	40	Nov., 1934	Amalgamation; flotation	Gold, silver.
Hercules	Phillips arm	Hercules Cons. M.S. & P. Co., Ltd., Vancouver						Gold, silver.
Hayden Bay	Hayden bay	Hayden Bay Gold Mines, Ltd., Vancouver						Gold, silver.
Ashloo	Squamish	Ashloo Gold Mining Syndicate, Vancouver						Gold, silver.
Britannia	Britannia Beach	Britannia M. & S. Co., Ltd., Britannia Beach	6,500	6,500	4,600	Jan., 1923	Flotation	Copper, gold, silver.
Dawson	Jessica	Dawson Cons. Gold Mines, Ltd.		25	*		Amalgamation; flotation	Gold, silver.

* Idle at present.

§ 100-ton mill at Tadanac (Trail) reconditioned to handle Rossland ores shipped by leasers.

TABLE XVII.—MINING COMPANIES EMPLOYING AN AVERAGE OF TEN OR MORE MEN DURING 1934.

Shipping Mines.

Name of Mine or Company.	DAYS OPERATING.		AVERAGE NUMBER OF MEN.		TONNAGE.	
	Mine.	Mill.	Mine.	Mill.	Mined.	Milled or Shipped.
Dunwell Mines, Ltd.....	334	235	20	15	6,361	4,100
Premier Gold Mining Co.....	306	306	217	26	154,693	154,693
United Empire.....	365	.....	33	.....	.....	58
Granby Cons. M.S. & P. Co.— Hidden Creek.....	362	362	454	68	1,744,524	1,742,324
Bonanza.....	363	.....	53	.....	133,476	133,476
Granby Point.....	362	.....	15	.....	13,948	.....
Timmins, Inc., Surf Point.....	340	311	21	7	7,814	5,658
Cariboo Gold Quartz.....	365	365	106	11	28,447	27,693
Island Mountain Mines Co.....	56	56	41	9	2,894	2,894
Columario Cons. Gold.....	365	90	25	7	2,300	2,300
Windpass Gold Mine Co.....	365	364	29	5	9,005	11,316
Pre Cambrian Gold Mines.....	354	167	8	6	3,154	3,100
Nicola Mines & Metals.....	334	168	44	8	6,095	6,095
Union Mine.....	99	164	5	16	.....	18,143*
Beaver Silver Mines, Ltd.....	300	.....	10	.....	.....	102
Bell Mine.....	299	.....	15	.....	.....	1,823
Butcher Boy.....	352	.....	10	.....	.....	56
Dentonia.....	365	241	28	31	22,610	22,464
Highland Lass, Ltd.....	310	.....	11	.....	.....	1,107
Superior Gold Mines, Ltd.....	61	61	20	8	3,504	3,419
Sally Mines, Ltd.....	308	.....	21	.....	.....	475
Waterloo Gold Mines, Ltd.....	334	.....	15	.....	.....	59
Wellington.....	300	.....	15	.....	.....	559
Grandoro Mines, Ltd.....	365	.....	26	.....	.....	546
Morning Star (Fairview).....	347	.....	33	.....	.....	2,652
Twin Lakes Gold Mining Co.....	308	254	35	5	5,471	5,471
Sullivan.....	299	313	547	251	1,764,211	1,741,742
Monarch.....	342	341	56	24	96,200	94,880
Noble Five Mines, Ltd.....	365	.....	15	.....	.....	164
Gold Belt Mining Co.....	365	.....	17	.....	.....	291
Granite-Poorman.....	307	.....	13	.....	.....	563
Kootenay-Belle.....	304	29	26	6	2,824	1,615
Ymir Consolidated.....	92	.....	30	.....	.....	222
Goodenough.....	273	.....	16	.....	.....	4,030
Relief-Arlington.....	365	365	43	11	14,614	11,663
Reno Gold Mines, Ltd.....	365	365	85	25	26,895	26,895
Salmo Malartic, Ltd.....	365	.....	12	.....	.....	18
Willcox Mining Syndicate.....	264	.....	8	2	3,320	1,660
Yankee Girl.....	193	.....	34	.....	.....	13,966
Velvet Gold Mining Co.....	214	60	6	7	2,400	2,553
Vancouver Island Gold.....	276	.....	12	.....	.....	40
Vidette Gold Mines, Ltd.....	330	277	40	6	7,229	7,217
Grange Mines, Ltd.....	365	365	28	6	3,330	3,330
Minto Gold Mines, Ltd.....	305	34	28	9	2,878	1,439
Bralorne Mines, Ltd.....	365	365	125	14	98,664	98,664
Pioneer Gold Mines.....	365	365	180	16	130,066	130,198
Wayside Gold Mines, Ltd.....	365	54	25	7	2,381	513
Hercules Consolidated.....	280	.....	28	.....	.....	18
Britannia M. & S. Co., Ltd.....	289	165	350	150	786,412	759,697

* Tailing re-treated.

TABLE XVII.—MINING COMPANIES EMPLOYING AN AVERAGE OF TEN OR MORE MEN DURING 1934—*Continued.*

Non-shipping Mines.

Name of Mine or Company.	DAYS OPERATING.		AVERAGE NUMBER OF MEN.		TONNAGE.	
	Mine.	Mill.	Mine.	Mill.	Mined.	Milled or Shipped.
Big Missouri.....	.....	.....	37	.....	.....	.....
Proserpine Gold Mines.....	277	.....	10	.....	.....	.....
Northern Reef Gold Mines.....	213	.....	17	.....	.....	.....
Radio Gold Mines, Ltd.....	225	.....	10	.....	.....	.....
Frances Gold Mines, Ltd.....	37	.....	14	.....	.....	.....
Dictator Gold Mines, Ltd.....	.....	.....	10	.....	.....	.....
Monashee Mines Syndicate, Ltd.	214	.....	17	.....	.....	.....
Fairview Amalgamated.....	291	.....	22	.....	.....	.....
Kelowna Exploration.....	.....	.....	52	15	.....	.....
Osoyoos Mines, Ltd.....	166	.....	18	.....	.....	.....
Meridian Mining Co.....	365	.....	15	.....	.....	.....
Teddy Glacier Mine.....	173	.....	23	.....	.....	.....
Trites Gold Mining Co.....	365	.....	15	.....	.....	.....
Westko Ex. & Dev. Co.....	365	.....	15	.....	.....	.....
Silversmith Mines, Ltd.....	225	.....	17	.....	.....	.....
Taseko Motherlode Syndicate.	.....	.....	10	.....	.....	.....
Bradlan Mines, Ltd.....	300	.....	49	.....	.....	.....
B.R.X. Gold Mines, Ltd.....	365	.....	44	.....	.....	.....
National Gold Mines.....	300	.....	10	.....	.....	.....
Pacific Eastern Gold.....	245	.....	36	.....	.....	.....
Home Gold Mining Co., Ltd.....	365	.....	10	.....	.....	.....
B.C. Nickel Mines, Ltd.....	365	.....	62	.....	.....	.....

LECTURES TO PROSPECTORS.

A series of fourteen lectures on geology and mining was prepared by the Provincial Mineralogist and presented by the Resident Mining Engineers and other instructors at the following centres throughout the Province:—

Athalmer-Invermere.	Hazelton.	Quesnel.
Burnaby.	Prince George.	Revelstoke.
Castlegar.	Smithers.	Rossland.
Nelson.	Lumberton.	Victoria.
Cranbrook.	Moyie.	Vernon.
Fort Steele.	North Vancouver.	Winfield.
Skookumchuck.	Penticton.	Williams Lake.
Wardner.	Prince Rupert.	Kelowna.
Fernie.	Princeton.	Ashcroft.
Michel-Natal.	Premier.	Vancouver.

The total average attendance at the lectures was 1,576.

This work was carried out in conjunction with the Department of Education. The lectures were also used by the Department of Education in correspondence courses.

It is expected that the lectures will be given during the winter of 1935-36, and that the course will be considerably improved by having adequate sets of rocks and minerals for the instructors as well as a number of sets available for those attending the lectures.

GEOLOGICAL SURVEY.

By an arrangement made at the time the Province of British Columbia entered Confederation, all geological investigations and mapping in the Province were to be carried on by the Geological Survey of Canada; this agreement has been fully adhered to by the Dominion Government and has proved of great benefit to the mining industry of the Province. Each year several geological parties are kept in the field and in the aggregate a vast amount of information

is made available to the prospector and the mining engineer in the many excellent reports and maps covering British Columbia which have been issued by the Geological Survey of Canada.

For some years a branch office of the Geological Survey has been maintained in Vancouver, where copies of maps and reports on British Columbia can be obtained. The officer in charge of the British Columbia office is W. E. Cockfield and the address is 512 Winch Building, Vancouver, B.C.

During the season of 1934 the Geological Survey of Canada had the following officers employed on geological field-work in British Columbia: W. E. Cockfield conducted detailed investigations in the Camp McKinney, Osoyoos, Fairview-Twin Lakes, and Vidette areas, and at the property of B.C. Nickel Mines, Limited; C. E. Cairnes carried out a detailed survey of the Cadwallader Creek area, Bridge River district; George Hanson completed geological mapping of the Willow River area, Cariboo district; F. A. Kerr made a reconnaissance survey along the Prince Rupert branch of the Canadian National Railway east and west of Prince George; J. F. Walker spent part of the season on a reconnaissance survey in the vicinity of Cranbrook.

W. Spence carried out detailed topographic mapping of the Cadwallader Creek area, Bridge River district, and R. Bartlett completed topographic mapping of the Willow River area, Cariboo district.

SYNOPSIS OF MINING LAWS OF B.C.

BY

ROBERT DUNN.

Mineral Act and Placer-mining Act.

The mining laws of British Columbia are very liberal in their nature and compare favourably with those of any other part of the world. The terms under which both lode and placer claims and placer leaseholds are held are such that a prospector is greatly encouraged in his work, and the titles, especially for mineral claims and placer-mining leaseholds, are perfect. The fees required to be paid are as small as possible, consistent with a proper administration of the mining industry, and are generally lower than those commonly imposed elsewhere. Provision is also made for the formation of mining partnerships practically without expense, and a party of miners is enabled to take advantage of these sections of the Acts so that such miners may work their claims jointly.

Placer-mining leases are granted for a period of twenty years and are approximately 80 acres in size. On a lode claim of 51 acres the expenditure of \$500 in work, which may be spread over five years, is required to obtain a Crown grant, and surface rights are obtainable at a small figure, in no case exceeding \$5 per acre.

The following synopsis of the mining laws will be found sufficient to enable the miner or intending investor to obtain a general knowledge of their scope and requirements; for particulars, however, the reader is referred to the Acts relating to mining, which may be obtained from any Mining Recorder, or from the Department of Mines or the King's Printer, Victoria, B.C.

Free Miners' Certificates.

Any person over the age of 18, and any joint-stock company, may obtain a free miner's certificate on payment of the required fee.

The fee to an individual for a free miner's certificate is \$5 for one year. To a joint-stock company having a capital of \$100,000, or less, the fee for a year is \$50; if capitalized beyond this, the fee is \$100.

The free miners' certificates run from date of issue and expire on the 31st of May next after its date, or some subsequent 31st day of May (that is to say, a certificate may be taken out a year or more in advance if desired). Certificates may be obtained for any part of a year, terminating on May 31st, for a proportionately less fee.

The possession of this certificate entitles the holder to enter upon all lands of the Crown, and upon any other lands on which the right to so enter is not specially reserved, for the purpose of prospecting for minerals, locating claims, and mining.

A free miner can only hold, by location, one mineral claim on the same vein or lode, but may acquire others by purchase. Under the "Placer-mining Act," a free miner may locate one placer claim or leasehold in his own name and one placer claim or leasehold for each of two free miners for whom he acts as agent, on any separate creek, river-bed, bar or dry diggings. Other placer claims or leaseholds may be acquired by purchase.

In the event of a free miner allowing his certificate to lapse, his mining property (if not Crown-granted) reverts to the Crown (subject to the conditions set out in the next succeeding paragraph), but where other free miners are interested as partners or co-owners the interest of the defaulter becomes vested in the continuing co-owners or partners *pro rata*, according to their interests.

Six months' extension of time within which to revive title in mining property which has been forfeited through the lapse of a free miner's certificate is allowed. This privilege is given only if the holder of the property obtains a special free miner's certificate within six months after the 31st of May on which his ordinary certificate lapsed. The fee for this special certificate in the case of a person is \$15 and in that of a company \$300.

It is not necessary for a shareholder, as such, in an incorporated mining company to be the holder of a free miner's certificate.

Mineral Claims.

Mineral claims are located and held under the provisions of the "Mineral Act."

A mineral claim is a piece of land not exceeding in area fifty-one and sixty-five one-hundredths acres. The angles must be right angles unless the boundaries, or one of them, are the same as those of a previously recorded claim.

No special privileges are allowed for the discovery of new mineral claims or districts.

A mineral claim is located by erecting three "legal posts," which are stakes having a height of not less than 4 feet above ground and squared 4 inches at least on each face for not less than a foot from the top. A tree-stump so cut and squared also constitutes a legal post. A cairn of stones not less than 4 feet in height and not less than 1 foot in diameter 4 feet above the ground may also be used as a legal post.

The "discovery post" is placed at the point where the mineral in place is discovered.

Nos. 1 and 2 posts are placed as near as possible on the line of the ledge or vein, shown by the discovery post, and mark the boundaries of the claim. Upon each of these three posts must be written the name of the claim, the name of the locator, and the date of location. On No. 1 post, in addition, the following must be written: "Initial post. Direction of Post No. 2 [*giving approximate compass bearing*] ——— feet of this claim lie on the right and ——— feet on the left of the line from No. 1 to No. 2 posts."

The location-line between Nos. 1 and 2 posts must be distinctly marked—in a timbered locality by blazing trees and cutting underbrush, and in bare country by monuments of earth or rock not less than 2 feet in diameter at the base, and at least 2 feet high—so that the line can be distinctly seen.

Mineral claims must be recorded in the Mining Recorder's office for the mining division in which they are situate within fifteen days from the date of location, one day extra being allowed for each 10 miles of distance from the recording office after the first 10 miles. If a claim is not recorded in time it is deemed abandoned and open for relocation, but if the original locator wishes to relocate he can only do so by permission of the Gold Commissioner of the district and upon the payment of a fee of \$10. This applies also to a claim abandoned for any reason whatever.

Mineral claims are, until the Crown grant is issued, held practically on a yearly lease, a condition of which is that during such year assessment-work be performed on the same to the value of at least \$100, or a payment of such sum be made to the Mining Recorder. Such assessments must be recorded before the expiration of the year, or the claim is deemed abandoned. If, however, the required assessment-work has been performed within the year, but not recorded within that time, a free miner may, within thirty days thereafter, record such assessment-work upon payment of an additional fee of \$10. The actual cost of the survey of a mineral claim, to an amount not exceeding \$100, may also be recorded as assessment-work. If, during any year, work is done to a greater extent than the required \$100, any further sum of \$100—but not less—may be recorded and counted as further assessments; such excess work must be recorded during the year in which it is performed. All work done on a mineral claim between the time of its location and recording may be counted as work done during the first period of one year from the recording. As soon as assessment-work to the extent of \$500 is recorded and a survey made of the claim, the owner of a mineral claim is entitled to a Crown grant on payment of a fee of \$25, and giving the necessary notices required by the Act. Liberal provisions are also made in the Act for obtaining mill-sites and other facilities in the way of workings and drains for the better working of claims.

Placer Claims.

Placer-mining is governed by the "Placer-mining Act," and by the interpretation clause its scope is defined as "the mining of any natural stratum or bed of earth, gravel, or cement mined for gold or other precious minerals or stones." Placer claims are of four classes, as follows:—

"Creek diggings": any mine in the bed of any stream or ravine:

"Bar diggings": any mine between high- and low-water marks on a river, lake, or other large body of water:

“‘Dry diggings’: any mine over which water never extends:

“‘Precious-stone diggings’: any deposit of precious stones, whether in veins, beds, or gravel deposits.”

The following provisions as to extent of the various classes of claims are made by the Act:—

“In ‘creek diggings’ a claim shall be two hundred and fifty feet long, measured in the direction of the general course of the stream, and shall extend in width one thousand feet, measured from the general course of the stream five hundred feet on either side of the centre thereof:

“In ‘bar diggings’ a claim shall be:—

“(a.) A piece of land not exceeding two hundred and fifty feet square on any bar which is covered at high water; or

“(b.) A strip of land two hundred and fifty feet long at high-water mark, and in width extending from high-water mark to extreme low-water mark:

“In ‘dry diggings’ a claim shall be two hundred and fifty feet square.”

The following provision is made for new discoveries of placer-mining ground:—

“If any free miner, or party of free miners, discovers a new locality for the prosecution of placer-mining and such discovery be established to the satisfaction of the Gold Commissioner, placer claims of the following sizes shall be allowed to such discoverers, namely:—

“To one discoverer, one claim..... 600 feet in length;

“To a party of two discoverers, two claims amounting together to.....1,000 feet in length;

“And to each member of a party beyond two in number, a claim of the ordinary size only.

“The width of such claims shall be the same as ordinary placer claims of the same class:

Provided that where a discovery claim has been established in any locality no further discovery shall be allowed within five miles therefrom, measured along the watercourses.”

Every placer claim shall be as nearly as possible rectangular in form, and marked by four legal posts at the corners thereof, firmly fixed in the ground. On each of such posts shall be written the name of the locator, the number and date of issue of his free miner's certificate, the date of the location, and the name given to the claim. In timbered localities boundary-lines of a placer claim shall be blazed so that the posts can be distinctly seen, underbrush cut, and the locator shall also erect legal posts not more than 125 feet apart on all boundary-lines. In localities where there is no timber or underbrush, monuments of earth and rock, not less than 2 feet high and 2 feet in diameter at base, may be erected in lieu of the last-mentioned legal posts, but not in the case of the four legal posts marking the corners of the claim.

A placer claim must be recorded in the office of the Mining Recorder for the mining division within which the same is situate, within fifteen days after the location thereof, if located within 10 miles of the office of the Mining Recorder by the most direct means of travel. One additional day shall be allowed for every 10 miles additional or fraction thereof. The number of days shall be counted inclusive of the days upon which such location was made, but exclusive of the day of application for record. The application for such record shall be under oath and in the form set out in the Schedule to the Act. A claim which shall not have been recorded within the prescribed period shall be deemed to have been abandoned.

To hold a placer claim for more than one year it must be rerecorded before the expiration of the record or rerecord.

A placer claim must be worked by the owner, or some one on his behalf, continuously, as far as practicable, during working-hours. If work is discontinued for a period of seventy-two hours, except during the close season, lay-over, leave of absence, sickness, or for some other reason to the satisfaction of the Gold Commissioner, the claim is deemed abandoned.

Lay-overs are declared by the Gold Commissioner upon proof being given to him that the supply of water is insufficient to work the claim. Under similar circumstances he has also the power to declare a close season, by notice in writing and published in the Gazette, for all or any claims in his district. Tunnel and drain licences are also granted by him on the person applying giving security for any damage that may arise. Grants of right-of-way for the construction of tunnels or drains across other claims are also granted on payment of a fee of \$25, the owner of the claims crossed having the right for tolls, etc., on the tunnel or drain which may be constructed. These tolls, however, are, so far as the amount goes, under the discretion of the Gold Commissioner.

Co-owners and Partnerships.

In both the "Mineral" and "Placer-mining" Acts provision is made for the formation of mining partnerships, both of a general and limited liability character. These are extensively taken advantage of and have proved very satisfactory in their working. Should a co-owner fail or refuse to contribute his proportion of the expenditure required as assessment-work on a claim he may be "advertised out," and his interest in the claim shall become vested in his co-owners who have made the required expenditure, *pro rata* according to their former interests.

It should not be forgotten that if any co-owner permit his free miner's certificate to lapse, the title of his associates is not prejudiced, but his interest reverts to the remaining co-owners; provided that said co-owner has not taken advantage of the six months' period of grace allowed for the taking-out of a special free miner's certificate, thus reviving the title to his interest.

Placer-mining Leases.

Leases of unoccupied Crown lands approximately 80 acres in extent may be granted by the Gold Commissioner of the district after location has been made by staking along a "location-line" not more than one-half a mile (2,640 feet) in length. In this line one bend, or change of direction, is permitted. Where a straight line is followed two posts only are necessary—namely, an "initial post" and a "final post." Where there is a change of direction a legal post must be placed to mark the point of the said change. The leasehold is allowed a width not in excess of one-quarter mile (1,320 feet), and the locator, both on his "initial post" and in his notice of intention to apply, which is posted at the office of the Mining Recorder, is required to state how many feet are included in the location to the right and how many feet to the left of the location-line.

That section of the Act dealing with the staking of placer-mining leases follows:—

"105A. (1.) For the purpose of locating a placer leasehold, a line to be known as the 'location-line' shall be marked on the ground by placing a legal post at each end, one post to be known as the 'Initial Post' and the other as the 'Final Post.' The direction of the location-line may change at not more than one point throughout its length, and an intermediate legal post shall be placed at the point at which the direction changes. The total length of the location-line, following its change of direction (if any), shall not exceed two thousand six hundred and forty feet.

"(2.) Upon the initial post and the final post shall be written the words 'Initial Post' and 'Final Post' respectively, together with the name of the locator and the date of the location. On the initial post shall also be written the approximate compass-bearing of the final post, and a statement of the number of feet of the leasehold lying on the right and on the left of the location-line, as viewed from the initial post, not exceeding in the aggregate a width of thirteen hundred and twenty feet, thus: 'Direction of Final Post, . . . feet of this claim lie on the right and . . . feet on the left of the location-line.' In addition to the foregoing, where there is a change of direction in the location-line as marked on the ground, the number '1' shall be written on the initial post; the number '2' shall be written on the intermediate post; and the number '3' shall be written on the final post. There also shall be affixed to the initial post a notice to the following effect, namely: 'Application will be made under the "Placer-mining Act" for a lease of the ground within this location.'

"(3.) The location-line shall at the time of location be marked between the legal posts throughout its length so that it can be distinctly seen; in a timbered locality, by blazing trees and cutting underbrush, and in a locality where there is neither timber nor underbrush, by placing legal posts or monuments of earth or stones not less than two feet high and not less than two feet in diameter at the base, so that the location-line can be distinctly seen.

"(4.) Where, from the nature or shape of the surface of the ground, it is impracticable to mark the location-line of a leasehold as provided by this section, the leasehold may be located by placing legal posts as witness-posts, as near as possible to the location-line, and writing on each witness-post the distance and compass-bearing of some designated point on the location-line from the witness-post; and the distances and compass-bearing so written on the witness-posts shall be set out in the application for the lease and in any lease granted thereon.

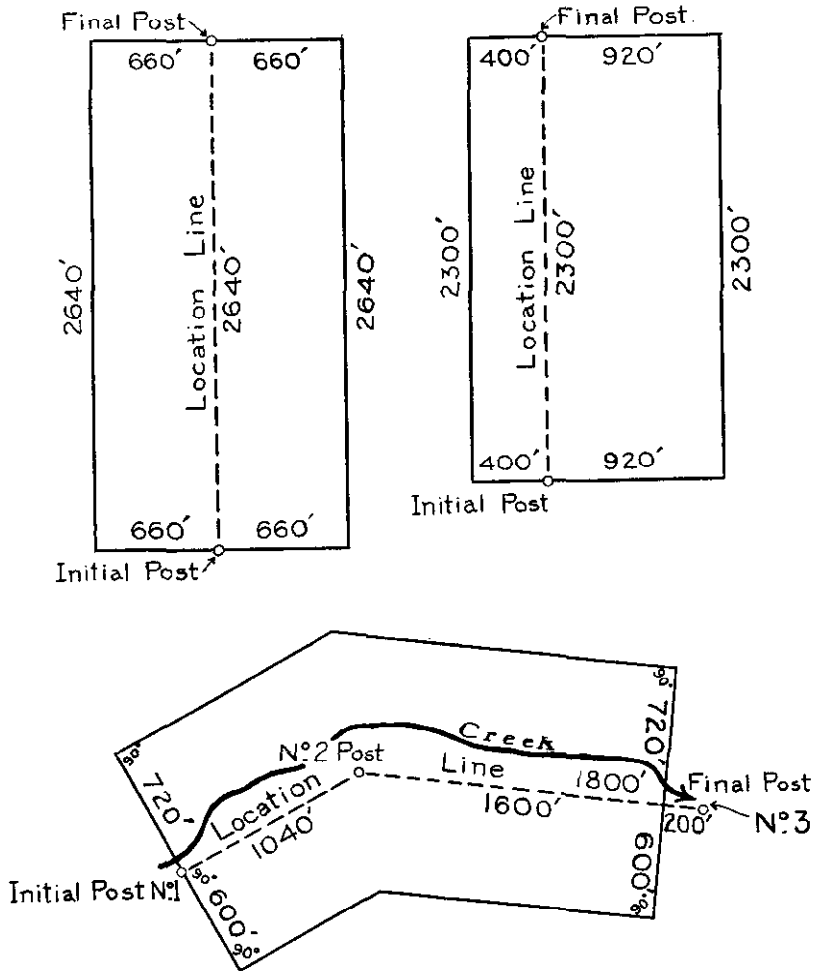
"(5.) The locator shall, within thirty days after the date of the location, post a notice in Form 1 in the office of the Mining Recorder, which notice shall set out:—

- “(a.) The name of the intending applicant or each applicant if more than one, and the numbers of their free miners’ certificates:
- “(b.) The date of the location:
- “(c.) The number of feet lying to the right and left of the location-line, and the approximate area or size of the ground.

The words written on the initial post and final post shall be set out in full in the notice; and as accurate a description as possible of the ground to be acquired shall be given, having special reference to any prior locations it may join, and the general locality of the ground to be acquired.

EXAMPLES OF VARIOUS METHODS OF LAYING OUT PLACER LEASEHOLDS.

Showing Areas secured with Location-lines of Various Lengths.



“(6.) The location and area of the placer leasehold shall be determined by establishing its end lines running from or through the initial post and from or through the final post, at right angles to the course of the location-line at those posts, respectively; and by establishing its side-line parallel to the course or courses of the location-line, and distant one thousand three hundred and twenty feet from each other.”

Another provision is that there must be affixed to the “initial post” and to the “final post” a numbered metal identification tag furnished by the Mining Recorder with each free miner’s certificate issued. These tags may be attached to the posts, or placed in a container within a

claim, either at the time of location or some time during the succeeding year, but must be so placed before the Mining Recorder will grant the first certificate of work in respect of the leasehold.

The annual rental on a placer-mining lease is \$30, and the amount to be expended annually on development-work is \$250.

Dredging leases on rivers for 5 miles below low-water mark are also granted. Section 122 of the Act establishes a definite method of staking such mining ground. Authority also has been given for the granting of placer-mining leases for dredging purposes in locations other than has been defined.

For more detailed information the reader is referred to the complete "Placer-mining Act," which may be obtained from the King's Printer, Victoria, B.C.

Table of Fees, Mineral Act and Placer-mining Act.

Individual free miner's certificate, annual fee	\$5.00
Company free miner's certificate (capital \$100,000 or less), annual fee	50.00
Company free miner's certificate (capital over \$100,000), annual fee	100.00
Recording mineral or placer claim	2.50
Recording certificate of work, mineral claim	2.50
Rerecord of placer claim	2.50
Recording lay-over	2.50
Recording abandonment, mineral claim	10.00
Recording abandonment, placer claim	2.50
Recording any affidavit under three folios	2.50
Per folio over three, in addition .....	.30
Records in "Records of Conveyances," same as affidavits.	
Filing documents, "Mineral Act" .....	.25
Filing documents, "Placer-mining Act"	1.00
Recording certificate of work, placer-mining lease	2.50
For Crown grant of mineral rights under "Mineral Act"	25.00
For Crown grant of surface rights of mineral claim under "Mineral Act"	10.00
For every lease under "Placer-mining Act"	5.00

Provisional Free Miners' Certificates (Placer) Act.

This Act was passed at the 1932 session of the Provincial Legislature and provides for the issuance of "provisional free miners' certificates" for the locating, recording, representing, and working of placer claims of a size, and according to the terms, and in the manner set out in Parts II. and III. of the "Placer-mining Act." Any person over 18 years of age who has resided in the Province continuously for a period of not less than six months prior to date of his application may, on application accompanied by a statutory declaration or other satisfactory evidence as to his age and period of residence in the Province, obtain from any Gold Commissioner or Mining Recorder a provisional free miner's certificate. No fees are payable in respect of such certificate, and it abolishes the fees payable in respect of the recording or rerecording of placer claims, but no record or rerecord of a claim shall be granted for a longer period than one year without the payment of fees. It should be pointed out that the provisional free miner's certificate does not carry the privileges of an ordinary free miner's certificate as to the staking and working of placer-mining leases or mineral claims.

An amendment passed at the 1933 session of the Legislative Assembly gives the Lieutenant-Governor in Council, as a means of unemployment relief, power to make provision for the establishment, equipment, maintenance, and operation of one or more placer training camps at suitable locations, at which unemployed persons who hold provisional free miners' certificates and are British subjects may acquire knowledge and training in the art of placer-mining and may be afforded gainful work in the recovery of minerals by placer-mining. Reserves for the location of such camps shall not exceed one mile in length by one-half a mile in width, and the right is given to enter into agreements with private holders under the Act for the development of their ground by means of unemployment relief camps.

Mines Development Act.

When it is shown to the satisfaction of the Minister of Mines that ore-bodies exist in quantity and of commercial value sufficient to warrant the expenditure of public moneys, the Minister of Mines may authorize the expenditure of so much of the public money as may be required for the construction, reconstruction, or repair of trails, roads, and bridges to facilitate the operation and development of such mineral or placer claims.

Furthermore, the Minister of Mines may authorize the expenditure of public money towards the building or repairing of trails and bridges in or to any mineral district for the purpose of facilitating the exploration of the mineral resources of the district, such expenditure not to exceed 50 per cent. of the cost of the work. If such roads, trails, or bridges have been built by any person or company having mining interests in the district, the Minister of Mines may refund to such person a portion, not exceeding 50 per cent. of the cost of such construction.

Mineral Survey and Development Act, 1929.

PART I.—MINERAL SURVEY.

A mineral survey of the Province has been established, to be carried on continuously and records thereof kept.

For this purpose the Province has been divided into Mineral Survey Districts, and there are five Resident Engineers who, with such assistance as is necessary, devote their whole time to carrying out the provisions of this Act, reporting direct to the Minister.

PART II.—AID TO PROSPECTORS.

The Resident Engineer in each district shall aid prospectors, as far as practicable:—

- (a.) By giving information as to mineral indications and as to ground open for location as mineral claims or placer claims as a result of knowledge gained during the carrying-out of the mineral survey of his district:
- (b.) By examining samples and applying such tests as may be possible on the ground or in his office and advising as to the nature of any mineral and as to the best available methods of analysis, sampling, assay, and test:
- (c.) By forwarding samples to the Minister of Mines for further examination and tests whenever in his opinion such course is necessary or expedient:
- (d.) By reporting to the Minister of Mines the location and approximate cost of such roads, trails, and bridges as in his opinion are reasonably necessary in order to render possible the development of any mineral resources; and
- (e.) Generally, by giving such advice, information, and directions as may be of assistance to miners and prospectors within his district.

PART III.—PROTECTION OF WAGE-EARNERS.

1. Every person giving or making a working bond or a lease, with or without any option for sale, of any mining property shall insert therein a provision that during the currency of the bond or lease all free miners and wage-earners employed on or about the mining property shall be paid their wages semi-monthly, and shall demand and receive a letter, to be procured by the holder of the bond or lease from a Gold Commissioner or Government Agent or Mining Recorder, stating that security for such wages has been given pursuant to this section, otherwise the person giving or making the bond or lease shall be under personal liability to pay all such wages.

2. Every person taking a right or option to work or purchase any mining property shall furnish to the nearest Gold Commissioner, or Government Agent, or Mining Recorder adequate security from time to time for the payment semi-monthly of the wages of all free miners and wage-earners employed on or about the mining property, on the terms that every such security shall be forthwith realized and payment of wages made upon any default; and every Gold Commissioner, Government Agent, and Mining Recorder shall have full power and authority to realize upon the security lodged with him so as to make payment of any wages in default, and shall make payment thereof up to the amount realized.

PART IV.—PROTECTION OF INVESTORS.

Each Resident Engineer shall, upon receiving notice of any advertised or solicited sale of shares in any company or in any claim or mine or mineral property whatsoever, upon statements or terms not in accordance with actual facts and conditions, notify the Minister of Mines, who, upon investigation, may, if found necessary, give such notice, either personal or public, as may be necessary to prevent any injury to investors; and every notice given under this section by the Minister of Mines shall be absolutely privileged.

Iron and Steel Bounties Act, 1929.

The Lieutenant-Governor in Council may enter into an agreement with any person whereby the Crown will pay to that person, out of the Consolidated Revenue Fund, bounties on pig-iron and steel shapes when manufactured within the Province, as follows:—

- (a.) In respect of pig-iron manufactured from ore, on the proportion produced from ore mined in the Province, a bounty not to exceed three dollars per ton of two thousand pounds:
- (b.) In respect of pig-iron manufactured from ore, on the proportion produced from ore mined outside the Province, a bounty not to exceed one dollar and fifty cents per ton of two thousand pounds:
- (c.) In respect of steel shapes of commercial utility manufactured in the Province, a bounty not to exceed one dollar per ton of two thousand pounds.

Bounty, as on pig-iron under this Act, may be paid upon the molten iron from ore which in the electric furnace, Bessemer or other furnace, enters into the manufacture of steel by the process employed in such furnace; the weight of such iron to be ascertained from the weight of the steel so manufactured.

Bounty on steel shapes under this Act shall be paid only upon such steel shapes as are manufactured in a rolling-mill having a rated productive capacity per annum of at least twenty thousand tons of two thousand pounds per ton.

Phosphate-mining Act, 1925.

This Act takes the mineral tricalcium phosphate out of the "Mineral Act" for the purpose of administration. This is done to make possible the staking of phosphate claims one mile square in area.

Any person desirous of securing a licence to prospect for phosphate is required to stake the land he may wish to acquire and work; and after such staking shall post in the office of the Gold Commissioner for the mining division in which the land is situated a notice of his intention to apply for a licence. Then the applicant is required to make application in writing to such Gold Commissioner for a prospecting licence over the land for any term not exceeding one year. The Gold Commissioner shall forward this application to the Hon. the Minister of Mines, who may grant to the applicant a prospecting licence. Application shall be accompanied by a licence fee of \$100. The land to be acquired shall be of a rectangular shape and shall not exceed 640 acres for each licence, measuring 80 chains by 80 chains, and boundary-lines shall be run true north and south and true east and west. A renewal of the licence may be obtained for a second period of one year upon payment of further licence fee of \$100, and furnishing proof that he has explored for phosphate and has expended not less than \$50 in such exploration-work. An extension of the term for a third period of one year may be granted upon like conditions and terms. Provision is made for the payment of \$150 in cash in lieu of exploration-work. The cost of the survey of the land, not being less than \$150, can be counted as exploration-work. If during any one year work is done to a greater extent than the required \$50—but not less—same may be applied as work for any subsequent year that the licence remains in force.

The Lieutenant-Governor in Council may grant a lease of the land covered by a prospecting licence to any licensee who during the existence of his licence, or within thirty days following the expiry of same, gives satisfactory evidence that he has discovered phosphate on such lands. He shall at the same time pay a sum sufficient to cover the first annual rental and also shall have expended not less than \$50 per licence in exploration-work during the term of the last renewal licence or tender in lieu thereof the sum of \$50 per licence. Such lease shall be granted

for a term of five years, renewable for three years, and for a further three years after the expiry of the first renewal. A lease shall not be issued until the land has been surveyed by an authorized land surveyor. An annual rental rate of 15 cents per acre shall be payable under said lease.

The lease provides for the expenditure of not less than \$100 per annum in the development of a mine, or the payment of \$100 in lieu of such development-work. Excess work done in any one year may be applied as work to subsequent years. Provision is also made for the purchase of phosphate-mining rights.

Metalliferous Mines Regulation Act.

At the 1935 session of the Provincial Legislature "An Act to amend and consolidate the Enactments regulating the Working of Metalliferous Mines, Quarries, and Metallurgical Works" was passed. This Act is known as the "Metalliferous Mines Regulation Act," and, in its general tone, its clear purpose is to maintain the highest standard in respect of safety and of healthy conditions, both on the surface and underground in mining operations. The idea is to not only assure, as far as practicable, the protection of workmen against injury, but to establish those conditions best calculated to safeguard the health of the men employed. The Act also provides for the drafting of regulations, if such are found necessary, for the protection of men who are working under conditions which may lead to pulmonary disability.

This Act may be divided into six parts, as follows:—

- (1.) Administration:
- (2.) Duties of owners, managers, and others:
- (3.) Special Rules for protection of miners:
- (4.) General Rules, having reference to: (a) Employees; (b) Ventilation; (c) Explosives and blasting; (d) Fire-protection; (e) Connection between mines; (f) Mine signals; (g) Aid to injured; (h) Prevention of dust; (i) Handling of water; (j) Sanitation; (k) Protection of working-places, shafts, winzes, raises, etc.; (l) Ladder-ways; (m) Shaft equipment and operation; (n) Testing of brakes; (o) Haulage; (p) Protection from machinery; (q) Electrical installations:
- (5.) General Rules for quarries:
- (6.) Supplemental.

SUMMARY OF ACTS SPECIALLY RELATING TO MINING.

(The complete Acts may be obtained from the King's Printer, Victoria, B.C.)

Mining Licences under the Coal and Petroleum Act.

Any person desiring to prospect for coal, petroleum, or natural gas upon any unsurveyed unreserved lands in which these resources are held by the Crown may acquire a licence to do so over a rectangular block of land not exceeding 640 acres, of which the boundaries shall run due north and south and east and west, and no side shall exceed 80 chains (1 mile) in length. Before entering into possession of the said lands he shall place at the corner of such block a legal stake, or initial post, and shall inscribe thereon his name and the angle represented by such post, thus: "A. B.'s N.E. corner," or as the case may be, and shall post in a conspicuous place upon the said land, and also in the Government office of the land recording district, notice of his intention to apply, as well as publishing the same in the B.C. Gazette and local newspaper once each week for four consecutive weeks. If the area applied for is surveyed no staking is required, but the same procedure with regard to advertising notice of intention to apply is necessary.

The application for said licence shall be in writing, in duplicate, and shall contain the best written description possible, with a diagram of the land sought to be acquired, and shall be accompanied with a fee of \$100. The application shall be made to the Commissioner of Lands for the district, and by him forwarded to the Minister of Lands, who will grant such licence—provided no reasons arise to the contrary—for a period not to exceed one year, and at the expiration of the first year an extension of such licence may be granted for a second or third year at a fee of \$100.

Where coal is discovered during the existence of licence or within eighteen months after expiration, the land held under licence, having been surveyed and licence conditions fulfilled, may be leased for five years at rental of 15 cents an acre, subject to renewals for four successive periods of three years each, renewal fee being \$100 for each lease, in addition to annual rental.

Lessees, on showing continuous work has been done and reasonable expenditure made for development, may, after carrying out the provisions of the lease, purchase at \$20 per acre where surface is available, or \$15 per acre for under-surface rights where surface is not available. Lands under the sea may be purchased at \$15 per acre. Provided also that, in addition to the rental or purchase price, there shall be paid to the Government as a royalty 2½ cents a barrel (35 imperial gallons) of crude petroleum raised or gotten from such land. (See chapter 162, R.S.B.C. 1924.)

Taxation Act.

A preliminary note is essential to the understanding of this Act. As the law has stood, a Crown-granted mineral claim on which taxes were in arrears for a number of years was offered for sale by the Government at a *tax* sale, with arrears of taxes plus interest and charges and Crown-grant fees as an upset price. If no sale was made the property remained in the hands of the Assessor until desired by some one, when it could only be purchased by tender. It was not open to location under the "Mineral Act" and a prospector had no protection, and to relieve the situation an amending Act was passed.

Under the amended Act such reverted Crown-granted mineral claim may be obtained by any person under a lease for one year upon payment of \$25, and a renewal of such lease may be granted upon payment of further \$25 for a further period of one year, but no longer. During the period of such lease the lessee has the right to enter, prospect, and mine on such mineral claim, save for coal, petroleum, and natural gas, and during such time the lessee has the option to purchase such Crown-granted mineral claim upon payment of all taxes, costs, and interest which remained due and unpaid on such claim on the date of its forfeiture to the Crown, together with an amount equal to all taxes and interest which, except for its forfeiture to the Crown, would have been payable in respect thereof from the date of the lease to the date of application for a Crown grant. If, however, the lessee establishes to the satisfaction of the Gold Commissioner that he has expended upon the claim in mining-development work a sum of not less than \$200 a year during the continuance of the lease, then the payment of the sum in respect of taxes and penalties from the date of the lease to the date of application for a Crown

grant shall not be required. Provision also is made for the grouping of adjoining claims, not exceeding eight in number, and the performing on one of such claims mining-development work for all of the claims.

A person may obtain a lease, or interest in a lease, of eight such claims in the same mining division.

Such leases are not transferable and are subject to the rights any person may already hold to any portion of the surface of such Crown-granted mineral claim.

Taxation of Mines.

Crown-granted mineral claims are subject to a tax of 25 cents per acre. The tax becomes due on April 1st in each year, and if unpaid on the following June 30th is deemed to be delinquent.

All mines are subject to a tax upon income, subject to the exemptions and allowances given in the "Income Tax Act"; provided, in the case of those mines paying an output tax, that an income tax is only collected if such tax prove greater than the output tax, and the output tax is then regarded as part payment of the income tax.

In addition to the ordinary working expenses, mines are allowed to deduct from their income a charge for:—

- (1.) Development—being such proportion of this capital expenditure as is ascertained to be chargeable to the year's operation:
- (2.) Depreciation of buildings and plant:
- (3.) Depletion—being such proportion of the capital cost of the mine as, being a wasting asset, is ascertained to be chargeable to the year's operation.

The above-mentioned charges are allowable at the discretion of the Minister of Finance, subject, however, to an appeal to the Lieutenant-Governor in Council.

The rate of income tax varies from 1 per cent. up to a maximum of 10 per cent. on incomes of \$19,000 and over.

All mines, other than coal, are subject to a tax (payable quarterly) of 2 per cent. on gross value of ore, less cost of transportation from mine to reduction-works and the cost of treating same at reduction-works or on the mining premises.

Any such mine, not realizing on ore shipments a market value of \$5,000 in any one year, is entitled to a refund of the output tax paid.

Coal is subject to a tax of 10 cents per ton of 2,240 lb., except coal shipped to coke-ovens within the Province. Tax payable monthly.

Coke is subject to a tax of 10 cents per ton of 2,240 lb., except in respect of coke produced from coal upon which this tax has already been paid. Tax payable monthly.

Coal land from which coal is being mined (Class A) is taxed at 1 per cent. upon the assessed value, in addition to any other tax.

Unworked coal land, known as "Coal Land, Class B," is subject to a tax of 2 per cent. upon the assessed value.

For further particulars *see* the "Taxation Act," also the "Public Schools Act," which are obtainable from the King's Printer, Victoria, B.C.

ASSAY OFFICE.

BY

D. E. WHITTAKER.

During the year 1934 there were made by the staff in the Government Assay Office 6,989 assays or quantitative determinations and 251 analyses; of these the majority were for the Department of Mines or for the other departments, for which no fees were received.

The fees collected by the office were as follows:—

Fees for analyses	\$98.00
Fees for assaying	65.50
Fees for assayers' examinations	495.00
Total cash receipts	\$658.50

Determinations and examinations made for other Government departments, for which no fees were collected:—

Attorney-General's Department	\$1,002.00
Agricultural Department	1,985.00
Board of Health	750.00
Forest Branch	95.00
Other departments	190.00
	\$4,022.00

Value of work done outside of Mines Department work..... \$4,680.50

FREE DETERMINATIONS.

In addition to the above quantitative work, about 2,650 qualitative determinations, or tests, were made in connection with the identification and classification of rocks or minerals sent to the Assay Office for a report; for these no fees were charged, as it is the established custom of the Department to examine and test qualitatively, without charge, samples of minerals sent in from any part of the Province, and to give a report on the same. This has been done for the purpose of encouraging the search for new or rare minerals and ores, and to assist prospectors and others in the discovery of new mining districts, by enabling them to have determined, free of cost, the nature and probable value of any rock they may find. In making these free determinations, the Department asks that the locality from which the sample was obtained be given by the sender.

EXAMINATION FOR ASSAYERS.

The writer has the honour, as Secretary, to submit the Annual Report for the year 1934 of the Board of Examiners for Certificates of Competency and Licence to Practise Assaying in British Columbia, as established under the "Department of Mines Act, 1934."

A meeting of the Board of Examiners was held on May 19th and December 3rd, 1934. Two candidates applied for examination on May 19th and both passed the examination. Fourteen candidates applied for examination on December 3rd and all passed the examination. One candidate applied for exemption under section 10, subsection (2), of the Act, on May 19th. During the year several special meetings of the Board of Examiners were held, and eight candidates applied for exemption under section 10, subsection (2), of the Act. The Board recommended that certificates be issued to the above-mentioned twenty-five candidates.

In accordance with the recommendations of the Board, certificates have been duly issued by the Honourable the Minister of Mines to the twenty-five successful candidates.

The following list of assayers holding Provincial certificates of efficiency include all those known or presumed to be alive. In future, the published list will include only those known to be actively engaged in the practice of assaying in the Province.

LIST OF ASSAYERS HOLDING PROVINCIAL CERTIFICATES OF EFFICIENCY UNDER THE
"DEPARTMENT OF MINES ACT, 1934."

(Only the holders of such certificates may practise assaying in British Columbia.)

Under section 10, subsection (1).

Adams, J. B.	Ellison, R.	Meale, Eric A.	Shore, J. T.
Archer, E. G.	Elmes, Harold.	Merrifield, T. T.	Sim, Chas. John.
Armstrong, N.	Farquhar, J. B.	Miles, Arthur D.	Sloan, Wm.
Ayres, D. A.	Fingland, John J.	Milne, A. S.	Snyder, Blanchard M.
Austin, John W.	Gardner, C. S.	Mitchell, Charles T.	Stephen, Wm. Gordon.
Backus, Geo. S.	Goodblood, L. A.	Mitchell, E. A.	Stimmel, E. A.
Bainbridge, R.	Grimwood, G. H.	Mitchell, R. F.	Stockly, Galt.
Bajus, N. J.	Grosvenor, F. E.	McCormick, Alan F.	Sundberg, Gustave.
Baker, C. S. H.	Hamilton, Wm. J.	MacDonald, Aicc C.	Tally, Robert E.
Barke, A. C.	Hannay, W. H.	MacDonald, J. S.	Taylor, E. S.
Beilby, E. B.	Harsant, R. C. C.	McIntosh, J. H.	Taylor, H. L.
Bernard, Pierre.	Hart, P. E.	McLellan, R. D.	Teed, A. J.
Bishop, Walter.	Hawes, F. B.	Morgan, Richard.	Thirkell, V. R.
Boulding, J. D.	Hawkins, Francis.	Morris, J.	Thomas, Percival W.
Brachat, Victor A.	Hendricks, R.	Nicholls, Frank.	Thomson, W. G.
Brake, D. S.	Hodgson, A. R.	Nicholson, L. T.	Trehwella, M.
Broughton, F. W.	Hunt, Basil.	Okell, S. E.	Turner, H. A.
Buchanan, James.	Hurfer, C. S.	Ortner, G. S.	Vance, John F. C. B.
Buehman, A. S.	Irwin, George E.	Parker, Robt. H.	Van Agnew, Frank.
Campbell, Colin.	John, D.	Parsenow, W. L.	Vaughan-Williams, V. L.
Carmichael, Norman.	Kiddie, Geo. R.	Perkins, Walter G.	Wales, Roland T.
Church, George B.	King, R.	Pirrie, Noble W.	Watson, Wm. J.
Clarke, E. R.	Kitto, Geoffrey B.	Pool, H. W.	Watson, Thomas.
Cobeldick, W. M.	Lang, T. F.	Prior, C. E.	Welsb, J. Cathbert.
Collison, H.	Langley, A. G.	Puder, H. F. H.	Wells, Ben T.
Comrie, George H.	Laucks, I. F.	Raht, K.	Wenerstrom, L. H.
Cornwall, G. L.	Lee, Geo. M.	Richmond, Leigh.	West, Geo. G.
Cotton, G. W.	Ley, Richard H.	Ringwood, J. G. T.	West, K. C.
Craufurd, A. J. F.	Levy, Frank.	Robertson, T. R.	Wetherup, I.
Crear, George.	Lindsay, W. W.	Rodgers, Ch. B.	White, E. King.
Crompton, S. V.	Locke, V. F.	Rogers, G. J.	Whittaker, Delbert E.
Crossley, C. E.	Longworth, F. J.	Rombauer, A. B.	Widdowson, E. Walter.
Cruickshank, G.	Mailleue, G.	Ross, R. H. LeB.	Willemar, Douglas R.
Davidson, J. R.	Manning, S. M.	Schoefeld, J. L.	Williams, W. A.
Day, Athelstan.	Marston, R. W.	Schroeder, Curt A.	Williams, Eliot H.
Dedolph, Ed.	Martin, C. J.	Segsworth, Walter.	Williams, J. R.
DeLespee, H.	Martin, S. J.	Selby, C. C.	Williams, R. N.
Dockrill, Walter R.	Marsh, Richard.	Shepherd, G. H.	Wilson, Thomas S.
Dolphin, John.	Marshall, H. Jukes.	Sharp, Bert N.	Wimberley, S. H.
Dunn, G. W.	Marshall, William S.	Sharples, H.	Youngs, T. N.
Edwards, A. H.			

Under section 10, subsection (2).

Archer, Allan.	Dawson, V. E.	Hurley, T. Mason.	McLellan, John.
Blylock, Selwyn G.	Dempster, R. C.	Johnston, William Steele.	McMurtry, Gordon O.
Bisset, D. G.	Dempster, A. S.	Kaye, Alexander.	McNab, J. A.
Bolton, George E.	Dick, John P.	Kendall, George.	McPhee, W. B.
Brennan, Charles Victor.	Dixon, Howard A.	Kidd, G. L.	McVicar, John.
Browne, R. J.	Eardley-Wilmot, V. L.	Kilburn, Geo. H.	MacLennan, F. W.
Browne, P. J.	Edwards, H. C.	Lathe, Frank E.	Moran, P. J.
Bryant, Cecil M.	Ethredge, F. M.	Lay, Douglas.	Newton, W. E.
Bryden, James.	Farrar, Ben. K.	Manson, Robert.	Nicolle, C. C.
Bullen, R. L.	Fortheringham, D. F.	Mathews, L. G.	Norrie, James P.
Burwash, N. A.	Galbraith, M. T.	Mellish, Albert Henry.	Oliver, Charles E.
Cavers, Thomas W.	Gibson, Swanson.	Merrit, Charles P.	Oughtred, S. W.
Clothier, George A.	Gilman, Ellis P.	Millen, J.	Oughtett, Christopher.
Cole, Arthur A.	Gray, Stanley.	Munro, Neil.	Owen, Francis J.
Cole, G. E.	Green, J. T. Raoul.	Murphy, C. J.	Pellew-Harvey, Wm.
Cole, L. Heber.	Guess, George A.	Musgrave, W. N.	Pemberton, W. P. D.
Collins, H. E.	Hallam, F. Lloyd.	McArthur, Reginald E.	Reid, J. A.
Conway, E. J.	Harding, Wilson M.	McBean, K. D.	Ritchie, A. B.
Coo, Cecil William.	Heal, John H.	McLeod, Norman A.	Roaf, J. R.
Couthard, R. W.	Hearn, Roy D.	McDiarmid, S. S.	Roscoe, Harold M.
Cowans, Frederick.	Hilliary, G. M.	McGinnis, Wm. C.	Rose, J. H.
Cuttress, G. S. C.	Howells, J. O.	McKay, Robt. R.	Rutherford, R. C.

Under section 10, subsection (2)—Continued.

Sampson, E. H. S.	Stevens, F. G.	Thompson, W. K.	Wilson, Ridgeway R.
Scott, John Mitchell.	Stewart, A. G.	Watson, A. A.	Workman, Ch. W.
Scott, Oswald Norman.	Stroud, J. E. C.	Watson, Henry.	Wright, Richard.
Shannon, S.	Sullivan, Michael H.	Weir, William.	Wynne, Llewellyn C.
Sharpe, G. P.	Sutherland, T. Fraser.	White, E. Grove.	Yuill, H. H.
Shorey, P. M.	Sutherland, Wm.	Willis, F. S.	
Sloan, David.	Swinney, Leslie A. E.	Winslow, R. H.	

Under section 10, subsection (3).

Carmichael, Herbert.	Harris, Henry.	Kiddie, Thos.	McKillop, Alexander.
Galloway, J. D.	Hedley, Robt. R.	Marshal, Dr. T. R.	

PREVIOUSLY ISSUED UNDER THE "BUREAU OF MINES ACT, 1897," SECTION 12.

Thompson, James B.

GOLD COMMISSIONERS AND MINING RECORDERS.

The following list shows the Gold Commissioners and Mining Recorders of the Province:—

Mining Division.	Location of Office.	Gold Commissioner.	Mining Recorder.	Deputy Recorder.
Atlin.....	Atlin.....	H. F. Glassey.....	H. F. Glassey.....	
Sub-office.....	Telegraph Creek.....			J. V. Boys.
Sub-office.....	Haines (U.S.).....		(Com. for taking Affidavits)	B. A. Barnett.
Sub-office.....	Squaw Cr. via Atlin.....			Mrs. F. Muncaster.
Sub-office.....	Tulsequah.....			H. L. Fraser.
Sub-office.....	Juneau (U.S.).....		(Com. for taking Affidavits)	Harold E. Brown.
Stikine.....	Telegraph Creek.....	J. V. Boys.....	J. V. Boys.....	
Sub-office.....	Boundary via Telegraph Creek			Duncan Miller.
Sub-office.....	Burns Lake.....			T. E. Taylor.
Liard.....	Telegraph Creek.....	J. V. Boys.....	J. V. Boys.....	
Sub-office.....	McDane Creek.....			Thos. A. Perry.
Sub-office.....	Fort St. John.....			F. W. Beaton.
Sub-office.....	Fort Nelson.....			J. S. Clark.
Sub-office.....	Deuse Lake Townsite.....			John Fleming.
Skeena.....	Prince Rupert.....	N. A. Watt.....	N. A. Watt.....	
Sub-office.....	Kitimat.....			Chas. E. Moore.
Sub-office.....	Copper River.....			L. G. Skinner.
Sub-office.....	Terrace.....			O. T. Sundal.
Sub-office.....	Stewart (Portland Canal)			H. W. Dodd.
Sub-office.....	Rosswood.....			Mrs. Alberta Smith.
Sub-office.....	Kimsquit.....			Percy Gadsden.
Nass River.....	Anyox.....	N. A. Watt.....	E. Ross Oatman.....	
Sub-office.....	Alice Arm.....			Mrs. L. Cummings.
Sub-office.....	Stewart.....			H. W. Dodd.
Portland Canal.....	Stewart.....	N. A. Watt (at Prince Rupert)	H. W. Dodd.....	
Bella Coola.....	Prince Rupert.....	N. A. Watt.....	N. A. Watt.....	
Sub-office.....	Bella Coola.....			C. A. Brynildsen.
Sub-office.....	Bella Bella.....			
Sub-office.....	Ocean Falls.....			Geo. H. Hill.
Sub-office.....	Kimsquit.....			Percy Gadsden.

GOLD COMMISSIONERS AND MINING RECORDERS—Continued.

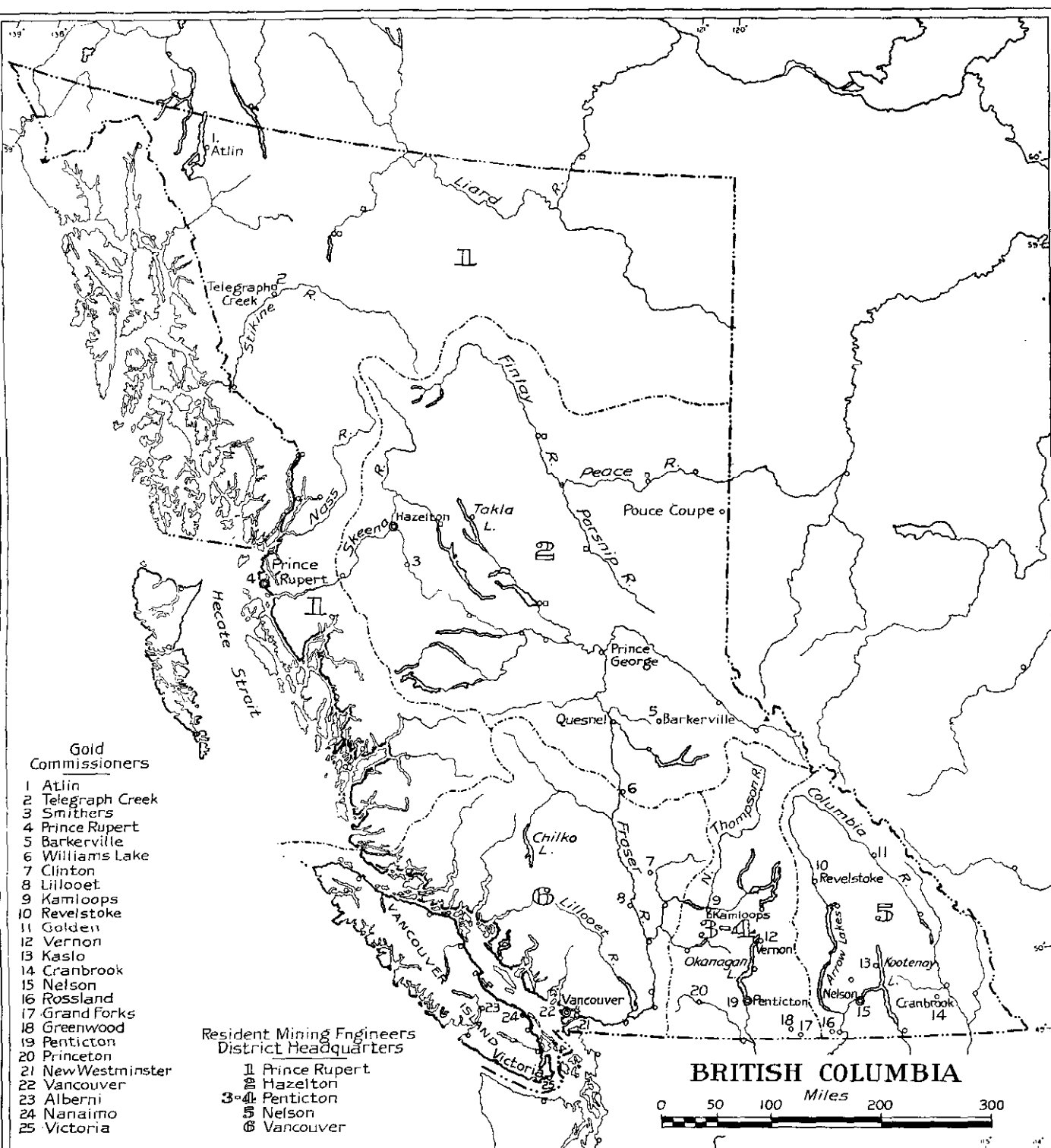
Mining Division.	Location of Office.	Gold Commissioner.	Mining Recorder.	Deputy Recorder.
Queen Charlotte.....	Queen Charlotte.....	N. A. Watt.....	G. A. Charter, M.D.....	
Sub-office.....	Jedway.....			W. T. Reavley.
Sub-office.....	Masset.....			T. D. Brunton.
Sub-office.....	Lockeport.....			
Omineca.....	Smithers.....	H. B. Campbell.....	H. B. Campbell.....	
Sub-office.....	Fort Graham.....			L. T. Kempfle.
Sub-office.....	Bella Coola.....			C. A. Brynildsen.
Sub-office.....	Finlay Forks.....			A. MacKinnon.
Sub-office.....	Fort St. James.....			Alec Kynoch.
Sub-office.....	Manson Creek.....			W. B. Steele.
Sub-office.....	Telkwa.....			T. J. Thorp.
Sub-office.....	Prince George.....			Geo. Milburn.
Sub-office.....	Hudson Hope.....			F. F. Monteith.
Sub-office.....	Kimsquit.....			Percy Gadsden.
Sub-office.....	Fort St. John.....			F. W. Beaton.
Sub-office.....	Whitewater (Finlay River) via Fort Graham.....			James Ware.
Sub-office.....	Fort McLeod.....			J. E. McIntyre.
Sub-office.....	Cedarvale.....			John Thompson.
Sub-office.....	Terrace.....			O. T. Sundal.
Sub-office.....	Fort Fraser.....			J. D. Moore.
Sub-office.....	Vanderhoof.....			Geo. Ogsdon.
Sub-office.....	Pacific.....			T. H. McCubbin.
Sub-office.....	Hazelton.....			Wm. Grant.
Sub-office.....	Burns Lake.....			T. E. Taylor.
Sub-office.....	Usk.....			Jas. L. Bethurem.
Sub-office.....	Takla Landing.....			Mrs. Wilhemina Aiken.
Sub-office.....	McConnell Creek.....			H. K. Henry.
Sub-office.....	Copper River.....			L. G. Skinner.
Peace River.....	Fort St. John.....	H. B. Campbell (at Smithers)	F. W. Beaton.....	
Sub-office.....	Prince George.....			G. Milburn.
Sub-office.....	Finlay Forks.....			A. MacKinnon.
Sub-office.....	Hudson Hope.....			F. F. Monteith.
Sub-office.....	Pouce Coupe.....			M. S. Morrell.
Cariboo.....	Barkerville.....	J. P. Scarlett.....	J. P. Scarlett.....	Miss L. D. Boyd.
Sub-office.....	Quesnel.....			E. C. Lunn.
Sub-office.....	Prince George.....			Geo. Milburn.
Sub-office.....	McBride.....			R. McKinlay.
Quesnel.....	Williams Lake.....	L. C. Maclure.....	L. C. Maclure.....	
Sub-office.....	Quesnel.....			E. C. Lunn.
Sub-office.....	Likely.....			A. Morrison.
Sub-office.....	Barkerville.....			J. P. Scarlett.
Sub-office.....	Horsefly.....			A. B. Campbell.
Clinton.....	Clinton.....	R. J. A. Dorrell.....	R. J. A. Dorrell.....	
Sub-office.....	Williams Lake.....			L. C. Maclure.
Sub-office.....	Haymore, Bridge River P.O.....			W. Haymore.
Sub-office.....	Hanceville.....			Edwin Hance.
Kamloops.....	Kamloops.....	E. Fisher.....	E. Fisher.....	
Sub-office.....	Chu Chua.....			George M. Fennell.
Sub-office.....	Vavenby.....			H. Finley.
Sub-office.....	Salmon Arm.....			A. P. Suckling.
Ashcroft.....	Ashcroft.....	E. Fisher (at Kam.)	W. C. Adam.....	Geo. D. Mead.
Sub-office.....	Lytton.....			J. A. Carmichael.
Nicola.....	Merritt.....	E. Fisher (at Kam.)	A. G. Freeze.....	
Yale.....	Hope.....	E. Fisher (at Kam.)	H. Beech.....	J. W. Chadwick.
Sub-office.....	Lytton.....			J. A. Carmichael.
Similkameen.....	Princeton.....	Chas. Nichols.....	Chas. Nichols.....	
Sub-office.....	Hedley.....			R. E. Baxter.
Vernon.....	Vernon.....	R. M. McGusty.....	R. M. McGusty.....	F. H. C. Wilson.
Sub-office.....	Kelowna.....			C. W. Dickson.

GOLD COMMISSIONERS AND MINING RECORDERS—Continued.

Mining Division.	Location of Office.	Gold Commissioner.	Mining Recorder.	Deputy Recorder.
Greenwood.....	Greenwood.....	L. A. Dodd.....	L. A. Dodd.....	
Sub-office.....	Kettle Valley.....			G. B. Gane.
Sub-office.....	Beaverdell.....			T. W. Clarke.
Sub-office.....	Oliver.....			E. B. Rossiter.
Grand Forks.....	Grand Forks.....	E. Harrison.....	E. Harrison.....	
Osoyoos.....	Penticton.....	W. R. Dewdney.....	W. R. Dewdney.....	
Sub-office.....	Keremeos.....			L. S. Coleman.
Sub-office.....	Hedley.....			R. E. Baxter.
Sub-office.....	Oliver.....			Edward B. Rossiter.
Golden.....	Golden.....	A. W. Anderson.....	A. W. Anderson.....	H. C. Moore.
Windermere.....	Windermere.....	A. W. Anderson (at Golden)	A. M. Chisholm.....	
Fort Steele.....	Cranbrook.....	J. E. Kennedy.....	J. E. Kennedy.....	
Sub-office.....	Fernie.....			J. R. Nolan.
Ainsworth.....	Kaslo.....	Ronald Hewat.....	W. M. H. Dunn.....	
Sub-office.....	Trout Lake.....			H. Macpherson.
Sub-office.....	Poplar Creek.....			Arthur G. Johnston.
Slocan.....	New Denver.....	Ronald Hewat (at Kaslo)	Frank Broughton.....	
Sub-office.....	Sandon.....			W. J. Parham.
Slocan City.....	Slocan.....	Ronald Hewat.....	T. McNeish.....	
Nelson.....	Nelson.....	J. Cartmel.....	J. Cartmel.....	
Sub-office.....	Creston.....			R. H. Hassard.
Sub-office.....	Ymir.....			Wm. Clark.
Sub-office.....	Salmo.....			M. C. Donaldson.
Arrow Lake.....	Nakusp.....	J. Cartmel (at Nelson)	N. A. Herridge.....	
Revelstoke.....	Revelstoke.....	Wynfield Maxwell.....	W. Maxwell.....	
Lardeau.....	Beaton.....	Wynfield Maxwell (at Revelstoke)	Stephen Rowe.....	
Sub-office.....	Trout Lake.....			H. Macpherson.
Trail Creek.....	Rossland.....	W. H. Reid.....	W. H. Reid.....	
Nanaimo.....	Nanaimo.....	C. L. Monroe.....	C. L. Monroe.....	
Sub-office.....	Ladysmith.....			J. A. Knight.
Sub-office.....	Alert Bay.....			A. M. Holman.
Sub-office.....	Vananda.....			Wm. Stromberg.
Sub-office.....	Shoal Bay, Thurlow P.O.			C. C. Thompson.
Sub-office.....	Granite Bay.....			Henry Twidle.
Sub-office.....	Powell River.....			A. C. Sutton.
Sub-office.....	Cumberland.....			S. B. Hamilton.
Alberni.....	Alberni.....	W. H. Boothroyd.....	W. H. Boothroyd.....	
Clayoquot.....	Clayoquot.....	W. H. Boothroyd (at Alberni)	W. T. Dawley.....	
Sub-office.....	Ceepeecee.....			P. McGregor.
Quatsino.....	Quatsino.....	Ditto.....	Ed. Evenson.....	
Victoria.....	Victoria.....	R. J. Steenson.....	R. J. Steenson.....	
New Westminster.....	New Westminster.....	A. P. Grant.....	A. B. Gray.....	
Sub-office.....	Chilliwack.....			Chas. J. Whittaker.
Vancouver.....	Vancouver.....	A. S. Tyrer.....	R. A. Burgoyne.....	
Lillooet.....	Lillooet.....	L. J. Price.....	L. J. Price.....	T. B. Williams.
Sub-office.....	Haymore, Bridge River P.O.			W. Haymore.

GOLD COMMISSIONERS' AND MINING RECORDERS' OFFICE STATISTICS, 1934.

District and Division.	FREE MINERS' CERTIFICATES.			LODE-MINING.					PLACER-MINING.				REVENUE.		TOTAL.		
	Individual.	Company.	Special.	Mineral Claims recorded.	Certificates of Work.	Bills of Sale, etc.	Certificates of Improvements.	Leases of Re-verted Crown-granted Mineral Claims.	Placer Claims recorded.	Placer Leases recorded (Bench, Creek, and Dredging).	Certificates of Work, Placer Leases.	Bills of Sale, etc.	Free Miners' Certificates.	General.	Mining Divisions.	Districts.	
North-western District (No. 1)																	\$28,618.65
Atlin.....	438	6	3	119	142	39	5	1	94	45	62	138	2,833.00	9,409.00	12,242.00		
Stikine.....	101	1		13	15	7				12	3	8	471.00	520.25	991.25		
Jiard.....	57			143	5	13				17	43	18	244.00	4,323.50	4,567.50		
Nass River.....	82	12		110	136	24							499.00	697.40	1,196.40		
Portland Canal.....	205	5	1	542	541	47	15						1,480.25	4,193.95	5,674.20		
Skeena.....	229	3		92	65	29		47	5	10		3	1,207.75	1,945.25	3,153.00		
Queen Charlotte.....	84			29	37	26			7	1	1	5	169.20	353.25	522.45		
Bella Coola.....	19			64	16	2			1				66.50	205.25	271.75		
North-eastern District (No. 2)																	71,083.90
Cariboo.....	474	4	2	1,935	1,650	418	20		95	222	285	90	3,018.00	32,531.95	35,549.95		
Quesnel.....	941	3	4	802	647	119			90	171	173	132	2,648.00	16,693.65	19,341.65		
Omineca.....	709	3	1	708	927	160	19	3	47	87	94	32	3,259.00	12,238.30	15,497.30		
Peace River.....										18	6			695.00	695.00		
Central District (No. 3)																	14,611.60
Nicola.....	67	1		238	87	31	1		1				376.00	950.00	1,326.00		
Vernon.....	379	3	2	461	121	77		8	37	18	15	7	1,750.25	3,279.05	5,029.30		
Kamloops.....	773		3	699	307	114		8	80	32	23	18	3,047.75	5,208.55	8,256.30		
Southern District (No. 4)																	31,261.05
Grand Forks.....	283			243	65	14		72	3	4		15	927.50	2,947.70	3,875.20		
Greenwood.....	304	10	4	708	387	151	2	142	5	12	35	23	1,819.25	8,435.65	10,254.90		
Osoyoos.....	712	9	5	1,083	347	145		62	2				3,115.50	5,748.75	8,864.45		
Similkameen.....	361	1		407	268	76		9	3	45	63	50	1,581.75	6,684.75	8,266.50		
Eastern District (No. 5)																	40,003.04
Fort Steele.....	575	2	2	397	222	100	5	14	44	37	90	84	2,528.25	8,033.05	10,561.30		
Windermere.....	44	2		82	61	21			16	1		8	306.50	619.05	925.55		
Golden.....	115	3		73	56	14			9	10	3	6	656.50	2,483.14	3,139.64		
Ainsworth.....	106	3	1	79	244	17	11	55	28	3	9	12	859.50	2,747.60	3,607.10		
Slocan.....	42	1		43	186								304.50	313.25	617.75		
Slocan City.....	62			61	72	11			5				186.50	694.00	880.50		
Nelson.....	535	12	1	713	725	185	23	187	68	5	3	15	2,077.25	9,959.65	12,936.90		
Arrow Lake.....	55			109	12	30			6			2	207.50	457.75	665.25		
Trail Creek.....	165	3		22	15	4	8	39					969.25	1,111.35	2,080.60		
Revelstoke.....	186	2	3	87	138	49	6	17	15	18	9	21	902.25	2,544.00	3,446.25		
Jardean.....	65	1		97	191	15			4				372.00	770.20	1,142.20		
Western District (No. 6)																	113,656.80
Nanaimo.....	136		3	444	281	143	10	20	3				469.75	3,320.80	3,790.55		
Alberni.....	167			203	82	47		10	4	9	2		626.25	1,753.45	2,379.70		
Clayoquot.....	62			128	147	42				7	1		258.50	1,766.30	2,024.80		
Quatsino.....	33			22	14								153.75	90.00	243.75		
Victoria.....	438	22	1	63	23	12		14	15	7	21	8	3,357.50	2,057.70	5,415.20		
Lillooet.....	1,127	26	6	3,796	3,364	1,178	97		8	36	102	26	9,390.60	27,601.45	36,992.05		
Clinton.....	248	1		773	299	34	39		44	9	16	42	1,046.00	4,854.20	5,900.20		
Ashcroft.....	183	1	1	803	342	145	12		21	22	14	13	963.50	6,727.45	7,690.95		
Yale.....	350	6	4	908	752	240			95	11	16	5	1,868.75	8,619.30	10,488.05		
New Westminster.....	362	8	2	679	107	85	6		6	49			1,931.50	4,129.65	6,061.15		
Vancouver.....	3,280	228	35	134	105	13		6	6				31,858.25	812.15	32,670.40		
Totals.....	14,554	371	85	18,112	13,201	3,877	279	720	904	892	1,039	781	\$90,708.05	\$208,526.99	\$299,235.04		\$299,235.04

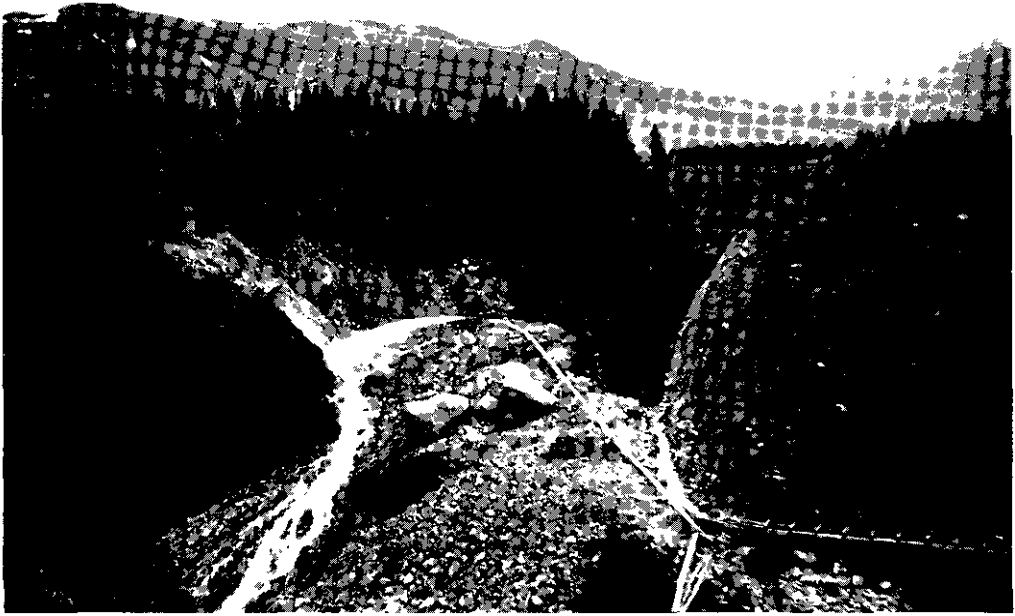




Salmon Glacier—looking towards August Mountain. Portland Canal Area.



Tatchenshini River Area—looking South-east towards Talbot Creek from the Divide to Squaw Creek.



Hydraulic Operation on Quartz Creek, Tributary of McDame Creek, Locality of 1934 Lode-gold Discovery.
Dease Lake Area.



Fourth of July Creek—looking North-east towards Gladys Lake. Atlin Area.

PART B.

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

BY

JOSEPH T. MANDY.

The North-western Mineral Survey District (No. 1) embraces the Pacific drainage area of the Province from Seymour inlet to the Yukon boundary and all of the Arctic drainage area of the Province north of the Peace river and its tributaries.

Three main topographic features characterize the district. On the west is the comparatively low-lying coastal area with deeply indented and irregular shore-line and numerous islands. To the east the land gradually rises through rugged, mountainous country to the crest of the Coast range, from 7,500 to 9,000 feet altitude, and then descends to the comparatively rolling, though in places still rugged, Interior plateaux of from 2,000 to 3,000 feet elevation.

These three topographically distinctive sections of the district are further characterized by distinctive geological and climatic features. Decided, in places excessive, precipitation, with mild and comparatively equable temperature, marks the coastal area. Diminution in rainfall, a heavy winter snowfall, and less equable seasonal temperature characterizes the Coast Range section. The Interior Plateaux region is featured by moderate rainfall and snowfall and a marked difference in seasonal temperature.

The dominant factor in the geology of the three distinctive sections, particularly from an economic standpoint, is the Coast Range batholith and its satellites. The batholith has been intruded into and underlies the various formations exposed in the district. Most of the mineral deposits in the district are related to the batholith.

All bearings in this report refer to true north.

GENERAL SUMMARY.

There has been a decided increase in activity in all branches of the mining industry in this district during 1934. More mines have entered the production list and quantity and value output should exceed the 1933 figure. Employment has increased over 1933 and approximately 2,000 men have been on direct pay-roll employment in about forty operations of varying sizes. This is exclusive of the numbers of individual prospectors and smaller outfits scattered throughout the district.

The Stewart camp is in the soundest condition of any time in its history, with no unemployment during the season; a condition that has not prevailed for several years. Towards the close of the year negotiations between Premier Gold Mines, Limited, and B.C. Silver Mines, Limited, offers encouragement for the early resumption of operations with production from the latter property. Although the Alice Arm area has been comparatively inactive, the gold aspects of the west side of the Upper Kitsault Valley area have become more definitely apparent and have attracted attention.

In the Atlin area lode-mining has been revived and mining interests have commenced operations. Placer-gold operations in the district have also increased, and many individuals, syndicates, and companies have been active.

Interest is being taken in low-grade gold properties such as *Big Missouri* in the Upper Salmon River area.

During the year Eastern Canadian operating companies and financial interests have become actively associated with mining development in the northern section of the district. Interest in the potentialities of the district is also evident in the increased activity of examining engineers, mainly representing substantial Canadian interests.

Operations have been chiefly centred in gold. No definite revival of operating activity in purely silver and base-metal deposits has yet materialized.

The low price and discouraging market outlook for copper has had a depressing effect on present and future production concerning this metal. This adversely affects the large operation

of the Granby Consolidated Company at Anyox, and also the immediate possibility of opening up future copper-producers. Although this district contains important copper potentialities, it would seem that further development of these must await adjustment of the intricate factors of world supply and demand governing this metal.

PRODUCTION.

The following is the production from No. 1 District during 1934: Ore, 2,054,332 tons; gold, lode, 47,658 oz.; silver, 968,639 oz.; copper, 37,077,718 lb.; lead, 725,164 lb.; zinc, 192,406 lb.; placer gold, 10,889 oz. Miscellaneous metals, minerals, and structural materials produced had a value of \$51,761.

DEVELOPMENT, EXPLORATION, AND PROSPECTING.

Development and exploration has been actively carried out on many lode properties, including *Dunwell*, *Big Missouri*, *Unicorn*, *Salmon Gold*, *United Empire*, *Surf Point*, *Princess Royal Gold Mines*, *Atlin Pacific* (formerly *Norgold*), and *Atlin Ruffner*. Exploratory work has also been carried out on many other smaller properties in the district during the year. Placer-gold operations have shown an increase as compared with 1933. Besides the larger placer operations, more individuals are engaged in prospecting and recovery work than was the case in 1933. Regarding placer activity, a feature of the year has been the introduction of substantial capital and more thorough preliminary testing of ground.

Although prospecting for both lode and placer has been very active in the district, no outstanding new discoveries in new areas have been made. Some discoveries of importance have, however, materialized, and a feature has been the constructive results achieved from detailed prospecting of many old properties in already known areas.

TRANSPORTATION FACILITIES.

The use of aeroplanes has shown a marked increase during 1934 and has proved the suitability and feasibility of this method of transportation, particularly in connection with exploration of the more remote areas. A slight improvement in rates for aeroplane transportation has been observed, but a further reduction in this respect would make this form of transportation available for more general use, especially by prospectors, small syndicates, and companies with limited funds, and would thus be of greater material assistance in the further exploration of the extensive favourable virgin area in this district.

ACKNOWLEDGMENT.

The writer desires to express his thanks for their co-operation to the prospectors, operators, and all those with whom he has come in contact during the conduct of his work.

BELLA COOLA MINING DIVISION.

This Division has been described in previous Annual Reports, and in *Bulletin No. 1, 1932*, its geological characteristics are described and likely areas for prospecting mentioned. During 1934 the Division was comparatively inactive and was not visited.

QUEEN CHARLOTTE MINING DIVISION.

The Queen Charlotte Mining Division embraces the Queen Charlotte islands. Graham island and Moresby island, approximately 2,500 and 1,000 square miles in area respectively, are the main islands. Graham island, with the exception of its south-westerly quarter, is built entirely of Cretaceous and Tertiary sedimentary and eruptive rocks, with a generally low-lying topography. Moresby island, lying to the south of Graham island, is built almost entirely of Triassic volcanics and sediments and has a comparatively elevated and rugged topography. Although the mineral occurrence of the islands were amongst the first in the district to receive attention, and promising deposits carrying gold and copper are known to occur, the area has not yet received the exploration or prospecting attention it warrants.

No lode operations were carried out on Graham Island during 1934. On the east coast several individuals have earned wages or expenses from sluicing the gold-bearing black sands in the localities of Lawn hill, Eagle river, Bull swamp, and Cape Fife.

AREAS RECOMMENDED FOR PROSPECTING.

Graham Island.—The area of granitic contacts with Triassic volcanics in the vicinity of Vancouver harbour and Rennel sound.

Moresby Island.—The area of Triassic volcanics striking north-easterly towards Mitchell inlet, about 1 mile wide and lying between a limestone-shale belt on the south and tuffaceous rocks on the north, on the west coast in the vicinity of Kootenay harbour.

The low-lying area of possibly Triassic amygdaloidal and spheroidal lavas on the south side of Mitchell inlet, Moore channel, and extending to around the head (Thetis cove).

A low-lying area of similar rocks to those described in Mitchell inlet, occupying the central section of the south side of Douglas inlet, Moore channel.

Some areas of green andesitic rocks, Peel inlet, Moore channel.

On the north side of Cumshewa inlet in the Triassic formation about a quarter of a mile from the beach and contiguous to a granitic contact exposed along Cumshewa point, Cumshewa inlet.

This company, with registered office at 612 Standard Bank Building, Vancouver, was incorporated in May, 1933, as a private company and later as a public company with an authorized capitalization of 2,000,000 shares of no par value; 400,000 vendors' shares have been issued at 10 cents and 520,000 shares sold at 10 cents. The holdings consist of ten claims located on the South arm of Kootenay harbour, Moresby island, and are reached by steamboat from Vancouver or Prince Rupert to Queen Charlotte City; thence about 30 miles by launch to Kootenay harbour. A good trail extends for about 1 mile from the beach to the showings between elevations of 300 to about 1,000 feet.

The topography of the area is characterized by comparatively steep, rugged, and timbered mountain and ridge slopes to elevations of from 3,000 to about 4,500 feet. In some places, generally marking variations in formation, the steep slopes are bordered by a low-lying, hillocked topography. The formation is composed of a belt of andesitic volcanic rocks contiguous to dark calcareous and shaly sediments. The mineralization consists of comparatively erratic quartz-replacement veins with generally tight walls, occurring in the volcanic rocks. The veins strike about east-west, dip steeply south, and are very sparsely mineralized with pyrite, chalcopyrite, and native gold in erratic distribution.

The property was staked as the *Rupert* group in 1930 by E. C. Stevens, of Skidegate, and is partly a restaking of the old *Blue Mule* group and referred to under that heading in the Annual Reports for the years 1920, 1922, and 1923. In 1922 the old *Blue Mule* owners, after carrying out some stripping and open-cutting, built a 100-foot flume, a 14½-foot water-wheel with an 8-foot drive-pulley, four ore-bins, suitable housing, and erected a Ross amalgamating-mill. Some gold was recovered with this equipment, but operations soon ceased. In the 1932 Annual Report the properties are referred to under the heading of *Kootenay* group.

Surface cuts and stripping show the veins to be brecciated and reticulated in structure and from 6 inches to about 6 feet wide, with varying degrees of silicification and a tendency to stringer into the walls. Surface exposures show characteristic sparse mineralization with pyrite, chalcopyrite, and some gold in erratic distribution. The gold is sometimes fairly coarse and visible, but is generally too fine to be detected by the naked eye. From some sections of the vein where gold is not visible it can be panned from the finely crushed quartz. The greater part of the work is being done on what is known as "C" vein. Several veins have been traced for about 100 to 500 feet on the surface.

Exploratory operations by the present company were started in 1933 and continued to the late fall of 1934, when lack of funds necessitated cessation. The work done included surface stripping, trenching, underground drifting, and crosscutting in two adits, with detailed sampling. Operations have been carried out under the management of A. H. Ingraham. At an elevation of about 445 feet "C" vein was drifted on in No. 1 adit for a distance of about 280 feet in an easterly direction. This work shows the characteristic vein-structure and mineralization with vein-widths varying from about 16 to 48 inches, and several branch stringers entering the foot-wall. Visible gold in fine distribution was encountered at intervals between the portal and the face of this working, and detailed sampling carried out by the management shows values varying from 0.02 to 1.42 oz. gold per ton, with an average assay value for the length of the working reported to be 0.214 oz. gold per ton across a width of

29 inches. Values seem to be distributed in short lengths or lenses. An analysis of the company assay-plan shows seven of these lenses or pockets in No. 1 adit. Starting from the portal, these are as follows:—

	Gold. Oz. per Ton.
Length, 15 feet; width, 18.6 inches.....	0.56
Length, 15 feet; width, 20 inches.....	0.698
Length, 20 feet; width, 35 inches.....	0.435
Length, 10 feet; width, 45 inches.....	0.259
Length, 10 feet; width, 39 inches.....	0.128
Length, 5 feet; width, 38 inches.....	0.21
Length, 40 feet; width, 17.75 inches.....	0.28
Length, 30 feet; width, 21.8 inches.....	0.257
Face: Length, 5 feet; width, 22 inches.....	0.145

These lenses are spaced respectively 15, 20, 10, 10, 10, 10, 35, and 20 feet apart. A summary of these lenses shows a total of 150 feet, averaging 28.57 inches wide, assaying 0.303 oz. gold per ton.

At an elevation of about 218 feet, or 220 feet below No. 1 level, a crosscut adit (No. 3) is reported to have intersected "C" vein at a distance of about 387 feet from the portal, showing at this intersection a width of 30 inches of solid quartz and about 60 inches of small quartz veins and stringers. The vein was drifted on for 50 feet to the east and about 70 feet to the west, exposing characteristic structure with some mineralization. According to the company assay-plan, the east drift shows generally low values, and one possible lens, 10 feet long and 28 inches wide, assaying 0.217 oz. gold per ton. In the face of the east drift the vein is reported to be 22 inches wide, assaying 0.4 oz. gold per ton. According to the mine assay-plan, the west drift on this level also shows generally low values, and one possible lens, 15 feet long and 30 inches wide, assaying 0.19 oz. gold per ton, with the vein in the face, 40 inches wide, assaying 0.05 oz. gold per ton.

On account of the values in this deposit being in the form of free gold in erratic distribution, it is deemed advisable that the channel-sampling should be checked by bulk samples of, say, 1 ton each, which could be shipped to a smelter or to the ore-testing laboratory at Ottawa for value determination. These samples should be taken from raises on several of the short lens-lengths in both adits. Providing this bulk-sampling offers sufficient encouragement regarding values, several other veins which occur on the property would be worth further exploration, and the continuation of the No. 1 adit to explore the section below the higher-grade lenses in the upper level would also be constructive.

OTHER PROPERTIES.

On the *Fairtide* claim, adjoining the *Cumshewa* group, owned by Robert Scharffe and partners, of Skidegate, a narrow vein has been stripped for 100 feet, and for this length across 10 inches assays 0.4 oz. gold per ton and 8.4 oz. silver per ton. Additional stripping and open-cutting on this vein should be carried out to determine the possibility of greater widths and further continuity. On the *Ruby* group at Copper bay, J. Peacock, of Charlotte City, has carried out open-cutting on a pyritized shear-structure, 10 feet wide, in volcanic rocks outcropping on the beach below high-tide mark. Several years ago an attempt was made to sink a shaft on this deposit by building a cement coffer around the collar. From two new open-cuts about 150 feet apart encouraging gold values were reported, but sampling of these cuts by the writer across 9 and 11 feet respectively failed to disclose any values of importance.

SKEENA MINING DIVISION.

This Division, about 22,000 square miles in area, embraces the largest area of the Coast Range batholith in No. 1 District. Mineralization occurs chiefly as cupriferous replacements and contact-metamorphic deposits of copper and magnetite in the roof-rocks, sometimes accompanied by galena and sphalerite. In the granitic rocks of the batholith, particularly those richer in hornblende, such as quartz diorite, high-grade gold-bearing pyrite in quartz veins frequently occurs. Gold-bearing copper and iron mineralization in pegmatitic dykes is

known and deposits of molybdenite also occur. Limestone, marble, possibly building and ornamental stone and superficial clay deposits, are widely distributed in this Division. There are also possibilities for the discovery of mica and refractory deposits.

In the extensive coastal area of the Skeena Mining Division the availability of immediate seaboard transportation to markets eradicates what is the main handicap for the development of mineral resources, especially those of the non-metallic category. Industrial utilization of the latter type of deposit is worthy of more intensive investigation in the Skeena Division than it has heretofore received. There are extensive areas of this Mining Division in both the pendant or included roof-rocks and also in favourable structural and contact areas of the batholith itself that are as yet very little or totally unprospected and are deserving of the attention of prospectors.

This company was incorporated in 1933 with an authorized capitalization of **Princess Royal Gold Mines, Ltd.** 7,000,000 shares of no par value. The registered office of the company is 810 Rogers Building, 470 Granville Street, Vancouver, and J. B. Woodworth is managing director. The holdings embrace the *Surf Inlet* and *Pugsley* groups of the old Belmont-Surf Inlet Mines, Limited, which company ceased operations in 1926. The property is situated about 7 miles inland from the head of Surf inlet, on Princess Royal island, and is reached by launch up Cougar and Bear lakes from where about 1 mile of narrow-gauge railway extends to the camp.

The mineralization consists of pyritized quartz veins occupying shear-zones in granitic rocks of the batholith. The *Surf Inlet* workings are on the north and the *Pugsley* workings are on the south side of a deep and precipitous valley. The shear-zones strike northerly across the valley and dip from 45 to 60 degrees west. The ore in the old *Surf Inlet* mine occurred in pyritized quartz veins in places up to about 40 feet wide. The *Pugsley* veins are narrower. Production by the old Belmont-Surf Inlet Company came mainly from the *Surf Inlet* veins, although considerable mining was also carried out on the *Pugsley* veins. A total of about 836,500 tons of ore yielding nearly \$8,000,000, of which \$1,437,500 was paid in dividends, was produced by the old Belmont-Surf Inlet operation. This deposit, although discovered several years before, was first known as the *D.L.S.* group and was formerly owned by the Surf Inlet Mines, Limited, which sold the property to Belmont Canadian Mines, Limited. The latter company reorganized into the Belmont-Surf Inlet Mines, Limited, which began production on a large scale in 1917 and continued until 1926, when operations ceased. The property then remained dormant until the transference of the holdings to the present company in 1933.

Preparatory work by the present company was initiated in 1933 and continued into 1934 with a crew of thirty-six men under the supervision of Ed. Kinder and the direction of J. B. Woodworth, of Vancouver. This work included repairs to the wharf, buildings, railway, etc., installation of power and telephone line, laying of track, construction of ore-bunkers, transportation and installation of machinery. A small tonnage of ore selected from pockets of sulphides in several parts of the old *Pugsley* workings has been shipped. At the time of examination by the writer in June no other mining or underground preparatory work had been undertaken. The writer was informed that for the time being initial mining operations would be confined to the *Pugsley* veins.

For purposes of efficient examination the old *Surf Inlet* mine main workings were deemed inaccessible.

The *Pugsley* property was originally opened up by the Belmont-Surf Inlet Company on four levels, the main or track level being the so-called 900-foot level, with a shaft to the 1,000-foot level and raises to the 800- and 700-foot levels, and above this to and towards surface. The shaft and 1,000-foot level were flooded and inaccessible, and no criterion could be formed regarding the amount of the old mining or aspect of veins on this level. It is claimed that on this level drifting and stoping was carried out on the "Big" (or east) vein, but that no mining exploration or development was done on the "Small" (or west) vein. The mineral occurrence in the old *Pugsley* workings consists mainly of two parallel shear-structures about 90 feet apart, in gneissic quartz diorite. Mineralization consists of pyrite and chalcopyrite erratically distributed in a quartz gangue in blebs, streaks, and patches, favouring generally the hanging or foot walls of the veins and sometimes being in sufficient quantity to form minable lenses and shoots. Gold values are confined entirely to the sulphides, the quartz itself being barren of values.

The east vein varies from about 5 to 15 feet in width on the 900-foot level. On this level in the drift south on the east vein to the old stope, along a distance of about 350 feet, short lengths of quartz with some sulphide mineralization can be seen and would be worth further exploration for mill-grade ore possibilities. Beyond this the level has been stoped out for a length of about 120 feet, the stope extending probably about 100 feet in the back and also below the level probably to the 1,000-foot level. The workings on the east vein in and beyond this stope were not accessible with any degree of safety. It is understood that further mining by the old company in the back of this stope towards the surface was limited by the encroaching boundary of the *Homestake* claim, which claim is reported to be now under option to the Princess Royal Gold Mines, Limited. It is also understood that surface continuity of the "Big" (or east) vein has not been definitely located. Any further possibilities in the upward extension of this stope can consequently only be ascertained by accessibility, examination and sampling of the stope-back, and further exploration in this direction. Possible continuity of this ore-shoot in the east vein below the stoped area on the 1,000-foot level can likewise only be ascertained by examination and sampling after dewatering the 1,000-foot level and the prosecution of further exploration if deemed warranted. In the drift north on the east vein good widths of quartz are exposed in places, with some scattered blebs and streaks of sulphides. In this drift the shear decreases in intensity to the face, which shows a structure of somewhat crushed diorite, 6 feet wide, containing a few small streaks and patches of quartz.

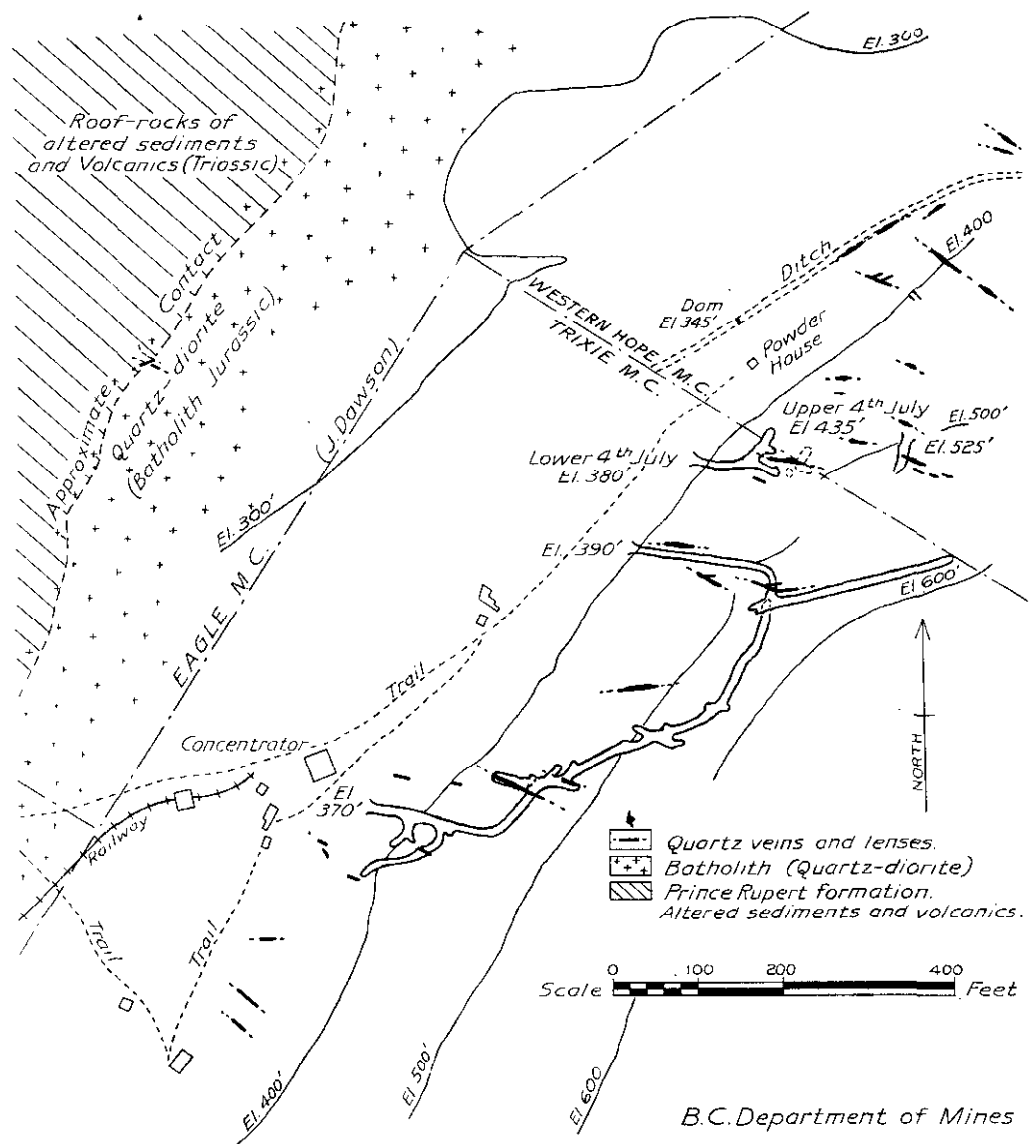
The "Small" (or west) vein varies in width from 10 to about 14 inches of quartz, with sulphide mineralization in places, contained in a sheared structure up to about 5 feet in width in some sections. Sulphide mineralization is mainly confined to the quartz gangue, which averages about 24 inches in width. Sulphides are erratically distributed in generally small lenses or shoots, which have a stope-length varying from a few feet to a maximum of about 200 feet. This characteristic necessitated careful selective mining in the old workings, with a resultant erratic stope outline. Considerable stoping was completed on this vein by the former Belmont-Surf Inlet operation between the 900-foot level and surface. Many sections of these old stopes were, however, inaccessible at the time of examination. Before any definitely accurate criterion can be gathered regarding possible remaining ore-tonnage in the worked area above the 900-foot level, these old workings should be accurately surveyed, mapped, and sampled. Along the 900-foot, 800-foot, and accessible parts of the 700-foot drift-levels short lengths of vein that may possibly grade to ore can be observed in the backs and floors. Samples taken by the writer from some of these sections on the 900-foot and 800-foot levels assayed as follows:—

Width.	Gold.	Silver.	Copper.
		Oz. per Ton.	Per Cent.
(1.) 12 inches.....	0.50	0.1	Trace
(2.) 24 inches.....	0.16	0.5	Trace
(3.) 14-39 inches.....	0.08	Trace	<i>Nil</i>
(4.) 14 inches.....	0.20	Trace	.....
	Oz. per Ton.		

Since the examination of this property in June the management reports raising between the 900 and 800 levels on a split section of the west vein in the *Pugsley* workings. In this work a short section of good-grade ore is reported to have been encountered. The incline shaft between the 900 and 1,000 levels is also reported to have been pumped out with a view to further exploration of the east vein on the 1,000 level and crosscutting to the west vein and drifting along it.

Surf Point. This property embodies the old *Trixie* group formerly owned by Frank Patterson, of Porcher island, and acquired some years ago by J. B. Woodworth, of Vancouver, in association with Noah H. Timmins, of Montreal. During the last two years the property has been operated by the N. A. Timmins Corporation, with R. E. Legg in charge of the work at the mine. The claims are situated off Welcome harbour, on the westerly shore of Porcher island, about 25 miles south-westerly of Prince Rupert. The property is reached by launch from Prince Rupert.

The topography of the area is featured by a comparatively flat or hillocked foreshore deeply covered with muskeg and of about 300 feet general elevation, bordering the steep slopes to mountain domes or ridges of from 4,000 to 5,000 feet elevation that form the central portion of the island. This characteristic topography is conformable to the flat and doming structure of the intrusive batholithic rocks, the low hillocked areas generally marking flat roof-horizons of the batholith with remnants of preserved roof-rocks. It is in this flat roof-horizon that



Surf Point Mine.

the mineral deposits occur. In former years small shipments of sorted ore were made to the smelter, either by the owner or by some operator working under lease and bond. In 1917 the property was bonded to the Belmont-Surf Inlet Mines, Limited, which company after doing considerable exploratory work relinquished the bond. About 1928 the property was bonded by J. B. Woodworth, of Vancouver, and later, in association with N. A. Timmins, of Montreal, was purchased. In the operation preceding the present active direction of the work by the

B.C. Department of Mines

N. A. Timmins Corporation inaugurated in 1933, extensive underground work and open-cutting were carried out and an incline railway constructed. The older operations are described in former Annual Reports. The more recent operations are described in the Annual Reports from 1927 to date. The property is also referred to in Bulletin No. 1, 1932, issued by the B.C. Department of Mines, and in the Geological Survey of Canada Summary Report for 1922.

The mineral occurrence consists of gold-bearing pyrite in erratic and lenticular quartz veins in quartz diorite. These veins occur contiguous to the contact of quartz diorite of the Coast Range batholith with the older roof sediments and volcanics of the Prince Rupert series. The veins outcrop along a rather flat benched area of the diorite which represents a comparatively flat roof-horizon of the batholith. The veins, which strike generally easterly to north-easterly, appear to occupy joint-planes in the diorite and are very lenticular, erratic, and restricted in outcrop continuity. Sharp variations in vein-widths of from a few inches to several feet are characteristic, and unless some shearing along the joint-planes is evident the veins die out rapidly at both extremities. Over thirty of these quartz veins or lenses are known to outcrop, and underground work has indicated the possibility for the occurrence of blind lenses.

Operations have been carried out in several adits and open-cuts between elevations of 370 to 500 feet. In the work carried out by the N. A. Timmins Corporation during the last two years approximately eleven different veins and lenses have been developed. The property is equipped with a 25-ton flotation-mill built in 1933. Production commenced in July of that year, and from six months' operations 1,268 oz. gold and 345 oz. silver from 1,626 tons of ore were recovered.

For the nine months ended September 30th, 1934, 4,049 tons of ore averaging 0.81 oz. gold per ton was milled. With recovery at 94.6 per cent., this produced 364.5 tons of concentrates averaging 8.6 oz. gold and 3 oz. silver per ton, or a total of 3,136.6 oz. gold for the nine-month period. This ore all came from stoping operations above the main adit-level. During the latter part of the 1934 season some sinking was carried out on one of the lenses below the main adit-level, with encouraging results. This indicates possibilities for the occurrence of high-grade gold-bearing pyrite below the horizon of the first and present main mining operations. Development during 1934 consisted mainly of drifting, crosscutting, and raising for the purpose of opening various lenses for production.

During the first part of the year a short diamond-drilling campaign consisting of 985 feet in seventeen holes was undertaken with a view to the discovery of further lenses below known horizons. Several small lenses were located. Further work of this nature, however, is warranted, as all possibilities in this category have not been exhausted. At the beginning of the year the power-supply was augmented by the installation of a 60-horse-power Diesel engine. A crew of about twenty men is employed.

This group of five claims is owned by F. T. Patterson, of Porecher island, and **Edye Pass.** adjoins the *Surf Point* on the north. Quartz veins and lenses similar in character to those occurring on the *Surf Point* have been discovered on this property. Several good lenses of gold-bearing pyrite have been uncovered by extensive stripping and small shipments of high-grade ore have been made from time to time.

Recent operations have been carried out on the *Jeanie* and *Nabob* claims. During the latter part of this year work was continued on the long open-cut on the *Jeanie* claim and 13 dry tons of ore was shipped to Tacoma. The following assay and analysis of this ore may be of interest: Gold, 4.01 oz. per ton; silver, 1.25 oz. per ton; iron, 17.8 per cent.; silica, 56.7 per cent.; lime, 1 per cent.; sulphur, 19.2 per cent.; alumina, 3 per cent. Work was also commenced on a showing lying easterly of this cut and up to the end of December approximately 15 tons of high-grade ore is reported to have been extracted from lenses about 2 feet in width. On the *Nabob* claim a trench 170 feet long, continuing in an open-cut about 120 feet long, has exposed a well sheared and defined vein-structure varying from 6 to 41 inches in width. From the open-cut approximately 35 tons of ore, estimated to assay about 1 oz. gold per ton, was extracted and piled on a dump. A sample of the face of this cut across 41 inches assayed: Gold, 0.6 oz. per ton; silver, 0.5 oz. per ton. About 30 feet south of the face of this cut the vein is exposed again and shows a width of 30 inches of well-pyritized quartz. Southerly the vein is covered with muskeg, but its possible continuity is marked by a trough-depression which can be observed extending into the adjoining *Eagle* claim and aligning

itself with a deep draw about 1,000 feet south of this claim. Some further work is reported to have been carried out on the northerly extension of this vein at a point about 100 feet north of the trench. This ground is heavily covered with muskeg, but the work is reported to have exposed an encouraging width of vein carrying pyrite mineralization.

This property possesses indications for the possibility of a small-tonnage high-grade operation similar in type to that being carried out on the adjoining *Surf Point* mine and is worthy of exploration with this objective in view.

Redbird.

This claim is owned by J. H. Jones, of Porcher island, and is situated adjacent to the *Edye Pass* group and *Surf Point* mine on the north. The main showing consists of a quartz vein outcropping at 120 feet elevation and striking east-west, occurring in quartz diorite of the Coast Range batholith. The vein has been traced by trenching up the 15-degree slope of the hill for about 300 feet. Continuity beyond both exposed ends is covered by muskeg. Around the central and upper parts several small quartz stringers from 6 inches to 1 foot in width radiate from the main vein. The walls are well defined and the vein dips about 80 degrees east, with about 1 inch of gouge and shearing on the foot-wall. Peculiar to this vein are brecciated inclusions of a greenish rock, probably undigested pieces of the old roof-rocks, and in these sections sulphides in the form of pyrite seem to be best developed. The structure indicates that where exposed the vein is probably very close to the roof-horizon of the batholith. In this area this is a favourable structural horizon for the occurrence of gold values.

Mineralization consists of pyrite, in erratic and sparse distribution in the form of stringers, veinlets, and small patches. An average sample of pure sulphides selected from about 1 ton of vein material on the dump along the length of the vein assayed: Gold, 2 oz. per ton; silver, 2 oz. per ton.

This vein is worth further exploration with the view to extracting ore of a sufficient grade for shipment. This work should take the form of an open-cut along the vein, starting at the lowest end. A back of about 30 feet in this open-cut would be achieved at the upper end of the exposure.

Lying southerly from the main *Redbird* showing, a well-defined shear outcrops at elevation 50 feet and has been traced for about 100 feet to the beach. This shear strikes south 20 degrees east and dips 50 degrees to the south. This structure occurs at just about the contact-horizon between the schistose roof-rocks and the granitic rocks of the batholith. The shear is well defined and in places mineralized with stringers and patches of massive pyrite. A sample of the sulphides occurring along the 100-foot stripped section assayed: Gold, *nil*; silver, *nil*. Although the absence of values may appear to be disappointing, yet in view of the characteristic low gold values contained in veins occurring in the roof-rocks in this section and the general presence of gold values in the veins in the granitic rocks, it is considered that this vein would be worth exploring for the possibility of gold values occurring in it when, and if, it penetrates the underlying granitic rock.

Work was carried out on the *Mascot* and *Eagle* claims in this area.

The *Bald Mountain* and *Wren* are described in the Annual Report for 1933.

This group consists of seven claims owned by P. LaPorte and W. Hause, of Prince Rupert, and is being explored by a syndicate of Prince Rupert interests.

LaPorte. The property is located on the east side of the mouth of the Ecstall river, about a quarter of a mile west of Alexander (Balmoral) cannery, and is reached by launch from Port Essington, a distance of about 2 miles.

The formation of the area is biotite-quartz diorite of the Coast Range batholith intruded by pegmatitic and aplitic dykes and differentiation streaks, in proximity to the contact with altered sediments of the overlying Prince Rupert series. The topography is featured by a comparatively gently sloping foreshore bordered by the steep slopes of the granitic range-ridge. Structurally, the foreshore area embraces a flat roof-horizon of the batholith.

The showings are at about elevation 325 feet and 1,000 feet from the beach. They consist of some gold-bearing pyrite and chalcopyrite mineralization along a zone of stringering aplitic and pegmatitic differentiates. Mineralization occurs in small patches and streaks of pyrite and chalcopyrite in a quartzose gangue intermingled with pegmatite and aplite and is best developed in narrow streaks along some joint-planes. Eight open-cuts along a distance of about 200 feet have exposed an erratic zone of the described type without any definition of

confining walls, striking north 30 degrees west and dipping about 15 degrees north. The three central cuts along a distance of about 20 feet, each expose a small patch or lenticular pocket of pyrite and chalcopyrite mineralization in a quartzose gangue. The best of these is a wedge 5 feet long and up to 15 inches wide. Selected samples from this assayed:—

(1.) Gold, 2 oz. per ton; silver, 5 oz. per ton; copper, 7.3 per cent.

(2.) Gold, 0.64 oz. per ton; silver, 2.5 oz. per ton; copper, 8.7 per cent.

An average sample of this small pocket assayed: Gold, 0.24 oz. per ton; silver, 1.5 oz. per ton; copper, 3.6 per cent. In the three easterly cuts along a distance of about 20 feet a stringer 1 to 2 inches wide is exposed. A composite sample of this stringer exposed in these cuts assayed: Gold, 0.6 oz. per ton; silver, 1 oz. per ton; copper, 4.4 per cent. The two most westerly cuts show pegmatitic and aplitic streaks with only very sparse mineralization.

The character of these exposures indicates possibilities for the occurrence of small and erratic lenses or pockets of mineralization along pegmatitic and aplitic streaks, with no definite alignment of continuity one with the other, except where mineralization may be developed along joint-planes. The latter would show some continuity until disturbed by cross-jointing. In view, however, of the high gold content of the sulphides, the showings and the area are worthy of some limited prospecting and exploration with the objective of discovering lenses of appreciable size or some defined structure carrying mineralization. In this exploratory work some ore of a shipping-grade might be extracted.

NON-METALLICS.

Sericite. This group comprises the *Sericite* and *Mother of Cloud* claims owned by C. Jeddler and P. M. Ray, of Prince Rupert, with P. M. Ray acting as agent.

The property is situated on the north shore of the sheltered harbour of Baker inlet, off Grenville channel, about 35 miles south of Prince Rupert. The occurrence consists of a pegmatitic zone with sericite mica lenses and pockets in gneissic rocks of the Prince Rupert series. The zone outcrops along a bluff at altitude 290 feet about 1,000 feet from the beach, strikes north-south, and dips 17 degrees west. It has been prospected by two open-cuts and some superficial stripping and can be traced for several hundred feet practically by natural exposure. Erratic widths, bulging and stringering typical of a pegmatitic structure, with, in some sections, stringers a few inches in width separated by horses of country-rock, characterize the zone.

As is typical of this type of deposit, the mica occurs in pockets and lenses. Two adjacent pockets of good-grade mica each about 10 feet in length and from 4 to 5 feet in width are exposed in the two cuts. An appreciable percentage of sericite is apparent in other exposed parts of the zone. The mica is of the type that would be adaptable to pulverizing. Samples of the raw material from one of the cuts were screened by P. M. Ray and gave the following results: Plus 10 mesh=30 per cent.; minus 10 mesh=50 per cent.; minus 80 mesh=20 per cent. All this material appears to be remarkably pure sericite. A bulk sample of the raw material from the cuts was also submitted to the Ore Testing Laboratory at Ottawa. This was submitted to dry grinding in a Raymond mill combined with a Rotex screen and Gaco air separator and screened on a double-deck Rotex screen of 100 and 200 mesh. The recovery from this test was as follows:—

Plus 100 mesh—77 per cent. of feed recovered of about 99 per cent. pure mica.

Minus 100 and plus 200 mesh—88 per cent. of feed recovered of about 99 per cent. pure mica.

Minus 200 mesh—68 per cent. of feed recovered of about 80 per cent. pure mica.

The showing is worthy of further exploration, and it is quite possible that stripping in both directions along the strike will expose a much greater continuity of the zone, with possibility for further good-grade mica pockets and lenses. The property is ideally located for economical operation and convenience to direct seaboard transportation.

KITSUMGALLUM LAKE AND LAKELSE VALLEY SECTIONS.

In the Kitsumgallum Lake area only assessment-work was carried out on several properties in the Maroon Mountain area, and also in the Thornhill Mountain area in the Lakelse Valley section. Properties in these areas have been fully described in former Annual Reports. The gold possibilities of the Maroon and Thornhill Mountain areas warrant more intensive exploration than they have received, with the objective of developing small-tonnage operations.

PLACER GOLD.

On Douglas creek, in the Kitsumgallum Lake area, several individuals have been active. Work this year has been mainly confined to the repairing of damage done by the high-water flood which occurred in the spring. A small amount of sluicing, resulting in some gold-recovery, was carried out and will be continued during the low-water period of the winter months.

NASS RIVER MINING DIVISION.

Geologically, this Division embraces a substantial portion of the central pendant-inclusion area of the Coast Range batholith and an appreciable length of the eastern contact. The mineral deposits of the Division vary in character in conformity to their relationship to these geological conditions. The outstanding general feature in this respect is a lowering temperature gradation from west to east, from predominating copper mineralization in the westerly pendant-inclusion area to a predominating zinc-lead-silver mineralization, with gold possibilities in structurally favourable sections, along the eastern-contact margin.

As with all the known mineralized areas of the district, much of the Alice Arm and other sections of the Nass River Mining Division still remain to be thoroughly prospected. With a better understanding of the geology and localization of ore-bodies in the important Alice Arm area gradually emerging, new ore sources and possibilities are being indicated. In this category, besides the known silver-lead-zinc and copper potentialities, are possibilities for gold-bearing siliceous pyritic zones contiguous to intrusive diorite or fine-grained porphyries on the west side of the upper Kitsault River valley. These possibilities are deserving of investigation.

This company was incorporated in British Columbia in 1901 with an authorized capital of 500,000 shares of \$100 par value, of which 450,001 shares have been issued. Charles Bocking is the general manager and the head office is 789 Pender Street West, Vancouver. The company controls several properties in different areas of British Columbia, but in recent years operations have been confined to properties at or in the neighbourhood of Anyox, on Observatory inlet. These include *Hidden Creek*, *Golskeish*, *Bonanza*, and *Granby Point* deposits, all located in the Anyox area. The present operations are on the *Hidden Creek* and *Bonanza* deposits and during 1934 work has also been continued in the *Granby Point* mine.

The plant at Anyox consists of a crushing plant and concentrator of about 5,000 tons capacity, smelter, coke-ovens, and power plant.

The *Hidden Creek* mine was first brought into production with shipments to the smelter in 1914 and has continued producing to date on a large scale. Total production to the end of 1933 amounted to 21,133,588 tons of ore containing 693,181,686 lb. copper. At the *Hidden Creek* mine since initiation of operations production has come from Nos. 1, 2, 3, 4, 5, and 6 ore-bodies.

The mineral deposits of this area occur in a large remnant or inclusion of argillites and andesitic rocks lying within the granitic rocks of the Coast Range batholith. This remnant of sedimentary and volcanic rocks is about 7 miles wide and 17 miles long. The ore-bodies occur at or near the north-south-striking contact between argillite and a younger, possibly intrusive, andesitic rock. The formation is acutely folded and faulted and is cut with numerous post-ore dykes of both basic and acid character. The ore-bodies seem to favour the crests and troughs of the folds and are of two types—namely, replacements along the folded argillite-andesite contact or in sheared areas in the andesitic rocks contiguous to the contact. The ore along the contact generally differs from that in the sheared andesitic rocks, in that it is characteristically more siliceous and generally characterized by chalcopyrite intimately associated with pyrite, whilst that in the andesitic rocks is generally an association of chalcopyrite and pyrrhotite, with sometimes a marginal phase of more pronounced pyrite mineralization grading into pyrrhotite towards the centre or core of the ore-bodies. Nos. 2 and 3 ore-bodies are of the sheared-zone type and Nos. 1, 4, 5, and 6 are of the contact type.

Besides the ore-bodies mentioned which have been developed and from which production has been derived, two other ore-bodies, No. 7 and No. 8, which are apparently of the contact type, have been indicated by diamond-drilling with only a small amount of development done on No. 8. No intensive exploration, development, or mining has been carried out in either of these ore-bodies and their definite potentialities are consequently unknown.

Early in 1929 the *Bonanza* ore-body, about 3 miles southerly from Anyox, which had been under development for some time, was brought into production and an aerial tramway from this deposit to the smelter constructed. Although the structure of this ore-body is not quite clear, it appears to be a shear-zone in biotite and hornblende-schist (possibly an altered andesite) near the contact of this rock with argillite. As is the case with the *Hidden Creek* deposits, numerous dykes of basic, acid, and dioritic character cut through the formation in an east-west direction and intersect the ore-body. In the shaft on the north side of Bonanza creek a pronounced fault striking north-westerly and dipping 70 degrees south-westerly intersects the northerly continuity of the zone. The ore-zone seems to occupy a portion of a flat anticlinal fold striking north-south. The segment south of the fault, on which mining is being carried out, dips from 10 to 15 degrees west and steepens to a dip of about 30 degrees west about 500 feet southerly from the outcrop, at the same time diminishing in width and increasing in grade. To the east the structural continuity is not clear. This zone has been developed on both the north and south sides of Bonanza creek and shows widths of from about 10 to 90 feet, varying in accordance with the flattening or steepening of the dip. The best development of ore seems to occupy the central portion of the zone where there are ore-widths up to 70 feet, with the best grade developed along widths of from 10 to 40 feet on the foot-wall side. In the zone, bands of solid sulphides (pyrite with chalcopyrite) several feet in width are separated by belts of chloritic schists also containing ore. These sections of the best ore are irregular in shape and sometimes occupy the locality of "rolls" in the zone, which may also possibly be inter-zonal and unconformable to the walls of the zone.

On the south side of Bonanza creek the deposit has been developed and practically mined out for a horizontal length of about 1,660 feet. Along the westerly margins of these workings the westerly dip of the structure steepens, with a corresponding restriction of the walls, but ore is seen to occur in places from 3 to 4 feet thick in the floor of the workings. Further exploration for a westerly continuity of ore-bodies similar to those which have been mined, where the dip of the structure may flatten again, would seem to be warranted. It would also appear that some possibilities may exist on the east side of the underground workings along the upward continuity of the dip. The *Bonanza* ore-body has also been developed through an incline shaft on the north side of Bonanza creek to the fault for a length of about 650 feet. Between the workings on the north and south sides of the creek there is a distance of approximately 370 feet in which no mining has been carried out.

During 1934 the continued low copper price has adversely affected the Granby operations at Anyox and the bulk of the blister-output has necessarily been stored. A generally lower tenor of ore has been met by a slight increase of tonnage to the mill, which towards the end of the year was treating about 5,200 tons of ore per day. The bulk of the mining in the latter part of the year was carried out on No. 4 ore-body between the 525 and 700 levels. No new ore developments of importance have materialized in the mine during the year. The practice of breaking a large ore-tonnage in one blast has materially assisted in achieving low costs in this operation. In the early part of December one of these blasts involving 500,000 or more tons of ore, mainly in pillars and sills of old stopes in No. 1 and No. 5 ore-bodies between the 385-foot level and surface, was carried out.

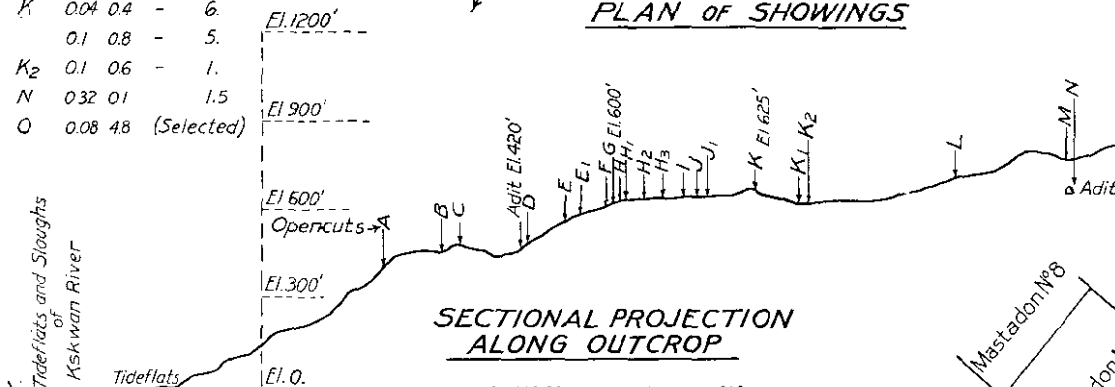
Production from *Bonanza* was continued at the rate of approximately 300 tons of ore per day. Operations were also continued in the *Granby Point* mine, from which an appreciable tonnage of gold-bearing siliceous ore was produced. About 1,100 men are employed at Anyox, with a pay-roll of \$135,000 per month. In view of the discouraging low copper price and outlook for this metal, at a shareholders' meeting held in December the directors were empowered to cease operations at any time in accordance with their discretion.

This group is owned by Carl Ecklund, J. Flynn, W. Eve, and associates. of **Mastodon.** Anyox, and is located on the east side of Hastings arm, about 12 miles northerly of the town of Anyox. It is reached by launch from Anyox to the cabin on the shore at Granite creek, from where a trail of about half a mile in length leads to the workings between 400 and 800 feet altitude. The property consists of ten claims comprising the *Mastodon Nos. 1 to 8* and the *Chieftain Nos. 1 and 2*. The mineral occurrence consists of a siliceous replacement in what appears to be a narrow belt of altered semi-digested sedimentaries contained in the granitic rocks of the batholith. The altered sedimentary belt is possibly 100 to 200 feet wide. The siliceous replacement is from about 1 to 6 feet in width.

	Au. oz.	Ag oz	Cu %	Width ft
H ₃	Tr.	Tr.	-	3.
I	0.02	1.2	-	5.
J	Tr.	10	Nil	4.5
K	0.1	0.8	-	2.
K ₁	0.04	0.4	-	6.
	0.1	0.8	-	5.
K ₂	0.1	0.6	-	1.
N	0.32	0.1	-	1.5
O	0.08	4.8	(Selected)	



PLAN OF SHOWINGS



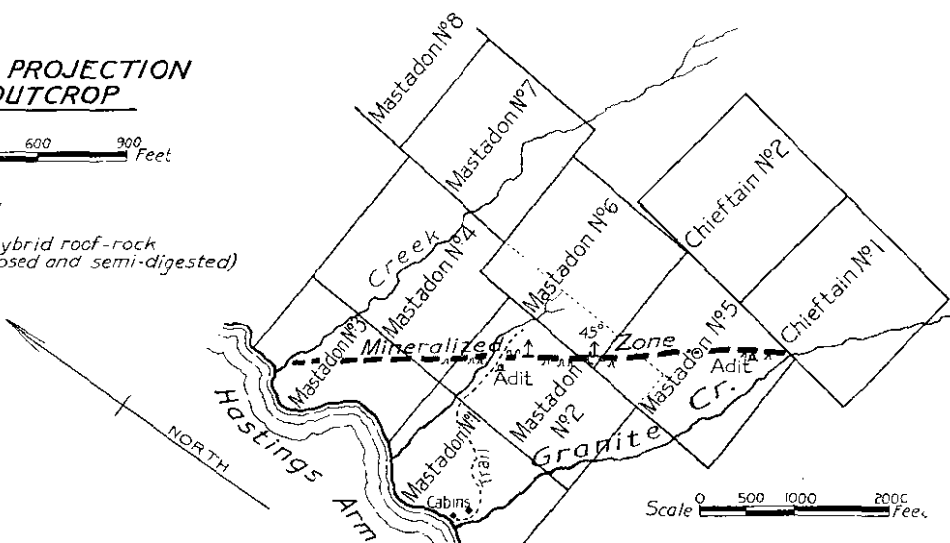
SECTIONAL PROJECTION ALONG OUTCROP

Scale 0 100 200 300 600 900 Feet

- Granitic rocks of Coast Range Batholith
- Zone of altered and hybrid roof-rock sediments (metamorphosed and semi-digested)



SECTION ACROSS OUTCROP



Scale 0 500 1000 2000 Feet

B.C. Department of Mines

Mastadon Group.

mineralized in places with pyrite, some sphalerite, and occasionally small amounts of galena. The quartz in which the mineralization occurs has an erratic and lenticular distribution in the form of veins and veinlets, patches and blebs, in the zone. Prospecting has been carried out by twenty-two trenches and shallow cuts along a distance of about 2,700 feet between elevations 400 and 850 feet. The best developments of quartz and mineralization occur in the central section at about elevation 600 feet along a distance of about 600 feet. The geological, structural, and topographical conditions and values are indicated on the accompanying map.

Elkhorn. This group of four claims is owned by J. Flynn and associates, of Alice Arm, and is situated at an elevation of about 3,300 feet on the eastern slope of Saddle mountain at the head of Hastings arm. The occurrence consists of an ill-defined, partially silicified structure in andesitic rock and mica-schist, in places carrying alteration products of epidote and garnet. Sparse mineralization of pyrite, pyrrhotite, with some galena and sphalerite in places, occurs along small sections of silicification in narrow and discontinuous fractures. In 1929 some spectacular finely divided gold was discovered in an isolated pocket in a small open-cut. During 1934 work was continued in several trenches and open-cuts along a distance of about 600 feet which showed some silicification and pyrite mineralization. Samples from the best mineralized of these showings only showed traces of gold and silver.

KITSAULT RIVER SECTION.

Esperanza Mines, Ltd. (N.P.L.). This company is composed of 1,000,000 shares of \$1 par value, of which 510,050 are reported to have been issued. The head office is located at Victoria. The company controls the *Aldebaren*, *Black Bear*, and *I'll Chance It* Crown-granted claims and thirteen mineral claims held on location situated on Esperanza mountain. $1\frac{1}{2}$ miles from the town of Alice Arm on the north side of the Dolly Varden Railway. The main showings are a series of erratic quartz veins carrying pockets and lenses of mainly silver-lead-zinc mineralization occurring in argillites of the Kitsault River formation between altitudes of about 300 and 2,000 feet.

The main showings were opened up by nine adits and in former years were worked inter-

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tion in dip.

ERRATUM.

Page B 14, line 29, should read:—

“Since 1916 the records show 1,021 tons of ore have been shipped from the property, giving a net return of 123 oz. of gold, 84,519 oz. of silver, and some copper.”

The best ore seems to occur where the veins are cretulated into a series of “rolls.” These “rolls” seem to be best developed where the veins are transverse to the bedding of the formation, but the veins also follow the bedding in places. Mineralization consists of pyrite, arsenopyrite, galena, sphalerite, grey copper, with some ruby and native silver, mainly in a quartz gangue. In places scheelite is known to occur, but is probably not in sufficient quantity to be of commercial importance.

Mining has been carried out in a haphazard and intermittent manner and these operations are described in former Annual Reports. During 1934 the driving of the “Alice” adit at elevation 1,730 feet was continued for the purpose of intersecting the “Alice” vein outcropping at about 65 feet higher elevation. At the time of examination this adit had been driven in a winding direction for about 114 feet, with the face heading south 67 degrees west, which location should be about 50 feet to the projection of the vein at this level. The “Alice” vein has been traced by open-cuts and stripping between elevations 1,798 and 1,850 feet for a distance of about 700 feet, striking north 40 degrees west and dipping about 70 degrees to the south-west. Along this stretch the vein shows a width of from 6 to 36 inches and is composed of quartz, pyrite, galena, sphalerite, some grey copper, and possibly some ruby silver. A sample along 8 feet of the most easterly cut and across a width of 3 feet assayed: Gold, 0.10 oz. per ton; silver, 75 oz. per ton; lead, 0.2 per cent.; zinc, 2 per cent. A composite sample of the stripped vein exposed 50 feet westerly of this cut across widths of from 6 to 22 inches and along a length of 56 feet assayed: Gold, 0.04 oz. per ton; silver, 22.5 oz. per ton; lead, 0.5 per cent.; zinc, trace. It is understood that work on the crosscut adit to this vein ceased before the vein was intersected.

Gold Reef. This group, composed of the *Gold Reef Nos. 1, 2, 3, 4, and 5* mineral claims and fractions, is situated on the west side of the upper Kitsault valley adjoining the *Homestake* group on the west. The claims extend from about elevation 3,000 feet on the *Homestake* line to about elevation 5,400 feet. The formation of the area consists of fragmental and massive volcanic rocks of the Dolly Varden series overlain in places by argillites, quartzites, conglomerates, and tuffs of the Kitsault River formation. These formations are intruded in this area by a series of dioritic intrusive rocks in the form of what might possibly be dykes, sills, and small bosses.

The mineral occurrence consists of three siliceous replacement-zones, in places showing some shearing. These zones strike approximately east and dip from 80 to 85 degrees north. In places silicification across appreciable widths is observed and mineralization consists of pyrite and chalcopyrite, with some sphalerite and galena. In the order of their occurrence from north to south these zones are known as the "Silver Tip" and "Tip Top" zones, the "Matilda" zone, and the "Spar" zone. In accordance with their general strike, it would appear the zones may possibly come together and form a wide mineralized area a short distance easterly from the cabin. In some of the stringers in the main zones tetrahedrite can be observed, especially in sections with a barite gangue contiguous to or in the argillite formation. Striking across the main zones are several cross-veins from about 2 to 5 feet in width, mineralized generally with pyrite, pyrrhotite, chalcopyrite, and occasionally some sphalerite and galena. A considerable amount of work in the form of open-cutting, several short adits, and some stripping has been carried out on the various showings on this property.

In order to derive some indications regarding values, the following samples were taken:—

(1.) Chip sample across a section of pyritized and quartzose andesite about 12 inches wide occurring about 200 feet above the cabin: Gold, 0.2 oz. per ton; silver, 0.2 oz. per ton.

(2.) Chip sample selected from silicified cross-fractures mineralized with pyrite, chalcopyrite, galena, and sphalerite cutting across an argillite-zone at elevation about 4,000 feet: Gold, 0.04 oz. per ton; silver, 0.8 oz. per ton.

(3.) Chip sample across a cross-vein 5½ feet wide at elevation 3,970 feet, well mineralized with pyrite and chalcopyrite, with stringers of calcite, but showing no silicification: Gold, 0.50 oz. per ton; silver, 1 oz. per ton; copper, 2 per cent.

(4.) Chip sample across 4 feet of cross-vein known as the "gold vein" from a cut above the adit at elevation 3,820 feet: Gold, *nil*; silver, *nil*; copper, *nil*.

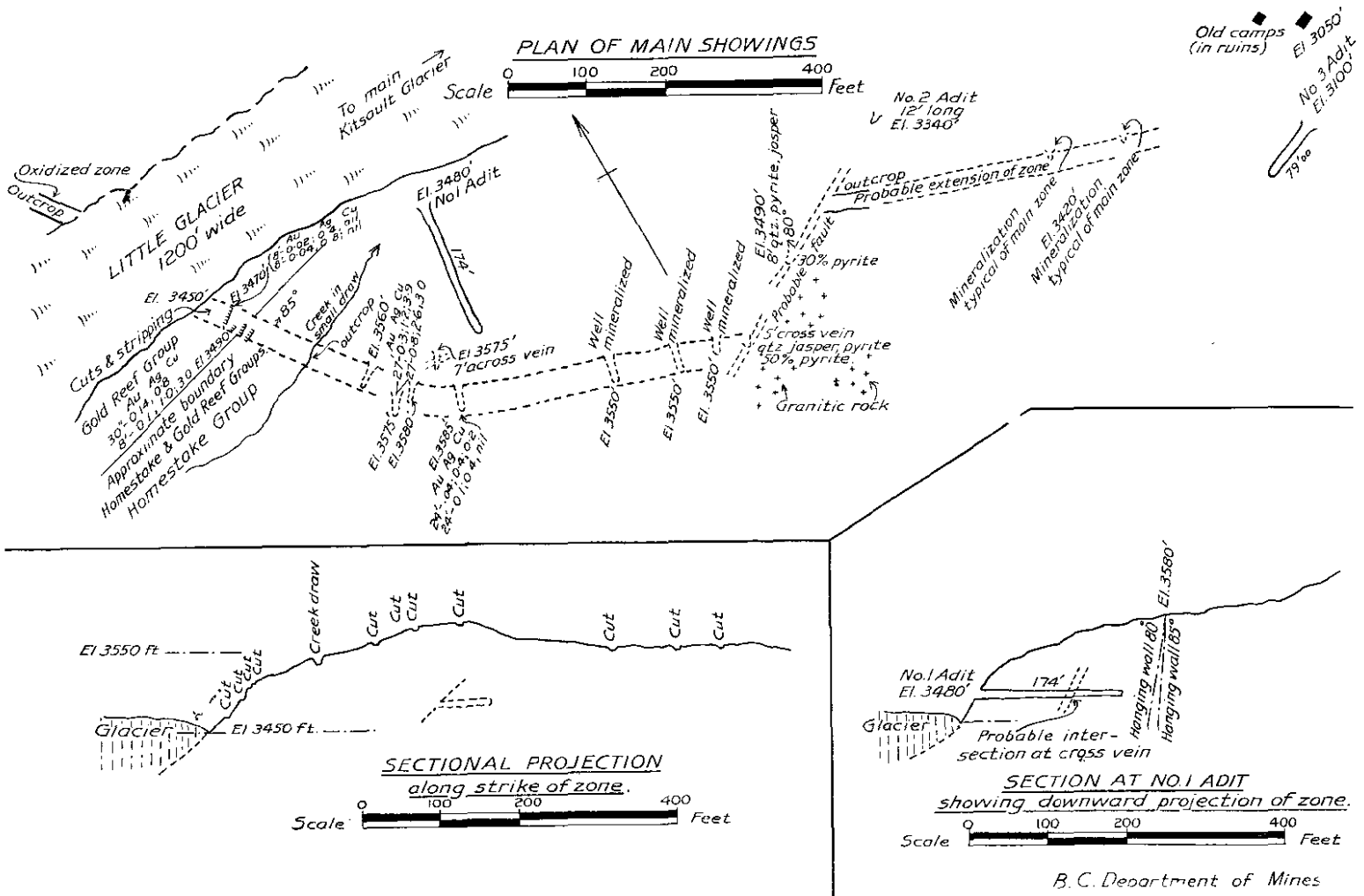
(5.) Chip sample selected from quartzose section showing the best mineralization from the dump of the old *Silver Tip* adit at altitude 3,680 feet: Gold, trace; silver, 3.6 oz. per ton; copper, 0.5 per cent.; lead, *nil*; zinc, 4.5 per cent.

In view of the widespread mineralization, the tendency to appreciable gold values in places, the geology, and good widths of mineralization in places, it would appear that this property is worthy of exploration. This could conveniently be carried out in a combined operation including the adjoining *Homestake* group.

Homestake. This group of four claims is owned by A. Davidson, Miles Donald, and partners, of Alice Arm. The claims are located about 25 miles from Alice Arm on the west side of the upper Kitsault valley bordering the "Little Glacier" and adjoining the *Gold Reef* group on the east. The property is reached by a good trail about 7 miles in length from the terminus of the Dolly Varden Railway at Camp 8. It is understood an option has recently been given by the owners to Vancouver interests. The claims lie between elevations of about 3,000 and 4,000 feet.

The mineral occurrence consists of a siliceous replacement-zone carrying chiefly pyrite, chalcopyrite, galena, and sphalerite in andesitic lavas of the Dolly Varden formation contiguous to an intrusion of dioritic rock. The zone strikes approximately east-west and dips about 85 degrees north. It has been exposed by stripping and eleven open-cuts along a length of approximately 700 feet and shows a width from about 15 to 30 feet. The zone is exposed practically at the brink of the "Little Glacier" at an elevation of about 3,450 feet and is traced easterly to elevation 3,550 feet. At this point the zone appears to be intersected by a likely-looking cross-vein and seems to be offset 150 feet down the hill, continuing from the easterly side of this cross-vein with apparently equal strength, but with no work done on it in this direction.

In some sections in the zone unmineralized horses of country-rock occur, but all the cuts examined showed fairly even mineralization. All the open-cuts were not sampled, but what



Homestake Group.

sampling was done showed low-grade values in some sections and quite encouraging gold values in others. Some exposures showed appreciable widths of heavily oxidized material which will doubtless change to sulphide mineralization below the zone of oxidation. This oxidized mineral was avoided as much as possible in the sampling. In order to ascertain possible values the following samples were taken:—

(1.) Chip sample across vein-face, 8 feet wide and 15 feet high, in the lowest cut, at elevation 3,470 feet: Gold, 0.02 oz. per ton; silver, 0.4 oz. per ton; copper, *nil*; lead, 1.5 per cent.; zinc, 1.2 per cent.

(2.) Chip sample of vein-face 8 feet wide and 12 feet high immediately above sample 1: Gold, 0.04 oz. per ton; silver, 0.8 oz. per ton; copper, *nil*; lead, 4 per cent.; zinc, 3 per cent.

(3.) Chip sample across 30 inches of unoxidized material in a cut at elevation 3,490 feet: Gold, 0.14 oz. per ton; silver, 0.8 oz. per ton.

(4.) Chip sample across 8 feet of unoxidized material in cut at elevation 3,490 feet: Gold, 0.1 oz. per ton; silver, 1 oz. per ton; copper, 3 per cent.

(5.) Chip sample of cut at elevation 3,575 feet across 27 feet: Gold, 0.30 oz. per ton; silver, 1.2 oz. per ton; copper, 3.9 per cent.; lead, *nil*; zinc, 3.5 per cent.

(6.) Channel sample along same cut as No. 5 and across 27 feet: Gold, 0.8 oz. per ton; silver, 2.6 oz. per ton; copper, 3 per cent.; lead, trace; zinc, 4.5 per cent.

(7.) Chip sample in cut at elevation 3,585 feet across 24 feet: Gold, 0.04 oz. per ton; silver, 0.4 oz. per ton; copper, 0.2 per cent.; lead, *nil*; zinc, 3 per cent.

(8.) Channel sample in same cut as No. 7 and across 24 feet: Gold, 0.1 oz. per ton; silver, 0.4 oz. per ton; copper, *nil*; lead, 0.3 per cent.; zinc, 3 per cent.

Some years ago a crosscut adit was projected at about elevation 3,500 feet for the purpose of intersecting this zone. In this work a cross-vein was intersected, but projections show that the working would have to be advanced about another 50 feet along its present bearing in order to intersect the main zone on this horizon. In this area of the zone there is a good opportunity to excavate exploratory drifts, but permanent operations, if warranted, would be from an adit-site at a lower altitude at the easterly end of the zone.

Further exploratory work should also be carried out on this zone on its easterly extension. The topography of the area indicates that permanent development-work should be carried out from the easterly side of the hill-slope, and consequently the zone should be traced and explored at this end in order to ascertain its possibilities and to supply information regarding the location of possible eventual working-sites. The topography of the locality also indicates that the zone can be readily explored by diamond-drilling, which work should be preceded by further detailed open-cutting, exploratory drifting, and sampling.

There is a good location at the easterly end of the property for a camp-site contiguous to water-supply and timber. Although no measurements were taken with regard to horse-power available, it would seem that a substantial water-power could be developed from Clearwater creek, distant from 2 to 3 miles from the property.

Assessment and further prospecting has been carried out on several other properties in the Kitsault River area, including the *Storm*, *Bunker Hill*, *Wildcat*, *Summit*, *Combination*, *Tyee*, *Highland*, *Maud*, *Vanguard Extension*, *Gold Reef*, and *Lucky Strike* groups and claims by their respective owners of Alice Arm.

PORTLAND CANAL MINING DIVISION.

This area is approximately 7,000 square miles in extent, and, excepting the Unuk River section, is accessible from the town of Stewart at the head of Portland canal. An important geographical feature is the fact that the west boundary of the Division, a length of about 130 miles, is formed by the Alaskan boundary.

The economic geologic feature of this Division is the mineralized eastern contact-belt of the Coast Range batholith which strikes through the Division in a north-westerly direction for about 70 miles bordering its westerly boundary. Penetrating the central portion of the Division are numerous granitic spurs and cupolas, satellitic offshoots from the underlying and easterly plunging batholith.

From a standpoint of exploration and prospecting, the Division is the most active in the district.

A growing intimacy with the area indicates that much of it, easily accessible from Stewart, in which claims have been staked and restaked for a number of years is as yet only partly prospected.

BEAR RIVER SECTION.

This company was incorporated in 1928 with a capitalization of 4,000,000 shares of 50 cents par value for the purpose of developing the *Gold Cliff Gold and Silver Mines, Ltd.* group of claims. The company holdings at present consist of the following Crown-granted claims: *Gold Cliff Nos. 1, 2, 4, 5, and 6; Gold Cliff Nos. 1, 2, and 3 Fractions; Gold Fraction; Tom Fraction; No. 1 Fraction; Cliff Fraction; Lucille No. 1; Beth, Tom, Barney, Margaret, and Jerry Dog.* The *Lucille No. 1, Beth, and No. 3 Fraction* were acquired from the Bayview Mining Company, Limited. Four additional claims and two fractions were staked in 1933. A tract of 5 acres on the Bear River flats is also reported to be owned by the company and application for surface rights to an adjacent 160 acres has been made.

The property is located about $2\frac{1}{2}$ miles from the town of Stewart on the easterly slope of the Bear River ridge, the claims extending from the valley-flats at about altitude 200 feet to the Alaskan boundary at about altitude 5,200 feet. A good pack-horse trail extends from the Bear River motor-road to the camp at elevation 2,920 feet. The workings are also connected by an aerial tramway with the terminal at the Bear River road. The topography of the area is steep and rugged with timber-line at about elevation 3,000 feet. The mineral occurrence consists of fracture-zones in sedimentary and volcanic rocks of mainly the Bear River series contained in an embayment of the easterly-plunging granite batholith. Mineralization is mainly pyrite, pyrrhotite, sphalerite, galena, chalcopyrite, and in some places tetrahedrite (grey copper) and ruby silver. Values are mainly in silver, lead, and zinc, with minor values in gold.

The *Gold Cliff* showings were discovered by William Dann in 1923 and the first exploratory work was undertaken in 1924. The property was then optioned to the Pacific Mines, Petroleum, and Development Company, Limited, represented by A. B. Trites, of Vancouver, which carried out some trenching, open-cutting, and driving, and later relinquished the option. With the incorporation of the present company in 1928 further exploration by trenching and driving of the "Dann" adit was carried out and continued in 1929. The property then remained practically inactive until 1933, when the present operations were initiated through the negotiation of a deal with York Investments, Limited. Reports and references to the property and the adjoining *Bayview* group are contained in the Minister of Mines' Annual Reports for the years 1924, 1925, 1926, 1928, 1929, 1930, and 1933. The property is also described in the Geological Survey of Canada Memoir 159, 1929.

The mineral deposit occurs in a formation of mainly altered sandy argillite with some tuffs and andesitic lavas contained in an embayment of granitic rock immediately adjacent to the easterly-plunging main contact of the Coast Range batholith. Mineralization occurs in fracture-zones contiguous to the granitic rock and, other than in some instances extending from the metamorphosed sedimentary and volcanic rocks into the digested or semi-digested phases of these rocks bordering the contact, does not extend into the batholithic rocks. Horizontal, lateral, and depth continuity of the mineralization is consequently limited by the bordering granitic contacts, which upon further exploration may possibly be found to dilate in relationship to the contained mineral-bearing formation, or possibly may be found to constrict and to be erratically intrusive into it. At the time of various examinations the main showings had not been tied in by accurate survey, and no correlation of the various showings into a continuous vein structure or structures can evolve until the required exploration-work and surveying is carried out. Surface showings and underground work indicate the occurrence of the best mineralization in lenticular distribution in replacements along lines of fracturing striking north-westerly contiguous to the granitic contact.

Generally, the fracture-zones are not well defined by clean-cut walls and mineralization gradually diminishes into the bordering country-rock. In places, however, better definition is evident in some subdued shearing or movement along the planes of fracturing. In places, veinlets, stringers, bands, blebs, and patches of quartz in erratic distribution, with an occasional accompaniment of garnet and epidote, occur in the structures and generally accompany the best mineralization. Silicification of the structures is, however, generally not intense.

The operations carried out in 1933 are described in the Annual Report for that year. During 1934 exploratory operations have been continuously carried out under the supervision of W. Dann with a crew of about thirty men. The property has been equipped with a 2-bucket jig-back tramway, a ground power-cable from the Dunwell plant, necessary machinery, buildings, accommodation, and a telephone-line. In the "Brindle" adit at elevation about 2,825 feet a crosscut to the north and a raise under the surface open-cut at elevation about 2,860 feet had at the time of examination not intersected the ore showing in the surface cut. In the "Trites" adit at elevation about 3,055 feet a crosscut to the south intersected a structure about 6 feet wide mineralized mainly with pyrite, galena, and sphalerite. The main crosscut at elevation 2,995 feet, at an estimated depth of about 60 feet below the "Trites" level, intersected, at a point about 1,550 feet along the working from the portal, a vein-structure 6.5 feet wide mineralized with pyrite, sphalerite, and galena. A chip sample of the north-west face (as at September 17th) across about 6 feet assayed: Gold, 0.04 oz. per ton; silver, 4.5 oz. per ton; copper, *nil*; lead, trace; zinc, 2 per cent. It is reported by the management that the south-east drift from the main crosscut has broken through to the surface and the north-west drift has been continued, with a crosscut from it to the west. In these workings better results are reported by the management. Exploratory diamond-drilling was also carried out.

At the time of examination (September 17th) it was indicated that a considerable amount of exploratory-development work in the form of drifting, raising, and sub-levelling, coupled with detailed sampling, would be required before any accurate estimate of ore-tonnage to warrant mill-installation could be made.

This company, with head office at 101 Pemberton Building, Victoria, was **Dunwell Mines**, incorporated in 1922 as a specially limited reorganization of Nass River **Ltd. (N.P.L.)** Lands, Limited, which was incorporated in 1913. The capitalization of the

Dunwell Mines, Limited, was originally \$350,000, but this was doubled in 1925 and further increased in 1926 to \$1,000,000, divided into 1,000,000 shares of \$1 par value each, of which 840,000 have been issued. Late in 1933 a debenture issue of \$18,000 was authorized to provide funds for rehabilitation and resumption of operations. The property was originally owned by Stewart Bros. and W. Noble, of Stewart, and in the holdings are now included the claims of the old Stewart Mining and Development Company.

The property consists of some twenty-four claims and fractions situated on the north side of Glacier creek, about 4 miles from the town of Stewart, from where a motor-road extends to the workings.

The mineral deposit consists of a main shear-structure with lateral veins, carrying silver-lead-zinc mineralization with gold values in places. The veins occur in argillite of the Bear River series.

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

Production from this operation amounted to 27,067 tons of ore, from which was recovered 4,805 oz. gold, 102,199 oz. silver, 1,264,787 lb. lead, and 1,602,634 lb. zinc. Some electrical prospecting by the Radiore Company of Canada, followed by diamond-drilling, was carried out during 1928 and 1929, but with negative results. The property remained inactive until attacked by lessees in 1932 and 1933, from which small-scale hand operations about 1,767 tons of ore was produced, with an output of 630 oz. gold, 28,653 oz. silver, 4,744 lb. copper, and 57,237 lb. lead. In the interval some of the mill machinery was sold to Bralorne Mines, Limited.

Reference to the property is contained in the Minister of Mines' Annual Reports for the years 1920, 1922, 1923, 1924, 1925, 1926, 1927, 1928, 1929, 1932, and 1933. The property is also described in the Geological Survey of Canada Memoir No. 159, 1929.

Surface exposures on the *Dunwell* have not been sufficiently correlated to definitely identify the vein-structures exposed. One main shear-structure with a strike about north and a dip 50 degrees west, extending throughout the length of the property, is indicated. Smaller more or less parallel lateral veins converge towards and join it at acute angles along the strike and dip. The vein-structures are frequently accompanied by pre-mineral lamprophyre dykes. These were probably injected along already-formed shear-structures, subjected to subsequent stresses, and appear to have had a controlling influence on later mineralizing solutions. Mineralization of

the ore-shoots and lenses consists mainly of a quartz-calcite gangue with sphalerite, galena, pyrite, and tetrahedrite. Argentite, ruby silver, native silver, and probably some electrum constitute very high-grade ore in places.

Commercial-grade ore in shoots or lenses seems to favour intersection areas of the lateral veins with the main north-south structure, but occurs in both structures. There is no definite evidence to indicate that commercial ore is confined solely to these areas of vein-intersection and their vicinity, and further development may show a wider ore-distribution. Underground mining in the old 1927 operation through No. 4, No. 3, and No. 2 adits was confined principally to one ore-shoot occurring apparently around one such vein-intersection area, but in the extensive underground workings and in surface exposures commercial mineralization is indicated at places appreciable distances north and south of this formerly mined area. The various surface exposures are described in detail in the 1933 Annual Report.

Although correlation is not yet definite, it would seem that the main underground workings on the *Ben Hur* claim, from No. 2, No. 3, and No. 4 adits, are on the *Sunbeam* vein-structure, with possibly closely related lateral branches. No. 4 main crosscut adit intersects the main vein-structure at 960 feet in. From the portal to about 480 feet several small quartz veins from 2 to 30 inches wide are intersected and should receive some exploration. At 480 feet from the portal a silicified shear-zone 20 feet wide, with some pyrrhotite and arsenopyrite mineralization, is worth exploration. At the end of the crosscut adit the main vein has been drifted on for 380 feet north. For the first 220 feet of this length the vein is 3 to 5 feet wide and fairly well mineralized with galena, sphalerite, and pyrite, and sections of it would probably make good milling-ore. At 40 feet along the drift a crosscut-intersection stope and chute entry has been installed. Commencing about 50 feet above the drift-level, the vein has been stoped out for a height of 150 feet to No. 3 level along a length of 120 feet. Appreciable ore probably still remains in the drift-back to the stope. Below the drift-level between station 412 and the main crosscut (a length of about 220 feet) there is an excellent chance of developing ore along what appears to be the southerly rake of this ore-shoot. North of station 412 the drift continues 160 feet to the face, with the shearing gradually diminishing along the dyke which accompanies the vein.

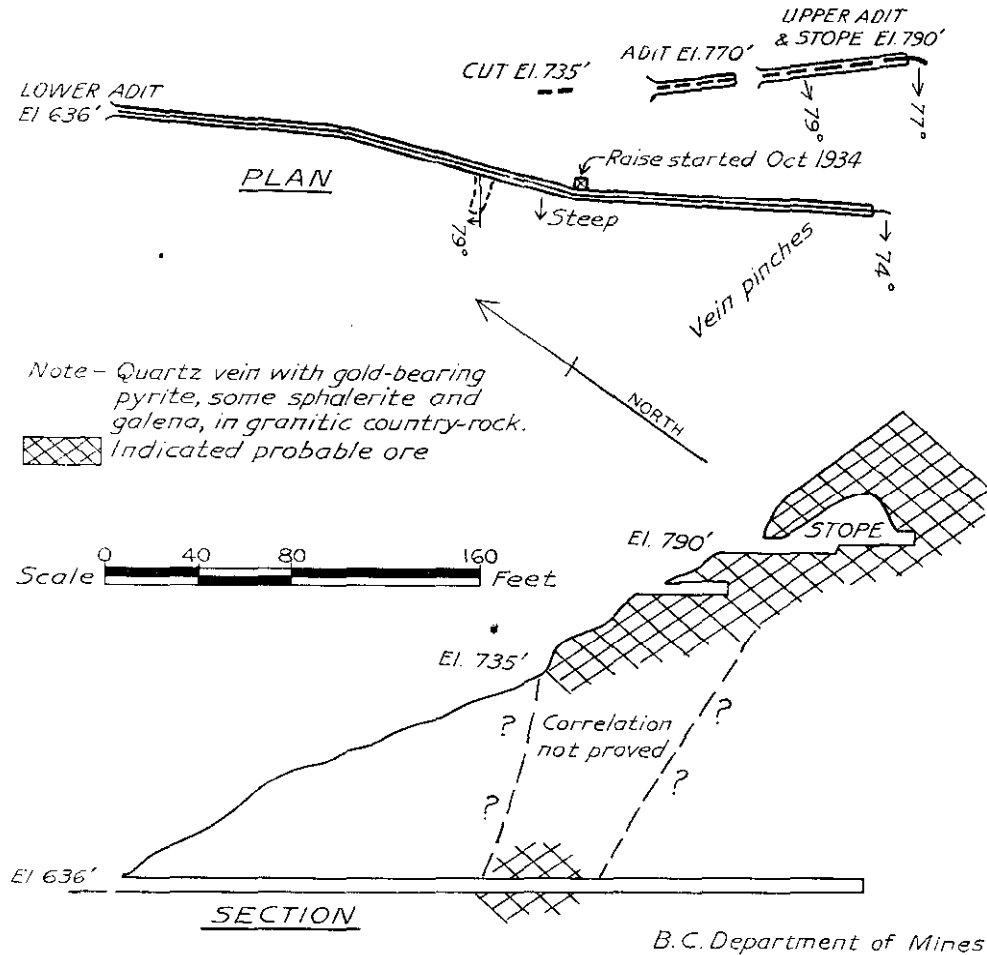
No. 3 crosscut adit, 200 feet higher in elevation than No. 4 crosscut, intersects the main vein-structure at about 450 feet from the portal. Near the point of intersection, between No. 1 and No. 2 south raises, an area 160 feet high and averaging 90 feet long was stoped out in 1927 along the upward extension of the ore-shoot from No. 4 level. The workings on No. 3 level are described in detail in the 1933 Annual Report and localities possible for further ore-development are indicated.

In the southern section of the property, on the *George E.* claim, about 200 feet lower than No. 4 level, there are two old adits on the east and west side of a deep canyon. The canyon probably coincides with the main north-south structure of the property and marked shearing with quartzose vein-matter of appreciable width can be seen along its base, especially towards its south end on the *George E.* claim and extending into the Glacier Creek property. The old adits on the east and west sides of the canyon are probably on veins converging laterally to the main shear-structure. The adit on the east side of the canyon was not examined. The one on the west side is about 500 feet long and was started on a vein 4 to 5 feet wide which follows a dyke and strikes north 15 degrees east, with a dip of 55 degrees west. The working is very crooked and appears to trend to the east off the vein at 170 feet from the portal, following a slip. The vein is fairly well mineralized from the portal to the winze, a distance of about 150 feet. At the winze, said to be 57 feet deep, the vein is 3 to 4 feet wide and well mineralized. The main working continues along a slip on a winding course and shows shearing, calcite, and a little pyrite in the face. At 100 feet from the face a small vein is intersected. A crosscut to the west from near the face intersects a vein, which is drifted on north and south for about 100 feet. The vein is 18 inches to 6 feet wide and well mineralized in places. About 35 feet from the start of this drift the vein is 4 to 6 feet wide and well mineralized. A sample across 5 feet of this section assayed: Gold, 0.5 oz. per ton; silver, 17 oz. per ton; copper, trace; lead, 28 per cent.; zinc, 5 per cent. A small shoot of ore from this showing was mined out during 1934.

On the *Ben Ali* claim a well-defined, sheared quartz vein in a granitic rock is exposed in open-cuts and adits along a horizontal length of 350 feet through a vertical distance of 250 feet.

The vein strikes north 40 degrees west, dips 80 degrees south, and varies from 20 to 48 inches in width. Mineralization consists chiefly of pyrite with some sphalerite and a little chalcopyrite. This ore assays about 0.5 oz. gold and about 1 oz. silver per ton.

Generally speaking, examinations of the *Dunwell* have indicated a probable ore-horizon along the dip in the known veins of from 300 to 400 feet deep, raking from north to south at possibly 50 degrees through practically the entire *Dunwell* property. In this, ore-shoots are lenticularly distributed. It is indicated that this ore-horizon may be structurally related to and conformable with the southerly plunge of the *Ben Ali* granitic stock, which outcrops about 1,800 feet to the westward of the main *Dunwell* workings. With this governing structural condition, mineralization and ore-carrying structures could be expected to occupy a zonal horizon in the Bitter Creek formation.



Dunwell Mine—Plan and Section of Ben Ali Workings.

During 1934, mining by the company commenced in April and the mill, with a daily capacity of 25 tons, was started in May, milling being carried on at an average of about 20 tons per day. To October 31st, 3,100 tons of ore averaging 0.186 oz. gold and 7.4 oz. silver per ton was milled, with a recovery of about 85 per cent. Besides this, 119 tons of sacked ore averaging 0.81 oz. gold and 142 oz. silver per ton and 930 tons of flux ore averaging 0.15 oz. gold and 11 oz. silver per ton has been mined and shipped. The total tonnage mined to October 31st is reported as 5,500 tons averaging 0.195 oz. gold and 12.5 oz. silver per ton. Production has come from the main workings of the old mine, where the indicated ore possibilities in stoping up along

the rake to the north are responding favourably as mining proceeds. Due to hanging-wall dilution the initial grade of mill-feed was appreciably lowered. With sufficient care to avoid this, the grade could be improved, and during the month of October mill-heads were reported to assay 0.27 oz. gold and 11.25 oz. silver per ton. Production from the *Ben Ali* of about 15 tons per day of siliceous fluxing-ore, estimated to average about 0.5 oz. gold and 11 oz. silver per ton, for shipment to Anyox was commenced in the late fall. For this purpose an aerial tram about 1,000 feet long was constructed to the road.

A crew of about forty men is employed in the operation.

This company, with registered office at 101 Pemberton Building, Victoria, **Lakeview Mines, Ltd.** has a capitalization of \$1,000,000, divided into 4,000,000 shares of 25 cents par value. The holdings consist of four Crown-granted claims east of the *Dunwell* at an elevation of 2,000 to 3,000 feet above sea-level. An excellent 4-foot trail on wagon-road grade has been constructed from the *Dunwell* to the *Lakeview* camp, a distance of about 2 miles.

Mineralization consists of quartz veins about 1 to over 8 feet wide with galena, sphalerite, pyrite, and some grey copper. The main structure has a general north-west strike and dips about 60 degrees south-west in a formation of argillite intruded by numerous granitic dykes.

The main ("cabin") vein outcrops in a creek-bed immediately south of the old camp at 2,250 feet elevation. Several years ago a section of this vein was stripped and a shaft sunk in the hanging-wall of the vein. In 1928 the shaft was unwatered and crosscuts were driven to the vein at depths of 25 to 45 feet from the collar. The upper crosscut is reported to have found promising ore consisting of galena, sphalerite, chalcopyrite, and pyrite, but the vein is reported not so well mineralized at the lower crosscut. About 1925 a long crosscut adit was driven to cut the vein at a depth of about 250 feet below the collar of the shaft. A narrow vein was cut at 180 feet and a vein, believed to be the "cabin" vein, at 750 feet from the portal. A total of 175 feet of drifting was done on this vein and indicated some lenses of silver-lead mineralization.

Approximately 500 feet south-easterly from the "cabin" shaft is a shallow shaft, believed to be on the same vein. This is connected with a very shallow open-cut, crosscut, and drift, known as the "McKay" cut, which exposes a well-defined and well-mineralized vein 8 to 10 feet wide, from which a small tonnage of high-grade ore is reported to have been shipped several years ago by McKay. About 300 feet south of these workings and at 100 feet lower elevation is the portal of the old "Campbell" crosscut adit driven north along a minor structure. At about 200 feet this working intersects the vein, which is drifted on to the north-west for 300 feet. Slightly east of the intersection in the crosscut the vein appears to be faulted or dragged. Along the north-westerly drift some sections of mineralization across widths of from 10 to 30 inches are encountered, starting about 50 feet west of the crosscut and continuing for about 120 feet to slightly west of the winze. Beyond this to the face the values are low and the structure is not as strong. A 25-foot raise driven in 1928 at the south-east end of the ore-shoot is reported to have encountered low-grade material, and the winze about 170 feet west of the crosscut was reported in fairly good material for 20 feet. About 400 feet north-easterly of the old "McKay" cut and at about 100 feet higher elevation there is an old shaft, short adit, and open-cut on a reticulated and brecciated quartz vein 12 feet wide in argillite. In this some quartz stringers and streaks carrying galena and pyrite are to be seen. It is reported that some very high gold assays were obtained from this showing by "old-timers" and about 21 tons of ore shipped. The strike of this vein is in alignment with a wide cross-structure at the "McKay" cut and interval trenching should be carried out to establish continuity. The property is referred to in the Annual Reports for 1925 and 1928 and also in Geological Survey of Canada Memoir 159, 1929.

During 1934 the property was leased by H. D. Rochfort and W. Noble, of Stewart, and associates, and further exploration in the effort to extract ore of a shipping-grade resulted in the sacking of about 17 tons of estimated high-grade ore for shipment. This ore came from extensions of the veins about 50 feet easterly from the old "McKay" cut, where a high-grade lens 12 to 18 inches wide in a vein up to 4 feet wide was stripped and open-cut for about 30 feet.

A sample by the writer of the cross-structure adjacent to the old McKay workings across 10 feet assayed: Gold, 0.05 oz. per ton; silver, 10.6 oz. per ton; lead, *nil*; zinc, 1.5 per cent. A sample across 10 inches of the foot-wall streak of the "cabin" vein assayed: Gold, 0.02 oz.

per ton; silver, 20.15 oz. per ton; lead, 15 per cent.; zinc, 15 per cent. A sample of the hanging-wall side adjacent to this across 4 feet assayed: Gold, 0.04 oz. per ton; silver, 10.5 oz. per ton; lead, *nil*; zinc, 3 per cent.

The development-work carried out to date has indicated the possibility of developing mill-grade ore-shoots across appreciable widths and short shoots or lenses of high-grade ore across narrow widths. The frequency, structural relation, and attitude of these shoots in the vein system has not yet been indicated by the work done. Surface exposures, especially those about the "McKay" cut and the 1934 lessees' workings, indicate a main vein-structure striking north-westerly, with cross-structures in places and smaller lateral veins joining at acute angles as is the case in the *Dunwell* structure.

King.

This group of fourteen claims is owned by J. Rochfort and associates, of Stewart, and adjoins the *Dunwell* on the north-east and lies northerly of the *Lakeview* group. The claims embrace a 1934 restaking of the property of old Emperor Mines, Limited. The property is reached by a good trail branching from the *Lakeview-Dunwell* trail. Considerable underground work was carried out by the Emperor Mines, Limited, and the property equipped with necessary buildings at elevation 2,880 feet and efficient machinery for exploratory work. The property is referred to in the 1920, 1925, 1926, and 1928 Annual Reports and also in the Geological Survey of Canada Memoir 159, 1929.

The main showing consists of a well-defined quartz vein about 15 feet wide, strike about north 15 degrees east, dip 50 degrees west, apparently following a fault-plane between two dykes. The vein is generally sparsely mineralized with pyrite, some chalcopyrite, galena, jamesonite, and possibly a manganese mineral. The strike and dip of the vein are similar to the strike and dip of the siliceous argillites of the Bitter Creek series. The latter are intruded by numerous granitic and lamprophyre dykes.

Very little surface work has been done, but two crosscut adits have intersected the main vein showing good definition but sparse mineralization. A sample across 5 feet of the best-mineralized section of the vein on the east side of the lower crosscut at elevation 2,880 feet assayed: Gold, 0.04 oz. per ton; silver, 3.9 oz. per ton; copper, 0.1 per cent.; lead, 0.5 per cent.; zinc, 14 per cent. An old adit ("McKay") and cut southerly from the surface outcrop above the upper adit shows intense oxidation evidently derived from sulphide mineralization. Other showings are reported but were not examined.

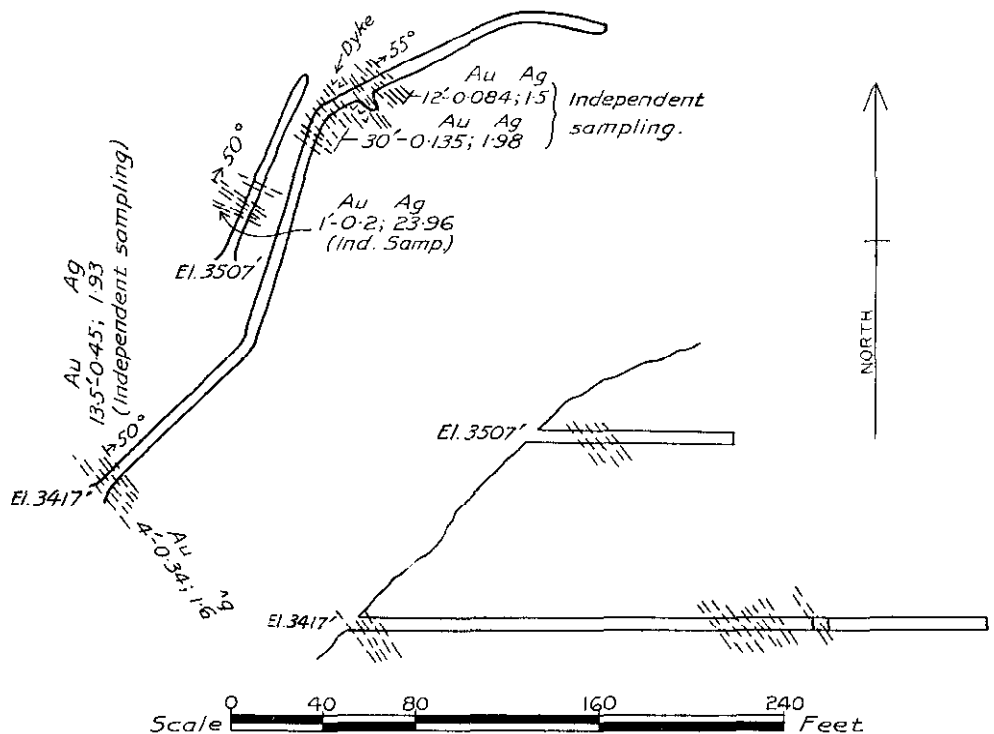
In view of the good width and definition of this vein and the fact that the small amount of work, particularly on the surface, along the strike has not adequately prospected this structure for the possible occurrence of ore-shoots, it is considered to be worthy of further exploration. This could constructively be carried out by surface-trenching and open-cutting both north and south of the known outcrop.

Playfair Gold Mines, Ltd. (N.P.L.).

This company was incorporated in June, 1934, with an authorized capital of 2,000,000 ordinary shares of 50 cents par value each. The registered office is at 608 Central Building, Victoria. The holdings embrace the old *L.L. and H.* group, situated at an elevation of from about 2,000 to 4,000 feet in Harkley gulch near the head of Bitter creek, about 7 miles east of the Bear River motor-road. The property is reached by good trail extending from the Bitter Creek bridge to the lower camp at about elevation 1,907 feet and to the projected new camp-site at about elevation 2,807 feet. The property is referred to in the Annual Reports for the years 1920, 1926, 1929, and 1932.

Mineralization consists mainly of pyrite, galena, and sphalerite, with some chalcopyrite and arsenopyrite, carrying silver and, in places, appreciable gold values, in well-defined shear-zones in argillaceous sediments and andesitic lavas of the Bitter Creek series. The latter formation is intruded by dykes of granitic character. During 1934 work was carried out by two men, and consisted mainly of preparatory clearing and grading for the establishment of a new camp and projected crosscut adit-site at elevation 2,807 feet.

Detailed sampling of the underground workings was carried out by an independent engineer. A sample taken by the writer at the portal of the lower adit across 4 feet on the east side of the working assayed: Gold, 0.34 oz. per ton; silver, 1.6 oz. per ton; copper, 0.2 per cent.; lead, *nil*; zinc, 1 per cent. The workings and indicated values obtained from independent and reliable sampling are shown on the accompanying sketch. The property merits further exploration.



B.C. Department of Mines

L.L. & H. Group (Playfair Gold Mines, Ltd.)—Plan and Vertical Projection of Workings.

Other Properties in the Bear River Section.

Prospecting and development work was carried out on a number of properties in the Bear River section, including the *L. and L. group*, *Palmey* and *Kenneth* (Argentine Syndicate), *Black-hill*, *Maud*, *Ruth* and *Frances*, *Mayflower*, *El Oro*, and *Lucky Date*.

In the Marmot River area work was done on the *Marmot*, *Engineer*, *Capitol Hill*, *Star*, and *Sure Thing*.

SALMON RIVER SECTION.

This company was incorporated in February, 1919, with a capitalization of **Premier Gold Mining Co., Ltd.** 5,000,000 shares of \$1 par value, all issued, and of which the American Smelting and Refining Company, Guggenheim Bros., and M. C. Keith and Isaac Untermeyer Estate hold 52 per cent. The head office is in the Royal Trust Building, Vancouver, and the New York office is at 120 Broadway. The company operates the *Premier* mine at Stewart and owns substantial interests in the adjoining B.C. Silver Mines, Limited, *Prosperity* and *Porter-Idaho* properties in the Marmot River area, and several other properties in British Columbia, Eastern Canada, and Australia.

The main operation is at the *Premier* mine, located in the Salmon River valley between elevations 775 and 2,000 feet, and is reached by a good motor-road from the town of Stewart, a distance of about 16 miles. The property comprises about thirty-four mineral claims. It is equipped with a complete mining plant, including a concentrator of about 500 tons daily capacity. Power is supplied by the company's own power plant, consisting of 1,620 horse-power in Diesel engines and 1,100 horse-power in water-power. An aerial tramway 12 miles long connects the mine with ore-bins and dock at tide-water, at Stewart.

The deposit consists of a quartz replacement in andesitic volcanic rocks of the Bear River series. Mineralization consists of pyrite, pyrrhotite, sphalerite, chalcopyrite, galena, tetra-

hedrite, freibergite, polybasite, ruby silver, argentite, native silver, and gold. Stephanite has also been identified. Mineralization is either massive or disseminated in isolated patches and stringers through the quartz gangue.

Silicification of the zone is generally intense and fades into the wall-rocks, with no clear line marking the walls of the ore-bodies. The general trend of the zone is crescent-shaped, striking north-easterly in its northerly section and veering to a westerly strike in its southerly section, and dips at an angle of between 70 and 80 degrees to the west. Ore-shoots of appreciable length are distributed in the zone, with a generally southerly plunge or rake. The best ore seems to occur in porphyritic sills bordering the contacts of these rocks with tuffs. The formation of the area is intruded by several large granitic dykes and also by some younger lamprophyre dykes. The rocks of the area are highly sheared, especially near the ore-bodies, and the mineralized zone is intersected in several places by faults.

The holdings embrace the *Old Bush* and *Bunting-Dillsworth* groups, staked about 1910 and originally explored by the Salmon Bear River Mining Company. The property was subsequently explored by New York interests and in 1919 was bonded to R. K. Neill, of Spokane, Wash., in association with Messrs. Trites, Wood, and Wilson, of Fernie. Under this management, work was started in the upper adit and in a comparatively short distance a shoot of high-grade gold-silver ore was intersected. In the fall of 1919 the American Smelting and Refining Company acquired an interest in the property and the present company was formed, with Dale L. Pitt in charge of operations. Production from this property since commencement of operations in November, 1919, to date totals 2,672,674 tons of ore averaging 0.52 oz. gold and 12.99 oz. silver per ton. The property is referred to in the Minister of Mines' Annual Reports from 1910 to date and in the Geological Survey of Canada Memoirs 32, 132, and Summary Report, Part B, 1919.

The property has been developed through five adits—No. 1 at elevation 2,000 feet, No. 2 at elevation 1,752 feet, No. 3 at elevation 1,582 feet, No. 4 at elevation 1,328 feet, and No. 6 at elevation 773 feet—several intermediate levels, many sub-levels, winzes, and drifts. A vertical projection of part of the mine-workings is contained in the Minister of Mines' Annual Report for 1930. The main ore-shoot is considered bottomed slightly below the fifth level, with a few shoots of commercial grade persisting down in the eastern end of the sixth level. Subsidiary lateral ore-shoots occur in the hanging-wall and particularly the foot-wall of the ground adjacent to the main zone, and more recent exploration has been devoted to discovery and development of these shoots between No. 2 level and the surface. During 1934 an ore-shoot lying in the foot-wall of the main structure between No. 1 level and the surface was discovered and developed. The increased price of gold has also permitted extraction of formerly uncommercial ore from some parts of the old workings. During the latter part of the year about seventeen drills were employed in the mine, chiefly on exploration and development. The mill treated about 500 tons per day for the first ten months of the year. An average crew of about 275 men was employed.

On November 2nd a fire destroyed No. 1 power plant and stopped milling for the last two months of the year. Immediate construction of a new plant of about the same Diesel capacity as the old one was, however, at once undertaken. Lack of power due to the fire necessitated a slight reduction in the crew to about 200 employed on development and construction. Production to October 31st, which on account of the fire will represent the year, was 153,950 tons of ore with an average content of 0.17 oz. gold and 4.38 oz. silver per ton.

It is understood that negotiations between the Premier Gold Mines, Limited, and the B.C. Silver Mines, Limited, which may culminate in the early resumption of operations and production from the latter property through the forming of a new company and its operation by the Premier Gold Mines, Limited, are progressing.

The *Big Missouri* property is owned and operated by Buena Vista Mining Company, in which the Consolidated Mining and Smelting Company of Canada holds a 60-per-cent. interest. The remaining 40-per-cent. interest is held by **Buena Vista Mining Co. (Big Missouri)**. Big Missouri Mines Corporation (N.P.L.). The latter company was incorporated in Quebec in August, 1933, as a holding and exploration company to acquire the assets of the Big Missouri Mining Company, Limited, shares of the old company being exchangeable into the new on the basis of two old for one new. The authorized capitaliza-

tion is 5,000,000 shares of \$1 par value, of which 3,314,000 are reported as issued. The head office is at 603 Perkins Building, Tacoma, Wash., and the executive office at 221 Notre Dame Street West, Montreal.

The *Big Missouri* property consists of about twenty-four fractional Crown-granted claims situated about 18 miles from Stewart on the Missouri ridge east of the Salmon glacier and it is reached by motor-road. The original group is amongst the oldest locations in the Portland Canal area, having been staked by Dan Lindeberg in 1904. The topography of the immediate area is a rugged, hillocked, and ridged section of from 3,000 to 3,500 feet general elevation. The rock formations of Missouri ridge consist mainly of andesitic tuffs and porphyries with some argillite, of the Bear River series, intruded by granitic dykes. The andesitic rocks have been extensively altered and are generally greenish in colour. Lenticular and zonal areas of quartz stringers sometimes approaching stock-works, and sections of complete or partial silicification accompanied by general pyritization, characterize the area. The mineral deposit consists of wide silicified zones in both the tuffs and porphyries containing generally low-grade gold and silver values in irregular lenticular distribution. The zones as well as the country-rock are generally pyritized and sparsely and irregularly mineralized with galena and sphalerite. In the zones occasional quartz stringers sometimes carry native gold irregularly and finely distributed or, in rare instances, isolated pockets and patches of coarse grains, blebs, and streaks. The main silicified zone which is being explored strikes generally north-south with an indicated length of about 900 feet, and width of over 175 feet at its southerly end, about 300 feet in the central section and also at the northerly end. Beyond this northerly point the zone appears to swing north-westerly for a further distance of about 500 feet, with a width of approximately 150 feet at that end. Northerly from this point the zone appears to finger out into alternations of silicification and country-rock, which condition seems to become intensified beyond the northerly boundary of the *Province* and into the *Buena Vista* claim. In this area several bands of silicified porphyry 10 to 50 feet wide, separated by wide stretches of country-rock, occur. On the *Buena Vista* claim a change in the colour and texture of the formation seems to occur north of a hornblende-andesite dyke 20 to 40 feet wide that strikes north-west. Irregular and generally low-grade gold values are scattered through the silicified zone. In places high assays are obtained and occasionally free gold is found. The zone has been extensively explored by drifting, crosscutting, wide stope-sills breast-stopped to a height of about 16 feet, and diamond-drilling. For the purpose of ascertaining the contained distribution of values by bulk mine-run sampling, a test concentrating-mill of 100 tons daily capacity was constructed in 1930 and operated to September, 1931.

During 1933 and 1934 active exploration was continued by drifting, raising, and further diamond-drilling. In this work some values with indications of continuity were encountered in diamond-drilling below the *Province* or 300 level (elevation 2,850 feet). Together with this, the prevailing high gold price has offered additional encouragement relative to the generally low-grade content of the deposit. During 1934, for purposes of further exploration and development of the section below the "Province" tunnel, the *Day* claim on the west side of the ridge was acquired for purposes of a low-level exploratory adit. This adit (to be driven about 2,500 feet) has been started on the west side of the Missouri ridge at about 550 feet lower elevation (2,250 feet) than the "Province" level, which is on the east side. In the same area in the "Province" level the raise has broken through to the surface. From these workings further exploration and development by sub-levelling and raising is planned. In order to supply transportation to the "Day" adit on the west side of the ridge, the "Province" level was extended through the ridge to the west side. A crew of about sixty men is employed under the supervision of D. S. Campbell.

This group, owned by J. E. Munro and A. M. McDonald, of Hyder, Alaska, consists of eleven surveyed and Crown-granted claims and fractions and also nine claims and fractions held by location. The property is situated on the easterly slope of Mount Lindeberg, facing the Salmon glacier, directly opposite the "Day" adit of the *Big Missouri* property and is reached by either traversing up the glacier from its foot, a distance of about 3 miles, or crossing it from the *Missouri* workings, a distance of about 1 mile. The cabin is at elevation 2,400 feet, directly above the Salmon glacier and on the north ridge bordering the Munro glacier. There are several showings on this property which have been reported in the 1922 and 1926 Annual Reports, and which were not examined on this

occasion. The showings on the *Big Pete No. 3* claim only were examined. The formation of this section consists chiefly of folded, silicified argillite, with possibly some intercalated tuff-beds, striking north-westerly and dipping east at varying low angles. These rocks are intruded by bosses, spurs, and dykes of granitic rocks related to the adjacent Coast Range batholith. The showings on the *Big Pete* are reached by a precipitous and in places hazardous scramble up the rugged mountain-side to the workings at an elevation of about 3,750 feet.

The mineral deposit consists of a quartz vein striking north-westerly, dipping about 15 degrees east with the mountain-slope and conformable with the formation. From its southerly outcrop at the foot of a bluff this vein has been traced 230 feet north-westerly to the brink of a deep and precipitous canyon, beyond which no continuity can be seen. About 1,000 feet south-easterly of the main southerly exposure, a quartz vein 24 inches wide outcrops in a creek, but cannot definitely be correlated with the north-westerly showings. The outcrop and open-cut of the main exposure shows a width of from 1 inch to about 4 feet, mineralized with patches and streaks of galena, sphalerite, some tetrahedrite (grey copper), and chalcocopyrite. In the open-cut a width of from 3 to 4 feet of quartz is exposed, with irregular mineralization but carrying a streak of possibly high-grade mineralization 2 to 3 inches wide on both the hanging- and the foot-wall sides. It is possible that some small pockets and lenses of high-grade mineralization may be located in this vein and it is considered that the area adjoining to the north is worth prospecting.

Spider. This group, owned by Theo Collart, of Prince Rupert, and associates, consists of the *Spider No. 1, No. 2, and No. 3* Crown-granted claims and eight adjoining claims staked in 1934 and held by location. The property is situated on the east side of the head of Long lake, about 3 miles north-easterly from the *Big Missouri* and about 22 miles from Stewart. It is reached by motor-road to the *Big Missouri* and trail for 3 miles through open country to the cabin at elevation 3,440 feet. The property was originally located in 1918, optioned to a Belgian syndicate in 1920 and in 1925 to the B.C. Bonanza Mines, Limited. Considerable underground work, some stripping, open-cutting, and diamond-drilling was done during these operations. In 1933 and 1934 the property was leased to two Stewart miners, who mined and shipped a small tonnage of high-grade ore.

The formation of the area consists of augite porphyry intrusive into slates and conglomerates, the whole being intersected by basic and acid dykes. The mineral deposit consists of quartz veins varying from 1 to about 12 feet wide, mineralized with pyrite, galena, sphalerite, and, in places, some tetrahedrite (grey copper), argentite, and native silver. The best mineralization occurs in short shoots and lenses constituting ore of a possible shipping-grade, with greater lengths of possible milling-grade ore. Values are mainly in silver with appreciable gold values in the higher-grade ore. Several veins striking generally north-easterly, but in places converging along the strike and dipping 50 to 80 degrees both east and west, have been located on the property. The largest of these is No. 1, the most northerly vein, which varies from 6 to 12 feet in width and is composed mostly of quartz carrying very little sulphide mineralization where exposed on the surface. Some surface samples of this vein are reported to have assayed about 8 oz. silver per ton and a diamond-drill intersection 15 oz. silver per ton, with a trace of gold. Very little work has been done on this vein. Other veins vary from a few inches to about 3 feet wide.

An adit about 870 feet long at elevation 3,450 feet and two raises explores part of No. 5 vein and possibly No. 3 vein underground. This working, with a raise to the surface at about 275 feet from the portal, follows No. 5 vein, showing a width of from 2 to 3 feet for about 670 feet, where it is crossed by a feldspar-porphry dyke 18 feet wide. The vein dips into the floor of the level at the contact. In this working mineralization, especially on the hanging and foot wall across widths from 18 to 30 inches, is seen in places. The working continues south of the dyke for 165 feet in augite porphyry to the intersection with a vein (possibly No. 3) 12 to 18 inches wide, which is drifted on for 30 feet south 30 degrees east. A raise has also been driven on this vein but was not examined.

At elevation 3,630 feet, open-cutting and also drifting was done on a vein 4 to 6 inches wide. An intersection of two other veins up to 3 feet wide is indicated. Some high-grade mineralization was encountered in these workings, and during 1933 and the early part of 1934 O. McFadden and partner, of Stewart, carried out leasing operations on this showing. In

November, 1933, these lessees shipped 3½ tons of ore containing 1.01 oz. gold per ton and 294 oz. silver per ton. In August, 1934, 7.67 tons of ore assaying 0.23 oz. gold and 152.18 oz. silver per ton was shipped.

It is considered that this property is worthy of further exploration. This should be initiated by accurate sampling and surveying of the showings and workings and further exploration of the No. 5 vein in the long adit to develop possible ore-shoots along its known length and to pick up its possible continuity south of the dyke. Some diamond-drilling of No. 1 vein around the area of its intersection with No. 3 vein would also be constructive and any encouraging indications could be later explored by extending the lower level.

This property consists of twenty-three claims divided into three groups and is owned by C. H. Lake and Neil McDonald, of Stewart. The property is situated on the west side of Mount Dillsworth adjacent to the Nass River slope of the Salmon glacier. The Missouri-Tide Lake trail passes through the property, which is about 6 miles from the end of the Missouri road, and the cabin is at about 2,700 feet altitude, adjacent to the shore of Daisy lake. In 1925 the original *Troy* group of nine claims was bonded to the Northland Mining Company, but reverted to the original owners in 1926. The property is referred to in Annual Reports for the years 1925, 1930, and 1933.

The formation of the area consists of interbedded slates, argillites, sandstone, and conglomerate, possibly belonging to the Salmon River or Nass formations of Upper Jurassic age, to the west of which is a belt of tuffs, breccias, and altered andesitic lava, possibly belonging to the older Bear River series. Two types of mineralization occur. Irregular narrow and lenticular quartz veins occur in argillite, mineralized mainly with sphalerite and galena, with which is associated some chalcopyrite and tetrahedrite (grey copper). These veins have been explored in the earlier operations in several places by open-cutting, stripping, and short adits, but this work failed to disclose commercial mineralization. The second type of mineralization consists of somewhat erratic silicified and pyritized replacement-zones in the volcanics. Recent work has been confined to tracing and exploring these zones with the objective of discovering a possible commercial gold content.

During 1934 considerable stripping and open-cutting was done on a series of silicified zones and veins contained in a belt of tuffaceous and porphyritic volcanic rocks bordering the easterly rim of the Salmon glacier in a section about 400 feet wide and extending from the glacier at elevation 3,125 feet up the steep hill-slope to about altitude 3,500 feet. In places basic and acid dykes intrude the formation. The veins strike generally east-west and apparently dip both north and south. They occur in light-coloured, fine-textured tuffs southerly of and adjacent to a band of andesitic porphyry about 300 feet wide (possibly a sill), which in turn is bounded on the north by coarse-grained purple tuff and fine breccia. The "contact" vein occurs at the southerly contact of the porphyry with the light-coloured tuffs and the silicified structures occupy a belt about 400 feet wide, lying southerly of this and marked by surface oxidation. Silicification is erratic and patchy in the form of veins, veinlets, patches, and blebs. Mineralization consists of erratic, sparse, and patchy distribution of mainly pyrite, galena, and sphalerite. Lying southerly of this north belt, pronounced oxidation indicates the occurrence of two similar belts, with the most southerly adjoining the 49 group, but very little prospecting or work has as yet been done on these.

Only the most northerly belt was examined by the writer. A sample of 4.5 feet of quartz exposed in a cut adjacent on the south to the "contact" vein assayed: Gold, 0.01 oz. per ton; silver, 1.1 oz. per ton. A sample by the owners from the same cut across 4 feet assayed by John Hovland, Hyder, Alaska, assayed: Gold, 0.08 oz. per ton; silver, 2.5 oz. per ton. Another sample by the writer from a section of silicification 1 foot wide in a 12-foot cut at elevation 3,300 feet on the most southerly zone and about 400 feet south of the "contact" vein assayed: Gold, 0.02 oz. per ton; silver, 0.7 oz. per ton. A sample from the same cut taken by the owners across 8 feet and assayed by John Hovland, Hyder, assayed: Gold, 0.12 oz. per ton; silver, 3 oz. per ton. A series of twelve samples taken by the owners from different cuts on these zones across widths of from about 3 to 12 feet and assayed by John Hovland, of Hyder, Alaska, assayed from 0.02 oz. gold and 0.07 oz. silver per ton to 0.16 oz. gold and 6 oz. silver per ton. Three samples taken by the owners from cuts in the southerly belt adjoining 49 and about 4,000 feet south of the "contact" vein, across widths of from 4 to 6 feet and assayed

by John Hovland, Hyder, assayed from 0.04 oz. gold and 1.5 oz. silver per ton to 0.08 oz. gold and 2.5 oz. silver per ton.

Salmon Gold Mines, Ltd. This company was incorporated in British Columbia in 1933 with a capitalization of 3,000,000 shares of 50 cents par value each, of which 1,000,000 shares are reported as outstanding. In February, 1934, Consolidated Mining and Smelting Company of Canada, Limited, took an option on a 60-per-cent.

interest in the company and commenced exploratory operations in June.

The property consists of thirty-seven claims situated on the west side of Summit lake, at the divide between the Salmon River and Nass River drainage-basins, about 8 miles from the *Big Missouri*. The claims are reached by the Missouri-Tide Lake trail to Summit lake, which is crossed by small boat to the camp at altitude 2,720 feet.

The formation of the area consists of porphyritic, tuffaceous, and argillitic rocks of possibly the Bear River series intruded by acid and basic dykes and contiguous to a granitic spur of the Coast Range batholith. The mineral deposit consists of siliceous replacement and fracture zones in porphyritic rocks, mineralized with pyrrhotite, pyrite, chalcopyrite, sphalerite, and galena, carrying appreciable gold values. Several mineralized structures of appreciable width have been discovered and are described in the Annual Reports for 1930, 1931, 1932, and 1933.

During 1934 the Consolidated Company commenced diamond-drilling with an O'Connor drill set up at altitude 3,680 feet. The first hole drilled at a down-angle of 35 degrees intersected at depths along the hole of 340 feet, 1,094 feet, and 1,156 feet, widths of 7.5 feet, assaying respectively 0.23, 0.44, and 0.50 oz. gold per ton. The hole was stopped at the deepest intersection, which on resampling assayed 2.11 oz. gold per ton. In order to gather information for the purpose of correlating these intersections, especially the deepest, with known surface exposures, a second hole at a flatter angle was started, but remained incomplected when snow necessitated the closing of operations for the season. It is understood that the Consolidated plan the continuation of exploration during the 1935 season.

Portland. This group consists of about sixteen claims owned by Alphonse Thomas, of Stewart. It is situated about 2 miles west of the *Pioneer* group on the west side of the foot of Tide lake and on the westerly side of the foot of a glacier-tongue coming down from the ice-sheet covering the divide to the Unuk River headwaters, and about 2 miles southerly of the Tide Lake-Unuk River glacier (Frankmakie glacier). The area is about 35 miles from Stewart and is reached by motor-road to the *Big Missouri*, a distance of 18 miles; thence by trail for 16 miles to the foot of Tide lake, from where the moraine and glacier is crossed for about 2 miles to the cabin at altitude 3,200 feet (about 1,000 feet above the level of Tide lake). The showings are located on a bluff bordering the glacier, about 300 feet south-west of the cabin. A trail could be easily constructed from the cabin following a sloping ridge to the lake-level.

The topography of the area is very rugged and is part of the slope of the ice-capped divide between the Unuk River trough and the Bowser River trough draining to the Nass river. The rock formation of the section is composed of slates, tuffs, and porphyritic lavas of andesitic type of possibly the Bear River series, intruded by granitic and dioritic dykes of sometimes appreciable dimensions. The mineral deposit consists of a siliceous replacement-zone about 20 feet wide striking north 60 degrees east and dipping 80 degrees north conformable to the formation, occurring in an andesitic lava. A band of slate about 10 feet wide constitutes the hanging-wall in contact with a diorite dyke. Several cross-fractures 2 to 4 feet wide and also showing typical mineralization characterize the foot-wall side, which is also adjacent to a dioritic rock. Mineralization consists of pyrite, galena, and some sphalerite in a quartz gangue.

The zone has been explored by four open-cuts over a vertical distance of about 50 feet. These cuts show silicification and mineralization in a well-defined structure. A sample from the main cut at elevation 3,200 feet across 9 feet of well-silicified and mineralized material on the hanging-wall side assayed: Gold, 0.04 oz. per ton; silver, 0.35 oz. per ton. A sample across 6 feet of similar material on the foot-wall side of this cut assayed: Gold, 0.10 oz. per ton; silver, 0.7 oz. per ton. In view of the presence of mineralization across appreciable widths, defined structure, and indicative gold values, it is considered that this showing and the area generally is worthy of further prospecting and exploration.

UNUK RIVER SECTION.

The Unuk River section forms the extreme north-westerly area of the Portland Canal Mining Division. The trough of the drainage area is crossed by the easterly contact-belt of the Coast Range batholith, which strikes across the valley in a north-westerly direction.

Some prospecting and exploration was carried out in this area between the years 1900 and 1903, and during 1930 and 1931 some superficial prospecting was carried out on the Canadian side of the International boundary by T. McQuillan, of Ketchikan, Alaska. In 1932 a prospecting expedition into this area with the aid of aeroplane transportation was undertaken by T. S. McKay, A. H. Melville, and W. A. Prout, representing a syndicate of Premier, B.C., interests. This resulted in the discovery of a wide area of mineralization in which gold values occur. Further exploration of these discoveries was carried out by the Mackay Syndicate during 1933 and 1934. This season the country was also penetrated by an additional syndicate of Premier interests, another representing Prince Rupert interests, and several individual prospectors. During 1934 T. A. McQuillan and G. E. King, of Ketchikan, Alaska, also penetrated the area by means of river navigation from seaboard and staked three groups of claims in the central section of the valley.

A detailed citation of all the available early information concerning this area is contained in the 1929 Annual Report and it is also referred to in subsequent reports to date.

Through the courtesy of the Mackay Gold Syndicate and the facility of its chartered aeroplane based at Stewart, the section was examined by the writer during the 1934 season. To serve the upper area of the main stream, in which the recent prospecting and exploration is being carried out, aeroplane landings are made on Mackay lake at elevation 3,600 feet.

The area examined comprises Prout plateau, a comparatively sparsely timbered, indented, and ridged terrain trending north-south, about 6 miles wide and 8 miles long and from about 3,000 to 3,800 feet in elevation. This area is bordered on the east by the deep valley of the upper Unuk river, on the west by the deep-canyon valley of Melville creek (North fork), and is centrally indented by Coulter creek. Melville creek rises in Melville glacier and is confined on the west by a rugged glacier-crowned range up to about 7,000 feet altitude. The upper Unuk river is confined on the east by the exceptionally rugged, ice-capped range-divide up to about 7,500 feet altitude between this and the Salmon-Bowser River troughs. An outstanding topographical form of this range is Twin John mountain of about 7,500 feet altitude, and a remarkable feature is the immense and practically unbroken glacier-field blanketing the range summit. This ice-field extends unbroken along the entire length of the summit of the range between the trough of Treaty creek on the north and the Chickamin river on the south, a distance of about 40 miles, and constitutes the main ice-mass to the subsidiary Frankmakie (Tide Lake), Salmon, and Chickamin glaciers.

The ice-crowned barrier between the Unuk River trough and the Salmon-Bowser troughs prohibits any efficient or convenient accessibility into the Unuk area from the latter valleys. The only possible practical route from this side would be along the Bowser River trough to Treaty creek, from the headwaters of which there is a comparatively low and glacier-free pass to the headwaters of the upper Unuk river, a total distance of about 50 miles from Tide lake, or about 85 miles from tide-water at Stewart. The natural route into the area is by way of the Unuk River valley through Alaskan territory.

The rock formation of the Prout Plateau area is composed of fine-grained, light-coloured andesitic tuffs, some fine breccias, fine-grained andesitic lavas (in places porphyritic), and dark argillaceous sediments which dip from 40 to 60 degrees west. In places the volcanic components of this series are intensely silicified and pyritized and intruded by bosses of granitic rock which are characterized in the topography by small outstanding domes rising above the general contour. Occasional large, subangular to angular boulders of conglomerate, especially to the east on the slope of the upper Unuk river, indicate the possible presence of this formation in that locality.

In places, intercalated with the tuffaceous rocks, are narrow bands of argillaceous sediments, and towards the northerly section of the plateau a gradual increase of argillite and sandstone is observed, apparently overlying the volcanic rocks. Towards the southerly end of the plateau, however, the volcanic rocks are well developed, but with occasional intercalated belts of argillite. A feature of the volcanic rocks of the area is the gradual merging of tuffs and lavas with no clear-cut line of contact or demarcation. As porphyritic structure of the

lavas is not generally pronounced and frequently only obscure shadows of phenocrysts can be observed in the ground-mass, this feature makes the accurate determination of these two phases of volcanic rocks extremely difficult in the field. As, however, the contact-zones of the tuffs and lavas appear to be structurally related to the occurrence of the best values in the recently explored mineral occurrences of the Prout Plateau area, the accurate determination of tuffs and lavas would seem to be important. Regional or local shearing and pronounced lines of fracturing are remarkably absent from the structural make-up of the area examined, but seem to be more in evidence in the southerly area around McQuillan (Sulphide) and Ketchum (South Fork) creeks and the central section of the Unuk River trough towards the International boundary.

The sedimentary and volcanic rocks composing Prout plateau are similar in character and may possibly be correlated with the Upper Bear River series of Jurassic age. In places the exposures of this series may possibly approach the younger Nass series horizon, especially in the northerly and north-westerly areas of argillaceous and sandy sediments. Structurally, the area would appear to represent a northerly-plunging anticline along the southerly axial projection of which the Upper Bear River series is exposed.

This syndicate controls about thirty claims in two blocks comprised by the **Mackay Syndicate.** *Unuk* and *Barbara* groups. The claims are located from north to south along the easterly side of Prout plateau for a distance of over 3 miles covering a general altitude from 3,000 to 4,000 feet. The property has so far been reached by aeroplane from Stewart with landings on Mackay lake, a flying distance of about 90 miles.

A good cabin and assay office have been constructed at altitude 3,000 feet on *Unuk No. 4* and are reached by a 3-mile trail through open country from Mackay lake. The claims embrace a belt of volcanic rocks consisting of fine-grained tuffs with some slightly porphyritic lavas. About the central section of the ground a dioritic rock, possibly representing a cupola projection of an underlying intrusive, forms the small outstanding eminence of Prout dome (Battleship dome) of about 4,000 feet elevation. Forming outstanding knolls or domes of a central ridge striking north-south in the topography and characterized by heavy oxidation are several insular areas of comparatively intensely silicified and pyritized tuffs, possibly associated with some andesitic porphyries. In flying over the section these can be noted from a considerable distance and first attracted the attention of the Mackay Syndicate in 1932. A wide distribution of quartz in the form of a network of irregularly striking and dipping veins, stringers, and patches, with mineralization of pyrite in both the quartz and the intervening country-rock, occurs in and about the vari-coloured oxidized domes. On the east side of Coulter creek and on the *Sulphurette* group a dioritic core of a similar dome was observed. This indicates the possibility of the silicified domes which characterize the Prout Plateau ridge being cored by unexposed diorite cupola projections, of which Prout dome (Battleship) may represent a completely exposed core. It is understood that only generally low and dispersed gold values have as yet been found in the superficial prospecting of these silicified domes.

The main showings being explored consist of localities of quartz stringers and partial silicification occurring in irregular areas of slightly porphyritic lavas along the contacts of the latter rocks with the tuffs. Mineralization consists of an irregular distribution of pyrite with some galena and sphalerite. These showings occur in the more depressed area of the Prout Plateau ridge, in sections between and lateral to the oxidized knolls. Several of these occurrences carrying good gold values have been discovered in widely scattered localities on the claims. Exploratory work has so far been concentrated only on this type of showing on *Unuk No. 9* and *No. 11* claims. In 1933 these were explored by several open-cuts. No. 1 cut exposes a width of 48 feet reported to assay 0.16 oz. gold per ton, of which two sections 9 feet and 4 feet wide are reported to assay respectively 0.45 and 0.62 oz. gold per ton. No. 2 cut, about 90 feet north of No. 1, exposes about 10 feet of quartzose material reported to average 0.02 oz. gold per ton. No. 3 cut, about 50 feet south of No. 1 cut, is reported to assay 0.2 oz. gold per ton across 12 feet. No. 6 cut, about 20 feet south of No. 1 cut, is reported to assay 0.14 oz. gold per ton across 12 feet. Two specimen samples of the heavier sulphide mineralization from this cut are reported to assay 0.84 and 0.32 oz. gold per ton. Shearing does not characterize the structure in and about these cuts, but some fracturing with a general westerly dip of about 60 degrees and conformable to the regional dip of the sediments is evident.

Whether the mineralization is structurally related to this fracturing, or to the irregular contact between porphyries and tuffs which could be quite erratic and characterized by varying strike and dip, is as yet not clearly indicated.

During 1934 a Boyles Bros. "X-ray" surface diamond-drill was transported in by aeroplane and eleven holes varying from 28 to 115 feet were drilled under and around No. 1 cut. The first four holes drilled from the east side of the ridge failed to disclose values of importance. Six subsequent holes, drilled from the west side of the ridge, showed distinctly better results. In four of the holes drilled values from about 0.2 to 0.48 oz. gold per ton across widths from 3 to 9 feet respectively, with lower values across greater widths, are reported. This drilling indicates at least a local condition of northerly strike and westerly dip or plunge of the mineral-bearing structure. Whether this is the characteristic or regional attitude of the structure governing the mineralization will require further exploration to determine.

About 500 feet south of No. 1 cut, No. 4 cut on *Unuk No. 9* was excavated in 1933 on a series of quartz stringers in porphyritic lava and the following values reported: Across 6 inches, 2.56 oz. gold per ton; across 6 inches, 8.08 oz. gold per ton; across 12 inches, 1.96 oz. gold per ton; across 7 inches, 2.40 oz. gold per ton. Some further work was done on this showing and an assay of 0.20 oz. gold per ton across 5 feet is reported. Some shearing and fracturing striking north-westerly is associated with this showing.

On *Unuk No. 13* some prospecting was done in the dioritic rock of Prout dome and from a quartz stringer a selected sample is reported to assay 0.24 oz. gold per ton. About 500 feet north-easterly of this and about 2,000 feet from No. 1 cut quartz stringers were discovered in a lava-tuff area and high gold values reported in 1933. During 1934 cut No. 13 was excavated on this showing and from sectional samples reported assays average 0.384 oz. gold per ton across a total width of 10 feet. The sample-sections distributed across this width vary from 0.16 oz. to 1.64 oz. gold per ton, the highest and lowest values being across widths of 1 foot. A stringer 2 inches wide in this showing is reported to assay 6.64 oz. gold and 10.88 oz. silver per ton. The exploration of this area by diamond-drilling is planned for 1935.

On *Unuk No. 21* claim at the north end of the property and adjoining the *Verna D.* group of the Unuk Valley Gold Syndicate several quartz stringers with pyrite, sphalerite, and some galena mineralization are exposed in a porphyritic lava formation. No work has been done on these, but a selected sample of the best mineralization is reported to assay 0.14 oz. gold and 0.62 oz. silver per ton.

The results achieved in a short time indicate that the showings and area covered by the holdings warrant further exploration. In the conduct of this work detailed attention must be paid to the indicated structural relation between the mineralization and the porphyry-tuff complex. As this is indicated as being somewhat complex and irregular, varying or irregular results are not unlikely until this structural factor has been adequately solved.

This syndicate, composed of Premier, B.C., interests, controls the *Verna D.*, **Unuk Valley** *Paven*, and *S.K.* groups, comprising sixteen claims adjoining the *Unuk* group **Gold Syndicate.** on the north. The claims occupy a northerly segment of Prout plateau and the northerly continuation of the mineralized ridge described under the heading of "Mackay Syndicate." The tent-camp is at altitude 3,600 feet and the claims cover an area of from about 3,500 to 3,700 feet elevation. Similar rocks and knolled topography feature the area, but towards the northerly section of the claims more argillaceous and arkosic sediments occur. Tuffs and slightly porphyritic lavas, similar to those described on the *Unuk* group, but differing in that the tuffs appear to be more calcareous and in places coarsely brecciated, are, however, also well represented. Three prominent highly oxidized, pyritized, and silicified tuff knolls similar to those described on the *Unuk* group are also features of the topography. The rocks appear to represent higher horizons of the Upper Bear River series than those forming the southerly area of Prout plateau.

At elevation 3,575 feet two wide cuts in a pyritized, tuffaceous, and calcareous breccia expose dispersed stringers, blebs, and seams, mineralized with galena, sphalerite, and pyrite. About 200 feet easterly of this, three wide cuts spaced along about 300 feet between elevations 3,575 and 3,625 feet in a tuff-porphry ridge expose a zone striking north-westerly carrying irregular patches, blebs, and joint-plane stringers 2 to 3 inches wide of galena, sphalerite, pyrite, some arsenopyrite and chalcopyrite across exposed widths of 5 to 15 feet. It is understood that generally low-grade values predominate in these showings, but as small irregular

outcrops of slightly porphyritic lavas are contiguous to the cuts, these should be extended to the tuff-porphry contacts and any mineralization exposed there should be thoroughly sampled. Several other discoveries have been made on these claims, but as yet they have been only very superficially prospected. During the 1934 season the work was carried out under the direction of Ralph Swartzfiger, of Premier.

**Sulphurettes
Prospecting
Syndicate.**

This syndicate is composed of Prince Rupert interests. During 1934 prospecting was carried out by A. R. Nichols and Robert Wilson, of Prince Rupert. Some discoveries were made and four groups comprising sixteen claims were staked. The *Gull* group of eight claims is located adjacent to the *Unuk* group on the south. The general geology of this area is described under the heading of "Mackay Syndicate" and the group covers a section that should be carefully prospected. The *Sulphurette* group of eight claims is located south of Mackay lake and towards the northerly section of the ridge between Coulter and Melville creeks. An outstanding oxidized and silicified knoll of tuff similar to those on the *Unuk* and *Verna D.* groups, cored with dioritic rock, occurs on this group. The rocks of the area comprise tuffs, breccias, porphyritic lavas, argillite bands, and some dioritic intrusives. Some silicification and dispersed quartz stringers were seen in the porphyries, but no defined fracturing or lines of structural weakness were observed. The *Top* group of four claims is located east of and adjoining the *Verna D.* and *Pawn* groups of the Unuk Valley Gold Syndicate and the *Alone* and *Owl* groups of two claims each adjoin the *S.K.* group of this syndicate on the north. The geology and mineral possibilities of this area are indicated in the description relative to the Unuk Valley Gold Syndicate holdings. No work other than superficial prospecting was done by this syndicate during the season.

Other properties on which exploratory work was carried out are as follows: Eight claims staked by J. Storie and O. Bjorke; three groups, the *Gold Run*, *Unuk Jumbo*, and *Florence*, staked by T. J. McQuillan and Geo. E. King.

STIKINE MINING DIVISION.

This Division covers an area of about 19,850 square miles and embraces an appreciable area of the eastern contact-margin of the Coast Range batholith which cuts across the Stikine River trough at about the confluence of the Iskut river and then follows the main Stikine valley in a northerly direction to the confluence of the Chutine (Clearwater) river, which it parallels on the westerly side, striking in a north-westerly direction across the Whiting and Taku River troughs.

From a lode-mining aspect, interest in the Stikine Division is comparatively new and from year to year is receiving more attention from prospectors. Although nothing of definite economic importance has as yet materialized in lode-mining, many discoveries, particularly of the base metals, have been made. A favourable area for prospecting occurs along the eastern contact-belt of the batholith, accessible from the Stikine River drainage-basin. Reference to various mineral deposits occurring in the district will be found in former Annual Reports, and are thoroughly covered in the reports from 1927 to 1933. This Division was not visited during the 1934 season.

LIARD MINING DIVISION.

This Division, about 52,930 square miles in extent, is the largest Division in the district and is embraced by the Interior Plateaux country which lies east of the Coast range. The area is about 3,200 feet average elevation, with peaks and ranges rising to about 4,000 feet above the rolling upland plateaux. In conformity to the orogenic structure and in contrast to the westerly bordering Coast Range area, the drainage of the section is northerly to the Arctic.

This Division is as yet very imperfectly mapped both geologically and topographically. It is indicated, however, that the area is underlain by sedimentary and volcanic rocks of varying ages from early Palaeozoic (in some sections possibly Precambrian) to Recent. Intrusive into this complex are granitic rocks of the Cassiar batholith and many stocks and bosses of about Upper Jurassic age.

On account of its remoteness, very little attention has been paid to lode possibilities of this Division. Several important discoveries of the silver and base-metal type have been made, but to be of immediate commercial utility gold deposits, especially of the free-milling type, would be required. The Division is largely unprospected. A favourable and comparatively

easily accessible area deserving of prospecting is that embraced by the Cassiar batholith. The area is described in Bulletin No. 1, 1932, "Lode-gold Deposits of British Columbia."

Placer-gold prospecting has been carried out in the Division for a number of years and dates from the early discoveries in 1872. During the early period a substantial production resulted, but the output declined steadily in subsequent years. This phase of mining is described in former Annual Reports; latterly in the reports for the years 1927 to 1933 and in Bulletins No. 2, 1930; No. 1, 1932; and No. 2, 1933. Despite these long-standing placer activities, there still remains an extensive favourable area totally unprospected for placer gold and several known favourable sections only partially prospected.

ATLIN MINING DIVISION.

The Atlin Mining Division embraces about 18,800 square miles, bounded on the north by Yukon territory. The central (or Atlin) section proper occupies an upland plateau area draining through a complicated system of lakes and rivers into the Yukon river and Bering sea. The southerly and north-westerly segments, embracing the Whiting River, Taku River, and Rainy Hollow sections, drain into the Pacific ocean. The north-westerly and southerly sections are generally underlain by a rock-complex of about Carboniferous to Recent age, and the central plateau section of Precambrian to Recent rocks. The geologic factor governing lode-mineral deposits in the southerly and north-western sections is the Coast Range batholith, the eastern contact of which cuts across the Whiting and Taku River troughs in the south and through the Rainy Hollow section in the north-west. In the central plateau section Jurassic granitic rocks in the form of stocks and bosses, with later dykes, are intrusive into the older rock-complex.

Due to comparative remoteness, high transportation and freight rates, lode-mining has been comparatively inactive, and for this reason, although several silver and base-metal deposits are known, the limited lode-mining activity has been mainly devoted to gold deposits.

Placer-gold mining dates from the discovery of rich gravel deposits in the Atlin Lake area in 1898. Substantial placer-gold production came from the Atlin deposits up to the period of the World War, but then declined steadily up to 1929, when interest revived. Since that year there has been a steady increase in placer-mining and exploratory activity, with a gradual increase in production, which promises to continue. There is in this section an appreciable known area of favourable ground as yet only partially prospected and explored. There is also a large area of possibly favourable virgin territory worthy of prospecting for both lode and placer deposits.

This Division is described in detail in former Annual Reports and especially those for the years 1929 to 1933. Detailed references will also be found in Bulletin No. 1, 1931; Bulletin No. 1, 1932; and Bulletin No. 2, 1933, issued by the British Columbia Department of Mines, and also in numerous publications of the Geological Survey of Canada.

LODE-MINING.

Under the name of Norgold Mines, Limited, this company was incorporated in British Columbia in December, 1933, with a capitalization of 5,000,000 shares of no par value. In order to avoid confusion with an Eastern company of the same title, the name was later changed to the present one. The **Atlin Pacific Mining Co., Ltd. (N.P.L.) (formerly Norgold)**, registered office of the company is at 1002 Stock Exchange Building, Vancouver. Late in 1934, Bobjo Mines, Limited, an Ontario company, acquired an interest in the company and assumed active management, with Frank Smith, a member of its engineering staff, in charge of operations at the property.*

The holdings consist of thirty-nine claims and fractions held by location and include the *Spokane* group, formerly owned by Fred Lawson, of Lawson's Landing, Taku arm (Tagish lake), and associates, of Atlin. The property is located on the westerly side of Bighorn river and is reached by wagon-road about 8 miles long from the lake at Lawson's Landing (elevation 2,161 feet). The camp is at elevation 2,640 feet on the west side of Bighorn river. Several claims are located on the east side of the river, but the majority cover the steep slopes of the mountain on the west side from the river at about elevation 2,620 feet to the summit at about

* Bobjo Mines, Limited, relinquished its interest in February, 1935.

elevation 5,000 feet. The mineral deposit was first discovered in 1898 and was formerly staked as the *Birdie* and *Gold Cup* claims. Since that time claims covering it have been abandoned, restaked, and owned by several different parties. On the adjoining *Bighorn* group Mr. and Mrs. Fred Lawsan, in the early days, carried out some small-scale mining of rich gold pockets in lenticular quartz veins. The property is mentioned in Bulletin No. 1, 1932, and described in the Annual Report for 1933, and in Bulletin No. 1, 1934, issued by the British Columbia Department of Mines, and referred to in Memoir 37, 1913, Geological Survey of Canada.

The rocks of the area consist of a gneissoid complex of the Mount Stevens series tentatively referred to the Precambrian. Intrusive into this series are post-Palaeozoic dykes of andesite, rhyolite, and feldspar porphyry. In general the formations strike slightly east of north and dip at varying angles to the east. In places the formation is cut by fault-zones characterized by crumpling, mashing, and distortion of the rocks.

The mineral deposit consists of a quartzose fissure, striking generally east-west across the formation, and standing vertical or dipping steeply to the north. The vein (or veins) is adjacent or contiguous to a dyke of possible andesitic type. Surface tracing of the vein or veins was indefinite at the time of the writer's examination. A major fault marked by a deep gully, striking north-south and apparently dipping east, cuts the fracture-structure at about elevation 4,000 feet, between the "Incline" and "Blacksmith" adits, causing a horizontal displacement of about 250 feet. On account of the pronounced shearing, crushing, and distortion of the rocks in the gully, it is probable that extensive vertical movement has also accompanied this dislocation. The structural aspects of the vein or veins, however, indicate quite persistent fissuring. At the time of examination (June 28th and 29th) intermittent tracing of the vein had been carried out from elevations of about 2,650 to 4,225 feet, along a horizontal distance of about 3,000 feet, with surface and underground exposures showing a vein-width varying from about 2 to 6 feet and averaging about 3.5 feet. The gangue consists of quartz with generally sparse mineralization of pyrite, with some galena and sphalerite, in places carrying appreciable gold values with low silver values. In this mineralization it is interesting to note that free gold is not visible.

At the time of examination exploration was being carried out in three short adits. The "Incline" adit at elevation 4,125 feet had advanced about 67 feet on the vein. A sample across 27 inches about 42 feet from the portal assayed: Gold, 0.6 oz. per ton; silver, 0.8 oz. per ton; lead, *nil*; zinc, 2.4 per cent. A sample across 51 inches at the face assayed: Gold, 0.06 oz. per ton; silver, trace; lead, *nil*; zinc, 1.5 per cent. The "Blacksmith" adit at elevation 3,540 feet had advanced 81 feet on the vein. A sample from this working across 30 inches, 42 feet from the portal, assayed: Gold, 0.64 oz. per ton; silver, 0.8 oz. per ton; lead, trace; zinc, 3 per cent. A selected specimen sample of a streak of fairly massive mineralization at about this point assayed: Gold, 1.40 oz. per ton; silver, 0.8 oz. per ton; lead, 1.7 per cent.; zinc, 5 per cent. A sample from the face across 22.5 inches on the foot-wall side assayed: Gold, 0.04 oz. per ton; silver, trace. A sample across 31 inches on the hanging-wall side assayed: Gold, 0.34 oz. per ton; silver, 0.6 oz. per ton; lead, *nil*; zinc, 2.2 per cent. The "Peters" adit at elevation 3,370 feet parallels the vein for about 87 feet, where a crosscut to the south for 23 feet intersects the vein at 12 feet, showing a width of about 44 inches. A sample of the east face across 44 inches assayed: Gold, 0.04 oz. per ton; silver, 0.2 oz. per ton. A sample of 3 feet of wall-rock on either side of the vein at this face assayed: Gold, 0.03 oz. per ton; silver, trace. Systematic sampling of the workings at about the beginning of September by a reliable independent engineer is reported to indicate ore-shoots of about 0.31 oz. gold per ton grade across an average width of 3 feet. Length, attitude, and frequency of these will be determined by further exploration. Other veins are known on the property, but no work has been done on them. It would also seem that the fault-zone is worth some exploration.

It is understood that equipment for machine-mining has been installed and development is proceeding in the "Blacksmith" and "Peter" adits and in a new low-level adit.

(Refer to Annual Report for 1933 and former Annual Reports.) During
Engineer Gold Mines, Ltd., Inc. 1934 the assets of this company were sold at Sheriff's sale to representatives of the Mining Corporation of Canada, Limited, for \$25,000 cash in satisfaction of a judgment for \$207,431.18 in favour of John G. Harris, Oakville,

Ontario. Although definite plans have not as yet been made public, it is understood that exploratory operations will be resumed on this property in 1935 by the Mining Corporation of Canada.

(Refer to former Annual Reports.) During 1934 Bobjo Mines, Limited, of **Atlin Ruffner Lead-Silver Mines, Ltd.** Ontario, through purchase of shares, acquired an interest in this property and early in the season carried out some further exploration, under the supervision of Frank Smith. This work was mainly confined to the exploration of known higher-grade sections of the veins at the upper elevations with the objective of exploring the vertical continuity of this ore-grade. Towards the late summer the operation was discontinued.

PLACER-GOLD MINING.

In the Tatshenshini River and Squaw Creek areas placer operations have been very active during the year. Although more individuals penetrated this area, many were inexperienced and poorly equipped, and after the exhaustion of their own resources were forced to look for jobs on profitable ground held by others. Prospecting of this area suffered accordingly. On Blizzard creek the promising superficial indications discovered in 1933 were followed up by several parties, but after the excavation of long and deep drainage-cuts the heavy boulders and deep gravel forced abandonment before bed-rock could be reached.

On Squaw creek about forty Indians and whites were active and some fair recoveries were made. On *Discovery* claim a recovery of about 190 oz. gold is reported. On No. 1 above *Discovery*, Gold Run Exploration Company, under the supervision of G. Stillwell, reports a recovery of 270 oz. gold. This organization with a crew of ten men also carried out prospecting of several other localities and creeks in this section. The feature of the year on Squaw creek has been the extension of pay-channels under the benches on both sides of the creek. This indicates an appreciable area still to be prospected along the banks of this creek both on the low and high benches. In the canyon and mouth area of Squaw creek, on the Yukon side of the boundary, Victoria Ventures, Limited, carried out extensive exploration under the supervision of John Shaller, with the objective of determining values and character and extent of possible "pay" ground for an hydraulicking operation. Values are reported in places and a subdued boulder condition in comparison to that pertaining in the Upper Squaw Creek area is indicated. Some exploratory work was also carried out by this company on a lease held in the Upper Squaw Creek area in British Columbia territory. In the old-channel outwash area behind Muncaster's camp two test-pits showed some fine gold. Some prospecting of creeks westerly of Squaw creek was also done.

In the Atlin area proper much activity by individuals, syndicates, and companies has prevailed on O'Donnell river, Bull, Wilson, McKee, Spruce, Pine, Birch, Boulder, Ruby, Cracker, Otter, and Wright creeks. Exploration has also extended to several creeks in the outlying areas. Under the supervision of R. D. Adams, the Yukon Border Placer Golds, Limited, incorporated in 1934 and controlled by the J. E. Hammell interests of Toronto, carried out extensive Keystone-drilling on Lincoln and Consolation creeks in the Gladys Lake area, but reports discouraging results. On McKee creek, Atlin Gold Mines, Limited, with George Adams in charge of operations, continued hydraulicking with a crew of seventeen. Stripping of overburden was done and piping into the bed-rock gravels commenced in two pits. Towards the close of the season a third pit at the upper end of the workings was started. At the close of the season the management reports from the lower pit the disposal of 50,390 cubic yards of tailings and 3,750 cubic yards of pay-gravel sluiced, averaging 36 cents per cubic yard, or \$1.44 per square yard of bed-rock, with a total recovery from this pit of \$1,350. Operation in the upper pit No. 1 is reported as 50,000 cubic yards of overburden stripped, 44,940 cubic yards of tailings disposed, and 2,520 cubic yards of pay-gravel sluiced, averaging \$2.53 per cubic yard, or \$10.12 per square yard of bed-rock, a total recovery from this pit of \$6,374.45. The upper pit No. 2 operation is reported as 6,192 cubic yards of tailings disposed and 3,096 cubic yards of pay-gravel sluiced, averaging \$1.1927 per cubic yard, or \$4.77 per square yard of bed-rock, a total recovery from this pit of \$3,692.72. For the season a total recovery of \$11,417 is reported from this operation.

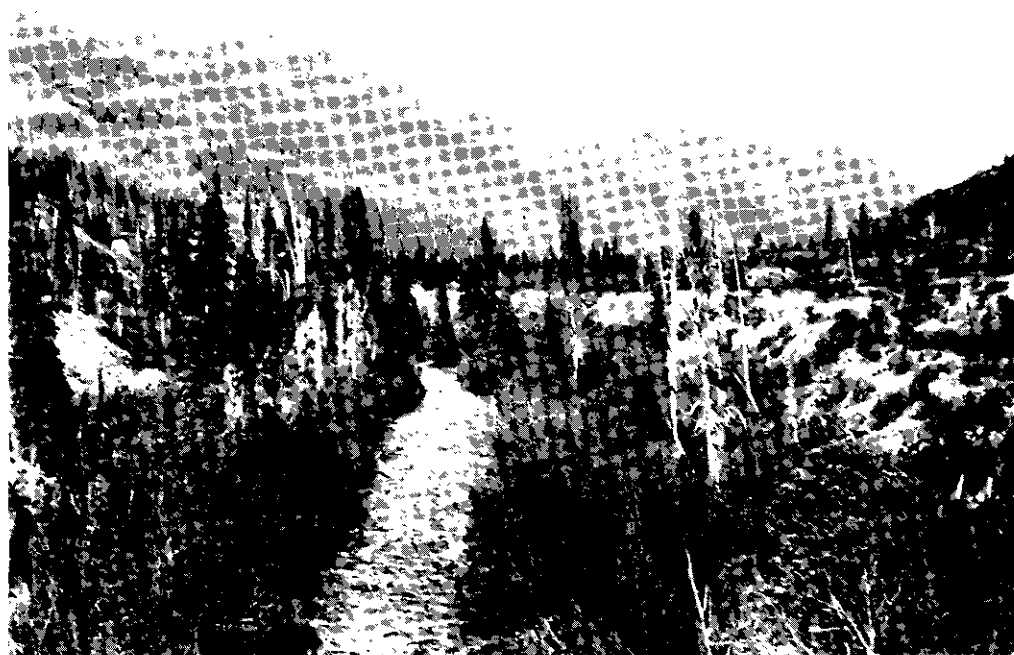
On Boulder creek, Consolidated Mining and Smelting Company, with a crew of fifteen, discontinued hydraulicking and started exploratory drifting, and report a recovery of 135 oz. gold

for the season. Drift-mining in the deep bed-rock gravels on Otter creek has also been inaugurated by Compagnie Francaise des Mines d'Or du Canada. On Pine creek extensive hydraulicking by the Northern Goldfields Exploration Company, Limited, with a crew of nine, had proved disappointing up to the time of examination in July.

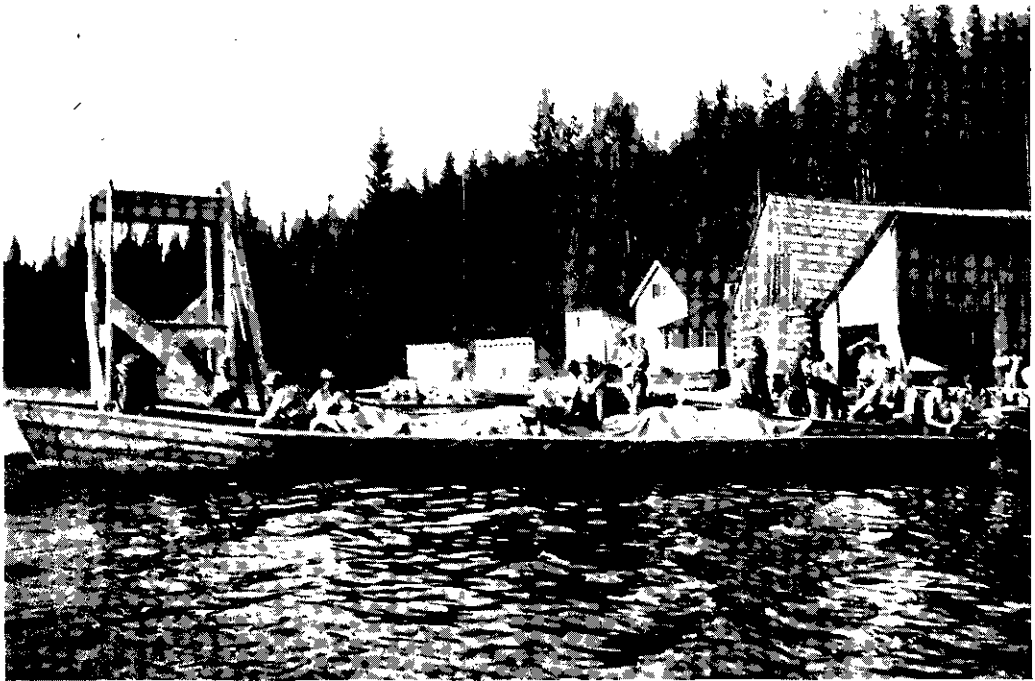
On Spruce creek drifting and shovel operations have returned some very good recoveries. On this creek the settlement of litigation concerning the *Beaton* drift-mine has permitted this, Atlin's most substantial producer, to again proceed with production. A feature in the Atlin area this year has been the installation on Spruce creek by the Columbia Development Company, controlled by A. R. Kaufman, of Kitchener, Ontario, of a Bucyrus-Erie caterpillar steam-shovel of $\frac{5}{8}$ cubic yard capacity. The work of installation and operation was carried out under the supervision of J. Walsh. The management reports a recovery of \$1.13 to the cubic yard of gravel sluiced and a total recovery of about 1,400 oz. gold for the season. The extension of this work during the 1935 season is planned.



McLaren (McLair) Creek Valley. Belle Creek enters McLaren Creek at Right. Near Headwaters of Finlay River.



McLaren (McLair) Creek—looking Down-stream above Canyon.



Transporting Supplies on Crooked River, Tributary of Parsnip River.



Quesnel Forks—Old Buildings of the Cariboo Gold-rush Days.

PART C.
NORTH-EASTERN MINERAL SURVEY DISTRICT (No. 2).

BY
DOUGLAS LAY.

INTRODUCTION.

In 1934, as in 1933, interest in mining was chiefly confined to gold properties, both lode and placer, and real progress was made resulting in substantial increases in production in these branches of the industry. This progress is reflected in the rapid growth of the new town of Wells. Interest in prospecting, revived in 1933, was also maintained throughout the year.

Stimulated by the rise in price of silver, work in excess of assessment requirements was carried out at a few silver-lead-zinc properties and a car of ore was shipped from the *Golden Eagle* group, Topley, by the owners.

For the first time in many years, interest was evinced in tungsten properties, at one of which, the *Hardscrabble* mine near Barkerville, preliminary investigation was commenced.

Of considerable interest is the announcement by English interests, towards the end of the year, of their intention to develop hydro-electric power on Swamp river.

Production from the district for the year is as follows: Ore, 32,912 tons; gold, lode, 12,400 oz.; silver, 5,861 oz.; lead, 5,556 lb.; zinc, 3,089 lb.; placer gold, 10,811 oz. Miscellaneous metals, minerals, and structural materials produced had a value of \$28,678. Coal production for this district was 3,277 tons.

LODE-GOLD MINING.

Two interesting discoveries were made during the year—namely, the *Patmore* group near Dorreen, in the Skeena section, and the *Timber Line* group near McKee lake, in the Horsefly section.

In the Omineca Mining Division a number of small-scale operations were carried on by the owners of properties situated near Usk, on Hudson Bay mountain near Smithers, on Dome mountain near Telkwa, at Topley near Babine lake, and in the northern part of the Division.

In the Cariboo district, embracing the Cariboo and Quesnel Mining Divisions, steady expansion continued at the properties of Cariboo Gold Quartz Mining Company, Limited, and Island Mountain Mines Company, Limited.

The discovery of a highly auriferous pyrite replacement deposit in limestone on the property of Island Mountain Mines Company, Limited, in 1933, and its development this year, has aroused considerable interest not only at this property, but also at the Cariboo Gold Quartz Mining Company, Limited, where similar though less extensive mineralization has been found.

It may be said in general of lode-gold mining in the Cariboo district that the position to-day compared with that of two years ago shows real progress has been made by well-directed development.

PLACER-MINING.

A general increase in placer-mining activities was a feature of the year and several new discoveries were made. Various operators installed additional equipment, including several drag-lines and two small dredges of a new type. Individual bar-workers on the Fraser and other rivers made a recovery estimated to have been about \$50,000. Activity was manifested at all points in the Cariboo and Quesnel Mining Divisions and also in the Manson Creek, McLeod River, and Two Brothers Lake areas in the Omineca Mining Division.

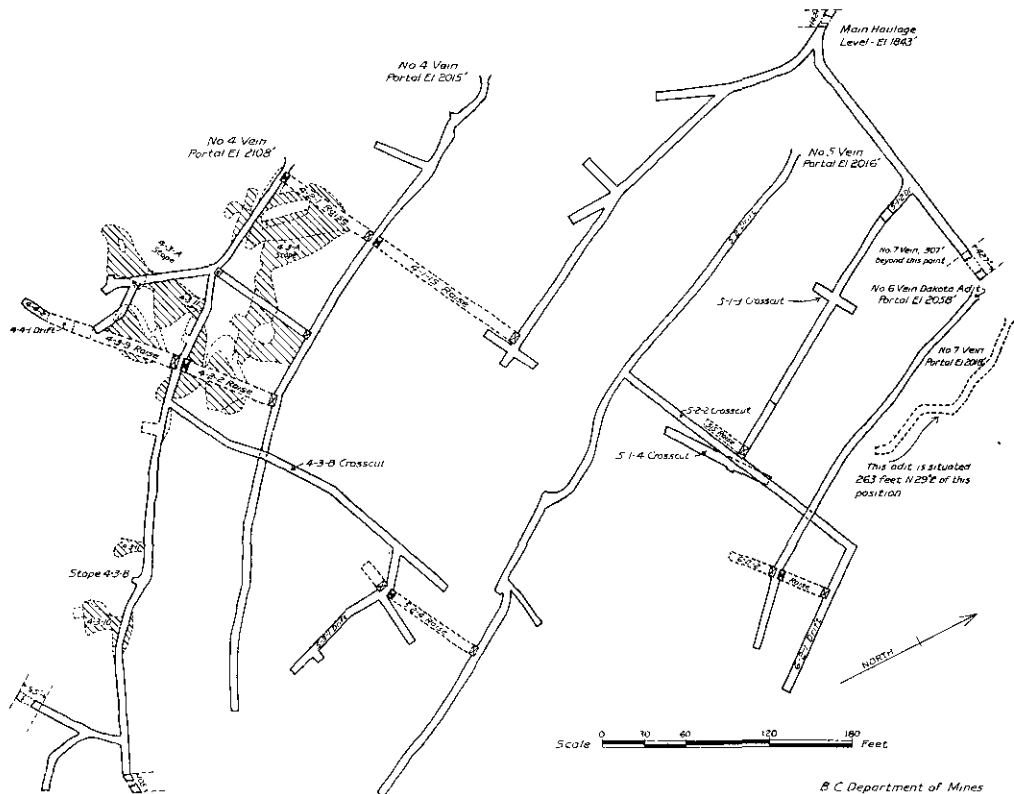
Operating control of two well-known mines in the Cariboo district was secured by different English interests—the property of Consolidated Gold Alluvials of B.C., Limited (more generally known as the *Wingdam* mine), on the one hand, and the *Bullion* mine on the other.

OMINECA MINING DIVISION.

**Columario
Consolidated
Gold Mines, Ltd.**

The *Valhalla*, *Kleanza*, and *Tenderfoot* groups, the property of Columario Consolidated Gold Mines, Limited, consist of the following Crown-granted claims and thirty held on location: *Valhalla No. 2*, *Valhalla No. 3*, *Norman Fraction*, and *L.C. Fraction*. The workings are on the steep and densely-timbered slopes of *Kleanza* mountain at elevations of 1,400 to 1,860 feet above the *Usk-Terrace* highway. The mill is situated on the right bank of *Noble Five* creek on the highway about $4\frac{1}{2}$ miles distant from *Usk*. A go-devil road and aerial tramway connect mine and mill. The mine may be reached by a shorter trail leaving the highway at *Kleanza* creek.

Nine parallel quartz veins, with free walls, mainly from 1 to 3 feet wide and in one case 6 feet wide, average distance apart being about 150 feet, outcrop at various points on the steep mountain-side between elevations of 1,700 and 2,100 feet. They strike north 20 to 30 degrees west and dip north-east at angles of about 50 degrees. Sulphide mineralization is chiefly pyrite with some chalcopyrite, and in the case of No. 5 vein, galena. The veins are named in order from west to east, No. 1 being the most westerly and No. 9 the most easterly. The rock formation is



Columario Consolidated Gold Mines, Ltd.

altered andesite (greenstone) intruded by diorite stocks and lamprophyre dykes. Tongues of aplite occur which antedate the veins, and in which the latter pinch. The point at which the eastern flank of the Coast Range batholith plunges downward is not, it is believed, accurately known, but indications point to this plunge taking place just east of *Pitman*, in which case this property would be situated in a roof-pendant area.

In 1919 the *Kleanza* Company was organized for the purpose of developing this property, and preliminary prospecting was carried on in that and the following year. In 1921 a syndicate known as the "*K. Partnership*" acquired a lease on the *Golden Crown* from the *Kleanza* Company and erected a *Ross* mill on the property, but work was suspended shortly afterward. During the next few years prospecting operations were carried on under the supervision of

John Willman. A small amount of work was subsequently done annually, with results which led to the incorporation of a company in 1927, the Columario Gold Mines, Limited. In that year a portable compressor was installed and an active campaign of development was carried out in the years 1928 and 1929. The work consisted of drifting, raising, and crosscutting on and between Nos. 4, 5, 6, and 7 veins. Development was continued during 1930 and a little work was done in 1931 and 1932. Development was speeded up at the end of 1933 following reorganization of Columario Gold Mines, Limited, as Columario Consolidated Gold Mines, Limited. In 1934 a flotation plant of about 100 tons daily capacity was erected on the right bank of Noble Five creek on the Usk-Terrace highway, a 12-bucket aerial tram was constructed from the mine to the mill, and an Ingersoll-Rand air-compressor of 500 cubic feet of free air per minute capacity, operated by a 112-114-horse-power Vickers-Petter Diesel engine, installed at the mine. Difference in elevation of the two tram terminals is approximately 1,400 feet. Milling operations were commenced on September 2nd and, simultaneously with construction, underground development was carried on as actively as possible. (Refer also to Annual Reports 1919, 1920, 1921, 1925, 1927 to 1933, inclusive, and Bulletin No. 1, 1932.)

The workings have been driven to explore the downward continuation of the surface showings. Other exposures, it is reported, occur at higher elevations, and this fall a showing is stated to have been discovered some distance above No. 4 upper adit, but these exposures have not been examined by the writer.

Present operations are confined almost entirely to Nos. 4, 5, 6, and 7 veins. Two adits between 550 and 600 feet long have been driven on No. 4 vein at elevations of 2,015 and 2,108 feet. They are known respectively as No. 4 lower and No. 4 upper adits. Two raises about 135 feet apart connect these levels.

Adits have been driven on Nos. 5, 6, and 7 veins at elevations of 2,016, 2,058, and 2,133 feet for distances of about 600, 300, and 150 feet respectively.

A crosscut has been driven from the upper adit on No. 4 vein to No. 5 vein, connecting with a raise from the adit on the latter. The adits on Nos. 5 and 6 veins are connected by a crosscut and short raise on No. 6 vein. This raise has been continued for a considerable distance above the adit-level.

The main haulage-level is at an elevation of 1,843 feet, about 100 feet above the upper terminal of the aerial tram. It is driven in a south-easterly direction for 155 feet, from which point workings have been driven to intersect the downward continuation of Nos. 4, 5, 6, and 7 veins. With the exception of what is presumably No. 7 vein, where a quartz stringer a few inches wide is exposed, no marked evidence of the downward continuation of the veins had been found at the time of the writer's examination on November 2nd.

A raise connects the main haulage-level with the lower level on No. 4 vein. In this raise No. 4 vein has apparently been located 115 feet up, where, although narrow, it is said to be well mineralized. Up to the time of the writer's examination all the ore milled had been extracted from No. 4 vein. The necessary connections had not been made with the higher levels on the other veins for passing ore to the main haulage-level. No samples were taken.

Development to date has disclosed in No. 4 vein a fairly continuous ore-shoot between the raises (135 feet apart) connecting the adits on this vein and showing evidence of strong continuation above No. 4 upper adit. This ore-shoot has now been heavily drawn upon to feed the mill. In addition, there is another shorter lens of ore south-east of this shoot showing in the back of No. 4 upper level. The width of ore varies from 12 to 30 inches. The last 200 or so feet driven on both No. 4 upper and No. 4 lower adits did not disclose material amounts of quartz.

The adit on No. 5 vein at 385 feet from the portal encountered an ore-shoot 100 feet long averaging 15 inches in width, containing \$9.60 per ton in gold (gold taken at \$20.67), as stated by W. G. Norrie-Lowenthal. In the raise from this adit to the crosscut from No. 4 upper adit, the average of nine samples taken by the management gave \$34.30 per ton in gold across 20½ inches (value of gold being taken at \$35 per ounce).

The adit on No. 6 vein shows between 215 and 245 feet from the portal an ore-shoot averaging \$14.60 across 21 inches, according to the sampling of W. G. Norrie-Lowenthal. The raise on this vein was carried to a height of 129 feet above the level of the adit on No. 5 vein. The average of fourteen samples taken by the management from this raise is given as \$22.40 across 18 inches (gold valued at \$35 per ounce). The adit on No. 7 vein, elevation 2,133 feet, shows a

shoot of ore 90 feet in length averaging \$18.30 across a width of 21 inches, according to the statement of W. G. Norrie-Lowenthal.

Milling operations were suspended after three months' duration before the end of the year. The following statement has been made by the manager: "The mill was run experimentally for three months at low capacity. The mine is not yet developed to operate the mill at capacity, and it was decided to shut down for the winter, as it is undesirable to run one or two shifts only through the cold weather, as costs are increased if the mill be run below capacity. We are therefore confining our work to development for the next three months."

Data are not available covering the entire mill-run, but from start to finish 101.3 tons of concentrates were produced, containing approximately 492.622 oz. gold and 1,401.23 oz. silver.

Primary crushing is done by an 8-inch Traylor gyratory crusher, belt-fed over a magnetic pulley to eliminate tramp iron. Ore passing from the gyratory crusher is elevated to a 90-ton feed-bin, whence it is delivered by jig-feeder to a 6- by 4-foot Hardinge-type ball-mill (4-ton charge of 4-inch and 3-inch balls) operating in closed circuit with a Dorr-type duplex classifier overflowing at 90 per cent. through 150-mesh to a 6-cell "gravity-flow" flotation-cone, the under-flow passing to a 6-leaf American filter. Reagents used per ton are as follows: 0.1 lb. soda-ash; 0.25 lb. ethyl xanthate; 0.1 lb. G.N.S. No. 5 pine-oil. Xanthate and pine-oil are added to the flotation circuit, half in the first cell and half in the third. Power is supplied by a full Diesel 168-brake-horse-power Petter engine.

Lucky Luke. This group, owned by L. E. Moody, of Usk, and R. Lowrie, consists of four claims—*Lucky Luke*, *Hummer*, *Amigo*, and *Indian* (the last on an Indian reserve). The property is on the well-timbered eastern slope of Kitsalas mountain on the west side of the Skeena river, about 700 feet above and a few hundred yards distant from the railway. It is reached by road from Usk about $1\frac{1}{4}$ miles distant.

A quartz vein, 1 to 3 feet wide, strike about north 65 degrees west, dip about 57 degrees north-east, carries bornite, chalcopyrite, pyrite, and free gold. The walls of the vein are free. The rock formations are schistose volcanics intruded in places by aplitic tongues.

This property was operated by the owners until 1923, when it was optioned to S. A. D. Davis and partners, who during 1923 and 1934 carried on intermittent development-work with two men. In the fall of 1924 a shipment of 25 tons of hand-sorted ore was made; this gave returns of 18 oz. gold, 316 oz. silver, and 11,162 lb. copper. Thereafter but little work was done until the present year, when it was optioned to R. W. Seelye. (Refer also to Annual Reports 1918, 1919, 1923, 1924, 1925, and 1928.)

So far as known, the vein is largely covered, except at the original discovery, by glacial drift and dense vegetation, which makes it difficult to trace it on the surface.

The underground workings consist of an upper adit driven about 60 feet on the vein and another about 55 feet lower in elevation. The lower level is driven as a crosscut for about 100 feet to the vein, which it then follows for approximately 100 feet to a point where the vein is terminated by a fault, strike north 45 degrees east and dip south-east. A working follows the fault southwards for 21 feet, without disclosing definite evidence of the continuation of the faulted portion of the vein. The apparent displacement is to the south-west. The two workings are connected by a raise and stope, and in the latter an aplite tongue is exposed along the hanging-wall side of the vein. During the year a small belt-driven air-compressor of 100 cubic feet per minute capacity, operated by a Fordson tractor, was installed, and a winze sunk to a depth of 80 feet below the lower adit, immediately below the good ore found in the stope between the levels. The ore continues in the winze to a depth of 40 feet and then pinches, but improves again, and in the bottom a width of about $2\frac{1}{2}$ feet of quartz well mineralized with bornite and chalcocite and showing some free gold is exposed. From the bottom of the winze a drift was run for 15 feet following the vein north-westwards.

Operations were suspended in the summer.

Zymoetz. This group is owned by T. M. Turner, of Terrace, and consists of several claims situated on the right bank of the Zymoetz river, about 3 miles above its mouth, and conveniently reached by a trail about half a mile in length from the Usk-Terrace highway. The property lies at a low elevation, comparatively close to river-level. A very brief examination of the property was made.

Surface showings consist of a number of quartz veins varying in width from a few inches to somewhat over 3 feet, occupying well-defined fissures. Some are mineralized with sphalerite,

galena, and pyrite; others with chalcopyrite and pyrite; and all show gold values which warrant further investigation. At one point just above the river an adit 65 feet in length passes through a vein 2 feet wide mineralized with galena and sphalerite showing values in gold.

Taking into consideration the geology and mineral-showings of the surrounding region, it is believed that careful prospecting may lead to the discovery of gold-bearing veins of commercial size. It is understood that recently further showings have been uncovered at this property and also in the region to the north between the Zymoetz river and Kleanza creek.

This company, incorporated in the State of Washington (secretary, H. T. **Nicholson Creek Mining Corporation.** Fitch, 916 Insurance Building, Seattle, Wash., U.S.A.), holds sixty-nine claims situated in the region between Lowrie and Nicholson creeks. Included in these claims are the *Diadem* (fully described in the 1930 Annual Report) and *Phoenix* (described in the 1928 Annual Report) groups. The claims cover a large part of the entire area between the creeks mentioned up to a point about 3 miles west of the Skeena river. The property is reached by a road to a camp distant about 2 miles from Usk, situated adjacent to the railway-track, a tractor-trail continuing for another 4½ miles up the right bank of Nicholson creek to the mine camp situated at an elevation of a little over 1,000 feet.

The surface showings which are at present engaging the attention of the company consist of well-defined shear-zones in granodiorite. The shear-zones are quartz-filled and well mineralized with pyrite and in places show molybdenite. They are exposed in the gorge of Molybdenum creek. The shear-zones vary in width from several inches to several feet. Four samples of selected mineral assayed from a trace to 0.02 oz. per ton in gold. It is understood that samples taken by the corporation show higher values, which would indicate the advisability of thorough and systematic sampling in advance of underground development.

Preparatory work during the year comprised the construction of 3½ miles of good tractor-trail and erection of camp buildings.

This group is one of the new discoveries of the year and is situated on the **Patmore.** ridge between Knauss and Fiddler creeks. It is reached by following the *Fiddler* wagon-road to Knauss creek, from which point a good trail leads to the property, which is distant about 7 miles from Dorreen. It is owned by W. H. Patmore and associates.

The deposit consists of quartz veins mineralized with small amounts of pyrite, chalcopyrite, sphalerite, and galena. The prevailing rock formations consist of argillite and quartz members of the Hazelton series intruded at various points by tongues of granodiorite.

It is reported that a mineralized quartz vein in granodiorite carrying attractive gold values was discovered subsequent to the writer's visit to the property. At the time of examination several mineralized quartz veins, varying in width from a few inches to in one case between 2 and 3 feet, had been uncovered by open-cuts between elevations of 2,075 and 3,175 feet. Selected mineral from one of these assayed 1 oz. gold per ton, indicating the advisability of carefully prospecting this region. It is within a few hundred feet of this spot that the showing reported was later discovered. It is said to be the most important showing on the property.

SMITHERS SECTION.

It seems desirable to again direct attention to the gold potentialities indicated at several points on Hudson Bay mountain, stressed in "Lode-gold Deposits of British Columbia." Furthermore, the presence of manganese minerals in the outcrops of certain veins, and the depth to which extensive oxidation persists in the case of some, indicate possibilities of enrichment at depth. In the case of the property of Duthie Mines, Limited, a very noticeable feature is the increase in silver values at depth. These facts, coupled with the knowledge that, generally speaking, mineralizing agencies were active in this region, justifies more energetic development at several points than has actually taken place.

This group, consisting of several claims, is owned by S. F. Campbell, G. E. **Glacier Gulch.** Loveless, and Wesley Banta, of Smithers. It is situated at the head of Glacier creek, the claims extending both north and south of the steep-walled broad gulch immediately below Lake Kathlyn glacier, and is reached by a motor-road branching from the highway, which serves both this property and the adjoining Lake Kathlyn coalfield. The distance from Smithers is about 6 miles.

There are two types of deposits on the property: (a) Fractures mineralized with sphalerite, galena, freibergite, pyrite, and pyrrhotite, carrying good values in silver and some in gold; and (b) irregular replacements of auriferous tetradymite (telluride of bismuth) in the sedimentary measures of the Lake Kathlyn coalfield. Silver-lead-zinc mineralization has been found on both sides of the gulch, but the bismuth mineralization has to date been found only on the south side.

The property was prospected on the north side of the gulch by the owners until 1928, when an option was secured by the late F. H. Taylor, who relinquished it the same year. Subsequently, the owners continued prospecting, discovering the tetradymite mineralization in 1929, and in 1933 shipped 26 tons of ore containing 82 oz. gold and 15 oz. silver. In the spring of 1934 an option was secured by R. W. Wilson; cabins to accommodate a small crew were constructed, small-scale development was carried out and a shipment of ore made. (Refer also to Annual Reports 1926 to 1930, inclusive, and Bulletin No. 1, 1932.)

On the north side of Glacier creek at an elevation of about 3,000 feet mineralized replacement-fractures cut across the volcanic host-rocks. In places the contact-planes of the volcanics are silicified and mineralized. Mineralization is on the whole somewhat irregular, although precious-metal values warrant investigation. On the south side of Glacier creek surface showings consist of a tetradymite mineralization in several acid tongues or replacements, within a zone about 175 feet in width. The widths of individual tongues or replacements varies greatly, from a few feet to a few inches within a short distance. The strike of the larger tongues or replacements is about north 76 degrees west and the dip is about 50 degrees south. There seems to be no reason why similar mineralization will not be found beyond the zone mentioned. A persistent quartz vein mineralized with galena, pyrite, and sphalerite, which can be traced along its dip for many hundreds of feet, occurs in close proximity to the tetradymite mineralization.

On the north side of Glacier creek, at a point 480 feet in elevation above the creek, a shaft has been sunk 23 feet following a replacement-fracture striking north 64 degrees west. The greatest width of mineral exposed in the shaft is about 16 inches. In 1928 a sample across a width of 1.5 feet at the collar of the shaft assayed: Gold, 0.04 oz. per ton; silver, 179 oz. per ton; copper, 0.3 per cent.; lead, 12.6 per cent.; zinc, 16.8 per cent. In the bottom a width of 9 inches of mineralization composed almost entirely of pyrrhotite is exposed. Some additional work was done by the owners in this shaft in 1929, but the shaft has not been examined since 1928. During the year several adits were driven into the mountain following the tetradymite replacements at elevations from 3,175 feet to 3,260 feet on the south side of Glacier creek. In all cases mineralization appeared to become weaker as the workings were advanced. A quartz vein containing sphalerite and galena was discovered at an elevation of 3,260 feet somewhat to the north of the tetradymite mineralization. It was found to extend for several hundred feet from this point down the steep wall of the gulch, averaging about 12 inches in width. An adit was started at 3,000 feet elevation and on August 4th had been advanced a distance of 30 feet in a direction of south 39 degrees east, at which point the vein showed a tendency to widen. A sample of selected mineral from the face assayed: Gold, 0.04 oz. per ton; silver, 13 oz. per ton; lead, 10.3 per cent.; zinc, 20.7 per cent. A car of ore was shipped from the workings driven on the tetradymite mineralization.

This group, owned by the estate of the late L. S. McGill, and others, is now under option to W. R. Wilson & Sons. It consists of the following Crown-granted claims: *Silver Lake No. 1, Silver Lake No. 2, Silver Lake No. 3, "A" Fraction, Key Fraction, Bee, Cec, and 2nd Glacier*. The property is situated on an elevated plateau between elevations 6,400 to 6,800 feet. A motor-road leads from Smithers to Toboggan creek, a distance of about 6 miles, and a good pack-trail continues a further distance of about 4 miles to the property.

Several veins occur on the property, three of which show possibilities of commercial importance. Mineralization varies from essentially silver-bearing galena-sphalerite types to arsenopyrite-sphalerite types carrying gold values. The rock formations consist of beds of volcanics and limestone.

The property was discovered in 1926. In 1931 an option was secured by W. R. Wilson & Sons, who also hold an option on the adjoining *Trade Dollar* group. (Refer to Annual Reports, 1926, 1927, 1928, 1929, 1931, 1933, and Bulletins Nos. 1 and 3, 1932.)

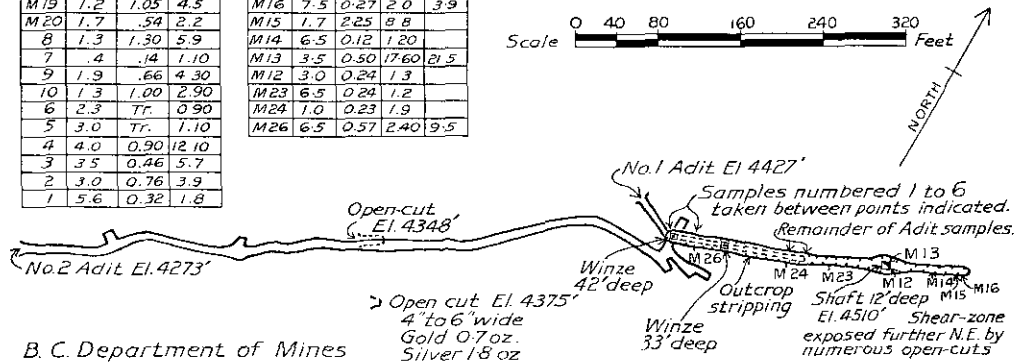
Evidence of the existence of nine veins in all on this group has been found to date and the extensions of three of them are found on the *Trade Dollar Fraction* of the *Trade Dollar* group. To date, prospecting has indicated the possible commercial importance of Nos. 3, 4, and 5 veins. The outcrops have been investigated by an extensive system of pits and open-cuts. No. 4 vein has been located at intervals over a length of 1,200 feet along the strike, and lenses of compact mineralization varying in width from 1 to 30 inches, narrowing and again widening, are exposed in the numerous workings. The mineralization changes in character from galena-sphalerite (essentially silver-bearing) at the lower or western end to arsenopyrite-sphalerite-chalcopyrite (gold-bearing) at the upper or eastern end. No. 5 vein exhibits a length of 750 feet, mineralization being somewhat similar to that of No. 4 vein. Vein No. 3 shows a length of 600 feet, in which the galena-sphalerite mineralization is more prevalent than the higher-temperature type. At one point this vein shows a width of 6 feet, containing bands of sphalerite, chalcopyrite, and galena. These showings lie between elevations of 6,450 and 6,700 feet. This plateau is above the upper limit of glaciation and no glacial drift overlies it. It consists merely of shattered rock in place.

In view of the possibilities indicated in the showings described and the impossibility of carrying on mining operations on the plateau except for a very short time each year, the management decided to explore the showings at depth by a crosscut adit. The latter is situated at an elevation of 6,200 feet and on August 4th had been advanced a distance of 60 feet in a direction of south 69 degrees east.

This group, owned by the estate of the late J. Aldrich, now under option to **Mamie.** W. R. Wilson & Sons, consists of the Crown-granted claims *Myrtle Fraction*, *Iron King*, *Mamie*, *Evinrude*, *Florence*, and *Dome Extension*. These do not all adjoin, the two first mentioned being situated north of, and the last-mentioned south of, the remaining three adjoining claims. The property is situated on the western slopes of Hudson Bay mountain and adjoins the *Coronado* group on the east and the *Henderson* group (Duthie Mines, Limited) on the north. It is reached by a branch road half a mile in length from the camp of Duthie Mines, Limited, which is distant 15 miles by motor-road from Smithers. The claims are all located on a gentle slope which steepens as the hillside is ascended. Mineralization consists of arsenopyrite, sphalerite, and some chalcopyrite, with values chiefly in gold along an extensive shear-zone in volcanic rocks.

No. 1 Adit Samples				
No.	Width Feet	Oz. to the ton		
		Gold	Silver	
M19	1.2	1.05	4.5	
M20	1.7	.54	2.2	
8	1.3	1.30	5.9	
7	.4	.14	1.10	
9	1.9	.66	4.30	
10	1.3	1.00	2.90	
6	2.3	Tr.	0.90	
5	3.0	Tr.	1.10	
4	4.0	0.90	12.10	
3	3.5	0.46	5.7	
2	3.0	0.76	3.9	
1	5.6	0.32	1.8	

Surface Samples				
No.	Width Feet	Oz. to the ton		
		Gold	Silver	Zinc
M16	7.5	0.27	2.0	3.9
M15	1.7	2.25	8.8	
M14	6.5	0.12	1.20	
M13	3.5	0.50	17.60	21.5
M12	3.0	0.24	1.3	
M23	6.5	0.24	1.2	
M24	1.0	0.23	1.9	
M26	6.5	0.57	2.40	9.5



B. C. Department of Mines

Mamie. Plan and Sampling by Company.

The property was prospected by the owner until 1919, when it was bonded by J. F. Duthie, who continued operations until 1923, when the Federal Mining and Smelting Company obtained an option from J. F. Duthie, which after further development was relinquished in 1924. The property remained idle until the present year, when W. R. Wilson & Sons obtained an option and prospected the north-eastward continuation of the vein by open-cutting. (Refer also to Annual Reports, 1919, 1921, 1922, 1923, 1924, and Bulletin No. 1, 1932.)

The main showing, examined in 1931, consists of a strong shear-zone from 6 to 8 feet wide, strike north 70 degrees east, dip steep south-east. The lower end of the outcrop is at an

elevation of 4,425 feet and the shear-zone has been well stripped for about 300 feet. A sample taken in 1931 across a width of 7 feet assayed: Gold, 0.30 oz. per ton; silver, 6.2 oz. per ton; copper, 1 per cent.; zinc, 10.2 per cent. During the present year the optionees state that the shear-zone was traced by open-cuts at intervals for many hundreds of feet beyond the outcrop in a north-easterly direction, with every indication that it continues to the summit of the mountain.

An adit, elevation 4,425 feet, has been driven at the lower end of the outcrop for a distance of 165 feet, exposing a mineralized width of from 3 to 4 feet. The mineralization in this working does not appear to be as strong as on the surface above. Two winzes, now full of water, were sunk from this adit to depths of 33 feet and 42 feet respectively.

Approximately 130 feet below this adit, a lower one has been driven a length of about 650 feet on the general strike of the shear-zone to a point approximately below the first winze in the upper workings. The mineralization exposed in this level is not pronounced, although in places crosscuts show a fairly wide zone, especially near the face.

A crosscut has been driven from the Henderson Creek gorge for a distance of 200 feet from a point approximately 450 feet in elevation below the upper adit, the original intention being to crosscut the vein at this level at an estimated distance of 950 feet.

In Bulletin No. 1, 1932, detailed arguments were advanced for developing this shear-zone on and above the horizon of the upper level, on the grounds that (1) surface exposures indicate upward rather than downward strength, and (2) that geological conditions are such that gold mineralization is more likely to be found above rather than below the horizon mentioned.

R. W. Wilson has reported recently that the shear-zone has been traced for 4,000 feet.

This group consists of eight Crown-granted claims—namely, *Rio Grande*, *Spondulix*, *Rico Aspen*, *Little Joe*, *Iron Dollar*, *Last Hope*, *Jumbo*, and *Big Hope Fraction*—and six adjoining claims. The property is held by the *Rio Grande Syndicate*, of Vancouver. The group is situated on the steep north-eastern slopes of Hudson Bay mountain immediately north-east of the *Schufer* group, on the north side of Toboggan creek. It is distant about 7 miles from Smithers and is reached by motor-road to Toboggan Creek bridge; thence by pack-trail up Toboggan creek a further distance of 2 miles to the camp.

There are two types of deposits—(a) auriferous and (b) argentiferous. The former consists of a deeply oxidized shattered zone in places showing arsenopyrite apparently several feet in width, strike north 75 degrees east, dip south-east. It is exposed at elevations of about 4,500 feet and upwards. The latter type consists of certain shear-zones mineralized with galena, sphalerite, arsenopyrite, and freibergite, but not exhibiting pronounced gold values, outcropping on the *Rico Aspen* and *Spondulix* claims, about 1,000 feet in elevation above the former type. These showings have not been examined. The rock formations consist of volcanics and sediments intruded by a stock of granodiorite.

The property was originally owned by J. Sheedy and J. Fisher, who many years ago drove various prospect-workings at different points, and in 1913, it is reported, shipped 2 tons of ore to the Granby smelter at Anyox. This ore is reported to have assayed: Silver, 84.5 oz. per ton; copper, 7 per cent.; gold, \$2.50 per ton. In 1917 an option on the property was secured by A. C. Gardé, which subsequently lapsed, and the estates of the owners automatically reverted to the Government. In 1933 the option was renewed by A. C. Gardé and in 1934 the *Rio Grande Syndicate* was formed for the purpose of operating the property. Under the direction of A. C. Gardé, camp buildings were erected close to the main trail at an elevation of 4,490 feet, and diamond-drilling was carried out under contract by Boyle Bros.

An old adit, elevation 4,595 feet, now caved, was driven in a deeply oxidized and shattered zone several feet in width, strike about north 75 degrees east, dip steep south-east, which gives evidence of continuation for a considerable distance along the steep, left bank of Toboggan creek. In places arsenopyrite is exposed in the form of small seams. A piece of the arsenopyrite was assayed and contained good values in gold and silver. This zone occurs in sediments of the Hazelton series and granodiorite outcrops a comparatively short distance above. The zone lends itself to development by a crosscut adit as the strike closely parallels the direction of Toboggan Creek valley.

Unusually deep surface oxidation is exhibited in the *Rio Grande* shatter-zone and also in two veins on the property adjoining on the east—namely, that formerly owned by Mount Evelyn

Mines, Limited, now held by Skeena Gold and Silver Mines, Limited. The short distances required to reach the shatter-zone by crosscuts, determined by diamond-drilling, indicates the advisability of doing some development by hand methods at an early date to obtain more positive indications of values and widths than can be found on the surface.

This group consists of *Henderson, Raven, Raven Fraction, White Swan, Galena Henderson, Queen, Dome, Humming Bird, and Canary* Crown-granted claims, owned by Duthie Mines, Limited. The property is located on the western slopes of Hudson Bay mountain and is reached by a motor-road, 15 miles in length, from Smithers. The slope of the ground is between 20 and 30 degrees.

There are two converging veins on this property, the Ashman and Henderson, striking north-easterly, the former dipping north-westerly and the latter steeply south-easterly. Within the area developed the distance between the veins varies from 150 to 250 feet. The Henderson vein is the more southerly and of predominant importance. The intersection appears to be a point of interest. Other veins of lesser importance have been found underground. Mineralization consists of highly argentiferous galena, sphalerite, much freibergite, ruby, and some native silver, and appreciable values in gold. North-eastwards the mineralization on the surface exhibits more pronounced values in gold and indications point to increasing gold values into the mountain, particularly above the 4,200-foot horizon.

The *Henderson*, originally owned by J. K. Ashman, was bonded to J. F. Duthie in 1922, who in that year started underground development in addition to much surface-stripping. In July, 1923, Duthie Mines, Limited, was incorporated, and a 55-per-cent. interest optioned to the Federal Mining and Smelting Company, which latter company, possessing directive control, continued operations until August, 1924, when it relinquished its option. Operations were resumed in 1925 by Duthie Mines, Limited, under the direction of J. R. Turner, with commencement of active development in the Henderson vein. The results obtained in this and the following year led to the erection in 1927 of a 50-ton daily capacity flotation concentrator and milling operations were commenced. An adit to serve the mill, known as the Mill adit, was driven 255 feet in elevation below the compressor level, which up to this time had been the main working-adit. In 1928 reorganization of Duthie Mines, Limited, was effected and the management was taken over by Atlas Exploration Company, associated with Mining Issues Corporation, of Toronto, with C. A. Banks as managing director. The scope of operations was increased, a 600-horse-power steam-electric power plant erected, and a 3-compartment shaft sunk from the Mill adit to the 600-foot level (100 feet below the latter) crosscut to the Ashman vein. Improvements were made to the mill. Operations were suspended in March, 1930, owing to depressed metal-market conditions, although during the year fine surface showings on the north-east continuation of the Henderson vein were uncovered on the *Canary* claim.

Following is the total production of this property to date: 4,788 tons of hand-sorted ore yielding gross smelter returns of \$523,744.92, leaving net smelter returns of \$411,705.72, after deducting freight and treatment rates of \$23.40 per ton; 31,956 tons of ore milled yielded 1,663 tons of lead concentrates and 1,834 tons of zinc concentrates. Values contained in the tonnage milled were as follows: Gold, 776 oz.; silver, 739,055 oz.; lead, 1,920,487 lb.; zinc, 1,606,014 lb. The following may be taken to represent the average tenor of the various products:—

Feed.—Silver, 37.2 oz. per ton; lead, 4.8 per cent.; zinc, 5.2 per cent.

Lead Concentrates.—Gold, 0.27 oz. per ton; silver, 430.8 oz. per ton; lead, 48.6 per cent.; zinc, 10.9 per cent.

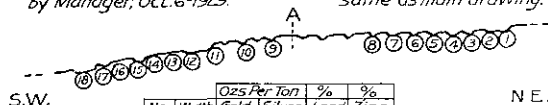
Zinc Concentrates.—Gold, 0.093 oz. per ton; silver, 36 oz. per ton; lead, under 1.4 per cent.; zinc, 47.2 per cent. Savings effected, 95 per cent. of silver contents, 95 per cent. of lead contents, and 80 per cent. of zinc contents.

(Refer also to Annual Reports, 1922 to 1930, inclusive.)

As the result of mining operations a marked increase in silver values in depth was found both in the case of the Henderson and Ashman veins, but the silver content in the latter from the surface downwards is markedly lower than in the former. This fact considered in conjunction with the presence of manganese in the form of rhodochrosite in the constituent vein-minerals suggests that the increase in silver values may be due to secondary enrichment.

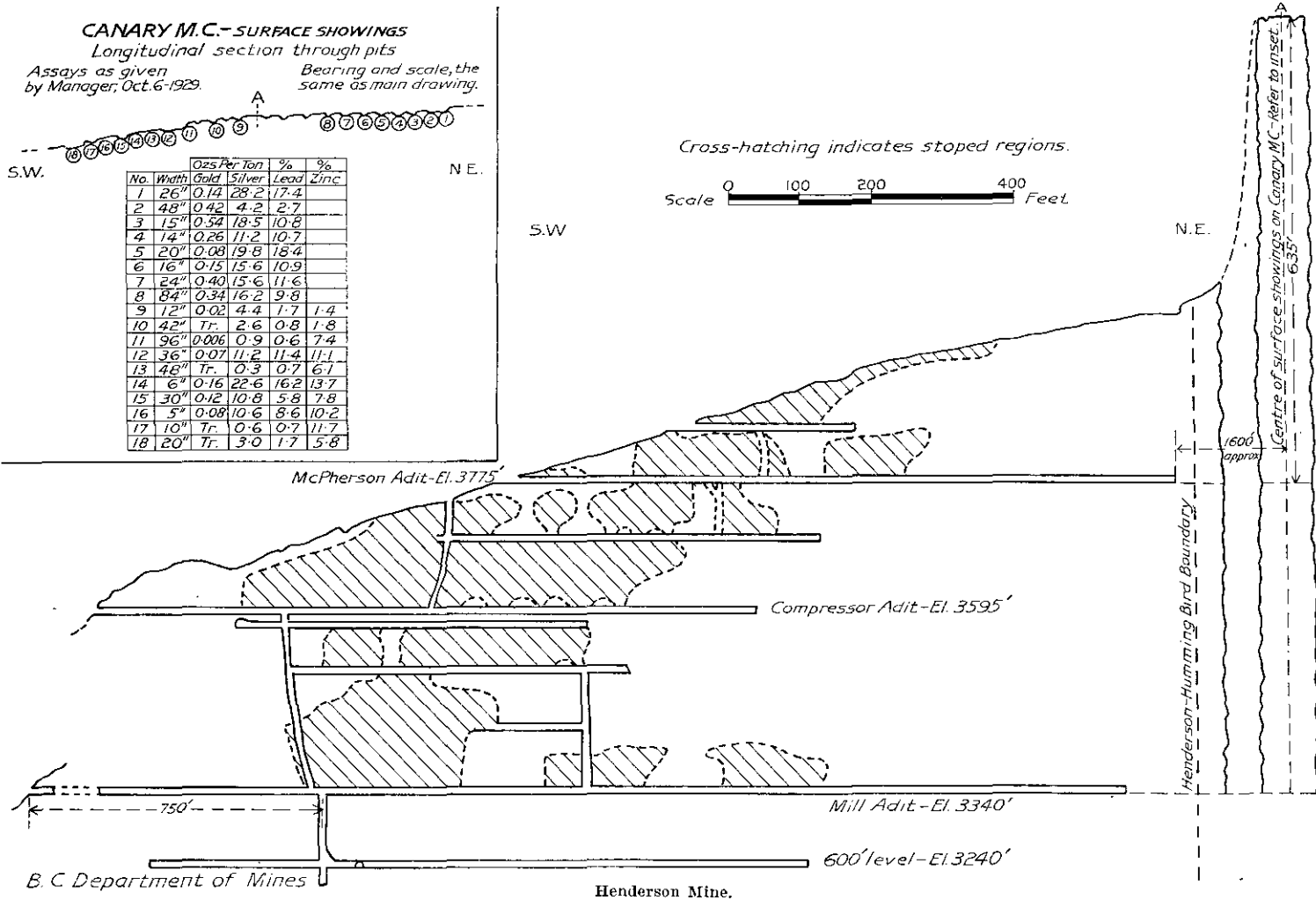
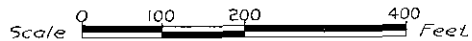
The importance of the surface exposures on the *Canary* claim should be considered in connection with any future operations. Gold values are an important feature, samples running

CANARY M.C. - SURFACE SHOWINGS
 Longitudinal section through pits
 Assays as given by Manager, Oct. 6-1929. Bearing and scale, the same as main drawing.



No.	Width	Ozs. Per Ton		%	
		Gold	Silver	Lead	Zinc
1	26"	0.14	28.2	17.4	
2	48"	0.42	4.2	2.7	
3	15"	0.54	18.5	10.8	
4	14"	0.26	11.2	10.7	
5	20"	0.08	19.8	18.4	
6	16"	0.15	15.6	10.9	
7	24"	0.40	15.6	11.6	
8	84"	0.34	16.2	9.8	
9	12"	0.02	4.4	1.7	1.4
10	42"	Tr.	2.6	0.8	1.8
11	96"	0.006	0.9	0.6	7.4
12	36"	0.07	11.2	11.4	11.1
13	48"	Tr.	0.3	0.7	6.1
14	6"	0.16	22.6	16.2	13.7
15	30"	0.12	10.8	5.8	7.8
16	5"	0.08	10.6	8.6	10.2
17	10"	Tr.	0.6	0.7	11.7
18	20"	Tr.	3.0	1.7	5.8

Cross-hatching indicates stoped regions.



as high as 0.54 oz. per ton, and it has been reasonably demonstrated by operations at various other properties that gold values tend to increase as the core of this mountain is approached. (Refer to Bulletin No. 1, 1932, published by this Department.) The accompanying longitudinal section representing conditions as at October 6th, 1929 (practically unchanged), renders evident that this property still contains a large amount of promising virgin territory, which can be developed to a depth of 1,075 feet, to the present Mill level. The present face of the Mill level is between 1,600 and 1,700 feet horizontally from a point beneath the centre of the surface showings described.

TELKWA SECTION.

Free Gold. This group, consisting of a number of claims owned by Alex. Chisholm, of Smithers, is operated under option by Babine Gold Mines, Limited. The property is located on the eastern flanks of Dome mountain, distant about 26 miles from Telkwa, from where it is reached by following a branch road from the highway and sleigh-road. The well-timbered ground slopes gently and the elevation is about 4,300 feet.

A number of quartz veins varying in width from a few inches up to a maximum of 5 feet occur in a belt of country about 450 feet in width. The formation is andesite intruded in the near vicinity by a tongue of granitic rock. The metalliferous mineralization is mainly pyrite and sphalerite, with a small amount of galena. Good gold values are present, in some cases up to several ounces per ton.

The property was optioned by W. R. Wilson & Sons in 1932, and Babine Gold Mines, Limited, a private company, was incorporated to develop it. (Refer to Bulletin No. 3, 1932, and 1933 Annual Report.) After preliminary surface prospecting in the form of trenching and pit-sinking, a crosscut adit was started in 1933, and up to the date of the writer's examination in May, 1934, about 600 feet of underground work had been carried out.

Eleven veins, varying in width from a few inches to a maximum of 5 feet, have been exposed in a crosscut trench about 500 feet in length. These veins strike about north 75 degrees west and dip steeply north-east, with the exception of one which has a low dip. Various other pits and open-cuts have shown that three veins at least hold out promise of minable widths and continuity being found.

No. 11 working, elevation 4,180 feet (aneroid determination), has been driven as a crosscut for a distance of approximately 325 feet south-westerly to a point about 100 feet below surface showings, and thereafter follows a zigzag course below the outcrops, intercepting several small veins and three of commercial proportions. The last 50 feet of this working, the total length of which is about 600 feet, exposes two veins which were sampled with the following results: Sample across vein 28 inches wide at face of working assayed: Gold, 1.40 oz. per ton. Sample across another vein 24 inches wide, 50 feet distant from first vein, assayed: Gold, 0.20 oz. per ton. It is understood that the vein showing in the face is to be followed by a raise to connect with a shallow shaft sunk from the surface above this point.

Pioneer. This group of four claims is owned by W. A. Skelhorne, G. Timmermeister, and associates, of Telkwa. Situated on the south side of McKendrick mountain, the property is distant about 4 miles in a direct line north-west from Dome mountain, and is reached by a trail 3 miles in length leading off the Cronin road at a point 18 miles from Telkwa, the total distance from the latter place being 21 miles. The gently sloping hillside becomes steeper towards the apex of the vein.

A quartz vein varying in width from 15 inches to 3.5 feet, showing high-temperature mineralization of arsenopyrite, pyrite, chalcopyrite, with some sphalerite and galena, occurs in an acid dyke, cutting volcanics. Granodiorite also outcrops on the property. Both dyke and vein are persistent along the strike.

The property is a relocation of one on which considerable work had been done in former years. It is not mentioned in previous Annual Reports of this Department.

A quartz vein from 15 inches to 3.5 feet in width, strike north 79 degrees east, dip steep north-east, mineralized as above mentioned, is exposed at various points on the south slope of McKendrick mountain by pits for a distance of upwards of 2,000 feet between elevations 4,990 and 5,540 feet (near summit of mountain). There are two adits on the property, each about 75 feet in length, at elevations of 5,090 and 5,265 feet respectively. These workings are driven on the vein and in each case an average width of about 1.5 feet of mineralized quartz is exposed. The following samples indicate the values contained in the mineralization and are of selected

portions only:—Sample of selected mineral from lower adit: Gold, 0.32 oz. per ton; silver, 10 oz. per ton; copper, *nil*; lead, 1.2 per cent. Sample of selected mineral from an open-cut at 5,540 feet elevation: Gold, 0.10 oz. per ton; silver, 14 oz. per ton; copper, 0.2 per cent.

There is said to be evidence of another parallel vein west of the foregoing and close to the trail at 4,340 feet elevation.

TOPLEY SECTION.

Golden Eagle. This group, owned by C. Matheson and D. Heenan, of Topley, consists of five claims held on location. The property is reached by a branch road from the Topley-Babine Lake road, the distance from Topley being about 7 miles. It is situated about $1\frac{1}{2}$ miles south-east of the property formerly owned by the Topley-Richfield Mining Company, Limited. The ground is comparatively flat, sloping gently downwards to the north-west and lying in a pass between Huckleberry and Black mountains at an elevation of just under 4,000 feet.

Two more or less parallel quartz veins and other intersecting veins mineralized with sphalerite, galena, freibergite, and pyrite, carrying high silver values and appreciable gold values, occur in andesite breccia.

The property was discovered by the present owners in 1927 and optioned in 1928 by Topley Silver, Limited, when the existence of only one vein was known. This company immediately commenced small-scale operations, installed a small air-compressor, and sank a shaft to a depth of 140 feet. In 1929 some diamond-drilling was done which proved disappointing and the option was relinquished. The owners continued surface prospecting and very shortly discovered another and more promising vein south-west of the one which had been previously investigated. Early in 1932 an option was taken on the property by T. D. Pickard, and payments due under the option were made, although no actual work was carried out by the optionee, who subsequently relinquished the option. Prospecting was continued by the owners and in 1934 a shipment of 16.51 dry tons was made, assaying as per smelter returns: Gold, 0.135 oz. per ton; silver, 199.2 oz. per ton; lead (wet), 17.7 per cent.; zinc, 11 per cent. (Refer also to Annual Reports, 1927 to 1932, inclusive.) The map on page 175, 1928 Annual Report, shows location of Topley properties.

The surface showings consist essentially of two parallel quartz veins about 70 feet apart, strike about west, dip north. The northerly vein has a dip of 30 to 45 degrees, whereas the southerly vein dips more steeply. At various points there is evidence of other veins crossing them. The more important vein is the southerly one, which has been well exposed by strippings and pits at various intervals over a length of 355 feet. In all of these workings high-grade mineralization consisting of galena, sphalerite, tetrahedrite, and pyrite, varying in width from a few inches up to 18 inches, occurring mainly on the foot-wall of the vein, is exposed. The northerly vein contains similar mineralization, although not quite as strong, and the maximum width of the quartz is about $1\frac{1}{2}$ feet. Some very beautiful specimens of transparent green-coloured sphalerite were obtained from this vein.

The northerly vein is developed by two shafts about 100 feet apart. One, 30 feet deep and filled with water shortly after completion, has not been examined. It is reported that the other shaft has been sunk to a depth of 140 feet, but it was not examined after a depth of 75 feet had been reached. At this point the quartz vein is 1 foot wide and well mineralized with galena, sphalerite, freibergite, and pyrite. In 1929 Topley Silver, Limited, put down a number of diamond-drill holes from the north side of this vein to intercept its downward continuation. The results apparently were not considered by this company sufficiently good to continue its option. These holes were not, however, drilled deep enough to intersect the downward continuation of the southerly vein subsequently discovered by the owners. On the southerly vein a shaft has now been sunk to a depth of 40 feet, according to report, but it has not been examined below a depth of 21 feet. At this point the total vein-width is 5.2 feet, of which 6 inches on the foot-wall is high-grade mineralization, the remainder consisting of quartz and sheared country-rock. A sample of the 6-inch seam on the foot-wall assayed: Gold, 0.30 oz. per ton; silver, 820 oz. per ton; copper, 7.5 per cent.; lead, 14 per cent.; zinc, 16 per cent. A sample at this point across the remainder of the vein assayed: Gold, 0.02 oz. per ton; silver, 4 oz. per ton; lead, *nil*; zinc, 3.6 per cent. The dip of the vein at this point is 70 degrees north-east. It is reported that the major portion of the shipment mentioned above made this year was derived from this shaft.

This property merits development because of the high values encountered and the possibility of finding other veins, having regard to the fact that on the adjoining *Box* group other more or less parallel veins occur.

Gold.

This group is a restaking of the claims formerly comprising the *Cup* group and described in the Annual Reports for the years 1924, 1927, 1928, and 1930.

The owners are J. H. Kenney, F. L. Simonds, and Alex. Chisholm, who did a considerable amount of work during the year and opened up some promising mineral-showings. The work consisted of driving an adit on the flat-dipping, 4-foot vein discovered in 1930 at 3,665 feet elevation on the left bank of Richfield (Findlay) creek, about 500 feet up-stream from the original workings. (See Annual Report for 1930, page 144, under *Cup*.) On September 13th an open-cut had been made in the vein and preparations were being made to drift on it. A total vein-width of 6 feet is exposed in which are two well-mineralized seams, each 1.5 feet wide, consisting of sphalerite, galena, and pyrite. A sample of selected mineral assayed: Gold, 0.04 oz. per ton; silver, 4 oz. per ton; copper, 1.5 per cent.; lead, 7 per cent.; zinc, 17.5 per cent. It is stated that a material improvement is shown in the adit driven subsequent to the writer's examination.

ENDAKO.

Stella.

This group consists of four claims—*Stella 1*, *Stella 2*, *Stella 3*, and *Stella 4*—owned by A. Langley, C. H. Foote, J. Braithwaite, and W. Foote. (Adjoining claims on the south are the *Marjory* and *Gladys* and on the north the *Snowbird*, the ownership of which is not known, and on which no showings of molybdenite were pointed out to the writer.) The property is situated on the Nechako plateau, about 5 miles in a direct line south-west of Endako and about 3 miles north of Francois lake. A car can be driven during reasonably dry weather to a point about 6½ miles from Endako; a trail leads a further 1¼ miles to a cabin constructed on the *Snowbird* mineral claim, which is within easy access of the most easterly showings. Molybdenite occurs in fine scales, remarkably free from other sulphides, in quartz veins up to 2 feet wide in granodiorite and also as disseminations in the latter adjacent to the veins. The property is situated on the eastern fringe of the Central batholith, and it is likely, judging from exposures, that much of the region is underlain by batholithic rocks.

Numerous open-cuts have been made at various points, exposing the 2-foot vein and also other quartz-seams of considerably smaller size.

The extent of the area over which pieces of float-quartz showing molybdenite are found suggests that other showings may be discovered.

In the vicinity of the 2-foot vein the topography is such that a vertical depth of between 50 and 60 feet could be gained by an adit.

Subsequent to the writer's examination, he was informed by A. Langley that such an adit had been started and mineralized rock assaying 0.10 oz. in gold per ton had been encountered. (Refer also to 1927, 1928, 1929, 1931, and 1933 Annual Reports.)

MCLEOD RIVER AREA.

A map of the area will be found in the 1933 Annual Report, page 101.

The oldest rocks in the region are garnetiferous mica-schists which occur in the western portion of the area and are presumably of Precambrian age. Adjoining these on the east are schistose carbonaceous argillites and intercalated volcanics and argillites. The region lies directly over what is deemed to be the path of the Cassiar-Omineca-Cariboo batholith, which trends north-west and south-east, and the western margin of which may be approximately marked by the south-easterly-flowing portion of the McDougall river. Outcrops of this batholith are infrequent. The area appears to be only thinly covered by glacial drift.

Evidence to date indicates the existence of a belt some miles in width of quartz veins extending east of the McDougall river. While it is quite possible that this belt follows the path of the batholith north-westerly, its south-eastward limit appears to be about 3 miles north of the McLeod river, for in the valley of the latter where the formations are well exposed there is little evidence of quartz veins beyond a few mineralized stringers. Some of the quartz veins are of large size: one observed about 1 mile above Reed creek, on the left bank of the McDougall river, is about 100 feet in width. None of the veins are exposed along their strike for any distance and very little work has been done on any of them. Some appear to conform in dip

and strike with the enclosing formation, while others cut across the bedding. Samples taken from the best-mineralized parts of several different veins did not disclose appreciable gold values. From the foregoing description of bed-rock geology it is possible that placer deposits of local origin may exist, but there is no evidence indicating that even if uneroded pre-Glacial channels are found they will be of bonanza type. Some placer gold occurs and it is undoubtedly post-Glacial in age. It occurs in bar concentrations, for example, at the large bend of the McDougall river below Reed creek on the property of Northern Reef Gold Mines, Limited. Just instream from the river at the same point both rock-rims of a former channel of this river are plainly exposed. It is also evident that the "big flat" on the left bank of the river at the bend above mentioned may be underlain at shallow depth by rock benches on which a placer concentration of strictly local origin may be found apart from any superficial values resulting from post-Glacial waters. Placer-gold occurrences on rock benches in this area are numerous. The only evidence observed of a channel of pre-Glacial age is the deeply-decayed, gravel-covered rock bench on the McLeod river on C. Nelson's claim described in the 1932 and 1933 Annual Reports. Ultrabasic rocks cut by the McLeod river suggest that the probable local origin of the occurrences of platinum and iridium in the placer deposits of that river.

A review of all the ascertained facts concerning the area indicates that most or all of the placer is of local origin.

Unfortunately the main watercourses have not cut through the heart of the quartz-vein belt. The McDougall river in its upper reaches flows easterly and north-easterly, and after cutting into the western edge of the quartz-vein belt near Reed creek turns away from it, flowing south-easterly. The part of McLeod river flowing at right angles to the vein-belt is apparently just south of the latter.

The distribution of glacial drift in the region indicates a marked *south-east* movement of the ice. (Refer also to 1932 and 1933 Annual Reports.)

This company was incorporated during 1934 with head office at 1405 **Northern Reef Gold Mines, Ltd.** Douglas Street, Victoria. The property consists of the six mineral claims named *Pearl, Ruby, Flossie, Myrtle, Jason, and Midas*, and placer leases numbered 690, 691, and 692; the placer leases are described under "Placer-mining." The location of the property is shown on the map on page 101 of the 1933 Annual Report. Situated on the McDougall river, it is distant about 16½ miles from Fort McLeod, from which it is reached by good tractor-trail constructed by the company during 1934. Fort McLeod is reached by water route 66 miles in length from Summit lake, 32 miles north of Prince George. Low-lying benches flank the east side of the river, rising to cut-banks above which is the rolling broken-up country of the Nechako plateau. The country west of the river is much the same, save that the rise from the river is more abrupt.

At several points slightly mineralized quartz veins are exposed on which no great amount of work has yet been done. The rock formations consist of argillites and volcanics, the former schistose at some points. The quartz veins conform with the enclosing rock formations in dip and strike and also in places cut the bedding. They vary greatly in size from stringers up to 100 feet. A vein not less than 100 feet in width outcrops strongly on the left bank of the McDougall river, where it has been cut by the river at a point about 1 mile above Reed creek. Just below the mouth of the latter another quartz vein is exposed on the left bank of the McDougall river. On the *Jason* claim on right bank of the river a cut 30 feet in length exposes volcanic rocks in contact with argillites. The latter are sheared and the shear-planes are slightly pyritized. The volcanics show disseminated pyrrhotite. A sample of mineralized argillites assayed a trace of gold. The workings are mainly on a large quartz-showing between 20 and 30 feet wide which outcrops prominently close to the left bank of the river near the boundary-line between the *Pearl* and *Ruby* claims. This showing, which is somewhat oxidized, shows a little pyrite and galena. One or two cuts have been made on its outcrop, but exposures are few, and its exact strike and form cannot be determined. It may be a lens-like body. The outcrop strikes south 39 degrees west and the enclosing schistose argillites strike north 69 degrees west. A short distance east volcanics are in contact with argillites. The former are hydrothermally altered where intruded by acid dykes and a green micaceous-like mineral is in evidence. About 50 feet north-west of this exposure an adit has been driven 10 feet above the river for a distance of 52 feet, from the end of which a winze had been sunk 28 feet at the time of examination. It was the intention of the management to continue this winze to a depth of

about 50 feet and then crosscut to the vein to determine its appearance at this depth. It is understood that underground development is to be continued during the winter.

The immediately surrounding region merits close prospecting as there seems to be a large number of veins. In addition to those mentioned above, quartz-outcrops can be seen from a distance on the mountain between Reed creek and McDougall river.

PLACER-MINING.

Sauchi Creek.

Sauchi creek flows easterly in its upper portion, and finally about 5 miles above its mouth bends north-easterly, flowing into the south end of Stuart lake. It is a large creek with several tributaries; the position of its most easterly tributary is shown on the Pre-emptor's map, about 2½ miles east of its true position.

In dry weather a car can be driven from the Vanderhoof-Fort St. James road over a branch road about 6 miles in length. The lower 8 miles of this creek were examined.

The occurrence of placer gold on this creek has apparently been known locally for some years, but it was not until the fall of last year that the occurrence was reported to the writer.

For the lower 5 miles the creek occupies a deep valley cut in glacial debris. About 6 miles above its mouth, slightly pyritized quartzites of presumably Carboniferous age are exposed on the left bank of the creek. Just above this point the valley widens, and large low-lying benches flank both sides of the creek for about half a mile, when the valley narrows, cutting through a large stock of granodiorite, above which it again widens to the point at which it is joined by a north-flowing tributary about 8 miles above its mouth. The fall of the creek in the lower 5 miles is about 73 feet per mile and above this the gradient is somewhat less.

Placer gold in coarse flakes occurs on a false bed-rock concentration of post-Glacial type on the low-lying benches mentioned above. Panning at several points disclosed quite good values, and at one point a pan indicating a value of \$8.10 per cubic yard (gold valued at \$32 per ounce) was obtained. Unfortunately these benches are overlain with many very large boulders, which are so frequently present in this type of deposit and which are a great handicap to development. However, careful testing of this ground is fully warranted.

This region lies within the eastern contact-zone of the Central batholith, of which the granite stock cut by this creek about 6½ miles above its mouth is a satellite. This stock and the pyritized quartzite also mentioned above were the only rock-exposures noted, the bed-rock generally being obscured by the thick mantle of glacial debris. Sauchi creek has cut down through this debris and in doing so has effected the post-Glacial concentrations of placer mentioned. Whether gold will be found on bed-rock or not is largely dependent on a local source, such as quartz veins. There is every reason to suppose that the placer gold is of local origin, and, generally speaking, the up-stream region of this creek and its tributaries merits prospecting for the occurrence of lode-minerals.

McLeod River Area.

A general description of placer occurrences in this area will be found on a previous page of this report, and a map on page 101 of the 1933 Annual Report.

This company holds placer leases 690, 691, and 692, and has applied for three **Northern Reef Gold Mines, Ltd.** additional placer leases north of the foregoing. (This company's mineral holdings are described on previous pages of this report.) The property covers that portion of the McDougall river immediately below the junction of Reed creek, where the river, after flowing easterly, turns sharply south-westerly, then south-easterly, forming a large bend. On the left bank of the river a large gently-sloping, gravel-covered terraced flat is situated at this point. The shape is roughly that of a crescent. The length of this large flat is about 1,000 yards and the average width about 350 yards. At the downstream end rock is exposed, and also the two rims of a former channel of the river. Instream from this flat the ground rises sharply in the form of gravel cut-banks (rock is exposed at one point) to a height of about 270 feet above the river, the average plateau-level of the region (as determined by aeroid this is about 3,100 to 3,200 feet above sea-level). This ground covers in whole or in part the area tested last year by Cariboo Northern Development Company, Limited (*see* 1933 Annual Report).

Placer gold occurs in this region in proximity to the river, where good values are found on both banks as bar concentrations derived from glacial debris of local origin. It is quite possible

that bed-rock underlies the large flat on the left side of the river at comparatively shallow depth, and in view of the surrounding bed-rock geology and the existence of numerous quartz veins the occurrence of placer of local origin on rock benches or former channels of the river is possible.

Pans taken at four different points immediately adjacent to the river at the time of the writer's visit indicated an average value of \$1.87 per cubic yard for the material tested. Much test-pitting has already been carried out during this and last season by the company's staff, and results are stated to be satisfactory. To obtain an accurate idea of the average values and yardage of the "big flat" a great deal of testing is required. The gold is fairly coarse; the largest piece observed by the company's staff is stated to have a value of 17 cents.

It is the intention of the company to start hydrauliclicking just below the big flat, at which point rock is exposed. Water for this purpose is to be obtained by impounding Green Timber lake, situated on the plateau, and construction of a ditch-line 8,500 feet in length to a lower dam situated just above the point at which piping is to be commenced. The head at the monitor will be 90 feet. Considerable progress was made during the year on this project, and it is anticipated that it will be possible to commence hydrauliclicking early next season, when it will be possible to carry out more extensive testing.

During the year the company has been actively engaged in testing the ground, in ditch and dam construction, and in tractor-trail construction from Fort McLeod, a distance of about 16 miles. A "K.O." Allis-Chalmers (48-horse-power) caterpillar tractor, taken into the property during the year, has proved extremely useful in many ways.

Camp accommodation for a crew of twenty-four men has also been erected, together with an assay office, and a sawmill has also been installed. (Refer also to Annual Report for year 1933.)

Two Brothers Lake Area.

This company has staked and applied for a large number of leases on **Two Brothers Valley Gold Mines, Ltd.** McLaren, Moosehorn, and Thudegade creeks. The latter, frequently called Two Brothers river, is more correctly named Thudegade river. Rising in the low Stikine-Finlay divide, this river meanders in a wide flat valley, which mainly trends almost due east and west, but trends more northerly from the confluence of McLaren creek down-stream. Two Brothers lake (barometric elevation 3,695 feet) is about $4\frac{1}{2}$ miles below the mouth of McLaren creek. From Two Brothers lake the river flows north-easterly into the Finlay river. McLaren creek is a misnomer for McLair creek, Chas. McLair having been the original discoverer of placer gold on this creek. McLair is reported to have taken several thousand dollars' worth of gold from the creek, but he finally disappeared some years ago and presumably lost his life in this region. Very little evidence of his workings now remains, but his well-constructed cabin is situated on the north shore of Two Brothers lake. The direction of flow of McLaren creek is south-easterly. Moosehorn creek flows southerly. Both are large creeks, the flow being of the order of thousands of cubic feet per minute.

The region lies in the western contact-zone of the Cassiar-Omineca-Cariboo or Eastern batholith. The batholith evidently swings to a northerly direction from McConnell creek, and exposures on McLaren creek are mainly of igneous rock. The rock is chiefly syenite and is well pyritized in the region, more especially the exposures along McLaren creek. Samples of well-mineralized batholithic rock taken at three different points failed to disclose any gold values. The intruded rocks, so far as observed, are volcanics and outcrop in small exposures along McLaren creek and extensively in the canyon of Moosehorn creek to the west. The geology of the district is not unfavourable to the discovery of mineral deposits and, therefore, prospecting is warranted.

The valley of Two Brothers river has been over-deepened, and all tributaries of this river cut deep canyons and gorges adjacent to the main river-valley. Of these canyons, that of McLaren creek is the oldest and bench deposits (low-lying) are laid down within it. This canyon is quite possibly of inter-Glacial age. On either side of Two Brothers River valley, at or about 300 feet in elevation above the present river, is what may be described as a master rock bench, but thinly covered with glacial drift. This would seem to be the level of a pre-Glacial channel system in this region. The glaciated pre-Glacial channel of McLaren creek is remarkably well exposed at several points. Just below the junction of Belle creek the width

of this channel is about 400 yards, and it is situated on the left bank of the present creek, which occupies a channel about 35 feet in elevation below it. Down-stream in the vicinity of the gorge near the mouth the pre-Glacial channel exists in the form of a wide rock bench on the west side. At some points the old channel has been swept bare of even gravel deposits by the large streams arising from the melting ice during its retreat. At others it is covered with terraces and benches of glacial drift.

It is apparent that the likelihood of finding any true bed-rock placer deposits of local origin in such a region is remote. On the other hand, there is no reason why post-Glacial concentrations of commercial proportions may not be found, but it is important to bear in mind that such concentrations are likely to show erratic distribution of values. A very large area in this region is occupied by benches and terraces, which may be considered as of potential promise and which merit testing. Particularly impressive in this connection is the wide valley of Thudegade creek, or Two Brothers river as it is frequently called, wherein low-lying and high-lying benches extend for many miles. The question of dredging possibilities therein naturally arises. This can only be determined by very thorough and systematic testing of the surface, followed by Keystone-drilling. It is self-evident that the adequate testing of such an extensive area must occupy considerable time.

Good values may possibly be found on some of the bench deposits within the gorge of McLaren creek.

A particularly important point commercially in connection with the benches in this region is the absence of large boulders. In some cases the size of the gravels renders them readily workable by drag-line or shovel, in so far as can be determined by *superficial* observation only.

It is clear that the placer gold originates from the glacial drift, but this, for the most part, is of local origin, and boulders consist mainly of batholithic and volcanic rocks. Probably a diagnostic erratic is a conglomerate. Boulders of the latter, although not very numerous, are of widespread distribution throughout the area. The ice-sheet flowed south-east in this region, and its scar on the mountains is plainly discernible from the aeroplane, in the region at the north end of Thutade lake. Iron oxide resulting from the oxidation of the pyritized batholithic rocks has resulted in cementation of some of the older gravels and in coating the placer gold, rendering the latter somewhat difficult to amalgamate, although simple means only are necessary to overcome this. A noteworthy feature is the presence of a large quantity of magnetite and to a lesser extent of specularite. Some of this is quite coarse—of the size of walnuts. While these minerals were not observed in such coarse form in place, nevertheless, in view of the geology described, it will be evident that their occurrence in such coarse form is possible, and they are probably of strictly local origin.

Probably a point of minor importance is the fact that field evidence supports the view that drainage has probably been reversed in Belle creek (East fork of McLair creek), and this creek formerly flowed in the opposite direction.

Values in gravels tested to date are stated to range up to several dollars per cubic yard. A test of a cubic yard of gravel at the time of the writer's visit showed a content of \$1 with gold at \$34.50 per ounce.

It is evident that in such a remote region adequate testing of such a large potentially promising area of gravels must involve considerable expense.

The Two Brothers Company is served entirely by aeroplanes. Three aeroplanes, each capable of carrying a load of about 600 lb., are based at Takla lake, to which point freight is conveyed by boat from Fort St. James. A radio-station at Two Brothers lake and another at the aeroplane base contribute to safe flying conditions and keep the mine manager in touch with the outside. Preliminary operations consisted in conveying to the ground a small sawmill, a 30-horse-power caterpillar tractor, and a "Denver pan" (for testing gravels in 1-cubic-yard lots). A crew of thirty men is employed. Suitable camp buildings for the accommodation of this force have been erected. The camp (barometric elevation 3,750 feet) is situated in Two Brothers River valley close to McLaren creek, at a point between 4½ and 5 miles from Two Brothers lake. A motor-boat plies on the lake and river, bringing supplies from the aeroplane-landing on the lake to a point on the river about three-quarters of a mile below the camp.

The company, it is understood, has during the latter part of the year been carrying out testing and drilling under the direction of S. Hancock, and intends to continue drilling during the winter.

The flying-time from Takla lake to Two Brothers lake is about two hours. In the long run this is probably the cheapest way of reaching this area. Of the alternative routes, by trail from Takla lake, by boat and trail via Finlay river (starting by boat from Summit lake), and by trail from Telegraph Creek, the last mentioned would seem to be the best.

Other points in the Omineca Mining Division at which activities were manifested are Lorne and Hankin (Philip) creeks in the Skeena section and Bob creek near Houston.

CARIBOO MINING DIVISION.

LODE-MINING.

Prince George Section.

These groups, consisting of a number of claims, are owned by A. St. Louis, **Black Cat and Wild Cat.** T. Corless, and Chas. Wisenden, of Prince George. The property is situated on Corless creek (tributary of Skaret creek), about 1½ miles above the mouth. A car can be driven in dry weather to Tabor creek; thence a good sleigh-road follows up Skaret creek, and a foot-trail up the right bank of Corless creek to the property. The total distance from Prince George is about 9 miles. The valley-sides of Corless creek are steep and thickly wooded.

Mineralization consists of a number of more or less parallel quartz stringers mineralized with pyrite in andesitic volcanic rocks. In the latter a small amount of molybdenite occurs in places in disseminated form.

Several of the quartz stringers mentioned are exposed by shallow open-cuts and trenches. The widest stringer is about 8 inches. The stringers strike north-east and dip steeply north-west. Samples of selected mineral were taken at four different points, but yielded upon assay only traces of gold in each case.

This group consists of a number of claims owned by A. McLarty and G. B. **Dome.** Williams, of Prince George. The property is situated on the East fork of Evans creek, tributary of Dome creek, a large creek flowing into the Fraser river at Dome Creek Station on the Canadian National Railway. From this station a pack-trail about 14½ miles in length leads to the property, which lies at elevations of between 4,575 and 5,750 feet. The hillside on which the property is located is steep and wooded.

The deposit is of quite unusual size and is apparently a large mineralized acid sill about 600 feet in width, which can be traced on the surface for a great distance.

The rock on the foot-wall is a limy argillite and on the hanging-wall a grey quartzite. Along the foot-wall is a body of quartz about 50 feet in width, the outcrop of which can be traced for a great distance up the mountain-side over the divide between Evans and Dome creek, a height of 1,175 feet in elevation above the exposed mineralization in the bed of the creek. The sill is cut diagonally by the East fork of Evans creek, and the surface has been exposed by blasting in places for a length of about 200 feet in the bed of the creek. The mineralization is on the whole sparse, although good in spots, and consists mainly of pyrite and chalcopyrite with a subordinate amount of galena. The sill has been altered to carbonates, apparently ankerite, weathers to a rusty-brown, and is traversed with a network of small quartz veins. After injection the sill has apparently been fractured and mineralized. Fragments of the country-rock are in places cemented with quartz and carbonate material, and a network of small quartz veins traverses the whole. Mineralization exhibits a tendency to replace the brecciated parts.

The strike of the sill and enclosing country-rock is north 84 degrees west and dip about 60 degrees south. The prevailing rock formations in the region up to the head of this creek are apparently entirely sedimentary. Three samples were taken of the more heavily mineralized parts: (a) Near the foot-wall, where low gold values were reported; (b) at the point of heaviest mineralization; and (c) at a point where a little galena was in evidence. All samples disclosed upon assay only traces of gold and silver. Sample (a) assayed 0.2 per cent. copper; sample (b) assayed 3.2 per cent. copper; and sample (c) assayed 2.5 per cent. lead.

This group, consisting of several claims, is owned by T. Rush and associates. **Tabor.** of Prince George. The property, which is a relocation of earlier staking, is situated on the open, gentle slopes of Six-mile mountain, which lies about

9 miles in a direct line north 80 degrees east of Prince George. A motor-car can be driven to the base of the mountain.

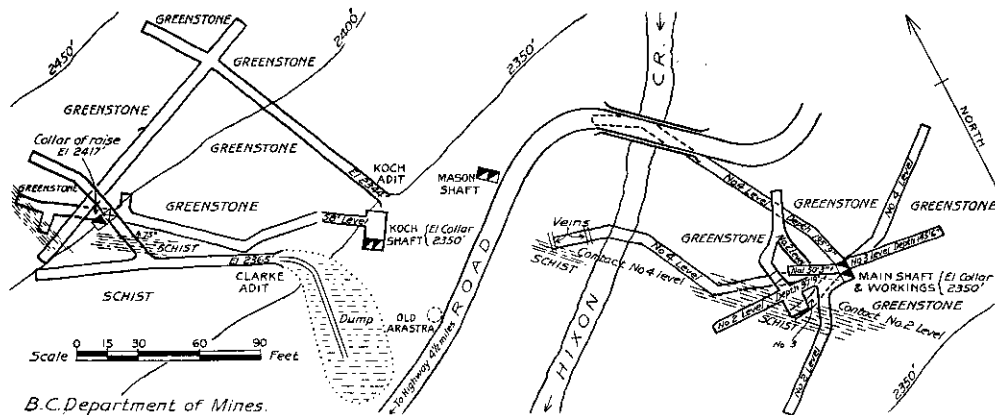
A number of parallel quartz veins occur in sedimentary rocks (argillites and quartzites) intruded in places by granodiorite stocks. They occur within a belt about 1,500 feet wide. Mineralization is sparse and consists of chalcopyrite and pyrite.

Most of these veins are several feet in width, reaching 11 feet in one case, strike north to north 31 degrees east, dip east to south-east at varying angles.

The underground workings consist of several short adit-drifts, one crosscut, and shallow winzes. So far noteworthy precious-metal values have not been disclosed. (Refer to 1929 Annual Report.)

This company is a reorganization of an old company of the same name **Quesnelle Quartz Mining Co., Ltd.** incorporated in the seventies. The authorized capital is \$600,000, divided into 2,400,000 shares of a par value of 25 cents each. The registered office is 1000 Hall Building, Vancouver, and the president is Newton J. Ker. The property consists of six Crown-granted claims—*Morrison Location, Stewart Location, Washburn Location, Washburn Lateral*, and also Lot 55G and Lot 56G.

The property is situated on Hixon creek, about $4\frac{1}{2}$ miles distant from the Prince George-Quesnel highway, and can now be reached by motor-car. The slopes of Hixon Creek valley are timbered and the rock formations are largely covered by gravel terraces at elevations much above the creek. The creek has cut down to a depth of about 200 feet below the plateau-level and, at or about creek-level, country-rock and quartz veins are exposed.



Quesnelle Quartz Mining Co.

The country-rock consists of bands of a highly altered kaolinized formation interstratified with schistose sediments and phyllites. Within the first mentioned are numerous quartz veins, mineralized with pyrite, varying in size from an inch or less to several feet in width. Quartz veins also follow the contact of the highly altered rock with the sediments. Underground workings show that the deeply oxidized and kaolinized rock gradually passes at depth into greenstone; the zone of oxidation extending to about 100 feet below the creek-level. It is evident that the rock formations were deeply weathered in Tertiary times and that secondary enrichment took place in the quartz veins. Commercial gold values only occur in some of the quartz veins. It is stated that a large volume of the altered greenstone contains low gold values up to \$2.04 per ton (gold valued at \$30 per ounce). The greenstone is a highly altered rock, possibly diorite, originally intruded in the form of sills. About 2 miles down-stream a stock of augite syenite outcrops at the falls on the creek, and granodiorite outcrops 2 miles up-stream in the creek-valley.

After incorporation in the seventies the original company carried out the greater portion of the existing underground work and erected a stamp-mill. Old records show apparently that 239 tons of ore was milled, averaging \$20.91, with gold valued at \$20.67 per ounce. Operations were suspended in the late eighties, shaft-workings allowed to fill with water, and for nearly fifty years until last year they remained in that condition.

An option on the property was secured in 1918 by Chas. F. Law and later in 1929 by Cariboo Lode Mines, Limited, but on each occasion little was done other than clearing out adits. Interest was revived in 1932 following the discovery by B. Briscoe of some rich quartz stringers, and the property was optioned by R. W. Alward, M.L.A., and J. H. Johnson. Pits were sunk on the quartz stringers to where the ore pinched and 8 tons was shipped, yielding 7 oz. gold and 3 oz. silver. The option was allowed to lapse. In 1933 the present company was organized, plant was installed, comprising a 50-horse-power Diesel-engine-operated air-compressor, 18-horse-power gasoline-engine, hoist and pump, and the main shaft was unwatered and development commenced.

The main shaft is sunk close to the creek on the left bank to a depth of 207 feet. From this shaft the following workings have been driven: A working 25 feet west at a depth of 50 feet; at 97½ feet, a total of 232 feet of workings west, north, and south; at 145½ feet depth, a total of 81.5 feet of workings east and west; and at 196 feet, a total of 240 feet of workings east and north. The shaft shows that the decomposed rock at the surface gradually becomes less oxidized in depth and at 100 feet merges into greenstone, which continues to the bottom.

An adit was started last year on the right bank or opposite side of the creek, its objective being to explore the ground under the rock bench on which the rich stringers were discovered in 1932. This adit is about 170 feet in length and enters the region in which pits were originally sunk from the surface. At the top of the raise a quartz vein 4 feet wide was intersected which showed free gold. It is stated that 548 lb. of ore from this region yielded gold to the value of \$5.25, representing a value of \$19.16 per ton (gold valued at \$30 per ounce).

On the right bank of the creek, in the near vicinity of the above adit, another shaft, known as the Koch shaft, was sunk many years ago to a depth of 70 feet and a working run south-west therefrom. This working was cleaned out during the year. Close to the collar of this shaft an adit was run also many years ago north-westerly. At a distance of about 114 feet from the portal branch workings were run south-west 108 feet and north-east 35 feet, the former branch cutting a number of quartz veins. This working was extended somewhat during the year by the present company. In close proximity to the Koch shaft, another known as the Mason shaft was sunk originally to a stated depth of 51 feet and certain workings were run from the bottom. This working has not been examined by the writer.

It is the opinion of the management that the most promising region for quartz veins with commercial values is in the greenstone bordering the contact with the schistose sediments, and it has therefore been decided to drive south-west from the bottom of the main shaft in the greenstone to the contact, and then drive north-west, following it under the workings on the opposite side of the creek. At the time of the writer's examination in September a new head-frame had been erected over the main shaft, and this work had been commenced. Camp buildings were improved during the year and a 12-14-horse-power Petter Diesel engine and electric generator were installed for the purpose of lighting the camp.

It is understood that the Crown grants of this property convey placer rights as well as lode-mineral. The possible existence of a segment of a buried channel on the rock bench on the right bank of the creek in the vicinity of the present workings is indicated. Further investigation seems well justified. (Refer also to Annual Reports for 1918, 1929, 1930, and 1933, and Bulletins Nos. 1 and 3, 1932.)

BARKERVILLE SECTION.

Cariboo Gold Quartz Mining Co., Ltd. This company has an authorized capitalization of 2,000,000 shares of a par value of \$1 each. Registered office, 615 Bower Building, Vancouver. President, Dr. W. B. Burnett; managing director, Fred M. Wells; general superintendent, R. R. Rose. The property owned by this company consists of the *Rainbow, Pinkerton*, and adjoining claims, in all over sixty in number, located for the most part on Cow mountain, extending north-westwards across Jack of Clubs lake to Island mountain. The hillsides are timbered and the rock formations largely obscured.

Numerous quartz veins mineralized with pyrite strike north-easterly or easterly. Black fibrous minerals occur locally, with which free gold is almost invariably associated. These minerals have been identified by H. V. Warren as galenobismutite and cosalite, sulphides of lead and bismuth, copper being also present in the latter. Milling has proved that particles of free gold occur in the veins up to ¼ oz. in size.

The *Pinkerton* claim was apparently worked to a limited extent in the very early days and later, in 1902, by C. J. Seymour Baker. Surface showings first received serious attention by the late A. W. Sanders, a prospector who staked the *Rainbow* group about 1921, and during the next few years exposed rich surface showings, to which attention was drawn and the development of which was recommenced in the 1925 Annual Report. In 1927 the Cariboo Gold Quartz Mining Company, Limited, was formed and small-scale operations commenced under the management of F. M. Wells. The initial operations consisted of a crosscut adit and branch workings driven from the left bank of Lowhee creek, 380 feet in elevation above the present main working-adit. One objective of this work was to explore the ground below the *Rainbow* group outcrops. In view of the encouraging results secured in this working, it was decided in 1930 to start a permanent main crosscut adit just above Jack of Clubs lake. New camp buildings were erected at this site. The results gained in driving this adit were such that a decision to erect a mill was reached in 1932, and a cyanide plant of about 65 tons daily capacity was completed by the end of that year and milling operations commenced on January 2nd, 1933. Material additions to air-compressor capacity and Diesel-engine power plant were made in 1933 to meet the demands of the extensive programme of underground developments being carried out.

Still further additions in this respect were made in 1934; Diesel-engine power has now reached a total of about 1,000 horse-power and air-compressor capacity about 3,000 cubic feet of free air per minute. Three electric locomotives and one mechanical mucker are employed in the main haulage-adit. The capacity of the mill was stepped up to 100 tons daily during the latter part of the year, the present treatment scale.

The surface showings are mainly on the *Rainbow*, *Cariboo No. 1*, and *Pinkerton* claims. The *Rainbow* surface showings consist of a number of small veins of the "B" type showing free gold in their outcrops. The original owner, the late A. W. Sanders, used to make several hundred dollars each year by roughly crushing and rocking ore extracted from these outcrops. On the *Cariboo No. 1* claim the chief showing is a large "A" vein, between 40 and 50 feet in width, showing free gold in its outcrop, yielding good assays across several feet. The indicated strike is north-west and the downward continuation is being sought by a crosscut now being driven from a point close to the end of the main haulage-adit. The distance is now less than 1,200 feet. The host-rocks are schistose sediments of the Richfield formation of Precambrian age.

The underground workings have now reached a total length of about 5 miles. The old upper workings total several hundred feet in length and comprise one main adit and two branches therefrom. Several quartz veins from a few inches to 2 feet in width were intersected and one large vein 9 feet in width crossing the formation, which shows good gold values. This vein was followed for about 150 feet along its strike and has been stoped to some extent.

The main adit, known as the 1,500 level, is at elevation 4,000 feet above sea-level (about 100 feet above Jack of Clubs lake). For the first 450 feet its direction is southerly; thereafter it continues on a bearing south 47 degrees east to the face, and about 3,700 feet from the portal. Approximately 350 feet in elevation above this level another adit, known as the 1,200 level, has been run south-easterly and connected by a raise with the old workings. Intermediate between the above two adits are the 1,400 and 1,300 sub-levels, which do not connect with the surface. About 115 feet below the 1,500 level a limited amount of driving has been carried out on the 1,600 level. The 1,500 level has cut in all nine veins in addition to numerous veinlets, the existence of which were not previously known. In addition to the foregoing, the members of the *Rainbow* or *Sanders* system were intersected. On the 1,500 level development has disclosed to date three productive regions represented by three separate groups of veins—namely, the No. 2 vein area, the Nos. 5, 6, and 7 vein areas, and the *Rainbow* or *Sanders* vein area. Extensive development has taken place in these at the various horizons between the 1,200 and 1,500 levels, and the persistence of these groups of veins and the presence of commercial gold values at different horizons has been proved. Particular interest attaches to the *Rainbow* system, because originally it was chiefly the surface exposures of this system which led to the initiation of this mining enterprise. It is also interesting to note that it is in association with this vein system that auriferous pyrite replacements in limestone occur, similar in type although not so extensive as that found at the adjoining property of the Island Mountain Mines Company, Limited. (Refer to Annual Reports for years 1922 to 1933, inclusive; also Bulletins Nos. 1 and 3, 1932, and to Geological Survey Summary Report, 1933, Part A.)

Aurum. This group, owned by C. J. Seymour Baker, consists of *Aurum*, *Aurum N.E.*, *Aurum West*, *Aurum South*, and *Union Quartz* claims. The *Aurum* group and eight adjoining claims are now controlled by the Island Mountain Mines Company, Limited, a subsidiary of Newmont Mining Corporation. The manager is M. D. Banghart. The property is situated on the steep, timbered slopes of Island mountain adjacent to the town of Wells, and the concentrator is beside the Quesnel-Barkerville road. It adjoins the property of the Cariboo Gold Quartz Mining Company, Limited, on the north-west.

There are two distinct types of deposits: (a) Quartz veins mineralized with pyrite and arsenopyrite, and with rare occurrences of cosalite or galenobismutite, carrying gold values, striking in main easterly and north-easterly, dip steep southerly; (b) a pronouncedly auriferous pyrite replacement deposit in limestone. The property is situated within an area of schistose sediments of the Richfield formation of Precambrian age. One intrusive tongue of diorite has been cut in the workings.

The property was first operated, according to early records, by the Enterprise Company in 1878, and later by the Island Mountain Mining Company, which company is reported to have employed from forty to sixty men in one year. The latter company purchased a Lane and Kurtz mill and graded a site for it during the years 1886-87. A 10-stamp mill was erected by the latter company at Jack of Clubs lake (on the site of which an up-to-date cyanide plant was constructed this year), but early records differ as to the date of erection; the late W. Fleet Robertson in the 1902 Annual Report giving the date as 1878, whereas the Gold Commissioner at Barkerville in 1890 states that the mill was completed in 1890. However, although many hundreds of feet of development were undoubtedly carried out on this property in the early days, mainly by this company, milling operations were of very short-lived duration ("about one month" according to the 1902 Annual Report), the metallurgical treatment of the ore, coupled with other difficulties, offering a problem which the operators could not at that time solve. In 1903 C. J. Seymour Baker and associates carried out "a great deal of work on Island mountain clearing out old adits," but subsequently, until 1925, interest in the property lapsed. In 1925 C. J. Seymour Baker acquired from the Government much of the property now known as the *Aurum* group, and each year until 1932 employed a small force of men in clearing out old workings—no inconsiderable task in view of the fact that many of the trails approaching them were completely blocked with a fifty-year-old timber-growth. In 1932 the *Aurum* group was optioned by C. J. Seymour Baker to Reward Mining Company, Limited. The latter staked eight adjoining claims on the west and the same year bonded the whole property to Cariboo Consolidated Gold Mines, Limited, which company in turn optioned these holdings to Newmont Mining Corporation, of New York. This corporation commenced active development in 1933, operations being carried on under the name of P. Kraft, the resident manager. Subsequently Island Mountain Mines Company, Limited, was incorporated to operate the property. In 1934 the scope of operations was greatly increased, the Diesel power plant increased to 389 horse-power, and a 50-60-ton daily capacity counter-current cyanide plant constructed, which went into operation on November 1st. (Refer also to Annual Reports for 1902, 1925 to 1928, inclusive, 1930 and 1933; also Bulletins Nos. 1 and 3, 1932, and Geological Survey Memoir No. 149 and Geological Summary Report, 1933, Part A.)

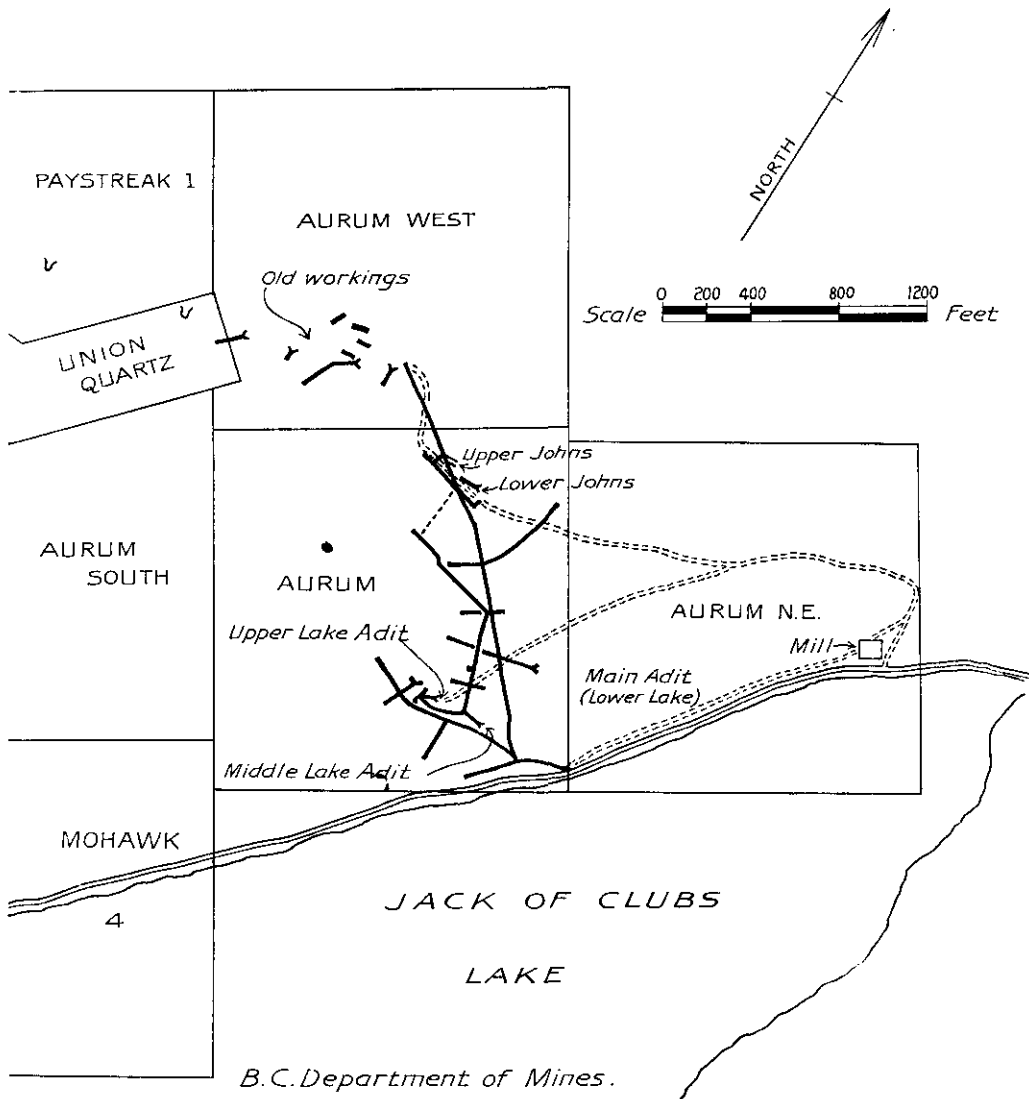
A large number of quartz veins are exposed on the eastern portion of the property, on the *Aurum* and *Aurum West* claims, the outcrops of some of which are said to have been rocked for their gold contents by early individual workers. On the claims adjoining the *Aurum* group on the west large quartz veins outcrop also. The old surface cuts are now sloughed in and largely obscured.

The underground workings are almost entirely confined to the *Aurum* claim, and consist of the following adits: Main adit, elevation 4,000 feet; Middle Lake adit, elevation 4,236 feet; Upper Lake adit, elevation 4,347 feet; Upper John's adit, elevation 4,573 feet; and Lower John's adit, elevation 4,540 feet. There are also some short adits known as the Walker and Wright adits, somewhat north and west of the John's adits. On October 20th the extent of these workings was approximately as follows: Main adit, 85 feet above Jack of Clubs lake, was in 1,850 feet from the portal, with south-westerly and westerly workings 275 and 900 feet long respectively at 160 feet from the portal. The Middle Lake adit follows a generally westerly bearing for 350 feet. At about 75 feet from the portal a branch which has subsequently become the main working is run almost at right angles to the former course for 450 feet north, then

north-westerly a further 500 feet, at which point it connects with a raise from the Main adit following the pyrite replacement deposit. The Upper Lake adit is about 60 feet long and the John's adits (very old workings) are each about 200 feet long.

While it is a matter of uncertainty in this area to attempt the identification of veins exposed in workings as widely separated as these, evidence to date indicates the existence of about seven principal veins, on all of which some drifting has been carried on. In addition, there are a large number of veinlets. Of the principal veins mentioned, four were encountered in the Main level, and the most northerly of these, intersected about 1,000 feet from the portal, may possibly be the downward continuation of the vein on which the John's adits are driven. The width of the veins varies up to about 5 feet and the mineralization has already been described.

The pyrite replacement deposit was first penetrated in the Main adit in the region directly below the John's workings. The width of this mineralization varies, reaching at one point a maximum of 7 feet of almost solid pyrite with high gold values. It has been drifted on, following the limestone, for about 300 feet at the horizon of this working. This deposit is followed upwards by raises at two points, one of which is connected with the Middle Lake level.



Aurum Property of Island Mountain Mines Co., Ltd.

At the end of October active preparations were being made to explore its downward continuation by diamond-drilling below the Main level.

This company, incorporated during the year with an authorized capitalization of 3,000,000 shares of a par value of \$1 per share, holds options on the **Proserpine Gold Mines, Ltd.** *Independence, Hard Cash, General Currie, Tipperary, Blighty, and Warspite.* Crown-granted, and ten adjoining claims held by location. Owners and optioners concerned are E. E. Armstrong, F. B. Armstrong, F. J. Tregillus, T. A. Blair, Clinton S. Harley, W. T. Hoover, and Proserpine Syndicate. The registered office of the company is 502 Pacific Building, Vancouver. The property is situated on Proserpine mountain, distant by pack-trail about 4 miles from Barkerville. It is located on a timbered, flat-topped mountain summit which falls away sharply in the south-eastern portion of the property to Grouse creek.

Several quartz veins of "A" type striking north-westerly are intersected by a large number of north-easterly-striking "B" veins, mineralized with pyrite, arsenopyrite, galena, and sphalerite; the galena content being more pronounced in the veins at the south-east end of the property.

Some of the claims were staked by E. E. Armstrong in 1909, and he and the owners of adjoining claims carried out superficial prospecting exposing various veins by trenching and open-cutting. In 1919 and 1920 this property was operated under option by the Mining Corporation of Canada, which company relinquished its bond in the latter year. This work was carried out prior to the field-work of the late W. L. Uglow, who, in his report, Memoir No. 149, Geological Survey of Canada, has done so much to solve the problems of mineralization in the district. Prospecting was subsequently carried on by the owners until 1933, when options were secured by the Proserpine Syndicate, which carried out much stripping and open-cutting under the direction of C. M. Campbell. Options were assigned to Proserpine Gold Mines, Limited, in 1934, following incorporation of the latter.

The surface showings are situated at an elevation of about 5,600 feet on the flat summit of the mountain and extend for about 1 mile practically throughout the entire length of the property. They consist of various "A" veins crossed by a very large number, said to be forty, of "B" veins. These have been exposed by several thousand feet in all of surface-trenching and open-cutting. The veins occur in schistose sediments of the Richfield formation intruded by Proserpine dykes and sills.

The underground workings are situated at each end of the property, mainly about 100 feet below the summit of the mountain; the two points at which development is taking place being about 1 mile apart. At the northern end on the *Warspite* claim an adit 150 feet in length is driven at elevation of 5,500 feet in a north-easterly direction to intersect the possible north-west continuation of the "A" vein, in which a shaft is sunk 450 feet to the south-east. The shaft (now full of water) is said to be 30 feet deep. From this adit a branch working is being run in a south-easterly direction to reach the region under the shaft. The vein in the shaft is reported to be several feet in width, carrying encouraging gold values. This working on October 17th was within 175 feet of its objective. The collar of the shaft is 80 feet in elevation above this working, which cuts argillite and quartzite beds diagonally. The quartzite-beds passed through in this working are intensely silicified, and at one point are cut by numerous small, closely spaced, well-mineralized quartz veins. A sample of pyrite taken therefrom assayed 0.12 oz. gold per ton, which would seem to justify some investigation at this point.

At the southern end of the property two adits, the Bell and Newberry, 450 and 525 feet long respectively and about 1,050 feet apart, are driven to crosscut various veins exposed on the surface by open-cuts and shallow shafts. The former is at about the same elevation as the *Warspite* adit and the latter 90 feet lower. At 200 feet below and about 675 feet east of the Newberry adit, another crosscut adit has been advanced a distance of 85 feet on a bearing south 19 degrees west.

In the Newberry adit a large vein was encountered under No. 1 shaft, and in this region a width of 30 feet is said to yield encouraging values. Another large vein was passed through below No. 2 shaft. In the Bell adit, below No. 4 shaft, a vein 12 feet wide was passed through, and farther in three additional veins were cut varying in width from 4 to 6 feet. The formation at the southern end of the property consists of sheared black graphitic schists and quartzites. The buff-coloured schistose rock cut by the outer sections of the Newberry and Bell adits is considered by the company's geologist to be a sheared Proserpine sill. Generally speaking, the formations at this end of the property are much shattered and the veins appear to be irregular

and somewhat difficult to follow; conditions change markedly in this respect in a northerly direction.

Cariboo Coronada Gold Mines, Ltd. This company, with a capitalization of 2,500,000 shares of a par value of \$1 each and incorporated under the company laws of Ontario, is registered as an extra-provincial company in this Province. The property consists of twenty-one mineral claims and five fractional claims situated on the timbered slopes of Cornish mountain. The superintendent is E. Hanson. The property is reached by a branch road about 1 mile in length from Wells.

In 1933 work was commenced by the Cariboo Coronada Mining Syndicate, consisting of road-construction and erection of camp buildings adjacent to the main adit. This year operation was taken over by Cariboo Coronada Gold Mines, Limited. A 50-horse-power Diesel engine and air-compressor were installed at the portal of the main adit. Operations were suspended towards the close of the year. (Refer to 1933 Annual Report.)

Quartz veins striking from north 3 degrees west to north 27 degrees east, sparsely mineralized with pyrite, occur in the Barkerville formation, consisting of schistose argillite and quartzite, strike north 42 degrees east, dip steep north-east. At and about an elevation of 4,800 feet on Cornish mountain several veins have been exposed by open-cuts and strippings. One of these is close to 9 feet in width. A main crosscut adit, elevation 4,000 feet (just above Williams Creek meadows), is driven in a northerly direction for 1,354 feet (October 21st) to explore the ground at a depth of 731 feet below the surface showings. The working is almost entirely in schistose limestone, which is slightly pyritized at the face. From 641 to 660 feet the formation (striking north-westerly and dipping north-east) is intruded by diorite apparently in the form of a sill. At 200 feet from the portal two quartz veins about 2 feet wide and close together were intersected. It seems likely they will unite immediately to the east of the working. In the near vicinity are other small veins. These veins are mineralized with pyrite.

Coronada Extension Gold Mines, Ltd. The property consists of a large number of claims situated on the northern part of Cornish mountain in the vicinity of Martin creek. It is reached by a trail above the right bank of the Willow river from the camp of Cariboo Coronada Gold Mines, Limited. Several large quartz veins outcrop at about 4,700 feet elevation. Float showing galena and pyrite occurs in the vicinity. An adit has been driven by hand on a bearing north 36 degrees west on the right bank of Martin creek a distance of 400 feet in schistose limestone with the object of exploring the ground below the surface showing. At 70 and 105 feet from the portal, veins 6 and 8 feet in width respectively were intersected, and at 150 feet from the portal a number of closely spaced veins occur within a width of about 60 feet. Pyrite is present in these veins and a sample of the more heavily mineralized portions of one vein showed upon assay gold values of 0.06 oz. per ton. It is stated by E. Hanson, in charge of operations, that a shaft 28 feet deep was sunk in the surface showings subsequent to examination by the writer.

Richfield Cariboo Gold Mines, Ltd. This company, incorporated in 1933 with a capitalization of 3,000,000 shares of no par value, was organized to acquire from A. G. Henderson Syndicate, Limited, the *Williams* group of twenty-one mineral claims. A large number of adjoining claims comprising the *El Dorado* and *Murray* group are also among the company's holdings. The registered office of the company is 716 Hall Building, Vancouver.

The property is situated on Bald mountain and extends across Williams creek to Proserpine mountain. The ground is timbered and steep in places. The mine camp is situated at the head of Mink gulch on the old road from Barkerville to Stanley, and is distant about 2½ miles from the former place.

Quartz veins containing pyrite and occasionally pyrrhotite occur in schistose sediments of the Richfield formation. The veins are highly oxidized on the surface.

The company started operations in 1933, erecting camp buildings and installing a portable Sullivan air-compressor. Work was stopped temporarily, at any rate, in the spring of 1934. (Refer to 1933 Annual Report.)

The surface showings examined consist of one "A" vein several feet in width, and a cluster of veins striking in an easterly and westerly direction, situated at elevations of between 5,850 and 6,000 feet on Bald mountain above Mink gulch. The showings are situated about 2,400 feet south of the main working-level. Other surface showings on the slopes of Proserpine mountain have not been examined.

The main working-level, situated at the divide between Mink gulch and the East fork of Jack of Clubs creek at an elevation of 5,200 feet, had on May 27th (by which date operations had been suspended) been driven a total length of approximately 1,535 feet. For the first 600 feet the adit follows a bearing south 51 degrees east and thereafter a due-south course. At 275 feet from the portal some well-mineralized quartz is exposed on the west side of the working and at 317 feet a vein with a maximum width of 3 feet. Just south of the bend in the working a large vein slightly mineralized crossing the formation was intersected. Between 920 and 1,020 feet the working passes through a siliceous sill intruding the formation.

Sugar Creek Section.

Moonlight and Comstock. These groups consist of a number of claims owned by T. Riley and associates, of Wells. The groups are situated on what is locally known as Mustang mountain, which lies immediately north of Little Mustang creek. The latter flows into Sugar creek close to Walker's House, which is reached by sleigh-road from Wells, about 12 miles distant. From Walker's House a good pack-trail about 1½ miles in length leads to the property. The property lies on a timbered, flat-topped summit, cut by creek-valleys. Quartz veins, both "A" and "B" types, occur in schistose sediments of the Cariboo series, sparsely mineralized with pyrite and galena with some sphalerite.

At one point a prominent vein, upwards of 30 feet in width, striking with the sediments, very sparsely mineralized with pyrite and galena, is exposed by an open-cut on the left bank of a small creek. A sample of selected mineral assayed a trace of gold. The creek mentioned flows north-westerly, and various veins are exposed at different points on its banks up-stream from the vein described. Some of these appear to be typical "B" veins, while others strike more or less with the formation but cut it on the dip.

At one point on the right bank of the creek an adit 50 feet long follows a flat-dipping vein exposed on the south side only in faulted ground. The face of the working is almost wholly in oxidized quartz, in which occurs a compact seam of galena and sphalerite a few inches wide. A sample of this upon assay yielded: Gold, trace; silver, 10.2 oz. per ton; lead, 25.1 per cent. Above this working are exposed on the surface several closely spaced veins, somewhat oxidized and sparsely mineralized. About 250 feet up-stream from the working a shaft full of water, said to be 18 feet deep, is sunk on a quartz vein of the "A" type. On the foot-wall of this vein is a narrow seam of pyrite. A sample of the latter showed upon assay a trace of gold.

Cosalite. This group, consisting of several claims owned by P. Johnson, E. Johnson, and J. T. McCay, of Wells, is situated immediately north of Mustang lake, at the head of the divide between Little Mustang creek and Mustang creek. It is reached by following the Sugar Creek trail from Wells to Walker's House; thence a pack-trail 3 miles in length leads up Little Mustang Creek valley to the lake at the base of the property. Quartz veins of "A" and "B" types sparingly mineralized with pyrite and galena occur in sheared sediments of the Cariboo series.

A quartz vein apparently of "A" type conforming with the quartzite formation in strike and dip is exposed 750 feet above Mustang lake, at the edge of the valley-rim. It is much oxidized but shows a little galena. Gold values are stated to be low. Somewhat east and 50 feet above this vein is another, 9 inches wide, mineralized with pyrite exposed in an open-cut. A sample of selected portions of this vein showed upon assay a trace of gold. On the steep valley-slope 75 feet below this exposure a typical "B" vein, 18 to 20 inches wide and mineralized with pyrite, is exposed in an open-cut. A sample taken across 20 inches at the face of the exposure yielded upon assay a trace of gold. About 200 feet below the last exposure a typical "A" vein from 3 to 4 feet wide is exposed for a length of a hundred or more feet on the steep valley-slope.

K.V. This group, consisting of several claims owned by V. Hulbert and Karl Anderson, of Prince George, is situated along a small creek on the south side of Little Mustang Creek valley on the slope of Tom mountain. It is reached by following the Sugar Creek trail to Walker's House; thence by pack-trail for about a mile up Little Mustang creek; thence by blazed line up the valley-slope.

On the left bank of a small creek a quartz vein several feet in width is exposed striking with the argillites. The underground working consists of a short adit 30 feet long about 50 feet below the surface showing and a short distance north-east of it. Several small quartz veinlets

mineralized with pyrite crossing the formation are cut by the working. A sample of selected pyrite assayed a trace of gold.

Stanley Section.

This company was incorporated in 1933 for the purpose of acquiring and working twenty-three claims comprising the old *Foster* mine and contiguous territory, owned by C. Fuller, D. Haws, and N. Hansen, on Chisholm creek.

Foster Ledge Gold Mines, Ltd. The company's camp buildings are within a hundred yards or so of the main road, about half a mile from Stanley. The ground is steep in places and timbered.

Quartz veins of the "B" type, mainly under 2 feet in width, occur in the Richfield formation of the Cariboo series. Mineralization consists essentially of galena, pyrite, and sphalerite, and in places free gold is visible in the outcrops.

According to old records, the property was apparently worked in the seventies, and an old shaft now full of water is sunk on the left bank of Chisholm creek. According to the Geological Survey Summary Report, 1933, Part A, it "is reported to be 56 feet deep and to have been sunk on two 5-foot veins 4 feet apart." The property remained idle until last year, when Foster Ledge Gold Mines, Limited, commenced operations. (Refer to 1933 Annual Report.)

Three northerly-striking mineralized quartz veinlets of "B" type within a width of a few feet outcrop on the right bank of Chisholm creek immediately opposite the old Foster shaft. About 1,200 feet east of the creek on the mountain-slope two intersecting veins striking respectively north 13 degrees west and north 22 degrees east, both dipping north-west, are exposed by some very old and by some recent surface-trenching. One shows free gold in places. The veins are about 14 inches wide. There may be other surface showings, but only those mentioned have been examined.

About 400 feet down-stream from the Foster shaft on the left bank of the creek, a rock working commenced years ago by placer-miners has been advanced a distance of about 250 feet northerly, and from the end a branch working has been driven about 40 feet west, cutting the three veinlets mentioned. A drift follows these three well-mineralized quartz seams, each of which is about 6 inches wide, and all of which are included in the working for a distance of about 30 feet northerly. The portal of this working is 80 feet below the collar of the Foster shaft. These small veins show encouraging gold values.

About 1,500 feet down-stream from the above working in the left bank of the creek and 190 feet below the above-described working, an adit starting on a bearing north 2 degrees east and finishing on a bearing north 67 degrees east is in a distance of about 220 feet, intersecting 12 feet from the face a well-mineralized quartz vein 6 inches wide, strike north 23 degrees west, dip west. A sample of selected mineral from this vein assayed: Gold, 0.24 oz. per ton.

The presence of gold values in the three small veins would appear to justify the unwatering of the Foster shaft so that an examination of the large veins reported to have been exposed in it may be made.

Tertiary. This property, owned by D. D. Fraser and Jas. McHardie, of Quesnel, is situated at the foot of the Cottonwood canyon on the east side of the Fraser river, about 18 miles above Quesnel. It is reached by a branch road from Cinema, on the Prince George-Quesnel highway.

The property is situated at a point where the Fraser river has cut obliquely through an old channel, the gravels of which are exposed on both sides of the present river. On the east side the bed-rock of the old channel is considerably above the river-level. The length of the oblique exposure on the east side is about 1,100 feet, but the true width is probably about 900 feet. The gutter where mining has been carried on is on the left rim; values being too scattered on the right rim to admit of profitable extraction. The channel has been followed up-stream or northerly for a distance of 1,500 feet by workings on bed-rock. The gradient is about 3½ per cent. For the last 400 feet the pay-streak has averaged about 12 feet in width, prior to which it was about 50 feet. The values are concentrated on bed-rock, although the gravels for a few feet up contain small values. In the area mined the unconsolidated materials are about 120 feet deep, but are thicker farther ahead. The gravel is tightly cemented, almost a conglomerate, and does not show any sign of oxidation. Carbonized driftwood is of frequent occurrence. The gold is coarse (some pieces have adhering particles of quartz), indicating a somewhat local source. The property was originally owned by Mr. Killam, being worked by him for many years prior to 1917, when it was known as the "Killam gravel-mine." During this period the

gravel mined was exposed to weathering for six months to effect partial disintegration before being washed. In 1917 the property was acquired by the Tertiary Gravel Company, which installed a compressed-air plant for mining with machine-drills and erected a mill to treat the cemented gravel. The mill consisted of jaw-crusher, ball-mill, and Pearce amalgamators, but apparently operations were not an economic success and were suspended in 1922. The property was acquired by the present owners in 1923 and mining was continued in a small way until 1926, when operations were suspended because the cemented gravels hitherto encountered gave place to those less firmly cemented, rendering mining difficult. Work done this year on the surface seems to indicate more favourable mining conditions ahead.

The gravel mined stands up well, without timber for some distance, provided no surface water percolates through. There is a seam of sand and silt about 7 feet above bed-rock, and when even a little surface water percolates through, trouble is manifested at once. As the value of the gravel does not exceed between \$1.50 and \$2 a ton, it is considered cheaper to turn the drive into bed-rock when wet ground is encountered, until conditions improve, rather than go to the expense of the heavy timbering required to continue in the gravel. For about the last 100 feet surface waters have given some trouble and the working is in bed-rock for this distance.

By using 60 per cent. explosive the gravels are disintegrated sufficiently to free the gold, which is recovered by sluicing in the ordinary way. The sluice-boxes are installed at the portal of the working, and also a small boiler for the operation of a steam-driven air-compressor. Originally the company operating this property installed a crushing and milling plant, but the necessity for this was entirely eliminated by the simple expedient of using 60 per cent. explosive as above described, and the plant has been discarded long since.

The cost of driving in the gravel is given by D. D. Fraser as \$34.50 for 5 feet of advance, which yields about 25 tons of gravel; that is to say, the cost per ton of gravel is about \$1.25. The maximum yield of gold is \$1.50 to \$2 per ton; therefore no wide margin is left for any contingencies such as bad ground.

Careful records have been kept by D. D. Fraser, and he finds that, whenever the grade of the bed-rock steepens, the pay-streak gets narrower and poorer, widening and improving when the grade flattens. The grade varies from 1.1 to about 7 per cent., the rise being in a northerly direction.

James McHardie with one man has been working at the property throughout the past season, and the owners report that a shaft has been sunk at a point about 300 feet ahead of the underground workings to a depth of 40 feet, showing a thickness of some 20 feet of cemented gravels. This would seem to indicate more favourable conditions for mining ahead of the present underground workings.

Should this channel continue in a northerly direction where lode-gold occurrences are more pronounced, it seems a justifiable anticipation that bed-rock gold values will improve, but more tangible proof of conditions in the channel ahead of the present workings must be obtained, by Keystone-drilling for example, before the possibilities of this property can be clearly delimited.

This is a private company incorporated for the purpose of operating fourteen **Sovereign Creek** leases on Gagen creek and vicinity. Of these, eleven leases have been granted **Gold Mines, Ltd.** and three are under application. The leases cover the area of G. S. Gagen's discovery made in 1932. The property is reached by a trail leaving the Quesnel-Barkerville road $5\frac{1}{2}$ miles from Cottonwood House at the foot of Mexican hill. Lightning creek is crossed on a foot-bridge. The total distance from the highway is between 1 and $1\frac{1}{2}$ miles.

Gagen creek flows almost due north in its upper reaches, then turns sharply at right angles near Lightning Creek valley just below a small lake, continuing south-westerly in the region of the discovery, and finally entering "Lost valley," to flow north-westerly to its junction with Lightning creek.

The discovery was made on the right bank of the creek at a point where rock frequently outcrops and seems to be everywhere close to the surface. The rock is chiefly basalt, but at one point a highly oxidized and altered rock, which could not be identified in the field, occurs. The material overlying bed-rock consists of glacial gravels and shattered rock. Well-worn and fairly coarse gold up to a \$3 piece occurs in the cracks and crevices of bed-rock and in the gravels; \$2 pans were obtained from the discovery pit, which yielded 37 oz. of gold from between 250 and 300 cubic yards. The bench on which the discovery was made is only a

few feet above creek-level, and it continues for about half a mile, with a width of about 200 feet, offering considerable possibilities. Two channels trend across the direction of Lightning creek in this region, about three-quarters of a mile apart, one being the valley in which the upper portion of Gagen creek is contained and the other "Lost valley." The latter does not now contain any definite watercourse, but is very clearly defined and is upwards of 600 yards in width near Lightning creek.

The source of the gold is probably from a former stream-channel, coming from the south, flowing into Lightning creek on this ground which has been cut by the lower portion of Gagen creek. Somewhat similar occurrences of placer gold, extensively worked by early operators, occurred on the same side of Lightning creek about 2 miles above this point on the high rock bench down-stream from Mosquito creek.

During the year camp buildings were erected, and water was brought from Sovereign creek by ditch and flume a distance of $4\frac{1}{2}$ miles for hydraulicking. The ditch-line was constructed under contract and is $6\frac{1}{2}$ by 3 by $2\frac{1}{2}$ feet deep, the grade being 0.15 per cent. There is a total length of 4,400 feet of flume. Flume-lumber was sawn on the ground by a sawmill installed for that purpose. Piping operations with one 3-inch and one 4-inch monitor were commenced on October 23rd close to the scene of the original discovery. The maximum piping-head available is about 145 feet. A considerable amount of testing was carried out prior to installation of plant this year under direction of the manager, who reports satisfactory results. (Refer to 1932 and 1933 Annual Reports.)

QUESNEL MINING DIVISION.

LODE-MINING.

Quesnel Section.

This group, consisting of seven claims, is owned by A. S. Vaughan, of Quesnel. **Cousin Jack.** It is situated on Dragon mountain and is reached by following the Quesnel River road from Quesnel for about 9 miles, at which point a trail leads up the eastern slopes of the mountain. The total distance from Quesnel is about $10\frac{1}{2}$ miles.

The rock formations in the region are intercalated sedimentaries and volcanics. A sheared and oxidized zone about 20 feet wide strikes north 68 degrees east for about 500 feet. Small quartz stringers occur at intervals which are in places well mineralized chiefly with pyrite and galena. The zone is well defined by a depression on the surface, and the existence of some similar parallel depressions suggests the possible presence of similar sheared zones which might be disclosed by prospecting.

One or two shallow pits and open-cuts at intervals in the sheared zone disclose in places well-mineralized stringers about 6 inches in width. A sample of one such assayed: Gold, 0.04 oz. per ton; silver, 4.2 oz. per ton; lead, 9 per cent. The showings lie at elevation 3,440 feet or about 855 feet above the point on the road at which the trail starts.

Keithley Section.

In the region of Yanks peak, on the French Snowshoe plateau, and in "Nigger basin," another plateau-like region situated due south-east of Yanks peak, south of French Snowshoe creek, there are a large number of quartz veins, many of which are of considerable size. In these regions there is not by any means the same clear distinction between Uglow's "A" and "B" type veins as found in the Barkerville area, and to a lesser extent in the Stanely area, either structurally or as to gold values. In the Yanks Peak area some veins striking north-westerly frequently carry gold values, while others cutting across the bedding-planes of the host-rocks do not. Mineralization is markedly less heavy than in the Barkerville area. Intrusives similar to the Proserpine sills occur in this region, but are less numerous. It would seem that the region in which these intrusives occur is likely to prove that of greatest promise from the point of view of values.

This group and a number of other claims is under operation by Saddle Mines, **Midas.** Limited, incorporated by Britannia Mining and Smelting Company, Limited. The property is situated on the rolling plateau-like divide between French Snowshoe and Little Snowshoe creeks. It is reached by pack-trail from Keithley, the distance being about 13 miles. The property is on a sparsely timbered, rolling mountain-summit at an

elevation of about 5,700 feet, falling away north-westerly to Little Snowshoe basin and easterly to French Snowshoe Creek valley.

Numerous quartz veins varying in strike from north-west to approximately east and west, and varying in width from several inches to several feet, occur in schistose sediments of the Cariboo series.

The property was operated for some years by the owners, O. J. Pickering, J. Glover, H. G. Heisterman, and E. L. Tait, and a large amount of painstaking prospecting, including several hundred feet of underground work, was carried out by the two first mentioned, who were resident at the property summer and winter for several years. In 1933 the property was taken under option by Britannia Mining and Smelting Company, Limited, who carried out a great deal of surface-stripping of the various veins and sunk a shaft on the most important exposure, establishing connection with the adit previously driven by the owners. Saddle Mines, Limited, was incorporated during the year, and it is understood that a certain amount of drifting was carried out on one vein. (Refer to Annual Reports, 1929 and 1933; also Bulletin No. 1, 1932.)

The most important surface showings are as follows: The vein of chief importance is of about 4 feet average width and is stripped on the surface at elevation 5,730 feet for a distance of about 90 feet. It strikes about north 10 degrees west and dips steeply north-east. It is mineralized mainly with pyrite and samples taken from its outcrop averaged about 1 oz. gold per ton. The vein lies between carbonaceous schist on the foot-wall and buff-coloured quartz-schist on the hanging-wall. Distant about 900 feet to the east and north is another prominent approximately parallel vein striking about north 30 degrees west, which shows free gold at some points where it is exposed by open-cuts. A short distance farther east, within a strip of country about 240 feet wide, are exposed by extensive trenches five more or less parallel veins striking about east and west. These also are mineralized with pyrite, and free gold can be seen in places in their outcrops. These showings are situated on the plateau-like region more immediately adjacent to the basin at the head of Little Snowshoe creek, which basin affords a means of penetrating the region below by means of adit-workings.

An adit is driven from Little Snowshoe Creek basin, at elevation 5,600 feet, to explore the downward continuation of the chief vein above described, at a depth of approximately 130 feet below its outcrop. It is run on a steep grade in a south-easterly direction, with some turns, and connection at the time of examination on June 15th had been established with a shaft sunk on the vein. The distance from the portal to the shaft is about 500 feet. In the shaft at 30 feet below the collar there is a showing of quartz well mineralized with pyrite. A sample taken across a width of 3 feet at this point assayed: Gold, 3.4 oz. per ton. On the date of examination, only surface prospecting by two men was taking place, but it is understood that subsequently some drifting was carried out following the vein south-east from the bottom of the shaft.

Yanks Peak. This group was originally owned by H. Talbut and J. Larson and consists of five mineral claims. It is now under operation by Cariboo Yankee Belle Mining Company, Limited, incorporated in 1932. The property is situated on the eastern slopes of Yanks peak, facing French Snowshoe creek, and is reached by pack-trail about 12 miles in length from Keithley. The property is situated on a gently sloping, timbered mountain-slope.

Numerous quartz veins carrying pyrite, varying in width from a few inches to several feet, occurring in schistose sediments, show high but spotty gold values, while others show no appreciable values.

This property was originally prospected by the owners, who uncovered the showings carrying good gold values. In 1929 the property was optioned to a syndicate and a small 25-ton mill was (quite prematurely) erected.

Yanks Peak Mining Company was incorporated at the end of that year to continue operations. This company became defunct subsequently, and in 1932 Cariboo Yankee Belle Mining Company, Limited, was incorporated for the purpose of acquiring the property from John W. Willoughby. This company, under the management of J. W. Willoughby, installed in the fall of 1933 a portable compressor and commenced driving a crosscut adit, continuing the same during 1934. (Refer to Annual Reports for years 1925, 1929, and 1933; also Bulletin No. 1, 1932.)

The chief surface showings, so far as known, consist of possibly five parallel oxidized quartz veins in a region about 100 feet wide. The quartz veins vary in width from $1\frac{1}{2}$ to $3\frac{1}{2}$ feet, strike about north 7 degrees east, dip steeply east, and cut the north-westerly-striking schistose sediments of the Cariboo series. The showings lie at elevations of between 5,555 and 5,665 feet (barometric) on a mountain-slope of about 20 degrees. Samples vary greatly, showing at some points high gold values and at other points no values.

Distant about 1,500 feet in a north-westerly direction from the above are numerous exposures of other quartz veins, all somewhat oxidized. Samples from two of these showed in one case a trace of gold and silver and in the other case no values. About 2,000 feet south-east of the first-described showings numerous other quartz veins are exposed.

Underground workings consist of various adits and one shallow shaft driven on the showings first described. On the most westerly vein of the group mentioned an adit is driven, at elevation 5,665 feet, a distance of about 84 feet, the vein being apparently interrupted by a fault at 69 feet from the portal. A sample taken at 69 feet from the portal across 1.6 feet assayed: Gold, 4.24 oz. per ton; silver, 0.72 oz. per ton. A sample taken across $3\frac{1}{2}$ feet, 51 feet from portal, showed no values in gold or silver. About 155 feet in a south-westerly direction and 40 feet below this adit, a shaft is sunk to a depth of about 12 feet, from which a sample taken in 1925 showed good gold values. About 25 feet below the shaft and 120 feet from it, a small adit is driven 105 feet, but does not disclose anything of importance, being apparently run off a vein. A sample taken from an open-cut across $2\frac{1}{4}$ feet of a well-defined vein about 30 feet east of this working showed no values. On the most easterly of the veins an adit, elevation 5,555 feet, is driven 95 feet to intersect the vein, which is then followed for 36 feet. The vein is $1\frac{1}{2}$ feet wide as exposed in the face. A sample across the face showed no gold or silver values. A sample taken from the same vein, across 2 feet where it is exposed by an open-cut somewhat below the uppermost adit described, assayed: Gold, 0.24 oz. per ton; silver, 0.06 oz. per ton. A sample taken from an open-cut on another vein just east of the uppermost adit showed no gold or silver values.

Some of the above-described workings were last year intentionally blocked by the manager for reasons unknown. The foregoing description represents the position in 1929, since when no great amount of work has been done. It is apparent that gold values, although high in places, are spotty and irregular.

At a point about 1,600 feet distant in a direction almost due south at elevation 5,265 feet (barometric) an adit is being driven to explore the ground below the workings above described. As viewed on June 15th, this adit had been driven north 42 degrees west for 313 feet and then north 60 degrees west for 537 feet. The working was being deflected farther west at 790 feet from the portal, heavy faulted ground having been encountered at the face. So far as could be determined, one large quartz vein (or a number of closely spaced veins) was cut in the faulted ground. Up to this point twenty-two veins were intersected by the working. The width of these veins varies from stringers up to in one case a maximum of 6 feet. It is evident that these veins should be sampled individually and in detail. They are in some cases heavily oxidized. The first 80 feet of this adit is closely lagged and could not be examined. Samples taken from veins exposed at points respectively about 80, 210, and 760 feet from the portal did not contain material gold values. A portable air-compressor is installed at this property. The mill was being dismantled at the time of examination.

Hebson. This group, owned by B. E. Taylor and associates, is situated on the North fork of Little Snowshoe creek. It is reached by a branch trail which leaves the main Little Snowshoe Creek trail from Keithley at the Haywood cabins.

The total distance from Keithley is about 12 miles. The ground in the lower portions is a steep well-timbered slope becoming flatter in the upper part and finally merging into the rolling plateau summit which lies at an elevation of about 6,100 feet in this region.

A large quartz vein, strike north 63 degrees west, dip steeply south-west, occurs in schistose sediments. The exposed width at one point is 14 feet. The vein shows considerable signs of oxidation and a little pyrite. It was originally prospected many years ago.

The vein outcrops and is also exposed by open-cuts on the plateau at an elevation of 6,100 feet. It can be traced for a considerable distance down the steep mountain-slope west of the North fork of Little Snowshoe creek. At elevation 5,750 feet a sample taken across 14 feet

exposed by an open-cut assayed 0.01 oz. gold per ton. It is stated that free gold has been found at certain points in this vein.

An adit, elevation 5,890 feet, follows the vein for 75 feet. The vein is 8 feet wide in the face. A sample across the face where the vein contains a little pyrite and is somewhat oxidized showed a trace of gold upon assay.

A short adit somewhat lower in elevation was started with the intention apparently of crosscutting the vein, but was not continued.

It is possible that certain sections of the vein may be more promising than others, and this can be determined in more detailed sampling of the great length of outcrop.

This group, owned by E. Levasseur and associates, of Keithley, is situated at an elevation of about 2,000 feet above Cariboo lake, about 1 mile east of Nigger (Pine) creek. The property may be reached by following a branch trail leaving the Keithley-Harvey Creek trail about 1 mile east of Nigger creek, close to the lake-shore, or this branch trail may be reached by boat from Keithley. The distance from Keithley is about 8 miles.

Quartz veins occur in schistose sediments.

The chief showing is at elevation of 4,450 feet and consists of a large quartz vein from 15 to 20 feet wide, well exposed by surface-trenching for a length of about 150 feet along its strike. The vein and enclosing schistose quartzites strike north 67 degrees east and dip northerly at about 30 degrees. The vein is leached at the surface, but at a depth of a few feet shows considerable oxidation and a small amount of pyrite. Samples taken of oxidized portions of the vein and of the sulphides assayed in both cases a trace of gold. About 500 feet south of this exposure a number of quartz veins cut across the bedding of the sediments. Some distance north-west of the showing first described a short crosscut in argillites exposes a somewhat oxidized quartz vein 4 feet wide, a sample of which showed a trace of gold.

Horsefly Section.

A discovery was made in 1934 on this property, originally owned by J. Rowley, of Horsefly, and the property has now been acquired, it is understood, by the Gold Coin Syndicate, of Vancouver. It is situated just south of McKee lake, between Elbow and Crooked lakes, and is reached from the end of the motor-road at Black creek (19 miles from Horsefly) by a horse-trail about 23 miles in length.

This discovery was apparently made by Gusto Hoehne and Chas. Goetjen, and staked by them in ignorance of the fact that the ground was already located. The ground is broken, hilly, and well timbered.

Quartz veins occur in andesitic volcanics, in a zone of shearing trending north 63 degrees west. The chief exposure is a large vein showing free gold, small amounts of chalcopyrite, pyrite, and much sericite, and is considerably oxidized. This vein shows a tendency to widen at depth. Outcrops of diorite occur close to the discovery. A pit 10 feet deep shows at the bottom a vein somewhat over 11 feet wide. A sample taken across 11 feet 9 inches assayed: Gold, 0.30 oz. per ton.

By way of preliminary investigation, the Gold Coin Syndicate decided to sink a shaft to a depth of 50 feet on this vein, and it is understood that this work was commenced in October.

Several other groups have been staked in the adjoining region, including the *Home*, *Noranda*, and *Long Chance*.

This property, owned by W. J. Boswell and associates, is situated on Lemon creek and is reached by car and trail from Horsefly, from which it is distant about 11 miles. The property is situated on a timbered rolling plateau. A shear-zone occurs in volcanics, which are intruded in the near vicinity by pyroxenite. Mineralization consists essentially of pyrite with some copper-stain.

A shear-zone, strike north 22 degrees east, dip 60 degrees north-west, with a maximum width of 4 feet is exposed by open-cuts and pits on the right bank of Lemon creek. The shear-zone is highly oxidized and shows copper-stain. Seams of solid pyrite occur within it. A seam 18 inches wide on the foot-wall and another seam 1 foot wide on the hanging-wall contain much solid pyrite. A sample of selected pyrite assayed: Gold, 0.14 oz. per ton; silver, 0.2 oz. per ton.

PLACER-MINING.

Baker Creek.

Property of R. Blair. This consists of one discovery claim situated on Lot 8651, just below the canyon about $3\frac{1}{2}$ miles above the mouth of Baker creek. The property is distant about 4 miles from Quesnel and a car can be taken 3 miles of the distance. The property is a new discovery made this year by the owner and is presumably an old channel of the Fraser river. Immediately below the mouth of the canyon, Baker creek cuts diagonally across the old channel, in which the direction of flow was approximately due south. On the right bank or south side of Baker creek the old channel is covered with a high bank of gravels, but the eastern rim is plainly exposed. On the north side of Baker creek the latter has largely removed the overlying gravels, and the remaining cover is left in the form of an extensive low-lying bench flanking the left bank of the creek. Immediately instream the eastern or left rim of the old channel is plainly exposed for some distance on the left bank of Baker creek, and it is at this point that the discovery was made in shallow gravels immediately overlying the rim.

Unfortunately the slope of the rim-rock, coupled with the level of Baker creek, renders it impossible to make much progress with hand-mining methods. The gold occurs in coarse flakes and small nuggets. Although the gold is coarse, unfortunately the ground is not very good at the only point at which it is possible to mine by hand methods.

The old channel is cut in carbonaceous argillites which outcrop both up-stream and down-stream from this point. The argillites are ferruginous and contain veinlets mineralized with pyrite. Among the gravels immediately overlying the rim-rock of the old channel are small boulders of solid pyrite. While there is every indication that bed-rock placer of local origin is a justifiable anticipation in this old channel, there is no evidence to date suggesting very rich bed-rock gravels. Investigation of this property is, however, well merited. It seems possible that the channel may be again cut by the Fraser river down-stream in the vicinity of Dragon Siding, and that this might account for the placer deposits of "Rich bar" extensively worked years ago at that point.

Quesnel River.

Cariboo Syndicate. This syndicate, under direction of H. S. Coulter, acquired during the year, by staking and by optioning, certain properties covering a long stretch of the Quesnel river down-stream from Beavermouth, including the large flats known as French flats, over which the Quesnel-Hydraulic road passes. The distance is about 23 miles to the lower end of the flats from Quesnel. Early attempts to mine the bed of the river in this region are exemplified by the old Hall dredge installed at the lower end of the flats, and a unique and interesting device known as the French Flats bells; this latter being a form of drag-line, the buckets being cylindrical, with heavy lips somewhat resembling large bells. With this device it was proposed to drag the bed of the Quesnel river opposite about the centre of the flats. Both these attempts were of short-lived duration apparently, because of an imperfect understanding of the nature of the problem presented. The superficial concentrations due to post-Glacial waters on French flats have been quite extensively worked at various points in the past and still engage the attention of operators apart from the Cariboo Syndicate at the present time—namely, that of the King Mining and Development Company at the upper end of the flats and A. E. McGregor and associates somewhat down-stream from the former (the ground of the latter is under option to Cariboo Syndicate).

There are several modes of placer occurrence exemplified on the flats. At the upper end of these flats (at which point the King Mining and Development Company is now working), which are situated on the left bank of the river, the river has cut a gorge-like channel to the east, and it is apparent that underlying these flats at an unknown depth is a former channel of this river. The various bars on the river opposite French flats are stated to be quite good, and it is alleged that values extend downwards into the bed of the river.

About three-eighths of a mile down-stream from Beavermouth an extensive bench, 120 feet above the left bank of the river, overlies a former river-channel, which lies buried immediately adjacent to the left bank of the river, from which it is separated by the right rim of the former. Some years ago an hydraulic enterprise, utilizing water from Beaver creek, was started at this

point and three pits were opened up. In the highest pit up-stream, when the channel-rim was encountered, further hydraulic advance was temporarily arrested. A tunnel 15 feet above the river was then run through the rim for a distance of about 300 feet, the sluice-flume placed in this tunnel and piping resumed. Presumably, although this fact is now obscured by sloughing of the face of the pit, this tunnel was above the bed-rock of the channel, and it was therefore impossible to continue hydraulic operations to advantage. The country-rock passed through by this tunnel is carbonaceous argillite intruded by granitic tongues. It is stated that before this hydraulic plant was installed a shaft was sunk from the top of the large flat mentioned to a depth of 90 feet, at which point it encountered bed-rock, on which encouraging values are stated to have been obtained.

Down-stream from this upper hydraulic pit a distance of about 1,200 feet, two other hydraulic pits immediately adjacent were opened up, but these show no evidence of rim or bed-rock. The total yardage piped from these three pits amounts to several hundred thousand cubic yards. The pits disclose no large boulders.

At low water on March 2nd, 1931, Beaver creek had a flow of 15 cubic feet per second.

A certain amount of testing was carried out during the year on French flats.

Leases of A. E. McGregor and Associates. These leases, situated about 1½ miles above the Hall dredge, are under option to the Cariboo Syndicate, prior to which the owners had installed a 1½-horse-power gasoline-engine, and small centrifugal pump (1½-inch discharge) at the river, to pump water to the low-lying flat. The owners shovelled about 900 cubic yards of material, washing about half this amount, as it was found that the "pay" was in a stratum about 3 feet thick overlain by an equal thickness of barren material immediately below the surface. From the yardage washed gold to the value of \$750 was recovered.

King Mining and Development Co. This company holds two leases at the upper end of French flats in the vicinity of Pre-emption Lot 9887. A road leads to the property from Quesnel, the distance being 26 miles. This company is operating a ½-cubic-yard bucket drag-line, run by a McCormick-Deering winch, on the gravels of the flat, which is about 25 feet above the river at this point. This ground was also worked by earlier operators. An 8-inch centrifugal pump operated by a car-engine is set up at the river for the purpose of pumping water for washing the gravels. The sluice-flume is 19 by 20 inches in cross-sectional dimensions with an undercurrent. In the undercurrent box expanded metal riffles are laid over burlap. Material passing to the undercurrent is minus ¾ inch.

Operations of F. W. Kiesel and Associates. E. W. Kiesel is trustee for a private California syndicate, for which he is carrying on operations. The syndicate holds four leases on the Qesnel river between Morehead and Birrel creeks. The camp erected on the left bank of the Qesnel river is distant 4 miles west of the mouth of Morehead creek, or 11¼ miles from Hydraulic, along the Quesnel-Hydraulic road. A high-line plant has been set up with a 1½-cubic-yard-capacity bucket on a low-lying flat on the left bank of the river. Power is supplied by a 125-horse-power boiler burning Diesel oil. A 6-inch centrifugal pump is set up at the river to supply sluice-water. The sluice is 210 feet long by 16 by 12 inches, with an undercurrent 60 feet long, at the end of which there are four blanket-tables 3 feet wide by 15 feet long.

The gravels being mined are post-Glacial concentrations.

There is much in the surrounding topography to suggest that immediately down-stream from the plant a channel crosses the river in this region. Rock outcrops on the valley-rim immediately behind the plant, and is exposed on this side of the river for some considerable distance down-stream, sloping gradually downward in a down-stream direction. What may be both rims of this channel are well exposed on the other side of the river. This channel would seem to warrant close investigation, as, if existent, its point of crossing by the Quesnel river will be a region in which a reconcentration effected by the latter is to be expected.

Cedar Creek.

Leases of A. W. Allott. These comprise those originally operated by the Cedar Creek Mining Company, Limited—namely, the *Stevens*, *Sheridan*, and four adjoining leases. The property is situated some 900 feet above Quesnel lake, on rolling plateau-like ground which was originally covered with dense timber on the south side of Cedar creek. The property is distant about 4 miles from Likely by motor-road.

This deposit, the richest placer discovery since the very early days, is unique in many respects. It is the only known placer occurrence within the district resulting from erosion of Mesozoic rocks, comparable in richness with the bonanza placers of the Cariboo yielded by erosion of Precambrian rocks. There is no running water near the deposit except Cedar creek, which is contained in a deep gorge many hundreds of feet below it.

Several times rich "pay" has again been found after virtual abandonment and the discovery this year was made in ground which had actually been closely drilled. Many features of the deposit are undeniably unusual and difficult of explanation, but other modes of occurrence of placer in the near vicinity—e.g., on Spanish mountain, on Lukin creek, and on Fisher creek—are perhaps not less uncommon.

The deposit is situated on a gently sloping plateau-like upland surface flanking the left bank of Cedar Creek gorge. The volcanic bed-rock, which slopes upwards south-east on a gradient of about 3 per cent., is overlain by a covering varying in thickness from a few feet up to a maximum of about 25 feet. Originally the surface was covered with thick timber which has now been cleared off. The placer gold occurs in several different ways: (a) In a thickness of about 3 feet of gravels resting on bed-rock, with very little gold in the cracks in the bed-rock; (b) both in the gravels mentioned and in cracks in the underlying bed-rock; in both these instances the gravels are overlain by a thickness of from several feet to 20 feet of tight glacial debris mainly boulder-clay; (c) within a stratum of gravels wrapped up in boulder-clay; (d) almost wholly in shattered bed-rock immediately overlying solid rock, the rock detritus being overlain by a few feet of top soil and glacial debris.

The deposit varies greatly in richness at different points in a zone 1,500 feet long and from 50 to 200 feet wide, trending north-west and south-east. Rich "pay" apparently terminates abruptly at the north-west end. The south-east end is less rich and termination of "pay" was less abrupt. While the underlying rock-surface rises on an even grade of 3 per cent. south-eastwards, there is little or no evidence of any rims to the deposit as a whole.

The character of the gold is coarse, closely resembling in general aspects rich channel-gold. The coarsest nugget found was 17 oz. in weight, and at this time, in 1926, three pans taken from the "Second Nugget Patch," the most northerly rich "pay" found, yielded respectively 49, 35, and 28 oz. gold. It should be clearly understood that the gold is far from resembling "residual" gold as ordinarily understood.

Many opinions have been advanced to account for the origin. Those of officers of the Geological Survey are given on page 79 of Geological Survey Summary Report, 1922, Part A (W. A. Johnston): also on page 136 of Geological Survey Summary Report, 1932, A 1 (W. E. Cockfield).

The following facts are cited as having a close bearing on the question of the origin of this deposit:—

(a.) The very richness of the deposit stamps it as of strictly local origin, apart altogether from the fact that it occurs in some spots in local rock detritus.

(b.) There is abundant evidence of a possible local source for a rich placer. For example, shear-zones on the *Treadwell* group in the Cedar Creek canyon carry close upon 1 oz. gold per ton, but gold values are spotty. Again, the valley-rim of Cedar Creek meadows shows replacement-seams of arsenopyrite carrying quite good values in gold. Finally, the number of small quartz veinlets in the bed-rock underlying the deposit would seem to suggest a possible strictly local source, as bed-rock values are frequently more pronounced where quartz veinlets are most numerous.

(c.) Probably the greatest insight into the question of the origin of this deposit is afforded by the deposit on Lukin creek, a small creek running into Poquette creek a short distance north of the south end of this pass. This is a small gorge cut down in Mesozoic volcanics (very similar to the bed-rock of the Cedar Creek deposit), much oxidized and hydrothermally altered, in which are numerous small quartz veins. Glacial debris is entirely absent, and the unconsolidated material in this little valley appears to consist almost entirely of local rock detritus. From this creek there was recovered in the early days, by ordinary placer-mining methods, residual gold, a method still followed by the present owners of this deposit. Although this gold is largely residual in character, some is rounded, and it follows that (as can also be demonstrated from the placer occurrence on Hixon creek), if the supply of water is very small, it is possible, although admittedly very unusual, to find a detrital deposit of gold in which the

edges of the gold pieces are rounded, but the containing unconsolidated material is comparatively unrounded.

It is possible that the neighbouring Cedar Creek deposit is in part to be accounted for by some such reason as the foregoing, the resulting deposits being partly contained in gravels and partly in detritus. It is clearly indicated that while there was no ice erosion they were merely disturbed by glaciation.

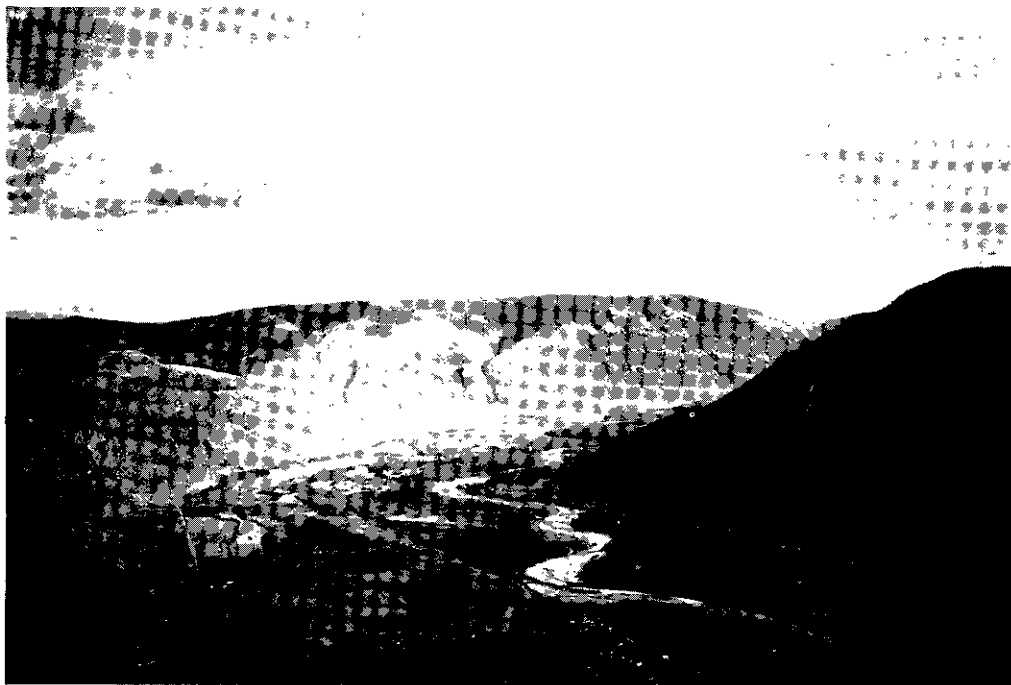
The discovery was made in 1921 by A. E. Platt and John Lyne. The following year the Cedar Creek Mining Company, Limited, was incorporated and acquired six leases covering the richest known ground in the region. The company went into liquidation the following year, and was operated in 1923 and 1924 by the receiver appointed by the Court, with G. C. Bagley in charge. During this time the ground was drifted in part where cover was sufficient. In the late summer of 1924, B. Boe installed a "pump-hydraulic" plant and commenced operations on a royalty basis under contract, continuing in 1925, with some drift-mining. In 1926 he discovered the "Second Nugget Patch" north of the previous rich ground, one nugget weighing 17 oz. being discovered. From a small area at the north-west end of the run of "pay" it is stated that 4,700 oz. gold was recovered in nine months. In 1927 K. C. Laylander obtained an option on this property and adjoining leases, which he subsequently assigned to the Revenue Mining Company, Limited. Very extensive Keystone-drilling was carried out in 1927, and pump-hydraulic operations were continued the following year by Revenue Mining Company, Limited, but were subsequently suspended. Again B. Boe secured an option on this ground in 1930, continued pump-hydraulic operations in 1931, and once again struck rich ground on the *Sheridan* lease. In 1932 operations were continued south-eastward to about 500 feet from the north-west corner post of the lease mentioned above, and the ground was deemed to be practically exhausted. In 1933 the property was practically idle. In 1934 rich ground was again struck about 75 feet east of the rich ground in the vicinity of the "Nugget Patch" in ground drilled in 1927. Options on the ground were secured by A. W. Alliot during the year, who at once commenced the operations described below.

(Refer to Annual Reports for 1921 to 1932, inclusive: Geological Survey Summary Reports, 1922, Part A, and 1932, Part A 1.)

The rich ground discovered in 1934 lies east of and distant only about 75 feet from the first "Nugget Patch" discovered in 1923 and in ground drilled in 1927. The depth to bed-rock is about 7 feet. Immediately overlying bed-rock is 2 feet of shattered bed-rock in which the "pay" is contained: overlying this is about 3 feet of boulder-clay underlying about 2 feet of top soil. Nuggets up to 1¼ oz. in weight were obtained. A ½-yard high-line plant was installed, operated by a Fordson engine and double-drum hoist, the ground being loosened by hand-picking first and subsequently conveyed by drag-line to a bin over the sluice-flume. Water is pumped from the settling-pond for washing. After removal of the majority of the material mechanically, bed-rock is cleaned by hand. The present plant is only a temporary expedient. The proposal of the optionee is to bring in a supply of wash-water from Boswell lake, and to re-treat the tailings on this property in addition to any virgin ground. It is estimated by the optionee that Boswell lake will yield 250 miners' inches for twenty-four hours per day for two months in the year, and for the remainder of the season will yield this supply for sixteen hours daily.

A sluice-flume will be constructed of sufficient length to carry tailings into Cedar Creek gorge from the point of commencement at the extreme north-west end of the ground, and only one monitor pump will be necessary. This scheme would seem to be well conceived, and the only way, judging from past events, to avoid missing good ground.

Reference to the map published in the 1928 Annual Report will facilitate study of the text.



Looking down Similkameen River Valley. Keremeos in Foreground.



Twin Lakes—looking North-easterly across Sparsely Wooded Country Typical of the District South-west of Penticton.



Morning Star Mine, Fairview.



Pre-Cambrian Gold Mines—60-foot Level. Ewings Landing, Okanagan Lake.

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

BY

PHILIP B. FREELAND.

INTRODUCTION.

Summarizing the year's developments, continued activity accompanied by an increased output was evident in gold-mining, and a new interest was taken in silver properties, especially in the vicinity of the producing mines at Beaverdell. Practically all of this work was done in the older, better-known mineral districts such as Greenwood, Beaverdell, Oliver-Fairview, Hedley, Stump lake, North Thompson River area, Vernon-Monashee, and Lightning Peak.

Increased interest and activity was shown in placer-mining, particularly on the part of individual operators. Attractive values were found in the old high channels on Scotch creek; large-scale operations are indicated along the benches of the North Thompson river; testing by surface pits suggests possibilities for large-scale mining on Cherry creek (Vernon); exploration of Woods Lake old channel continued to produce coarse gold; and the Tulameen and Similkameen River benches still hold opportunities for mining gold, platinum, and iridium. Rock creek and its tributaries are expected to produce on a comparatively large scale. All the above operations require capital outlay.

PROSPECTING.

In the Annual Reports for 1932 and 1933 different areas were suggested as attractive for prospecting. There is nothing to add, except to say that the Camp McKinney section has not received the attention it deserves. Both the Fairview and McKinney mineral deposits are similar in many ways and require careful study on account of the fact that the ore-shoots are generally buried and only the barren quartz outcrops.

Increased popularity towards the use of the divining-rod was in evidence amongst the more or less uninitiated prospector and small capitalist. "Doodle-bugs," especially trained by the operators to dip for every conceivable metal, were in demand. Various "doodle-bug" methods for finding minerals have been tried out for many years, and the best proof of their worthlessness lies in the fact that no authentic discovery is known to have been made.

Throughout this report all bearings refer to true north. "Tunnels" are correctly referred to as adits.

ACKNOWLEDGMENT.

The writer wishes to thank all the mine operators and prospectors with whom he came in contact for their kindly assistance and hospitality.

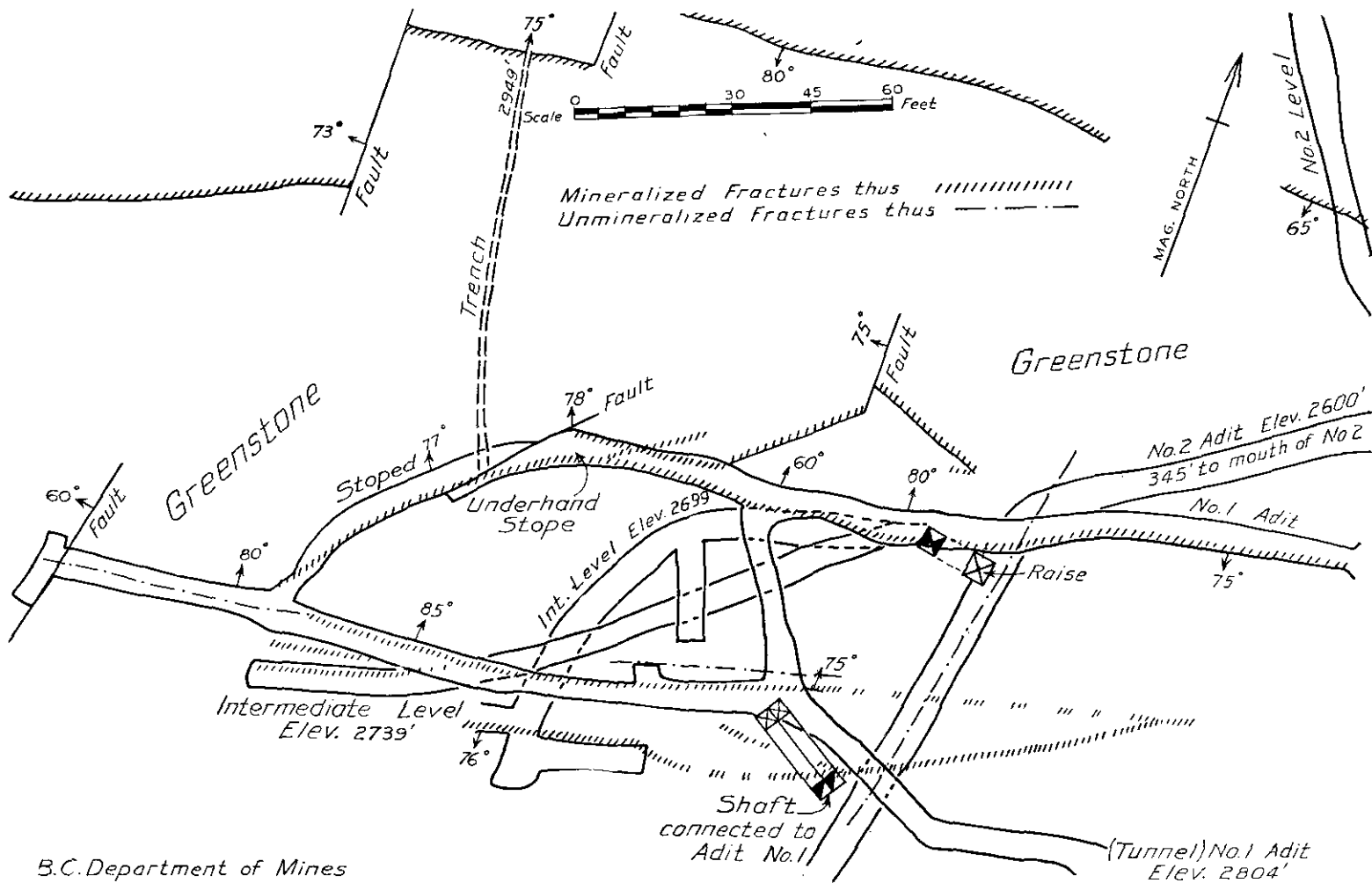
PRODUCTION.

No. 3 District.—Ore, 20,570 tons; gold, lode, 9,779 oz.; silver, 25,794 oz.; copper, 45,525 lb.; lead, 178,223 lb.; zinc, 40,681 lb.; placer gold, 223 oz. Miscellaneous metals, minerals, and structural materials produced had a value of \$149,550. Coal production for this district was 24,611 tons.

No. 4 District.—Ore, 39,279 tons; gold, lode, 8,614 oz.; silver, 651,490 oz.; copper, 460 lb.; lead, 490,843 lb.; zinc, 547,904 lb.; placer gold, 510 oz. Miscellaneous metals, minerals, and structural materials produced had a value of \$66,872. Coal production for this district was 116,001 tons.

GRAND FORKS MINING DIVISION.

This group, owned by the James Hutchinson Estate, of Montreal, and consisting of the Crown-granted claims *Yankee Boy* (Lot 1559), *Yankee Girl* (Lot 1558), *Bell* (Lot 1560), as well as an unknown number of recently staked claims, has been optioned by the Royal Development Company, of Spokane, Wash. The property, located on Hardy mountain $2\frac{1}{2}$ miles due west of Grand Forks, can be reached by a narrow road. In the neighbourhood of the workings the ground stands in high relief, with



B.C. Department of Mines

Yankee Boy.

open, gently rolling country to the north. Water is scarce in the immediate vicinity of the mine.

Two or more veins mineralized with pyrite and lesser amounts of chalcopyrite and galena in a gangue of quartz occur in fissures and fractures with free walls in greenstone. They vary from a few inches to 3 feet in width, strike between north-east and east, and dip generally at steep angles to the north.

For production and history see Annual Reports for the years 1900, 1901, 1905, 1919, 1920, 1923, 1924, 1925, 1930, and 1931.

Development on the surface consists of numerous open-cuts and trenches along the strike of the veins. Underground work carried out this year (see map) consists of extending the No. 2 adit westerly and southerly, connecting it with a raise to the bottom of the winze from the No. 1 level, and driving two sub-levels at 55 feet and 105 feet respectively below No. 1 level.

At a point in the winze about 80 feet below No. 1 level the vein has been faulted probably to the north. No. 2 level was driven in a westerly direction to locate the vein under the fault. At a point about 90 feet in from the portal of this working a narrow quartz-filled fissure was intersected. No drifting was done to prove its value.

A picked sample of ore from the winze assayed: Gold, 9.70 oz. per ton; silver, 2.5 oz. per ton. A shipment of sorted ore is being prepared for the smelter. About 11 tons of sorted ore was shipped in 1926 and, according to the 1905 Annual Report, several shipments were made prior to that date.

Union. Work at the *Union* mine in Franklin camp was discontinued about November 1st. During the summer the mill tailings were cyanided. Some ore left in No. 2 level sill was mined and stored in the stopes until next year, when operations will be resumed.

McLeod, Blue Bird, etc. These groups of claims, situated between the old Granby smelter and a point several miles south-easterly, were staked following spectacular assays from samples taken by Wm. Puritch and McLeod from an old 200-foot adit on the McLeod claim. The area covered by the claims consists chiefly of schistose rocks containing many parallel well-defined and often banded quartz veins which have been intruded and replaced by comparatively recent quartz porphyry and porphyritic granite. In a few localities pods of practically pure crystalline limestone impregnated along the contacts with pyrite and minute segregations of galena were observed.

In other areas quartz veins contain pyrite and sphalerite. Samples taken by individual owners from other outcrops portrayed the presence of gold and silver in paying quantities, so that further prospecting along the strike of the veins appears to be warranted. Due to the fact that the schistose beds are tilted and fractured in many directions, a full cross-section of veins at depth can be found in many of the ravines. A careful study of these exposures, with sampling across the veins every 5 feet, may save a considerable amount of useless work.

GENERAL.

Development and exploratory work was carried out on the *Winner* claim (see 1932 Annual Report) south of Phoenix; the *Athelstan* group (see 1932 Annual Report) east of Phoenix; on properties along McRae creek in the Paulson area; the *White Swan* group south-west of Coryell; the *Boas, Creek, Jakin,* and *Moody* claims on Moody creek; the *Canadian Boy* on Hardy mountain.

Some placer-mining was done by R. Campbell and associates on a bench on May creek, which flows into Fourth of July creek about 5 miles from Grand Forks, and a considerable quantity of coarse gold recovered. The gold occurs on a greenstone bed-rock overlain by partly sorted glacial material.

LIGHTNING PEAK SECTION.

Waterloo Consolidated Mines, Ltd. Development on the *Waterloo No. 3* and *Silver Spot* consisted of driving No. 4 level to a total distance of about 1,780 feet to the east, with occasional short crosscuts north and south, excavating numerous open-cuts on the strike of the shear-zone to the east, as well as sinking a shallow winze and raising on one of the better-mineralized shear-zones. The end of the No. 4 level is approximately 195 feet below the surface.

The shaft on the *A.U.* was unwatered and the drift from the bottom of the shaft extended a total distance of 925 feet south and 70 feet north. A fault angling across the length of the south drift has displaced the vein. A car-load consisting of 49,665 dry tons was shipped to the smelter, containing: Gold, 1.078 oz. per ton; silver, 19.6 oz. per ton; lead, 6.70 per cent.; zinc, 4.7 per cent. Actual development of the mine by the company has ceased for the winter and the *Waterloo No. 3* has been leased on a royalty basis. (See Annual Reports, 1918 to 1922, 1925, 1927, and 1929 to 1933.)

This property, located about 4 miles by road north of the *Waterloo* mine, and consisting of the *Dictator* (Crown-granted), the *Alpha*, *Beta*, *Digmore*, **Dictator Gold Mines, Ltd.** *Betty*, *Mary*, *Ronald*, *Blackie*, *Pine Tree*, *Cordova*, *Morning No. 2*, *International*, *Ontario*, *Alberta*, *Quartz*, *Rip*, *Penticton*, *Hope*, *Tiptop*, *Excelsior*, *Harpan*, *Dakota*, *Gold Pan*, *Fir*, *Dawn*, and *Doris Fraction*, was bonded by the Dictator Gold Mines, Penticton, and a public company formed with a capitalization of 2,500,000 shares of no par value.

The type of deposit, mineralization, etc., was mentioned in the Annual Reports for 1931 and 1933 under the name of *Morning No. 2*; also in the Geological Survey of Canada Summary Report, 1930, Part A.

This year a 4-mile road was built from the main *Waterloo* road and the following frame buildings constructed: Bunk-house, dining-room, warehouse, compressor building, blacksmith-shop, 300-gallon water-tank, and a root-house. At the mine a head-frame was erected and a 50-horse-power caterpillar tractor and a 400-cubic-foot Gardner-Denver compressor were installed.

A shaft was sunk for 115 feet on the shear-zone at an 80-degree slope to the east. Considerable trouble was experienced with soft ground due to intense shearing of the quartz-porphry dyke which accompanies the quartz, and considerable time was lost on this account. On the 100-foot level an 18-foot crosscut was put in to the east and two workings driven on the shear-zone, one 60 feet south and the other 52 feet north. According to the management, the quartz found in the shaft was of low grade, but a gradual improvement took place in both the north and south drifts as follows: No. 1 north drift across the face, 4-inch streak: Gold, 6.60 oz. per ton; silver, 42.2 oz. per ton. No. 2, 10 inches, including high-grade streak: Gold, 2 oz. per ton; silver, 4.6 oz. per ton. No. 3, 2-foot width, including both the above: Gold, 0.71 oz. per ton; silver, 2 oz. per ton. In the face of the south drift 2 feet of quartz assayed: Gold, 0.25 oz. per ton; silver, 0.75 oz. per ton.

The caterpillar tractor, attached to a 15-ton "bummer," was found exceedingly useful for transportation of supplies, etc. During the "mucking" shift a return trip to and from the supply depot was made.

This group, consisting of the *Thunder Hill*, *First Chance*, *West Fork*, and **Lightning Peak.** *Jim Hill* Crown-granted claims, owned by C. F. Deither, St. Paul, Minnesota, has been bonded to W. A. Calder, Fritz and R. Jordan, and B. F. Lundy, of Edgewood and Vancouver. During the year No. 4 level was extended 17 feet to the south through a fault, and the vein, about 3 feet wide, with free walls, containing tetrahedrite, galena, pyrite, and sphalerite, disclosed. This drift has been continued, according to the owners, for 40 feet along the foot-wall, and occasional drill-holes across the vein give an estimated width of 3 feet. A channel sample taken by the owners assayed: Gold, 0.05 oz. per ton; silver, 40 oz. per ton. A raise 32 feet high has been put up on ore the same width as noted with porphyry on both foot and hanging walls. As in other parts of this camp, there appears to be a structural relationship between the ore and the porphyry. A new camp has been established about 300 yards west of the old cabin.

General.

On the *Fire Fly* group, a short distance north-west of the *Rampalo*, W. A. Calder *et al.*, of Edgewood, have done a considerable amount of trenching and uncovered an 8-foot quartz vein assaying: Gold, 0.04 oz. per ton; silver, 8 oz. per ton. Some quartz float from the same locality assayed: Gold, 0.74 oz. per ton; silver, 160 oz. per ton. The vein occurs along the contact of granite and a quartz porphyry.

Exploratory work was carried out on the *Killarney* and *Pay Day* groups. (See Annual Reports for 1919, 1922 to 1925, 1927, and 1929 to 1933.)

GREENWOOD MINING DIVISION.

This mine, situated at Jewel lake, 8 miles by road north-west of Greenwood, **Dentonia Mines, Ltd.** was reported upon in full, with map, in the Annual Report for 1933. Developments this year are as follows: A crosscut adit 1,330 feet long was driven from the *Perseverance* claim to intersect the downward extension of the *Jewel-Enterprise* vein on its dip at a depth of 340 feet. Drifts were driven both ways from the intersection and a raise is being put up. The 200-foot level was extended north under the outcrop of high-grade ore found on the *Anchor* claim and a connecting raise driven. The collar of the old *Jewel* shaft was retimbered, a new head-frame and hoist-house erected, and a new Mead-Morrison hoist installed.

A 15-foot-wide, post-mineral porphyry dyke cuts the area where the main crosscut intersects the vein, and only remnants of quartz are found at this point. In the raise, now about 100 feet above the lower level, a high-grade section assaying, according to the management, 3.61 oz. gold per ton, has been found. For some distance north of the *Enterprise* ore-shoot on the 200-foot level the vein is much disturbed and low in value. The downward extension of the *Anchor* mineral-zone is reported to have been found on this level. All the shoots rake to the north and have free walls.

The mill, with a rated capacity of 140 tons, is treating about 90 tons of ore daily, taken from above the 200-foot level. It is expected that the tonnage will be stepped up when the 500-foot level is prepared for stoping and the ore can be hauled directly to the mill-bin through the new crosscut.

This company, with headquarters at 6 Cameron Building, Calgary, Alberta, **Superior Mines, Ltd.** and reported as owning a controlling interest in the Askalta Oil Company, has bonded the *North Star* group of claims, consisting of the following: *North Star* (Lot 1165), *Cairn Gorn Fraction* (Lot 2853), *Old Bird* (Lot 1324), *Golden Eagle Fraction*, and *Eastern Star Fraction*, situated to the north-west and adjoining the Dentonia Mines, and also the old *Providence* mine located about 1 mile north of Greenwood.

The *North Star* group, elevation 4,700 feet, lies on the rolling summit and eastern slope of the range of mountains skirting the east side of Jewel lake, and can be reached by a branch road from the Dentonia mine. Timber is plentiful, but water is scarce, except in Jewel lake.

The vein upon which most of the work has been done occurs in schistose quartzite, conforms to the strike of the formation in a northerly direction, dips variably to the east, and is often frozen to the walls. Mineralization consists of pyrite, galena, sphalerite, and gold telluride in a gangue of quartz. The mineral-zones, which reach a maximum width of 3 feet, but average about 8 inches, lie in isolated shoots, with low-grade quartz between.

The *North Star* and *Cairn Gorn* were first bonded by Leslie Hill in 1897 and two shafts sunk, 50 and 60 feet respectively, on the vein. At a later date (not known) a crosscut 45 feet long was driven to intersect the vein below the shafts and a drift driven 125 feet on the vein. At a point about 45 feet along the vein some stoping was done and a shipment of ore made to the smelter. In 1932 R. L. Clothier and associates, of Penticton, leased the *North Star* and shipped three car-loads of ore to Trail. In 1933 W. E. McArthur, of Greenwood, shipped a car-load of ore from the same stope and drove the main adit ahead, as well as a semicircular side-drift on a branch vein. In 1934 the Superior Mines extended the main drift in a northerly direction through a porphyry dyke. The property has been mentioned in the Annual Reports for the years 1897, 1931 to 1933, under the heading of *North Star*.

Development on the surface consists of two shafts 50 and 60 feet deep, as well as numerous open-cuts over a length of about 500 feet. Underground, a total of 299.6 feet of drifting and crosscutting has been done and a small area stoped. From the point where the crosscut intersects the vein for 42 feet along the north drift the vein is split, having a maximum width of 14 inches, averaging about 4 inches on each strand. For the next 83 feet much of the ore has been stoped above the level; then for 27 feet the vein is narrow and displaced. From this point to within 10 feet of the face only occasional displaced remnants of quartz occur. In the semicircular side-drift, about 40 feet long, driven easterly from a point about 120 feet along the drift, the vein is much disturbed and narrow, but generally well mineralized.

In the face of the main drift the vein, varying from 3½ to 11 feet in width, is exposed along the hanging-wall of a porphyry dyke. It seems likely that the dyke has either replaced

and shattered the vein or displaced it to the north-east of the working for at least 50 feet back from the face. A channel sample across the vein on the north side of the face assayed a trace in gold and silver. The ore occurrences in the *North Star* are similar to those found in the *Dentonia*, and may possibly rake to the north. In the region where the vein splits the schistose rocks are generally highly pyritized and stoping-widths of milling-ore may be found.

On the *Providence* the old workings were unwatered and sampled by the company's engineer, M. M. Reese. The reported results of this investigation indicate a sufficient tonnage of ore in the old stopes and on the dump to warrant the installation of a 50-ton mill. The south shaft was sunk to the 500-foot level.

The mill flow-sheet is as follows: 10-ton coarse-ore bin; ½-inch grizzly; 9- by 16-inch Forano jaw-crusher; 75-ton fine-ore bin; 6-foot by 22-inch Hardinge conical ball-mill; Dorr simplex classifier; 6-cell gravity-flow flotation unit; 10 by 4 feet 5 inches by 4 feet deep settling-tanks. Milling operations commenced on October 25th. The ore is transported from the dump to the mill by a 5-ton truck.

The *Providence* mine shipped several thousand tons of gold-silver ore to the smelter in former years. (See Annual Reports of the Minister of Mines for 1896, 1897, 1903 to 1906, 1918 to 1921, 1924 to 1930.)

This group, consisting of the *Amandy* (Lot 2795) and six other claims, is owned by E. C. Henniger and associates, of Grand Forks. Most of the work has been done on the *Amandy* claim, which lies at an elevation of about 5,000 feet on the eastern slope of Roderic Dhu mountain. A trail 2 miles long leads from the end of the road at Jewel lake to the claims. On the upper part of the group the ground slopes gradually to the east and becomes more precipitous before reaching the lake. Timber is plentiful, but water, except for domestic purposes, is scarce in the immediate vicinity of the workings. The lake lies 3,500 feet from and about 1,300 feet below the *Amandy* claim.

A quartz vein with free walls, strike between north and north-west, dip 60 degrees north-easterly, varying from a few inches to 10 feet in width, with cross-veins branching to the north-east, occurs along the bedding of quartzitic schists. It has been traced for over 1,000 feet from the *Alice* claim downhill to the south. Mineralization consists of pyrite, with lesser amounts of galena, sphalerite, and probably gold telluride.

Under the name of *Amanda* the property is mentioned in the 1897 Annual Report. No production is recorded.

Ten open-cuts and shafts to 15 feet in depth have been excavated at intervals over a distance of 1,000 feet on the main vein, as well as other work on the branch or parallel veins. In nearly all of these workings mineralized bands and segregations were found in the quartz. The old work consists of a 30-degree inclined shaft 40 feet deep, with a short drift north. One foot of highly mineralized quartz is exposed near the collar. Downhill to the south of the old shaft the vein is obliterated for a short distance by a porphyritic granite dyke. Beyond this point more mineralized quartz has been discovered.

Three samples of the better-mineralized quartz from different shafts taken across widths of 4 inches to 8 inches assayed:—No. 1: Gold, 0.50 oz. per ton; silver, 8 oz. per ton. No. 2: Gold, 0.70 oz. per ton; silver, 42 oz. per ton. No. 3: Gold, 0.80 oz. per ton; silver, 8 oz. per ton. The width and persistency of the vein and its location, close to water and within 2 miles of electric power, appears to warrant further exploration of the property.

GENERAL.

Development-work was done on the *C.O.D.*, *Roderic Dhu*, *Lakeview*, and *Electric* in the vicinity of Jewel lake. (See Annual Reports as follows: *C.O.D.*, 1897 to 1900, 1902, 1931, and 1932; *Roderic Dhu*, 1896, 1921, and 1931; *Electric*, 1902, 1921, and 1931; *Lakeview*, 1896, 1897, 1901, 1902, and 1931.)

GREENWOOD SECTION.

This group, owned by Ola Lofstad *et al.*, of Greenwood, and consisting of the *Helen* (Lot 691), *Capital Prize* (Lot 914), *Maple Leaf* (Lot 1484), *Maple Leaf Fraction* (Lot 2040), all Crown-granted, and the *Tiger Fraction* and *Clifford Fraction* recently staked, was optioned by I. B. Flater interests (address, Greenwood). The property adjoins the town of Greenwood on the south and can be reached by road. The Canadian Pacific Railway passes within 1,000 feet of the workings.

A quartz vein, strike westerly, dip 62 degrees southerly, varying from a fraction of an inch to 24 inches in width, occurs along a well-defined fissure in highly metamorphosed greenstones and quartzites that flank the eastern side of Boundary creek. Mineralization observed consisted of pyrite, galena, sphalerite, and possibly tetrahedrite.

In 1906 the Helen Mining Company, of Chicago, did a considerable amount of sinking, crosscutting, and drifting on the *Helen* claim and 60 tons of ore is reported to have been shipped. In 1921 a lease was taken on the property by Ola Lofstad and two adits were driven at lower elevations than the outcrop and a small quartz vein developed. In 1925, 5 tons of ore was shipped to the smelter by Ola Lofstad.

The *Helen* vein, upon which most of the work was done, has been traced on the surface for several hundred feet by open-cuts. Uphill and to the north-east other quartz veins have been indicated by shallow shafts and cuts.

The old west inclined shaft sunk on the ore with crosscuts where the vein is faulted, and the more recent inclined shaft to the east connected with it by drifts, have been unwatered and the drifts cleaned out. Drifts were formerly run 115 feet to the south-east and 140 feet to the north-west from the bottom of the west shaft, mostly on a quartz vein varying from 2 to 12 inches in width and mineralized with pyrite, sphalerite, and galena. At a point 60 feet south-east from the shaft a fault has displaced the vein to the north-east. The vein with free walls, strike approximately north-west, dip 62 degrees south-west, varies from 2 to 24 inches in width. Samples generally assay low in gold, but where galena is present from 0.08 to 15.8 oz. in silver per ton and from 0.40 to 30 per cent. lead are obtained. Three samples of the better-mineralized material—(1) 12-inch sample across the vein 20 feet south of the shaft in the bottom level assayed a trace in gold and silver; (2) 8-inch sample across the vein 6 feet from the face of north drift in the bottom level assayed: Gold, 0.04 oz. per ton; silver, 14 oz. per ton. A sample from a 6-foot shaft uphill from the main workings assayed: Gold, trace; silver, 0.40 oz. per ton. In the upper levels from the west inclined shaft where the vein has been twice faulted to the east at 35 feet and 60 feet respectively, a considerable amount of stoping has been done on the vein, which varies between 1 inch and 1 foot in width. Values were too low in gold and silver for profitable mining. The lead contents varied between 8 and 31 per cent.

Machinery installed includes a Jenks 10 by 10 compressor driven by electric power supplied by the West Kootenay Power Company, a Gardner-Denver steel-sharpener, and a 5-ton 2-drum hoist. A new engine-house, blacksmith-shop, and office were built and a 5-ton truck purchased. The operation closed down in the late summer owing to lack of finances.

This group, adjoining the *Helen* group to the east, and consisting of the **Dynamo**, *Dynamo* (Lot 2087), *Mamont* (Lot 879), *Starve-out Fraction* (Lot 2944), *Mayflower* (Lot 1773), *Little Home Fraction* (Lot 170s), *Hamilton* (Lot 1106), which are Crown-granted, and the *Tunnel Fraction*, stated to be Crown-granted, was acquired first by the Dynamo Mines Syndicate, Limited, of 1927 Marine Building, Vancouver, who did some exploration-work and then formed a public company called the Dynamo Mining and Milling Company, with headquarters at 1024 Marine Building, Vancouver, and a capitalization of 2,000,000 shares of \$1 par value.

Five known quartz fissure-veins with generally free wills varying from 2 inches to 3 feet wide, and striking from slightly east of north to westerly, occur in greenstones and granodiorite that invade the area. Mineralization observed includes pyrite, galena, sphalerite, and chalcopryrite associated with gold and silver. Several shipments of sorted ore have been made to the smelter at Trail from time to time, chiefly from the *Dynamo*.

Surface exploration consists of numerous open-cuts along the strike of the veins over distances of several hundred feet. Underground development is as follows: A crosscut and drift approximately 200 feet on the *Dynamo*; an old crosscut adit 1,700 feet long on the *Mamont* (*Argo*); a crosscut and drift on the *Dynamo* 780 feet long, as well as numerous shafts and an adit 60 feet long on the different veins. The long crosscut adits are mostly in country-rock and have not developed any of the more important veins.

As far as development has gone, none of the veins are consistently wide enough or contain sufficiently high value at present metal prices to be mined without sorting. The future of the property appears to lie in the possibility of obtaining tonnage from the five different veins that will pay to mill. Transportation, electric power, and gravity-mining facilities enhance this

opportunity. A 270-cubic-foot Gardner-Denver compressor and 50-horse-power Novo gasoline-engine have been installed.

(See Annual Reports, 1926 to 1930, 1932, and 1933. Geological Survey Report, **Brooklyn-Stemwinder Gold Mines, Ltd.** 1908.) This company, with headquarters at 574 Howe Street, Vancouver, and an authorized capital of \$1,000,000, has optioned the old *Brooklyn-Stemwinder* and adjacent claims at Phoenix. A. Knox Paton is managing director. New work consists of cleaning out some of the old surface cuts and shafts, stripping and open-cutting other likely mineralized zones, as well as reconditioning some of the old dwelling-houses for domestic purposes. The results of this work have exposed a narrow vein about 10 inches wide for about 500 feet in length, striking from the old *Stemwinder* "glory-hole" towards the *Brooklyn* workings. A sample from this vein assayed: Gold, 1 oz. per ton; silver, 1.5 oz. per ton; copper, 14 per cent. The 250-foot level in the *Brooklyn* (under water) is said to have been driven on this vein for 250 feet. About 250 feet north-westerly, or uphill from this vein, another similar parallel vein has been stripped for 360 feet. Widths vary from 4 to 50 inches, and samples assayed from 0.36 to 1.30 oz. in gold per ton, from 1.7 to 3.5 oz. in silver per ton, and from 2 to 12 per cent. copper. Prospecting under a heavy mantle of overburden a short distance to the east of the *Brooklyn* "glory-hole" has resulted in the discovery of two leads, one striking west of north, heavily impregnated with copper carbonates and hematite, and the other striking east, consisting of leached quartz with free walls. Insufficient work has been done to prove the extent of these discoveries. Another discovery has been made downhill closer to the wagon-road between the *Brooklyn* and *Stemwinder* "glory-holes," about 44 inches wide, that assays, according to the management: Gold, 0.10 oz. per ton; copper, 7.5 per cent. A new 30-foot cut and 12-foot shaft at the end of it on the north side and close to the upper *Brooklyn* "glory-hole" uncovered a 4-foot vein which may possibly be the continuance of one of the veins of the above system.

A sample across the vein assayed: Gold, 0.84 oz. per ton; silver, 0.20 oz. per ton; copper, *nil*. The water in the *Brooklyn* shaft-workings has not been pumped out to date. When this is done, crosscuts from the 250-foot level will determine the value of these new discoveries.

General.

On the *Silver Cloud*, about 2 miles east of Greenwood, there are two inclined shafts filled with water and several open-cuts which are caved. Judging by the size of the dumps, the underground workings must be at least 100 feet deep or else there are drifts from shallower shafts. Some broken, banded quartz containing pyrite, sphalerite, and arsenopyrite occurring in what is evidently a highly pyritized greenstone assayed: Gold, 0.34 oz. per ton; silver, 18 oz. per ton. W. E. McArthur and associates, of Greenwood, obtained an option on the *Bay* claim from R. Forshaw, a short distance east of the town, and after unwatering the old shafts sorted and shipped several tons of high-grade gold ore from a 22-inch vein in the west inclined shaft. (See Annual Reports, 1905, 1906, 1913, and 1922.)

The W. E. McArthur interests have unwatered the old workings on the *Skylark* preparatory to investigating future possibilities. It lies a short distance east of the *Bay* and has been mined spasmodically since 1895, several car-loads of ore having been shipped. The same organization is operating the *No. 7* mine, approximately 8 miles by road south-east of Greenwood, which was also worked many years ago. According to the management, five car-loads of ore, carrying gold, silver, lead, and zinc, have been mined and are ready to ship. (See Annual Reports, 1901 and later.)

The *Republic* group, situated 3 miles south-west of Greenwood, was optioned by J. E. Taylor interests, 1390 Granville Street, Vancouver, and besides reconditioning the old lower adit, numerous open-cuts and a new drift 40 feet long was driven on a quartz vein from 6 inches to 3 feet wide, containing pyrite, galena, sphalerite, and variable quantities of gold and silver.

On the *Dominion* (Lot 2587), *No. 2* (Lot 2588), and *Bristol Boy* (Lot 2586), situated $4\frac{1}{2}$ miles north-west of Heed's ranch on Nicholson creek, 9 miles north-east of Rock creek, a syndicate of men under F. Gorse, of Kelowna, cleaned out the old workings and excavated several new open-cuts in different pyritized beds occurring in the volcanic rocks which occupy the area. Samples of the most heavily mineralized sections failed to return high enough values to permit mining at a profit.

On the *Imperial* group, situated about 4 miles north of Rock creek, A. M. Molander and associates shipped 31.072 tons of ore carrying: Gold, 0.177 oz. per ton; silver, 23.7 oz. per ton; lead, 2.90 per cent.; zinc, 4.9 per cent.; and contemplated making another shipment from the underhand stopes in the lower adit. Recent reports state that much higher-grade ore has been discovered. Work done on this group is mentioned in the Annual Reports for 1925 to 1928.

CAMP MCKINNEY.

Beyond a short campaign of diamond-drilling by the Bralco Company on the old *Cariboo-Amelia* claims and exploration by the Camp McKinney Gold Hill Mining Company, practically nothing was done in this camp during the year. Numerous other claims, including the *Ogo Fan No. 1* and *No. 2*, *Snowden*, *Datun*, *Homestake*, *Olimax*, *Le Roi*, *War Eagle*, *Beaver* group, *Waterloo Consolidated*, and *Sailor*, were inspected by outside interests, but due to the fact that most of the old workings are caved or full of water very little could be seen. In most instances on the above claims mineralization consists of pyrite, galena, and sphalerite, and occasionally chalcopyrite occurring in quartz veins in the schistose or highly altered volcanic rocks. On the *Datun* an oxidized stringer 4 inches wide in one of the open-cuts assayed 4.70 oz. gold per ton. In past years some shipments were made from this stringer. Former reports portray the fact that there is still pay-ore in the old *Sailor* and *Waterloo Consolidated* mines.

In the Bridesville area, G. Partridge & Sons, of Naramata, drove an adit on the *Morning Glory No. 1* under some massive pyrite-pyrrhotite outcrops, and stripped and explored several quartz veins found in quartzites and highly altered volcanics and along the contact.

WALLACE MOUNTAIN SECTION.

Development, exploration, and production from the mines on Wallace mountain, Beaverdell, have been quite satisfactory during the year, and as a result a larger output amongst the older mines as well as some new producers may be anticipated in 1935. The *Highland Lass* mine drove an 800-foot crosscut at an elevation of 3,975 feet from the *Belle* claim and connections were made with the *Highland Lass* ore-zones above. This working gives gravity access to these ore-bodies. A road was also built to connect this adit with the main highway, so that the ore, hitherto hoisted, can be hauled direct to the railway. A new ore-bin was also built. On the *Belle* the usual production was maintained. The *Highland Chief*, adjoining the *Highland Lass* on the north-east and upon which a considerable amount of exploration by means of open-cutting and driving was done in the past, lies in a formation almost entirely covered by the Wallace formation, which up to the present has produced only low-grade mineralized stocks containing silver, galena, and sphalerite. The depth from the surface to the quartz diorite, in which the high-grade shear-zones occur, near the *Highland Lass* boundary, is in the neighbourhood of 300 feet, so that the possible value of the *Highland Chief* might be ascertained by diamond-drilling for the quartz diorite. On the *Beaver* development-work and production continued from the 100-foot level in the shaft where some ore had been indicated by diamond-drilling. The same company, it is understood, acquired the *Bounty* group, which lies to the south-east, and ore shipments may be looked for from this mine. Production continued throughout the year from the *Wellington*. It appears probable that the winze from the lower level will be sunk to a greater depth and another lift taken on the shear-zones. On the *Revenge* a syndicate of Princeton men drove two crosscut adits below and to the south-west of the upper workings. One shear-zone was cut, but up to the present the objective has not been reached. The *Standard Fraction* and *Rambler*, situated on the south-east side of the camp and mentioned in former Annual Reports for 1919, 1920, 1922 to 1927, and 1929, have been bonded by Geo. S. Walters, of Greenwood, and a syndicate will be formed to operate them. Former development places these two claims in a favourable position for finding more high-grade silver ore. The *Buster* claim has been acquired by Penticton interests from the Jim Kelly Estate and probably a syndicate will be formed to work the holdings.

This group, consisting of the *Sally*, *Rob Roy*, *Pueblo Fraction*, *Highland Queen*, **Sally Mines, Ltd.** *Excelsior*, *Duncan Fraction*, *Nodaway*, *Sally Fraction*, *Alice M. Fraction*, *Hard Times Fraction*, and *Tunnel Fraction*, all Crown-granted, is owned by the Sally Mines, Limited, Penticton, with a capitalization of 500,000 shares of \$1 par value.

The property is located in the centre of the camp adjoining the *Bell* on the north-east and the *Wellington* on the south-west, on the west slope of Wallace mountain.

The shear-zones in the quartz diorite are similar to those found elsewhere on Wallace mountain, and contain most of the high-grade silver sulphides, including argentite, pyrargyrite, native silver, as well as a low percentage of galena and sphalerite. The usual amount of complex faulting exists, so that often the top of one section of an ore-body lies at a lower horizon than the bottom of another section. Strike-faults are also complicated and add to the cost of mining.

The *Sally* is one of the oldest operating mines in British Columbia. The property was opened up and operated from 1901 to 1910 by the Vancouver and Boundary Creek Development and Mining Company under the management of Robert Wood, who at that time hauled by wagon 45 miles and shipped about 1,200 tons of high-grade ore, which produced roughly \$100,000. During 1911 and 1912 the property was idle and in 1913 it was leased by James Drumm, who shipped in the five succeeding years 517 tons of high-grade ore, which netted \$68,000. In 1916 the property was optioned to Wallace Mountain Mines, Limited, which company, with a capital of \$10,800, purchased and equipped the mine, did 4 miles of underground development, and paid the shareholders about \$189,000 in dividends. In 1925 it was optioned to the Federal Mining and Smelting Company, which relinquished its option in 1926. In the years 1926 to 1928 the mine was operated by Sally Mines, Limited, under option from Wallace Mountain Mines. Deep and intensive development-work was undertaken and the company got into debt. During the period, however, Sally Mines paid on its option by way of royalties \$54,000 from ore returns. Purchase of the property was completed by Sally Mines, Limited, in 1932, by which company the property is now owned and operated. Production figures from 1919 to 1928 show the *Sally* to have shipped 4,004.5 tons of silver ore, which produced 1,162,688 oz. silver, or an average of 290.5 oz. per ton.

The property has been mentioned in the following Annual Reports: 1900 and 1901, 1903 to 1906, 1908 and 1909, 1913 to 1918, 1920 to 1933.

No up-to-date map of the surface and underground workings is on hand, but several thousand feet of development and exploration work has been done on several shear-zones occurring in the area covered by the claims. Most of this work has been carried out on the *Pueblo Fraction* and *Rob Roy*. Development in the lower workings of the *Wellington* uncovered a shear-zone carrying high-grade silver ore striking into the *Sally* ground. This year a 2-compartment vertical shaft, 7 by 11 feet, was sunk 500 feet about 75 feet east of the *Wellington* ground and crosscuts were driven about 90 feet south and 75 feet west. The No. 2 shear-zone, though much faulted to the south-east, was found and is being mined, and two car-loads of ore have been shipped. On the *Rob Roy* the No. 7 vein was explored both by diamond-drilling, adits, and a winze, and eight car-loads of ore were shipped. According to the management, the work done on the No. 7 vein indicates that a considerable tonnage may be found in this section in the future. The ore is averaging about 130 oz. in silver per ton, besides lead and zinc.

A new double-drum hoist and a 50-horse-power Gardner-Denver full Diesel engine were installed at the new shaft.

According to the "statement in lieu of prospectus," this company was formed to take over the holdings of the Canadian American Mines, Limited, and the **Carmi Gold Mines, Ltd.** York Investments, Limited, Vancouver, which in turn bonded the *Butcher Boy, No. 3, No. 2 Fraction*, and a three-quarter interest in the *May* claim, the *Carmi, B.A. Fraction* (part of Lot 1563s), and the *St. Lawrence*, all Crown-granted, and eighteen located claims in the vicinity of the above from the owners, P. B. S. Stanhope, R. D. Kerr, James Kerr, R. Lyman, W. E. McArthur, H. Fritz, and J. E. Miller.

The claims are located a short distance south-west of Carmi, within a quarter of a mile of the Kettle Valley Railway, from which a road has been built. The ground upon which most of the work has been done this year lies on the west side of the West fork of the Kettle river, where the hills slope gently to the east and north, except where Carmi creek and the river have cut deep ravines.

The ore occurs in quartz-filled shear-zones and fractures with free walls in the quartz diorite and Wallace rocks, and theoretically represents a lower horizon of the same shear-zones found on Wallace mountain. Mineralization consists chiefly of pyrite with lesser amounts of galena and sphalerite carrying values in gold and silver.

The property has been reported on in the Annual Reports for 1898, 1900, 1901, 1904, 1906, 1913 to 1916, 1920, 1922, 1932, and 1933. A map of the *Carmi* workings is incorporated in the 1932 Report.

About 109.4 tons of ore containing 68.49 oz. gold and 211.8 oz. silver was shipped to Trail from the *Carmi*, and about 55.55 tons containing 18.275 oz. gold and 90.52 oz. silver from the *Butcher Boy*.

Work done this year consists of driving the west drift to and connecting with the *Butcher Boy* workings and 310 feet beyond, or a total of drifts and crosscuts west of the *Carmi* shaft of 1,390 feet, as well as numerous crosscuts, sinking the main *Carmi* shaft to the 300-foot level, cleaning out and drifting from the shaft near the river, and exploring the *May* claim to the north of the *Butcher Boy*.

Developments to the west of the *Carmi* shaft on this horizon and between the two shafts disclosed only small segregations of ore. The *Butcher Boy* ore-bearing shear-zone splits into stringers on this level, with narrow lenses from 6 inches to 1 foot wide, and "horses" of quartz diorite between. In the *Carmi* shaft, below the 150-foot level, some well-mineralized segregations and bands of ore were found in quartz widths varying from 4 to 7 feet. The management states that some good ore has been found on the floor of the 150-foot level for 265 feet along the east drift. It seems probable that more work will be done under lease, from the shaft under the east drift, to ascertain the value of this ore-shoot. Most of the ore taken from the *Carmi* was mined from above the east 150-foot level.

This syndicate, with headquarters at 312 Pacific Building, Vancouver, bonded **Monashee Mines** seven Crown-granted and five other claims, situated about 47 miles east of **Syndicate, Ltd.** Vernon on Monashee mountain, from the New Monashee Mines (see Annual Report, 1933), as well as staking twelve new locations mostly on Monashee mountain. The writer examined the property in September.

The following construction, installation, and underground work is reported by the managing director, Gordon F. Dickson: The old buildings have been renovated and new ones consist of a log bunk-house with a frame addition, dry-house, cook-house, dining-room addition; office, living-quarters, superintendent's house, barn, warehouse, blacksmith-shop, and engine-room.

Air was first produced by a unit consisting of a Model D-770 caterpillar Diesel engine with 6-cylinder W.B.G. Gardner-Denver 2-stage compressor. This was later sold and a larger unit purchased, consisting of a Fairbanks-Morse 140-horse-power Model 32D14 Diesel engine direct-connected to a 780-foot Sullivan angle compound compressor. Machine-shop equipment consists of lathe, drill-press, and power-emery. Electric power is supplied to machine-shop and powerhouse lighting system by a 7½-kw. alternator with belted exciter, driven by a 7-horse-power Petter Diesel engine. Starting-air for the large Diesel is supplied by a small compressor driven by a 3-horse-power Fairbanks-Morse "Z" type engine. Blacksmithing equipment includes an Ingersoll-Rand oil-furnace, a Gardner-Denver steel-sharpener, drill-press, forge, and general blacksmithing-tools. Mining equipment consists of one R-51 stoper, one L-74 drifter, and four D-79 drifters, together with all general mining tools and accessories.

Development underground has been confined to four adit-levels, three of which are old workings and one new. In each of the old adits considerable work was required in catching up old timbering, cutting the bottom down to grade, and cleaning out drifts and crosscuts. Much of No. 3950 adit was badly caved and had to be driven through and retimbered.

The following advances in workings have been made:—Adit No. 4050 (elevation): Drifting, 532 feet; crosscutting, 125 feet; reopening, 409 feet. Adit No. 3950 (elevation): Drifting, 88 feet; reopening, 390 feet. Adit No. 4150 (elevation): Drifting, 130 feet; crosscutting, 35 feet; reopening, 76 feet. Adit No. 3900 (elevation): Drifting, 82 feet.

The mineralization, as in veins of similar character, occurs in shoots with free walls, and in the total distance there are lengths of quite high-grade ore. There are three faults, all normal, in the length of the working, but in each case the displacement is less than 30 feet and the vein has been picked up by drifting south on the faults. At present we are continuing the highest adit, No. 4150; the new lowest, No. 3900; and are putting a raise from No. 4050 to 4150. As soon as this raise is through, No. 4050 adit will be extended on the vein into the mountain.

A crew of about twenty men has been employed.

PLACER-MINING.

Rock Creek Area.

The Rock Creek Consolidated Placers, a holding company of Penticton and Greenwood, optioned their holdings (*see* Annual Reports, 1930 to 1933) to Porter and Condit, 522 Old National Bank Building, Spokane, Wash.

A ditch approximately 1,600 feet long, 20 feet wide, and 25 feet deep was dug by a 1¼-yard drag-line shovel from the road crossing up-stream. Besides this, numerous test-pits were dug and an old Star churn-drill was used to put down three holes between the end of the ditch and White's bar, a distance of approximately 1,800 feet. In the first hole bed-rock was encountered at 42 feet. The other holes failed to reach bottom owing chiefly to an accumulation of boulders. Only fine gold was recovered from the ditch and the drill-sludge.

As White's bar and other bars in the creek produced a large quantity of coarse gold in former years, it seems probable that the "pay-streak" follows some other course than that cut by the present channel. Exploration along the banks of the creek in the vicinity of the old worked-out bars may be recommended.

On the Sixty Six placer-ground, one lease below the above, Lynch Bros., of Seattle, built a small plank dam, installed a pump, and hydraulicked a 50- by 100-foot section of gravel 6 feet deep on bed-rock at the entrance of the canyon, which returned about 65 cents a cubic yard. A drain 300 feet long dug to bed-rock in the canyon produced no gold.

On lease No. 98, owned by M. D. Kinney, good "pay" was sluiced from a section of ground about 90 by 30 by 21 feet deep on a point on the east side and about 33 feet above the present McKinney creek, by using a Chevrolet engine and high-pressure gasoline-pump and hose.

A section of the pit is as follows: Surface soil 2 feet, 6 feet of glacial gravel (fine gold colours), 8 feet of fine gravel and broken clay (18 cents a pan), 4 feet of red sand in and under which coarse gold is found, 1 foot of clay which forms false bed-rock, and 5 feet of barren gravel on granite bed-rock. An estimate of values by the owner is stated to be 40 cents per cubic yard.

For several miles up-stream in the same creek comparatively coarse gold has been panned by individual miners. As prospecting proceeds up the creek the gold becomes heavier and rough-edged, which suggests that its source is not far distant. On Rock creek proper, about a mile up-stream from its confluence with Jolly creek, a considerable amount of gold was taken from a high-channel rim on the north side of the creek.

Porter and Condit.—From the mouth of Rock creek up-stream for several miles, placer leases on both sides have been staked and optioned by Porter and Condit, 522 Old National Bank Building, Spokane, Wash.

In the early autumn tests on a large scale, by means of short drifts from 15 to 50 feet long, pits, and shafts, were carried on with the result, according to the owners, that between 2,000,000 and 3,000,000 cubic yards of gravel have been outlined containing values varying from 12 to 45 cents a cubic yard in the top gravel and about \$1 a cubic yard on bed-rock.

A by-pass dam, intake, and a 7- by 7- by 14-foot penstock have been built 3 miles up the creek. From this, 500 feet of 30-inch, followed by 5,000 feet of 26-inch, 3,000 feet of 24-inch, and 10,000 feet of 22- and 20-inch metal pipe has been laid to a No. 5 giant, giving a total head of 257 feet. The sluice-boxes will be 36 inches wide, holding 45-lb. cross-rails spaced 1 inch apart, with bottoms up. Operations will commence as soon as weather conditions permit.

Boundary Creek.

Boundary Creek Mining Co., Ltd.—This private company continued operations on the Dr. Lang leases on Boundary creek, a few miles up-stream from Midway. A 1-cubic-yard Marian shovel, moving between 200 and 250 cubic yards of gravel in eight hours, is being used and the gravel hauled a quarter of a mile to the sluice-boxes by two 2½-ton Federal trucks. A cut has been dug about 30 feet wide and 200 feet long, and, according to the owners, good "pay" has been recovered. A high rib of porphyry over 150 feet wide is exposed at the north end of the cut. Coarse gold was found in a shaft a short distance beyond the porphyry. About twenty men are employed under the superintendency of Thomas E. McElroy. Work was discontinued in the autumn.

OSOYOOS MINING DIVISION.

(See Annual Reports for 1913, 1927, 1928, and 1930 to 1933, under *Dividend-Osoyoos Mines, Lakeview*.) This company continued exploration upon the *Dividend-Lakeview* group of claims at Osoyoos. During the year the following development was carried out: On the *Dividend* (see map, 1932) No. 1 adit east was extended to the bluff outside, and some ore stoped above the level. No. 1 west was driven ahead, with crosscuts at about 100 feet. No. 2 level was driven 45 feet east, with a north-east crosscut 55 feet long to the surface. No. 2 west was driven 110 feet in a south-westerly direction, with a branch working 40 feet long to the north-west. Some diamond-drilling was done south from No. 2 level. On the *Lakeview* the lower level was cleaned out and retimbered. On the *Little Manx* the upper adit has been driven ahead a few feet.

Construction consists of two bunk-houses, housing twelve men; dining-room; office with sleeping accommodation for two; assay office, built on top of a 10,000-gallon concrete water-tank; and blacksmith-shop. Roads were built to the *Little Manx* and *Lakeview* lower adits.

New machinery comprises an Ingersoll-Rand 10- by 8-inch, type 20 portable gasoline compressor, a steel sharpener and temperer, a 2½- by 4-inch duplex pump driven by a Stover gas-engine at the irrigation-flume below, and 3,000 feet of pipe to the camp. A 40-foot well was sunk on the *Lakeview* and a small typhoon hand-pump installed.

Developments on the *Dividend* have indicated a considerable tonnage of ore averaging on No. 1 level 0.676 oz. gold per ton, and in No. 2 level 0.20 oz. gold per ton, as well as two undeveloped diamond-drill sections from No. 2 east drift south, of 1.70 oz. and 4 oz. gold per ton over 11- and 4-foot widths. In the east side of the mine, according to information obtained from drill-holes, the mineralized beds roll and dip slightly to the south, whereas the upper ore-zones dip to the north. It also appears probable that the central section of ore between the east and west workings has been faulted, dropped, and moved south. This will account for the lack of ore in the shaft and old lower workings. In the westerly drifts, which have been extended farther south than the easterly workings, some attractive ore has been discovered.

In the *Manx* adit 5-foot widths near the face carry 0.33 oz. gold per ton. In the *Lakeview* upper adit a section 4 feet wide and 20 feet long averages 0.338 oz. gold per ton, as well as a very large possible ore-zone indicated in the east crosscut of 0.078 oz. gold per ton, and in the west crosscuts of 0.205 oz. gold per ton. J. O. Howells is superintendent.

(See Annual Reports, 1920, 1923, 1924, 1927, 1928, 1930 to 1933.) In the **Morning Star (Fairview) Gold Mines, Ltd.** spring, R. L. Clothier, former managing director, resigned, and his place was taken by John D. Galloway. Later C. C. Camp took charge, with Robert Clark acting as consulting engineer. All outside work was stopped and development confined to the underground workings, as follows: Total length to date of No. 1 level north of shaft, 990 feet; south, 892 feet to the surface. No. 2 level north of shaft, 554 feet; south, 186 feet. On the east vein 176 feet of drifting has been done from the intersection of the crosscut from the west vein. Altogether about 1,100 feet of raising and 550 feet of crosscutting has been accomplished.

The first ore-body commences about 50 feet north of the shaft on the 101 level and extends for 145 feet along the drift, having an average width of 4.5 feet and value, based on ore shipped, of 0.63 oz. gold per ton. The third shoot, 320 feet north of the shaft, is 12 feet long, having an average width of 5 feet and value of 0.25 oz. gold per ton. The fourth ore-body is 540 feet north of the shaft, has an indicated length of 100 feet, width of 4.5 feet, and averages 1 oz. gold per ton. This is possibly the top of an ore-shoot because the values decreased when a raise was put up. The fifth shoot, 820 feet north of the shaft, is 44 feet long, 13 feet wide, and averages 0.37 oz. gold per ton. Some samples across the face assayed 2 oz. gold per ton. The sixth shoot is of unknown length, with the face still in ore, width 6 feet, and face samples assaying 1.16 oz. gold per ton. South of the shaft the second ore-body commences 65 feet and, extending for 175 feet, has an average width of 3.8 feet and value of 0.65 oz. gold per ton. All the walls are free. Three car-loads comprising 173.9 tons shipped from this shoot returned: Gold, 1.155 oz. per ton; silver, 1.10 oz. per ton.

The *Stemwinder* mine was unwatered down to the 500-foot level, and according to the *Morning Star* authorities, although large and persistent quartz veins are exposed in the old workings, only low values were found. For this reason the option on the *Stemwinder* group,

including the *Stemwinder*, *Brown Bear*, *Wynne M.*, *Stemset*, *Gunsite*, *Peter*, and *Peter No. 1*, owned by the Federal Mining Company, was relinquished.

Several theories regarding the genesis of the ore-bodies have been put forward, but to date no clear solution of the problem is forthcoming. It appears probable that there have been two definite periods in which quartz was injected into the shear-zones—one, pure white in colour accompanied with comparatively little sulphide mineralization; the other, more transparent, which came later, containing gold, galena, pyrite, and sphalerite. The latter are found only in certain sections where stresses produced intense fracturing in the schistose quartzite and evidently permitted the circulation of mineral-bearing solutions. The ore-bodies occur close along the east contact of the granite and are generally associated with aplite and dacite-porphry dykes or apophyses from the granite. A theory offered by R. Clarke is that there is a possibility of the west vein having been split on its downward extension, and that the foot-wall branch, which is ore-bearing, may still lie under the shaft or to the west and parallel to the No. 2 level.

During 1934, 2,664.3 dry tons of ore was shipped to the smelter at Trail, having a weighted average gold content of 0.55 oz. per ton. The silver and gold ratio averaged about 2.5 to 1. Most of the ore was taken from No. 1 and No. 2 ore-bodies.

(See Annual Reports, 1933; under *Flora*, 1899 to 1901.) During 1934 a crosscut was driven about 45 feet long in a north-easterly direction from the end of the *Flora* lower adit and, intersecting the main vein at 25 feet, crossed it for a distance of 20 feet. From this point a working was driven 350 feet in a south-easterly direction, with crosscuts across the vein to the north-east at intervals of about 25 feet for 150 feet, and from this point, where the vein passed into the foot-wall of the workings, two crosscuts were driven across the vein at 255 and 300 feet in a south-westerly direction. From the point at which the crosscut intersected the vein a 25-foot drift was driven north-west in the foot-wall. Following this work, the old *Flora* lower adit was extended about 70 feet, where the vein was again intersected and drifted on, with intervening sections in country-rock due to faulting, for 360 feet, where two branch workings were driven north-westerly, each about 180 feet long, in much-disturbed ground. Four crosscuts were driven north-east from the south-east branch, two of which connected with the other drift. In the main drift seven crosscuts have been driven at intervals across the vein.

Besides bending to the south-east, two major faults have displaced the vein in the same direction for distances of 15 and 20 feet respectively. For a distance of approximately 240 feet between these faults the vein averages about 35 feet in width. To the north-west and south-east beyond the faults the vein splits and the two strands in the latter direction represent the veins in the *Flora* adit and in the south-east drift. The north-west branches are wider and in one place measure 45 feet across the vein.

Construction and equipment are as follows: A double-decked bunk-house, office, blacksmith-shop, and engine-room. A 240-foot portable Sullivan compressor was used temporarily, and was later replaced by a 790-foot Gardner-Denver machine, electrically driven. A Sullivan steel-sharpener and oil-forge are used in the blacksmith-shop. A new power-line has been built 11,685 feet long from Oliver to the mine by the West Kootenay Power Company. The cost of this line is temporarily paid for by the mining company. In the mine a 10-inch blower vent-pipe has been installed for ventilation.

(See Annual Reports, 1913, 1915, 1922, 1923, 1932.) This group, consisting of the *Susie*, *Oakville*, *Federal*, *Banker*, *Agricola*, *Grey Gables*, and *Tres Hermanos*, all Crown-granted, and owned by the Federal Mining Company, Wallace, Idaho, is situated 2½ miles north-east of the Fairview Amalgamated property.

Development-work done in the past consists of numerous open-cuts, shallow shafts, as well as a 215-foot inclined shaft, from which drifts and crosscuts have been driven in northerly and southerly directions, totalling 1,335 feet on the *Susie* and on the *Federal* an adit 130 feet long. Twelve diamond-drill holes have been bored on the property.

This year an 850-foot (?) crosscut adit was commenced by contract near the upper Fairview road on the *Tres Hermanos* claim, and driven about 500 feet towards its objective, to intersect the downward extension of the *Susie* vein about 600 feet below the collar of the shaft, or 400 feet below the main level.

The *Susie* vein, striking west of north and dipping from 25 to 30 degrees to the east, is a quartz-filled fissure from 4 to 40 feet wide containing pyrite, galena, and sphalerite, in the Oliver granite. Sufficiently encouraging gold and silver values are reported as occurring in certain sections to warrant the development outlined above.

Viking Gold Mines, Ltd. This company, with an authorized capital of 3,000,000 shares of no par value, and head offices at 712 Standard Bank Building, Vancouver; acquired the *Viking* group of claims, held on location, situated about 15 miles south-west of Penticton, and the *Torres* group of twenty-one claims located approximately 7 miles north-east of Cawston. A considerable amount of trenching and open-cutting was done on the *Viking* group, which adjoins the Twin Lakes claims, and also on the *Torres*, with the result that the company decided to concentrate their efforts upon the latter, where two well-mineralized quartz fissure-veins with free walls, varying from 4 inches to 6 feet in width and striking north-west, have been uncovered in the granite.

In the late summer a 50-horse-power Petter Diesel engine driving a 325-cubic-foot Gardner-Denver compressor were installed and an office built. An adit 610 feet long, with 90- and 50-foot crosscuts south and north respectively, were driven, as well as stripping and open-cutting the vein for about 1,000 feet.

Except near the mouth of the adit and in occasional segregations, the values are low throughout the workings. About December 23rd a 3-inch vein was struck in the foot-wall face of the adit, two samples of which assayed: Gold, 2.92 oz. per ton; silver, 24.5 oz. per ton; and 6 oz. gold per ton. Further development has not, as yet, disclosed the potentiality of this discovery, but similar occurrences of high-grade mineralization generally accompany the ore-bodies in other parts of this area.

The assumption that the quartz vein had passed from the granite into the schistose quartzite is erroneous, and probably due to the fact that the country-rocks are considerably schisted in the vicinity of the veins.

(See Annual Reports, 1933, and under *Tiger* for 1928, 1930, and 1931.) This **Mak Siccar Gold Mines, Ltd.** company, with headquarters at 124 Pacific Building, Vancouver, operated its property on Manery creek, below Similkameen Station, throughout the year with a crew of ten men. The 3,750-foot adit on the *Buller* claim was driven a total distance of 700 feet, and a crosscut 106 feet long from the 4,100-foot level, in an endeavour to intersect the downward extension of the ore-body indicated in No. 1 adit above, and from which a shipment of 2 tons containing 1.83 oz. gold per ton and 1 oz. silver per ton was made.

The ore, consisting of pyrite and lesser amounts of chalcopyrite in quartz, occurs in certain favourable zones along the schisted contact of the diorite and greenstone rocks. Numerous slightly mineralized quartz-filled fractures strike in every direction through the diorite.

An 8 by 6, 220-cubic-foot portable Ingersoll-Rand compressor and engine were installed and a camp built near the workings, consisting of log bunk-house and cook-house. A very steep 6-foot-wide road was constructed 1½ miles long between the property and the foot of the mountain.

(See Annual Reports for 1932 and 1933; *Oro Fino* and *Independence* in Annual Reports for 1896, 1898, 1920, 1922, 1923, 1930, and 1931.) This **Grandoro Mines, Ltd.** company, with a capitalization of 2,500,000 shares of no par value, and head office at 102-06 Pacific Building, Vancouver, acquired the assets of the Grandoro Mining and Milling Company's property, consisting of the *Oro Fino* and *Independence*, both Crown-granted, and twenty-five other claims on Oro Fino mountain, about 25 miles by road south-west of Penticton.

This year the *Oro Fino* winze was sunk to the 150-foot level and drifts were driven 250 feet east and 200 feet west, with crosscuts from the west drift 50 feet each way. On the *Independence* a 40-foot crosscut was driven south from the main adit and the vein drifted on for 50 feet east.

The *Oro Fino* winze 150-foot level east followed the vein, though low grade, for its entire length. In the west drift only a 50-foot length of quartz was found. Crosscuts north and south failed to pick up the faulted extension. About 2½ feet of ore 50 feet long was found in the drift from the crosscut from the main *Independence* adit.

Arrangements are being made to truck the Grandoro ore, of which the management estimates there is 10,000 tons, averaging 0.50 oz. gold per ton, to the Twin Lakes mill, which lies about three-quarters of a mile distant below the *Independence* adit.

(See Annual Report for 1933, and under *Huntsman* and *Juniper*, 1924, 1933; **Twin Lakes Gold Summit Section**, 1928; B.E. Mining Company, 1929 to 1931; *Parvenue Mines, Mining Co., Ltd.* 1932.) This year the "mill" adit was driven a total distance of 900 feet.

The *Summit* inclined shaft was sunk a total length of about 250 feet and drifts driven 100 feet north-east and 160 feet south-west from it. Connections were made from the south-west end with an inclined shaft situated 140 feet south-west of the main incline.

A complex condition of normal and reverse faulting from the bottom of the main inclined shaft north-west hindered successful mining. Most of the ore shipped and milled was taken from above the south-west drift. On the *Alice* claims, situated about 600 feet south of the *Summit* workings, a shaft was sunk 36 feet on a 5-foot quartz vein. About 1,000 feet of diamond-drilling was done in various parts of the mine and more ore indicated. The 40-ton-capacity mill flow-sheet, which treated 35 tons a day, consists of: 100-ton coarse-ore bin; 9 by 6 Blake-type jaw-crusher; 50-ton fine-ore bin; Bryan-type high-speed Chile mill; 5-foot-diameter amalgamation-plates having a total area of 64 feet; blankets having an 80-foot area; two Wilfley tables; blankets and thickener. The underflow from the blankets is tailings; the overflow returns to the Bryan mill. Power equipment consists of a 90-horse-power semi-Diesel engine driving a single-stage 420-cubic-foot compressor, a 50-horse-power semi-Diesel that drives a 35-k.v.a. generator, and a 25-horse-power Diesel driving the mill. The mine-hoist is a 15-horse-power motor-driven winch.

The mine closed down in the early winter after shipping about \$50,000 worth of bullion and gold-bearing concentrates. It is understood that a lease has been taken on the property by the Grandoro Mines, and arrangements have been made to operate both properties under one management.

Empire.

This group, consisting of the *Empire* (Crown-granted), *Standard*, *Monarch*, and others, and situated about 1½ miles directly north-west of Oliver and 9,000 feet south-east of the *Susie* mine, is controlled by a syndicate under the direction of A. M. Whiteside, K.C., 930 Rogers Building, Vancouver. The property can be reached by motor-road 5 miles in length from Oliver. The main Provincial highway passes 4,000 feet to the east and 400 feet below the *Empire* workings. The Canadian Pacific Railway branch line from Oliver to Penticton is about 5,000 feet to the east. The West Kootenay Power Company's electric line passes through the *Empire* claim. Water, though scarce on the claims, can be obtained from the Okanagan river, about a mile to the east.

Two or more roughly parallel quartz veins, with free walls, varying from 1½ to 4½ feet wide, strike north-westerly, dip nearly perpendicular, occur in fissures in the Oliver granite. Mineralization consists of pyrite, galena, sphalerite, and occasionally chalcopyrite in a gangue of quartz. Samples indicating values assayed from 0.10 oz. gold per ton and 3 oz. silver per ton to 1.70 oz. gold per ton and 6 oz. silver per ton over widths varying between 2 and 4 feet. Development by means of a 25-foot shaft and four open-cuts has been done over a distance of 600 feet on the *Empire* claim. On the *Standard*, which lies roughly 1,500 feet west of the *Empire*, a 40-foot open-cut has uncovered a quartz vein mineralized with pyrite and galena, measuring 18 inches at the top and 2½ feet at the bottom of the cut. This vein has been traced spasmodically for 200 feet. Other open-cuts and shafts have been sunk in various locations where quartz veins outcrop.

The mineralization is similar to that found in the *Susie* and *Morning Star* mines, and appears to warrant further exploration.

FAIRVIEW SECTION (GENERAL).

A considerable amount of prospecting by means of trenching, open-cutting, and sinking has been done on various quartz-vein systems on the following claims throughout the area lying between the Okanagan and Similkameen rivers and north of Osoyoos lake, and some interesting discoveries made: The *Gipsy No. 1*, *Dorothea*, *Macawber*, *Moltka*, *Hecla*, and *Rhone Fraction* group, adjoining the Osoyoos Mines, Limited, and owned by P. Simpson *et al.*, of Oliver and Osoyoos; the *Orlando*, *Bill*, and *May* groups, adjoining the Mak Siccar mine on the east and

owned by M. O. Heaps *et al.*, of Penticton; the *Waukesha*, *Dark Horse*, *Nancy* groups, located in the east end of Richter pass and owned by Roy Jardine *et al.*, of Oliver; the *Gertrude*, *Sunrise*, *Swan* group, 7 miles south of Oliver, owned by R. Jardine, Oliver; the *Challenger* group, near the mouth of Testalinda creek, owned by A. Carmichael and W. Dalrymple, Oliver; the *Good Hope* group, 1½ miles north-east of the *Stemwinder*, owned by H. Davies, Oliver; the *Wildcat* group, adjoining the *Good Hope* on the north-west, owned by W. H. McLean, Penticton, and A. R. Phelps, Oliver; the *Junction* group, north-east of the *Good Hope*, owned by Alan Roadhouse and associates, Penticton. The *Monarch* and *Miraculous* groups, adjoining the Grandoro Mines on the south are owned by Wm. Long and associates, of Penticton. The *Oliver* claim, adjoining the *Susie* on the north, is owned by A. Carmichael *et al.*, of Oliver.

PAUL CREEK SECTION.

Paul creek, draining an area about 12 miles long by 6 miles wide, flows into the Similkameen river from the south-west about 9 miles south-east of Hedley. The upper part of the creek drains an area of well-rounded generally glaciated summits rising to elevations of nearly 7,000 feet. It flows in a wide U-shaped valley to about 4 miles above its mouth, where the grade steepens and it enters a deep and narrow gorge. In this belt Paul creek and its numerous tributaries have cut deep and narrow ravines, especially in the neighbourhood of its confluence with the Similkameen river, where the hills rise abruptly from an elevation of 2,000 to 4,000 feet in 1½ miles.

The general geology of the north-east section is represented by numerous, large, highly altered remnants of sedimentary rocks similar to those on Nickel Plate mountain, composed chiefly of limestone, thinly bedded argillites, interbedded volcanics, and occasionally quartzite. This series is deeply folded, dipping from 15 to 90 degrees, and strikes in various directions according to displacement. These rocks are intruded by dykes and dyke-like masses of granite, granodiorite, diorite and augite diorite, and quartz porphyry. Most of the outcrops observed consist of highly altered fine-grained sediments with garnetite and epidote, and impregnated with pyrite, massive and disseminated arsenopyrite, pyrrhotite, and lesser amounts of chalcopyrite, chiefly along or near the intrusive rock-contacts. The south-eastern flank of this area is almost entirely underlain with volcanic rocks in which certain fractured sections are highly pyritized.

Commencing at a point about 1 mile west of the junction of the Ashnola and Similkameen rivers, and stretching in a semicircle to a point slightly south of Johns creek, several groups of claims have been staked, as follows: *Shamrock*, *Snow Shoe*, *Confederation*, *Arrawana*, *Lost Horse*, and *Speculator*.

On the *Shamrock* numerous quartz veins have been uncovered cutting at right angles a porphyritic granite dyke about 20 feet wide. Along the contact and for 2 feet on either side of these veins the dyke has been highly fractured and replaced to some extent by quartz, pyrite, and arsenopyrite. In the 50-foot crosscut (not examined), driven 30 feet below an open-cut at the lower end of the dyke-outcrop, four quartz veins with altered frozen contacts, and varying from 6 inches to 1 foot in width, are reported to have been intersected. Samples of the mineralized zones are being assayed.

On the *Confederation*, *Arrawana*, *Snow Shoe*, and *Lost Horse* groups only preliminary prospecting has been done on several outcrops of highly altered limestone impregnated chiefly with arsenopyrite. On the *Speculator* group, which lies in the extreme north-west point of the area described, a considerable amount of exploration has been done by means of stripping and open-cutting the different mineralized outcrops, especially on the *Jumbo No. 1* and *Speculator* claims.

No systematic sampling was done as none of the workings have penetrated below the zone of oxidation. Spasmodic samples, however, indicated gold and silver values associated with arsenopyrite.

The general geology of the Paul Creek section is similar in many respects to that of Nickel Plate mountain, Hedley area, from which much gold has been mined, and therefore appears to warrant extensive exploration.

(See Annual Reports, 1933, and under Hedley Gold Mining Company for 1917 to 1919, 1923, 1927, 1929, and 1930. Also Geological Survey Memoir No. 2, Kelowna Exploration Co. 1910, and Summary Report, 1929, Part A.) Since taking over this property from the Hedley Gold Mining Company in July, 1933, crosscutting, drifting,

and diamond-drilling indicated and proved sufficient additional tonnage in the upper part of the mine to that already blocked out to warrant continuing the operation.

The following constitutes the amount of work done during 1934: In the mine, crosscutting and drifting on No. 4 level, 253 feet; on No. 4½ level, 720 feet; on No. 5 level, 1,060 feet; and on No. 6 level, 890 feet. A total of 2,781 feet of diamond-drilling was done in various sections. Hoisting-cables were renewed and preparations made for converting the air-hoist to electrical control. The high-tension line to the mine was overhauled and new transformers installed. The average number of men working in the mine and on the surface was twenty-seven.

The mill was overhauled, reconditioned, and practically all the foundation timbers renewed and necessary replacements of equipment made.

Pilot-milling operations started on December 1st, and 2,865 dry tons of ore was cyanided, followed by concentration, during the month. Concentrates were reground and cyanided.

The tramway between the mine and mill was repaired. Cables were found to be satisfactory and were not replaced.

The dam across the Similkameen river was repaired and a new wing-dam built on the east side as well as a new intake. By means of the latter the water enters the flume from the bottom of the river. A boiler installed at the intake transmits steam into the water at the intake, thereby eliminating freezing conditions. The 3-mile flume from the dam to the forebay was completely overhauled, relined, and covered for protection against frost. Booms were floated to prevent ice from entering the forebay. The average number of men employed at the mill and power plant, etc., was thirty-six. W. C. Douglass is manager for the company.

(See Annual Report, 1931.) This company, with headquarters at 327 Seymour

Hedley Mascot Street, Vancouver, was formed to acquire the *Mascot Fraction, Copper Chief, Gold Mines, Ltd. Nick of Time*, and thirty-one other Crown-granted claims, all located in a group to the west and south of Nickel Plate mountain. The *Mascot Fraction*, formerly owned by Dunc. Woods, contains 17.2 acres lying in the lower centre of the Kelowna Exploration Company's ore-bodies. The new company has confined its explorations by diamond-drilling to this fraction, and up to the present 244,000 tons averaging 0.48 oz. gold per ton is indicated, as well as 56,000 tons of lower-grade ore which may be profitably mined and milled in conjunction with the higher-grade material.

The Hedley Gold Mining Company, which owned the ground above and below the *Mascot Fraction*, drove a crosscut through it and mined ore on each side, so that the tonnage left in the fraction is practically "blocked out."

Plans are materializing to mine this ore by gravity, build a mill and tram-line, and commence production about August, 1935.

(See Annual Reports under *Whirlwind-Peggy* group, 1921, 1923, 1926, 1928 to

Hedley Amalgamated Gold Mines. 1932; and under *Stemwinder Mountain Mines*, 1933.) This company, with headquarters at 417 Stock Exchange Building, Vancouver, and capitalized for 3,000,000 shares, 50 cents par value, was formed to take over the holdings of the *Stemwinder Mountain Mines* on *Stemwinder* mountain, about 2 miles north-west of Hedley, as follows: Seven claims and one fraction, including the *Whirlwind, Peggy, Cyclone*, most of which are located on Indian Reserve No. 2.

The location of these claims, on the north-east slope, centre, and south-west slope of *Stemwinder* mountain, permits economical exploration by means of adits. At present the workings are reached by a narrow road about a mile long up the south-west slope, and from thence a "go-devil" trail three-quarters of a mile to the camp. If developments on the north-east slope justify it, the old road up 20-Mile creek could be reconstructed.

The core of *Stemwinder* mountain is diorite-flanked on either slope by a series of folded limestone-beds similar to those on *Nickel Plate* mountain. The limestones are intruded by tongues of diorite, andesite, and gabbro dykes. The sediments are metamorphosed and often highly altered to epidote and garnetite, and in certain strata heavily impregnated with arsenopyrite and pyrite. As found in other parts of the area, the gold values occur in the arsenopyrite, chiefly along the contacts of the gabbro or diorite tongues.

Development-work consists of extending the "Red tunnel" on the *Whirlwind* a total distance of 335 feet in a northerly direction, with two branch drifts, 77 and 100 feet respectively, along the comparatively flat mineralized beds to the east, and two winzes, 35 and 14 feet deep respectively, to the west, where the beds fold steeply. A raise 32 feet to the surface was put up from

the 77-foot working. Besides several open-cuts, some diamond-drilling was done in former years which indicated a continuance of the mineralized beds to the north and east. On the *Cyclone* claim, which covers part of the north-east slope, the upper adit was extended about 30 feet, with workings to the contact of the sediments and diorite. A new adit was started 100 feet north-west and 50 feet lower to determine the attitude of the beds in that direction. About 800 feet north-east and 300 feet lower a 15-foot open-cut was put in on an outcrop of pyrrhotite and arsenopyrite.

In the workings on the *Whirlwind* numerous narrow tongues of diorite and also one gabbro dyke have intruded the sediments in the vicinity of the mineralized beds. Up to the present the mineralized widths have varied considerably between 6 inches and 6 feet and are made up of bands of quartz containing arsenopyrite and pyrite with interbanded oxidized gangue-matter. In the winze, near the north-west face, the management states that about 14 feet of highly garnetized limestone has been found impregnated with arsenopyrite. Near the mouth of the *Cyclone* adit some high-grade ore has been found in the limestone remnants close to the diorite-contact. Some picked samples from the open-cuts in the pyrrhotite assayed well in gold, according to the management.

The property has been systematically sampled by the management, Dan McKinnon, and Victor Dolmage, consulting geologist, and the results have shown a considerable variance in gold values. All work done so far has been of an exploratory nature in an attempt to prove the future possibilities of the area.

The highway between Hedley and Princeton, the high-power electric line, and the Similkameen river all pass within 2 miles of the property.

GENERAL.

All that section of the country north of the Similkameen river, lying within a radius of 10 miles of Hedley, from due north to east and south-east, is potential prospecting-ground, especially along the summits and headwaters of Hedley (20-Mile), Shatford, Texas, Keremeos, Cedar and its branches, Olalla, Shoemaker, and Winters (16-Mile) creeks.

Within this belt there are many large altered and well-mineralized remnants of Mesozoic sediments and volcanics associated with the diorite-gabbro rocks and accompanied by pyrite-arsenopyrite mineralization containing, in places, high gold values. Some work has been done in several of these localities, including: The *Golden Zone* (see Annual Report for 1930-31) north of Hedley and owned by Dunc. Woods, Hedley, from which some high values in gold were found across good widths; the *Apex* and *Nelson* groups (see Annual Reports, 1919, 1922, 1924, 1926 to 1928, 1930, 1931 to 1933); *Star of Hope* group at the headwaters of Cedar creek (see Annual Reports, 1904, 1906, 1933); the *Yuniman* group (see Annual Reports, 1929, 1933).

SIMILKAMEEN MINING DIVISION.

(See Annual Reports for 1933 and under *Pollock*, 1909, 1910, and 1913.) This year five diamond-drill holes were bored to a maximum depth of 25 feet below the upper workings and the shear-zone continuity established to that depth, and one flat hole north 65 degrees west to explore the ground in that direction. After this work was done a crosscut adit, 237 feet lower and 410 feet south 20 degrees east of the upper adit, was driven 946 feet north 65 degrees west, with a branch north 20 degrees west 300 feet long. The old *Pine Knot* adit below was cleaned out and a winze commenced on the lead.

The lower crosscut was driven through dark-coloured highly altered banded sediments occasionally intruded by tongues of diorite, diabase dykes, and gabbro. Numerous narrow shear-zones, filled with quartz, calcite, and lesser amounts of pyrite, arsenopyrite, and containing low values in gold and silver, were intersected. The north-west drift coincided with the downward extension of the ore-body found above; hence the reason for deeper exploration.

Seven men are working under the supervision of Frank Dollemore.

This company, with headquarters at 417 Metropolitan Building, Vancouver, **Hedley Gold Hill Mining Co., Ltd.** and a capitalization of 2,000,000 shares, has acquired eight located claims, the *Gold Hill Nos. 1 to 8*, adjoining the Gold Mountain Mines on the south-west and to the west of Henri creek, which flows into the Similkameen river from the south about 2 miles north-west of Hedley. The claims are reached by following the Gold

Mountain Mines road up the west side of Henri creek from the Great Northern Railway, and thence by a steep "zigzag" trail to a tent-camp near the workings on the *Gold Hill No. 1*.

The claims are located within an area of well-rounded glaciated summits between 4,000 and 5,000 feet in elevation, cut by numerous well-timbered ravines and short creek branches which flow into Henri creek on the east and Sterling creek on the west.

The geology of the claims is typical of that found elsewhere in this section and is composed of remnants of Mesozoic sediments, including limestone and volcanic rocks underlain and intruded by diorite and quartz porphyry. The mineralized area upon which most of the work has been done covers, roughly, an area 200 feet square on a dome-shaped hill covered by flat-lying sedimentary beds which are cut off on the south, west, and north by either diorite or andesite, but dip and continue at a low angle to the east towards Henri creek. Mineralization observed consists of pyrite, arsenopyrite, with lesser amounts of sphalerite, galena, and chalcopryite in quartz in alternating frozen bands in the limestone-beds, from a fraction of an inch to 6 inches in width, in a shear-zone about 6 feet wide.

Work done consists of trenching 100 feet and open-cutting 106 feet across the mineralized zone, and a 25-foot adit and 8-foot winze sunk from it.

The whole occurrence is complex both in mineralization and its mode of deposition. The mineral-bearing bands are generally lenticular, superimposed, and much disturbed, with a pyritized siliceous carbonate gangue between. In some instances the limestone is finely crystalline and contains isolated segregations of arsenopyrite, and in others remnants of diorite.

(See Annual Reports, 1933, and under *Patsy*, 1927, 1928, and 1931.) This **Hedley Sterling** company, with headquarters at 318 Pemberton Building, Victoria, and capital-ized for 1,000,000 shares, was formed to take over the property of the Canada

Gold Mines, Ltd. Lode Gold Mines, situated on the east side of Sterling creek, about 2 miles above its junction with the Similkameen river. The claims are located along the east side of the creek where the ground rises abruptly from 2,000 to 4,500 feet elevation within 2 miles. A narrow road leads from the Hedley-Penticton highway up the creek-valley to the lower workings.

The geology of the area consists of Mesozoic sediments and volcanic rocks, striking west of north and dipping steeply to the east. A fine-grained dark-grey dyke-rock containing a considerable amount of calcite occurs along the east contact and has intruded the sediments at the end of the lower adit. This rock is possibly andesite and related to an underlying diorite or gabbro.

Mineralization occurs in four definite, nearly parallel shears with free walls within a distance of 600 feet striking west of north and conforming to the bedding of the sediments. The shears are generally lenticular in shape, both on the strike and dip, and vary from a few inches to 8 feet in width. Within the shears, bands and segregations of pyrite and arsenopyrite from 1 inch to 3 feet in width occur associated with a quartz gangue.

Surface development consists of several open-cuts along the strike of some of the shears within a radius of 200 feet in the vicinity of the main workings. Underground, the No. 3 (elevation 2,599 feet) or upper crosscut adit has been driven about 90 feet; No. 2 crosscut (elevation 2,827 feet), about 20 feet; No. 1 (elevation 2,783 feet), 40 feet, with a winze at the mouth 25 feet deep; No. 0 crosscut (elevation 2,700 feet), 650 feet long, with drifts northerly 130 feet and southerly 34 feet on a shear 75 feet in from the portal. All these crosscut adits have been driven in an easterly direction. No. 3 lies farthest north. No. 2, 80 feet south and 70 feet west of it; No. 1, 15 feet south and 50 feet west of No. 2; and No. 0, in line and 90 feet west of No. 1. Five diamond-drill holes have been bored from a point 150 feet in from the portal of No. 0 adit, as follows: No. 1, 98 feet long, 50 degrees down to the west from the level, passed through the shear at about 70 feet, but due to caving ground the width and values were uncertain. No. 2, 73 feet long, and down 50 degrees to the north-west, cut mineralization containing low values in gold between 28 and 48 feet, followed by 1 foot of arsenopyrite and quartz assaying 0.30 oz. gold per ton. The end of the hole caved before reaching the main shear. No. 3, depth unknown, up 50 degrees to the east, passed through sections of oxidized low-grade ore. No. 4, 78 feet long, up 55 degrees to the north-east, cut 2 feet of ore assaying 0.11 oz. gold per ton between 5 and 7 feet and quartz and pyrite between 49 and 59 feet. The end of the hole caved. No. 5, depth unknown, up 55 degrees to the south-east, cut ore between 4 and 7 feet assaying 0.35 oz. gold per ton and between 18 and 20 feet assaying 0.91 oz. gold per ton and

0.50 oz. silver per ton. All these diamond-drill results have been furnished by the management (Dan McKinnon).

In the No. 0 crosscut numerous narrow highly altered tongues of gabbro have cut the sediments, occurring first 10 feet east of the shear 75 feet in from the portal of the adit, and recurring at intervals up to 50 feet and again at a point 415 feet in. A dark-grey fine-grained dyke, probably andesite, has cut the sediments at 540 feet and continues at intervals for 90 feet. The face of the crosscut is in the sedimentary rocks.

In the drifts north and south at 75 feet in on the No. 0 adit the shear varies in width from 4 to 10 feet and contains bands and segregations of quartz, pyrite, arsenopyrite, and schisted country-rock. A sample across 14 inches of vein-matter containing pyrite and arsenopyrite in the south drift, 15 feet in, assayed: Gold, 0.12 oz. per ton; silver, 0.20 oz. per ton. A picked sample of ore from No. 1 adit winze assayed: Gold, 0.64 oz. per ton; silver, 0.10 oz. per ton. Samples taken by the management in the north drift vary from 0.08 oz. gold per ton to 0.38 oz. gold per ton across widths between 20 inches and 6 feet, with an average width of about 3 feet. A sample taken from a massive piece of ore 18 by 14 inches assayed 0.80 oz. gold per ton.

Future work consisting of diamond-drilling to the east and above No. 0 adit and drifting and raising on the indicated shears will continue in the hope that sufficiently high-grade ore over minable widths may be found in some of the shears. It is evident that the shears pinch and swell both on the strike and dip.

The gabbro in the lower adit may have some structural relation to the mineralization found. Up to the present no contact-metamorphic gangue-minerals have been found in the workings.

(See Annual Reports for 1901, 1905, 1908, and 1933.) This group, owned by

Cousin Jack. J. Osborne, Tulameen, and W. D. Vallance and associates, of Blakeburn, and situated near the headwaters of Smith creek, about 2 miles directly west of Manning, on the Kettle Valley Railway, consists of the *Cousin Jack*, No. 263; *Ymir*, No. 264; *Morning*, No. 265; *Blackbird*, No. 268; *Berlin Fraction*, No. 269, Crown-granted; and the *Wisconsin*, *Florence*, *Canadian Girl*, *Homestead*, *Ottawa*, and *Michigan* claims held on location.

The claims are located on the eastern, well-rounded and timbered slopes of Spearing mountain. A short distance east the hill steepens and cliffs flanked by talus-slopes are of frequent occurrence. To the south-west forest fires have destroyed the virgin timber and second-growth jack-pine and willow cover the area.

The rocks exposed on the claims (see map) consist of chloritic schists of the Tulameen series mentioned in Geological Survey of Canada Memoir No. 36, 1911, which strike generally in a northerly and southerly direction and dip from 15 to 25 degrees westerly. Conforming to the strike and dip of the rocks, two or more parallel quartz veins with free walls occur, varying from 2 inches to 6 feet in width and containing pyrite, galena, and sphalerite.

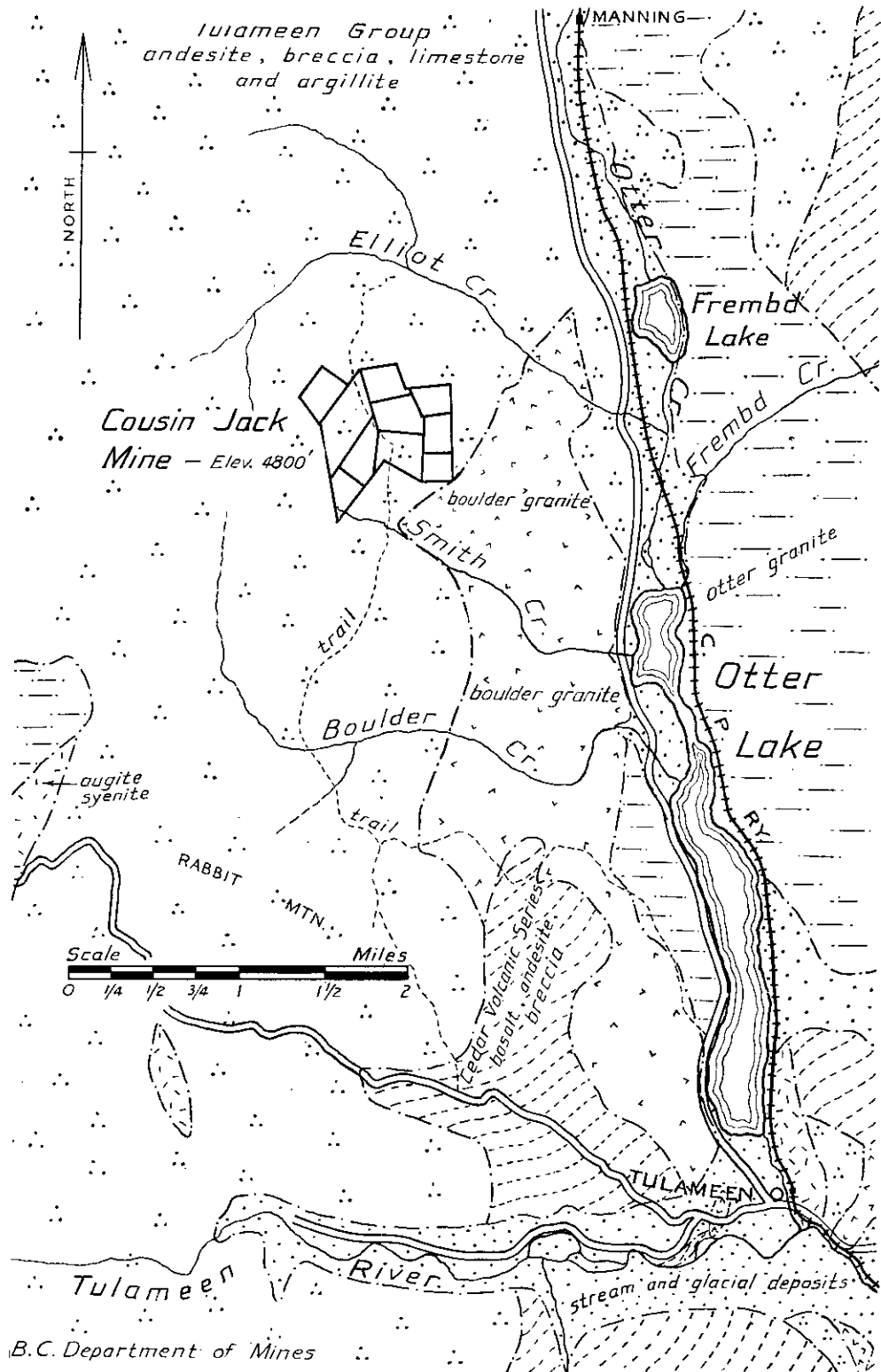
On the surface for about 2,500 feet numerous open-cuts, shallow shafts, and two crosscut adits, 75 and 100 feet long respectively, have been driven along the strike of the veins. On an adjoining claim south and about 1,000 feet from the *Cousin Jack* workings the same vein system has been uncovered by a 100-foot crosscut and 70-foot drift. All the underground workings except the shaft on the *Berlin Fraction* are crosscuts. The flat-dipping schists do not permit drifting on the vein from the surface except to the north.

A general sample of the ore taken from the 75-foot adit on the *Cousin Jack* assayed: Gold, 0.20 oz. per ton; silver, 0.10 oz. per ton; lead, 0.70 per cent. A sample taken across 18 inches of vein-matter at the collar of the *Berlin Fraction* shaft assayed: Gold, 0.20 oz. per ton; silver, 0.50 oz. per ton; as well as lead and zinc.

The general mineralization in the Tulameen series of rocks adjacent to the Otter and Boulder granite and the Eagle granodiorite, which often carries gold as well as base metals, appears to warrant attention.

GENERAL.

A considerable amount of work has been done on the following claims: The *Marathon* group, owned by George Drossos and associates, of Penticton, and situated on the south side of the Similkameen river about 8 miles north-west of Hedley. About six open-cuts and a short adit have been driven on different shear-zones containing pyrite and chalcopyrite in a quartz-feldspar gangue in granite. On the *Dead Deer* group, belonging to the same owner and lying to the south-east and adjoining Smith creek, similar occurrences as those found on the *Marathon*



B.C. Department of Mines

Geology of Part of Tulameen Area from Geological Survey of Canada, Map 46A— showing Location of Cousin Jack Group.

have been uncovered in cuts and short adits. On Raven mountain, which lies approximately 4 miles by trail up Steven creek north-east of Bromley's ranch on the Hedley-Princeton road, two groups of claims have been staked by C. M. Hayward, W. B. Hall, and associates, of Princeton and Coalmont. Open-cuts, shafts, and short adits have been driven in a series of mineralized beds, containing gold, silver, galena, and sphalerite occurring in the Mesozoic banded sediments and volcanics. Samples varied from 0.04 oz. to 0.20 oz. gold per ton and 3 oz. to 36 oz. silver per ton. A picked sample of the better-mineralized quartz from the *Golden Fleece* shaft carried: Lead, 21 per cent.; zinc, 5 per cent.

PLACER-MINING.

International Placers, Ltd.—This company, with headquarters at 716 Hall Building, Vancouver, has been operating the old *Swan* and other leases between Granite creek and the Tulameen river near Coalmont. On the *Swan*, between February and the end of May, 264 feet of drifts were driven, exposing 2,107 square feet of bed-rock, from which 172 oz. 14 dwt. gold and 17 oz. 14 dwt. platinum, including iridium, was recovered. The theory that there is an old glacial-filled channel of Granite creek cutting across towards the Tulameen near Coalmont has long been held, but never seriously explored until this year. Churn-drilling at the Tulameen River end has been in progress, but the results are not known. The distance between the Granite Creek work and the Tulameen is 2,700 feet, having a maximum depth of ground of 300 feet. The bed-rock is slate.

Siwash Gold Placers, Ltd.—(See Annual Reports, 1927, 1933.) This company, with headquarters at 417 Metropolitan Building, Vancouver, and a capitalization of 200,000 shares of 50 cents par value, was formed to work thirteen leases on Siwash creek, which flows into Hayes (5-Mile) creek about 3 miles west of Jellicoe, on the Kettle Valley Railway. The leases are reached by trail 8 miles from Jellicoe. The possibilities of the locality are described in Bulletin No. 1, 1934.

GENERAL.

In previous reports the possibilities of the Tulameen and Similkameen River benches have been mentioned. The higher price for gold may be an incentive for further exploration, especially from Tulameen village up for 6 miles, where broad gravel benches exist on either side of the stream. Test-pits and churn-drilling, chiefly for platinum, by the Munitions Board Commission in 1918 near the mouth of Slate creek proved the existence of that metal, accompanied by gold. (See report for that year.) Lower down, test-pits dug by Guest on the south side of the river indicate commercial values in gold and platinum. Above Slate creek, where the valley closes in and the benches are narrower, hydraulic mining by means of pumps has produced sufficiently high values per yard to warrant more serious exploration by means of churn-drilling. It seems likely that the old river was diverted from its original bed by glacial debris, which in turn is often covered by slopes of talus material. The top sections are low in values, and often thick strata of glacial clay are found covering channel-gravels. The Tulameen river crosses the peridotite and pyroxenite rocks that form part of Olivine and Grasshopper mountains. Platinum in place associated with chromite has been found in small quantities in the former rock in this locality. Bands of platinum in a peridotite matrix have been found in the sluice-boxes. Should sufficiently high values per yard be found in testing operations, hydraulic heads of water may be found in Eagle or Bear creeks, which flow into the Tulameen river from the north. Past operations on both the Tulameen and Similkameen have generally ended in disaster owing to insufficient knowledge of the direction of the old-channel run having been obtained before installing a plant.

NICOLA MINING DIVISION.

(See Annual Reports under *Alameda*, *Thelma*, and *Corona*, 1924 to 1930.)

Sheffield Gold and Silver Mines, Ltd. This company, with an authorized capital of 3,000,000 shares, par value 50 cents, and headquarters at 736 Granville Street, Vancouver, acquired the *Thelma* group of twelve claims, the *Alameda* group of ten claims, and the *Corona* group of four claims located on Swakum mountain, about 8 miles directly north of Nicola, from which a narrow, steep road leads to the property. Unfortunately a fire has destroyed the head-frame and buildings of the main *Thelma* shaft, and the workings

are full of water, so that the latest underground work cannot be examined. The surface exposures in the neighbourhood of the shaft are mostly altered pods of limestone intruded by quartz and feldspar-porphry dykes. The country-rocks on the dump from the shaft showed much brecciated porphyry cemented with quartz and calcite. The *Bernice* shaft, which lies about 400 feet north of the *Thelma* shaft, which is also full of water, is a comparatively new working. The depth of this shaft is said to be 105 feet, with an 18-foot crosscut and drifts from the bottom and from the 65-foot level north and south.

The ore-minerals noticed, associated with the limestone, are pyrite, galena, and sphalerite. New equipment consists of a Petter semi-Diesel "S" type engine and Broomwade compressor (portable).

(See Annual Reports, 1916, 1920, 1927 to 1931, and 1933, with map.) This year, George Shaw, mine superintendent, and Major Moon, manager, resigned, and J. P. MacFadden took charge. New work to November 15th, 1934, consisted of extending the *Enterprise* 320 drift to a total distance of 526 feet southerly; sinking the *Enterprise* winze to a total depth of 236 feet, with a crosscut in the hanging-wall to the vein. Samples of the vein at this point assayed about 0.12 oz. gold per ton and some silver. Drifting 125 feet on the 190-foot level on *Enterprise*; crosscutting from the *Tubal Cain* north drift, total 90 feet, with a drift 50 feet north on what appears to be the intermediate vein; stoping on the Nos. 1, 3, and 4 levels from the *Joshua* shaft, and above the 320-foot and 190-foot levels in the *Enterprise*. The quartz vein in the face of the intermediate (?) vein north contains about 5 feet of quartz slightly mineralized with pyrite, galena, and sphalerite, across which channel samples assayed 0.12 oz. gold per ton.

There are two estimated blocks of ore below the floor of the *Enterprise* 320-foot level consisting of 164 feet assaying: Gold, 0.487 oz. per ton; silver, 10.35 oz. per ton; lead, 3.7 per cent., over a 20-inch width; and 114 feet assaying: Gold, 0.243 oz. per ton; silver, 6.78 oz. per ton; lead, 2.23 per cent., over a 26.7-inch width, which have not been explored except in a small way from the 440-foot level south.

Composite mill-heads averaged about: Gold, 0.17 oz. per ton; silver, 3.07 oz. per ton; with varying amounts of lead. Six shipments of concentrates were made between July 25th, 1934, and October 31st, 1934, and another car-load lot of about 35 tons will probably be shipped before the end of November. The returns from the Trail smelter, less the gold premium, are as follows:—

Shipments, July 25th, 1934, 30.320 dry tons assaying: Gold, 3.4845 oz. per ton; silver, 161.75 oz. per ton; lead, 51.30 per cent.; zinc, 5.2 per cent. Net smelter returns, \$3,920.87.

Shipments, August 14th, 1934, 32.81 dry tons assaying: Gold, 2.897 oz. per ton; silver, 138.9 oz. per ton; lead, 35.80 per cent. Net smelter returns, \$3,379.59.

Shipments, September 11th, 1934, 37.43 dry tons assaying: Gold, 2.856 oz. per ton; silver, 90.4 oz. per ton; lead, 26 per cent. Net returns, \$3,027.53.

Shipments, October 2nd, 1934, 36.20 dry tons assaying: Gold, 2.67 oz. per ton; silver, 81.25 oz. per ton; lead, 26 per cent. Net returns, \$2,627.57.

Shipments, October 16th, 1934, 35.72 dry tons, assaying: Gold, 2.72 oz. per ton; silver, 62.3 oz. per ton; lead, 31.4 per cent. Net returns, \$2,356.45.

Shipments, October 31st, 1934, 12.166 dry tons assaying: Gold, 2.73 oz. per ton; silver, 41.3 oz. per ton; lead, 24.8 per cent. Net returns, \$692.59.

Shipments, October 31st, 1934, 21.6 dry tons assaying: Gold, 2.46 oz. per ton; silver, 52.8 oz. per ton; lead, 29.71 per cent. Net returns, \$1,256.50.

The costs of mining and milling are running about \$4.28 a ton.

The mine was closed down at the end of November.

(See Annual Report, 1933.) Certain Vancouver and Calgary interests, under **Jennie Long**, the superintendency of E. W. Watson, have interested themselves in the *Jennie Long*, Crown-granted, and several adjoining claims situated about 3 miles south-east of Stump lake, on the east side of the Kamloops-Merritt highway at the end of a branch road, and about 35 miles from Kamloops. Title is registered in the name of H. Nelmes, 547 Howe Street, Vancouver. The country surrounding the claims is one of low relief and open, rounded, grassy summits.

Up to the present development has been done on three mineralized veins or fractures in the Nicola series of highly altered, dense, green-coloured volcanic rocks. On the surface these veins strike about westerly, dip northerly, vary from 6 inches to 4½ feet in width, and form a "Z" shape widening at the intersections. Mineralization consists of pyrite, galena, and freibergite in a gangue of quartz.

Surface work consists of numerous open-cuts and trenches along the vein system for a distance of, roughly, 250 feet. Underground development consists of a 90-foot shaft on the main No. 1 south vein, with a crosscut 22 feet long which intersects No. 2 vein. Since examination the management reports underground work as follows: "Drifting on No. 2, 180 feet south and 200 feet north of crosscut from shaft. No. 3 vein north joins No. 2 120 feet north-west of shaft crosscut. No. 3 vein has been drifted on south-east for 100 feet. A 5-foot crosscut has been driven from No. 2 to No. 1 at intersection of No. 3, also a drift south-east on No. 1 towards the shaft. Vein-widths vary from a fracture to 8½ feet, with an indicated average in excess of 20 inches. No. 3 vein differs from the others, being composed of a blue quartz containing freibergite as the principal metalliferous mineral. Selected ore from this vein carried comparatively high values in gold and silver. Preparations are being made to sink No. 1 shaft to 300 feet."

A sample across 4½ feet of quartz in a surface cut 75 feet southerly from the shaft assayed: Gold, 0.20 oz. per ton; silver, 16 oz. per ton. Some galena was present in this sample. Another sample of picked ore from a surface cut on No. 2 vein assayed: Gold, 0.04 oz. per ton; silver, 2.3 oz. per ton; lead, 1 per cent.

Mine equipment is as follows: Gardner-Denver drill-sharpener, oil-furnace, steam-boiler, and 20-horse-power hoist. Power includes 100-horse-power steam-boiler, 12 by 12 Ingersoll-Rand compressor; 90-k.v.a. 2,300-volt generator with 11 by 12 Robb-Armstrong steam-engine; auxiliary electric-lighting plant of 2.5 kilowatts. Entire plant arranged for Pelton wheel driven by 3,000-foot hydro line during high-water season. Wood is used for fuel.

The mill flow-sheet is as follows: Jaw-crusher, cone-crusher, mill-bin, ball-mill, drag-classifier, 4-cell Denver sub-A flotation unit, settling-tank, and steam-drier. A 20-horse-power motor drives the crushing unit, a 40-horse-power motor the ball-mill, and a 20-horse-power motor the flotation unit. Mill capacity is estimated at 35 tons.

(See Annual Reports, 1918, 1919, 1922, 1927 to 1931, and Geological Survey **Mary Reynolds** Report, 1894, by G. M. Dawson.) This company, with headquarters at 919 **Mining Co.** Stock Exchange Building, Vancouver, and a capitalization of 1,500,000 shares of no par value, took over the *Mary Reynolds*, *Gold Cap*, and *Robert Dunsmuir* Crown-granted claims, and the *Troy No. 1* to *Troy No. 10*, inclusive, *Victor*, *Violet*, *Hall*, *Hall No. 1*, *Hall No. 2*, *Hall Fraction*, and *Troy Fraction*, situated about 2 miles by road east of the Kamloops-Merritt highway, at an elevation of about 3,500 feet.

The topography is similar to that surrounding the *Jennie Long*, only slightly more rugged and more heavily timbered. In the geological report for 1894 G. M. Dawson states in part: "The country-rock of the region is almost uniformly a dark-green or grey-green diabase porphyry, in which large uraltite crystals are often conspicuous. There are, however, occasional bands consisting of diabase tuff, well bedded, with others of a fine grey feldspathic rock, also well bedded, and possibly a few layers of fine amphibolite. . . ."

"The vein-matter generally consists of white quartz, containing iron pyrites, copper pyrites, galena, blende, and tetrahedrite, with a varying but on the whole very satisfactory content of silver and gold."

Two shear-zones varying from 2 to 6 feet wide, striking in a northerly direction about 100 feet apart, converging to the north and dipping from perpendicular to 85 degrees west, have been traced for 900 feet.

Most of the workings are in an unfit state for examination, but numerous open-cuts, shafts, and adits have been driven on the shears. Several diamond-drill holes were bored to the west, some of which indicated the southerly continuity of the mineral-zone. Comparatively new work consists of a crosscut 87 feet long driven on the lower drill-hole west, which, when finished, will give 187 feet of backs under the outcrop. Some ore is said to have been shipped from the property in former years.

KAMLOOPS MINING DIVISION.

(See Annual Reports, 1917, 1921 to 1927, 1930, and 1933; also Geological Survey Summary Report, 1921, Part A.) This company's holdings, situated about 10 miles from Chu Chua, on the Canadian National Railway, consist of the *Windpass No. 1*, *No. 2*, and *No. 3*, the *Gott*, *Erin*, *North Dunn*, *Donegal*, *Jupiter*, *Elise*, *Sweet Home*, and other claims. Development done during the year is as follows: On the *Windpass No. 1* the Telluride shaft (see map) was sunk from the third to the fifth level in order to find ore indicated in a diamond-drill hole. No ore was found on the fifth level. No. 3 level was advanced 275 feet to the west on the foot-wall vein and an ore-shoot 70 feet long by 4 feet wide was developed. On the 500-foot level in the Davis winze a 75-foot crosscut was driven in the foot-wall which developed an ore-shoot 35 feet long by 4 feet wide, still continuing and assaying well in gold. This ore constitutes two very high-grade frozen stringers which had impregnated the gangue rock for a distance of 2 feet on each side. The ore had been step-faulted down in the foot-wall of the Davis winze between the fourth and fifth levels, and the winze and fifth level below this horizon were driven in the hanging-wall. On the compressor vein on the *Windpass No. 3* nine open-cuts and a 20-foot shaft have developed similar fractures, containing some values, as those found on the *Windpass No. 1*.

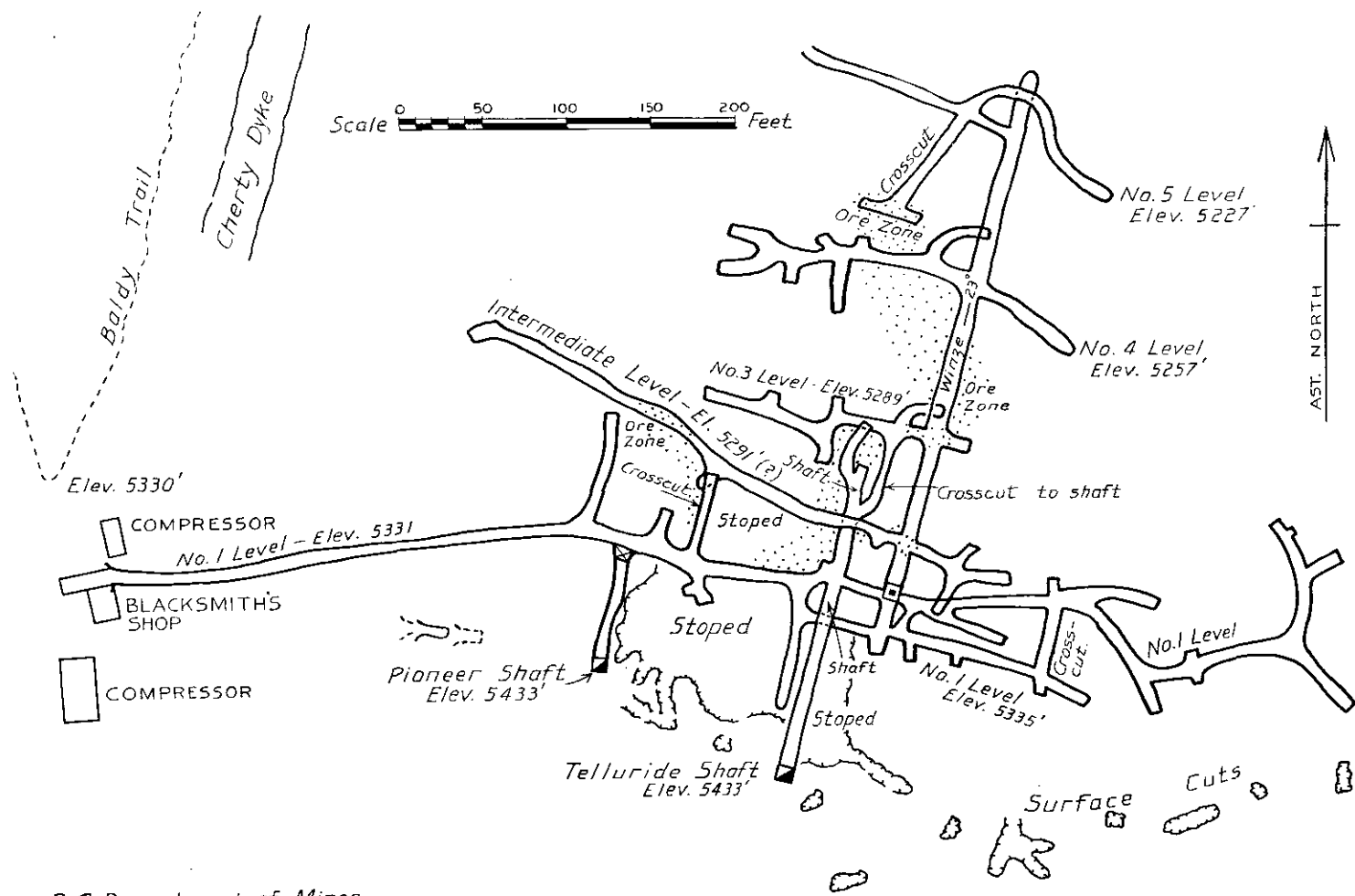
On the *Sweet Home*, 3,000 feet south of the *Windpass No. 1* (elevation 5,433 feet), a crosscut (elevation 4,966 feet) about 350 feet long was driven under the old 120-foot shaft, and the vein drifted on about 350 feet, giving a depth on the dip of 160 feet. An ore-body, 100 feet long and from 3 to 5 feet wide, is indicated containing good values in gold. A raise is being put up on ore east of the old shaft. Preparations are being made to sink the old shaft from the adit-level, with the hoist installed underground. Evidence obtained suggests that good ore has been concentrated where the vein steepens, due to movement along the dip. This vein occurs in a fissure with free walls in diorite. Where it passes into a 60-foot cherty dyke to the west the widths become narrower and the ore becomes lower in grade. Greenstone occurs on the other side of the dyke.

The 50-ton mill has been improved by closing in the jaws of the crusher and relieving the duty of the ball-mill. The flow-sheet is as follows: 15 by 10 Blake crusher, grizzly, 100-ton crushed-ore bin, 6-foot ball-mill, 4-foot ball-mill, classifier, four flotation units, Dorr thickener, and Oliver filter. Tails over two Wilfley tables. Sixty tons of concentrates are being shipped to Tacoma a month. New construction consists of a log cook-house and dining-room at the mine, also new log stable. Electric-light and telephone wires have been connected with the mine. Allan J. Smith is manager and P. W. Racey is consulting engineer.

NORTH THOMPSON RIVER SECTION (GENERAL).

A considerable amount of exploration-work has been done on the following groups of claims on both sides of the river: The *Bendor* group, consisting of nine claims on Dixon creek, 38 miles north of Kamloops, owned by R. M. Reid, R. G. Davis, G. Nelson, *et al.*, of Kamloops. The area is described in the Geological Survey Summary Report, 1921, Part A. Numerous quartz veins from 2 inches to 2 feet wide occur, striking generally east and west and conforming to the bedding of the schists in which they occur. Mineralization observed is pyrite, chalcopyrite, galena, and tetrahedrite. Some free gold was seen in hand specimens. A quantity of placer gold was recovered from Dixon creek below the workings. The *Tyce* group was also staked around the *Bendor* and a syndicate is reported to have been formed to prospect the area. Pyrite, galena, and sphalerite are found in quartz veins conforming to the strike and dip of the schists on the *Empire* and *Bluebird*, owned by R. M. Ballantyne and associates, of Kamloops, situated 1 mile north of Clearwater Station on the Canadian National Railway. The *Polestar* group and *Francis No. 1*, owned by George Mackey, are situated on Jamieson creek, which flows into the North Thompson river from the west. The owners were absent and only those workings along the creek were examined. Two or more quartz veins from 2 inches to 3 feet wide occur, conforming to the strike and dip of the schists and argillites, which have been exposed by the creek. It is understood that wider and better-grade mineralization is found in veins elsewhere on this property, which is mentioned in the Annual Report for 1913.

The *Allies* group, on Tranquille creek, mentioned in the Annual Reports for 1924, 1931, and 1933, was further explored by G. B. Sterrett and associates, of Kamloops, in a westerly



B.C. Department of Mines

Windpass Mine.

direction uphill without finding, up to the present, a continuance of the high-grade gold-ore float discovered near the creek.

The *Goldfield* group, owned by Batchelor & Sons, of Kamloops, and reported on in the Annual Report for 1932, lies about 12 miles north-east of Kamloops, near the South Thompson river, where quartz veins containing gold in pyrite have been developed in the volcanic breccias.

ADAMS PLATEAU SECTION.

(See Annual Reports, 1930 to 1932.) The *King Tut* and other groups of claims were fully reported upon in 1930. Since then exploration-work has continued along the strike of the different mineralized, more or less parallel, bands of sediments which outcrop over the area to the north and north-east in the vicinity of Spillman creek. On the *Donnamore* group, owned by F. McLeod Estate, Salmon Arm, which lies farthest north and occupies the section crossed by the creek, the continuance of the mineral-zones have been discovered and open-cut for 500 feet at an elevation of approximately 2,000 feet lower and about 1 mile distant from the *King Tut* outcrops. The replacement-zones vary from 1 to 5 feet in width and contain galena, pyrite, and sphalerite in a quartz gangue. The continuation of these mineral-zones are found extending beyond the *Donnamore* group and uphill for several thousand feet to the north, but no work has been done. Samples taken assay as follows: No. 1, 8 inches galena mineralization from lowest cut on *Donnamore*: Gold, 0.04 oz. per ton; silver, 23 oz. per ton; lead, 27 per cent.; zinc, 12 per cent. No. 2, 2 feet of pyritized quartz on foot-wall of No. 1: Gold, trace; silver, trace. No. 3, 5-foot sample across altered limestone in second cut 100 feet uphill: Gold, trace; silver, trace. Some lead and zinc were noticed in Nos. 2 and 3 samples, but these metals were not analysed. No. 4, 3-foot sample 500 feet up from lower cut: Gold, trace; silver, 10 oz. per ton; lead, 15 per cent.; zinc, 8 per cent. No. 5, 10 inches of galena mineralization 200 feet up from lowest cut: Gold, trace; silver, 4.4 oz. per ton; lead, 6 per cent.; zinc, 9 per cent.

The future of the *Donnamore* and *King Tut* groups, if combined, appears to lie in the possibility of being able to mine a large tonnage over great vein-lengths which may offset the comparatively narrow widths found up to the present. Mining facilities are excellent and there is plenty of water in Spillman creek for all purposes.

On the *Speedwell* group, owned by John Thornton and associates, of Salmon Arm, many open-cuts, shafts, and short adits have uncovered similar mineralization in similar rocks. On the *Joyce* claim, where the latest work has been done near the intrusion of an andesite dyke, alternating mineralized beds, the widest of which is 8 inches, occur across about 20 feet. Only surface work has been done at present, so that it is too soon to estimate the value of the discovery. This find is comparatively close to the diorite intrusion mentioned in the 1930 Report.

(See Annual Reports under *Lincoln* and *Wallace* for 1927 and 1928.) This **Wallace.** group, consisting of four claims—the *Donald*, *Dal*, *Wal*, and *Lucky Flame*—situated about 9 miles from the south end of Adams lake, 1,750 feet higher and $1\frac{1}{4}$ miles east, is owned by Don Dalgleish and John Wallace, of Kamloops. Under the name of *Lincoln*, much development was done formerly by W. McAdam, of Vancouver, but a recent forest fire destroyed the camp and mine structures. Supplies can be transported by motor-launch and a scow on Adams lake, from whence the property is reached by a 4-foot trail on a good grade.

Mineralization, consisting of pyrite, galena, sphalerite, and chalcopyrite in a quartz-sericite gangue, occurs in a highly brecciated (shear) zone striking in a northerly and southerly direction, dip 65 degrees east, varying from a few inches to 10 feet in width in the centre and 200 feet long in a highly schistose greenstone, probably andesite.

Surface work done includes open-cutting the widest and central part and stripping to the north and south, where the mineralized zone tapers to a few inches. A 246-foot crosscut was driven about 125 feet below. The shear was intersected at 206 feet and drifts driven north 135 feet, with a 70-foot winze from it, and south 6 feet.

The lead in the drifts varies from a few inches to 4 feet in width and has free walls. The winze was sunk at a point 70 feet north of the crosscut and continued in mineralization for 50 feet, where it cut steeply into the foot-wall.

A sample across 2 feet on the north side 50 feet down the winze assayed: Gold, trace; silver, 2.1 oz. per ton; lead, 0.4 per cent. A general sample of mineralization from the dump

of the upper cut assayed: Gold, trace; silver, 14.4 oz. per ton. It is understood that a shipment has been made from the open-cut and that individual samples assayed well in silver.

SCOTCH CREEK SECTION (GENERAL).

Scotch creek flows from the north into Shuswap lake near the west end. In the adjoining territory the following claims have been explored: *Mosquito King*, owned by P. H. Bischoff, of Celista, and situated on the east slope of Adams plateau (see Annual Reports, 1928, 1930, and 1931). Mineralization consists of silver-bearing galena, pyrite, and sphalerite in deposits similar to those found on Adams plateau. Pinewell Mining Company, 744 Hastings Street West, Vancouver, is exploring some quartz veins in the schistose rocks near the granite-contact on the east side of Scotch creek, about 3½ miles north by trail from Sturdy's ranch. The *Shuswap* group, owned by W. E. Brett, of Salmon Arm, is situated about 1 mile south of Sturdy's ranch, and several open-cuts and two adits have been driven on a 6-foot quartz vein containing segregations of galena and pyrite in the schistose rocks. On the *Onyx* claims, owned by C. L. Johnson, Magna Bay, and situated about 4 miles up Onyx creek from Shuswap lake, some very high-grade argentiferous galena has been found associated with quartz in the sedimentary rocks.

PLACER-MINING.

Many individuals and small groups of men have been obtaining a living by "sniping" along the numerous streams that flow into the North Thompson river from both sides, especially on Jamieson, Dixon, Louis, Noble, Hefley, as well as Scotch creek, which flows into Shuswap lake. Most of this gold has either been resorted from, or is in, old Tertiary (?) gravels, remnants of which exist in different parts of the area adjoining the North Thompson and Scotch creek. The nuggets found are generally coarse but well rounded. New stakings on a large scale have taken place near Louis creek on the benches lying east of the North Thompson river.

On Scotch creek Chas. Johnson and L. Carson took 60 oz. gold from the bed-rock of an old high channel 175 feet above and on the east side of the present creek. Other miners have also been successful in this area about 3 miles above Sturdy's ranch on each side of the creek. History relates that Chinese took large quantities of gold from this section. The present creek, apparently, has not been worked to any great extent. A reconcentration of the gold from the old high channels might be found in Scotch creek, providing some means of economically by-passing the water could be constructed. At the mouth of the creek much fine gold occurs in the gravels.

NON-METALLICS.

This syndicate, with headquarters at Cherry creek, about 10 miles west of **The B.C. Sodium Kamloops**, has been operating a sodium-carbonate plant on a small lake about **Syndicate.** 2 miles north-west of the Kamloops-Ashcroft highway. During the year 250 tons of crystal salts was shipped to Vancouver and a further 200 tons is on hand ready for shipment. Experimental work on this product and also on a sodium-sulphate deposit in an adjoining lake was continued, and considerable interest has been attracted to the possibilities of erecting a soda-ash and sulphate plant at this point. Equipment is being enlarged and an increase in production is expected next year.

Gypsum, Lime and Alabastine, Canada, Ltd.—(See Annual Reports, 1923, 1930, and 1932.) This company operated their plant at Falkland on a reduced basis throughout the year. The product is shipped to Port Mann, where it is manufactured into plaster of Paris, plaster-boarding, wall-board, gypsum wall-blocks, etc.

VERNON MINING DIVISION.

(See Annual Reports, 1929, 1930 to 1933, and under *White Elephant* for 1921 **Pre Cambrian** to 1924, 1927 to 1929, and 1931 to 1933.) This company, with headquarters **Gold Mines, Ltd.** in Smith Tower, Seattle, Wash., and Ewings Landing, B.C., for the mine, continued operations as follows:—Period from January 1st to November 1st: The inclined shaft was sunk 90 feet to obtain a vertical depth of 200 feet, and a raise commenced from this level is up about 90 feet. Crosscuts and drifts were driven from the 60-foot level totalling 90 feet, with a 60-foot raise to the "glory-hole." Drifts and crosscuts on the 200-foot level total 146 feet. A stope-raise from the 100-foot level is up 90 feet.

New construction consists of a 106-horse-power Diesel engine; New Denver sub-A flotation unit; an additional concentrate settling and drying building for winter work; a new 2-story bunk-house to accommodate forty men. Mill and other buildings insulated for winter work.

Milling operations produced as follows: Tons milled, 2,740; value per ton, \$15.95 (heads); recovery per ton, \$14.15; percentage recovery for season, 88.7 per cent.; recovery since new installation, 94.5 per cent.; gross value of production, \$38,771.

A continuous shoot of ore from 15 to 25 feet wide was found between the 60-foot level and the bottom of the "glory-hole," where a considerable amount of tonnage was broken recently. Apparently the quartz "plug," which measures about 40 feet in diameter on the surface, has increased in size to the 100-foot level. At the 150-foot level the diameter is considerably reduced. At the 200-foot level it has increased to four times the cross-sectional area of the 150-foot level. Mineralization, consisting of pyrite, pyrrhotite, and bismuth telluride, occurs in certain cross-fracture zones within the quartz. As most of the quartz in the "plug" is apparently fractured in the same way and does not carry values throughout, the depositional theory still remains to be proven. The shaft will probably be sunk to the 300-foot level or farther, and crosscuts driven to the granite walls to delimit the size and value of the body at that depth.

Falcon.

(See Annual Reports, 1899, 1921, and 1932; also Geological Survey Summary Report, 1931, Part A.) This claim, situated about 2 miles north-west of Vernon and owned by Frank Mitchell, 2064 Penzance Road, Victoria, was located about 1899 on the south slope of the open, rounded, glaciated hills which encompass the area. A narrow branch road from the Vernon-Kamloops highway leads to the property.

Since the geology described by C. E. Cairns, Geological Survey of Canada Summary Report, 1931, Part A, has a bearing upon many claims in this area, part of his findings are appended:—

"The members of this group occupy wide areas along, and to the west of, Okanagan valley. They comprise a variety of both sedimentary and volcanic formations and in addition are intruded by many dyke-like and less regular bodies of granite and allied rocks. Though for the most part not as severely altered as corresponding members of Group I, they have, nevertheless, experienced great changes; are notably faulted and deformed, and, in places, show transition into rocks similar to those included with Group I. The members of Group II, have a general westerly to north-westerly trend. South of Vernon and Equisis (6-Mile) creek the group includes a conspicuous amount of light to dark grey, massive limestone in beds varying from a few feet to several hundred feet thick. In places these limestone-beds carry abundant fossils of Carboniferous age. The associated rocks include greenish volcanic tuffs and breccias; green, schistose rocks of less certain origin; and considerable black, cherty argillite, and dark-grey to black, rusty-weathering, slaty argillites. From Equisis creek north-easterly to near the southern end of Otter lake the formations include a great abundance of fairly massive, greyish-green, commonly porphyritic, volcanic rocks—chiefly tuffs and breccias—associated with a variety of sediments which in greater part possess a somewhat ashy or tuffaceous appearance, as though built up in large part of materials ejected from volcanoes and subsequently reassorted by water action. These sedimentary rocks vary from fine-grained, slaty, and limy sediments to coarse, water-lain tuffs and breccias. To a lesser degree some more typical sediments, including quartzites, slate, and true conglomerates, were observed. The coarser fragmental members, including volcanic breccias, water-lain breccias, and conglomerates, carry occasional fragments of limestone, some of which were observed to be fossiliferous and to resemble fragments from the limestone-beds previously referred to. The inference is that Group II, includes formations of post-Carboniferous, probably early Mesozoic, age.

"From the vicinity of Otter lake northward, the members of Group II, are chiefly dark-grey to black, slaty rocks commonly carrying small, lustrous, dark flakes of ottrelite.* Such rocks form the greater part of the hill west of Armstrong and continue in this general direction across Salmon River valley. These slaty, argillaceous rocks appear to underlie the other formations of Group II, and for this reason may be presumed to be relatively older. In Dawson's Shuswap sheet they are mapped separately as forming a part of his 'Niskonlith series,' which was thought to be of Cambrian age. No fossil evidence has, however, been

* A green to grey, hard, brittle, micaceous silicate resembling chloritoid of doubtful composition and uncertain crystallization.

discovered to substantiate this age assignation, and, so far as structural relations are concerned, it appears that the members of this belt are conformable with the overlying formations of Group II. and, consequently, may represent a considerably later period in the Palæozoic.

"The several members comprising Group II. contain most of the metalliferous lode deposits in northern Okanagan valley and vicinity. The majority of these take the form of quartz veins carrying gold and an irregular, generally sparse, dissemination of sulphide minerals. In addition, a couple of base-metal, mixed sulphide deposits have received considerable attention. In general, slaty formations of the group are least favourable either for the occurrence or persistence of mineral deposits.

"The quartz veins on the various properties bear, on the whole, a close resemblance to each other. The quartz is mostly a massive, milky-white, semi-vitreous type carrying little trace of mineralization. Individual veins may, however, contain either a sparse or a liberal impregnation of sulphides. In places the quartz may be quite vuggy, in part as a result of the leaching-out of sulphide materials and in part owing to incomplete filling of the vein-fissures by the quartz. On the whole, the smaller veins are better mineralized than the larger, though in places, as on the Keystone group, heavy sulphide mineralization was noted across a vein several feet wide. Veins vary in width from a few inches to 100 feet, but rarely exceed 10 feet. Their length is seldom in proportion to their widths, partly owing to faulting, which has been particularly severe. As a consequence vein outcrops can rarely be traced for more than a hundred yards or so, because they either pinch out or are faulted. In general, the veins are sharply defined against the enclosing formations, and though they may pinch and swell there is comparatively little evidence of silicification of, or gradation into, the wall-rocks. The latter may, however, show some alteration and commonly carry disseminated sulphides, chiefly pyrite cubes, for some distance away from the veins. Many veins strike north to north-east, but the majority strike west to north-west and in this respect coincide more or less closely with the structural trend of the members of Group II. with which they chiefly occur. So far as could be determined, all the quartz veins were introduced at about the same time, though some veins or bodies of quartz appear to have formed under higher-temperature conditions than others, notably, for example, the quartz at the *White Elephant* mine. On the *Jumbo* claim a group of north-south stringers are intersected by an east-west vein. At other places veins following different directions unite to form single veins. At no place did the character of the quartz or its mineralization appear to bear any relation to the trend of the veins."

For the first time in many years the 70-foot inclined shaft on the *Falcon* was unwatered and examined. The vein, with free walls exposed down the shaft, dips 41 degrees westerly and varies from 2 to 20 inches wide, with numerous fractures branching from it. Chiefly on the foot-wall the country-rocks have been highly silicified and impregnated with pyrite and lesser amounts of arsenopyrite for a maximum width of 2 feet. In the bottom of the shaft the vein, 9 inches wide, was almost barren of mineralization. About 20 feet down from the collar 14 inches of quartz on the north side contained specks and isolated segregations of pyrite. At the collar a veinlet $\frac{1}{4}$ inch wide on the hanging-wall contained dense pyrite-chalcopyrite mineralization. It seems probable that this vein was not developed in the shaft and still lies in the wall. Samples of the shaft-vein are as follows: No. 1, 10 inches quartz on south side of shaft 25 feet from bottom: Gold, a trace; silver, a trace. No. 2, 6 inches hanging-wall vein, collar of shaft containing pyrite: Gold, 0.04 oz. per ton; silver, a trace per ton. No. 3, bottom of incline shaft, 9 inches of quartz on south side: Gold, a trace; silver, a trace. No. 4, 14 inches of quartz from north wall in shaft 25 feet up from bottom containing pyrite and streak on hanging-wall: Gold, *nil*; silver, *nil*. No. 5, 2 feet of highly siliceous pyritized rock on foot-wall: Gold, *nil*; silver, *nil*. No. 6, pyritized band 2 feet between veins at collar of shaft: Gold, *nil*; silver, *nil*. No. 7, sample of 10-inch quartz, bottom of shaft on north side: Gold, *nil*; silver, *nil*. No. 8, 20 inches of quartz on north side of shaft 35 feet up from bottom: Gold, trace; silver, trace.

Some stripping was also done on what appears to be a 2-foot branch vein 50 feet higher and 150 feet westerly from the shaft. A sample across 16 inches of this vein assayed: Gold, 0.04 oz. per ton; silver, a trace per ton. A few hundred feet farther west a similar vein was uncovered in former years. A picked sample of oxidized pyrite and arsenopyrite taken from the collar of the shaft in 1921 assayed: Gold, 0.82 oz. per ton; silver, 0.70 oz. per ton. Evidently the values are erratic.

Insufficient work has been done on this claim to prove its value, and the following exploration is suggested: The north-west branch vein should be traced downhill to its possible intersection with the shaft-vein, and if found a working should be driven at this point where more consistent vein-widths and mineralization might occur.

These groups of thirty-two claims, owned by a Summerland syndicate headed **Beverley, Peggy**, by Geo. Gartrell, are located on the Okanagan Indian Reserve No. 1, about **Marie, and Edith**. 1½ miles south-west of Goose lake and about 7 miles by road from Vernon, on an open rolling grass-covered country between elevations of 1,300 and 2,660 feet. The quartz veins, which form a huge network in this section, differ to a great extent from those found elsewhere, inasmuch that the continuity and mineralization of the veins appear to be much more persistent. The country-rocks, where seen, are Mesozoic sediments and volcanics occasionally intruded by tongues of granite. The veins strike anywhere from north-south to east-west, dip from 54 degrees to perpendicular, and generally conform to the schistosity of the enclosing rocks.

Exploration consists of trenching, open-cutting, and sinking on the different mineral-outcrops in an endeavour to locate ore-shoots upon which deeper development may be done. The veins vary from 10 inches to 30 feet in width between free walls and are generally mineralized with pyrite and galena and occasionally with chalcopyrite and tetrahedrite. High silver values are obtained from the latter. Many samples were taken across vein-widths varying between 10 inches and 6 feet, which assayed from a trace in gold and silver to: Gold, 0.80 oz. per ton; silver, 32 oz. per ton; lead, 31 per cent. The latter gold and silver values were obtained from across 4 feet of quartz in a shallow shaft on the *Beverley No. 2* claim. Vein continuity and widths have been proven for over 800 feet in several instances, and in spite of many low value assays further exploration appears to be warranted.

(See Annual Reports, 1897 and 1899, and Geological Survey Summary Report, 1921, Part A.) **Blue Jay.** This claim, owned by A. H. Craven, Ashley, Tiverton, Devonshire, England, and situated about 1½ miles north-west of Vernon, close to the road, has lain idle for many years until recently when the lower crosscut adit was cleaned out and examined.

A quartz vein with free walls about 4½ feet wide, striking north-westerly and dipping 56 degrees north-east, occurs in volcanic breccias. Due to the heavy mantle of soil the north-west extension has not been uncovered. To the south-east for 100 feet the vein has been sheared and brecciated: beyond this point there are no outcrops. Mineralization observed consists of pyrite and lesser amounts of galena.

An inclined shaft has been sunk 44 feet. About 100 feet below and to the east a 169-foot crosscut adit has been driven, and a drift from it to the north-west 35.2 feet long.

In the shaft the quartz vein has definite walls with heavy gouge. In the lower drift the lead, dipping 51 degrees, is 5 feet wide, containing bands of quartz and country-rock impregnated with pyrite, with graphitic mud along the slickensided walls. The quartz in the adit varies from nothing to 10 inches in width, is transparent, and does not resemble that found in the shaft, so it seems possible that it is not the downward extension of the quartz in the shaft, but rather later siliceous material introduced along a fault. The intense shearing which is not in evidence above suggests this. A few feet to the south-west of the shaft-collar, a depression, possibly the surface expression of a fault, striking north-west and south-east, is easily traceable. If this is the case and the throw is normal, the downward extension of the shaft-vein will be located in the foot-wall of the shaft, and the extension of the crosscut adit to the south-west should pick it up. The strike of the shaft-vein does not coincide with the strike of the mineralization in the adit.

Kalamalka Mines. This syndicate, with headquarters at the Kalamalka Hotel, Vernon, was formed by W. V. Somerville to take over the holdings of P. Murphy, A. Brewer, and associates, of Vernon. The property, consisting of the *Homestake* group of eight claims, the *Jolly Jack* group of six claims, the *Black Spider* group of six claims, and the *Evening Star* group of four claims, is located on Brewer creek approximately 10 miles east of Vernon on the south side of the Coldstream valley, about 2 miles by road from the Vernon-Edgewood highway and the Canadian National Railway.

The claims cover a well-rounded ridge and the east slope on the west side of Brewer creek, where an excellent growth of timber exists and tunnelling operations can be resorted to. Elevations vary from 2,000 feet at the mouth of Brewer creek to 3,000 feet uphill.

The rocks in the vicinity are composed chiefly of argillaceous volcanics which have been intruded by diorite. Along the contacts and within the diorite numerous parallel shear-zones filled with quartz and country-rock have been uncovered within an area about 1,000 feet long and 100 feet wide. Mineralization consists of pyrite, galena, and free gold.

Surface work consists of twelve open-cuts and trenches spaced at various intervals where the rock-outcrops showed vein-matter. Underground an old 100-foot crosscut adit and 40-foot drift on an 8-foot quartz vein were driven many years ago. A new crosscut adit was driven for about 50 feet and a winze 35 feet deep sunk from it. A new crosscut adit about 300 feet long will be driven to intersect the shear-zones at depths varying between 77 and 177 feet on the dip.

The major shearing follows a north-east, south-west strike, and dips generally at a steep angle to the north-west. The old drift from the adit was driven on a strong quartz fissure-vein with free walls, striking northerly, and if produced will intersect the other shears about 100 feet north of the face. The new adit will be started about 300 feet north-east and drifts driven both ways when the mineral-zones are reached. The main shear-zone, about 22 feet wide, on which most of the work has been done, consists of nearly vertical bands of quartz from 2 to 10 inches wide, generally free on the walls, with alternating bands of argillaceous and altered diorite between, accompanied by graphite, pyrite, and manganese oxide. Free gold can be panned from some of this material. The following samples indicating the grade of mineralization were taken: No. 1, 3 feet of quartz and diorite from south-west wall of adit 3 feet from face: Gold, 0.01 oz. per ton; silver, trace. No. 2, high-grade quartz and pyrite from upper adit: Gold, 1.32 oz. per ton; silver, 0.4 oz. per ton. No. 3, general sample of pyrite and quartz from incline shaft 600 feet south-west of first adit: Gold, trace; silver, trace. No. 4, sample from upper cut about 3 feet wide above upper adit: Gold, 0.1 oz. per ton; silver, 0.7 oz. per ton.

A frame-camp has been built near the creek and machinery installed preparatory to commencing the new crosscut.

(See Annual Report, 1918, under *Torpedo*.) This company, with headquarters **Lakeside Mines, Ltd.** at 837 Hastings Street West, Vancouver, acquired the *Klondyke* (Lot 1188), *Okanagan* (Lot 557), *Excelsior* (Lot 997), *Torpedo Fraction* (Lot 1189), all Crown-granted, and the *Okanagan No. 1* to *No. 8*, inclusive, *Torpedo No. 1*, *Torpedo No. 2*, and *Klondyke No. 1* to *No. 5*, inclusive, from Wm. Armstrong and associates, of Penticton. The claims are situated about 1 mile north-east of Penticton on the banks of Okanagan lake. A rough trail half a mile long leads to the property from the Penticton-Naramata road, or along the lake-shore when the water is low. The ground on which the claims are located, in the region of the lake, consists of benches and deeply cut ravines and is occupied by fruit-ranches.

In 1918, 135 tons of mixed gold-silver-lead-zinc-copper ore was shipped to the smelter by the Penticton Development Company, from which values averaging 0.35 oz. gold per ton, 2 oz. silver per ton, and 0.60 per cent. copper are reported to have been recovered. The claims were worked many years before this, but no record as to the names of claims, owners, etc., has been found.

On the lake-shore bluffs, about 75 feet high, in the vicinity of the workings on the *Torpedo Fraction*, an outcrop of granite has been sheared, fissured, and filled with quartz in an easterly and westerly direction, with a dip between 70 degrees and 80 degrees north. At a point about 90 feet to the east from the portal of the adit the vein has been displaced by a north-south, nearly perpendicular fault. Beyond this, the rock formation is severely crushed, sheared, and broken. Mineralization consisting of pyrite, chalcopyrite, galena, and sphalerite in a gangue of quartz and sheared granite occurs between two definite walls.

No work, if done, was seen on the surface, which is heavily covered for about a mile east by glacial silt and clay. Underground an adit has been driven from the lake-shore for 90 feet on the shear-zone, extending beyond to the east about 75 feet, and two drifts of unknown length on the fault to the north and south. From near the mouth of the adit a 100-foot inclined shaft has been sunk and levels and crosscuts driven easterly and westerly on the shear. In the west drifts and crosscuts, which extend over 100 feet, no ore was found. To the east the drift follows the east-west shear-zone and develops about 60 feet of mineralization varying from a stringer

to 1 foot in width. Beyond this point the vein pinches and passes into the crushed faulted zone found above.

The mineralization appears to be generally narrow, but across the shear-zone, measuring about 6 feet in the widest part, with free walls, there are many fractures filled with quartz, etc., which occasionally unite and, at depth, may become mineralized throughout. Some stoping has been done for a few feet above the No. 1 and No. 2 (shaft) levels.

The new company cleaned out the workings and drove the upper adit east beyond the fault.

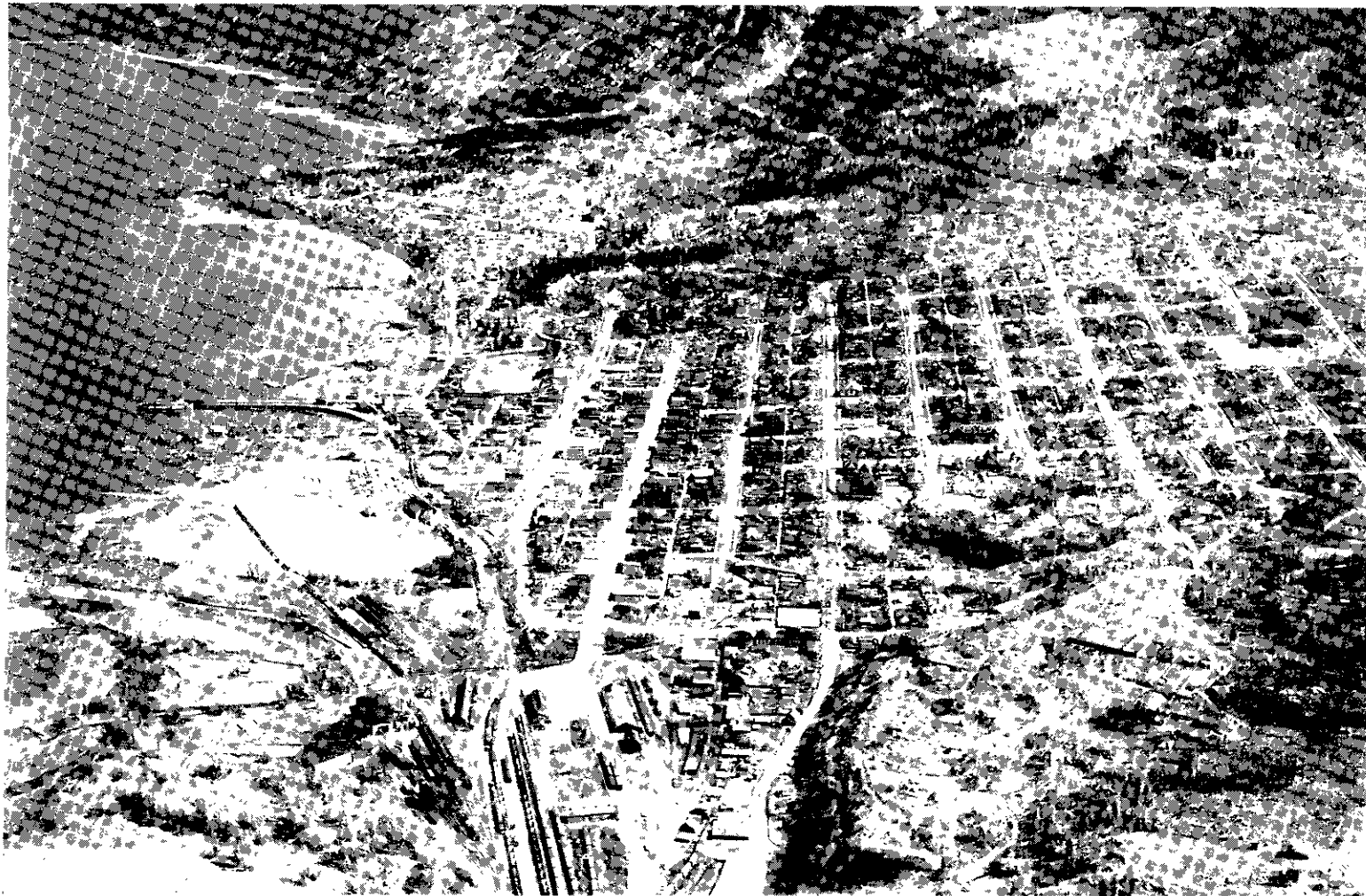
GENERAL.

Continued exploration by small crews of men and individuals was carried out on the following groups of claims: In the vicinity of Okanagan lake, the *Blue Jay*, *Black Hawk*, *Skookum*, *Blue Hawk*, *Kelly*, *Derby* and *Gipsy*, *Jumbo*, *Batchelor*, *Ideal*, *Devonshire*, *Blue Bell No. 2*, and the *St. Paul* (see Annual Reports, 1923, 1928, 1930 to 1933), situated on Monashee mountain and owned by O. Van Etter, M.D., and associates, of New Westminster.

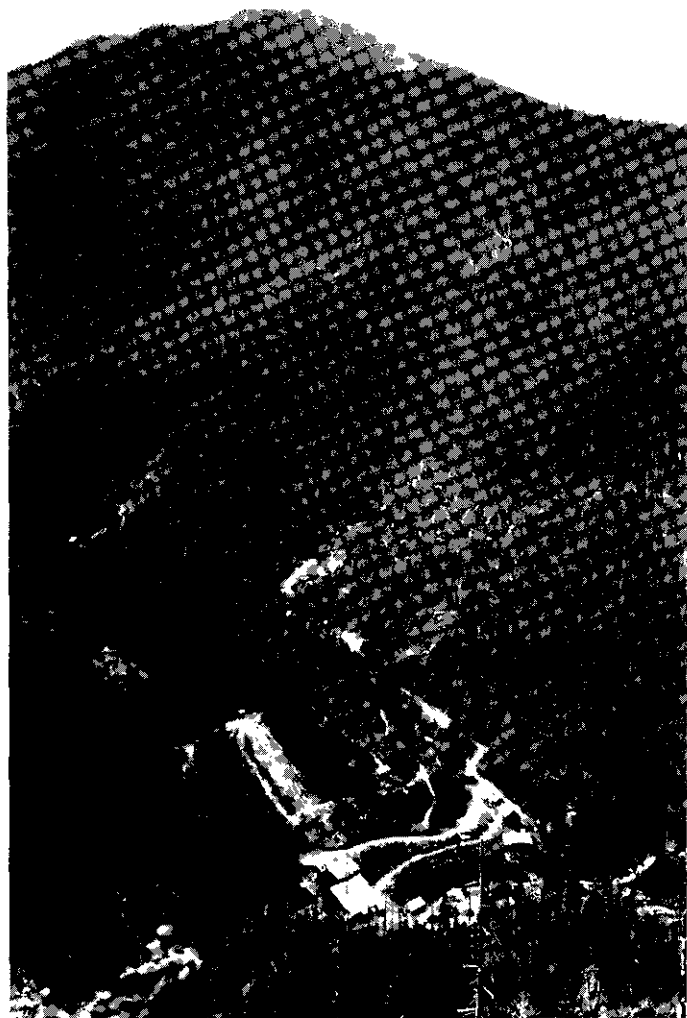
PLACER-MINING (GENERAL).

Development of the Woods Lake old-channel placer-ground, located about 800 feet above and 1 mile east of the lake, was continued by Hall and Eley, and also by a syndicate of Kelowna men who drove a 100-foot drift on the Stuart lease about a mile north of Hall and Eley's ground (see Annual Report, 1933). A considerable amount of coarse placer gold has been found in the former workings. On Mission, Cherry, Siwash, Trout, and Deep creeks, "snipers" continue to earn a living.

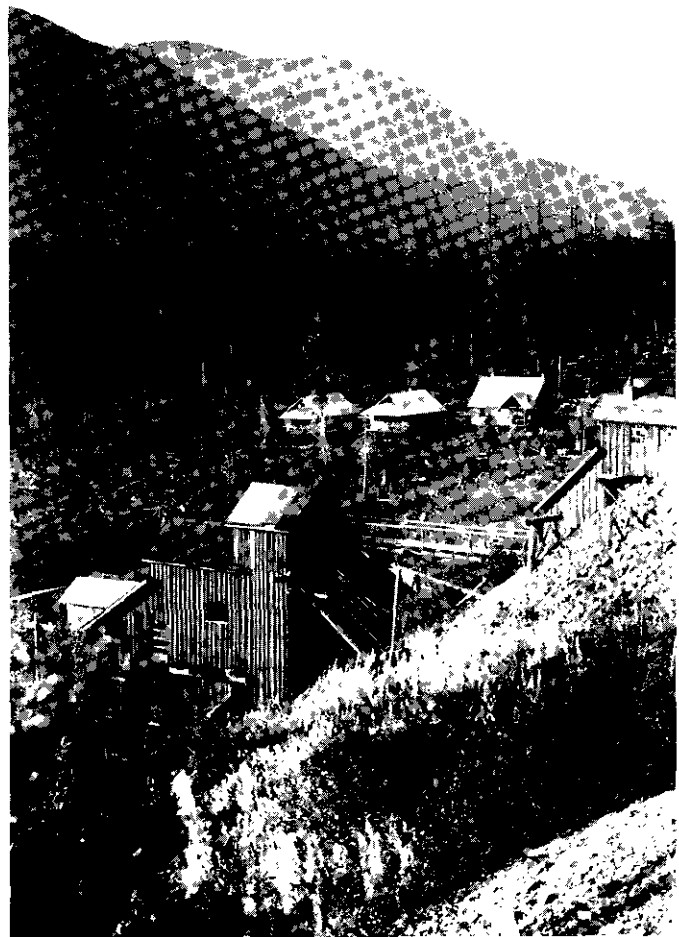
The Woods Lake placers appear to offer possibilities to capital.



Nelson.



Queen Mine. Old Mill and Yellowstone Workings in Foreground; Queen Workings in Creek Valley in Middle Distance. Sheep Creek Area.



Second Relief Mine. Erie Area.

PART E.
EASTERN MINERAL SURVEY DISTRICT (No. 5).

BY

B. T. O'GRADY.

INTRODUCTION.

During the period under review the Trail plants of the Consolidated Mining and Smelting Company were operated on the largest scale in their history. Lead and zinc production established an all-time high volume record, with accompanying large increase in silver. This is due primarily to the greater output of the *Sullivan* mine at Kimberley to meet the requirements of the smelter. The *Monarch* mine of the Base Metals Mining Corporation at Field contributed substantially to the production of these metals, lead and zinc concentrates having gone forward regularly to European smelters. Customs shipments to the Trail smelter, chiefly gold ores and concentrates, show a substantial increase, with contributions from thirty-four properties in the Nelson Division, twenty-eight in the Slocan camp (including portions of the Ainsworth and Slocan City Divisions), eleven in the Trail Creek Division (exclusive of the large output made by lessees at the Rossland mines of the Consolidated Mining and Smelting Company), and three in the Lardeau, Arrow Lake, and Fort Steele Divisions (one small shipper in each of these). The Slocan Camp shipments, with a few exceptions where the ores contained gold, consisted of silver-lead-zinc ore and concentrates chiefly derived from leasing operations. In this camp company operations are suspended, except, as stated in the body of this report, where exploration was conducted on a restricted scale. Two mines also shipped to the Tacoma smelter.

Production from No. 5 District for the year was: Ore, 1,939,592 tons; gold, lode, 66,164 oz.; silver, 6,822,948 oz.; copper, 1,169,569 lb.; lead, 344,888,248 lb.; zinc, 240,826,501 lb.; placer gold, 1,373 oz. Miscellaneous metals, minerals, and structural materials produced had a value of \$781,831. Coal production for this district was 627,619 tons.

Gold-mining has contributed in an important degree to the improvement in the district employment situation. Production of gold for the current year is better than any year since large-scale production by the Consolidated Mining and Smelting Company ceased at Rossland. Customs shipments of gold ores and concentrates for the twelve-month period contained 22,091 oz. gold, to which must be added the bullion produced by the Reno Gold Mines, Limited; the Relief-Arlington Mines, Limited; and the Wilcox Leasing Syndicate. Lessees on the mines of the Consolidated Mining and Smelting Company at Rossland contributed 25,432 oz. gold. A rough estimate of 1934 total gold production for District No. 5 is over 66,000 oz.

The gold-mining industry, based on the enhanced price of this metal, is showing evidence of permanence, with an assurance of increased production when milling operations, such as at the *Yankee Girl* (Ymir-Yankee Girl Gold Mines, Limited) and *Queen* (Sheep Creek Gold Mines, Limited), get under way. Shipments have been suspended from these properties and the *Good-enough* (Ymir Consolidated Gold Mines, Limited) pending consummation of milling plans. Mill expansion is expected at the *Second Relief* (Relief-Arlington Mines, Limited), operated by the Premier Gold Mining Company organization. A substantially larger annual production from the Reno Gold Mines, Limited, no longer handicapped for power-shortage, can be reasonably expected, and also from the *Kootenay Belle*, which is now equipped with a mill. Increased output can also be expected from some of the properties entering the production stage, such as the Gold Belt Mining Company and Ymir Dundee Gold Mining Company, while new developments and discoveries, such as, for instance, at the *Centre Star* property of the Wesko Exploration and Development Company near Ymir, must be taken into consideration.

Lode-gold development and exploration is going on at numerous prospects in the Nelson Mining Division; at points in the Fort Steele Division, including the *Midway* group of the B.C. Cariboo Gold Fields, Limited, near Moyie, and the *Quartz Mountain*, near Cranbrook, of the Kimberley Goldfields Consolidated, Limited; and in the Lardeau Mining Division, as at the *Teddy Glacier* (gold-silver-lead) near Camborne. Long-dormant properties in the area south of Nelson are being investigated and exploration resumed at former producers, such as at the *Porto Rico*, which lessees are reopening, and the *Fern*, where the Gold Fern Syndicate, of Toronto, has started work. Preparations are being made to resume work and initiate pro-

duction from the *Bayonne* mine, reached from Tye Siding on the western side of Kootenay lake. In the Lardeau Division mill-construction has been completed by the Meridian Mining Company. Gold-ore occurrences are widespread in District No. 5 and with good management and adequate financing, important factors which are beginning to materialize, a substantially increased and permanent gold production can be expected. A satisfactory feature is the provision of adequate and dependable power in the Nelson-Ymir-Salmo-Erie area through the newly constructed transmission-lines of the West Kootenay Power and Light Company extending from existing hydro-electric plants on the Kootenay river.

The writer desires to thank all mine operators and prospectors for co-operation and hospitality given.

NELSON MINING DIVISION.

During the period under review activities in this Division were nearly all concerned with gold-mining. The appended notes are intended to be read in conjunction with previously published information as specified in each case. The principal areas of gold occurrences are the Nelson, Ymir, Sheep Creek, and Erie Creek camps. Geological Survey of Canada publications dealing with the first three mentioned are the Summary Report for 1911, Nelson Map-area; Memoir 94, "Ymir Mining Camp"; and the recently published Memoir 172, "Salmo Map-area." The upper part of Erie creek, including the *Second Relief* mine, is beyond the west limit of the last-mentioned map-area, but is shown on the old West Kootenay Sheet, Map No. 792, which is of reconnaissance nature, geological boundaries being very approximate. It affords, however, a means of interpreting the rock formations with the new classification afforded by Memoir 172, with which Map 299A is incorporated. To serve the growing demands of the gold-mining industry, which is showing evidence of permanence, a large expenditure was made by the West Kootenay Power and Light Company in extending its transmission-line from Ymir to Salmo and up Sheep creek, with a branch from Porto Rico via Barrett creek to the *Second Relief* mine. In addition to this mine, the new lines now connect with the *Kootenay Belle*, *Queen* (Sheep Creek Gold Mines, Limited), and *Gold Belt* in the Sheep Creek camp; the *Yankee Girl*, *Dundee*, *Centre Star*, and *Ymir-Goodenough* properties in the Ymir camp.

NEAR NELSON.

This company's *Athabasca* property consists of the following seven Crown-granted claims and fractions, namely: *Good Hope*, *Athabasca*, *Algoma*, *Alberta*, *Manitoba*, *Ruby Fraction*, and *Triangle Fraction*. It is situated on the east slope of Morning mountain, 3 miles south of the city of Nelson. The *Venus-Juno* group, to the west, consists of the *Venus*, *Saturn*, *Jupiter*, *Orion*, *Juno*, *Kirkwall*, and *King of the Forest* Crown-granted claims. The *Venus-Juno* connected group of workings is 6,000 feet westerly from the *Athabasca* workings. The latter are connected with Nelson by a road 7 miles in length, from which a branch road extends to the *Venus*. The claims cover the well-wooded mountain-side sloping to Giveout creek. Briefly summarizing the general character of the deposits: The associated minerals are pyrite, galena, and sphalerite in a quartz gangue. The veins, which are generally narrow, dip with the slope of the hill at flat angles, and cross the contact of the Nelson granite with a schistose eruptive member of the Rossland volcanic series. In the case of the *Athabasca* conditions are complicated owing to numerous step-faults. In this mine the best gold values were found in the schist where the vein is flat and much disturbed by folds and faults, and in the vicinity of the contact where concentrations occurred. In the granite the values did not average as well as in the schist, but the vein was found in a more normal condition and better adapted to mining. An interesting discussion of conditions at the *Athabasca* by E. Nelson Fell is contained in the Journal of the Canadian Mining Institute, Vol. V., 1902. Considerable information regarding past mining and milling operations at the three properties is contained in the Report of the Minister of Mines for the years 1896 to 1904, inclusive, and in the Summary Report of the Geological Survey for 1911. These cover the early history and period of chief productive activity.

From 1911 to 1913 the *Athabasca* and *Venus* were idle, being reopened in 1914 by A. H. Gracey, who leased the properties and carried on stoping operations in the *Venus* mine until 1915. In 1916 the *Athabasca* was leased by A. E. Rand and C. D. Brymer, no production being made. In 1917, 131 tons was milled. In 1919 no work was done in the mines, but the *Athabasca* mill was leased by the operators of the *California* mine. No further activity occurred until 1932,

when work on the *Venus* and *Juno* was undertaken by J. C. Allison, G. Allen, and associates, of Nelson, who turned their operation over to the Noble Five Mines, Limited, in 1933, this company having since been in possession. At the time of writing the option on the *Venus-Juno* group has been dropped by the Noble Five Mines, Limited. G. Gormley and associated lessees are continuing work on the *Venus*. According to the official records at Victoria, the combined past production of the *Athabasca* and *Venus* between 1899 and 1917 is 28,296 tons, containing 17,915 oz. gold and 427 oz. silver. This ore was milled and poor recoveries are stated to have been made. No further production occurred until 1934, when 34 tons was shipped from the *Athabasca*. In the same year 127 tons was shipped, chiefly by lessees from the *Venus*, but including a small lot from the *Juno*. The *Juno* is credited in 1905 with 1925 tons containing 911 oz. gold. In 1932 J. C. Allison and G. Allen shipped 123 tons and 29 tons in 1933 before the Noble Five Mines, Limited, took over. A car-load was shipped by this company in 1934, this tonnage being included with the 127 tons credited to the *Venus* as specified above. The 1933 development-work is recorded in the Report of the Minister of Mines for that year and the present notes are additional to previously published information.

Athabasca. The *Athabasca* vein strikes north 45 degrees east and dips towards the north-west at flat angles, the maximum being 45 degrees. The chief mine-development of former years consisted of two adits, 53 feet apart in elevation, driven along the strike of the vein, and by a shaft sunk on the vein at an inclination of 12 degrees. No. 2 is the main working-level and the shaft has been sunk to a point 30 feet vertically below it. On the No. 3 intermediate level, 15 feet vertically below No. 2, 250 feet of drifting has been done. The greatest development of the vein is on No. 2 level, where a section in the granite 700 feet long has been opened up and stoped. In the schist, where disturbance of the vein made its exploitation difficult, the vein-development was limited to 225 feet in length. In the stope above the western end of No. 2 level there is a cross-fault dipping steeply to the west, beyond which very little effort has been made to find the vein. This is considered to constitute an important objective for future exploration. Most of the ground above this level has been stoped. A new lower adit at an elevation of 4,437 feet, or 163 feet below No. 2, was driven by the present operators. This comprises 719 feet of driving, with two raises, 30 and 90 feet up respectively, all in granite. The downward continuation of the vein was not encountered, its projected position at this horizon being farther to the north-west if the vein maintained its dip and strike as shown in the upper workings. In November, work in No. 4 adit had been discontinued and exploration was proceeding on No. 2 level in the vicinity of the granite-schist contact. All work on the *Athabasca* ground was done with machines driven by the 14 by 12 Canadian Rand (old model) compressor, which had previously been moved up to No. 4 level portal from the old *Athabasca* mill. This is operated by a 100-horse-power General Electric motor, current being supplied by the West Kootenay Power and Light Company.

Venus. This property, together with the *Juno* referred to later, is owned by R. Heddle, of Nelson, the option on both held by the Noble Five Mines, Limited, having just been dropped. The general strike of the *Venus* vein is south 65 degrees east. It appears to follow a basic dyke traversing the schist close to the granite-contact. The mine has been developed on eight levels over a length of 1,500 feet along the strike of the vein and over a vertical range of 400 feet, the elevation at No. 8 level being 4,900 feet. The vein is generally narrow but very persistent. Above No. 8 level the known ore-shoots have been stoped out. Except for stoping done by lessees, no new work has been undertaken in the old mine. A start was made to open up a new deeper level at an elevation of 4,750 feet. This level has been driven, chiefly in broken ground, for a length of 300 feet, the face being about 600 feet short of a point below the ore-zone mined on No. 8 level. This work was done by hand under contract.

Juno. This mine, owned by R. Heddle, is above and south of the *Venus*. The adit, at an elevation of 5,394 feet, is connected by means of a long raise with No. 4 level of the *Venus*. The *Juno* vein strikes north 50 degrees east and dips at 60 degrees to the north-west. Its present development is entirely within the schistose eruptive rock. The adit is a crosscut 625 feet long to the vein, on which a raise has been put up to the surface. Drifts extend to the south-west from the raise at elevations of 5,500 and 5,400 feet. The upper (or No. 1) level is 50 feet long, being stoped to the surface. The No. 2 level drift is 470 feet long, of which the last 250 feet, driven by the Noble Five Mines, Limited, is stated to

average 0.65 oz. gold per ton across 16 inches. This ore is assumed to be the flatly raking downward continuation of the ore stoped above No. 1 level by former operators and in the adjoining outcrop section to the south-west from which ore was shipped in 1932 by G. Allen and J. C. Allison. A car-load of ore included with *Venus* tonnage was shipped from No. 2 level in 1934. The *Juno* work was done by hand.

Euphrates. This property, owned by the Euphrates Mining Company, Limited, is situated on the north-eastern side of the Salmo river, opposite Golden Age Siding on the Great Northern Railway, 9 miles from Nelson. The camp adjoins the Nelson highway and the railway-tracks below the workings which are reached by trail. There are sixteen claims, none of which is Crown-granted, covering the steeply sloping, burned-over mountain-side. The history of the property, dating back to 1926, when the discoveries of gold mineralization were made, is contained in the Reports of the Minister of Mines for the years 1926 to 1931, inclusive, and 1933; also in Bulletin No. 1, 1932, "Lode-gold Deposits of British Columbia." The 1929 Report contains a comprehensive description of the deposits which occur in schistose eruptive members of the Rossland volcanic formation. Production, consisting of shipments of sorted ore to the Trail smelter, has been as follows: 11 tons in 1928, 1 ton in 1929, 47 tons in 1931, and 59 tons in 1934. This last lot was shipped by S. Terzian on a leasing basis after work under company management had been suspended in the summer. The present notes are additional to previously published information. The development-work in 1933 and 1934 was done under the management of B. N. Sharp, representing the controlling interest acquired under option by the Spokane-Idaho Copper Company, of Spokane, of which J. P. Graves is managing director. The chief work done consisted in extending the lower adit on the *EU-Tee* vein. This working, at an elevation of 3,950 feet, is now about 1,700 feet in from the portal. From the economic point of view there is no appreciable change in conditions since the property was described in 1929. The *EU-Tee* fissure, well exposed throughout the length of the working, averages from 4 to 6 inches in width, with a maximum width of about 2 feet. There are two short stopes, each about 30 feet long and 25 feet high, at points about 300 and 900 feet in from the portal. In the backs of these stopes vein-widths were about 3 inches, of which samples taken in June, 1933, gave assays of 0.36 and 0.15 oz. gold per ton respectively. The vein-filling as exposed throughout the adit is either quartz or shattered wall-rock, or both. Quartz occurrences are not very persistent either in length or vertical extent, as may be seen along the adit and in the small stopes. The occurrences may be described as elongated lenses from a few feet to 30 or 40 feet in length and averaging less than 6 inches wide. The quartz is often well mineralized with galena and pyrite, at times oxidized, and the shattered or schistose wall-rock is highly oxidized. The small ore-body stoped in the upper *EU-Tee* adit does not persist to the lower level, indicating a habit of extreme localization of the ore occurrences, which is further shown by the small amount of quartz and mineral showing in the backs of the two small stopes previously mentioned. The *Lost Cabin* shear-zone, on which some more trenching was done, strikes and dips with the formation, the average width of the shearing being from 6 to 8 feet. Its intensity tends to diminish rapidly in short distances and the same is true of the mineralization and bands or elongated lenses of quartz. The gold content as sampled in the old workings was very erratic, with occasional high assays being obtained, due to heavy concentration through oxidation or possibly the local occurrence of a little free gold (*see* sampling recorded in Report of the Minister of Mines for 1929). Diamond-drilling was also done by the company.

HALL CREEK.

Flying Dutchman. This group consists of fourteen claims, of which the *Flying Dutchman* and *Phoebus* are Crown-granted. It is owned by the partnership of O. A. Tapanila and L. Madden, of Nelson, and H. Erickson and C. Peterson, of Hall Siding. The property, situated on the north side of Hall creek, west of Noman creek, is connected by trail, 1.5 miles in length, with the Hall Creek road, 3.5 miles from the highway south of Nelson. Elevations range from 3,600 feet on Hall creek below the claims to over 6,000 feet at the top of the ridge. The ground covered is a steep, burned-over side-hill. The country-rocks are augite porphyry, augite-feldspar porphyry, and their metamorphosed equivalents, greenstone-schists, members of the Rossland volcanic series of Triassic age. There are numerous quartz veins on the claims irregularly mineralized with disseminated pyrite and occasional

chalcopyrite, galena being associated in places with one or both of the other sulphides. The mineralization contains gold values, the silver content not being of importance. In general, oxidation is not much in evidence. No previous description of the property has been published and no past production is recorded. With the exception of the two Crown-granted claims specified, the stakings are all recent locations.

On the *Flying Dutchman* two adits, at elevations of 5,055 and 5,000 feet respectively, develop a quartz vein, strike north 50 degrees to 10 degrees east, dip from 65 to 75 degrees to the west. Surface workings consist of two open-cuts. The upper adit, a shallow drift on the vein from its outcrop, is all in quartz. At the inner end of this drift, which is 35 feet long, a crosscut shows a width of 13 feet of quartz. Sampling in two sections here gave assays of 0.04 and 0.1 oz. gold per ton across widths of 6 and 7 feet respectively. In an open-cut 30 feet southerly from the portal the vein is 6 inches wide, indicating a lenticular occurrence, containing traces of pyrite. The lower adit is a crosscut 140 feet long to the vein, which is drifted on for 105 feet, mostly to the north of the crosscut. The drift follows quartz, 1.5 to 7 feet wide, to a point 70 feet north of the crosscut, where the quartz pinches out and gives way to schistose porphyry containing streaks of quartz. Irregular disseminations of pyrite occur throughout the quartz in the drift, with a concentration of the iron sulphide, with a little chalcopyrite, towards the northern extremity of the lens. Sampling on the No. 2 level gave the following results:—

Location.	Width in Feet.	Gold. Oz. per Ton.
South end of drift	3.0	0.02
At crosscut intersection, hanging-wall side	3.0	0.04
At crosscut intersection, foot-wall side	4.0	Trace
20 feet north of crosscut	4.8	0.29
40 feet north of crosscut	3.7+	0.11
60 feet north of crosscut	4.6	0.07
70 feet north of crosscut	1.5	0.31
From pile of 1.5 tons at portal	Selected	0.40

About 150 feet east of the occurrence described there is a parallel vein, 8 to 10 inches wide, which has been opened by a 20-foot adit. The vein-filling is white quartz with no apparent mineralization.

On the *Rainbow Hill* claim, at an elevation of 5,400 feet, a vein which outcrops on the face of a low bluff has been exposed by two open-cuts and an adit just started. It is from 1 to 3 feet wide and strikes north 10 degrees east, with a dip of 70 degrees to the west. In the face of the adit a sample across 3 feet of quartz containing sparsely disseminated pyrite gave a *nil* assay.

On the *Skookum Boy*, at about 5,800 feet elevation, a deep trench exposes a northerly-striking sheared and crushed zone 9 to 10 feet wide. It contains fragments of pyritized rock with specks of chalcopyrite and, in places, faint copper-carbonate stains. On the same claim, at a slightly higher elevation, a shallow cut has been made on the outcrop of a 6- to 8-inch quartz vein well mineralized with disseminated pyrite and chalcopyrite, occasional galena being present. A selected sample of the sulphide material assayed: Gold, 0.80 oz. per ton; silver, 1.2 oz. per ton. There are other veins, on which only shallow cuts have been made, on the *Iona*, *Skookum Boy*, and *Gold Coinage* claims.

H.B.

This group of five claims, owned by the same partnership, is situated on the south side of Hall creek, opposite the *Flying Dutchman* property, and is reached by a steep branch trail from the main trail along the valley-bottom.

The topography and character of the ground are similar on both sides of Hall creek. The deposits also consist of quartz veins, the country-rocks being greenstones. Mineralization, where present, consists of pyrite, chalcopyrite, and their oxidation products. The claims are comparatively recent locations by H. Erickson and C. Peterson, but old workings not previously described are on the *H.B. No. 1* claim. No production has been made from the property. On the *H.B.* work done by the owners includes five open-cuts and 165 feet of driving underground, mostly crosscut, 55 feet below the outcrop workings, which are comprised within a length of 100 feet. In the cuts the vein varies from 5 feet of solid white quartz to two or more irregular stringers of quartz in the country-rock. A little pyrite was noted in the gangue and, where oxidized, slight copper-carbonate stain. Selected material from the surface assayed: Gold, trace; silver, 0.6 oz. per ton; copper, 0.9 per cent. At an elevation of 3,825 feet the adit, driven

south 35 degrees west for 70 feet, cuts the vein at 35 feet in from the portal, from which point it is followed by a drift run north 80 degrees west for 25 feet to where the vein pinches out against a fault. The working then continues south 40 degrees west in country-rock for 70 feet. The vein, which is vertical, varies in width from 1 to 3 feet and is composed of quartz and decomposed siliceous material very sparsely mineralized with pyrite, chalcopyrite, and their oxidation products. A sample taken across 15 inches at the western end of the drift at the crosscut gave a negative assay for gold and silver. Higher up the hill, and 200 feet to the south, shallow cuts imperfectly expose a parallel vein apparently 1 foot wide. The gangue is decomposed iron-stained siliceous material with occasional light copper-carbonate stain. Selected material assayed 0.19 oz. gold per ton.

On the *H.B. No. 1* claim there are two old adits at elevations of 4,535 and 4,475 feet respectively. The upper adit is driven south 65 degrees west for 25 feet, cutting diagonally across a zone of east-west shearing in silicified pyritized greenstone. The dip of the fracturing is 50 degrees to the north. The lower adit is first driven west for 95 feet along a barren fissure, then turns north 20 degrees west for 55 feet to the face. The reason for driving these workings is not apparent, but the claim lies to the west of the *Fern* property, and prospecting for the possible south-western extension of that vein would no doubt have been carried on during the past period of activity when the *Fern* mine was producing.

YMIR CAMP.

This company's property, consisting of the *Canadian Girl*, *Yankee Girl*, *Lake Ymir-Yankee Girl View*, *Black Diamond*, *Yukon Fraction*, and *Klondyke No. 1 Fraction Crown-Gold Mines, Ltd.* granted claims, is located on the northern slope of Oscar (Bear) Creek valley east of Ymir. An ore-bin at the Great Northern Railway tracks, elevation 2,393 feet, is connected by aerial tram, 6,000 feet long, with the main working, or 1,235-foot level, at an elevation of 3,618 feet. A road 2 miles in length extends from Ymir to the mine camp below the workings. The recently constructed mill is on the eastern side of the Salmo river, about 300 feet from the railway and directly across from the old tramway terminal. The type of deposit, character of mineralization, and early history of the property have been described in Geological Survey of Canada Memoir 94, published in 1917, and in the Report of the Minister of Mines for 1915. The latter publication for the years 1920, 1926 to 1929, 1932, and 1933 contains references to the salient features of progressive development. The important operating periods were: Between 1911 and 1919 by the Hobson Silver Lead Company, Limited; in 1920, when a large amount of underground exploration was done by the Mining Corporation of Canada; between 1926 and 1928 successively by the Yankee Girl, Limited, the Porcupine Gold-fields Development and Finance Company, Limited, and the Yankee Girl Consolidated Mines, Limited. In 1929 work done by the last-mentioned company chiefly consisted in driving a long adit from the Wild Horse Creek side to intersect the vein 765 feet below the 1,235-foot level horizon. Work in this adit was discontinued before the objective was reached. Subsequently the *Yankee Girl* mine, as distinguished from the ground which had been acquired for the low adit-site on Wild Horse creek, reverted to the owners, the Texas Yankee Girl, Limited. Early in 1932 a new period started when E. P. Crawford and F. R. Weekes, mining engineers, took over the property under agreement with the owners. After operating successfully on a shipping basis during 1932, 1933, and 1934 they participated in the formation of the present company. The 1934 output to November 1st totalled 13,966 dry tons containing 9,104 oz. gold, 72,979 oz. silver, 1,570,110 lb. lead, and 2,375,910 lb. zinc. Shipping from the date mentioned was discontinued to break ore for the mill. According to figures compiled by the management, total shipments of crude ore to date amount to 101,166 tons, of which 65,404 tons was shipped prior to 1932. Principal values are in gold, with minor amounts of silver, lead, and zinc. The main ore-bearing area of the *Yankee Girl* vein, including the original *McDowell* and *Hobson* ore-bodies at the eastern and western extremities, is about 1,000 feet long. Within this length, and in vertical extent as far as development has gone, ore selectively mined for shipment has been found to occur in irregular manner. In the central area, between the 800- and 540-foot levels, one of the best stopes in the mine was opened up latterly, although the old 540-foot level drift did not give any indication of it. This stope has attained a length of over 400 feet, with ore-widths mined up to 12 feet. Much ground with ore possibilities remains to be tested above the 1,235-foot level, comparatively little work having been done in the eastern section above the 540-foot

level. Vein areas below shipping-grade left in the workings will be stoped for milling. The year's development footage to November 1st totalled 1,698 feet of drifting and raising, chiefly in the ore-zone. The 528 raise was put up 300 feet above the 540-foot level and from it drifts were run east and west on the 400-foot level.

In the east drift, 400 feet long, a 50-foot length of high-grade ore 3.5 to 4 feet wide was exposed immediately east of the raise. The west drift connects with the formerly established 400-foot level drift east of the Hobson stope. Drifting off the raise in both directions has been started at the 250-foot level. The 935-foot level was extended westerly to a point below the Hobson stope and a good section of ore, up to 9.5 feet wide, opened up in the western extension of the 794 stope. The 791 raise was completed to the 935-foot level and the 792 raise has been carried up to connect with the 800-foot level. Exposures of milling-grade ore over mining-widths, averaging 5 feet in width, are exposed at numerous points in the new workings, with sections of better ore in places such as has been shipped. In the foot-wall country of the *Yankee Girl* vein is a branching fracture, known as the *Spur* vein, which has been exposed and stoped in places on the 1,035-, 800-, and 400-foot levels. It appears to extend over a length of about 800 feet, with a width of from 4 to 6 feet where exposed. At the eastern extremity of the 1,235-foot level development is proceeding in the area of the *Lakeview* shear-zone, which, striking north-easterly, makes a pronounced angle with the more easterly-striking *Yankee Girl* vein. The *Lakeview* fracture has hitherto been practically unexplored, except for some surface work and a small amount of drifting on the 1,235-foot level. Improvements at the mine include housing at the 1,235-foot level portal for the newly provided electrically-driven 1,500-cubic-foot capacity Canadian Ingersoll-Rand compressor. The old compressor plant, driven by water-power and situated in the creek-valley below the mine, is to be moved to the same location. Total compressor capacity of 2,200 cubic feet will thus be available for an extended campaign of development. Electric haulage is to be used on this main working-level consisting of a Mancha mule storage-battery locomotive 31 inches wide. The aerial tram has been repaired and improved for heavier duty. New terminals have been erected, a new driving-cable installed, and the standing cable replaced in part.

The mill, of 100 tons capacity, consists of a coarse-crushing plant, separately housed, connected by conveyor with the main building, containing the fine-crushing, flotation, and cyanide section. Two concentrates will be made, a gold-silver-lead concentrate to be shipped to the smelter and a gold-zinc-iron concentrate to be cyanided for bullion product. The latter concentrate is expected to contain the bulk of the gold in the ore. The concentrates for shipment will be conveyed from the mill to the railway on a covered track. The mill flow-sheet was designed by W. L. Zeigler, of Spokane. From the aerial tram the ore, dumped into a 150-ton bin, is fed through a 2-inch grizzly to a 10- by 20-inch Blake crusher. The product goes by 24-inch conveyor to 4- by 6-foot Acro-vib 1-inch mesh screen, from which the oversize goes to a 24-inch Symons cone-crusher. This product with the undersize go by 18-inch conveyor to the 300-ton mill-bin, from which it is fed by 12-inch conveyor to the 7- by 3-foot direct-driven Hardinge ball-mill connected with 6- by 21-foot Dorr-type classifier. The flotation equipment consists of two units each comprising eight Mineral Separation 18-inch sub-A cells, the first for making the lead concentrate which goes to a 20- by 8-foot thickener, from which it is conveyed by an elevator to a filter, the concentrate product being stored for shipment in a 100-ton bin and the tailings going to storage impound. The iron-zinc concentrate from the second Mineral Separation flotation 8-cell unit goes to the cyanide section, comprising standard units designed for a treatment capacity of 20 tons of gold-zinc-iron concentrate. All machines are operated by individual motors, power for the mill, as for the mine, being supplied by the West Kootenay Power and Light Company. Water-supply for the mill is pumped from the Salmo river to the 15,000-gallon tank located above the plant. At the time of writing the mill is being operated on a 24-hour basis and, commencing with 50 tons a day during the testing period, the tonnage treated is being gradually increased. H. W. Seamon is general manager, residing at the mine.

**Ymir Dundee
Gold Mining
Co., Ltd.**

The property of this recently incorporated company, acquired under agreement from the Dundee Gold Mines, Limited, comprises the *Old Bill*, *Parker*, *Lighthart*, *Annie Fraction*, and *White Pine* Crown-granted claims, which are contiguous to and immediately south of the *Yankee Girl* property, being reached by the same road extending 2 miles easterly from Ymir, on the

Great Northern Railway. The type of deposit, character of mineralization, and history of the property from 1897 to 1914 are described in Geological Survey of Canada Memoir 94 and in the Report of the Minister of Mines for 1915. The following notes are intended to be additional to the previously published information: Total production to 1914 is given as about 300 tons, averaging from \$15 to \$20 per ton, being chiefly in gold with some silver. No further activity occurred until 1934, when the present company took over the property. The description in Memoir 94 includes plan and sections of the mine. Exact elevations above sea-level are not available at the time of writing. The collar of the shaft, the original working sunk from the surface, is 904 feet in elevation above the adit, 2,954 feet long. This latter working is a few hundred feet lower than the 1,235-foot level of the *Yankee Girl* at 3,600 feet elevation. The new work done consists of raising on the ore-shoot at a point 25 feet back from the face of the long adit. The shaft, 260 feet deep, which was sunk on an ore-shoot, as has been described in the publications referred to, is about 400 feet westerly from the theoretical prolongation of the new raise to the surface. East of the shaft-collar the old outcrop workings include an adit which crosscuts the vein, exposing a width of 4 feet of heavily oxidized mineralization. The past production was derived from the shaft-workings, where a limited amount of drifting was done. When the writer visited the property in November the new 5- by 18-foot raise was up 100 feet on the steep dip of the vein. Throughout this working irregular mineralization was apparent, with, in places, concentrations of pyrite, galena, and sphalerite. At the top of the raise heavy sulphide mineralization over a width of 7 feet is in evidence. From this working eight lots of roughly sorted ore shipped to the Trail smelter totalled 307 dry tons, containing 113 oz. gold, 834 oz. silver, 25,597 lb. lead, and 25,622 lb. zinc. Improvements at the mine include blacksmith-shop and compressor-house, with office, bunk-house, dry, and stable. The compressor-house has been connected with the West Kootenay Power and Light Company's transmission-line, but for the present compressed air is being supplied from the *Yankee Girl* mine, for which purpose a new pipe-line has been laid. B. N. Sharp is in charge.

The property of this company consists of the *Morning Star* and *Evening Star*
Trites Gold Mining Co., Ltd. Crown-granted claims, with fourteen contiguous claims held by location. The claims are situated on the north side of Oscar creek, adjoining the *Yankee Girl* property to the east and north-east, being reached by an extension of the same road which serves that mine and the *Dundee*. The distance from Ymir to the Two Star property, as it is known, is 4 miles by road. The camp at the adit-level, 4,300 feet in elevation above sea-level, is situated in a gully sloping steeply to Oscar creek, the character of the ground being brushy, open, side-hill. The deposits occur in north-easterly-striking fissures cutting diagonally across argillites, schists, and quartzites of the Pend d'Oreille series, and granitic tongues from the Nelson batholith. Exposures of the igneous rock are more extensive on Two Star ground than on the *Yankee Girl* and *Dundee*, where vein strikes and dips and structural relations to the rock formations are similar. The mineralization consists of iron, lead, and zinc sulphides, with which gold values are associated. The property was acquired late in 1933 from the Two Star Mining Company, Limited, which started development, financed by A. B. Trites, of Vancouver, after an interval of many years during which the property was idle. The *Morning Star* and *Evening Star* claims, constituting the nucleus of the present undertaking, were staked prior to 1897 by T. Flynn. Subsequent work included open-cuts on both claims and the sinking of a prospect-shaft on the *Evening Star* claim. No further activity is recorded until operations were initiated in August, 1933, by J. L. Parker for the Two Star Mining Company, Limited. Towards the end of 1933 the Trites Gold Mining Company, Limited, was incorporated to carry on the work. The Report of the Minister of Mines for that year contains a description of the camp construction, compressor plant, and initial progress made. A new 350-cubic-foot Canadian Ingersoll-Rand compressor has since been substituted in the power plant, the original equipment, brought from the *Giant* mine, being kept in reserve. The surface workings on the *Evening Star* and *Morning Star* consist of open-cuts tracing the continuity of the north-easterly-striking vein. On the *Evening Star* the old shaft, at elevation 5,144 feet (collar), was sunk in an ore-shoot 95 feet on the 75-degree dip of the vein. No drifting was done in this working, which was largely filled with water until recently drained by the tapping of the same fissure in the crosscut at 4,300 feet elevation (portal). This adit, which has been driven 3,135 feet in a direction slightly west of north, starts on the *Mill Fraction* claim, passes through the *Black Diamond*, owned by the Ymir-Yankee Girl Gold Mines, Limited,

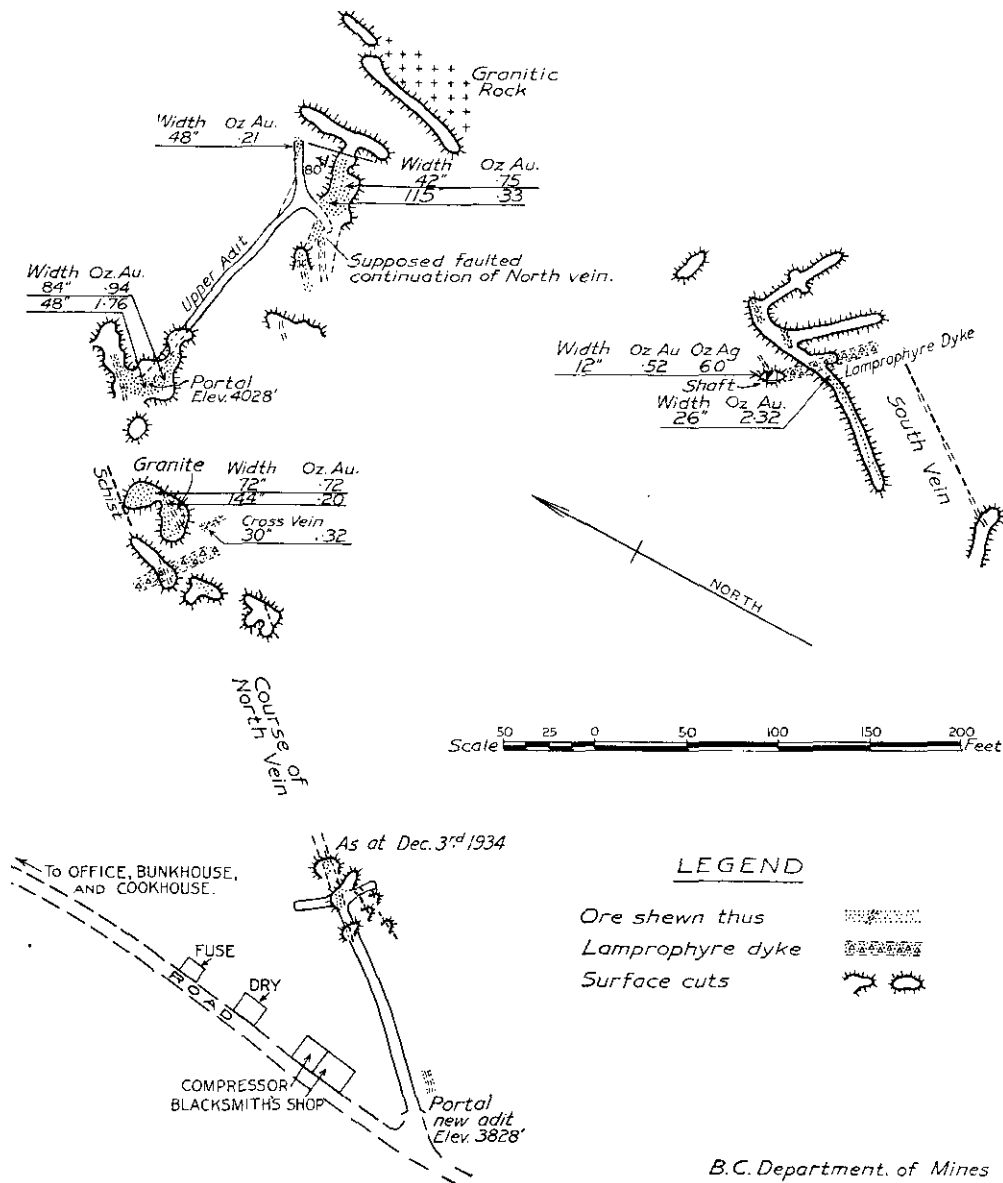
into the *Evening Star* claim. It cuts a series of parallel fissures and fissured zones, including those believed to correspond to the projected positions of the *Twilight*, *Morning Star*, and *Yankee Girl* veins. The rocks cut, measured in feet from the portal, are: From 0 to 770, granite; 770 to 1,455, interbanded quartzite, argillite, and schist; 1,455 to 1,820, granite; 1,820 to 2,253, argillite, quartzite, and schist; 2,253 to 2,429, granite; 2,429 to 2,583, chiefly quartzite and argillite, with some schist; 2,583 to 2,620, lamprophyre dyke; 2,620 to 2,832, argillite, some schist, and altered granite; 2,832 to the face at 3,135, granite. At 1,566 feet, in the second granite area, a fissure known as the *Black Diamond* is cut. This is sheared granite 3 feet wide, including a 3-inch quartz stringer mineralized with pyrite, some galena, and sphalerite. At 2,130 and 2,190 feet the adit cuts fractures containing quartz stringers, 11 and 8 inches wide respectively, and similarly mineralized, correlated as the *Twilight* vein-zone. In drifting to the east on the northern fracture faulting was encountered and, when the property was visited in November, crosscuts were being made to the north and south. The drift, 190 feet long, was in quartzite. At 2,542 feet the *Morning Star* zone of fissuring, 13 feet wide, is intersected in a quartzite-argillite area, much quartz being in evidence. At 2,955 feet a zone of fissuring 9 feet wide, in granite, is thought to be the *Yankee Girl* vein-fissure, or its *Lakeview* branch. It is evidently the downward extension of the vein-fissure on which the 95-foot shaft was sunk on the *Evening Star* claim, although standing at a steeper angle, the dip in the adit being from 80 to 85 degrees as compared with 75 degrees in the shaft. The latter working is about 285 feet westerly from the vein intersection in the adit. On November 9th 150 feet of drifting had been done to the west from the crosscut as part of the programme to test the ground below the shaft. In sections of the drift towards the face there were quartz stringers containing iron, lead, and zinc sulphides, from which selected samples gave gold and silver values similar to the general content of the ores of the camp.

The very extensive holdings of this company, of which only the *Centre Star* is herein described, comprise twenty-three Crown-granted claims, with five **Wesko Exploration and Development Co., Ltd.** leases of reverted Crown grants which are specified later, and 238 claims acquired by staking. The exact location of the Crown-granted claims, except the four included in the *Longsley* group, are shown on Mineral Reference Map 2 T 280. The general geology of the area is shown on the Geological Survey of Canada, Ymir Sheet, Map 175A, which is of a reconnaissance nature, issued in 1916, and the Salmo Sheet, Map 299A, recently published. Except for claims staked to round off Crown-granted properties, the new stakings consist of blocks and lines of claims, totalling 12½ miles in length, covering the extensions of the metamorphosed sedimentaries of the Pend d'Oreille series and Reno formation (*see* G.S.C. Memoir 172) from the Sheep Creek camp northerly. The ground staked includes a group north-east of the *Reno* property and a large area between Hidden and Active creeks. Going north-north-east from the latter point, in the vicinity of the *Howard* mine, two continuous belts of claims, separated by an extensive exposure of the Nelson batholith, lenticular in plan, extend to the head of Wild Horse (Ymir) creek. At this northern point is situated the *Longsley* property, which includes the *B.C.*, *Longsley*, *Coliseum*, and *Anaconda* Crown-granted claims. The other Crown grants, including leases, acquired by the company are: The *Carthage*, *L.M. Fraction*, *Joplin*, *Oronogo*, *Ramsey*, *Golden Calf*, and *Annie Maud*, comprising the *Carthage* group adjacent to and north-east of the *Ymir* mine property on Huckleberry creek; the *Rosalie* and *Centennial* east of and across Ymir creek from the *Wilcox* mine; the *Wren* and *Calumet* south of and across the creek from the *Wilcox*; the *Comet*, *Planet*, and *Rocket* on the north side of Oscar (Bear) creek, 3½ miles east of Ymir; the *Neb Girl* and *Bonanza* at the head of Oscar creek, 4½ miles from Ymir; the *Chihuahua*, *Eldorado*, and *Carmencita* in the angle between Porcupine and Active creeks; and the six claims of the *Centre Star* property described below.

This group includes the *Redman*, *Twilight*, *Gold Island*, *Crowfoot*, *Blind Canyon*, and *Centre Star* Crown-granted claims, with ten adjoining claims held by location. The property, situated on the south side of Oscar creek, south-east of Ymir settlement, is reached by road 3 miles long. The Ymir-*Yankee Girl* mine road is followed for half a mile to the cemetery (shown on G.S.C. Map 175A), and from there the old *Jubilice* mine road, renovated by the Wesko Company, is used for a length of 1.25 miles. From this point to the *Centre Star* workings a new section of road suitable for caterpillar-tractor haulage was built for a length of 1¼ miles. The elevation at Ymir is 2,393 feet and at

the Centre Star lower adit it is 3,828 feet. The area lies on a brushy, burned-over side-hill descending on a moderate slope to the Salmo river 3,000 feet to the west. The Great Northern Railway tracks are on the western side of the valley a few hundred feet beyond the river.

The general geology of the area is shown on Map 175A, Geological Survey of Canada. The Centre Star deposits occur as fissure-veins cutting diagonally across the trend of schistose rocks of the Pend d'Oreille series, mineral occurrences being localized where the fissures intersect



B.C. Department of Mines

granitic tongues related to the main mass of Nelson granite to the east. Lamprophyre dykes cut the fissures, which are filled with quartz and altered, silicified wall-rock, mineralized with streaks and masses of iron-stained oxidized material, denoting the original presence of sulphides. Pyromorphite was identified in one showing, assays showing up to 3 per cent. lead. The only sulphide mineralization seen was at a depth of about 100 feet at the inner extremity of the old

prospect-adit. This consisted of pyrite, galena, and sphalerite in a quartz gangue, values being chiefly in gold with some silver, as in the case of the typical ores of the Ymir mining camp. The *Centre Star* claim was located in 1900 and at that time a limited amount of work was done on one of the showings. The present operators acquired the property in the summer of 1934 and carried on systematic prospecting to trace the veins and showings on the surface. This work, as shown in the accompanying illustration, defined two vein areas designated as the north and south veins. These strike approximately north 45 degrees east, dips being from 75 to 80 degrees to the north-west. On the north vein, which is a sheared zone, 30 feet wide in places, there are three principal showings irregularly outlined by the trenching and stripping done. The first, at an elevation of 3,997 feet, is up to 16 feet wide, where sampling done in two sections 6 and 12 feet wide gave assays of 0.72 and 0.20 oz. gold per ton respectively. These and all assays quoted were supplied by the management, the results of sampling by independent examining engineers also being made available. All surface exposures are more or less oxidized and the assays quoted show the gold content found in the better sections of the outcrop exposed. The average grade of the primary mineralization below the zone of oxidation will be the ultimate criterion of value. The next showing is 60 feet to the north-east at and adjacent to the portal of the original prospect-adit, which, mostly driven in a faulted area, ran out of the mineralization in a short distance. The new trenching here, at an elevation of 4,028 feet, exposes a large irregularly shaped mineralized area. To the north-west of the adit portal a sample across 6 feet assayed 0.60 oz. gold per ton. At the portal, where cross-fracturing occurs striking south-easterly, a sample across 4 feet assayed 1.76 oz. gold per ton, and a check sample taken at the same point gave 2.44 oz. gold per ton, with 7.2 oz. silver per ton across 3 feet. Beyond here 30 feet, going north-easterly along the surface exposure, the vein appears to be faulted about 40 feet to the south-east, where it is again exposed in surface-trenching. What appears to be another faulted segment is exposed 100 feet away, going south 70 degrees east in extensive trenching varying in elevation from 4,120 to 4,139 feet. Here a sample across 10 feet, taken in three sections, averaged 0.32 oz. gold per ton, with 3.7 oz. silver per ton. East of here a sample across 3.5 feet assayed 0.75 oz. gold per ton. The eastern end of the showing appears to be cut off by another fault in a crushed and brecciated zone. Some trenches, not specified, show vein indications and north-east shearing, while in others schist, granitic rock, or lamprophyre dykes are exposed. The south vein, of smaller dimensions, lying 350 feet to the south-east, strikes in the same general direction as the north vein. A section of this vein 75 feet long is exposed in new trenching done between elevations of 4,157 and 4,182 feet. At the upper point, near which a 26-inch sample gave 2.32 oz. gold per ton, the vein is offset by a lamprophyre dyke for 20 feet to the north-west, where a short section is exposed at the collar of a prospect-shaft 16 feet deep. Here a 12-inch sample assayed: Gold, 0.52 oz. per ton; silver, 6 oz. per ton. The apparent continuation of the vein at the shaft is picked up in trenching 30 feet to the north-east at an elevation of 4,189 feet. The only appreciable underground work done before the present company took over is the prospect-adit on the north vein. This working, 132 feet long, is driven south 81 degrees east for 75 feet, where a north-westerly-striking lamprophyre dyke 8 feet wide crosses the adit. From here the course is south 60 degrees east for 25 feet; thence south 82 degrees east for 32 feet to the face, where the Wesko Company ran branches south 24 degrees west for 21 feet and north 8 degrees east for 6 feet. In the face of the last-mentioned branch mixed sulphide mineralization of uncertain definition makes its appearance. A new adit, 350 feet in at the time of writing, is being driven north-easterly from an elevation of 3,828 feet. This is a drift along the north vein which was traced to the adit-site. Crosscutting of this vein will be done when the ore-zone is reached and the south vein will be similarly tested at depth from the new adit. After the preliminary prospecting was done and road-work completed by the company, all necessary camp buildings were erected on a site adjoining the new adit and at the same elevation. These include a two-story combined bunk and cook house, compressor building, blacksmith-shop, dry, fuse-house, and powder-magazine. A Gardner-Denver 360-cubic-foot capacity compressor was installed, with drill-sharpener and oil-forge. The plant is operated by electricity supplied by the West Kootenay Power and Light Company. H. Lakes is in charge, with H. Stevens mine foreman.

While latterly all efforts of the Wesko Exploration and Development Company were concentrated on the *Centre Star* operation, work was previously done, during the period under review, at the *Carthage*, *Longsley*, and *Big Patch* groups. All this work was by hand. At the *Carthage*,

referred to in Geological Survey of Canada Memoir 94 and in the Report of the Minister of Mines for 1917, the old adit was cleaned out and some surface work done to prospect for the possible north-easterly continuation of the *Ymir* vein. Surface work was done on the *Longsley* group, and at the *Big Patch* group of claims near the head of Porcupine creek underground work in progress was discontinued for the winter.

Following the activity initiated in 1933 by the *Ymir Gold Mines, Limited*, this new company was incorporated in September, 1934, to acquire and operate the adjoining *Goodenough* and *Ymir* mine properties, which are situated on the western side of *Huckleberry* creek, in the angle between that stream and *Wild Horse* creek. The distance by road from *Ymir* is 5 miles to the *Ymir* mine, south of which a branch road leads to the *Goodenough* mine. Conditions being similar in some respects, the two properties are combined for preliminary description in these notes and later treated separately for individual attention. The ground, sloping steeply to the creeks mentioned, is burned over and covered with heavy brush. The deposits are alike, in that they occur as lenticular-shaped shoots, of widely varying size, in quartz-filled fissure-veins striking from north 65 degrees east to north 70 degrees east and dipping at from 60 to 70 degrees to the north-west. The veins cut diagonally across the strike of the enclosing schist and argillite, members of the *Pend d'Oreille* series of late Precambrian age, which trend north 5 degrees east to north 30 degrees east and dip from 65 to 70 degrees to the north-west, to vertical. The general geology of the area is shown on Geological Survey of Canada Map 175A. The mineralization consists of pyrite, galena, and sphalerite, with which gold and silver values are associated, principal values being in gold. The tonnage is quartz and altered wall-rock. O. D. Frith is in charge of work at both properties.

This property consists of the *Rockland*, *Ymir*, *Mugwump*, *Golden Horn*, *Robertson Fraction*, and *Laurence Fraction* Crown-granted mineral claims, with surface rights and a mill-site. The geology, history, development, and production of the deposits were extensively dealt with by C. W. Drysdale in Geological Survey of Canada Memoir 94, "*Ymir Mining Camp*," published in 1917. The more important references in the Report of the Minister of Mines are contained in this publication for the years 1900, 1903, and 1904. A summary of conditions was published in Bulletin No. 1, 1932, "*Lode-gold Deposits of British Columbia*." Notes by R. W. Brock are contained in the Summary Report of the Geological Survey for 1908, since which year no production has been made nor development-work done. Total past production is listed as follows:—

Year.	Tons.	Gold.	Silver.	Lead.
		Oz.	Oz.	Lb.
1899.....	17,000	5,000	20,000	500,000
1900.....	43,065	15,584	46,860	1,301,986
1901.....	69,540	25,151	80,815	2,355,736
1902.....	50,034	14,931	50,976	1,256,680
1903.....	53,970	11,543	47,196	970,869
1904.....	32,706	2,107	27,653	709,000
1905.....	22,196	4,108	20,530	370,636
1906.....	15,000	1,894	8,250	155,320
1907.....	944	202	1,795	22,034
1908.....	39	20	267	4,962
Totals.....	304,494	80,540	304,342	7,647,223

New activity was initiated in November, when a crew was put to work reconditioning the old workings in the partially exploited ore-zone. Previously extensive sampling operations had shown that, in view of the enhanced price of gold, there remained a substantial tonnage of probable ore of potential value to a milling operation. Inspection of the mine-plans, combined with an examination of the accessible workings in July, shows that there is a large block of ground still to be explored in the area east of the shaft between Nos. 3 and 10 levels. It is possible that the rake of the ore-body may be to the east, where the vein cuts hard slates similar to the formation enclosing the ore-body in the upper levels. On No. 10 level, as in other parts of the mine, much crosscutting remains to be done to test the full width of the vein, which is

generally much wider than the drift-workings. No work whatever has been done on the vein below No. 10 and there is no known geological reason why there should not be a recurrence of values at deeper horizons. New work done at the portal of No. 10 level includes construction of power-house, with auxiliary mine buildings, and grading done for a proposed surface tramway to connect this main working-adit with the building which formerly housed the cyanide plant and which has been tentatively chosen for the mill under consideration for the combined *Ymir* and *Goodenough* operations. The old 80-stamp mill and buildings at the No. 10 adit portal were destroyed by fire many years ago.

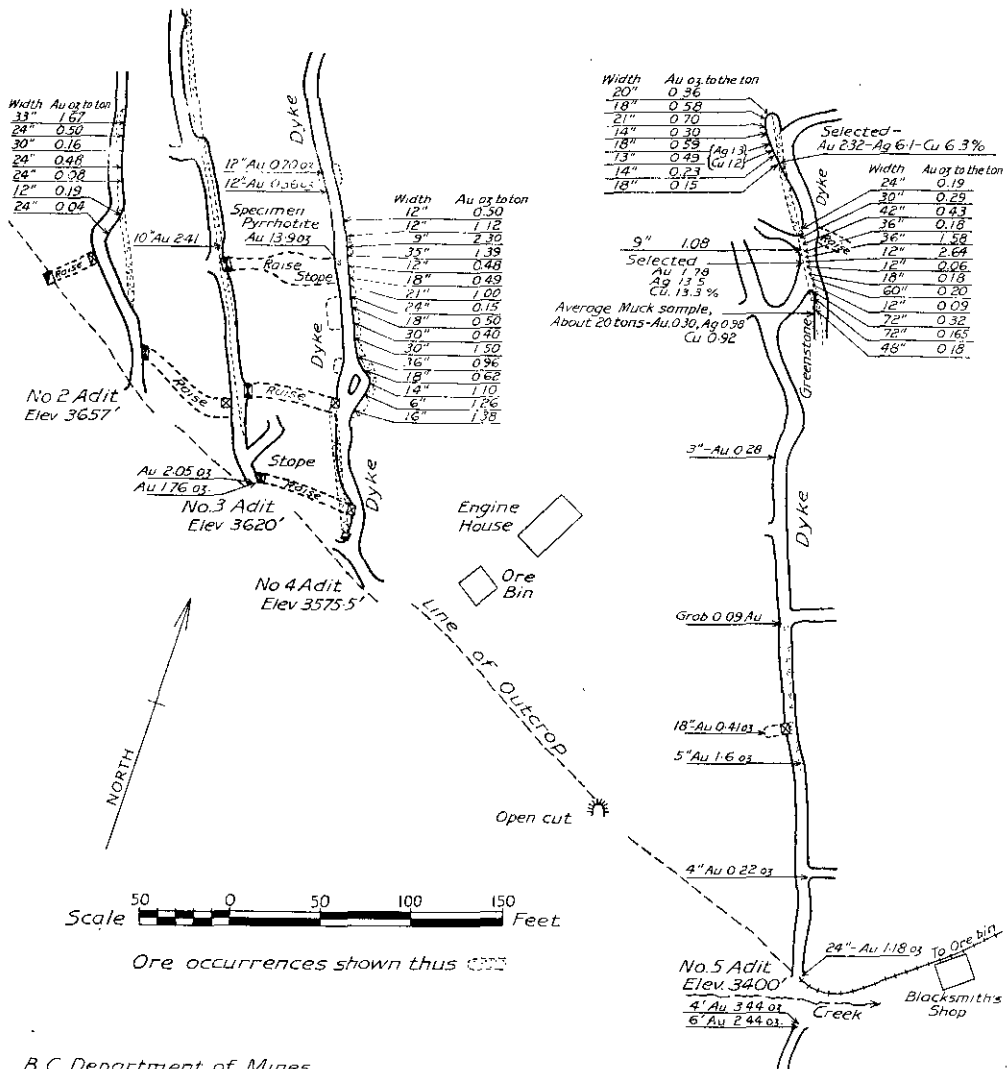
Goodenough. This group, adjoining the *Ymir* property to the south-west, includes the *Gibraltar*, *Goodenough Fraction*, and *Alma* Crown-granted claims, with eight contiguous claims held by location. The *Goodenough* was staked in 1898. In 1899 the *Ymir* Gold Mining Company took an option on the property and sunk a shaft 60 to 70 feet deep. The next record of development-work being done is in the Report of the Minister of Mines for 1923, since when progress has been recorded annually in this publication and in Bulletin No. 1, 1932, "Lode-gold Deposits of British Columbia." Past production consists of crude-ore shipments to the Trail smelter, itemized as follows: 20 tons in 1898, 323 tons in 1926, 1,306 tons in 1927, 1,608 tons in 1928, 337 tons in 1929, 1,086 tons in 1930, 408 tons in 1932, and 4,263 tons in 1934. Of these, the first 20-ton shipment assayed \$22 per ton; and the 4,660 tons shipped between 1926 and 1930 contained 3,993 oz. gold, 30,283 oz. silver, and 431,091 lb. lead. Shipments during the period under review were suspended in October pending consideration of milling plans. Development-work includes the extension of No. 1 level easterly along the vein towards the ground below the two surface shafts mentioned in previous reports, and the putting-up of a raise on the vein on the No. 3 (or lowest) level. This was up 175 feet recently and drifting was proceeding in both directions at the 100-foot intermediate level. The raise-workings follow the foot-wall pay-streak, 3 feet wide, which was first encountered 40 feet up from No. 3 adit.

Wilcox. At this mine, on the north-west side of Wild Horse creek, 7 miles by road from *Ymir*, work was continued by D. H. Norcross, J. J. Cullinane, and associates operating under lease from the *Ymir-Wilcox* Development Company. The property comprises the *Warwick*, *Bywater*, *Willcock*, and *Fourth of July* Crown-granted claims, with one claim held by location and a mill-site. Extended descriptions of the property are contained in Geological Survey of Canada Memoir 94 and in the Report of the Minister of Mines for 1915. These include an outline of the history to 1914 and itemize past production, the bulk of which was made in 1910 and 1911, when the mill was operated. Total production to 1911 is given as 8,450 tons, valued at \$86,326.44. The mine remained idle since the year 1914, when development-work ceased, until 1930, when F. A. Hebbard, of Vallejo, California, put 500 tons of ore through the 10-stamp mill. Work was discontinued by Hebbard in 1931. The present operators took over the property under lease in 1932, since when work has been continuous, except for winter shut-downs. They milled 607 tons in 1932 and 1,694 tons in 1933, from which gold-silver bullion was produced and concentrates shipped. References to the activities specified are contained in the Report of the Minister of Mines for the years 1930 to 1933, inclusive.

In regard to 1934 operations, 1,680 tons of ore was milled during the period between April and December. From this 515 oz. gold and 531 oz. silver was produced and 146 dry tons of concentrates shipped to Trail. The latter contained 135 oz. gold and 512 oz. silver, with some lead and zinc. D. H. Norcross reports that the greater part of the season's production was derived from a stope on the east side of the main raise between Nos. 2 and 3 levels. This stope was started in 1933 and work revealed that the ore-shoot at this point extended much farther east than was indicated on the No. 2 level above. In the east face of the stope the vein has pinched against the large lamprophyre dyke which separates Nos. 1 and 2 ore-shoots. Conditions on the east side of the dyke have not yet been determined. Stoping was also done above No. 2 level, vein-widths being so erratic as to necessitate leaving of barren ground as pillars. A new adit started on No. 1 ore-shoot outcrop, 60 feet above and east of No. 2 adit, was run for a distance of 140 feet, disclosing a short shoot of good-grade ore from which about 200 tons was milled.

Blackcock. This Crown-granted claim, owned by A. McMillan, of Calgary, lies to the south-west of the *Wilcox* property, being reached by a short branch from the same road. No mining was done in 1934, but a survey of the old workings

was made by A. H. Green Company for the owner, who reports that the property is to be opened up again during the coming season. A description of the accessible workings and a résumé of past production is contained in the Report of the Minister of Mines for 1928. A reference to the *Blackcock* is contained in Geological Survey of Canada Memoir 94, but some confusion apparently occurred in identifying the boundaries of this claim, as the vein is described as belonging to the general north-south (magnetic) trending system of veins and as occurring in the same roof-pendant as the adjoining *Sterling*. The *Blackcock* vein, as developed by nine workings distributed along an outcrop length of 672 feet, strikes approximately east-west and the country-rock is granite. The roof-pendant is believed to lie west of the workings and it would be of interest to trace the vein from the granite into the altered sedimentary rock. The *Blackcock* vein is well mineralized and wider at the western end towards the roof-pendant and gets narrow and weak as it extends farther into the granite in the opposite direction. The lower adit, inaccessible in 1928, has been opened up.



B. C. Department of Mines.

Clubine Comstock Gold Mines. From Company's Plans.

BOULDER MILL CREEK.

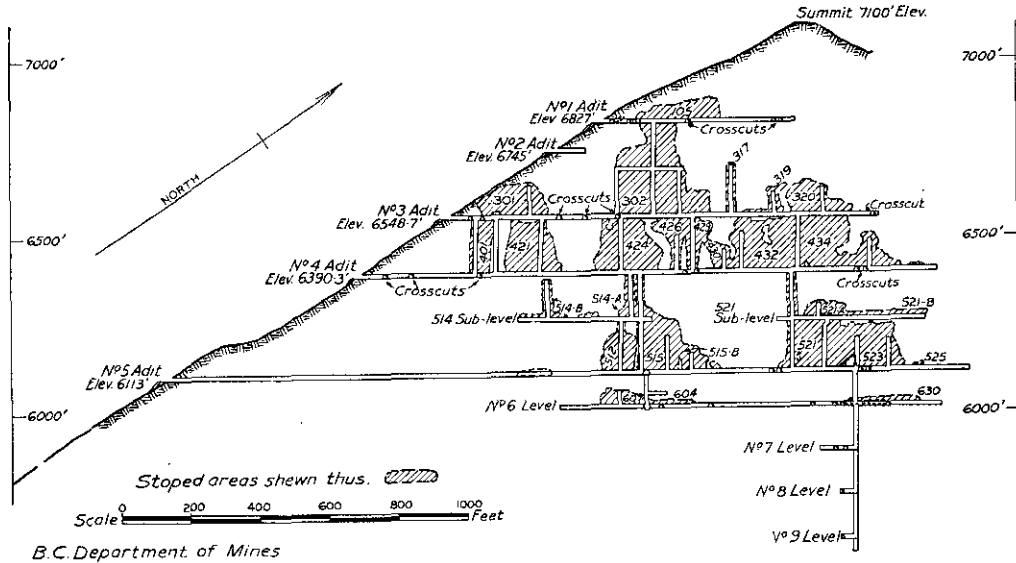
**Clubine
Comstock
Gold Mines, Ltd.** This company's property on Boulder Mill creek now consists of nineteen claims held on location, including the *Boulder City* group of eight claims under option to purchase. The *Maggie* Crown-granted claim is under lease from the British Columbia Government and the *Snow Slide* and *Snow Slide No. 1* on Hall creek are held on location. The *Boulder City* group, 3 miles north of Salmo, is described in Geological Survey of Canada Memoir 172 and its precise location is shown on the accompanying Map 299A. The property is now connected by branch road, 1.5 miles in length, with the highway near Boulder Mill Station on the Great Northern Railway. The *Boulder City* group has been under development by L. R. Clubine for the above company since 1931 and references to progress of development-work are contained in Bulletin No. 1, 1932, "Lode-gold Deposits of British Columbia," and in the Report of the Minister of Mines for 1932 and 1933. First appreciable production was made in 1931, when 24 tons was shipped. In 1932 shipments aggregated 174 tons, 57 tons in 1933, and 100 tons in 1934. Camp buildings include bunk and cook house, office, garage, and blacksmith-shop. The mine plant consists of an 80-horse-power Junkers truck type Diesel engine belted to a 348-cubic-foot capacity Sullivan compressor, together with a 35-horse-power Le Roy gasoline-engine and a 100-cubic-foot capacity Canadian Ingersoll-Rand compressor, all housed in one building. The transmission-line of the West Kootenay Power and Light Company, passing along the highway to the east, is conveniently accessible whenever the provision of electric power becomes desirable. Operations were handicapped due to the necessity of sending to Germany for new parts for the Junkers engine, work latterly having been carried on by hand. The accompanying illustration shows the present extent of the workings, stoped areas, and assays in ore-shoot areas. The newly opened-up mineralization on No. 5 level differs in character from that exposed in the upper levels in this respect: that, whereas the mineralization in the latter is largely oxidized down to the No. 4 adit, there is practically no oxidation in evidence on the bottom level. Here the quartz contains chalcopyrite, pyrite, and pyrrhotite, with occasional specks of galena and sphalerite. The gold content in the primary mineralization appears to vary directly with the proportion of sulphides present, the best values being where the quartz contains a mixture of the different sulphides. A more extended programme of development is under consideration to include extension of No. 5 adit to the north-west, raising in the ore-shoot from No. 5 to No. 4 level, and sinking a winze below No. 5.

SHEEP CREEK CAMP.

The writer's notes on the properties specified hereinafter are intended to be read in conjunction with Memoir 172, Geological Survey of Canada, which forms the basis for a proper understanding of geological and economic conditions of the camp and which includes information concerning past production and historical data. Map 299A, accompanying Memoir 172, shows the precise location of the properties. Several of the mines using water-power were severely handicapped during the phenomenally dry summer months, but adequate and dependable power is now assured through the extension of the West Kootenay Power and Light Company's transmission-line from Ymir to Sheep creek via Salmo. Branch connections have been made with the *Reno*, *Gold Belt*, *Kootenay Belle*, and *Queen* mines.

**Reno
Gold Mines, Ltd.** Progress of this company's operations is recorded in the Reports of the Minister of Mines for the years 1928 to 1933, inclusive, and in Bulletin No. 1, 1932, "Lode-gold Deposits of British Columbia." Total production from 1928 to 1934, inclusive, amounts to 49,100 oz. gold and 24,700 oz. silver. During 1934 development-work and production were curtailed during the late summer and fall owing to the unusually low-water conditions. Production, therefore, fell below expectations. Since the mine and mill were supplied with full power requirements in November the full scope of the operation has been vigorously resumed. In December production amounted to 1,993 oz. gold and 896 oz. silver. The output for the year was 16,000 oz. gold and 8,700 oz. silver, 26,895 tons being treated in the mill in 279 days' run. Development totalled 3,115 feet. The major feature to report is the sinking of the shaft to a point 515 feet below No. 5 level, the lowest station being established at 475 feet. Development-work from the shaft has advanced on Nos. 7 and 8 levels, and some ore was encountered at both vein intersections which are in between the two main ore-bodies and below ground in which the vein was not productive on No. 6 level. Additional development will be necessary to determine the extent and character of the new ore occurrences on the lower

levels in the shaft. Crosscutting to the vein on No. 9 level is to be started shortly. According to data supplied by the management in November the eastern ore-shoot on No. 6 level was 236 feet long, 2.5 feet wide, assaying a little over 1 oz. gold per ton; and the western ore-shoot on the same level was 290 feet long, 2.78 feet wide, assaying 1.62 oz. gold per ton. Ore reserves, estimated by the management on a basis of blocked out and probable ore, were from 40,000 to 50,000 tons of 0.7 oz. gold per ton. The mill has been gradually stepped up to 100 tons a day and over, but 3,000 tons a month is expected to be maintained. At the end of August the management was taken over by W. R. Lindsay on the retirement of I. M. Marshall.



Reno Mine. Longitudinal Section—looking North.

The following notes report progress at this company's property during 1934. It is described in the Reports of the Minister of Mines for 1932 and 1933. **Gold Belt Mining Co., Ltd.** During the period under review development-work was continued chiefly on the 200-foot level, from which seven car-loads of ore, aggregating 291 tons, was shipped between June and December. During the period of water-power shortage, when the Reno plant was unable to supply current to the company, work was carried on with a 230-cubic-foot portable gas-compressor. Since commercial power became available towards the end of the year the full scope of development operations has been resumed. A progress report and résumé of conditions on the 200-foot level of the Gold Belt is as follows: The workings from the crosscut, started at 5,389 feet elevation on the Clyde, extend into the Bruce Fraction, Sunbeam Fraction, and Double Joint claim. The crosscut, driven north 23 degrees west for 535 feet, is then continued for 790 feet along a course of north 25 degrees east, the face being at the time of writing 1,325 feet in from the portal. The relative position of the various veins and fissures, and amount of drifting done on them, on the 200-foot level is detailed in the appended list:—

Vein.	Distance from Portal of Crosscut.	DRIFTING DONE.		Remarks.
		East.	West.	
Bruce.....	176	215	45	Angle in crosscut at "C" vein Intersection. 12-inch quartz-filled fissure. Fissure 4 inches wide. 18-inch quartz-filled fissure in schist, 400 feet below outcrop.
" D ".....	388	402	308	
" C ".....	535	136	75	
" F ".....	1,163	12	Nil	
" G ".....	1,287	Nil	Nil	
" A ".....	1,325	Started	Nil	

On "C" vein the raise, situated in the west drift 75 feet from the crosscut, was continued to the surface, 220 feet above the 200-foot level at this point, and drifting was done on the 50-, 90-, and 120-foot levels measured down from the top. Along the outcrop the ore-shoot is 155 feet long. Stoping has been done for this length between the surface and the 50-foot level, where drifts extend 105 feet to the east and 71 feet to the west. Drifts started at the 90-foot level are in 28 feet to the east and 20 feet to the west. On the 120-foot level drifts extend 284 feet to the east and 22 feet to the west. In the eastern working the first 30 feet from the raise is in a fault-zone, from 30 to 50 feet ore has been stoped, and from this point to the face spots of high grade, which will be mined for shipment, occur in the quartz. In the 200-foot level east drift commercial mineralization is restricted to the section 40 feet long adjoining the crosscut. In the west drift, where the vein is followed 75 feet to the schist-contact, the quartz is low grade. In "D" vein high-grade sulphide ore 4 to 15 inches wide was opened up in sections on both sides of the crosscut. Measured in feet from the crosscut, stoping has been started in the east drift from 10 to 80, 110 to 225, and 280 to 320. Measured in feet from the crosscut, ore in the west drift extends along sections 15 to 75 and 265 to 302. Stoping on "C" and "D" veins for shipment has been selective, the average width of ore mined being 8 inches. Shipments from above the 200-foot level were as follows:—

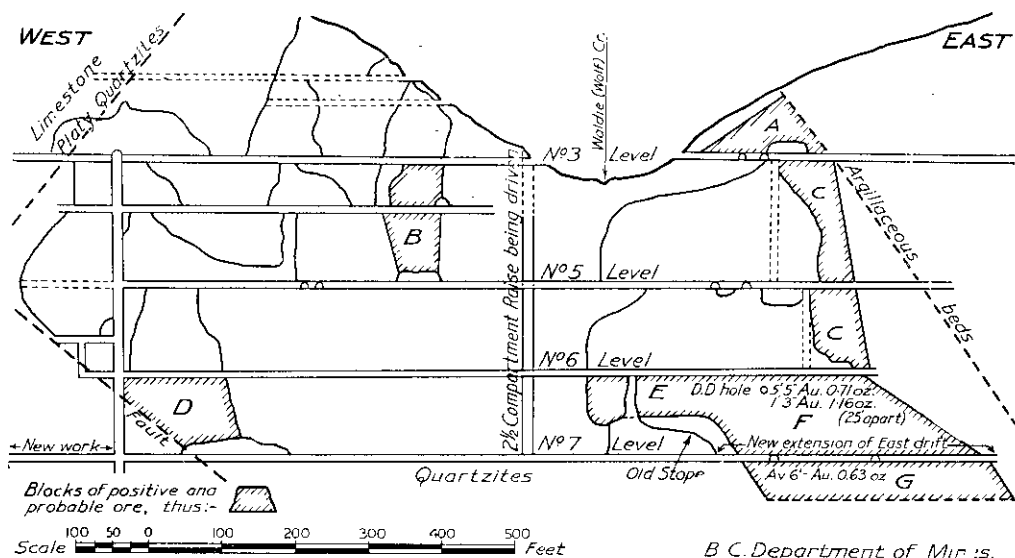
Dry Weight (Pounds).

From "D" Vein.	From "C" Vein.	Gold Assay. Oz. per Ton.
91,198	.....	4.155
.....	89,019	1.456
.....	97,773	1.47
.....	94,144	1.6375
46,125	16,000	2.021
67,782	.....	2.0755
.....	80,000	1.714

The "A" vein, a well-defined fissure exposed in open-cuts along the outcrop 400 feet above the crosscut, is now being drifted on to the east to test it in the quartzite. It was intersected by the crosscut in a schist-zone. During the summer surface prospecting located the "E" fissure, which is believed by the management to be the western extension of the *Nugget* vein. Eventually the 200-foot level crosscut may be extended to cut this also. The 600-foot level crosscut, at an elevation of 4,943 feet, is driven north 28 degrees west for 1,381 feet, converging towards the 200-foot level crosscut. Where both adits cut "C" vein they are 130 feet apart horizontally. The deep adit was extended to cut the "C" vein, on which drifting was done for 28 feet to the east and 60 feet to the west. Bunches of ore occur here in a broken section of the vein. Drifting was also done on the "D" vein for 129 feet to the east and 197 feet to the west, exposing streaks of quartz in crushed material, the country-rock consisting of thin-bedded schists, and on the *Bruce* for 186 feet east and 166 feet west. Future plans include the putting-up of a raise on "D" vein, from a point in the west drift 140 feet from the main crosscut, to the 200-foot level. This will explore "D" vein below the ore-body being stoped and provide an outlet for the ore from the upper levels. Installation of a pilot-mill of 50-ton capacity is under consideration as part of the development programme and to test the milling competency of the veins, such as the "C" and "D," where dilution will necessarily occur to get a stoping-width. The veins approximate a vertical position permitting narrow stoping. Tentative plans include an aerial tram 6,000 feet in length to connect with a proposed mill-site adjoining the Sheep Creek road near Hausen's at the junction of the *Reno* mine road. M. O'Donnell is mine foreman and H. Lakes manager.

This company's *Queen* and *Vancouver* properties were described in Geological Survey of Canada Memoir 172. This includes the number and names of **Sheep Creek Gold Mines, Ltd.** claims, the precise location of the constituent sections of the property, type of deposit, character of mineralization, outline of the history, description of accessible workings, and past production (to 1928). Since this date minor activities occurred at intervals, as mentioned in the Report of the Minister of Mines for the years 1929 to 1933, inclusive, but no important production was made.

The present company took over in September, 1933, since when important progress has been made toward the re-establishment of the *Queen* mine as a commercial producer. Unwatering of the *Queen* lower workings was finished late in February, 1934, and the mine was then cleaned up sufficiently for a thorough inspection. Air-lines were put in and about 1,000 feet of diamond-drilling was done, most of this footage being located to prospect the central part of the vein below No. 5 level in an area as yet unproductive. Active development-work was started early in May, the main point of attack being on No. 7 level east. At that time the face of this drift was on the vein, but it was not of commercial grade. Values began to show at a point 40 feet beyond the original face and continued for a length of 360 feet. This section was sampled by the management both by daily muck samples and moiled samples at 5-foot intervals. The latter averaged 0.63 oz. gold per ton over drift-widths. A raise put up from the old stope west of the new section of drift indicated by exposure on three sides a block of ore of a mining grade of 0.40 oz. gold per ton. In computing this average, allowance was made for 20 per cent. dilution. In estimating ore reserves 50 feet of depth below the No. 7 east drift was assumed, giving



Queen Mine. Longitudinal Section—looking North. From Company's Plans.

values of 0.51 oz. gold per ton, allowing the same ratio of dilution as above this level. Two crosscuts in the eastern ore-zone at this horizon show a zone of parallel fracturing up to 45 feet wide. The partially blocked-out ore, referred to previously, lies mainly along the northern wall of the fractured zone. The southern side of the zone carries some values, as in the crosscuts which expose 4-foot widths of 0.25 oz. gold per ton. Next to this south wall below No. 6 level, a diamond-drill hole showed a 1.5-foot width assaying 1.16 oz. gold per ton. However, the mineralization along the southern wall considered as possible ore has not been taken into consideration in tonnage figures. Ore reserves indicated by new exposures, together with the blocks of stope-ground left in the mine, are estimated by the management to assay 0.42 oz. gold per ton. The accompanying section shows the areas estimated by the management as reasonably assured ore. Blocks A, B, C, and D consist of ore partially developed and not mined for the reasons hereinafter stated. Block A is estimated to be 0.55-oz. grade. An attempt was made to mine this section by previous operators, but, where stoped, a width of about 11 feet was taken, whereas the actual width of the vein is from 1 to 2.5 feet. The dilution was therefore too great for profitable mining. Excessive dilution also occurred in the case of Block B, estimated to be 0.61-oz. grade, where the vein is 3 feet wide and a stope-width of 15 feet was carried where mined. In the case of Block C, estimated to be of 0.30-oz. grade, this is marginal

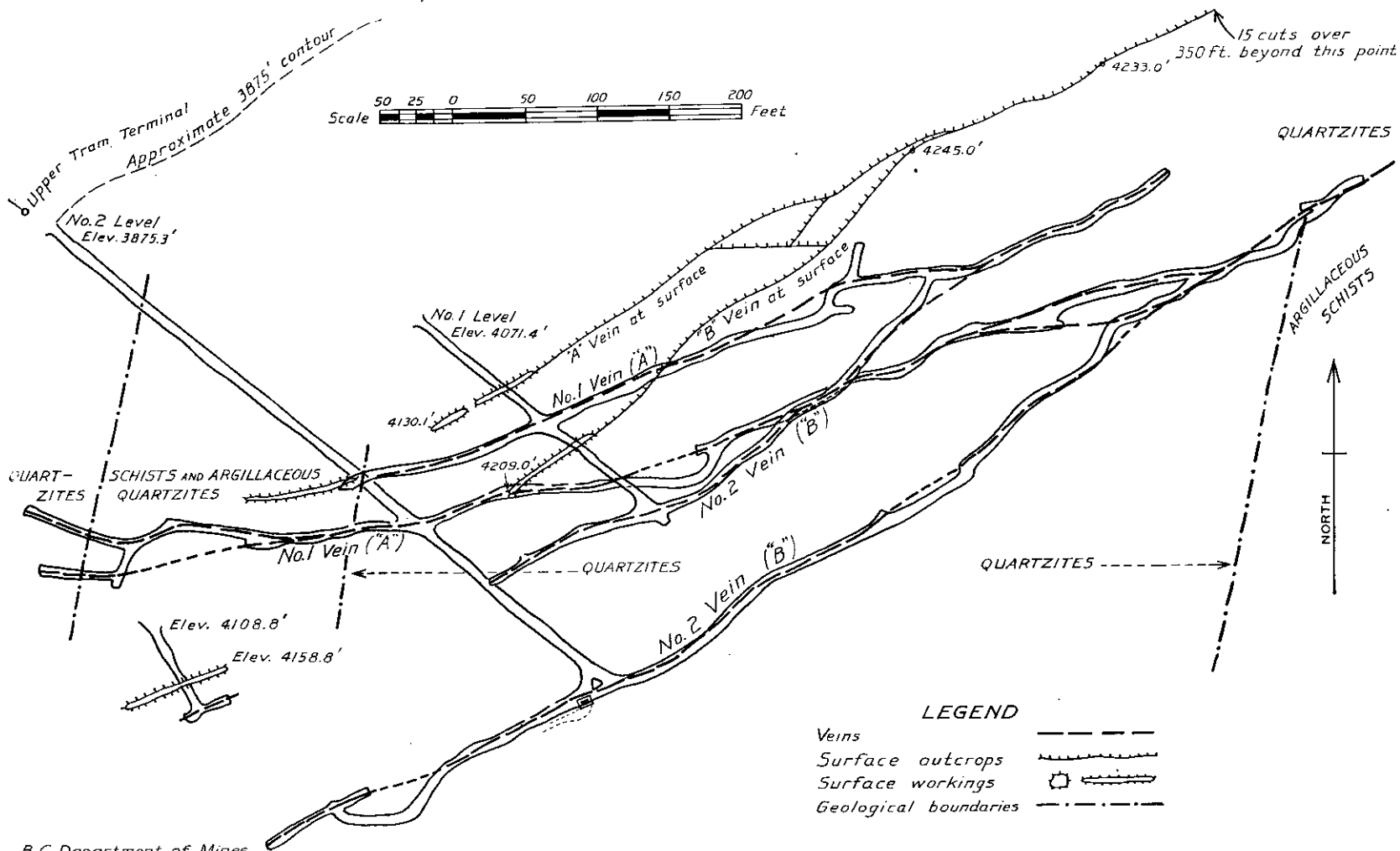
ore, the grade of which being tentative owing to the impossibility of sampling this area thoroughly without incurring considerable expense. Block D is estimated to be 0.21-oz. grade. Here a very soft foot-wall brought the mining-width up to 15 feet, thus reducing the grade below commercial limits. Summarizing these tonnage figures, Blocks A, B, C, and D in the old section of the mine are estimated to contain 0.34-oz. grade gold per ton and new ore indicated by Blocks E, F, and G to contain 0.46-oz. gold per ton. These combined average 0.42 oz. gold per ton. In the old workings, shown on the accompanying illustration, there were two major ore-shoots. The west shoot was mined down to a fault, but in the former work was not picked up below and west of this fault. Recent work at the western end of No. 7 level, totalling 115 feet, consisted of the extension of the west drift underneath the fault and crosscutting to the north-west in the direction of the throw as indicated by the geological evidence. This work disclosed the vein, which was drifted on for 69 feet to the west, but values here were below commercial grade. The new section of vein exposed, averaging 5.3 feet in width, is stated to lie on the northern side of a well-defined vein 10 to 15 feet in width. Drifting is proceeding with a view to locating ore in the faulted area on this level. Underground development, handicapped by shortage of power during the summer, has been speeded up since commercial power was secured from the West Kootenay Power and Light Company. The major feature of the new work is the 2½-compartment vertical raise being driven to the surface from No. 7 level, which will become the main working-shaft of the mine. After connection is made with the surface this shaft will be sunk first to open up the proposed No. 8 level 150 feet below No. 7. Camp buildings have been improved, assay office, steel and machine shop were erected, and an Ingersoll-Rand 1.050-cubic-foot compressor provided. This is being driven by a 177-horse-power motor. The new 150-ton mill, for which the foundations and building are completed, is conveniently situated to the location of the collar of the new shaft. Bulk samples for mill tests were sent to the Department of Mines at Ottawa and to the General Engineering Company at Salt Lake City. Straight cyanidation indicating an extraction of 97 per cent. was decided upon. The flow-sheet, designed by the company mentioned, calls for a separate coarse-crushing plant connected by conveyor-belt with the fine-crushing section and tank-room. Machinery for the mill will be put in by degrees.

Some new work has also been done by the present operators on the *Yellowstone*, *Alexandra*, and *Vancouver* veins. In the case of the first mentioned, developed by three adits with a total combined footage of drifting and crosscutting of 2,030 feet, two short diamond-drill holes were put in. On the *Alexandra* vein, developed by three adits with a total footage of 1,545 feet, 235 feet of new work done in the lowest level did not disclose minable widths of ore. On the *Vancouver* vein, opened up by two adits totalling 300 feet, a new lower adit started 250 feet below the second level was advanced 275 feet in low-grade vein material. The favourable formation, however, has not yet been reached. H. E. Doelle is in charge of operations.

The accompanying illustration shows progress of development-work since the **Kootenay Belle** property was fully described in Geological Survey of Canada Memoir 172. **Gold Mines, Ltd.** During 1934 exploration was continued chiefly on No. 2 level, where new sections of ore were opened up on Nos. 1 and 2 fissures, respectively known as "A" and "B" veins. Prior to the recent installation of the mill, stoping by the company has been of a selective nature to obtain shipping-ore, of which 824 dry tons was shipped in 1934 up to October 13th. "A" vein, in which ore-widths vary from a few inches to 2½ feet, has been generally high grade as compared with the wide "B" vein, which, except in a few places where pay-streaks occurred, was low grade. In this connection good milling values in "B" vein on No. 2 level, over widths up to 10 feet, were recently reported. As, in the case of "A" vein more especially, dilution may have an important bearing on what will constitute milling-ore, and values fluctuate in short spaces laterally and vertically, ore reserves are difficult to estimate with exactitude. Geological boundaries are shown approximately on the plan. Ore occurrences, as summarily described hereinafter, are taken from the assay-plans supplied by the management in November, since when new ore disclosures are reported. The ore previously mined has chiefly been oxidized, but sulphides have recently appeared on No. 2 level in both "A" and "B" veins, where the quartz content contains pyrite accompanied in places with galena and sphalerite. On the "A" vein, No. 1 level east drift, sampling shows the possible extension to the east up to 100 feet of the stope situated above the adit-crosscut vein intersection. This stope,

of irregular outline, is 70 feet long at the outcrop, with a maximum length of 85 feet midway between the surface and No. 1 level drift, where it was mined for a length of 40 feet. Connecting with this main stope by sub-level, 80 feet long, driven to the east from a point 75 feet above No. 1 level, there is a small stope extending to the surface. It is below this ground that sampling shows milling values on the level below. Going easterly along the No. 1 level drift, there is a length of 95 feet in which eight samples average 7.15 oz. gold per ton over 11.5 inches. This ore is opposite the intersection of "A" and "B" veins, 65 feet of the ore-body lying west of the junction and 35 feet to the east. "B" vein, going south-westerly from the intersection, shows a length of 25 feet which averages 0.57 oz. gold per ton over 27.3 inches. The north-east end of this showing goes into the southern wall of the working for a short distance to the actual point where the veins unite. Going south-westerly along "B" vein drift, sampling shows scattered values, mostly low grade, to the western extremity beyond the adit-crosscut. The possible downward extension of the ore-shoot, selectively mined above the crosscut-"B" vein intersection and described in Memoir 172, is indicated on the No. 1 level drift, where samples show mineralization over a length of 30 feet and widths from 51 to 99 inches, values of interest being confined to the hanging-wall pay-streak 4 to 12 inches wide (six samples average 0.885 oz. across 9.2 inches). The quartz and quartzite on the foot-wall side assays from 0.04 to 0.10 oz. per ton. These samples are just west of the crosscut; 25 feet to the east there is a winze in which ore is reported to have been exposed.

On No. 2 level, 195 feet vertically below No. 1, ore developments are briefly as follows: The 201 stope, immediately below the previously described "A" vein stope on No. 1 level, is 90 feet long, having reached a height of 125 feet, leaving 70 feet of backs to the adit above. A drift run 25 feet to the west from the top of the 201 stope opened up exceptionally high-grade oxidized ore over widths from 6 to 12 inches, indicating increased length to the ore-shoot in this vicinity. In the adit below 201 stope sampling over a length of 50 feet averages 1.64 oz. per ton across 13.1 inches. The western stope, situated above and just west of the adit-crosscut intersection, was carried through to connect with the old working stoped underhand from the surface. It has been mined for a length of 55 feet along the No. 2 adit drift and above this level increases to 65 feet in length. Below this, and immediately west of the main crosscut, ore is exposed in a shallow underhand stope 35 feet long, which averages 7.5 oz. gold per ton across 7.22 inches. Measured in feet from the crosscut along "A" vein west drift, this underhand stope extends to 35. From 35 to 115 the pay-streak averages 1.36 oz. across 5.6 inches. From here to the face the main drift follows the northern of two fractures on which sampling from 190 to 235 averages 2.23 oz. across a pay-streak 2.8 inches wide. Sampling at two points of the adjoining hanging and foot wall gives assays of 0.39 and 0.66 across widths of 24 inches in each case. From here to the face at 267 values are very low. At 195 a 30-foot crosscut extends southerly to cut the other fracture which was drifted on westerly for 53 feet, the vein here being tight and values poor. Going easterly along "A" vein drift, measured in feet from the crosscut, the vein is picked up beyond 201 stope at 218 on the other side of the section of broken ground. From this point to 343 samples show low average gold content, the better values being confined to narrow streaks. From 401 to 498, on the foot-wall side, values average 0.64 oz. across 16 inches. On the hanging-wall side, where a spur or cross vein strikes easterly towards "B" vein, five samples between 413 and 437 average 1.04 oz. across 11.8 inches. At 466 another sample, taken where the working is widened to expose the easterly-striking split, assayed 2.53 oz. across 10 inches. In the main drift from 558 to 607 values are 1.06 oz. across 9.5 inches. This last section is opposite the intersection of "A" and "B" veins. From 664 to 674 three samples average 1.24 oz. across 16 inches, the last point mentioned being 29 feet from the face of the "A" vein east drift. Going south-westerly along "B" vein drift from point 584, where the two veins unite, for a length of 25 feet samples average 0.46 oz. across 31 inches. At points 49 and 69 feet from point 584 two samples assayed respectively 0.79 oz. across 40 inches and 1.27 across 35 inches. The last sample is where the cross-fracture previously mentioned at point 566 apparently strikes "B" vein. The next point of interest continuing south-westerly along "B" vein drift is where milling values extend from points 108 to 143 feet from 584. Recent work here is said to have exposed 5 feet of ore assaying 0.40 oz. per ton in another area of cross-fracturing. In the section 290 feet long between this shoot and the adit-crosscut there are two mineralized sections, 50 and 30 feet long respectively. In the case of the last mentioned,



BC Department of Mines.

Kootenay Belle Mine. From Company's Plans as at November, 1934.

extending easterly from the crosscut, samples average 0.72 oz. across 8.2 inches. The other section, from 160 to 218 feet easterly from the crosscut, is very low grade where exposed. Westerly along "B" vein drift, just beyond the crosscut, three samples in a length of 20 feet average 2.12 oz. across 9.7 inches. Towards the end of this working, where "B" vein is picked up again beyond the broken ground and drifted on 20 feet easterly, samples average 0.98 oz. across 21.6 inches. These are exclusive of good values found in places on the hanging- and foot-wall side of the samples given. Beyond this section of ore to the west face vein-widths are narrow and average values low. Installation of the new Hardinge-Hadsel mill was completed towards the end of November. Individual motors are supplied for the different machines. The rated capacity is from 50 to 60 tons working three shifts. From the 300-ton bin the ore, up to 8-inch size, is fed to the Hadsel mill, the outside dimensions of which are 16 by 7.5 feet. The crushed ore passes through three Montezuma gold-traps (from which the gold goes to an amalgam-barrel) to the Hardinge spiral classifier, the coarse material being returned to the Hadsel mill and the fines going to two 3- by 6-foot blanket-tables, from which gold goes to amalgamation and the fines to four Union Iron Works pattern flotation-cells. The concentrates, going to three 8- by 4- by 4-foot settling-tanks equipped with sucker units, will be shipped to the smelter. The tailings from the flotation unit are finally treated on a 3- by 6-foot blanket-table, from which gold goes to amalgamation and the tailings into the creek. According to the management, 588 tons was crushed in twenty-one days' operation in December, or 28 tons per day working two shifts. During most of that period flotation tests were being made concurrently with adjustment of the plant. Commercial power supplied by the West Kootenay Power and Light Company is in use for the mill and replaces the Diesel engines for driving the compressors. New additions to the camp buildings included a bunk-house at the mine and accommodation at the mill-site. F. M. Black is managing director, W. G. Norrie-Loewenthal consulting engineer, with Frank Phillips in charge at the mine. J. P. MacFadden has been appointed as resident engineer-superintendent.

At this company's *Aspen* property, near the head of the creek similarly named, **Salmo-Malartic Mines, Ltd.** exploratory work was resumed in 1933 and continued throughout 1934, P. F. Horton being in charge, with H. C. Boydell, of Toronto, acting in a consulting capacity. The latter represents the Arntfield Mining Syndicate, which is financing the work. Essential information, which includes the economic geology of the *Aspen* and other silver-lead-zinc deposits in the Pond d'Oreille limestone-belt, is contained in Geological Survey of Canada Memoir 172, in conjunction with which the present notes are intended to be read. The property was visited by the writer in June, to which time work had been concentrated at the northern end of the workings.

Progress of development is taken from the survey by A. H. Green Company, made available by the mine management. The most northerly working, an adit at 4,724.5 feet elevation, has been extended south-easterly along the limestone and is now 435 feet in from the portal. A raise at the face connects with the working driven north-westerly along the same limestone-band from the crosscut at 4,770 feet elevation (portal). Since this working was described by Walker as the "adit below No. 1" in the publication referred to, the north-western branch, then in 110 feet, has been extended and is now 370 feet in from the main crosscut to the previously mentioned raise connection. This raise continues to the surface at 4,835.8 feet elevation. For a combined length of 500 feet on the two levels separated by the raise low-grade zinc mineralization is in evidence, the associated minerals being pyrite, pyrrhotite, and sphalerite, with occasional specks of galena. Since the writer inspected this new development, work has been resumed in the "B" inclined shaft, the collar of which, at an elevation of 4,800 feet, is 340 feet south-east of the portal of the crosscut previously mentioned. "B" shaft, down 225 feet according to the management, dips to the north-east, being headed for the face of the 130-foot north-west branch of the "B" crosscut (portal elevation 4,635 feet) previously described as the "long adit." The flat dip of the shaft, however, is expected to put it over the top of the adit which is being approached and with which connection will be made. "B" shaft is sunk on the limestone-band in line with the light sphalerite mineralization mentioned by Walker as being noted at a point 285 feet in from the portal of the long adit. No further work has been done in the "H" tunnel, situated to the south at elevation 4,536 feet, or other workings of the property. In September 18.28 dry tons of silver ore, containing small percentages of lead and zinc, was shipped from the "B" shaft and adjoining outcrop.

ERIE CREEK SECTION.

This mine, situated on Erie creek, 13 miles from Erie, is owned by the Relief-
Second Relief. Arlington Mines, Limited, the control of which was acquired in the spring
 by the Premier Gold Mining Company. The Report of the Minister of Mines
 for 1933 contains an extended description of the property, with vertical projection, when it was
 being operated by W. G. Norrie-Loewenthal, representing the controlling interest then held by
 the W. N. O'Neil Company, of Vancouver. Other references to the *Second Relief* in the same
 publication include those for the years 1904, 1915, 1927 to 1930, inclusive, and Bulletin No. 1,
 1932, "Lode-gold Deposits of British Columbia." These record the history and past production.
 Since the Premier Gold Mining Company took over the operation in June development has been
 vigorously prosecuted, though at first handicapped for power by low-water conditions and
 subsequent interruptions through forest fire and snowslides. In November the new 60,000-volt
 power-line, 7.5 miles in length from Porto Rico Siding to the mine, was completed by the West
 Kootenay Power and Light Company. A step-down station to 480 volts was erected close to
 the mill building. New buildings erected include those to accommodate a crew of up to 100
 men, with three residences for the staff. New equipment installed for the mine includes a
 Canadian Ingersoll-Rand angle compound compressor of 1,430-cubic-foot capacity (at an altitude
 of 4,000 feet), driven by a 250-horse-power synchronous motor. Electric motors now drive the
 mill units. In spite of the difficulties encountered a substantial amount of underground work
 was accomplished, consisting of 1,868 feet of drifting and crosscutting, with 102 feet of raising.
 In No. 5 level a shaft-station was cut, hoist installed, and a start made on sinking. Drifting
 done included the continuation of Nos. 3 and 5 levels into *Ida D.* ground, previous work having
 been stopped at the boundary of this claim, the outstanding interest in which was acquired when
 the Premier organization took over. In the new drifting on No. 5 level an ore-shoot was opened
 up having a length of 200 feet and a width of 3 feet, the average assay being 0.99 oz. gold
 per ton. Stoping has been started in this section, which is in virgin ground, 700 feet below
 the surface. The 2-compartment vertical winze will first be sunk to a depth of 180 feet and
 a drift under the ore-zone will be made at the 150-foot level. Milling has been conducted on
 a basis of 40 tons a day, the average grade of the ore for the year being about 0.6 oz. gold
 per ton. Mill practice has been simplified by realignment, which eliminates the shaking screen,
 one concentrating-table, the Drag classifier, and the amalgam-barrel. No direct gold-recovery
 is now made, the recovered values all being in the concentrates which, since the latter end of
 June, have been going to the Tacoma smelter. In addition to its function of producing revenue,
 the mill has been run more or less experimentally to determine the appropriate flow-sheet to
 use in the event of mine-development warranting a larger mill. S. M. Manning, of the Premier
 organization, is in charge.

PEND D'OREILLE RIVER AREA.

This group of eight claims is owned by W. H. Miller, W. J. Hale, and
You and Me. G. Maitland, of Salmo. The property lies along the ridge half a mile to
 the west of Tillicum (15-Mile) creek and a few hundred feet above the road
 which branches off the Pend d'Oreille River road to Limpid (16-Mile) creek. The area is shown
 on Geological Survey of Canada Map 299A, Salmo Sheet. The workings seen are on an open
 side-hill of from medium to fairly steep slope. The deposits consist of quartz-bands and
 silicified rock formed along a zone of shearing in greenstone of the Beaver Mountain-Rosslund
 group. The strike, looking uphill, varies from north to north 20 degrees west and north 15
 degrees east, the dip being steep to the west. Mineralization in the quartz and altered wall-
 rock consists of disseminated pyrite with occasional galena and sphalerite, economic values
 being in gold and silver. The claims are recent locations following prospecting by the owners.
 When visited late in the fall work done at this point consisted of four surface workings within
 a length of a few hundred feet. Numbering from the northern (or upper) end and going south,
 these are as follows: Nos. 1 and 2 are shallow cuts in which the outcrop is not well exposed;
 Nos. 3 and 4 are closely spaced, comparatively large excavations. In No. 3 working there is a
 width of 22 inches of iron-stained quartz on the hanging-wall side which assayed: Gold, 0.10 oz.
 per ton; silver, 2 oz. per ton. Adjoining this to the foot-wall side there is from 6 to 8 feet
 of quartz and silicified rock containing light pyrite mineralization. A sample across 8 feet in
 the floor of this working assayed a trace in gold and silver. At No. 4 surface working, where

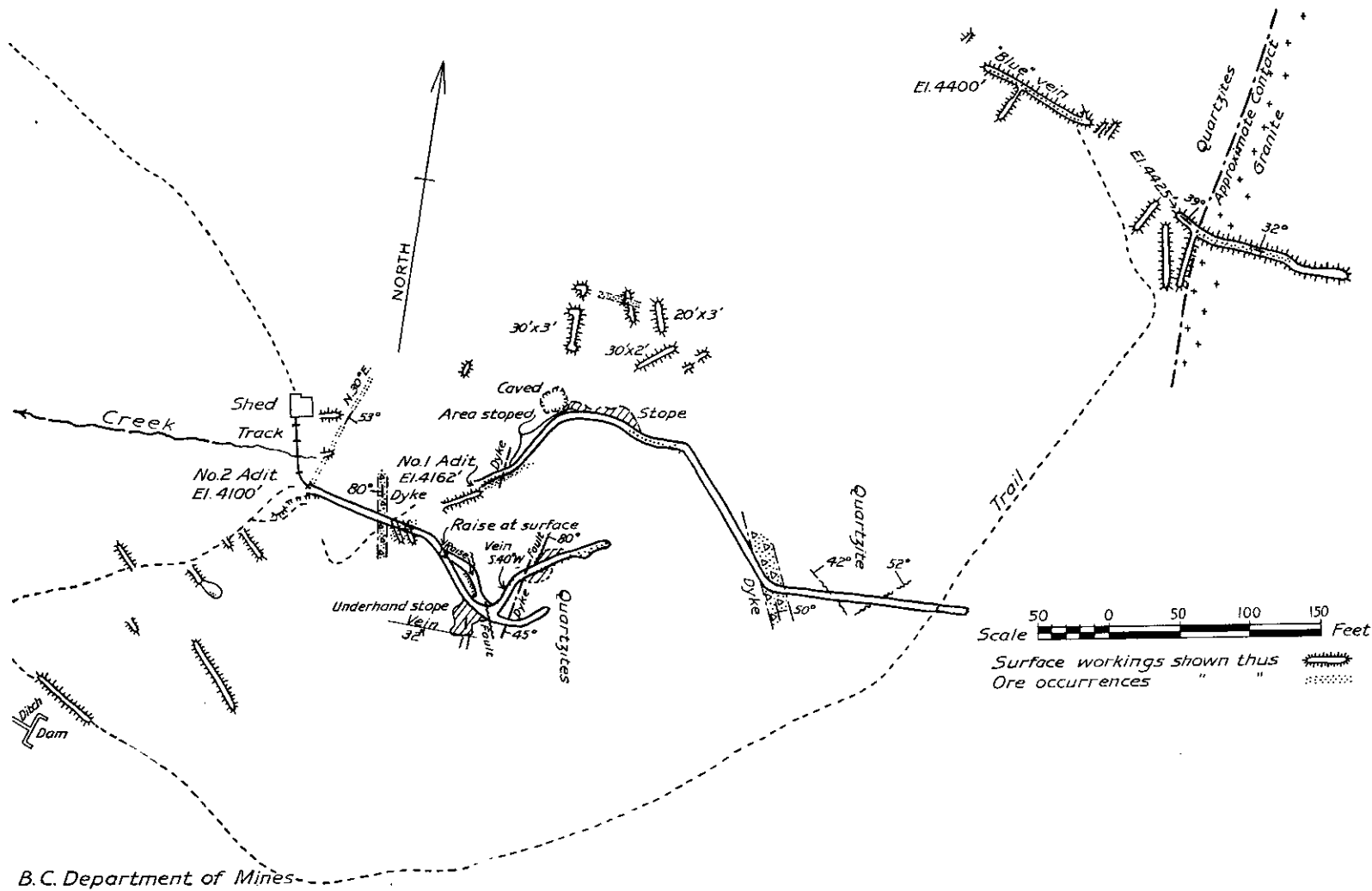
an adit has been started since the writer's inspection, the mineralized zone is 6 feet wide, of which 10 inches of rusty quartz on the hanging-wall side assayed: Gold, 0.20 oz. per ton; silver, 2 oz. per ton. The adjoining 4 feet, consisting of scattered quartz stringers mineralized with pyrite, a little galena and sphalerite, was not sampled. Selected sulphide ore from this place assayed: Gold, 0.40 oz. per ton; silver, 4 oz. per ton; copper, *nil*; lead, 4 per cent.; zinc, 2 per cent. Substantially better values in gold are reported to have been encountered during recent work.

This group, owned by the recently incorporated Bunker Hill (Waneta) Mines, **Bunker Hill.** Limited, consists of the *Bunker Hill* and *Mormon Girl* Crown-granted claims, with fourteen adjoining claims held by location. The property is on the eastern side of Limpid (16-Mile) creek, a tributary of the Pend d'Oreille river from the north-east. Its exact location is shown on Geological Survey of Canada Map 299A. A branch road following Limpid creek connects the new lower camp, at the foot of the trail to the workings, with the Pend d'Oreille River road. The latter is approached either from the Nelson-Spokane highway to the east or from Trail to the west. The early history of the *Bunker Hill* and conditions existing there before new activity was initiated in 1933 by the Bunker Hill Gold Mines, Limited, a private company, are described in Geological Survey of Canada Memoir 172, and the 1933 work is referred to in the Report of the Minister of Mines for that year.

The rocks underlying the area are mapped as belonging to the Reno formation. In the vicinity of the explored area they consist principally of impure quartzite, with occasional thin bands of argillite. An intrusion of granite is exposed above and to the east of the underground workings. Recent investigations have disclosed the presence of easterly-striking quartz-filled fissures cutting across the quartzitic rocks in addition to the north-easterly-striking veins referred to in previous reports. All dips are to the south-east or south at angles from 35 to 45 degrees. The formation has been intruded by lamprophyric and aplitic dykes which cut some of the veins. Gold values are associated with pyrite, which occurs disseminated through the quartz. The operation of the old 10-stamp mill erected in 1900 is reported to have been of very short duration as the ore was not amenable to straight amalgamation, the gold values being chiefly associated with pyrite. There is no record of any production having been made prior to 1933, when 50 tons of ore was shipped. The 1934 shipments totalled 91 tons. Since 1933 the old workings were cleaned out and a considerable amount of prospecting-work has been done, chiefly on the surface. The accompanying illustration shows the extent and relative position of the workings from the survey made in October by P. S. Barratt, assistant to A. G. Langley. No. 1 adit, not previously accessible, follows a curving course, ore having been stoped in former years for a length of about 130 feet. Part of this stope has caved from the surface. Beyond the stope the vein is lost and the working meanders into the hill for 257 feet. In No. 2 adit, 62 feet in elevation below the upper working, ore has been stoped underhand for a width of about 4 feet, a length of 16 feet, and to a depth of 15 feet below the level. The ore extracted was roughly sorted, sacked, and hauled to the Trail smelter by motor-truck. The several lots aggregating 91 tons, shipped from this stope in 1934, contained 57 oz. gold and 40 oz. silver. The continuation of this vein westerly down the hill has been sought by deep trenching to bed-rock through the heavy mantle of overburden. In some of the trenches gold values, associated with broken ledge-matter, are present, but the vein has not been sufficiently exposed to determine its true character at these points. Sampling in No. 2 adit for a length of 50 feet east of the fault averaged 0.37 oz. gold per ton across 4 feet. Several other veins are indicated in trenching on the side-hill above the underground workings, one of which is in granite. Prospecting-work on these has not reached the stage where they can be described in detail. It is considered possible that strong quartz-exposures, about 100 feet to the north of and above No. 1 adit, may have some relation to the main vein system. The presence of an ore-body is definitely indicated by the work so far accomplished; just how big an ore-body can only be proven by further development. The formations in the vicinity of the workings are considerably disturbed. To the west, or down the hill, conditions will possibly be more regular.

PLACER-MINING.

The usual seasonal activities occurred: In the Pend d'Oreille River area on and near the mouth of the Salmo river; on Rover and Forty-nine creeks west of Nelson; and on Hall creek



B.C. Department of Mines

Bunker Hill, Waneta. From Company's Plans by Langley and Warren.

south of Nelson. On Forty-nine creek a small crew was employed for a period by the Black Watch Syndicate, of Edmonton. No developments of importance are reported.

KOOTENAY LAKE AREA.

Bayonne. This group, owned by the Bayonne Gold Mines, Limited, consists of the following ten Crown-granted claims: *Ohio, Columbus, Bayonne, Oxford, Virginia, New Jersey, Delaware, Kentucky, Maryland, and Illinois.* An option has been acquired by A. C. Frost, of Seattle, and preliminary work done includes construction of 13 miles of caterpillar-tractor road. The property is situated at the head of Bayonne creek (North fork of Summit), a tributary of Summit creek which flows easterly into the Kootenay river, joining the latter stream south of Kootenay Landing. The present means of access is by the recently completed road, 23 miles in length, extending to the camp from Tye Siding on the Canadian Pacific Railway between Procter and Kootenay Landing. From this point the road follows Cultus creek for 6 miles, over which section trucks are used; then continues southerly over a low divide for 8.5 miles to Next (Canyon) creek, which is followed for 3.5 miles; thence easterly for 5 miles to the mine camp at 6,300 feet elevation. The section from Cultus creek to the *Bayonne* is a caterpillar-tractor road. The claims cover gently sloping, well-timbered, summit country, being located towards the southern extremity of the Bayonne batholith, which is related to the Nelson batholith, and consists of granitic rocks several hundred square miles in extent lying for the most part along and west of Kootenay Lake. The main vein system consists of a series of fissures cutting the granodiorite in a direction north 60 to 85 degrees and dipping at from 80 to 85 degrees to the south. The vein-filling is quartz and altered granite, the ore-minerals being chiefly pyrite with occasional galena and sphalerite. In the oxidized portions of the veins the pyrite, with which gold values are chiefly associated, is largely altered to limonite. Conditions are described and the history of the property recorded in the Reports of the Minister of Mines for the years 1904, 1915, 1929, and 1930, and in Bulletin No. 1, 1932, "Lode-gold Deposits of British Columbia." The main system of fissuring includes two parallel veins, of which only one has been developed underground. A characteristic feature of the veins is their persistency along the strike. On the surface, as at many points underground, the sulphide minerals are oxidized and the included or adjoining country-rock stained with iron oxide. Thirty or more open-cuts trace what is apparently the same (or south) vein for a length of 3,500 feet up the hillside, which slopes gently at about 9 degrees. In almost every case these expose a strong quartz vein consisting in some of the cuts of a foot- and hanging-wall band of quartz, with decomposed country-rock between. The other vein, 300 feet to the north, has been trenched for a considerable distance along the outcrop, the superficial workings having caved in. All the trenches indicate that this vein was located.

The present notes deal with the economic data not previously published. The underground workings on the south vein consist of three adit-levels known from east to west as the *Bayonne, Ohio,* and *Virginia* adits, at relative elevations of 6,915, 6,395, and 6,240 feet above sea-level. The *Bayonne* adit, temporarily inaccessible when visited by the writer, is described by Galloway in the Report of the Minister of Mines for 1915 as being about 500 feet in length. In all cases assays given are based on several independent sampling operations. The enriched oxidized surface mineralization is not included in the sampling. The *Bayonne* adit develops one ore-shoot 160 feet long, on which a raise extends 37 feet to the surface and a winze is sunk 23 feet. The average assay of this ore-body is 1.02 oz. gold per ton across 3.8 feet. Two samples taken across 3 feet of quartz at the bottom of the winze assayed: Gold, 7.20 oz. per ton; silver, 0.9 oz. per ton; lead, 1.6 per cent.; copper, *nil*; and: Gold, 0.80 oz. per ton; silver, 0.7 oz. per ton; lead, 1.6 per cent.; copper, *nil*. The *Ohio* adit does not develop the ground below the *Bayonne* level, the two portals being about 2,100 feet horizontally apart. In this working the vein has been followed for 1,400 feet. Measured in feet from the portal, three ore-shoots are developed between points 200 to 370, 420 to 450, and 850 to 960. At 360 the first mentioned, 170 feet long, is further developed by a raise 70 feet to the surface. Average values in this shoot are 1.05 oz. gold per ton over 2.6 feet. The second ore-shoot, 30 feet long, averages 0.61 oz. gold per ton across 2.9 feet. The third ore-shoot averages 0.36 oz. gold per ton across 3.6 feet as sampled along the working. One hundred and ten feet above the level the raise passes out of the ore which rakes to the east. Throughout the 110-foot section in the raise the ore averages 0.525 oz.

gold per ton across 3.4 feet. The *Virginia* adit starts as a crosscut for 350 feet, from which point the vein is followed for 650 feet to the face. It extends 400 feet below the *Ohio* adit. Results here are indefinite, the mineralization being narrow and confined to short lengths. It is considered possible that this adit is not driven along the main vein and may follow a parallel minor fracture, some crosscutting being necessary to clear up this point. A 30-foot length of rich mineralization, but of too narrow width to mine, is exposed in this level at a point below the ground near the portal of the *Ohio* adit. The road extension was completed late in November and mine-development has been postponed until the spring. W. S. Harris is in charge of the new undertaking.

NEAR KITCHENER.

Sullivan. This property comprises seven claims, none of which is Crown-granted, on the southern side of the Goat River valley, 2.5 miles west of Kitchener. The workings are on the southern side of the highway and Canadian Pacific Railway tracks and 600 feet in elevation above them. The claims, formerly owned by the late J. A. Sullivan, were relocated in 1934 on behalf of W. C. Conn, of Vancouver, and associates, who installed a portable gas-compressor and carried on development-work for a short period during the summer. No appreciable change has occurred since this prospect was described by Langley in the Report of the Minister of Mines for 1919. In addition to the main vein mentioned, there is a series of similar fissures cutting the hornblende diorite, quartz being developed in them in places. Pyrite and chalcopyrite occur occasionally disseminated through the quartz. Samples taken by Langley and the writer failed to show appreciable gold or silver values associated with the small percentage of copper present at selected points. The country-rock is believed to be part of a sill, the rocks of the area being mapped by S. J. Schofield, Geological Survey of Canada Map 147A, as the Aldridge formation.

GOLDEN MINING DIVISION.

Burns Basin Gold Mines, Ltd. The property with which this company is concerned includes the *Flying Dutchman* and seven other claims, all being held by location. The claims are situated on the northern side of Bobbie Burns creek, formerly known as the Middle fork of the Spillimacheen river, south-east of the *Robert E. Burns* group of Crown-granted claims in Bobbie Burns basin. These are shown on the Glacier Park, Sheet No. 82, Topographical Survey of Canada, published by the Department of the Interior, Ottawa. The company's property is reached by pack-trail about 35 miles in length from Parson, on the Canadian Pacific Railway south of Golden. This distance can be reduced by several miles if the short-cut route to Carbonate Landing is used, but at the latter point there is no bridge over the Columbia river. The claims cover the steep slope adjoining the small creek which drains Bobbie Burns basin in an old burned-over area which is now covered with scattered second growth. The surrounding formation is composed of metamorphosed sedimentaries, probably members of the Windermere series of late Precambrian age, which are shown to extend along Bobbie Burns creek on the illustration, Fig. 13, page 222A, "Reconnaissance in the Purcell Range West of Brisco, Kootenay District, B.C.," published in Geological Survey Summary Report, 1925, Part A. The formation, in Bobbie Burns basin as well as adjoining the main valley, is folded and fractured across the bedding to form a schistose structure. Rock types vary from a grey, quartzose schist to dark slaty schist in which cubes of pyrite are a characteristic feature. The deposits, which have so far been found only in the area covered by the dark schists, consist of quartz in elongated lenses or filling small fractures, mineralization being chiefly pyrite, which occurs in massive form or irregularly disseminated through the quartz. Exclusive of the old *Flying Dutchman*, which is a relocation, the claims constituting the company's property were staked by agents on October 6th, 1934, after previous stakings by the same representatives, found to be irregular, were abandoned. The *Flying Dutchman*, as also the *Robert E. Burns* group, with which this report is not directly concerned, were described by the late W. Fleet Robertson in the Report of the Minister of Mines for 1898. No mining has been done in the immediate area since then. The only development done on the property of the Burns Basin Gold Mines, Limited, is on the *Flying Dutchman* claim, where two adits were driven in the nineties on separate quartz-exposures. The upper adit, at an elevation of 6,350 feet, is a crosscut driven north-westerly for about 115 feet. At 23 and 30 feet in from the portal 12-inch

quartz stringers are cut which strike north 80 degrees east and dip at 38 degrees to the north. At about 65 feet in from the portal a branch working 24 feet in length cuts a lens of quartz up to 34 inches wide. A sample at this point gave no appreciable values in gold and the two quartz stringers previously mentioned showed no evidence of mineralization. The lower adit, at an elevation of 6,125 feet, is a crosscut driven north-westerly for about 65 feet to its intersection with a quartz vein, tightly frozen to the wall-rock, which strikes about north 60 degrees east and dips at 60 degrees to the north-west. A curving drift 60 feet long exposes short sections of the vein, 20 to 36 inches wide, at opposite extremities of this working, the central section being left in the south-eastern wall of the adit. A sample at the south-western face assayed 0.46 oz. gold per ton across 21 inches. Samples at the opposite face were: Across 36 inches, which assayed 0.04 oz. gold per ton; and the same section, in two cuts 24 and 12 inches wide, which assayed respectively: Gold, *nil* and 0.06 oz. per ton. The latter cut on the hanging-wall side was heavily mineralized with pyrite, the assay results indicating erratic gold content in the iron sulphides. A selected sample of massive pyrite taken from the *Robert E. Burns* property at the head of Bobbie Burns basin, which is owned by Eastern Canadian interests, assayed 0.80 oz. gold per ton. There is at present no camp accommodation or mining equipment of value on the ground of the Burns Basin Gold Mines, Limited, the preliminary work done having chiefly consisted of cleaning out the debris at the portals of the old *Flying Dutchman* adits. From Parson to the South fork of the Spillimacheen river the trail has been kept open by G. W. Edwards, of the Witwatersrand Syndicate, in connection with his undertakings on Vermont creek. From that point to the Burns Basin area the trail in September was in very bad condition with dense brush and much fallen timber. This is due to the lack of activity in the Bobbie Burns Creek section, where the last mining activity was that by the Alpha Mines Syndicate, Limited, in 1923 in the International basin.

WINDERMERE MINING DIVISION.

Key. This group of four claims, held by location and owned by the Blake Bros., of Skookumchuck, is situated at the head of the South fork of Doctor creek, about 1.5 miles north of the 50th parallel and 4 miles west of the 116th meridian. The property is reached by an old trail, largely obliterated, and some 12 miles in length from the upper end of the logging-road extending up Findlay creek from a point on the highway 3 miles north of Canal Flats. The claims are new locations covering the basin towards the summit and lying largely above timber-line at elevations ranging from 8,000 to 9,000 feet above sea-level. Prospecting in the early days is indicated by a short adit and some shallow cuts. The area, which lies between the Windermere and Cranbrook Sheets of the Geological Survey of Canada, has not yet been geologically mapped. The claims are staked along the trend of quartzite strata, including rusty-weathering argillaceous bands, which locally strike north and south with a dip of 64 degrees to the west. A large area of granitic rock is exposed across a deep gulch to the east of the quartzites. Below the tent-camp, towards the northern extremity of the claims and on the western side of a small creek, mineralization consisting of galena, with iron sulphides and minor amounts of sphalerite, occurs in decomposed pockets and streaks in an intensely metamorphosed and sericitized band of quartzite 80 to 100 feet wide. A grab sample of this material assayed: Gold, 0.02 oz. per ton; silver, 9.2 oz. per ton; lead, 17 per cent.; zinc, 1.5 per cent. This band, compressed into small, sharp folds, is weathered dark brown to black. Along the foot-wall of this band, which is underlain by rusty-weathering hard quartzite, similar mineralization is more strongly developed in streaks, from which heavy slabs of mineral were detached. A selected sample of this material assayed: Gold, 0.02 oz. per ton; silver, 45 oz. per ton; lead, 48.7 per cent.; zinc, 2 per cent. On top of the eastern bank of the creek and close to the camp, at a roughly estimated elevation of 8,200 feet, open-cuts have been made to prospect mineralization associated with two porphyritic granite dykes cutting quartzite. The structural relationship of the formations is not clear in the shallow workings, but adjoining the dykes, several of which are indicated in the immediate vicinity, the quartzite is contorted and folded. The two dykes exposed, as well as the adjacent quartzite, are irregularly mineralized with pyrite, occasional galena, sphalerite, and chalcopyrite. An unidentified grey metallic mineral was also noted, possibly an antimonial sulphide. Selected samples assayed: Gold, 0.04 oz. per ton; silver, 2.5 oz. per ton; copper, 0.2 per cent.; and: Gold, trace; silver, 6 oz. per ton; lead, 11.9 per cent.; zinc, 1 per cent. Towards the southern end of the claims, at the top of an

extensive talus-slope below the bluffs forming the western side of the basin, and at about 9,000 feet elevation, open-cuts and stripping over a length of 600 feet expose a vein, 2.5 to 6 feet wide, which strikes north 30 degrees east and dips at from 60 to 65 degrees to the north-west. The enclosing formation is a diorite-sill. Mineralization consists of iron sulphides with occasional galena, sphalerite, and chalcopyrite in a gangue of quartz and siderite. A composite sample assayed: Gold, 0.08 oz. per ton; silver, 12 oz. per ton; copper, 0.8 per cent.; lead, trace; zinc, 1 per cent. The Blake Bros. have been actively prospecting the area and have repaired the old trail up the South fork of Doctor creek so that pack-horses can be used.

PLACER-MINING.

In this Division placer-mining was conducted at several points, including Findlay and Dutch creeks, no production of importance being reported.

FORT STEELE MINING DIVISION.

Lily May.

This group of claims, owned by H. Kershaw, of Fort Steele, is situated on the south-east side of Wild Horse creek, opposite a point about a mile below Victoria gulch. The workings are at an elevation of about 6,300 feet, or approximately 3,500 feet above the creek-level. The property is reached by steep trail, which also gives access to the adjacent *Dardanelles* group, about 2.5 miles in length from the end of the Wild Horse Creek road 10 miles from Fort Steele. The country-rock is composed of fine-grained argillaceous quartzites striking north-south and dipping at 40 degrees to the west. The quartz vein, 5 to 30 inches wide, which follows the contour of the very steep side-hill, strikes north 10 degrees west, with a dip of from 30 to 32 degrees to the east into the hill. Small irregular greenstone dykes older than the vein, striking east-west, cut the formation in the vicinity of the vein. Mineralization consists of iron sulphides and galena disseminated through the quartz, which is only slightly oxidized. Samples taken indicate that the gold values vary with the proportion of sulphides present. The property, including its past history, was described by W. Fleet Robertson in the Report of the Minister of Mines for 1898 under *Tit-for-Tat*. The surface workings consist of stripping and open-cuts tracing the continuity of the vein. In the section examined the width of the vein-outcrop is from 5 to 18 inches. Distributed over a length of a few hundred feet, underground workings consist of four shallow inclined shafts sunk on the vein dipping flatly into the hill and a short crosscut which has not reached the vein. Commencing at the northern extremity, No. 1 incline is 20 feet deep, through-out which length the vein, 5 to 12 inches wide, is continuous. A sample at the face across 12 inches of iron-stained quartz, containing some galena, assayed: Gold, 0.22 oz. per ton; silver, 2.4 oz. per ton; lead, 4 per cent.; zinc, trace. One hundred feet southerly the next working is a 35-foot inclined shaft in which the rusty quartz, 18 to 30 inches wide, also contains galena. A sample taken across 16 inches at the face assayed: Gold, 0.38 oz. per ton; silver, 3.2 oz. per ton; lead, 5 per cent.; zinc, trace. One hundred feet southerly there is a 10-foot inclined shaft in which the vein is up to 15 inches wide, no sulphides being in evidence. A sample across 9 inches of rusty quartz at the face assayed: Gold, trace; silver, trace. The next working, 75 feet to the south, is an 8-foot crosscut which has not reached the vein, 18 inches wide as exposed at the outcrop just beyond the face. The most southerly underground working, 60 feet from the last, is an inclined shaft, said to be down 30 feet, partly filled with water. A sample across 26 inches of quartz, containing no apparent sulphide mineralization, at a point 8 feet down from the collar, assayed: Gold, 0.08 oz. per ton; silver, 0.4 oz. per ton. It is stated that open-cuts to the south of the latter point trace the extension of the vein in this direction.

Marysville Mining Co.

This company was incorporated under Dominion charter on June 7th, 1934. The British Columbia properties of this company are reported to be the *Evans* group on Whitefish creek, the *Dardanelles* on Wild Horse creek, and the *Wellington* on Hellroaring creek. The last two are stated to be held under option. The *Evans* property is referred to in Geological Survey of Canada Memoir 76, "Geology of the Cranbrook Map-area, British Columbia," and in the Report of the Minister of Mines for 1915. The *Wellington*, owned by the J. Angus Estate, is described in the Report of the Minister of Mines for 1932 and in Geological Survey of Canada Summary Report, 1932, Part A. References to the *Dardanelles*, owned by E. Banks, are contained in the report of the Minister of Mines for 1898 and 1925. No appreciable amount of work is known to have been done since

the latter mention. Two samples taken in the 55-foot inclined shaft on the *Dardanelles* assayed as follows:—

Location and Description.	Width.	Gold.	Silver.	Lead.	Zinc.
	Inches.	Oz. per Ton.	Oz. per Ton.	Per Cent.	Per Cent.
Galena-streak 20 feet down from collar.....	7	0.08	5.0	43.0	Trace
Quartz with galena-streak and slight copper-carbonate stain 30 feet down from collar	54	0.20	1.0	Not assayed	Not assayed

The other inclined shaft, said to be down 217 feet, was inaccessible a short distance below the collar. A sample taken here across 2 feet of quartz, containing disseminated galena, assayed: Gold, 0.10 oz. per ton; silver, 2.5 oz. per ton; lead, 16 per cent.; zinc, trace. Gold values fluctuate and a thorough sampling of the vein-exposures would be necessary to arrive at an approximation of the average gold content.

Big Chief. This group of claims covers the steep wooded side-hill between the forks of Boulder creek, which flows into Wild Horse creek from the east at a point about 6 miles above Fort Steele. Access is by the Boulder Creek trail for a roughly estimated distance of 5 miles from the Wild Horse Creek road. Two porphyry dykes—one 2 feet wide, strike 35 degrees, dip 58 degrees north-west; the other 24 feet east, 15 feet wide, strike 55 degrees, dip 50 degrees north-west—cut phyllites, striking 65 degrees, dip 72 degrees north-west.

The larger dyke is jointed more or less along the strike and in the main working calcification is quite pronounced along some of the joints. Mineralization, consisting of a little quartz galena, pyrite, and chalcopyrite, occurs in the jointing of the dyke and in the phyllite close to the contact. The main adit (elevation 5,130 feet), driven north 40 degrees east along the north-west side of the large dyke, was 130 feet long when examined in July. At a point 90 feet in from the portal two crosscuts, both 25 feet long, had been driven to the north-west and south-east respectively. A 4-inch quartz stringer, sampled in the face of the first-mentioned crosscut, gave a negative assay for gold and silver. The north-west crosscut exposes the 2-foot dyke in the face. In the main working, 50 feet in from the portal, a mineralized patch 2 feet square was sampled, the assay giving 0.68 oz. gold per ton and 1.2 oz. silver per ton. Two men were employed driving the main working by hand.

St. Tresa. This claim, owned by A. Suran, is a recent location situated on the steep slope just north of Boulder creek, about 1 mile by trail from the Wild Horse Creek road. Surface prospecting has been done on two quartz occurrences associated with fracturing in hard grey sandy argillite and quartzite, strike north 10 degrees west, dip of 60 degrees west. Two quartz-outcrops, 50 feet apart in elevation, strike about east-west, the upper one, which is the better exposed, being 2 feet wide and dipping at 78 degrees to the south. Selected material, containing disseminated pyrite and galena, assayed: Gold, trace; silver, 2 oz. per ton; lead, 2 per cent.; zinc, trace. Two samples, across 18- and 26-inch widths of quartz, in which no sulphides were present, gave negative assays. The veins are irregular and ill-defined.

Kimberley Goldfields Consolidated, Ltd. The holdings of this recently incorporated company comprise thirty-three claims, all held by location, taken over from the Kimberley Goldfields Syndicate. The *Quartz Mountain* group, described in the Report of the Minister of Mines for 1933, constitutes the nucleus of the property to which more claims were added during 1934. The staked area, covering brushy ground with scattered timber, is at the head of Sawmill creek, a small tributary of Perry creek, the main workings being located on the medium to steep mountain-side sloping south-easterly towards the main valley. Access is by branch road, chiefly new construction, 4.5 miles in length from the Perry Creek road, which connects with Cranbrook. Referring to the information published in 1933, subsequent work has all been in connection with the large quartz-showing in the T-shaped trench at about 6,300 feet elevation. It has become apparent that the mineralization of economic interest strikes up and down the hill in a northerly and southerly direction, closely approximating the strike of a greenstone dyke which is about north 20 degrees west. The trench can perhaps be described more closely as being "F-shaped," its north-south main section being represented by the upright bar and the two extensions to the east completing the letter. The dyke was encountered in the northerly of the two easterly sections where a shaft

was sunk 8 feet below the bottom of the trench. The quartz appears to occur in a banded structure adjoining the dyke to the west. The surface exposure is largely oxidized with scattered pyrite, occasional chalcopyrite, and bornite. The results of sampling done in 5-foot sections along the main trench, on the first assumption that this working crosscut the deposit, were given in the Report of the Minister of Mines for 1933. Two samples, of oxidized and sulphide material respectively, were taken to ascertain the gold content of the types specified. Selected oxidized material assayed: Gold, 1.88 oz. per ton; silver, 0.8 oz. per ton; and selected pyrite in quartz assayed: Gold, 0.34 oz. per ton; with silver, 1 oz. per ton.

To determine the structure of the deposit eleven holes, aggregating 650 feet and distributed over a length of 300 feet, were put down from the surface with a Boyle Bros. X-ray diamond-drill. This was done under the direction of L. E. Drummond, mining engineer in charge. According to this authority, the drilling indicates a mineralized zone over 100 feet wide. This was traced down the hill to the south and a 6- by 7-foot drift-adit started at about 6,200 feet elevation to develop the ground below the F trench. This working, in 100 feet at the time of writing, is stated to be in quartz throughout, with low values from the portal. At the face the adit has just entered sulphide ore, similar to that in the surface working, containing encouraging values. In grading the road to a stable, quartz has been exposed throughout a length of 500 feet, the upper end of this section being about 400 feet south of the adit-site. A portable gas-compressor has been installed at the portal and improvements at the camp below include office, cook and bunk house, and assay office.

Sullivan. The progress of this outstanding operation of the Consolidated Mining and Smelting Company at Kimberley has been recorded annually in the Report of the Minister of Mines, the first mention being by W. A. Carlyle, Provincial Mineralogist, in the year 1896, in publications of the Geological Survey of Canada, and in the technical press. The period under review witnessed capacity operation of the 6,000-ton concentrator. No plant additions of importance were made. Development-work done included 2,089.5 feet of crosscutting and drifting, 3,820.5 feet of raising, and 376.5 feet of sinking. This represents a substantial increase over the corresponding work done in 1933. The big shaft being sunk from the 3,900-foot level is down 1,200 feet, with stations cut at the various levels. During the year 1,744,151 tons of ore was treated, with an estimated recovery of 6,370,000 oz. of silver, 322,000,000 lb. of lead, and 212,000,000 lb. of zinc. E. G. Montgomery is general superintendent; W. Lindsay, mine superintendent; and C. T. Oughtred, mill superintendent.

Lead. At this group of six claims, 2 miles by trail from the end of the Findlay Creek road, which has been extended 2 miles beyond Jeffrey's ranch, prospecting-work was continued by the Blake Bros., of Skookumchuck. Conditions have been described in the Report of the Minister of Mines for 1926, 1928, and 1932, the present notes being supplementary to this previously published information. Past work was done chiefly on silver-lead-zinc showings in a zone of fracturing in a granitic sill. The new work has been done to prospect the adjoining quartzites, and in this connection an adit and shallow inclined shaft expose a fracture striking about north 38 degrees east and dipping at about 50 degrees to the north-west. In the outcrop-zone the fracture is filled with honeycombed and decomposed quartz containing loose aggregates and masses of galena. A selected sample assayed: Gold, 0.04 oz. per ton; silver, 48 oz. per ton; lead, 72 per cent.; zinc, 3 per cent. At the face the fracture persists, accompanied by gouge, but there is less quartz and no appreciable mineralization. On the *May Queen* claim, about 1.5 miles to the north-east and reached by branch trail, surface prospecting has been done on a quartz-outcrop 7 feet wide, which strikes about north 30 degrees east and dips at 45 degrees to the north-west, apparently coinciding in attitude with the enclosing schist. On the foot-wall side the quartz contains galena and some chalcopyrite associated with siderite, the main mass containing only occasional specks of galena. A selected sample assayed: Gold, trace; silver, 3.5 oz. per ton; lead, 3 per cent.; zinc, trace; copper, trace. Summarizing the various occurrences, the area contains numerous quartz veins and veinlets apparently paralleling the metamorphosed sedimentaries in strike and dip, maintaining this general attitude in the fractures developed in a granitic sill.

Midway. This group of the B.C. Cariboo Gold Fields, Limited, comprises five claims held under option from J. Leask, of Cranbrook, and sixty-five adjoining claims staked by this company in 1933, all claims being held by location. The property is situated on the wooded slope on the north-western side of the Moyie River valley.

Conditions were described at some length in the Report of the Minister of Mines for 1933. An adit, about 80 feet in elevation above the highway and a few hundred yards in only a short distance when this prospect was taken over by the present company, had been extended to a point 300 feet from the portal at the end of 1933. Subsequently the property was shut down, work being resumed in the fall of 1934 under the technical direction of R. H. Stewart. The present notes are supplementary to previously published information. Summarizing conditions revealed by progressive development, the deposit occurs in a sheared zone striking northerly, with dips of from 35 to 45 degrees to the east. The quartzites are generally argillaceous in the vicinity of the vein, some of the beds being quite soft. They strike easterly and westerly, with dips to the north of from 10 to 20 degrees. Therefore, as the adit is extended into the hill along the vein, successive quartzite strata are cut. In this working, mineralization, developed along the hanging-wall side of the sheared zone, consists chiefly of pyrite with small amounts of galena, and zinc-blende, with occasional arsenopyrite and tetrahedrite, in a gangue of quartz, intensely brecciated and subsequently recemented. The width of the mineralization varies from a few inches to over 6 feet, the foot-wall side of the zone consisting of fractured iron-stained country-rock. The outcrop of the vein, thoroughly oxidized and leached, is exposed by a series of open-cuts for a distance of between 700 and 800 feet from the adit up the face of the hill, which slopes upwards from the valley at angles of from 25 to 30 degrees and continues to rise at somewhat flatter angles beyond the open-cuts. The adit, according to recent advices, has been driven 655 feet along the general trend of the vein. Measured in feet northerly from the portal, the vein to point 20 is completely oxidized with little quartz. From here to 30 the quartz widens to 2 feet, shows sulphides, then narrows to 55. From this point the quartz widens to 4.5 feet at 90 and 4 feet in the stoped section from 105 to 120, where a concentration of sulphides occurs, and from which a test shipment of 40 tons, made to the Trail smelter in 1933, assayed: Gold, 0.32 oz. per ton; silver, 2.5 oz. per ton. At point 135 the mineralization with disseminated sulphides widens to 6 feet or more, and at this point a crosscut was run to the east for about 45 feet. From 145 to 250 the quartz is narrow, varying from 1 to 2 feet in width in the floor, with little or no quartz in the back. Samples taken in the section between 160 and 250 averaged: Gold, 0.17 oz. per ton; silver, 1.66 oz. per ton, across 19.5 inches. At the latter point the drift was swung into the hanging-wall, but the vein is again exposed in the face of a 15-foot crosscut to the west at 285. Here a sample across the 22-inch hanging-wall pay-streak of the vein assayed: Gold, 1.06 oz. per ton; silver, 3.1 oz. per ton; and a sample across the adjoining mineralization, 2 feet wide, on the foot-wall side assayed: Gold, 0.05 oz. per ton; silver, 0.05 oz. per ton. Beyond the crosscut the working curves back to cut the quartz mineralization, 2.5 to 3 feet wide, at 360; then leaves it in the hanging-wall to 389, from which point it is again exposed to 445. In this section low-grade mineralization is reported to occur over widths of from 3 to 5 feet, and beyond 445 the working swings first to the hanging-wall side and then to the foot-wall side, cutting the vein shearing and exposing it again towards the face. In the section of the working seen by the writer the vein was largely oxidized and leached, the gold and silver values apparently fluctuating with the percentage of sulphides present. It is considered possible that as the vein penetrates harder and more competent quartzite-beds more favourable conditions for ore-deposition will be encountered, as is reported to have been the case at the *St. Eugene* mine at Moyie, which is in the same general formation.

PLACER-MINING.

Seasonal placer-mining undertakings in the Fort Steele Division provided considerable employment in the aggregate. In the Wild Horse Creek area the principal activity was that by J. H. Norman and J. H. Dixon, both of Calgary, where gravel was excavated under contract with a gas-shovel. On Boulder creek A. Suran & Sons continued work, coarse gold being recovered at a point about a mile by trail from the Wild Horse Creek road. On Perry creek work was continued by G. M. Bell, of Calgary, in the shaft-workings near Old Town. At the falls on Moyie river J. C. Ewen and D. Oscarson continued their underground work, which after being driven 250 feet through rock was extended 112 feet through gravel. An incline was sunk where the gravel was first encountered and a substantial amount of gold was recovered. Drilling was done at Swansea, near Palmer Bar creek, south of Cranbrook, by the Consolidated Mining and Smelting Company, and by L. E. Drummond on the leases of the Grizzley Gold Mines on Hellroaring creek. This mining engineer also test-drilled leases on Sawmill creek

near where it joins Perry creek. Individuals and groups placer-mined at other points, including Bull river, Fish Lake creek, Weaver, and Nigger creeks, and the Moyie river.

SLOCAN MINING DIVISION.

Noble Five Mines, Ltd. The silver-lead-zinc property of this company is situated at Cody, on the north side of Carpenter creek, 1.5 miles by road east of Sandon. Past references to the Noble Five include those in the Report of the Minister of Mines for the years 1895, 1896, 1910, 1911, 1915, 1916, 1925, 1928, 1929, and 1930. Those for the last three years mentioned include the active period of operations by the present company, production having been discontinued early in 1930. The same publication for the year 1929 describes the later development on the No. 18 level of the ore-body then described as the *Deadman*. Diamond-drilling done during 1934 has, among other results, definitely correlated the vein system as developed in the upper and deep levels, the ore-body mentioned now being known to occur in the *Noble Five* vein. Two holes were put in to explore this vein beyond a fault which had cut off the mineralization in the north-east face of the main drift on the No. 18 level (elevation 5,116 feet). It was from the ore-shoot in this drift, previously thought to be on the *Deadman* vein, that the bulk of the 1929-30 production was derived. The drilling here cut a width of 8 feet, normal to the dip of the vein, of disseminated pyrite-galena-sphalerite mineralization, with some associated quartz, indicating the continuity of the vein to the north-east beyond the fault for a length of over 100 feet. Four holes drilled easterly and southerly from and near the south-east face of the No. 16 level crosscut encountered the upward continuation of the *Noble Five* vein at this horizon, mineralization being chiefly pyrite, no appreciable amount of lead or zinc sulphides being noted in the cores. Two other holes put up above the No. 16 level crosscut showed vein material. The diamond-drilling done indicates the continuity of the *Noble Five* vein between No. 8 level, where it was mined in past operations, and the stoped area on the No. 18 level. The two horizons are 1,070 feet apart measured along the dip of the vein. Hole No. 9 was drilled in a northerly direction from the north end of the No. 18 level main crosscut. Between points 210 and 211 feet a fair showing of galena and sphalerite, with some pyrite, was cut. It is considered possible that this may be the *Last Chance* vein which was mined in the upper levels of the property. No. 10 hole was driven to south 50 degrees east from the No. 18 level main crosscut to explore for the *Deadman* vein. This hole ran into crushed material at a point where this vein is supposed to be, that is about 500 feet to the south-east of the *Noble Five* vein, being one of the parallel system of north-easterly-striking fissures. The *Deadman* vein did not show up appreciably where intersected by the main crosscut.

Silversmith Mines, Ltd. The property of this company adjoins the town of Sandon. Past operations are recorded in the Report of the Minister of Mines under *Silversmith*, or *Slocan Star*, activities of the present company being covered in this publication for the years 1922 to 1929, inclusive. The early history and geological conditions were summarized by C. E. Cairnes in Geological Survey of Canada Summary Report, 1925, Part A. Since 1930, when company operations were suspended, minor activity has been maintained by lessees. In 1934 exploratory work on a restricted scale was resumed by the company under the direction of J. Lancaster. On his arrival at the end of March it was found that the mill building had been undermined and the foundation washed out by flood-water from Carpenter creek in 1933. The damage was repaired and a rock-filled cribbing 100 feet long and 12 feet wide was built in front of the mill to divert the creek and prevent a recurrence of similar damage. The mine had suffered most during the long shut-down, a slide having obstructed the portal of No. 10 adit, while underground on this level over 400 lineal feet of drifts had caved. This was cleared out and new timbers substituted for decayed ones before diamond-drilling could be carried on safely. Other repairs were also made to recondition the property. Diamond-drilling in the *Silversmith* area on No. 10 level was commenced in May and continued to the end of the year. Development-work was done at the extreme east end of the *Silversmith* ore-zone, where a raise had encountered a shoot of silver-lead-zinc ore when the property was visited in November.

Slocan-Monitor Silver Mines, Ltd. The property of this company, known as the *Monitor* mine, adjoins the New Denver-Sandon road at Three Forks. Conditions were summarized by C. E. Cairnes in Geological Survey of Canada Summary Report, 1925, Part A. Other references are contained in the Report of the Minister of Mines for

the years 1896, 1904, 1926, and 1929, also in the Report of Commission appointed to investigate the Zinc Resources of British Columbia, published in 1906 by the Mines Branch, Department of the Interior. Work was started in June under the direction of H. Lakes, of Nelson. On the No. 5 level 720 feet of driving was done to test the ground below the ore-zone stoped between No. 4 level and the surface. High-grade streaks of silver-lead-zinc ore were developed over short lengths. Low gold values are occasionally associated with the other values. A portable gas-compressor was in use.

Shipments to the Trail smelter from the Slocan Division were made, chiefly by lessees, from sixteen properties listed as follows:—

Mine.	Name and Address of Shipper.
<i>Best</i>	H. Giegerich, Kaslo.
<i>Black Colt</i>	E. J. Vandergrift, New Denver.
<i>Canadian</i>	C. Calgare, Sandon.
<i>Early Bird</i>	James Woods, Sandon.
<i>Ivanhoe</i>	J. A. Black, Sandon.
<i>Lucky Thought</i>	H. V. Dewis, Silverton.
<i>Mammoth</i>	Western Exploration Co., Ltd., Silverton.
<i>Mollie Hughes</i>	W. R. Green, New Denver.
<i>Mountain Chief</i>	J. Checkelero, Sandon.
<i>Palmita</i>	E. J. Vandergrift, New Denver.
<i>Rio</i>	W. R. Roberts, Sandon.
<i>Ruth</i>	Ruth-Hope Mining Co., Vancouver.
<i>Silversmith</i>	Silversmith Mines, Ltd., Seattle.
<i>Standard</i>	Western Exploration Co., Ltd., Silverton.
<i>Victor</i>	E. Doney, Sandon.

With the exception of the *Mollie Hughes*, where the ore is silver-gold, shipments were silver-lead-zinc ore, with some concentrates from the *Silversmith*. The contained silver values are generally high, about 100 oz. per ton or more.

REVELSTOKE MINING DIVISION.

PLACER-MINING.

In the Big Bend area placer-mining continued to afford some employment. Individuals and groups washed for gold at numerous points, as: On the Columbia river at the mouth of Goldstream; on Smith creek, a tributary of the Columbia from the west; on Camp, McCulloch, and French creeks, which flow into Goldstream from the north; and on Carnes creek, a tributary of the Columbia river from the east. On Camp creek a crew of men was employed by the Coughlan Gold Mines, Limited, sponsored by J. B. Coughlan, of Calgary. This undertaking was described in the Report of the Minister of Mines for 1933. At the property of the French Creek Development Company, Limited, work was continued on a restricted scale under the direction of L. N. Remillard.

DeMers Placers, Ltd.—On Isaac creek, a tributary of the Columbia river south of Revelstoke, the undertaking of this company, described in Bulletin No. 1, "Summary and Review of the Mineral Industry of British Columbia," was discontinued at the end of July after a 13-ton shipment of black sand was sent to the Trail smelter. This shipment, which assayed 0.005 oz. gold per ton, was the result of screening a large quantity of gravel during a period of over two months.

LARDEAU MINING DIVISION.

CAMBORNE AREA.

Operations by this company, initiated late in 1932, have been carried on continuously throughout 1933 and 1934. The present notes are additional to the information published in the Report of the Minister of Mines for 1932 and 1933. The groups of claims forming the company's holdings are known as the *Eva*, *Criterion*, *Cholla*, and *Lucky Jack*. These comprise the following thirty-two Crown-granted claims and fractions: *Conmore*, *Silver Wedge*, *Gold Fly*, *Sleeve-na-mon*, *Rossland*, *Balfour*, *Imperial*, *Oyster*, *Criterion*, *Mascotte Fractional*, *Gold Bug Fractional*, *St. Joe*, *Meridian*

Fraction, Lucky Jack Fraction, Red Horse, Alamo, J. J. Davis Fraction, Cholla, Treadwell, L. V. Fractional, Tuscan, Blue Jay, Dora, Thelma, Joker, Stockholm Fraction, Eva, Highland Mary, Last Chance, Iron Dollar, Wedge Fraction, and H.M. Fractional.

The consolidated and contiguous groups of claims are located on the eastern side of the Incomappleux (Fish) river, north of Pool creek and immediately adjacent to the settlement of Camborne. Elevations on the claims range from 1,550 to 3,900 feet above sea-level, the ground covered being well timbered, steep mountain-side sloping to the two streams specified. The geology of the area, with history and past production, are contained in Geological Survey of Canada Memoir 161, "Lardeau Map-area." The Report of the Minister of Mines for 1914 also summarizes the past history and production. The operations of the present company represent a new period of activity after an interval of many years. During 1934 work was carried on in the *Eva* No. 7A level until September 25th and in the *Criterion* workings throughout the year. Both properties, and the *Lucky Jack* where old workings were being reconditioned, were visited by the writer at the beginning of August.

A crosscut-section of the *Eva* workings was reproduced in the Report of the Minister of Mines for 1914. Reporting progress in relation to previously published information: The No. 7A (or lowest) adit at 2,790 feet elevation has been continued south-easterly, the face now being over 1,800 feet in from the crosscut-drift intersection towards the portal. This working, therefore, now extends far beyond the ground below the *Highland Mary* shaft and adjacent stoped area at the south-eastern extremity of the old upper workings and penetrates the ground below the western extremity of the *Criterion* workings for a length of several hundred feet. The vertical difference in elevation between the No. 7A *Eva* adit and the No. 2 *Criterion* level is about 275 feet. The last 230 feet of the new work in No. 7A has been driven since the writer's inspection. In the section examined the vein consists of interbanded quartz stringers and schist, silicification of the wall-rock being apparent in places. Mineralization consists of pyrite, sphalerite, and galena occurring irregularly in streaks. Measured in feet south-easterly along the working from the crosscut-drift intersection there is at point 320 the old No. 704 raise connecting the No. 6A level at 2,900 feet elevation. South-easterly from the raise, crosscuts, designated as Nos. 705 to 717, inclusive, have been made to north-east and south-west at intervals throughout the section of working examined to the face then at 1,530 feet. From the original descriptive point adopted Nos. 705 and 708 crosscuts are at points 405 and 705 feet respectively, or 300 feet apart. Within these limits there occurs comparatively concentrated mineralization associated with quartz stringers, including a length of 240 feet sampled by B. W. W. McDougall, consulting engineer, which averaged 0.228 oz. gold per ton across 2.3 feet. The better values, which materially affect the average quoted, are chiefly confined to a short length at the north-western extremity of the shoot towards No. 705 crosscut. Material approximating 0.25 oz. gold per ton is reported by the mine superintendent to have been encountered in the latter end of the working, widths being about 3 feet.

A plan of the *Criterion* workings was reproduced in the Report of the Minister of Mines for 1933. No further work was done on No. 1 level as this is only slightly above the *Rossland* adit, the difference in the portal elevations being about 10 feet. Development has been concentrated on the No. 2 (corrected elevation 3,073 feet) and *Rossland* (elevation 3,224 feet) levels and between the latter and the surface. The No. 2 adit main drift has been extended for a length of about 675 feet south-easterly beyond the face as shown on the illustration specified, and crosscuts have been made at intervals. Raises, designated as Nos. 221 and 217, have been put up to the *Rossland* level, and from No. 229 raise an intermediate level was established at 3,185 feet elevation. No. 228 raise is up a short distance. The *Rossland* working has also been extended south-easterly, the face now being about 90 feet beyond the extremity of the No. 2 working. The No. 221 raise has been extended above the *Rossland* level and a sub-level established by drifts at the 3,362 level. The No. 119 raise has been put up to the 3,336 level, where a drift has been run to the north-west. Most of the new drifting on the No. 2 and *Rossland* levels had been done prior to the writer's visit, but the other work specified has been done since. No ore of consequence was exposed on either of these levels in this section of the vein, values being very erratic, with some concentration where acute-angled cross-fracturing occurred. Ore is reported by the management to have been encountered in raising between the two levels and above the *Rossland* level towards the surface. One area described as including new ore-exposures is that extending laterally between raises Nos. 221 and 217, a length of about 300 feet, and between the No. 2 and *Rossland* levels and

above the latter towards the surface. The second ore-area is described as lying between survey stations 231 and 233, about 100 feet apart, which is indicated by 217 raise to extend to and above the No. 1 level. This section adjoins the first-mentioned ore-zone to the south-east, indicating an area containing irregular mineralization about 400 feet in length which is partially explored by raises and intermediate levels between the No. 2 level and the surface. Recent construction includes an aerial tram, 3,700 feet in length, connecting the No. 2 *Criterion* adit with the mill. The tram, installed by the B.C. Riblet Company and completed November 24th, has a capacity of 100 tons per eight-hour shift. Improvements at the mine include additions to the bunk and mess house, affording increased capacity and comfortable quarters for the men. Construction of the mill, which adjoins Pool creek at Camborne, was commenced October 10th and concentrates are being produced at the time of writing. The flow-sheet, designed by Stanley Gray, is as follows: Ore from the tram is dumped into a 75-ton receiving-bin, from which it is drawn over a 2½-inch grizzly to a 10- by 18-inch jaw-crusher set at 2½ inches. Undersized and crushed product are conveyed by a 14-inch conveyor, the head pulley of which is magnetic, supplied by the Robinson Electric Company; thence over a Junior 1½- by 3-foot Niagara shaking screen to a Traylor-type T.Y. 20-inch gyratory crusher set at ⅝ inch. A bucket elevator feeds the fine-ore bin, which is a hopper-bottom circular bin of 125 tons capacity. An 18-inch belt supplies the ball-mill, which is an 8- by 4-foot Vancouver Engineering Works conical mill set in closed circuit with a 4- by 22-foot Dorr Simplex Model F classifier. The overflow from this machine passes, at 65 per cent. minus 200 mesh, to the 6-cell No. 18 Special Denver flotation unit. Concentrates are filtered and sacked for shipment. Power for the mill and compressor plant is supplied by a General Electric generator direct-connected to a 600-horse-power impulse water-wheel, regulated by Lombard oil-governor, supplied by the Nelson Iron Works.

FERGUSON AND TROUT LAKE AREA.

Since these prospects, situated on Silver Cup mountain on the north-east side of Trout lake, were described in Geological Survey of Canada Memoir 161, seasonal prospecting-work has been carried on by Mrs. Jowett. The *Hercules* is at the head of Ottawa creek, a tributary of Lardeau creek. Above the crosscut adit at 6,900 feet elevation, referred to by Gunning in the publication mentioned, an open-cut exposes a fissure-vein, 3 to 6 inches wide, striking north 40 degrees east and dipping at 30 degrees to the south-east. A sample of sphalerite and pyrite in the decomposed gangue assayed: Gold, 0.30 oz. per ton; silver, 8.2 oz. per ton; lead, trace; zinc, 7.2 per cent. Galena is also present in the exposure. This fissure is parallel to the other small one cut in the adit, both occurring in chlorite-schists. Gunning suggested prospecting the neighbouring slates to the east. Going easterly up the hill, a 15-foot adit has been driven south 40 degrees west. At the portal it cuts oxidized brecciated siliceous material associated with fracturing striking north 40 degrees west and dipping flatly to the south-west. Continuing up the hill, there is a 30-foot adit driven south 20 degrees west along a quartz-filled fissure, 1 to 6 inches wide, which dips 30 degrees to the south-east. These newer workings are also in chloritic schists. Work done on the *Foggy Day* group, at the head of the South fork of Brown creek, now includes six adits, of an aggregate length of 200 feet, distributed along the outcrop of the irregular, lency, quartz-vein occurrences described by Gunning in Memoir 161.

PLACER-MINING.

Small-scale placer-mining activities occurred at points on Lardeau creek above Trout lake and at points near 10-Mile. The most productive operation was that by Roy Jacobson and associates at a point about 1.5 miles above the lake, where a dam was constructed and a flume built to divert the stream.

TRAIL CREEK MINING DIVISION.

In this Division the most interesting feature to report is the sustained output made by the lessees at the Rosslund properties of the Consolidated Mining and Smelting Company. The numbers employed in this manner fluctuate and many of the men move from one section of ground to another as they find the ore. At the time of writing there are 280 men at work on about sixty separate operations. Through the courtesy of company officials, 1934 production data from these extensive leasing undertakings have been supplied, the total figures being 39,392 dry

tons, which contained 25,432.21 oz. gold and 40,365 oz. silver. The increasing tonnage coming to the Trail smelter from this source made it necessary to devise special means of treatment, as recounted in the Report of the Minister of Mines for 1933. Subsequently the separate furnace set aside for these ores was found inadequate and a large stock-pile accumulated. That the comparatively large production is expected to be sustained for some time to come is evidenced by the decision of the company to operate the "Old Red Mill" at Tadanac, formerly used for experimental purposes and for customs ores. At the end of the year this was being operated on a basis of 100 tons a day. Customs shippers in the Rossland area were the *Cliff*, *Evening Star*, *Georgia*, *Gold Drip*, *Hattie*, I.X.L. Lessors, Limited, *Jumbo*, *Midnight*, *Mighty Midas*, *Nest Egg*, *O.K.*, *Silverine*, and Velvet Gold Mining Company. These all shipped to the Trail smelter, but from the last mentioned shipments were also made to the Tacoma smelter. The Rossland mines were described by C. W. Drysdale in Geological Survey of Canada Memoir 77, published in 1915, and subsequent developments are recorded annually in the Report of the Minister of Mines. Past gold production of the camp to 1930 is summarized in Bulletin No. 1, 1932, "Lode-gold Deposits of British Columbia."

From 1894 to 1934, inclusive, the Trail Creek Division has been responsible for an aggregate output of roughly 2,909,000 oz. gold. This was mostly derived from auriferous copper ores of the principal mines, with contributions from the small high-grade properties on O.K. mountain, the *Velvet* mine, and miscellaneous properties surrounding Rossland. A new productive period commenced in 1933, when the comparatively large production by lessees from the mines of the Consolidated Mining and Smelting Company was initiated.

CONSOLIDATED MINING AND SMELTING COMPANY OF CANADA.

Smelting Operations.

During the period under review operations in the group of metallurgical plants at Tadanac have been conducted on the largest scale on record, based chiefly on the increased volume of lead and zinc concentrates received from the *Sullivan* mine at Kimberley. Towards the end of the year lead production was running about 440 tons a day, or more, of electrolytically refined metal. This represents capacity output of lead as compared with about 400 tons a day for the years from 1927 to 1930 and a lower production for the years 1931 to 1933, inclusive. The zinc plant has been turning out about 340 tons of electrolytic zinc per day, or about 85 per cent. of its capacity, which approximates the highest operating level reached. The zinc plant original capacity was increased in 1930, when 100 tons a day was added when the fuming plant enabled zinc-recoveries to be made from lead-furnace slags and zinc-plant rejects without calling for more ore-tonnage. During 1934 the scope of operations was gradually increased to the current dimensions from an initial scale of 80 to 85 per cent. of the lead-refinery capacity and from 40 to 50 per cent. of the zinc capacity. Increased production of cadmium, bismuth, silver, and gold contributed to the record metal-output. While these represent a minor item in the gross weight of metal produced, their aggregate value is important. Copper was also produced, being a by-product from the lead-smelter through the dressing plant. Cadmium is a by-product of the zinc plant and the bismuth is recovered in the precious-metals refinery. No large stocks of metals were on hand during the year, the products being marketed steadily.

New construction in 1934 was the smallest for any large operating year for many years, but progressive metallurgical efficiencies called for some installations, as in the zinc department, where a new steel-frame building 50 feet high and 80 by 40 feet in ground dimensions was erected. This is designed to increase the efficiency of the zinc-recoveries by providing additional filtering for the zinc-plant residues. It contains a vat-filter installation for purification of the product of the leaching plant. This slime is placed in a concrete tank containing a series of filter-frames holding bag fabric, and suction is applied, the solids remaining on the bags, while the zinc sulphate is extracted as a filtrate. A crane takes the frames, which are 12 feet square, to a second concrete compartment, where an air-blast blows the deposited solids into a bin, from which they are taken to the American leaf filters for "washing." This new filter installation is an adjunct to the suspension roasting process.

Another new building houses zinc-dust and blue-powder manufacture. An electric zinc-dust furnace of 2 tons capacity makes zinc-dust from bar zinc, while a 5-ton furnace makes blue powder from zinc-dross, this latter process saving the electrolyzing of the dross. These products

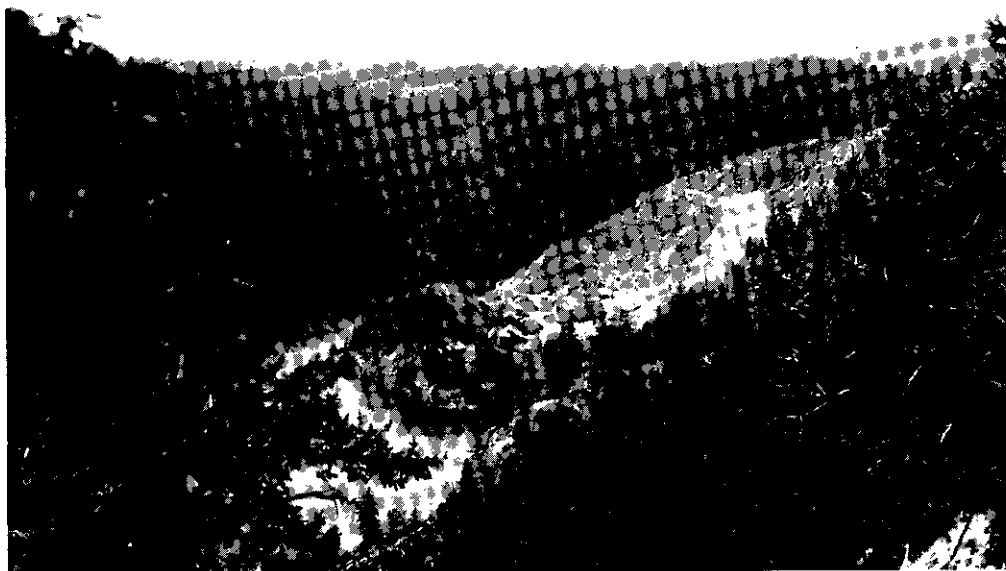
are used in the paper industry for purification, in cyanide-mills, and in the company's zinc plant, in the latter being used to purify the zinc-plant fluids by precipitating their foreign bodies. This manufacture is adjacent to the oxide-leaching plant. The introduction of concentrate-burning in the zinc plant, referred to in the Report of the Minister of Mines for 1933, has proved of great value. The apparatus used consists of a comparatively large combustion-chamber, the excess heat from which is utilized to dry the powdered concentrates on hearths above, while the roasted product settles on hearths at the bottom of the combustion-chamber, to be evacuated to the leaching department of the zinc plant. In applying the process the concentrates, after they have been dried, are conveyed to a ball-mill to make sure that there are no lumps, and then blown into the top of the combustion-chamber as a very fine powder, the combustion-chamber having been preheated by an oil-burner, or any other suitable burner, to a temperature at which the sulphide in the charge is ignited and burned off to sulphur dioxide, leaving particles of zinc oxide to drop to the bottom hearths, no fuel other than the sulphur in the particles of the charge being required to maintain the combustion. Only sufficient air is blown into the chamber to carry the powdered concentrates and to provide the necessary oxygen for the conversion of the sulphur to sulphur dioxide and of the zinc to zinc oxide. If the combustion-gas does not contain a sufficiently high concentration of sulphur dioxide for use in the sulphuric-acid plant, part of it can be recirculated through the furnace, thus increasing its concentration. This sulphur dioxide is not contaminated with combustion-gases which would be present in other and older methods whereby the concentrates were roasted or burned by the aid of heat derived from coal, oil, or other fuel, making it therefore purer and of a higher concentration, which is necessary when it is to be converted into sulphuric acid.

In regard to the treatment of the fume from the slag plant there are no important changes to report. Referring to conditions described in Report of the Minister of Mines for 1933, it was found that fluorine was introduced into the zinc-plant electrolyte by this circuit. It became necessary to change the flow-sheet so that the zinc-plant sulphide section could be separated from the oxide circuit, thus confining the fluorine contamination to as small a body of solution as possible. This was accomplished during the early part of 1934 and the sulphide section is now running with the normal amount of aluminium corrosion on the cathodes. Such steps as colder temperatures, protected cathodes, and smaller cathodes are being used on the oxide solution to reduce the effects of this aluminium corrosion to a minimum.

In regard to the ores derived from the leasing operations on the company's mines, a large stock-pile accumulated, due to shortage of furnace capacity, for a considerable time as construction changes were being made in the smelter, a new lead-furnace comprising some novel features being in process of erection. Some action became necessary to reduce the Rossland tonnage to be smelted. The Tadanac concentrator was therefore reconditioned and has been in operation since the latter end of the year. Some of the ore comes from underground and some from dumps, the latter being largely oxidized. Whether or not suitable results can be obtained on the oxidized portion of the feed is not yet known. The success of the milling operation depends on the tonnage and kind of ore received from Rossland. The smelting of these ores was done as described in the writer's report of last year—namely, with the addition of just sufficient lead to the charge to collect the gold.

Chemical and Fertilizer Department.

During the period under review capacity operation was attained in all sections excepting the phosphate plant, which was shut down September 1st after satisfying the bulk of anticipated requirements for the season. After an interval, during which minor adjustments will be made to give an improved flow, the phosphate plant will be reopened. Production for the year was approximately 84,000 tons of assorted fertilizers, representing a substantially increased output over previous years. An 80-foot extension was built on to the storage warehouse, increasing the storage capacity by 12,000 tons. The building is now 600 feet long and 100 feet wide, with 50 feet of vertical working depth. Primary products of the fertilizer plant are superphosphate, triple superphosphate, ammonium phosphate in two strengths, and ammonium sulphate, with various combinations of these products to meet special demands of the trade. A stock-food, mono-calcium phosphate, recently added to the Warfield products, is making its way in the Prairie market. It is given as a tonic to stock. Phosphate rock is obtained from a deposit at Garrison, Montana.



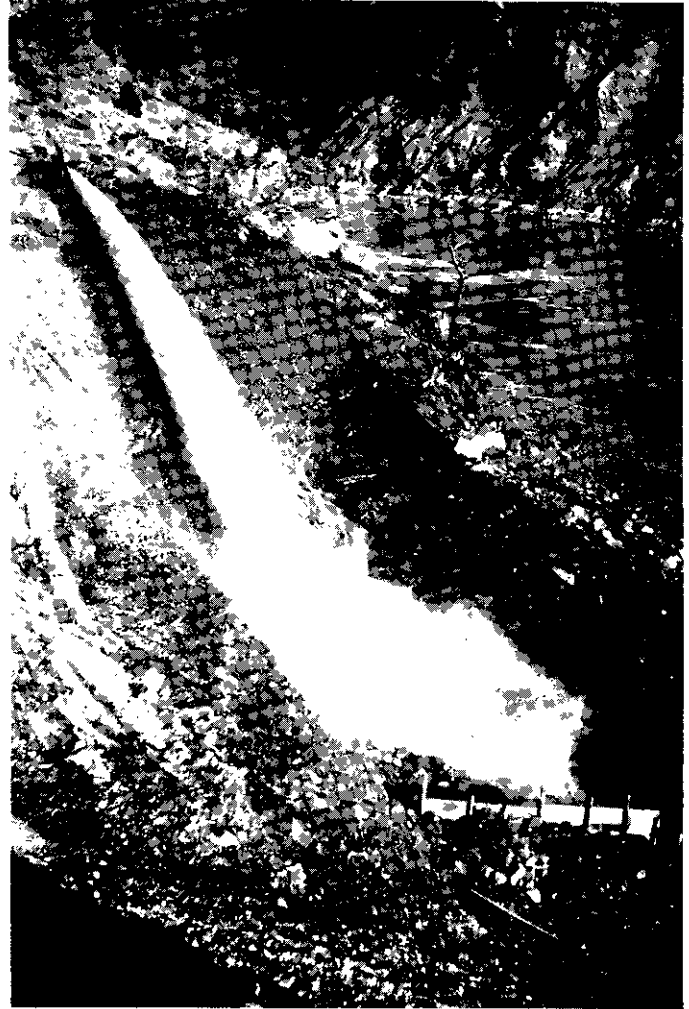
Vidette Mine, North-west of Kamloops.



Gold Bridge, Bridge River. (Copyright Canada, Leonard Frank.)



(Copyright Canada, Leonard Frank.)
Bralorne Mines—King Vein.



Texas Creek Placers, Fraser River below Lillooet.

PART F.
WESTERN MINERAL SURVEY DISTRICT (No. 6).

BY

A. M. RICHMOND.

GENERAL SUMMARY.

Prospecting for, development of, and the production from gold properties continued to hold first place in the mining activity of No. 6 District during 1934.

During 1934, as in 1933, more prospectors and prospecting parties were in the field than for many years past. On Vancouver island the areas around Zeballos river, Herbert arm, and Muchalat arm have received attention. Prospecting was continued at many other localities on Vancouver island, and on the Mainland section of the Coast in the vicinity of Phillips arm, Shoal bay, Knight and Jervis inlets. Several individuals and small syndicates were prospecting the area at the head of Harrison lake, in the vicinity of Fire mountain and Glacier lake, an area that is well worthy of more attention than it has received in the past. The area contiguous to the Fraser river, in the sections around Hope, Lytton, Ashcroft, and the area about the Vidette camp were carefully looked over during the season by prospectors and many new claims were staked. Several zones of mineralization were discovered in the Tatlayoko Lake country by prospecting parties, and further development-work will be undertaken, as soon as weather conditions permit, in 1935.

The main Bridge River camp was the scene of intense activity in 1934, and while much of the work accomplished is reported as development-work, it might be more properly classified as company and syndicate prospecting. Similar prospecting of claims staked in the 1933 rush to the ground contiguous to the Pacific Great Eastern Railway was carried out in 1934, particularly in the Brandywine, Birkenhead, D'Arcy, and Whitecap Creek areas.

The writer desires to acknowledge the help and many courtesies extended to him by the prospectors, mining operators, and the general public with whom he came in contact during the field season.

In the following report details of mining activity in the various Mining Divisions of No. 6 District are given.

VICTORIA MINING DIVISION.

Mining activities during 1934 were confined to intermittent placer-mining and prospecting on Leech river and Wolfe creek: testing of the Sombrio River placers by Victoria interests; prospecting by several groups of men on the headwaters of the San Juan, Jordan, and Nitinat rivers; further development-work on the *El Capitan* property on Cowichan lake; and the commencement of exploration-work at the old *Tyce* property near Duncan late in 1934.

References to Properties in past Reports.—*Alpha-Beta*, 1931; *Blue Grouse*, 1931; *El Capitan*, 1933; Gabbro Copper Mines, Limited, 1931; *Kilchener*, 1931; *Margarct*, 1931; *Paint Pot*, Bulletin No. 1, 1932; *Sombrio Placers* (Kootenay Central Mining and Development Company, Limited), 1930; *Southern Cross*, 1931; Sunloch Mines, Limited, 1931; *Tyce*, 1931; *Willow Grouse*, 1931.

**Butterworth
Placers.**

The property (MacKay leases) on which E. Butterworth and associates, of Victoria, established a small hydraulic placer plant in 1933 is located at Martin gulch, a small tributary of the Leech river, approximately 3½ miles from Leechtown. During the early part of 1934 sluicing with a small monitor opened up a pit 20 by 25 feet in area on the banks of Leech river just above Martin gulch. The pit disclosed the remnants of an old channel 15 to 18 feet above the river, containing 6½ to 7 feet of rusty bouldery pay-gravels, overlain with 20 feet or more of barren sand, gravel, and silt. It would appear that this channel remnant would extend up-stream for possibly 400 feet to a rock bluff and that the average width would be 60 to 100 feet, with a heavy cover of barren overburden. From bed-rock in the pit which existed at the time of the writer's visit approximately \$70 to \$80 in gold had been recovered, with several quite coarse slugs of gold included.

Later in the summer of 1934 it was reported that the operators changed the location of their water-supply flume to eliminate an unwieldy piping system and give a slightly increased head of water for hydraulicking. The recovery made is not known to the writer.

ALBERNI MINING DIVISION.

Port Alberni at the head of the canal is the main settlement within the area and is the distributing-point for supplies and labour. Boats are available on Sproat and Great Central lakes and at Port Alberni for points down the canal. The area is served by fair pack-trails up the main river-valleys, while access to properties up China creek is best made by way of the logging-railway of the Alberni Pacific Logging Company, Limited.

During 1934 mining activity and particularly prospecting and development within the area was greatly stimulated by the gold developments at the properties of the Vancouver Island Gold Mines, Limited; Taylor River Gold Mines, Limited; and Franklin River (British Columbia) Gold Mines, Limited. Many hundreds of claims were staked and interesting discoveries have been reported by the individual prospectors.

References.—Alberni Mines, Limited (*Three Jays*), 1928; *Copper King*, 1928; *Dauntless*, 1931; *Edith*, 1931; *Ferguson*, 1932; *Happy John and Monitor*, 1916; Island Copper Company, Limited, 1931; *Klanawa and Canyon*, 1931; *Morning* (Taylor River Gold Mines, Limited), Bulletin No. 1, 1932; *Rainy Day*, 1928; *Regina*, Bulletin No. 1, 1932; *Sunshine*, 1928; *Thistle*, 1927; W.W.W. (Franklin River Gold Mines, Limited), Bulletin No. 1, 1932; Vancouver Island Gold Mines, Limited, 1933.

This company was incorporated in September, 1933, with a capitalization of **Vancouver Island Gold Mines, Ltd.** \$2,250,000, divided into 4,500,000 shares of 50 cents par value, and 1,000,000 shares of the company stock were issued (in escrow) for the properties.

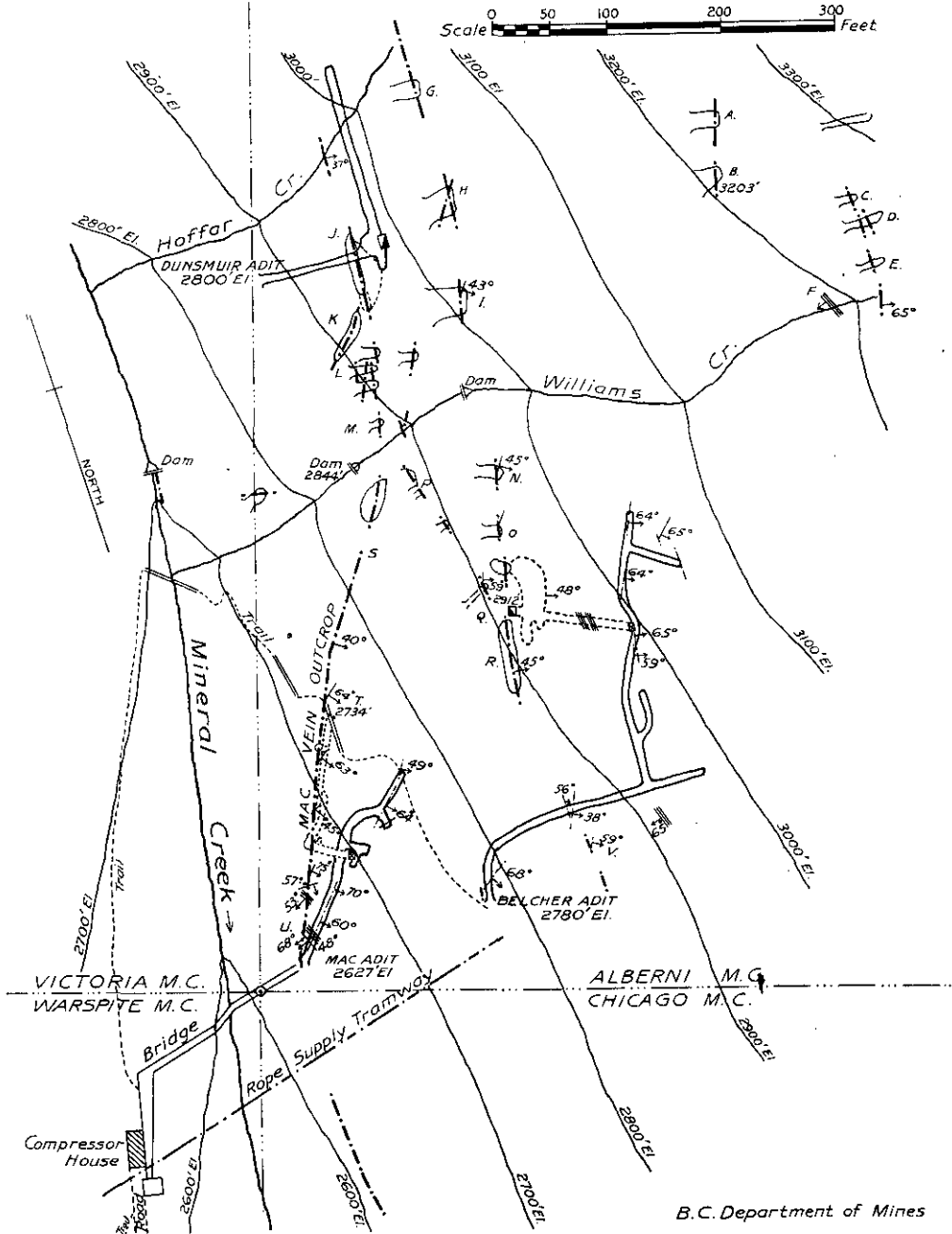
(N.P.L.). The property consists now of ten Crown-granted mineral claims—*Alberni, Victoria, Warspite, Chicago, Champion, Missing Link, Ophir, Union, Last Chance*, and *Last Dollar*—and twenty-seven claims held on location. The claims are situated at the headwaters of Mineral creek, a tributary of China creek, about 10 miles from tide-water up the logging-railway of the Alberni-Pacific Lumber Company from Port Alberni, and about 1½ miles by caterpillar-tractor road from the railway. At one time the road extended from Port Alberni to the property, but many parts of the road were destroyed by the construction of the railway-grade. The claims extend over the divide separating Mineral creek and Cameron river, the main workings being located approximately 2,600 feet in elevation above sea-level. The railway-grade below the camp is at 1,200 feet elevation above sea-level. The ground is precipitous, well timbered with fir, hemlock, and cedar, and there is a sufficient supply of water in Mineral creek for all domestic purposes.

The *Alberni, Warspite, Chicago*, and *Victoria* claims were staked in 1895 and worked for two years by the James Dunsmuir interests. In 1897 the ground was acquired by an English company, who erected an 8-stamp mill on the property in 1898 and then stopped operations after making a few clean-ups. In the spring of 1933, R. W. Williams, of Vancouver, leased the reverted Crown grants from the Government, later turning the property over to the present company, who in turn have devoted attention to an appraisal of the real value of the mineral-showings, under the direction of J. W. Herman, superintendent, and P. M. Hurley, geologist, with a crew of fourteen men.

The rocks in the vicinity are andesites of the Vancouver Island volcanic series. A few miles to the west a small stock of granite rock, similar in appearance to the granite of the Coast Range batholith, outcrops. The mineralization under development consists of quartz veins in sheared sections of the andesitic rocks, the valuable mineral constituents being gold and silver, associated with pyrite. The quartz is massive and the walls of the veins are free. Excellent specimens of free gold have been obtained from several of the workings, in particular from the Mac vein.

The surface and underground workings as at November, 1934, are shown in detail on the accompanying map. The surface-trenching disclosed three main veins. The Waterfall vein is opened up by cuts C, D, and E, where a 3-inch to 2.5-foot vein is exposed along a length of 108 feet, and from which generally low gold values were obtained by the company, except for two assays, 1.4 oz. gold per ton across 3 inches and 11.8 oz. gold per ton across 6 inches, both

from the creek open-cut. The Belcher vein is developed by open-cuts G, H, I, N, O, R, and V, and possibly underground by the Belcher adit and by the shaft and stope at Q. The values obtained by the company on this vein were generally low grade, and while the vein in some places is several feet in width, it is only in the shaft and stope-workings that good gold values have so far been obtained over narrow widths and along short vein-lengths. The vein is more or less lenticular and fairly well defined.



Plan of Workings, Vancouver Gold Mines, Ltd. From Company's Plans.

The most important showing to date is the Mac vein, developed by open-cuts J, K, L, M, S, T, and U, and by the Mac and Dunsmuir adits, and sub-levels above the Mac adit. Over a length of approximately 250 feet (from U to T on the map), the company has disclosed by sampling a narrow but good-grade showing of gold-bearing quartz. The average of sixty-three samples taken by P. Hurley over this 250-foot length shows the quartz to have an average width of 0.51 feet and an average gold content of 3.69 oz. gold per ton. Of the sixty-three samples taken, seventeen samples were above the average in grade, the highest sample being 20 oz. gold per ton across a 6-inch vein-width. It is from the workings on this vein that the company recently made a trial shipment of 40 tons of ore to the Tacoma smelter. Preliminary smelter returns on this shipment are reported as being 2.9 oz. gold per ton and 0.5 oz. silver per ton.

Development-work underground on this showing seems to indicate that the gold values are concentrated in the vein just above a 3- to 4-foot bed of argillaceous sediments which strike and dip almost in conformity with the slope of the hillside. Below the sediments the gold values are quite low, but sufficient development has not been done as yet to show the possible relationship between the mineralization and the sediments. The strike and dip of the sedimentary bed has caused the underground work on the showing to be done in a series of short sub-levels above the main Mac adit. These short levels have been connected by raises. Possibly 80 feet higher stratigraphically than the thin band of sediments is another bed of similar sediments, possibly 20 feet or more in thickness, and of similar strike and dip. Development-work at the present time is being directed to establish the continuity of the gold values between the two parallel beds of sediments along the strike of the Mac vein, and in the driving of a raise from the Belcher adit to connect through to the bottom of the old shaft-stope in which gold values were found on the Belcher vein. In this raise a bed of sediments corresponding in strike and dip with the lower bed mentioned above has been recently encountered.

The property is equipped with an office and camp accommodation for twenty men, assay office, 50-horse-power Diesel-engine-driven compressor, steel-sharpener and oil-furnace, machines, steel, rails, cars, etc., required in development-work. A short rope-tramway to supply material to the Belcher adit-workings was constructed from the compressor-house to the portal. A bridge from the compressor-house gives access to the Mac adit-workings. A caterpillar tractor is used for transferring supplies from the railway siding to the mine camp.

This company was incorporated in April, 1934, with a capitalization of 2,000,000 shares of no par value. The registered office of the company is **Taylor River Gold Mines, Ltd. (N.P.L.)**, 316-320 Hall Building, Vancouver. The company owns twenty-three claims, including the *Morning*, *Morning No. 1*, and *Apea* claims, and holds an option to purchase seven additional claims, all situated about 3½ miles up Taylor river, which flows into the upper end of Sproat lake. The main workings and camp are reached from Port Alberni by road to Sproat lake, launch up Sproat lake to the mouth of Taylor river, and thence 3½ miles by pack-trail which follows the river-grade for most of that distance.

This property was formerly owned by A. Smith, of Alberni, and W. P. Beavan, of Nanaimo, and it has been described in some detail in Bulletin No. 1, 1932, under the name of *Morning* group. During 1934 the present company made extensive improvements to the trail, constructed log camp buildings, and spent several months sampling and surveying the numerous veins which are found outcropping principally on the *Morning* and *Morning No. 1* claims. Eight to twelve men were employed for part of the season under the supervision of B. P. Johnson.

The country-rocks in the vicinity of the workings are basalts and andesites of the Vancouver Island volcanic series. These rocks in places are intruded by quartz-diorite dykes. The area has been faulted and sheared to a marked extent in the vicinity of the showings, the shearing taking place mostly before the mineralization, and the faulting, generally of but slight displacement, after the intrusion of the acid dykes. Several quartz-filled fissures have been traced by surface and underground work. The quartz is mineralized principally with pyrite, with which is found associated gold values. In some places small quantities of chalcopyrite, galena, and sphalerite were noticed.

The most westerly surface exposures are on the *M.T.* claim, about 1,500 feet west of the *Morning* showings. At this location low-grade galena-pyrite mineralization has been exposed in several large open-cuts. In the largest cut at 450 feet elevation the mineralization has been exposed for a length of 40 feet and across a width of 14 feet. The company reports that gold

values up to \$9 per ton were obtained from this cut. A second cut, approximately 150 feet to the east of the above working, exposes 3 to 5 feet of sulphide mineralization at the contact of diorite and basaltic rocks over a length of 25 feet.

The main showings on the *Morning* and *Morning No. 1* claims consist of open-cuts and one 360-foot adit that have exposed eleven fissure-veins, all approximately parallel and striking north-easterly into the hill. The veins dip at high angles. No. 8 vein at the westerly end of the showings has been opened up by one open-cut at 730 feet elevation. It strikes north 55 degrees east and dips 80 degrees to the south-east. The width exposed is 14 inches, mineralized with quartz and pyrite, with stringers of altered wall-rock. Only low gold values have been obtained from this cut. No. 7 vein is exposed by one open-cut at 700 feet elevation, 65 feet south from No. 8 vein open-cut. The vein is narrow, of similar strike to No. 8 vein, but dips 80 degrees to the north-west. No. 6 vein, approximately 65 feet south-east from No. 7 vein, has been exposed by open-cuts and a short adit over a length of about 280 feet, the width varying from a few inches to 4.6 feet. This vein strikes north 44 degrees east and dips 85 degrees north-west to vertical. Company sampling on the vein indicates values from 0.05 oz. gold per ton to 0.13 oz. gold per ton across widths of 0.9 to 2 feet. The writer took a channel sample across the exposure in No. 2 adit at 640 feet elevation and obtained 1 oz. gold per ton and 0.2 oz. silver per ton over the 4.6-foot width sampled. This showing justifies further drifting to establish the continuity and grade of the mineralization exposed in the short adit.

Very little work has been done on No. 5 vein, 55 feet south-easterly from No. 6 vein. No. 4 vein has been opened up along a length of 110 feet by open-cuts. This vein is 40 feet south-east of No. 5 vein and approximately 250 feet south 70 degrees east from No. 8 vein open-cut. The vein varies in width from 0.8 to 1.8 feet, strikes north 40 degrees east to north, and has a vertical dip. Company sampling indicates gold values of 0.09 to 0.22 oz. gold per ton. No. 3 vein would appear to be a branch from No. 4 vein. The south end of it as exposed is but 15 feet from No. 4 vein, and the strike of north 73 degrees east causes it to diverge rapidly as the outcrop of the vein is followed up the hillside. Open-cuts have exposed No. 3 vein along a length of 160 feet. The width varies from 3 to 16 inches and company sampling has indicated gold values varying from 0.02 to 0.25 oz. gold per ton across vein-widths. No. 2 vein, of which a portion is named the "Stump" vein, is approximately 70 feet east of No. 3 vein. The northern section of this vein outcrops at 950 feet elevation and company samples indicate a gold content of approximately 0.24 oz. gold per ton and an average width of 1.5 feet. One company sample, not included in the above average, assayed 2.48 oz. gold per ton across the 1-foot vein-width. The writer obtained an assay of 0.20 oz. gold across a 1-foot vein-width. The southern section of No. 2 vein, or Stringer vein as it is sometimes called, averages 1.9 feet wide and four company channel samples returned an average of 0.17 oz. gold per ton over this vein-width.

No. 1 vein, upon which development was formerly concentrated, has been stripped along the surface for 400 feet in length and followed underground for 250 feet in a 360-foot adit at 600 feet elevation. This vein is 20 to 30 feet south-east of No. 2 vein, strikes north 60 degrees east, dips vertically, and varies in width from 1.3 to 6.6 feet. Sampling underground by the company has indicated values from 0.02 to 0.34 oz. gold per ton, with many assays in the 0.13- to 0.25-oz. brackets. The mineralization is chiefly quartz and pyrite with low gold values. A sample across 3.3 feet in No. 2 cut, No. 1 vein, taken by the writer, assayed 0.30 oz. gold per ton and 0.06 oz. silver per ton.

Three other veins of similar type to those mentioned have been discovered south-east of No. 1 vein. Values up to 0.22 oz. gold per ton across vein-widths of less than 1 foot have been obtained by the company. These veins are called No. 1 east, No. 2 east, and No. 3 east, and are located 80, 100, and 240 feet, respectively, south-east from No. 1 vein.

Further work was done during 1934 in prospecting on the *Apeæ* claim at 3,000 feet elevation, where several veins of similar character to the above are reported to have been discovered.

CLAYOQUOT MINING DIVISION.

This Division is served by boats of the west-coast service of the Canadian Pacific steamships once every ten days. During 1934 there was considerable small-scale mining activity in the area and several new discoveries were reported from the Zeballos and Herbert Arm districts.

References.—*B.C. Wonder*, 1931; *Big Boy*, 1933; *Copper King*, 1931; *Craigellachie*, 1928; *Douglas*, 1930; *Indian Chief* (Pacific Tidewater Mines, Limited), 1931; *King Midas Mining*

Company, Limited, 1933; *Mary McQuilton* (Abco Mines, Limited), 1933; *Ormond*, 1932; *Jo Jo*, Bulletin No. 1, 1932; *Rose Maric*, Bulletin No. 1, 1932; *Shannon* (Silverado), 1928; *Star of the West*, 1928; Zeballos River Mining Company, 1933.

ZEBALLOS RIVER SECTION.

Following the publication of H. C. Gunning's report on the Zeballos River area by the Geological Survey of Canada in their Summary Report for 1932, Part A-II., the area adjacent to the Zeballos river was intensively prospected by many of the west-coast inhabitants, and as a result of this activity several discoveries have been reported.

This property has been described in considerable detail in the Geological Survey of Canada Summary Report, Part A-II., pages 38-42, for the year **King Midas Mining Co., Ltd.** 1932, and in the 1933 Annual Report. The following notes will bring the data up to date: The property is about 9 miles by trail from the head of Zeballos river, and during 1934 a small crew of men was employed on contract to extend No. 1 adit-workings. A total of 225 feet of drifting and crosscutting, some surface-stripping and prospecting was completed. The drift north from the winze in No. 1 adit-crosscut was extended a distance of 120 feet, following a narrow, well-mineralized fissure-vein of irregular strike and steep dip for much of the way. The writer took a composite sample of eleven channel samples along a 40-foot length of the vein exposed in this drift, and it assayed 4.04 oz. gold per ton, 0.6 oz. silver per ton, 1.9 per cent. copper, lead *nil*, and zinc 8.2 per cent., over an average width of 3.7 inches. A sample from the same vein at the surface, almost directly above this drift, assayed 3.30 oz. gold per ton, 0.8 oz. silver per ton, 4 per cent. copper, and 11.8 per cent. zinc, across a vein-width of 4 inches. A sample across an 18-inch width of mineralization at the glory-hole workings, some 1,400 feet northerly from the No. 1 adit portal, assayed a trace in gold and silver, 0.6 per cent. copper, and 1 per cent. zinc.

QUATSINO MINING DIVISION.

This Division is reached either by west-coast boats from Victoria every ten days, or by road from Port Hardy, on the east coast of Vancouver island, to Coal harbour, from which point the mail-boat calls at several places, or launches are available.

References.—*Alice Lake*, 1932; Canada Copper Company, Limited, 1930; Coast Copper Company, Limited, 1931; Copper Cup Mines, Limited, 1930; *June*, 1931, and Summary Report, G.S.C., Part A, 1929; *Marble Creek*, 1930; *Millington*, 1927-28-29, and Summary Report, G.S.C., Part A, 1929; Quatsino Copper-Gold Mines, Limited, 1931; *Quatsino King* (Teta River Gold), 1931; *Yreka*, 1928, and Summary Report, G.S.C., Part A, 1929.

NANAIMO MINING DIVISION.

This Division includes the eastern half of Vancouver island north of Chemainus and the west coast of the Mainland from the south end of Texada island and Jervis inlet, north to Seymour inlet, including the drainage areas of the Klinaklini, Homathko, Southgate, and Toba rivers. The recording office is at Nanaimo. This is one of the largest Divisions in the district and one of the most important in the Province on account of the great variety of mineral products that are mined in it. It contains all the coal mines of Vancouver island; many iron-ore deposits; many deposits of gold, silver, copper, lead, and zinc ores; as well as most of the non-metallic materials, such as lime, cement, brick, sand, gravel, crushed rock, and building-stone, which are of such importance to the development of the populous centres of the Province.

During 1934 the greatest mining activity, aside from coal and structural materials, was in the areas on Phillips arm and Shoal bay and in the Tatlayoko Lake district.

References (Vancouver Island).—*Big G.*, 1916; *Caledonia*, 1927-28-29, and G.S.C. Summary Report, Part A, 1929; *H.P.H.*, 1931-32; *Jubilee*, 1930; *Kinman*, 1929-30, and G.S.C. Summary Report, Part A, 1929; *Lucky Jim*, Bulletin No. 1, 1932; *Lynx*, 1927-30; *Maple Leaf*, 1930; Paramount Mining Company, 1920; *P.D.*, 1927; Price Creek Mining Company, 1929; *Robbins*, 1930; *Silver Leaf*, Bulletin No. 1, 1932; *Sumpter*, 1929; *Smith Copper*, 1931.

References (Mainland and Islands).—*Alexandria*, 1933, and Bulletin No. 1, 1932; *Blue Bells*, Bulletin No. 1, 1932; Cambria Copper Company, 1928-29; Central Copper and Gold Company (Vananda), 1928-29; *Colossus*, 1929; *Copper Bowl*, 1928; *Doratha Morton* (Hercules),

Bulletin No. 1, 1932, 1933; *Douglas Pine*, 1930; *Geiler*, Bulletin No. 1, 1932; Gem Gold Mines, Limited (B.C. Gold Mines, Limited), Bulletin No. 1, 1932, 1933; Hayden Bay Gold Mines, Limited, 1933; *Inca*, 1929-30; *John Bull*, 1926; *Juneau*, Bulletin No. 1, 1932; Lasqueti Mining Company, Bulletin No. 1, 1932; *Lucky Jim*, 1916, and Bulletin No. 1, 1932; Malaspina Mines, Limited, 1927-29; *Marjorie*, Bulletin No. 1, 1932; *Nancy Bell*, 1927; Romana Copper Mines, Limited, 1928-29-30; Sautana Copper Syndicate, 1929-30; *Solyman and Freya*, 1930; Sonora Gold Mines, Limited, Bulletin No. 1, 1932; *Stromberg*, 1927; Tatlayoko Lake Gold Mines, Limited, Bulletin No. 1, 1932; Thurlow Gold Mines, Limited, Bulletin No. 1, 1932, 1933; *White Pine*, Bulletin No. 1, 1932; *Wyho*, 1927.

VANCOUVER ISLAND SECTION.

Georgina. This property includes the *Georgina*, *Bessie*, *Margaret*, *Louise*, and *Josie* claims, all locations, owned by F. A. Whitehouse, of Nanoose Bay, and associates. The claims are situated within a quarter of a mile of the main Island highway, 1½ miles north of Nanoose Bay Post-office. A short trail leads from the road to the principal showings located on the west bank of Nanoose creek, just below a small timber dam constructed several years ago.

The mineralization, consisting of quartz, chalcopyrite, and associated gold and silver values, occurs in greenstone volcanics, presumably members of the Vancouver Island volcanic series, just west of a fault separating the greenstones from younger conglomerates of Upper Cretaceous age. The fault follows the creek-bed in the vicinity of the mineralization so far uncovered. Several open-cuts and trenches have indicated the occurrence of narrow fissures in the greenstone, all mineralized with quartz and occasionally with sulphides.

The main open-cut and shaft-workings, just below the dam, have disclosed two or three very narrow parallel (1 to 14 inches in width) fissures, strike approximately north 75 degrees west, dip 78 degrees north-east. The fissures, exposed for 35 feet, narrow to fractures in width as they are followed away from the fault, suggesting that a search towards the fault might indicate better widths of vein-filling. Development in this latter direction is seriously interfered with by the flow of water in the creek, but the owner is at present sinking a winze from the open-cut and intends to drift south-easterly under the creek as soon as sufficient depth has been gained.

The writer took several samples at the property. A channel sample, five cuts, across fissure-widths of 1½ to 4 inches, along a length of 20 feet, assayed 0.16 oz. gold per ton, 0.05 oz. silver per ton, and 0.4 per cent. copper per ton. Selected sulphides, which occur in the vein-filling in widths up to 12 to 14 inches and in irregular bunches, have been sorted from the deposit, a 1-ton shipment of such ore to the Tacoma smelter assaying 1.22 oz. gold per ton, 0.35 oz. silver per ton, and 5 per cent. copper. Another sample of approximately ½ ton of selected sulphide ore from the above workings assayed 1.60 oz. gold per ton, 0.6 oz. silver per ton, and 7.4 per cent. copper.

Approximately half a mile to the south-west and at 300 feet elevation a series of quartz-filled fissures, sparingly mineralized with pyrite, occur in schistose rocks. Assays from these showings returned no values in gold.

SHOAL BAY-PHILLIPS ARM SECTION.

This area is reached by Coast steamships to Shoal Bay and surrounding points. The most important operations are only briefly reviewed here as most of them have been reported on at length in previous publications of the Department of Mines.

At this property, on the north shore of Phillips arm, and some 2 miles from Shoal bay by boat, the Premier Gold Mining Company, with a crew of twenty-five to thirty men under the superintendency of S. M. Manning, and later J. C. McCutcheon, started an aggressive development programme early in 1934, discontinuing their work in the summer months. It is recently reported that R. Crowe-Swords, of Vancouver, has the property under personal option.

The Premier Company unwatered the shaft and did an appreciable amount of drifting and crosscutting on the 100- and 200-foot levels. The shaft-pumps failed temporarily and the underground workings below sea-level had to be abandoned pending the recovery of the pumps.

During this period No. 2 adit-level, approximately 50 feet above sea-level, and the main (or No. 1) adit-level were extended north along the mineralized shear-zone, which at this property is found in a bed of highly altered sedimentary rocks between two granite sills or stocks.

The underground workings were all carefully sampled by the Premier Company, the results of some hundreds of carefully taken channel samples checking very closely the figures obtained by engineers who had formerly sampled the mine. It is indicated that the values, chiefly pyrite and some chalcopyrite, with which is associated gold and silver, are confined to that portion of the shear-zone between the portal and the flat-dipping fault on No. 1 level. In this area it appears that there have been two periods of mineralization; the first period during which the quartz and pyrite was deposited, and the second period subsequent to faulting, when quartz, chalcopyrite, pyrite, and the associated gold values were deposited. This is indicated by the distribution of values as obtained by sampling, the best values coming in the section of the shear underlying the fault, while past it very little in the way of values were found. Ore-zones were located by sampling on the main or No. 1 level and on the 100-foot level, with almost negative results being obtained on the 200-foot and No. 2 levels.

About 15,000 tons of material assaying approximately 0.30 oz. gold per ton is indicated in the ore-shoot between No. 1 and 100-foot levels, due allowance being made for the extension of the ore some distance above and below the two levels mentioned.

Following the dropping of the option by the Premier Gold Mining Company, the property was placed in charge of a watchman. Power mining equipment, camps, and boat-landing facilities are a part of the property equipment. The power equipment is driven by a 116-132-horse-power Crossley Diesel engine.

Enid-Julie Mines, Ltd. This company's property, which is located on the west side of Phillips arm between the *Alexandria* and the *Doratha Morton* properties, is reached by boat to the beach and a steep 2-mile trail to the mine camp at 2,100 feet elevation.

During the early part of 1934 a crew of eleven to fifteen men was employed in driving the 780-foot level to get under the shaft showing, located 780 feet in elevation above and 800 to 1,000 feet beyond the portal. This adit was in 284 feet as at June, 1934, and the work was discontinued a few weeks later. The working followed a quartz-filled shear, mineralized with pyrite, in the altered sedimentary rocks of the area. The shear followed by the adit is not considered to be the same one on which the shaft is sunk.

At the upper (or shaft) showing, where high gold values are reported to have been obtained across 1½- to 3½-foot widths, the writer took three channel samples across widths of 3½ and 3 feet respectively of quartz mineralization. The average gold content obtained on assay of these samples was 0.1 oz. per ton. A selected sample showing approximately 3 per cent. galena and pyrite assayed 0.85 oz. gold per ton, but little or no mineralization of this character was visible in the well-defined shear at this shaft. A short distance downhill from the 10-foot shaft the quartz-filling pinches in width and at 60 to 80 feet distance it disappears as a narrow stringer under the overburden.

The property is equipped with a camp, a small gasoline-driven portable compressor, and necessary machines. It is understood that operations have been suspended since early in July, 1934.

Doratha Morton. This property is owned by the Hercules Consolidated Mining, Smelting, and Power Company, Limited, which is capitalized at 10,000,000 shares of \$1 par value, and has several holdings in British Columbia, including a group of some seventy-three claims in the Phillips Arm district. The claims held by the company include sixty-four claims by location and the following nine Crown-granted claims: *Doratha Morton*, *Doratha Morton Fraction*, *Percy*, *Africa*, *Comox Fraction*, *Chimnang*, *Eva*, *Douglas*, and *Banker*. J. Y. McCarter, of Vancouver, is the managing director.

Phillips arm is approximately 120 miles by boat from Vancouver, and the claims, approximately 3,400 acres in area, cover the strike of a mineralized shear-zone which extends to the north-west of the *Alexandria* and *Enid-Julie* properties on the west side of Phillips arm. The principal workings are located on the *Marble* and *Doratha Morton* claims; the *Marble* claim camp being situated on the shore of Fanny bay, 1 mile north of the main beach camp, and the *Doratha Morton* workings and mine camp being situated approximately 2 miles by road and trail west of the beach camp and at an elevation of 2,300 to 2,600 feet above sea-level. An aerial tramway of light construction was built in 1934 to transport supplies to the upper camp.

The *Doratha Morton* group of claims was first worked in 1898 and late in 1899, the operation being closed after about 10,000 tons of ore, yielding approximately 10,000 oz. silver and 4,434 oz. gold, had been mined and treated in the cyanide-mill which the company had erected at tide-water. This mill, the first cyanide-mill in the Province, was connected to the mine-workings by an aerial tramway. Following the shut-down the milling plant and other mining machinery, including compressors, tramway, etc., were dismantled and the property remained idle until 1924, when the Glasair Mining Corporation, of Vancouver, acquired title to the ground. This company expended an appreciable amount of money in further developing the various mineral-showings on the property. More recently title to the ground passed to the present company and during 1934 a crew of up to thirty-five or forty men has been employed in the construction of camps at the beach: building a light aerial tramway; constructing a road and trails from the beach to the upper camp; driving a 409-foot adit on the *Marble* claim; and developing various showings on the *Doratha Morton* claim, the scene of the original mine-workings.

The main zone of mineralization, best developed on the *Doratha Morton* claim, is a wide shear-zone following a north-west and south-east strike along the contact of altered volcanic and sedimentary rocks with granitic rocks of the Coast Range batholith. The shear-zone is up to approximately 100 feet in width, possibly more, and the quartz mineralization, with which is associated pyrite, gold, and silver, and occasionally chalcopyrite, is found occurring as veins, stringers, and broken lenses, generally at and near the foot-wall side of the shear. In some cases the mineralization has been found on the foot-wall of the shear. Several basic dykes cut the veins.

The shear-zone has been definitely traced along a length of approximately 1,400 feet.

The old mine-workings consist of five adits, from two of which there are drifts aggregating approximately 600 feet. The more recent work consists of open-cutting the westerly continuation of the shear-zone and the driving of a new adit (the 250 level) some 800 feet west of No. 1 adit, to tap a mineralized section of the shear-zone at a depth of approximately 75 feet. A short adit (the 100 level) was also started below outcrop showings situated 400 feet west of No. 1 adit.

In the most westerly working on the shear-zone, approximately 70 feet from the western boundary of the *Doratha Morton* claim, two channel samples taken across widths of $2\frac{1}{2}$ and 3 feet averaged but a trace in gold and silver, while a representative grab sample of 500 lb. of sorted quartz pieces from the shear-filling assayed 0.1 oz. gold per ton and 0.8 oz. silver per ton. Approximately 75 feet easterly from this cut a quartz-filling in the shear was sampled across a width of 5 feet and the assay value was 0.08 oz. gold per ton. This cut is directly above the projected end of the new 250 level adit, wherein crosscutting is being continued.

At 240 feet east of the first cut and 165 feet from the last-mentioned cut the company has opened up a small stope, from which has been extracted the ore shipped to the Tacoma smelter. Two samples across widths of 24 inches in the best section and 48 inches in the hanging-wall section assayed 5.36 oz. gold and 0.02 oz. gold respectively. A sample across the possible continuation of the shear-filling underground near by assayed 0.04 oz. gold across a width of 34 inches of quartz and iron oxidation. In the 250 level crosscut two zones of quartz have been encountered, the first at 50 feet from the portal and the second at 122 feet from the portal (the face on November 7th, 1934). Both quartz-fillings were sampled across widths of 30 inches and 24 inches respectively and returned assays of 0.12 oz. gold and 0.02 oz. gold per ton. From the above assays on this part of the property it is seemingly apparent that the values are associated with the heavy pyritic mineralization.

To the east of the creek and some 500 feet east of the first-mentioned cut the 100-foot level adit is under an open-cut exposure of sulphide and quartz shear-filling in the volcanics. Two samples taken here gave low gold values, while a cut 35 feet to the east of this level and across a quartz-width of 30 inches, partially oxidized, assayed a trace in gold.

In No. 1 east cut, which is 90 feet east of the new 100-foot level, a strong showing of sulphide mineralization and quartz has been stripped over a length of 12 to 15 feet. Five channel samples in this area over widths of 10 inches to 2 feet 6 inches assayed from a trace to 0.3 oz. gold per ton; the average value of the mineralization over a length of 15 feet and an average width of 3.6 feet being 0.19 oz. gold per ton. This showing is worth further development along its strike and depth.

Just above the western end of the old stoped section of the mine an open-cut 40 feet long opened up a zone of quartz-pyrite mineralization in the schistose rocks. This was sampled at 10-foot intervals along the strike, the four channel samples averaging 0.14 oz. gold over an average width of 2.2 feet, the highest and lowest assays here being 0.2 oz. gold and 0.04 oz. gold per ton.

In the old underground workings thirty-one samples taken by the writer, with four exceptions, assayed from *nil* to 0.16 oz. gold per ton, the majority being but a trace or less than 0.1 oz. gold per ton. Of the four samples better than the general run, one assayed 0.8 oz. gold per ton across a width of 19 inches of sulphides in a short hanging-wall crosscut and drift on the west end of No. 1 level; another assayed 0.42 oz. gold per ton across a width of 5 feet of the quartz-filled shear 320 feet east of No. 1 adit-crosscut; another assayed 0.4 oz. gold per ton across a width of 3.9 feet at a point 340 feet east of No. 1 adit-crosscut; and the fourth assayed 0.5 oz. gold per ton across a width of 5 feet, 30 feet north of the main drift on No. 1 level. This last sample is in the so-called low-grade zone of silicification.

In No. 3 level only traces in gold and silver were obtained in the eight channel samples taken.

Since the writer visited the property the new 100-foot level has been driven a total length of 47 feet from the portal. The average of twenty-one samples taken by C. C. Starr for the last 28 feet of the drift-length are reported to show an average width of 2.45 feet and a gold content of 0.74 oz. per ton. The 250-foot level has been extended 8 feet past the hanging-wall of the shear-zone at 140 feet from the portal, and a drift at 55 feet in from the portal has been driven 19 feet on the quartz-filling. This assays, according to Starr's samples, 1.02 oz. gold per ton across an average width of 3 feet sampled by him.

These later results are encouraging and will require further work to delimit the showings. The main section of the old workings proved disappointing as to values when sampled. The mineralization on No. 3 level at 2,315 feet elevation is sparse and low grade. Some sections toward the west end of the No. 1 adit-level may contain values, possibly under the sill-floor of the stopes from which the original company mined the ore for the old cyanide plant.

The present operators have made several small shipments of ore, aggregating possibly 30 to 40 tons, from the old No. 2 workings, to the west of the creek and between the 250 level and the new 100 level. The shipments have contained between 1.58 and 2.89 oz. gold per ton and about 6 or 7 oz. silver per ton. The small segment of the vein from which this ore was obtained has been cut off by a fault, and the continuation of the ore beyond the fault has not, as yet, been picked up.

The *Marble* adit, at sea-level, is driven for 409 feet in granitic rocks. Several narrow beds of sedimentary rocks are encountered in this length, but no mineralization other than occasional segregations of pyrrhotite and pyrite is exposed.

This property, formerly owned by Seymour Campbell, of Shoal Bay, consists of nine claims, two of which, the *White Pine* and *Electric*, are Crown-granted. **Shoal Bay Mining Syndicate** Early in 1934 the ground was acquired by the Shoal Bay Mining Syndicate and active development with a crew of four to six men under the supervision of S. Campbell continued throughout the year. The claims are reached by an old logging-road and trail from Shoal Bay, the distance to the present workings being about 2 miles from tide-water. Shoal Bay is a regular port of call by Union Steamships from Vancouver.

**Shoal Bay
Mining Syndicate
(White Pine
Group).**

A brief description of the workings is given in Bulletin No. 1, 1932. The mineralization consists of massive quartz veins in fissures and quartz lenses frozen in granitic rocks of the Coast Range batholith. The veins and lenses are from 6 to 20 feet in width, and in places are heavily mineralized with pyrrhotite, pyrite, and small associated gold values.

On the *Electric* and *White Pine* claims considerable surface and underground work was done many years ago. The most easterly working, an open-cut, shows massive pyrite-pyrrhotite mineralization in an irregular quartz-outcrop. The foot-wall is not in evidence in the cut, but there is an indicated width of 10 to 12 feet of quartz, slightly oxidized. Approximately 60 feet west of this cut and 30 feet higher in elevation at 700 feet above sea-level, a 26-foot shaft (No. 1 shaft) shows a vein-width of 10 feet. Parts of the vein are mineralized with massive bunches of sulphides. A representative sample of the dump at this shaft assayed a trace in gold per ton. Cuts to the west of this shaft indicate the continuity of the quartz mineralization for possibly 200 feet along a strike of north 80 degrees west.

About 1,200 feet west of the above shaft, and on the *White Pine* claim at 830 feet elevation, there is an adit (No. 1 tunnel) 165 feet long. This working, driven on a north 17 degrees west bearing, intersects a 5-foot vein 75 feet from the portal. The vein strikes north 70 degrees west and dips at 70 degrees to the north-east. A chip sample across 5 feet of vein material in this working is reported by J. F. Coates to assay 0.04 oz. gold per ton. At 165 feet north 39 degrees west from the adit portal, and at 915 feet elevation above sea-level, there is a 74-foot shaft (No. 2 shaft) on an 8-foot vein of quartz, containing about 5 per cent. pyrite. Selected samples containing up to 1.10 oz. gold per ton have been reported by the syndicate from this shaft. Generally the values are low in gold. It would appear that a fault between the adit and the shaft has offset the vein as exposed in the shaft about 60 feet to the north. A 40-foot crosscut from the face of the present adit on a westerly bearing should intersect the vein about 20 feet below the shaft-bottom. The vein has been traced for 175 feet west of the shaft, where it is again cut off by a fault.

Approximately 1,000 feet in a north 40 degrees west direction from No. 2 shaft, the syndicate has done considerable open-cut and underground work during 1934. An open-cut at 1,000 feet elevation shows a narrow width of oxidized quartz in the granite. A short distance to the east, at 1,015 feet elevation, No. 2 adit has been driven about 60 feet south 60 degrees west. Heavy sulphide mineralization was found across widths of 6 to 12 feet in this adit. A sample representative of 10 tons of sulphide mineralization from this working when it was in 16 feet was taken by the writer. The sample assayed 0.32 oz. gold per ton. Open-cuts to the south-west (up the hill) indicate the continuation of the quartz mineralization for 200 to 250 feet.

Since the writer visited the property in June, 1934, it is reported by S. Campbell that No. 3 adit was started below No. 2 adit, and that 35 feet of drifting exposed mineralization in bunches and stringers of sulphides along the granite shear. Surface work is also reported to have been done recently between No. 2 shaft and No. 2 adit, and on another vein outcropping to the north of No. 2 adit. A camp for five men was erected during 1934.

TEXADA ISLAND SECTION.

This property, owned by Hugh McMillan, of Nanaimo, is said to consist of **Nancy Bell.** ten Crown-granted mineral claims and one held on location, including the *Silvertip, Nancy Bell, Dundee, Surprise, Copper King, Hillside, Apache, Retriever, Silver Plume, R.A.M.,* and *Westgate* claims. They are situated on the south-western slope of Surprise mountain near the north end of Texada island and approximately 3½ miles due south-west from Vananda bay. Access to the property is by road (4 miles) and trail 1½ miles from Vananda. The general rock formation is a basic porphyry (basic fine-grained porphyritic rock in the vicinity of the *Nancy Bell* claim) and limestone-beds of the Marble Bay formation. The mineralization occurs in shears and fissures in the porphyry and consists of quartz, pyrite, chalcopyrite, galena, sphalerite, and associated gold and silver values.

On the *Nancy Bell* claim a 48-foot shaft at 1,090 feet elevation and one or two open-cuts have disclosed a shear carrying iron, copper, lead, and zinc sulphides. A sample taken to represent about 15 tons of sorted ore at the shaft assayed: Gold, 0.30 oz. per ton; silver, 2 oz. per ton; copper, 0.7 per cent.; lead, 0.7 per cent.; zinc, 17.8 per cent.; while another sample from a similar pile of ore on the south side of the shaft-collar assayed: Gold, 0.30 oz. per ton; silver, 1.5 oz. per ton; copper, 2.4 per cent.; lead, trace; zinc, 10 per cent. Further work might be done on the surface to the north-west of the shaft along the strike of the shear in order to test out the continuity and grade of the mineralization in view of the above values.

Very little can be seen on the *Silvertip, Surprise, Copper King,* and *Retriever* claims of the group at the present time, due to the caved condition of the several shafts and adit-workings thereon. These claims have been described in past Annual Reports (1921-23-26) and in Memoir 58 of the Geological Survey of Canada, "Texada Island, B.C." During 1934 a zone of mineralization, heavily impregnated with iron oxides and containing minor amounts of copper, lead, and zinc sulphides, was uncovered by trenching to the south-east of the old *Surprise* shaft. A grab sample representing the material excavated from five large open-cuts assayed: Gold and silver, trace; copper, 0.5 per cent.; zinc, 1.8 per cent. Another sample representing several tons of oxidized material from a long cut 100 feet south of the above five cuts assayed: Gold, 0.04 oz. per ton; silver, 0.10 oz. per ton; copper, 2.4 per cent.; lead, trace; zinc, 3 per cent.

TATLAYOKO LAKE SECTION.

Several descriptions of the general topography, accessibility, mineral-showings, and possibilities of this area have been published in past Annual Reports of the Department of Mines (1910, 1916, 1921); also the 1924 Summary Report, Part A, of the Geological Survey of Canada. Very little work has been done in the way of development since Brewer and Dolmage wrote their reports, and the following notes are simply for the purpose of bringing the foregoing reports up to date.

This company acquired the *Morris* property from the Tatlayoko Gold Mining **Bridge Island** Company, Limited, early in 1934. The claims, six in number, and including **Gold Mines, Ltd.** the *Tatlico, Tyee, Isaac, Spokane, Copper Dyke, and Copper Dyke Extension* Crown-granted claims, are situated about 4 miles south-east of the southern end of Tatlayoko lake at an elevation of 6,000 to 7,000 feet above sea-level. The only means of access to the property at present is by motor-road for 170 miles west of the Pacific Great Eastern Railway at Williams Lake to the north end of Tatlayoko lake, and thence 16 miles by launch to the wagon-road at the south end of the lake. This road, 3 miles in length, has been built to the company's camp on Mathews creek near their power-plant site. From this camp it is 4 to 5 miles by trail and a 3,000-foot climb to the mine camp and workings. It is approximately 53 miles from the property down the Homathko river to Bute inlet and tide-water, but the country traversed is exceptionally rugged and to date there is not even a passable Indian or trapper's trail along this route.

During 1934 the present holding company established boat-landings at both ends of Tatlayoko lake; built several miles of road and trail to gain access on an easy grade to the mine-workings; established a semi-permanent camp at the power-site and a temporary camp at the mine; geologically and topographically mapped the area in the vicinity of the mine-workings both on the surface and underground; further prospected the surface of the claims by open-cut work and cleaned out the underground workings preparatory to the resumption of underground development.

The mineralization developed on the steep and rocky sides of a gulch at 6,000 to 6,500 feet elevation consists of several veins of quartz in which the metallic mineral constituents are arsenopyrite, stibnite, pyrite, and gold and silver values. Many different vein-outcrops have been uncovered in an area of highly altered argillaceous rocks and fine-grained sandstones, but the principal exploration-work has been confined to two of the veins, on each of which several open-cuts and an adit have been excavated. The sedimentary rocks in the vicinity of the adits are cut by numerous east-west and north-westerly-striking dykes, while a short distance to the north-east of the portal of the upper (or No. 1) adit there is an outcrop of a quartz-diorite stock. The dykes are up to 8 feet in width, dip at steep angles into the hill, and are generally basaltic, although occasionally dykes of dioritic type are found. A thin bed of fine-grained siliceous conglomerate outcrops between No. 1 and No. 2 adits.

No. 1 adit at 6,150 feet elevation is 382 feet long. It develops the underground continuation of a portion of the 800-900-foot length of the *Morris* vein (main vein), which can be seen outcropping up the rocky hillside. The vein varies in width from a few inches to 4 feet, averaging possibly 16 to 18 inches. The mineralization in places is well developed and an ore-shoot 150 feet long, averaging 20.5 inches wide and containing 0.53 oz. gold per ton and 8.5 oz. silver per ton, is indicated by ten channel samples. Values up to 4.5 oz. gold per ton have been obtained from vein-widths of 3½ feet at the surface outcrop of this ore-shoot. At the inner end of this adit the vein is lower in grade and at the face a dyke splits it. The vein strikes north 8 degrees west and dips at 25 to 40 degrees into the hillside (north-east).

No. 2 adit at 6,015 feet elevation and 350 feet south 56 degrees west from No. 1 adit portal is 255 feet long, the last 75 feet of it being a crosscut to the foot-wall of the narrow vein exposed on this level. The vein varies in width up to 8 inches and strikes south 35 degrees to 40 degrees east, with a dip of 65 degrees to the north-east. At 130 feet from the portal the vein is cut by a narrow dyke and a fault of small displacement. Two samples across 8-inch widths of vein assayed 0.7 oz. gold per ton and 13 oz. silver per ton.

Encouraging assays have been obtained from a new vein known as the *Hume* vein, the outcrop location being at an elevation of 6,500 feet and 500 feet south 73 degrees east from No. 1 adit portal. The writer took two channel samples across vein-widths of 34 inches and 36 inches, the average assay being 0.36 oz. gold per ton and 3 oz. silver per ton.

In 1935 the company contemplates extensive surface exploration and further underground development, particularly on No. 1 adit-level.

Feeney. This property, owned by J. I. Feeney and associates, of Vancouver, includes the following nineteen mineral claims, all held on location: *Langara Nos. 1 to 8, inclusive, Braemar, Standard, Argo Nos. 1 and 2, Federal, Mary, Joan, Helen Nos. 1 and 2, and Talla Nos. 1 and 2.* The claims are situated on both sides of the South fork of Feeney (Ottarasko) river, about 10 miles by fair pack-trail in a north-westerly direction from the southern end of Tatlayoko lake. The mineral-showings were first discovered many years ago by Mr. Feeney, who relocated them before the present exploration and development work was started.

The mineralization consists of quartz veins, in places well mineralized with arsenopyrite, pyrite, and associated gold and silver values. The veins are found cutting highly altered sediments, principally argillites and quartzites, in the vicinity of tongues and stocks of diorite. The diorite intrusions are in all probability related to the granitic rocks of the Coast Range batholith, which outcrop within comparatively short distances of the showings. Numerous dark basaltic dykes are found cutting the formation.

For convenience in description, the workings, with the exception of one short adit, are described from south-east to north-west across the property.

On the *Langara* showings, about 1 mile by trail and 1,100 to 1,300 feet in elevation above the camp, one main vein and several smaller veins have been uncovered. The most easterly vein, at 6,000 feet elevation, strike south 80 degrees east, dip 80 degrees south-west, varies in width from 2 to 20 inches and has been traced up the mountain-side for 300 feet. A channel sample across two 20-inch cuts on the vein, mineralized with arsenopyrite and pyrite, assayed: Gold, 0.08 oz. per ton; silver, 0.3 oz. per ton; arsenic, 17 per cent. About 500 feet to the west of this vein and at an elevation of from 5,650 to 5,850 feet, a well-defined vein, strike south 53 degrees east, dip 60 degrees south-west, has been uncovered for a length of possibly 350 to 400 feet, with showings in the bluffs above the open-cuts indicating greater length. A branch of this vein, strike north 30 degrees west, dip vertical, intersects the main vein at 5,900 feet elevation on the surface. These veins occur in a diorite stock close to its contact with argillaceous sediments, the vein continuing into the argillites. The main vein averages possibly 4 feet in width where exposed, the branch vein being 2 feet wide. The writer took five samples across widths of from 21 to 54 inches, the average assay being 0.16 oz. gold per ton and 22.6 oz. silver per ton. The owners report having had considerably better but still low-grade values from this section of the property, and further work should be done on the showings to prove their real merit.

On the west side of the South fork of Feeney river and at 5,820 feet elevation on the *Standard* claim, a massive showing of arsenopyrite-pyrite mineralization, occurring as a replacement in the argillites on either side of a north 20 degrees west vertical shear, has been exposed by an open-cut. Two samples representing a mineralized width of 6 feet were taken. The assay returned 0.24 oz. gold per ton and 0.15 oz. silver per ton. The mineralization has been shown up for a length of possibly 250 feet and varies from 2 to 6 feet in width.

About 2,000 feet to the north-west on the *Argo* claim several north-south-striking fissure-veins in cherty argillites have been uncovered by trenching. Seven mineralized fractures, varying from 1 to 4 inches in width, occur within a width of 50 feet. Selected material assayed 0.13 oz. gold per ton, trace in silver, and 28.5 per cent. arsenic.

Approximately 1,000 feet to the west at 5,700 feet elevation a 4- to 6-foot quartz vein, strike north 30 degrees west, dip vertical, was discovered during 1934. A chip sample of the vein exposed in a small creek assayed 0.24 oz. gold per ton and 2 per cent. arsenic. This showing requires and justifies considerable exploration-work before its value will be properly known.

The property is located in a geologically favourable area, and the widespread and uniform mineralization found with the limited prospecting it has been possible to do in the past year warrants further exploration.

VANCOUVER MINING DIVISION.

PACIFIC GREAT EASTERN RAILWAY SECTION.

Brandywine. This group of eight claims—*Exchange, Brandywine, May, June, August, Dan, Den, and Cypress*—is owned by Wm. Barclay and Wm. Anderson, of Brandywine Falls. The claims are situated 2 miles up the Brandywine river by

trail from the falls at the Pacific Great Eastern Railway. The mineralization consists of quartz-filled fissures and lenses of quartz in a wide zone of schistose greenstones and sericitic schists which here occur surrounded by granodiorite of the Coast Range batholith. Development-work in the past, described in the 1927 Annual Report and Bulletin No. 1, 1932, has shown up several low-grade showings of quartz mineralized with small amounts of pyrite, galena, and sphalerite, carrying small gold and silver values. The writer took four samples of representative mineralization from the various workings and obtained traces of gold and silver upon assay in three of the samples. The fourth sample, taken across a 12-inch vein at 1,900 feet elevation and up-stream opposite the owner's cabin, assayed 0.06 oz. gold per ton, 0.6 oz. silver per ton, and 1 per cent. lead. This vein, varying in width from 8 to 14 inches, has been drifted on in a southerly direction for 86 feet, the vein being on the hanging-wall side of an acid-porphry dyke which cuts the granodiorite of the immediate area. The owners report having obtained high gold values from this last-mentioned working, and some further prospecting is planned in view of the results they have to date.

This group, consisting of eight claims—*Blue Jack Nos. 1 to 8, inclusive*—situated on the west side of the Pacific Great Eastern Railway, 3 miles by trail from Brandywine falls, is owned by the Blue Jack Mines, Limited.

A. E. Snow, one of the original owners, is the Vancouver representative of the company. The property is described in some detail in the 1927 and 1930 Annual Reports of this Department.

The showings are exposed above and below the camp cabins at 2,250 feet elevation, along either side of a shear-zone in schistose greenstone exposed on both sides of a small southerly-flowing tributary of the Brandywine river.

The lowest showing, on the banks of the river at the outlet of the creek, shows 12 inches of sparse galena-pyrite mineralization of indefinite length in the schist. At 2,200 feet elevation a new low-level adit below the two upper adits at 2,600 and 2,650 feet elevation respectively was started in 1933 and driven north 35 degrees east for 100 feet through overburden.

At 2,475 feet elevation, on the west bank of the creek, a small open-cut in the schist shows segregations of galena and quartz mineralization a few inches wide and short exposed length. A selected sample of mineral from this exposure assayed 1.22 oz. gold per ton, 1 oz. silver per ton, 1.2 per cent. lead, and 4 per cent. zinc. At 2,700 feet elevation and approximately 200 feet west of the main showings to be described, stripping has exposed galena and sphalerite mineralization in quartz stringers along a length of 20 feet and over a width of 14 to 24 inches. A sample taken across a width of 24 inches of the best mineralization in the schist assayed a trace of gold, silver, copper, and lead, and 2.5 per cent. zinc.

At 2,600 to 2,700 feet elevation along the creek-banks, open-cuts and two adits have exposed pyrite-galena-sphalerite segregations over an aggregate width of 40 to 50 feet of a shear-zone in schistose greenstone. The mineralization occurs as stringers and bunches across this width, and no segregation of mineral has any appreciable continuity along the trend of the schistosity. A channel sample across a 7½-foot width of mineralization, on the east bank of the creek at 2,675 feet elevation, assayed: Gold, 0.16 oz. per ton; silver, 2.2 oz. per ton; copper, *nil*; lead, 0.8 per cent.; zinc, 1 per cent. The two adits, No. 2 at 2,650 feet elevation on the west side of the creek and No. 1 at 2,600 feet elevation on the east side of the creek, expose small segregations of sulphide mineralization near the portal of No. 2 and in a short crosscut to the west from the face of this working, and in the present face of No. 1 adit-crosscut.

The occurrence of good gold values with the sulphides justifies further prospecting in the area, and this should be done before any long crosscut adits are considered.

This group of fourteen claims, including the *Astra, Cardiff, Cambria, Doffofy, Dick, Harry, Pal, Progress, Ruth,* and *Tom* claims, all held on location, is situated about 1 mile to the north-west of the *Blue Jack* group. The same

trail serves both properties, the distance from the Pacific Great Eastern Railway being 4 miles to the cabins at 3,250 feet elevation. The claims are owned by Frank Price, of Vancouver, and associates.

Several zones of disseminated low-grade galena-sphalerite mineralization with narrow lenses of more massive sulphides have been developed by open-cuts in schistose greenstone found in association with diorite tongues of the Coast Range batholith. Of those examined the zone developed by four large and several smaller open-cuts at 3,250 feet elevation and approximately 2,500 feet north-westerly from the cabin is the largest in areal extent. This showing is called

No. 6 lead and mineralization over a length of 600 to 800 feet and up to 65 to 75 feet in width is indicated by open-cut work. No. 4 cut at the south end of the open-cut workings was sampled by taking chip samples from the 15-foot width of sulphide mineralization, principally pyrite with galena and sphalerite; the sample assaying 0.40 oz. gold per ton, 2 oz. silver per ton, trace in copper, 2.6 per cent. lead, and 4 per cent. zinc. Approximately 175 feet north 35 degrees west of No. 4 cut is No. 3 cut, which shows similar sulphide mineralization of the greenstones, and a representative sample of the 16-foot-wide exposure assayed: Gold, trace; silver, 1 oz. per ton; copper, *nil*; lead, *nil*; zinc, 2.5 per cent.

No. 2 cut, 30 feet north 35 degrees west from No. 3 cut, indicates a width of 30 feet of sulphide mineralization and a grab sample from the entire exposure assayed: Gold, trace; silver, 1.5 oz. per ton; copper, *nil*; lead, 1 per cent.; zinc, 3 per cent. No. 1 cut, a short distance north-west from No. 2 cut, indicates a 75-foot width to the zone of mineralization and a chip sample from forty or fifty places in the open-cut assayed: Gold, trace; silver, 1.5 oz. per ton; copper, trace; lead, 1.4 per cent.; zinc, 4 per cent. From the various exposures it is indicated the zone strikes north 35 degrees west and dips at 65 degrees into the hill (south-west).

Approximately 600 feet to the south-east and at 2,960 feet elevation a long open-cut in schistose rocks, partly silicified, exposes what is regarded as the hanging-wall of the zone, the strike and dip of the mineralization being the same as above. One sample from the open-cut face assayed: Gold, 0.14 oz. per ton; silver, 1.5 oz. per ton; zinc, trace; while a sample from an open-cut above the long open-cut assayed: Gold, trace; silver, 2 oz. per ton; copper, trace; lead, 0.8 per cent.; zinc, 3 per cent.

Several other showings of sulphide mineralization have been located by prospecting along a northerly-flowing tributary of the North fork of the Cheakamus river, about 1 mile to the north-west of the cabin at 2,400 feet elevation. Assays of a 15-foot sample from one such showing (No. 5 vein showing) contained only a trace in zinc. Above this showing, on the same small creek at 2,850 feet elevation, a 24-inch quartz vein, strike north 15 degrees west, dip 60 degrees south-west, has been opened up by open-cuts and a shallow shaft. A sample of the mineralized portion of this vein assayed: Gold, 0.06 oz. per ton; silver, 1 oz. per ton; copper, trace; lead, 1 per cent.; zinc, 4 per cent.

Within 1,500 feet of the cabin and above a small pond on the divide between the Brandywine and Cheakamus rivers a mineralized replacement of limestone by galena occurs close to the contact of the limestone and the underlying serpentized and chloritized greenstone-schists, in the vicinity of a quartz-porphry dyke.

The widespread distribution of the mineralization, though low in grade, indicates that the area is worthy of further prospecting.

NEW WESTMINSTER MINING DIVISION.

References.—*Barkoola*, 1930; *Blue Lead*, 1930; *Cow* claims, 1928; *Dandy (Mayflower)*, 1930; *Empress*, 1931; *Faith* (Silver Chief Mining Company, Limited) (*Providence*), Bulletin No. 1, 1932; *Lucky Four*, 1931; *Money Spinner*, 1930; *Mountain Goat*, Bulletin No. 1, 1932; Pitt Mining Company, 1930; Slease Creek Mining and Development Company, 1929; *Wisota and Zenith*, 1929.

This property, comprising the *Money Spinner*, *Wonderful*, *Prince*, *Golden Money Spinner Queen*, *Tellurium*, *Free Gold*, *Neptune*, and *Star* Crown-granted mineral claims, is situated 16 miles north west of Tipella by trail on the north side of Fire lake, on the southern slope of Fire mountain. Tipella is 42 miles (N.P.L.) by boat north of Harrison Hot Springs, and Harrison Hot Springs is 6 miles from Agassiz, on the Canadian Pacific Railway, or 90 miles by road from Vancouver.

The principal showing on the property is a well-defined quartz fissure-vein averaging 4 feet in width, strike almost north-south, dip 50 degrees to 40 degrees west. The vein occurs in fine-grained to porphyritic greenstone, profoundly sheared in many areas to greenstone-schist. The vein is well banded and sheared between gouge-filled walls. This vein is on the *Money Spinner* claim and it outcrops at 4,900 feet elevation above sea-level. It is at this point that the principal workings are located.

No. 1 adit, 4,900 feet elevation, is caved at 250 feet from the portal, but is stated to have been driven 420 feet along the strike of the vein. At 83 feet from the portal a winze was sunk

on the vein for 84 feet, and from the bottom of the winze two short drifts aggregating 35 feet in length were driven on the vein. At 138 feet a raise was driven 80 feet up on the vein, following it almost to the surface. Two small stopes were excavated at the bottom of this raise.

No. 1 level shows the vein to be well defined and mineralized with small amounts of pyrite. Occasional samples showing free gold in small amounts have been found along the fracturing in the banded vein. Five channel samples taken across vein-widths varying from 30 to 49 inches in this level and in the two small stopes from it showed traces in gold. Two samples, 250 and 230 feet from the portal, assayed 0.06 oz. gold per ton, while one sample across a 3-foot vein-width in the stope assayed 0.16 oz. gold per ton. Two samples were taken from the vein at the bottom of the winze across 3.5- and 5.7-foot vein-widths. These samples showed traces in gold. A specimen showing a small quantity of free gold was found at the bottom of the winze-workings. In the winze-workings there is evidence of a concentration of sulphides and it is from this place that the former owners report having obtained excellent gold values.

Surface work has shown the continuation of the vein for several hundred feet. The occurrence of reported good gold values at places warrants a thorough sampling of the vein as exposed and the cleaning-out of the workings beyond the caved ground on the No. 1 level. A short crosscut and drift from the new No. 2 adit-level, 125 feet below No. 1 level, would definitely establish whether or not minable values are located below the winze from No. 1 level.

When the property was examined in October the new No. 2 adit was in 16 feet from the portal.

This group of five Crown-granted claims—the *Barkoola*, *Toledo*, *Monterey*, **Barkoola.** *Washington*, and *Golden Eagle*—are located about 1 mile west of the *Money Spinner*. A rough trail joins the two properties. The showings consist of a number of narrow veins, most of them gash-veins, in greenstone, the quartz being mineralized with traces of copper. On the *Barkoola* claim an adit at 5,100 feet elevation, 57 feet long in a north-easterly direction, exposes a quartz vein up to 2 feet wide. A sample of three cuts across 13 inches of quartz in the bottom on an 8-foot winze at the face of the working showed only a trace in gold. A second sample of three cuts across 18 inches of quartz on the back of the working assayed 0.04 oz. gold per ton.

On the *Monterey* claim, at 5,300 feet elevation and to the west of the *Barkoola* adit, are a caved adit and shaft and a fairly large dump of quartz and greenstone, the quartz containing slight copper mineralization. Quartz veins are found in greenstone here as at the other claims of the group. No work has been done on this property for many years.

This company owns by location a group of approximately sixty mineral claims **Richfield Cariboo** staked along the north side of Fire creek and Fire lake. The claims include **Gold Mines, Ltd.** the *Blue Lead* and *King No. 1* claims, formerly owned by C. D. Morgan, of Vancouver. The *Money Spinner* trail from *Tipella* and branch trails give access to the various claim-workings. During 1934 two to four men were employed doing assessment-work during the summer and autumn months.

The most westerly showing consists of four parallel gash-veins on the *Blue Lead* claim. These veins are from 60 to 80 feet in length, vary from nothing to 18 inches in width at the central portion, strike north 85 degrees east, and dip 43 degrees to 46 degrees north-east. On the lowest vein at 5,450 feet elevation a 35-foot shaft was sunk several years ago. The vein exposed in the shaft varies from 12 to 24 inches in width and a sample of four channel cuts across widths of 16, 19, 20, and 24 inches, at 10-foot intervals, assayed a trace in gold. A grab sample of the quartz-dump from this shaft assayed 0.04 oz. gold per ton. On the *Blue Lead* No. 1 vein, 400 feet north-west from the above winze, a gash-vein 20 feet long and 14 inches at its widest part assayed: Gold, *nil*; silver, *nil*; copper, trace; across an average width sampled of 11 inches.

At 3,700 feet elevation at the west end of Fire lake and about 300 feet above there is a 34-foot shaft on another gash-vein in the greenstone. This vein has an exposed length of 110 feet and a width of 6 to 14 inches. It strikes east and west and dips 26 degrees to the north. The vein pinches to a fracture 15 feet down the shaft. Two channel samples at the shaft-collar across an average width of 15 inches of quartz assayed: Gold, trace; while two channel samples across an average width of 12.5 inches, 10 feet down the shaft, assayed: Gold, 0.02 oz. per ton.

About 1 mile from the west end of Fire lake and close to the north shore-line there is a massive outcrop of quartz in schistose greenstone. The quartz is white and shows practically no mineralization other than a slight iron-oxide discoloration.

The *King* No. 1 vein is located to the east of the *Money Spinner* showings. It consists of a series of short gash-veins 6 to 24 inches wide exposed along a length of 50 feet in the greenstone at 4,600 feet elevation. A chip sample from fourteen of the exposed gash-veins assayed a trace in gold per ton. About 200 feet above and due north from this showing there is a massive irregular outcrop of barren-looking quartz. The main *King* outcrop is located at 5,050 feet elevation and about 800 feet from the *Money Spinner* No. 1 adit. Here several gash-veins varying up to 36 inches in width are exposed by open-cut work along a length of 150 feet. Two samples of three cuts each over average widths of 14 inches and 9 inches on the largest of these veins assayed: Gold, *nil*.

A great number of similar gash-veins outcrop on the property, and from several of them occasional specimens showing chalcopyrite and containing good gold values have been obtained, but the average values of all the samples taken are practically *nil*.

YALE MINING DIVISION.

CHOATE SECTION.

References.—*Aurum*, 1927-28-29-30-31-32; B.C. Nickel Mines, Limited, 1929-30-31-33; *Dawson*, 1931-32-33; *Emancipation* (Dawson), 1915-18 to 1920, 1922 to 1927, 1929-30; *Emigrant*, 1917-18; *Eureka*, 1915-24-25-26; Home Gold, 1929-31-32-33; *Home X*, 1933; *Master Ace*, 1930-32-33; *Pipestem* (Home Gold), 1922-27-28-29-32; *Pride of Emory* (B.C. Nickel), 1924-26-28-29; *Roddick*, 1915; *Siwash Creek*, 1915-22-23-26; *Star*, 1933; *St. Patrick*, 1933.

This property, comprising in all approximately 113 mineral claims, including the *Pride of Emory* group, is situated across the ridge between Choate and Emory creeks, approximately 15 miles by road north-west of Hope. Access to the property is by means of a private road constructed by the company from the main Cariboo highway at Choate. This road is 7½ miles long and climbs from an elevation of about 100 feet above sea-level to No. 1 tunnel portal at 3,527 feet elevation.

B.C. Nickel Mines, Ltd.

During 1934 approximately 130 men were employed under the direction of C. B. North, engineer in charge, in furthering development-work on the extensive property holdings. Several hundred acres of the company's claims were surveyed with a magnetometer of the Askania type under the direction of E. E. Bergman, of Seattle. This work indicated approximately sixty-eight areas of possible nickeliferous-pyrrhotite mineralization. On several of these indicated areas test-pits were sunk to bed-rock and in every case nickeliferous mineralization was found to occur where it had been indicated.

About 20,000 feet of diamond-drilling was also done during 1934, most of it being done from underground stations in the No. 1 tunnel.

The general geology of the area has been described in some detail in the 1933 Summary Report, Part A, Geological Survey of Canada.

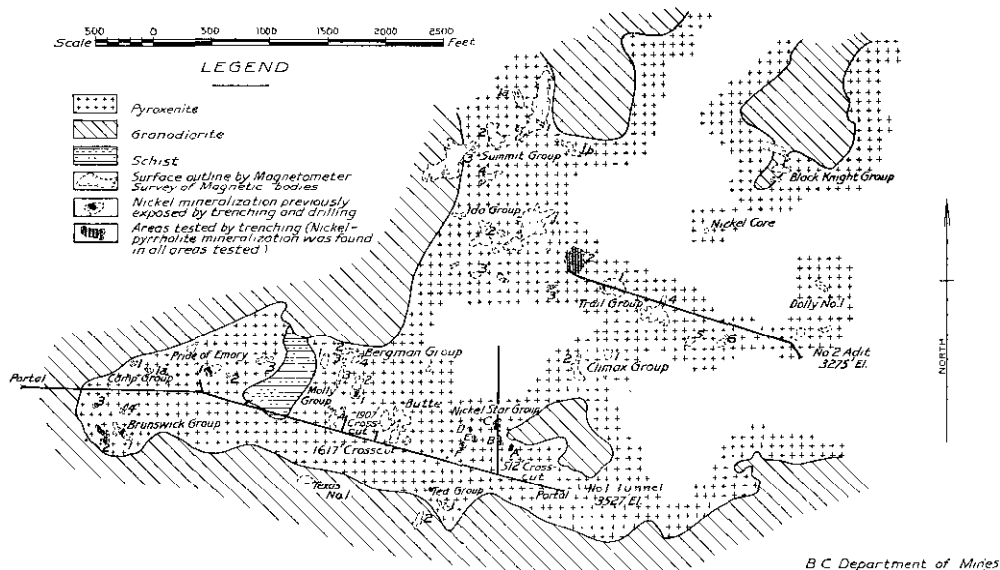
The company's map which accompanies this report shows the general geology; the occurrence and location of the nickeliferous-pyrrhotite mineralization located by the magnetometer survey, and the underground work done by the company in 1934. As shown on the map, the Main (or No. 1) tunnel at 3,527 feet elevation was holed through in a length of 4,700 feet to the Emory Creek side of the mountain. At 512 feet from the eastern portal (or Main camp side) of this tunnel the 512 crosscut, to the north, had been advanced 1,125 feet at the end of 1934. At 1,617 feet from the eastern portal of No. 1 tunnel, the 1,617 north crosscut was in 84 feet in pyroxenite at December 31st, 1934, while the 1,907 north crosscut at 1,907 feet west of the portal had been advanced a total of 147 feet at the end of the year. These development-workings are being advanced at an exceptionally good rate of speed, it not being uncommon to make 600 feet of progress in a heading in one month. The several crosscuts listed are being driven for the purpose of getting under the various magnetometer indications, and as soon as these workings have been advanced a sufficient distance, diamond-drilling will be used to delimit and determine the possibilities of the ground on either side.

Diamond-drilling from this main tunnel has located in several holes widths of nickeliferous-pyrrhotite mineralization averaging more than 1 per cent. nickel.

In hole No. 36, which is located about 1,600 feet in from the eastern portal of the main tunnel and which was drilled in a northerly direction, a width of 120 feet of nickeliferous-pyrrhotite mineralization averaging 1.13 per cent. nickel was encountered. Of this 120 feet, 30 feet of what is presumably the hanging-wall section assayed 2.59 per cent. nickel.

In hole No. 37 from the same set-up and drilled at an angle of 30 degrees to the east of hole 36, 30 feet of nickel-pyrrhotite mineralization averaging 1.08 per cent. nickel was encountered. In holes 57, 60, 68, 70, 208, and 210, which were drilled southerly under the *Brunswick* group of showings near the west end of the main tunnel, good sections of mineralization have been encountered.

In hole No. 57, which is drilled in a southerly direction from the No. 1 tunnel at 3,837 feet west of the eastern portal, a composite sample across a width of 60 feet assayed 1.09 per cent. nickel and 0.37 per cent. copper. In hole No. 60 at the same set-up and drilled southerly at a direction of $7\frac{1}{2}$ degrees to the east of No. 57 hole, a composite sample along a length of 49 feet of core assayed 1.37 per cent. nickel and 0.3 per cent. copper. In hole No. 70, drilled in a southerly direction from a point in the No. 1 tunnel, 367 feet east of the last two mentioned holes, a core-length of 70 feet averaged 1.29 per cent. nickel. In hole No. 208, drilled in a



Plan showing the Workings, Rock Formations, and Mineralization on the Property of B.C. Nickel Mines, Ltd.
From Company's Maps.

southerly direction from the No. 1 tunnel at about 183 feet east of holes Nos. 57 and 60, a composite sample along a length of 49 feet of drill-core assayed 1.44 per cent. nickel and 0.6 per cent. copper. In several diamond-drill holes short sections of core assaying more than 1 per cent. nickel have been encountered.

No. 2 adit, the portal of which is approximately 2,200 feet west of No. 1 tunnel and at an elevation of 3,275 feet above sea-level, was advanced to a total distance of 2,208 feet from the portal at the end of 1934. It is planned to continue this working in a westerly direction for another 800 feet, at which point a connection will be made to the 512 north crosscut now being driven from No. 1 tunnel. From No. 2 adit a large amount of diamond-drilling has been done and in several holes nickel mineralization, generally of low grade, has been encountered. Hole No. 79, which is located 1,706 feet in from the portal, was drilled in a north 21 degrees east direction horizontally, and an average of 1.02 per cent. nickel and 0.45 per cent. copper was obtained from 50 feet of core-length, with 20 feet of core-length averaging 1.67 per cent. nickel.

The property is equipped with its own hydro-electric plant which drives two Sullivan air-compressors capable of providing 2,500 cubic feet of air per minute. Underground equipment necessary for the rapid driving of the large development-workings includes three Nordberg-

Butler shovels, several switching-track sections, 25-cubic-foot steel cars of the Coeur d'Alene type, Ingersoll-Rand and Gardner-Denver heavy-duty drifting-machines, and necessary steel-sharpening shops. The surface mechanical shops are located at the eastern portal of the No. 1 tunnel. The company also owns and operates a sawmill capable of producing 15,000 feet board measure daily to provide necessary timber used underground and in camp-construction. Comfortable camp accommodation for a crew of 130 men, 100 of whom work underground, has been provided.

Diamond-drilling is conducted on a three-shift basis with two drills, the core from the holes being stored and, when necessary, assayed at the property by the company's own staff.

A large amount of underground development and diamond-drilling work was done during the year, but there still remains to be done a great deal of development to delimit the many mineral indications which have been shown up on the property by the magnetometer survey. It is expected that results in this work in the next six months will be sufficient and of such character as to definitely indicate the commercial importance of this low-grade nickeliferous-pyrrhotite occurrence.

The assays which are given in the above report were furnished through the courtesy of C. B. North, the assays and sampling being done in the company's assay office.

This company's property, comprising thirty-four claims held on location, is situated 4 miles north of Hope, on the Fraser River highway. The camps, **Ideal Gold and Nickel Mines, Ltd.** power-house, and main adit are all within a few hundred yards of the road and the main line of the Canadian Pacific Railway. W. T. Fairgreaves, of Vancouver, is managing director for the company. In the vicinity of the main adit coarse-grained hornblende diorite is in contact with altered siliceous-feldspar tongues and dykes, while at the Dam showings are schistose greenstone and talc.

The workings shown to the writer were: (1.) An open-cut 320 feet in elevation above the adit in the bed of a small creek used as a source of water for the small Pelton installation. Here there is an outcrop of lenses of quartz aggregating 34 inches in width in the talc-schist. A sample across this width assayed a trace in gold and silver. (2.) A large open-cut at 940 feet elevation, called the Upper cut, where pyrite mineralization occurs in granitic rocks; a representative sample of the exposure, 20 feet by 20 feet in area, assayed trace in gold and silver. (3.) The main adit, where several siliceous-feldspar zones in hornblende diorite have been cross-cut by the 507-foot working. This working, driven 425 feet south 57 degrees west, with the last 80 feet south 50 degrees west, was found to cut two quartz sections, the first at 190 to 220 feet from the portal and the second at 331 feet from the portal. The writer carefully cut six 5-foot channel samples across the 30-foot width of the first showing intersected. All the samples, upon assay, were found to contain only traces in gold and silver. Values of \$8 to \$14 per ton in gold have been reported from this showing. The exposure at 331 feet from the portal was sampled across its 36-inch width and found to assay only a trace in gold and silver.

The property is equipped with portable Ingersoll-Rand compressor, air-drills, etc., and a camp. Work was carried out during the early part of 1934, but the property was idle when examined in December.

YALE SECTION.

Roddick. This claim, situated 4 miles up Siwash creek by trail from the Fraser River cable-crossing, 1½ miles above Yale, was further developed during 1934 by the Fagan Bros. and partners. The camp at 2,050 feet elevation on Roddick creek, a north-easterly-flowing tributary of the South fork of Siwash creek, is a short distance above the main showings.

The mineralization consists, as far as could be seen, of a narrow quartz vein, 2 to 10 inches wide, strike north 50 degrees west, dip 25 degrees south-west, in slate. A short distance to the west of the adit and the quartz-outcrops a wide feldspar-porphry dyke outcrops between the slates and a zone of greenstone-schists.

The owners were engaged in driving a short crosscut (in 30 feet in slates and slide-rocks when examined) to intersect the vein at a depth of possibly 30 feet below its outcrop. It is reported by the owners that gold values of spectacular amount have been found in the heavily oxidized sections of the vein. Approximately 50 feet east of the present working there is the portal of an old crosscut adit said to be 140 feet long.

Several parties were hand-placer mining along the banks of Siwash creek in 1934 and at the falls just above the Fraser river.

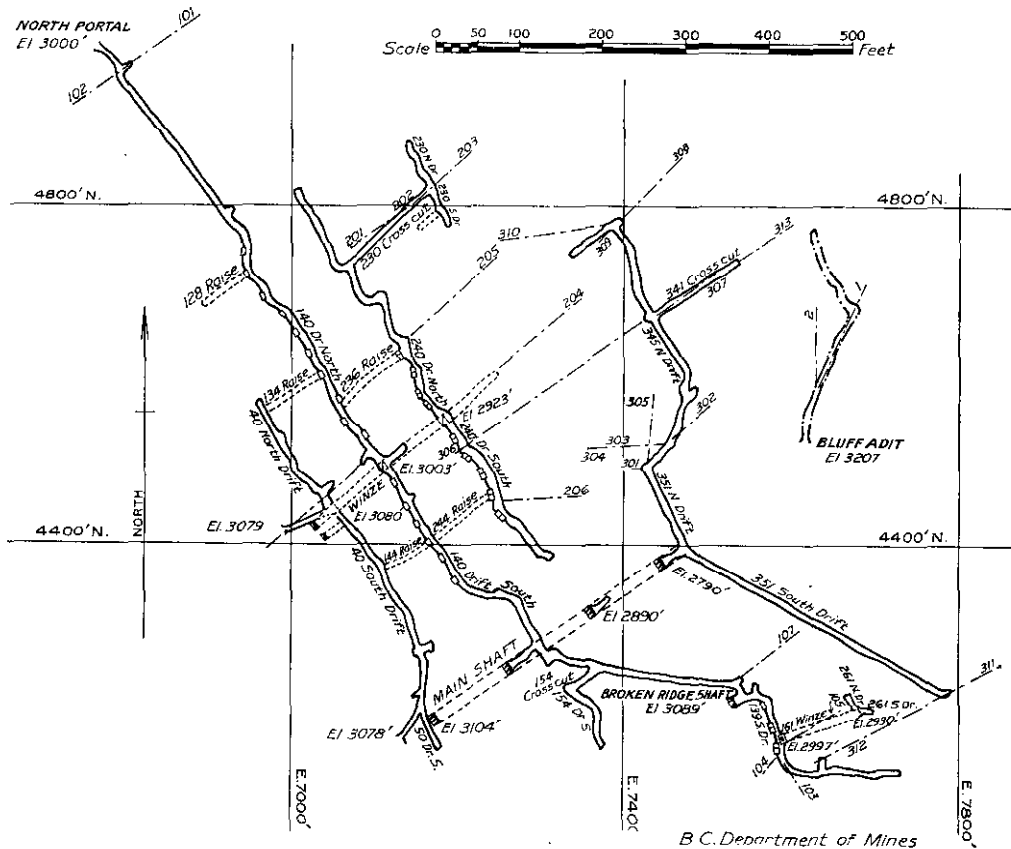
ASHCROFT MINING DIVISION.

References.—Basque Chemical Company, 1918-19; Deadman River Placers, 1933; *Empire* group, 1924-30; *Highland*, 1915-17, 1922-23; *Independence*, Bulletin No. 1, 1932; *Kanaka Bar*, 1921-32; *Keystone*, 1917-25; *Last Chance-Sylvanite* (Savona Gold Mines, Limited), 1933; *O.K.*, 1919-22-30; *Sharp*, 1929-33; *Snowstorm*, 1915-17-19-20-23-29; *Vidette Gold Mines, Limited*, 1931-32-33, and Bulletin No. 1, 1932.

DEADMAN RIVER SECTION.

Vidette Gold Mines, Ltd. This company, capitalized at 1,000,000 shares of no par value, of which 682,174 shares were issued as at November 2nd, 1934, has its head office at 312 Pacific Building, 744 Hastings Street West, Vancouver. Detailed descriptions of the company operation at the north end of Vidette lake have appeared in the Annual Reports for 1931, 1932, and 1933. Twenty-four claims and fractions covering an area of greenstone of the Nicola series are held by the company. Most of the mining developments have occurred on two of the claims, the *Searcher No. 1* and *Searcher Fraction*.

During the year the company mined and milled 7,216.5 tons of ore, principally from the Tenfold vein, from which they recovered 4,440.95 oz. of gold. This is equivalent to a mill-head average of 0.616 oz. gold per ton for the tonnage milled. Operation of the mill was not continuous until April, 1934, the equipment at present installed having a daily capacity of 40 tons of ore per day. The plant is a modern flotation-mill with which good gold-recoveries are made. Several additions of equipment were made during 1934, including the installation of two 140-horse-power Fairbanks-Morse Deisel engines, respectively driving, by direct coupling, a



Plan of Underground Workings, Vidette Gold Mines, Ltd.

16 by 9¼ by 10 Sullivan angle compound compressor of 700-cubic-foot capacity, and a 112-k.v.a. alternator used for driving the mill equipment. A new machine-shop, blacksmith-shop, assay office, sawmill, two-story bunk-house for fifty men, cook-house, staff-house, two bungalows, and a guest-house were also added to the plant equipment in the period under review.

The main ore-showings developed to date have been on the north-westerly side of a faulted zone which occurs between the Broken Ridge shaft-workings and the main shaft. This, the Tenfold vein, narrow at the surface, averages about 18 inches in width for the 750-foot length developed on No. 1 level. Ore was also developed along an appreciable stoping-length on No. 2 level, but the winze from this level encountered a fault 20 feet below the drift. It is reported that the vein has been located by diamond-drilling beyond the fault. Good values across narrow vein-widths were found in the short lengths exposed by the 139 south drift and 161 winze at the Broken Ridge shaft-workings.

Stoping operations were conducted mainly on No. 2 and No. 1 levels on the Tenfold vein-workings, and to a limited amount from No. 1 level on the Broken Ridge vein. Of the 7,216.5 tons milled, approximately 1,250 tons was from development-work. The development-work up to the end of 1934 and the diamond-drilling is shown on the accompanying map. Approximately 1,875 feet of drifting, 880 feet of crosscutting, 400 feet of sinking, and 435 feet of raising was done as development-work in 1934. Diamond-drilling in search of the faulted portion of the vein amounted to 2,788 feet.

At the end of 1934 the development-work, additional of course to mining of ore in the stopes, included diamond-drilling at the third level to locate the vein below the No. 2 level fault; the sinking of a winze to No. 2 level in the Broken Ridge workings, with a view to establishing greater lengths of ore on the lower levels (due to fault-dip conditions); and drifting on No. 2 level on the Broken Ridge vein.

According to a statement by Gordon F. Dickson, managing director of the company, at September 30th, 1934, the amount of developed ore estimated to be still in the mine above No. 2 level of the Tenfold workings and north-west of the fault between the Tenfold and Broken Ridge workings was sufficient for seven to eight months' operation at 850 tons per month milling capacity. H. A. Rose is superintendent in charge of the plant operation.

During 1934 a new road to the mine was constructed from Tobacco flats. This 17-mile section of new road materially reduces the cost of transportation of supplies from Savona, the nearest station on the Canadian Pacific Railway.

This company, capitalized for \$1,000,000, divided into 1,000,000 shares of \$1 par value, acquired the property formerly known as the *Last Chance-Sylvanite* **Savona Gold Mines, Ltd.** group of nine claims and fractions, all situated to the north-west of the property of the Vidette Gold Mines, Limited. The company office is at 1016 Vancouver Block, Vancouver. The claims are reached by road from Savona, up the valley of Deadman river, a distance of 43 miles.

Exploration-work during the past year has exposed several veins occurring in north-westerly-striking fractures and fissures in the greenstones of the Nicola series. Mineralization consists of quartz and occasionally small amounts of pyrite and chalcopyrite. Diamond-drilling (1,000 feet total) in eight holes indicated quartz-vein extensions along a horizontal length of approximately 1,000 feet.

When the writer visited the property in August, 1934, a crew of thirty men was employed in surface camp-construction and underground development-work. The main underground work, known as the main adit, had been driven 268 feet as a crosscut north 65 degrees east to intersect the Sylvanite vein at 228 feet from the portal. Approximately 100 feet of drifting south 32 degrees west had been done on this quartz vein, which, as exposed, varies in width from 8 to 24 inches (averaging possibly 15 inches) and dips to the north-east at 70 degrees. Six channel samples across the quartz vein at 10-foot intervals across an average width of 14 inches assayed in every case a trace in gold and silver content. It is reported that high values from gold tellurides have been obtained from one of the small veins exposed by open-cutting just to the north-east of the Sylvanite vein-outcrop.

Another adit, in 57 feet from the portal on a north 40 degrees west bearing, was also being driven to connect with the main adit-drift. So far gold values uncovered have been low, but the occasional occurrence of good gold values in the veins in the greenstones makes the area worthy of a thorough exploration.

The property is equipped with a 50-60-horse-power McCormack-Deering Diesel engine and a 225-cubic-foot single-stage Holman compressor. Camps and an assay office have been provided. The crew at the end of the year numbered eight men, under the supervision of A. D. Kerr.

This company owns the *Hamilton Creek*, *Ruth Hope*, *Dick*, *Last*, *Last Nos. 2*, **Hamilton Creek 3**, and *4*, *Argentine No. 2*, and *Downie Fraction* surveyed mineral claims, all **Gold Mines, Ltd.** situated adjoining the Vidette Gold Mines, Limited, claims to the west. The property was explored and prospected by trenching, diamond-drilling, and crosscutting during 1934. The principal workings are located on the *Hamilton Creek* claim, approximately half a mile by trail north-west of the Vidette camp and the road connecting Vidette with the Canadian Pacific Railway at Savona.

The showings exposed in the valley-bottom and by a 360-foot length of trench, near the middle of the eastern boundary of the *Hamilton Creek* claim, consist of narrow quartz stringers in greenstone. The veins and stringers strike north 80 degrees west and dip 35 to 45 degrees north-east. Following the open-cut work, a programme of diamond-drilling for formational information was started under the supervision of J. Bennett, the company's engineer and manager. Three holes were drilled south 63 degrees west into the hill for 400, 250, and 260 feet respectively at an angle perpendicular to the assumed plane of the veins. Several quartz-showings were encountered and low gold assays on short sections of the core were obtained.

The main adit, following the line of No. 2 drill-hole, was started after the writer's visit to the property, and it is reported by the management to have been advanced a total distance of 245 feet on January 11th, 1935. In this crosscut-length it is reported by J. Bennett that eight quartz-filled fissures varying in width from 2 to 24 inches have been intersected, and it is further reported that values up to 0.32 and 0.56 oz. gold per ton have been obtained across the 24-inch and 20-inch quartz veins encountered at 85 and 150 feet from the portal.

W. C. Shelly and associates, of Vancouver, owning twenty-four claims and fractions, all held on location, did a limited amount of surface and underground exploration on their *Ply U.*, *Grebo*, and *Alpha No. 1* claims during 1934. The claims are situated to the north-east of Vidette lake, about 1½ miles by road from Vidette, on the old Vidette-Savona road. The property was in charge of a watchman when it was visited in August, 1934.

On the *Ply U.* claim a 30-foot adit driven into the hill at 3,450 feet elevation in an easterly direction exposes at its portal a narrow quartz-filled fissure in schistose greenstone. A small open-cut just above the adit exposes a narrow band of calcite in the greenstone. A sample of selected material from the 1- to 3-inch stringer exposed at the portal assayed *nil* in gold and silver.

Approximately 2,000 feet to the south-east of the above working and on the *Grebo* claim at 3,250 feet elevation, a 10- by 9-foot open-cut in a small draw has exposed a narrow, badly crushed quartz vein (strike north 60 degrees east and dip 45 degrees north-west), 3 to 12 inches wide, in volcanic rocks. A sample assayed *nil* in gold and silver. About 30 feet to the west of this cut, another 10- by 6-foot cut exposes what is undoubtedly the same vein. A 12-inch channel sample from this exposure assayed *nil* in gold. Quartz float was also found about 150 feet to the west and up the hill from this last-mentioned exposure.

On the *Alpha No. 1* claim there is a 15-foot open-cut and a 24-foot adit (with a maximum possible back cover of 20 to 25 feet) driven north 65 degrees east on a narrow calcite stringer. Approximately 1,000 feet south 70 degrees east of this adit and 200 feet north 10 degrees east from the *Alpha No. 1* post, a shallow shaft exposes a quartz vein in the volcanics similar in appearance to the exposures on the *Grebo* claim. These workings were all that were known to the watchman in charge at the property. Possibly there are other showings on the claims which the writer did not see.

A number of prospectors were in the hills in the Vidette Lake section and to the north-west in the Clinton Mining Division.

LYTTON AND ASHCROFT SECTIONS.

The Epsom-salt lakes at Basque were worked in a small way during 1934 by Epsom Refineries, Limited, a Winnipeg company. The company was organized in 1934 with a Dominion charter, with a capitalization of 1,000 shares, each of \$100 par value. In the fall of 1934 the refinery at Ashcroft was started and in 1935 the new company hopes to market from 1,000 to

2,500 tons of the salts. The deposits, which are the best known in British Columbia, have been described in detail in past Annual Reports and in "Investigations of the Mineral Resources and Mining Industry, 1924," issued by the Dominion Department of Mines, Ottawa.

PLACER-MINING.

The usual number of individuals were working on the bars of the Fraser and Thompson rivers during 1934.

CLINTON MINING DIVISION.

Within this Division are located the numerous non-metallic clay, salt, and carbonate deposits of the Green Timber plateau north of Clinton; the lode-gold deposits on Kelly creek and the Fraser river to the west of Clinton; the Watson bar and Fraser River bar placer-diggings; the Poison Mountain and Creek placer area; the Chilko, Tatla, and Taseko lode-gold area, situated 40 to 50 miles north-west of the main Bridge River camp by trail.

Mining activity in 1934 was concentrated in the Kelly Creek and Taseko Lake and River areas.

References.—*Astonisher*, 1933; B.C. Chemical Company, 1929-30; *Buzzer*, 1928-30-31; Churn creek, 1932; *Copper King*, 1919; Crow's Bar Placers, 1931-32; Dominion Soda Producers, Limited, 1918-28-29-30; Grange Mines, Limited, 1933; *Maggie*, 1915-30; *Motherlode*, 1927-29-30, and Bulletin No. 1, 1932; Pavilion Gold Mines, Limited, 1933; Poison Mountain area, 1933; Timothy Mountain, 1929-30-31, and Bulletin No. 1, 1932; Watson Bar creek, 1923-24-30-32; *Windfall*, 1922-23-29-31, and Bulletin No. 1, 1932.

CLINTON SECTION.

(See past Annual Reports, 1928-33). This company started milling operations at their 25-ton-per-day table-flotation plant at the beginning of 1934, continuing at somewhat less than rated capacity until near the end of the year, when the mill equipment was increased to treat 60 tons of ore per day, since when operations have been at the rate of 50 tons per day. A total of 646.1 oz. gold, 785 oz. silver, and 4.669 lb. copper were recovered by milling operations in 1934.

Development-work underground resulted in considerably improving the position of this property as regards ore possibilities. The main shaft was sunk a further 115 feet and the sixth level, at 105 feet below No. 5 level, was developed by a total of 940 feet of drifts and crosscuts and 300 feet of raises. Drifting and raising on the fifth level during 1934, totalling 30 feet and 100 feet respectively, was done.

The No. 6 level was opened up by a drift along the foot-wall shear for 200 feet in a north-westerly direction and disclosed a lens of heavy sulphide mineralization along an ore-shoot length of possibly 150 feet over an average width of 15 to 18 inches. Three stope-shoots were being worked in this section of the mine when the writer visited the property in November, the stope-backs at that time being 12 to 16 feet above the No. 6 level drift. Channel-sampling in this stoping section by the writer across an average width of 16 inches averaged slightly over 1 oz. gold per ton in the massive pyrrhotite-pyrite mineralization exposed. Near the end of this north-west drift the formation, principally hornblende diorite, becomes badly fractured and very basic, and the vein lenses gradually diminish in width and strength in this less competent rock.

To the south-west of the shaft on No. 6 level the foot-wall shear was followed by drifting for 140 feet to a fault of 25-foot displacement to the east. The vein was picked up at several places in the form of short lenses. Sampling of a 35-foot lens of ore encountered just to the west of the fault assayed 0.3 oz. gold per ton across an average width of 30 inches.

After the vein was picked up to the south-east of the fault on No. 6 level it was followed for 60 feet before the ore-lens pinched to a fracture. This fracture, it is reported, was followed a further 60 feet to a second fault of short easterly displacement. The writer took a channel sample of this vein section 10 feet south-east of the No. 1 fault across a vein-width of 28 inches. The sample assayed: Gold, 0.64 oz. per ton; silver, 2.5 oz. per ton; copper, 0.7 per cent. The management reports that this lens of ore widened out to 7 feet in width a short distance to the south-east of where this sample was cut, gradually narrowing to a fracture.

The diorite in the south-east end of the mine is considerably less fractured than it is in the north-western end of the mine. The ore-lenses also are of better width and the possibilities

are that further work to the south-east beyond the second fault will show up more uniform conditions of mineralization.

The hanging-wall shear, 30 feet to the east of the shaft-bottom on No. 6 level, was followed north-west for a short distance along a fairly narrow vein-filling of pyrrhotite-pyrite mineralization in badly fractured diorite. Considerable ore above No. 5 level was stoped from the foot-wall shear lenses of ore described in the 1933 Annual Report.

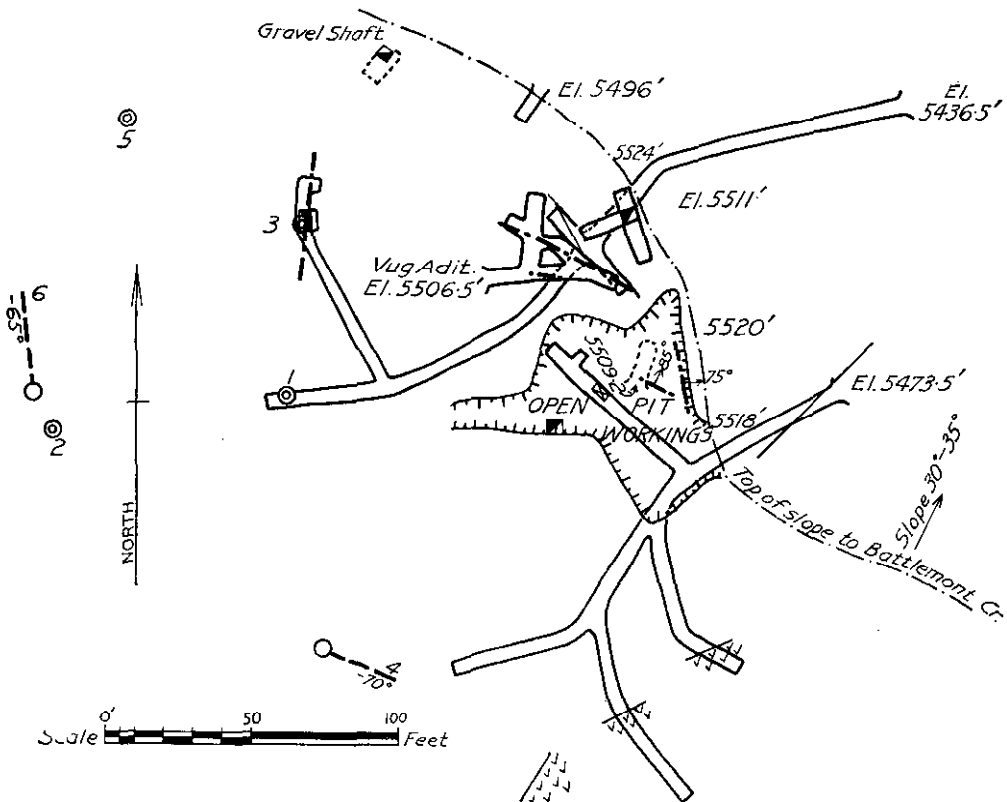
During 1934 improvements were made to the trail leading down to the mine, and a new siding on the Pacific Great Eastern Railway at Grange was built to serve the mine.

In December a fire destroyed the dry-house and part of the bunk-house. This structure has been replaced by a new bunk-house and a separate change-house. J. W. Southin was appointed general superintendent for the company in November, 1934, and many improvements have been made in operating methods, both underground and on the surface.

TASEKO LAKE SECTION.

This company, capitalized at 500,000 shares of \$1 par value, owns the *Windfall* and *Windfall No. 2* Crown-granted claims and the *Sunnyside*, *Sunshine*, *Buzzer No. 2*, *Buzzer No. 3*, and *Buzzer No. 4* claim locations. The claims are all located on Battlement creek, 12 miles west of Taseko lake up the valley of the Taseko river. Access to the property is by trail from the Minto mine, Bridge River, over Warner pass (7,600 feet elevation), a distance of about 45 miles, or by aeroplane from either Seton lake or Vancouver to Taseko lake, and thence by a 12-mile trail up Taseko river to the mine-workings and camp on Battlement creek.

The country-rocks in the immediate vicinity of the workings are tuffs which overlie the Coast Range granitic rocks to a thickness of possibly 800 to 1,000 feet. The mineralization which was found on the surface in the open-cut working shown on the accompanying map



Sketch-plan of Taylor-Windfall Main Workings.

consisted of rich pockets of badly oxidized, rusty, silicified sections of the tuffs, with tourmaline in some of the fractures. The results obtained from the mining and milling of about 85 tons of this surface material disclosed a number of these rich pockets, all without any appreciable continuity of length, width, or depth, but all apparently following lines of fracturing which varied from east to north-east in strike.

Shortly after the company was formed in the spring of 1934, a 3-4-ton-per-day amalgamation-mill was shipped to the property by aeroplane.

Later in the season the property came under the charge of R. H. Stewart. Diamond-drilling of six holes, shown on the map, resulted in finding two or three mineralized sections of core in holes No. 1 and No. 3. In hole No. 1 the sludge assay at 38-48 feet was 1.48 oz. gold per ton; at 160-162 feet it was 1.98 oz. gold per ton; and at 205-235 feet it was 0.35 oz. gold per ton. In hole No. 3 the sludge assay between 70-90 feet was 1.52 oz. gold per ton. These assay results were supplied by the management. The showings obtained by drilling were partially investigated by drifting and sinking before the close of the season's work, and no doubt further testing-work will be done on this section of the property in 1935 as soon as weather conditions permit.

An adit at 5,436 feet elevation was extended to cut No. 1 hole and a raise was driven through to the surface, following the line of the drill-hole, without encountering any definite structure which would indicate an ore-shoot. A crosscut and winze were then driven on No. 3 drill-hole and 2½ to 3 feet of ore assaying more than 1.5 oz. gold per ton was followed down for a depth of 24 feet in the winze, with the width of the vein being 2.5 feet at the winze-bottom. The mineralization occurs in a silicified section of the tuffs in which there is a zone of chloritic alteration containing gold tellurides. As opened up by the winze and a short drift and crosscut to the north of the winze the impression is gained that the top of an ore-shoot has been cut by the work to date. The vein strikes north, dips at 75 degrees west (on the map), and has been opened up along a length of 18 feet and to a depth of 24 feet.

The camp was closed for the winter shortly after this interesting showing was encountered, but present plans indicate that an appreciable amount of development-work will be done underground on this showing in the summer of 1935. A crew of twelve men was employed under the supervision of E. E. Mason during the latter part of the 1934 work.

Taseko This property is situated approximately 9 miles by trail from the south end
Motherlode. of Taseko lake. The claims are all located on the east side of Granite creek, a northerly-flowing tributary of Taseko river. During 1934 Vancouver interests transported about 9 tons of supplies in to the ground, built winter camps, and repaired the trails leading to the various showings, in addition to doing further surface and underground development-work.

The mineralization consists of sparse amounts of pyrite, chalcopyrite, galena, and sphalerite in a silicified shear-zone which strikes north-easterly across the property. The country-rocks are principally granodiorite phases of the Coast Range batholith, and the two principal and approximately parallel shear or fracture zones have been exposed on the surface by trenching for a length of 600 to 700 feet. The westerly shear-zone, the better mineralized, is about 1,000 feet downhill from the other. The width of the western shear varies from about 100 feet at the south end of the exposures to possibly 75 feet at the north end. At the south end of the shear-zone, at an elevation of 6,400 feet above sea-level, a crosscut adit 290 feet long has been driven and partly cuts it. The present company contemplates continuing the adit a further 60 feet to crosscut through the width of the shear and then to drift to the north-east along the foot-wall for a distance of 150 feet, with crosscuts to the hanging-wall every 75 feet.

As regards values in the sparsely mineralized shear-zone, R. H. Stewart reports that several years ago H. L. Batten sampled across 60 feet of the shear-zone and obtained an average of 0.15 oz. gold per ton. Sampling of the underground work by R. H. Stewart shows that a section of 15½ feet next to the foot-wall assayed 0.135 oz. gold per ton, 1.4 oz. silver, and 0.73 per cent. copper. The next 12 feet of the zone showed an assay value of 0.045 oz. gold per ton, 1.4 oz. silver per ton, and 0.14 per cent. copper; while surface sampling gave gold values of 0.19 oz. per ton over a width sampled of 15 feet, 0.145 oz. over 23 feet, and 0.08 oz. over 10 feet. The values seem to be associated with the copper, and with the possible development of a large tonnage of comparatively low-grade ore of the character visible in the surface and underground work done to date it would be possible to make a fairly high grade gold-copper concentrate by comparatively simple metallurgical methods.

LILLOOET MINING DIVISION.

References.—The reader is referred to the 1933 Annual Report and the following references in the Annual Reports from 1916 to 1932, inclusive, for information about Bridge River properties and the Lillooet Mining Division: *Alpha* (now Minto Gold Mines, Limited), 1930-33, and Bulletin No. 1, 1932; Anderson Lake Mining and Milling Company, Limited (now National Gold Mines, Limited), 1933, and Bulletin No. 1, 1932; *Arlo*, 1918; B.C. Alluvials, 1927; Cayoosh creek (Enterprise Mining Partnership), 1927; *Cinnibar King*, 1931; *Copper Bear*, 1927-28; *Copper Mount*, 1929-30; *Copper Mountain*, 1917-18; *Copper Plate*, 1918; Copper Queen Mining and Smelting Company, Limited, 1916-28; *Coronation* (now Bradian Mines, Limited), 1923-25-27; *Countless (Pioneer)*, 1923; *Crown*, 1923-25; *Eureka*, 1928-33; *Eva (Moffatt)*, 1918-23-25-26; *Forty Thieves* (now Bridge River Consolidated), 1916-33; *Gold King*, 1923-27-30; *Griswold*, 1929-30; *Index*, 1916; *Iron Ridge*, 1924; *Li-li-kei*, 1923-25-27-33; *Lorne (Bralorne)*, 1916-18-23 to 33, and Bulletin No. 1, 1932; Lower Bridge River Placers, 1931-33; *Lucky Gem*, 1924-31, and Bulletin No. 1, 1932; *Marion*, 1927-29; McGillivray Gold Mines, Limited, 1929; *Native Son*, 1924-25-33; Nobb's placer claim, 1922; *Paymaster*, 1930; P.E. Gold Mines, Limited, 1930; *Pioneer*, 1916-18-22 to 33, and Bulletin No. 1, 1932; *Regal*, 1918; *Shulap*, 1925-26; *Silver Bell*, 1923-25-26; *Theima Maud*, 1918; *Tyughton*, 1927; Universal Mining and Milling Company, Limited, 1925; *Wayside*, 1925.

PEMBERTON-BIRKENHEAD SECTION.

Mariposa. This property, situated 5 miles by road and trail west of D'Arcy Station on the Pacific Great Eastern Railway, received extensive prospecting and exploration during 1934. A crew of eight to twelve men, under the supervision of J. Savage, the Syndicate manager, established camps a short distance south of Blackwater creek; excavated many open-cuts at various showings found on the surface; and drove several hundred feet of workings to test the underground continuation of some of the surface showings.

The mineralization consists of sparsely mineralized quartz veins in an area of schistose greenstones and sedimentary rocks. Very little sulphide mineralization is in evidence in the showings and only low gold values were obtained in representative samples taken.

About 800 to 1,000 feet above the camp, and to the south of it, the *Wonder* showings have been opened up by four surface cuts. The No. 4 *Wonder* showing, the most westerly of the four, at 3,275 feet elevation, exposes a partially oxidized 24-inch quartz vein, strike north 55 degrees west, dip 45 degrees south-west, in greenstone-schist. The best value obtained in this cut is stated to be 60 cents gold per ton. The No. 3 *Wonder* showing, 1,700 feet south-east of the No. 4 showing and at 3,300 feet elevation, consists of an 18-inch quartz vein, strike north 60 degrees east, dip 60 degrees north-west, in schist. A channel sample of two cuts across the width of the quartz assayed: Gold, *nil*; silver, 0.5 oz. per ton. The No. 2 *Wonder* showing, a few hundred feet to the east at 3,500 feet elevation, is opened up by two open-cuts. The cuts expose a width of 4 to 6 feet of a slightly oxidized quartz vein in greenstone and schist. This vein strikes north 50 degrees west and dips into the hill at 75 degrees to the north-east. A chip sample across a 4-foot width of the most heavily oxidized portion of the vein assayed *nil* in gold and silver.

A short distance up-stream from the camp at 2,400 feet elevation four short adits and several open-cuts have been made. Except for the No. 4 adit at 2,825 feet elevation, and in an open-cut just above it, the various exposures are all narrow in width and carry low gold values. They do not show any marked continuity in the schist and sheared greenstone country-rocks. The No. 4 adit outcrop shows an 8- to 10-inch quartz vein, strike south 30 degrees east, dip 45 degrees west, in schist. Below and 20 feet to the east is exposed 15 feet of soft clayey and chloritic schist. The adit is driven on the foot-wall side of a feldspar-porphyrty dyke in an easterly direction, a slight turn to the west being made to cut through the dyke, strike south 30 degrees east. Just before the dyke was cut underground, 3 feet of silicified and banded sediments (argillite) were found on the foot-wall. A sample was taken of 9 inches of quartz on the dyke foot-wall. It assayed *nil* in gold and silver. The No. 4-A adit, 25 feet higher than No. 4 and a short distance up-stream, exposes a fine-grained basic dyke and greenstone rocks with no values. Across the creek from the portal of No. 4 adit a 24-foot width of pyritized quartz is stated by J. Savage to have assayed \$1.02 in gold per ton. No. 3 adit, at 2,815 feet elevation and down-stream from No. 4, is in 25 feet in dyke-rocks. No. 2 adit, at 2,750 feet

elevation and down-stream from No. 3, was driven 65 feet on a band of quartzite. Small stringers of quartz occur in this working. From No. 1 adit, at 2,700 feet elevation, J. Savage reports a \$13.20 gold assay. This adit is in 50 feet in an easterly direction and the inner end of it breaks through into slide-rock after passing through schist. The open-cuts on the westerly side of the creek expose several narrow quartz veins from which it is reported that values of from 60 cents to \$1 in gold have been obtained.

ANDERSON LAKE SECTION.

This company controls two groups of mineral claims on McGillivray creek west from McGillivray Falls Station on the Pacific Great Eastern Railway. **National Gold Mines, Ltd.** The *National* group of six claims, held by location, is approximately 9 miles by trail west of the station. Very little work has been done on this section of the property. The *Youcon-Skeena* group of seven claims, formerly owned by the Anderson Lake Mining and Milling Company, Limited, and known as the National or McGillivray Creek mine, is situated to the north of McGillivray creek, $3\frac{1}{2}$ miles by trail west of McGillivray falls. The mine camp and principal underground workings are on the *Youcon-Skeena* claims at elevations varying between 3,275 and 4,000 feet. The underground workings have been described in detail in past Annual Reports and in Summary Report, 1933, Part A, recently issued by the Geological Survey of Canada.

The country-rocks in the vicinity of the mine are carbonaceous phyllites and slaty beds which may be altered tuffs or volcanics. Outcropping a short distance to the west of the mine is an area of greenstone, while underground in the No. 3 level west workings, dykes of diorite were encountered.

The vein outcrops along a north strike up the back of a small ridge between elevations of 3,525 and 4,050 feet over a horizontal distance of some 900 feet. It dips at steep angles to the west almost conformable with the surrounding formations.

Three adits were driven on the vein in past development operations. No. 1 level, at 3,655 feet elevation, is now caved and inaccessible. No. 2 level, at 3,550 feet elevation, follows the vein for approximately 450 feet before encountering a fault. No. 3 level, at 3,400 feet elevation, follows the vein and a faulted segment of it for approximately 500 feet before striking the same major fault. This fault, on the No. 2 level innermost workings, strikes north 42 degrees west and dips 55 degrees to the south-west. On the No. 3 level this fault strikes north 41 degrees west and dips at 50 degrees to the south-west.

During the past summer a crosscut to the east succeeded in picking up the faulted portion of the vein about 100 feet distant from the main vein. At the time of the writer's visit this new section of the vein had been drifted on for 250 feet. The vein was continuous for 200 feet of this drift-length. Where the vein was first encountered it is 19 feet in width and two cross-cuts in the length of this new drift on No. 3 level indicate that the vein will possibly average 12 to 15 feet in width. The vein-filling of quartz is partially oxidized and iron-stained and car samples taken by the management during the driving of this drift are reported by them to assay \$8 to \$9 in gold per ton. Two hundred feet from where the vein was first crosscut in this new working a second fault, parallel in strike and dip to the major fault, was encountered. Underground conditions would indicate that this second fault is also a normal fault, and that the northerly continuation of the vein beyond the fault should be picked up a short distance to the east of the present drift.

During 1934 the company also completed a raise between No. 3 and No. 2 levels in well-oxidized quartz in the vein on the west side of the major fault. Three large open-cuts and a short crosscut were also driven to intersect the surface showing above the portion of the vein recently located underground. The vein-width is here about 24 feet. A small crew of men has been employed throughout the year under the supervision of T. Brett, one of the original locators and now managing director for the company.

It is very difficult to properly estimate the values underground in the large amount of quartz which has been exposed by the development-work by ordinary sampling methods. A shipment of several tons of bulk samples to the smelter would give a very good idea as to what might be expected in mining the large amount of quartz which has been exposed. It is reported that the

company proposes to install a 50-ton pilot-mill early in 1935 and with this to properly determine the gold values in the 200,000 or more tons of quartz vein-matter which has been exposed.

This company owns a large number of claims situated on either side of **Canadian Rand Gold Mines, Ltd.** McGillivray creek west of McGillivray Falls Station. The claims are reached by a continuation of the National Gold Mines trail, the Canadian Rand camp being approximately 6 miles from the railway and at 3,700 feet elevation. During 1934 a crew, varying from twelve to twenty-five men, was employed by the company in prospecting several surface showings and driving two adits.

On the *California* section of the property, situated just below the National Gold *Youcon-Skeena* claims, a drift 188 feet long was driven in a north-westerly direction. This drift followed a narrow quartz vein for a portion of its length, the vein varying in width from a mere fracture to 3 feet. It contains only low values in gold. On the diorite section of the property, located just to the north and west of the main camp, approximately 450 feet of drifting and crosscutting was done to establish underground continuity of the No. 1 Diorite vein. The vein, as exposed in the last 120 feet of this working, varies in width from 1 to 3 feet and shows practically no mineralization. The gold values obtained in this showing were practically negligible according to company officials. When the writer visited the property in November the camp was in charge of a watchman, all work having been stopped about the middle of July, 1934. In addition to the underground work described, the company did assessment-work in prospecting on the *Colorado-Washington* claims.

(See previous Annual Reports.) This company was incorporated in March, 1928, with a capitalization of \$2,500,000, divided into shares of \$1 par value. **Pioneer Gold Mines, Ltd.** The holdings consist of eighteen mineral claims and fractional claims situated on Cadwallader creek. The mine plant is 55 miles by road from Shalalth Station on the Pacific Great Eastern Railway.

This mine, for the second year in succession, is British Columbia's leading lode-gold producer. The mill capacity was stepped up during the year to approximately 400 tons of ore milled per twenty-four hours.

Underground developments have been of importance and have added appreciably to ore reserves. On the fourteenth level west 270 feet of high-grade ore averaging $2\frac{1}{2}$ to 3 feet in width was encountered early in the year; a 78-foot length of this ore-shoot averaged 7 oz. gold per ton over vein-widths. On the fifth level east a length of 550 feet of ore averaging 3 feet wide and containing 3.9 oz. gold per ton was also opened up by drifting early in the summer months. Development-work on the fourth level east and on the levels below the tenth, both east and west, was continued with additional ore discoveries.

Early in June the work of sinking the No. 2 shaft to the 3,100-foot level was commenced from the 1,700-foot level (fourteenth level). At the end of the year the shaft was down to the nineteenth level, about half the total depth to be sunk before lateral work from the shaft will be started. Shaft-stations are being cut at 125-foot intervals, so that the 3,100-foot level will correspond to the twenty-sixth mine level.

Many additions to the surface plant and equipment have been made during 1934, and the camp and buildings reflect the prosperity of the company and its efficient management. New houses and camp facilities, a new hospital, community buildings, tennis-courts, and skating-rink have all been added to make life enjoyable. Minor changes in the mill resulted in increased capacity. Underground, many minor improvements in practice have been made. D. Sloan is managing director, H. T. James is general superintendent, Ed. Emmons is mine superintendent, and P. Schultz is mill superintendent for the company.

This company was formed in January, 1934, with a capitalization of \$2,000,000, divided into shares of \$1 par value, to acquire and develop the eastern half of the property owned by Bralorne Mines, Limited. The ground acquired includes twenty-one Crown-granted and five un-Crown-granted claims, with a total area of 773 acres. Following the installation of an electrically-driven Ingersoll-Rand 550-cubic-foot compressor plant, underground development-work was started at the *Coronation* and *Ida May* sections of the property. The No. 1 shaft (old *Coronation* shaft—collar at 3,850 feet elevation), which was down to a depth of 200 feet below the *Coronation* adit, was sunk 510 feet farther. Three shaft-stations were cut at 150-foot level intervals. Crosscutting from the

lowest level (650-foot) to the north-east was expected to cut the *Coronation* vein at a distance of 250 feet from the shaft. This vein was cut shortly before the end of 1934.

At the *Ida May* property a new shaft is being sunk to a depth of 500 feet below the *Ida May* adit level at 4,110 elevation. From the 460-foot level, corresponding in elevation with the 200-foot level of the *Coronation* shaft, a crosscut will be run to intersect the *Ida May* vein, and for the purpose of exploring the ground between the two shafts which are approximately 2,000 feet apart horizontally.

In the past good gold values from vein-widths up to 4 feet were explored and partially mined on both the *Coronation* and *Ida May* properties. The veins are well ribboned, generally less than 3 feet in thickness, strike parallel to the trend of the hornblende-diorite stock in which they occur, and dip at high angles.

Comfortable camps have been provided for the crew of forty-six men employed under the supervision of Don Matheson, the mine superintendent. Power is supplied by the B.C. Electric Company through its high-tension line from Bridge river, to drive two 100-horse-power electric motors, each direct-connected to 550-cubic-foot Ingersoll-Rand compressors.

(See previous Annual Reports.) During the period under review underground developments and surface improvements at the **Bralorne Mines, Ltd.** have kept up with the developments of 1933. The milling plant was increased in size to handle a capacity of 450 tons per day by the addition of a new 250-ton unit and the revamping and reconditioning of the old 200-ton flotation unit. At the end of the year about 375 tons of ore was being milled daily.

Development-work underground included the installation of new shaft-hoisting equipment following the completion of the main shaft to the eleventh level. At the end of 1934 approximately 500 feet of drifting had been done on the eleventh level west of No. 1 fault on the King vein and about 400 feet on the King vein east of the No. 1 fault. The vein, as exposed west of the fault on this the lowest level in the mine (500 feet below the eighth level on the dip of the vein), is wider than drift-width. Development raises from the eleventh to tenth levels have shown increased values over those obtained on the eleventh level. The "C" vein and Shaft vein systems, which responded exceptionally well to development on the sixth, seventh, eighth, and ninth levels, have not yet been reached on the eleventh level. During the mining of the King vein above the eighth level it was found that the gold values had a tendency to occur in ore-shoots of horizontal rake, and that between the ore-shoots it was common to find low-grade and barren vein sections. Similar conditions apparently exist on No. 11 level and further work both above and below the level will no doubt disclose conditions similar to those found above. During 1934 the King vein was opened up west of the No. 2 fault on the sixth, seventh, and eighth levels, and good widths of average grade ore disclosed. The "C" vein, lying along the No. 2 fault-zone, has responded well to development. The 805 drift on the eighth level (main adit-level) opened up a length of more than 300 feet of better than average grade ore across vein-widths of 3 feet average. This is considered to be the Shaft vein, and, if so, it will require considerable drifting on the sixth, seventh, ninth, and lower levels to delimit its possibilities. The various developments have added materially to ore reserves. Numerous camp building additions and improvements were completed during 1934. R. Bosustow is manager, T. Chenoweth is mine superintendent, and F. Grey is mill superintendent.

This company, owning two groups of claims in the Bridge River camp, continued work throughout 1934. The main group of claims, twenty-one in number, which adjoins the *Bralorne* ground to the north, was diamond-drilled and prospected further by underground drifting and crosscutting from the main adit of the *Bralorne*. This latter work was done under contract by the **Taylor (Bridge River) Gold Mines, Ltd.** and at the end of 1934 approximately 3,000 feet of a 3,700-foot contract had been completed, and 2,250 feet of the distance driven was in *Taylor* ground.

The long crosscut from the eighth level of the *Bralorne* entered *Taylor-Bridge River* ground early in January, 1934, and subsequent drifting and crosscutting has encountered seven quartz-filled fault-fissures and shears. The first vein was cut 450 feet north of the *Bralorne* property-line and 116 feet of drifting in a northerly direction on the fault-fissure (filled with broken quartz and gouge) showed only low values and narrow quartz-widths. The second vein, 100 feet to the north, was drifted on for 30 feet. Here again values and widths were below com-

mercial grade. The third vein was struck in the main crosscut 135 feet north of the first vein. It varies in width from 14 inches to 6 feet, is well ribboned, and structurally looks attractive, although samples taken indicate the values are quite low, the best assay being 0.08 oz. gold per ton. A short drift to the north-west on this vein shows it to pinch rapidly to a 14-inch width in a drift distance of 16 feet. Towards the end of the year the four other veins and lenses mentioned were found. Approximately 3,700 feet of diamond-drilling for geological structure was completed during the year and the property was surveyed and geologically mapped.

B.R.X.

Early in January, 1934, a diamond-drill hole from the No. 3 level of the *California* vein-workings encountered a section of core at a depth of 400 feet below the No. 3 level which assayed 0.7 oz. gold per ton along a core-length of 10 feet. The sludge for the same distance assayed 1.4 oz. gold per ton. This diamond-drill hole, No. 2, which was collared 905 feet from the portal of No. 3 adit, was drilled at a vertical angle of approximately 78 degrees, thereby indicating that the 10-foot core-length would be representative of a vein approximately 7 feet wide. Up to the time that this drill intersection was made, the company had extensively developed the *California* vein on three levels without finding commercial values of mineralization. Following the intersection of the good gold values in diamond-drill hole No. 2, drilling was stopped and an incline shaft from the No. 3 level on the *California* vein was sunk 557 feet on the dip of the *California* shear, intersecting the diamond-drill hole at a vertical distance of approximately 400 feet below No. 3 level. Lateral development totalling 857 feet of drifting and 355 feet of crosscutting was done on the shear on No. 6 level, started at the drill-hole intersection with the shaft, and while values over narrow widths have been found, commercial values and tonnage have not been developed. Approximately 278 feet of drifting and crosscutting was also done on the shear on the fifth level, also off the shaft, with similar results. More recently a long crosscut adit was started on the *Arizona* claim, and the company plans to extend this working eventually a total distance of 6,000 feet to cut under the *California* shear at a depth of 675 feet below the present No. 6 level.

At the end of 1934 this crosscut had been advanced a distance of 180 feet. New camps, compressor and blacksmith-shop, machinery, etc., were installed at the portal of this new adit.

During 1934 a 1,400-foot motor-driven compressor was installed at No. 3 portal of the *California* adit and several additions were made to the camp facilities, such as four modern bungalow residences for employees, new store-house, office, and staff-house. Late in 1934 a fire destroyed the office and records contained therein. The property is under the direction of E. R. Shepherd, president and managing director for the company.

This company was formed in September, 1934, with a capitalization of **Tuscarora Gold Mines, Ltd.** \$1,500,000, divided into 3,000,000 shares of 50 cents par value. The registered office of the company is 409-410 Rogers Building, Vancouver. The property comprises twelve mineral claims and two fractional claims, approximately 500 acres in area, all situated between Bridge river and Gun lake. The country-rocks, as exposed by numerous outcrops and open-cuts, consist principally of a banded zone of argillites and cherty quartzites lying in contact with hornblende-diorite masses. The mineralization would appear to be in silicified zones in the sediments, and surface and underground work on the property has so far only shown up minor values in gold in the silicified zones. A crew of six to eight men is employed under the supervision of T. B. Lewis.

This company's property consists of twenty-one mineral claims situated on both sides of Gun creek and extending five claims up-stream from the mouth of Gun creek at Bridge river. **Congress Gold Mines, Ltd.** The main Bridge River highway passes through the lower claims close by the portal of the main adit. The general rock formation in the area under most intensive development is a zone of sedimentary rocks cut by wide feldspar-porphry dykes. On the west the sedimentaries are bordered by a wide zone of greenstone and argillites. There is an outcrop of augite diorite above the main showings at a distance of about 1,000 feet north of the Gun Creek bridge. The mineralization consists of arsenopyrite, pyrite, and stibnite, with associated gold values in the arsenopyrite and pyrite. This mineralization apparently is developed along fracture-zones and fissure-fillings in the greenstone and the sedimentaries. The mineralization is later than the porphyry dykes, for the veins cut through the dykes, but generally with narrower widths.

Underground development-work done during the past year has been mainly confined to the driving of three adits close to the road. No. 3 adit (upper level), at 2,455 feet elevation, was

extended a total distance of approximately 305 feet along a well-mineralized zone. The first 70 feet of this working cut through a porphyry dyke, the mineralization therein being confined to narrow widths. The sampling done by the management has shown gold values over minable widths to vary between 0.04 and 0.72 oz. gold per ton, the average value not yet having been computed.

The writer took four channel samples across 20 feet of the 27-foot width of mineralization exposed in a crosscut and the drift in this level. The average assay for the 20-foot width was 0.16 oz. gold per ton, 2 oz. silver per ton, and 1 per cent. zinc. Other sampling at this same section has indicated values between 0.2 and 0.3 oz. gold per ton across the 27-foot width of mineralization. No. 2 adit is 170 feet south 65 degrees east of and 125 feet below No. 3. This working is a crosscut which intersects the same mineral-zone exposed in No. 3 adit at 325 feet from the portal. The mineralization has been drifted on along a length of approximately 390 to 400 feet. About 100 feet from the portal some 100 feet of drifting has been done along a narrow shear. No. 1, or the lowest adit, at 2,140 feet elevation, is now being driven to cut the mineralization at a point 750 feet from the portal. At the end of 1934 it had been driven 400 feet; the last half of this distance is in greenstone, the first 200 feet being in a porphyry dyke. Approximately 1,200 feet easterly of No. 1 adit a new low-level adit has been started to intersect another shear similar in appearance to that developed by the three preceding workings.

The property is equipped with compressor plant, steel-sharpening shop, and camp.

Olympic Gold Mines, Ltd. The property of the Olympic Gold Mines, Limited, consisting of twenty claims, is 37 miles by road from Bridge River Station on the Pacific Great Eastern Railway. It is on the south side of Bridge river, almost directly opposite the Minto Gold Mines property. When the writer visited the property in the fall of 1934 work was being concentrated on what are known as the Leckie and Magee adit showings, both located at or close to the river-level. The main camp, situated near No. 1 vein, is over 1,000 feet above the river-level. Work had been discontinued on the heavy pyrite-magnetite showing, just below the camp, prior to the writer's visit to the property. Values are said to have been disappointing in this working in spite of the heavy sulphide mineralization.

The more recent work at the river-level has been for the purpose of developing what appears to be possibly a shear-zone in the fine-grained, altered rocks of the Bridge River series.

The Leckie adit, 8 feet above the river-level, develops a heavily mineralized quartz-sulphide vein, strike south 55 degrees east, dip 50 to 60 degrees south-west, which has a width of 13 feet 2 inches where first intersected. This adit, it is understood, has since been advanced to a total distance of 200 feet from the portal. The vein was sampled where first intersected in three sample sections, each section being a milled channel sample. The first sample across 46 inches on the hanging-wall side of the vein assayed a trace in gold, 0.6 oz. silver per ton, and 1.7 per cent. zinc. The centre 54 inches of the vein assayed 0.02 oz. gold per ton, 6.5 oz. silver per ton, 1 per cent. lead, and 2.5 per cent. zinc. The 58-inch foot-wall section of the vein assayed 0.04 oz. gold per ton, 0.8 oz. silver per ton, and 2.5 per cent. zinc. Three carefully taken representative samples of the sorted mineralization from the Leckie adit showed an average assay of 0.078 oz. gold per ton, 5.7 oz. silver per ton, 0.3 per cent. copper, 0.7 per cent. lead, and 3.2 per cent. zinc.

Approximately 150 feet higher in elevation and 200 feet south-easterly from the portal of the Leckie adit is the *Magee* showing, on which an adit has recently been started. The mineralization as here exposed consists of 10 to 12 feet of badly decomposed and highly oxidized vein material separated into a hanging-wall and a foot-wall section by a 3- to 4-foot felsite dyke. The Magee vein shows strikes and dips similar to the showing in the Leckie adit, and the two showings are believed to be closely related.

A sample of selected oxidized material from the open-cut at the north-west end of the outcrop assayed 0.12 oz. gold per ton, 2.6 oz. silver per ton, 0.3 per cent. copper, and 2 per cent. zinc. A channel sample across a width of 60 inches of quartz and sulphide mineralization at the portal of the Magee adit (being driven into the hill south 55 degrees east) assayed 0.06 oz. gold per ton, 4.4 oz. silver per ton, 0.3 per cent. copper, 1 per cent. lead, and 1 per cent. zinc.

A crew of fourteen men was employed at the property under the supervision of W. J. Uzzell. Portable compressor equipment was being used in the driving of the Leckie adit; the work at the Magee adit being driven by hand-mining methods.

GUN CREEK SECTION.

This company has had under development the *Simons* property, situated near Fish lake, and the *Taylor* property, situated in Taylor basin. The properties are known respectively as the *South* and *North Goldside* properties. Work at the *South Goldside* property during the period under review consisted of driving a 140-foot adit into a wide porphyry dyke which outcrops on the property. In this dyke a small quartz-filled fissure widening at one end to 3½ feet was developed for a short length. Diamond-drilling was also used to explore the underground continuation of this particular vein. The best value obtained across the 3½-foot vein of quartz close to the eastern edge of the dyke was 0.07 oz. gold per ton. Work was subsequently stopped at this property and concentrated on the *North Goldside*, situated in Taylor basin, about 8 miles by trail from the road at Tyauhton lake.

At *North Goldside* property several mineral-showings are being developed by a crew of twelve men under the supervision of S. H. Davis. The lower showing consists of a massive gossan-outcropping of iron oxide which, overlying a calcite-body in serpentine, was being developed by ground-slucing and surface-trenching. A sample of the oxidized gossan over an area approximately 30 by 20 feet assayed but a trace in gold, while another sample of the unaltered calcite and iron pyrite, which was exposed over a length of up to 17 feet by 40 feet in width, assayed but a trace in gold. This exposure is at 6,000 feet elevation and close to the bank of Taylor creek. Several narrow quartz stringers partially oxidized and but a few inches in width, showing arsenopyrite mineralization, have been exposed by a long ground-slucice open-cut at 6,600 feet elevation, a short distance above the camp. These exposures occur in serpentine rocks, with which are interbedded silicified rocks of volcanic origin, locally called greenstone. No work is being done on this showing at the present time.

North-east about 500 feet from No. 1 (or Big) cut, another open-cut has exposed some dark-brown-stained siliceous rocks and pyrite mineralization over a width of about 6 feet. The main showings at the camp, where development-work is being pushed by diamond-drilling, underground and open-cut work, is situated half a mile west of the last-mentioned showings at an elevation of 7,350 feet above sea-level. This showing, which consists of several narrow disconnected veins in association with diorite and porphyry, was diamond-drilled, and at the present writing it is reported that the No. 1 crosscut adit has been advanced a distance of 282 feet from the portal toward the showings. At the surface on this showing a branching vein system was exposed by open-cut work. The most important exposure is along a vein-length of 25 feet, with the vein averaging from 6 to 22 inches in width. Two channel samples across widths of 12 and 22 inches of the vein in a shallow shaft sunk on this section of the property assayed 0.64 oz. gold per ton. The diamond-drilling was done to strike this vein at a depth of 40 to 50 feet below its outcrop. The other veins in this branching system are not more than 2 or 3 inches in width.

At still higher elevations and above the showings just referred to, several open-cuts have been made along mineral-showings in the sedimentary formations. A sample of selected ore from one of the open-cuts at 7,900 feet elevation assayed 0.5 oz. gold and 1.4 oz. silver per ton. The mineralization in all the veins at the higher elevations consists of arsenopyrite and pyrite with associated gold values. Since the writer visited the property winter camps have been established and outfitted with sufficient food and mining supplies to last the winter months. A crew of eight to twelve men is employed under the supervision of S. H. Davis.

GUN LAKE SECTION.

This company was incorporated in April, 1934, with a capitalization of 3,000,000 shares of no par value, to take over and operate the *Ypres* group of mineral claims, then owned by the Cariboo Bridge River Properties, Limited. The property consists of eighteen mineral claims and fractional claims, all situated on the west side of Gun lake. During 1934 a new road was constructed along the west shore of the lake to the property from the end of the Little Gun Lake road. The property is therefore about 7 miles by road from the main Bridge River road at South Forks, and 49 miles by road from Bridge River Station on the Pacific Great Eastern Railway.

The claims cover a stock, or tongue, of augite diorite in which several narrow, well-defined quartz veins were previously exposed by surface-slucing done under the direction of O. Fergus-

son. Most of the underground work has been done on the *Ypres* claim near the lake-shore, and it has disclosed several persistent quartz veins which vary in width from a few inches to as much as 4 feet, averaging possibly 18 inches.

The main crosscut adit, started 50 feet above the lake-level (3,000 feet elevation), is driven north, crosscutting the diorite, for a distance of 775 feet. The first vein is intersected 65 feet from the portal and is drifted on for 600 feet in a north 25 degrees west direction to a shear-zone, probably a major fault. The vein averages about 16 inches in width for a length of 400 feet, the gold content being up to \$1.60 per ton, according to the company sampling. The second vein is cut 130 feet from the portal. It is similar in strike, dip, and gold content to No. 1 vein. It is of greater average width and is drifted on in a north 25 degrees west direction for 110 feet. The No. 3 vein is cut at 250 feet from the portal and it is similar in strike and dip (steep to almost vertical) to No. 1 and No. 2 veins. A drift 250 feet long in a north 25 degrees west direction shows the vein to average about 18 to 20 inches in width for 200 feet along the drift. Two channel samples from this vein assayed 0.02 oz. gold per ton.

Approximately 500 feet of drifting along the main fault-zone, encountered in the No. 1 vein-drift, was done in a northerly direction and small inclusions of sulphide mineralization, with generally low, but occasionally fair, gold values, were found along the gouge-filled fault.

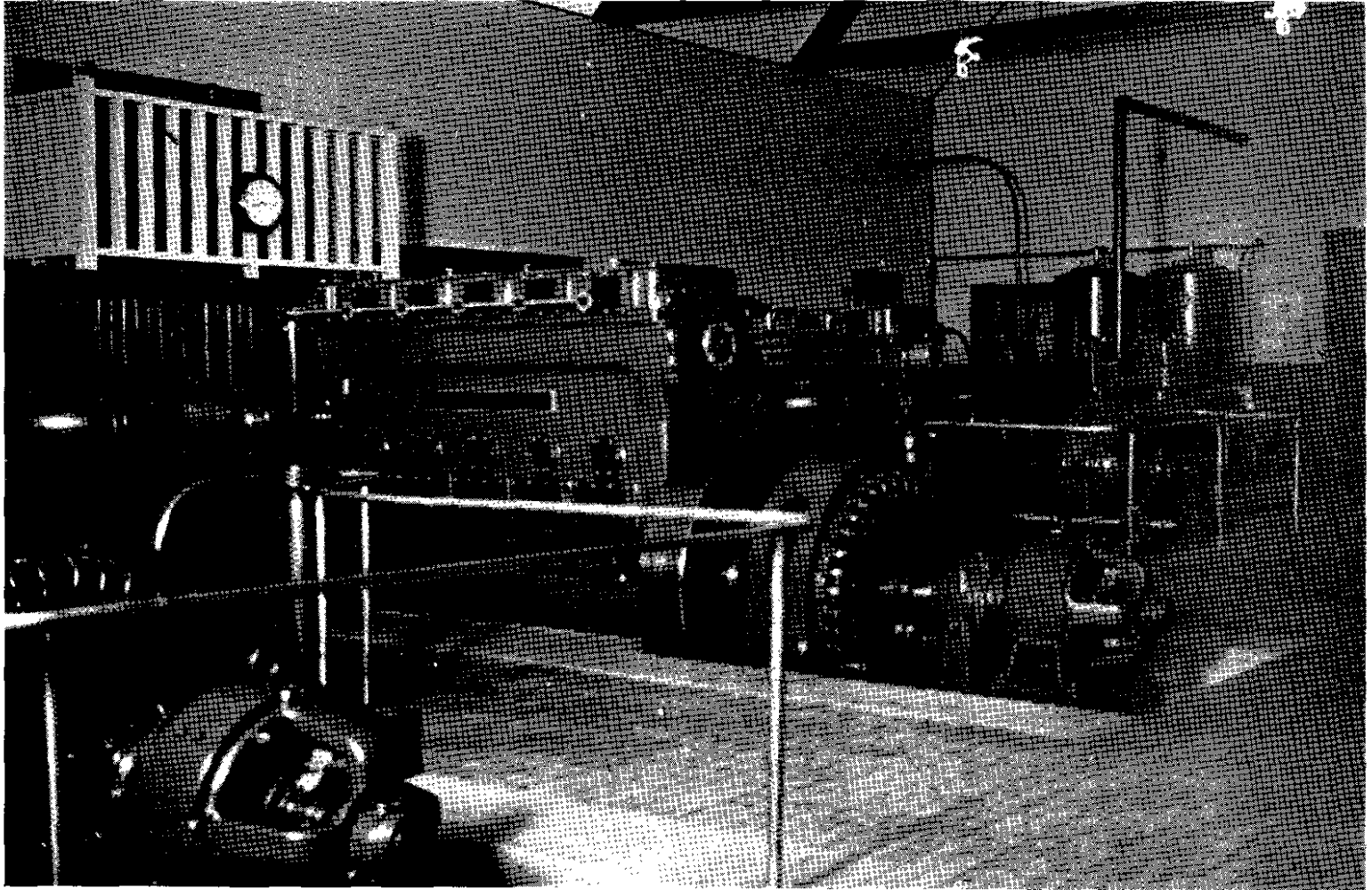
More recently it is reported that a drift to the west from the intersection of the vein and the fault has encountered a quartz vein in a shear-zone along a length of 80 feet, with the quartz averaging possibly 3 to 4 feet in width. Five samples of this quartz by H. J. Cain, the managing director, returned an average assay of 0.06 oz. gold per ton, and 1.17 oz. silver per ton across an average width of 2.6 feet from four of the samples; the fifth sample, an average of the dump from the vein, assaying 0.06 oz. gold per ton and 0.72 oz. silver per ton. Samples taken by the mine superintendent, A. Arlaud, across an average width of 3.1 feet along the 80-foot length assayed 0.135 oz. gold per ton. Drifting to the north in this section of the mine is reported to have picked up several narrower lenses of quartz in the sheared ground.

A camp capable of accommodating fifty men has been erected near the workings. Power equipment used for mining is driven by a 200-horse-power Pelton water-wheel installation. Water for the power plant is supplied from Walker creek under a head of 287 feet.

PLACER-MINING.

Texas Creek Placers. This organization, controlled by the A.P. Consolidated Oils, Limited, of Calgary, during 1934 worked a crew of nine men under the direction of Colonel Harstone at the mouth of Texas creek, 15 miles by road below Lillooet, on the Fraser river. Approximately 10,000 feet of steel flume was constructed from the dam built on Texas creek. This system furnishes water to 1,000 feet of 22-inch to 15-inch steel pipe and a No. 4 monitor (6-inch nozzle) under a pressure-head of 250-300 feet.

The ground being worked is on the west bank of the Fraser river just south of Texas creek, and hydraulic methods are being used for the double purpose of removing the recent river-graves and sand from what appears to be an old channel of the Fraser river which cuts into the west bank at this point and for testing the bed-rock values in this channel. Only a small area of old channel bed-rock had been uncovered in October, most of the season's work having been spent in installing the water system and removing a large quantity of unconsolidated recent river-graves; consequently nothing is known about what bed-rock values may be obtained. Colonel Harstone reports recovering encouraging quantities of coarse gold from the preliminary testing, but could not say what average values might be recovered until the work had proceeded further and indicated the true conditions of the old bed-rock channel and permitted more extensive tests. The bed-rock is slate, badly fractured, the beds standing at high angles, and thus excellent as a natural channel-riffle system.



Consolidated Gold Alluvials of B.C.—Interior of Power-house.

PART G.

INSPECTION OF MINES.

BY

JAMES DICKSON.

The Province is divided into six Inspection Districts, as follows:—

Inspection District.	Mining Divisions in District.
Vancouver Island.....	Victoria, Alberni, Clayoquot, Quatsino, and that portion of the Nanaimo Division situated on Vancouver Island.
Southern Coast.....	Vancouver, New Westminster, and that portion of Nanaimo Division situated on the Mainland.
Northern.....	Atlin, Liard, Stikine, Portland Canal, Nass River, Omineca, Peace River, Skeena, Bella Coola, and Queen Charlotte Islands.
Nicola-Princeton.....	Cariboo, Quesnel, Clinton, Lillooet, Kamloops, Ashcroft, Nicola, Vernon, Similkameen, and Osoyoos.
West Kootenay and Boundary....	Revelstoke, Lardeau, Trout Lake, Ainsworth, Slocan, Arrow Lake, Slocan City, Nelson, Trail Creek, Greenwood, and Grand Forks.
East Kootenay.....	Fort Steele, Windermere, and Golden.

The Inspectors inspect the coal mines, metalliferous mines, and quarries in their respective districts.

BOARD OF EXAMINERS FOR COAL-MINE OFFICIALS.

James Dickson.....	Chairman, Victoria.
James Strang.....	Secretary, Victoria.
H. E. Miard.....	Member, Fernie.

Messrs. Strang and Miard and the Inspector of Mines of the district in which an examination is being held form the Board for granting certificates of competency to coal-miners.

An Inspector of Mines is empowered to grant provisional certificates to miners for a period not exceeding sixty days between regular examinations.

INSTRUCTORS, MINE-RESCUE STATIONS.

J. D. Stewart.....	Nanaimo Station.
Jas. L. Brown.....	Cumberland Station.
Alfred Gould.....	Princeton Station.
John T. Puckey.....	Fernie Station.

Robert Strachan, senior Inspector of Mines, died on September 20th after a long illness; he was born in Scotland and studied mining there, and was in charge of mines before coming to Canada in 1902. He was manager of mines in the Crowsnest Pass area of British Columbia for a number of years and in 1909 was appointed Inspector of Mines; later he was made senior Inspector, which position he held until his death. His long experience in mining made his service particularly valuable to the Department and the mining industry, in which he spent his whole life.

PRODUCTION.

The total tonnage produced by the coal mines of the Province for the year ended December 31st, 1934, was 1,347,090 tons, being an increase of 82,343 tons or 6.5 per cent. over the production of 1933.

The Coast District, which includes Vancouver Island, Nicola-Princeton District, and the Northern District produced 719,471 tons, a decrease of 67,598 tons or 5.3 per cent. from 1933. Vancouver Island collieries produced 574,508 tons during 1934, a decrease of 38,695 tons or

6.3 per cent. from 1933. The Northern District produced 3,277 tons. The Nicola-Princeton District produced 141,686 tons, a decrease of 28,777 tons or 16.8 per cent. from 1933. The East Kootenay District produced 627,619 tons, an increase of 149,942 tons or 31.4 per cent. over 1933.

The following table shows the output and *per capita* production daily and for the year of the various mines:—

Colliery and Mine.	Gross Tons of Coal mined during Year.	Days worked.	Total No. of Employees.	Tons of Coal mined per Employee daily.	Tons of Coal mined per Employee for Year.	No. of Employees Under-ground.	Tons of Coal mined per Under-ground Employee daily.	Tons of Coal mined per Under-ground Employee for Year.
No. 1 mine, Nanaimo.....	234,391	208	730	1.54	321	457	2.46	513
No. 5 mine, South Wellington.....	136,506	194	302	2.33	452	244	2.88	559
Comox Colliery.....	193,002	190	534	1.91	363	412	2.46	468
Lantzville Colliery.....	4,897	244	18	1.11	272	13	1.54	377
Fiddick mine.....	1,839	271	11	0.61	167	8	0.84	230
Ida Clara Colliery (Richardson).....	1,345	278	10	0.48	134	6	0.80	224
Jingle Pot mine.....	242	116	5	0.41	48	4	0.51	60
Biggs' mine.....	1,498	119	10	1.26	150	7	1.80	214
Old Adit mine.....	175	66	3	0.88	58	2	1.33	87
Chambers' mine.....	613	145	4	1.05	153	3	1.40	204
Middlesboro Colliery.....	24,611	150	109	1.50	226	75	2.16	328
Coalmont Colliery.....	78,764	166	203	2.33	388	130	3.64	605
Tulameen Coal Mines, Ltd.....	19,157	119	94	1.71	204	72	2.23	266
Pleasant Valley Colliery.....	4,123	220	34	0.55	121	20	0.93	206
Blue Flame Colliery.....	12,897	233	40	1.38	322	24	2.30	537
Cascade Coal Co. (Bromley Vale).....	1,060	48	12	1.83	88	6	3.66	176
Canada Coal & Development Co.....	1,074	.....	9	.....	119	7	.....	153
Bulkley Valley Colliery.....	3,277	217	11	1.37	298	9	1.67	364
Coal Creek Colliery.....	91,604	150	149	4.09	614	116	5.32	789
Michel Colliery.....	292,027	232	357	3.52	818	256	4.91	1,140
Corbin Colliery.....	243,988	267	248	3.68	983	179	5.10	1,363

COLLIERIES OF VANCOUVER ISLAND INSPECTION DISTRICT.

The output of Vancouver Island collieries was 574,508 tons. Of this amount, 34,255 tons or 5.9 per cent. was lost in preparation for the market, 63,559 tons or 11 per cent. was consumed by producing companies as fuel, and 476,887 tons or 81.9 per cent. was sold in the competitive markets. Of the amount sold in the competitive markets, 454,884 or 95.3 per cent. was sold in Canada and 22,003 tons or 4.6 per cent. was sold in the United States.

COLLIERIES OF NICOLA-PRINCETON INSPECTION DISTRICT.

Of the gross output of 141,686 tons produced by the collieries of the Nicola-Princeton District, 22,612 tons or 15.9 per cent. was consumed by the producing companies as fuel and 117,589 tons or 83 per cent. was sold in the competitive markets in Canada.

COLLIERIES OF THE EAST KOOTENAY INSPECTION DISTRICT.

The output of the collieries of the East Kootenay District was 627,619 tons. Of this amount, 41,471 tons or 6.6 per cent. was lost in preparation for the market, 16,394 tons or 2.6 per cent. was consumed as fuel, 47,894 tons or 7.6 per cent. was made into coke, and 528,611 tons or 84.2 per cent. was sold in the competitive markets. Of the amount sold in the competitive markets, 505,079 tons or 95.5 per cent. was sold in Canada and 23,532 tons or 4.5 per cent. was sold in the United States.

The following table shows the *per capita* production of the various districts for the past five years. Similar figures for the years prior to 1929 are shown in previous Annual Reports.

OUTPUT AND PER CAPITA PRODUCTION OF VARIOUS DISTRICTS.

Year.	District.	Gross Tons of Coal mined during Year.	Total No. of Employees at Producing Collieries.	Tons of Coal mined per Employee for Year.	No. of Men employed Underground in Producing Collieries.	Tons of Coal mined per Underground Employee for Year.
1930	East Kootenay District..	689,230	1,252	550	931	740
	Coast District.....	1,197,894	3,393	353	2,458	487
	Whole Province.....	1,887,130	4,645	406	3,389	556
1931	East Kootenay District..	661,426	1,211	546	909	727
	Coast District.....	1,046,164	2,871	364	2,048	510
	Whole Province.....	1,707,590	4,082	419	2,957	577
1932	East Kootenay District..	587,875	1,001	587	752	781
	Coast District.....	947,100	2,607	363	1,876	504
	Whole Province.....	1,534,975	3,608	425	2,628	584
1933	East Kootenay District..	477,677	698	684	522	915
	Coast District.....	787,069	2,396	328	1,719	457
	Whole Province.....	1,264,746	3,094	408	2,241	564
1934	East Kootenay District..	627,619	754	832	551	1,139
	Coast District.....	719,471	2,139	336	1,499	480
	Whole Province.....	1,347,090	2,893	465	2,050	657

The following table shows the production and distribution of coal by the various collieries and districts, compiled from returns furnished by the owners:—

COLLIERIES OF BRITISH COLUMBIA—PRODUCTION, 1934.

MINE.	SOLD.			Total Sales.	Lost in Washing.	Used in making Coke.	Used under Companies' Boilers, etc.	Total for Colliery Use.	STOCKS.		DIFFERENCE.		Output for Year 1934.
	In Canada.	In U.S.A.	Elsewhere.						First of Year.	Last of Year.	Added to.	Taken from.	
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
Vancouver Island District.													
Canadian Collieries (D.), Ltd.—													
South Wellington, No. 3 mine.....	111,522	4,748	.....	116,270	21,565	.....	5,529	28,094	9,588	1,730	.....	7,858	136,506
Comox Colliery.....	187,992	4,263	.....	192,255	.....	.....	4,491	4,491	6,098	2,354	.....	3,744	193,002
Western Fuel Corporation of Canada, Ltd.—													
No. 1 mine.....	145,642	12,992	.....	158,634	12,690	.....	51,658	64,348	13,836	25,245	11,409	.....	234,391
Lantzville Colliery.....	4,078	.....	.....	4,078	.....	.....	819	819	.....	.....	.....	.....	4,897
Fiddick mine.....	1,839	.....	.....	1,839	.....	.....	.....	.....	.....	.....	.....	.....	1,839
Ida Clara Colliery (Richardson).....	1,345	.....	.....	1,345	.....	.....	.....	.....	.....	.....	.....	.....	1,345
Jingle Pot mine.....	180	.....	.....	180	.....	.....	62	62	.....	.....	.....	.....	242
Biggs' mine.....	1,498	.....	.....	1,498	.....	.....	.....	.....	.....	.....	.....	.....	1,498
Old Adit mine.....	175	.....	.....	175	.....	.....	.....	.....	.....	.....	.....	.....	175
Chambers' mine (Old Extension No. 1).....	613	.....	.....	613	.....	.....	.....	.....	.....	.....	.....	.....	613
Totals, Vancouver Island District.....	454,884	22,003	.....	476,887	34,255	.....	63,559	97,814	29,522	29,329	11,409	11,602	574,508
Nicola-Princeton District.													
Middlesboro Collieries, Ltd.....	21,121	.....	.....	21,121	.....	.....	3,659	3,659	312	143	.....	169	24,611
Coalmont Collieries, Ltd.....	68,386	.....	.....	68,386	.....	.....	10,378	10,378	.....	.....	.....	.....	78,764
Tulameen Coal Mines, Ltd.....	14,343	.....	.....	14,343	.....	.....	4,327	4,327	.....	487	487	.....	19,157
Pleasant Valley Colliery.....	2,318	.....	.....	2,318	.....	.....	1,805	1,805	.....	.....	.....	.....	4,123
Blue Flame Colliery.....	9,377	.....	.....	9,377	.....	.....	2,353	2,353	.....	1,167	1,167	.....	12,897
Cascade Coal Co., Ltd. (Bromley Vale).....	970	.....	.....	970	.....	.....	90	90	.....	.....	.....	.....	1,060
Canada Coal & Development Co., Ltd.....	1,074	.....	.....	1,074	.....	.....	.....	.....	.....	.....	.....	.....	1,074
Totals, Nicola-Princeton District.....	117,589	.....	.....	117,589	.....	.....	22,612	22,612	312	1,797	1,654	169	141,686
Northern District.													
Bulkley Valley Colliery.....	3,277	.....	.....	3,277	.....	.....	.....	.....	.....	.....	.....	.....	3,277
Totals, Northern District.....	3,277	.....	.....	3,277	.....	.....	.....	.....	.....	.....	.....	.....	3,277
Grand totals, Coast District.....	575,750	22,003	.....	597,753	34,255	.....	86,171	120,426	29,834	31,126	13,063	11,771	719,471
East Kootenay District.													
Crow's Nest Pass Coal Co., Ltd.—													
Coal Creek Colliery.....	79,270	9,279	.....	88,549	.....	.....	2,821	2,821	22	256	234	.....	91,604
Michel Colliery.....	234,025	722	.....	234,747	.....	47,894	7,276	55,170	469	2,579	2,110	.....	292,027
Corbin Collieries, Ltd.....	191,784	13,531	.....	205,315	41,471	.....	6,297	47,768	31,310	22,215	.....	9,095	243,988
Totals, East Kootenay District.....	505,079	23,532	.....	528,611	41,471	47,894	16,394	105,759	31,801	25,050	2,344	9,095	627,619
Coal.													
Grand totals for Province.....	1,080,829	45,535	.....	1,126,364	75,726	47,894	102,565	226,185	61,635	56,176	15,407	20,866	1,347,090
Coke.													
Crow's Nest Pass Coal Co., Ltd.—													
Michel Colliery.....	15,278	6,609	.....	21,887	.....	.....	.....	.....	212	503	291	.....	22,178
Total coke for Province.....	15,278	6,609	.....	21,887	.....	.....	.....	.....	212	503	291	.....	22,178

COLLIERIES OF BRITISH COLUMBIA—MEN EMPLOYED, 1934.

MINE.	WHITE MEN.															INDIANS.			JAPANESE AND CHINESE.						Total Men employed.								
	Super- vision and Clerical.			Miners.			Helpers.			Labourers.			Mechanics and Skilled Labour.			Boys.			Labourers.			Miners.						Helpers.			Labourers.		
	U.	A.	T.	U.	A.	T.	U.	A.	T.	U.	A.	T.	U.	A.	T.	U.	A.	T.	U.	A.	T.	U.	A.	T.	U.	A.	T.	U.	A.	T.	U.	A.	T.
Vancouver Island District.																																	
Canadian Collieries (D.), Ltd.— South Wellington, No. 5 mine.....	10	7	17	159	.....	159	4	.....	4	60	20	80	11	12	23	.....	19	19	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	244	58	302
Comox Colliery.....	18	11	29	123	.....	123	.....	.....	.....	141	32	173	79	49	128	21	11	32	.....	.....	.....	.....	.....	.....	30	19	49	412	122	534			
Western Fuel Corp. of Canada, Ltd.— No. 1 mine.....	25	28	53	141	.....	141	.....	.....	.....	152	94	246	101	66	167	38	26	64	.....	.....	.....	.....	.....	.....	59	59	118	457	273	730			
Lantzville Colliery.....	2	.....	.....	11	.....	11	.....	.....	.....	.....	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	13	14
Fiddick mine.....	1	.....	.....	7	.....	7	.....	.....	.....	.....	3	3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	8	3	11
Ida Clara Colliery (Richardson).....	2	.....	.....	2	.....	2	2	.....	2	.....	.....	.....	.....	2	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	2	4	6	4	10			
Jingle Pot mine.....	.....	.....	.....	4	.....	4	.....	.....	.....	.....	.....	.....	.....	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4	1	5
Biggs' mine.....	1	.....	.....	4	.....	4	2	.....	2	.....	3	3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	7	3	10
Old Adit mine.....	.....	.....	.....	2	.....	2	.....	.....	.....	.....	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	1	3
Chambers' mine (Old Extension No. 1).....	.....	.....	.....	2	.....	2	.....	.....	.....	.....	1	1	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3	1	4
Totals, Vancouver Island District.....	59	46	105	455	.....	455	8	.....	8	354	155	509	191	133	324	59	56	115	.....	.....	.....	.....	.....	.....	30	81	111	1156	471	1627			
Nicola-Princeton District.																																	
Middlesboro Collieries, Ltd.....	5	1	6	39	.....	39	13	.....	13	18	10	28	.....	13	13	.....	10	10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	75	34	109
Coalmont Collieries, Ltd.....	10	11	21	68	.....	68	.....	.....	.....	16	27	43	31	34	65	5	.....	5	.....	.....	.....	.....	.....	.....	1	1	2	130	73	203			
Tulameen Coal Mines, Ltd.....	5	3	8	26	.....	26	26	.....	26	12	13	25	3	6	9	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	72	22	94
Pleasant Valley Colliery.....	3	2	5	12	.....	12	3	.....	3	2	5	7	.....	5	5	.....	2	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	20	14	34
Blue Flame Colliery.....	3	2	5	9	.....	9	8	.....	8	1	7	8	3	5	8	.....	2	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	24	16	40
Cascade Coal Co., Ltd. (Bromley Vale).....	.....	.....	.....	6	.....	6	.....	.....	.....	.....	6	6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	6	6	12
Canada Coal & Development Co., Ltd.....	1	1	2	6	.....	6	.....	.....	.....	.....	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	7	2	9
Totals, Nicola-Princeton District.....	27	20	47	166	.....	166	50	.....	50	49	69	118	37	63	100	5	14	19	.....	.....	.....	.....	.....	.....	1	1	2	334	167	501			
Northern District.																																	
Bulkley Valley Colliery.....	.....	.....	.....	4	.....	4	4	.....	4	1	.....	1	.....	1	1	.....	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	9	2	11
Totals, Northern District.....	.....	.....	.....	4	.....	4	4	.....	4	1	.....	1	.....	1	1	.....	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	9	2	11
Grand totals, Coast District.....	86	66	152	625	.....	625	62	.....	62	404	224	628	228	197	425	64	71	135	.....	.....	.....	.....	.....	.....	30	82	112	1499	640	2139			
East Kootenay District.																																	
Crow's Nest Pass Coal Co., Ltd.— Coal Creek Colliery.....	5	2	7	70	.....	70	.....	.....	.....	8	7	15	32	23	55	1	1	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	116	33	149
Michel Colliery.....	13	7	20	149	.....	149	4	.....	4	27	27	54	62	65	127	1	2	3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	256	101	357
Corbin Collieries, Ltd.....	12	12	24	118	.....	118	13	.....	13	32	22	54	2	32	34	2	3	5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	179	69	248
Totals, East Kootenay District.....	30	21	51	337	.....	337	17	.....	17	67	56	123	96	120	216	4	6	10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	551	203	754
Grand totals for Province.....	116	87	203	962	.....	962	79	.....	79	471	280	751	324	317	641	68	77	145	.....	.....	.....	.....	.....	.....	30	82	112	2050	843	2893			

NOTE.—U=Underground; A=Above ground; T=Total.

INSPECTION OF MINES.

LABOUR AND EMPLOYMENT.

During 1934, 2,893 persons were employed in and about the coal mines of the Province, a decrease of about 6.5 per cent. compared with 1933.

Taking the average of all the mines in Vancouver Island District, about 30 per cent. of the working-days was lost through lack of trade. In the Nicola-Princeton District the different collieries worked from 40 to 77 per cent. of the working-days, averaging for the district about 59 per cent. of the working-days. In the East Kootenay District the mines worked from 50 to 89 per cent. of the working-days during the year, and worked on an average for the whole district about 72 per cent. of the time.

The table on page 5 shows the number of persons ordinarily employed in and about the mines, distinguishing the persons and different classes employed underground and above ground, compiled from returns furnished by the owners.

FUEL-OIL COMPETITION.

During 1934 the imports of crude oil for refining in British Columbia totalled 158,288,000 gallons, and from this 40,000,000 gallons of gasoline and 93,000,000 gallons of fuel-oil were produced and sold in British Columbia.

In addition to this, 23,293,000 gallons of fuel-oil was imported in bond for marine use and 17,787,000 gallons of fuel-oil was imported for use in British Columbia; of all the above imports only the latter item is dutiable.

The most recent figures available regarding the use of fuel-oil in British Columbia show that of the total fuel-oil used for different purposes in Canada this Province used as follows: 17.4 per cent. of the fuel-oil in domestic and building heating; 22.5 per cent. in manufacturing; 1.2 per cent. for tractors; 70 per cent. by railways; and 48.7 per cent. for ships' bunkers. British Columbia used 38.8 per cent. of the total fuel-oil consumed in the Dominion.

COMPETITION OF COAL PRODUCED OUTSIDE BRITISH COLUMBIA.

During 1934 the importations of coal from United States into British Columbia consisted of 2,486 tons of lignite, 1,928 tons of bituminous coal, and 5 tons of coke.

Imports of coal into British Columbia from Great Britain consisted of 282 tons anthracite, 42 tons of bituminous coal, and 1,574 tons of coke.

In addition to above, 300 tons of bituminous coal was imported from Japan and 314 tons of coke from Germany.

The following table shows the amount of Alberta coal sold in British Columbia during past years:—

Year.	Short Tons.	Year.	Short Tons.
1925.....	117,037	1930.....	227,385
1926.....	127,858	1931.....	193,060
1927.....	187,028	1932.....	136,188
1928.....	262,198	1933.....	119,026
1929.....	247,060	1934.....	123,968

The total tonnage of coal brought into British Columbia during 1934 was 129,026 tons, as compared with 151,573 tons in 1933.

HYDRO-ELECTRIC DEVELOPMENT.

At the end of 1934 the hydro-electric horse-power in use amounted to 726,000 horse-power. The steadily increasing development of hydro-installations in British Columbia is shown in the following table:—

Year.	Water-power developed. Horse-power.	Year.	Water-power developed. Horse-power.
1900.....	9,366	1926.....	460,562
1905.....	29,334	1927.....	473,142
1910.....	64,474	1928.....	523,902
1915.....	254,005	1929.....	559,792
1920.....	309,185	1930.....	630,792
1921.....	309,762	1931.....	655,992
1922.....	329,057	1932.....	713,792
1923.....	355,718	1933.....	717,602
1924.....	355,718	1934.....	726,000
1925.....	414,702		

For the purpose of comparison, it may be stated that one developed horse-power per year is equivalent to the power value of 6 tons of coal.

ACCIDENTS IN AND AROUND COAL MINES.

During 1934, 2,893 persons were employed in and around the coal mines. Six fatal accidents occurred during the year, as compared with three for 1933.

The ratio of fatal accidents per 1,000 persons employed was 2.07, as compared with 0.97 in 1933. In 1932 the ratio was 2.21; in 1931, 1.22; in 1930, 11.62; in 1929, 2.38; in 1928, 2.64; in 1927, 2.10; in 1926, 1.88; in 1925, 1.10; the average for the ten-year period being 2.89.

The number of fatal accidents per 1,000,000 tons produced during 1934 was 4.45; during 1933 the figure was 2.37; in 1932, 5.21; in 1931, 2.81; in 1930, 28.64; in 1929, 5.33; in 1928, 5.54; in 1927, 4.48; in 1926, 4.3; in 1925, 2.45; the average for the ten-year period being 6.53 per 1,000,000 tons of coal mined.

The following table shows the collieries at which the fatal accidents occurred during 1934 and comparative figures for 1933:—

Name of Company.	Name of Colliery.	1934.	1933.
Canadian Collieries (D.), Ltd.....	Comox.....	1	....
Canadian Collieries (D.), Ltd.....	South Wellington.....	1	....
Tutameen Coal Mines, Ltd.....	No. 2 mine.....	....	1
Coalmont Collieries, Ltd.....	No. 4 mine.....	....	1
Crow's Nest Pass Coal Co., Ltd.....	Coal Creek.....	1	....
Crow's Nest Pass Coal Co., Ltd.....	Michel.....	3	1
Totals.....		6	3

The following table shows the various causes of fatal accidents and their percentage of the whole, with corresponding figures for 1933:—

Cause.	1934.		1933.	
	No.	Per Cent.	No.	Per Cent.
By falls of roof and coal.....	4	66.70	2	66.70
By mine-cars and haulage.....	2	33.30	1	33.30
Totals.....	6	100.00	3	100.00

The following table shows the number of tons of coal mined for each fatal accident in their respective classes in the years 1934 and 1933:—

Cause.	1934.		1933.	
	No. of Fatal Accidents.	No. of Tons of Coal mined per Fatal Accident.	No. of Fatal Accidents.	No. of Tons of Coal mined per Fatal Accident.
By falls of roof and coal.....	4	336,772	2	632,373
By mine-cars and haulage.....	2	673,545	1	1,264,746
Totals.....	6	224,515	3	421,582

The number of tons mined per fatal accident during 1934 was 224,515 tons, compared with 421,582 tons for 1933. The average for the ten-year period was 153,082 tons.

The following table shows the fatalities from various causes in coal mines during the year 1934, compared with 1933, according to Inspection Districts:—

District.	NUMBER OF DEATHS FROM ACCIDENTS.		TOTAL.		ACCIDENT DEATH-RATE.			
	Falls of Roof and Coal.	Mine-cars and Haulage.	1934.	1933.	Per 1,000 Persons employed.		Per 1,000,000 Tons of Coal mined.	
					1934.	1933.	1934.	1933.
Vancouver Island.....	2	....	2	....	1.73	....	3.48	....
Nicola-Princeton.....	....	....	....	2	....	3.57	....	11.73
East Kootenay.....	2	2	4	1	7.27	1.43	6.37	2.09
Northern.....	....	....	....	....	....	....	....	....
Province (1934).....	4	2	6	....	2.07	....	4.45	....
Province (1933).....	....	....	....	3	....	0.97	....	2.37

The following table shows the ratio of accidents per 1,000 employees and per 1,000,000 tons of coal mined in the Coast and East Kootenay Inspection Districts for the ten-year period ended December 31st, 1934:—

District.	No. of Fatalities.	ACCIDENT DEATH-RATE.	
		Per 1,000 Employees.	Per 1,000,000 Tons of Coal mined.
Coast.....	100	3.16	8.19
East Kootenay.....	29	2.37	3.84
Total for Province.....	129	2.89	6.53

The details regarding the occurrences of the fatal accidents in coal mines during 1934 are as follows:—

The fatal accident which occurred to William Jenkins, miner, No. 1 mine, Michel Colliery, on April 10th was due to a fall of roof. Deceased and others were detailed to timber a piece of bad roof and while engaged in this work part of it fell and injured Jenkins, who died shortly after.

The fatal accident which occurred to William McMillan, miner, No. 4 mine, Comox Colliery, on May 2nd was due to a fall of coal and cap-rock from the working-face. Deceased had had a shot fired in his working-place, but the shot did not dislodge the coal, and while completing the work of the shot with his pick the coal and cap-rock fell outwards and killed him instantly.

The fatal accident which occurred to William Mitchell, miner, No. 1 mine, Michel Colliery, on May 14th was due to a small fall of coal which caused deceased to fall against a face conveyor. While the falling coal was a cause of the accident, the fatal injuries were due to the violence with which he fell against the conveyor.

The fatal accident which occurred to Louis Harman, motorman, "B" seam, Michel Colliery, on November 2nd was due to deceased being crushed between a moving trip and a "splash-board" at a loading-chute on the main level; he had apparently been coupling cars when other cars came against the trip and caused all the cars to move ahead, and deceased had come from between the cars just at the "splash-board" and his head was crushed.

The fatal accident which occurred to Harry A. Meikle, timberman, No. 5 mine, South Wellington, on November 11th was due to a large fall of rock in an old roadway which he was retimbering. Deceased and his partner were men of wide experience and former firebosses.

The fatal accident which occurred to George Smith, bratticeman, No. 1 East mine, Coal Creek Colliery, on November 23rd was due to deceased being crushed, below the right knee, between the bumpers of two cars. Deceased had been standing in a parting of No. 20 East slope when an empty trip, intended for a level below, was by some means deflected into the parting where deceased was standing against some loaded cars; he died from shock some hours later.

EXPLOSIVES.

The following table shows the quantity of explosives used in coal mines during 1933, together with the number of shots fired, tons of coal produced per pound of explosive used, and the average pounds of explosive per shot fired (these quantities include all explosives used for breaking coal and for rock in coal mines):—

VANCOUVER ISLAND DISTRICT.

Colliery.	Quantity of Explosive used in Pounds.	Tonnage for Mine.	Total No. of Shots fired.	Tons of Coal per Pound of Explosive used.	Average Pounds of Explosive per Shot fired.
No. 1 mine, Nanaimo.....	80,163	234,391	119,900	2.92	0.66
No. 5 mine, South Wellington.....	42,225	136,506	54,793	3.23	0.77
Comox Colliery.....	53,823	193,002	53,623	3.59	1.00
Lantzville Colliery.....	5,200	4,897	5,600	0.94	0.93
Fiddick mine.....	2,200	1,839	2,900	0.83	0.75
Ida Clara Colliery (Richardson).....	875	1,345	1,771	1.53	0.49
Jingle Pot mine.....	100	242	150	2.42	0.66
Biggs' mine.....	700	1,498	1,000	2.14	0.70
Old Adit mine.....	20	175	100	8.75	0.20
Chambers' mine.....	300	613	600	2.04	0.50
Totals for district.....	185,406	574,508	240,437	3.09	0.77

NICOLA-PRINCETON DISTRICT.

Middlesboro Collieries.....	5,330	24,611	9,540	4.45	0.55
Coalmont Collieries.....	18,328	78,764	25,500	4.30	0.71
Tulameen Coal Mines, Ltd.....	5,400	19,157	9,000	3.54	0.60
Pleasant Valley Colliery.....	3,000	4,123	6,000	1.37	0.50
Blue Flame Colliery.....	4,500	12,897	6,500	1.45	0.69
Cascade mine (Bromley Vale).....	473	1,060	940	2.24	0.50
Canada Coal & Development Co.....	.....	1,074	.....	.....	.....
Totals for district.....	37,031	141,686	57,480	3.82	0.64

NORTHERN DISTRICT.

Bulkley Valley Colliery.....	1,950	3,277	3,500	1.68	0.56
Totals for district.....	1,950	3,277	3,500	1.68	0.56

EAST KOOTENAY DISTRICT.

Coal Creek Colliery.....	.....	91,604	.....	.....	.....
Michel Colliery.....	31,673	292,027	50,239	9.22	0.63
Corbin Colliery.....	8,247	243,988	8,740	29.05	0.94
Totals for district.....	39,920	627,619	58,979	15.72	0.67
Totals for Province.....	264,307	1,347,090	360,396	5.09	0.73

QUANTITIES OF DIFFERENT EXPLOSIVES USED.

	Lb.
Monobel of different grades	211,331
Permissible rock-powder	52,976
Total.....	264,307

The following is a list of explosives permitted for use in coal mines by the Honourable the Minister of Mines under the provisions of section 101, General Rule 11, clause (2), "Coal-mines Regulation Act":—

Polar Monobel No. 4.	Polar Monobel No. 14.
Polar Monobel No. 6.	Polar CXL-ite No. 2.
Polar Monobel No. 12.	

MACHINE-MINED COAL.

During the year 1934 mining-machines produced approximately 616,895 tons of coal, or 46.8 per cent. of the total.

The following table gives the district, number of machines, how driven, and type of machine used:—

District.	NUMBER DRIVEN BY		TYPE OF MACHINE USED.					
	Electricity.	Compressed Air.	Mavor and Coulson.	Anderson Boyes.	Little Hardy.	Siskol.	Sullivan.	Ingersoll-Rand.
Vancouver Island	1	30	8	7	1	12	3	....
Nicola-Princeton.	....	23	....	....	....	11	....	12
East Kootenay.....	....	30	1	2	27	....	....	....
Totals.....	1	83	9	9	28	23	3	12

SAFETY-LAMPS.

There were 2,488 safety-lamps in use in the coal-mines of the Province. Of this number, 194 were flame safety-lamps of the Wolf type and 2,294 were electric lamps of various makes, as follows: Edison, 2,223; Wheat, 4; and Wolf electric, 67.

The following table shows the distribution of lamps by district, method of locking, and illuminant used:—

VANCOUVER ISLAND DISTRICT.

Colliery and Mine.	METHOD OF LOCKING.		ILLUMINANT USED.	
	Magnetic Lock.	Screw or Automatic Clip.	Naphtha Gasoline.	Electricity.
No. 1 mine, Nanaimo.....	35	538	35	538
No. 5 mine, South Wellington.....	12	204	12	204
Comox Colliery.....	28	375	28	375
Lantzville Colliery.....	2	27	2	27
Fiddick mine.....	2	8	2	8
Ida Clara (Richardson).....	2	10	2	10
Jingle Pot mine.....	2	....	2	....
Biggs' mine.....	2	11	2	11
Old Adit mine.....	1	....	1	....
Chambers' mine.....	1	4	1	4
Totals for district.....	87	1,177	87	1,177

NICOLA-PRINCETON DISTRICT.

Colliery and Mine.	METHOD OF LOCKING.		ILLUMINANT USED.	
	Magnetic Lock.	Screw or Automatic Clip.	Naphtha Gasoline.	Electricity.
Middlesboro Colliery.....	7	75	7	75
Coalmont Colliery.....	10	181	10	181
Tulameen Mines, Ltd.....	5	132	5	132
Pleasant Valley Colliery.....	4	74	4	74
Blue Flame Colliery.....	2	25	2	25
Cascade mine (Bromley Vale).....	2	8	2	8
Canada Coal & Development Co.....	.....	.....	.....	.....
Totals for district.....	30	495	30	495

NORTHERN DISTRICT.

Bulkley Valley Colliery.....	12	.....	12	.....
Totals for district.....	12	.....	12	.....

EAST KOOTENAY DISTRICT.

Coal Creek Colliery.....	7	120	7	120
Michel Colliery.....	36	330	36	330
Corbin Colliery.....	22	172	22	172
Totals for district.....	65	622	65	622
Totals for Province.....	194	2,294	194	2,294

APPROVED SAFETY-LAMPS, ELECTRIC AND FLAME.

A list of the approved safety-lamps, both electric and flame, was published in the 1930 Annual Report. The following lamps, all electric, are now also approved:—

No. 8.—The electric lamp manufactured by the Edison Storage Battery Company, Orange, New Jersey, U.S.A., under Approval No. 18 of the United States Bureau of Mines. The only bulb approved for use in this lamp carries the symbol BM-18 and is manufactured by the National Lamp Works of the General Electric Company, Cleveland, Ohio.

No. 9.—The electric lamp manufactured by the Edison Storage Battery Company, Orange, New Jersey, U.S.A., under Approval No. 18F of the United States Bureau of Mines. This model of Edison lamp in reality represents an extension of the lamp approval given under Approval No. 18. The only bulb approved for use with this lamp carries the symbol BM-18F and is manufactured by the National Lamp Works of the General Electric Company, Cleveland, Ohio.

No. 10.—The electric lamp manufactured by the Edison Storage Battery Company, Orange, New Jersey, U.S.A., under Approval No. 18H of the United States Bureau of Mines. This lamp represents an extension of the No. 18 approval of the United States Bureau of Mines. The only bulb approved for use with this lamp carries the symbol BM-18H and is manufactured by the National Lamp Works of the General Electric Company, Cleveland, Ohio.

No. 11.—The electric lamp manufactured by the Edison Storage Battery Company, Orange, New Jersey, U.S.A., under Approval No. 24 of the United States Bureau of Mines. The only bulb approved for use with this lamp carries the symbol BM-24 and is manufactured by the National Lamp Works of the General Electric Company, Cleveland, Ohio. This lamp is known as the Edison Model J lamp.

No. 12.—The electric lamp manufactured by the Edison Storage Battery Company, Orange, New Jersey, U.S.A., under Approval No. 25 of the United States Bureau of Mines. The only bulb approved for use with this lamp carries the symbol BM-25 and is manufactured by the

National Lamp Works of the General Electric Company, Cleveland, Ohio. This lamp is known as the Edison Model K lamp.

(Unless otherwise specified, all lamps are cap-lamps.)

NOTE.—While the use of flame safety-lamps is permitted, it is the policy of the Department of Mines to encourage the use of approved electric safety-lamps for all persons underground in the coal mines, except such flame-lamps as may be required by the officials of the mines in the carrying-out of their duty and in such cases as it is considered advisable to provide flame safety-lamps in addition to the electric safety-lamps.

ELECTRICITY.

Electricity is used for various purposes on the surface at nine mines and underground at five mines. The purpose for which it was used, together with the amount of horse-power in each instance, is shown in the following table:—

Above ground—	Nature of its Use.	Aggregate H.P.
Winding or hoisting		1,577
Ventilation		625
Haulage		600
Coal-washing		335
Miscellaneous		2,047
Total horse-power		5,184
<hr/>		
Underground—		
Haulage		1,870
Pumping		2,120
Coal-cutting		30
Miscellaneous		770
Total horse-power		4,790
Total horse-power above and under ground		9,974

Of the above amount, approximately 1,442 horse-power was operated as direct current and 8,532 horse-power as alternating current.

VENTILATION.

The District Inspectors' reports give details regarding the ventilation in the splits and main returns of the various mines. In some instances requests had to be made during 1934 to increase the ventilation during the year, while in others it was found that in some of the machine long-wall faces over 20,000 cubic feet of air per minute was passing at a velocity of over 1,000; this was considered to be too high, even although there was an attempt to reduce the gas content in the air; on the whole, ventilation was well maintained throughout the year.

USE OF THE BURRELL GAS INDICATOR.

The Burrell Gas Indicator was used throughout the mines of the Province, immediately determining the methane content where the percentage was too small to be detected by means of the flame safety-lamp.

MINE-AIR SAMPLES.

Mine-air sampling was carried out as usual during the year and 355 samples were collected in the various coal mines of the Province; of this number, twenty-three were spoiled in transit and accidents in the laboratory. While samples were taken in all the mines at intervals, this method is carried out most intensively in the mines of the Crowsnest Pass District and No. 5 mine, Comox Colliery, where the gas-inflow is much higher than in other mining districts of the Province. In Vancouver Island and also the Crowsnest Pass Districts a large number of samples were taken in old workings and near the seat of fires. Analyses of mine-air samples taken throughout the coal mines of the Province during 1934 are on file in the office of the Chief Inspector of Mines and copies will be furnished to any one interested.

INSPECTION COMMITTEES.

Practically all the mines throughout the Province have had inspection committees, appointed by the workmen under General Rule 37, section 101, "Coal-mines Regulation Act," who made monthly inspections on behalf of the employees. The courtesy is acknowledged of many of the inspection committees in forwarding copies of their reports to this office. The different operations were reported by the above inspection committees to be in good condition generally.

COAL-DUST.

Sampling of dust was well maintained during the year and a total of 1,075 samples were analysed at the different mines, and where the analyses showed that the incombustible content of the dust sampled in any mine was only 50 per cent. immediate steps were taken to see that the mine or part of the mine was re-rock dusted.

DANGEROUS OCCURRENCES.

During the year the following dangerous occurrences, in addition to those causing injuries, were reported:—

On January 8th a severe "bump" occurred on 19 East slope, No. 1 East mine, Coal Creek Colliery, and heaved the floor 150 feet.

On February 11th open fire was discovered in No. 6 mine, Corbin Colliery; this was in the vicinity of a heated area that had been dealt with for several months. Every effort was made to control this fire by means of water and later by sealing off, but due to the crushed nature of the ground this work was unsuccessful and in July it was found necessary to seal off and abandon the whole mine.

On March 1st the hoisting-rope in the west compartment of No. 5 shaft, Comox Colliery, broke inside the cone when the loaded cage was being raised from the bottom of the shaft; the cage was only 1 foot from the bottom when the rope broke and no damage was done.

On March 14th an open outbreak of fire was discovered in No. 4 mine, Corbin Colliery, and was dealt with by sealing off the area.

On April 4th three "bumps" occurred at one-minute intervals in No. 20 East slope, No. 1 East mine, Coal Creek Colliery; a considerable amount of coal was displaced and the methane outflow was increased for some time.

On April 23rd a slight explosion of methane occurred in No. 5 level, *Pioneer* mine, and two men sustained slight burns; this was in a raise that had been standing idle for some time and when the two men went up they lit the gas which had unexpectedly accumulated there.

On April 25th a miner was slightly injured by an explosion of acetylene gas in the *Bralorne* mine.

On May 28th a fire of spontaneous origin was discovered in the lower workings of No. 5 mine, South Wellington; this area was sealed off.

On June 12th a serious outbreak of fire was discovered as a result of an old fire burning through an old seal; this was sealed off with concrete.

On June 18th a recurrence of the fire of May 28th was discovered in No. 5 mine, South Wellington, and was dealt with by further sealings.

On July 13th a man was slightly burned by an ignition of methane in the 11 East level, *Pioneer* mine.

On September 15th the hoisting-rope in the sinking-shaft at the *Reno* mine broke and allowed the bucket to fall to the bottom of the shaft; this occurrence is dealt with in another part of this report.

On October 18th spontaneous heating was discovered in 8 West section, No. 4 mine, Coalmont Collieries, and as a result this area was sealed off.

On October 30th a heavy "bump" occurred in 20 East, No. 1 East mine, Coal Creek Colliery; the mine had not worked for five days prior to the "bump."

On December 12th the counterbalance in the main shaft, *Sally* mine, fell, due to the faulty fastening of the rope to the hoist-drum; adequate precautions were adopted to prevent a recurrence of this.

On December 13th spontaneous heating was discovered in 11 West section, No. 4 mine, Coalmont Colliery, and as a result this area was sealed off.

On December 27th a small feeder of gas was ignited by a shot in machine-cut coal; the fire was promptly dealt with and no damage was done.

PROSECUTIONS.

During 1934 there were three prosecutions made for infractions of the "Coal-mines Regulation Act" and special rules, all of which resulted in convictions.

PROSECUTIONS UNDER "COAL-MINES REGULATION ACT."

Date.	Colliery.	Occupation of Defendant.	Offence charged.	Judgment.
July 13	Crow's Nest Pass Coal Co., Ltd., Michel Colliery	Miner.....	Failed to observe special timbering rules	\$5 and costs.
Nov. 10	Canada Coal & Development Co., Hat Creek Colliery	General Superintendent	Failed to observe regulations prohibiting naked lights underground	\$25 and costs.
Nov. 10	Canada Coal & Development Co., Hat Creek Colliery	General Superintendent	Used a non-permitted explosive underground	\$25 and costs.

GOVERNMENT RESCUE-STATIONS.

The Department of Mines has now four mine-rescue stations in different parts of the Province and centrally located in the mining districts—namely, at Nanaimo, Cumberland, Princeton, and Fernie. During the year many requests were received from medical men for oxygen and the inhalators for use in emergencies, and immediate service was rendered in every case. In the larger coal-mining districts of Crowsnest, Cumberland, and Nanaimo experienced teams maintain a regular schedule of training throughout the year and so keep ready for any emergency calls.

The preliminary training course consists of twelve two-hour lessons in the actual use of the oxygen apparatus and Burrell all-service gas-masks in an irrespirable atmosphere and instruction on the approved method of dealing with mine fires and recovery-work. The training itself is strenuous work, and all candidates have to undergo a special physical examination before starting training and must be under 34 years of age.

During the year, in addition to the regular teams in training, sixty-one new men took the full training and were granted certificates of competency:—

Cert. No.	Name.	Where trained.	Cert. No.	Name.	Where trained.
791	John Blake.....	Nanaimo.	812	Dominic Armand.....	Nanaimo.
792	Herbert Collishaw.....	Nanaimo.	813	James S. Doblinson.....	Nanaimo.
793	John Gilmour.....	Nanaimo.	814	Othniel Hepworth.....	Nanaimo.
794	Robert H. Hamilton.....	Nanaimo.	815	Charles Kules.....	Nanaimo.
795	Leslie Hunter.....	Nanaimo.	816	Arthur Paul.....	Nanaimo.
796	William Jardine.....	Nanaimo.	817	Thomas Henry Baker.....	Cumberland.
797	Joseph R. Laskovitch.....	Nanaimo.	818	David J. Morgan.....	Cumberland.
798	Gilbert Leigh.....	Nanaimo.	819	Irvine Morgan.....	Cumberland.
799	Joseph Malbon.....	Nanaimo.	820	Gordon Hamilton Robertson.....	Cumberland.
800	John Midan.....	Nanaimo.	821	John Wm. Watson.....	Cumberland.
801	Christopher Mills.....	Nanaimo.	822	John Coggins.....	Anyox.
802	John McKellor.....	Nanaimo.	823	Sherwood D. Ford.....	Anyox.
803	Walter Richards.....	Nanaimo.	824	Walter Forshaw.....	Anyox.
804	William Wilson.....	Nanaimo.	825	Thomas Griffiths.....	Anyox.
805	William B. Rafter.....	Nanaimo.	826	William Horne.....	Anyox.
806	Sydney Hunt.....	Cumberland.	827	Frank Tautz.....	Anyox.
807	Alexander Mossey.....	Cumberland.	828	Robert M. Gellately*.....	Anyox.
808	Benjamin Nicholas.....	Cumberland.	829	Geo. M. Downton.....	Nanaimo.
809	Thos. H. Robertson.....	Cumberland.	830	Daniel Chester.....	Coal Creek.
810	Jack Taylor.....	Cumberland.	831	Perry Casarini.....	Michel.
811	Harry Waterfield.....	Cumberland.	832	Levi Elmes.....	Corbin.

* Substituted for No. 721, issued at Princeton, June, 1931.

GOVERNMENT RESCUE-STATIONS—*Continued.*

Cert. No.	Name.	Where trained.	Cert. No.	Name.	Where trained.
833	John Eckersley.....	Corbin.	843	John Rallison.....	Michel.
834	Herbert D. Hughes.....	Michel.	844	Henry Sanders.....	Michel.
835	Thomas A. Heyes.....	Michel.	845	William Singleton.....	Coal Creek.
836	Abel E. Hampton.....	Michel.	846	Robert Shaw.....	Corbin.
837	Douglas H. Jones.....	Corbin.	847	James P. Terrion.....	Michel.
838	John Mogielka.....	Fernie.	848	Alphonse Tiberghien.....	Corbin.
839	David McNay.....	Coal Creek.	849	Frank Townsley.....	Coal Creek.
840	Robert Pettigrew.....	Corbin.	850	Vernon Uphill.....	Corbin.
841	Antonia Quarin.....	Michel.	851	James Woodward.....	Corbin.
842	Ettore Regenas.....	Michel.	852	Frank Worthington.....	Coal Creek.

SAFETY AND FIRST-AID WORK.

The Department of Mines through its Inspectors in the different districts has continued to assist in keeping up the safety and first-aid organizations in all the mining areas of the Province.

There are now active centres of this work at the mines in the Crowsnest Pass, Kimberley, Princeton, Nanaimo, Britannia, Anyox, and at the newer mines in the Bridge River area.

There is a growing realization that the utmost safety can be attained only by the fullest co-operation between the mine employees, the mine operators, and the Inspectors of Mines; most of the different safety associations are on this basis.

SUPERVISION OF COAL MINES.

During the year twenty-one coal companies operated twenty-three collieries, with thirty-four mines, employing 2,050 men underground. In the supervision of underground employees there were twelve managers, one safety engineer, nineteen overmen, eighty-six firebosses and shotlighters, a total of 118, or one official for every seventeen persons employed underground.

"COAL SALES ACT."

A considerable amount of work was done by the Inspection Branch under the "Coal Sales Act" during 1934, and this was principally directed to the examination of invoices of coal-dealers and the coal covered by the said invoices to see that all coal was sold under its registered name.

The chief difficulty experienced in this work is during the winter months, when a large number of small dealers and transfermen enter the retail coal business and peddle coal from door to door; very few of this class of coal-dealers have a recognized coalyard or place of business, and as a rule are only concerned in the immediate sale of whatever coal they may have on their truck.

When a purchaser is found and the coal delivered, the coal is often found to be different to what he had been led to expect, and when a complaint is made it is often difficult if not impossible to locate the vendor.

If the authorities in the larger towns took steps to see that only coal-dealers with a recognized coalyard were licensed, the substitution of inferior coals for the higher grades and higher-priced coals would largely disappear.

LIST OF REGISTERED NAMES OF BRITISH COLUMBIA COALS, APPROVED BY THE CHIEF INSPECTOR OF MINES, IN ACCORDANCE WITH THE PROVISIONS OF THE "COAL SALES ACT."

Registered Name.	Colliery and District.	Producing Company.
Comox.....	Nos. 4 and 5 mines, Comox Colliery, Cumberland.....	Canadian Collieries (D.), Ltd.
Old Wellington.....	No. 9 mine (Wellington).....	Canadian Collieries (D.), Ltd.
Ladysmith-Wellington.....	No. 5 mine (South Wellington).....	Canadian Collieries (D.), Ltd.
Ladysmith-Extension.....	No. 8 mine (Extension).....	Canadian Collieries (D.), Ltd.
Hi-carbon.....	Mixture of Canadian Collieries' coal and B.C. Electric coke.....	Canadian Collieries (D.), Ltd.
Nanaimo-Douglas.....	No. 1 mine, Upper seam (Nanaimo).....	Western Fuel Corporation of Canada, Ltd.
Nanaimo.....	No. 1 mine, Lower seam (Nanaimo).....	Ditto.
Nanaimo Reserve.....	Reserve mine (Nanaimo).....	"
Nanaimo-Wellington.....	Blend of No. 1 mine, Nanaimo, and No. 5 mine, South Wellington.....	"
Wellington South, Ida Clara	Ida Clara No. 1 (South Wellington).....	Richardson Bros., Ltd.
Cassidy-Wellington.....	Cassidy Colliery (Cassidy).....	Granby Consolidated M.S. & P. Co., Ltd.
Lantzville-Wellington.....	Lantzville Colliery (Lantzville).....	Lantzville Collieries, Ltd.
Biggs-Wellington.....	Biggs' mine (Wellington).....	Biggs' mine.
Fiddick-Douglas.....	Fiddick mine (South Wellington).....	Fiddick mine.
Little Ash-Wellington.....	Little Ash mine (Wellington).....	Little Ash-Wellington.
Jingle Pot.....	Jingle Pot Colliery (East Wellington).....	Jingle Pot Colliery, Ltd.
Old Adit, Wellington.....	Old Adit (Wellington).....	Old Adit Mine (C. Stronach).
Chambers-Extension.....	Chambers (Extension).....	R. H. Chambers.
Bromley Vale, Princeton.....	Bromley Vale (Princeton).....	Bromley Vale Colliery, Ltd.
Middlesboro.....	Middlesboro (Merritt).....	Middlesboro Collieries, Ltd.
Nicola Sunshine Coal.....	Sunshine (Merritt).....	Sunshine Coal Co., Ltd.
Coalmont Coal.....	Coalmont (Coalmont).....	Coalmont Collieries, Ltd.
Princeton Blue Flame.....	Blue Flame (Princeton).....	W. R. Wilson Mining & Investment Co.
Tulameen Coal, Princeton..	Tulameen (Princeton).....	Tulameen Coal Mines, Ltd.
Diamond, Princeton District, B.C.....	Diamond (Princeton).....	Pleasant Valley Mining Co., Ltd.
Sunrise, Princeton District, B.C.....	Sunrise (Princeton).....	Pleasant Valley Mining Co., Ltd.
Pleasant Valley, Princeton District, B.C.....	Diamond and Sunrise Blended (Princeton).....	Pleasant Valley Mining Co., Ltd.
North Thompson Gem.....	North Thompson (North Thompson).....	North Thompson Colliery, Ltd.
Red Triangle, Princeton Quality.....	Red Triangle (Princeton).....	Red Triangle Coal Co., Ltd.
Princeton-King.....	King (Princeton).....	King Colliery, Ltd.
Hat Creek.....	Hat Creek (Lillooet).....	Canada Coal & Development Co., Ltd.
Aveling Coal.....	Aveling (Telkwa).....	Aveling Colliery.
Bulkley Valley.....	Bulkley Valley (Telkwa).....	Bulkley Valley Colliery, Ltd.
Crow's Nest, Coal Creek.....	Coal Creek (Coal Creek).....	Crow's Nest Pass Coal Co., Ltd.
Crow's Nest, Michel.....	Michel (Michel).....	Crow's Nest Pass Coal Co., Ltd.
Corbin Washed.....	Corbin (Corbin).....	Corbin Collieries, Ltd.

During 1934, in addition to numerous inspections of coalyards and invoices, there were two prosecutions for the substitution of an inferior coal for the registered coal named in the invoices given to the buyers; in one case the Magistrate held that there had been no intent to deceive and in the other case a fine of \$10 and costs was given. Both cases were in Vancouver.

BOARD OF EXAMINERS FOR COAL-MINE OFFICIALS.

FIRST-, SECOND-, AND THIRD-CLASS CERTIFICATES AND MINE-SURVEYORS' CERTIFICATES.

BY

JAMES STRANG.

The Board of Examiners, which was formed on July 10th, 1919, now consists of James Dickson, Chief Inspector of Mines, Chairman; Henry E. Miard, member; and James Strang, member and Secretary to the Board. The meetings of the Board are held in the office of the Mines Department, Victoria. The examinations are held in accordance with the amended rules made by the Provincial Board of Examiners and approved by the Minister of Mines on September 28th, 1929. Two examinations were held in 1934. The first was held on May 16th, 17th, and 18th, and the second on November 21st, 22nd, and 23rd. The total number of candidates at the examination were as follows: For First-class Certificates, 2 (2 failed); for Second-class Certificates, 4 (3 passed and 1 failed); for Third-class Certificates, 13 (9 passed and 4 failed); for Mine Surveyors, none.

The following is a list of the candidates who successfully passed in the various classes:—

Second-class Certificates.—Albert E. Rear, Munro M. Gibson, and John C. H. Davies.

Third-class Certificates.—Douglas W. Jones, Vernon R. Uphill, Henry Sanders, John H. Parker, Frank M. Dockrill, John Eckersley, Adolphus J. Tiberghien, William Dinsdale, and R. E. Blakemore.

There is a continued improvement in the work of the candidates, this time particularly in the work of the candidates for Third-class Certificates, who seem to be getting a better ground-work than formerly.

EXAMINATIONS FOR CERTIFICATES OF COMPETENCY AS COAL-MINERS.

In addition to the examination and certificates already specified as coming under the Board of Examiners, the Act further provides that every coal-miner shall be the holder of a certificate of competency as such. By "miner" is meant any person employed underground in any coal mine to cut, shear, break, or loosen coal from the solid, whether by hand or machinery.

The work of the Board of Examiners in examining candidates has been carried out in all the mining districts and at intervals of not less than sixty days as required by the amendment to the Act.

No certificate has been granted in any case where the candidate failed to satisfy the Board as to his general fitness, experience in a coal mine, and a working knowledge of the English language. During 1934 examinations have been held in the various coal-mining districts of the Province. Eighty-seven candidates presented themselves for examination, seventy-three passed and fourteen failed to qualify. In addition to the above, a number of duplicate certificates were issued to coal-miners who had lost their original certificates. The Board of Examiners desires to thank the different coal-mining companies for the use of their premises for holding the examinations. The Inspector of Mines in each district has authority, under the amendment (1919) to the "Coal-mines Regulation Act," to grant, after a satisfactory examination, a provisional certificate of competency as a coal-miner to applicants, which entitles the holder to follow the occupation of a coal-miner for a period not exceeding sixty days, or until the date of the next regular examination before the Board.

GOVERNMENT MINE-RESCUE STATIONS.

NANAIMO.

BY

J. D. STEWART.

There were two calls to stand by with the apparatus in connection with underground fires at No. 5 mine, South Wellington, but the fires were sealed off without recourse to the rescue apparatus.

There were nineteen emergency calls for oxygen from local doctors and others.

During the year twenty-four men were awarded certificates for efficiency in mine-rescue work after a course of training at this station.

The equipment at this station consists of six sets of the McCaa two-hour oxygen apparatus; six sets of the Gibbs two-hour oxygen apparatus; twelve sets of the Burrell all-service gas-masks; with supplies and spare parts to maintain the equipment in service.

CUMBERLAND.

BY

JOHN THOMSON.

During the year five men underwent a full training course and received certificates of competency in mine-rescue.

During the year twenty-four employees of the Canadian Collieries (Dunsmuir), Limited, maintained constant practice once a month. There were no emergency calls during the year.

The equipment at this station consists of eleven sets of the Paul oxygen two-hour apparatus; eleven sets of McCaa two-hour apparatus; twelve sets of the Burrell all-service gas-masks and twenty self-rescuers; also one pulmotor and one H.H. inhalator. An adequate stock of supplies for the above machines are maintained at all times.

Two teams from this district competed at the mine-rescue competition held in Nanaimo on June 16th.

PRINCETON.

BY

ALFRED GOULD.

No emergency calls from any of the mines during 1934 were received, but eight calls for oxygen administration from the Princeton Hospital were attended to immediately.

Several men have visited the station regularly during the year for the purpose of keeping in training, and have thereby maintained a high standard of efficiency as rescue-men.

The equipment at this station consists of the following: Eleven sets of Burrell all-service gas-masks; seventeen M.S.A. self-rescuers; one M.S.A. high-pressure pump to recharge oxygen cylinders; one H.H. inhalator; and an adequate supply of all necessary parts and materials for the maintenance of the machines are kept on hand.

FERNIE.

BY

JOHN T. PUCKEY.

The only emergency calls received during the year were in connection with the continued fire at No. 6 mine, Corbin Colliery. Six sets of the Burrell all-service gas-masks were sent from this station and were in frequent use in patrolling and examining the fire area. All the rescue equipment of the Corbin Collieries was overhauled, but the oxygen apparatus was not required underground.

The first-aid classes of the East Kootenay Mine Safety Association were held in this station during the year and ninety-three members obtained the St. John certificate for first aid.

Twenty-three new men completed the course in mine-rescue training and obtained the Department of Mines certificates for this work; of these, eight men were from Corbin, nine from Michel, and six from Coal Creek. Members of the local fire brigade carried out several practices in the smoke-chamber.

INSPECTION OF COAL MINES.

VANCOUVER ISLAND INSPECTION DISTRICT.

BY

GEO. O'BRIEN.

Western Fuel Corporation of Canada, Ltd.

Head Office—Nanaimo, B.C.

F. Perry, President, Montreal, Que.; Lieut.-Col. C. W. Villiers, Vice-President, Nanaimo, B.C.; P. S. Fagan, Secretary-Treasurer, Nanaimo, B.C.; John Hunt, General Superintendent, Nanaimo, B.C.

This company operated the Nanaimo Colliery and the Reserve mine during the year.

NANAIMO COLLIERY.

Arthur Newbury, Mine Manager: A. W. Courtney, Overman, North Side;
John Sutherland, Overman, South Side.

This mine, situated at the south end of the Esplanade in the City of Nanaimo adjacent to the shore-line, is the oldest working coal mine in British Columbia.

The mine has four openings, as follows: No. 1 and No. 2 shafts on the Esplanade, Protection shaft on Protection island, and Newcastle shaft on Newcastle island.

No. 1 shaft and Protection shaft are in daily operation. The other two are used as air-shafts.

A detailed description of the power-installations, washery plant, and other equipment has been given in previous Annual Reports. No additions were made during 1934.

No. 1 mine was in operation 208 days during 1934 and the average daily output was 1,127 tons. This average is considerably below that for the year 1933, chiefly due to the depression in the coal trade which necessitated the closing-down of the North side of the mine for five months, from February to July, when it was again started on a reduced scale and kept in operation for the rest of the year.

The output is from the North and South sides of the mine in the proportion of about 40 and 60 per cent. respectively. The average number of men of all classes employed underground daily is 460 for the twenty-four-hour period. On the surface there are approximately 270 men employed daily, including pit-head, power plants, washery plant, wharves, machine-shops, colliery railway, office staff, and engineering staff.

There are twenty-five certificated underground mine officials of all classes employed daily in the supervision of mining operations, or one mine official for every eighteen workmen and for every 45 tons of coal produced, which may be considered very close supervision.

The sizes of coal prepared for the market are lump, nut, pea, and slack, and at times there is a demand by customers for various combinations of these sizes which is readily prepared for them.

Both the Douglas and Newcastle seams are operated on both sides of the mine and practically the whole of the workings are submarine, having an average cover of 450 feet. The whole output is hoisted from No. 1 shaft, which is the main hoisting-shaft 600 feet in depth.

In the Newcastle seam the entire operations on both sides of the mine are worked on the long-wall system, with face-lines about 300 feet long. These face-lines are equipped with conveyors of the Meco type and driven by compressed air. All face-lines are machine-mined, the coal-cutting machines being driven by compressed air and the depth of cut being approximately 6 feet.

The Douglas seam operations are chiefly recovery of pillars, some of which are machine-mined.

Where possible, the undercutting is done in rock-bands in the seam or in the under-clays directly below the seam. Some of the finely ground cuttings from the undercut are carried along the face-line by the air-current, which has a similar effect to rock-dusting the face-line and nullifies to a great extent the dangers from coal-dust, especially where explosives are used.

The surplus cuttings are packed in the waste or gob. Very light charges of explosives are used in blasting the coal and a large percentage of lump coal is produced as a result.

Ventilation of the underground workings, which are very extensive, is achieved by two fans, one situated at Protection shaft on Protection island and operated as a "blower" fan: the other at No. 2 shaft on the Esplanade operating as an exhaust-fan. There is a third fan at No. 2 shaft held in readiness for immediate use in case of emergency.

The haulage system underground is very extensive and is divided into two phases, animal and mechanical. Steam, compressed air, and electricity is used on the mechanical haulage. The animals are used for gathering purposes from the faces to near-by sidings, where trips are made up for the mechanical haulage.

The pumping system is also very extensive and all three forms of power are used.

Most of the workmen are transported by ferry across the bay, a distance of $1\frac{1}{2}$ miles to Protection island, where they descend the Protection shaft. A very small percentage of the workmen descend No. 1 shaft.

Every effort appears to be made to keep the accident-rate down to the minimum, and it is a pleasure to state that considerable progress has been made, as this is the second year in succession that no fatal accidents have occurred in No. 1 mine. Only two non-fatal accidents of a serious nature occurred in 1934, and these were caused by falls of rock at the working-face. This is a very good record and great credit is due to workmen and officials for their co-operation in the drive to reduce preventable accidents.

The ventilation was kept up to a very high standard at all times and very little inflammable gas or gas-caps were found in the live workings. In most cases where inflammable gas was found it was issuing from roof-breaks or in the neighbourhood of "faults" and was immediately dealt with and rendered harmless.

Precautions against the menace of coal-dust were efficiently carried out during 1934, especially on the discharge end of conveyors, where a considerable quantity of dust is produced as the coal from the conveyors is discharged into mine-cars. Haulage-roads and face-lines were also taken care of, large quantities of lime-rock dust in addition to water-sprinkling being used in the combat against the coal-dust hazard.

Regular sampling of mine-dust collected from suspected areas was carried out and analyses of the samples showed the dust to be well within the requirements of the regulations for precautions against dangerous mine-dust.

Regular sampling of mine-air was also carried on throughout 1934, samples of the mine-air being taken monthly in every split and return airway, and in some cases bi-weekly samples were taken. Through the courtesy of the Department of Mines at Ottawa, the samples were analysed and returns of analysis were sent to this office regularly. As a result a complete check of the chemical and technical analysis of the mine atmosphere generally is on record. In conjunction with the taking of samples of mine-air, hygrometric readings are also taken showing the relative humidity of the mine atmosphere. The analyses of the mine-air showed the samples to contain but a very small percentage of methane gas and in no instance did it exceed four-tenths of 1 per cent., showing the mine atmosphere to be well within the safety-zone.

Regular inspections were made by the miners' "gas committee" as provided for in General Rule 37. This committee very kindly furnished a copy of all their inspections and at no time during 1934 were there any reports of dangerous conditions existing in the mine made by this committee.

Report-books as required by the "Coal-mines Regulation Act" are kept at the mine, and were regularly examined by the writer and found to be conforming to the regulations.

On the whole, general conditions with regard to safety at this mine were very satisfactory throughout 1934.

RESERVE MINE, NANAIMO.

W. H. Moore, Mine Manager; A. W. Courtney, Overman.

This mine is situated in the Cranberry district, about 5 miles south of the City of Nanaimo. The coal-seam is reached by two shafts; the approximate depths of the shafts are 1,000 feet. This operation was closed down in March, 1930, and remained closed until February, 1934, when

it was reopened and some development-work was done, chiefly driving in rock. The mine was again closed down in August, 1934, and remained closed for the rest of the year, the only work being done during the latter part of the year was keeping the water from rising in the workings. About 7,000 tons of coal was produced during the time of operation in 1934.

It is expected that the year 1935 will see this mine in operation again and further development is being considered.

Canadian Collieries (Dunsmuir), Ltd.

Head Office—Montreal, Que.

F. Perry, President, Montreal, Que.; Lieut.-Col. Chas. W. Villiers, General Manager, Nanaimo, B.C.; H. S. Adlington, Treasurer, Montreal, Que.; P. S. Fagan, Assistant Secretary, Nanaimo, B.C.; John Hunt, General Superintendent, Nanaimo, B.C.; T. W. Scott, Assistant General Superintendent, Cumberland, B.C.

The mines operated by this company during 1934 were No. 4 and No. 5 mines, known as Comox Colliery, Cumberland, and No. 5 mine and the Alexandra mine, known as the South Wellington Colliery, at South Wellington. No. 9 mine at Old Wellington was not operated during 1934.

COMOX COLLIERIES.

These mines are situated in the Comox district, about 12 miles from the shipping-point at Union Bay, which is reached by the company's railway and most of the output is shipped from this point.

No. 4 mine is situated at the easterly end of Comox lake, about 3 miles from Cumberland. No. 5 mine is situated about 1 mile from Cumberland. During the month of November the Comox Colliery was closed down for three weeks owing to a labour dispute.

No. 4 MINE.

John S. Williams, Mine Manager.

Practically all the work done in this mine during 1934 was the recovery of pillars, and at the time of writing the slope pillars are being withdrawn. There is only a couple of months' work left to recover all the available pillars before final abandonment of the mine.

The coal is hand mined and loaded and is of excellent quality. During inspections the ventilation was found to be maintained at a high standard. No explosive gas or methane gas-caps were found on any inspections. All working-places were well timbered and maintained in a safe condition. The portion of the mine now being worked is naturally damp and there are no accumulations of dangerous coal-dust.

One fatal and two non-fatal accidents occurred in this mine during 1934. The fatal and one non-fatal accident were caused by falls of cap-rock and coal at the working-face. The other non-fatal accident was caused by mine-cars and haulage.

The output from No. 4 mine averaged about 300 tons per day. There are six certificated mine officials underground, or one official for each 50 tons produced.

Regular monthly inspections were made by the miners' "gas committee," who very kindly furnished this office with a copy of each report of inspection made by them. At no time during 1934 were any reports of dangerous conditions existing in the mine reported.

Report-books as required by the "Coal-mines Regulation Act" are kept at the mine, and were frequently examined and found to conform with the regulations.

The Scott slope, which is a part of No. 4 mine and situated about a mile north of the main portal of No. 4 mine, is ventilated by a separate fan, and may be termed a separate mine though operating the same seam of coal. The work carried on in this mine during the year was recovery of pillars. All available pillars were recovered and the mine finally abandoned at the end of the year. Pumping operations, however, will be continued for some time to come, as a considerable quantity of water can be prevented from flowing into No. 4 mine by keeping the Scott slope pumps in operation as both mines are connected.

No. 5 MINE.

Robert Laird, Mine Manager ; Sam Jones, Overman.

The seam is reached by a shaft about 280 feet in depth. The present seam being worked is known as the No. 2 seam and is of excellent quality. All the workings in this mine are on the dip side of the shaft and are reached by slopes driven down from the shaft-level. The main slope-face is about 1 mile from the shaft-bottom and the long-wall system is the method of working. Long-wall faces average about 300 feet in length. The coal is machine-mined by compressed-air-driven coal-cutting machines ; the depth of undercut averages about 5 feet. Meco conveyors are used on the long-wall faces driven by compressed air and are very efficient.

The power plant, consisting of four air-compressors driven by electricity, is situated underground on the Main slope about 4,000 feet from the shaft-bottom. The compressor-rooms are built of concrete and iron and are made as fire-proof as it is possible to make them.

The average output daily from the mine is about 800 tons and this can be increased any time market conditions become favourable.

There are fourteen certificated mine officials employed daily underground, or one mine official for every 57 tons of coal produced.

This seam is known to give off large quantities of methane gas and extreme safety measures are necessary. Blasting operations are carried on under the following regulations : No shooting off the solid ; all shots must be properly mined ; each individual shot-hole is to be thoroughly cleaned out and a cartridge of lime-rock dust placed at the back of the hole, the powder is then inserted, and this is followed by at least three cartridges of lime-rock dust so that the detonation takes place between two cushions of lime-rock dust for the purpose of preventing flame from the explosion of the powder. Up to the present time this method has been found to be satisfactory. All shots are electrically fired.

During 1934 the ventilation of the mine was considerably improved. A rock-raise 8 by 14 feet and 700 feet long on an angle of 46 degrees was driven from No. 1 level to the surface, where a perpendicular shaft 22 feet deep was sunk. This shaft is concrete-lined. A double-inlet Sirocco fan was installed at the top of this shaft in a fire-proof building constructed of concrete and metal. This fan was put into operation in October last and has made a great improvement in the quantity of air in circulation in the mine. The old fan-drift is now used as an additional intake augmenting the shaft intake. The old fan is still in position at its original site and can be used as a "blower" should it become necessary. At the time of the writer's last inspection in December he measured 120,000 cubic feet of air per minute passing in the main intake at a point about 3,000 feet down the Main slope. This air is divided into four splits, giving each district in the mine a separate split of fresh air continuously circulating along the working-faces and roadways.

No explosive gas was found during any inspections in the last three months of 1934. A gas-cap, however, was found in the return air from No. 5 East district which indicated 1.5 per cent. methane. This gas was being given off from the old gob below No. 1 East level and is gradually diminishing.

The last mine-air sample taken in the main return airway at the bottom of the new fan-drift showed 1 per cent. methane. The quantity of air measured at this point was between 130,000 and 140,000 cubic feet per minute, or an average of 135,000 cubic feet per minute. This shows that approximately 1,350 cubic feet of gas is given off per minute, and, carrying the calculation still further, nearly 2,000,000 cubic feet of gas is given off in twenty-four hours, and nearly 2,500 cubic feet of gas per ton of coal mined. This mine can well be considered to be a gaseous mine and every known safety precaution must be used in operating a mine of this character.

Precautions against the menace of coal-dust are carried out by means of rock-dusting and water-sprinkling. All conveyors are equipped with water-sprinkling apparatus at the discharge end. All trips of coal sent up the slope are sprinkled to prevent the deposit of coal-dust.

Mine-dust samples are collected in different sections of the mine and analysed and the incombustible content determined, which must be over 50 per cent. of the volume.

Mine-air samples are also collected and analysed and a fairly good check is kept on the condition of the mine atmosphere.

It is a pleasure to state that no fatal accidents occurred in this mine during 1934, and only two accidents of a serious nature were reported as occurring underground, both of which were caused by falls of coal at the working-face. One accident was reported on the surface which was not of a very serious nature.

WELLINGTON-EXTENSION MINES.

NO. 5 MINE AND ALEXANDRA MINE.

Wm. Wilson, Mine Manager; Joseph Wilson, Overman. (Same Officials for both mines.)

This colliery is situated in the Cranberry district, near the Esquimalt & Nanaimo Railway Station at South Wellington, and the colliery siding is connected to this railway. Most of the output is shipped over the Esquimalt & Nanaimo Railway to the loading-wharves of the Western Fuel Corporation of Canada, Limited, at Nanaimo. A small tonnage is shipped by rail to Lady-smith to the C.P.R. slip located there and thence transported to the mainland on barges.

No. 5 mine and the Alexandra mine are both operating the Douglas seam and were formerly connected and ventilated by the same fan. During the early part of the year, however, it became necessary to isolate each mine, due to spontaneous combustion breaking out in No. 5 mine. A separate fan was installed for No. 5 mine and both mines are now operated as separate units.

This colliery was in actual operation 194 days during 1934 and the average daily output was 700 tons. The average number of men employed daily underground for the twenty-four-hour period was 225. There are eleven certificated mine officials employed daily underground, or one mine official for every twenty men and for every 65 tons of coal produced.

The ventilation was kept up to a high standard during 1934 and inflammable gas or gas-caps were rarely found. Both mines are naturally damp and there is practically no coal-dust menace.

There were two outbreaks of spontaneous combustion in No. 5 mine early in the year. Both areas were successfully sealed without accident and no damage was done.

One fatal accident and two serious accidents occurred at the colliery during 1934. The fatal accident was caused by a fall of rock and one non-fatal by a fall of coal; the other non-fatal accident was caused by the person injured falling off a scaffold.

Regular inspections were made by the miners' "gas committee" as provided for in General Rule 37, and this committee very kindly furnished the writer with copies of its reports. At no time during 1934 did this committee report any dangerous conditions existing underground.

Regular monthly sampling of the mine-air and mine-dust was made, and the analyses of same showed the different samples taken to be well within the requirements of the "Coal-mines Regulation Act."

Report-books as required by the regulations are kept at the mine and were regularly examined and found to conform to regulations.

On the whole, general conditions with regard to safety at this colliery were fairly satisfactory.

Lantzville Collieries, Ltd.

NO. 1 MINE, LANTZVILLE.

Arthur Challoner, Overman.

This colliery is situated on the shore of Nauoose bay, in the strait of Georgia, about 9 miles north of Nanaimo. The mine is entered by means of a slope 270 feet long and dipping at an angle of 30 degrees. The seam operated is the Wellington seam and the method of working is a semi-long-wall system. The coal is hand mined and loaded. Gateways are driven at from 30- to 40-foot intervals and the brushing is done in the floor, chiefly, to get the required height.

The mine worked for 244 days during 1934. Only a small daily tonnage is produced, the total for 1934 being 4,900 tons.

The ventilation of the mine, which is produced by mechanical means, was kept up to a fairly high standard during 1934. No explosive gas or methane gas-caps were found during any inspections.

Report-books as required by the regulations are kept at the mine and were regularly inspected.

Regular sampling of the mine-air was done at monthly intervals and the analyses showed the mine atmosphere to be in good condition.

One serious non-fatal accident occurred in this mine during 1934 and was caused by a runaway mine-car on an incline. This car had not been properly blocked to prevent it getting away. It is a pleasure to comment at this point that a very remarkable record of freedom from accidents in this mine has been achieved, this being the first accident recorded in five years, but to maintain this record complete co-operation and continued use of safety appliances is necessary at all times to prevent avoidable accidents.

BIGGS' MINE, WELLINGTON.

James Biggs, Operator.

This mine is situated about 1 mile from Wellington and about 7 miles north of Nanaimo. The seam is the very well-known Wellington seam and the mine is on the site formerly worked by the Dunsmuir interests many years ago. Pillars left in by the former operators are being recovered. The coal is of excellent quality and is hand mined and loaded.

This mine did not operate steadily during 1934; a total of 119 days only were worked, with a total tonnage for the year of 1,478 tons. The mine closed down in August, 1934, and remained closed for the rest of the year.

The ventilation was produced by natural means and at no time during the period of operation was any explosive gas or gas-caps found. The cover on the seam at this point is very thin; in many places there is only 6 to 8 feet of clay and gravel on top of the seam.

The mine is naturally damp and there is practically no coal-dust menace.

No accidents were reported from this mine.

STRONACH MINE, WELLINGTON.

Charles Stronach, Operator; J. W. Sanders, Fireboss.

This mine is situated about 1½ miles from Wellington and only a short distance away from the Biggs' mine. It is part of the old Dunsmuir property where the Adit mine was worked many years ago. The present operations consist of recovering the pillars left in near the surface of the Adit mine. The daily output is small and is handled by truck over a good road. Approximately 200 tons was recovered during 1934 and sixty-six days were worked. The mine closed down in August, 1934, and is now permanently abandoned.

JINGLE POT MINE, EAST WELLINGTON.

Alex. McLachlan and Associates, Operators; Alex. McLachlan, Overman.

This mine is situated on the site of the original Jingle Pot mine at East Wellington, about 3 miles from Nanaimo. The seam is the Wellington seam and the present operations consist of recovering the pillars left in by the former operators. The mine is reached by a good road and the output, which is small, is handled by truck and sold locally.

The mine did not operate steadily during 1934; only 108 days were worked, with a total tonnage for the year of 235 tons. The mine closed down in October, 1934, and remained closed for the rest of the year. No accidents were reported from this mine during the period of operation in 1934.

FIDDICK MINE, SOUTH WELLINGTON.

Richard Fiddick, Sr., Operator; Wm. Roper, Overman.

This mine is situated on the site of the former operations of the Pacific Coast Coal Company, near the South Wellington Station of the Esquimalt & Nanaimo Railway. The seam is the Douglas seam and the present operations are the recovery of pillars left in by former operators. The mine was worked for 271 days during the year and 1,849 tons produced. Most of the output is sold locally.

The ventilation, which is by natural means, was ample for this small operation. Roadways and working-places were well timbered. The mine is naturally damp and there is practically no coal-dust menace.

Report-books as required by the regulations are kept at the mine, and were regularly examined and found to conform very well with the regulations. No accidents were reported from this mine during 1934.

RICHARDSON BROS.' MINE, SOUTH WELLINGTON.

Richardson Bros., Operators; Daniel Caldwell and John Unsworth, Firebosses.

This mine is on the site of the former operations of the Pacific Coast Coal Company, and is close to the Fiddick mine, near the South Wellington Station of the Esquimalt & Nanaimo Railway. The seam is the Douglas seam and the present operations consist of recovery of the pillars left in by the former operators. The mine was worked for 278 days during 1934 and 1,794 tons produced. The mine is reached by a good road and the output is handled by truck, though some of it is shipped over the Esquimalt & Nanaimo Railway.

The ventilation, which is by natural means, was ample for this small operation. No accidents were reported from this mine during 1934.

CHAMBERS' MINE, EXTENSION.

Ralph H. Chambers, Operator.

This mine is situated at Extension, on the site of the original No. 1 mine at Extension operated by the Dunsmuir interests many years ago. Access to the mine is by the Nanaimo Lakes road, the location of the mine being about 7 miles from Nanaimo.

The seam is the Wellington seam and the present operations consist of recovery of pillars left in by former operators. The mine was worked for 145 days and 696 tons produced. The output is sold locally and is handled by truck from the mine to Nanaimo.

The ventilation, which is by natural means, was ample for this small operation. No explosive gas or gas-caps were found during any inspections in 1934. No accidents were reported from this operation during the year.

COWIE'S PROSPECT, SOUTH WELLINGTON.

Cowie and Associates, Operators.

Prospecting for the Douglas and Wellington seams was carried on by A. Cowie and associates, of Nanaimo, during part of 1934 in the area between Extension and South Wellington in the Cranberry district. The seams were not located and prospecting was discontinued when the bad weather set in. It is expected to resume prospecting in the spring of 1935.

This covers in a general way the active operations in the coal mines of Vancouver island during 1934.

All workmen in the coal mines of Vancouver island are equipped with electric cap-lamps, chiefly of the Edison type. All firebosses and shotlighters are equipped with flame safety-lamps

for the purpose of gas-testing. All shot-firing is done electrically by shot-firing battery and cable under the supervision of certificated mine officials and permitted explosives only are used.

All serious accidents were investigated and inquests attended on the fatal accidents. In a number of the accidents investigated it was regrettable to find that they could easily have been prevented if only ordinary care had been taken, and the writer again stresses the fact that if the accident-rate is to be kept down to the minimum complete co-operation by all concerned is necessary in the interests of safety. Safety appliances and safety measures are of very little use if not taken advantage of by the persons for whom they are provided. Careful workmen and officials are the best preventives, and it may be added here that most of the workmen and officials in this inspectorate are careful, but there is always the odd one here and there who either forgets or entirely disregards safety measures, and it is to him that an appeal for closer co-operation in reducing preventable accidents is made.

NICOLA-PRINCETON INSPECTION DISTRICT.

BY

JOHN G. BIGGS.

The following coal companies operated in this district during 1934: Coalmont Collieries, Limited; Middlesboro Collieries, Limited; Tulameen Coal Mines, Limited; Pleasant Valley Mining Company, Limited; Wilson Mining and Investment Company, Limited; Bromley Vale Collieries, Limited; and the Cascade Coal Company, Limited.

There were no fatal accidents in the coal mines during 1934 and only two that caused serious injuries.

During the year rock-dusting of the roads in the above operations has been well attended to, and with the exception of the mines that are naturally wet, samples of material from the roads have been taken each month for analysis and in almost all cases were in accordance with the requirements of the Coal-dust Regulations. No methane was detected in the mines during 1934 and only slight percentages were found by analyses.

Coalmont Collieries, Ltd.

Blake M. Wilson, President, Vancouver, B.C.; General J. W. Stewart, Vice-President, Vancouver, B.C.; A. H. Douglas, Secretary, Vancouver, B.C.; D. McLeod, Treasurer, Vancouver, B.C.; Geo. Murray, Superintendent, Blakeburn, B.C.

(This plant has been described in previous reports.)

This is the largest colliery in the district and is situated 12 miles west of Princeton. The power plant, screens, and mine-yard are situated at Coalmont and are served by a spur off the Kettle Valley Railway; mining operations are conducted at Blakeburn, 3 miles distant and 1,700 feet higher in elevation. An aerial tramway 2½ miles in length is used for transporting the coal from the mines to the tippie at Coalmont.

This colliery consists of Nos. 3, 4, and 5 mines, which operate in the same seam; the measures are separated into two coal-basins by a large intrusive dyke cutting through the coal-basin. No. 3 mine is on the east side of this dyke, while Nos. 4 and 5 mines are on the west side of the intrusion. All the work in Nos. 3 and 4 mines consists of the extraction of pillars, while the slope developments in the No. 5 mine are developing a section of the Coalmont basin lying to the west of the No. 4 mine.

NO. 3 MINE.

John Davis, Allen McDonald, and Robert Barrass, Firebosses.

The entrance to this mine is close to the upper terminal of the overhead tramway. The mine has been in operation since 1920, but is now near exhaustion and pillars are being extracted within 500 feet from the portal. Ventilation is produced by a 5-foot diameter fan situated near

the portal of the counter-level, and during the last visit of inspection 12,000 cubic feet of air per minute was passing into this mine for the use of ten men. The air was well conducted around the working-faces, the brattice and stoppings being in good order. The working-places and roadways were well timbered and, being naturally wet, were free from dangerous coal-dust.

No. 4 MINE.

Harry Hopkins, Overman; Robert Murray, Frank Bond, Thomas Smith, and Thomas Bryden, Firebosses.

This mine is situated 5,400 feet north of the entrance to No. 3 mine and is reached by a light electric railway running from the top terminal of the overhead tramway: it is entered by a cross-measure drift 1,600 feet in length that intersects the Main slope. The seam has an average pitch of 25 degrees and the operations at present consist of the extraction of pillars on the No. 11 West level.

The measures at the Coalmont Collieries are of unusual thickness, highly volatile in character, and may be better described as a number of seams of coal separated by a number of bands of shale and bone, with the result that the operations are confined to the best sections of coal in the series. The coal is very susceptible to spontaneous combustion and all caved areas have to be closely watched for indications of heating, which, when detected, is usually followed by the suspected area being sealed off; two sections were sealed on account of spontaneous combustion during 1934.

Ventilation is produced by an 84-inch double-inlet belt-driven Sirocco reversible mine-fan operated by a 75-horse-power constant-speed motor situated near the entrance to the counter-slope. During the last visit of inspection to this mine 25,000 cubic feet of air per minute was passing for the use of twenty men. The brattice and stoppings were in fairly good order, the working-places well timbered, the roads in fairly good condition and well treated with inert dust. Analysis of material taken from the roadways showed them to be in accordance with the requirements of the Coal-dust Regulations.

A well-appointed surgery and first-aid room is maintained at this colliery under the supervision of a first-aid man who is in attendance to render any service that may be required, while the doctor is in daily attendance and resides at the mine camp at Blakeburn. A mine-rescue station, with smoke-room, is also provided at the camp and equipped with five sets of Gibbs self-breathing apparatus, gas-masks, inhalator, charging-pump, with a supply of oxygen and regenerators at all times ready for use in case of emergency; Edison electric head-lamps are used by the employees underground. Blasting is done, under the supervision of certificated officials, with permitted explosives; shots are fired by electric defonators and batteries and flame safety-lamps of the Wolf type are used by the officials for inspection purposes. Copies of the "Coal-mines Regulation Act" and special rules are posted at these mines.

No. 5 MINE.

William G. Brown and Wilfred Valentine, Firebosses.

The portal of this mine is situated 2,800 feet north of and at an elevation of 252 feet above the portal of No. 4 mine. It is in the same seam as Nos. 3 and 4 mines. The coal is transported down a surface incline to a siding situated near the entrance to the No. 4 mine: here the mine-cars are again collected in trips and transported by means of the electric railway to the top terminal of the overhead tramway. The development of this mine has been confined to the driving of a pair of 20-degree slopes from the surface outcrop and at the end of the year had reached a distance of 2,300 feet from the portal. It is intended to drive these slopes as far as possible without any lateral work with a view to extracting the coal by the retreating method; by doing so it will be possible to have all abandoned areas under water.

Ventilation is produced by a small force-fan situated near the portal of the counter-slope, and during the last visit of inspection 6,000 cubic feet of air per minute was passing into this mine for the use of ten men. The air was well conducted around the working-faces, the brattice and stoppings being in good order and the mine free from any trace of methane. The measures are of the usual friable nature found at Coalmont.

Middlesboro Collieries, Ltd.

E. W. Hamber, President, Vancouver, B.C.; Thos. Sanderson, Secretary, Vancouver, B.C.;
Robert Fairfoull, Superintendent, Merritt, B.C.

(This plant has been fully described in previous reports.)

This colliery is situated 1 mile south of Merritt and is connected to the Kettle Valley Railway by a branch line; the colliery at present consists of No. 3 North and No. 2 South mines. There was no change in the plant during the year and no new developments underground. The measures are steeply inclined and form a series of small basins.

No. 3 NORTH MINE.

Alex. McDiarmid Allen, Overman; Garnet S. Corbett, Fireboss.

This mine is situated 200 feet above and 2,000 feet south of the mine-yard near the top terminal of the surface incline which provides transportation facilities from the mines to the screening plant situated in the valley below. This mine is developed by a slope driven in the seam from the surface outcrop and is in a seam 6 feet thick with the coal steeply inclined; all the work consists of the extraction of pillars in proximity to the outcrop and the life of the mine will be very limited. The mine is well ventilated by natural means and free from any trace of methane.

No. 2 SOUTH MINE.

James Fairfoull, Overman; Leslie Dickie, Thomas Rowbottom, and
William Ewart, Firebosses.

This is the most important mine of the Middlesboro Collieries; it is situated on the same elevation and 1,000 feet south of the No. 3 mine, being developed from the surface outcrop by an adit-level following the strike of the seam for a distance of 3,500 feet; the basin shape of this area causes this level to form a large part of a circle and at the present time it is headed outwards towards the outcrop on the side of the basin opposite to the portal. The seam is about 8 feet thick and is fairly clean. Headings have been driven from the Main level to the surface outcrop, a distance of 400 feet, for the purpose of ventilation; slopes are down the pitch to the bottom of the basin.

Compressed air is the only power used underground for haulage, pumping, and coal-cutting. Ventilation is natural and during the last visit of inspection 12,500 cubic feet of air per minute was passing into this mine for the use of forty-five men: the air was well conducted around the working-faces and the mine free from any trace of methane. The working-places and roads were well timbered, with a sufficient supply of suitable timber provided for the use of the miners, and, being naturally wet, were free from dangerous coal-dust. The coal is mined by machines of the post-puncher type and very little shot-firing is required. Electric head-lamps are used by employees underground, while safety-lamps of the Wolf type are used by the officials for inspection purposes.

Tulameen Coal Mines, Ltd.

Robert Dixon, President, Vancouver, B.C.; A. B. Barclay, Secretary, Vancouver, B.C.;
Thos. M. Wilson, Superintendent, Princeton, B.C.

This mine is situated on the west side of the Tulameen river some 2 miles from Princeton and is connected to the Kettle Valley Railway by a half-mile spur; there was no change in the surface plant during 1934.

No. 2 MINE.

William Strang, Overman; Frank Lester, David Francis, and
Thomas Dobie, Firebosses,

The seam is reached from a 20-degree rock slope which intersects the coal-seam 500 feet from the portal, at which point the Main level follows the contour of the seam for some 1,700 feet; the seam has an average thickness of 7 feet and all mining is done with the post-puncher type of machines. Practically all the coal in the developed area below the Main level has been

extracted and most of the present production is from the inclined area between the Main level and the outcrop. Most of the underground workings are below the river elevation and as a result this mine makes water rather freely and is faced with considerable expense for pumping; compressed air is the only power used underground.

Ventilation is produced by a steam-driven enclosed-type fan situated near the portal of the counter-slope, and during the last inspection visit 18,000 cubic feet of air per minute was passing into this mine for the use of forty-four men. The air was fairly well conducted around the working-faces, the mine being free from any trace of methane; the working-places and roads were well timbered and, being naturally wet, were free from coal-dust.

Pleasant Valley Mining Co., Ltd.

W. R. Wilson, President, Vancouver, B.C.; R. R. Wilson, Vice-President, Vancouver, B.C.; Miss M. Duncan, Secretary-Treasurer, Vancouver, B.C.; Robert Henderson, Superintendent, Princeton, B.C.

This colliery is situated on the south side of the Tulameen river 2 miles west of Princeton; the power and cleaning plant being located on the river-flats.

No. 2 MINE.

Thomas Cunliffe, Overman; John Gillham and James Sim, Firebosses.

This mine is 1,700 feet west of the mine-tipple and has been developed by the No. 1 West levels, following the strike of the seam for a distance of 3,000 feet from the portal. The present production of the mine is from the Nos. 4 and 5 Incline sections, where the work consists of the extraction of pillars, and, owing to the low inclination of the seam, belt-conveyors are used for transporting the coal from the working-places to the level below, where it is loaded into mine-cars.

During 1934 the ventilation of this mine was found to be fairly good with no trace of methane. The working-places and roadways were well timbered, with a sufficient supply of suitable timber provided for the use of the miners. The coal at the working-faces is mined by machines of the post-puncher type. Edison electric head-lamps are used by the employees underground, while safety-lamps of the Wolf type are used by officials for inspection purposes.

Wilson Mining and Investment Co., Ltd.

W. R. Wilson, President, Vancouver, B.C.; H. P. Wilson, Vice-President, Fernie, B.C.; J. S. Irvine, Secretary, Fernie, B.C.; Miss M. Duncan, Assistant Secretary-Treasurer, Vancouver, B.C.; Robert Henderson, Superintendent, Princeton, B.C.

BLUE FLAME MINE.

Robert Alstead, Overman; Arthur Hilton and John Yards, Firebosses.

This mine is situated on the right bank of Lamont creek and about 10 miles from Princeton. It is reached by the Hope-Princeton road, over which the coal is hauled by motor-trucks to the Kettle Valley Railway near Princeton. This mine has been in operation under various companies since the year 1927 and during 1933 was acquired by the Wilson Mining and Investment Company, since which time considerable improvements and developments have been accomplished; among the improvements are better living accommodations for the employees.

The seam is slightly inclined and about 7 feet thick, all mining being done with the post-puncher type machines. New operations are being conducted in the No. 1 Right Heading section, 600 feet east of the slope, where a pair of levels are being driven north 30 degrees east, and have reached a distance of 800 feet from the heading with a view of developing a new area.

The mine is ventilated by a 4-foot-diameter direct-driven enclosed-type ventilating-fan situated near the entrance to the counter-slope. During the last visit of inspection thirty men were employed and 8,000 cubic feet of air per minute was passing into this mine for the use of twenty men. The working-places and roadways were well timbered and treated with

inert dust; analysis of material taken from the roadways showed them to be in accordance with the requirements of the Coal-dust Regulations, and the mine was free from any trace of explosive gas. Edison electric head-lamps are used by the employees underground, while safety-lamps of the Wolf type are used by the officials.

Cascade Coal Co., Ltd.

R. Haigh, President, Princeton, B.C.; P. W. Gregory, Secretary, Princeton, B.C.

BROMLEY VALE MINE.

Antoni Ambrosi, Superintendent.

This mine is situated 5 miles west of Princeton and is accessible by a branch road off the Hope-Princeton highway; the coal being hauled by motor-trucks from the mine-bunkers to the loading-chutes situated on a spur off the Kettle Valley Railway near Princeton.

The mine was operated for the greater part of the year by the Bromley Vale Company, which was succeeded by the Cascade Coal Company. The seam has an inclination of approximately 30 degrees and is about 14 feet thick; however, the upper part of the seam is somewhat inferior in quality, with the result that only the lower 6 feet is mined.

The mine was found to be well ventilated, free from methane, and the working-places and roadways well timbered. The coal is mined by machines of the post-puncher type and Edison electric head-lamps used by the employees underground, while safety-lamps of the Wolf type are used by the officials for inspection purposes.

The power plant consists of a return-tubular boiler, this power chiefly being used for operating a single-stage 250-cubic foot compressor, which in turn was used for operating the mining-machines.

REPORT BY THOS. R. JACKSON, INSPECTOR.

Canada Coal Development Co., Ltd.

The above company operated the Hat Creek mine intermittently during 1934 and suspended work indefinitely in November.

NORTHERN INSPECTION DISTRICT.

BY

CHARLES GRAHAM.

Bulkley Valley Colliery.

F. M. Dockrill, Operator; Edward E. Hughes, Overman.

This mine is located on Goat creek, 7 miles from Telkwa. Coal is hauled by truck to the railway siding at Telkwa. The market is chiefly domestic and is confined to the line of the Canadian National Railway between Prince George and Prince Rupert. The Canadian National Railway uses it in all their stations between these points, and also in their steam-shovel and ditchers, which are the only coal-burning units they have on this section.

The Main slopes were extended about 150 feet farther during the summer months and practically all the operations are on No. 1 level. The ventilation is natural, frequent openings to the surface providing sufficient ventilation. No explosive or inflammable gas has been noted in the mine and it is free from coal-dust.

Skeena Development Syndicate.

Asa Robinson, Fireboss.

This is an organization of local men who have taken a lease on the Aveling property on the Telkwa river. Considerable work had to be done on the road to the property and a bridge built across the Telkwa river close to the mine. At the end of the year the mine was ready for

production. It is a different seam and different class of coal from that mined by the Bulkley Valley Colliery, and an unfortunate feature is that they will have to share a very limited market. Two levels have been started and were in about 60 feet at the end of the year.

Lake Kathlyn Anthracite Coal Co., Ltd.

Thos. Campbell, Superintendent.

A crosscut adit was started at the foot of the mountain with the object of intersecting the various seams outcropping farther up the mountain, the seams dipping at 65 degrees at the outcrops. This adit was worked in a very spasmodic way owing to lack of funds. A new organization has taken over control of the property, with Thomas Campbell in charge. It is expected that active developments will be started early in 1935.

EAST KOOTENAY INSPECTION DISTRICT.

BY

JOHN MACDONALD.

Three collieries, consisting of seven separate mines, were operated during 1934—namely, Coal Creek and Michel, owned and operated by the Crow's Nest Pass Coal Company, Limited, with head office in Fernie; and Corbin Colliery, owned and operated by Corbin Collieries, Limited, with head office in Vancouver.

A welcome improvement in trade was noted in the coal business generally and all collieries in the district recorded increased outputs as compared with the 1933 production, as follows: Coal Creek, 70 per cent.; Michel, 41.3 per cent.; and Corbin, 21.2 per cent.; the increase for the district as a whole being 35.4 per cent. The production of coke at Michel Colliery amounted to 22,178 tons, which was a substantial increase over the unusually low figure of 5,442 tons in 1933. Coal Creek Colliery worked 150 days during 1934; Michel Colliery, 232 days; and Corbin Colliery, 267 days; this shows an increase of 22 per cent. in working-time when compared with the total days worked in 1933.

Except for one short stoppage at Michel and Corbin over minor matters, no serious labour troubles developed during the year; excepting the above, good relations have existed in general between the various companies and their employees.

ACCIDENTS.

Fourteen accidents, four of which were fatal, were reported to this office and fully investigated. Three of the fatalities occurred at Michel Colliery and one at Coal Creek Colliery. By occupations the accidents occurred to: Miners, 3 (one fatal); miners' helpers, 2; driver, 1; bratticeman, 1 (fatal); motorman, 1 (fatal); conveyorman, 1 (fatal); mine mechanic, 1; car-coupler, 1; rollerman, 1; truck-driver, 1; and timber-packer, 1.

DANGEROUS OCCURRENCES.

Seven notices were received under this heading in accordance with section 71, subsections (d) and (h), of the "Coal-mines Regulation Act," three of which were in connection with "bumps" that occurred in January, April, and October respectively in No. 1 East mine, Coal Creek Colliery; three had relation to outbreaks of fires at Corbin and Michel Collieries, and one dealt with a mishap to a truck on the roadway between the "Big Showing" and the loading-chute at Corbin Colliery. All of these were fully investigated and reported on in detail. Of the fires reported, two occurred at Corbin, one in No. 4 mine and one in No. 6 mine, while the other was detected at the concrete seal in the old fire area of No. 3 East mine, Michel Colliery, where it was found the fire had burnt through some faulted ground at the inby end of the seal and ignited the timbers on the main return airway. This was finally brought under control and the fire seal extended to more solid ground.

Regarding those reported from Corbin, that in No. 6 mine proved very serious indeed. This was first discovered on the night of February 11th when the fireboss was making his usual inspection of the mine. Notwithstanding the fact that the most vigorous steps were taken during the following five months to control this fire and seal off the district affected, it eventually assumed such proportions that it was found necessary to abandon the mine, permanent seals being erected at the various openings in the latter part of July. The outbreak in No. 4 mine was found to have originated in an old fire area and had burnt through a seal on the north angle in the No. 1 Chute district. On account of this fire being found in close proximity to the main intake and return airways, all work was ordered suspended in the mine, with the exception of that absolutely necessary in and around the various fire areas and the driving of a new airway clear of the heated ground. After a suspension of four weeks, and conditions being found comparatively favourable, permission was given the management to resume production, provided the affected areas were constantly patrolled by experienced men on each shift, who had instructions to withdraw all men at the least sign of anything unusual in regard to fire or smoke. A considerable amount of cleaning-up and repairing of old workings has been done during 1934 in the heated areas of this mine, as past experience has proven this to be the only effective method of dealing with such conditions. In extracted areas, where the direct method of fighting fire is impossible, fire seals composed of gravel or crushed limestone-dust are erected in all roadways through which leakages of noxious gases may be anticipated, and these have generally been very effective in isolating such portions of the mine from the active workings.

VENTILATION.

Conditions in this respect have been generally satisfactory and are dealt with more fully at a later stage in this report. Seventy-nine samples of mine-air were sent to the Department of Mines at Ottawa for analysis, eighteen being sent from Coal Creek Colliery, twelve from Michel, and forty-nine from Corbin. Following the practice of the previous year, the majority of these were taken in and around old workings where heating was suspected or in progress to check on the possibility of carbon-monoxide leakage rather than methane, as the latter has rarely exceeded 1 per cent. in the regular air-currents. The carbon-monoxide contents of several samples taken in the fire areas of Nos. 4 and 6 mines, Corbin Colliery, varied from a slight trace to 0.10 per cent.

REGULATIONS FOR PRECAUTIONS AGAINST COAL-DUST.

Except for a few isolated cases, which were usually attended to immediately the attention of the management was directed to same, conditions generally with respect to this danger have been kept fairly satisfactory. Crushed limestone-dust is the medium used to combat the dust hazard, in addition to being extensively used at and around all fire areas. Eight hundred and eighty-five samples of dust were taken in the district in accordance with the Coal-dust Regulations, all but fourteen being in keeping with the standard set by Regulation No. 4. In all cases where samples are found to be under the standard, additional treatment is given the roadways in question and further samples taken.

INSPECTION ON BEHALF OF THE WORKMEN.

This inspection has been made at regular intervals at all mines throughout the district, and it is very satisfactory to report that a most commendable spirit of co-operation was shown by the various committees in maintaining and encouraging safety-first methods in and around the mines. No complaints or unsatisfactory reports in regard to working conditions were received from any inspection committee. Searches for matches or other articles prohibited by General Rule 9 were made regularly, but no contravention of the above rule was discovered.

EXPLOSIVES.

At Michel and Corbin explosives are used in certain districts to bring down the undermined coal; no explosives are used for this purpose at Coal Creek Colliery. General Rules 11 and 12 regarding the handling and use of explosives have been fairly well complied with. Full particulars in the matter of the amount of explosives used and total number of shots fired are given in the regular returns under this heading.

COAL-CUTTING MACHINERY.

The coal-cutting machines that were installed during 1933 on the long-wall faces in the "B" seam district of No. 1 mine, Michel Colliery, have been operated steadily and given very satisfactory service; additional machines of the percussive type have also been introduced in this district and have greatly facilitated the driving of the main development places. It might be stated here that the greater portion of the Michel output is machine-mined coal, full particulars of the tonnage produced by this means being given in detail in the annual returns under this heading.

MINE-RESCUE AND FIRST AID.

Successful classes in first aid were held during 1934 at Fernie, Michel, and Corbin; while none were held at Coal Creek, arrangements have already been made regarding the resumption of this work in the latter centre and the initial lectures and practices are to commence in the beginning of January, 1935. The measure of success which has attended the above classes reflects great credit on the various doctors who gave the lectures and the certificated instructors who take charge of the practical work, as these gentlemen have devoted much of their spare time to the teaching of this important subject in the various local centres.

It is very gratifying indeed to report that a total of twenty-three candidates took the Department of Mines' course in mine-rescue training and were recruited from the different collieries as follows: Coal Creek, 6; Michel, 9; and Corbin, 8. All of the above students passed a creditable examination and the interest shown individually in the training will no doubt react favourably on our mine-rescue personnel in the future.

BRIEF DETAILS *RE* OPERATING COLLIERIES.

At all collieries operating in the East Kootenay Inspection District the Edison electric cap safety-lamp is used exclusively by the workmen, while Wolf safety-lamps are used by the officials and bratticemen for testing purposes, all lamps being cleaned and repaired in well-equipped lamp-rooms located in a central position at each colliery; Burrell gas-detectors are also provided at all the mines and readings taken regularly in the return air-currents. Copies of the "Coal-mines Regulation Act" and special rules are posted up at each mine and all report-books required to be kept at the mines have been periodically examined.

Following is a brief summary on the conditions prevailing underground during 1934.

Crow's Nest Pass Coal Co., Ltd.

Head Office—Fernie, B.C.

W. R. Wilson, President, Fernie, B.C.; A. H. MacNeill, K.C., Vice-President, Vancouver, B.C.; J. S. Irvine, Secretary, Fernie, B.C.; A. A. Klauer, Treasurer, Fernie, B.C.; B. Caufield, Superintendent, Michel Colliery, Michel, B.C.; E. Morrison, Superintendent, Coal Creek Colliery, Coal Creek, B.C.; H. P. Wilson, Manager, Fernie, B.C.

The above company operated, during 1934, Coal Creek and Michel Collieries on the western slope of the Rocky mountains in East Kootenay Inspection District. Coal Creek Colliery is situated at Coal Creek, about 5 miles from Fernie. Railway connections from the colliery are made with the Canadian Pacific Railway and the Great Northern Railway at Fernie, over the Morrissey, Fernie & Michel Railway. Michel Colliery is situated on both sides of Michel creek, about 24 miles in a north-easterly direction from Fernie.

COAL CREEK COLLIERY.

E. Morrison, Manager.

This colliery is situated at Coal Creek and has railway connection with the Canadian Pacific and Great Northern Railways at Fernie by means of a branch line, 5 miles in length, called the Morrissey, Fernie & Michel Railway.

No. 1 East was the only mine operated during 1934 and worked an average of 12.5 days per month, or a total of 150 days for the year, with a crew of 150 men all told. Conditions

in the coal trade have not warranted the reopening of any of the other mines of this colliery which were scaled off and abandoned in the latter part of 1932 and the first three months of 1933.

A general description of the method of working, system of haulage in and around the mines, and surface plant has appeared in previous Annual Reports. As the coal-seams at Coal Creek are of a very friable and dusty nature in general, the company installed a calcium-chloride plant in the latter part of the year for the purpose of treating certain classes of coal before shipment with a view to removing the dust nuisance. This consists of a tank having a capacity of 1,000 gallons and a force-pump capable of producing a pressure of 300 lb. per square inch, together with the necessary piping and sprays. Three different sizes of coal are treated and the finished product has aroused many favourable comments from satisfied customers.

NO. 1 EAST MINE.

J. Caufield, Overman.

This mine operates the eastern portion of No. 1 seam and is ventilated by an electrically driven 11- by 7½-foot Sirocco fan, which, running at a speed of 174 r.p.m., produced an average quantity of 166,520 cubic feet of air a minute, under a water-gauge of 3.4 inches. Ventilation is divided into two splits; the quantities passing in each at the last inspection measured as follows:—

No. 1 Split.—40,000 cubic feet of air a minute for the use of forty men and six horses. Burrell gas-detector, 0.6 per cent. methane.

No. 2 Split.—39,000 cubic feet of air a minute for the use of forty-eight men and seven horses. Burrell gas-detector, 0.7 per cent. methane.

North Return.—90,000 cubic feet of air a minute for the use of fifty-one men and seven horses. Safety-lamp indicated 0.7 per cent. methane.

West side of fan-shaft, 110,500 cubic feet of air a minute; east side of fan-shaft, 56,000 cubic feet of air a minute; total return air, 166,500 cubic feet of air a minute.

Explosive gas has been found several times in the course of inspection, mostly in cavities in the roof above the timbers and close to the face of the long ventilating crosscuts which are driven when necessary through the barrier-pillars which separate each series of rooms. Burrell readings taken regularly in the return air-currents have varied from 0.6 per cent. in the No. 1 split to 1.3 per cent. in the No. 2 split. Roadways and timbering have been kept in a satisfactory condition generally and fairly well treated for coal-dust, all roadways and working-places being treated periodically with crushed limestone-dust where required. Three hundred and seventy-six samples of dust were taken in accordance with Regulation No. 4 of the Coal-dust Regulations, nine of which failed to reach the standard set by the above regulation.

MICHEL COLLIERY.

B. Caufield, Manager.

This colliery is situated on Michel creek, 24 miles north-east of Fernie, on the Canadian Pacific Railway. A general description of the method of working, system of haulage in and around the mines, and surface plant has appeared in previous Annual Reports. In the latter part of the year this colliery has been specializing in the production of a certain class of coal for selective marketing which is meeting with a ready sale and is in keen demand by customers. This is termed a stoker coal and varies in size from 1½ inches to ¼ inch. To provide a suitable product to fill the above requirements it was found necessary to install another coal-crusher in the fall, together with the necessary elevators and conveyors.

In the month of June Robt. Bonar resigned his position as manager of Michel Colliery and retired from further active participation in mining. As a result B. Caufield was transferred from Coal Creek Colliery to take charge at Michel. It might be mentioned in passing that Mr. Caufield held the position as manager of Coal Creek Colliery for over twenty years, during which period he was frequently called upon to exercise all his powers of ingenuity and originality in dealing with the many emergencies that occurred during his tenure of office as the active head of a colliery such as Coal Creek, where mining was carried on at all times under the most difficult conditions in past years, particularly with regard to humps, blowouts, mine fires, etc. It is needless to add that Mr. Caufield carries with him the good wishes of his many friends for his continued success in his new sphere of operations.

No. 3 MINE.

Robt. McFegan, Overman.

This mine operates the upper No. 3 seam and is ventilated by an electrically driven 12- by 6-foot Sullivan fan, which, running at a speed of 240 r.p.m., produced an average quantity of 123,720 cubic feet of air a minute, under a water-gauge of 3.1 inches. Ventilation is divided into three splits; the quantity passing in each at the last inspection measuring as follows:—

No. 1 Split.—19,600 cubic feet of air a minute for the use of thirty men and four horses. Safety-lamp indicated a slight trace of methane.

No. 2 Split.—12,000 cubic feet of air a minute for the use of thirty men and two horses. Safety-lamp indicated a trace of methane.

No. 3 Split.—5,000 cubic feet of air a minute for the use of five men and one horse. Safety-lamp, *nil*.

Main Return (all Mines).—130,000 cubic feet of air a minute for the use of 145 men and sixteen horses. Safety-lamp, 0.5 per cent. methane.

Explosive gas has been found on two occasions in this mine during the course of inspection; in both cases the places in question were being driven through faulted ground. Burrell gas-detector and safety-lamp readings taken regularly in the various return air-currents have varied from *nil* in the No. 3 split to 0.6 per cent. methane in the main return airway. Roadways and timbering have been kept in a satisfactory condition and generally well treated for coal-dust. Where it is found to be necessary, all working-places and roadways are treated regularly with crushed limestone-dust. Two hundred and twenty-eight samples of dust were taken in accordance with Regulation No. 4 of the Coal-dust Regulations, all of which were in keeping with the standard set by the above regulation.

No. 1 MINE.

C. Stubbs and W. McKay, Overmen.

This mine is reached by a crosscut from the upper No. 3 seam of No. 3 mine, which intersects Nos. 2, 1, "A," and "B" seams; Nos. 1 and "B" only being operated at the time of writing. Until the end of March, 1934, this mine was ventilated by No. 3 East fan; since then all mines have been ventilated by No. 3 mine fan. Ventilation is divided into two splits; the quantities passing in each at the last inspection measured as follows:—

No. 1 Seam, Return.—19,900 cubic feet of air a minute for the use of thirty men and three horses. Safety-lamp indicated a slight trace of methane.

"B" Seam, Return.—30,000 cubic feet of air a minute for the use of fifty men and four horses. Safety-lamp, 0.5 per cent. methane.

Explosive gas has been found on several occasions during the course of inspection, usually close to the faces of the development-places that have to be driven from time to time through the barrier-pillars for the purpose of opening up new walls. Roadways and timbering have been kept in satisfactory condition and generally well treated for coal-dust. All roadways and working-places, where required, are treated regularly with crushed limestone-dust. One hundred and seventy-three samples of dust were taken in accordance with Regulation No. 4 of the Coal-dust Regulations, three of which failed to reach the standard set by the above regulation.

No. 3 EAST MINE.

J. Henney, Fireboss.

This mine is ventilated by an electrically driven 8- by 3½-foot Jeffrey fan, which, running at a speed of 240 r.p.m., produced an average quantity of 81,700 cubic feet of air a minute, under a water-gauge of 2.2 inches. During the first three months of the year this fan provided the ventilation for Nos. 1 and 3 East mine; the quantities passing at the inspection made prior to closing down the fan measured as follows:—

No. 1 Mine, Main Return.—56,250 cubic feet of air a minute for the use of seventy men and five horses. Safety-lamp, 0.5 per cent. methane.

No. 3 East Mine, Main Return.—79,800 cubic feet of air a minute for the use of seventy-five men and six horses. Safety-lamp indicated a slight trace of methane.

Operations during 1934 have been confined strictly to enlarging and repairing the main return airway and reinforcing the fire seals around the fire area. As stated under the heading of "Dangerous Occurrences," a serious outbreak of fire occurred in June at the inby end of the main concrete seal close to the junction of the West level and the main return airway. For two days following this occurrence every effort was put forth to get the situation under control, but without success until the fan was started as a blower. While this had the effect of causing the fire to burn more fiercely for a time, it had the advantage of clearing out the dense smoke, and by following up closely with the rock-dust and water-lines the fire on the airway proper was soon extinguished. When the surrounding strata were sufficiently cooled, the main fire seal was extended to connect with the solid ground clear of the faulted area.

Corbin Collieries, Ltd.

Austin Corbin, President, Spokane, Wash.; E. J. Roberts and J. M. Fitzpatrick, Vice-Presidents, Spokane, Wash.; A. M. Allen, Secretary-Treasurer, Spokane, Wash.; E. L. Warburton, Manager, Corbin, B.C.

CORBIN COLLIERY.

E. L. Warburton, Manager; F. W. Reger, Assistant Manager.

This colliery is situated 14 miles from McGillivray Junction on the Crowsnest branch of the Canadian Pacific Railway, to which it is connected by a branch line, called the Eastern British Columbia Railway. This colliery consists of four mines—Nos. 3, 4, 5, and 6. All of these were on the active producing list with the exception of No. 5; this mine did not operate during 1934.

A general description of the method of working, system of haulage in and around the mines, and surface plant has appeared in previous Annual Reports. Due to the closing of No. 6 mine in July, preparations were begun in August for a new opening in the No. 6 seam in an isolated portion of the bed situated to the north-west of the new incline. For the purpose of transporting this coal to the railway it was necessary to grade an incline 2,200 feet in length across the mountain-side; this has an average pitch of 18 degrees and is laid with railway steel. A new dumping-tripple was erected adjacent to the railway-tracks to handle this coal, while a hoist and boiler were also installed to operate the incline. Coal production was commenced at this new opening on October 1st.

No. 3 MINE.

M. M. Gibson, Overman.

This is an open-cut mine, the overburden being stripped off ahead of the face and the coal-seam mined in a series of benches. It is then loaded direct into trucks by gasoline-shovel and hauled to the main loading-chute at the colliery yards. Where blasting is necessary, all shots are prepared and fired under the direct supervision of certificated officials. Conditions in general were satisfactory at all inspections and the roadway down the mountain kept in good shape. This mine resumed production in July and operated continuously until December 22nd, when heavy snow blocked the roadway and stopped the hauling of coal. An attempt was made to plough out the road, but the constant drifting of snow offset every effort made in this direction and operations ceased at the end of the year for the balance of the winter.

No. 4 MINE.

J. Taylor, Overman.

This mine operates the No. 4 seam and is ventilated by an electrically driven fan of the Guibal type, which, running at a speed of 160 r.p.m., produced an average quantity of 19,000 cubic feet of air a minute, under a water-gauge of 1.5 inches. This mine is all on one split, with the exception of the fire areas; the quantity passing at the last inspection measured as follows:—

A Level Intake.—18,000 cubic feet of air a minute for the use of thirty men and three horses.

Explosive gas has been found on several occasions during the course of inspection, mostly at the barricades in the caving areas. Burrell and safety-lamp readings taken regularly in the return air-current have varied from 0.5 to 1.1 per cent. methane. Considering the continual

movement on the workings of this mine, roadways and timbering have been kept in a fairly satisfactory condition, and good progress made in the repairing and enlarging of the main return airway. All roadways and working-places, where required, are treated regularly with crushed limestone-dust. Sixty samples of dust were taken in accordance with Regulation No. 4 of the Coal-dust Regulations, all of which were in keeping with the standard set by the above regulation.

No. 6 MINE.

W. Almond, Overman.

This mine operated the No. 6 seam and was ventilated by an electrically driven fan, which, running at a speed of 280 r.p.m., produced an average quantity of 47,000 cubic feet of air a minute, under a water-gauge of 0.5 inch. With the exception of the fire areas, the ventilation was all on one split; the quantity passing at the last inspection in July measured as follows:—

East Side Return.—18,000 cubic feet of air a minute for the use of sixteen men and one horse. Safety-lamp. *nil*.

No trace of explosive gas was found during the course of inspection, while the methane content in the return air-current was always under 0.5 per cent. Roadways and timbering were kept in satisfactory shape and well treated for coal-dust. Forty-eight samples of dust were taken in accordance with Regulation No. 4 of the Coal-dust Regulations, all but two of which were above the standard set by the above regulation.

As mentioned elsewhere in this report under the heading of "Dangerous Occurrences," a serious outbreak of fire occurred in this mine on the night of February 11th in the East Side district, which in all probability originated in the extracted area on this side of the mine. Although every effort was exerted for a period of five months to isolate this district from the remainder of the mine, the fire gradually kept spreading and gaining ground as the broken nature of the strata, together with the fact that the breaks extended right through to the surface and along the mountain-side for a distance of several hundred feet, made it practically impossible to erect satisfactory seals. This situation assumed such alarming proportions that a decision was given on July 13th to close the mine; from this date until the end of the month as much of the material as could be got out safely was recovered and permanent seals erected at the main entrances to the mine.

WEST No. 6 MINE.

W. Almond, Overman.

This is a dual operation, being operated on the surface as well as underground, and was opened in the beginning of October for the purpose of providing some tonnage to help replace that inadvertently lost by the closing of No. 6 mine. It is the intention of the company to drive a new opening in virgin ground to the south of the former No. 6 mine; to do this it will be necessary to construct a grade of a quarter of a mile in length around the mountain from the top of the new incline, together with the driving of an adit in rock 500 feet long to tap the seam at this location. Plans are also under consideration to branch out along the same lines at the No. 3 mine or "Big Showing," as the experience of the past few years has proved that this section of the property should be operated from underground in conjunction with the surface workings.

CONCLUSION.

All accidents that occurred in this district were investigated and, where these ended fatally, the inquests were attended on behalf of the Department. The writer wishes to express his appreciation to the Coroners for their courtesy in allowing him to question witnesses with a view to arriving at the cause of the fatal accidents.

The writer again wishes to thank all workmen, officials, and the different companies for the co-operation and assistance given in carrying out his duties during 1934, and looks forward with every confidence to this pleasant relationship being continued in the future, as it is generally conceded by all concerned that it is only by this whole-hearted effort on the part of every one connected with the industry that our accident-list can be reduced to the lowest possible minimum.

INSPECTION OF QUARRIES.

BY

JAMES STRANG.

VANCOUVER MINING DIVISION.

Coast Quarries, Ltd.—This company operates a quarry at Granite Falls, Burrard inlet, about 18 miles from Vancouver. The granite is used for general construction-work. During 1934 work has been very irregular, the number of men engaged varying from twelve to four. The regulations, generally, have been well observed and no accidents of a serious nature have occurred. Thomas Burrows is in charge of operations.

Kilgard Red-shale Quarry.—This quarry is the property of the Clayburn Company and is worked in conjunction with their clay mines. No material has been taken from the quarry this year.

Deeks Sand and Gravel Pit.—T. O. Burgess, superintendent. This quarry is about 3 miles above Second Narrows bridge on Burrard inlet. It is a hydraulic operation, electrical power being used for mechanical operations of the plant, which has a producing capacity of 100 tons per hour. The number of days worked at the plant was considerably less than last year. The condition of the machinery, fencing, and other equipment was in good condition generally and no accidents were recorded.

Cascade Sand and Gravel Quarry.—North Vancouver; Alfred Ellis, superintendent. This operation, which operated only part time during 1934, recovers sand and gravel from the bed of Seymour creek by means of a large power-shovel. The condition of machinery, equipment, and fencing was good and no accidents were recorded.

B.C. Sand and Gravel Quarry.—North Vancouver; William Monks, foreman. This operation produced very little during 1934. The machinery, equipment, and fencing were quite satisfactory and no accidents were recorded.

Hillside Sand and Gravel Quarry.—West Howe Sound; John Campbell, superintendent. This plant has been described in previous reports. On account of trade depression the plant did not operate many days during 1934. The machinery, equipment, and fencing were in good condition and no accidents were reported.

NEW WESTMINSTER MINING DIVISION.

Gilley Bros.' Quarry.—Situated at Silver valley, on the Pitt river. A plant for crushing and screening granite is built on the banks of the Pitt river; the stone from this quarry being used for general construction-work. Work has not been steady at this plant during 1934, the number of men varying from twelve to five. Machinery is in good condition and securely fenced. Regulations have been well observed.

Maryhill Sand and Gravel Pit.—Operated by Gilley Bros.; is situated on the banks of the Fraser just below the junction of the Fraser and Pitt rivers. The screening and loading plant is operated electrically, a power-shovel and conveyor being used in the gravel-pit. The entire plant is kept in good condition and regulations fully carried out. About twelve men are employed when the plant is running to capacity.

VICTORIA MINING DIVISION.

B.C. Cement Co., Ltd.—This company operates their main plant at Bamberton, where there are two limestone-quarries and a cement plant. Bamberton quarry has not worked steadily during 1934 due to lack of orders for cement. About thirteen men are employed in the quarry when working. Officials and men at this plant are interested in safety measures and the regulations are strictly observed.

Pioneer Sand and Gravel Co., Ltd.—This company operates a sand and gravel pit at Albert head, but very little work has been done here during 1934.

Producers Sand and Gravel Co.—Situated at Royal bay. This sand and gravel pit has been idle the greater part of 1934.

NANAIMO MINING DIVISION.

Pacific Lime Co.—This company operates a large limestone-quarry, lime-kilns, and sawmill on Texada island. The material from the quarry is conveyed by an aerial tramway to the bunkers at the lime-kiln. Over 120 men are employed over the whole plant, an average of about twenty men being employed in the quarry. Conditions at the quarry and plant were generally found to be good.

B.C. Cement Co., Ltd.—On the opposite shore of Blubber bay from the Pacific Lime Company a quarry is operated by the B.C. Cement Company. The limestone is crushed and shipped by scow to Bamerton. Work has been very irregular in 1934. The number of men employed varied from seven to two. This plant is kept in good condition and regulations are fully observed.

Marble Bay Quarry.—This quarry is operated by F. J. Beale and is situated at Marble bay, near Vananda. No work is being done at present.

Vananda Quarry.—Also operated by F. J. Beale and was opened in 1933. A loading-wharf and crushing plant have been built. Conditions at this quarry were found to be satisfactory. The number of men employed varied from twenty-two to thirteen, depending on the trade.

Vancouver Granite Co.—Operates a granite-quarry on Nelson island, producing a fine dimension stone. Work has been intermittent throughout 1934.

It is satisfactory to report that no fatal accidents occurred in the Coast District during 1934.

NANAIMO AND ALBERNI MINING DIVISIONS.

BY

GEO. O'BRIEN.

McDonald Cut-stone Operators.—Eugene Bottiselle, superintendent. This quarry is situated near the northerly end of Gabriola island and the work consists of getting out cylindrically cut stones for pulp-grinding mills, etc. The stones average about 5 feet in diameter, with a 3-foot grinding-face. The stones are faced, bored, and dressed ready for installation in mills before they leave the quarry. Blasting is done by electric battery and cable under the supervision of a certificated blaster. No accidents were reported from this operation during 1934.

Gabriola Shale Products, Ltd.—Charles T. De Long, manager. This quarry is situated near the southerly end of Gabriola island. The work consists of getting out shale for the brick-making plant located near by. A good grade of shale is produced for brick-making. The quarry and plant were in operation for a short period only during 1934 and were then closed down for an indefinite period. Blasting is done by electric battery and cable under the supervision of a certificated blaster. No accidents were reported from this operation during 1934.

The regulations under the "Quarries Regulation Act" are very well observed in these two operations.

KAMLOOPS MINING DIVISION.

BY

JOHN G. BIGGS.

Falkland Quarries.—Alex. Jessiman, superintendent. These quarries are operated by the Gypsum Lime and Alabastine, Canada, Limited, at Falkland. The quarries are situated 30 miles north of Vernon and 2 miles north of the Vernon-Kamloops highway. Operations are conducted in a large gypsum deposit; the work during 1934 being generally confined to the upper or No. 3 quarry. The rock is blasted at the side of the mountain and loaded at the foot of the quarry into 1-ton mine-cars and trammed by hand to the upper terminal of a self-acting surface incline running down the side of the mountain to a bin below; from here it is transhipped to an aerial tramway which delivers it to bunkers at the railway. The rock is of a friable nature and as a result the walls of the quarry have to be maintained at a safe inclination to provide for the safety of the men working on the floor; this was well attended

to during 1934. About twenty men were employed at this operation and during inspections working conditions were found to be good and the provisions of the "Quarries Regulation Act" well complied with.

BELLA COOLA MINING DIVISION.

BY

CHAS. GRAHAM.

Cunningham Island Quarry.--This quarry, from which the Pacific Mills at Ocean Falls obtained their limestone in previous years, has been abandoned.

A quarry has been opened at Koeve river, about 7 miles south of Namu, by Christenson and Neielson, and has produced 1,779 tons. Work was just being commenced on this quarry at the time of the writer's visit. Information and advice as to the requirements of the "Quarries Regulation Act" was given to the operators; four men were employed. The balance of the limestone required by the Pacific Mills for the year, 6,761 tons, was obtained from F. J. Beale, Vananda.

INSPECTION OF METALLIFEROUS MINES.

BY

JAMES DICKSON.

FATAL ACCIDENTS IN METALLIFEROUS MINES (INCLUDING UNDERGROUND PLACER MINES).

There were twenty-two fatal accidents in and about the metalliferous mines in 1934, being an increase of twelve from the figures for 1933.

There were 4,525 persons employed under and above ground in the metalliferous lode mines in 1934. The ratio of fatal accidents was 4.86, compared with 3.20 in 1933. The ratio for the last ten-year period was 2.95.

The tonnage mined per fatal accident was 446,390 tons for the last ten-year period.

The following table shows the mines at which fatal accidents occurred during 1934 and comparative figures for 1933:—

Mining Division.	Mine.	No. of Accidents.	
		1934.	1933.
Vancouver.....	Britannia.....	4	....
Phillips Arm.....	Alexandria.....	1	....
Fort Steele.....	Sullivan.....	3	1
Nelson.....	Yankee Girl.....	....	1
Nicola.....	Quilchena.....	....	1
Osoyoos.....	Morning Star.....	1	....
Osoyoos.....	Twin Lakes.....	1	....
Lillooet.....	Bralorne.....	2	....
Lillooet.....	Pioneer.....	2	....
Cariboo.....	Cariboo Gold Quartz.....	....	1
Trail Creek.....	Josie No. 1.....	1	....
Vernon.....	Pre Cambrian.....	1	....
Omineca.....	Vital.....	2	....
Nass River (Northern).....	Hidden Creek.....	4	3
Atlin (Northern).....	Otter Creek.....	....	1
Atlin (Northern).....	Matthew.....	....	1
Portland Canal (Northern).....	Premier.....	....	1
Totals.....		22	10

The following table shows the cause, the percentage to the whole of the fatal accidents, with comparative figures for 1933:—

Cause.	1934.		1933.	
	No.	Percentage.	No.	Percentage.
By gases from blasting.....	....	.....	1	10.00
By blasting.....	1	4.54	2	20.00
By falling down chutes, shafts, etc.....	7	31.82	3	30.00
Haulage.....	4	18.18	....	.....
By falls of ground.....	7	31.82	4	40.00
Miscellaneous.....	3	13.64	....	.....
Totals.....	22	100.00	10	100.00

ACCIDENTS IN METALLIFEROUS MINES.

It will be noted that many of the following accidents are of an individual nature, where greater care on the part of the deceased would have prevented the accident, and point to the need of increased education and instructions on safety-first to the extent that every person employed underground should personally realize the necessity of constant vigilance.

The fatal accident which occurred to Norman McIvor, motorman, *Sullivan* mine, on December 27th, resulting in death on January 14th, 1934, was due to deceased being crushed between his motor and the side of the working; his left leg was crushed below the knee. Deceased had stopped his motor to allow another train to switch off his track and started his motor ahead before the other train had cleared, with the result that the motor driven by deceased collided with the other train and was derailed. He was crushed as he attempted to jump clear; normal care on the part of deceased would have prevented this accident.

The fatal accident which occurred to Joseph A. Lewis, miner, *Sullivan* mine, on February 6th was due to deceased being carried down a raise where he was engaged in moving loose ore; the ore under him started to move and deceased was caught and crushed by the moving ore.

The connected fatal accidents at *Britannia* mine on March 1st, whereby Joseph Coyle, shiftboss, Robert White, chute-drawer, and Samuel Perkins, motorman, lost their lives, is dealt with in a separate part of this report.

The fatal accident which occurred to Ferdinand Turk, compressor-man, *Alexandra* mine (Premier Gold Mining Company), on March 16th was due to deceased attempting to examine the stuffing-gland of a belt-driven air-compressor while the compressor was going full speed. He had leaned over the guard-fence and apparently was struck on the head by the bolts on the driving-belt and when found was hanging over this fence; he was alone at the time and died several hours later.

The fatal accident which occurred to Alexander Rea, miner, *Sullivan* mine, on May 10th was due to a fall of ground when deceased was engaged in making a trail in a stope; the ground fell from the back some 50 feet up the slope from deceased and some of the rocks rolled down on him.

The fatal accident which occurred to Domenico Morrone, pluggerman, *Hidden Creek* mine, on May 14th was due to deceased falling down a stope; deceased was ballasting a trail which was protected by iron pickets and three side-ropes and had apparently gone outside the fence-ropes to obtain some fine rock to put a smoother surface on the trail and had fallen down the stope; deceased had no orders or need to go outside the fence.

The fatal accident which occurred to Alexander Gillis, miner, *Bralorne* mine, on June 4th was due to the misuse of explosives. Deceased was engaged in bulldozing the rough ore on the mill grizzly, which is a short distance from the mine portal; on this occasion deceased had arranged two buldoze charges, and after spitting the first apparently had trouble in spitting the second charge and told his helper that he would get the second shot later. Both men left the grizzly-house and went in different directions to prevent persons approaching until the shot went off, deceased entering the portal of the adit. At this point he stopped an ore-train until blasting was completed, and was talking to the train crew when the shot went off in the grizzly-house: he said, "All right boys, only one shot," but a second shot went off immediately and deceased was found on the ground seriously injured. Apparently under the impression that he had failed to spit the second shot, he had picked up the charge (one stick of dynamite) and put it in his hip pocket, where it went off, causing injuries from which he died several hours later. Ordinary common sense would have prevented this accident.

The fatal accident which occurred to Carl Lauderbach, miner, *Pre Cambrian* mine, on June 19th was due to deceased drilling into part of an old charge of dynamite. This was in a surface open-cut operation which had been started and abandoned in 1923. Deceased was engaged in drilling in the floor with a jack-hammer drill, and after the hole had been put down about 2 feet the drill jammed, and deceased and several others tried to release the drill by various methods. While trying to get the drill out a small explosion occurred which did no damage, but made the men suspicious that there might be an old missed shot in the immediate area; and they made an examination to discover whether this was so, but did not find anything of this nature. The air was then turned on the machine to assist in releasing the drill and an explosion occurred that injured deceased so seriously that he died several hours later.

An old hole was discovered about 18 inches from the new one and parallel to it; examination showed that apparently only part of the charge in the old hole had been detonated at the time of the original firing. This shot had cracked the ground and apparently the heat in the ground had caused the nitroglycerine to run through the cracks to where the new hole was being drilled. The temperature of the rock at this time would be approximately 90 degrees, and this dynamite must have been affected by varying temperatures since 1923, when operations were suspended in this open-cut.

The fatal accident which occurred to Martin Kralj, pluggerman, *Hidden Creek* mine, on July 6th was due to deceased being carried down a raise by loose ore which he had blasted from a "hang-up" position some fifteen minutes prior to the accident.

The fatal accident which occurred to Robert Fornasa and Steve Cernak, miners, Juneau-Vital Mining Company, on Vital creek, on July 30th was due to an inrush of mud and gravel at the face of the main level. This is an underground placer operation and four men were engaged at the face at the time of the occurrence, which gave no previous indications of danger; the working was filled for some 14 feet outwards from the face and completely covered both men, whose bodies were recovered the following day.

The fatal accident which occurred to Gunnar Brothen, miner, *Pioneer* mine, on August 16th was due to a fall of ground while deceased was engaged in loading a round of shots; a piece of the rock pushed him back some 10 feet from the face and crushed him against a stull.

The fatal accident which occurred to Joseph Umiljenovich, miner, *Britannia* mine, on September 4th was due to a fall of ground from the side of a working. Deceased and his partner were detailed to bar down and timber this part of the working, some 500 feet from the face, and apparently thought they had taken down all the loose rock as far as they had gone, when a large piece of rock slid down from the side of the working and toppled over on deceased, who was barring down ahead. Both men understood this part was being timbered, as the ground showed signs of being loose, and should have exercised greater care.

The fatal accident which occurred to Marco Dangela, nipper, *Hidden Creek* mine, on September 6th was apparently due to deceased falling some 15 feet from a trail in a stope; there were other men in the vicinity who saw his light disappear, but there was no evidence to show what caused him to fall.

The fatal accident which occurred to Rasmus K. Lodomell, miner, *Josie No. 1* mine, on September 20th was due to deceased falling into an abandoned raise. Deceased was engaged, with a number of other men, on a lease taking out ore, and while tramming had got off the usual track with his car and followed along the track to the abandoned raise, where his car was derailed and the resulting jerk apparently caused deceased to fall into the old raise.

The fatal accident which occurred to Stephen Slonky, cage-tender, *Pioneer* mine, on October 10th was due to deceased falling out of, or being dragged out of, the cage while it was ascending the shaft. Deceased and his partner were taking up a load of steel when they heard some unusual noise, and apparently deceased had put his head outside the cage to investigate. His head was caught by the timber and he was dragged over the safety-bar of the cage and fell down the shaft. One-half of the cage-door was open at this time and was a direct contributory cause of this accident.

The fatal accident which occurred to Ole Loberg, miner, *Bralorne* mine, on October 17th was due to deceased entering a chute to start the ore running and was caught and suffocated by the moving ore. Deceased and his partner had taken all the ore that would run in this chute and had then taken some ore from another chute, after which they returned to the first one. Deceased said he would go into the chute to start the ore running, and his partner warned him of the danger, but was unable to dissuade deceased from entering the chute.

The fatal accident which occurred to Ernest Fox, mucker, *Twin Lakes* mine, on October 28th was due to a fall of ground. A shot had been fired at this point a few hours previously and the ground had been examined and apparently deemed safe. This was only some 30 feet in from the entrance of the mine.

The fatal accident which occurred to Joe Annett, chuteman, *Hidden Creek* mine, on November 4th was due to his being struck on the head by a piece of ore while looking up a chute from the gate; deceased was apparently examining a "hang-up" a short distance above the gate when struck. The "hang-up" did not move.

The fatal accident which occurred to Samuel Popatz, mucker, *Morning Star* mine, on November 25th was due to a fall of ground shortly after the miner had barred down the roof at this point and the place was examined by the mine foreman some fifteen minutes prior to the accident.

ACCIDENTS AT BRITANNIA MINE INVOLVING THE LOSS OF THREE LIVES.

On March 1st two separate but connected accidents caused death to Joseph Coyle, shiftboss; Robert White, chute-drawer; and Samuel Perkins, motorman.

Perkins was engaged on the afternoon shift as motorman and nipper on the 1,050-foot level, and his work consisted of taking the necessary supplies from No. 1 shaft to the miners on this level, and after delivering some timber to miners had started with his motor in the general direction of Nos. 1 and 2 shafts with the apparent intention of going to No. 2 shaft. To reach No. 2 shaft he had to reverse and back-switch at a point some 700 feet from No. 1 shaft, and it is the writer's opinion that when he reached this point and stopped his motor to throw the track-switch for No. 2 shaft he found that he had not cleared the track-points with his motor and had started his motor a few feet ahead.

There was about 3 feet clearance on the left side of the track and 1.5 feet on the right side at this point and the control of the motor was on the right side. Instead of resuming his seat in the motor to move this short distance ahead, Perkins had gone between the motor and right side of the working to operate the control while standing outside the motor, and by some means had been crushed and fatally injured when the motor started ahead.

The motor went on uncontrolled to No. 1 shaft and went down one of the hoisting compartments in which Coyle and White were being lowered at that time and were then 600 feet below the 1,050-foot level.

The first intimation of these accidents was when the hoistman on No. 1 shaft hoist heard a noise while he was lowering the two men and looked over his hoist in time to see the motor go down the shaft; he immediately stopped his hoist and gave the alarm by telephone and then ran to the nearest men on this level, and on the way to them found Perkins lying on the track near where he had been injured. Perkins was still alive, but died shortly afterwards.

A party descended the shaft and found that Coyle and White had been instantly killed and the cage totally wrecked, with the whole mass of the cage and the motor jammed in the shaft.

There is an established rule in this mine that motormen must not move their motor except when they are in the motor, and apparently Perkins had ignored this rule and had, in this instance, started his motor when standing outside.

At a distance of 80 feet from No. 1 shaft is a safety-switch for the protection of the shaft, but at this vital time the switch was open to the shaft. At 18 feet from the shaft there were stop-blocks over both tracks; these consisted of 4- by 6-inch timbers, faced with 3.5- by 0.5-inch iron, and pivoted securely at one end, with the outer end held by a short hinged member.

These blocks were in position, but the motor rode over them and apparently kept the track, as there were no marks of derailment, and reached the shaft; the shaft-opening is protected by the usual collapsible gate of the lazy-tong type and this offered appreciable resistance to the motor.

No ore or waste is handled on this level, which is used only for travel and supplies, and while the stop-blocks offered a measure of safety they were not designed to resist a motor-locomotive under power.

Perkins was a former shiftboss and had the reputation of being a disciplinarian in regard to safety-work, but apparently he thought he could handle his motor in a way that he would not have tolerated if done by a man in his charge. On his last trip from No. 1 shaft he had left the safety-switch open apparently under the belief that as he was the only man using a motor or cars on this level on the afternoon shift there was no need of the usual precautions.

Simple observance of the safety rules would have prevented these accidents.

REPORT ON A HOISTING-ROPE WHICH BROKE DURING SINKING OPERATIONS IN RENO GOLD MINES, LIMITED.

This rope was $\frac{3}{4}$ -inch diameter and of non-spin construction and the material was best plough-steel acid quality. The construction consisted of five inner strands, of seven wires

each, over a hemp core; these five strands and core making a complete rope with a left-hand Lang lay, and over this was eleven strands, of seven wires each, with a right-hand Lang lay.

The normal load on this rope was a 600-lb. bucket and 2,400 lb. of rock; the bucket and load fell from the dump to the bottom of the shaft, a distance of 350 feet, but luckily no one was injured, although there were men at the bottom of the shaft.

The rope was installed on July 20th, and on September 1st some 14 feet at the bucket end was cut off and hoisting continued until September 16th, when the rope broke with above results; the actual point of breakage being at the cross-head button, which was some 5 feet above the bucket.

The dumping arrangement at the top of the shaft was by the fixed anchor-chain method; that is, this fixed chain was hooked to the bottom of the bucket after the safety-door was closed and the bucket was tipped upside down as the bucket was lowered by the hoist.

There was considerable bending of the rope in this process, and it is probable that this bending was partly arrested and concentrated by the cross-head button and clamp, with possibly some abrasion or cutting of the rope where it made contact with the clamp.

The fact that all the strands broke at this point (all the strands broke within less than 2 inches of rope-length) would indicate that the cross-head button and clamp had an important bearing on the rope-failure.

Parts of this rope were sent to Victoria for examination, and so far as could be determined by visual inspection the rope appeared to be satisfactory and well lubricated and presented the general appearance of a new rope.

Tests were carried out at the University of British Columbia, with the following results:—

No. of Test.	Part of Rope tested.	Strain at which Rope broke under Test.	Elongation of First Sign of Breaking.
		Lb.	Inches.
1.....	1 in. to 3 ft. below break	36,940	1.60
2.....	1 in. to 3 ft. above break	37,640	1.30
3.....	13 to 15 ft. above break	37,890	1.35

Remarks.—While under test it was noted that all the outer strands failed simultaneously, but that the strands composing the inner rope were not affected to the same extent, and during test No. 3 the testing-machine was stopped immediately the outer strands broke and an examination made of the inner rope; as far as could be determined by visual inspection, the inner rope appeared to be intact and it required further strain from the machine to break the inner rope. No additional strength from the latter part of this test is included in the breaking strength given, as the writer considered that when the outer strands broke the rope as a whole had failed.

It would appear that in a rope of this construction the inner rope and the outer strands act as two separate ropes so far as their reaction to load ratio is concerned; whether, over a greater length of rope, this difference is maintained is a matter of conjecture.

From above tests the writer is of the opinion that the non-spin advantage of a rope of this construction is gained at the cost of slightly reducing the total available strength of the rope as compared with the strength of a rope of the same diameter and standard construction, and while the non-spin rope has very decided advantages in sinking operations, the diameter of such ropes should be slightly increased as compared with the diameter of a standard rope designed for the same load.

From the above results it will be seen that the rope itself can be regarded as satisfactory for the duty it had to perform and had been subjected to severe usage, if not abuse; a careful examination of this rope should have discovered some indications of the impending breakage.

While it may be conceded that a rope used in sinking operations is subjected to more severe conditions than obtain in normal hoisting, there is need for greater care in the examination and supervision of the rope.

The knowledge that a rope is practically new and of good general appearance may tend to cause those charged with the daily inspection of ropes, as per the "Metalliferous Mines Regulation Act," General Rule 16, to rely on this knowledge rather than on a strict examination of the rope itself and its reaction to the severe duty it is performing.

It is with a view to securing co-operation in having all hoisting-rope examinations made as carefully as the responsible nature of this work demands that this report is made.

EXPLOSIVES USED IN MINING.

During 1934 slightly over 10,000,000 lb. of explosives were used in mining operations in the Province and approximately 4,000,000 shots were fired, of which 605,000 were fired electrically; 21,000,000 feet of fuse was used in above blasting operations.

PRECAUTIONS REGARDING ROCK-DUST.

In the latter part of 1934 a Konimeter was obtained for sampling the dust content of the air and much information of an interesting nature has been found, although much work will have to be done to determine the nature and possible dangers of such dust in the mine-air; this testing-machine shows a considerable amount of dust in mine-air which, to the eye, appears to be perfectly clear of dust. The Consolidated Mining and Smelting Company has purchased a similar testing-machine for use in the *Sullivan* mine.

Particular attention is being devoted to improved ventilation underground and to, as far as possible, having the main blasting done at the end of the shift, in order that the dust raised by blasting may be largely cleared away before the next shift of men enter the places where blasting has been done.

QUARRIES.

Most of the quarrying operations throughout the Province have been of an intermittent nature and with considerably reduced crews, and at the different inspections under the "Quarries Regulation Act" were found to be generally in good working condition; any recommendations by the Inspector regarding increased safety were immediately acted upon.

There were 377 men employed in the various quarry operations and no fatal accidents occurred during the year.

CONCLUSION.

The writer desires to express his appreciation of the faithful co-operation and assistance afforded during 1934 by the District Inspectors and Instructors in mine-rescue work. He also wishes to thank the management and employees at the various collieries for the assistance and support given in making operations as safe as possible, and looks forward to a continuance of the same during the coming year. It is only by the closest and efficient co-operation of all parties concerned that the number of accidents can be kept down and so make the mining industry a safer and more congenial occupation. The writer is much indebted to the Director of the Mines Branch at Ottawa for co-operation in the work of mine-air sampling.

LILLOOET MINING DIVISION.

BY

THOS. R. JACKSON.

Throughout the Bridge River, Lillooet, and Barkerville districts there has been developed a keen practical interest in mine-safety and first-aid methods, and it is hoped that at the larger operations a safety engineer will be appointed.

There were four fatalities and three serious accidents reported during 1934. Two of the fatal accidents occurred at the *Pioneer* mine and two at the *Bralorne* mine. Explosives were responsible for one death: one in a chute suffocated another: one was killed by a fall of rock in a stope: and a cage accident proved fatal to another. Excepting the stope accident, the others can be classified as avoidable, assuming that ordinary care and judgment had been used.

A fairly good number of mine-air samples were taken in the various mines during the year. In several samples traces of white-damp were found and one sample recorded a content of 0.03 per cent. some five hours after blasting. Black-damp registered as low as 0.75 per cent. and as high as 3.01 per cent. Several air samples from the *Pioneer* and *Bralorne* mines showed traces of methane and in the former mine this gas has been found in inflammable quantities.

At the *Pioneer* mine an excellent six-bed hospital has been built; on the ground floor is a three-bed ward, a two-bed ward, and a single-bed ward, as well as an operating-room, dispensary, doctor's office, etc. On the upper floor is the nurse's living-quarters.

The hospital equipment is up to date and includes a portable X-ray machine. Dr. G. R. Barret is in charge and Miss M. Gibbons is resident nurse. Greater first-aid activity has been manifested by some of the employees urged on by their own personal desires, the company's assistance in this respect, the able services of Instructor J. D. Stewart, and the help, guidance, and lectures given by the new medical incumbent, Dr. G. R. Barret. Quite a large number attended these classes and were rewarded by certificates, labels, etc., just as the higher-grade student passes his St. John Ambulance examination from one year to another. It is to be hoped that some time during the year 1935 a suitable centre will be agreed upon by the chief operating companies, so that a Bridge River District first-aid competition, with mine-safety equipment and appliances on display, could be organized and carried out successfully.

During the writer's visits of inspection general operating conditions were found to be satisfactory; the fatal accidents causing some improvements to be carried out as a future safeguard.

B.R.X. Gold Mines, Ltd.—The general superintendent is E. H. Shepherd. First-aid equipment is provided at different strategic points for the convenience of those who may be injured. Safety notices and warning-signs are posted in conspicuous places for the guidance of employees and explosives are very well looked after. No reports of accidents have reached this office during the year.

Bralorne.—Operated by the Bralorne Mines, Limited, with Richard Bosustow as general manager. An excellent hospital was built and a nurse is in constant attendance. Considerable activity in first-aid and mine-safety work was maintained in the latter months of 1934, resulting in the formation of a branch of the St. John Ambulance Association. This resulted in twenty-seven employees gaining the St. John first-aid certificate. Richard Bosustow has rendered every conceivable assistance towards encouraging first-aid work and has arranged for classes for ladies, boys, and girls. It is also intended to hold an open first-aid competition some time during the year, at which representatives from other mining companies will be requested to compete.

General conditions in the mine were found to be good and attention immediately given to any recommendations in regard to safety.

Minto.—Operated by Minto Gold Mines, Limited, with Warren Davidson as superintendent. First-aid equipment is satisfactory and a qualified St. John Ambulance attendant is on the ground to render first aid when necessary. Dr. Osborne is the medical officer for the company, with head office at Minto City.

At the *Grange* mine it was requested that a second exit be provided and this work was completed.

The following properties were also inspected during the year and general conditions found to be satisfactory: *Wayside, Grull Wilksnc, Bradian, National Gold, Olympic, Bonanza, Butte I.X.L., Congress, Pilot, Tuscarora, and Federal.*

CARIBOO MINING DIVISION.

There were no major accidents during 1934 at the Cariboo Gold Quartz property; such minor accidents as did happen were taken care of by a regular first-aid man and a doctor who resides at Wells, where a small hospital is maintained. Throughout the year the doctor conducted classes in first aid and twenty-one St. John Ambulance Society certificates were obtained by those attending. All men working underground are required to wear hard hats and those operating stopper-machines to wear gloves. It is proposed to have all men wear hard-toed safety-shoes.

The Island Mountain, Richfield Cariboo, Cariboo Coronada, Barkerville, Quesnelle Quartz, Bullion, and Sovereign Creek operations were inspected.

At the property of Consolidated Gold Alluvials of B.C., Limited, a surgery has been fitted up at the mine, medical services arranged with doctors from Quesnel, and a qualified first-aid man is always at hand for emergency work. A committee has organized a first-aid class with weekly lectures and the first-aid man demonstrates the practical work between lectures. A St. John Ambulance Association has been formed and a charter for same applied for to the proper authorities. No accidents were reported during 1934.

ASHCROFT MINING DIVISION.

The Lytton Gold and Vidette Gold properties were inspected during 1934.

SOUTHERN COAST INSPECTION DISTRICT.

BY

JAMES STRANG.

VANCOUVER MINING DIVISION.

Britannia Mining and Smelting Co.—C. P. Browning is general manager, C. G. Dobson is mine superintendent, and N. D. Bothwell is safety engineer. General conditions were found to be satisfactory.

There is no slackening in the efforts of the officials and men in safety education. First-aid courses were conducted under the auspices of the St. John Ambulance Association, and sixty-two persons, including men, women, and children, received awards of various grades. At the annual first-aid meet, competitions are held where the skill of the members of the first-aid classes is demonstrated to the residents and visitors.

Meetings are held every two weeks for each group of employees, at which recent accidents are described and discussed with a view to finding means to prevent their recurrence. At these meetings the men are encouraged to bring forward suggestions on any matter pertaining to safety. Safety posters are put up on bulletin-boards at the entrance to the mine and in illuminated cases underground. Simple charts are also drawn up and displayed showing the records of accidents in each mine and on each shift. In addition to the location of stretchers, blankets, and splints at all hoists and other strategic points, twenty-six first-aid kits containing all the necessary requirements for immediate treatment of injuries are distributed about the property. *The importance of immediate treatment of cuts and bruises is stressed. The use of hard hats is general and the use of hard-toed shoes and the wearing of heavy gloves is encouraged.*

The underground workings were found to be in good condition and ventilation is generally good. A series of doors was installed to direct the natural ventilation on the 1,200-foot level, which was inclined to be smoky, and further work is being done here. Timbering was in good condition. Ropes are continually examined and reported on, careful records being kept, and there is no hesitation in changing the rope—even before it might be strictly necessary.

Four fatal accidents occurred during 1934, on which full reports were submitted to the Chief Inspector.

Complete first-aid equipment is kept at the property of the B.C. Nickel Mines, Limited, and a competent first-aid man is also employed. General conditions were good and compliance with the "Metalliferous Mines Regulation Act" carried out under the management of Major C. B. North.

The Ideal Gold and Nickel Mines, Limited, and Clayburn Company, Limited, properties were inspected during 1934.

NANAIMO MINING DIVISION.

Alexandria Mining Co.—This mine was reopened early in 1934 by the Premier Mining Company and worked until August, when it was again closed down.

A fatal accident occurred to Ferdinand Turk in the power-house at this property. He was struck by the belt-fasteners while leaning over the guard-rail. A full report of the accident was submitted to the Chief Inspector.

Enid Julie, Hercules Consolidated Mining, Smelting, and Power Company, *White Pine*, and *Gem* properties were visited during the year and general conditions found to be satisfactory.

NICOLA-PRINCETON INSPECTION DISTRICT.

BY

JOHN G. BIGGS AND THOS. R. JACKSON.

Satisfactory conditions were found to exist at the various mining properties in this district and the provisions of the "Metalliferous Mines Regulation Act" being followed.

There were four accidents at the mines in this district during 1934, three of which ended fatally. Two of these accidents happened at the surface and two underground.

Nickel Plate, Fairview Amalgamated, Grandoro, Morning Star, Osogoos, Stenwinder, Gold Mountain, Mak Siccar, Hedley Sterling Creek, Twin Lakes, Pre Cambrian, Nicola, Jenny Long, Home Gold, and Windpass properties were inspected during 1934.

NORTHERN INSPECTION DISTRICT.

BY

CHARLES GRAHAM.

Conditions in general at the various operations in the district were satisfactory and in compliance with the provisions of the "Metalliferous Mines Regulation Act." In the case of new operations those in charge were given information and advice with a view to having the mines and power plants comply with the regulations from the start.

ATLIN MINING DIVISION.

Placer operations on Spruce, Otter, Boulder, McKee, Cracker, Ruby, Pine, Gold Run, and Wright creeks and O'Donnel river were inspected.

A second opening was ordered at the *Beaton* mine, Spruce creek, but due to litigation very little was done on this work.

Lode operations inspected include the *Atlin-Ruffner, Atlin Pacific (Norgold)*, and *Engineer*.

STIKINE MINING DIVISION.

The *Lady Jane, Jackson*, and *Big Chief* groups, all lode operations, and a placer operation on the Barrington river were inspected.

NASS RIVER MINING DIVISION.

The *Hidden Creek, Bonanza*, and *Granby Point* mines, owned by Granby Consolidated Mining, Smelting, and Power Company, Limited; Charles Bocking, president; W. B. Maxwell, general superintendent; and F. S. McNickolas, mine superintendent.

Mine safety and first aid was given considerable attention by the officials and is under the direction of T. Waterland, safety engineer.

A safety committee composed of the operating officials, two men from each section of the mine, and surface representatives, meets regularly every two weeks. At these meetings questions of safety are discussed and the employees are urged to bring up any matter which they consider requires attention. The various members of the committee make inspections of their districts with the safety engineer and discuss any matter with him with reference to safety in their particular district. The writer attended several of these safety meetings and was very well satisfied with the manner in which safety problems were discussed and decisions arrived at.

First-aid work has been very active during the past two years. Last year at *Hidden Creek* mine sixty men obtained first-aid certificates. The Hon. G. S. Pearson very kindly donated a cup on behalf of the Department of Mines for competition in the Northern District, but as there was not sufficient time to arrange a district competition the cup was put up for competition at Anyox. (A competition was held at the mine on May 23rd, at which three teams competed.) The cup was won for the first time by a team captained by Sam Reid. The competition created a great deal of interest in the work. This year they have had the largest classes in first aid in the history of Anyox; 140 men enrolled for the classes at *Hidden Creek* mine; ninety-four passed the examination and obtained certificates. There are now at *Hidden Creek* mine about 200 men capable of rendering first aid to the injured. In addition, there was a large class at the beach composed of mill, smelter, and miscellaneous employees. The benefits of such a large number of men trained in first aid is incalculable. Prompt rendering of competent first-aid service reduces suffering and prevents further injury through unskilled handling. A well-trained first-aid man is also a safer man, and it is to be hoped that some day all men engaged in mining and indeed in all industrial occupations will have first-aid training.

The Granby Company has also trained a number of men in the use of the Gibbs and Paul breathing apparatus. Two teams of five men each were given training. Six men were granted the certificate of proficiency in mine-rescue work issued by the Department of Mines. The other members of the teams were already the holders of these certificates. These teams were under the instructions of T. Waterland and the men on examination showed the result of his careful coaching. The company sent Mr. Waterland to the Rescue Station at Nanaimo to take some further instructions in the use and care of the apparatus.

The *Mastadon*, *Elkhorn*, *Espanza*, *Gold Reef*, and *Homestake* mines, all lode operations, were inspected.

PORTLAND CANAL MINING DIVISION.

The following properties were inspected: *Premier*, *Big Missouri*, *Salmon River Gold*, *Unicorn*, *Pioneer Syndicate*, *Spider*, *Troy*, *Portland* group, *McKay Syndicate*, *Dunwell*, *Glacier Creek*, *Lakeview*, *United Empire*, *L. and L.*, *Argentine Syndicate*, *L.L. and H.*, *Lucky Date*, *Sure Thing*, and *Helena Gold Mines, Limited*.

OMINECA MINING DIVISION.

The *Columario*, *Lucky Luke*, *Diadem*, *Free Gold*, *Jessie*, *Glacier Gulch*, *Mamie*, *Gold Brick*, *Topley Silver*, *Gold* group, and *Radio Gold* properties were inspected.

Vital Creek.—This placer property is owned and operated by Juneau Vital Creek Mining Company, Limited. The company owns some leases and has a lease on some other ground owned by a group of Chinese. The lower adit was started and driven a considerable distance by the Chinese operators. It starts in the creek-bed and follows the bed-rock grade for the entire length of the working, about 1,200 feet. Only a single working was driven. Ventilation was by water-blast and wooden air-boxes. As very little blasting was required the ventilation was fairly good.

Owing to the dangers from possible slides at the mouth of the adit, a second opening was ordered. This will be either a vertical or inclined shaft and will be put down near the present face of the adit.

Two men were killed at the face of the adit by a cave. The face and all of the adit was well timbered. The cave was due to an inrush of water and glacial mud which was unexpectedly tapped.

Other placer operations inspected were those on *Tom*, *Slate*, *Manson*, *Lost*, and *Germanesen* creeks and on *McLeod* river.

QUEEN CHARLOTTE MINING DIVISION.

The *Kitsault Eagle*, *Haida*, and *Gold Harbour* properties were inspected, but only the *Haida* group had any work done on it during 1934.

SKEENA MINING DIVISION.

Surf Point and *Surf Inlet* mines were visited during 1934.

EAST KOOTENAY, WEST KOOTENAY, AND BOUNDARY INSPECTION DISTRICTS.

BY

H. E. MIARD.

Seventy-one operations were visited in the course of regular inspections. The total number of men employed in and around the mines and mills of the district is varying constantly, and the establishment of an absolutely correct census of those so employed is a difficult undertaking, as fluctuations occur between inspections. A close estimate, made in November, placed this number at 2,380.

During the year, 316 certificates of competency as blaster were granted, twenty-nine were issued as substitutes, and ten certificates of the same class were cancelled, five owing to the

death of their holders, the others for various reasons, chief among which was incorrect spelling of the holder's name on the original. In addition, twenty-five certificates of competency as blaster were issued under the provisions of the "Quarries Regulation Act," twenty-one being granted to men engaged in road-work and four to holders of surface leases at Rossland.

Efficient ventilation is the chief prerequisite of successful mine operation, and this fact is now recognized at most of the larger mines. In the gold-producing section intensive development has led to the sinking of shafts and the driving of long crosscut adits in order to gain depth on the veins. To supply an adequate volume of pure air to new workings thus opened, until they may be connected to the surface or to higher levels by raises, is a problem which, if not readily solved, was until recently but too often looked upon as being only of secondary importance. Fortunately, this attitude is now fast disappearing, although improvement is still desirable in some cases.

Advantage was taken of the facilities placed at the Department's disposal by the Dominion Department of Mines, and samples of air were sent to Ottawa for analysis when doubts were entertained regarding the quality of a mine atmosphere. The practical value of the assistance afforded in this respect cannot be overestimated. The use of explosives is, of course, the chief cause of air contamination in metalliferous mines, but in some cases exhaust gases from gasoline-engines may be drawn either into the ventilating-current or into the intake of compressors, and the greatest care must be exercised in the selection of a site for machinery of this type and in its operation. Carbon-monoxide poisoning (the so-called "gassing" of the miners) should be unknown even in its mildest form, and its repeated occurrence may be accepted as an unmistakable indication of reprehensible carelessness.

The condition of manways and ladders was not always found to be satisfactory, dimensions being reduced to the minimum and poor use made of the restricted space available. The most unsatisfactory conditions in this respect are perhaps to be found in mines operated on lease.

One of the chief menaces to the metal-miner's health is the dust produced in the course of drilling and mucking operations. This matter claimed considerable attention during 1934 and seventy representative specimens of the rocks encountered underground were sent to Victoria for examination at the Bureau of Mines laboratory. In many cases both vein-matter and wall-rock must be looked upon as potentially dangerous in this respect. No dry machine-drilling has been done in the Kootenays for some years.

The explosive in universal use in this district is Polar Forceite gelatine of 35, 40, 50, and 60 per cent. strength. A small quantity of Polar "Stopeite" has been used experimentally at one operation with apparently good results. In stopes and drifts blasting is done with time fuse and, in the overwhelming majority of cases, with No. 6 lead azide detonators. In shaft-sinking operations electric blasting is the method adopted, as demanded by the "Metalliferous Mines Regulation Act," and it is highly desirable that this practice be extended to important raises as well, as it presents distinct advantages. For such work it has been already introduced at the *Sullivan* mine with excellent results.

At all but the smallest operations there is some one able to render first aid in case of accident, but there is still room for considerable improvement in this work. The distances to be covered before expert medical assistance can be obtained present a somewhat disquieting feature, particularly in the case of the mines situated in the Camborne, Lightning Peak, and Salmo areas.

Three fatal accidents occurred during 1934 in the district and are described in another part of this report. One was caused by a fall of rock from the back in a high stope. The other two were the results of men falling into an ore-chute in the one case and into a disused raise in the other. Two dangerous occurrences were reported. A hoisting-rope used in shaft-sinking broke while a loaded bucket was being hoisted, and a counterbalance weight broke away and fell down a shaft. No personal injuries resulted from either incident.

FORT STEELE MINING DIVISION.

Sullivan.—Owned by Consolidated Mining and Smelting Company of Canada, Limited. General superintendent, E. G. Montgomery; mine superintendent, Wm. Lindsay; and safety engineer, J. M. Wolverton. The ventilation is very good and so much progress has been made with the handling of smoke (which in the past has often proved troublesome in some parts of

the mine) that considering the problem as very nearly mastered does not betray an undue amount of optimism. A Jeffrey aerovane fan has been installed at No. 10 shaft, and another fan of the same type and a Sirocco are used underground as boosters. The two surface fans are run constantly as long as the surface temperature remains above zero degrees Fahrenheit, below which natural ventilation, properly guided and assisted by boosters, proves quite sufficient. Samples of the mine-air taken in July under the most unfavourable conditions that could be discovered at the time, and at a point at which the smoke appeared very dense, were analysed at Ottawa, with the following results: Carbon dioxide, 0.15 per cent.; oxygen, 20.74 per cent.; carbon monoxide, *nil*; nitrogen, 79.11 per cent.; or air, 99.09 per cent.; and black-damp, 0.91 per cent. The small deficiency in oxygen and the total absence of carbon monoxide indicate efficient ventilation.

The production of rock-dust is combated by an abundant use of water. The working-places are thoroughly washed down and broken rock is sprayed before loading, as are the loaded cars on their way out. It may be noted here that dampening the ore as freely as is done in the stopes, in order to keep the dust down, is not assisting the flotation process at the mill, as rapid oxidation follows. One of the company's field engineers, L. Telfer, is in charge of the research-work undertaken in order to ascertain the nature of the dust carried in suspension by the air-current. The first point to be established was the actual quantity of dust of all sizes so held in suspension, and a simple and very satisfactory apparatus operated by compressed air was designed for the purpose. A small ejector creates a depression, drawing air through a Sprague meter and a Whatman's extraction-thimble enclosed in a steel shell and containing a wad of cotton-wool. The air passing through the apparatus is thus thoroughly filtered and the dust is trapped in the thimble. The latter, with the cotton-wool partly filling it, is weighed carefully on a chemical balance (turning on $\frac{1}{10}$ milligram) before and after the test. As each test may be extended over any length of time desired, the quantity of dust in suspension at any point may be estimated with great accuracy. Some difficulty is presented by the fact that cotton-wool absorbs water-vapour from the air and must be dried carefully before and after the test, following which it begins to gather moisture again with extraordinary rapidity, this becoming at times apparent even in the short time during which a thimble remains on the balance. Lately, this trouble has been largely overcome through the use of asbestos wool as filtering material. A Zeiss konimeter has been added to the equipment.

As the insoluble contents of the ore amount only to about 11 per cent. of the whole and it carries barely 3.5 per cent. of free silica, the dust produced in the stopes may be considered as being comparatively innocuous. Drifts and raises are driven in quartzite and penetrate the chert-zones surrounding the ore-bodies, with the result that the dust in such places is looked upon with considerable suspicion.

There are now about thirty wet pluggers on hand at the mine and practically all those in frequent use are of this type.

A number of 100-watt flood-lights have been in use in scraper stopes for some time with very satisfactory results. Several Model K Edison electric safety-lamps have also been obtained and seem to have met with the approval of shiftbosses and other officials who tried them.

Periodically, the employees are brought in groups of about twenty to the office of the safety engineer to hear a short address on accident-prevention. The writer attended some of these gatherings and found the subject treated in a very appropriate manner. The safety-first and accident-prevention committees continued their excellent work during 1934. The minutes of their meetings make very interesting reading, as does also each issue of the "Safety Bulletin" published every six months.

The number of shifts lost, owing to accidents, per thousand worked remained about the same as last year. The underground average stood at 4.4, against five in 1933, but an increase in the surface ratio offset this gain. All departments worked forty days (May 25th to June 5th) without a single lost-time accident. However, the number of shifts lost per thousand worked was appreciably higher in the course of the last six months than during the first half of the year, a matter that gave the officials no little concern. A rapid increase in the number of men employed may not have been entirely foreign to the enlargement of this percentage.

Hard-toed boots will soon be worn as generally as protective hats, gloves, and goggles are now.

First-aid classes were held in the fall at both MacDougal and Chapman camps, with a total attendance of 225 (about 200 being employees of the company), of which 213 took the final examination. There are now 555 certificate-holders at the mine and 294 at the mill, this bringing the percentage of employees qualified to render first aid to 89.

At the end of the year 72.5 per cent. of the employees were of British origin and 6.6 per cent. came from the U.S.A., while Scandinavians represented 10.1 per cent., Italians 5.7 per cent., and other Europeans 5.1 per cent. of the total.

In the course of inspections the conditions prevailing both underground and on the surface were always found very good, and on every occasion some improvement of one kind or another was observed.

The property of B.C. Cariboo Gold Fields, Limited, near Aldridge was also inspected during 1934.

GOLDEN MINING DIVISION.

The *Monarch* mine at Field, operated by Base Metals Mining Corporation, Limited, with F. Eichelberger as general superintendent, was included on the inspection list for 1934.

REVELSTOKE AND TROUT LAKE MINING DIVISIONS.

Such properties as the Alco Silver Mines, Limited: Meridian Mines, Limited: the *Gold Finch* claim, and the Teddy Glacier Mines were visited during 1934.

AINSWORTH AND SLOCAN MINING DIVISIONS.

Wellington.—This mine, under lease to Ross Mining Syndicate, has workings consisting of a long crosscut difficult to ventilate adequately with the equipment on hand and becoming rapidly inaccessible when the small fan in use is stopped.

Utica Mines, Ltd.—The ventilation at this mine depends on a galvanized-iron pipe in which circulation is induced by three compressed-air jets, and the workings were in good condition in this respect, but the ultimate capacity of this arrangement was nearly reached at the time of the last inspection, and the management was advised to procure a fan as soon as possible, particularly in view of the fact that the next step in the scheme of development has to be the driving of a long raise connecting the present workings with the level above them.

The *Whitewater*, Slocan Monitor Silver Mines, Limited. *Victor*, *Black Colt*, *Silversmith*, *Noble Five*, and *Molly Hughes* properties were inspected during 1934.

GRAND FORKS AND GREENWOOD MINING DIVISIONS.

General conditions were found to be satisfactory at the following properties during 1934: *Dictator*, *Waterloo*, *Lightning Peak*, *Pay Day*, *Yankee Boy*, *Union*, *White Swan*, *Helen*, *Dynamo*, *Providence*, and *North Star*. The two latter under control of Superior Gold Mines, Limited. *Dentonia*, *Rainbow* group, *C.O.D.*, *Beaver*, *Bell*, *Highland Lass*, *Sally*, *Wellington*, *Revenge*, *Tiger*, *Bounty*, *Olympic*, and *Carmi*, *Butcher Boy*, and *May*. The three latter controlled by Carmi Gold Mines, Limited.

NELSON MINING DIVISION.

The following properties were visited during 1934 and conditions found to be satisfactory: *Vcaus-Juno-Athabasca* group, *Granite-Poorman*, *Royal Canadian*, *Nevada*, *Perrier*, *California*, *Porto Rico*, *Fern*, *Euphrates*, *Goodenough* and *Ymir*. The two latter operated by the Ymir Consolidated Gold Mines, Limited; *Wilcox* and *Yankee Girl*.

At the property of the Two Star Mining Company samples of the mine-air analysed at Ottawa revealed the presence of a small percentage of carbon monoxide in the temporarily unventilated blind end of the Twilight drift. As a raise nearly 700 feet high will have to be driven before natural circulation is established, the ventilation will present a delicate problem and will require close attention during the present year.

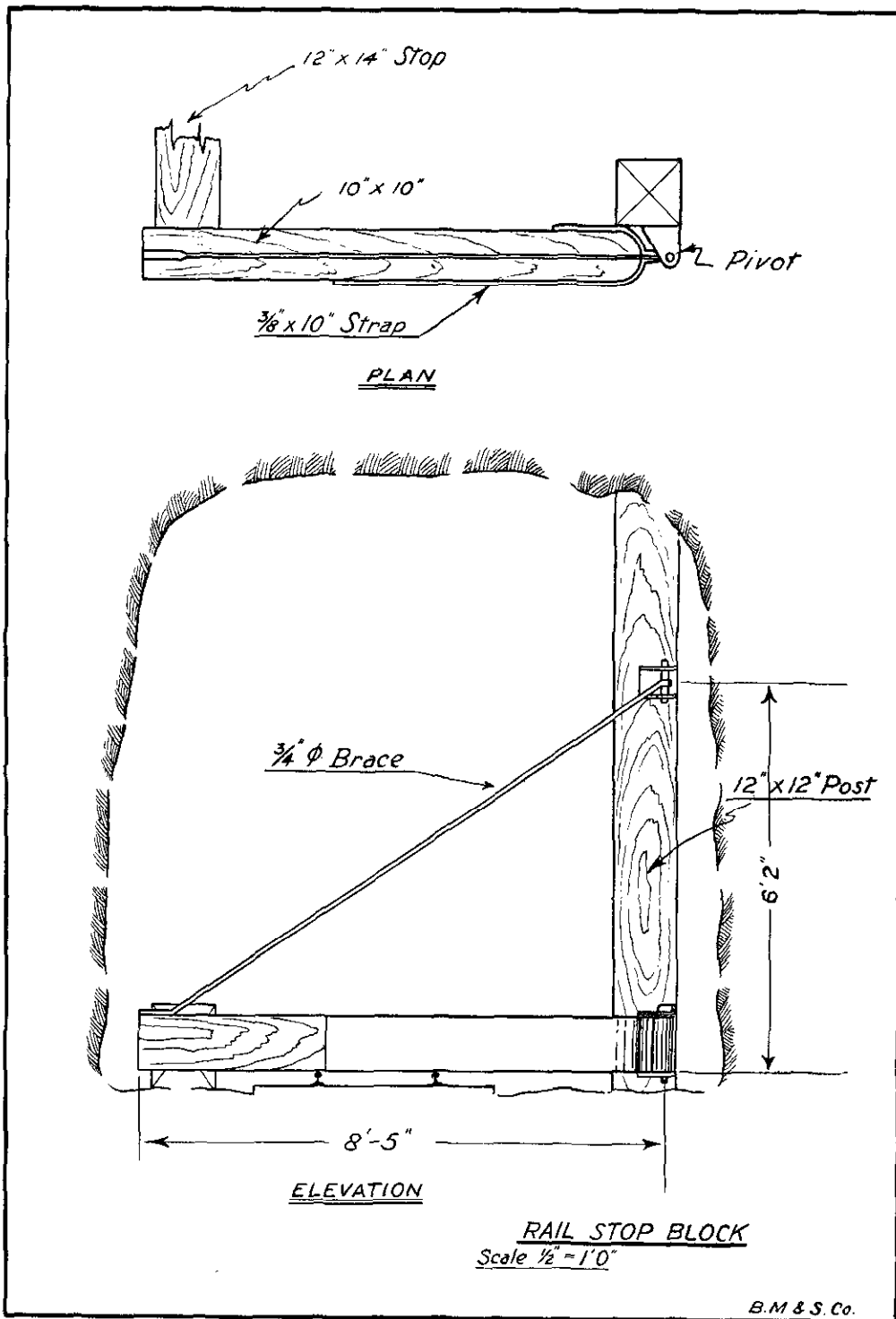
The *Dundee*, *Ymir*, *Centre Star*, *Howard*, *Clubine-Comstock*, *Aspen*, *Gold Belt*, *Reno*, *Kootenay Belle*, *Queen*, *Emma*, *Black Rock*, *Arlington*, and *Second Relief* properties were also inspected during 1934.

TRAIL CREEK MINING DIVISION.

Rossland properties inspected include the following leases: *Le Roi* shaft, *Le Roi Peyton* vein, *Black Bear* and *Le Roi*, *Centre Star*, *Iron Mask*, *Josie No. 1*, *Josie No. 2*, *Idaho* and *Idaho No. 2*, *Annie*, and *Nickel Plate*.

The *War Eagle*, *Virginia*, *Evening Star*, *North Star*, *Midnight*, *Gold Drip*, *I.X.L.*, *O.K.*, *Velvet Gold*, and *Portland* properties were also inspected in 1934.

The writer desires to express his grateful appreciation of the courteous manner in which he was received on all occasions, the friendly attitude assumed towards the suggestions advanced, and the sincere efforts made to maintain satisfactory conditions. Considerable progress was made in the course of the past year, and the willing co-operation met during that period justifies the hope that it may be possible to record still greater improvements at the end of 1935.



Rail Stop Block as used at Britannia Mine. (See page G 45.)

INDEX.

A.

	PAGE.		PAGE.
Accidents	G 7, 43	<i>Apez</i> (Alberni)	F 4
Active creek	E 9	(Osoyoos)	D 19
Aeroplane transport in Omineca Mining Division	C 17	Argentine Syndicate	B 24
Adams plateau	D 28	<i>Argo</i> (Greenwood)	D 7
A. G. Henderson Syndicate, Ltd.	C 25	Arntfield Mining Syndicate	E 22
<i>Alameda</i> (Nicola)	D 23	<i>Arrawana</i> (Osoyoos)	D 17
<i>Alberni</i> (Alberni)	F 2	Ashcroft, Epsom salts at	F 22
ALBERNI MINING DIVISION:		ASHCROFT MINING DIVISION:	
Report by Resident Mining Engineer	F 2	Report by Resident Mining Engineer	F 20
<i>Aldebaran</i> (Nass River)	B 14	Askalta Oil Co.	D 5
<i>Alexandra</i> (Nelson)	E 19	Assay Office, report by D. E. Whittaker	A 43
Alexandra coal mine	G 24	Assayers' examinations	A 43
Alexandria Gold Mines, Ltd.	F 7	<i>Astra</i> (Vancouver)	F 14
Alice Arm	B 17	Atlin Gold Mines, Ltd.	B 36
<i>Alice M. Fraction</i> (Greenwood)	D 9	<i>Athabasca</i> group (Nelson)	E 2, 3
<i>Allies</i> (Kamloops)	D 26	<i>Athelstan</i> (Grand Forks)	D 3
<i>Alone</i> (Portland Canal)	B 33	Atlas Exploration Co.	C 9
Alpha Mines Syndicate	E 28	<i>See also</i> Duthie Mines, Ltd.	
<i>Amandy</i> (formerly <i>Amanda</i>) (Greenwood) ..	D 6	ATLIN MINING DIVISION:	
<i>Amelia</i> (Greenwood)	D 9	Report by Resident Mining Engineer	B 34
American Smelting and Refining Co.	B 24	Gold, placer	B 36
<i>Amigo</i> (Omineca)	C 4	Atlin Pacific Mining Co., Ltd. (formerly	
<i>Anchor</i> (Greenwood)	D 5	Norgold Mines, Ltd.)	B 34
Anderson lake	F 27	Atlin Ruffner Lead-Silver Mines, Ltd.	B 36
Anderson Lake Mining and Milling Co., Ltd. F 27		<i>Aurum</i> group (Cariboo)	C 22
Anyox	B 11	Aveling coal mine	G 31

B.

Babine Gold Mines, Ltd.	C 11	B.E. Mining Co. <i>See</i> Twin Lakes Gold Mining Co., Ltd.	
<i>B.A. Fraction</i> (Greenwood)	D 10	<i>Bendor</i> (Kamloops)	D 26
Baker creek (Quesnel)	C 33	Bentonite, production	A 11
<i>Bald Mountain</i> (Skeena)	B 9	<i>Berlin Fraction</i> (Similkameen)	D 21
Bald mountain (Cariboo)	C 25	<i>Beverly</i> (Vernon)	D 32
<i>Barbara</i> (Portland Canal)	B 31	<i>Big Boy</i> (Clayoquot)	F 5
Basque, Epsom salts at	E 22	<i>Big Chief</i> (Fort Steele)	E 30
Bayview Mining Co., Ltd. (Portland Canal) B 18		<i>Big Hope Fraction</i> (Omineca)	C 8
<i>See also</i> United Empire Gold and Silver Mines, Ltd.		<i>Bighorn</i> (Atlin)	B 35
Barkerville, tungsten near	C 1	<i>Bighorn</i> (Atlin)	B 34
Barkerville section	C 20	<i>Bighorn river</i> (Atlin)	B 34
<i>Barkoola</i> (New Westminster)	F 16	<i>Big Missouri Mining Co., Ltd.</i>	B 25
<i>Batchelor</i> (Vernon)	D 34	<i>Big Missouri Mines Corporation.</i>	B 25
<i>Bay</i> (Greenwood)	D 8	<i>See also</i> Big Missouri Mining Co., Ltd.	
<i>Bayonne</i> (Nelson)	E 26	<i>Big Patch</i> (Nelson)	E 11
Bayonne Gold Mines, Ltd.	E 26	Biggs' mine	G 25
Bear creek (Nelson). <i>See</i> Oscar creek.		<i>Bill</i> (Osoyoos)	D 16
Bear river (Portland Canal)	B 18	Birch creek (Atlin)	B 36
Bear River ridge	B 18	<i>Birdie</i> (Atlin)	B 35
<i>Beaton</i> , placer (Atlin)	B 37	Birrel creek	C 34
<i>Beaver</i> , McKinney	D 9	Bismuth, production	A 11
<i>Beaver</i> , Wallace mountain	D 9	Bitter creek (Portland Canal)	B 23
Bear creek (Quesnel)	C 34	<i>Black Bear</i> (Nass River)	B 14
Beaverdell	D 9	(Quesnel)	C 32
Beavermouth (Quesnel)	C 33	<i>Blackbird</i> (Similkameen)	D 21
<i>Bell</i> (Grand Forks)	D 1	<i>Black Cat</i> (Cariboo)	C 18
(Greenwood), dividends declared.	7	<i>Blackcock</i> (Nelson)	E 13
BELLA COOLA MINING DIVISION:		<i>Black Diamond</i> (Nelson)	E 6
Report by Resident Mining Engineer	B 2	<i>Black Hawk</i> (Vernon)	D 34
Belle creek (Omineca)	C 17	<i>Blackhill</i> (Portland Canal)	B 24
Belmont-Surf Inlet Mines, Ltd.	B 5	Black mountain (Omineca)	C 12
<i>See also</i> Princess Royal Gold Mines, Ltd.		<i>Black Spider</i> (Vernon)	D 32
		Black Watch Syndicate (Nelson)	26

	PAGE.		PAGE.
Blair, R.	C 33	<i>Brandywine</i> group	F 13
<i>Blue Bell No. 2</i> (Vernon).....	D 31	Brewer creek (Vernon).....	D 32
<i>Blue Bird</i> (Grand Forks).....	D 3	Brick, production	A 11
<i>Bluebird</i> (Kamloops).....	D 26	Bridge Island Gold Mines, Ltd.....	F 10
Blue Flame mine.....	G 30	See also <i>Morris</i> .	
<i>Blue Hawk</i> (Vernon).....	D 34	Bridesville	D 9
<i>Blue Jack</i> (Vancouver).....	F 14	<i>Bristol Boy</i> (Greenwood).....	D 8
Blue Jack Mines, Ltd.....	F 14	<i>Britannia</i> , fatal accidents.....	G 45
<i>Blue Jay</i> , Okanagan lake.....	D 34	Rail stop-block, illustration	G 56
(Vernon).....	D 32	Britannia Mining and Smelting Co., at Quesnel	C 29
<i>Blue Lead</i> (New Westminster).....	F 16	B.C. Bonanza Mines, Ltd.....	B 27
<i>Blue Mule</i>	B 3	See also <i>Spider</i> .	
See also Haida Gold Mines, Ltd., and Kootenay.		B.C. Cariboo Gold Fields, Ltd.....	E 31
<i>Boas</i> (Grand Forks).....	D 3	B.C. Nickel Mines, Ltd.....	F 17
Bob creek (Omineca).....	C 18	Plan	F 18
Bobbie Burns creek.....	E 27	B.C. Silver Mines, Ltd.....	B 24
Bobjo Mines, Ltd.....	B 36	B.C. Sodium Syndicate.....	D 29
See also Atlin Ruffner Silver-Lead Mines, Ltd., and Atlin Pacific Mining Co., Ltd.		<i>B.C. Wonder</i> (Clayoquot)	F 5
<i>Bonanza</i> (Nass River).....	B 11	Bromley Vale coal mine.....	G 31
Bonanza creek (Nass River).....	B 12	Brooklyn Stenwinder Gold Mines, Ltd.....	D 8
<i>Boulder City</i> (Nelson).....	E 15	<i>B.R.X.</i>	F 30
Boulder creek (Atlin).....	B 36	Buena Vista Mining Co., Ltd.....	B 25
Boulder creek (Fort Steele).....	E 30	See also Big Missouri Mines Corporation.	
Boulder Mill creek.....	E 15	Bulkley Valley Colliery.....	G 31
Boundary creek (Greenwood)	D 7, 12	Bull creek (Atlin).....	B 36
Boundary Creek Mining Co., Ltd.....	D 12	Bull swamp (Queen Charlotte).....	B 2
<i>Bounty</i> (Greenwood)	D 9	<i>Bunker Hill</i> (Nass River).....	B 17
Bowser river	B 29	<i>Bunker Hill</i> (Nelson)	E 24
<i>Box</i> (Omineca)	C 13	Plan	E 25
Bradian Mines, Ltd.....	F 28	Bunker Hill Gold Mines, Ltd.....	E 24
Bralco Co.	D 9	Bunker Hill (Waneta) Mines, Ltd.....	E 24
Bralorne Mines, Ltd.....	B 7, 19, F 28	Burns Basin Gold Mines, Ltd.....	E 27
Accidents	G 47	<i>Buster</i> , Beaverdell	D 9
		<i>Butcher Boy</i> (Greenwood)	D 10
C.			
Cadmium, production	A 11	<i>Cariboo No. 1</i> (Cariboo)	C 21
Cadwallader creek	F 28	Cariboo Syndicate	C 33
<i>Cairn Gorn</i> (Greenwood).....	D 5	Cariboo Yankee Belle Mining Co., Ltd.....	C 30
<i>Cambria</i>	F 14	<i>Carmi</i> (Greenwood)	D 10
Cameron river	F 2	Carimi Gold Mines, Ltd.....	D 10
Camp creek	E 34	See also Canadian American Mines, Ltd.	
Camp McKinney Gold Hill Mining Co.....	D 9	Carpenter creek	E 33
Canada Coal Development Co., Ltd.....	G 31	<i>Carthage</i> group (Nelson).....	E 9
Canada Lode Gold Mines, Ltd.....	D 20	Cascade Coal Co., Ltd.....	G 31
See also Hedley Sterling Gold Mines, Ltd.		Cedar creek (Osoyoos).....	D 19
Canadian American Mines, Ltd.....	D 10	(Quesnel)	C 34
See later Carimi Gold Mines, Ltd.		Cedar Creek Mining Co.....	C 34
<i>Canadian Boy</i> (Grand Forks).....	D 3	Celista (Kamloops)	D 29
Canadian Collieries (Dunsmuir), Ltd.....	G 22	Cement, production	A 11
<i>Canadian Girl</i> (Nelson).....	E 6	<i>Centre Star</i> (Nelson).....	E 9
(Similkameen)	D 21	Plan	E 10
Canadian Rand Gold Mines, Ltd.....	F 28	<i>Challenger</i> (Osoyoos)	D 17
<i>Canary</i> (Omineca)	C 9	Chambers mine	G 26
<i>Capital Hill</i> (Portland Canal).....	B 24	Chickamnia river	B 30
<i>Capital Prize</i> (Greenwood).....	D 6	<i>Chieftain No. 1</i> (Nass River).....	B 12
<i>Cariboo</i> , McKinney	D 9	China creek	F 2
Cariboo Coronada Gold Mines, Ltd.....	C 25	Chisholm creek	C 27
Cariboo Coronada Mining Syndicate.....	C 25	Choate	F 17
Cariboo Consolidated Gold Mines, Ltd.....	C 22	<i>Cholla</i> (Lardeau)	E 34
Cariboo Gold Quartz Mining Co., Ltd.....	C 20	Chutine river	B 33
Cariboo lake	C 32	Clay, production	A 11
Cariboo Lode Mines, Ltd.....	C 20	CLAYOQUOT MINING DIVISION :	
CARIBOO MINING DIVISION :		Report by Resident Mining Engineer.....	F 5
Report by Resident Mining Engineer.....	C 18	<i>Cliff</i> (Trail Creek).....	E 37
Lode-mining	C 1	<i>Clifford Fraction</i>	D 6
Tungsten	C 1	<i>Climar</i> , McKinney	D 9
Cariboo Northern Development Co.....	C 15	CLINTON MINING DIVISION :	
		Report by Resident Mining Engineer.....	F 23

	PAGE.		PAGE.
Clubine Comstock Gold Mines, Ltd.	E 15	Consolidated Mining and Smelting Co. of	
Plan of mine	E 14	Canada, description of plant	E 37
<i>Clyde</i> (Nelson)	E 16	Drilling at Swansea	E 32
Coal, production tables	G 2	At Salmon Gold	B 29
Men employed	G 5	At Atlin	B 36
Foreign	G 6	Copper, price	A 8, 10
Production	A 11	Copper, production	A 11
Registered names of coals	G 16	Copper bay (Queen Charlotte)	B 4
Statistics	A 10	<i>Copper Chief</i> (Osoyoos)	D 18
Coal and Petroleum Act	A 41	Corbin Collieries, Ltd.	G 37
Coal Creek Colliery	G 34	Corless creek	C 18
Coal-dust	G 13	Cornish mountain	C 25
Coal mines, inspection	G 18	<i>Corona</i> (Nicola)	D 23
Coal-mine officials, examinations for	G 17	Coronada Extension Gold Mines, Ltd.	C 25
Coalmont	D 23	<i>Coronation</i> (Lillooet)	F 28
Coalmont Collieries, Ltd.	G 27	<i>Cosalite</i> (Cariboo)	C 26
Coal Sales Act	G 15	<i>Cosalite</i> (Cariboo)	C 22
<i>C.O.D.</i> (Greenwood)	D 6	Cottonwood canyon, Fraser river	C 27
Cody	E 33	Coughlan Gold Mines, Ltd.	E 34
Coke, statistics	A 10	Coulter creek (Portland Canal)	B 30
Columario Consolidated Gold Mines, Ltd.	C 2	<i>Cousin Jack</i> (Quesnel)	C 29
Plan	C 2	(Similkameen)	D 21
Columario Gold Mines, Ltd.		Cow mountain	C 20
See Columario Consolidated Gold Mines, Ltd.		Cowie's mine	G 26
Columbia Development Co. (Atlin)	B 37	Cracker creek (Atlin)	B 36
Columbia river	E 34	<i>Creek</i> (Grand Forks)	D 3
<i>Combination</i> (Nass River)	B 17	<i>Criterion</i> (Lardeau)	E 34
Comox Colliery	G 22	Crow's Nest Pass Coal Co., Ltd., dividends	
Compagnie Francaise des Mines d'or du		declared	A 7
Canada	B 37	Reference	G 34
<i>Comstock</i> (Cariboo)	C 26	Cultus creek (Nelson)	E 26
<i>Confederation</i> (Osoyoos)	D 17	<i>Cumshewa</i> (Queen Charlotte)	B 4
Congress Gold Mines, Ltd.	F 30	<i>Cup</i> (later <i>Gold</i>) (Omineca)	C 13
Consolation creek (Atlin)	B 36	Cyanide-mill, <i>Union</i>	D 3
Consolidated Mining and Smelting Co. of		<i>Cyclone</i> (Osoyoos)	D 18
Canada, dividends declared	A 7		

D.

Dangerous occurrences	G 13	<i>Dome</i> (Cariboo)	C 18
<i>Dardanelles</i> (Fort Steele)	E 29	Dome creek, tributary of Fraser river	C 18
<i>Dark Horse</i> (Osoyoos)	D 17	Dome mountain	C 11
<i>Datun</i> . See <i>Dayton</i> .		<i>Dominion</i> (Greenwood)	D 8
<i>Dayton</i> (not <i>Datun</i>) (Greenwood)	D 9	<i>Donnamore</i> (Kamloops)	D 28
<i>Dead Deer</i> (Similkameen)	D 21	<i>Doratha Morton</i>	F 8
<i>Deadman</i> (Slocan)	E 33	<i>Dorothea</i> (Osoyoos)	D 16
Deadman river	F 20	Dorreen	C 1
Demers Placers, Ltd.	E 34	Douglas creek (Skeena), gold, placer	B 11
Dentonia Mines, Ltd.	D 5	Drag-lines (Quesnel)	C 34
<i>Derby</i> (Vernon)	D 34	Dragon mountain	C 29
<i>Devonshire</i> (Vernon)	D 34	<i>Duncan Fraction</i> (Greenwood)	D 9
Dickson, James, report as Chief Inspector of		Dundee Gold Mines, Ltd.	E 7
Mines	G 1	See also Ymir Dundee Gold Mining Co.	
Dictator Gold Mines, Ltd.	D 4	Dunn, Robert, synopsis of laws	A 32
<i>Diadem</i> (Omineca)	C 5	Dunwell Mines, Ltd.	B 19
Diatomaceous earth, production	A 11	Plan and section	B 21
Dividends declared	A 7	Duthie Mines, Ltd.	C 5, 9
<i>Dividend-Lakeview</i> (Osoyoos)	D 13	<i>Dynamo</i> (Greenwood)	D 7
Dixon creek	D 26, 29	Dynamo Mines Syndicate. See <i>Dynamo Mining and Milling Co.</i>	
Doctor creek	E 28	Dynamo Mining and Milling Co.	D 7
Dolomite, production	A 11		

E.

<i>Eagle</i> (Skeena)	B 9	<i>Edith</i> (Vernon)	D 32
Eagle creek (Similkameen)	D 23	Edye pass	B 8
Eagle river (Queen Charlotte)	B 2	<i>Electric</i> (Greenwood)	D 6
EASTERN MINERAL SURVEY DISTRICT (No. 5):		(Nanaimo)	F 10
Report by Resident Mining Engineer	E 1	<i>Elkhorn</i> (Nass River)	B 14

	PAGE.		PAGE.
<i>Ell-Tee</i> (Nelson)	E 4	Erie creek	E 23
<i>El Oro</i> (Portland Canal).....	B 24	Esperanza Mines, Ltd.	B 14
Emperor Mines, Ltd.....	B 23	<i>Euphrates</i> (Nelson)	E 4
<i>Empire</i>	D 16	Euphrates Mining Co., Ltd.....	E 4
(Kamloops)	D 26	<i>Eva</i> (Lardeau)	E 34
Endako	C 13	<i>Evans</i> (Fort Steele).....	E 29
<i>Engineer</i> (Portland Canal).....	B 24	<i>Evening Star</i>	D 32
Engineer Gold Mines, Ltd., Inc.....	B 35	(Trail Creek)	E 37
Enid-Julie Mines, Ltd.....	F 8	<i>Evinrude</i> (Omineca)	C 7
<i>Enterprise</i> (Greenwood)	D 5	Ewings Landing	D 30
Enterprise Co.	C 22	<i>Excelsior</i> (Greenwood)	D 9
Epsom Refineries, Ltd.	F 22	Explosives	G 9
Epsom salts, Ashcroft, Basque.....	F 22		

F.

<i>Fairtide</i> (Queen Charlotte).....	B 4	Flux, production	A 11
Fairview Amalgamated Gold Mines, Ltd.....	D 14	<i>Flying Dutchman</i> (Golden).....	E 27
Fairview camp	D 16	(Nelson)	E 4
<i>Falcon</i> (Vernon)	D 30	<i>Foggy Day</i> (Lardeau).....	E 36
Falkland, gypsum at.....	D 29	FORT STEELE MINING DIVISION:	
Fanny bay	F 8	Report by Resident Mining Engineer.....	E 29
Fees, table of	A 37	Placer	E 32
Federal Mining and Smelting Co., at Duthie mine	C 7	Forty-nine creek	E 24
At <i>Sally</i>	D 10	<i>Foster</i> (Cariboo)	C 27
At <i>Stemwinder</i>	D 14	Foster Ledge Gold Mines, Ltd.....	C 27
Feeney property	F 13	<i>Francis No. 1</i> (Kamloops).....	D 26
Ferguson	E 36	Franklin camp	D 3
<i>Fern</i> (Nelson)	E 6	Franklin River (British Columbia) Gold Mines, Ltd.	F 2
Fertilizer plant at Trail.....	E 38	See also Franklin River Gold Mines, Ltd.	
Fiddick mine	G 26	Franklin River Gold Mines, Ltd.....	F 2
Fiddler creek	C 5	<i>Free Gold</i> (Omineca).....	C 11
Fife, cape, sands (Queen Charlotte).....	B 2	Freeland, P. B., report as Resident Mining Engineer	D 1
Fireclay, production	A 11	Free miners' certificates	A 32
<i>Fire Fly</i> (Grand Forks), Lightning peak.....	D 4	French Creek Development Co., Ltd.....	E 34
Fire lake	F 15	French flats (Quesnel).....	C 33
<i>First Chance</i> (Greenwood).....	D 4	French Snowshoe creek	C 29
<i>Florence</i> (Portland Canal).....	B 33		
(Similkameen)	D 21		

G.

Gagen creek	C 28	Gold, placer, Findlay creek.....	E 29
Geological Survey of Canada, work in British Columbia	A 30	Fraser river	F 23
<i>George E.</i> (Portland Canal).....	B 20	Fort Steele	E 32
<i>Georgia</i> (Trail Creek)	E 37	Forty-nine creek	E 24
<i>Georgina</i> (Nanaimo)	F 7	French creek	E 34
<i>Gertrude</i> (Osoyoos)	D 17	Grand Forks	D 3
<i>Gypsey</i> (Vernon)	D 34	Goldstream (Revelstoke)	E 34
<i>Gypsey No. 1</i> (Osoyoos).....	D 16	Hall creek	E 24
Glacier creek (Omineca)	C 5	Heffley	D 29
(Portland Canal)	B 19	Jamieson creek	D 29
<i>Glacier Gulch</i> (Omineca).....	C 5	Kamloops	D 29
Gladys lake (Atlin)	B 36	Kitsumgallum lake	B 10
<i>Gold</i> (formerly <i>Cup</i> group) (Omineca).....	C 13	Lardeau river	E 36
Gold, lode	A 11	Lecch river	F 1
Gold, placer	A 11	Lillooet river	F 33
Atlin	B 35	Louis creek	D 29
Baker creek	C 33	May creek	D 3
Camp creek (Revelstoke).....	E 34	Mission creek	D 34
Carnes creek	E 34	McLeod river	C 15
Columbia river	E 34	No. 2 District	C 1
Cherry creek	D 34	Noble creek	D 29
Deep creek (Vernon)	D 34	Pend d'Oreille river.....	E 24
Dixon creek	D 29	Quesnel river	C 33
Douglas creek	B 10	Revelstoke Mining Division	E 34
Dutch creek	E 29	Rock creek	D 12
		Rover creek	E 24

	PAGE.		PAGE.
Gold, placer, Salmo river.....	E 24	GOLDEN MINING DIVISION :	
Sauchi creek	C 15	Report by Resident Mining Engineer.....	E 27
Scotch creek	D 29	<i>Golden Zone</i> (Osoyoos).....	D 19
Siwash creek (Vernon)	D 34	<i>Golskeish</i> (Nass River).....	B 11
Squaw creek	B 36	<i>Goodenough</i> (Nelson)	E 12, 13
Smith creek (Revelstoke).....	E 34	<i>Good Hope</i> (Osoyoos).....	D 17
Tatshenshini river	B 36	Goose lake	D 32
Texas creek	F 33	Graham island	B 2, 3
Thompson river	F 23	Beach sands	B 2
Trout creek	D 34	<i>Granby Point</i>	B 11
Two Brothers lake.....	C 16	Granby Consolidated Mining, Smelting, and	
Vernon	D 34	Power Co.	B 11
Windermere Mining Division.....	E 29	GRAND FORKS MINING DIVISION :	
Woods lake	D 34	Report by Resident Mining Engineer.....	D 1
Yale	F 19	Grandoro Mines, Ltd.....	D 15, 16
Gold Belt Mining Co., Ltd.....	E 16	<i>See also</i> Grandoro Mining and Milling Co.	
<i>Gold Cliff</i> (Portland Canal).....	B 18	Grandoro Mining and Milling Co.....	D 15
Gold Coin Syndicate	C 32	<i>See also</i> Grandoro Mines, Ltd.	
<i>Gold Coinage</i> (Nelson).....	E 5	Grange Mines, Ltd.....	F 23
Gold Commissioners	A 45	Granite creek (Similkameen).....	D 23
<i>Gold Cup</i> (Atlin).....	B 35	Green Timber plateau.....	F 23
(Nicola)	D 25	GREENWOOD MINING DIVISION :	
<i>Gold Drip</i> (Trail Creek).....	E 37	Report by Resident Mining Engineer.....	D 5
<i>Goldfield</i> (Kamloops).....	D 28	Grindstones, production	A 11
Gold Mountain Mines (Similkameen).....	D 19	Grizzly Gold Mines	E 32
<i>See also Pollock.</i>		Guest (Similkameen), placer.....	D 23
<i>Gold Reef</i> (Nass River).....	B 15, 17	Guggenheim Bros.	B 24
<i>Gold Run</i> , Unuk river.....	B 33	<i>Gull</i> (Portland Canal).....	B 33
Gold Run Exploration Co.....	B 36	Gun creek	F 32
Goldside Mines, Ltd.	F 82	Gypsite, production	A 11
<i>Golden Age</i> (Nelson).....	E 4	Gypsum, production	A 11
<i>Golden Crown</i> (Omineca).....	C 2	(Kamloops), Falkland	D 29
<i>Golden Eagle</i> (Omineca).....	C 1, 12	<i>See also</i> Gypsum, Lime and Alabastine,	
<i>Golden Eagle Fraction</i> (Greenwood).....	D 5	Canada, Ltd.	
<i>Golden Fleece</i> (Similkameen).....	D 23	Gypsum, Lime and Alabastine, Canada, Ltd.....	D 29

H.

Haida Gold Mines, Ltd.	B 3	<i>Henderson</i> (Omineca), section	C 10
Hall creek	E 4, 24	Henderson creek	C 8
(Nelson)	E 5, 15	Henri creek (Similkameen).....	D 19
Hall dredge (Quesnel).....	C 34	<i>Hercules</i> (Lardeau)	F 36
Hamilton Creek Gold Mines, Ltd.....	F 22	Hercules Consolidated Mining, Smelting, and	
<i>Hardscrabble</i> (Cariboo), tungsten	C 1	Power Co.	F 8
<i>Hard Times Fraction</i> (Greenwood).....	D 9	<i>Hidden Creek</i> (Nass River).....	B 11
Hardy mountain	D 1	Hidden creek (Nelson).....	E 9
Harkley gulch (Portland Canal).....	B 23	<i>Highland</i> (Nass River)	B 17
Harrison lake	F 15	<i>Highland Chief</i> (Greenwood).....	D 9
Hastings arm	B 12	<i>Highland Lass</i> (Greenwood).....	D 9
Hat creek, coal on.....	G 31	Highland Lass, Ltd., dividend declared.....	A 7
<i>Hattie</i> (Trail Creek)	E 37	<i>Highland Queen</i>	D 9
Hayes creek	D 23	Hobson Silver Lead Co., Ltd.	E 6
<i>H.B.</i> (Nelson)	E 5	<i>See also</i> Ymir-Yankee Girl Gold Mines, Ltd.	
<i>Hebson</i> (Quesnel)	C 31	<i>Home</i> (Quesnel)	C 32
<i>Hecla</i> (Osoyoos)	D 16	<i>Homestake</i> , McKinney	D 9
Hedley creek	D 19	(Nass River)	B 15
Hedley Amalgamated Gold Mines, Ltd.....	D 18	Plan and section.....	B 16
<i>See also</i> Peggy.		(Skeena)	B 6
Hedley Gold Hill Mining Co., Ltd.....	D 19	(Vernon)	D 32
Hedley Gold Mining Co., Ltd.....	D 17	<i>Homestead</i> (Similkameen)	D 21
<i>See also</i> Kelowna Exploration Co.		Horsefly river	C 1
Hedley Mascot Gold Mines, Ltd.....	D 18	Horsefly section	C 32
Hedley Sterling Gold Mines, Ltd.....	D 20	Howe Sound Co., dividends declared.....	A 7
<i>See also Patsy and Canada Lode Gold</i>		Huckleberry creek	E 9
Mines, Ltd.		Huckleberry mountain	C 12
Heffley creek	D 29	Hudson Bay mountain, manganese.....	C 5
<i>Helen</i> (Greenwood)	D 6	<i>Hummer</i> (Omineca)	C 4
Helen Mining Co.....	D 7	Hydraulic	C 34
Hellroaring creek	E 29	Hydro-electric development	G 7
<i>Henderson</i> (Omineca)	C 9	Hydro-electric power (Cariboo).....	C 1

I.	
PAGE.	PAGE.
<i>Ideal</i> (Vernon).....	D 34
<i>Ideal Gold and Nickel Mines, Ltd.</i>	F 19
<i>I'll Chance It</i> (Nass River).....	B 14
<i>Imperial</i> (Greenwood).....	D 9
<i>Incomappleux river</i>	E 35
<i>Independence</i> (Cariboo).....	C 24
(Osoyoos).....	D 15
<i>Indian</i> (Omineca).....	C 4
<i>Inspection of coal mines</i>	G 18
<i>Inspection of mines, report by Chief Inspector of Mines</i>	G 1
<i>International Placers, Ltd.</i>	D 23
<i>Iona</i> (Nelson).....	E 5
<i>Iron and Steel Bounties Act, 1920</i>	A 30
<i>Iron Dollar</i> (Omineca).....	C 8
<i>Iron oxide</i>	A 11
<i>Isaac creek</i>	E 34
<i>Iskut river</i>	B 33
<i>Island Mountain Mines, Ltd.</i>	C 22
Plan.....	C 23
<i>I.X.L. Leasors, Ltd.</i>	E 37
J.	
<i>Jamieson creek</i>	D 26, 29
<i>Jakin</i> (Grand Forks).....	D 3
<i>Jeannie</i> (Skeena).....	B 8
<i>Jennie Long</i> (Nicola).....	D 24
<i>Jewel</i> (Greenwood).....	D 5
<i>Jewel lake</i>	D 6
<i>Jim Hill</i> (Greenwood).....	D 4
<i>Jingle Pot mine</i>	G 25
<i>Johns creek</i>	D 17
<i>Jolly creek</i> (Greenwood).....	D 12
<i>Jolly Jack</i> (Vernon).....	D 32
<i>Jowett, Mrs.</i>	E 36
<i>Jumbo</i> (Omineca).....	C 8
(Trail Creek).....	E 37
(Vernon).....	D 31
(Vernon), Monashee mountain.....	D 34
<i>Jumbo No. 1</i> (Osoyoos).....	D 17
<i>Junction</i> (Osoyoos).....	D 17
<i>Juno</i> (Nelson).....	E 2, 3
K.	
<i>Kalamalka Mines Syndicate</i>	D 32
KAMLOOPS MINING DIVISION:	
Report by Resident Mining Engineer.....	D 26
Gold, placer.....	D 29
<i>Kathlyn lake</i>	C 5
<i>Keithley</i>	C 29
<i>Kelly</i> (Vernon).....	D 34
<i>Kelowna Exploration Co.</i>	D 17
See also Hedley Gold Mining Co.	
<i>Kenneth</i> (Portland Canal).....	B 24
See also Argentine Syndicate.	
<i>Kereemos creek</i>	D 19
<i>Ketchum creek</i>	B 31
<i>Key</i> (Windermere).....	E 28
<i>Killam gravel mine</i>	C 27
<i>Killarney</i> (Grand Forks).....	D 4
<i>Kimberley Goldfields Consolidated, Ltd.</i>	E 30
<i>Kimberley Goldfields Syndicate</i>	E 30
<i>King</i> (Portland Canal).....	B 23
See also Emperor Mines, Ltd.	
<i>King Midas Mining Co.</i>	F 6
<i>King Mining and Development Co.</i>	C 33, 34
<i>King Tut</i> (Kamloops).....	D 28
<i>Kitsalas canyon and mountain</i>	C 4
<i>Kitsault river</i>	B 14
<i>Kitsumgallum lake</i>	B 10
<i>Kleanza</i> (Omineca).....	C 2
<i>Kleanza Co.</i>	C 2
<i>Kleanza mountain</i>	C 2
<i>Klondyke No. 1 Fraction</i> (Nelson).....	E 6
<i>Knauss creek</i>	C 5
<i>Kootenay</i> (Queen Charlotte).....	B 3
See also <i>Blue Mule</i> .	
<i>Kootenay Belle</i> (Nelson).....	E 19
Plan.....	E 21
<i>Kootenay Belle Gold Mines, Ltd.</i>	E 19
<i>Kootenay harbour</i> (Queen Charlotte).....	B 3
<i>Kootenay lake</i>	E 26
<i>K. Partnership</i>	C 2
<i>K.V.</i> (Cariboo).....	C 26
L.	
<i>Lake Kathlyn Anthracite Coal Co., Ltd.</i>	G 32
<i>Lakelse lake</i>	B 10
<i>Lakeside Mines, Ltd.</i>	D 33
<i>Lakeview</i> (Greenwood).....	D 6
<i>Lake View</i> (Nelson).....	E 6
<i>Lakeview Mines, Ltd.</i> (Portland Canal).....	B 22
<i>L. & L. group</i> (Portland Canal).....	B 24
<i>Lantzville Collieries, Ltd.</i>	G 24
<i>La Porte group</i> (Skeena).....	B 9
<i>Lardeau creek, placer</i>	E 36
LARDEAU MINING DIVISION:	
Report by Resident Mining Engineer.....	E 34
<i>Last Chance</i> (Slocan).....	E 33
<i>Last Hope</i> (Omineca).....	C 8
<i>Lawless creek</i>	D 23
<i>Lawn Hill</i> (Queen Charlotte).....	B 2
<i>Lawsan Landing</i>	B 34
<i>Lay, Douglas, report as Resident Mining Engineer</i>	C 1
<i>Lead, price</i>	A 8, 10, 11
<i>Lead</i> (Fort Steele).....	E 31
<i>Leech river</i>	F 1
<i>Lemon creek</i> (Quesnel).....	C 32
<i>Le Roi, McKinney</i>	D 9
LIARD MINING DIVISION:	
Report by Resident Mining Engineer.....	B 33
<i>Lightning creek</i>	C 28
<i>Lightning peak</i>	D 3
<i>Lightning Peak group</i> (Greenwood).....	D 4
LILLOOET MINING DIVISION:	
Report by Resident Mining Engineer.....	F 26
Placer.....	F 33
<i>Lily May</i> (Fort Steele).....	E 29
<i>Lime and limestone</i>	A 11
<i>Limestone for flux</i>	A 11
<i>Limpid creek</i>	E 23
<i>Lincoln</i>	D 28
See also <i>Wallace</i> .	
<i>Lincoln creek</i> (Atlin).....	B 36
<i>Little Joe</i> (Omineca).....	C 8

	PAGE.		PAGE.
<i>Little Manx</i> (Osoyoos).....	D 13	<i>Lost Horse</i> (Osoyoos).....	D 17
Little Mustang creek.....	C 26	Lost valley (Cariboo).....	C 28
Little Snowshoe creek.....	C 29	Louis creek, placer.....	D 29
<i>J.L. and H.</i> (Portland Canal).....	B 23	Lowrie creek.....	C 5
Plan and section.....	B 24	<i>Lucky Date</i> (Portland Canal).....	B 24
<i>Long Chance</i> (Quesnel).....	C 32	<i>Lucky Jack</i> (Lardeau).....	E 34
<i>Longsley</i> (Nelson).....	E 9	<i>Lucky Luke</i> (Omineca).....	C 4
Lorne creek (Omineca).....	C 18	<i>Lucky Strike</i> (Nass River).....	B 17
<i>Lost Cabin</i> (Nelson).....	E 4		

M.

Mackay leases.....	F 1	Mineral claims, staking of.....	A 33
Mackay Gold Syndicate.....	B 30, 31	Mineral creek.....	F 2
Mackay lake.....	B 30	Mineral Survey and Development Act.....	A 38
<i>Macawber</i> (Osoyoos).....	D 16	Mines Development Act.....	A 38
Magnesium sulphate.....	A 11	Mining Corporation of Canada.....	B 35, E 6
Mak Secar Gold Mines, Ltd.....	D 15	At <i>Proserpine</i>	C 24
<i>Mamie</i> (Omineca).....	C 7	Mining industry.....	A 7
Plan.....	C 7	Mining Issues Corporation.....	C 9
<i>Momont</i> (Greenwood).....	D 7	Mining laws, synopsis, R. Dunn.....	A 32
Mandy, Joseph T., report as Resident Mining Engineer.....	B 1	Mining Recorders.....	A 45
Manery creek.....	D 15	Mink gulch (Cariboo).....	C 25
Manganese (Omineca).....	C 5	<i>Miraculous</i> (Osoyoos).....	D 17
Hudson Bay mountain.....	C 5	Mitchell harbour.....	B 3
<i>Maple Leaf</i> (Greenwood).....	D 6	<i>Moltka</i> (Osoyoos).....	D 16
<i>Marathon</i> (Similkameen).....	D 21	<i>Molybdenite</i> (Omineca), at <i>Stella</i>	C 13
<i>Marmot</i> (Portland Canal).....	B 24	<i>Monarch</i> (Osoyoos).....	D 16, 17
<i>Marmot</i> river.....	B 24	Monashee Mines Syndicate, Ltd.....	D 11
Maroon mountain (Skeena).....	B 10	See also New Monashee Mines, Ltd.	
Martin creek (Cariboo).....	C 25	Monashee mountain.....	D 33, 34
Mary Reynolds Mining Co.....	D 25	Money Spinner Gold Mines, Ltd.....	F 15
Marysville Mining Co.....	E 29	<i>Monitor</i> (Slocan).....	E 33
<i>Marie</i> (Vernon).....	D 32	<i>Moody</i> (Grand Forks).....	D 3
<i>Mariposa</i> (Lillooet).....	F 26	<i>Moody</i> creek (Grand Forks).....	D 3
Martin gulch.....	F 1	<i>Moonlight</i> (Cariboo).....	C 26
<i>Mascot</i> (Skeena).....	B 9	Morhead creek (Quesnel).....	C 34
<i>Mascot Fraction</i> (Osoyoos).....	D 18	<i>Mormon Girl</i> (Nelson).....	E 24
<i>Mastodon</i> (Nass River).....	B 12	<i>Morning</i> (Alberni).....	F 4
Mine-plan.....	B 13	(Similkameen).....	D 21
<i>Maud</i> (Nass River).....	B 17	<i>Morning Glory No. 1</i> (Greenwood).....	D 9
(Portland Canal).....	B 24	Morning mountain (Nelson).....	E 2
<i>May</i> (Greenwood).....	D 10	<i>Morning No. 2</i> (Greenwood).....	D 4
(Osoyoos).....	D 16	See also <i>Dictator</i> .	
May creek (Grand Forks), gold, placer.....	D 3	<i>Morning Star</i> (Nelson).....	E 8
<i>Mayflower</i> (Portland Canal).....	B 24	<i>Morning Star</i> (Fairview) Gold Mines, Ltd.....	D 13
<i>May Queen</i> (Fort Steele).....	E 31	<i>Morris</i> (Nanaimo).....	F 12
Melville creek (Portland Canal).....	B 30	See also Bridge Island Gold Mines Co., Ltd.	
Men employed.....	A 23	<i>Mosquito creek</i> , tributary of <i>Lightning creek</i>	C 29
Meridian Mining Co., Ltd.....	E 34	<i>Mosquito King</i> (Kamloops).....	D 29
Metalliferous Mines Regulation Act.....	A 40	<i>Mother of Cloud</i> (Skeena).....	B 10
Inspection under.....	G 42	Mount Evelyn Mines, Ltd. See Skeena Gold and Silver Mines.	
Mica.....	A 11	Moyie river.....	E 30
(Skeena).....	B 10	Placer.....	E 32
Michel Colliery.....	G 35	<i>Munro</i> group.....	B 26
<i>Michigan</i> (Similkameen).....	D 21	McCulloch creek.....	E 34
<i>Midas</i> (Quesnel).....	C 29	McDougall river.....	C 13
Middlesboro Collieries, Ltd.....	G 29	McGillivray creek.....	F 27
<i>Midnight</i> (Trail Creek).....	E 37	McKee creek (Atlin).....	B 36
<i>Midway</i> (Fort Steele).....	E 31	McKee lake (Quesnel).....	C 32
<i>Mighty Midas</i> (Trail Creek).....	E 37	McKendrick mountain.....	C 11
Mill, Vidette.....	F 20	McKinney camp.....	D 9
Grange.....	F 23	McLair (not McLaren) creek (Omineca).....	C 16
Columario.....	C 3	McLaren creek (Omineca). See McLair creek.	
Dentonia.....	D 5	<i>McLeod</i> (Grand Forks).....	D 3
<i>Athabasca</i>	E 2	McLeod river.....	C 13, 14, 15
Twin Lakes.....	D 16	McQuillan creek (Portland Canal).....	B 31
Mill, cyanide, <i>Reno</i>	E 19	McRae creek.....	D 3
<i>Nickel Plate</i>	D 18		
Mineral Act.....	A 32		

N.

	PAGE.		PAGE.
<i>Nabob</i> (Skeena)	B 8	Noble Five creek (Omineca)	C 2
NANAIMO MINING DIVISION:		Noble Five Mines, Ltd.	E 33
Report by Resident Mining Engineer.....	F 6	At <i>Athbasca, Venus</i>	E 2
<i>Nancy</i> (Osoyoos)	D 17	<i>Nodaway</i> (Greenwood)	D 9
<i>Nancy Bell</i> (Nanaimo)	F 11	Noman creek	E 5
NASS RIVER MINING DIVISION:		Non-metallics, sodium carbonate.....	D 29
Report by Resident Mining Engineer.....	B 11	Gypsum	D 29
National Gold Mines, Ltd.	F 27	Kamloops Mining Division.....	D 29
<i>Nelson</i> (Osoyoos)	D 19	Mica (Skeena)	B 10
NELSON MINING DIVISION:		<i>Sericite</i> (Skeena), mica.....	B 10
Report by Resident Mining Engineer.....	E 2	Non-shipping mines	A 30
Placer	E 24	Norgold Mines, Ltd. (later Atlin Pacific Min- ing Co., Ltd.)	B 34
<i>Nest Egg</i> (Trail Creek)	E 37	<i>Noranda</i> (Quesnel)	C 32
Newmont Mining Corporation	C 22	NORTH-EASTERN MINERAL SURVEY DISTRICT	
NEW WESTMINSTER MINING DIVISION:		(No. 2):	
Report by Resident Mining Engineer.....	F 15	Report by Resident Mining Engineer.....	C 1
Nicholson creek (Greenwood)	D 8	Northern Reef Gold Mines, Ltd.	C 14
(Omineca)	C 5	Northland Mining Co., Ltd.	B 28
Nicholson Creek Mining Corporation.....	C 5	<i>North Star</i> (Greenwood)	D 5
Nicola Mines and Metals, Ltd.	D 24	North Thompson river.....	D 26
NICOLA MINING DIVISION:		NORTH-WESTERN MINERAL SURVEY DISTRICT	
Report by Resident Mining Engineer.....	D 23	(No. 1):	
Nigger basin (Quesnel)	C 29	Report by J. T. Mandy.....	B 1
Nigger creek (Quesnel)	C 32	<i>No. 2</i> (Greenwood)	D 8
Noble creek	D 29		

O.

O'Donnel river (Atlin)	B 36	OMINECA MINING DIVISION:	
Office statistics	A 48	Report by Resident Mining Engineer.....	C 2
<i>Ogo Fan No. 1</i> (Greenwood)	D 9	Gold, placer	C 14
O'Grady, B. T., report as Resident Mining Engineer	E 1	<i>Onyx</i> (Kamloops)	D 29
<i>O.K.</i> (Trail Creek)	E 37	<i>Orlando</i> (Osoyoos)	D 16
Okanagan valley	D 30	<i>Oro Fino</i> (Osoyoos)	D 15
Olalla creek	D 19	Oscar creek (Nelson)	E 6
<i>Old Bill</i> (Nelson)	E 7	Osoyoos Mines, Ltd.	D 13
Old Red Mill.....	E 37	OSOYOOS MINING DIVISION:	
<i>Oliver</i> (Osoyoos)	D 17	Report by Resident Mining Engineer.....	D 13
Olivine mountain	D 23	Ottarasko river	F 13
<i>Old Bird</i> (Greenwood)	D 5	<i>Ottawa</i> (Similkameen)	D 21
Olympic Gold Mines, Ltd.	F 31	Ottawa creek	E 36
		Otter creek (Atlin)	B 36
		<i>Owl</i> (Portland Canal)	B 33

P.

Pacific Mines, Petroleum, and Development Co., Ltd.	B 18	Phosphate, production	A 11
Palmer Bar creek	E 32	Phosphate-mining Act, 1925.....	A 39
<i>Palmey</i> (Portland Canal)	B 24	Pilot Gold Mines, Ltd.	F 32
Parvenue Mines. <i>See</i> Twin Lakes Gold Min- ing Co., Ltd.		Pine creek (Atlin)	B 36
<i>Patmore</i> (Cariboo)	C 1	<i>Pine Knot</i> (Similkameen)	D 19
<i>Patmore</i> group (Omineca)	C 5	Pinewill Mining Co.	D 29
<i>Patsy</i> (Similkameen)	D 20	<i>Pinkerton</i> (Cariboo)	C 20
Paul creek (Osoyoos)	D 17	<i>Pioneer</i> (Omineca)	C 11
<i>Pawn</i> (Portland Canal)	B 32	Pioneer Gold Mines of B.C., Ltd., dividends declared	A 7
<i>Pay Day</i> (Grand Forks)	D 4	Reference	F 28
<i>Peggy</i> (Osoyoos)	D 18	Accidents	G 47
(Vernon)	D 32	Pitman	C 2
Pemberton area	F 26	Placer claims, staking of.....	A 33
Pend d'Oreille river.....	E 23	Placer-mining Act	A 32
Placer	E 24	Placer-mining leases	A 35, 36
Perry creek	E 30, 32	Platinum, production	A 11
Philip creek (Omineca)	C 18	Platinum, Tulameen river.....	D 23
Phillips arm	F 6, 7	Playfair Gold Mines, Ltd.	B 23
<i>Phoebus</i> (Nelson)	E 4	Plan	B 24
<i>Phoenix</i> (Omineca)	C 5	Pleasant Valley Mining Co., Ltd.	G 30
		<i>Polestar</i> (Kamloops)	D 26

	PAGE.		PAGE.
<i>Pollock</i>	D 19	Princess Royal Gold Mines, Ltd.....	B 5
<i>See also</i> Gold Mountain Mines, Ltd.		<i>See also</i> Belmont Surf Inlet Mines, Ltd.	
Porcher island	B 6	Princeton	G 30
Porcupine Goldfields Development Finance Co., Ltd.	E 6	Production tables	A 11
<i>Porter-Idaho</i> (Portland Canal)	B 24	Production, computation of	A 8, 10
<i>Portland</i> (Portland Canal)	B 29	Prosecutions	G 14
PORTLAND CANAL MINING DIVISION:		Proserpine Gold Mines, Ltd.....	C 24
Report by Resident Mining Engineer.....	B 17	Proserpine mountain (Cariboo).....	C 25
Pottery, production	A 11	Proserpine Syndicate	C 24
Pre Cambrian Gold Mines, Ltd.....	D 29	Prospectors, aid to.....	A 38
<i>See also</i> <i>White Elephant</i> .		Lectures to	A 30
Premier Gold Mining Co., Ltd., dividends de- clared	A 7	<i>Prosperity</i> (Portland Canal).....	B 24
Reference	B 24	Prout plateau	B 30
Premier Gold Mining Co., at <i>Arlington</i>	E 23	<i>Providence</i> (Greenwood)	D 6
At <i>Alexandria</i>	F 7	<i>Province</i> (Portland Canal).....	B 26
<i>Pride of Emory</i> (Yale).....	F 17	Provisional Free Miners' Certificates (Placer) Act	A 37
Prince George	C 18	<i>Pueblo Fraction</i> (Greenwood)	D 9
		<i>Pugsley</i> (Skeena)	B 5

Q.

Quarries, inspection of	G 39	Queen Charlotte Islands, beach sands.....	B 2
Quartz for flux.....	A 11	QUEEN CHARLOTTE MINING DIVISION:	
<i>Quartz Mountain</i> (Fort Steele).....	E 30	Report by Resident Mining Engineer.....	B 2
QUATSINO MINING DIVISION:		QUESNEL MINING DIVISION:	
Report by Resident Mining Engineer.....	F 6	Report by Resident Mining Engineer.....	C 29
<i>Queen</i> (Nelson). section of workings.....	E 18	Quesnelle Quartz Mining Co., Ltd.....	C 19
Queen Charlotte islands	B 2	Plan of workings	C 19
Gold, placer	B 2		

R.

Radiore Co. of Canada, at <i>Dunwell</i>	B 19	Richmond, A. M., report as Resident Mining Engineer	F 1
<i>Rainbow</i> (Cariboo)	C 20	Richter pass	D 17
<i>Rainbow Hill</i> (Nelson)	E 5	<i>Rico Aspen</i> (Omineca)	C 8
<i>Rampalo</i> (Grand Forks).....	D 4	<i>Rio Grande</i> (Omineca).....	C 8
Raven mountain	D 23	Rio Grande Syndicate.....	C 8
<i>Redbird</i> (Skeena)	B 9	Riprap, production	A 11
Reed creek (Omineca)	C 13	<i>Rob Roy</i> (Greenwood).....	D 9
Registered names of coals.....	G 16	<i>Robert Dunsmuir</i> (Nicola).....	D 25
<i>Relief-Arlington Mines, Ltd.</i>	E 23	Rock creek (Greenwood), placer.....	D 12
Reno Gold Mines, Ltd.....	E 15	Rock Creek Consolidated Placers.....	D 12
Section	E 16	<i>Roddick</i> (Yale)	F 19
Accident	G 45	<i>Roderick Dhu</i> (Greenwood).....	D 6
<i>Republic</i> (Greenwood)	D 8	Roderick Dhu mountain.....	D 6
Rescue-stations	G 14, 18	<i>Rosalie</i> (Nelson)	E 9
REVELSTOKE MINING DIVISION:		Ross mill	C 2
Report by Resident Mining Engineer.....	E 34	Rover creek	E 24
Gold, placer	E 34	Royal Development Co.....	D 1
<i>Revenge</i> , Beaverdell	D 9	Rubble, production	A 11
Revenue Mining Co., Ltd.....	C 36	<i>Ruby</i> (Queen Charlotte).....	B 4
Reward Mining Co.....	C 22	Ruby creek (Atlin).....	B 36
<i>Rhone Fraction</i> (Osyoos).....	D 16	<i>Rupert</i> (Queen Charlotte).....	B 3
Richardson mine	G 26	<i>See also</i> <i>Haida Gold Mines, Ltd.</i>	
Richfield Cariboo Gold Mines, Ltd.....	C 25	<i>Ruth and Francis</i> (Portland Canal).....	B 24
At Fire lake.....	F 16		
Richfield creek	C 13		

S.

Saddle Mines, Ltd.....	C 29	Salmon Gold Mines, Ltd.....	B 29
<i>Sailor</i> , McKinney	D 9	Salmon river (Portland Canal).....	B 24
<i>Sally</i> (Greenwood)	D 9	Sand and gravel	A 11
<i>Sally Fraction</i> (Greenwood).....	D 9	Savona Gold Mines, Ltd.....	F 21
<i>Sally Mines, Ltd.</i>	D 9	Sawmill creek (Fort Steele).....	E 30, 33
Salmo river, gold, placer.....	E 24	Scotch creek	D 29
Salmo-Malartic Mines, Ltd.....	E 22	<i>Second Relief</i> (Nelson).....	E 23
Salmon-Bear River Mining Co., Ltd.....	B 25	<i>Sericite</i> (Skeena)	B 10

	PAGE.		PAGE.
<i>Shamrock</i> (Osoyoos)	D 17	SOUTHERN AND CENTRAL MINERAL SURVEY	
Shatford creek	D 19	DISTRICTS (NOS. 3 AND 4):	
Sheep Creek camp	E 15	Report by Resident Mining Engineer.....	D 1
Sheep Creek Gold Mines, Ltd.....	E 17	<i>Speculator</i> (Osoyoos)	D 17
Sheffield Gold and Silver Mines, Ltd.....	D 23	<i>Speedwell</i> (Kamloops)	D 28
Shelly Syndicate	F 22	<i>Spider</i> (Portland Canal).....	B 27
Sheridan, placer lease.....	C 34	<i>Spokane</i> (Atlin)	B 34
Shipping-mines	A 23-A 29	Spokane-Idaho Copper Co.....	E 4
Shoal bay	F 6, 7	<i>Spondulix</i> (Omineca)	C 8
Shoal Bay Mining Syndicate.....	F 10	Squaw creek (Atlin), gold, placer.....	B 36
Shoemaker creek	D 19	Spruce creek (Atlin).....	B 36, 37
Shuswap lake	D 29	<i>St. Teresa</i> (Fort Steele)	E 30
Silver, production	A 11	<i>Standard</i> (Osoyoos)	D 16
Price	A 8, 10	<i>Standard Fraction</i> , Beaverdell.....	D 9
At depth, Hudson Bay mountain.....	C 5	Stanley	C 27
<i>Silver Cloud</i> (Greenwood).....	D 8	<i>Star</i> (Portland Canal).....	B 24
Silver Cup mountain (Lardeau).....	E 36	<i>Star of Hope</i> (Osoyoos).....	D 19
<i>Silver Lake</i> (Omineca).....	C 6	<i>Starveout Fraction</i> (Greenwood)	D 7
<i>Silverine</i> (Trail Creek).....	E 37	Statistical tables	A 11
Silversmith Mines, Ltd.....	E 33	<i>Stella</i> (Omineca), molybdenite.....	C 13
<i>Silver Spot</i> (Greenwood).....	D 3	<i>Stemwinder</i> (Greenwood)	D 8
SIMILKAMEEN MINING DIVISION:		(Osoyoos)	D 13
Report by Resident Mining Engineer.....	D 19	Stemwinder Mountain Mines, Ltd. See Hed-	
Gold, placer	D 23	ley Amalgamated Gold Mines, Ltd.	
Similkameen river	D 19	Steven creek	D 23
<i>Simons</i> (Lilloet)	F 32	Stevens, placer lease	C 34
Siwash creek (Yale).....	F 19	Stewart Mining and Development Co., Ltd..	B 19
Siwash Gold Placers, Ltd. (Similkameen).....	D 23	STIKINE MINING DIVISION:	
Six-mile mountain, south-east of Prince		Report by Resident Mining Engineer	B 33
George	C 19	Stikine river	B 33
<i>S.K.</i> (Portland Canal).....	B 32	Stoue, production	A 11
Skaret creek	C 18	<i>Storm</i> (Nass River).....	B 17
Skeena Development Syndicate.....	G 31	Stronach mine	G 25
Skeena Gold and Silver Mines, Ltd.....	C 9	Sugar creek (Cariboo).....	C 26
See also Mount Evelyn Mines, Ltd.		<i>Sullivan</i> (Fort Steele).....	E 31
SKEENA MINING DIVISION:		(Nelson)	E 27
Report by Resident Mining Engineer.....	B 4	Sulphur, production	A 11
<i>Skookum</i> (Vernon)	D 34	Sulphide creek (Portland Canal). See Mc-	
<i>Skookum Boy</i> (Nelson).....	E 5	Quillan creek.	
<i>Skylark</i> (Greenwood)	D 8	<i>Sulphurette</i> (Portland Canal).....	B 31
Slate, production	A 11	Sulphurettes Prospecting Syndicate.....	B 33
Slate creek (Similkameen)	D 23	<i>Summit</i> (Nass River)	B 17
SLOCAN MINING DIVISION:		<i>Sunrise</i> (Osoyoos)	D 17
Report by Resident Mining Engineer.....	E 33	Superior Mines, Ltd.....	D 5
Slocan-Monitor Silver Mines, Ltd.....	E 33	<i>Surf Inlet</i> (Skeena)	B 5
<i>Slocan Star</i> (Slocan).....	E 33	See also Princess Royal Gold Mines, Ltd.	
Smith creek (Revelstoke).....	E 34	<i>Surf Point</i> (formerly <i>Trivie</i>) (Skeena).....	B 6
(Similkameen)	D 21	Plan	B 7
Smithers	C 5	<i>Surprise</i> (Nanaimo)	F 11
<i>Snowden</i> (Greenwood)	D 9	<i>Susie</i> (Osoyoos)	D 14
<i>Snow Shoe</i> (Osoyoos)	D 17	Swakum mountain	D 23
Sodium carbonate	A 11, F 23	<i>Swan</i> , placer	D 23
(Kamloops)	D 29	(Osoyoos)	D 17
South Thompson river.....	D 28	Swansea, B.C.	E 32
Sovereign Creek Gold Mines, Ltd.....	C 28	<i>Sylvain</i> (Quesnel)	C 32
		<i>St. Lawrence</i> (Greenwood).....	D 10
T.			
<i>Tabor</i> (Cariboo)	C 18	Taylor River Gold Mines, Ltd.....	F 2, 4
Tabor creek	C 18	Taylor-Windfall Gold Mining Co., Ltd., plan	
Taku river	B 33	of workings	F 24
Talc, production	A 11	Telkwa	C 11
Taseko lake	F 24	Coal at	G 31
<i>Taseko-Motherlode</i>	F 25	Tenas creek	D 19
Tatlayoko lake	F 6, 12	<i>Tenderfoot</i> (Omineca)	C 2
Tatshenshini river, gold, placer.....	B 36	<i>Tertiary</i> (Cariboo)	C 27
Taxation Act	A 41	Testalinda creek	D 17
Taxation of mines	A 42	<i>Tetradymite</i> (Omineca)	C 6
Taylor basin	F 32	Texada island	F 11
Taylor (Bridge River) Gold Mines, Ltd.....	F 29	Texas creek	F 33

	PAGE.		PAGE.
Texas Creek Placers	F 33	Trites Gold Mining Co., Ltd.....	E 8
Texas Yankee Girl, Ltd.....	E 6	<i>See also</i> Two Star Mining Co., Ltd.	
<i>Thelma</i> (Nicola)	D 23	<i>Trixie</i> (later <i>Surf Point</i>) (Skeena).....	B 6
Thornhill mountain	B 10	Trout Lake area.....	E 36
Thudegade (not Two Brothers) river (Omineca)	C 16	<i>Troy</i> (Portland Canal).....	B 28
<i>Thunder Hill</i> (Greenwood).....	D 4	<i>Troy No. 1</i> (Nicola).....	D 25
<i>Tiger</i> (Osoyoos)	D 15	Tulameen area, zinc cut.....	D 22
<i>Tiger Fraction</i> (Greenwood).....	D 6	Tulameen Coal Mines, Ltd.....	G 29
Tillicum creek	E 23	Tulameen river	D 23
<i>Timber Line</i> (Quesnel).....	C 1, 32	Tungsten (Cariboo)	C 1
<i>Tipperary</i> (Cariboo)	C 24	<i>Hardscrabble</i>	C 1
Toboggan creek	C 6, 8	<i>Tunnel Fraction</i> (Greenwood)	D 9
<i>Top</i> (Portland Canal).....	B 33	Tuscarora Gold Mines, Ltd.....	F 30
<i>Topley</i>	C 1, 12	Twin John mountain.....	B 30
Topley-Richfield Mining Co., Ltd.....	C 12	Twin Lakes	D 15
Topley Silver, Ltd.....	C 12	Twin Lakes Gold Mining Co., Ltd.....	D 16
<i>Torpedo</i> group (Vernon).....	D 33	Two Brothers lake (Omineca).....	C 16
<i>Torres</i> (Osoyoos)	D 15	Two Brothers river. <i>See</i> Thudegade river.	
<i>Trade Dollar</i> (Omineca).....	C 6	Two Brothers Valley Gold Mines, Ltd.....	C 16
TRAIL CREEK MINING DIVISION:		Two Star Mining Co., Ltd.....	E 8
Report by Resident Mining Engineer.....	E 36	<i>See also</i> Trites Gold Mining Co., Ltd.	
Tranquille creek	D 26	<i>Tyee</i> (Kamloops)	D 26
Treaty creek (Portland Canal).....	B 30	(Nass River)	B 17

U.

<i>Union</i> (Grand Forks)	D 3	<i>Unuk Jumbo</i> (Portland Canal).....	B 33
United Empire Gold and Silver Mines, Ltd.		Unuk river	B 30
<i>See</i> Bayview Mining Co., Ltd.		Unuk Valley Gold Syndicate.....	B 32
<i>Unuk</i> (Portland Canal).....	B 31	Usk	C 2

V.

<i>Vahalla</i> (Omineca)	C 2	VERNON MINING DIVISION:	
<i>Vancouver</i> (Nelson)	E 19	Report by Resident Mining Engineer.....	D 29
Vancouver and Boundary Creek Development and Mining Co.....	D 10	Gold, placer	D 34
<i>Vancouver island</i>	F 7	<i>Victoria</i> (Alberni)	F 2
Vancouver Island Gold Mines, Ltd.....	F 2	VICTORIA MINING DIVISION:	
Plan	F 3	Report by Resident Mining Engineer.....	F 1
VANCOUVER MINING DIVISION:		Victoria Ventures, Ltd.....	B 36
Report by Resident Mining Engineer	F 13	Vidette Gold Mines, Ltd.....	F 20
<i>Vanguard Extension</i> (Nass River).....	B 17	Plan	F 20
Velvet Gold Mining Co.....	E 37	Vidette Inke	F 22
<i>Venus</i>	E 2, 3	Viking Gold Mines, Ltd.....	D 15
<i>Verna D.</i> (Portland Canal).....	B 32	Volcanic ash, production.....	A 11

W.

Walker House (Cariboo).....	C 26	<i>Whirlwind</i> (Osoyoos)	D 18
<i>Wallace</i> (Kamloops)	D 28	<i>White Elephant</i> (Vernon).....	D 29
<i>See also</i> <i>Lincoln</i> .		Whitefish creek	E 29
Wallace mountain	D 9	<i>White Pine</i> (Nanaimo)	F 10
Wallace Mountain Mines, Ltd.....	D 10	<i>White Swan</i> (Grand Forks).....	D 3
<i>War Eagle</i> , McKinney	D 9	Whiting river	B 33
<i>Waterloo Consolidated</i> , McKinney.....	D 9	Whittaker, D. E., report as Provincial Assayer	A 43
Waterloo Consolidated Mines, Ltd.....	D 3	<i>Wilcox</i> (Nelson)	E 13
<i>Waterloo No. 3</i> (Greenwood).....	D 3	<i>Wild Cat</i> (Cariboo)	C 18
<i>Wankesha</i> (Osoyoos)	D 17	(Nass River)	B 17
Welcome harbour	B 6	(Osoyoos)	D 17
Wellington, Beaverdell	D 9	Wild Horse creek.....	E 6
(Fort Steele)	E 29	(Fort Steele)	E 29
Wellington-Extension Mines.....	G 24	<i>Willcock</i> (sometimes called <i>Wilcox</i>) (Nelson)	E 13
Wells, town	C 22	<i>Williams</i> (Cariboo)	C 25
Wesko Exploration and Development Co., Ltd.	E 9	Willow river (Cariboo).....	C 25
<i>West Fork</i> (Greenwood).....	D 4	Wilson creek (Atlin).....	B 36
Western Fuel Corporation of Canada, Ltd.....	G 20	<i>Wilson Mining and Development Co., Ltd.</i>	G 30
WESTERN MINERAL SURVEY DISTRICT (No. 6):			
Report by Resident Mining Engineer.....	F 1		

	PAGE.		PAGE.
Windpass Gold Mining Co., Ltd.....	D 26	Wisconsin (Similkameen)	D 21
Plan	D 27	Witwatersrand Syndicate	E 28
WINDERMERE MINING DIVISION:			
Report by Resident Mining Engineer.....	E 28	Woods lake (Vernon).....	D 34
Winner (Grand Forks).....	D 3	Wren (Nelson)	E 9
Winters creek	D 19	(Skeena)	B 9
		Wright creek (Atlin).....	B 36

Y.

Yale	F 19	Ymir (Similkameen)	D 21
YALE MINING DIVISION:			
Report by Resident Mining Engineer.....	F 17	Ymir camp	E 6
Yankee Boy (Grand Forks).....	D 1	Ymir creek	E 9
Plan	D 1	Ymir Consolidated Gold Mines, Ltd.....	E 12
Yankee Girl (Grand Forks).....	D 1	Ymir Dundee Gold Mining Co., Ltd.....	E 7
(Nelson)	E 6	See also Dundee Gold Mines, Ltd.	
Yankee Girl, Ltd. See later Ymir-Yankee		Ymir Gold Mining Co., Ltd.....	E 13
Girl Gold Mines, Ltd.		See also Ymir Gold Mines Co., Ltd.	
Yankee Girl Consolidated Mines, Ltd.....	E 6	Ymir-Wilcox Development Co., Ltd.....	E 13
Yanks Peak (Quesnel).....	C 30	Ymir-Yankee Girl Gold Mines, Ltd.....	E 6
Yanks peak	C 29	York Investment, Ltd.....	B 18, D 10
Yanks Peak Mining Co. See Cariboo Yankee		You and Me (Nelson).....	E 23
Belle Mining Co.		Youcon (Lillooet)	F 28
Yellowstone (Nelson)	E 19	Yukon Border Placer Gold, Ltd.....	B 36
Ymir (Nelson)	E 12	Yukon Fraction (Nelson).....	E 6
		Yuniman (Osoyoos)	D 19

Z.

Zeballos river	F 6	Zymoetz (Omineca)	C 4
Zinc, price	A 8, 10	Zymoetz river	C 4
Zinc, production	A 11		

LIST OF ILLUSTRATIONS.

PLANS.

	PAGE.
Index Map of Province.....	A 48
Britannia Mining and Smelting Co.—Rail Stop-block.....	G 56
B.C. Nickel Co.—Plan of Workings.....	F 18
Bunker Hill Mine—Plan of Workings.....	E 25
Centre Star Mine—Plan of Workings.....	E 10
Clubine-Comstock Mine—Plan of Workings.....	E 14
Columario Consolidated Gold Mines Co.—Plan.....	C 2
Dunwell Mine—Plan and Sections of Workings, Ben Ali Mine.....	B 21
Henderson Mine—Section of Workings.....	C 10
Homestake Mine, Nass River—Plan and Sections of Workings.....	B 16
Island Mountain Mines Co., Ltd.—Plan.....	C 23
Kootenay Belle Mine—Plan of Workings.....	E 21
L.L. & H. Group—Plan of Workings.....	B 24
Mamie Mine—Plan of Workings.....	C 7
Mastodon Mine—Plan and Section.....	B 13
Queen Mine, Nelson—Section of Workings.....	E 18
Quesnelle Quartz Mining Co., Ltd.—Plan.....	C 19
Reno Mine—Section.....	E 16
Surf Point Mine—Plan of Workings.....	B 7
Taylor-Windfall Mine—Plan of Workings.....	F 24
Tulameen Area—Map showing location Cousin Jack Group.....	D 22
Vancouver Gold Mines Co.—Plan of Workings.....	F 3
Vidette Mine—Plan of Workings.....	F 20
Windpass Mine—Plan of Workings.....	D 27
Yankee Boy, Grand Forks—Plan of Workings.....	D 2

PHOTOGRAPHS.

	OPPOSITE PAGE.
Portland Canal Area—Model Map.....	Frontispiece
Bralorne Mine—King Vein.....	F 1
Consolidated Gold Alluvials of B.C.—Interior of Power-house.....	G 1
Crooked River, Tributary of Parsnip River.....	C 1
Finlay River—Headwaters of at McLair Creek Valley.....	C 1
Fourth of July Creek, Atlin.....	B 1
Goldbridge, Bridge River.....	F 1
Morning Star Mine, Fairview.....	D 1
McLair Creek, Finlay River.....	C 1
Nelson—Air View of City.....	E 1
Pre-Cambrian Gold Mines, Okanagan Lake.....	D 1
Quartz Creek, Tributary of McDame Creek, Liard M.D.....	B 1
Queen Mine—General View.....	E 1
Quesnel Forks—Old Town.....	C 1
Salmon Glacier, Portland Canal, looking towards August Mountain.....	A 48
Second Relief Mine—General View.....	E 1
Similkameen River at Keremeos.....	C 36
Tatshenshini River Area—South-east towards Talbot Creek.....	A 48
Texas Creek Placers, Fraser River.....	F 1
Twin Lakes, South-west of Penticton.....	C 36
Vidette Mine, North-west of Kamloops.....	F 1

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