

Minister of Mines

PROVINCE OF BRITISH COLUMBIA

ANNUAL REPORT

For the Year Ended 31st December

1957



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1958

BRITISH COLUMBIA DEPARTMENT OF MINES
VICTORIA, B.C.

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To His Honour FRANK MACKENZIE ROSS, C.M.G., MC., LL.D.,
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 1957 is
herewith respectfully submitted.

W. K. KIERNAN,
Minister Of Mines.

Minister of Mines' Office,
May, 1958.

Cecil George Hewlett, Associate Geologist with the British Columbia Department of Mines, fell from the **headwall** of a glacial **cirque** and was killed instantly on August **14th**, 1957. The accident occurred on Monument Peak, in the Purcell Mountains west of **Invermere** within the Mineral King mine area where, with a field assistant, Dr. Hewlett was engaged in geological mapping. Dr. Hewlett is survived by his father, mother, and two sisters, his wife, **Catharine**, and their sons, John **Phillip**, born in November, 1956, and Andrew Cecil, born in February, 1958.

Dr. Hewlett was **born** in **Kelowna** in 1926 and received his schooling there and in England. He obtained a **B.A.Sc.** degree in geological engineering from the **University** of British Columbia in 1949, an **M.Sc.** from Queen's University, and a Ph.D. from the University of Wisconsin in 1954. In the **course** of his training he spent one summer with the Geological Survey of Canada and five summers with New Jersey Zinc Company. He joined the staff of the Department of **Mines** as Assistant Geologist in 1953, and became Associate Geologist in 1956. In 1956 he became a member of the British Columbia Association of Professional Engineers. He was named the winner of the Peacock Memorial Prize in 1956, given for the best Canadian scientific paper on pure or applied mineralogy. From 1952 to 1956 he was associated with **J. T. Fyles** in detailed mapping in the **Salmo-Pend d'Oreille** River area, south of Nelson. He had started geological mapping in the Mineral **King** mine area at the beginning of the 1957 field season.

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ANNUAL REPORT OF THE MINISTER OF MINES, 1957

Introduction

A Report of the Minister of Mines of the Province of British Columbia has been published each year since 1874.

The Annual Report records the salient facts in the progress of the mineral industry, also much detail about individual operations, including those undertaken in the search for, exploration of, and development of mineral deposits, as well as the actual winning of material from mineral deposits.

The Annual Report of the Minister of Mines now contains introductory sections dealing with Statistics and Departmental Work, followed by sections dealing with Lode Metals; Placer; Structural Materials and Industrial Minerals; Petroleum and Natural Gas; Inspection of Lode Mines, Placer Mines, and Quarries; Coal; and Inspection of Electrical Equipment and Installations at Mines and Quarries, each with its own table of contents. A table listing the properties described, in geographic groupings, precedes the index.

An introductory review of the mineral industry and notes at the first of several of the main sections deal generally with the industry or its principal subdivisions. Notes in the various sections deal briefly with exploration or production operations during the year or describe a property in more complete detail, outlining the history of past work and the geological setting as well as describing the workings and the mineral deposits exposed in them. Some notes deal with areas rather than with a single property.

The work of the branches of the Department is outlined briefly in the section on Departmental Work. This section is followed by notes dealing briefly with the work of other British Columbia or Federal Government services of particular interest to the mineral industry of British Columbia. Information concerning mine operations and **some** of the activities of the Inspection Branch of the Department of Mines is contained in the section on Inspection of **Lode** Mines, Placer Mines, and Quarries, early **in** the section on Coal and in the section on Inspection of Electrical Equipment and Installations at Mines and Quarries.

The section on Statistics begins with an outline of current and past practice in arriving at quantities and calculating the value of the various products.

Review of the Mineral Industry in British Columbia, 1957

The end of 1957 was the eve of British Columbia's centennial, but the centennial of the mining industry was some years earlier. Coal was mined on Vancouver Island for twenty-two years before 1858, the year of establishment of the colony of British Columbia. Available records do not give the yearly production, but show a total of 41,871 long tons of coal, valued at \$149,548, mined from 1836 to 1859. Placer-gold production started with the rush of 1858 and in the first year was valued at \$705,000. The production of placer gold increased rapidly each year until 1865, when it reached its maximum of \$3,491,205. The early mining of coal and placer gold made a major contribution to the economy, and the search for placer led to the rapid exploration of much of the colony. Mining in its various forms has continued to be of prime economic importance for the past 100 years, and still performs the necessary pioneer function of opening up distant parts of the Province. By 1957 the list of products of the mineral industry included a dozen metals, nine industrial minerals, a dozen structural materials, and **three** fuels, **with** a combined value exceeding \$172,000,000. The accumulated value for the first 100 years amounts to \$3,900,000,000, and it is apparent that the 4-billion-dollar mark will be passed well before the end of 1958, British Columbia's centennial year.

The combined value of all mineral products for 1957 is well below that for 1956, although it has been exceeded only in that year and in two others, 1951 and 1955. This was largely because prices for most of the principal metals were lower than for 1956 and several metal mines were forced **to** close or to reduce their output. As a result, the value for principal metals was below the average of recent years, and was \$23,000,000 less than the record achieved in 1956. Increased output of industrial minerals and structural materials offset **some** of this loss, however, and **the** aggregate value of all mineral production, although about \$17,800,000 less than for 1956, was greater than the last **five**-year average. The relative importance of **the** various groups of products in 1957 is shown by the percentages of the total value as follows, with the average of the five preceding years in parentheses: Principal metals, 65 (74) per cent; miscellaneous metals, 7.4 (8) per cent; industrial minerals, 7.7 (3.5) per cent; structural materials, 15 (9) per cent; fuels, 4.9 (5.6) per cent.

The complete figures for prices, quantities, and values are tabulated on pages A 13 to A 48.

The metal-mining branch of the industry produces for an international market at world metal prices. British Columbia sales are **affected** directly by prices in the United States and by the value of United States money in terms of Canadian money. Throughout the year United States money was at a discount in Canada. Settlements for all metals reflect the rate of exchange, which ranged from just **over** 3 per cent to just under 6 per cent. The average discount for the year was about 4.2 per cent.

The price of copper moved downward during the year. The price for electrolytic copper at refineries **in** eastern United States fell from an average of 33.337 cents for January **to** 22.418 cents for December. Lead and zinc prices in the United States were stable for **the** first four **months** of 1957, then fell fairly steeply **in** May and June, lead losing 2 cents a pound and **zinc** 3% cents. Later lead lost an additional cent. The price for silver in the United States changed very slightly; **some** other metal prices changed markedly, notably tungsten ore, **for** which the December market price was about half the January price.

Prices have reflected uncertainty about stock-piling and stock-piled metal in the United States and Great Britain. The prospects in the United States are for cessation or greatly reduced buying of metal for stockpiling, and in Great Britain a limited sale of stockpiled copper was announced in 1956. Prices also reflect metal supplied in excess of current demand, and important producers have curtailed production.

British Columbia's output of placer gold fell to the lowest point since the beginning of the industry. Lode-gold production was greater than in 1956, mainly because of increased output in the Bridge River district. The closing of copper and silver-lead-zinc operations affected the output of those metals. Copper was reduced drastically, silver and lead were reduced slightly, but the output of zinc increased slightly, and a new quantity record was set, although the value was some \$8,000,000 less than in 1956. Export of iron ore was mainly in the last five months of the year, when shipments were resumed by Texada Mines Ltd. and Empire Development Company began shipping.

Lode-metal development and exploration were carried on actively in many parts of the Province. Preparations by Western Nickel Limited for production, near Hope; continued diamond drilling by Climax Molybdenum Company, at the molybdenum deposit on **Takomkane** (Boss) Mountain; and the activities of several large companies exploring for copper in the Highland Valley-Merritt area are worthy of note:

Exploration included airborne magnetometer surveys by several companies and by the British Columbia Department of Mines. Work for the Department was done with fixed-wing aircraft and helicopter in areas on Vancouver and Texada Islands known to contain deposits of magnetite (see *B.C. Dept. of Mines, Airborne Magnetometer Surveys, 1956-57*, published May, 1958). Exploration undertaken by several companies also showed interest in iron ores.

Industrial-mineral and structural-materials production both achieved new records, mainly because of materially increased output of asbestos, sulphur, cement, sand and gravel. **Sulphur** has been entirely a by-product of lode-metal mining, but recovery of sulphur from sour natural gas was started **late** in 1957 at Taylor. This sulphur was stockpiled and is not credited in 1957 production figures. Production of most structural materials was **at** a high level, and provision has been made for greatly increased production of Portland cement. The capacity of the plant of the British Columbia Cement Company at **Bamberton** was increased to 3,500,000 barrels a year, effective in August, and Lafarge Cement of North America Ltd. built a plant on Lulu Island that began operating early in 1958.

Petroleum production in British Columbia began in June, 1956. At the end of that year six wells were producing in the Boundary Lake field and four in the Fort St. John **field**. By the end of 1957 a total of eighteen **wells** had been produced—ten from the Triassic **Schooler** Creek formation in the Boundary Lake field, four from the Triassic "C" formation, one from the Permo-Pennsylvanian, one from the basal Gething at Fort St. John, and two from the Nikanassin formation at Buick Creek. **All** these wells were within about 40 miles of Fort St. John, and all shipped to the XL refinery at **Dawson** Creek.

To the end of October, natural-gas production was for use in the village of Fort St. John. However, the Westcoast Transmission Company pipe-line to the Vancouver area and the International Boundary was completed and in service in November. At Taylor, between Dawson Creek and Fort St. John, an absorption plant to remove sulphur and liquid fractions from the natural gas and a refinery to treat liquid fractions began operating in November. A branch pipe-line for Inland Natural Gas Company Limited, to convey gas to the **Okanagan Valley** and to Trail and Nelson, was completed. Natural gas is now being produced in large volume to supply the needs of the Greater Vancouver area and communities along the two pipe-lines, and also for export to the United States.

Exploration has continued to indicate additional gas and oil fields, the Boundary Lake **oilfield** has been greatly extended, oil has been found near Mile 100 on the Alaska

Highway, and two oil wells at Buick Creek began producing in 1957. Although most activity was in northeastern British Columbia, drilling was done at two sites on the delta of the **Fraser River**, and a well was started on **Saturna** Island. Applications for permits indicate interest in several parts of British Columbia, including renewed interest in the Queen Charlotte Islands. Substantial areas are held under permit or lease in the **Fernie** area, and much exploratory work has been done there. Exploration and drilling have been predominantly in northeastern British Columbia, and all the successful completions have been in that area, in which multiple productive zones feature several of the fields. So far oil wells have been completed in Lower **Cretaceous** (Gething and **Nikanassin**), **Triassic** (Schooler Creek and Triassic "C"), **Permo-Pennsylvanian**, and Mississippian horizons.

The average number employed throughout 1957 in placer, lode, fuel, **industrial-mineral**, and structural-material mining was 13,257. Major expenditures by those branches of the industry included: Salaries and wages, \$56,409,056; fuel and electricity, \$8,937,567; process supplies (inclusive of explosives, chemicals, drill-steel, lubricants, etc.), \$24,257,177; Federal taxes, \$8,170,826; Provincial taxes, \$2,872,807; municipal and other taxes, \$907,143; levies for workmen's compensation (including silicosis), unemployment insurance, and other items, \$1,983,553. Dividends amounted to \$24,247,240. The lode-mining industry spent \$30,273,900 in freight and treatment charges on ores and concentrates. Expenditure in exploration for petroleum and natural gas in 1957 was \$10,030,87X.

Statistics

The statistics of the mineral industry are collected and compiled and the statistical tables for this Report are prepared by the Bureau of Economics and Statistics, Department of Industrial Development, Trade, and Commerce.

In the 1951 Report, extensive rearrangements of tables and of their order were made. The tables in the present Report closely parallel those presented in Reports for years preceding 1951, but additional details have been incorporated, and the present order is considered to make more apparent the relationship between **summary** tables and the tables giving the details summarized.

METHOD OF COMPUTING PRODUCTION

The tables of statistics recording the mineral production of the Province for each year are compiled from certified returns made by the operators, augmented by some data obtained from the Royal Canadian Mint and from the operators of customs smelters. The value of each mineral product, in **Canadian** funds, is calculated at the average price for the year (see p. A 13). The quantities of metals are net after making deductions for losses in smelting and refining.

METALS

Prior to 1925 the average prices for gold and copper are true average prices, but, as a means of correcting for losses in smelting and refining, the prices of other metals were taken at the following percentages of the year's average price for the metal: Silver, 95 per cent; lead, 90 per cent; and zinc, 85 per cent. For 1925 and subsequent years the value has been calculated using the true average price and the net metal contents, **iii**

accordance with the procedures adopted by the Dominion Bureau of Statistics and the co-operating Provincial Departments of Mines.

Beginning with the Annual Report for 1948, production figures for individual lode-mining operations are the assay contents of the products shipped (ore, concentrates, or bullion), no deductions being made for losses in smelting and refining. In previous Annual Reports the production figures given for individual properties are net, after deductions for smelting and refining losses.

Placer Gold

The data on placer-gold production were very largely obtained from the Gold Commissioners until 1925. The value of placer gold in dollars is now obtained from returns received annually from the operators. At the old standard price, \$20.67 per ounce of fine gold, \$17 was regarded as a close approximation of the average value per ounce of crude placer gold produced in British Columbia. Dividing the production reported in dollars by 17 gave the equivalent in crude ounces. The average value \$17 per ounce is equivalent to a fineness of 822%. Beginning with 1932 the average value per crude ounce has been based on the same fineness but has recognized the varying price of gold. The average price per ounce of crude placer gold for the year is listed on page A 13.

Lode Metals, Gross and Net Contents

The gross contents are the gold and silver contents of bullion and for ores and concentrates the total assay contents, obtained by multiplying the assay by the weight. The quantities for gold, silver, copper, lead, and zinc in Table XV and in "Notes on Metal Mines" are gross.

Calculations of the value of production are based on the total assay content for gold and on net content for the other principal metals. These are: In lead ores and concentrates and zinc concentrates, for silver 98 per cent, lead 95 per cent, and zinc 85 per cent of the total assay content; and in copper concentrates, 95 per cent of the silver and the total assay content of copper less 10 pounds per ton of concentrates. Quantities for silver, lead, zinc, and copper in Tables I to VIII, inclusive, are net.

Average Metal Prices

In the interests of uniformity the Statistical Bureaux of the Provinces and the Dominion Bureau of Statistics use the same average metal prices in valuing mineral production. Up to and including the year 1939 the prices used in evaluating metal and mineral production were:—

Gold and silver: The average United States price for the year, as quoted in the Engineering and Mining Journal, converted into Canadian funds at the average exchange rate.

Copper, lead, and zinc: For lead and zinc, the average London Metal Market price for the year converted into Canadian funds at the average exchange rate; for copper, until 1932 the New York price for copper was used, thereafter the average London Metal Market price was used.

Suspension of trading on the London Metal Exchange in September, 1939, and the controls of metals during the war years necessitated changes from the procedures which had been followed.

The method of arriving at the price for gold continued unchanged, but the prices for the metals controlled were those set by the Canadian Metals Controller. In 1945 the controls were largely removed from sales but not from prices. Control of metal prices ended on June 6th, 1947. For 1945 and subsequent years the prices are those computed by the Dominion Bureau of Statistics, using information supplied by the principal Canadian refiners of silver and the base metals.

In the period 1945-47 the prices received for silver, lead, and zinc sold for use in Canada were substantially less than the prices received for these metals exported to the United States. The prices for silver in 1945 and 1946 and for copper, lead, and zinc in 1946 and 1947 are weighted averages, taking into consideration sales in Canada at the ceiling prices and sales abroad at New York prices converted into Canadian funds.

Prices are now arrived at by the methods as given in the footnotes to table of average prices on page A 13.

FUEL

Coal

In 1926 a change was made in computing coal and coke statistics. The practice in former years had been to list as coke production only the coke made in bee-hive ovens, the coal used in making it not being listed; coke 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 both the coal and the coke production figures were incomplete. Starting with the 1926 Annual Report, the standard practice of the Bureau of Statistics, Ottawa, was 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 the data are of interest to the mining industry, Table X is included in the Report to show the total coke produced in the Province, together with by-products, and the values given by the producers. The pre-1926 data have now been reworked and brought into conformity with current practice. Table IXA lists the full mine output (gross) produced and its net value, and these figures are incorporated in Table I, in the total mine production for the Province. Table X gives the complete data for coke, gas, and by-products manufactured for the period 1895 to 1925, and for each year subsequent to 1925.

Up to and including the year 1947, production was recorded in long tons (2,240 pounds). Beginning in 1948, production is given in short tons (2,000 pounds). The quantity of coal produced in the preceding years has been recalculated in short tons.

The average price for coal, listed year by year (see p. A 13), is the total value divided by the quantity. Up to and including 1945, the quantity is the gross mine output; for 1946 and subsequent years, the quantity is the quantity sold and used. For 1946 and subsequent years, the value (Tables I, III, VIIA, IXA, IXB, and IXC) is the amount realized from sales of coal, at colliery loading points, plus the colliery valuation of coal used under companies' boilers and in making coke. For 1946 and subsequent years the quantity sold and used is shown in Table IXC. "Use" includes coal used under company stationary and locomotive boilers, and used in making coke. Washery loss and changes in stocks, year by year, are shown in the table "Collieries of British Columbia, Production and Distribution by Collieries and by Districts," page 121 of this Report.

Natural Gas

Commercial production of natural gas began in 1954. The production shown in Tables I, III, VIIA, and VIIIA is gas sold in Fort St. John. The figures are compiled from the Crown royalty statements filed monthly with the Department of Mines by the producer. The quantity is reported as thousands of cubic feet at standard conditions (14.4 pounds per square inch pressure, 60° F. temperature).

Petroleum

Commercial production of petroleum began in 1956. The figures shown in Tables I, III, VIIA, and VIIIA are compiled from the Crown royalty statements filed monthly with the Department of Mines by the producer. The quantity is reported in barrels (35 imperial gallons = 1 barrel).

AVERAGE PRICES USED IN VALUING PROVINCIAL PRODUCTION OF GOLD,
SILVER, COPPER, LEAD, ZINC, AND COAL

Year	Gold, ¹ Crude, Oz.	Gold, Fine, Oz.	Silver, Fine, Oz.	Copper, Lb.	Lead, Lb.	Zinc, Lb.	Coal, Short Ton
	\$	\$	Cents	Cents	Cents	Cents	\$
1901.....	17.00	20.67	56.002 N.Y.	16.11 N.Y.	2.577 N.Y.	.....	2.679
1902.....	.....	.....	49.55 ..	11.70 ..	3.66 ..	.....	.....
1903.....	.....	.....	50.78 ..	13.24 ..	3.81 ..	.....	.....
1904.....	.....	.....	53.36 ..	12.82 ..	3.88 ..	.....	.....
1905.....	.....	.....	51.33 ..	15.59 ..	4.24 ..	.....	.....
1906.....	.....	.....	63.45 ..	10.28 ..	4.81 ..	.....	.....
1907.....	.....	.....	62.06 ..	20.00 ..	4.80 ..	.....	3.125
1908.....	.....	.....	50.22 ..	13.20 ..	3.78 ..	.....	.....
1909.....	.....	.....	48.93 ..	12.98 ..	3.85 ..	.....	.....
1910.....	.....	.....	50.812 ..	12.738 ..	4.00 ..	4.60 E. St. L.	.....
1911.....	.....	.....	50.64 ..	12.38 ..	3.98 ..	4.90 ..	.....
1912.....	.....	.....	57.79 ..	16.341 ..	4.024 ..	5.90 ..	.....
1913.....	.....	.....	56.80 ..	15.27 ..	3.93 ..	4.80 ..	.....
1914.....	.....	.....	52.10 ..	13.60 ..	3.50 ..	4.40 ..	.....
1915.....	.....	.....	47.20 ..	17.28 ..	4.17 ..	11.25 ..	.....
1916.....	.....	.....	62.38 ..	27.202 ..	6.172 ..	10.88 ..	.....
1917.....	.....	.....	77.35 ..	27.18 ..	7.91 ..	7.560 ..	.....
1918.....	.....	.....	91.93 ..	24.83 ..	8.67 ..	8.94 ..	4.464
1919.....	.....	.....	105.57 ..	18.70 ..	5.19 ..	6.24 ..	.....
1920.....	.....	.....	95.80 ..	17.45 ..	7.16 ..	6.52 ..	.....
1921.....	.....	.....	59.52 ..	12.50 ..	4.09 ..	3.95 ..	.....
1922.....	.....	.....	64.14 ..	13.38 ..	5.16 ..	4.86 ..	.....
1923.....	.....	.....	61.63 ..	14.42 ..	6.54 ..	5.62 ..	.....
1924.....	.....	.....	63.442 ..	13.02 ..	7.287 ..	5.39 ..	.....
1925.....	.....	.....	69.065 ..	14.042 ..	7.848 Lond.	7.892 Lond.	.....
1926.....	.....	.....	62.107 ..	13.795 ..	6.751 ..	7.409 ..	.....
1927.....	.....	.....	56.37 ..	12.92 ..	5.256 ..	6.194 ..	.....
1928.....	.....	.....	58.176 ..	14.570 ..	4.575 ..	5.493 ..	.....
1929.....	.....	.....	52.998 ..	13.107 ..	5.050 ..	5.385 ..	.....
1930.....	.....	.....	38.154 ..	12.982 ..	3.927 ..	3.599 ..	.....
1931.....	.....	.....	28.700 ..	8.116 ..	2.710 ..	2.554 ..	4.018
1932.....	19.30	23.47	31.671 ..	6.380 Lond.	2.113 ..	2.405 ..	3.795
1933.....	23.02	28.60	37.832 ..	7.454 ..	2.391 ..	3.210 ..	.....
1934.....	28.37	34.50	47.461 ..	7.419 ..	2.436 ..	3.044 ..	.....
1935.....	28.94	35.19	64.790 ..	7.795 ..	3.133 ..	3.099 ..	.....
1936.....	28.81	35.03	45.127 ..	9.477 ..	3.913 ..	3.315 ..	.....
1937.....	28.77	34.99	44.881 ..	13.078 ..	5.110 ..	4.902 ..	.....
1938.....	28.93	35.18	43.477 ..	9.972 ..	3.344 ..	3.073 ..	.....
1939.....	29.72	36.14	40.488 ..	10.092 ..	3.169 ..	3.069 ..	.....
1940.....	31.66	38.50	38.249 ..	10.086 ..	3.362 ..	3.411 ..	.....
1941.....	31.66	38.50	38.281 ..	10.086 ..	3.362 ..	3.411 ..	.....
1942.....	31.66	38.50	41.166 ..	10.086 ..	3.362 ..	3.411 ..	.....
1943.....	31.66	38.50	45.254 ..	11.75 ..	3.754 ..	4.000 ..	.....
1944.....	31.66	38.50	43.000 ..	12.000 ..	4.500 ..	4.300 ..	.....
1945.....	31.66	38.50	47.000 ..	12.550 ..	5.000 ..	6.440 ..	.....
1946.....	30.22	36.75	83.650 ..	12.80 ..	6.750 ..	7.810 ..	4.68
1947.....	28.78	35.00	72.000 ..	20.39 ..	13.670 ..	11.230 ..	5.12
1948.....	28.78	35.00	75.000 Mont.	22.35 U.S.	13.040 ..	13.930 ..	6.09
1949.....	29.60	36.00	74.250 U.S.	19.973 ..	15.800 U.S.	13.247 U.S.	6.51
1950.....	31.29	38.05	80.635 ..	23.428 ..	14.454 ..	15.075 ..	6.43
1951.....	30.30	36.85	94.55 ..	27.70 ..	18.4 ..	19.9 ..	6.46
1952.....	28.18	34.27	83.157 ..	31.079 ..	16.121 ..	15.874 ..	6.94
1953.....	28.31	34.42	83.774 ..	30.333 ..	13.265 ..	10.675 ..	6.88
1954.....	27.52	34.07	82.982 ..	29.112 ..	13.680 ..	10.417 ..	7.00
1955.....	28.89	34.52	87.851 ..	38.276 ..	14.926 ..	12.127 ..	6.74
1956.....	29.92	34.44	90.372 ..	30.727 ..	15.756 ..	12.278 ..	6.50
1957.....	27.59	33.55	87.057 ..	26.031 ..	14.051 ..	11.175 ..	6.76

¹ Unrefined placer gold, average price per ounce, is taken as \$17 divided by \$20.67 times the price of an ounce of fine gold.

Prices for fine gold are the Canadian Mint buying prices. Prices for other metals are those of the markets indicated, converted into Canadian funds. The abbreviations are: Mont.=Montreal; N.Y.=New York; Lond.=London; E. St. L.=East St. Louis; and U.S.=United States.

Prior to 1925 the prices for gold and copper are true average prices, but the prices of other metals were taken at the following percentages of the year's average price for the metal: Silver, 95 per cent; lead, 90 per cent; and zinc, 85 per cent.

For coal see last paragraph under "Fuel," page A 12.

The bases for the prices listed are discussed in detail on pages A 11 and A 12.

TABLE I.—TOTAL MINERAL PRODUCTION FOR ALL YEARS UP TO AND INCLUDING 1957

	Total Quantity	Total Value	Quantity, 1957	Value, 1957
Gold—placer..... crude, oz.	5,200,296	\$95,955,159	2,936	\$80,990
„ lode..... fine, oz.	15,136,211	435,187,967	222,506	7,465,076
Silver..... oz.	403,103,630	240,061,747	8,129,971	7,077,708
Copper..... lb.	2,916,652,085	476,690,590	29,318,494	7,631,897
Lead..... lb.	12,284,544,537	880,027,584	281,603,346	39,568,086
Zinc..... lb.	9,893,251,300	781,317,148	449,448,607	50,225,881
Miscellaneous metals ¹.....	.....	129,899,516	.....	12,755,362
Industrial minerals ².....	.....	76,291,020	.....	13,361,751
Structural materials ³.....	.....	248,696,868	.....	25,626,939
Coal..... tons	140,499,723 ⁴	540,208,640	1,085,657	7,340,339
Natural gas..... M s.c.f.	8,692,322	411,685	8,274,942	366,867
Petroleum, crude ⁵ bbls.	489,981	1,063,042	340,945	763,721
Totals.....	.....	\$3,905,810,966	.....	\$172,264,617

¹ For individual miscellaneous metals, see Tables III and VIIIc, pages A 15 and A 28.

² For individual industrial minerals, including sulphur, see Tables III and VIIIb, pages A 15 and A 30.

³ For individual structural materials, see Tables III and VIIIe, pages A 15 and A 32.

⁴ Total quantity is gross mine output; it includes material discarded in picking and washing. The quantity shown for 1957 is that sold and used (see also Table IXc).

⁵ Includes 582 barrels produced for test purposes in 1955, no value assigned.

TABLE II.—PRODUCTION FOR EACH YEAR FROM 1836 TO 1957, INCLUSIVE

1836–95 (incl.)	\$95,355,010	1928.....	\$65,372,583
1896.....	7,507,956	1929.....	68,505,527
1897.....	10,455,268	1930.....	55,660,399
1898.....	10,906,861	1931.....	34,968,916
1899.....	12,429,707	1932.....	28,855,660
1900.....	16,344,751	1933.....	32,650,554
1901.....	19,671,572	1934.....	42,444,013
1902.....	17,486,550	1935.....	48,886,303
1903.....	17,495,954	1936.....	54,179,442
1904.....	18,977,359	1937.....	74,475,902
1905.....	22,461,325	1938.....	64,485,551
1906.....	24,980,546	1939.....	65,707,398
1907.....	25,882,560	1940.....	75,701,145
1908.....	23,851,277	1941.....	78,479,719
1909.....	24,443,025	1942.....	75,551,093
1910.....	26,377,066	1943.....	65,892,395
1911.....	23,499,072	1944.....	54,923,803
1912.....	32,440,800	1945.....	63,343,949
1913.....	30,296,398	1946.....	72,319,951
1914.....	26,388,825	1947.....	113,314,314
1915.....	29,447,508	1948.....	151,436,039
1916.....	42,290,462	1949.....	131,100,468
1917.....	37,010,392	1950.....	148,289,687
1918.....	41,782,474	1951.....	175,613,693
1919.....	33,296,313	1952.....	171,309,429
1920.....	35,543,084	1953.....	152,628,683
1921.....	28,066,641	1954.....	153,383,860
1922.....	35,162,843	1955.....	174,710,606
1923.....	41,304,320	1956.....	190,084,302
1924.....	48,704,604	1957.....	172,264,617
1925.....	61,492,242		
1926.....	67,188,842		
1927.....	60,729,358		
		Total.....	\$3,905,810,966

TABLE III.—QUANTITY AND VALUE OF MINERAL PRODUCTS FOR YEARS 1948 TO 1957

Description	1948		1949		1950		1951		1952		
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	
<i>Principal Metals</i>											
Gold—placer, crude	oz.	20,332	\$ 585,200	17,886	\$ 529,524	19,134	\$ 598,717	23,691	\$ 717,911	17,554	\$ 494,756
" lode, fine	oz.	286,230	10,018,050	288,396	10,382,256	283,983	10,805,553	261,274	9,627,947	251,393	8,615,238
Silver	oz.	6,718,122	5,038,592	7,636,053	5,669,769	9,507,225	7,666,151	8,215,884	7,768,118	8,796,720	7,315,088
Copper	lb.	43,025,388	9,616,174	54,856,808	10,956,550	42,212,133	9,889,458	43,249,658	11,980,155	42,005,512	13,054,893
Lead	lb.	332,996,351	60,072,542	263,580,349	41,645,726	307,122,803	44,391,530	273,456,604	50,316,015	284,949,396	45,936,692
Zinc	lb.	296,012,941	41,234,603	276,324,451	36,604,700	324,263,778	48,882,765	333,910,764	66,448,242	372,871,717	59,189,656
Totals			126,565,161		105,788,525		122,234,174		146,858,388		134,606,323
<i>Miscellaneous Metals</i>											
Antimony	lb.	310,062	113,173	158,288	61,020	643,540	216,229	1,310,836	622,647	2,333,239	1,028,025
Bismuth	lb.	222,000	444,000	102,913	210,972	162,616	369,138	191,471	451,872	142,246	312,941
Cadmium	lb.	617,226	1,126,437	665,449	1,364,170	650,540	1,535,274	1,164,933	3,122,021	726,172	1,561,270
Indium	oz.			689	1,550	4,952	12,132	582	1,368	404	889
Iron ore concentrates	tons			5,472	27,579			113,535	790,000	900,481	5,474,924
Mercury	lb.	679	3,735								
Platinum	oz.	242	21,175	99	7,468	111	9,239	22	2,085	2	176
Tin	lb.	691,332	688,567	619,117	633,047	796,403	828,259	346,718	495,807	212,113	250,293
Tungsten (WO ₃)	lb.	1,409,297	1,409,297			281,160	281,160			1,434,640	4,565,024
Totals			3,806,384		2,305,806		3,251,431		5,485,800		13,193,542
<i>Industrial Minerals</i>											
Asbestos	tons									20	23,000
Barite	tons	1,632	16,317	1,314	13,145	1,440	17,284	1,248	16,224	848	13,408
Diatomite	tons	24	817	36	963	4	108	8	223	12	240
Flux (quartz, limestone)	tons	83,389	248,977	108,531	213,773	144,325	268,411	144,235	292,100	55,588	141,478
Granules (quartz, limestone, granite)	tons	4,958	68,937	5,941	79,661	7,886	104,590	5,727	73,767	1,610	21,026
Gypsum and products	tons	77,055	546,707	98,977	616,490	92,882	620,108	124,729	263,072	91,112	235,453
Iron oxides	tons	3,386	30,472	2,752	23,301						
Mica	lb.	894,000	9,494	578,000	5,675	456,000	5,533	606,000	7,462	314,000	3,001
Sodium carbonate	tons			47	517						
Sulphur	tons	144,448	1,409,156	160,435	1,546,798	143,343	1,421,806	194,874	1,840,992	182,607	1,745,258
Totals			2,330,877		2,500,323		2,437,840		2,493,840		2,182,864
<i>Structural Materials</i>											
Brick—common	No.	3,810,000	111,300	3,220,000	95,075	3,980,500	117,770	1,353,000	41,820	830,815	28,248
" face, paving, sewer	No.	2,584,752	129,268	509,560	24,793	974,380	52,823	3,127,888	153,575	2,566,540	121,254
" firebrick, blocks			392,458		135,391		282,962		380,742		435,681
Clays	tons	5,673	32,922	6,500	22,339	6,706	32,264	14,786	60,255	11,483	51,797
Structural tile, hollow blocks			116,513		145,512		191,016		171,481		60,273
Drain-tile, sewer-pipe, flue-linings			597,541		265,098		428,418		410,206		468,110
Pottery—glazed or unglazed			5,138		5,176		5,860		4,695		6,536
Other clay products			9,611		9,676		11,335		10,393		11,296
Cement			2,441,304		3,209,425		3,088,296		3,311,439		3,603,273
Lime and limestone	tons	209,453	1,177,632	179,400	1,295,087	221,454	1,133,776	241,723	1,251,327	321,710	1,552,772
Rubble, riprap, crushed rock	tons	896,780	839,780	1,112,272	916,841	1,164,049	990,257	972,178	1,145,072	739,504	982,792
Sand and gravel			3,060,535		3,967,132		3,723,487		3,355,693		3,839,965
Stone	tons	3,579	54,220	2,287	44,345	26,758	188,675	4,837	309,350	122,308	434,964
Totals			8,968,222		9,955,890		10,246,939		10,606,048		11,596,961
<i>Fuel</i>											
Coal ¹	tons	1,604,480	9,765,395	1,621,268	10,549,924	1,574,006	10,119,303	1,573,572	10,169,617	1,402,347	9,729,739
Provincial totals			151,436,039		131,100,468		148,289,687		175,613,693		171,309,429

¹ The quantity of coal is that sold and used.

TABLE III.—QUANTITY AND VALUE OF MINERAL PRODUCTS FOR YEARS 1948 TO 1957—Continued

Description	1953		1954		1955		1956		1957		
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	
<i>Principal Metals</i>											
Gold—placer, crude	oz.	14,245	\$ 403,230	8,684	\$ 238,967	7,666	\$ 217,614	3,865	\$ 109,450	2,936	\$ 80,990
" lode, fine	oz.	253,553	8,727,294	258,388	8,803,279	242,477	8,370,306	191,743	6,603,628	222,506	7,465,076
Silver	oz.	8,376,953	7,017,709	9,825,153	8,153,108	7,902,145	6,942,113	8,404,600	7,511,443	8,129,971	7,077,708
Copper	lb.	49,021,013	14,869,544	50,150,087	14,599,693	44,328,031	16,932,549	43,360,575	17,251,872	29,318,494	7,631,897
Lead	lb.	296,559,781	39,338,655	332,474,456	45,482,505	302,567,640	45,161,245	283,718,073	44,702,619	281,603,346	39,568,086
Zinc	lb.	378,345,159	40,388,346	334,124,560	34,805,755	429,198,565	52,048,909	443,853,004	58,934,801	449,448,607	50,225,881
Totals			110,744,778		112,083,307		129,672,736		135,113,813		112,049,638
<i>Miscellaneous Metals</i>											
Antimony	lb.	1,551,043	570,474	1,302,333	382,104	2,021,721	667,776	2,140,432	768,843	1,360,731	577,344
Bismuth	lb.	71,298	157,569	225,351	493,519	160,767	356,903	156,753	346,424	145,634	314,569
Cadmium	lb.	787,158	1,550,701	680,734	1,123,211	1,593,591	2,677,233	1,937,927	3,236,338	1,946,397	3,172,627
Indium	oz.	6,752	14,922	477	1,281	104,774	232,389	363,192	795,390	384,360	693,770
Iron ore	tons	991,248	6,763,105	535,746	3,733,891	610,930	3,228,756	369,955	2,190,847	357,342	2,200,637
Mercury	lb.					75	250				
Platinum	oz.				408						
Tin	lb.	1,092,228	581,746	587,528	280,437	391,228	311,613	756,934	637,792	709,102	555,936
Tungsten (WO ₃)	lb.	2,168,977	5,950,323	2,206,443	5,851,558	1,914,000	5,460,967	2,264,775	6,351,376	1,921,483	5,240,479
Totals			15,588,840		11,866,409		12,935,887		14,327,010		12,755,362
<i>Industrial Minerals</i>											
Asbestos	tons	3,102	988,716	8,599	2,920,751	17,187	4,265,971	20,356	6,620,060	31,714	9,245,800
Barite	tons	3,560	52,845	5,056	115,337	9,465	238,825	11,436	287,626	20,072	433,200
Diatomite	tons					14	280	40	800	120	2,400
Flux (quartz, limestone)	tons	37,358	110,698	39,897	40,804	111,759	208,198	176,311	392,429	137,433	442,204
Granules (quartz, limestone, granite)	tons	4,620	59,321	4,541	65,507	6,355	73,858	13,220	173,214	17,295	221,864
Gypsum and products	tons	172,665	387,655	175,480	421,734	149,719	383,934	13,220	72,973	66,499	142,751
Mica	lb.	604,000	11,338	284,000	5,326	505,300	2,861	200,000	1,100	180,000	1,200
Perlite	tons	1,112	11,120								
Sulphur	tons	151,954	1,590,055	219,999	2,308,422	216,520	2,624,171	212,885	2,523,190	226,550	2,872,332
Totals			3,211,748		5,877,881		7,798,098		10,390,338		13,361,751
<i>Structural Materials</i>											
Brick—common	No.	1,382,883	51,381	1,289,911	35,550	4,853,940	232,139	2,248,447	75,767	663,828	24,345
" face, paving, sewer	No.	4,307,894	226,459	5,651,262	316,676	3,901,866	248,913	6,913,682	485,176	4,660,231	345,081
" firebrick, blocks			426,783		372,528		578,578		600,753		658,873
Clays	tons	5,226	31,990	6,609	36,425	8,033	46,757	7,985	47,101	3,849	29,495
Structural tile, hollow blocks			123,469		122,903		114,460		129,257		200,216
Drain-tile, sewer-pipe, flue-linings			627,097		753,297		801,019		696,385		697,611
Pottery—glazed or unglazed			30,012		31,081		38,035		38,385		47,612
Other clay products			19,267		32,697		55,514		69,659		38,868
Cement			5,071,260		4,935,298		5,474,875		6,339,071		7,078,108
Lime and limestone	tons	338,005	1,357,958	317,976	1,555,002	318,152	1,711,348	396,012	1,220,792	334,303	1,494,578
Rubble, riprap, crushed rock	tons	770,415	1,122,516	920,707	1,253,856	890,613	962,272	2,028,143	2,210,315	2,364,301	4,272,768
Sand and gravel			4,388,594		4,850,469	7,148,666	4,886,890		8,535,348		10,503,274
Stone	tons	2,611	78,252	3,055	99,392	26,079	148,454	148,454	139,150	2,403	236,110
Totals			13,555,038		14,395,174		15,299,254		20,587,159		25,626,939
<i>Fuels</i>											
Coal ¹	tons	1,384,138	9,528,279	1,308,284	9,154,544	1,332,874	8,986,501	1,417,209	9,346,518	1,085,657	7,340,339
Natural gas	M s.c.f.			60,883	6,545	168,651	18,130	187,846	20,143	8,274,942	366,867
Petroleum, crude ²	bbls.							148,454	299,321	340,945	763,721
Totals			9,528,279		9,161,089		9,004,631		9,665,982		8,470,927
Provincial totals			152,628,683		153,383,860		174,710,606		190,084,302		172,264,617

¹ The quantity of coal is that sold and used.

² For test purposes, 582 barrels were produced in 1955, no commercial value assigned.

TABLE IV.—MINERAL PRODUCTION VALUE, 1895-1957

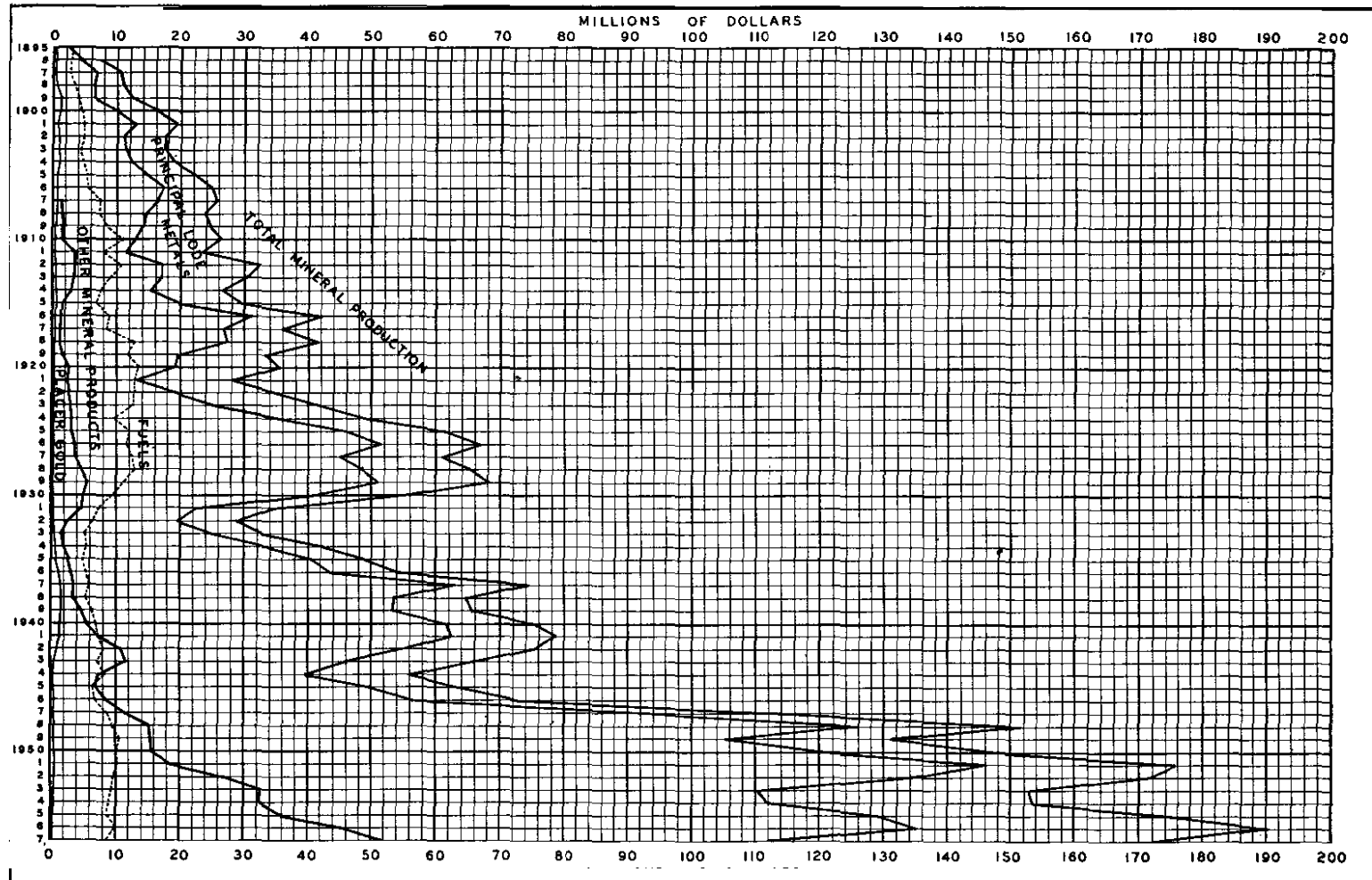


TABLE V.—PRINCIPAL LODE-METALS PRODUCTION, 1913-57

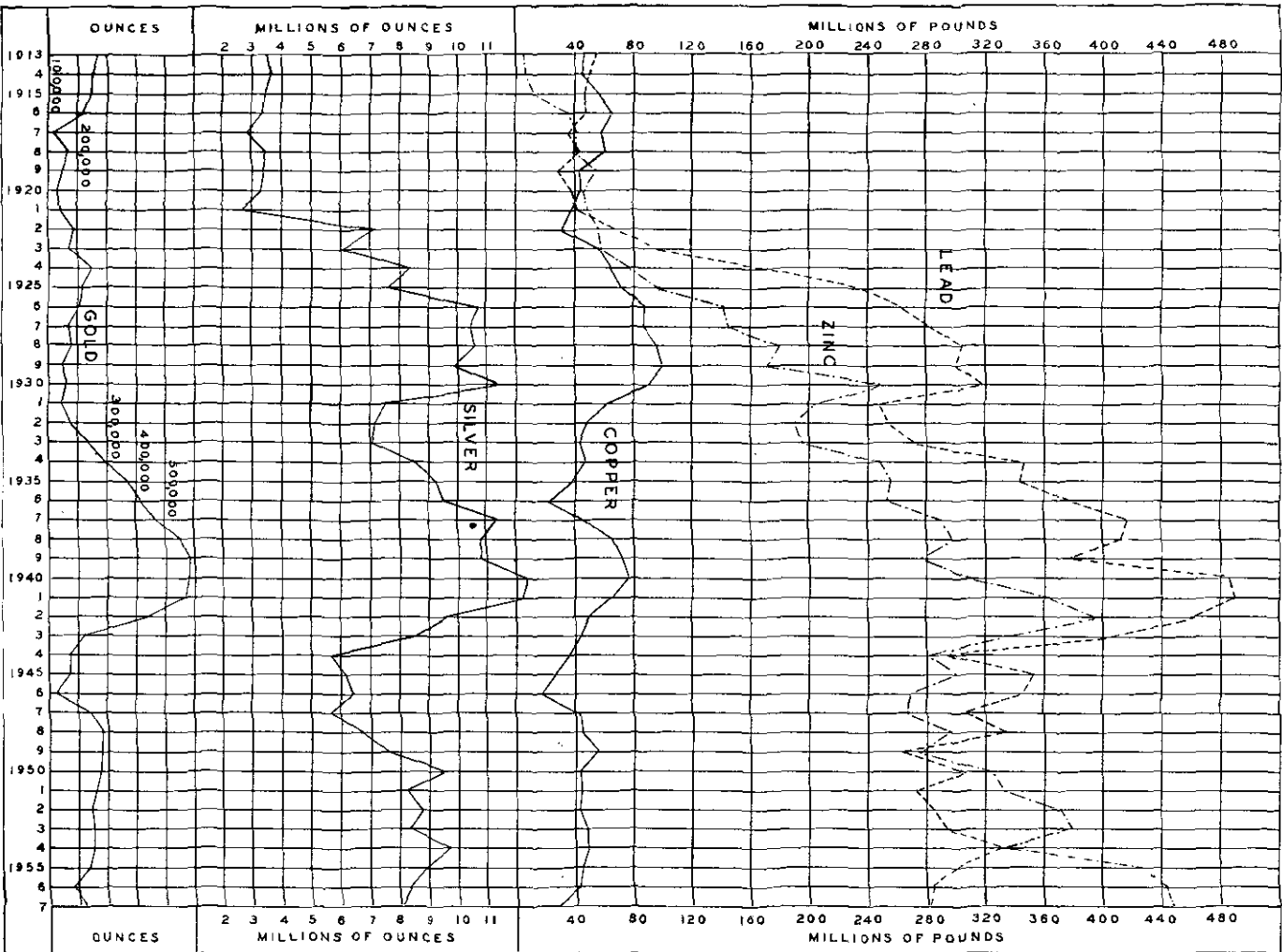


TABLE VI.—PRODUCTION OF PRINCIPAL METALS, 1858-1957

Year	Placer Gold		Gold		Silver		Copper		Lead		Zinc		Total Value
	Quantity ¹	Value	Quantity ²	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	
	Oz.	\$	Oz.	\$	Oz.	\$	Lb.	\$	Lb.	\$	Lb.	\$	\$
1858-86, incl.	3,105,775	52,798,364											52,798,364
1887	40,810	693,709				17,690	17,331			204,800	9,216		720,256
1888	36,280	616,731				79,780	75,000			674,500	29,813		721,544
1889	34,640	588,923				53,192	47,873			165,100	6,498		643,294
1890	29,080	494,436				70,427	73,948						568,384
1891	25,280	429,811				4,500	4,000						433,811
1892	23,500	399,526				77,160	66,935			808,420	33,064		499,525
1893	20,950	356,131	1,170	23,404		227,000	195,000			2,135,023	78,996		653,531
1894	23,850	405,516	6,252	125,014		746,379	470,219	324,680	16,234	5,662,523	169,875		1,186,858
1895	28,330	481,683	39,270	785,400		1,496,522	977,229	952,840	47,642	16,475,464	532,255		2,824,209
1896	32,000	544,026	62,259	1,244,180		3,135,343	2,100,689	3,818,556	190,926	24,199,977	721,384		4,801,205
1897	30,210	513,520	106,141	2,122,820		5,472,971	3,272,836	5,325,180	266,258	38,841,135	1,390,517		7,565,951
1898	37,840	643,346	110,061	2,201,217		4,292,401	2,375,841	7,271,678	874,781	31,693,559	1,077,581		7,172,766
1899	79,110	1,344,900	138,315	2,857,573		2,939,413	1,663,708	7,722,591	1,351,453	21,862,436	878,870		8,096,504
1900	75,220	1,278,724	167,153	3,453,381		3,958,175	2,309,200	9,997,080	1,615,289	63,358,621	2,691,887		11,348,481
1901	57,060	970,100	210,384	4,348,605		4,396,447	2,462,008	27,603,746	4,446,963	51,582,906	2,010,260		14,237,936
1902	63,130	1,073,140	236,491	4,888,269		3,917,917	1,941,328	29,636,057	3,446,673	22,536,381	824,832		12,174,242
1903	62,380	1,060,420	232,831	4,812,616		2,996,204	1,521,472	34,359,921	4,547,535	18,089,283	689,744		12,631,787
1904	65,610	1,115,300	222,042	4,589,608		3,222,481	1,719,516	35,710,128	4,578,037	36,646,244	1,421,874		13,424,335
1905	57,020	969,300	238,660	4,933,102		3,439,417	1,971,818	37,692,251	5,876,222	56,580,703	2,399,022		16,149,464
1906	55,790	948,400	224,027	4,630,639		2,990,262	1,897,320	42,990,488	8,288,565	52,408,217	2,667,578		18,432,502
1907	48,710	828,000	196,179	4,055,020		2,745,448	1,703,825	40,832,720	8,166,544	47,738,703	2,291,458		17,044,847
1908	38,060	647,000	255,582	5,282,880		2,631,389	1,321,483	47,274,614	6,240,249	43,195,733	1,632,799		15,124,411
1909	28,060	477,000	238,224	4,924,090		2,532,742	1,239,270	45,597,245	5,918,522	44,396,346	1,709,259	8,500,000	14,668,141
1910	31,760	540,000	267,701	5,533,380		2,450,241	1,245,016	38,243,934	4,871,512	34,658,746	1,386,350	4,184,192	192,473
1911	25,060	426,000	228,617	4,725,513		1,892,364	958,293	36,927,656	4,571,644	26,872,397	1,069,521	2,634,544	129,092
1912	32,680	555,500	257,496	5,322,442		3,132,108	1,810,045	51,456,537	8,408,513	44,871,454	1,805,627	5,358,280	316,139
1913	30,000	510,000	272,254	5,627,490		3,465,856	1,968,606	46,460,305	7,094,489	55,364,677	2,175,832	6,758,768	324,421
1914	33,240	565,000	247,170	5,109,004		3,602,180	1,876,736	45,009,699	6,121,319	50,625,048	1,771,877	7,866,467	346,125
1915	45,290	770,000	250,021	5,167,934		3,366,506	1,588,991	56,918,405	9,835,500	46,503,590	1,939,200	12,982,440	1,460,524
1916	34,150	580,500	221,932	4,587,334		3,301,923	2,059,739	65,379,364	17,784,494	48,727,516	3,007,462	37,168,980	4,043,985
1917	29,180	496,000	114,523	2,367,190		2,929,216	2,265,749	59,007,565	16,038,256	37,307,465	2,951,020	41,848,513	3,166,259
1918	18,820	320,000	164,674	3,403,812		3,498,172	3,215,870	61,483,754	15,143,449	43,899,661	2,928,107	41,772,916	2,899,040
1919	16,850	286,500	152,426	3,150,645		3,403,119	3,592,673	42,459,339	7,939,896	29,475,968	1,526,855	56,737,651	3,540,429
1920	13,040	221,600	120,048	2,481,392		3,377,849	3,235,980	44,887,676	7,832,899	39,331,218	2,816,115	47,208,268	3,077,979
1921	13,720	233,200	135,663	2,804,154		2,673,389	1,591,201	39,036,993	4,879,624	41,402,288	1,693,354	49,419,372	1,952,065
1922	21,690	368,800	197,856	4,089,684		7,101,311	4,554,781	32,359,896	4,329,754	67,447,985	3,480,316	57,146,548	2,777,322
1923	24,710	420,000	179,245	3,704,994		6,032,986	3,718,129	57,720,290	8,323,266	96,663,152	6,321,770	58,343,462	3,278,903
1924	24,750	420,750	247,716	5,120,535		8,341,768	5,292,184	64,845,393	8,442,870	170,384,481	12,415,917	79,130,970	4,266,741
1925	16,476	280,092	209,719	4,335,269		7,654,844	5,286,818	72,306,432	10,153,269	237,899,199	18,670,329	98,257,099	7,754,450
1926	20,912	355,503	201,427	4,163,859		10,748,556	6,675,606	89,339,768	12,324,421	263,023,937	17,757,535	142,876,947	10,586,610

STATISTICS

TABLE VI.—PRODUCTION OF PRINCIPAL METALS, 1858–1957—Continued

Year	Placer Gold		Gold		Silver		Copper		Lead		Zinc		Total Value
	Quantity ¹	Value	Quantity ²	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	
	Oz.	\$	Oz.	\$	Oz.	\$	Lb.	\$	Lb.	\$	Lb.	\$	\$
1927	9,191	156,247	178,001	3,679,601	10,470,185	5,902,043	89,202,871	11,525,011	282,996,423	14,874,292	145,225,443	8,996,135	45,133,329
1928	8,284	143,208	188,087	3,888,097	10,627,167	6,182,461	97,908,316	14,265,242	305,140,792	13,961,412	181,763,147	9,984,613	48,425,033
1929	6,983	118,711	145,387	3,005,411	9,960,172	5,278,194	102,793,669	18,612,850	302,346,268	15,269,696	172,096,841	9,268,792	51,553,654
1930	8,955	152,235	160,853	3,325,126	11,328,263	4,322,185	92,362,240	11,990,466	319,199,752	12,535,931	250,287,306	9,010,093	41,336,036
1931	17,176	291,992	146,133	3,020,837	7,550,331	2,254,979	64,134,746	5,365,690	248,783,508	6,742,282	205,071,247	5,237,520	22,913,300
1932	20,400	395,542	181,651	4,263,349	7,150,655	2,264,729	50,608,036	3,228,892	254,488,952	5,378,878	192,120,091	4,621,641	20,153,031
1933	23,928	562,787	223,589	6,394,645	7,021,754	2,656,526	43,149,466	3,216,701	271,606,071	6,495,731	195,963,751	6,291,416	25,617,806
1934	25,181	714,431	297,216	10,253,952	8,613,977	4,088,280	49,651,733	3,683,662	347,366,967	8,461,859	247,926,844	7,546,893	34,749,077
1935	30,929	895,058	365,343	12,856,419	9,269,944	6,005,996	39,428,208	3,073,428	344,268,444	10,785,930	256,239,446	7,940,860	41,557,691
1936	43,389	1,249,940	404,578	14,172,367	9,547,124	4,308,330	21,671,711	2,053,828	377,971,618	14,790,029	254,581,393	8,439,373	45,013,867
1937	54,153	1,558,245	460,781	16,122,727	11,308,685	5,075,451	46,057,584	6,023,411	419,118,371	21,416,949	291,192,278	14,274,245	64,471,028
1938	57,759	1,671,015	557,522	19,613,624	10,861,578	4,722,288	65,769,906	6,558,575	412,979,182	13,810,024	298,497,295	9,172,822	55,548,348
1939	49,746	1,478,492	587,336	21,226,957	10,821,393	4,381,365	73,254,679	7,392,862	378,743,763	12,002,390	278,409,102	8,544,375	55,026,441
1940	39,067	1,236,928	583,416	22,461,516	12,327,944	4,715,315	77,980,223	7,865,085	485,364,420	16,317,952	310,768,251	10,600,261	63,197,057
1941	43,775	1,385,962	571,026	21,984,501	12,175,700	4,658,545	66,435,583	6,700,693	490,185,657	16,480,042	363,302,195	12,392,238	63,601,981
1942	32,904	1,041,772	444,518	17,113,943	9,677,881	4,080,775	50,097,716	5,052,856	463,269,005	15,575,104	396,857,260	13,536,801	56,401,251
1943	14,600	462,270	224,403	8,639,516	8,526,310	3,858,496	42,307,510	4,971,132	405,285,476	15,214,417	335,137,014	13,405,481	46,551,312
1944	11,433	361,977	186,632	7,185,332	5,705,334	2,453,293	36,300,589	4,356,070	294,797,469	13,265,886	280,356,477	12,055,328	39,677,886
1945	12,589	398,591	175,373	6,751,860	6,157,307	2,893,934	25,852,366	3,244,472	353,497,689	17,674,884	301,737,902	19,431,921	50,395,662
1946	15,729	475,361	117,612	4,322,241	6,365,761	5,324,959	17,500,538	2,240,070	347,990,146	23,489,335	270,718,128	21,143,086	56,995,052
1947	6,969	200,585	243,282	8,514,870	5,707,691	4,109,538	41,783,921	8,519,741	306,400,709	41,884,977	268,450,926	30,147,039	93,376,750
1948	20,332	585,200	286,230	10,018,050	6,718,122	5,038,592	43,025,388	9,616,174	332,996,351	60,072,542	296,012,941	41,234,603	126,565,161
1949	17,886	529,524	288,396	10,382,256	7,636,053	5,669,769	54,856,808	10,956,550	263,580,549	41,645,726	276,324,451	36,604,700	105,788,525
1950	19,134	598,717	283,983	10,805,553	9,507,225	7,666,151	42,212,133	9,889,458	307,122,803	44,391,530	324,263,778	48,882,765	122,234,174
1951	23,691	717,911	261,274	9,627,947	8,215,884	7,768,118	43,249,658	11,980,155	273,456,604	50,316,015	333,910,764	66,448,242	146,858,388
1952	17,554	494,756	251,393	8,615,238	8,796,720	7,315,088	42,005,512	13,054,893	284,949,396	45,936,692	372,871,717	59,189,656	134,606,323
1953	14,245	403,230	253,553	8,727,294	8,376,953	7,017,709	49,021,013	14,869,544	296,559,781	39,338,655	378,345,159	40,388,346	110,744,778
1954	8,684	238,967	258,388	8,803,279	9,825,153	8,153,108	50,150,087	14,599,693	332,474,456	45,482,505	334,124,560	34,805,755	112,083,307
1955	7,666	217,614	242,477	8,370,306	7,902,145	6,942,113	44,238,031	16,932,549	302,567,640	45,161,245	429,198,565	52,048,909	129,672,736
1956	3,865	109,450	191,743	6,603,628	8,404,600	7,511,443	43,360,575	17,251,872	283,718,073	44,702,619	443,853,004	58,934,801	135,113,813
1957	2,936	80,990	222,506	7,465,076	8,129,971	7,077,708	29,318,494	7,631,897	281,603,346	39,568,086	449,448,607	50,225,881	112,049,638
Totals	5,200,296	195,955,159	15,136,211	435,187,967	403,103,630	240,061,747	2,916,622,085	476,690,590	12,284,544,537	880,027,584	9,893,251,300	781,317,148	2,909,240,195

¹ Ounces of crude gold.² Ounces of fine gold.

TABLE VIIA.—PRODUCTION, 1956 AND 1957, BY MINING DIVISIONS—SUMMARY

Division	Year	Placer Gold		Principal Lode Metals	Miscellaneous Metals	Industrial Minerals	Structural Materials	Fuels						Division Totals
		Quantity ¹	Value					Coal		Petroleum		Natural Gas		
								Quantity	Value	Quantity	Value	Quantity	Value	
		Oz.	\$	\$	\$	\$	\$	Tons	\$	Bbls.	\$	M S.C.F.	\$	\$
Alberni	1956	.....	.....	.....	.....	.....	60,833	.....	.....	.....	.....	.....	.....	80,833
	1957	.....	.....	410	.....	.....	171,477	.....	.....	.....	.....	.....	.....	171,887
Atlin	1956	1,818	51,483	5,640,677	84,841	.....	5,428	.....	.....	.....	.....	.....	.....	5,782,429
	1957	1,300	35,861	4,832,488	104,160	.....	23,034	.....	.....	.....	.....	.....	.....	4,995,541
Cariboo	1956	1,505	42,619	1,421,013	.....	1,000	381,026	.....	.....	.....	.....	.....	.....	1,846,558
	1957	1,360	37,516	1,304,316	.....	3,600	396,333	.....	.....	.....	.....	.....	.....	1,741,765
Clinton	1956	.....	.....	.....	.....	.....	7,500	.....	.....	.....	.....	.....	.....	7,500
	1957	21	579	.....	.....	.....	14,500	.....	.....	.....	.....	.....	.....	15,079
Fort Steele	1956	.....	.....	60,168,461	637,792	510,122	192,694	1,158,213	7,228,993	.....	.....	.....	.....	68,733,062
	1957	2	55	49,577,717	555,936	842,580	594,873	895,118	5,310,835	.....	.....	.....	.....	55,881,996
Golden	1956	.....	.....	3,978,186	47,368	385,495	57,016	.....	.....	.....	.....	.....	.....	4,468,065
	1957	.....	.....	2,478,986	19,930	575,951	153,515	.....	.....	.....	.....	.....	.....	3,228,382
Greenwood	1956	.....	.....	661,911	3,844	73,824	17,621	.....	.....	.....	.....	.....	.....	757,200
	1957	.....	.....	1,115,868	5,307	23,126	12,100	.....	.....	.....	.....	.....	.....	1,156,401
Kamloops	1956	28	793	4,367	.....	294,050	663,356	.....	.....	.....	.....	.....	.....	962,566
	1957	7	193	.....	.....	.....	1,636,953	.....	.....	.....	.....	.....	.....	1,637,146
Liard	1956	6	170	998	.....	6,620,060	124,404	4,642	38,211	148,454	299,321	187,846	20,143	7,103,307
	1957	6	165	.....	.....	9,245,800	241,980	2,758	28,421	340,945	763,721	8,274,942	366,867	10,646,954
Lillooet	1956	54	1,529	4,024,683	.....	.....	75,886	.....	.....	.....	.....	.....	.....	4,102,098
	1957	58	1,800	4,900,877	.....	.....	59,920	.....	.....	.....	.....	.....	.....	4,962,397
Nanaimo	1956	.....	.....	4,619	2,190,847	39,531	1,260,566	172,529	1,629,168	.....	.....	.....	.....	5,124,731
	1957	.....	.....	.....	2,200,637	20,337	1,786,533	164,013	1,849,306	.....	.....	.....	.....	5,866,813
Nelson	1956	16	453	14,266,508	7,134,800	.....	86,041	.....	.....	.....	.....	.....	.....	21,487,802
	1957	65	1,793	12,465,726	6,015,573	.....	95,760	.....	.....	.....	.....	.....	.....	18,568,852
New Westminster	1956	12	340	776	.....	105,467	5,511,859	.....	.....	.....	.....	.....	.....	5,618,442
	1957	52	1,434	.....	.....	129,419	6,933,381	.....	.....	.....	.....	.....	.....	7,064,284
Nicola	1956	.....	.....	2,349	.....	.....	21,247	1,170	12,092	.....	.....	.....	.....	35,688
	1957	.....	.....	.....	.....	.....	20,523	1,081	11,615	.....	.....	.....	.....	32,138
Omineca	1956	55	1,567	1,479,941	44,339	.....	293,588	8,553	71,234	.....	.....	.....	.....	1,890,659
	1957	37	1,021	1,543,272	36,929	.....	648,068	4,991	47,414	.....	.....	.....	.....	2,276,704
Osoyoos	1956	.....	.....	24,916	.....	346,821	25,015	.....	.....	.....	.....	.....	.....	396,752
	1957	.....	.....	79,573	.....	479,866	11,370	.....	.....	.....	.....	.....	.....	570,808
Revelstoke	1956	317	8,977	1,866,610	42,112	.....	67,496	.....	.....	.....	.....	.....	.....	1,985,195
	1957	1	28	1,351,326	33,555	.....	54,185	.....	.....	.....	.....	.....	.....	1,439,094
Similkameen	1956	4	113	8,132,766	.....	.....	295,150	72,102	366,820	.....	.....	.....	.....	8,794,840
	1957	27	745	1,932,983	.....	.....	118,250	17,696	92,748	.....	.....	.....	.....	2,144,726
Skeena	1956	.....	.....	1,840,706	.....	.....	1,250,786	.....	.....	.....	.....	.....	.....	2,891,492
	1957	.....	.....	1,869,039	4,742	.....	1,390,868	.....	.....	.....	.....	.....	.....	3,064,649
Slocan	1956	.....	.....	11,073,608	202,007	.....	53,564	.....	.....	.....	.....	.....	.....	11,329,179
	1957	.....	.....	9,997,915	219,198	.....	58,574	.....	.....	.....	.....	.....	.....	10,275,687
Trail Creek	1956	.....	.....	22,289	.....	.....	135,798	.....	.....	.....	.....	.....	.....	158,087
	1957	.....	.....	97,745	.....	.....	132,808	.....	.....	.....	.....	.....	.....	230,553
Vancouver	1956	.....	.....	8,675,752	85,739	366,278	2,133,859	.....	.....	.....	.....	.....	.....	11,261,628
	1957	.....	.....	6,386,323	48,051	353,352	2,782,322	.....	.....	.....	.....	.....	.....	9,570,048
Vernon	1956	50	1,416	.....	.....	.....	328,888	.....	.....	.....	.....	.....	.....	330,304
	1957	.....	.....	.....	.....	.....	192,408	.....	.....	.....	.....	.....	.....	192,408
Victoria	1956	.....	.....	128,433	.....	.....	7,537,538	.....	.....	.....	.....	.....	.....	7,665,971
	1957	.....	.....	252,784	.....	.....	8,097,206	.....	.....	.....	.....	.....	.....	8,349,990
Totals	1956	3,865	109,405	135,004,363 ²	14,327,010 ²	10,390,338 ²	20,587,159	1,417,209	9,346,518	148,454	299,321	187,846	20,143	190,084,302 ²
	1957	2,936	80,990	111,968,648 ²	12,755,362 ²	13,361,751 ²	25,626,939	1,085,657	7,340,339	340,945	763,721	8,274,942	366,867	172,264,617 ²

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¹ Crude gold.

² Includes metals and sulphur not completely assigned to mining divisions (see Table VII, B, C, and D).

TABLE VIII.—PRODUCTION, 1956 AND 1957, BY MINING DIVISIONS—PRINCIPAL LODE METALS

Division	Year	Lode Gold		Silver		Copper		Lead		Zinc	
		Quantity ¹	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
		Oz.	\$	Oz.	\$	Lb.	\$	Lb.	\$	Lb.	\$
Alberni	1956										
	1957	12	403	8	7						
Atlin	1956	13,496	464,802	690,100	616,763	5,215,386	2,075,046	3,421,993	539,169	14,647,514	1,944,897
	1957	15,426	517,542	584,969	509,257	3,870,199	1,007,451	4,857,865	682,581	18,932,040	2,115,655
Cariboo	1956	41,118	1,416,104	4,482	4,006	2,270	903				
	1957	38,759	1,300,364	4,540	3,952						
Clinton	1956										
	1957										
Fort Steele	1956	297	10,229	2,539,478	2,269,608			180,268,315	28,403,076	222,025,518	29,480,548
	1957	279	9,360	2,491,430	2,168,964			164,060,122	23,052,088	208,924,430	23,347,305
Golden	1956			178,184	159,248	228,585	90,947	15,070,028	2,374,434	10,193,985	1,353,557
	1957	5	168	106,383	92,614	72,354	18,834	6,909,862	970,905	12,496,334	1,396,465
Greenwood	1956	224	7,713	630,728	563,701	1,732	689	289,968	45,687	332,270	44,119
	1957	2,207	74,045	711,983	619,831	1,140,562	296,900	468,703	65,857	530,066	59,235
Kamloops	1956	1	34	1,107	989			17,446	2,749	4,484	595
	1957										
Liard	1956			336	300	56	22	4,292	676		
	1957										
Lillooet	1956	116,226	4,002,823	24,459	21,860						
	1957	145,289	4,874,446	30,360	26,431						
Nanaimo	1956			55	49	11,487	4,570				
	1957										
Nelson	1956	121	4,167	133,922	119,690	63,039	25,081	23,533,297	3,707,906	78,397,830	10,409,664
	1957	118	3,959	127,667	111,143	32,909	8,567	24,488,582	3,440,891	79,563,010	8,891,166
New Westminster	1956			121	108						
	1957										
Nicola	1956			74	66	5,737	2,283				
	1957										
Omineca	1956	1,153	39,709	782,836	699,197	83,995	33,419	2,376,730	374,478	2,508,949	333,138
	1957	1,131	37,945	795,172	692,253	44,868	11,680	3,767,228	529,338	2,434,551	272,061
Osoyoos	1956	688	23,605	224	200	2,565	1,021				
	1957	2,367	79,413	184	160						
Revelstoke	1956	2,129	73,323	327,040	292,286	78,681	31,305	4,933,765	777,364	5,214,132	692,332
	1957	2,210	74,145	275,617	239,944	43,699	11,375	3,909,848	549,373	4,263,885	476,489
Similkameen	1956	6,353	218,797	124,965	111,685	19,610,133	7,802,284				
	1957	2,616	87,767	35,524	30,928	6,969,729	1,814,290				
Skeena	1956	114	3,926	1,541,908	1,378,049			1,374,597	216,582	317,437	42,149
	1957	357	11,977	1,650,598	1,436,961			1,499,780	210,734	83,819	9,367
Slocan	1956	360	12,398	1,378,107	1,052,910			36,836,084	5,803,888	31,663,743	4,204,312
	1957	443	14,863	1,087,841	955,747			37,145,715	5,219,344	34,075,711	3,807,961
Trail Creek	1956	180	6,189	290	259	39,790	15,831				
	1957	1,089	36,536	1,389	1,209	230,223	59,929		52	170	19
Vancouver	1956	9,165	315,643	86,023	76,881	15,271,944	6,076,248		96,330	15,891,320	2,110,050
	1957	10,005	335,668	94,614	82,368	14,448,864	3,761,189		281,817	17,228,467	1,925,281
Vernon	1956										
	1957										
Victoria	1956			1,464	1,309	319,511	127,124				
	1957			4,532	3,945	955,933	248,839				
Not assigned ²	1956	118	4,064	159,197	142,279	2,423,986	964,431			14,975,761	2,359,530
	1957	193	6,475	117,160	101,996	1,509,134	392,843			32,489,578	4,566,111
Totals	1956	191,743	6,603,628	3,404,600	7,511,443	43,360,575	17,251,872	383,718,073	44,702,619	443,853,904	58,934,801
	1957	222,506	7,465,076	3,129,971	7,077,708	29,318,494	7,631,897	281,603,346	39,568,086	449,448,607	50,225,881

¹ Fine gold. ² Gold, silver, copper, and some lead "not assigned" were recovered at the Tacoma smelter from dross shipped from the Trail smelter. The zinc and most of the lead were recovered at the Trail smelter by "fuming" current and reclaimed slag.

TABLE VIIC.—PRODUCTION, 1956 AND 1957, BY MINING DIVISIONS—MISCELLANEOUS METALS

Division	Year	Antimony ¹		Bismuth		Cadmium ²		Indium		Iron Ore		Mercury		Tin		Tungsten (WO ₃)		Division Totals
		Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	
		Lb.	\$	Lb.	\$	Lb.	\$	Oz.	\$	Tons	\$	Lb.	\$	Lb.	\$	Lb.	\$	\$
Atlin	1956					50,803	84,841											84,841
	1957					63,902	104,160											104,160
Fort Steele	1956													756,934	637,792			637,792
	1957													709,102	555,936			555,936
Golden	1956					28,364	47,368											47,368
	1957					12,227	19,930											19,930
Greenwood	1956					2,302	3,844											3,844
	1957					3,256	5,307											5,307
Lillooet	1956																	
	1957																	
Nanaimo	1956									369,955	2,190,847							2,190,847
	1957									357,342	2,200,637							2,200,637
Nelson	1956					469,116	783,424									2,264,775	6,351,376	7,134,800
	1957					475,518	775,094									1,921,483	5,240,479	6,015,573
Omineca	1956					26,550	44,339											44,339
	1957					22,656	36,929											36,929
Revelstoke	1956					25,217	42,112											42,112
	1957					20,586	33,555											33,555
Similkameen	1956																	
	1957																	
Skeena	1956																	
	1957					2,909	4,742											4,742
Slocan	1956					120,962	202,007											202,007
	1957					134,477	219,198											219,198
Vancouver	1956					51,341	85,739											85,739
	1957					29,479	48,051											48,051
Not assigned ^{1 2 3}	1956	2,140,432	768,843	156,753	346,424	1,163,272	1,942,664	363,192	795,390									3,853,321
	1957	1,360,731	577,344	145,634	314,569	1,181,387	1,925,661	384,360	693,770									3,511,344
Totals	1956	2,140,432	768,843	156,753	346,424	1,937,927	3,236,338	363,192	795,390	369,955	2,190,847			756,934	637,792	2,264,775	6,351,376	14,327,010
	1957	1,360,731	577,344	145,634	314,569	1,946,397	3,172,627	384,360	693,770	357,342	2,200,637			709,102	555,936	1,921,483	5,240,479	12,755,362

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¹ Antimony assigned to individual mining divisions is the reported content of concentrates exported to foreign smelters. Antimony "not assigned" is the antimony content of antimonial lead produced at the Trail smelter and antimony reported as recovered from Dore slag and flue dust exported.

² Cadmium assigned to individual mining divisions is the reported content of customs shipments to the Trail smelter and to foreign smelters. Cadmium "not assigned" is the remainder of the reported estimated recovery at the Trail refinery from British Columbia concentrates.

³ Antimony, bismuth, and indium recovered at the Trail smelter may include some metal from sources outside British Columbia, in addition to metal contained in British Columbia ores and concentrates. The Trail output of each of the three metals is shown as "not assigned."

NOTE.—In 1956 about 40 tons of manganese ore was shipped for experimental purposes by Ojala Mines Ltd.

TABLE VIII.—PRODUCTION, 1956 AND 1957, BY MINING DIVISIONS—INDUSTRIAL MINERALS

Division	Year	Asbestos		Barite		Diatomite		Fluxes (Limestone, Quartz)		Granules (Quartz, Limestone, and Granite)		Gypsum and Products		Mica		Sulphur		Division Totals
		Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	
		Tons	\$	Tons	\$	Tons	\$	Tons	\$	Tons	\$	Tons	\$	Lb.	\$	Tons	\$	\$
Cariboo	1956					40	800							200,000 ¹	1,100 ¹			1,900
	1957					120	2,400							180,000 ¹	1,200 ¹			3,600
Fort Steele	1956															25,006	510,122	510,122
	1957															36,401	842,580	842,580
Golden	1956			11,436	287,620							36,385	97,809					385,495
	1957			20,072	433,200							66,499	142,751					575,951
Greenwood	1956							73,824	73,824									73,824
	1957							23,126	23,126									23,126
Kamloops	1956													36,593	294,050			294,050
	1957																	
Liard	1956	20,356	6,620,060 ²															6,620,060
	1957	31,714	9,245,800 ²															9,245,800
Nanaimo	1956							39,170	39,531									39,531
	1957							18,608	20,337									20,337
New Westminster	1956									8,055	105,467							105,467
	1957									10,495	129,419							129,419
Omineca	1956																	
	1957																	
Osoyoos	1956							63,317	279,074	5,165	67,747							346,821
	1957							95,701	398,741	6,130	81,125							479,866
Vancouver	1956															23,200	366,278	366,278
	1957															21,377	342,032	353,352
Not assigned	1956									670	11,320					164,879 ³	1,646,790	1,646,790
	1957															188,772 ³	1,687,720	1,687,720
Totals	1956	20,356	6,620,060	11,436	287,620	40	800	76,311	392,429	13,220	173,214	72,978	391,919	200,000	1,100	212,885	2,523,190	10,390,338
	1957	31,714	9,245,800	20,072	433,200	120	2,400	137,433	442,204	17,295	221,864	66,499	142,751	180,000	1,200	226,550	2,872,332	13,361,751

¹ Estimated.² Does not include value of containers.³ Recovery at Trail smelter for use in Warfield fertilizer plants, and derived from several mining divisions.

TABLE VIII.—PRODUCTION, 1956 AND 1957, BY MINING DIVISIONS—STRUCTURAL MATERIALS

Division	Year	Cement	Lime and Limestone	Building-stone	Rubble, Riprap, and Crushed Rock	Sand and Gravel	Brick (Common)	Face, Paving, and Sewer Brick	Fire-bricks, Blocks	Clays	Structural Tile (Hollow Blocks), Roof-tile, Floor-tile	Drain-tile and Sewer-pipe	Pottery (Glazed or Unglazed)	Other Clay Products	Division Totals
		\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
Alberni	1956				5,790	55,043									60,833
	1957				5,142	186,335									171,477
Atlin	1956				380	5,043									5,423
	1957				1,092	21,942									23,034
Cariboo	1956				111,834	269,192									381,026
	1957				720	395,613									396,333
Clinton	1956					7,500									7,500
	1957					14,500									14,500
Fort Steele	1956				79,473	113,221									192,694
	1957				437,348	157,525									594,873
Golden	1956				400	56,616									57,016
	1957				500	153,015									153,515
Greenwood	1956				3,457	14,164									17,621
	1957				7,100	5,000									12,100
Kamloops	1956				393,349	269,507									663,356
	1957				1,186,908	450,045									1,836,953
Liard	1956				217	124,187									124,404
	1957				2,166	239,814									241,980
Lillooet	1956				1,000	74,886									75,886
	1957				5,000	54,920									59,920
Nanaimo	1956	7,063,551	35,000		4,508	157,417									1,260,566
	1957	1,306,434	189,195		4,845	286,059									1,786,533
Nelson	1956				23,313	62,728									86,041
	1957				835	94,925									95,760
New Westminster	1956		97,665		282,239	3,184,877	61,909	72,690	535,550	47,101	110,967	629,085	30,284	59,492	5,511,859
	1957		132,144		3,368,125	2,630,953	14,581	309,307	595,003	29,495	154,789	337,084	35,000	28,920	6,933,381
Nicola	1956				4,500	16,747									21,247
	1957					20,523									20,523
Omineca	1956				10,000	283,588									293,588
	1957				150,484	497,584									648,068
Osoyoos	1956				1,680	23,335									25,015
	1957				10,000	1,370									11,370
Revelstoke	1956				32,105	35,391									67,496
	1957					54,185									54,185
Similkameen	1956				39,500	255,650									295,150
	1957				25,000	93,250									118,250
Skeena	1956		51,182		75,393	1,124,211									1,250,786
	1957		44,400		32,345	1,314,123									1,390,868
Slocan	1956				5,730	47,834									53,564
	1957					58,574									58,574
Trail Creek	1956			6,500	16,000	113,298									135,798
	1957			1,850	12,000	119,158									132,808
Vancouver	1956			97,650	1,085,171	857,043	18,308	12,486	58,034					10,167	2,133,850
	1957			45,265	14,367	2,615,045	8,236	35,774	53,687					9,948	2,782,322
Vernon	1956				30,000	298,888									328,888
	1957				5,000	187,406									192,406
Victoria	1956	6,339,071	8,394		3,886	1,084,977	550		7,169		18,290	67,300	8,101		7,537,538
	1957	7,078,108	11,800		5,781	871,410	1,528		10,183		45,447	60,527	12,612		8,097,208
Totals	1956	6,339,071	1,220,792	189,150	2,210,315	8,535,348	75,767	185,176	600,753	47,101	120,257	696,385	38,385	69,659	20,587,159
	1957	7,078,108	1,494,578	236,110	4,272,768	10,503,274	24,345	345,081	659,873	29,495	200,216	697,611	47,612	88,868	25,626,939

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TABLE VIIIa.—PRODUCTION TO DATE BY MINING DIVISIONS—SUMMARY

Division	Placer Gold ¹		Principal Lode Metals	Miscellaneous Metals	Industrial Minerals	Structural Materials	Fuels						Division Totals
	Quantity	Value					Coal		Petroleum ²		Natural Gas		
							Quantity	Value	Quantity	Value	Quantity	Value	
	Oz.	\$	\$	\$	\$	\$	Tons	\$	Bbls.	\$	M S.C.F.	\$	\$
Alberni	1,610	33,052	11,657,492	—	9,398	903,716	—	—	—	—	—	—	12,603,658
Atlin	728,157	17,170,234	37,482,188	387,814	20,325	181,912	—	—	—	—	—	—	55,242,473
Cariboo	2,590,132	53,588,697	36,690,196	23,730	162,680	2,848,193	290	1,100	—	—	—	—	93,314,596
Clinton	10,084	240,583	847,454	900	162,867	94,445	—	—	—	—	—	—	1,346,249
Fort Steele	20,425	465,363	1,428,187,403	8,302,270	2,717,621	3,873,161	52,723,789	212,257,849	—	—	—	—	1,655,803,667
Golden	469	11,268	33,083,061	193,689	2,303,072	1,059,404	—	—	—	—	—	—	36,650,494
Greenwood	5,051	114,996	114,689,685	48,393	2,323,897	510,549	—	—	—	—	—	—	117,687,520
Kamloops	27,519	602,594	3,044,836	65,678	6,528,308	5,661,206	14,995	59,765	—	—	—	—	15,962,387
Liard	50,082	1,245,186	6,312	79	24,064,298	915,597	86,743	577,552	489,981	1,063,042	8,692,322	411,685	28,283,751
Lillooet	91,651	1,886,837	108,209,951	48,350	5,129	710,718	—	—	—	—	—	—	110,860,985
Nanaimo	866	19,300	5,880,933	24,559,080	663,204	23,542,352	79,685,055	294,220,173	—	—	—	—	348,885,042
Nelson	3,573	88,649	127,422,735	34,684,151	64,126	2,288,721	—	—	—	—	—	—	164,548,382
New Westminster	11,531	241,454	127,234	87,724	301,300	49,002,792	—	—	—	—	—	—	49,760,504
Nicola	230	4,652	571,128	17	9,610	298,711	2,928,372	11,065,272	—	—	—	—	11,949,390
Omineca	52,368	1,386,555	16,949,484	15,311,294	11,460	1,941,220	406,524	2,490,171	—	—	—	—	38,090,184
Osoyoos	190	4,142	50,147,236	1,020	2,208,867	909,964	1,122	5,008	—	—	—	—	53,276,237
Revelstoke	7,574	164,251	10,228,649	159,853	—	968,471	—	—	—	—	—	—	11,521,224
Similkameen	12,106	287,038	120,000,865	128,401	18,558	2,016,142	4,652,833	19,531,750	—	—	—	—	141,982,754
Skeena	4,603	105,569	207,652,391	274,317	1,240,215	6,774,201	—	—	—	—	—	—	216,046,693
Slocan	362	9,286	157,328,983	1,081,879	—	598,388	—	—	—	—	—	—	159,018,536
Trail Creek ³	848	24,176	88,881,789	35,564 ³	—	1,285,712	—	—	—	—	—	—	90,227,241
Vancouver	182	5,306	192,716,424	515,245	5,694,371	23,298,486	—	—	—	—	—	—	222,229,832
Vernon	2,394	63,588	188,310	—	3,978	1,911,230	—	—	—	—	—	—	2,167,106
Victoria	628	15,680	5,593,064	24,508	190,451	91,174,022	—	—	—	—	—	—	96,997,725
Not assigned	1,577,661	18,176,703	55,697,233	43,965,560	27,587,285	25,927,555	—	—	—	—	—	—	171,354,336
Totals	5,200,296	95,955,159	2,813,285,036	129,899,516	76,291,020	248,696,868	140,499,723	540,208,640	489,981	1,063,042	8,692,322	411,685	3,905,810,966

¹ Quantity of placer gold is given in ounces of crude gold. The year of first recorded production for the major placer-producing mining divisions was: Atlin, 1898; Cariboo, 1858; Lillooet, 1874; Quesnel, 1858.

² Includes 582 barrels produced for test purposes in 1955, no value assigned.

³ Re "Trail Creek" and re "not assigned," see footnotes under Tables VIIIb and VIIIc.

NOTE.—Full details for placer gold are given in this table. The columns headed "Principal Lode Metals," "Miscellaneous Metals," "Industrial Minerals," and "Structural Materials" give the total value only, details being set forth in Tables VIIIa, VIIIc, VIIIb, and VIIIe. The quantity of coal is gross output; see footnotes to Tables IXa, IXb, and IXc.

TABLE VIII.B.—PRODUCTION TO DATE BY MINING DIVISIONS—PRINCIPAL LODE METALS

Division	Lode Gold		Silver		Copper		Lead		Zinc		Division Totals
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	
	Oz.	\$	Oz.	\$	Lb.	\$	Lb.	\$	Lb.	\$	\$
Alberni.....	300,103	11,232,002	161,227	77,499	2,290,699	343,518	112,888	4,473	.....	.....	11,657,492
Atlin.....	344,163	12,125,578	3,375,330	2,893,940	24,777,597	8,160,266	23,765,211	3,437,907	91,067,749	10,864,497	37,482,188
Cariboo.....	1,015,745	36,614,193	114,089	71,340	2,352	920	24,560	3,724	505	19	36,690,196
Clinton.....	23,390	827,328	31,564	14,214	57,548	5,905	193	7	.....	.....	847,454
Fort Steele.....	3,925	104,597	191,264,912	105,854,977	28,592	6,193	10,831,153,299	747,791,058	7,896,683,401	574,430,578	1,428,187,403
Golden.....	105	2,671	2,623,479	1,878,673	628,005	218,185	190,093,340	17,395,314	186,539,395	13,588,218	33,083,061
Greenwood.....	1,135,619	24,456,890	30,235,873	17,540,945	442,394,706	70,810,683	13,326,674	962,413	13,977,319	918,754	114,689,685
Kamloops.....	47,868	1,608,328	304,512	181,984	6,411,583	1,179,668	538,097	45,030	438,023	29,826	3,044,836
Liard.....	114	4,120	540	446	56	22	10,102	1,724	.....	.....	6,312
Lillooet.....	3,081,786	107,757,686	761,806	449,682	400	41	62,463	2,542	.....	.....	108,209,951
Nanaimo.....	84,009	1,919,998	570,325	336,281	22,135,435	3,624,654	.....	.....	.....	.....	5,880,933
Nelson.....	1,328,787	41,551,552	7,614,065	4,476,869	14,798,370	1,682,270	202,224,633	24,617,555	424,275,485	55,094,489	127,422,735
New Westminster.....	4,416	112,407	13,380	6,180	28,167	7,047	28,425	1,119	12,755	481	127,234
Nicola.....	8,525	234,914	267,419	126,588	555,712	108,513	2,235,428	90,516	320,683	10,597	571,128
Omineca.....	24,765	763,333	9,339,812	7,404,246	6,732,597	1,541,211	27,162,955	3,453,412	30,393,283	3,787,282	16,949,484
Osoyoos.....	1,621,961	49,355,162	584,398	383,625	2,783,966	399,900	256,957	8,151	6,839	398	50,147,455
Revelstoke.....	35,606	1,030,387	3,963,618	2,641,955	153,740	51,037	34,437,100	3,628,919	23,365,267	2,876,351	10,228,649
Similkameen.....	183,015	6,293,366	4,218,593	2,581,525	601,103,456	111,111,551	246,806	10,459	72,275	3,964	120,000,646
Skeena.....	2,392,955	60,223,342	66,203,751	41,777,629	687,106,270	98,025,648	57,454,378	5,138,411	16,706,218	2,487,361	207,652,391
Slocan.....	15,194	435,050	67,954,333	43,034,925	229,696	43,512	767,978,914	59,528,567	580,921,580	54,286,929	157,328,983
Trail Creek ¹	2,948,796	62,555,449	3,620,741	2,066,041	121,136,623	18,034,726	18,485,041	919,768	158,016,367	5,305,805	88,881,789
Vancouver.....	437,347	13,920,557	4,713,375	2,852,189	916,289,250	149,206,205	17,733,528	1,781,320	191,450,082	24,956,153	192,716,424
Vernon.....	5,223	176,048	12,823	8,084	654	100	24,913	2,932	10,816	1,146	188,310
Victoria.....	37,663	812,730	815,598	453,303	24,191,290	4,023,260	210,097	19,848	3,568,709	283,923	5,593,064
Not assigned ²	55,031	1,063,804	4,338,067	2,948,607	40,805,321	8,105,555	72,264,075	11,182,415	275,340,730	32,390,377	55,697,233
Totals.....	15,136,111	435,187,967	403,103,630	240,061,747	2,916,642,085	476,690,590	12,259,830,077	880,027,584	9,893,251,300	781,317,148	2,813,285,036

¹ Includes zinc and lead recovered at the Trail smelter from current and reclaimed slags and also lead recovered at the Tacoma smelter from dross shipped by the Trail smelter, prior to 1953.

² Includes all metals recovered from dross and slag (see note 1) in 1953 and subsequently.

TABLE VIII.C.—PRODUCTION TO DATE BY MINING DIVISIONS—MISCELLANEOUS METALS

Division	Antimony ¹		Bismuth		Cadmium ²		Chromite		Cobalt		Indium		Iron Ore		Magnesium		Manganese	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
	Lb.	\$	Lb.	\$	Lb.	\$	Tons	\$	Lb.	\$	Oz.	\$	Tons	\$	Lb.	\$	Tons	\$
Atlin					233,875	387,454												
Cariboo							126	900										
Clinton																		
Fort Steele					2,418	5,155												
Golden	40,062	14,906			107,322	178,783									204,632	88,184		
Greenwood					10,273	16,998	670	31,395										
Kamloops													17,109	59,883				
Liard																		
Lillooet	13,466	4,321																
Nanaimo													3,935,155	24,559,080				
Nelson					1,498,325	2,550,285												
New Westminster																		
Omineca	104,489	15,217			115,681	195,694			1,730	420								
Osoyoos																		
Revelstoke	9,394	3,455			88,092	150,711												
Similkameen																		
Skeena					123,258	253,577							1,200	6,000				
Slocan	31,865	8,133			602,045	1,065,586											541	8,160
Trail Creek													550	1,925				
Vancouver					243,953	515,245												
Victoria																	1,167	24,508
Not assigned ^{2 a}	35,061,526	8,595,166	4,578,100	7,499,154	18,733,725	26,111,679					866,653	1,759,578						
Totals	35,260,802	8,641,198	4,578,100	7,499,154	21,758,967	31,431,167	796	32,295	1,730	420	866,653	1,759,578	3,954,014	24,626,888	204,632	88,184	1,708	32,668 ⁴

¹ Antimony assigned to individual mining divisions is the reported content of concentrates exported to foreign smelters. Antimony "not assigned" is the antimony content of antimonial lead or of other antimony products recovered at the Trail smelter.

² Cadmium assigned to individual mining divisions is that reported by operators of individual mines from concentrates shipped to the Trail smelter and to foreign smelters. Cadmium "not assigned" is the remainder of the reported estimated recovery at the Trail refinery from British Columbia concentrates.

³ The antimony, bismuth, and indium recovered at the Trail smelter are not assigned to mining divisions. In addition to the quantities of these metals from British Columbia sources, some may be from sources outside British Columbia.

⁴ Does not include some ore shipped for testing purposes by Olalla Mines Ltd. in 1956.

Year of first recorded production: Antimony, 1907; bismuth, 1929; cadmium, 1929; chromite, 1918; indium, 1942; iron ore, 1885; magnesium, 1941; manganese, 1918.

TABLE VIIIc.—PRODUCTION TO DATE BY MINING DIVISIONS—MISCELLANEOUS METALS—Continued

Division	Mercury		Molybdenite		Nickel		Palladium		Platinum		Selenium		Tin		Tungsten (WO ₃)		Division Totals
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	
	Lb.	\$	Lb.	\$	Lb.	\$	Oz.	\$	Oz.	\$	Oz.	\$	Lb.	\$	Lb.	\$	\$
Atlin															273	360	387,814
Cariboo									593	2,299					27,698	21,431	23,730
Clinton																	900
Fort Steele													10,534,526	8,208,931			8,302,270
Golden																	193,689
Greenwood																	48,393
Kamloops	10,987	5,795															65,678
Liard									2	79							79
Lillooet	1,783	3,555	2,448	2,440					3	113					32,353	37,921	48,350
Nanaimo																	24,559,080
Nelson			25,058	18,378											13,083,243	32,115,488	34,684,151
New Westminster					281,453	87,724											87,724
Omineca	4,150,892	10,400,259	1,600	1,840					3	154					2,210,892	4,697,710	15,311,294
Osoyoos			1,020	1,020													1,020
Revelstoke															7,784	5,687	159,853
Similkameen									1,276	128,401							128,401
Skeena			13,022	13,022							731	1,389			366	331	274,317
Siocan																	1,081,879
Trail Creek							749	30,462	53	1,177							35,564
Vancouver																	515,245
Victoria																	24,508
Not assigned																	43,965,577
Totals	4,163,662	10,409,609	43,148	36,698	281,453	87,724	749	30,462	1,930	134,223	731	1,389	10,534,526	8,208,931	15,362,609	36,878,928	129,899,516

Year of first recorded production: Mercury, 1895; molybdenite, 1914; nickel, 1936; palladium, 1928; platinum, 1887; selenium, 1931; tin, 1941; tungsten, 1937.

TABLE VIII.—PRODUCTION TO DATE BY MINING DIVISIONS—INDUSTRIAL MINERALS

Division	Arsenious Oxide		Asbestos		Barite		Bentonite		Diatomite		Fluorspar		Flux (Quartz and Limestone)		Granules (Quartz, Limestone, and Granite)		Gypsum and Gypsite		Hydromagnesite		
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	
	Lb.	\$	Tons	\$	Tons	\$	Tons	\$	Tons	\$	Tons	\$	Tons	\$	Tons	\$	Tons	\$	Tons	\$	
Alberni																					
Atlin																				1,450	20,325
Cariboo															48	168					
Clinton										1,543	34,495						983	6,676	803	7,211	
Fort Steele					8	80											112,827	298,824			
Golden					109,271	1,376,706											301,342	925,090			
Greenwood																					
Kamloops																					
Liard			80,977	24,064,298																	
Lillooet																					
Nanaimo																					
Nelson																					
New Westminster																					
Nicola																					
Omineca	16,997	340																			
Osoyoos	22,002,423	272,861																			
Similkameen																					
Skeena																					
Vancouver																					
Vernon																					
Victoria																					
Totals	22,019,420	273,201	80,977	24,064,298	109,279	1,376,786	791	16,858	1,543	34,495 ¹	40,165	783,578	3,362,776	4,923,170	82,701	1,112,412	1,664,617	7,565,078	2,253	27,536	

¹ Includes 30 tons of volcanic ash, worth \$300.

Year of first recorded production: Arsenious oxide, 1917; asbestos, 1952; barite, 1940; bentonite, 1926; diatomite, 1928; fluorspar, 1918; flux, 1911; granules, 1930; gypsum and gypsite, 1911; hydromagnesite, 1904.

TABLE VIII D.—PRODUCTION TO DATE BY MINING DIVISIONS—INDUSTRIAL MINERALS—Continued

Division	Iron Oxide and Ochre		Magnesium Sulphate		Mica		Natro-alunite		Perlite		Phosphate Rock		Sodium Carbonate		Sulphur		Talc		Division Totals
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	
	Tons	\$	Tons	\$	Lb.	\$	Tons	\$	Tons	\$	Tons	\$	Tons	\$	Tons	\$	Tons	\$	\$
Alberni							522	9,398											9,398
Atlin																			20,325
Cariboo					9,643,800	128,017													162,680 ¹
Clinton			1,923	39,085									9,524	109,895					162,867
Fort Steele												3,842	16,894			129,391 ²	2,401,823		2,717,621
Golden	27	920															\$	346	2,303,062
Greenwood																			2,323,897
Kamloops			8,742	193,967	424,700	2,075							968	9,088					6,528,308
Liard																			24,064,298
Lillooet																	296	5,129	5,129
Nanaimo																			663,204
Nelson	7,292	55,901																	64,126
New Westminster																			301,300
Nicola																			9,610
Omineca									1,112	11,120									11,460
Osoyoos			3,229	21,300	1,588,800	25,938													2,208,867
Similkameen																			18,558
Skeena					634,250	10,815										41,624	178,678		1,240,215
Vancouver	10,669	97,389														587,551 ³	5,346,949		5,866,983
Vernon					160,500	3,978													3,978
Victoria	120	840																1,504	29,380
Not assigned																			27,587,285
Totals	18,108	155,050	13,894	254,352	12,452,050	170,823	522	9,398	1,112	11,120	3,842	16,894	10,492	118,983	3,532,264	35,514,735	1,805	34,855	76,463,622

¹ Includes 30 tons of volcanic ash, worth \$300.

² Recovery in 1953 and subsequent years for use in fertilizer plant at Marysville.

³ Includes 11,010 tons valued at \$172,612 omitted from 1955 totals.

⁴ Recovery at Trail smelter for use in Warfield fertilizer plants, and derived from ores from several mining divisions.

Year of first recorded production: Iron oxide and ochre, 1918; magnesium sulphate, 1915; mica, 1932; natro-alunite, 1912; perlite, 1953; phosphate rock, 1927; sodium carbonate, 1921; sulphur, 1916; talc, 1916.

TABLE VIII.—PRODUCTION TO DATE BY MINING DIVISIONS—STRUCTURAL MATERIALS

Division	Cement	Lime and Limestone	Building-stone	Rubble, Riprap, and Crushed Rock	Sand and Gravel	Brick (Common)	Face, Paving, and Sewer Brick	Fire-bricks, Blocks	Clays	Structural Tile (Hollow Blocks), Roof-tile, Floor-tile	Drain-tile and Sewer-pipe	Pottery (Glazed or Unglazed)	Other Clay Products	Division Totals
	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
Alberni				45,065	845,245									890,310
Atlin		1,108		65,443	121,469									188,020
Cariboo		7,500		322,249	2,581,767	1,193	184	4,651	15,807				9,242	2,942,593
Clinton				1,606	93,839									95,445
Fort Steele		5,350	71,941	896,667	3,048,053	7,800								4,029,811
Golden		1,000	24,000	84,681	1,065,620									1,175,301
Greenwood		102,442	30,500	136,140	337,076	114,361			6,922					727,441
Kamloops		12,000	18,000	2,794,196	2,949,368	72,379								5,845,943
Liard				26,225	916,810									943,035
Lillooet		100	2,000	281,111	641,507									924,718
Nanaimo		21,363,571	3,184,532	57,727	1,717,881	1,104,295	38,939		35,758					27,502,703
Nelson		34,543	356,679	256,694	1,823,547	19,110	2,864							2,493,437
New Westminster		773,437		7,203,662	16,262,171	1,402,712	3,690,843	9,480,724	782,784	2,469,286	8,482,736	136,508	234,611	50,919,474
Nicola			8,000	74,061	257,050									339,111
Omineca		3,077		380,848	1,677,762	5,274								2,066,961
Osoyoos		32,070	14,850	145,557	778,917									971,394
Revelstoke		1,000	5,575	290,378	794,713									1,091,666
Similkameen	10,500	11,571	24,000	509,044	1,523,922				1,363				11,992	2,092,392
Skeena		1,276,344	144,000	1,010,370	3,758,781				4,925				8,324	6,202,744
Slocan		1,000	115,143	70,014	468,431									654,588
Trail Creek		28,000	46,550	189,542	1,169,801									1,433,893
Vancouver	335,718	40,885	3,695,891	7,393,597	16,405,318	132,194	123,110	485,696	17,633		54,701	79,146	28,763,889	
Vernon		46,499	81,052	174,609	1,509,341	131,467	6,202	1,011	5	18,224	4,325	20	1,972,755	
Victoria	78,977,445	740,197		416,036	9,648,849	1,804,987	23,052	19,189		645,410	758,782	120,043	11,003	93,164,993
Not assigned		315,498	505,018	282,455										11,234,250 ¹
Totals	79,323,663	24,797,192	8,327,731	23,107,977	70,397,238	4,795,772	3,885,194	9,991,271	865,197	3,132,920	9,245,843	311,252	354,338	248,666,867 ²

¹ Structural materials that so far cannot be assigned to mining divisions include the three items shown, an amount of \$3,150,828 for clay products, and a further \$6,980,451 that cannot be allotted to a particular class of material.

² Includes items noted in foot-note No. 1.

TABLE IXA.—QUANTITY (GROSS¹) AND VALUE OF COAL PER YEAR TO DATE

Year	Tons (2,000 Lb.)	Value	Year	Tons (2,000 Lb.)	Value
1836-59	41,871	\$149,548	1910	3,515,944	11,108,335
1860	15,956	56,988	1911	2,573,444	8,071,747
1861	15,427	55,096	1912	3,388,795	10,786,812
1862	20,292	72,472	1913	2,879,251	9,197,460
1863	23,906	85,380	1914	2,426,399	7,745,847
1864	32,068	115,528	1915	2,209,290	7,114,178
1865	36,757	131,276	1916	2,783,849	8,900,675
1866	28,129	100,460	1917	2,686,561	8,484,343
1867	34,988	124,956	1918	2,888,170	12,833,994
1868	49,286	176,020	1919	2,698,022	11,975,671
1869	40,098	143,208	1920	3,020,387	13,450,169
1870	33,424	119,372	1921	2,877,995	12,836,013
1871	55,458 ^a	164,612	1922	2,890,625	12,880,060
1872	55,458 ^a	164,612	1923	2,848,146	12,678,548
1873	55,459 ^a	164,612	1924	2,226,037	9,911,935
1874	91,334	244,641	1925	2,737,607	12,168,905
1875	123,362	330,435	1926	2,609,640	11,650,180
1876	155,895	417,576	1927	2,748,286	12,269,135
1877	172,540	462,156	1928	2,829,906	12,633,510
1878	191,348	522,538	1929	2,521,402	11,256,260
1879	270,257	723,903	1930	2,113,586	9,435,650
1880	299,708	802,785	1931	1,912,501	7,684,155
1881	255,760	685,171	1932	1,719,172	6,523,644
1882	315,997	846,417	1933	1,416,516	5,375,171
1883	238,895	639,897	1934	1,508,741	5,725,133
1884	441,358	1,182,210	1935	1,330,524	5,048,864
1885	409,468	1,096,788	1936	1,508,048	5,722,502
1886	365,832	979,908	1937	1,618,051	6,139,920
1887	462,964	1,240,080	1938	1,466,559	5,565,069
1888	548,017	1,467,903	1939	1,655,217	6,280,956
1889	649,411	1,739,490	1940	1,867,966	7,088,265
1890	759,518	2,034,420	1941	2,018,635	7,660,000
1891	1,152,590	3,087,291	1942	2,170,737	8,237,172
1892	925,495	2,479,005	1943	2,040,253	7,742,030
1893	1,095,690	2,934,882	1944	2,165,676	8,217,966
1894	1,134,509	3,038,859	1945	1,700,914	6,454,360
1895	1,052,412	2,824,687	1946	1,639,277	6,732,470
1896	1,002,268	2,693,961	1947	1,923,573	8,680,440
1897	999,372	2,734,522	1948	1,809,018	9,765,395
1898	1,263,272	3,582,595	1949	1,917,296	10,549,924
1899	1,435,314	4,126,803	1950	1,756,667	10,119,303
1900	1,781,000	4,744,530	1951	1,824,384	10,169,617
1901	1,894,544	5,016,398	1952	1,650,619	9,729,739
1902	1,838,621	4,832,257	1953	1,576,105	9,528,279
1903	1,624,742	4,332,297	1954	1,447,608	9,154,544
1904	1,887,981	4,953,024	1955	1,484,066	8,986,501
1905	2,044,931	5,511,861	1956	1,589,398	9,346,518
1906	2,126,965	5,548,044	1957	1,221,766	7,340,339
1907	2,485,961	7,637,713			
1908	2,362,514	7,356,866			
1909	2,688,672	8,374,884			
			Totals	140,499,723	40,208,640

TABLE IXB.—COAL PRODUCTION (GROSS¹) BY DISTRICTS AND MINING DIVISIONS

District and Mining Division	Total to Date			1956		1957	
	Period	Quantity	Value	Quantity	Value	Quantity	Value
<i>Vancouver Island District</i>		Tons	\$	Tons	\$	Tons	\$
Nanaimo Mining Division.....	1836-1957	79,685,055	294,220,173	200,347	1,629,168	200,205	1,849,306
<i>Nicola-Princeton District</i>		Tons	\$	Tons	\$	Tons	\$
Kamloops Mining Division.....	1893-1945	14,995	59,765				
Nicola Mining Division.....	1907-1957	2,928,372	11,065,272	1,170	12,092	1,081	11,615
Osoyoos Mining Division.....	1926-1927	1,122	5,008				
Similkameen Mining Division.....	1909-1957	4,652,833	19,531,750	72,102	366,820	17,696	92,748
District totals	1893-1957	7,597,322	30,661,795	73,272	378,912	18,777	104,363
<i>Northern District</i>		Tons	\$	Tons	\$	Tons	\$
Cariboo Mining Division.....	1942-1944	290	1,100				
Liard Mining Division.....	1923-1957	86,743	577,552	4,642	38,211	3,158	28,421
Omineca Mining Division.....	1918-1957	406,524	2,490,171	8,553	71,234	4,991	47,414
District totals	1918-1957	493,557	3,068,823	13,195	109,445	8,149	75,835
<i>East Kootenay District</i>		Tons	\$	Tons	\$	Tons	\$
Fort Steele Mining Division.....	1898-1957	52,723,789	212,257,849	1,302,584	7,228,993	994,635	5,310,835
Provincial totals	1836-1957	140,499,723	540,208,640	1,589,398	9,346,518	1,221,766	7,340,339

¹ Gross mine output, including washery loss and coal used in making coke (see Table X and discussion under "Fuel," page A 12).

² A combined total for 1871, 1872, and 1873 has previously been noted in Annual Reports and the above breakdown is estimated.

TABLE IXc.—QUANTITY¹ AND VALUE OF COAL SOLD AND USED,² 1947-57

Year	District and Mining Division	Total Sales ^{2*}	Used under Companies' Boilers ^{2†}	Used in Making Coke ^{2‡}	Total Sold and Used ²		District Totals, 1957	
		Tons	Tons	Tons	Tons	\$	Tons	\$
1947	Vancouver Island						164,013	1,849,306
1948	Nanaimo	450,968	3,786		454,754	3,625,348		
1949	"	365,328	2,801		368,129	3,219,868		
1950	"	451,074	3,925		454,999	4,055,572		
1951	"	472,690	4,329		477,019	4,080,337		
1952	"	391,637	3,425		395,112	3,486,615		
1953	"	267,346	2,980		270,332	2,749,206		
1954	"	204,931	1,798		206,729	2,059,828		
1955	"	181,534	536		182,070	2,029,099		
1956	"	173,861	465		174,326	1,769,682		
1957	"	172,140	389		172,529	1,629,168		
1947	Nicola-Princeton	163,574	439		164,013	849,306	19,777	104,909
1948	Nicola	1,997	261		2,258	15,483		
1949	"	1,777			1,777	15,281		
1950	"	1,672			1,672	14,809		
1951	"	1,125			1,125	9,926		
1952	"	899			899	8,640		
1953	"	1,139			1,139	11,493		
1954	"	1,040			1,040	10,400		
1955	"	1,256			1,256	12,769		
1956	"	1,259			1,259	12,904		
1957	"	1,170			1,170	12,092		
1947	Simikameen	1,081			1,081	11,615		
1948	"	49,324			49,324	329,179		
1949	"	49,859			49,859	299,387		
1950	"	49,006			49,006	298,293		
1951	"	16,784			16,784	87,483		
1952	"	3,941			3,941	28,094		
1953	"	6,306			6,306	48,760		
1954	"	7,047			7,047	51,012		
1955	"	29,713			29,713	138,080		
1956	"	78,475			78,475	379,511		
1957	"	72,102			72,102	366,820		
1947	Northern	17,696			17,696	92,748	7,746	75,835
1948	Liard	5,958	59		6,017	35,012		
1949	"	8,570	60		8,630	52,721		
1950	"	12,364			12,364	76,697		
1951	"	12,250			12,250	82,258		
1952	"	3,199			3,199	26,095		
1953	"	3,854			3,854	42,606		
1954	"	4,815	20		4,835	50,895		
1955	"	4,359			4,359	33,079		
1956	"	3,650			3,650	32,850		
1957	"	4,642			4,642	38,211		
1947	Omineca	2,758			2,758	28,421		
1948	"	10,751	59		10,810	63,375		
1949	"	10,920	66		10,986	85,981		
1950	"	11,468	63		11,531	92,865		
1951	"	13,037	62		13,099	104,700		
1952	"	27,904			27,904	206,799		
1953	"	37,270			37,270	285,732		
1954	"	42,079			42,079	324,988		
1955	"	36,572			36,572	292,862		
1956	"	30,015			30,015	227,010		
1957	"	8,553			8,553	71,234		
1947	East Kootenay	4,991			4,991	47,414	895,418	8,210,835
1948	Fort Steele	978,358	24,163	175,605	1,178,186	4,612,033		
1949	"	990,530	20,227	154,342	1,165,099	6,092,157		
1950	"	842,979	19,025	228,792	1,090,796	6,011,688		
1951	"	825,315	15,196	213,218	1,053,729	5,774,509		
1952	"	889,669	16,977	236,871	1,142,517	6,413,374		
1953	"	822,071	15,813	245,528	1,083,412	6,591,942		
1954	"	878,865	12,729	230,814	1,122,408	7,031,158		
1955	"	820,081	15,310	218,923	1,054,314	6,648,655		
1956	"	803,125	16,560	230,464	1,050,149	6,564,544		
1957	"	890,100	19,518	248,595	1,158,213	7,228,993		
1947	Provincial totals	677,534	17,830	199,754	895,418	5,310,835		
1948	"	1,492,356	28,328	175,605	1,696,349	8,889,440		
1949	"	1,426,984	23,154	154,342	1,604,480	9,765,395		
1950	"	1,369,463	23,013	228,792	1,621,268	10,549,924		
1951	"	1,341,201	19,587	213,218	1,574,006	10,119,303		
1952	"	1,317,299	19,402	236,871	1,573,572	10,169,617		
1953	"	1,137,986	18,799	245,528	1,402,313	9,729,739		
1954	"	1,138,777	14,547	230,814	1,384,138	9,528,279		
1955	"	1,078,515	15,846	218,923	1,308,284	9,154,544		
1956	"	1,085,385	17,025	230,464	1,332,874	8,986,501		
1957	"	1,148,707	19,907	248,595	1,417,209	9,346,518	1,085,657	340,338

¹ For differences between gross mine output and coal sold refer to table "Production and Distribution by Collieries and by Districts" in section headed "Coal" or "Coal-mining" in Annual Reports of the Minister of Mines.

² The totals "sold and used" include:—

* Sales to retail and wholesale dealers, industrial users, and company employees.

† Coal used in company boilers, including steam locomotives.

‡ Coal used in making coke.

See also discussion under "Fuel," page A 12.

TABLE X.—COKE AND BY-PRODUCTS PRODUCTION FOR YEARS 1895 TO 1925 AND 1926 TO 1957

Year	Coal Used in Making Coke		Coke Made in Bee-hive Ovens		Coke Made in By-product Ovens		Coke Made in Gas Plants		Total Coke Made		Gas Sold and Used	Tar Produced	Other By-products ¹	Total Production Value of Coke Industry
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value				
	Tons	\$	Tons	\$	Tons	\$	Tons	\$	Tons	\$	\$	\$	\$	\$
1895-1925	7,955,795	25,673,600	4,920,457	25,673,600					4,920,457	25,673,600				25,673,600
1926	299,839	1,338,565	105,227	795,841	42,209	244,469	42,468	221,600	189,904	1,261,910	1,009,613	50,035	45,772	2,367,330
1927	269,482	1,290,760	95,281	595,504	35,900	327,215	39,464	178,682	170,645	1,101,401	1,222,379	44,402	18,080	2,386,262
1928	210,207	940,668	68,734	429,590	32,322	263,781	41,711	187,882	142,767	881,253	1,313,407	45,313	14,036	2,254,009
1929	226,363	950,243	75,426	574,279	33,339	308,867	46,573	214,732	155,338	1,097,878	1,461,445	61,084	39,203	2,659,610
1930	225,325	1,002,684	73,708	558,801	31,904	298,004	45,751	232,917	151,363	1,089,722	1,547,092	65,770	11,935	2,714,519
1931	211,334	924,279	73,248	548,550	27,717	236,537	41,836	210,470	142,801	995,557	1,541,454	66,506	32,603	2,636,120
1932	151,750	710,432	33,090	247,615	25,436	217,221	44,645	237,174	103,171	702,010	1,589,656	54,771	14,109	2,360,546
1933	107,400	554,152	6,097	44,813	24,263	213,750	34,156	214,454	64,516	473,017	1,473,433	45,610	3,666	1,995,726
1934	141,384	571,167	24,840	154,105	23,512	213,653	51,184	198,217	99,536	565,975	1,439,287	43,939	4,756	2,053,957
1935	127,776	494,492	27,066	160,565	14,911	109,684	46,111	160,694	88,088	430,943	1,430,057	44,876	3,081	1,908,957
1936	125,810	436,595	34,009	191,843			48,859	138,787	82,868	330,630	1,422,783	38,872		1,792,285
1937	166,124	570,250	48,393	277,726			59,141	330,821	107,534	608,547	1,746,047	46,698		2,401,292
1938	176,877	623,649	54,602	315,294			58,643	345,790	113,245	661,084	1,770,839	44,324		2,476,247
1939	171,242	569,945	50,153	286,491	7,196	37,015	55,395	325,435	112,744	648,941	1,768,977	44,108		2,462,026
1940	184,160	577,706	37,845	220,211	29,124	151,931	60,726	303,421	127,695	675,563	1,810,083	54,379	3,060	2,543,085
1941	235,809	717,584	64,707	392,473	86,656	467,440	8,378	43,758	159,741	903,671	1,925,270	63,569	1,716	2,894,226
1942	255,862	866,795	66,824	439,464	96,428	608,521	6,528	54,307	169,780	1,102,292	2,165,888	86,113	22,028	3,376,321
1943	260,334	983,910	42,766	291,843	43,895	274,402	93,714	647,482	180,375	1,213,727	2,453,592	96,249	18,321	3,781,889
1944	212,883	1,439,891	36,966	301,201	47,401	347,245	88,430	565,393	172,797	1,213,839	2,562,610	56,476	19,046	3,851,971
1945	230,868	1,211,584	13,464	117,369	59,098	434,876	91,682	577,479	164,244	1,129,724	2,721,690	83,828	20,756	3,955,998
1946	251,954	1,441,415	20,542	178,556	53,525	423,025	101,094	648,297	175,161	1,249,878	3,079,009	88,947	53,097	4,470,931
1947	284,049	1,682,602	44,517	427,330	59,638	531,114	91,755	579,635	195,910	1,538,079	3,390,713	124,885	25,780	5,079,457
1948	235,297	1,440,415	47,461	559,735	57,112	630,390	57,678	455,096	162,251	1,645,221	4,520,886	153,130	19,489	6,338,726
1949	323,899	1,979,138	66,407	690,045	89,268	1,018,288	67,449	496,933	223,124	2,205,266	4,148,124	194,728	27,406	6,575,524
1950	333,955	2,027,470	23,703	269,728	127,477	997,200	92,704	686,871	243,884	1,953,799	4,298,161	277,138	27,944	6,557,042
1951	332,416	1,949,117	32,598	387,796	138,051	1,552,764	72,215	571,161	242,864	2,511,721	4,263,754	277,786	22,132	7,075,393
1952	323,922	1,972,918	35,110	440,756	142,156	1,729,924	64,906	525,384	242,172	2,696,064	4,625,747	252,070	25,639	7,599,520
1953	310,431	2,005,551			177,790	2,090,147	60,407	525,411	238,197	2,615,558	4,857,116	238,771	21,046	7,732,491
1954	302,052	2,052,641			168,982	2,032,902	67,108	566,660	236,090	2,599,562	5,113,334	226,824	20,586	7,960,306
1955	314,994	2,122,303			177,031	2,180,516	70,387	594,482	247,418	2,774,998	5,407,842	292,984	18,369	8,494,193
1956	328,805	2,277,402			180,263	2,270,167	78,185	738,292	258,448	3,008,459	5,145,851	287,437	20,961	8,462,708
1957	199,654	1,284,833			153,493	2,005,570			153,493	2,005,570		14,600	121,849	2,127,419
Totals...	15,488,052	62,684,756	6,223,241	35,571,124	2,186,097	22,216,618	1,829,283	11,777,717	10,237,718	69,565,459	83,240,739	3,673,471	554,617	157,019,686

STATISTICS

¹ "Other by-products" total includes ammonium sulphate, \$52,492; ammonia liquor, \$103,850; light oils, \$16,571; motor fuel, \$7,009; naphthalene, \$4,077; creosote, \$34; benzol (thinning), \$312; solvent naphtha, \$644; cinders, \$344,682; pitch, \$5,131; sulphuric acid, \$6,658; tar-paint, \$2,330; and miscellaneous, \$10,827.

TABLE XI.—DIVIDENDS PAID BY MINING COMPANIES, 1897-1957
Dividends Paid during 1956 and 1957

	1956	1957
Bralorne Mines Ltd.....	\$498,880	\$374,100
Canadian Collieries Resources Ltd.....	88,333	176,666
Canadian Exploration Ltd.....	6,453,400	
Consolidated Mining and Smelting Co. of Canada, Ltd.....	27,027,453	22,113,425
Crow's Nest Pass Coal Co. Ltd.....	248,472	372,708
Giant Mascot Mines Ltd.....	179,263	
Granby Consolidated Mining Smelting and Power Co. Ltd.....	113,058	
Highland-Bell Ltd.....		78,293
Island Mountain Mines Co. Ltd.....	79,854 ¹	
Pioneer Gold Mines of B.C. Ltd.....	224,033	218,968
Reeves MacDonald Mines Ltd.....	584,500	292,250
Sheep Creek Mines Ltd.....	93,750	
Sunshine Lardeau Mines Ltd.....	164,000	
Yale Lead and Zinc Mines Ltd.....	185,780	
Others	321,986	621,010
Totals	\$36,262,682	\$24,247,420

¹ "Liquidating" payments completed.

Dividends Paid Yearly, 1917 to 1957, Inclusive

Year	Amount Paid	Year	Amount Paid
1917.....	\$3,269,494	1939.....	\$11,865,698
1918.....	2,704,469	1940.....	14,595,530
1919.....	2,494,283	1941.....	16,598,110
1920.....	1,870,296	1942.....	13,627,104
1921.....	736,629	1943.....	11,860,159
1922.....	3,174,756	1944.....	11,367,732
1923.....	2,983,570	1945.....	10,487,395
1924.....	2,977,276	1946.....	15,566,047
1925.....	5,853,419	1947.....	27,940,213
1926.....	8,011,137	1948.....	37,672,319
1927.....	8,816,681	1949.....	33,651,096
1928.....	9,572,536	1950.....	34,399,330
1929.....	11,263,118	1951.....	40,921,238
1930.....	10,543,500	1952.....	32,603,956
1931.....	4,650,857	1953.....	22,323,089
1932.....	2,786,958	1954.....	25,368,262
1933.....	2,471,735	1955.....	35,071,583
1934.....	4,745,905	1956.....	36,262,682
1935.....	7,386,070	1957.....	24,247,420
1936.....	10,513,705		
1937.....	15,085,293	Total.....	\$590,409,525
1938.....	12,068,875		

TABLE XI.—DIVIDENDS PAID BY MINING COMPANIES, 1897-1957—Continued

Lode-gold Mines'

company or Mine	Locality	Class	Amount Paid
Arlington.....	Erie.....	Gold.....	\$94,872
Athabasca.....	Nelson.....	Gold.....	25,000
Bayonne.....	Tye Siding.....	Gold.....	25,000
Bralorne Mines Ltd.....	Bridge River.....	Gold.....	17,386,025
Belmont-Surf Inlet.....	Princess Royal Island.....	Gold.....	1,437,500
Cariboo Gold Quartz Mining Co. Ltd.....	Wells.....	Gold.....	1,679,976
Cariboo-McKinney Con. M. & M. Co.....	Camp McKinney.....	Gold.....	565,588
Canadian Pacific Exploration (Porto Rico).....	Nelson.....	Gold.....	37,500
Centre Star.....	Rosland.....	Gold-copper.....	472,255
Fairview Amalgamated.....	Oliver.....	Gold.....	5,254
Fern Gold Mining & Milling Co. Ltd.....	Nelson.....	Gold.....	9,375
Gold Belt Mining Co. Ltd.....	Sheep Creek.....	Gold.....	668,595 ²
Goodenough (leasers).....	Ymir.....	Gold.....	13,731
Hedley Mascot Gold Mines Ltd.....	Hedley.....	Gold.....	1,290,553
Island Mountain Mines Ltd.....	Wells.....	Gold.....	2,491,236 ²
I.X.L.....	Rosland.....	Gold.....	134,025
Jewel-Denero.....	Greenwood.....	Gold.....	11,751
Kelowna Exploration Co. Ltd. (Nickel Plate).....	Hedley.....	Gold.....	2,040,000
Kelowna Mines Hedley Ltd.....	Hedley.....	Gold.....	780,000 ³
Kootenay Belle Gold Mines Ltd.....	Sheep Creek.....	Gold.....	357,856
Le Roi Mining Co.....	Rosland.....	Gold-copper.....	1,475,000
Le Roi No. 2 Ltd.....	Rosland.....	Gold-copper.....	1,574,640
Lorne (later Bralorne).....	Bridge River.....	Gold.....	20,450
Motherlode.....	Sheep Creek.....	Gold.....	163,500
Mount Zeballos Gold Mines Ltd.....	Zeballos.....	Gold.....	165,000
Nickel Plate (Hedley Gold Mining Co. Ltd.).....	Hedley.....	Gold.....	3,423,191
Pioneer Gold Mines of B.C. Ltd.....	Bridge River.....	Gold.....	10,048,914
Poorman.....	Nelson.....	Gold.....	25,000
Premier Gold Mining Co. Ltd.....	Premier.....	Gold.....	18,858,075 ⁴
Privateer Mine Ltd.....	Zeballos.....	Gold.....	1,914,183
Queen (prior to Sheep Creek Gold Mines Ltd.).....	Sheep Creek.....	Gold.....	98,674
Relief Arlington Mines Ltd. (Second Relief).....	Erie.....	Gold.....	308,000 ²
Reno Gold Mines Ltd.....	Sheep Creek.....	Gold.....	1,433,640 ²
Sheep Creek Gold Mines Ltd. ⁵	Sheep Creek.....	Gold.....	3,609,375 ⁵
Silbak Premier Mines Ltd.....	Premier.....	Gold.....	2,425,000 ⁴
Spud Valley Gold Mines Ltd.....	Zeballos.....	Gold.....	168,000
Sunset No. 2.....	Rosland.....	Gold-copper.....	115,007
Surf Inlet Consolidated Gold Mines Ltd.....	Surf Inlet.....	Gold.....	120,279
War Eagle.....	Rosland.....	Gold-copper.....	1,245,250
Ymir Gold.....	Ymir.....	Gold.....	300,000
Ymir Yankee Girl.....	Ymir.....	Gold.....	415,002 ²
Miscellaneous mines.....		Gold.....	108,623
Total, lode-gold mines.....			\$77,300,897

¹ The gold-copper properties of Rosland are included in this table.² Includes "return of capital" and "liquidating" payments.³ Former Kelowna Exploration Company Limited; changed in January, 1951.⁴ Up to and including 1936, dividends paid by Premier Gold Mining Company Limited were derived from operations of the company in British Columbia. Subsequent dividends paid by Premier Gold Mining Company Limited have been derived from the operations of subsidiary companies in British Columbia and elsewhere and are not included in the figure given. In 1936, Silbak Premier, a subsidiary of Premier Gold Mining Company, took over the former gold operations of that company in British Columbia. Dividends paid by Silbak Premier are given above.⁵ In several years, preceding 1953, company revenue has included profits from operations of the Lucky Jim zinc-lead mine.⁶ Since March, 1956, company name is Sheep Creek Mines Ltd.

TABLE XI. DIVIDENDS PAID BY MINING COMPANIES, 1897-1957—Continued
Silver-Lead-Zinc Mines

Company of Mine	Locality	Class	Amount Paid
Antoine	Rambler	Silver-lead-zinc	\$10,000
Base Metals Mining Corporation Ltd. (Monarch and Kicking Horse)	Field	Silver-lead-zinc	586,143 ¹
Beaverdell-Wellington	Beaverdell	Silver-lead-zinc	97,200
Beaver Silver Mines Ltd.	Greenwood	Silver-lead-zinc	48,000
Bell	Beaverdell	Silver-lead-zinc	388,297
Bosun (Rosebery-Surprise)	New Denver	Silver-lead-zinc	25,000
Canadian Exploration Ltd.	Salmo	Silver-lead-zinc	11,175,400
Capella	New Denver	Silver-lead-zinc	5,500
Consolidated Mining and Smelting Co. of Canada, Ltd.	Trail	Silver-lead-zinc	455,692,122 ²
Couverapee	Field	Silver-lead-zinc	5,203
Duthie Mines Ltd.	Smithers	Silver-lead-zinc	50,000
Florence Silver	Ainsworth	Silver-lead-zinc	35,393
Giant Mascot Mines Ltd.	Spillimacheen	Silver-lead-zinc	179,263
Goodenough	Cody	Silver-lead-zinc	45,668
H.B. Mining Co.	Hall Creek	Silver-lead-zinc	8,904
Highland Lass Ltd.	Beaverdell	Silver-lead-zinc	132,464
Highland-Bell Ltd.	Beaverdell	Silver-lead-zinc	1,476,318
Horn Silver	Similkameen	Silver-lead-zinc	6,000
Idaho-Alamo	Sandon	Silver-lead-zinc	400,000
Iron Mountain (Emerald)	Salmo	Silver-lead-zinc	20,000
Jackson	Retallack	Silver-lead-zinc	20,000
Last Chance	Three Forks	Silver-lead-zinc	213,000
Lone Bachelor	Sandon	Silver-lead-zinc	50,000
Lucky Jim	Three Forks	Silver-lead-zinc	80,000
Mercury	Sandon	Silver-lead-zinc	6,000
Meteor	Slocan City	Silver-lead-zinc	10,257
Monitor and Ajax	Three Forks	Silver-lead-zinc	70,500
Mountain Con	Cody	Silver-lead-zinc	71,387
McAllister	Three Forks	Silver-lead-zinc	45,088
Noble Five	Cody	Silver-lead-zinc	72,859
North Star	Kimberley	Silver-lead-zinc	497,901
No. One	Sandon	Silver-lead-zinc	6,754
Ottawa	Slocan City	Silver-lead-zinc	110,429
Payne	Sandon	Silver-lead-zinc	1,438,000
Providence	Greenwood	Silver-lead-zinc	142,238 ³
Queen Bess	Alamo	Silver-lead-zinc	25,000
Rambler-Cariboo	Rambler	Silver-lead-zinc	467,250
Reeves MacDonald Mines Ltd.	Remac	Silver-lead-zinc	2,045,750
Reco	Cody	Silver-lead-zinc	334,992
Ruth Mines Ltd.	Sandon	Silver-lead-zinc	125,490
St. Eugene	Moyie	Silver-lead-zinc	566,000
Sheep Creek Mines Ltd.	Invermere	Silver-lead-zinc	93,750
Silversmith and Slocan Star ⁴	Sandon	Silver-lead-zinc	1,267,600
Silver Standard Mines Ltd.	Hazelton	Silver-lead-zinc	1,715,333
Spokane-Trinket	Ainsworth	Silver-lead-zinc	10,365
Standard Silver Lead	Silverton	Silver-lead-zinc	2,734,688
Sunset and Trade Dollar	Retallack	Silver-lead-zinc	88,000
Sunshine Lardeau Mines Ltd.	Beaton	Silver-lead-zinc	164,000
Torbrit Silver Mines Ltd.	Alice Arm	Silver-lead-zinc	390,000
Utica	Kaslo	Silver-lead-zinc	64,000
Violamac Mines (B.C.) Ltd.	New Denver	Silver-lead-zinc	850,000
Wallace Mines Ltd. (Sally)	Beaverdell	Silver-lead-zinc	135,000
Washington	Rambler Station	Silver-lead-zinc	20,000
Western Exploration Co. Ltd.	Silverton	Silver-lead-zinc	30,867
Whitewater	Retallack	Silver-lead-zinc	592,515
Yate Lead and Zinc Mines Ltd.	Ainsworth	Silver-lead-zinc	278,620
Miscellaneous mines			70,239
Total, silver-lead-zinc mines			\$485,290,837

¹ Includes \$466,143 "return of capital" distribution prior to 1949.

² Earnings of several company mines, and customs smelter at Trail.

³ Includes \$10,504 paid in 1944 but not included in the yearly figure.

⁴ These two properties were amalgamated as Silversmith Mines Limited in August, 1939.

TABLE XI.—DIVIDENDS PAID BY MINING COMPANIES, 1897-1957—Continued

Copper Mines

Company or Mine	Locality	I	Class	Amount Paid
Britannia M. & S. Co. ¹	Britannia Beach		Copper	\$18,803,772
Canada Copper Corporation	Greenwood		Copper	615,399
Cornell	Texada Island		Copper	8,500
Granby Cons. M.S. & P. Co. ²	Copper Mountain		Copper	29,873,226
Marble Bay	Texada Island		Copper	175,000
Hall Mines	Nelson		Copper	233,280
Miscellaneous mines			Copper	261,470
Total, copper mines				\$49,970,647

¹ The Britannia Mining and Smelting Company Limited is one of several mining companies controlled by the Howe Sound Company, and dividends declared by the latter company are from operations at all mines, but dividends credited to Britannia Mining and Smelting Company have been paid by that company directly to the parent concern.

² The Granby Consolidated Mining Smelting and Power Company dividends commenced in 1904 and cover all company activities in British Columbia to date. The dividends as set out in the table in the Minister of Mines Annual Report for 1942 were incorrect; the correct total is as above. The figure now includes all dividends, capital distributions, and interim liquidating payments, the latter being \$4,500,000, paid, in 1936, prior to reorganization.

Coal Mines

Company or Mine	Locality		Class	Amount Paid
Wellington Collieries Ltd.	Nanaimo		Coal	\$16,000,000
Bulkley Valley Collieries Ltd.	Telkwa		Coal	24,000
Crow's Nest Pass Coal Co. Ltd.	Fernie		Coal	16,346,490
Canadian Collieries (D.) Ltd.	Nanaimo		Coal	828,271
Total, coal mines				\$33,198,761

Aggregate of All Classes

Lode-gold mining	\$77,300,897
Silver-lead-zinc mining and smelting	485,290,837
Copper-mining	49,970,647
Coal-mining	33,198,761
Miscellaneous, structural, and placer gold	6,901,155
Total	\$652,662,297

NOTE.—The term "miscellaneous" noted in each class of dividend covers all payments of \$5,000 and under, together with payments made by companies or individuals requesting that the item be not disclosed.

In compiling the foregoing table of dividends paid, the Department wishes to acknowledge the kind assistance given by companies, individuals, and trade journals in giving information on the subject.

REPORT OF THE MINISTER OF MINES, 1957

TABLE XII.-PRINCIPAL ITEMS OF EXPENDITURE, REPORTED FOR
MINING OPERATIONS OF ALL CLASSES

Class	Salaries and Wages	Fuel and Electricity	Process Supplies
Lode-mining.....	\$37,976,911	\$4,591,908	\$16,449,200
Placer-mining.....	41,838	1,828	15,632
Fuels—coal, coke and gas plants, petroleum and natural gas.....	8,377,068	967,234	4,517,722
Miscellaneous metals and industrial minerals.....	4,477,791	707,860	1,355,991
Structural materials industry.....	5,535,448	2,668,737	1,918,632
Totals, 1957.....	\$56,409,056	\$8,837,667	\$24,257,177
Totals, 1956.....	57,266,026	9,762,777	22,086,839
1955.....	51,890,246	9,144,034	21,131,572
1954.....	48,702,746	7,128,669	19,654,724
1953.....	55,543,490	8,668,099	20,979,411
1952.....	62,256,631	8,857,845	27,024,500
1951.....	52,607,171	7,288,051	24,724,101
1950.....	42,738,035	6,775,998	17,500,663
1949.....	41,023,786	7,206,637	17,884,408
1948.....	38,813,506	6,139,174	11,552,121
1947.....	32,160,338	5,319,470	13,068,948
1946.....	26,190,200	5,427,458	8,867,705
1945.....	22,620,975	7,239,726	6,766,628
1944.....	23,131,874	5,788,671	6,138,084
1943.....	26,051,467	7,432,535	6,572,317
1942.....	26,913,160	7,066,109	6,863,398
1941.....	26,050,491	3,776,747	7,260,441
1940.....	23,391,330	3,474,721	6,962,162
1939.....	22,337,035	3,266,000	6,714,347
1938.....	22,765,711	3,396,106	6,544,500
1937.....	21,349,690	3,066,311	6,845,330
1936.....	17,887,619	2,724,144	4,434,501
1935.....	16,753,367	2,619,639	4,552,730
Grand totals, 1935-57.....	\$814,873,950	\$140,201,533	\$296,806,607

NOTE.—“Process Supplies” include explosives, chemicals, drill-steel, lubricants, etc.

TABLE XIII.-AVERAGE NUMBER EMPLOYED IN THE MINING INDUSTRY, 1901-57

Year	Placer-mining	Lode-mining			In Concentrators	In Smelters	Coal-mining			Structural Materials		Miscellaneous	Total ¹	
		Under	Above	Total			Under	Above	Total	Quarries and Pits	Plants			
1901.....		2,736	1,212	3,948			3,041	931	3,974				7,922	
1902.....		2,219	1,126	3,345			3,101	910	4,011				7,356	
1903.....		1,662	1,088	2,750			3,137	1,127	4,264				7,014	
1904.....		2,143	1,163	3,306			3,278	1,175	4,453				7,759	
1905.....		2,470	1,240	3,710			3,127	1,280	4,407				8,117	
1906.....		2,630	1,308	3,938			3,415	1,390	4,805				8,788	
1907.....		2,704	1,239	3,943			2,862	907	3,769				7,712	
1908.....		2,567	1,127	3,694			4,432	1,641	6,073				9,767	
1909.....		2,184	1,070	3,254			4,713	1,705	6,418				9,672	
1910.....		2,472	1,237	3,709			5,903	1,855	7,758				11,467	
1911.....		2,435	1,159	3,594			5,212	1,661	6,873				10,467	
1912.....		2,472	1,364	3,837			5,275	1,855	7,130				10,967	
1913.....		2,773	1,505	4,278			4,950	1,721	6,671				10,949	
1914.....		2,741	1,433	4,174			4,267	1,465	5,732				9,906	
1915.....		2,709	1,435	4,144			3,708	1,283	4,991				9,135	
1916.....		3,357	2,036	5,393			3,694	1,366	5,060				10,453	
1917.....		2,200	2,198	5,488			3,760	1,410	5,170				10,658	
1918.....		2,626	1,764	4,390			3,658	1,769	5,247				9,637	
1919.....		2,512	1,746	4,259			4,145	1,821	5,966				10,225	
1920.....		2,074	1,605	3,679			4,191	2,158	6,349				10,028	
1921.....		1,355	975	2,330			4,722	2,163	6,885				9,215	
1922.....		1,510	1,239	2,749			4,712	1,932	6,644				9,393	
1923.....		2,102	1,516	3,618			4,342	1,807	6,149				9,767	
1924.....		2,353	1,680	4,033			3,894	1,524	5,418				9,451	
1925.....		2,298	2,840	5,138			3,828	1,615	5,443				10,581	
1926.....		290	2,606	1,735	4,341	808	2,461	3,757	1,565	5,322	493	324	124	14,172
1927.....		415	2,671	1,916	4,587	854	2,842	3,646	1,579	5,225	647	138	122	14,830
1928.....		355	2,707	2,469	5,176	911	2,748	3,814	1,520	5,334	412	368	120	15,424
1929.....		341	2,926	2,052	4,978	966	2,948	3,675	1,353	5,029	492	544	268	15,565
1930.....		425	2,318	1,260	3,576	832	3,197	3,389	1,256	4,645	843	344	170	14,032
1931.....		658	1,463	834	2,297	531	3,157	2,957	1,125	4,082	460	526	380	12,171
1932.....		874	1,355	900	2,255	542	2,036	2,628	980	3,008	536	329	344	10,524
1933.....		1,134	1,786	1,335	3,121	531	2,436	2,241	853	3,094	376	269	408	11,369
1934.....		1,122	2,796	1,729	4,525	631	2,890	2,050	843	2,893	377	187	360	12,985
1935.....		1,291	2,740	1,497	4,237	907	2,771	2,145	826	2,971	536	270	754	13,737
1936.....		1,124	2,959	1,840	4,769	720	2,678	2,015	799	2,814	931	288	825	14,179
1937.....		1,371	3,603	1,818	5,421	1,168	3,027	2,286	867	3,153	724	327	938	16,129
1938.....		1,303	3,849	2,266	6,115	919	3,158	2,088	874	2,962	900	295	369	16,021
1939.....		1,252	3,905	2,050	5,955	996	3,187	2,167	800	2,976	652	311	561	15,890
1940.....		1,004	3,923	2,104	6,027	1,048	2,944	2,175	699	2,874	827	384	647	15,705
1941.....		939	3,901	1,823	5,724	1,025	3,072	2,229	494	2,723	766	413	422	15,084
1942.....		489	2,920	1,504	4,424	960	3,555	1,892	468	2,360	842	378	262	13,270
1943.....		212	2,394	1,699	4,093	801	2,835	2,240	611	2,551	673	326	567	12,448
1944.....		255	1,896	1,825	3,721	849	2,981	2,150	689	2,839	690	351	628	12,314
1945.....		209	1,933	1,750	3,683	822	2,834	1,927	503	2,480	921	335	586	11,820
1946.....		347	1,018	1,817	3,735	672	2,813	1,773	532	2,305	827	555	679	11,933
1947.....		360	3,024	2,238	5,262	960	3,461	1,694	731	2,425	977	585	869	14,899
1948.....		348	3,143	2,429	5,572	1,126	3,884	1,594	872	2,466	1,591	656	754	16,397
1949.....		303	3,034	2,724	5,758	1,203	3,763	1,761	545	2,306	2,120	542	626	16,621
1950.....		327	3,399	2,415	5,814	1,259	3,759	1,745	516	2,261	1,916	616	660	16,612
1951.....		205	3,785	3,695	7,480	1,307	4,044	1,462	463	1,925	1,783	628	491	17,863
1952.....		230	4,171	3,923	8,094	1,516	4,120	1,280	401	1,681	1,530	557	529	18,257
1953.....		131	3,145	2,589	5,734	1,371	3,901	1,154	396	1,550	1,909	559	634	15,790
1954.....		199	2,644	2,520	5,164	1,129	3,119	1,076	358	1,434	1,861	638	584	14,123
1955.....		103	2,564	2,553	5,112	1,091	3,304	1,100	378	1,478	1,646	641	722	14,102
1956.....		105	2,637	2,827	5,464	1,043	3,339	968	398	1,366	1,598	770	854	14,539
1957.....		87	2,393	2,447	4,840	838	3,328	1,020	360	1,380	1,705	625	474	13,257

¹ The average number employed in the industry is the sum of the averages for individual companies. The average for each company is obtained by taking the sum of the numbers employed each month and dividing by 12, regardless of the number of months worked.

TABLE XIV.-LODE-METAL MINES-TONNAGE, NUMBER OF MINES,
NET AND GROSS VALUE OF PRINCIPAL METALS,⁴ 1901-57

Year	Tonnage ¹	Number of Shipping Mines	Number of Mines Shipping over 100 Tons	Gross Value as Reported by Shipper ²	Freight and Treatment ²	Net Value to Shipper ³	Gross Value of Lode Metals Produced ⁴
1901.....	926,162	119	78	.....	.....	.....	\$14,100,282
1902.....	1,009,018	124	75	.....	.....	.....	11,581,153
1903.....	1,288,466	125	74	.....	.....	.....	12,103,237
1904.....	1,461,609	142	76	.....	.....	.....	12,909,035
1905.....	1,706,679	146	79	.....	.....	.....	15,930,164
1906.....	1,963,872	154	77	.....	.....	.....	18,484,102
1907.....	1,805,614	147	72	.....	.....	.....	17,316,847
1908.....	2,083,608	108	59	.....	.....	.....	15,847,411
1909.....	2,057,713	89	52	.....	.....	.....	15,451,141
1910.....	2,216,428	83	50	.....	.....	.....	14,728,731
1911.....	1,770,755	80	45	.....	.....	.....	11,454,063
1912.....	2,688,532	86	51	.....	.....	.....	17,662,766
1913.....	2,663,809	110	58	.....	.....	.....	17,190,838
1914.....	2,175,971	98	56	.....	.....	.....	15,225,061
1915.....	2,720,669	132	59	.....	.....	.....	19,992,149
1916.....	3,229,942	169	81	.....	.....	.....	31,483,014
1917.....	2,797,368	133	87	.....	.....	.....	26,788,474
1918.....	2,912,516	175	80	.....	.....	.....	27,590,278
1919.....	2,146,920	144	74	.....	.....	.....	19,750,498
1920.....	2,215,445	121	60	.....	.....	.....	19,444,865
1921.....	1,586,428	80	35	.....	.....	.....	12,920,398
1922.....	1,592,163	98	33	.....	.....	.....	19,227,857
1923.....	2,447,672	77	28	.....	.....	.....	25,847,092
1924.....	3,413,912	86	37	.....	.....	.....	35,638,247
1925.....	3,840,269	102	40	.....	.....	.....	46,200,135
1926.....	4,775,327	138	55	.....	.....	\$38,558,613	51,508,031
1927.....	5,416,411	132	52	.....	.....	27,750,364	44,977,082
1928.....	6,241,672	110	49	.....	.....	29,070,076	48,281,825
1929.....	6,977,903	106	48	.....	.....	34,713,887	51,174,859
1930.....	6,804,276	68	32	.....	.....	21,977,688	40,915,395
1931.....	5,549,622	44	22	.....	.....	10,513,931	22,536,573
1932.....	4,354,904	75	29	.....	.....	7,075,393	19,700,235
1933.....	4,063,775	109	47	.....	.....	13,976,358	25,007,137
1934.....	5,141,744	145	69	.....	.....	29,243,278	33,896,930
1935.....	4,927,204	177	72	.....	.....	25,407,914	40,697,569
1936.....	4,381,173	168	70	.....	.....	30,051,207	43,666,452
1937.....	6,145,244	185	118	\$48,617,920	\$4,668,843	43,954,077	62,912,783
1938.....	7,377,117	211	92	40,222,237	4,943,754	35,278,483	53,877,333
1939.....	7,212,171	217	99	45,133,788	4,416,919	40,716,869	53,522,098
1940.....	7,949,736	216	92	50,004,909	6,334,611	43,670,298	62,848,642
1941.....	8,007,937	200	96	52,354,870	5,673,048	46,681,822	62,216,019
1942.....	6,894,844	126	76	50,494,041	5,294,637	45,199,404	55,359,479
1943.....	5,786,864	48	32	37,234,070	3,940,867	33,293,203	46,080,042
1944.....	4,879,851	51	31	29,327,114	2,877,706	26,449,408	39,315,910
1945.....	4,377,722	36	27	34,154,917	2,771,292	31,383,625	40,997,071
1946.....	3,705,594	50	32	48,920,971	2,994,130	45,926,841	56,519,691
1947.....	5,011,271	75	33	81,033,093	4,722,010	76,311,087	93,176,165
1948.....	5,762,321	97	51	118,713,859	18,586,188	100,128,727	125,979,961
1949.....	6,125,460	118	64	99,426,878	19,613,185	79,814,694	105,259,001
1950.....	6,802,432	112	58	108,864,792	22,118,431	86,751,361	121,635,457
1951.....	6,972,400	119	64	142,500,427	25,096,743	117,493,684	146,140,477
1952.....	9,174,617	95	58	140,070,389	30,444,675	109,625,714	134,111,567
1953.....	9,660,281	80	48	94,555,069	27,815,152	66,739,917	110,341,548
1954.....	8,513,865	63	40	106,223,833	29,135,673	77,088,160	111,844,340
1955.....	9,126,902	53	34	119,039,285	30,696,044	88,343,241	129,455,122
1956.....	8,827,037	70	40	125,043,590	31,933,681	93,110,262	141,315,045
1957.....	7,282,436	59	40	95,644,930	30,273,900	65,370,186	117,209,127

¹ Includes mercury ores, tungsten ores, iron ores, and silica (flux).

² Data not collected before 1937.

³ Previous to 1937 the shipper reported "Net Value at Shipping Point," no indication being given as to how the net value was computed. From 1937 on, the shipper has reported "Gross Value," from which deduction of freight and treatment gives "Net Value."

⁴ Gross value as represented by valuing gold, silver, copper, lead, and zinc at yearly average prices and since 1956 includes value of tungsten content in concentrates shipped.

TABLE XV.-LODE-METAL PRODUCTION IN 1957

Property or Operator	Location of Mine	Owner or Agent	Ore Shipped or Treated	Product Shipped	Gross Metal Contents						
					Gold	Silver	Copper	Lead	Zinc	Cadmium	
<p>NORTHERN BRITISH COLUMBIA</p> <p><i>Atlin Mining Division</i></p>											
Big Bull and Tulsequah Chief	Tulsequah.....	Tulsequah Mines Ltd., Trail.....	Tons 142,537	Zinc concentrates, 20,145 tons; lead concentrates, 4,564 tons; copper and gold concentrates, 10,999 tons	Oz. 15,426	Oz. 610,615	Lb. 4,436,737	Lb. 5,365,372	Lb. 24,651,145	Lb. 91,289	
Maid of Erin	Rainy Hollow.....	St. Eugene Mining Corporation Ltd., Toronto, Ont.	2	Crude ore			3,940				
<i>Liard Mining Division</i>											
Nil.....											
<p>CENTRAL BRITISH COLUMBIA</p> <p><i>Cariboo Mining Division</i></p>											
Cariboo Gold Quartz and Aurum	Wells.....	The Cariboo Gold Quartz Mining Co., Ltd., Vancouver	90,796	Bullion	38,757	4,547					
<i>Clinton Mining Division</i>											
Nil.....											
<p><i>Omineca Mining Division</i></p>											
Cronin Babine	Smithers.....	Leew Cronin Babine Mines Ltd., Vancouver	5,917	Zinc concentrates, 742 tons; lead concentrates, 445 tons	63	66,625	17,840	698,941	848,354	10,782	
Silver Standard	Hazelton.....	Silver Standard Mines, Ltd., Vancouver	21,758	Lead concentrates, 2,251 tons; zinc concentrates, 1,205 tons	1,068	745,175	87,523	3,266,562	2,015,825	21,584	
<p>COAST AND ISLANDS</p> <p><i>Alberni Mining Division</i></p>											
White Star	Zeballos.....	Cascade Lode Mines Ltd., Vancouver	5	Crude ore	12	8		16	67		
<i>Nanaimo Mining Division</i>											
Iron Hill	Quinsam Lake.....	Argonaut Mine Division of Utah Co. of the Americas, Campbell River		Re-treated iron-ore concentrates, 81,856 tons							

TABLE XV.—LODE-METAL PRODUCTION IN 1957—Continued

Property or Operator	Location of Mine	Owner or Agent	Ore Shipped or Treated	Product Shipped	Gross Metal Contents						
					Gold	Silver	Copper	Lead	Zinc	Cadmium	
COAST AND ISLANDS—Continued											
Nanaimo Mining Division—Continued											
Merry Widow No. 5 and Kingfisher	Benson Lake	Empire Development Co. Ltd. Vancouver	Tons 123,631	Iron-ore concentrates, 66,215 tons	Oz.	Oz.	Lb.	Lb.	Lb.	Lb.	
Prescott, Paxton, Yellow Kid, Yellow Jacket	Texada Island	Texada Mines Ltd., Vancouver	402,443	Iron-ore concentrates, 209,271 tons; copper concentrates, 2,563 tons	621	9,485	666,185				
New Westminster Mining Division											
Nil											
Skeena Mining Division											
Silbak Premier	Premier	Silbak Premier Mines Ltd. Vancouver		Salvage—zinc concentrates, 68 tons; lead and gold concentrates, 139 tons	357	2,664	2,030	112,649	100,724	4,155	
Toric	Citsault River	Torbrit Silver Mines Ltd., Toronto, Ont.	154,419	Silver-lead concentrates, 2,005 tons; silver bullion		1,674,166		1,466,066			
Vancouver Mining Division											
Britannia	Britannia Beach	Britannia Mining & Smelting Co. Ltd., Britannia Beach	849,212	Copper concentrates and precipitates, 28,497 tons; zinc concentrates, 16,693 tons; iron pyrite concentrates, 46,420 tons	11,027	102,105	7,657,915	2,005,673	19,029,991	97,044	
Victoria Mining Division											
Blue Grouse	Cowichan Lake	Cowichan Copper Co. Ltd., Lake Cowichan	9,234	Crude ore		4,771	1,048,273				
SOUTH CENTRAL BRITISH COLUMBIA											
Greenwood Mining Division											
Highland-Bell	Heaverdell	Highland-Bell Ltd., Vancouver	15,779	Lead concentrates, 1,045 tons; zinc concentrates, 474 tons; jig concentrates, 214 tons	401	716,546		492,854	623,118	4,652	
Motherlode	Greenwood	Woodgreen Copper Mines Ltd., Toronto, Ont.	100,000	Copper concentrates, 2,527 tons	1,802	8,911	1,165,832				
Providence	Greenwood	S. J. and J. S. Kleman, Greenwood; W. Madden, Greenwood	12	Crude ore	5	1,330					

<i>Kamloops Mining Division</i>											
Nil											
<i>Lillooet Mining Division</i>											
Bralorne	Bridge River	Bralorne Mines Ltd., Vancouver	141,192	Bullion; gold concentrates, 2,509 tons	89,091	18,954					
Pioneer	Bridge River	Pioneer Gold Mines of B.C. Ltd., Vancouver	102,084	Bullion	56,198	11,954					
<i>Nicola Mining Division</i>											
Nil											
<i>Osoyoos Mining Division</i>											
Fairview	Oliver	Consolidated Mining and Smelting Co. of Canada, Ltd., Trail	31,874	Silica flux							
French	Hedley	French Mines Ltd., Vancouver	4,394	Bullion	1,940	120					
Nickel Plate	Hedley	W. B. Graham, Hedley, lessee, from Kelowna Mines Hedley Ltd.		Salvage—concentrates, 127 tons	427	94	946				
<i>Similkameen Mining Division</i>											
Copper Mountain	Copper Mountain	Granby Cons. M.S. & P. Co. Ltd., Copper Mountain	568,006	Copper concentrates, 16,400 tons	2,616	37,394	7,133,729				
<i>Vernon Mining Division</i>											
Nil											
SOUTHEASTERN BRITISH COLUMBIA											
<i>Fort Steele Mining Division</i>											
Sullivan	Kimberley	Consolidated Mining and Smelting Co. of Canada, Ltd., Trail	2,423,577	Lead concentrates, 108,086 tons; zinc concentrates, 260,196 tons; tin concentrates, 546 tons	279	2,542,275	331,393	172,694,865	245,793,447		
<i>Golden Mining Division</i>											
Mineral King and Paradise	Toby Creek	Sheep Creek Mines Ltd., Nelson	168,119	Lead concentrates, 3,364 tons; zinc concentrates, 11,862 tons		71,675	85,122	3,960,047	13,568,709	14,823	
Monarch	Golden	Cowichan Copper Co. Ltd., Lake Cowichan		Salvage—lead concentrates, 60 tons; zinc concentrates, 94 tons		708		95,561	107,809	169	
Ptarmigan	Horsethief Creek	H. Seel, Edgewater	20	Crude ore	5	3,058		141	91		
Silver Giant	Spillimacheen	Giant Mascot Mines Ltd., Vancouver	75,237	Lead concentrates, 2,261 tons; zinc concentrates, 649 tons		33,112	90,124	3,217,789	863,330	2,475	

TABLE XV.-LODE-METAL PRODUCTION IN 1957—Continued

Property or Operator	Location of Mine	Owner or Agent	Ore Shipped or Treated	Product Shipped	Gross Metal Contents					
					Gold	Silver	Copper	Lead	Zinc	Cadmium
SOUTHEASTERN BRITISH COLUMBIA—Continued										
<i>Nelson Mining Division</i>										
Arlington	Erie	G. D. Fox and R. W. Linn, Trail	Tons 11	Crude ore, 4 tons; concentrate clean-up of mill, 7 tons	Oz. 26	Oz. 90	Lb.	Lb. 1,302	Lb. 2,097	Lb.
Emerald-Feeney-Dodger	Salmo	Canadian Exploration Ltd., Vancouver	172,160	Tungsten concentrates, 96,074 units WO ₃						
Hope	Boswell	Silver-Lead Producers Syndicate, Vancouver	12	Crude ore		107		3,929	2,172	
H.B.	Salmo	Consolidated Mining and Smelting Co. of Canada, Ltd., Trail	451,381	Lead concentrates, 4,569 tons; zinc concentrates, 36,112 tons		79,902		6,696,539	36,999,869	311,669
Jersey	Salmo	Canadian Exploration Ltd., Vancouver	420,695	Lead concentrates, 6,292 tons; zinc concentrates, 24,188 tons		23,306		11,146,961	28,718,653	217,492
King No. 1, Prince No. 2	Creston	King Crest Mines Ltd., Vancouver	216	Crude development ore		54		2,161		
Nugget	Salmo	A. Endersby, Sr., and A. Endersby, Jr., Fruitvale	107	Crude ore	58	48		372	215	
Reeves MacDonald	Remac	Reeves MacDonald Mines Ltd., Vancouver	405,531	Lead concentrates, 5,328 tons; zinc concentrates, 24,982 tons		26,155		7,922,967	27,378,157	150,152
Sun	Nelson	W. Rozan, Nelson	9	Crude ore	30	8		37	37	
<i>Revelstoke Mining Division</i>										
Spider, Eclipse	Camborne	Sunshine Lardeau Mines Ltd., Vancouver	29,355	Lead concentrates, 2,874 tons; zinc concentrates, 3,880 tons; crude ore, 456 tons	2,210	280,749	51,411	4,115,630	5,016,336	29,409
<i>Slocan Mining Division</i>										
Berengaria	Deanshaven	Mesera, Shugarman and D. Smith, Edmonton, Alta	47	Crude ore		400		18,262	19,614	
Bluebell	Riondel	Consolidated Mining and Smelting Co. of Canada, Ltd., Trail	256,118 ^a	Lead concentrates, 17,640 tons; zinc concentrates, 30,863 tons		361,189	298,692	25,925,392	31,079,628	139,423
Bosun	Sandon	W. H. McLeod, Silvertown, lessee, from New Santiago Mines Ltd.	76	Lead concentrates, 7 tons; zinc concentrates, 9 tons	1	1,251		6,566	12,049	63
Highlander	Ainsworth	Yale Lead and Zinc Mines Ltd., Ainsworth	65,240	Lead concentrates, 4,187 tons; zinc concentrates, 630 tons	22	98,461		6,408,079	864,930	
Index	Kaslo	Index Mines Ltd., c/o H. F. Kenward, Vancouver	5	Crude ore		164		2,083	1,008	
Laura M.	Ainsworth	M. B. Sirak, Ainsworth	8	Crude ore		73		5,369	1,406	
Lone Bachelor	Sandon	Lone Bachelor Mines Ltd., Toronto, Ont.	42 ^b	Crude ore		4,201		58,826	6,527	
Lost Atlantis	New Denver	Alex. S. Wojna, New Denver	3	Crude ore		166		1,184	511	
Molly Hughes	New Denver	Cory Johnson, New Denver		Crude ore, 0.37 ton		142		54	9	

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Moonshine (Moonstone)	Lardeau	Willett Mines Ltd., Balfour	268	Crude ore	1	2,933	964	97,452	94,770	
New Springfield	Sandon	E. H. Petersen, Sandon		Crude ore, 0.76 ton		57		692	167	
Ottawa	Slocan	W. E. Graham, Slocan; C. Thickett and W. Boisvert, Slocan	15	Crude ore		3,402		233	95	
Silversmith, Ruth-Hope, Slocan Star	Sandon	Carnegie Mines of B.C. Ltd., Vancouver, and lessees	2,265	Lead concentrates, 115 tons; zinc concentrates, 334 tons; crude ore, 102 tons	12	25,311		245,363	395,558	2,527
Spokane	Ainsworth	T. Lane and C. Hartland, Ainsworth	4	Crude ore		107		5,493	100	
Standard, Buffalo, Mammoth	Silverton	Western Exploration Co. Ltd., Silverton, and lessees	13,318	Lead concentrates, 941 tons; zinc concentrates, 1,492 tons	54	178,932		1,318,784	1,696,664	12,330
Utica	Kaslo Creek	J. A. Cooper, Kaslo; Lajo Mines Ltd., Vancouver	187 ¹	Crude ore, 17 tons; zinc concentrates, 17 tons		5,104		8,465	13,799	
Van Roi, Hewitt, Westmont	Silverton	Slocan Van Roi Mines Ltd. and lessees	7,719 ⁴	Zinc concentrates, 622 tons; lead concentrates, 467 tons	22	99,021		472,574	723,920	5,253
Victor	Sandon	Violamac Mines Ltd., New Denver	17,633	Lead concentrates, 2,851 tons; zinc concentrates, 4,304 tons; crude ore, 268 tons	341	339,801		4,673,565	5,217,096	32,516
<i>Trail Creek Mining Division</i>										
Snowdrop	Rossland	Warren Crowe, Trail		Crude ore, 0.02 ton	11	1				
Velvet	Rossland	Mid-West Copper and Uranium Mines Ltd., Rossland	13,598	Concentrates, 864 tons	1,000	1,410	238,863			
W.D.	Trail	E. Wells and F. Donnelly, Trail	87	Crude ore	78	50		388	200	

¹ Estimated.

² Includes 530 tons of tailings recovered from Kootenay Lake.

³ Ore milled is included in aggregate totals of Violamac Mines Ltd.

⁴ Includes 964 tons of ore salvaged from Westmont ore dump.

TABLE XVI.-LODE-METAL MINES EMPLOYING AN AVERAGE OF TEN OF MORE MEN DURING 1957¹

Name of Mine or Operator	Days Operating		Tons		Average Number Employed	
	Mine	Mill	Mined	Milled	Mine	Mill
<i>Shipping Mines</i>						
Big Bull and Tulsequah Chief (Tulsequah Mines Ltd.).....	215	242	142,537	142,537	133	13
Cariboo Gold Quartz Mining Co. Ltd.....	279	365	90,796	90,796	168	17
Silver Standard Mines Ltd.....	278	350	29,589	21,758	79	14
Torbrit Silver Mines Ltd.....	365	365	154,419	154,419	104	22
Britannia Mining and Smelting Co. Ltd.....	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Highland-Bell Ltd.....	267	267	15,779	15,779	42	48
Woodgreen Copper Mines Ltd.....	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Bralorne Mines Ltd.....	365	365	141,192	141,192	363	27
Pioneer Gold Mines of B.C. Ltd.....	365	365	107,998	102,084	226	21
French Mines Ltd.....	122	122	4,183	4,183	9	3
Copper Mountain (Granby Cons. M.S. & P. Co. Ltd.).....	120	120	568,006	568,006	241	45
Bluebell (Cons. M. & S. Co. of Canada, Ltd.).....	252	351	256,118	256,118 ²	282	20
Highlander (Yale Lead & Zinc Mines Ltd.).....	260	269	65,240	65,240	62	10
Western Exploration Co. Ltd.....	286	219	16,285	13,318	40	12
Victor (Violamac Mines Ltd.).....	365	.....	17,633	.....	63	.....
H.B. (Cons. M. & S. Co. of Canada, Ltd.).....	365	365	451,381	451,381	117	14
Jersey (Canadian Exploration Ltd.).....	365	365	420,695	420,695	168	14
Emerald-Feeney-Dodger (Canadian Exploration Ltd.).....	365	365	172,160	172,160	135	27
Reeves MacDonald Mines Ltd.....	250	354	415,374	405,531	125	24
Sullivan (Cons. M. & S. Co. of Canada, Ltd.).....	250	250	2,423,577	2,423,577	1,103	367
Mineral King and Paradise (Sheep Creek Mines Ltd.).....	307	355	168,119	168,119	307	355
Silver Giant (Giant Mascot Mines Ltd.).....	158	158	75,237	75,237	44	6
Spider (Sunshine Lardeau Mines Ltd.).....	293	351	29,977	29,355	66	12
Velvet (Mid-West Copper & Uranium Mines Ltd.).....	154	110	7,602	7,602	28	4
Blue Grouse (Cowichan Copper Co. Ltd.).....	256	12	9,234	.....	37	1
Argonaut Mine Division of Utah Co. of the Americas.....	.....	44	.....	81,856 ³	22 ³	6
Empire Development Co. Ltd.....	110	110	123,631	123,631	51	4
Texada Mines Ltd.....	188	212	402,443	402,443	76	22
<i>Non-shipping Mines</i>						
American Smelting & Refining Company.....	.....	.....	.....	.....	22	.....
Granduc Mines Ltd.....	.....	.....	.....	.....	66	.....
Newmont Exploration Co. Ltd.....	.....	.....	.....	.....	15	.....
Northwestern Exploration Ltd.....	.....	.....	.....	.....	21	.....
Phoenix Copper Co. Ltd.....	.....	.....	.....	.....	15	.....
Rexspar Uranium & Metals Mining Co. Ltd.....	.....	.....	.....	.....	11	.....
Sunro (Cons. M. & S. Co. of Canada, Ltd.).....	.....	.....	.....	.....	23	.....
Wesfrob Mines Ltd.....	.....	.....	.....	.....	10	.....
Western Nickel Ltd.....	.....	.....	.....	.....	155	.....

¹ The average number employed includes wage-earners and salaried employees. The average is obtained by adding the monthly figures and dividing by 12, irrespective of the number of months worked.

² Includes 530 tons of tailings dredged from Kootenay Lake at Pilot Bay, site of original concentrator.

³ Concentrates produced by re-treating impure material. Men noted were employed salvaging equipment, except for a short period when some were employed in mill.

N.A.=Not available.

Departmental Work

ADMINISTRATION BRANCH

The Administration Branch is responsible for the administration of the Provincial laws regarding the acquisition of rights to mineral and to coal, petroleum and natural gas, and deals with other departments of the Provincial service for the Department or for any branch.

Gold Commissioners, Mining Recorders, and Sub-Mining Recorders, whose duties are laid down in the "Mineral Act" and the "Placer-mining Act," administer these Acts and other Acts relating to mining. Mining Recorders, in addition to their own functions, may also exercise the powers conferred upon Gold Commissioners with regard to mineral claims within the mining division for which they have been appointed. Similar duties may be performed by Mining Recorders with regard to placer claims but not in respect of placer-mining leases. Recording of location and of work upon a mineral claim as required by the "Mineral Act" and upon a placer claim or a placer-mining lease as required by the "Placer-mining Act" must be made at the office of the Mining Recorder for the mining division in which the claim or lease is located. Information concerning claims and leases and concerning the ownership and standing of claims and leases in any mining division may be obtained from the Mining Recorder for the mining division in which the property is situated or from the Department's offices at Victoria, and Room 104, 739 West Hastings Street, Vancouver. Officials in the offices of the Gold Commissioner at Victoria and the Gold Commissioner at Vancouver act as Sub-Mining Recorders for all mining divisions. Sub-Mining Recorders, who act as forwarding agents, are appointed at various places throughout the Province. They are authorized to accept documents and fees, and forward them to the office of the Mining Recorder for the correct mining division. Officials and their offices in various parts of the Province are listed in the table on page A 50.

CENTRAL RECORDS OFFICES (VICTORIA AND VANCOUVER)

The transcripts of all recordings made in Mining Recorders' offices throughout the Province are sent to the office of the Chief Gold Commissioner in Victoria twice each month, and include the names of lessees of reverted Crown-granted mineral claims. These records and maps showing the approximate positions of mineral claims held by record and of placer-mining leases may be consulted by the public during office hours at Victoria and at the office of the Gold Commissioner at Vancouver, Room 104, 739 West Hastings Street. The maps conform in geographical detail, size, and number to the reference and mineral reference maps issued by the Legal Surveys Branch of the Department of Lands and Forests, and the approximate positions of mineral claims held by record and of placer-mining leases are plotted from details supplied by the locators. Provision has been made to supply the general public, on request to the office of the Chief Gold Commissioner, with copies of the maps. The charge for these maps is \$1 plus 5 per cent tax for each sheet.

MINING DIVISIONS AMALGAMATED SINCE 1949

Date	Mining Divisions Amalgamated	New Name	Mining Recorder's Office
Oct. 1, 1949	Revelstoke and Lardeau	Revelstoke	Revelstoke.
Dec. 1, 1949	Kamloops and Ashcroft	Kamloops	Kamloops.
Apr. 1, 1951	Skeena and Portland Canal	Skeena	Prince Rupert.
Mar. 1, 1952	Stikine and Peace River	Liard	Victoria.
Aug. 2, 1954	Slocan and Ainsworth	Slocan	Kaslo.
May 1, 1955	Cariboo and Quesnel	Cariboo	Quesnel.

LIST OF GOLD COMMISSIONERS AND MINING RECORDERS IN THE PROVINCE

Mining Division	Location of Office	Gold Commissioner	Mining Recorder
Alberni	Alberni	T. G. O'Neill	T. G. O'Neill.
Atlin	Atlin	L. D. Sands	L. D. Sands.
Cariboo	Quesnel	F. E. P. Hughes	F. E. P. Hughes.
Clinton	Clinton	W. E. McLean	W. E. McLean.
Fort Steele	Cranbrook	E. L. Hedley	E. L. Hedley.
Golden	Golden	R. E. Manson	R. E. Manson.
Greenwood	Grand Forks	R. Macgregor	R. Macgregor.
Kamloops	Kamloops	D. Dalgleish	D. Dalgleish.
Liard	Victoria	R. H. McCrimmon	
Lillooet	Lillooet	E. B. Offin	E. B. Offin.
Nanaimo	Nanaimo	W. H. Cochrane	W. H. Cochrane.
Nelson	Nelson	K. D. McRae	K. D. McRae.
New Westminster	New Westminster	J. F. McDonald	G. C. Kimberley.
Nicola	Merritt	D. Dalgleish (Kamloops)	T. S. Dobson.
Omineca	Smithers	G. H. Beley	G. H. Beley.
Osoyoos	Penticton	T. S. Dalby	T. S. Dalby.
Revelstoke	Revelstoke	W. T. McGruder	W. T. McGruder.
Smiikameen	Princeton	B. Kennelly	B. Kennelly.
Skeena	Prince Rupert	T. H. W. Harding	T. H. W. Harding.
Slocan	Kaslo	C. Macdonald	B. F. Palmer.
Trail Creek	Rossland	W. L. Draper	W. L. Draper.
Vancouver	Vancouver	J. Egddell	Miss S. Hyham (Deputy).
Vernon	Vernon	G. F. Forbes	G. F. Forbes.
Victoria	Victoria	R. H. McCrimmon	R. H. McCrimmon.

GOLD COMMISSIONERS' AND MINING RECORDERS' OFFICE STATISTICS, 1957

Mining Division	Free Miners' Certificates				Lode-mining						Placer-mining					Revenue		
	Individual	Company	Special	Provisional (Placer)	Mineral Claims Recorded	Certificates of Work	Cash in Lieu	Certificates of Improvements	Bills of Sale, etc.	Leases	Placer Claims Recorded	Placer Leases Granted	Certificates of Work, Placer Leases	Cash in Lieu	Bills of Sale, etc.	Free Miners' Certificates	Mining Receipts	Total
Alberni	91	3	—	—	190	385	\$1,700.00	—	37	13	—	—	—	—	—	\$568.25	\$4,563.50	\$5,131.75
Atlin	173	1	1	—	157	206	500.00	—	20	2	7	16	57	\$1,000.00	17	1,040.50	6,111.75	7,152.25
Cariboo	809	16	7	—	486	458	4,200.00	—	73	—	5	75	366	2,250.00	74	3,279.00	17,691.25	20,970.25
Clinton	37	—	—	—	170	118	600.00	—	83	—	—	1	20	250.00	—	184.25	2,861.95	3,046.20
Fort Steele	265	2	5	—	406	366	600.00	—	441	1	—	15	15	250.00	17	1,475.75	4,249.25	5,725.00
Golden	143	5	8	—	116	819	1,900.00	41	65	9	—	2	45	250.00	6	1,172.00	4,912.50	6,084.50
Greenwood	158	2	5	—	514	536	1,400.00	—	119	34	—	6	—	—	—	889.00	5,534.95	6,423.95
Kamloops	578	6	21	4	2,943	2,935	1,600.00	17	549	2	1	8	3	—	3	3,384.25	12,715.75	16,100.00
Liard	376	2	—	—	1,812	908	6,900.00	—	214	2	—	2	52	—	3	1,444.50	14,759.75	16,204.25
Lillooet	201	3	2	—	322	486	700.00	—	83	3	—	5	26	250.00	3	1,191.50	5,050.75	6,242.25
Nanaimo	144	1	7	—	281	498	5,200.00	—	55	7	—	—	—	—	—	959.00	8,044.50	9,003.50
Nelson	358	14	11	5	214	494	1,000.00	—	57	15	1	4	2	—	—	2,898.75	4,605.50	7,504.25
New Westminster	380	1	9	10	334	340	1,600.00	1	142	5	2	4	12	—	—	2,077.25	5,324.00	7,401.25
Nicola	99	—	1	1	910	1,327	1,200.00	—	236	—	—	—	1	—	—	361.25	7,862.20	8,223.45
Omineca	296	3	15	—	776	636	2,000.00	—	134	—	3	19	39	5,450.00	22	1,724.00	7,195.05	8,919.05
Osoyoos	181	1	4	1	257	339	1,000.00	—	41	9	—	—	—	—	—	888.75	2,553.75	3,442.50
Revelstoke	85	2	4	—	144	171	9,100.00	—	47	15	—	3	23	375.00	5	596.25	13,114.25	13,710.50
Similkameen	122	3	2	3	96	229	4,800.00	16	46	9	1	10	11	—	8	1,073.00	6,433.50	7,506.50
Skeena	265	6	3	—	324	1,187	4,000.00	14	126	18	—	4	6	—	—	1,693.75	9,573.50	11,267.25
Stocan	233	7	3	—	350	501	900.00	13	63	7	1	4	—	—	2	1,782.75	3,639.25	5,422.00
Trail Creek	129	2	1	1	53	23	400.00	—	4	4	—	—	—	—	—	702.00	737.25	1,439.25
Vancouver	1,908	174	36	—	339	126	1,000.00	5	41	8	—	—	1	—	—	26,468.25	2,918.25	29,386.50
Vernon	169	8	5	10	167	51	300.00	1	9	1	—	2	5	—	2	1,235.00	1,220.25	2,455.25
Victoria	441	27	12	—	749	642	500.00	—	135	1	—	—	6	—	—	5,562.75	6,690.25	12,253.00
Totals for Province, 1957	7,641	289	162	37	12,110	13,781	\$53,100.00	108	2,820	165	21	180	690	\$10,075.00	162	\$62,651.75	\$158,362.90	\$221,014.65
Totals for Province, 1956	10,171	304	159	28	26,170	13,595	—	75	4,416	485	20	161	609	—	162	\$70,544.00	\$233,746.64	\$304,290.64

COAL, PETROLEUM, AND NATURAL GAS

The Administration Branch has been responsible for the administration of the "Petroleum and Natural Gas Act" and for the "Coal Act" since April 1st, 1953. Information concerning applications for permits and leases issued under the "Petroleum and Natural Gas Act" and concerning the ownership and standing of them may be obtained upon application to the office of the Chief Commissioner, Department of Mines, Victoria, B.C. Similar information may be obtained respecting licences and leases issued under the "Coal Act." Maps showing the locations of permits and leases under the "Petroleum and Natural Gas Act" are available, and copies may be obtained upon application to the office of the Department of Mines, Victoria, B.C. Monthly reports listing additions and revisions to permit-location maps and listing changes in title to permits, licences, and leases and related matters are available from the office of the Chief Commissioner upon application and payment of a fee of \$2.50 per annum each.

Petroleum and Natural-gas Statistics, 1957

Permits—	
Issued	88
In good standing	395
Assigned	41
Natural-gas licences—Issued	8
Leases—	
Issued	170
In good standing	307
Assigned	3

Petroleum and Natural-gas Revenue, 1957

Permits—	
Fees	\$97,750.00
Rent	2,595,852.50
Cash in lieu of work	44,386.17
	<hr/>
	\$2,737,988.67
Leases—	
Fees	\$4,500.00
Rent	425,677.37
	<hr/>
	430,177.37
Tender bonus	1,342,812.69
Royalties—	
Gas	\$7,264.27
Oil	104,568.73
	<hr/>
	111,833.00
Assignment fees	1,125.00
Operators' licences	7,850.00
Miscellaneous	1,051.90
	<hr/>
	\$4,632,838.63

Coal Revenue, 1957

Licences—			
Fees	-----	\$1,450.00	
Rent	-----	11,272.50	
		<hr/>	\$12,722.50
Leases—			
Fees	-----	\$500.00	
Rent	-----	1,059.04	
Cash in lieu of work	-----	300.00	
		<hr/>	1,859.04
Miscellaneous	-----		28,805.00
			<hr/>
			\$43,386.54

MINING LAWS AND LAWS RELATED TO THE MINERAL INDUSTRY

Synopses of mining laws and of laws related to mining, and the titles of the various Acts and the prices charged for each are available on application.

ANALYTICAL AND ASSAY BRANCH

By S. W. Metcalfe, Acting Chief Analyst and Assayer

ROCK SAMPLES

During 1957 the chemical laboratory in Victoria issued reports on 1,476 samples from prospectors* and Departmental engineers. A laboratory examination of a prospector's sample generally consists of the following: (1) A spectrographic analysis to determine if any base metals are present in interesting percentages; (2) assays for precious metals, and for base metals shown by the spectrographic analysis to be present in interesting percentages. The degree of radioactivity is measured on all samples submitted by prospectors and Departmental engineers; these radiometric assays are not listed below in the table.

On March 26th, 1957, fire destroyed the chemical laboratory, causing a considerable loss and a cessation of analytical work during the months of April and May. Temporary facilities were provided in the Coal and Petroleum Control Laboratory, where general analytical work commenced again in June. The spectrograph was totally destroyed, and its duties were taken over to some extent by the Phillips X-ray spectrograph. Spectrographic analyses reported in the following table showing the distribution of laboratory reports were performed prior to the fire and therefore do not include work done with the X-ray equipment. It is hoped that a new spectrograph will be installed shortly, when all samples submitted to the laboratory will be examined for metals which cannot be detected by X-ray spectrography.

The laboratory reports were distributed in the following manner among prospectors who were not grantees, prospectors who were grantees under the "Prospectors' Grub-stake Act," and Departmental engineers:—

	Samples	Spectro-graphic Analyses	Assays
Prospectors (not grantees)	1,103	159	2,597
Prospectors (grantees)	174	7	432
Departmental engineers	199	24	386
Totals	1,476	190	3,415

* A reasonable number of samples are assayed, without charge, for a prospector who makes application for free assays and who satisfies the Acting Chief Analyst that prospecting is his principal occupation during the summer months. A form for use in applying for free assays may be obtained from the office of any Mining Recorder.

Mineralogical specimens submitted for identification and rocks for classification are examined by the Mineralogical Branch of the Department.

COAL, PETROLEUM AND GAS SAMPLES

Eighty-nine samples were analysed. Of these, nineteen were samples of formation **water** from wells being drilled for oil and gas; fifty were samples of coal for proximate analysis and **calorific** value; four were soils tested for oil seepage; seven were crude-oil samples for examination; one was a sample of gas for analysis and calorific value; two were samples of oil skimmed off a mud pit and examined for the presence of petroleum; **two** were samples of water tested for oil seepage; one was a sample of water and sand examined for indication of gas and oil; one was a sample of water containing a sediment examined for evidence of petroleum; two were samples of sand and gravel tested for oil seepage.

POLICE AND CORONERS' EXHIBITS

Sixty-four cases of a chemical-legal nature, making 153 exhibits, were completed for the Attorney-General's Department. Nineteen cases were analyses of alcohol only in blood; five cases were for alcohol **in** blood and other organs; four cases involved carbon monoxide poisons (two of these had in addition methyl alcohol in the blood); and in nine cases viscera were analysed for all possible poisons. Twelve cases were analyses of liquor and six were analyses of gasoline for **colouring** matter added in accordance with the regulations of the "**Coloured** Gasoline Tax Act." Narcotics were sought in six cases received from the Royal Canadian Mounted Police. The remaining three **cases** were of arson, robbery with violence, and suspected **wilful** damage to a car. On three occasions evidence was presented in Court.

MISCELLANEOUS SAMPLES

For the Purchasing Commission, specification tests were made on eleven samples of anti-freeze and on one jelly powder. One tank was examined to determine the nature of the external and internal coating, and one pad of **Terylene** fibres was examined.

For the Taxation Branch of the Department of Finance, eight samples of gasoline were analysed for marker dyestuff.

For the Department of Health and Welfare, one sample of calcium carbonate was examined by spectrographic and X-ray methods.

For the British Columbia Power Commission, one sample of calcium carbonate was examined by chemical, spectrographic, and X-ray methods.

For the Testing Branch of the Department of Highways, one sample of anhydrous calcium chloride pellets was examined by chemical, spectrographic, and X-ray methods.

For the Protection Division of the Forest Service, six wooden rods, using four as controls, were examined, to determine whether they had been manufactured from logs which had been immersed in salt water.

For the Department of Public Works, the disk from a time clock was examined to determine the intervals at which the clock had been punched.

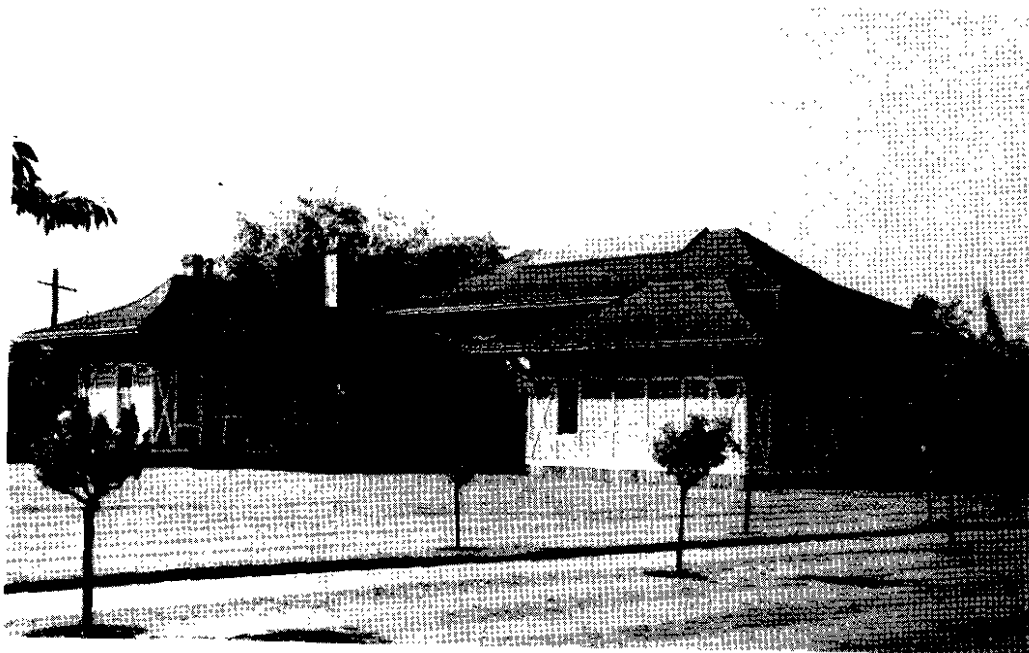
For the Department of Mining and Metallurgy at the University of British Columbia, two samples were analysed for titanium.

EXAMINATIONS FOR ASSAYERS

Provincial Government examinations for certificates of competency and licence to **practise** assaying in British Columbia were held at Trail in June and December. In June ten candidates were examined; seven passed, two obtained **supplementals**, and one failed. In December three candidates were examined at Trail; two passed and one failed.



The "Bird Cages" in old Victoria. The central building was the Colonial Office and to the left of it the Legislative Assembly. (Provincial Archives.)



The original Legislative Assembly building, with one added wing, on the lawn of the Parliament Buildings. This housed offices and laboratories of the Department of Mines from 1896 until it was destroyed by fire in March, 1957.

INSPECTION BRANCH

ORGANIZATION AND STAFF

Inspectors and Resident Engineers

H. C. Hughes, Chief Inspector.....	Victoria
Robert B. Bonar, Senior Inspector of Mines.....	Victoria
L. Wardman, Electrical Inspector of Mines.....	Victoria
E. R. Hughes, Senior Inspector of Mines.....	Victoria
J. W. Patterson, Inspector and Resident Engineer.....	Lillooet
Robert B. King, Inspector and Resident Engineer.....	Vancouver
A. R. C. James, Inspector and Resident Engineer.....	Vancouver
J. E. Merrett, Inspector and Resident Engineer.....	Cranbrook
J. W. Peck, Inspector and Resident Engineer.....	Nelson
D. R. Morgan, Inspector and Resident Engineer.....	Fernie
David Smith, Inspector and Resident Engineer.....	Prince Rupert

The Inspectors are stationed at the places listed and inspect coal mines, metalliferous mines, and quarries in their respective districts. They also examine prospects, mining properties, and roads and trails.

E. R. Hughes supervised the Department's roads and trails programme and prospectors' grub-stakes.

Instructors, Mine-rescue Stations

Arthur Williams.....	Cumberland Station
T. H. Cunliffe.....	Princeton Station
T. H. Robertson.....	Princeton Station
Joseph J. Haile.....	Fernie Station
W. H. Childress.....	Nelson Station

Staff Changes

W. H. Childress was appointed instructor at the Nelson station on March 6th, 1957. He replaced H. W. Aitchison, who resigned on November 21st, 1956.

A. R. C. James was transferred from Prince Rupert to Vancouver on April 1st, 1957.

David Smith was appointed Inspector and Resident Engineer at Prince Rupert and commenced his duties on February 15th, 1957.

J. W. Patterson resigned on July 31st, 1957, to take a position with the Canadian Government at Ottawa.

T. H. Cunliffe retired because of ill health on September 23rd, 1957, and was replaced by T. H. Robertson, who was appointed instructor for the Princeton station on July 1st, 1957.

Board of Examiners for Coal-mine Officials

H. C. Hughes, Chairman.....	Victoria
Robert B. Bonar, Secretary.....	Victoria
A. R. C. James, Member.....	Vancouver

R. B. Bonar, A. R. C. James, and the Inspectors for the district in which an examination is being held form the Board for granting certificates of competency to coal-miners. In the absence of the Inspector, the mine-rescue instructor is authorized to act in his stead.

An Inspector is empowered to grant provisional certificates to coal-miners for a period not exceeding sixty days between regular examinations.

MINERALOGICAL BRANCH

Field work by officers of the Mineralogical Branch includes geological mapping and examination of mineral deposits, and studies related to ground-water and engineering geology. The results are published partly in the Annual Report of the Minister of Mines and partly in a series of bulletins. The Mineralogical Branch supplies information regarding mineral deposits and the mineral industry, in response to inquiries received in great number. The activities of the Branch also include identification of rock and mineral specimens submitted directly by prospectors and others, or through the Analytical Branch.

PROFESSIONAL STAFF

On December 31st, 1957, the professional staff included the following engineers classified as geologists or mineral engineers: H. Sargent, Chief of the Mineralogical Branch; M. S. Hedley, S. S. Holland, J. W. McCammon, N. D. McKechnie, G. E. P. Eastwood, 3. T. Fyles, A. Sutherland Brown, 3. M. Carr, H. W. Nasmith, A. F. Shepherd, and J. E. Hughes. Dr. C. G. Hewlett died accidentally in the course of field work, August 14th.* J. E. Hughes was granted leave in October to continue postgraduate studies at McGill University.

Technical editing of the Annual Report of the Minister of Mines and of other publications was directed by M. S. Hedley. Copy for printing was prepared under the direction of Mrs. C. C. Savage, who serves as editor for English. Messrs. Hedley and Holland assisted in directing and supervising field work. Most of the other members of the professional staff are assigned to mapping the geology of the selected areas and of mineral deposits. The following have special assignments: J. W. McCammon, industrial minerals and structural materials; H. W. Nasmith, ground-water and engineering geology; A. F. Shepherd, records and library.

FIELD WORK

Systematic field work for the Mineralogical Branch in 1957 was done by eleven members of the permanent staff, a geologist engaged for the field season, and nine temporary field assistants.

A. Sutherland Brown extended geological reconnaissance in the Cariboo Mountains from Bowron Lake to the Rocky Mountain Trench via Goat River. Subsequently he examined mineral properties at McLeese Lake, Takomkane Mountain, and in the southern interior. At the beginning of the field season he examined areas where airborne surveys had indicated magnetic anomalies on Quadra Island.

J. M. Carr continued geological mapping of the Highland Valley area.

G. E. P. Eastwood and J. T. Fyles completed the most essential geological mapping for a section from the head of Gainer Creek to the head of Trout Lake. Fyles also spent two weeks in the Ainsworth area, preliminary to a proposed future campaign of detailed geological mapping on the west side of Kootenay Lake.

C. G. Hewlett began detailed mapping of the area containing the Mineral King mine. This work was terminated by his death on August 14th.

S. S. Holland made geological studies of sites proposed for power development on the Fraser River from the Pavilion site to Big Bar. He spent the major part of the field season examining beach and inshore sands at Wreck Bay and Cape Caution and in the northeastern part of Graham Island. H. W. Nasmith contributed to the investigation by studying physiography and glacial history of northeastern Graham Island. These investigations were undertaken to assist in evaluating such deposits as sources of iron and titanium. A report on this investigation, entitled "Investigation of Beach Sands," has been published (March, 1958). Holland and Nasmith spent about a month on geological

* See page A 4.

reconnaissance bearing on proposals for power development in the area including Taseko Lake, Chilko Lake, and Bishop River.

J. E. Hughes continued mapping the stratigraphy and structure of post-Palaeozoic rocks in the area traversed by the John Hart Highway between the West Pine bridge and Commotion Creek.

J. W. McCammon made ground investigations where magnetic anomalies had been indicated by airborne magnetometer surveys in Texada Island. McCammon spent the major part of the field season investigating occurrences of clay, shale, and limestone in the Prince George, John Hart Highway, and Peace River areas, and making a **reconnaissance** from Falkland to Louis Creek bearing on the possible occurrence of gypsum deposits. He also spent a short period reviewing structural materials being used by the building trade in the lower mainland.

N. D. McKechnie examined mineral properties on Vancouver Island and examined areas on Salmon River and Campbell Lake, where airborne surveys had indicated magnetic anomalies. He also supervised removal of bulk samples of coal from two seams on the Pine River. Coal of fair to good coking quality had been indicated by some tests on samples from diamond-drill holes. Although surface coal was stripped off before the samples were taken, it was found that partial oxidation had destroyed the coking properties of the coal, which, however, is of high heat value.

H. W. Nasmith made a soil study on the Kettle River to assist the soil survey being made by the Department of Agriculture, made a study of ground-water in part of the Highland Valley area, and a study of an ice-impounded lake and other geological features bearing on road location in Bear Pass. He collaborated with S. S. Holland in studies already mentioned.

H. P. Trettin was employed for the field season to make a geological study of the area along the Fraser River from Lillooet to Big Bar. This work was under the general direction of Professor K. C. McTaggart, retained as consultant, and is to be continued in 1958.

Airborne Magnetometer Surveys and Related Ground Investigations.-In 1956 airborne magnetometer surveys were made for the Government of British Columbia on Texada Island, Quadra Island, and in the Campbell River-Salmon River area on Vancouver Island. In 1957 helicopter-borne magnetometer surveys were made in selected areas in the Quatsino Sound-Nimpkish Lake-Head Bay area on the west coast of Vancouver Island. The results of the airborne magnetometer surveys have been released to the public as prints of twelve maps. In the early part of the 1957 field season A. Sutherland Brown, J. W. McCammon, and N. D. McKechnie made ground studies in sections where anomalies had been indicated by the 1956 airborne magnetometer work. A report on these investigations has been published, entitled "Airborne Magnetometer Surveys, 1956-1957."

PETROLEUM AND NATURAL GAS BRANCH

STAFF

J. D. Lineham, Chief Petroleum Engineer and Chief of Petroleum and Natural Gas Branch	Victoria
R. R. McLeod, Senior Petroleum Engineer and Chairman of the Board of Arbitration	Victoria
A. N. Lucie-Smith, Petroleum Engineer and Chairman of the Conservation Committee	Victoria
S. S. Cosburn, Mineral Engineer (Geology)	Victoria
T. A. Mackenzie, Engineering Assistant	Victoria
W. L. Ingram, Conservation Engineer	Dawson Creek
G. E. Blue, Conservation Engineer	Dawson Creek
H. B. Fulton, Assistant Geologist	Dawson Creek
P. K. Huus, Engineering Assistant	Dawson Creek

The Petroleum and Natural Gas Branch is responsible for the administration of the regulation, under the "Petroleum and Natural Gas Act," governing the drilling of wells, and the production and conservation of oil and natural gas. It was established in April, 1956, although it had functioned, nominally under the Inspection Branch, since April 1st, 1953.

During 1957 an office was maintained at 1805 One Hundred and Eighth Avenue, Dawson Creek, in one of three Pan Abode three-bedroom housing units constructed in 1956. The office unit was also used as bachelor quarters, the other two units being occupied as married quarters. A room in the new government building in Fort St. John was used as an auxiliary office and for the storage of engineering equipment.

The following members were appointed by Order in Council to the Board of Arbitration established under the authority of the "Petroleum and Natural Gas Act": R. R. McLeod, Department of Mines, Victoria, Chairman; S. G. Preston, Department of Agriculture, Prince George; and A. W. Hobbs, Department of the Attorney-General, Victoria. The Board of Arbitration grants right of entry by oil operators upon alienated land and determines conditions of entry and just compensation therefor. It also terminates the right of entry when the operator has ceased to use the land.

A Conservation Committee was also established under the authority of the "Petroleum and Natural Gas Act," and the following members were appointed by Order in Council: A. N. Lucie-Smith, Department of Mines, Chairman; N. D. McKechnie, Department of Mines; and M. H. A. Glover, Bureau of Economics and Statistics, all of Victoria. The duties of the Committee are:—

- (1) To act as an advisory committee to the Minister on such questions of conservation that the Minister, in writing, shall refer to the Committee for their consideration and recommendation.
- (2) To deal with such questions of conservation and production in the various fields of British Columbia as may arise between two or more operators in the same field or between operators and the Branch when appeals on such questions are made to the Minister and referred by him to the Committee.

STAFF CHANCES

A. N. Lucie-Smith joined the Victoria staff as petroleum engineer on April 1st, 1957. On October 10th he was appointed Chairman of the Conservation Committee.

G. E. Blue joined the Dawson Creek staff on May 6th, 1957. H. B. Fulton joined the Dawson Creek staff on November 12th, 1957.

GRUB-STAKING PROSPECTORS

Under authority of the "Prospectors' Grub-stake Act," as amended in March, 1944, the Department of Mines has provided grub-stakes each year since 1943 to a limited number of applicants able to qualify. The maximum grub-stake is \$300, but an additional amount up to \$200 may be added for travelling expenses to and from the prospecting area.

To qualify at the present time the Department requires that the applicant shall be a physically fit male British subject, holder of a valid free miner's certificate, who has been resident in the Province during the year preceding his application for a grub-stake, or who has been honourably discharged from Her Majesty's services, who is between the ages of 18 and 70, and who can identify common rocks and minerals.

It is required that in order to obtain the maximum grub-stake, he agree to spend at least sixty days actually prospecting for lode occurrences in one area of his choice in British Columbia considered favourable by officers of the Department of Mines. If he prospects a lesser time, the grant will be reduced proportionately. In the past, rebates have been recovered from grantees to whom payments have exceeded the proper amount for the time and effort devoted to prospecting.

The grantee must not accept pay from any other source for services rendered during the period credited to the grub-stake. At the end of the season he shall provide the Department with a diary and maps outlining his activities while working under the grub-stake. Any discoveries made, staked, and recorded are exclusively his own property.

Statistical information covering the grub-stake programme since its inception is given in the following table:—

GRUB-STAKE STATISTICS

Field Season	Approximate Expenditure	Men Grub-staked	Samples and Specimens Received at Department Laboratory	Mineral Claims Recorded
1943	\$18,500	90	773	87
1944	27,215	105	606	135
1945	27,310	84	448	181
1946	35,200	95	419	162
1947	36,230	91	469	142
1948	35,975	92	443	138
1949	31,175	98	567	103
1950	26,800	78	226	95
1951	19,385	63	255	137
1952	19,083	50	251	95
1953	17,850	41	201	141
1954	19,989	48	336	123
1955	21,169	47	288	183
1956	20,270	47	163	217
1957	22,000	46	174	101

Samples and specimens received from grub-staked prospectors are spectrographed, assayed, and tested for radioactivity. Mineralogical identifications are made on request.

Of the forty-six grantees in 1957, nineteen were given grants for the first time, and only four of these proved unsatisfactory. Three grantees who had received previous grub-stakes were also struck from the list for unsatisfactory work. Five grantees, who for various reasons were unable to fulfil the terms and conditions of the grant, received only partial payment or returned the grub-stake. Six grantees reached the maximum age limit and cannot qualify for further grub-staking. The 1957 season was one of average performance, and prospecting was done chiefly in the Cassiar, Manson Creek, and Vancouver Island areas, as well as across the southern part of the Province. D. H. Rae again gave able service in interviewing applicants and supervising grantees in the field.

MUSEUMS

The Department has a large exhibit of mineral rock specimens in the Douglas Building, Victoria; collections are also displayed in the joint office in Vancouver and in the offices of the Inspectors of Mines in Nelson and Prince Rupert.

Specimens from the collection in Victoria, accumulated in a period of more than sixty years, are displayed in cases on the fourth floor of the Douglas Building. The collection includes specimens from many of the mines and prospects in the Province, and also specimens of type rocks and special minerals from British Columbia and elsewhere.

British Columbia material includes specimens collected by officers of the Department of Mines and specimens donated by property-owners. The collection also includes type specimens purchased from distributors. Other valued specimens or groups of specimens have been donated or loaned to the museum.

ROCK AND MINERAL SPECIMENS

Information regarding collections of specimens of rocks and minerals available to prospectors and schools in British Columbia may be obtained from the Chief of the Mineralogical Branch.

PUBLICATIONS

Annual Reports of the Minister of Mines, bulletins, and other publications of the Department, with prices charged for them, are listed in the Department of Mines List of Publications available from the Chief of the Mineralogical Branch.

Publications may be obtained from the offices of the Department in Victoria and elsewhere in the Province. They are also available for reference use in the Department's library (Mineralogical Branch) at Victoria, in the joint office in Vancouver, and in the offices of the Inspectors of Mines in Nelson and Prince Rupert, as well as in public libraries.

**MAPS SHOWING MINERAL CLAIMS, PLACER CLAIMS, AND
PLACER-MINING LEASES**

From the details supplied by the locators, the approximate positions of mineral claims held by record and of placer-mining leases are shown on maps that may be inspected in the central records offices of the Department of Mines in Victoria and in Vancouver. Copies of these maps may be obtained on request. The boundaries of surveyed claims and leases are shown on the reference maps and other maps of the British Columbia Department of Lands and Forests.

**JOINT OFFICES OF THE BRITISH COLUMBIA DEPARTMENT OF MINES
AND THE DEPARTMENT OF MINES AND TECHNICAL SURVEYS,
CANADA.**

The Provincial Department's Inspector and Resident Engineer, the Gold Commissioner and Mining Recorder for the Vancouver Mining Division, and the officers of the Federal Geological Survey occupy one suite of offices. All official information relating to mining is now available to the public in the one suite of offices in Vancouver.

The services offered to the public include technical information on mining, the identification of mineral specimens, distribution of Federal and Provincial mining publications, a reference library, a display of rocks and minerals, and a central records office.

Topographic Mapping and Air Photography

Topographic mapping and air photography were continued by the Surveys and Mapping Branch of the British Columbia Department of Lands and Forests and by the Canadian Government Departments of Mines and Technical Surveys and of National Defence during 1957.

In addition, the Legal Surveys Division of the British Columbia Surveys and Mapping Branch was responsible for cadastral surveys of all Crown lands in the Province, and during the field season carried out surveys of 14,750 acres in the Peace River District for settlement purposes, surveyed the rights-of-way of new highways in the vicinities of Princeton and Vanderhoof, also various lots and subdivisions for alienation and reserve totalling fifty-three parcels. In the course of such work, 216 old lot corners were replaced by permanent monuments.

The Air Division of the British Columbia Surveys and Mapping Branch continued its programme of compiling interim maps at a scale of 2 inches to 1 mile showing planimetry, watershed boundaries, and cadastral surveys, and completed a total area of 37,400 square miles. The total area mapped is now 194,000 square miles.

The Air Division also flew 18,020 square miles of new photography at various scales, adding 13,510 photographs to the Air Photo Library. The total number of air photographs (Federal and Provincial) now on hand in the Air Photo Library at Victoria is 421,553.

The Topographic Division of the British Columbia Surveys and Mapping Branch completed control for twenty-four half-sheets of the National Topographic 1:50,000 series in the Sukunka and Parsnip River areas, also additional control in the Parsnip-Peace River Valleys to provide for 1-inch-to-1,000-foot pondage maps.

Other parties obtained control for 1:25,000 scale mapping in the Lower Fraser Valley, special mapping in the Prince George and Lac la Hache areas, and completed a triangulation tie between the Gataga River in the Rocky Mountain Trench and Muncho Lake on the Alaska Highway.

The Geographic Division of the British Columbia surveys and Mapping Branch produced fourteen lithographed maps, of which nine were completely new editions, including three of the National Topographic 1-inch-to-2-miles series and one of the 1-inch-to-10-miles series.

The Canadian Government Departments of Mines and Technical Surveys and of National Defence, working in close co-operation with Provincial agencies during 1957, completed the field work for thirty-six half-sheets of the National Topographic 1:50,000 series in the Province.

The 1957 Annual Report of the Deputy Minister of Lands contains key maps indicating coverage by air photographs and by topographic and interim maps. Further information concerning these or the corresponding Federal mapping may be obtained from the Director, Surveys and Mapping Branch, Department of Lands and Forests, Victoria.

Department of Mines and Technical Surveys

The Canadian Government Department of Mines and Technical Surveys, created by an Act of Parliament introduced in November, 1949, took over most of the branches and functions related to mining of the former Department of Mines and Resources. The Mines Branch, Geological Survey of Canada, and Surveys and Mapping Branch are the three branches of the Department of the most direct interest to the mining industry. Brief reference to the work of the Surveys and Mapping Branch in British Columbia is made in the preceding note headed "Topographic Mapping and Air Photography." A note on the Geological Survey of Canada follows this paragraph and is followed by a note on the Mines Branch.

GEOLOGICAL SURVEY OF CANADA

By an arrangement made at the time the Province of British Columbia entered Confederation, geological investigations and mapping in the Province are carried on by the Geological Survey of Canada. Several geological parties are in the field each year. Many excellent reports and maps covering areas of British Columbia have been issued by the Geological Survey of Canada, and they have made available a great amount of information that has been of much benefit to the mining and prospecting activities in British Columbia.

A branch office of the Geological Survey of Canada is maintained in Vancouver. Maps and reports on British Columbia can be obtained there. J. E. Armstrong is in charge of this office.

FIELD WORK BY GEOLOGICAL SURVEY OF CANADA IN BRITISH COLUMBIA, 1957

H. H. Bostock made a special study of a group of granitic dykes about 4 miles southwest of Penticton.

H. Frebold continued a detailed study of the Jurassic fauna and stratigraphy of southern British Columbia, examining strata in the Nelson West Half (82 F, W. $\frac{1}{2}$) map-area.

W. L. Fry continued a detailed study of the Tertiary palæobotany and stratigraphy of southwestern and south central British Columbia. Particular attention was paid to the Princeton and Coalmont areas.

J. G. Fyles continued, and nearly completed, the field study and mapping of the unconsolidated deposits of the east coast of Vancouver Island between Cumberland and Campbell River.

H. Gabrielse nearly completed geological field work in Cry Lake (104 I) map-area, which had been partly mapped by Operation Stikine in 1956.

E. C. Halstead completed a ground-water survey of the Lower Fraser Valley (from Hope to the Strait of Georgia),

E. J. W. Irish completed field work within Charlie Lake (94 A) map-area, which includes the Fort St. John gasfield.

G. B. Leech continued the geological mapping of the Fernie 4-mile map-area (82 G, W. $\frac{1}{2}$).

J. E. Reesor completed the geological mapping of the Lardeau 4-mile map-area (82 K, E. $\frac{1}{2}$), and began what will be an exhaustive, continuing study of Canadian granitic rocks.

J. G. Souther refined and largely completed the reconnaissance mapping done in 1956 by Operation Stikine in Telegraph Creek (104 G) and Iskut River (104 B) map-areas.

H. W. Tipper completed the geological mapping of the Anahim Lake 4-mile map-area (93 C), and started the mapping of the Quesnel 4-mile map-area (93 B).

R. A. Price completed the geological mapping of the Flathead North map-area (82 G/7, E. ½) This work extended into Alberta.

PUBLICATIONS OF THE GEOLOGICAL SURVEY

A total of fifteen publications of the Geological Survey of Canada relating to British Columbia was received by the British Columbia Department of Mines in 1957. A list of the fifteen publications will be supplied on request.

MINES BRANCH

The Mines Branch has branches dealing with mineral resources, mineral dressing and process metallurgy, physical metallurgy, radioactivity, and fuels and explosives. A total of eleven publications of the Mines Branch pertaining to British Columbia were received in 1957 by the British Columbia Department of Mines. A list of these publications will be supplied on request. They included tabular pamphlets dealing with coal mines, gold mines, stone quarries, petroleum refineries, and milling plants in Canada.

Lode Metals

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GENERAL REVIEW

The average prices of all principal metals were down in 1957 compared with 1956. The gains of the past two Years were wiped out in a time of still rising mining costs. The average Canadian price of gold fell to \$33.55, the lowest figure in twenty-five years, as the Canadian dollar attained a record premium over the United States dollar. The price of silver was relatively steady, but the Canadian price was reduced for the same reason as gold. The United States price of copper dropped below 30 cents in February, below 24 cents early in September, and at the year's end was 22.270 cents per pound. The average price in Canadian funds, 26.031 cents per pound, was almost 35 per cent less than the corresponding price in 1956. The New York price of lead dropped from 16 cents per pound early in May to 13 cents at the year's end. The St. Louis price of zinc dropped from 13.5 cents per pound at the first of May to 10 cents by early July, which figure held for the rest of 1957. The price of tungsten (scheelite) ore dropped from a quotation of \$27.25 to \$27.75 per unit to one of \$12 to \$13 at the end of the year.

Gold, silver, copper, lead, and zinc produced at British Columbia lode mines in 1957 had a gross value of \$111,968,648. Miscellaneous metals, including iron ore, tungsten, tin, and minor metals recovered at the Trail smelter, had a gross value of \$12,755,362. The total quantity of ore mined at all lode mines amounted to 7,282,436 tons and came from fifty-nine mines, of which forty produced 100 tons or more. The average number employed in the lode-mining industry in 1957, including mines, concentrators, and smelters, was 9,006.

In 1957 thirty-one mills were operated, eighteen of them throughout the year and three intermittently. There were five new mills—a small gold mill at Hedley, a lead-zinc mill near Kaslo, copper mills at Greenwood and Cowichan Lake, and a magnetic concentrator at Benson Lake on Vancouver Island. Six mills were closed when work ceased at the respective properties; namely, Polaris Taku (Tulsequah mine), Allenby (Copper Mountain mine), Velvet, Silver Giant, Iron Hill, and Woodgreen. Three Slocan mills accepted custom ore, one steadily and two intermittently.

The Trail smelter recorded custom receipts of 865 tons of crude ore, 13,865 tons of lead concentrates, and 9,951 tons of zinc concentrates from properties in British Columbia. Totals of approximately 21,802 tons of lead concentrates and approximately 81,673 tons of zinc concentrates were shipped out of the country for smelting. Copper concentrates and ores, and dross from the Trail smelter were shipped to the Tacoma smelter. Concentrated iron ore was shipped to Japan. Tungsten concentrates were sold to the United States Government under contract.

The production of gold increased slightly compared with that of 1956. A small mill was brought into production at Hedley by French Mines Limited. The Queen shaft of Bralorne Mines Limited was extended 175 feet to a point 630 feet below sea-level. Development on the 32nd level showed excellent ore in the 77 vein, the richest orebody in the history of the mine. A considerable amount of work was done to improve the ventilation and decrease temperature at depth.

Silver, lead, and zinc were mined at a somewhat reduced rate. The closing of the open pit at the Sullivan mine reduced the tonnage milled from 11,000 tons per day to 8,800 tons per day after May. The Silver Giant mine closed in June following exhaustion of the orebodies. At several properties the effect of lowered prices was countered with reduction of staff and other economy. Ore was developed on the 2900 adit level of Highland-Bell mine, and about one-third of the year's output came from the lower mine. In the Slocan, Violamac Mines Limited took over the mill and holdings of Carnegie Mines of British Columbia, Ltd. Western Exploration started to drive an adit 400 feet below the Mammoth No. 9 level, with a view to eventual elimination of the tram-line and upper camp. A small mill was erected at the Utica mine. There was a normal level of activity in the general Ainsworth-Slocan area.

Copper production was seriously curtailed with the closing on April 29th of the Copper Mountain mine. The 1,000-ton-per-day mill of Woodgreen Copper Mines

Limited, which had gone into production on January 20th, 1957, closed in August when the company went into bankruptcy. The Velvet mine closed, and with it the new mill that had been operating for about eight months. On the other hand, Cowichan Copper Co. Ltd. commenced milling in December at a rate of 300 tons per day. At the Granduc property a new level was driven, from the shaft, 625 feet below the main-haulage adit level.

The closing of the Copper Mountain mine ends another chapter in the history of the Granby company, which has prospered in British Columbia since 1899. The company mined nearly 14,000,000 tons of copper ore at Phoenix before the camp closed in 1919, and about 24,000,000 tons at Anyox from 1914 to 1935. Mining of the Copper Mountain orebodies was halted in 1930, but production resumed in 1937, and a total output of nearly 35,000,000 tons was achieved. In the past five years Granby has directed development of the Granduc property, in which it has a large interest, repurchased its old property at Phoenix and built there a 500-ton mill, conducted exploration on Babine Lake and at other places, and recently has undertaken the management of the Western Nickel mine. At the end of 1957 Granby, for the second time in more than fifty years, lacked a producing mine of its own.

Investigation of copper deposits continued in the southern part of the Province, although at a rate somewhat reduced by the drop in price of copper. In the Highland Valley area, drilling by American Smelting and Refining Company Ltd. on the Bethlehem property located the East Jersey ore zone of good grade. This was completely covered by overburden. In May, Bethlehem Copper Corporation Ltd. announced ore reserves of about 100,000,000 tons in the Iona and Jersey zones. Most of the property in the Highland Valley area came under the control of three major companies-American Smelting and Refining Company Ltd., Kennecott Copper Corporation (through its subsidiary, Northwestern Exploration, Limited), and Phelps Dodge Corporation (through its subsidiary, Anson Mines Limited). About 80 per cent of the total exploratory drilling, nearly 30,000 feet, was done on the Bethlehem property. Rotary drilling was tried and was found suitable for the testing of areas covered with overburden. The existence of an important orebody has been demonstrated at the Craigmont property, which is 7.0 miles south of the Bethlehem property. This situation is well south of Highland Valley and is at the southeastern edge of the Guichon batholith.

Development was started of a deposit of tungsten ore near Salmo that had been recently discovered by diamond drilling. However, the company's government contract for sale of concentrates was soon due to expire, and rapid worsening of the tungsten market resulted in closure soon after work had started.

In July, 1957, the final clean-up of iron ore was made at Iron Hill, ending the life of the first mine to ship magnetite concentrates to Japan, in 1951. In September, 1957, Empire Development Company Limited started producing magnetite concentrates at the newest iron mine at Benson Lake and hauling the concentrates 25 miles to Port McNeill for shipment to Japan. Texada Mines Limited recovered important amounts of copper and gold from a newly installed flotation circuit in the company's magnetic concentrator.

Airborne magnetometer surveys were conducted by the Provincial Government on Vancouver Island in 1957, continuing the work begun in 1956. Certain magnetic anomalies at Texada Island, Campbell Like, and Quadra Island, detected in 1956, were investigated on the ground, geologically and with dip needle. The aeromagnetic maps were made available to the public between February 8th, 1957, and January 9th, 1958. A separate publication, "Airborne Magnetometer Surveys, 1956-57," summarizes the extent of these investigations. contains full reports of the ground examinations, and is accompanied by pertinent maps (published May, 1958).

The results of investigations by the Department in 1957 of the magnetite content of beach sands at Florencia (Wreck) Bay, Cape Caution, and Graham Island were published as "Investigation of Beach Sands" in March, 1958.

NOTES ON METAL MINES

TAKU RIVER*

Gold-Silver-Copper-Lead-Zinc

(58" 133" N.W.) Company office, Trail; mine office, Tulsequah. **Tulsequah** Chief, J. J. McKay, property superintendent; R. M. Mattson, mine **superintendent**; O. I. Johnson, superintendent of maintenance; E. N. Big Bull (Tulsequah Mines, Doyle, mill superintendent. In 1957 this company, a subsidiary of Limited) The Consolidated Mining and Smelting Company of Canada, Limited, operated the Tulsequah Chief mine. There was no production from the Big Bull mine, which was closed in 1956. On September 1st, 1957, operations were suspended at the Tulsequah Chief due to low metal prices. Two watchmen remain at the property. All ore was treated at the Polaris Taku concentrator, which was operated under lease. Production: Ore milled, 142,537 tons.

The following is a summary of the development work completed at the Tulsequah Chief mine: Drifts and crosscuts, 590 feet; **subdrifting**, 289 feet; raising, 1,637 feet; underground diamond drilling, 9,898 feet. The property safety record for 1957 showed improvement; at the time of closure four lost-time accidents had occurred.

The annual Tulsequah River flood commenced on August 8th but did not reach its peak until August 15th. Both the Tulsequah Chief and the Big Bull crossings were badly damaged. The bridges were not replaced.

Janet-Vega (58" 133" N.W.) This, property of sixteen Crown-granted claims is owned by New Taku Mines Limited, Vancouver. It is on the east bank of the Tulsequah River, 1½ miles north of the Big Bull mine. In 1957 The Consolidated Mining and Smelting Company of Canada, Limited, **optioned** the claims, and during July drilled three holes totalling 1,472 feet to explore a sericitic shear **zone** in **volcanics** where it enters a concealed area. Four men were employed under the direction of D. W. Heddle. Access to the area was provided by tractor.

STIKINE*

NAHLIN (58" 131" N.W.)

Nickel

Company office, 601, 220 Bay Street, Toronto. G. Webster, **president**. This property is at Opal Lake, about 5 miles west of **Tedi** Opal (Canadian Explorers Limited) **deech** Lake in the Nahlin area. The following claims are held by record: **Tagoon** Silver Nos. 1 to 6, Web Nos. 1 to 8, Opal and Opal Nos. 2 to 12, Nor Nos. 1 to 8, Jim Nos. 1 to 8, and Windfall Nos. 1 to 6. The showings lie in a belt of ultrabasic rocks and close to a regional fault zone. Small faults and fractures transverse to **the** regional strike are **opalized** and locally contain concentrations of the nickel mineral, millerite. From late May to early October about 1,000 feet of open-cutting and 1,290 feet of diamond drilling were done. A crew averaging eight men was under the direction of Jack **McBeth**. The property was serviced entirely by air.

SCUD RIVER (57" 131" S.E.)

copper

Head office, 61 Broadway, New York 6, N.Y.; Canadian office, 25 Adelaide Street West, Toronto. H. A. Vogelstein, president. This property is at the headwaters of the east fork of Galore Creek, a tributary of the Scud River. It is about 13 miles east of the Stikine River and about 8 miles south of the Scud River. The property of seventy-three recorded claims and fractions is on show-

* BY David Smith.

ings found by an American Metal Company exploration party in 1956. Mineralization is chalcopyrite, which occurs as disseminations within a syenite stock emplaced along a major thrust fault at the **contact** between Permian sediments and Triassic **volcanics**. Work commenced on June 1st and finished August 27th, 1957. A crew averaging fifteen men, including a geologist and assistant, a surveyor and helper, and a helicopter crew was under the direction of K. H. Cumming. A geological survey was made, and diamond drilling and trenching were done. Seven drill-holes totalling 3,311 feet were drilled. Trenching was done on the WM 8, CC 9, and the LC 7 claims. Transportation from the base camp at the junction of the Stikine and Scud Rivers to the drill camp was by helicopter. On December 30th, 1957, the name of the controlling company became American Metal Climax, Inc.

UNUK RIVER*

Copper

(56" 130" S.E.) Company office, Room 507, 1111 West Georgia Street, Vancouver 5; mine office, Stewart. L. T. Postle, president; **Granduc (Granduc Mines, Limited)** J. J. Crowhurst, manager; R. F. Lambert, general foreman. This company holds a total of 240 mineral claims and fractions, as follows: By Crown grant, 16 claims; by retention lease, 48 claims; by record, 117 claims in the Leduc Glacier area and 59 claims in the South Fork Unuk River area. The property is 25 miles northwest of Stewart at an elevation of 4,500 feet. Mineralization consists mainly of chalcopyrite, pyrrhotite, and pyrite. Because of difficulties encountered in sinking the shaft, there is nothing to add to the description of the orebodies given in the 1956 Annual Report.

The shaft-sinking contract was concluded and the company undertook to finish the sinking to the 2625 level. A total of 313 feet of shaft sinking was completed during the year, a total depth of 676 feet below the 3250 main haulage level. Shaft stations were cut at the 3100 level and 2800 level in readiness for future operations. On the 2625 level the station was completed, and a sublevel sump and dam were installed to aid in **unwatering** the shaft. On the 2625 level, 1,570 feet of crosscutting was done. This work will permit further exploration in the Glacier area. On the 3250 level at the north end an additional 244 feet of drifting was done. On the 3250 level 5,488 feet of diamond drilling was done and on the 2625 level, 570 feet. In the shaft a 2-ton skip was installed in one compartment and a man cage in the other. On the 2625 level two **75-horsepower 200-gallon-per-minute** pumps were installed to operate singly or in parallel, and also a bank of **three 50-kva. 2,300-440-volt** transformers.

On the surface there was completed a diamond-drilling programme on the Leduc Glacier of seven holes totalling 4,674 feet. New units installed in the power-house include the following: A 350.kw. Caterpillar diesel-electric set and an electrically driven **550-cubic-feet-per-minute** Joy Sullivan compressor.

The difficulties of moving freight to the property have not been brought any closer to a final solution, and the aeroplane and the tractor train are the main standbys. A total of 159 tons of freight was transported to the mine by air from Stewart, as well as innumerable passengers. The tractor train transported 2,011 tons of freight during the winter months.

Work has been carried on continuously throughout the year with a crew averaging sixty-five men. One fatal accident marred the safety record, which has improved under the supervision of L. T. Kirby, newly appointed safety officer.

* By David Smith.

LODE METALS

PORTLAND CANAL*

SALMON RIVER (56" 130" S.E.)

Gold-Silver-Lead-Zinc

Silbak Premier Mines Limited Company office, 572 Howe Street, Vancouver. A. E. Bryant, president; 3. **Vallance**, superintendent; Henry Hill and Associates, consulting management engineers. Definite plans to rebuild the mill destroyed by fire in 1956 and to **resume** operation in 1957 were shelved owing to the decline of metal prices. A three-month detailed underground geological study was made by W. N. Plumb with four assistants. In June, salvage operations were undertaken to recover the scrap metal left in the wake of the fire, and to recover the concentrates which were scattered by the collapse of the bins, etc.

MAPLE BAY (55" 130" S.E.)

Copper

Maple Bay Copper Mines Limited Head office, Room 906, 357 Bay Street, Toronto; British Columbia office, 315 Credit Foncier Building, 850 West Hastings Street, Vancouver. W. J. Lawson, president; F. J. Hemsworth, consulting engineer. The company holds twenty-two Crown-granted claims, twenty-four recorded claims, and sixteen fractions near Maple Bay on the east side of Portland Canal, 37 miles south of Stewart. Assessment work consisting of stripping and trenching on several quartz veins was carried out in August and September by four men. All claims are maintained in good standing. During the month of October all machinery and equipment was moved from the beach camp and placed in storage in Prince Rupert.

ALICE ARM*

Silver

Toric (Torbrit)
Silver Miner
Limited)

(55" 129° N.W.) Registered office, 309 Royal Bank Building, Vancouver; executive office, 44 King Street West, Toronto; mine office. Alice Arm. R. W. Burton, **manager**; A. M. Cormie, mine superintendent; G. K. Sutherland, mill superintendent. Capital: 3,000,000 **shares**, \$1 par value. The Torbrit mine camp and mill are on the west bank of the Kitsault River, 17 miles by road from Alice Arm. Power is obtained from a company-operated hydro-electric plant 5 miles above the mine near the mouth of Clearwater Creek.

Production: Ore milled, 154,419 tons. Flotation concentrates amounting to 2,005 tons and containing 1,308,945 ounces of silver and 1,466,066 pounds of lead were shipped to the smelter. In addition, the total bullion produced was 365,221 ounces of silver. The source of the ore, milled in 1957 was as follows: 20 per cent from the winze below the 8 13 level; 28 per cent from the 8 13 level; 13 per cent from the 916 level; and 39 per cent from the 1018 level.

A summary of mining operations follows:—

Ore broken—

	Tons
Stoping	94,233
Stope raises and stope drifts	7,889
Development	775
Total	102,897

* By David Smith.

Waste broken—		Tons
Level development		1,719
Stope raises and stope drifts		5,110
Raises		2,225
	Total	<u>9,054</u>
Development in linear feet—		Ft.
Drifts and crosscuts		285
Raises		861
Stope drifts		284
Stope raises		3,549
	Total	<u>4,979</u>
Underground diamond drilling		14,979
Longhole drilling with tungsten carbide bits		68,943

No safety officer is employed, but a mine safety committee carries out regular monthly inspections of the mine and mill and holds monthly meetings. Sixteen compensable accidents occurred as follows: Mining, 10 accidents; surface, 3 accidents; kitchen, 3 accidents.

On the surface no new construction was undertaken. Roads in this area present a problem and require constant maintenance. Collapse of one of the more important bridges rendered the access trail to the hydro plant hazardous in the transportation of supplies.

On the Moose and Lamb claims 4,360 feet of surface diamond drilling was done, but results were **unfavourable** and the project was abandoned in September. On the North Star claim 4,678 feet of diamond drilling indicated a strong vein north of the **zone** of dykes traversing that claim. Almost all the vein intersections were reported to be below ore grade, but sufficient encouragement was obtained to warrant a further search for oreshoots.

OBSERVATORY INLET*

Copper

Anyox (The Consolidated **Mining and Smelting** Company of Canada, Limited). —(55° 129" S.W.) This property of sixty-five Crown-granted claims is owned by the Consolidated Mining and Smelting Company and includes the old Hidden Creek mine. During the summer of 1957 two diamond-drill holes totalling 2,911 feet were drilled on the Spruce claim about 1 mile south of the mine area. The men were housed at the **Anyox** camp. Coastal boats and aircraft were used for transportation. J. D. **Kelland** was engineer in charge.

(55" 129" S.W.) This property of fifteen recorded claims is on Double Ed (The Bonanza Creek 3 miles west of **Anyox**. It is on a showing of Consolidated Min- disseminated copper minerals in volcanic rock that was diamond ing and Smelting drilled in 1953 and 1954. From April 11th to September 30th Company of the Granby Construction Company, employing an average of Canada, Limited) twelve men, built 2 miles of road under contract, completing a road from Granby Bay to the property. The men were housed at the **Anyox** camp. Coastal boats and aircraft were used for transportation. John Rokosh was engineer in charge.

*BY David Smith.

ECSTALL RIVER*

Pyrite

(53" 129" N.W.) Company office, 355 Burrard Street, Vancouver. R. D. Mollison, New York, president; W. R. Bacon, director and manager of British Columbia operations. This property consists of twenty-one Crown-granted claims which extend across the Ecstall River at a point 30 miles above its confluence with the Skeena River. It is 45 miles southeast of Prince Rupert. Work on the property commenced in May and was discontinued in mid-September. A geophysical survey was performed on the southernmost claims, and a crew of five was engaged in geological reconnaissance up river from the property.

[Reference: Minister of Mines, B.C., Ann. Rept., 1952, pp. 81-84.1

HAZELTON*

Silver-Lead-Zinc-Cadmium

(55" 127" SW.) Head office, 609, 602 West Hastings Street, Vancouver; mine office, Hazelton. R. R. Wilson, president; H. B. Gilleland, manager; A. C. Ritchie, general superintendent; G. E. Apps, mine superintendent. The property is on Glen Mountain, 5½ miles north of Hazelton. It consists of the following claims: Thirty-five Crown granted, twelve recorded, and eight held by retention lease. Ore has been mined from the main vein system of sixteen parallel quartz veins ranging in width from a fraction of a foot to 12 feet. The veins strike northeastward and dip from 40 to 80 degrees to the southeast. The ore from these veins was almost exhausted when in 1955 surface drilling located a new vein designated No. 11 cross-vein, and its faulted extension No. 10 cross-vein. The vein strikes north 37 degrees west and dips 25 degrees northeast. All underground work during 1957 was concentrated on these vein segments. The mine worked 278 days, with 10,968 man-shifts underground, 3,607 man-shifts in the mill, and 3,490 man-shifts on surface.

A summary of the work done in 1957 was as follows:—

<i>Mine</i>		
Development—		Ft.
Drifting and crosscutting	.....	389
Subdrifting	.....	917
Raising	.....	1,063
Total		2,369
Diamond drilling—		
Surface	.....	5,050
Underground	.....	7,162
Total		12,212
Stopping—		Tons
No. 11 cross-vein	.....	13,405
No. 10 cross-vein	.....	11,607
No. 11 vein	.....	34
Ore-passes	.....	263
Total		25,309

* By David Smith.

ore to mill—	Tons
Stopes	25,309
Development	4,280
Total	29,589

Mill

Ore from mine	29,589
Sorted as waste	7,831
Tons milled	21,758

Underground the No. 10 cross-vein has been stoped for a strike length of approximately 400 to 100 feet above the 1500 level, and below the 1500 level to the main fault, a maximum of 130 feet down the dip. Only remnants of the oreshoot remain to be mined. Diamond-drill holes and prospect raises failed to find more oreshoots on this vein. No. 11 cross-vein has been stoped for a strike length of approximately 550 feet. Of this length, about 350 feet has been stoped from the bottom of the ore horizon (about 70 feet above the 1500 level) to the main fault, 100 to 265 feet above the 1500 level. The remaining 200 feet has been stoped to about 100 feet above the bottom of the ore horizon, and stoping is being continued. Subdrifting to the south of this section has disclosed at least an additional 100 feet of ore at a horizon about 80 feet above the 1500 level. This section is being developed for stoping. Several small oreshoots have been found and mined in the main fault zone above 151 1-1 200 and 151 1-1 300 stopes. All mining has been by open stoping. Development and stoping have been complicated by numerous faults which displace the veins from a few feet to 40 feet. A total of 7,161 feet of underground diamond drilling was done in forty-eight holes in 1957. Except for two drill-holes totalling 897 feet, that were drilled on the 1300 level to explore the main fault, the drilling was for the purpose of exploring the No. 10 and No. 11 cross-veins and to solve the fault problems involved.

On surface, approximately 4,000 feet of bulldozer trenching was done in 1957. Most of this work was in the vicinity of the main fault zone projected to the surface south of No. 11 vein, and in an area about 1,000 feet north and east of No. 11 vein on the surface. No new discoveries were made by this work. A total of 5,050 feet of diamond drilling in ten holes was done from the surface. This drilling was planned to explore areas which might be developed from the present underground workings.

Milling was on a seven-days-per-week basis. A total of 29,589 tons of ore was drawn from the mine. Of this, 7,831 tons was hand-sorted and discarded as waste; the remainder, 21,758 tons, was milled. The indicated recovery was 94.5 per cent of the gross value of the ore. There were no major alterations made to the mill flow-sheet and no major breakdowns.

SMITHERS***Silver-Lead-Zinc**

Duthie (Sil-Van Mines Limited) (54° 127" N.E.) Company office, 609, 602 West Hastings Street, Vancouver. R. R. Wilson, president; Newt Cornish, general superintendent. The Duthie mine is on the south slope of Hudson Bay Mountain and is about 16 miles by road from Smithers. Sixty-five mineral claims are held by the company—forty-three by Crown grant, twenty by record, and two by retention lease. The principal mine workings are between elevations of 3,200 and 4,500 feet on the Raven, Raven Fraction, Henderson, Hummingbird, and Canary claims of the Henderson group.

*BY David Smith.

The property is underlain by rhyolite, dacite, and andesite flows and breccias. The mineral deposits occupy four main fault zones, known as the Henderson, Ashman, Fault-plane, and Dome. Of these, the Henderson zone has been the most widely developed and has been traced on the surface for 3,500 feet from an elevation of 3,500 to 4,500 feet. These mineralized fault zones strike northeastward and range in dip from 50 degrees southeast to 70 degrees northwest. They are sliced, sheared, and brecciated zones along which occur sulphide veins and replacement deposits, the latter associated with some vein quartz and carbonate. The most important ore minerals are galena and sphalerite.

In the autumn of 1956 Sil-Van Consolidated Mining & Milling Company Ltd. entered into an agreement with Silver Standard Mines Limited whereby the latter undertook to expend the sum of \$32,000 on development work by January 31st, 1957. Under this agreement Silver Standard completed, in 1957, 215 feet of drifting, 108 feet of raising, and 1,919 feet of diamond drilling from underground headings.

On March 31st, 1957, Silver Standard Mines Limited exercised an additional option and the company was reorganized under the name of Sit-Van Mines Limited. During April and May plans were made to do further development work and stoping so that production could commence in the autumn. Reduced metal prices forced the company to alter plans, and limited development work and surface diamond drilling were carried out during June, July, and August, after which time work was suspended temporarily. The following work was done by the new company: 328 feet of drifting, 463 feet of raising, and 1,708 feet of surface diamond drilling. Hours worked were 378 shifts on the surface and 737 shifts underground.

Total development for 1957 was as follows:—

Place	Footage	Tons of Ore Extracted
Drifting—		
3950 drift north	215	250
3950 hangingwall drift	264	867
4100 hangingwall drift	65	190
	<hr/>	<hr/>
Totals ..	544	1,307
	<hr/>	<hr/>
Raising—		
3800 F. raise	32	
3800 D. raise	76	
3800 L. raise	43	
3950 K. raise	27	99
3950 M. raise	92	
3950 Q. raise	185	256
4100 O. raise	115	70
	<hr/>	<hr/>
Totals	570	1,732

A total of 1,919 feet of underground diamond drilling was done in twenty-seven holes to test the Henderson zone for parallel ore zones. One zone about 10 feet wide carrying mineralization of ore grade was located in the hangingwall on the 3950 level. A total of 1,708 feet of surface drilling in eight holes was done. Seven holes were drilled on the northern extension of the Henderson vein, five of which intersected material of ore grade over a width of 4 feet. One hole was drilled on the Dome vein. Approximately half a mile of road was built to provide access to diamond-drill set-ups and 600 feet of trenching was done, using a TD-9 tractor.

A watchman remains on duty at the property.

Silver-Lead-Zinc-Cadmium

(54° 126' N.W.) Company office, 572 Howe Street, Vancouver; Cronin (New mine office, Smithers. L. C. **Creery**, president; Paul **Kindrat**, Cronin Babine resident manager; Henry L. Hill and Associates, consulting **man-** Miner Limited) **agement** engineers. The property is on the east slope of Cronin Mountain, about 30 miles by road from Smithers. A considerable

amount of road-building and maintenance work was done. The crushing plant was redesigned and a **gyratory** crusher was installed. On the advice of the Workmen's Compensation Board, a complete dust-collector system was installed. The season's operations commenced May **16th**, milling was resumed June **17th**, and all operations were suspended October 25th. Approximately 5,000 tons of ore was mined from the No. 2 vein and approximately 1,000 tons from the No. 1 vein.

On the No. 1 vein (Rhyolite vein), No. **1** level was reopened, a raise was driven to it from No. 2 level, and a raise was driven from it to the bottom of No. 2 shaft. A small lens of high-grade lead ore was mined from the bottom of No. 2 shaft, and less than 100 tons was mined from 312 stope.

On the No. 2 vein a short raise was driven from 222 stope, 322 and 323 stopes were completed, and approximately 1,000 tons of ore was mined from 421 stope. Some 3,000 tons was mined from 521 and 531 stopes, mainly **in** the series of ore sections in the nose. Individual lenses contain from 200 to 500 tons. No diamond **drilling** or other exploration work was done. A total of 5,917 tons of ore was milled, grading 8.4 per cent lead and 10.3 per cent zinc.

TELKWA***Limonite**

(54° 127' N.W.) Head office, 204, 510 West Hastings Street, Vancouver. Nicholas Mussallem, **president**; Michael Hretchka, **Limonite** Creek (Shawano Iron Mines Limited) manager; James E. Louttit, consulting engineer. This property of five Crown-granted claims and ten claims held by record is approximately 38 miles east of the Copper River bridge on Highway No. 16 and **approximately** the same distance west of **Telkwa**. A series of **twenty-seven** holes was drilled, and on the basis of the findings a tonnage of 100,000 tons of limonite is indicated **over** an **area** of some 45 acres. Thicknesses as much as 22 feet were encountered, but the average thickness of clean limonite would be **in the neighbourhood** of 10 feet. The options on the Crown-granted claims have been dropped, but the recorded claims are still held by the company.

HOUSTON***Molybdenite**

(54° 127' S.W.) This property consists of fifteen recorded claims, owned by Matthew Sam and B. **McRae**, of Topley; it is on the east side of Morice Lake, 90 air miles west of Burns Lake. It covers a zone of quartz stringers containing molybdenite that cut quartz porphyry. The Consolidated Mining and Smelting Company of Canada, Limited, **optioned** the property and in July, 1957, did 203 lineal feet of trenching. Four men were employed under the direction of E. H. Caldwell. Transportation was by aircraft and back packing.

Zinc

(54° 126' S.W.) This property consists of the Dot and Rod claims on Bob Creek, 12 miles south of Houston. The claims are owned **by** George Smith. of Houston. and were **optioned** **by** Mindev Exploration Company, of Edmonton, Alta. Diamond drilling and **bulk** sampling outlined

* By David Smith.

an extensive low-grade deposit of zinc. A road was constructed for 1½ miles. Dan Tidsbury was engineer in charge. The crew averaged three men. The option has been dropped.

OMINECA*

THUTADE LAKE (57° 127" S.E.)

Silver-Lead-Zinc

Firesteel This group is on Bren Creek, a tributary of Finlay River, about 2 miles west of the north end of Thutade Lake. The claims are held by record by Emil Bronlund. The showings consist of siliceous zones along tuffaceous horizons in limestone, and fissure veins. Some high silver values occur. Exposures lie on either side of a north-trending limestone ridge immediately west of Bren Creek. Some zinc showings occur about 1 mile north on the same group, but no work was done on them during 1957. Granby Consolidated Mining, Smelting and Power Company Limited optioned the property, and between June 19th and August 26th surface work was done by eight men under the direction of A. W. Tempest. Eleven holes totalling 1,985 feet were drilled. Transportation to Thutade Lake was by airplane. The options have been dropped.

BABINE LAKE (54° 126" N.E.)

Copper

McDonald Island (Granisle Copper Limited) This island, locally known as Copper Island, is in the northern reach of Babine Lake at the mouth of Hagan Arm. The property consists of forty-five recorded claims. Early in 1957 a new company, Granisle Copper Limited, was formed; head office, Room 507, 1111 West Georgia Street, Vancouver; L. T. Postle, president. During the summer ten holes totalling 405 feet were drilled with a packsack drill. L. R. Haggard was geologist in charge. The property is serviced by boat from Topley Landing, a distance of 5 miles across the lake.

INGENIKA RIVER*

Lead-Zinc

Ferguson (The Consolidated Mining and Smelting Company of Canada, Limited) (56° 125" N.E.) This property is owned by Ingenika Mines Limited, and consists of thirty-two Crown-granted and twenty-two recorded claims at Delkluz Lake, 20 miles west of Fort Grahame. It covers a silver-lead-zinc deposit in limestone and is under option to the Consolidated Mining and Smelting Company. From March 28th to October 1st, 1957, twenty-eight diamond-drill holes totalling 10,718 feet were drilled to explore possible extensions of the known mineralization. This work was under the supervision of K. V. S. Meyer. In all, ten men were employed. Freight was carried from Prince George by aircraft and by river boat when water transportation became available.

Swannell (The Consolidated Mining and Smelting Company of Canada, Limited) (56° 125" N.E.) This property consists of thirty-three recorded claims on the Swannell River 5 miles south of the Ferguson group. It is held under option by the Consolidated Mining and Smelting Company from the owner, Gust Ola, of Prince George, and covers lead-zinc showings in limestone. From August 11th to September 11th 1,101 feet of diamond drilling was done in four holes. Five men were employed under the direction of K. V. S. Meyer. Equipment was moved by tractor from the Ferguson camp.

* By David Smith.

CARIBOO*

WELLS-BARKERVILLE (53" 121" S.W.)

Gold

Aurum and Cariboo Gold Quartz (The Cariboo Gold Quartz Mining Company Limited) Company office, 1007 Royal Bank Building, Vancouver. W. B. Burnett, president; M. Guiguet, manager; R. E. C. Richards, J. W. Wylie, superintendents; J. I. Stone, mill superintendent. The Cariboo Gold Quartz and Aurum mines operated by this company are adjacent to the town of Wells, which is 51 miles by road from Quesnel on the Pacific Great Eastern Railway. The development work in both mines comprised 3,007 feet of drifting and cross-cutting, 642 feet of raising, 218 feet of stope development, and 12,045 feet of diamond drilling.

The production from the two mines was about equal and totalled 90,796 tons, of which 87,610 tons was obtained from stoping and 3,186 tons from development.

LIKELY *

Mariner (Spanish Mountain Exploration Co. Ltd.) (52" 121° N.E.) This group of fourteen claims, including the Mariner and Tidewater groups, is held by record by Allen P. Himmelman. The claims are on Spanish Mountain, about 7 miles by road easterly from Likely. This deposit was discovered in 1933 and is described in the 1933 Annual Report, pages 134 and 135.

During the summer of 1937, surface exploration of the veins and some rehabilitation of the old underground workings was carried on. Three men were employed.

WILLIAMS LAKE†

MCLEESE-CUISSON LAKES AREA (52" 122° S.E.)

Copper

The country in the vicinity of McLeese and Cuisson Lakes is part of the Fraser Plateau. Relief is relatively slight and the slopes are mostly gentle, except for valleys such as that of Sheridan Creek, which are graded to the Fraser River. Much of the area is covered by swamp or drift.

The geology of the area is shown on Figure 1. The oldest rocks exposed are metamorphosed tuffs, green schists with lesser volcanic breccia, and limestone that may all belong to the Cache Creek group. On the Iron Mountain property these rocks grade northward into medium- to fine-grained foliated greenish diorites and amphibolites whose relationship to the stratified rocks is not clear. All these rocks are intruded and metamorphosed by foliated granodiorite which is very uniform in composition at all exposures, except on Granite Mountain where the prevailing rock is a poorly foliated leucocratic granite. Small aplitic granite dykes similar to the Granite Mountain phase are widely distributed but of minor importance. Possibly the granites are a late phase of the granodiorite or a separate intrusion. The southernmost granodiorite of Figure 1 seems to be a sheet overlying the intruded stratified rocks. All pre-Tertiary rocks in the area have a distinct to intense foliation that strikes eastward and dips southward at about 40 degrees. Primary and secondary foliations in stratified and plutonic rocks, are essentially parallel. In the granitic rocks primary foliation resulting from oriented hornblende crystals is in many places accentuated by a parallel shearing that at its most extreme produces a mylonite.

West of Cuisson Lake all the foregoing rocks are overlain with great unconformity by flat-lying late Tertiary basalt flows.

* By R. B. King.

† By A. Sutherland Brown.

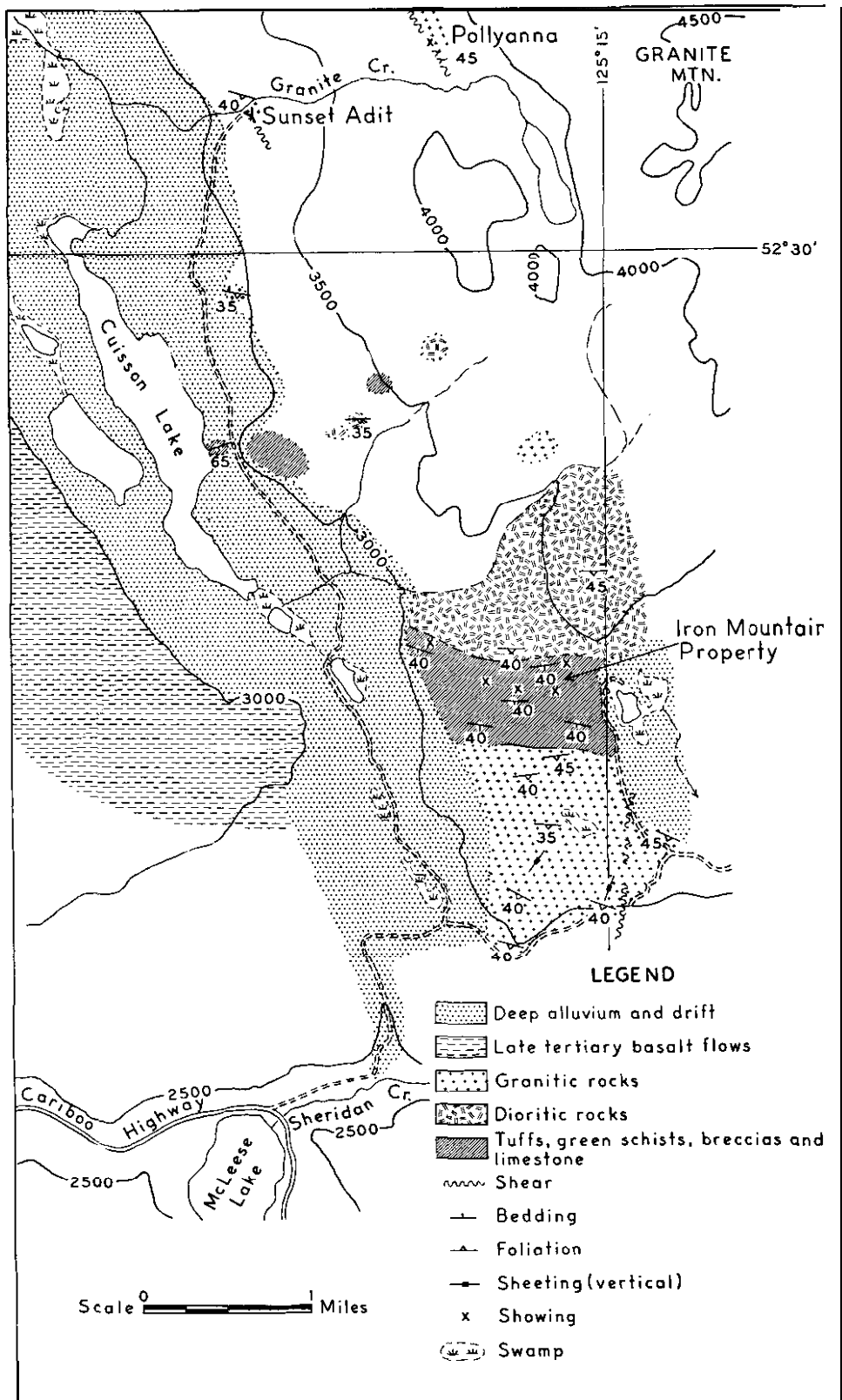


Figure 1. McLeese-Cuisson Lakes area

Copper mineralization is widely distributed in very small amounts throughout the whole of the area of Figure 1 east of Cuisson and McLeese Lakes in **granitic**, dioritic, and stratified rocks. Some concentrations are known and have been prospected sporadically since the early 1920's. Showings on Iron Mountain and Granite Creek have been actively explored during the past two years and, together with the Pollyanna, were visited by the writer.

This property includes more than 100 claims that extend eastward from a line joining McLeese and Cuisson Lakes. The showings are about 3 miles northeast of McLeese Lake and may be reached from the Cariboo Highway at McLeese Lake by a branch from the dirt road that follows Sheridan Creek. The original nucleus of claims, the Iron Mountain group, was located in 1952 by **S. Pearson**. Additional claims were located by **C. M. Fuller**, **J. MacGowan**, and others from 1954 to 1956. The groups were **optioned** and additional claims were located by The Cariboo Gold Quartz Mining Company Limited in 1956. The main showings are on the Iron Mountain and Iron Mountain Nos. 1 to 7 claims.

The area of the showings is underlain by metamorphosed thin-bedded **tuffs** and green schists with less schistose volcanic breccia and limestone (see Fig. 1). South of the showings is foliated granodiorite that appears structurally to overlie the stratified rocks. North of the area are foliated diorites and amphibolites. Bedding in the stratified rocks and foliation in intrusive rocks strike **east** and dip south at 40 degrees. Contacts between rock types appear to be largely conformable. The limestones are believed to be pod-like lenses in an essentially volcanic sequence. The thickness of limestone decreases markedly toward the west.

The showings are of two types: one consists of an aligned series of thin lenses of magnetite or specular hematite with chalcopyrite and some epidote, pyroxene, and garnet that replace the enclosing limestone and schist; the other consists of disseminated **chalcopyrite** and malachite in green schist or tuff. The iron oxide lenses are conformable with bedding and are aligned with an easterly strike for over 5,000 feet. They are not all at one horizon but are in one general zone. Specular hematite forms the lenses in the central section of the showings and magnetite those at either end. Individual lenses range from a few inches to as much as 6 feet wide, and the largest appears to be 200 feet long. Chalcopyrite occurs as disseminated blobs and grains within the iron oxide lenses, and malachite occurs on joints in oxide lenses and on bedding and joints in the **footwall** schists. The copper content of four samples of the iron oxide lenses was as much as 2.6 per cent and averaged 0.95 per cent. The disseminated copper mineralization is widespread. The best concentrations are seen in trenches in the northeastern part of the property, where sparse disseminated chalcopyrite and more prevalent malachite occur with small **veinlets** of epidote, quartz, chalcopyrite, and rare magnetite. Although assays of the order of 0.1 per cent copper can be obtained over hundreds of feet, no sample assayed more than 0.73 per cent copper (across 40 feet). In general, the volcanic breccia does not seem as well mineralized as the green schists or tuffs.

The showings have been explored by the locators with hand-dug trenches and **test-pits**, and by **The Cariboo Gold Quartz** company with bulldozed trenches, magnetometer surveys, and a minor amount of X-ray drilling. **The magnetometer** survey showed an anomaly of the order of 700 gammas over the western magnetite showings and two smaller anomalies to the south. Only 150 feet of X-ray drilling was done, core recovery was extremely poor, and the programme of work was abandoned and the option dropped. The writer carried out geological mapping and a dip-needle survey of the property. The latter showed no marked variations from the norm except immediately adjacent to the known magnetite bodies.

[Reference: Minister of Mines, **B.C.**, Ann. Rept. 1956, pp. 33, 34.]

Sunset (Kimacllo Mines Limited) Company office, 122, 744 West Hastings Street, Vancouver. The Sunset showings and **adit** are part of a group of about 100 claims held by the Kimacllo Company, a private company whose principals are E. Kinder, T. Matier, and R. L. Clothier. The group covers much of Granite Mountain and includes the Pollyanna showings. The claims were located from 1954 to 1956. The Sunset **adit** is on the lower part of Granite Creek at approximately 3,160 feet elevation about 1 mile east of the north end of Cuisson Lake. The **adit** can be reached by an extension of the Cuisson Lake road and is 7 miles by road from the Cariboo Highway.

The area of the **adit**, one of the few outcrops on lower Granite Creek, is underlain by intensely foliated, pyritized **granodiorite**. The foliation strikes in the usual direction for the area, north 65 degrees west, and dips 40 degrees south. The foliation is secondary, and consists of a shearing or sub-mylonitization that has the same intensity throughout the area of exposure. This regional shearing is cut at a small angle by a local shear striking north 35 degrees west and dipping 50 to 70 degrees southwestward. The **adit** follows the latter shear. Diamond drilling shows that Granite Creek follows locally the trace of a fault which is probably post-mineral and strikes about north 45 degrees east.

Mineralization seems to extend along the **adit** shear and also along the regional foliation. The **adit** shear contains lenses of quartz with chalcopyrite and pyrite, and veinlets horsetailling from it into the regional foliation contain quartz, pyrite, chalcopyrite, and chalcocite. Similar quartz veinlets occur over a minimum width of 15 feet on either side of the shear. Diamond drilling shows the full width of the mineralized zone at the **adit** to be of the order of 100 feet. The drilling also shows that pyrite-chalcopyrite mineralization extends southeastward along the regional foliation as well as along the **adit** shear. Besides the main ore minerals, traces of **azurite**, malachite, and covellite occur near the surface and at the portal. It is not known whether the chalcocite is primary or secondary or how much it may contribute to the value of the ore.

At the time of the writer's visit in June, exploration included clearing and blasting exposure along the creek, driving the **adit** 110 feet at south 35 degrees east, and 900 feet of **packsack** diamond drilling.

Chip samples assayed as follows:-

Sample No.	Position	Width	Copper
1	Open-cut west of portal.....	Ft. 23	Per Cent 0.87
2	Open-cut east of portal.....	23	0.20
3	Drift face (110 feet from portal) hangingwall above shear.....	12½	1.43
4	Drift face across shear.....	2½	1.95

The showings are on Granite Mountain at about 4,000 feet elevation, a little over half a mile northwest of the lake at the source of Granite Creek. A good trail leads up the mountain from the end of the road at the Sunset **adit**. The Pollyanna showings are in an extensive shear zone in **quartzose** granite. The shear zone strikes about north 30 degrees west, dips about 45 degrees northeast, and is at least 230 feet wide with several internal mylonitized zones. Shearing seems to be strongest to the southwest, and quite possibly the main shear is just beyond a small **scarp** that marks the end of the outcrop. The mineralization consists mostly of malachite and **azurite** with some chrysacolla, chalcopyrite, and traces of **cuprite**. Primary mineralization and much of the secondary occurs in small and commonly irregular quartz veins that in general strike parallel to the shearing. Some of the veins are drusy and some comb-like. Most of them do not appear to be sheared. Some of the **secondary** mineralization is distributed as films on shearing sur-

faces, which gives the whole zone a mineralized appearance. Although mineralization is distributed along the shear, the best mineralization seems to be concentrated in a line at right angles to the shearing at the point where most work has been done.

The workings are described in the 1950 Annual Report under Copper King, as follows:-

"The main original workings on the Pollyanna claim comprised three shafts at 25-foot intervals along a north-south line. When examined in September, 1950, these shafts were filled with water. It was reported that the most northerly shaft was sunk to a depth of 10 feet and that little or no copper mineralization had been found. The middle shaft was sunk to a depth of 30 feet. In 1949 this shaft was drained, and half a ton of ore was mined and shipped to Tacoma, Wash. It was reported that this shipment assayed 10.5 per cent copper. A grab sample of the quartz and sheared granodiorite on the dump of this shaft gave the following assay: Gold, nil; silver, 0.1 oz. per ton; copper, 3.3 per cent. The third shaft was not drained by the present owners but was reported to be 27 feet deep. It was noted that the dump material was stained with malachite.

"In 1949 considerable trenching was done to crosscut the shear zone approximately 50 feet north of the north shaft. This work was abandoned when it was found that the overburden was much deeper than anticipated. Work was then directed to sinking a shaft 120 feet south of the third shaft. This shaft was sunk to a depth of 28 feet in 1950 and penetrated sheared and weathered granodiorite lightly stained with malachite. One small lens of crushed quartz was exposed on the east wall of the shaft but did not extend across to the west wall. No copper mineralization was visible in the quartz. A grab sample of the sheared diorite on the dump gave the following assay: Gold, trace; silver, nil; copper, 0.3 per cent."

No new work of significance has been done. A grab sample of the dump of the last-mentioned shaft above assayed: Copper, 0.6 per cent.

[References: *Minister of Mines, B.C.*, Ann. Repts., 1950, pp. 106-107; 1925, pp. 155-156; 1928, p. 197; 1929, p. 122.1

LAC LA HACHE*

TAKOMKANE MOUNTAIN (52" 120" SW.)

Molybdenum

Boss Mountain (Climax Molybdenum Company)

British Columbia office, 718 Granville Street, Vancouver. In 1956 this company optioned 103 mineral claims, including nine Crown-granted claims, Lots 11116 to 11124, inclusive, which were located between 1928 and 1935. The recorded claims were located in 1956 by H. H. Huestis and associates, of Vancouver, owners of the Crown-granted claims. The property is on the east side of Takomkane (Big Timothy) Mountain at the headwaters of Molybdenite Creek. During 1957 the property was serviced entirely by aeroplane from Williams Lake, landings being made on a small lake near the head of Boss Creek at the southern foot of Takomkane Mountain. From this lake a pack-trail leads over the mountain and down to the camp near the showings. An alternative method of access involves travel by poor road from 100 Mile House to Murphy Lake and by pack-horse trail from there.

The property was first located in 1917. About 1,000 pounds of selected molybdenum ore from vein deposits on the south slope above Molybdenite Creek was shipped in 1918 (Eardley-Wilmot, 1925, p. 32). The property was acquired in 1930 by The Consolidated Mining and Smelting Company of Canada, Limited. The claims were sold for taxes in 1955 and acquired by the present owners. The Climax Molybdenum Company began exploration in September, 1956.

* By A. Sutherland Brown.

Geology

Takomkane Mountain is underlain by two types of plutonic rock of Mesozoic age and two types of olivine basalt of late Pleistocene age (see Fig. 2).

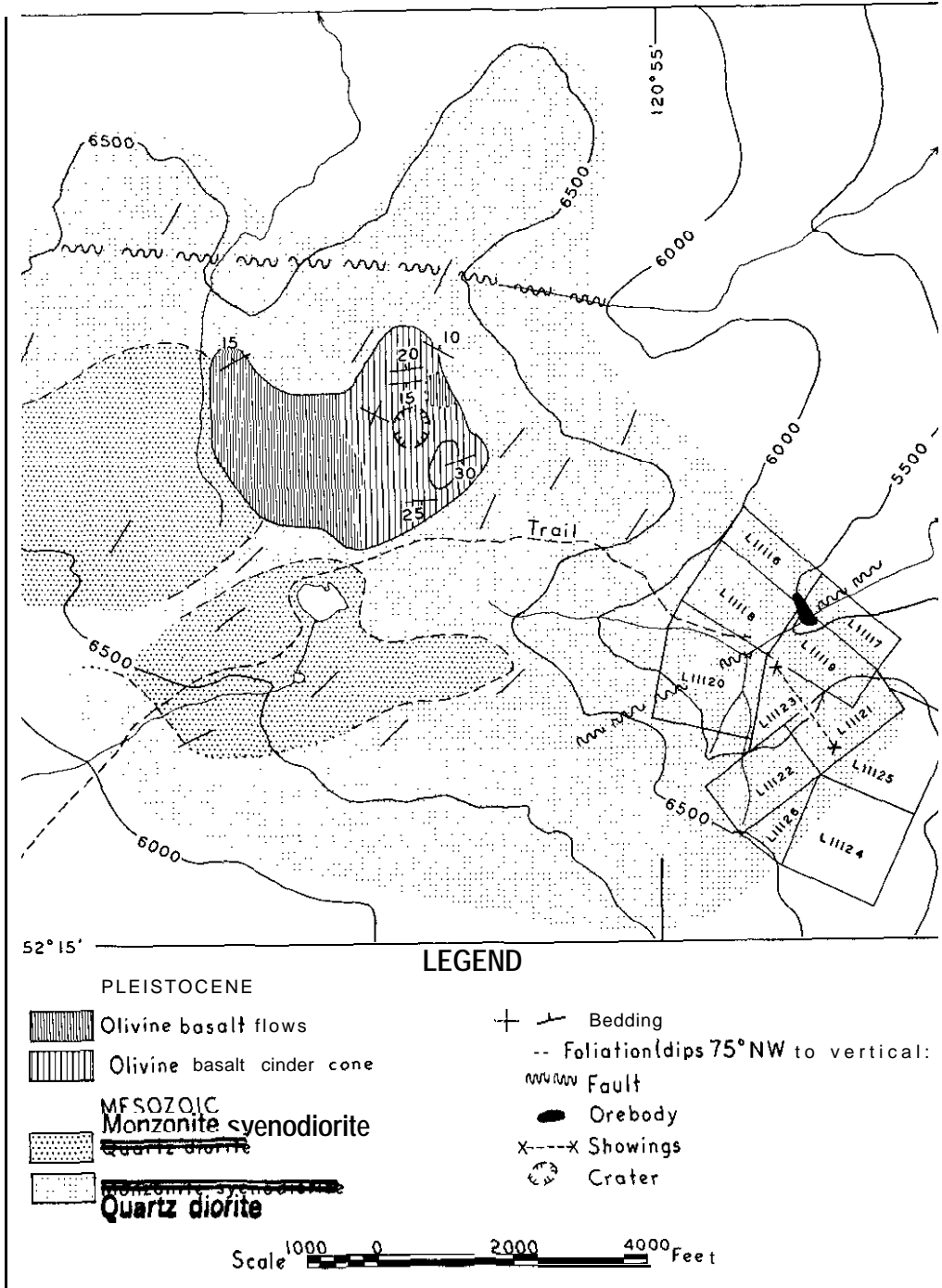


Figure 2. Takomkane Mountain.

The oldest rocks form the southwestern part of the mountain and consist chiefly of **monzonite** and **syeno-diorite**. These rocks have the appearance of fine-grained diorites but actually are very heterogeneous in grain size and rock type. Variation occurs **areally**, **in** hand specimens, and in thin sections as a gradational mottling. Foliation is weakly developed. Under the microscope the rocks all have a characteristic texture with large poikilitic orthoclase grains containing small rounded laths of labradorite. Fresh **clino**-pyroxene is locally the chief **mafic** mineral and quartz invariably forms less than 5 per cent of the rock. These rocks appear to be of hybrid origin.

Intruding these hybrid rocks are uniform, medium-grained hornblende-rich **quartz**-diorites. The contact may be gradational over a few hundred feet, but more commonly it is gradational over a few tens of feet; it also can be sharply intrusive. Under the microscope the quartz-diorite is seen to be composed of laths of slightly zoned fresh andesine (50 per cent) and hornblende (20 per cent) and in the interstices is orthoclase (18 per cent) and quartz (10 per cent); magnetite (2 per cent) is associated with the hornblende. The quartz-diorite has primary foliation throughout. Together with the weak foliation of the hybrid diorites, the foliation forms an arc from north 20 degrees east in the north and east to north 50 degrees east in the south and west. Everywhere it dips steeply north-westward to vertically.

All the foregoing rocks are markedly jointed. Variations in orientation are not related to the different rock types. The chief joint orientations are: North 65 degrees east, dip 65 degrees southeast; north 45 degrees west, vertical; and north 30 degrees west, dip 40 degrees southwest. Of these, the first is well developed throughout the area, the second particularly in the eastern part of the mountain, and the **third** in the west. Some joints are very extensive and may be dyke-filled or slightly faulted.

Five dyke rocks have been recognized; some of them occur in characteristic orientations. Quartz-orthoclase-tourmaline pegmatites are probably the oldest dykes. Characteristically they are very nearly flat lying. Small aplite dykes occur in any orientation. The biggest and commonest dykes are porphyritic hornblende **andesite**. These and biotite lamprophyre dykes regularly occur in the north 45 degrees west joint orientation. One large quartz-porphyry dyke is exposed in trenches north of the creek showing, but no other was seen.

The twin peaks of Takomkane Mountain are formed from a cinder cone of **olivine** basalt that rests on the glaciated surface of the main mountain mass. The cone is about 300 feet high, **and** from it a flow extends about one-half mile to the northwest (see Fig. 2). The cone is chiefly built of vesicular cinders and bombs of olivine basalt as much as 2 feet long by 1 foot in diameter. Some flows or dykes are intercalated. Rare blocks of quartz-diorite occur among the bombs and more commonly as inclusions in the flows, where they may be as much as 1 foot in diameter. The flows are composed of dense dark purplish basalt with large and small phenocrysts of olivine and small phenocrysts of plagioclase. The olivine crystals are very numerous and rarely are as much as 1 foot long. Some small ones are a good transparent green and may be called peridot, but most are semi-opaque, highly fractured, and altered to iddingsite, hypersthene, etc. A few crystals are fresh and glossy black. The flow to the northwest is about 15 feet thick at the snout and probably not much thicker elsewhere. The dips are everywhere gentle. Some erratic granitic boulders lie on the flow and on the cone. On the east side of the cone, flow material forms a wall **some** 30 feet high at the edge of a cirque but does not extend down into the cirque. This suggests the cirque was filled by a glacier at the time of eruption, whereas the main part of the mountain was ice-free. The mountain had obviously been glaciated before the cone was built, and the presence of erratic boulders and minor sculpturing of the cone indicate that it was also glaciated after. All facts indicate that the cone and flows were formed late in the Pleistocene epoch.

Faults are difficult to differentiate from large joints. The most continuous known fault is just north of the cone and strikes about north 85 degrees west and dips steeply south. Minor showings of pyrite and chalcopyrite and their weathered products occur adjacent to this fault (Reinecke, 1920, pp. 82, 97-98). A shear striking north 60 degrees east and dipping 80 degrees northwestward cuts the creek showings and extends at least 3,000 feet to the southwest.

Showings

Two main areas of mineral showings are known (see Fig. 2) : one on Molybdenite Creek is composed of breccia, and the other 800 feet southwest, and extending up the slope south of the creek, is composed of quartz veins. The only mineral of importance in both showings is molybdenite.

The creek showings are considered the most important as a result of the outlining by trenching and drilling of a well-defined **orebody**. This **orebody** forms the centre of a breccia pipe in quartz-diorite. The pipe at the surface forms a lens about 100 feet wide by more than 400 feet long oriented north 30 degrees west. The **orebody** forms the **centre** of the pipe, about 20 feet wide by 360 feet long.

The shattering of the pipe ranges outward from intense brecciation at the centre through a stockwork to a zone of random small veins. Where most intensely developed, the breccia is composed of angular fragments less than 6 inches in diameter of **quartz-diorite** with rare **felted** biotitic rocks that represent shattered **lamprophyre** dykes or altered inclusions. Some fragments have been rotated. The whole is sealed by quartz with a minor amount of **orthoclase**, but some drusy **vugs** occur in the matrix. There has been some silicification of quartz-diorite and complete alteration of hornblende to **felted** biotite. Molybdenite chiefly fringes the **quartz-diorite** fragments. Minor minerals include pyrite, magnetite, and chalcopyrite. The pyrite occurs chiefly in **vugs** and in the matrix but also occurs as impregnations in the fragments. The magnetite occurs as impregnations. The intensely brecciated zone is about 20 feet wide. Outward from it there is a gradation through breccia with less quartz filling and no rotation of fragments to a zone of minor quartz **veinlets** and silicification and beyond to **normal** quartz diorite. The complete zone of breccia, stockwork, and veining is about 100 feet wide. The central breccia that forms the **orebody** is well exposed at the creek and less well in trenches over a length of 360 feet. Trenches north of the **orebody** expose occasional quartz-molybdenite veins.

X-ray diamond drilling by the British Columbia Department of Mines in 1942 tested the breccia pipe to a depth of 150 feet, to which depth the average grade of the body was 0.61 per cent molybdenum (Stevenson, 1942).

At and near the creek the **orebody** is cut by post-mineral fractures striking north 60 degrees east and dipping 80 degrees northwestward. Minor pyrite mineralization is associated with fracturing of this attitude at the edge of the **cirque** 3,000 feet southwest of the **orebody**.

The showings on the south side of the creek consist of isolated small quartz veins which form a narrow zone that strikes parallel to the breccia pipe, north 35 degrees west, and extends along the slope for 1,700 feet. Some of these veins contain spectacular films of molybdenite. There are few other metallic minerals. The molybdenite occurs chiefly as fringes to the vein, with blades normal to the vein forming a honeycomb of **equilateral** triangles. The blades may be as large as a **centimetre** in diameter. Veins mostly **strike** north 50 degrees west and dip 50 to 70 degrees southwest, but exceptions and irregular veins occur. The largest veins are of the order of 2 feet wide and 50 feet long. Most are smaller.

Individual trenches at both showings are described by Stevenson (1940, pp. 41-47).

Exploration

Exploration by the Climax Molybdenum Company in 1957, as in 1956, consisted almost entirely of diamond drilling. In 1957 one drill started on June 23rd and a second at the end of August. A total of about 10,000 feet was drilled to test the extension of the breccia-pipe and to investigate the possibility of a similar deposit below the veins of the south slope.

[References: *Minister of Mines, B.C.*, Ann. Repts. 1956, pp. 34-35; Reinecke, L., *Geol. Surv., Canada, Mem.* 118, 1920; Stevenson, J. S., *B.C. Dept. of Mines, Bull.* 9, 1940; Stevenson, J. S., 1942, private report; Eardley-Wilmot, V. L., *Dept. of Mines, Canada, Mines Branch Pub. No.* 592, 1925.1

LILLOOET*

BLUE CREEK (51" 122" S.W.)

Gold

Elizabeth The Elizabeth group of four Crown-granted claims is north of Blue Creek, a tributary of Yalakom River. They are owned by Elizabeth V. White, of Vancouver, and T. W. Illidge, of Bralorne.

Access to the property is by 48 miles of road from Lillooet.

In 1956 a new crosscut on the Elizabeth claim was driven 466 feet to explore two quartz veins. These were intersected by the crosscut at 110 and 455 feet and were designated the main and west veins respectively. Twenty-four feet of drifting was done on the west vein.

In 1957 the west vein was followed an additional 320 feet under the supervision of T. W. Illidge. A geological study of surface and underground was carried out under the direction of R. Thompson.

BRIDGE RIVER (50" 122" N.W.)

Gold

Bralorne Miner Limited Company office, 555 Burrard Street, Vancouver; mine office, Bralorne. A. C. Taylor, president; M. M. O'Brien, vice-president and managing director; D. N. Matheson, general manager, died on November 7th, 1957; C. M. Manning, general superintendent; J. S. Thomson, mine superintendent; C. D. Musser, mill superintendent. This mine is on Cadwallader Creek, a tributary of Bridge River, and is 75 miles by road from Lillooet on the Pacific Great Eastern Railway.

The mine is worked from the Crown, Empire, and Queen shafts. The Queen is an internal shaft which is below the levels of the Crown and Empire shafts. In 1957 this shaft was sunk 175 feet, and a loading-pocket was installed on the 33rd or lowest level.

Development work comprised 2,972 feet of drifting, 1,356 feet of crosscutting, 845 feet of raising, and 10,377 feet of diamond drilling. The majority of the mine development was in the Queen shaft section on the 77, 79, and 93 veins. An extensive diamond-drilling programme was carried out on the 20th level in the area of the King section and in the adjoining Taylor (Bridge River) Mines property.

Ore is mined principally by cut and fill and shrinkage stoping. A total of 143,812 tons of ore was mined. Fill for the stopes was brought into the mine from talus slopes near the portal. In the mill, gold is recovered by amalgamation. A sulphide concentrate is made by flotation. A total of 141,192 tons of ore was milled in 1957.

The number of men employed was 367, of whom 261 were employed underground.

*By R. B. King.

Company office, 525 Seymour Street, Vancouver; mine office, Pioneer Gold Mines Pioneer Mine. Victor Spencer, president; W. B. Montgomery, of B.C. Limited general manager of Pioneer Mine Division; H. D. M. Jager, mine superintendent and chief engineer; T. Bevister, mill superintendent. This property is on **Cadwallader** Creek, a tributary of Bridge River, and is about 78 miles by road from **Lillooet** on the Pacific Great Eastern Railway.

The mine is at present being worked from No. 2 and No. 3 shafts and an inclined three-compartment **winze**, designated No. 5 shaft. Development work comprised 932 feet of drifting and crosscutting, 2,459 feet of raising, and 11,432 feet of diamond drilling. Most of this work was done in the No. 5 shaft area on the 27 and 29 veins.

Ore is mined mainly by cut and **fill** methods. The **stope** excavations are filled with sands from mill tailings. New construction consisted of a bin and conveyor belt at No. 3 headframe to handle ore that is trucked from the workings on the Taylor vein. A new substation was built at No. 3 portal. Electric immersion heaters with a total capacity of 50 kilowatts were installed in the water pipe-lines at the **Hurley** River dam to prevent freezing of the water supplied to the mine. In the crushing plant a 4- by 8-foot **Symons** rod-deck screen was installed to replace a **Hummer** screen.

In 1957, 102,084 tons of sorted ore was milled. The number of men employed was 247, of whom 124 **were** employed underground.

Cobalt-Gold-Uranium

Company office, 510 West Hastings Street, Vancouver. A. R. Little Gem (North- Allen, president; H. R. Shuttleworth, mine manager. This **prop-ern** Gem Mining erty, consisting of eight Crown-granted and twenty-six recorded Corporation Ltd.) mineral claims, is on **Roxey** Creek near its headwaters. **Roxey** Creek flows into **Gun** Creek, which is a tributary of the **Bridge** River. The mine camp, elevation 5,500 feet, is 3 miles from **Gun** Creek and 12 miles from the **Bridge** River Road. The mine road branches from the **Bridge** River road nearly 2 miles east of **Minto**.

The lowest or No. 3 **adit**, elevation 6,085 feet, is reached from the mine camp by a jeep road. No. 2 **adit**, elevation 6,193 feet, and No. 1 **adit**, elevation 6,250 feet, are serviced by a tramline.

On No. 1 level, development work comprised 363 feet of drifting, 50 feet of cross-cutting, and 400 tons of slashing. No work was done on No. 2 level during the year. No. 3 **adit** was started, and the development work comprised 435 feet of drifting, 70 feet of crosscutting, and 640 tons of slashing. A total of 2,600 feet of diamond drilling was done on the two levels.

This work was done from May 25th to October 21st. Eight men were employed.

STEIN RIVER (50" 122" S.E.)

Silver

Company office, 408 West **Pender** Street, Vancouver. R. H. Seraphim, exploration manager. The Silver Queen group of **eigh-** (Moneta Porcupine teen Crown-granted claims is on the west fork of **Cottonwood** Mines, Limited) Creek, which is a tributary of **Stein** River. Access to the property is gained by road from **Lytton** to the junction of **Stein** River and the **Fraser** River and then by pack-horse trail along **Stein** River for about 25 miles. The property is under option to **Moneta** Porcupine Mines, Limited.

Prospecting and surface trenching of several silver-bearing veins was carried out from June to September. A total of 2,387 feet of diamond drilling was done.

HIGHLAND VALLEY *

Copper

Since 1955 large-tonnage low-grade deposits of "porphyry copper" type have been investigated at Highland Valley, 20 miles southeast of Ashcroft. This central part of the Guichon Creek batholith is underlain by a variety of intrusive rocks which include older and younger quartz-diorites, granodiorite, dacite-porphry, and breccia composed of the above rocks. The intrusive rocks are overlain north of Highland Valley by mid-Tertiary lava flows. Elevations are mainly between 4,000 and 6,000 feet, and much of the area is covered by drift and alluvium. Mine roads connect all the properties with the Highland Valley road, which leads to Ashcroft or to Merritt.

An index map showing the locations of most properties in the Highland Valley area was included in the 1956 Annual Report (Fig. 2, p. 42). In a few cases the boundaries of the properties have changed.

Most of the property in the Highland Valley area is now controlled by three companies-American Smelting and Refining Company Ltd., Kennecott Copper Corporation, and Phelps Dodge Corporation. Since 1955 exploration of the Bethlehem property has been directed and financed by American Smelting and Refining (Vancouver office, 813 Birks Building, 718 Granville Street; G. A. Dirom, resident engineer), which now controls also a number of adjacent properties. These include the Sheba and Ventures-Minex properties together with the Lodge, Hat, and Gnawed Mountain groups, and part of the Beaver group. Kennecott, through its subsidiary, Northwestern Explorations, Limited (Vancouver office, 1111 Burrard Building, West Georgia Street; J. S. Scott, manager), controls the Bethsaida and Krain properties. Phelps Dodge, through its majority ownership of Anson Mines Limited (P.O. Box 519, Kamloops), controls the Jericho property, which has been greatly extended in 1957.

(50" 121" N.E.) Company office, 1004, 850 West Hastings
Krain Copper Ltd. Street, Vancouver. D. F. Farris, president. This company holds about eighty-six claims and fractions east of the north peak of Forge Mountain, which comprise the D.W., Krain, and R.K. groups. In August, 1957, the property was optioned by Northwestern Explorations, Limited.

Work in 1957 by Krain Copper Ltd. was directed by W. M. Sirola and included six surface diamond-drill holes, making a total of about 10,000 feet so far drilled on the property. Northwestern Explorations did geological mapping and electrical prospecting, together with a small amount of bulldozer trenching and 1 mile of road construction. This work was supervised by D. A. Barr.

On the Krain Copper claim a zone of primary mineralization adjoins a shallow zone of secondary mineralization and occurs in altered quartz-diorite and porphyry near Tertiary flows covering Forge Mountain. The zone is about 400 feet long and widens southward from about 130 to 500 feet. It persists in depth to at least 400 feet. The mineralization consists of chalcopyrite with pyrite, molybdenite, and very little bornite.

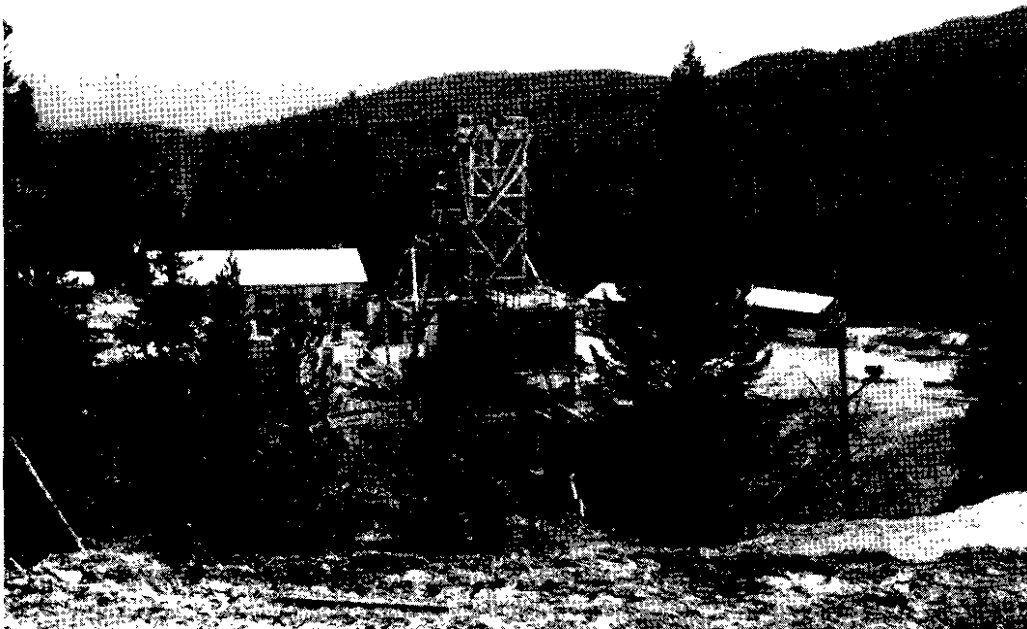
(50" 120" N.W.) Company office, 1001 837 West Hastings
 Trojan **Consolidated Mines Ltd.** Street, Vancouver. C. Armour, president; M. M. Hunt, mine manager. This company holds about 100 claims and fractions north and east of the south peak of Forge Mountain. At the Trojan mine, 4 miles north-northeast of Quiltanton (Divide) Lake, a great mass of breccia has been investigated by stripping and diamond drilling.

In 1957 the shaft was continued to 161 feet and a mineralized zone in the western part of the adjacent breccia mass was explored on the 150 level. Crosscutting and drifting totalled 881 feet. Chalcopyrite is enriched with chalcocite and native copper, near strong gougy faults in these workings.

* By J. M. Carr.



Bethlehem Copper Corporation Ltd., Highland Valley. Bulldozer stripping near an old shaft on a molybdenite-copper showing.



Trojan Consolidated Mines Ltd., Highland Valley. Shaft headframe and camp buildings.

Construction in 1957 included headframe, sampling plant, power-house, mine ventilation blower, and a residence for the chief mechanic. Twenty-five men were employed.

(50° 120" S.W.) Company office, 814, 402 West **Pender** Street, Bethlehem Copper Vancouver. H. H. Huestis, president. This company holds 110 Corporation Ltd. claims and fractions immediately east of Quiltanton Lake. American Smelting and Refining Company Ltd. continued exploration work on this property in 1957. To November the work was supervised by G. A. Dirom, with C. J. Coveney and J. R. Klem as engineer in charge, successively. Since November, P. A. Lewis is acting superintendent at the property and C. J. Coveney is geologist in charge.

Work in 1957 included 16,717 feet of diamond drilling, 10,925 feet of rotary drilling, and 1,830 feet of churn drilling. A total of 4,000 feet of bulldozer stripping and trenching was done, and 20 miles of road was constructed. Thirty-five men were employed.

By testing covered areas with rotary, churn, and diamond drill the East Jersey mineralized zone was discovered 1,000 feet east of the Jersey zone and 2,000 feet north of the Iona workings. The East Jersey zone appears to be of good grade, and by November was known to be at least 700 feet long, between 200 and 300 feet wide, and to be at least 400 feet deep. In the north part of the Jersey zone, diamond drilling has shown that mineralization in places persists to 1,000 feet in depth and has not been bottomed. The combined tonnage of the Iona and Jersey zones was estimated by Bethlehem Copper in May, 1957, at about 100 million tons.

Beaver (50° 120" N.W.) This group adjoins the northwest boundary of the Bethlehem property and is held jointly by Farwest Tungsten Copper Mines Limited (company office, 1075 Melville Street, Vancouver) and Beaver Lodge Uranium Mines Limited of the same address. The northern part of this group, comprising twenty-nine claims and fractions, was optioned in March, 1957, by American Smelting and Refining Company Ltd., which subsequently drilled seven rotary-drill test-holes totalling 2,240 feet and constructed 1 mile of road.

Lodge (50° 120" N.W.) This group adjoins the Beaver group and the north boundary of the Bethlehem property. It comprises about thirty-nine claims and fractions which are held by Northlodge Copper Mines Limited (company office, 1075 Melville Street, Vancouver). In March, 1957, the group was optioned by American Smelting and Refining Company Ltd., which drilled ten rotary-drill test-holes totalling 1,437 feet and constructed 1½ miles of road.

Hat (50° 120" N.W.) This group of ten claims and fractions is east of the Bethlehem property about 4½ miles from Quiltanton Lake. It is held by Northlodge Copper Mines Limited. In August, 1957, the group was optioned by American Smelting and Refining Company Ltd., which drilled five rotary-drill holes totalling 395 feet. These test-holes were drilled near faulted mineralized rock exposed in trenches dug in 1956.

Sheba Copper Mines Limited (50° 120" S.W.) Company office, 1519 Marine Building, 355 Burrard Street, Vancouver. W. R. Wheeler, president. This company holds ninety-six claims and fractions between Witches Brook and Gnawed Mountain, to the south of the Bethlehem property. Prior to optioning this property in February, 1958, American Smelting and Refining Company Ltd. carried out geological mapping, did some 200 feet of bulldozer trenching, and constructed about 4 miles of access road.

(50" 120" S.W.) This group of ten claims is on Gnawed Mountain, about 4 miles south of the Bethlehem property. The claims are held by B.X. Mining Company Limited (company office, 1500, 355 Burrard Street, Vancouver). In 1957 the company constructed about 3 miles of road, giving access to Gnawed Mountain from the Victor mine. Prior to optioning the Gnawed Mountain group in January, 1958, American Smelting and Refining Company Ltd. did preliminary geological mapping of the group.

(50" 120" S.W.) Ventures Exploration Limited, 612 View Street, Victoria, and Minex Development Company Limited, 640 West Hastings Street, Vancouver, hold 102 claims and fractions north-west and southeast of Gnawed Mountain, extending south to Roscoe Lake. In November, 1957, this property was optioned by American Smelting and Refining Company Ltd., which previously drilled five rotary-drill holes totalling 400 feet.

(50" 121" S.E.) Company office, 900 West Pender Street, Vancouver. S. S. Parker, president; C. Rutherford, consulting engineer. Victor (Skeena Silver Mines Ltd.) This company holds twenty-four claims and fractions immediately west of the Sheba property. The Victor adit is 1 1/2 miles south-southeast of Quiltanton Lake.

Work in 1957 consisted of 406 feet of surface diamond drilling. At the Victor workings a quartz vein dips 40 degrees to the east-southeast and is exposed underground for 180 feet along the strike. Pyrite and chalcopyrite occur in and along the vein, across widths ranging between 1 1/2 and 6 feet. Chip samples taken in the north drift assayed as follows:-

Sample No.	Location	Gold		Silver		Copper	
		Oz. per Ton	Gr. per Ton	Oz. per Ton	Gr. per Ton	Per Cent	Gr. per Ton
1	Across 5 feet, of which 6 inches is footwall, at 65 feet from the winze.....			0.2		3.28	
2	Across 1 1/2 feet in the hangingwall, at 70 feet from the winze					0.3	
3	Across 3 1/4 feet beneath the hangingwall, at 159 feet from the winze.....			Trace		0.82	

Mineralization is exposed on surface north and south of the adit for a total distance exceeding 800 feet. Surface diamond-drill holes inclined toward the vein from the east indicate that the mineralization continues to a depth of about 325 feet measured on the dip of the vein, and extends at this depth for at least 500 feet measured parallel to the strike of the vein. The width of mineralization appears to increase at depth.

(50" 121° S.E.) Company office, 303, 1075 Melville Street, Bethsaida Copper Mines Limited Vancouver. D. F. Farris, president. The company holds six Crown-granted claims and fifty-three located claims and fractions extending west from Quiltanton Lake. In July, 1957, the property was optioned by Northwestern Explorations, Limited, which did some line-cutting and electrical prospecting, supervised by D. A. Barr.

(50" 120" S.W.) Company office, 204, 717 West Pender Street, Jericho Mines Limited Vancouver. R. F. Stibbard, president. This company holds 1,077 claims and fractions, all of which are optioned by Anson Mines Limited. The latter company holds by record forty claims that are integral with the Jericho property. This property largely surrounds the Highland Valley area.

Work by Anson Mines Limited in 1957 was supervised by R. E. Geer. It included geological and magnetometer surveys of claims in the vicinity of the Jericho camp on Witches Brook and in the Pimainus Lake area. Some other parts of the property were covered by geological reconnaissance. Five miles of road was constructed between Calling Lake and Pimainus Lake. Five men were employed for most of the season.

GUICHON CREEK

Copper

(50° 120" S.W.) Company office, 1111 **Burrard** Building, West Georgia Street, Vancouver. J. S. Scott, manager, Vancouver; P. E. Hirst, superintendent, Merritt. Until late in 1957 the company held about 210 located claims and nine Crown-granted claims lying mainly west of Guichon Creek about 4 miles south of **Mamit** Lake. This property, which includes the old Aberdeen and Vimy Ridge mines, reverted to Bethlehem Copper Corporation in November. Copper mineralization occurs in altered and fractured intrusive rocks of the Guichon Creek batholith. Bornite and chalcopyrite are the two chief minerals. In 1957 work included six surface diamond-drill holes totalling 1,565 feet. Electrical and magnetic ground surveys were carried out and geochemical prospecting done, using both soils and stream sediments. Small amounts of bulldozer trenching and road-building were done. Camp at the property was occupied from April to July. Between fifteen and thirty men were employed.

Copper-Iron

(50" 120" S.W.) Head office, 678 Howe Street, Vancouver. The **Craigmont** (Craigmont Mines Limited)† property consists of 157 claims located from December, 1954 to 1957. The showings are about 10 miles northwest of Merritt on the Promontory Hills at about 4,000 feet elevation. The main showings are on the **Merrell** No. 8 claim. The property was optioned in November, 1957, by Canadian Exploration Limited, which assumed direction of exploration late in the year.

The property is in a **zone** of interfingering of dioritic phases of the Guichon batholith with banded flows and tuffs of the **Nicola** volcanics. Exposures in the general area are **meagre**, and the **orebody** at present being explored does not outcrop. About a mile southeast of this **orebody** are the showings that originally attracted attention to the area; they are all in diorite. The rocks of the ore zone are fine- to **medium-grained** foliated diorites and banded green to red volcanic flow rocks and tuffs. Intense alteration of original minerals to chlorite, epidote, and orthoclase is common. Foliation in the diorites and banding in the volcanic rocks are steeply dipping and subparallel.

The structure is obscure, but it appears that there is a shear zone subparallel and adjacent to a contact of the diorites with the volcanic rocks, and that the latter have been extensively replaced by ore minerals. Shears, foliation, banding, minor replacement features, and orientation of the **orebody** all appear to be subparallel, striking eastward and dipping steeply to the south.

Mineralization consists of large-scale replacement, chiefly of the volcanic rocks, by magnetite, specular hematite, or both, with included blobs and irregular **veinlets** of chalcopyrite. Other metallic minerals, including pyrite, are rare. Heavily replaced sections consist of about 50 per cent iron and 1 to 4 per cent copper.

The discovery of the **orebody** resulted from diamond drilling an area of coincident geophysical and geochemical anomalies. Field soil testing and reconnaissance magnetometer surveying in 1956 revealed several anomalies, and the most intense was tested by drilling starting in March, 1957. Seven holes with a total of about 3,500 feet were drilled by Craigmont Mines Limited in 1957 along the easterly trending axis of the anomalies. All are vertical holes except No. 7, which was drilled southward at an inclination at the collar of about 60 degrees. The first two holes missed the objective, but all the others except No. 6 contain ore. Estimates of dimensions and grade of the ore zone cannot be made, but it appears to extend at least 1,000 feet along strike and to have a true width at No. 7 drill-hole of about 200 feet.

*BY J. M. Carr.

†BY A. Sutherland Brown.

NICOLA*

Copper**Copperado
(Western Cop-
perada Mining
Corporation)**

(50° 120° S.W.) Head office, Room 608, 1255 Phillips Square, Montreal. D. W. Heller, president, Montreal. The Copperado property includes the Turlight Crown-granted claim and forty-seven claims and fractions held by record by Guichon Mine Limited. In December, 1956, the property was leased to Western Copperada Mining Corporation. The property is at an elevation of from 3,500 to 4,500 feet and is about 4 miles north of the southern end of Nicola Lake. The principal showings are on the flank of a low ridge sloping gently southwestward toward the valley of Clapperton Creek. The property is accessible by a 1-mile road which leaves the Merritt-Kamloops Highway at Nicola village. Geologically it lies near the southwestern margin of the Central Nicola batholith and is largely underlain by granodiorite. The main showing, which is on the Turlight claim, is a northwesterly to northerly trending shear zone that contains lenses of vein matter; this consists mainly of quartz which is locally mineralized with chalcopyrite and bornite.

The initial work on the Turlight claim was done in 1929, when a shaft inclined at 67 degrees was sunk 60 feet on the shear zone, and several small open-cuts were made near the shaft collar. The property remained inactive until 1947, when Guichon Mine Limited acquired control. During the following four years the shaft was deepened to 450 feet and approximately 720 feet of drifting and crosscutting was done at four levels—50-foot, 100-foot, 200-foot, and 425-foot. In the winter of 1947/48 the property was optioned to the Anaconda Copper Mining Company, which diamond drilled seven holes totalling 2,578 feet. The property remained inactive again from November, 1951, until May, 1956, when Guichon Mine Limited resumed work. The shaft was unwatered to a depth of 250 feet and a raise was driven 50 feet in ore from the 100-foot level. Approximately 95 tons of ore was produced, of which 45 tons was shipped to Tacoma smelter for test purposes. On December 1st, 1956, the property was taken over by Western Copperada Mining Corporation. In the winter of 1956/57 eight holes were diamond drilled at the 200 level, totalling 2,000 feet. Early in 1957 an electromagnetic survey of the property was carried out under the direction of Shield Mining Surveys Ltd., of Ottawa, and a number of anomalies were indicated. The majority of these were later found to be due to structural factors rather than to mineralization, but some are considered to merit further investigation. In the spring of 1957 a diamond-drilling programme was started under the supervision of W. L. Young, of Shield Mining Surveys Ltd., and later under F. D. M. Horsecroft. Twenty holes were drilled, totalling 9,962 feet. At the time of the writer's visit to the property in May, a crew of twenty-one men was employed and three diamond drills were in operation. The drilling was completed on July 26th. It is reported that the drilling has disclosed a new area of mineralization between 4,400 and 5,600 feet north-northwest of the shaft on the Turlight claim. In this area it is reported that drill cores indicated chalcopyrite and bornite mineralization in quartz feldspar veins and to a lesser extent in granodiorite and chlorite schist.

[Reference: Minister of Mines, B.C., Ann. Rept. 1949, pp. 115-120.]

KAMLOOPS†

Copper**Makaoo Develop-
ment Company
Limited**

(50° 120° N.E.) Company office, 1208 Vancouver Block, Vancouver. W. I. Nelson, president and general manager. This company holds five Crown-granted claims and seventy-two recorded claims in the vicinity of Coal Hill, about 3 miles southwest of Kamloops. This and other properties occurring in the eastern

*BY A. R. C. James.

†BY J. M. Carr, except as noted.

part of the Iron Mask batholith were fully described in the 1956 Annual Report, pages 47 to 69.

In 1957 the property was optioned by D. W. Heller, of Montreal. An electromagnetic survey was made by Shield Mining Surveys Ltd., Ottawa, of seven claims extending east from a point 1 mile south of the Python workings.

(50° 120" N.E.) Company office, 1430 Burrard Building, 1030 West Georgia Street, Vancouver. W. Fred Evans, president; W. I. Nelson, vice-president and general manager. This company holds six Crown-granted claims and seventy-two recorded claims immediately west of the Makaoo property. In 1957 about 200 feet of small-diameter diamond drilling was done on three widely separated claims.

(50° 120" N.E.) This company holds twenty-five claims and fractional claims at Jacko Lake, 5 miles southwest of Kamloops. Three of the claims are Crown-granted, one is held by retention lease, and the others are held by record. A detailed description of this property, which includes the Ajax and Wheel Tamar workings, was given in the 1956 Annual Report, pages 63 to 67. Disseminations and veins of chalcopyrite occur in albitized microdiorite of the Iron Mask batholith near contacts with picrite-basalt bodies. Surface diamond drilling by the Consolidated Mining and Smelting Company in 1929, 1955, and 1956 was concentrated about two small adits on the Ajax claim in the western part of the property. A plan showing the better-mineralized intersections in this area was included in the 1956 Annual Report.

Work by the company in 1957 consisted of 4,552 feet of drilling, bringing the total of surface diamond drilling in the vicinity of the Ajax claim to over 20,000 feet. Eleven holes were drilled at moderate inclinations to the southeast, in contrast to the northeast and southwest directions of previous holes. The holes are arranged in two parallel series which extend northeast and cover the eastern half of the Ajax claim and the adjacent part of Jacko No. 6 Fraction. The northwestern series comprises holes Nos. 35 to 39. The southeastern series crosses the adits and comprises holes Nos. 40 to 45.

The cores of holes Nos. 41 to 45 only were examined; holes Nos. 41 and 45 lie north and south respectively of the mineralized area. The first penetrates coarser-grained batholithic rocks; the second penetrates picrite-basalt together with microdiorite. Holes Nos. 42, 43, and 44 contain varying amounts of chalcopyrite over much of their lengths. Hole No. 43 follows closely the strike of the mineralized zone exposed in the north-driven adit. It is drilled south 34 degrees east at minus 51 degrees from a point near hole No. 6 (see Fig. 7, 1956 Ann. Rept.). Good mineralization is intersected almost continuously from 158 to 521 feet in the hole, and gives way to poorer material at 400 feet vertical depth. Holes Nos. 42 and 44 are on either side of hole No. 43, at distances of 200 feet to the northeast and 170 feet to the southwest respectively. They intersect better-grade mineralization for about one quarter of their aggregate length, the intersections being short and widely spaced.

Iron

(50° 120" N.E.) Cliff Fraction and Gift are Crown-granted mineral claims owned by Francis P. Newcome, 59 Menzies Street, Victoria. They lie one-half mile south of the Trans.Canada Highway about 8 miles west of Kamloops, and include showings on the former Magnet claim (see Iron Ores of Canada, Vol. 1, *Geol. Surv., Canada, Econ. Geol.* Ser. No. 3, 1926, pp. 115-128). Outcrops and shallow trenches expose several magnetite veins that occur in diorite and monzonite of the Iron Mask batholith. A shaft is now caved.

* By J. M. Carr and R. B. King.

The principal veins are Nos. 3 and 4. They strike east-southeast and dip either vertically or steeply north. The walls are generally sharply defined, but in places the veins either split or enclose sheets of country rock. The estimated magnetite content of the veins at the surface ranges between 50 and 90 per cent, and averages about 70 per cent. Other minerals include apatite, epidote, and possibly amphibole or pyroxene. Very small amounts of sulphides are present, with pyrite in excess of chalcopyrite.

Vein No. 3 is intermittently exposed for 900 feet and has widths varying between 6 and 30 feet. Omitting sheets of country rock, the maximum and average width of this vein are 13 feet and approximately 8 feet respectively.

Vein No. 4 is 7 feet wide at a point 60 feet north-northeast of the most easterly exposure of vein No. 3. It can be followed for 300 feet west-northwest, where its width is reported to increase to 30 feet. Because of caving of the trenches, only a vein 4 feet wide is now visible in that direction.

In 1957 two holes were diamond drilled at minus 45 degrees to intersect the veins from the north-northeast. Access to the cores in Vancouver was arranged by A. H. Upton. Hole No. 1, 605 feet long, is drilled from a point 300 feet slightly east of north of the caved shaft and at about 20 feet less elevation. It intersects two veins whose apparent widths are 5% and Y feet respectively, five other veins of widths between 1% and 2 feet, and numerous veinlets less than 1 foot wide. The 5½-foot intersection at 26 feet contains an estimated 80 per cent magnetite. The Y-foot intersection at 452 feet contains an estimated 75 per cent magnetite and lies nearly vertically below an outcrop of vein No. 3, whose width is there 12 feet. Two smaller veins at 269 feet have a combined apparent width of 6 feet, which includes 2% feet of country rock. Their estimated contents of magnetite are 75 and 60 per cent respectively.

Hole No. 2, 480 feet long, is drilled parallel to and approximately 415 feet east-southeast of hole No. 1 from a point whose elevation is about 40 feet less than that of the near-by showings. It intersects one 18-foot section of diorite containing an estimated 40 per cent magnetite, five veins of apparent width between 2% and 4% feet, seven veins of width between 1 and 2 feet, and numerous veinlets. The 18-foot intersection at 457 feet is vertically below the eastern showing of vein No. 4. It contains small amounts of chalcopyrite and is bounded by rock with little magnetite. The five veins of moderate width are intersected in the interval 239 to 346 feet. All but one have magnetite contents estimated between 70 and 80 per cent.

Copper

(SO" 120" N.W.) Company office, 1116, 85 Richmond Street West, Toronto. T. J. Day, president. This company holds 133 claims which lie mainly south of the Trans.Canada Highway between 8 and 11 miles west of Kamloops. Named the D.M. group, the property surrounds the Cliff and Gift claims and the Afton group, on which an old copper prospect known as the Pothook is situated.

In 1956 a geophysical survey of this property showed the presence of a very large number of conducting zones. During 1957 Graham Bousquet Gold Mines Limited soil-sampled most of the property and geologically mapped the whole of it. The work was supervised by H. Darling.

BIRCH ISLAND*

Fluorite-Celestite-Uranium

(51" 119° N.W.) Head office, 550 Sherbrooke Street West, **Mon-Rexspar** Uranium treat; mine office, Birch Island. Philip Joseph, president, **Mon-& Metals Mining** treat; John W. Scott, manager, Birch Island. Capital: 6,500,000 Company Limited shares, \$1 par value. The property is in the Red Ridge area, 2 to 3 miles south of Birch Island on the Canadian National Railway,

*BY A. R. c. James.

81 miles by rail or 90 miles by road north of Kamloops. The company holds 123 claims and fractions, of which 40 claims and fractions are held by Crown-grant, 72 claims and fractions by record, and 11 claims and fractions by lease from Deer Horn Mines Limited.

The property is on a north-sloping hillside at elevations ranging from 3,500 to 4,500 feet, and is accessible from Birch Island by a good road about 6 miles long. The area is underlain by schists and slates that are probably of Precambrian age. Associated with these rocks is a body of alkali feldspar porphyry. Within the porphyry are tabular zones containing radioactive mineralization and fluorite. The presence of fluorite together with other minerals has been known since 1918, and intermittent work has been done since that time. Uranium mineralization was discovered in 1949, and the present company has been active since 1950. The company reports that three uranium-bearing orebodies have now been explored by extensive diamond drilling and limited underground work. These are flat-lying lenses averaging 40 feet thick and situated around the periphery of a prominent ridge east of Foghorn Creek. The company reports that the aggregate tonnage proved up in these three zones, known as the A, B, and BD zones, is approximately 1,650,000 tons, grading about 0.08 per cent U_3O_8 . Other radioactive showings are being investigated. The fluorite-celestite body on the same ridge has, according to information supplied by the company, over 1,000,000 tons indicated by diamond drilling. In 1957 work was continuous throughout the year. A crew averaging fifteen men was employed; this was increased to a maximum of forty men in the middle of the summer. Ninety-nine holes were diamond drilled, totalling 15,045 feet. A total of 15,000 cubic yards of material was stripped by bulldozer on the various zones and showings.

A Geiger counter survey was made of a twelve-claim area on the east flank of the property. A considerable amount of preliminary work was done in preparation for the construction of an aerial **tramline** and mill. This included clearing along 2 miles of the **tramline** route and building access roads to the tower-sites. An additional 3 acres was cleared at the plant-site, making a total of 13 acres cleared. The ground for a 700-foot spur track was prepared and graded ready for track-laying. One and a half miles of main road was relocated and **gravelled**, and 2 miles of open-pit access road was roughed out. Aerial-tramline equipment was purchased and overhauled. Preliminary construction plans for the main leach plant, grinding plant, **office**, and warehouse were completed. Work was in progress at the end of the year.

[Reference: *Minister of Mines, B.C., Ann. Rept. 1954, pp. 108-111.*]

TULAMEEN RIVER*

SUMMIT CAMP (49° 121" S.E.)

Silver-Lead-Zinc

Silver Hill Miner Ltd.

Company office, 800 Hall Building, Vancouver. Ralph J. **Pronger**, president; Edward L. Borup, vice-president and managing **director**. This property is in the Summit camp, 21 miles by road southwest of **Tulameen**. It includes the old **Dornberg** mine (also known as the Mary E or *Silver King*), as well as the old Jensen mine. All activity on this property ceased early in 1957 and there was no production. The 50-ton mill was dismantled and removed in July.

* By A. R. C. James.

COPPER MOUNTAIN*

Copper

(49° 120" S.W.) Head office, 1111 West Georgia Street, Vancouver. Copper Mountain ver. J. A. C. Ross, general manager, Copper Mountain; D. W. (The Granby Con- Pringle, general superintendent; G. F. Camroux, mine superintendent. Undermound development at Copper Mountain was discontinued in 1956 and open-pit mining was expanded. However, Company Limited) early in 1957 it became evident that under conditions of declining copper prices the mining of low-grade ore could not be continued, and the mine was finally closed down on April 29th, together with the Allenby concentrator. Dismantling of the plant was continued for several months after the closing of the mine. The total production from Copper Mountain has been 34,774,902 tons of ore. Production in 1957 was 568,006 tons of ore, about half from the underground workings and the remainder from open-pits Nos. 1, 2, and 5.

HEDLEY*

Gold

(49° 120" SE.) Company office, 314, 718 Granville Street, French (French Vancouver; mine office, Hedley. W. B. Burnett, president; J. S. Miner Ltd.) Biggs, mine superintendent. The French mine is on the Oregon mineral claim., about 8 miles from Hedley and 1½ miles east of the Hedley-Nickel Plate road at an elevation of 3,900 feet.

The orebody consists of gold-bearing skarn. It is a generally flat-lying, northwesterly trending, irregular body approximately 620 feet long, from 40 to 80 feet wide, and ranging up to 12 feet thick. The main part of the orebody is flat lying at the 3,920-foot level, but at the easterly end it dips at about 35 degrees to the 3,785-foot level. Immediately below the 3,785-foot level it is cut off by the Cariboo fault. The flat-lying portion of the orebody is now almost entirely mined out, and the reserves of the mine are at present in the dipping part of the orebody at the easterly end and in a tongue of ore toward the westerly end which projects downward to the 3,835-foot level. The adding of new ore reserves would appear to depend on finding the extension of the orebody beyond the Cariboo fault.

The showings were originally discovered in the early years of the century, but the mineralization at the surface was mainly copper and the grade was low. Intermittent development work was done, however, in the period from 1905 to 1917. In 1949 Kelowna Mines Hedley Limited optioned the property from F. H. French and associates and drove a new adit on the 3920 level. The mine was brought into production in 1950 and continued to produce until 1955. In this period a total of 32,463 tons of ore was mined, yielding 25,284 ounces of gold. In 1956 a controlling interest in the property was acquired by The Cariboo Gold Quartz Mining Company Limited, and a new company, French Mines Ltd., was formed. Development work was resumed on July 12th, 1956. A new adit, the 3785 level, was driven for a distance of 700 feet to cut the downward extension of the orebody as indicated by diamond drilling from the 3920 level. The old adit at the 3835 level, driven over forty years ago by the Granby Company, was rehabilitated and driven 429 feet to a total distance of 550 feet from the portal. A new road was built to a point just below the 3785 level, which now forms the main haulage level of the mine. Early in 1957 an ore-bin was built at this level. Construction of a 50-ton mill for extraction of the gold by cyanidation was begun in April, 1957, in the Similkameen Valley just south of Hedley. Production began on August 26th.

The following underground development work was completed in 1957: Drifting, 363 feet; raising, 205 feet; crosscutting, 157 feet. A total of 4,394 tons of ore was

* BY A. R. c. James.

milled, yielding 1,940 ounces of gold and 120 ounces of silver. A crew of twenty men was employed in the mine and mill.

OLALLA*

Copper-Molybdenum

Golconda

(49" 119" S.W.) In 1957 W. W. Geminder, of Olalla, acquired control of this group of claims, together with the adjoining Crown-granted Copper King claim. The property is on the south fork of Olalla Creek, about three-quarters of a mile west of the highway.

There is a road into the property from the highway at Olalla.

The claim group is underlain by sedimentary rocks which are intruded by pyroxenite. Mineralization consists of quartz lenses with chalcopyrite and molybdenite in a fault zone in pyroxenite. The property has been developed intermittently since 1899, and small shipments of hand-cobbed copper-molybdenum ore were made in 1917 and 1922. There are several adits on the claims.

In 1957 some cleaning out of the old tunnels was done, together with some open-cutting on the Copper King claim. A small mill was erected on the property. This work was begun on November 1st and was still in progress at the end of the year. A crew of three men was employed.

[Reference: *Minister* of Mines, **B.C.**, Ann. Rept. 1946, pp. 126-132.]

FAIRVIEW CAMP"

Silica-Gold

Fairview (The

Consolidated **Min-**
ing and Smelting
Company of
Canada, Limited)

(49" 119° S.W.) Head office, Trail; mine office, P.O. Box 337, Oliver. G. S. Ogilvie, property superintendent. This mine is about 5 miles west of Oliver at an elevation of 3,080 feet. Quartz is mined and shipped to Trail for use as flux in the smelter. The quartz contains a small amount of gold and other metals. The orebody is a quartz vein, ranging in width up to about 25 feet, striking northwestward and dipping about 35 degrees northeast in the present working stopes. The ground is cut by many small faults and slips and is difficult to hold in shrinkage-stope mining; it is the practice to leave large pillars for support. The mine is at present worked from two adit levels. No. 6 level is the lowest adit and the haulage level, near the portal of which are the dry-house, blacksmith-shop, ore-bin, and compressor-house. No. 3 is the top level, and stoping is at present being done above it.

Most of the ore produced in 1957 was mined from one large stope, the 305-GH. A new stope, the 305-J, was prepared for production at the end of the year. Total development consisted of 250 feet of drifting, 330 feet of raising, and 502 feet of box holing. Operations were continuous throughout the year, and 31,874 tons of quartz was shipped. A crew of sixteen men was employed at the mine.

In addition to the rock shipped from the Fairview mine, 1,057 tons of tailings was shipped from the dump at the old Morning Star mill 2 miles west of Oliver.

PEACHLAND*

Copper

Brenda (**Noranda**
Exploration Corn-
pany, Limited)

(49" 120" N.E.) British Columbia office, 202, 2256 West Twelfth Avenue, Vancouver. B. O. Brynelsen, manager, Vancouver. The property comprises eighty-four claims held by record. It lies east of Brenda Lake and around the headwaters of Peachland Creek. Access is by road from Peachland. In 1957 North-western Explorations Limited participated in exploration of the property and was largely responsible for carrying out the programme of work.

* By A. R. C. James.

Mineralization is reported to consist of chalcopyrite and minor molybdenite in fractures in granitic rocks of the Similkameen-Okanagan batholith. Several small veins carry a relatively high grade of mineralization. The 1957 exploration programme, however, was aimed at examining the possibilities of outlining a large low-grade deposit in the area.

A camp was established at the property and was occupied from May 23rd to September 12th. A crew averaging eight men was employed under the supervision of C. S. Ney. Geological mapping and geophysical and geochemical prospecting were carried out, and seventy holes were diamond drilled, totalling 1,585 feet.

Copper-Lead-Zinc

Lakeview (Canadian Exploration Limited) (49° 119" N.W.) Company office, 700 Burrard Building, Burrard Street, Vancouver. J. A. Mitchell, exploration manager. This property comprises sixteen claims held by record by R. Fulks and Charles McDonald, of Peachland and Westbank respectively.

It is 3 miles west of Peachland, between Peachland and Trepanege Creek. The rock exposures are reported to range from syenite to pyroxenite and are locally mineralized with disseminated pyrite, galena, sphalerite, and chalcopyrite.

Canadian Exploration Limited optioned the property in June, 1957. A crew averaging four men was employed from June to August under the supervision of T. S. Smith. A total of 64,000 square feet of stripping was done by bulldozer to an average depth of 4.5 feet. Eight holes were drilled by X-ray diamond drill, totalling 695 feet, the holes ranging from 52 to 121 feet long. Because of disappointing results, the option was given up in August.

ROCK CREEK*

Chromium

(49° 119" S.E.) Anarchist Chrome Company, 524 Lawrence Avenue, Kelowna, holds a large group of claims located in 1956.

The showings are one-quarter mile north of Highway No. 3 at the Anarchist Summit, 2 miles west of Bridesville.

The showings are in rocks of the Anarchist group of probable Permian age, which, near the showings, include limestone, metamorphosed chert, and limy siltstone and some amphibolitic. The rocks strike about north 10 degrees west and are tightly folded, with axial planes overturned to the west.

The showings consist of small angular lenses of chromite which appear to be intrusive into limestone. No serpentine or other ultramafic rocks are seen in the immediate vicinity except as float. The ore lenses are composed dominantly of chromite, but contain about 35 per cent antigorite and related minerals. Microscopically, the chromite is translucent and has a brecciated texture. Typical ore has a chromium content of 26.7 per cent and a chromium-iron ratio of 3.15:1.

Exploration has consisted of a considerable amount of surface stripping and open-pitting and some diamond drilling. A few hundred tons of ore has been sorted for shipment.

(49° 119" S.E.) Company office, 536 Howe Street, Vancouver. Belchrome (Belair Mining Corporation Ltd.) W. P. Watson, president, Vancouver. This is a private company at present controlling the Belchrome property. The property comprises the Bridon group of six claims held under option agreement with B. A. Fenwick-Wilson, of Rock Creek, and twenty-eight claims held by record. It is situated about 2 miles northeast of Baldy Mountain and 3 miles north of Camp McKinney. The route into the property is as follows: The old Camp McKinney road, which leaves the Southern Trans.Provincial Highway at Rock Creek

* BY A. R. C. James, except as noted

† By A. Sutherland Brown.

canyon, is followed for 5 miles. The Jolly Creek trail (negotiable by motor traffic) is then followed for 2 miles, and from this point a mine road has been constructed to the property, a distance of 9 miles. The total distance from the main highway is 16 miles. A camp has been established at a point 2 miles from the showings.

The principal showings are at an elevation of 6,500 feet on the Bridon Nos. 1, 2, 3, and 4 claims near the headwaters of Rock Creek. The showings are on the summit of a rounded ridge with steep upper slopes. The ridge summit is relatively bare of trees, but otherwise the locality is quite heavily timbered.

The chromite showings were originally discovered many years ago, probably in the early years of the present century, and, according to local information, the ground has been restaked several times. Development work was restricted to open-cutting on the outcrops of chromite rock, and there have been no recorded shipments of ore. There has been no description of the property in any previous Annual Report. In 1956 the Bridon group was located by B. A. Fenwick-Wilson, of Rock Creek, and was subsequently **optioned** to the present company. Additional claims were located on ground **adjoining** the Bridon group.

The claims are underlain by a northwest-trending tongue of metamorphosed sediments and **volcanics** of the Anarchist series. These are surrounded by a large mass of granitic rocks of the Shuswap complex. In the area of the showings a zone of sheared serpentine strikes north 30 degrees west along the top of the ridge and dips very steeply. This zone is at least 300 feet wide and is bounded on the northeast side by banded reddish **quartzites**, also dipping very steeply and striking northwestward. Overburden is thin and outcrops are plentiful. The showings all occur in the highly sheared serpentine zone and consist of lenses of chromite ranging from a few inches to 7 feet wide and from a few feet to 100 feet long. The most important showings occur over a length of 2,200 feet along the top of the ridge and on the strike of the serpentine. These showings extend on either side of the location line between the Bridon Nos. 1, 2, 3, and 4 claims, with the most extensive showings on Nos. 2 and 4 claims. The showings include seven main lenses, as follows:-

	% ? ;	Average Width (Ft.)
A.....	40	4.0
B.....	90	1.7
C.....	20	3.0
D.....	20	2.5
F.....	25	4.0
G.....	70	3.0
H.....	100	5.0
Total	365	3.4

Lenses A to G were seen by the writer at the end of July. Lens H was uncovered by stripping later in the season.

A grab sample of typical ore material from an open-cut on lens A assayed: Chromic oxide, 30.21 per cent. A similar sample from lens B assayed: Chromic oxide, 28.25 per cent. These agree very closely with the results of sampling carried out by the company. The writer was advised by the company that the chrome-iron ratio from a composite sample was 1.84: 1.

Work on the property was carried out from May to November, with a crew averaging fourteen men. Nine miles of road was constructed, and a camp to accommodate **twenty-five** men was built about 2 miles south of the showings. Plywood buildings erected included bunk-houses, cook-house, machine-shop, wash-house, and power-house. Four thousand feet of stripping and 1,600 feet of diamond drilling were completed. Further work is planned for 1958.

WESTBRIDGE*

Lead-Zinc

**Jo Dandy
(Canadian Exploration Limited)**

(49° 119" S.E.) Company office, 700 Burrard Building, Burrard Street, Vancouver. J. A. Mitchell, exploration manager. The property comprises six recorded claims and one Crown-grant lease held by Mrs. Lillian Long, of Westbridge, and four recorded claims held by M. Wiley, of Westbridge. It is situated 2 miles northwest of Westbridge. The showings are reported to consist of argillite mineralized with disseminated pyrite, galena, sphalerite, and less chalcopyrite. The argillite is overlain by a porphyry sill and the rocks are strongly faulted and folded. The greater part of the area is covered by overburden.

The company optioned the property in April, 1957. A crew of two men was employed for one month under the supervision of T. Smith. Some trenching and geological mapping were done. Mineralization was found to be disappointing and the option was relinquished in June, 1957.

BEAVERDELL*

Silver-Lead-Zinc-Cadmium

**Highland-Bell
(Highland-Bell Limited)**

(49° 119" SE.) Company office, 604, 789 West Pender Street, Vancouver; mine office, Beaverdell. K. J. Springer, president, Toronto; O. S. Perry, manager; J. de Yaeger, mine superintendent; A. D. Coggan, mill superintendent. The mine is at Beaverdell, 32 miles north of Rock Creek. The property consists of twenty-nine Crown-granted claims and nine claims held by record. The mine at present consists of two sections—the upper and lower workings. Both sections are in the same ore zone, but are separated by a major fault known as the East Terminal fault, which dips 65 degrees to the east and has a vertical displacement of 800 feet; the upper workings are on the hangingwall side of the fault and the lower workings are on the footwall side. The No. 4 adit, at 3,974 feet elevation on Wallace Mountain, is the main haulage level for the upper mine. Access to the lower mine is by the 2900 adit level, which was completed in July, 1955. The portal of this adit is 1½ miles by road northeasterly from the office at Beaverdell.

In 1957 extensive development work was carried out in the lower mine, both on the 2900 and 3000 levels. A third raise, the 2905, was put up from the 2900 to the 3000 level. Stope preparation was carried out on the 3000 level. Development work disclosed the presence of a fault on the southwest side of the workings, and at the end of the year efforts were still being made to find the extension of the ore zone beyond the fault.

In the upper mine, work was restricted mainly to the mining of pillars and remnants of ore in old stopes. It is expected that operations in the upper mine will be finished sometime in 1958.

The following is a summary of mining operations in 1957:—

Type of Work	Upper Mine	Lower Mine	Total
Drifting .....ft.	174	1,103	1,103
Crosscutting "	174	510	684
Raising "	167	364	531
Diamond drilling "	2,641	9,183	11,284
Ore mined tons	10,505	6,045	16,550

Additions to plant included a secondary Symons cone crusher which was installed in the crushing plant at the mill. At the 2900 level portal, the 25-horsepower electric motor driving the Sturtevant size No. 45 ventilating fan was replaced with a 40-

* By A. R. C. James.

horsepower motor. The fan was speeded up to 1,720 r.p.m. The air is conducted for 6,000 feet along the adit through a 20-inch duct, and after the change-over to a larger motor about 6,000 cubic feet of air per minute was delivered at the end of the duct.

The ore from both mines is trucked to the mill, which is adjacent to a spur of the Canadian Pacific Railway at Beaverdell. A total of 15,779 tons of ore was milled in 1957, an increase of 10 per cent over the 1956 production. At the end of the year a crew of forty-three men was employed, of whom twenty-five were underground.

GREENWOOD"

Copper

(49° 118" SW.) Head office, 1024, 85 Richmond Street West, Toronto. S. B. Landell, president, Toronto; J. Embury, manager, Greenwood. The property is about 4 miles by road west of Greenwood. Open-pit mining in the area adjacent to the old Mother Lode glory-hole was begun on January 20th, the work being carried out at first under contract by the McClay Construction Company, of Vancouver. The new 1,000-ton concentrator, built in 1956, went into operation on January 26th. The concentrator worked intermittently through February, and toward the end of that month was closed down for twelve days due to unsatisfactory disposal of tailings. The concentrator was not operated at full capacity until about the middle of May. In August, due to steadily falling copper prices and other factors, the company went into bankruptcy and the property has remained inactive since then. It is estimated that about 100,000 tons of ore was milled. A crew of seventy men was employed.

PHOENIX*

Copper-Gold-Silver

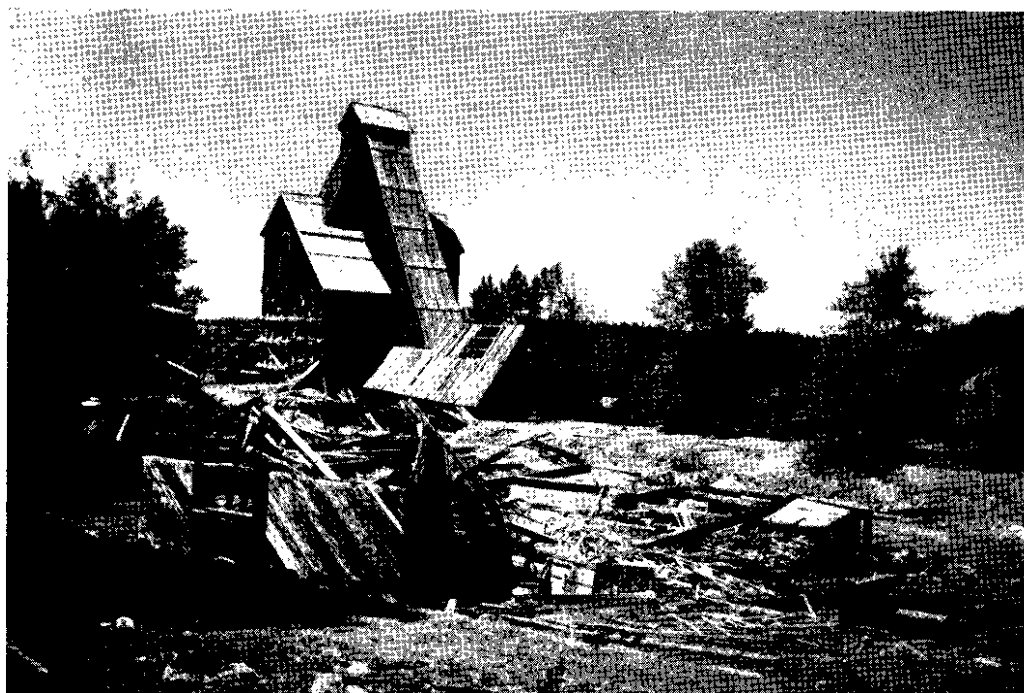
(49° 118" S.W.) Company office, 1111 West Georgia Street, Vancouver; mine office, Davis Block, Grand Forks. L. T. Postle, Phoenix Copper Company Limited president, Vancouver; J. H. Parliament, manager, Grand Forks. Capital, 3,000,000 shares, no par value. This company, a wholly owned subsidiary of The Granby Consolidated Mining Smelting and Power Company Limited, controls thirty-six claims in the Phoenix area. Twenty-one of these are Crown-granted claims held by option, in addition to which the company holds six other Crown-granted claims, eight recorded claims, and one retention lease. The Granby company resumed work on this well-known property in 1955 after an interval of thirty-six years. This renewal of interest was stimulated by the existing high price of copper and the possibility of cheap open-pit mining. Work on the property was continued throughout 1957, although after July the number of men employed was greatly reduced and construction work was slowed down. By the end of the year the crushing plant and concentrator buildings were completed and the machinery for a 750-ton mill was being installed by a small crew.

The compressor-house was completed, one 1,000-cubic-feet-per-minute compressor was installed, and a 1,500-cubic-feet-per-minute capacity compressor was in course of being installed. A repair-shop was completed and fitted out with machine tools. A main water system was completed, with an electrically driven pump in the old Victoria shaft supplying water from the old mine workings to the concentrator and to an 80,000-gallon storage tank. A transmission-line and transformer-station were installed by the West Kootenay Power Company and the main power distribution system was completed by the company electrical crew. The warehouse, engineering office, and dry, built in 1956, were stocked and furnished ready for use. Most of the above-mentioned machinery and equipment was transferred from the company's property at Copper Mountain and Allenby.

* By A. R. C. James.



Victoria shaft and ore-bins of the Granby company, Phoenix, in 1907. (Provincial Archives.)



Victoria shaft, Phoenix, just before the headframe was demolished in 1957

In the first half of the year a total of 54,000 tons of overburden and waste rock was removed from the Snowshoe area. During this operation 4,900 tons of ore was sorted and stockpiled at the concentrator.

Geological mapping of underground workings and surface was continued. Stripping, open-cutting, and geological mapping were carried out on located claims.

A total crew of forty men was employed to the middle of July. At that time the crew was drastically cut as, due to falling copper prices, the development programme was slowed down. At the end of the year a crew of fourteen was employed. In addition, a crew of about forty men was employed on construction work by contracting companies in the summer months. No living accommodation is provided at the mine, the crew being transported to the mine from Grand Forks.

ROSSLAND*

Gold-Copper

(49° 117" S.W.) Company office, 614 West Pender Street, Vancouver; mine office, Box 69, Rosslund. M. F. Maxwell, president; Copper & Uranium A. G. Pentland, director and consultant; S. J. Anderson, manager. Mine Ltd.) Capital: 4,000,000 shares, 50 cents par value. This company owns the old Velvet mine on the Rosslund-Cascade Highway, 13 miles west of Rosslund. Former operators had developed the steeply dipping Velvet vein by a vertical shaft and a lower adit, No. 8, which was connected by raises to No. 6 level, the bottom shaft level. Most of the past production was from above No. 4 level. The present owners started development work in 1955. A new 150-ton mill was erected and milling started in November, 1956.

A new **orebody**, or possibly the extension of the Velvet vein, was located on No. 7 level. Chalcopyrite mineralization was quite massive where encountered, but the walls were indefinite and the **orebody** was difficult to delineate. Two **stopes**, each mined for a length of 80 feet, indicated the **orebody** at these points to be flat lying, 15 feet thick, and 40 feet wide. This ore was mined by open stoping and removed by scrapers to ore-passes driven from the No. 8 or main haulage level. At the portal of No. 8 level, a gravity tram lowered the ore to the mill in the bottom of Sheep Creek valley.

Four other veins are known to exist in the footwall, and parallel to the old Velvet vein. Not much work has been done on them other than to establish their position by diamond drilling and crosscutting, mainly on No. 3 level. The Dick Rowe vein, closest to the Velvet vein, appeared to be the most promising. A crosscut was driven to this vein on No. 4 level and a raise driven to No. 3 level.

The mill operated at partial capacity. The concentrates were trucked to Northport, Wash., for rail shipment to the Tacoma smelter. All operations ceased in August, after which time only watchmen were employed. A maximum of fifty were employed previous to the shut-down.

Lead-Zinc

(49° 117" S.W.) These two Crown-granted claims, owned by **L'Nora**, X-Ray J. A. Ruelle, of Rosslund, are just south of the Velvet mine. A mineralized fissure zone in granite, 8 feet wide, is exposed on the new access road connecting the No. 8 portal of the Velvet mine to the **Rosslund-Cascade Highway**. Oxidation within the fissure is nearly complete. Galena, sphalerite, and limonite are the noticeable minerals. In 1957 an adit 50 feet below the showing was driven about 40 feet.

* By J. W. Peck.

Gold**Cariboo**

(49° 117" S.W.) The Cariboo, Bannock, **Elinor**, Camden, and Nugget Crown-granted claims are controlled by a syndicate consisting of B. Hunt, A. **Simm**, E. Tomich, R. Foyle, and H. **Thorsteinson**. The main workings are on the Cariboo claim and are reached by a steep road three-quarters of a mile long from a point on the Rossland-Cascade Highway 1 mile west of Rossland. A 60-degree shaft has been sunk 60 feet to develop a quartz vein. From a drift 30 feet long at the bottom, stoping has been done in the past to a height of 25 feet. Recent work has included rehabilitating the workings, erecting a small headframe, and installing a gasoline-powered hoist. The drift at the shaft bottom was driven a few feet. The vein here was nearly vertical, up to 4 feet wide, with 18 inches of gold-bearing pyrrhotite on the footwall. A few tons of ore was sorted from this work.

**O.K., Midnight,
I.X.L. (Midnight
Consolidated
Miner Ltd.)**

(49° 117" S.W.) Company office, 605 Howe Street, Vancouver. S. A. **Liening**, Seattle, Wash., president. Capital: 5,000,000 shares, \$1 par value. This company was formed late in 1956 to develop a group of old Crown-granted claims west of Rossland. The main workings are on the Midnight, I.X.L., and O.K. claims and are accessible by a road 1½ miles long which leaves the Rossland-Cascade Highway one-quarter mile west of **Rossland**. A small amount of drifting was done in the O.K. mine, but this work disclosed nothing of importance. **M. Doran** was in charge, with two men employed. All work ceased in April.

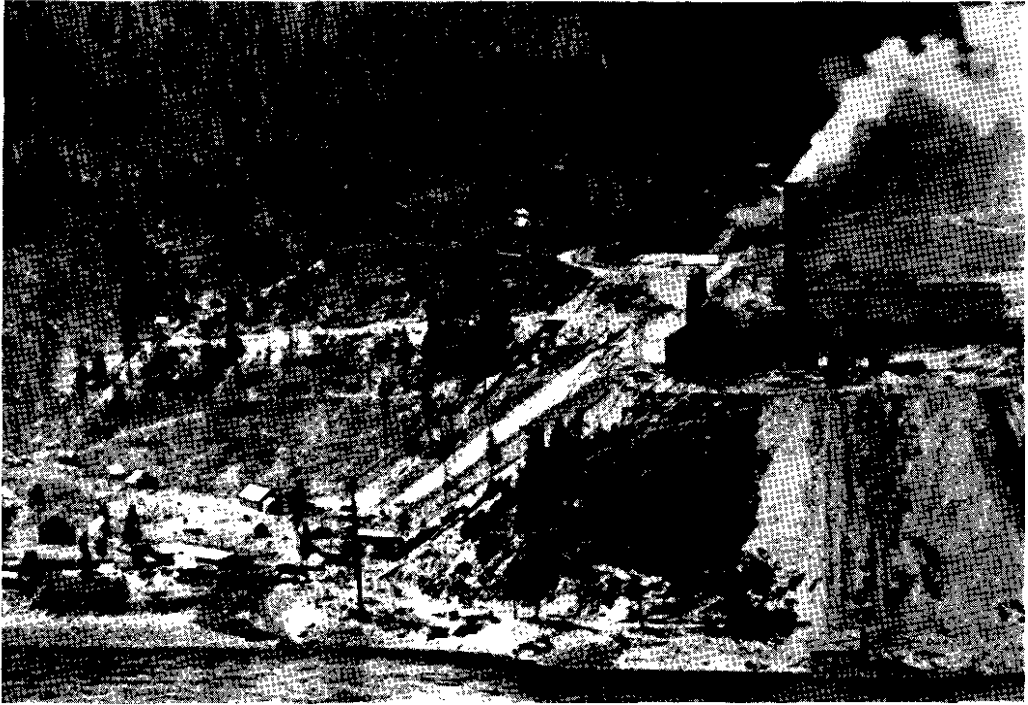
TRAIL***Gold****W. D.**

(49° 117" S.W.) This claim, owned by E. Wells and F. **Donnelly**, of Trail, is in the Columbia River valley, 4½ miles by road east of the Trail bridge. It was at one time known as the Casino Red Cap and was last worked in 1951. The main workings consist of open-cuts and a 50-foot crosscut **adit**. About 400 feet to the north an **adit** has recently been driven on a small fissure reported to contain high gold values. The mine plant consisted of a portable compressor and an ore-bin. Work was done intermittently, and the ore obtained was trucked to the Trail smelter. Production: Ore shipped, 87 tons. Gross content: Gold, 50 oz.; lead, 388 lb.; zinc, 200 lb.

NELSON***Gold-Silver-Lend****Golden Eagle**

(49° 117" S.E.) This Crown-granted claim is owned by B. A. Pickering and G. S. Strong, of Nelson. It is on the west side of Sandy Creek and was made accessible in 1957 by the construction of 1½ miles of road from a point on the Eureka mine road near the upper Eureka portal. This portal is 3 miles from the **Kenville** concentrator, which is 7 miles west of Nelson. The workings range in elevation from 4,075 to 4,150 feet. A quartz vein 6 to 12 inches wide, on a granite-schist contact, has been developed in the past by two **adits**, 50 feet apart vertically and each approximately 125 feet long. A stope-raise connects the **adits**. The vein strikes south 10 degrees west and dips 45 degrees to the east. There is a parallel vein 100 feet east on which an **adit** has been driven 20 feet. Recent work has consisted of bulldozer stripping above the upper **adit** of the main vein. Here the vein was as much as 18 inches wide, but it was broken up and the continuity was uncertain. A grab sample taken of material blasted from the vein assayed: Gold, 1.30 oz. **per** ton; silver, 1.3 oz. **per** ton; lead, 5.09 per cent.

• 30 J. Peck.



The Heinze smelter on the Columbia River at the mouth of Trail Creek in 1896. This was the start of the Trail smelter. (Provincial Archives.)



The Trail smelter and metallurgical works, 1949.

Silver-Lead-Zinc**Vera**

(49" 117° S.E.) The Vera No. 1 Fraction, Vera No. 2, Yankee Fraction, Yankee, and Yankee No. 1 are recorded claims covering the area of the cancelled Crown-granted Morning, Evening, Pacific, and Cumberland claims. They are owned by R. Palmer, of Nelson. The claims are west of the Silver King group and are accessible by 1 mile of jeep-road and 1 mile of blazed trail from a point on the Silver King mine road 8 miles from Nelson. A series of open-cuts was made in an effort to locate the source of galena float. One open-cut, at an approximate elevation of 5,600 feet, exposed a showing 10 feet wide of banded calcite, quartz, minor galena, and schist wallrock believed to be in place. One grab sample taken of the best material blasted from this showing assayed: Gold, trace; silver, 0.3 oz. per ton; lead, 0.09 per cent; zinc, 0.59 per cent. A small percentage of manganese was contained in this sample.

HALL CREEK (49" 117° S.E.)

Gold**Sun Fraction**

This property is owned by W. Rozan and associates, of Nelson. It is on the summit between Fortynine and Hall Creeks and is reached by 15 miles of road from Nelson up Fortynine Creek. Quartz veins in granite have been developed by two adits containing a total of about 500 feet of drifting and crosscutting. Most of this work was done prior to 1954. In the lower adit some sections of the vein contain soft iron sulphides with high gold values. A shipment was made to the Trail smelter in 1957.

Production: Ore shipped, 9 tons. Gross content: Gold, 30 oz.; silver, 8 oz.; lead, 37 lb.; zinc, 37 lb.

[Reference: *Minister Of Mines, B.C.*, Ann. Rept., 1954, p. 124.1

YMIR***Gold-Silver-Lead-Zinc**

(49" 117" S.E.) Company office, 1221 Cedar Avenue, Trail. **Goodenough, Ymir** W. L. Ashmus, president; Mrs. K. Lenhardt, Waukeshaw, Wis., **(Americonda Mines** secretary-treasurer; W. Geist, manager. Capital: 200,000 shares, Limited) \$5 par value. This company holds under option the Goodenough and Ymir mines on Ymir Creek, 6 miles by road northeast of Ymir. The only work done was in the No. 2 adit of the Goodenough mine, where an exploratory raise was put up 20 feet from the back of an old stope. Three men were employed.

SALMO *

ERIE CREEK (49" 117" S.E.)

Gold-Silver-Lead-Zinc

Company office, 609 Baker Street, Nelson. J. A. Russell, **Edmon-** ton, president. Capital: 3,500,000 shares, \$1 par value. This **Arlington (New** company owns the Arlington mine on Rest Creek, 7 miles by road **Arlington Mines** from Salmo. A 125-ton mill on site was operated previously to **Limited)** 1954, treating dump material. In 1957 G. D. Fox and R. W. Linn, of Trail, working under a lease arrangement, made a clean-up at the mill and shipped to the Trail smelter.

*BY J. W. Peck.

SHEEP CREEK (49" 117" S.E.)

*Gold***Nugget**

This mine is part of the old Reno holdings in the Sheep Creek camp. It is owned by A. Endersby, of Fruitvale, who has worked the property intermittently for several years. Recent work has been in the upper Nugget workings, which are reached by 6 miles of road from the main Sheep Creek road. Air for drilling is supplied through 2 miles of pipe by the old water-driven compressor which is installed in the Reno mill building on the north bank of Sheep Creek. As in 1956, mining was done in the Calhoun vein on No. 4 level, about 1,100 feet from the portal. Stopping reached a height of 30 feet on the nearly vertical quartz vein, which ranged in width from 6 inches to 2 feet. Ore was sorted and trucked to the Trail smelter.

IRON MOUNTAIN (49" 117" S.E.)

Lead-Zinc-Tungsten
**Emerald, Jersey,
Dodger, Feeney
(Canadian Exploration
Limited)**

Head office, 700 Burrard Building, Vancouver; mine office, Salmo. G. A. Gordon, general manager; J. D. Little, assistant general manager; C. M. McGowan, plant superintendent; D. N. Hogarth, mine superintendent; H. A. Steane, general mill superintendent; R. A. MacLeod, superintendent, tungsten concentrator; E. A. Erickson, superintendent, lead-zinc concentrator. This company is a wholly owned subsidiary of Placer Development Limited. The Emerald, Feeney, Dodger, and Jersey mines, the tungsten concentrator, and the main camp are located on the summit between Sheep Creek and Lost Creek. The property is reached by two roads which leave the Nelson-Nelway Highway 4 and 5 miles respectively south of Salmo. The lead-zinc concentrator is on the Nelson-Nelway Highway and is served from the mine by a series of surface and underground conveyors. The average number of employees was 340, a decrease of twenty from the average for 1956.

Emerald.—This mine produced the majority of the tungsten ore. Most of it came from the large open-pits where the outcrop has been stripped for a length of about 1,500 feet. Most of the ore remnants above the 3800 or lowest adit were almost mined out by this method at the end of 1957. Below the 3800 level the orebody has been fully developed by a 32-degree inclined three-compartment winze which was being sunk in the footwall of the trough of the orebody to the 2730 level. The trough plunges southward and is formed where the easterly dipping contact between black argillite and limestone is cut off on the east by granite. Scheelite-bearing skarn bands occur in the trough and also on the limbs as much as 100 feet above the trough. Except near the bottom of this winze-orebody, only the east limb has been productive. The limbs are mined 5 to 15 feet wide by open-stope and slusher methods. The orebody in the winze is smaller in size than it is above the 3800 level, but a higher grade has been maintained.

Feeney.—This tungsten mine, 800 feet north of the northern end of the Emerald workings, has been idle since 1955 and is considered about mined out.

Dodger.—The Dodger 4400 tungsten mine, with a portal elevation of 4,405 feet, has been developed by a 14- by 15-foot adit driven south 1,050 feet. Ore has been mined from above and below this adit. In 1957 an orebody on the east side of the adit was mined to surface. By the end of 1957 most of the known ore in this mine had been removed, a total of 127,000 tons since mining started in 1952. The ore is transported by diesel trucks to the top of an ore-pass near the Dodger 4200 portal, leading to an underground crusher on the 3800 level of the Emerald mine.

The Dodger 4200 tungsten mine is 5,000 feet southwest of the Dodger 4400 mine. A 14- by 15-foot crosscut adit, with a portal elevation of 4,125 feet, has been driven east for 2,500 feet. From near the end of the crosscut a drift of similar size extends north for 1,950 feet. The end of the drift is connected by raises and via the 4300 level to the Dodger 4400 mine. Irregularly shaped orebodies have been mined above the

main drift over a length of 1,500 feet. By the end of 1957 most of the known ore had been removed, a total of 158,000 tons since the start of mining in this ore zone in 1954.

Invincible.-This claim is north of the Feenev and west of the Dodger 4400 mine. Thirty-four diamond-drill holes drilled during the past three years indicated the presence of a tungsten orebody 800 to 900 feet below the surface. This indicated orebody, according to company reports, contains 386,000 tons grading 0.83 per cent tungstic oxide. A start was made on the sinking of a 900-foot vertical shaft. A large hoist was obtained and a foundation for it was established on surface. A large adit was driven to allow the construction of underground ore pockets. All work ceased in October because of the discouragement of low world prices.

Tungsten Concentrator.-This mill is near the 3800 portal of the Emerald mine. It can receive ore by track haulage from the Emerald mine, by conveyor from the underground crusher on the Emerald 3800 level, or by truck from outside sources. The milling rate averaged over 15,000 tons per month, a decrease from 1956. The grade of ore was also lower. All tungsten concentrates continued to be sold to the United States Government under contract.

Jersey.-This lead-zinc mine extends through Iron Mountain in a northerly direction from the Lost Creek slope. The ore zones occur in dolomitized limestone along folds which rise gently to the north. There are seven ore zones now recognized, named from west to east A, B, C, D, E, F, and G. The A ore zone, with long axis striking almost due north, has been fully developed from the south end of the Jersey mine to a point north of the old Emerald lead-zinc mine, a distance of 5,000 feet. The B, C, and D ore zones, each with long axis striking somewhat east of north, have not been developed more than 2,000 feet north of their outcrop on the Lost Creek slope. The E, F, and G ore zones lie farther to the east and are not distinguishable at the south end of the mine. They are 2,000, 1,500, and 1,000 feet long respectively.

The ore zones vary greatly in thickness. At places the A zone is over 70 feet thick, whereas the E, F, and G zones are 8 to 10 feet thick. Most of the production was by trackless mining using room-and-pillar methods, the ore being removed by diesel trucks and loaders. Ore is trucked via the 4200 Jersey adit to the top of the ore-pass beside the tungsten ore-pass near the Dodger 4200 portal. Both ore-passes lead to the underground crusher on the 3800 level of the Emerald mine. The remainder, 30 per cent of the production, was from the track area at the south end of the mine, where ore is mined by open-stoping and moved to draw points by slushers. The main haulage was on the 4000 level, where a diesel-electric locomotive transported the ore to the ore-pass system above the underground crusher in the Emerald 3800 level.

The following diesel equipment has been approved for underground use: 6 Dart 10-ton dump trucks, 7 Koehring S-ton Dumptors, 5 Eimco overhead loaders, 1 Allis-Chalmers HD 9 loader, 1 Euclid 10-ton dump truck, 1 Caterpillar DW-10 and Landis Wagon, 3 track-mounted drilling jumbos, 1 Caterpillar 212 grader, 1 Michigan tractor shovel, 2 Caterpillar D-7 bulldozers, 2 LeRoi 500 D compressors, 1 Ingersoll-Rand UD24 compressor, 1 Mercedes-Benz diesel-electric locomotive, 1 Trump Industrial Giraffe.

The operation of diesel equipment underground has necessitated the circulation of larger flows of air than is required in other methods of mining. This has been accomplished by the installation of large underground fans, numerous connections of mine workings, and by large fan pipe ventilation of dead-end areas. The total amount of air entering the Dodger and Jersey mines was 150,000 cubic feet per minute, which was more than sufficient for any combination of the diesel equipment used.

Lead-Zinc Concentrator.-This mill operated at near capacity of 2,000 tons per day, but only on a four-day week. The best month was October, when 41,000 tons was milled, The grade of ore was about 3.5 per cent zinc and 1.5 per cent lead. The concentrates were shipped to Kellogg, Idaho.

ASPEN CREEK (49° 117" SE.)

Silver-Lead-Zinc

H.B. (The Consolidated Mining and Smelting Company of Canada, Limited) J. C. MacLean, property superintendent; H. G. Barker, mine superintendent; N. Doyle, mill superintendent. The H.B. mine is on the west side of Aspen Creek, with the main camp located on the north side of Sheep Creek, 7 miles by road from Salmo. Zinc-lead dolomite replacement orebodies have been developed by two adits connected by an interior two-compartment vertical shaft. The hoistroom is on the top or 3500 level, and the main haulage is the bottom or 2800 level. Long ore-pass systems extend from the 2800 level to the ore zones. Most of the production came from two orebodies above the 3300 level, where mining was done by blast holing to pillar slots above slusher drifts. In plan the orebodies are roughly parallel to each other, about 150 feet apart, and have a rake to the south of about 20 degrees. In cross-section they are lenticular, with nearly vertical sides. The average width is 80 feet, and the maximum height is 350 feet. The No. 1 or East orebody has been developed over a length of 1,000 feet. The northern half of this block was about mined out at the end of 1957. The No. 2 or West orebody was being mined over a length of 500 feet. Some production also came from a smaller but higher-grade orebody situated between the East and West orebodies.

The milling rate averaged 37,500 tons per month, the highest in the Nelson district. This was an increase above that of 1956. The average number employed decreased slightly to 130.

NELWAY*

Silver-Lead-Zinc

(49° 117" S.E.) Company office, 413 Granville Street, Vancouver; mine office, Remac. W. L. Zeigler, Metaline Falls, Wash., general manager; L. M. Kinney, Metaline Falls, Wash., general superintendent; F. R. Thompson, property superintendent; J. Kozar, mine superintendent; J. S. Steele, mill superintendent. Capital: 3,000,000 shares, \$1 par value. This company owns the Reeves MacDonald mine on the Pend d'Oreille River, on the Nelway-Waneta road, 4 miles west of Nelway. Zinc-lead replacement orebodies have been developed from the main haulage 1900 level. At 3,500 feet from the portal the Reeves orebody, which has furnished most of the production, has been developed by an interior 55-degree inclined shaft which extends to the 2650 adit level. Except for lower-grade marginal sections, the orebody has been nearly mined out from the 1950 scam level to surface above the 2650 level. However, a considerable tonnage remained in the horizontal and vertical pillars, and pillar recovery accounted for more than 50 per cent of all production in 1957. The remainder of the production came from the O'Donnell orebody, which is 7,000 feet from the portal on the 1900 level. This orebody bottoms on the 1900 level and is believed to be a faulted section of the Reeves orebody. It is developed by a large service raise to the old O'Donnell adit or 2350 level. Six levels have been driven from this raise, the lowest or 1970 level being the scam drift. The ore was removed by blasting to pillar slots above this drift, similar to the mining method used in the Reeves orebody. By the end of 1957 the ore had been mined out to the 2250 level.

Exploration continued on the Reeves orebody below the 1900 level. The 52-degree inclined winze which was sunk in 1953 to the 1500 level was further sunk to the 1100 level. A Cryderman mucker was used in this work. About 200 feet from the bottom, ore was encountered in the hangingwall, and the winze was steepened at this point to 62 degrees. Other development was in the B.L. section of the mine. The B.L. orebody is also thought to be a faulted upper section of the Reeves orebody. Development previous

* By I. w. Peck.

to 1957 consisted of driving a 1,200-foot drift on the 2350 Reeves level to reach the bottom of this **orebody**. In 1957 a raise was driven to surface 250 feet vertically above. A scam drift was driven 10 feet above the 2350 level, and production from this area was under way by the end of the year.

The mill operated continuously at an average rate of 33,500 tons per month. Mill-heads averaged 3.7 per cent zinc and 1.3 per cent lead. Concentrates were shipped to smelters in the United States. The number employed averaged 135.

SOUTH KOOTENAY LAKE*

NEXT CREEK (49° 116" S.W.)

Gold-Silver-Lead-Zinc

Company office, 530 Rogers Building, Vancouver; mine office, Spokane (**Rimrock** Cranbrook. D. J. Fulton, president; E. H. Berquist, manager. Mining Corporation Limited) Capital: 5,000,000 shares, no par value. This mine, formerly owned by K. K. Laib, is on Wall Mountain, 18 miles by road from Tye. A steeply dipping vein in granodiorite has been developed by several adits, the main one being No. 4, which is at the upper terminal of a small tram-line. A new crosscut adit, No. 5, has been driven intermittently by different operators since 1949. In 1956 a vein was intersected 170 feet from the portal and a short drift was driven on it to the south. The new owners commenced work in August. The crosscut was driven ahead 6 feet and another vein was intersected. Drifting was done to the south on this vein, which is an oxidized fissure 30 inches wide containing mostly decomposed wallrock. High gold values are reported to be contained in a narrow soft oxidized zone adjacent to both walls. A raise will have to be driven to No. 4 level to determine if this is the same vein that in the past was productive above No. 4 level.

On the surface, living quarters and a compressor-house were built. Six men were employed.

SUMMIT CREEK (49° 116" S.W.)

Bayonne

This mine, 22 miles by road from Tye, is on Bayonne Creek, a southerly flowing tributary of Summit Creek. The first 17 miles of road are good, but the last 5 miles are only passable with a tractor or a vehicle with four-wheel drive. The mine and plant were owned by Bayonne Consolidated Mines Limited, which last operated the property in 1946. Since then lessees have carried on intermittent work. In 1957 the property was escheated to the Crown. The machinery was sold by public tender in November to Rogers and Coombs, of Vancouver.

SANCA (49° 116" SW.)

Silver-Lead-Zinc

Head office, Rogers Building, Vancouver, and 307 Sixth Avenue West, Calgary, Alta.; mine office, **Boswell**. This company retained its option on the **Lakeview** property of five claims on the east shore of Kootenay Lake, immediately south of **Sanca** Creek. The No. 2 level south drift was extended a distance of 50 feet to a total length of 680 feet. Two hundred feet of diamond drilling was done in three holes.

BOSWELL (49° 116" S.W.)

Hope*

This property, comprising six located claims, is on a steep mountainside one-quarter mile east of Dark Canyon Creek, the first south-flowing tributary of Akokli Creek east of its mouth. The claims were under option to W. **Schwartzenhauer**, of **Castlegar**, and development work was done on them by L. H. **Bettin**, of Vancouver.

*By J. W. Peck, except as noted.

†By J. E. Merrett.

The access road, 2½ miles long, was completed from the Glacier Logging Company road to the mine. A crew of three men extended the surface stripping and drove 80 feet of drift on the vein. Twelve and one-half tons of ore was shipped to the Bunker Hill smelter at Kellogg, Idaho.

NORTH KOOTENAY LAKE*

CRAWFORD CREEK (49" 116" N.W.)

Silver-Lead

This property of two recorded claims is on the northwest slope of the ridge between Hooker and Canyon Creeks, tributaries to Crawford Creek. D. Bentley, of the Dolores-Dorothy Exploration and Mining Company Limited, **optioned** the property from J. W. Mulholland, of Nelson. A tractor-road, 1½ miles long, was constructed over the original pack-horse trail, and 1,500 feet of surface stripping along the vein was done by bulldozer. Work was suspended when the vein mineralization was found to be of low grade.

DEANSHAVEN (49" 116" N.W.)

Silver-Lead-Zinc

Berengaria†

R. Deane, of Rosslund, **optioned** this property (also called Richard the First) to Messrs. **Shugarman** and D. Smith, of Edmonton, Alta. Three carloads of ore, **totalling** 124 tons, were shipped to the Bunker Hill smelter at Kellogg, Idaho. The weights and grades of the shipments were as follows:—

Lot No.	Dry Weight	Silver	Lead	Zinc	Iron
	Lb.	Oz. per Ton	Per Cent	Per Cent	Per Cent
1	58,860	1.6	7.4	9.85	28.8
2	99,142	5.4	6.5	6.5	32.5
3	89,900	2.1	8.3	8.2	28.6

RIONDEL (49" 116" N.W.)

Silver-Lead-Zinc

Company office, Trail; mine office, Riondel. D. S. Campbell, Bluebell (The property superintendent; J. B. Donald, mine superintendent; T. F. Consolidated Min- Walton, mill superintendent. This property is at Riondel on a ing and Smelting small peninsula on the east shore of Kootenay Lake, 6 miles by Company of road north of the ferry landing at Kootenay Bay. The ore deposits Canada, **Limited**)† are sulphide replacement bodies in a limestone band that crosses the peninsula and dips westward under the lake. The Bluebell ore zone is in the central part, the Comfort near the north, and the Kootenay Chief ore zone is at the south end of the peninsula. The early history of the property was given in the Annual Report for 1949, in which year extensive development was begun.

Mining and development operations were confined to the Comfort and Kootenay Chief ore zones, most of the work being done in the latter area. Development work completed in 1957 was as follows: 3,203 feet of drifting, 2,500 feet of crosscutting, 4,070 feet of raising, and 15,852 feet of diamond drilling. The development work was done on all levels from the 225 level to the 875 level.

In December, 1957, the average daily amount of water pumped from the mine was 3,257,000 imperial gallons (2,262 gallons per minute). To assist in removing this large quantity of water, two new 150-horsepower 500-gallons-per-minute pumps were added to four similar units at the 525 level pumping-station and two new 40-horsepower 300-

* By J. W. Peck, except as noted.

† By J. E. Merrett.

gallons-per-minute pumps were added to the 675 level pumping station. The thermal water, entering the bottom of No. 1 shaft at the rate of 1,000 gallons per minute, was brought under control by pouring a massive concrete bulkhead close to the shaft bottom. Diamond drilling was done in this vicinity to establish the location of the water conduit and to assist in the cement grouting of fissures.

The induced ventilation of the mine was increased to 150,000 cubic feet of air per minute by the installation of three 60-horsepower 48-inch-diameter Woods Aerofoil fans, each of 50,000 cubic feet per minute capacity. The increase was made to remove the carbon dioxide gas inflowing with the thermal water at the bottom of No. 1 shaft.

A total of 29,848 cubic yards of backfill was placed in empty stopes. This amount was composed of 16,885 cubic yards of gravel, 1,146 cubic yards of mine waste, and 11,817 cubic yards of deslimed tailings. Three Dorclone desliming units were installed in the mill, and a steel sand-storage tank of approximately 300 tons capacity was erected near by. This equipment was put into use in October, and the sand produced was conducted underground by way of large-bore diamond-drill holes.

The jig-tailings recovery operation on the deep deposit in Bluebell Bay was suspended in the spring by Inland Dredging Ltd., of Calgary, after 530 tons of tailings was recovered.

Through the combined efforts of all employees, the safety programme was successful in achieving an accident-free record. Mine-rescue and first-aid classes were held in the spring. The mine-rescue team, captained by J. D. McDonald, was successful in winning both the West Kootenay and Provincial Mine Rescue Competitions.

The average number of persons employed was 295, of whom 163 were employed underground.

The concentrator milled 256,118 tons of ore, including 530 tons of reclaimed tailings. The concentrates were shipped to the Trail smelter.

AINSWORTH (49" 116" N.W.)

Silver-Lead-Zinc

Belle Aire

This is a recorded claim astride Coffee Creek, adjacent to the Coffee Creek bridge on the Nelson-Kaslo Highway. The owner, S. Hallgren, of Ainsworth, has worked intermittently since 1950 developing a fissure vein exposed on the north side of Coffee Creek just west of the highway bridge. A lower adit has been driven above high-water mark for about 100 feet. An adit 30 feet vertically above it has been driven 20 feet. The vein is about 1 foot wide, mineralized with small lenses of galena and sphalerite.

In December, Bruce Plummer, of Columbia Falls, Mont., obtained an option and started underground operations. A small mining plant is on site.

[Reference: *Minister of Mines, B.C., Ann. Rept., 1950, p. 136.1*

Company office, 525 Seymour Street, Vancouver; mine office, Highlander, etc. Ainsworth. H. W. Knight, president; P. E. Olson, mine manager; (Yale Lead & Zinc Mines Limited) E. Pickard, mine superintendent; C. Anderson, mill superintendent. Capital: 5,000,000 shares, \$1 par value. This company controls most of the claims lying between Coffee and Cedar Creeks in the Ainsworth camp. The crushing plant, mill, and main haulage adit are below, and the mine plant and old Highlander adit are above the Nelson-Kaslo Highway, about three-quarters of a mile south of Ainsworth.

The Highlander mine is serviced by the old Highlander or 2150 level adit and by the main haulage or 1900 level adit. Both levels explore for several thousand feet the 7-foot-wide Highlander ore-bearing shear which strikes north-south and dips 45 degrees west. Two main ore zones, the Albion and Banker, have been developed by raises and sublevels through to surface several hundred feet above. The Albion ore zone, which is

in the south end of the workings, bottomed 60 feet above the 1900 level and was almost mined out by the end of 1957. The Banker ore zone at the north end of the workings continued to produce from ore remnants above the 2150 level, but these were becoming more difficult to find. Below the 2150 level the 1900 level was being driven toward the expected projection of the Banker ore zone. Another orebody was located on the 1900 level between the Albion and Banker zones; it was rapidly put into production. All mining was by open stoping with support furnished by numerous pillars, stulls, and roof bolts. Diesel locomotives are used on the 1900 and 2150 levels.

The mill operated continuously at about 5,300 tons per month. Mill-heads averaged 5 per cent lead and 1.3 per cent zinc. The crew was reduced from eighty at the beginning of the year to sixty-five at the end of 1957.

Spokane This old Crown-granted claim is part of the holdings of Yale Lead & Zinc Mines Limited. It was under lease to T. Lane, of Ainsworth, who made a shipment to the Trail smelter. Production: Ore shipped, 4 tons. Gross content: Silver, 107 oz.; lead, 5,493 lb.; zinc, 100 lb.

Kootenay Florence, Ainsworth. H. M. Wright, president; H. M. Turner, superintendent. Capital: 3,000,000 shares, \$1 par value. This company owns a large group of claims lying south of Lendrum Creek and astride Princess Creek. The mine plant and mill are on the Nelson-Kaslo Highway, 2 miles north of Ainsworth. Since 1954 The Consolidated Mining and Smelting Company of Canada, Limited, has been carrying out an exploratory programme with a view to gaining eventual control of the property. In 1957 the results of surface diamond drilling done in the preceding years was investigated at a lower horizon by underground work in the old Lakeshore mine. This adit (elevation, 2,520 feet) was rehabilitated throughout its length of about 550 feet. A total of 700 feet of drifting, crosscutting, and raising was done from the end of the adit workings. One surface hole was intersected, and it was shown to have been drilled parallel to a narrow mineralized fissure from which replacement had extended for a few feet into the limestone walls. Additional exploration consisted of 1,400 feet of underground diamond drilling in eight holes.

Compressed air for drilling was provided by a surface line from the Kootenay Florence plant. A diesel locomotive was used for haulage. Ten men were employed under the direction of M. N. Anderson. All work ceased in September.

Hercules, Silver Seattle, Wash., president; C. Lind, manager. Capital: 3,000,000
Glance (Triumph shares, \$1 par value. This company owns a group of recorded and
Mines Limited) Crown-granted claims south of Lendrum Creek and west of the
property of Western Mines Limited. The main workings are about
3 miles by road from the Kootenay Florence camp. Since 1954 a small crew has been employed on the underground development of fissure veins on the Noranda claim of the Hercules group. Recent work has been the extension of an adit on the Silver Glance Crown-granted claim with the object of intersecting these veins 380 feet vertically below.

Most of the work in 1957 was done under an agreement with Intermountain Petro-Mining Limited (company office, 640 Seventh Avenue West, Calgary; W. H. Myers, president). The Silver Glance adit was driven over 200 feet to a total length of 1,030 feet. The downward projection of the Hercules veins was not encountered. Diamond drilling, totalling 1,700 feet in nine holes, was done on the surface in the vicinity of the Hercules adits, the deepest hole being 340 feet. The results of this drilling were reported to be encouraging and also indicated that the Silver Glance adit would have to be driven farther to intersect the veins at that horizon. Work ceased in August because of financial difficulties. The number employed averaged three.

WOODBURY CREEK (49° 116" N.W.)

Can-Amer Mining & Milling Company Ltd. Company office, 459 Baker Street, Nelson. L. N. Martini, Kennewick, Wash., president; L. D. Besecker, Ainsworth, manager. Capital: 400 shares, \$500 par value. Since 1953 this company has been operating intermittently a custom mill at the mouth of Woodbury Creek. Capacity is rated at 85 tons per day. No ore was treated in 1957. A roof section of the mill was damaged by heavy snow and was not repaired.

KEEN CREEK*

Silver-Lead-Zinc

Daybreak (Daybreak Mining Corporation (1957) Ltd.) (49° 117" N.E.) Company office, 1442 Bay Avenue, Trail. D. L. Cummings, president. Capital: 4,500,000 shares, no par value. The Daybreak mine is on the east bank of Klawala Creek, a northwesterly flowing tributary of Keen Creek. It is accessible by 1½ miles of trail from a point on the Keen Creek road 11½ miles from Kaslo. The property has been idle for over thirty years, mainly because of litigation. In 1957 Henry L. Hill and Associates, of Vancouver, were engaged as consulting management engineers. Five adits, between elevations of 5,080 and 5,450 feet, explore for several hundred feet two nearly parallel lodes which conform with a belt of Slocan sediments. The lodes are known as the "A" and "B" veins and are about 300 feet apart. The veins are in a mineralized sheared and brecciated zone averaging 5 feet in width. The zone is filled with broken rock carrying, in places, disseminated sphalerite and pyrite with sparse amounts of galena. From June to late July five men, under the supervision of S. Fish, reopened the workings so that sampling could be done and a geological examination made.

Index (49° 117° N.E.) This old mine is on Keen Creek, 14½ miles by road from Kaslo. It is part of a group of recorded claims: B Nos. 1 to 8, owned by H. F. Kenward, 751 Granville Street, Vancouver. The last underground work was done by Kaslo Base Metals Limited in 1951. In 1957 the owner made a small shipment to the Trail smelter.

PADDY PEAK*

Silver-Lead-Zinc

Utica (Lajo Mines Limited) (49° 117" N.E.) Company office, 717 West Pender Street, Vancouver; mine office, Kaslo. T. S. Lathrop, New York, president; J. A. Cooper, manager. This company holds a long-term lease on the Utica mine (which has been operated since 1953 by J. A. Cooper, also under lease) from Utica Mines (1937) Limited. The mine is at the head of Twelve Mile Creek, about 15 miles by road from Kaslo. The main level is the No. 7 adit, which is connected by raise to the No. 4 adit. A sublevel, the No. 5, has been driven from the raise to develop two parallel veins known as the East and West veins. As in previous years, production in 1957 was from the East vein. A new stoping section was prepared on No. 5 level. The nearly vertical vein contained from 1 to 6 inches of galena with a high silver content. Ore was removed with a diesel locomotive on No. 7 level. All underground operations were under contract to E. Swantz, of Kaslo.

On the surface, erection was completed of a 50-ton mill which had formerly been at the property of Silver Hill Mines Ltd. near Tulameen. Milling started in December. The concentrates were shipped to the Trail smelter. A maximum of fifteen men was employed.

* By J. W. Peck.

RETALLACK-THREE FORKS*

Silver-Lead-Zinc

Caledonia
(Canadian **Min-
erals** Ltd.) (50° 117° S.E.) Company office, Calgary, Alta. R. E. Legg, consulting engineer. This company **optioned** the Caledonia mine near Blaylock from G. E. **McCready**, of Kaslo. An east-west fissure zone with a steep southerly dip has been developed by surface workings and two **adits**. A contract for 75 feet of drifting at each end of the lower **adit** was completed by C. Lind, of Kaslo. This work disclosed two short oreshoots. The option was dropped later in the year.

(50" 117" S.E.) Company office, 1500 Marine Building, **Van-
Star**, Wellington cover; mine office, Retallack. Edward L. Borup, president (**Blue** Star Mines and manager; B. **Ecker**, superintendent. This company controls Limited) the Star group of recorded claims and has a lease on the old Wellington mine near Retallack. The Star claims are 2 miles north of the Wellington mine, which is owned by New Wellington Mines, Ltd., and cover the **Heba**, Pluto Fraction, **Oppollo**, and Hera cancelled Crown-granted claims. The old Whitewater buildings at Retallack were purchased for a main camp. Work in 1957 was restricted to road work and improvement of camp facilities.

(50" 117" SE.) The Snap claim and the Lucky Jim mine at Snap, Lucky Jim **Zincton** were leased by a partnership of A. Keckonen, E. **D'Lerma**, and R. E. Martin. The Snap is owned by J. L. **Drumheller**, of Spokane, and the Lucky Jim by Sheep Creek Mines Limited, of Nelson. Fifteen feet of drifting was done on the No. 1 level of the Lucky Jim mine with the object of advancing into the Snap claim. Several hundred tons of milling ore was obtained from the No. 1, No. 2, and No. 3 levels of the Lucky Jim, but no shipments were made. Work started in August and ceased in October.

Min, Cork (50° 117° S.E.) This property of Slocan Monitor Mines Limited near Three Forks was **optioned** in 1956 to Frank **McMahon**, of Calgary. The Cork **adit**, near the **Violamac** mine road, was extended to investigate a structure determined by surface geological work. The underground work was completed in 1957, with a total of about 1,000 feet of drifting and crosscutting. No worth-while mineralization was encountered. Four men were employed.

(50" 117° S.E.) This group of recorded claims is astride the Lost Atlantis New Denver-Three Forks Highway just north of the old Alamo mill. It is owned by A. S. Wojna, of New Denver, but was under option to R. J. Renn, of Calgary. Small lenses of **galena** are found in the argillite bedding close to granite porphyry. Two **adits**, 30 feet apart vertically, were driven from near the highway. **Galena** sorted from this work was trucked to the Trail smelter. Three men were employed. Production: Ore shipped, 3 *tons*. Gross content: Silver, 166 oz.; lead, 1,184 lb.; zinc, 511 lb.

SANDON*

Silver-Lead-Zinc

(49" 117" N.E.) Head office, 1160 Peel Street, Montreal; mine Silversmith, etc. office, **Sandon**. G. S. Rosenthal, New York, president; T. R. (Carnegie Mines **Buckham**, mine manager. Capital: 10,000 shares, \$1 par value. of British This Company owns the Silversmith, Slocan Star, **Richmond-** Columbia, Ltd.) Eureka, Ruth Hope, and Slocan King mines on **Sandon** Creek, south of **Sandon**. A truck-road extends to all mines from the mill on the western outskirts of **Sandon**. Underground operations by the company ceased in

*By J. W. Peck.

February, and milling continued into March. Most of the ore came from the No. 3 level of the **Slocan Star**.

In June, groups of lessees began work. The **Slocan Star** was leased to J. Zambon, P. Leontowicz, S. Sibilleau, and N. Sibilleau. These partners obtained about 140 tons of milling ore by hand-sorting the No. 3 dump. Underground work was started on No. 5 level. The Rabbits Paw section of the **Silversmith** was leased to T. Hawes and E. Singel, who mined and shipped four truck-loads of high-grade ore to the Trail smelter. The **Ruth Hope** was leased to E. Perepolkin, F. Vanin, and F. Pho. Over 350 tons of milling ore was obtained from No. 4 and No. 5 levels. Higher-grade ore was trucked to the Trail smelter. Another lease on the **Ruth Hope** was given to E. H. Petersen, who stripped the surface above No. 3 adit with a bulldozer and exposed an ore remnant.

The mill reopened in November to handle lessees' ore. Three men were employed in the mill. In December, arrangements were being made for a merger with **Violamac Mines Limited**.

(49° 117° N.E.) Head office, 721 Eastern Avenue, Toronto.
 Noble Five, etc. James A. Taylor, president. Capital: 3,000,000 shares, \$1 par (Cody-Reco Mines value. This company owns a group of claims north of Cody, Limited) including old mines such as the Noble Five, **Slocan Sovereign**, Last Chance, **American Boy**, and **Deadman**. A road extends from the mill at Cody to all principal workings. No work was done in 1957. The mine and mill plant remained intact. A watchman was employed.

(49° 117" N.E.) Head office, 416, 25 Adelaide Street West, **Victor (Violamac Mines Limited)** Toronto; mine office, New Denver. Mrs. Viola MacMillan, president; J. C. Black, manager, western operations. Capital: 5,000,000 shares, \$1 par value. This company owns the **Victor** mine, 2½ miles by road northwest of **Sandon**, or 2% miles by road southeast of Three Forks. The nearly vertical **Victor** vein has been developed by several connected adits, the lowest being No. 9. The **Victor** vein has a mineralized length of about 1,400 feet and a width ranging from a crack to as much as 6 feet. Most of the production in 1957 came from the west end of the vein known as the **West Victor orebody**. The remainder of the ore was produced from remnants in various sections of the vein. Mining is done by cut-and-fill methods with close timbering. Not much ore remained in the **Victor** vein at the end of 1957. Exploratory work continued in the west end of the mine at the No. 5 level horizon with access from No. 7 level. Some promising discoveries were made of high-grade silver-lead ore.

The No. 10 adit, which is on a different vein, has been driven over 900 feet from the portal. Short sections of ore were encountered in this drive. A raise was put up to break through to surface near the compressor-house at No. 9 portal. Some stoping was done from this raise.

A new No. 11 adit was started near the old **Cinderella** mine in a location 150 feet northeast of No. 10 portal and 100 feet lower. It was driven southwestward to intersect old shaft workings at 150 feet from the portal, and by the end of 1957 was 550 feet long. Not much ore was found in this adit.

Milling ore continued to be trucked to the **Western Exploration** mill at **Silverton**, but at a reduced rate. Tin was indicated in the zinc concentrates but was not recovered. High-grade sorted ore was trucked to the Trail smelter. The number of men employed averaged fifty.

(49° 117" N.E.) This company is controlled by **Violamac Mines Limited**, which owns the adjoining **Victor** mine. The main haulage is the No. 4 level, which is connected by raises via a sublevel to the old No. 3 adit. A small amount of stoping was done on the sub-level and also on No. 2 vein on No. 4 level. All services were

supplied from the Violamac camp. Work was suspended in September. Two men were employed.

(49" 117" N.E.) This old Crown-granted claim is east of the Victor claim, about half-way along the Sandan-Victor mine road. It is owned by W. D. Pengelly and associates, of New Denver and Silverton. Since 1954 a narrow lode containing small lenses of **galena** has been developed intermittently by the extension of an old **adit**. Work in 1957 was restricted to a small amount of diamond drilling.

(49" 117" N.E.) Company office, 373 Baker Street, Nelson. Wonderful (Silver H. F. Magnuson, Wallace, Idaho, president and acting manager. Ridge Mining Capital: 5,000,000 shares, 50 cents par value. This company Company Limited) owns a large group of claims southwest of **Sandon**, including the Wonderful. A small amount of surface and underground work was done in the same location as in 1956. Two men were employed.

(49" 117" N.E.) This old mine, 1 mile west of **Sandon**, has been developed by three **adits**. The lowest or No. 3 contains about 1,000 feet of drifting and crosscutting. Most of the ore in the past has come from No. 2 **adit**. In 1957 the owner, E. H. Petersen, of **Sandon**, raised 10 feet in the west drift in No. 2 **adit**. Sorted ore from this work was sent to the Trail smelter. Production: Ore shipped, three-quarters of a ton. Gross content: Silver, 57 oz.; lead, 692 lb.; zinc, 167 lb.

SLOCAN LAKE*

Silver-Lead-Zinc

(50" 117" S.E.) This old property is located 1 mile north of New Denver. It is owned by C. Higgins, of New Denver, and was last active in 1940. In 1957 a lease was given to C. Johnson, who made a shipment to the Trail smelter from the **Tryon** claim. Production: Ore shipped, one-third of a ton. Gross content: Silver, 142 oz.; lead, 54 lb.; zinc, 9 lb.

(49° 117" N.E.) Company office, 38 South Dearborn Street, Mammoth, Stand- Chicago, Ill.; mine office, Silverton. M. P. McCullough, Chicago, ard, Monarch, president; A. M. Ham, Silverton, managing director; J. M. Mc- Enterprise Dearnid, manager; R. A. Avison, mine superintendent; C. E. (Western **Explora-** Towgood, mill superintendent. Capital: 2,000,000 shares. 50 tion Company cents par value. A management contract is held by H. L. Hill and Limited) Associates, consulting mining engineers, Vancouver. The company owns the Mammoth, Monarch, and Standard mines near Silverton, and the Enterprise mine on Enterprise Creek, 12½ miles by road south of Silverton.

The Mammoth produced continuously but at a variable rate to fit in with **custom-** ore intake at the mill. The main haulage is the No. 7 **adit**, which is connected by a 45-degree raise to No. 9 **adit** level, 340 feet below. Most of the ore above No. 8 sublevel has been mined in previous years. In 1957, as in 1956, ore was recovered from **square-** set stopes on No. 9 level. Drifting was done to the east on No. 9 level with encouraging results. On No. 7 level the Monarch **orebody** has been explored by a raise from the **Hecla** drift to the Monarch **adit**, 310 feet vertically above. Not much work was done on this **orebody** in 1957 other than the driving of a sublevel established half-way in the raise. In the **Hecla** drift the mineralized section discovered in 1956 was prepared for stoping. It was producing steadily in the latter half of 1957. All ore was delivered to the mill via the 16,000-foot tram-line, which has its upper terminal at the portal of No. 7 **adit**. Electricity and compressed air were supplied from the company's hydro plant on **Silver-** ton Creek.

*BY J. W. Peck.



Rawhiding ore at the True Fissure, Lardeau, 1914.



The Noble Five aerial tram-line at Cody in 1952, the last year it was operated.

The main development was the preparation for a new low-level drive. A new road 2.3 miles long was constructed from the old Hewitt mill-site on the Silverton Creek road to a portal site on the Tick claim at an elevation of 4,290 feet. It is proposed to drive 2,300 feet northeastward to reach a point 400 feet vertically below the No. 9 level of the Mammoth mine.

The Standard was idle, except for leasing operations. J. W. Kelly mined about 300 tons, which was milled at the company's mill.

The Enterprise mine remained closed, but the camp is intact and a watchman is employed.

The mill operated throughout 1957 treating company ore as well as Violamac ore on a custom basis. The number of men employed was increased from thirty-five to seventy in the latter half of 1957.

(49° 117' N.E.) Company office, 511, 850 West Hastings Street, Vancouver. R. Crow-Swords, president. Capital: 3,000,000 shares, 50 cents par value. The Bosun mine is on the east shore of Slocan Lake, 1½ miles south of New Denver on the Nelson-Nakusp Highway. The main haulage, No. 6 adit, is driven beneath the highway from a site 40 feet above the lake. W. H. McLeod, with the aid of a partner, has operated a lease intermittently since 1956. Exploration, consisting of crosscutting and raising, was continued in the south central section of the mine to investigate the findings of diamond drilling done many years ago, but was unsuccessful. Ore remnants were mined on No. 6 level near the main winze, in the central section above the main drift, and in the east section near the portal. This ore was milled at the Carnegie mill at Sardon. Production: Ore milled, 76 tons. Gross content: Gold, 1 oz.; silver, 1,251 oz.; lead, 6,566 lb.; zinc, 12,049 lb.; cadmium, 63 lb.

(49° 117' N.E.) Company office, 532 Burrard Street, Vancouver. W. Tattrie, mine manager; T. Leask, mill superintendent. Capital: 5,000,000 shares, no par value. This company owns the Van Roi and Hewitt mines, 6½ miles by road southeast of Silverton. Transcontinental Resources Limited has directional control. In the Hewitt mine an orebody below No. 10 level was developed in 1956 by a winze to No. 11 level. This block of ore, 95 feet long, was leased to J. Heichert for removal. Eight men were engaged in this work, and the operation was completed in July. Another lease was given to M. Tarnowski, who mined ore remnants in the same area above No. 10 level. Another lease on this level was given in the latter part of 1957 to J. Harding and A. Cooper.

In the Van Roi mine the S.F. and M. Mining Company, which has leased the mine since 1953, operated on a reduced scale. Some development was done on No. 4 level in the "Brookes" stope area. Four men were engaged in this work.

The Van Roi mill is 1 mile south of Silverton on the Nelson-Nakusp Highway. It operated in 1956 after being shut down since 1952. In 1957 it operated intermittently until September, handling lessees' ore from the Hewitt and Van Roi. Custom milling was also done for the Westmont mine on Enterprise Creek.

(49° 117' N.E.) This mine is 2 miles by road south of Silverton. Galena Farm For several years it has been operated intermittently on lease by Frank S. Mills, of Silverton. A mineralized fissure, discovered in 1955 east of the old shaft, was developed in 1956 by a short adit and shallow winze. In 1957 the old Galena Farm main adit was rehabilitated for 500 feet and a raise connection 100 feet long was made with the winze. A small orebody of milling grade was exposed in this work. No shipments were made in 1957, and the property was idle in the latter half of the year.

Westmont (49" 117" N.E.) This is a group of eight Crown-granted claims on the north side of Enterprise Creek, opposite the Enterprise mine. It is owned by J. A. Cullinane, of Nelson. A short access road leads to the lowest of four adits from a point on the Enterprise road about 4 miles from the Nelson-Nakusp Highway. The property has been idle since 1929, except for a leasing operation in 1956. In 1957 a lease was given to Chexdeco Mining Limited, of Nelson. The No. 4 dump was trucked to the Van Roi mill at Silverton.

Boomerang (49" 117" N.E.) The Boomerang and Richmond claims are owned by the estate of S. N. Ross, which is administered by the executrix, Mrs. E. Ward, of Rosslund. The claims are on the south side of Enterprise Creek, about 1 mile above the confluence with Paupo Creek. The property is accessible by a fair road to Paupo Creek, 9 miles from the Nelson-Nakusp Highway, and thence by a steep road and 1,000 feet of trail. A narrow quartz-tetrahedrite vein in granite has been developed by two adits which have been inaccessible for many years. In 1957 the Boomerang and Richmond Mining Company employed two men on a lease arrangement reopening the lower adit. The portal was retimbered and the adit made accessible for 225 feet. Work then ceased without the vein having been exposed.

White Hope, Homestake (Dolores-Dorothy Exploration-Dorothy Mining Company Limited) (49" 117" N.E.) Company office, 2, 415 Baker Street, Nelson. D. C. Bentley, manager. Capital: 600,000 shares, \$1 par value. This company owns the White Hope, White Hope No. 1, Homestake, and Senator Crown-granted claims and six recorded claims astride the Nelson-Nakusp Highway north of Slocan City. The main workings are on the White Hope and Homestake claims and are accessible by short access roads from points on the highway 4 and 5½ miles respectively north of Slocan City. On the White Hope a narrow vein in granite, striking south 40 degrees east and dipping 50 degrees southwestward, has been explored by two adits, 25 feet apart vertically. Most of the ore shipments in the past came from the upper adit, which is about 80 feet long with a raise to surface. The best part of the vein not mined shows 2 to 6 inches of zinc mineralization. The lower adit is 50 feet long and exposes a wider vein section but with minor mineralization. There is another adit at the elevation of the upper adit which was driven 140 feet as a crosscut to intersect a parallel vein exposed in an open-cut above, but no vein was encountered. In 1957 a new adit site was chosen to explore these veins at a horizon about 50 feet below the lowest workings. A crosscut was driven 200 feet, but no worth-while mineralization was encountered. Three men were employed in this work. On the surface a building was erected to house a portable compressor.

At the Homestake, silver-lead showings had previously been prospected by open pits and short adits. In 1957 a lower adit was extended 200 feet, but no worth-while mineralization was encountered. Two men were employed in this work.

SPRINGER CREEK*

Silver

Ottawa (Ottawa Silver Mining & Milling Company).-(49" 117" N.E.) Company office, c/o W. E. Graham, Slocan City. Capital: 3,000,000 shares, 1 cent par value. This company owns the Ottawa mine on Springer Creek, 5 miles by road from Slocan City. C. Thickett, operating under a lease arrangement, obtained ore by underhand mining in the lowest or No. 6 adit.

*BY J. W. Peck.

NORTH LARDEAU*

Gold-Silver-Lead-Zinc

(50" 117" N.W.) Company office, 604, 744 West Hastings Street, Spider, Eclipse Vancouver; mine office, Beaton. J. Drybrough, president; J. A. (Sunshine **Lardeau** Pike, managing director; G. G. Sullivan, manager; O. Marling, Mines Limited) mine superintendent; E. Hall, mill superintendent. Capital: 4,000,000 shares, no par value. The mine camp and mill are at the old townsite of Camborne, 6 miles by road northeast of **Beaton** on the northeast arm of Upper Arrow Lake. The mine is on the south side of Pool Creek, 2 to 3 miles by very steep road from Camborne. The Spider No. 4 **orebody** has been developed by several **adits**, the lowest being No. 10. The **orebody** is vein-like with a northerly strike and a dip of 75 degrees to the east. It is 1 to 4 feet wide, except at the junction of short branch veins, where it is as much as 18 feet wide. The **orebody** was 90 feet long above No. 7 level to near surface, 300 feet long on No. 8 level, and 450 feet long on No. 10 level. Mining in 1957 was restricted to the northern extremity of No. 10 level and a remnant above No. 7 level. Nearly all ore had been mined above No. 10 level by the end of the year. Preparations were made to sink a winze to recover the ore below No. 10 level, but the project was abandoned **after** the hoist station was cut. Underhand mining was started on the vein in December.

The Eclipse **orebody** is serviced by a 1,000-foot crosscut from the No. 10 level of the Spider mine. A raise has been driven on the vein to an **adit** 270 feet vertically above. The **orebody** on No. 10 level was 180 feet long and 6 feet wide, with strike and dip similar to the Spider **orebody**. The ore pinches out 130 feet above No. 10 level and was mined out by the end of 1957. A winze was sunk on the vein 150 feet at 65 degrees, and a level was established at 130 feet in the winze. This level, No. 11, was driven 160 feet and a raise driven to No. 10 level. About half the ore between No. 11 and No. 10 levels was removed by shrinkage stoping by the end of 1957.

A lease was given to S. Barclay, who worked No. 5 and No. 6 levels of the Spider mine with the aid of a partner. A few carloads of sorted ore were obtained.

On the surface, a geophysical survey was carried out to the south of the mine workings. Two anomalies were located. These **were** being checked in December by diamond drilling.

The mill operated continuously at an average of 2,400 tons per month. Mill-heads averaged: Silver, 9.5 oz. per ton; lead, 7.3 per cent; zinc, 9.3 per cent. Concentrates were shipped to smelters in the United States. The number employed averaged sixty-nine.

(50" 117" N.W.) Company office, 404 **Pemberton** Building, 744 Beatrice (Beatrice West Hastings Street, Vancouver. W. J. Scorgie, president and Mining Co. Ltd.) managing director. Capital: 50,000 shares, \$1 par value. This company owns a group of claims at the head of the east fork of Mohawk Creek. The main workings are on the Beatrice claim and are accessible by 4 miles of tractor-road from the Spider mine road. No work was done in 1957 other than **some** improvement to the camp buildings.

(50" 117" N.W.) Company office, 423 West Broadway, Vancouver. W. L. **Sebolt**, manager. Capital: 3,000 shares, no par value. The Silver Dollar mine adjoins the holdings of Beatrice Company Limited) Mining Co. Ltd. on the northwest. The Beatrice tractor-road passes through the Silver Dollar camp at a point about $3\frac{1}{2}$ miles from its junction with the Spider mine road. A quartz vein containing minor silver values was developed many years ago by two connected **adits**, 50 feet apart vertically. In 1952 diamond drilling was done from the surface north of the mine workings to test

* By J. W. Peck, except as noted.

the continuity of the vein on strike. In 1957 drifting was done on the vein in the lower adit to reach a point under the surface drill-holes. A crosscut was driven 70 feet into the hangingwall at this point to establish a diamond-drilling station. A total of 464 feet of drifting and crosscutting and 1,934 feet of diamond drilling was accomplished.

The old camp buildings were improved and a new cook-house was erected. Eight men were employed. All work ceased in November.

(50° 117' N.W.) Company office, 2210 Palmerston Avenue, Pipestem, Wide West Vancouver. G. D. Humphrey, president and manager. West, Lost Chord Capital: 10,000 shares, \$10 par value. This company owns Alma (Lardeau several groups of claims on Pool Creek. Most of the work in Mines Exploration 1957 was concentrated on the Pipestem group, which is on the Limited) north side of Pool Creek near the confluence with Mohawk Creek.

A short access road leads to the property from a point on the Sunshine Lardeau mine road near the No. 8 portal of the Spider mine. Trenching was done on vein exposures and a geophysical survey was carried out. Living quarters were erected. Work was done on the trails leading to the other groups near the head of Pool Creek. About five men were employed.

Silver-Lead

(50° 117' N.E.) Company office, 15th Floor, 1030 West Index (Northern Georgia Street, Vancouver. K. Hannigan, president; S. Donald Inland Resources Moore, vice-president. Capital: 20,000 shares, no par value. Ltd.)* This company holds the Index, Red Cliff, Royal R, Hidden Treasure, President, and White Quail Crown-granted claims under agreement, and the Joy group of eleven claims and the Star Fraction by record. These claims extend along the southwest side of Index Creek, from Redcliff Peak to Gainer Creek. Stripping of galena mineralization on the White Quail and Index in the summer of 1956 was followed by the diamond drilling of two holes that autumn and eight holes in the summer of 1957, all on the Index, and totalling 1,800 feet. Camp was made in the Mollie Mack cabins at Gainer Creek, 10 miles by road from Ferguson and 2 miles by jeep and tractor road from the Index. About five men were employed.

The galena is disseminated in portions of the thin Mollie Mac limestone that have been replaced by siderite. This member thickens and thins and appears to be largely squeezed out in the upper part of the Index basin. On the Index claim it is about 60 feet wide and dips vertically or steeply southwest. It is offset short distances by a number of cross-faults, at least one of which contains a little galena. Three mineralized zones occur in the limestone on the Index claim. The middle one is about 5 feet wide and 150 feet long. Another lies along the hangingwall and is rather ragged but probably averages 6 feet wide and is about 500 feet long. The third lies close to the footwall and has been the principal object of the drilling; it is 8 to 10 feet wide and has been traced for 1,000 feet. A short adit and shaft were driven into opposite sides of the limestone some years ago. The limestone is mostly covered in the southeast one-third of the Index claim, but several old pits expose a little mineralization near the boundary.

Silver-Lead-Zinc

(50° 117' N.E.) Executive office, 660 Market Street, San Francisco (The Cisco, Calif.; operations office, Kellogg, Idaho. W. G. Woolf, Bunker Hill Co.) vice-president; A. E. Nugent, exploration geologist. This company holds an option on the Bannockburn group of claims from J. Gallo, of Howser, together with an option on some adjoining recorded claims owned by Sheep Creek Mines Limited. The Bannockburn group is on the south side of Hall

* By J. W. Peck and G. E. P. Eastwood.

Creek on one of its headwater tributaries. The property is reached by a 17-mile road up Healy Creek to the divide with Hall Creek and thence by a rough trail about 4 miles long. It has been idle for over fifty years, except for surface diamond drilling done in 1955 by The Granby Consolidated Mining Smelting and Power Company Limited. In 1957 the Healy Creek road was reconditioned and road construction started towards the Bannockburn. Considerable rock was encountered, and only about one-quarter of the estimated 4-mile road had been completed when work ceased because of an early snowfall in September. A geological map of the area was produced for the company by Bruce Reed.

SOUTH LARDEAU*

J.G. (50° 116" S.W.) This group of claims lies northwest of Glacier Creek and extends across a mountain ridge to the east arm of Duncan Lake. The ground was at one time known as the Amato-Ruby and Glacier groups. It is owned by J. Gallo and associates, of Hawser, but was under option to The Consolidated Mining and Smelting Company of Canada, Limited. A band of limestone has been explored by trenching and diamond drilling over several thousand feet of strike length, and there is an adit on the Glacier Creek side. Work in 1957 was restricted to geological mapping.

(50° 116" S.W.) Company office, 717 West Pender Street, Vancouver. C. G. Willett, president; O. Moen, superintendent.
Moonshine, Right Bower (Willett Mines Ltd.) Capital: 1,000,000 shares, 50 cents par value. This property is on the Kaslo-Lardeau Highway: 1 mile south of Lardeau.

A narrow fissure vein in limestone has been developed by two short connected adits and an old shallow inclined shaft. The upper adit has been stoped to surface. A new level was started from this stope, with access via a raise from the bottom level. It was driven 50 feet on the vein. Overhand stoping was done in this drift to a height of 15 feet, making the back of the stope about 15 feet from surface.

On the surface, the vein was stripped below the lower adit, and some ore was obtained. The total ore from underground and surface amounted to 268 tons. It was shipped to the smelters at Trail and Kellogg, Idaho. Five men were employed during May and June.

CRESTON†

Lead-Silver-Copper

King (King Crest Mines Ltd.) (49° 116" S.W.) Company office, 516, 736 Granville Street, Vancouver; mine office, Creston. This company owns ten claims on Glaser Creek, 2 miles north of Creston. A crew of four men was employed sinking a 30-foot winze to a vertical depth of 20 feet on a g&ma-bearing quartz vein immediately west of the farm owned by L. J. Lansing, of Creston. In addition, 216 tons of low-grade ore was shipped to the Bunker Hill smelter at Kellogg, Idaho. This was from an irregular quartz vein in a diorite sill which outcrops on the west side of a low ridge 1 mile north of the winze workings.

Copper

May-Bee (49° 116" S.E.) This property, comprising three recorded claims owned by O. Arrowsmith, of Erickson, is on the north side of Arrow Creek, 3 miles west of Kitchener on the Creston-Cranbrook Highway. The claims are astride the south end of the Iron Range Mountain fault, and extend from the north side of Goat River northward up the mountain.

Access to the property is in part by way of either of two logging-roads, the remaining distances being by short trails to the workings. One road leaves the highway a quarter

* BY J. W. Peck.

† By J. E. Merrett.

of a mile west of Goat River bridge and passes the bottom claim a mile from the highway. The other road is by way of Kitchener, crossing the Goat River and ending close to the upper claim. This road is very rough and is suitable only for four-wheel-drive vehicles.

It is reported that several open-cuts have been made on the property on five separate veins. However, the depth of snow prevented the examination of anything other than two adits on the main vein. This occurrence is a chalcopyrite-bearing quartz vein ranging in width from 1 foot to 5 feet. The vein, striking north 36 degrees west and dipping vertically, is in a diorite sill of Purcell age in the Iron Range Mountain fault zone.

The upper adit, 83 feet in length, is at an elevation of 3,200 feet. The portal is in a creek bed and consequently is very wet. Leaching has removed most of the sulphide mineralization from the quartz to a distance of at least 20 feet from the portal. Seven samples were taken between this point and the drift face, as in the following table:-

Location of Sample	Width	Gold	Silver	Copper
	Ft.	Oz. per Ton	Oz. per Ton	Per Cent
Main adit face (portal + 83 feet)	2.3	0.03	0.5	1.81
Portal + 70 feet	1.0	Nil	0.1	0.82
Portal + 60 feet	2.0	Nil	0.4	0.72
Portal + 50 feet	2.0	Nil	Nil	0.09
Portal + 40 feet	3.2	Nil	0.3	0.56
Portal + 30 feet	4.6	Nil	0.3	0.18
Portal + 20 feet	1.8	0.02	0.5	0.18

A yellowish green lamprophyre dyke of northerly strike comes against and follows the vein. Isolated and unoriented plates of biotite as much as 1¼ inches in diameter occur within the dyke rock.

The second adit, which is 45 feet long, is 180 feet vertically below and about 600 feet down hill from the upper adit. No sulphides or secondary copper mineralization were seen in this drift and no samples were taken.

At the end of 1957 it was reported that 40 feet of surface stripping had been done along the vein, the upper adit had been extended a distance of 55 feet, 10 miles of access road via Kitchener had been repaired, and one-quarter mile of new road had been constructed.

Iron

Kitchener (The Consolidated Mining and Smelting Company of Canada, Limited).—(49° 116" S.E.) A small crew was employed reopening the Arrow Creek road to the summit of Iron Range Mountain, where bulldozer stripping was done on the large hematite deposit.

GOAT RIVER*

Silver-Lead-Zinc

Star

(49° 116" SE.) This property, owned by F. J. Brady, of Creston, is on the east side of Goat River approximately 3¾ miles from Kitchener, on the Creston-Cranbrook Highway. It is at an elevation of 4,500 feet. Access is by 2¼ miles along the Goat River road and 1½ miles of logging-road.

At the top of a talus slope a rock cut 7.5 feet long and 25 feet wide in Aldridge quartzite discloses a narrow quartz vein striking north 71 degrees east and dipping 72 degrees to the south. The vein is irregularly mineralized with galena and minor amounts of sphalerite and chalcopyrite. In some places the sulphides are absent and in others there are pods of galena 2 inches to 1 foot in width. The quartzite walls in the immediate vicinity of the vein are limy. A pit 7 feet deep was dug on the vein at the bottom of the open-cut. The pit exposed a diorite sill striking at right angles to the vein. Only

* By J. E. Merrett.

a small quantity of ore was seen, and from the surface evidence it would not appear profitable to mine it.

Two samples were taken—one across the vein where galena was present and the other a grab sample from a small pile of stacked ore. These were taken to indicate the silver-lead ratio.

Location of Sample	Width	Gold	Silver	Copper	Lead	Zinc
Top of open cut	Ft. 0.3	Oz. per Ton <i>Nil</i>	Oz. per Ton 21.0	Per Cent 0.04	Per Cent 61.1	Per Cent <i>Nil</i>
Ore dump	Grab	Trace	10.6	0.05	34.8	7.2

(49° 116" S.E.) This property, owned by F. I. Brady, is east of Blue Rain and adjoins the Star group. Traces of **tetrahedrite** in quartzite have been observed over a large area. A few short diamond-drill holes have been drilled at random locations in order to prospect the occurrence. A grab sample from this property assayed: Gold, trace; silver, 0.3 oz. per ton; copper, nil; nickel, less than 0.1 per cent.

KIMBERLEY

Silver-Lead-Zinc

(49° 115" N.W.) Company office, 215 St. James Street West, Montreal; mine and smelter office, Trail. R. E. Stavert, Montreal, president; R. D. Perry, Trail, vice-president and general manager; W. G. Jewitt, Trail, vice-president in charge of mines. Sullivan mine office, Kimberley. J. R. Giegrich, general superintendent; A. G. Robertson, superintendent of concentration; R. N. Porter, mine superintendent; H. W. Poole, Chapman Camp, superintendent of concentrator. Capital: 20,000,000 shares, no par value. This company owns and operates the Sullivan mine on Mark Creek, near Kimberley, and the Sullivan concentrator at Chapman Camp. The holdings include 67X Crown-granted mineral claims and fractions in a block in the Kimberley area, covering and surrounding the mine workings, from which over 73,923,500 tons of ore has been removed since December, 1909, at which time the company commenced operations on this property. The following report, prepared by the management, is a synopsis of the 1957 operations:-

"The Sullivan mine produced and the concentrator treated 2,423,577 tons of ore during 1957. The open-pit operation, which was temporarily closed down in May, produced 8 per cent of the mine tonnage. The section of the mine above the 3900 level produced 64 per cent of the mine tonnage. The remainder of the mine tonnage, 2X per cent, was produced from below the 3900 level.

"Long-hole drilling methods, using diamond drills and percussion drills with sectional steel, accounted for 85 per cent of the underground production. The remainder of the underground production was obtained from open stopes by bench mining methods. Three winzes for float filling of stopes below the 3900 level and two for gravel filling above 3900 level were sunk by diamond-drill methods, the longest one being 53 feet.

"The development footage of 57,098 for 1957 was considerably above that for 1956. The increase was mainly in development for stoping and backfilling. The backfill development included a long raise driven to surface for the gravel filling of three stopes above the 3900 level.

"In 1957, 160,000 cubic yards of gravel backfill were placed in two stopes above the 3900 level, and 228,100 cubic yards of float fill, returned from the concentrator, were placed in eleven stopes below the 3900 level. Of the total float fill placed, 29 per cent was scrapped. Induced caving of waste rock from the hangingwall following pillar extraction amounted to 293,800 cubic yards of backfilling above the 3900 level.

"Primary ventilation of the mine was done by seven Jeffrey fans totalling 950 horsepower, two Joy fans totalling 250 horsepower, one 100-horsepower Sheldon fan, and one 75-horsepower Sirocco fan. The total volume of air exhausted from the mine was approximately 900,000 cubic feet per minute.

"An active safety programme was maintained at the mine and concentrator during the year. The mine, with fifty-three lost-time accidents, had a frequency rate of 0.23 accidents per 1,000 shifts and a severity rate of 12.2 days lost per 1,000 shifts worked. The concentrator came close to equalling their best year of 1956 with only five lost-time accidents, giving a frequency rate of 0.05 and a severity rate of 0.9 per 1,000 shifts worked. Days lost due to accidents were: 2,814 at the mine and 101 at the concentrator.

"Eye protection is now worn by all employees underground. Seventy-three new employees attended the induction school at the mine. A total of 2,005 have had this training since the school was started. Twenty-five new miners were given a four-week course of mining instruction. Since the mining school was organized in 1947, 251 men have been given this training. Eighteen employees were trained in mine-rescue and were awarded their certificates. Mine-rescue and first-aid teams competed in local, East Kootenay, and Provincial competitions. An underground emergency fire and rescue squad was organized during the year, and twenty-eight men were given three days' training comprised of lectures and practical work. Fifty-six new employees were given a job safety training course and 147 employees a refresher course. Seven employees were successful in obtaining their industrial first-aid certificates. Three hundred and forty-five St. John first-aid certificates were awarded to 182 adults of the community, including a high percentage of employees, and to 163 school students. Training was done by mine and concentrator safety personnel.

"The concentrator operated 250 days. The milling rate averaged 11,000 tons per day for the first five months of the year but decreased to 8,800 tons per day for the balance of the year after the open-pit operation was suspended. A 125-ton-per-day pilot mill was constructed in the main concentrator building. The pilot-mill equipment generally duplicates the flotation flow of the main concentrator, and various circuits and reagents will be investigated.

"The number of men employed at the mine and concentrator at the year-end was 1,366, of whom 706 were employed underground."

FORT STEELE*

Silver-Lead-Zinc

Fort Steele Gold and Silver Mines Ltd.

(49" 115" N.W.) Registered office, 1442 Bay Avenue, Trail; mine office, Box 1720, Cranbrook. D. Shirling, president; C. F. Gorse, manager. The Joy, Rita, and Gertrude claims on the north side of Wild Horse River between Brewery and Fisher Creeks are held by C. F. Gorse. Immediately below the junction of Fisher Creek and Wild Horse River a caved adit 8 feet in length and 26 feet of abandoned shaft were reopened on a mineral occurrence of silver, lead, and zinc.

ELK RIVER*

Copper

Silver King

(49" 115" S.E.) This property comprises two claims overlying Lots S 34 and S 36 on the east bank of the Elk River, 3 miles south of Elko. It is owned by Z. A. Dunlop, of Elko. Access is by way of a narrow abandoned road on the east bank of the river.

The mineral occurrence consists of a few narrow scattered quartz stringers containing minor amounts of pyrrhotite and chalcopyrite in quartzite bands exposed below high-water level. The quartzite bands, which in places are well mineralized with fins

* By J. E. Merrett.

disseminated pyrite, alternate with bands of highly sheared argillite. The formation is Precambrian in age. Insufficient ore mineralization is evident to warrant further development.

Lead

Leah (49" 115" S.E.) R. Monesmith, of Waldo, and partners own six mineral claims on the summit and south slope of Sheep Mountain on the west side of the Elk River, approximately 3 miles south of Elko. Access to the property from the Elko-Rooseville Highway is by 1½ miles of narrow road.

Several widely scattered open-cuts have disclosed narrow vertical quartz veins of east-west strike and undetermined length in quartzite, closely paralleling Purcell diorite sills. Rare patches of galena occur within the quartz veins. At no point was sufficient ore mineralization apparent to warrant further development.

SKOOKUMCHUCK*

Tungsten

Pica (The Consolidated Mining and Smelting Company of Canada, Limited) (49" 116" N.E.) This property, comprising in excess of ninety mineral claims, is on Burnt Creek or the Second North Fork of Skookumchuck Creek. Access from Torrent station on the Kootenay Central Railway is by 18 miles of good dirt road and 4 miles of road suitable only for four-wheel-drive vehicles. The mineral occurrence is scheelite in a skarn zone within granite. The scheelite, which appears abundantly in some surface outcrops and in some boulders on the hillside, is associated with quartz, garnet, chlorite, and minor amounts of chalcopyrite and pyrrhotite.

A crew of eight men was employed surface stripping by bulldozer and hydraulic methods.

WINDERMERE'

TOBY CREEK (50" 116" S.E.)

Silver-Lead-Zinc

Mineral King (Sheep Creek Mines Limited) Company office, 6, 490 Baker Street, Nelson; mine office, Toby Creek. H. E. Doelle, managing director; J. B. Magee, mine manager. The property is on the Toby Creek slope of the ridge between Jumbo and Toby Creeks, 27 miles west of Athalmer. The deposit is a lead-zinc replacement, with barite, in limestone of the Mount Nelson formation. Development included 1,619 feet of drifts and crosscuts, 1,818 feet of raises, 381 feet of shaft raise, and 5,123 feet of diamond drilling in sixty holes. Parallel manway and ore-pass raises were completed from the inner end of No. 7 level to No. 3 level. A 50-horsepower hoist was installed underground on No. 7 level and a man-skip in the shaft for servicing between the levels. At the end of the year No. 7 level was being extended preparatory to driving a waste-pass raise system to No. 3 level.

Drifting on Nos. 4 and 5 levels, on a mineral occurrence encountered while raising the shaft, disclosed an ore zone ranging in width from 6 to 28 feet and with a higher lead content than encountered elsewhere in the mine. It is possible that this zone is a downward extension of the south end of the "A" ore zone.

Open-stope mining methods were used, and 168,119 tons of ore was mined and milled.

The mine ventilation was both natural and mechanical, with approximately 29,000 cubic feet of air per minute being exhausted from the workings. A 15-horsepower 6 HS Canadian Sirocco fan of 18,000 cubic feet per minute capacity was installed at No. 2 level intake.

* By J. E. Merrett.

On the surface a 500-ton coarse-ore bin was built and a 200-foot-long trestle leading to it from No. 7 level portal.

New equipment included a vibrating coarse-ore feeder under the new ore-bin, a 100-horsepower Belliss-Morcom air compressor in the power-house, and two diesel locomotives (27 and 30 horsepower) underground.

The average number of men employed was ninety-five, of whom fifty were employed underground.

HORSETHIEF CREEK (50° 116" N.E.)

Silver-Copper

Ptarmigan

This property is at an elevation of 8,600 feet, at the headwaters of Red Line Creek, a tributary of McDonald Creek, which in turn is a tributary of Horsethief Creek. H. F. K. Seel, of Edgewater, is the owner. A crew of three men was employed removing the ice from part of the old workings and reestablishing ventilation. A small cut-and-fill stope was developed on No. 3 level on a narrow quartz vein mineralized with tetrahedrite and pyrite. Six shipments of ore totalling 21 tons were made to the Trail smelter. Silver assays of these shipments ranged from 15 to 203 ounces per ton. The property was in continuous operation from May 15th.

SPILLIMACHEEN*

Silver-Lead-Zinc

Silver Giant (Giant Mascot Mines Limited)

(50° 116" N.E.) Company office, 908 Royal Bank Building, Vancouver; mine office, Spillimacheen. R. B. Buckerfield, president. A management contract is held by H. L. Hill and Associates, consulting mining engineers, Vancouver. J. M. McDearmid, general superintendent; J. C. Ehlers, mine superintendent; J. A. Vallance, mill superintendent; D. C. Beddie, surface superintendent. The property is on the west slope of Jubilee Mountain, on the northeast side of Spillimacheen River, 8 miles by road from Spillimacheen station on the Kootenay Central Railway.

Mining was discontinued on June 1st and milling on June 7th because the known ore reserves were exhausted. Diamond-drill exploration was discontinued July 29th, at which time the crew was reduced to a watchman.

Development work included 1,590 feet of drifts and crosscuts, 449 feet of raising, and 8,059 feet of diamond drilling.

During the period of operation 75,237 tons of ore was milled. A crew of 107 men was employed.

VOWELL CREEK*

Silver-Lead-Zinc

Ruth-Vermont (Rio Canadian Exploration Ltd.)

(50° 116" N.W.) Company office, Suite 1001, 335 Bay Street, Toronto. President, D. R. Derry. The property is on Vermont Creek about 3 miles west of its confluence with Vowell Creek, which is tributary to the Spillimacheen River by way of Bobbie Burns Creek. It was reported that a small amount of diamond drilling was done and a geochemical survey was made of soil samples.

FIELD*

Silver-Lead-Zinc

Monarch and Kicking Horse (Base Metals Mining Corporation, Limited).-(51° 116" S.E.) The mill equipment was removed and shipped to the property of Cowichan Copper Co. Ltd. on Cowichan Lake. While removing the equipment, 60 tons of lead concentrate and 94 tons of zinc concentrate were recovered and shipped to the Trail smelter.

* By J. E. Merrett.

Copper**SKAGIT RIVER***

A.M.
(**Canam** Copper
Company Ltd.)

(49° 121° S.E.) Company office, Hope. S. A. Perry, Toronto, president; F. R. Thompson, mine manager. The A.M. group consists of eight Crown-granted claims, in addition to which the Parks Branch of the Department of Lands and Forests allowed use of a small area in Manning Park under Park Use Permit No. 10. The property is on the western boundary of Manning Park and is about 4 miles by road southerly from approximately Mile 26 on the Hope-Princeton Highway. The claims are about 24 miles southeast of Hope.

The 4300 level adit was driven an additional 603 feet; the total distance driven on this adit since it was started in 1955 is 5,454 feet. Much of the work was done with considerable difficulty in the water-bearing sheared zone in granitic rock. Work was suspended in February, 1957.

Nickel-Copper**HOPE***

Western Nickel
Limited

(49° 121" SW.) Company office, 1111 West Georgia Street, Vancouver; mine office, Hope. D. W. Pringle, manager; L. R. Archibald, mine superintendent. The property is at the head of Stulkawhits (Texas) Creek, which flows eastward into the Fraser River about 6 miles north of Hope. From a point on the Trans-Canada Highway 10 miles north of Hope, a good gravel road, 5.1 miles long, leads up Stulkawhits Creek to the mine camp near the 2600 adit portal. A branch road from the camp provides access to the 3550 adit.

In November, 1954, work was suspended after the 2600 adit, an inclined raise, and the 2950 sublevel were driven. This work provided access for diamond drilling beneath known mineral occurrences.

In April, 1957, The Granby Consolidated Mining Smelting and Power Company Limited was appointed to conduct the management of the mine. The road from the mine to the highway was rebuilt throughout, and a machine-shop, change-house, warehouse, assay office, crushing plant, concentrator, and concentrate-storage buildings were built at the mine. Concentrate-loading facilities were built at the Canadian Pacific Railway siding at Choate.

In the underground workings, the inclined raise from the 2600 level to the 2950 sublevel was continued to the 3550 level and was converted to an internal shaft for servicing this and intermediate levels. A station was cut at the 3250 level. An ore-pass was driven from the 2600 level to the 3550 level. A raise 700 feet long was being driven in the Pride of Emory orebody from the 3550 level to surface.

Sublevel and shrinkage methods of mining are being used. Production started in January, 1958.

The following summary supplied by the management shows the underground work completed during 1957: Winze, 456 feet; ore-pass, 1,200 feet; raises, 1,780 feet; drift and sublevels, 1,121 feet; diamond drilling, 7,264 feet. At the end of the year 240 men were employed.

Gold

Blue Chip

(49° 121° S.W.) This property, comprising eight claims held by record, is adjacent to the Trans-Canada Highway approximately 1 mile west of Laidlaw. D. McWilliams has an agreement with the recorded owner, George Steeves, to operate the property. The showings are in diorite and consist of several narrow stringers containing pyrrhotite, arsenopyrite, and chalcopyrite, striking north 34 degrees east and dipping about 15 degrees northwest. The stringers have been explored by former owners with open-cuts and short tunnels.

. By R. B. King.

In 1957 two trial shipments of vein material totalling 3,280 pounds were sent to the Tacoma smelter.

HOWE SOUND*

Copper

(49° 123" N.E.) Head office, 730 Fifth Avenue, New York, N.Y.; mine office, Britannia Beach. E. C. Roper, president; J. S. Roper, acting manager, succeeded G. C. Lipsey, vice-president and general manager who retired November, 1957; L. Allan, mine superintendent. The company owns and operates the Britannia mine and concentrator at Britannia Beach. The following summary supplied by the management provides details of the operation in 1957:—

Classification by Type

Class	Jane	No. 8	Bluff	Fairview	Empress	Victoria	Total
	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.
Drifts	220	1,104	1,187	...	...	1,154	3,665
Crosscuts	95	214	413	21	...	100	843
Raises	338	2,074	2,512	460	18	814	6,216
Powder workings	235	...	1,652	203	...	...	2,090
Totals	888	3,392	5,764	684	18	2,068	12,814

Classification by Mine

Mine	Current	Stope	Total	Percentage of Total
	Ft.	Ft.	Ft.	
Jane	153	735	888	6.93
No. 8	924	2,468	3,392	26.47
Bluff	834	4,930	5,764	44.98
Fairview	...	684	684	5.34
Empress	...	18	18	0.14
Victoria	1,007	1,061	2,068	16.14
Totals	2,918	9,896	12,814	100.00

The ore is mined by caving, shrinkage, open-cut-and-fill and filled square-set mining methods. The tonnage broken in the various sections of the mine was as follows: Bluff, 403,618; Fairview, 113,683; Victoria, 92,717; No. 8, 198,537; Jane, 34,794; Empress, 2,619; development, 5,692; total, 851,660 tons.

The consumption of explosives and blasting accessories was: Powder, 18,802 cases; electric blasting-caps, 10,977; No. 6 blasting-caps, 338,760; safety fuse, 2,534,405 feet.

The accident-frequency rate for the mining department was 0.28 per 1,000 shifts worked. The severity rate was 16.71 shifts per 1,000 shifts worked. The total men on the mine payroll at the end of the year was 323, including SO staff. The total number of shifts worked in the mining department was 134,851.

The total number of full-time employees in all departments at Britannia at the end of the year was 523. The accident-frequency rate for the whole operation was 0.23 per 1,000 shifts worked. Production: Ore milled, 849,212 dry tons.

TEXADA ISLAND*

Iron

Texada Mines Ltd.

(49° 124" N.W.) Registered office, 626 West Pender Street, Vancouver. A. D. Christensen, San Francisco, president; B. L. Alexander, general manager; J. Kenneth Halley, chief engineer; J. Yuill, mine superintendent. This property is on the southwest

* By R. B. King.

coast of Texada Island about 3 miles westerly from Gillies Bay, which is nearly 70 air miles northwest of Vancouver airport. The Prescott, Paxton, and Yellow Kid orebodies were mined during the year.

Magnetite is mined in pits from levels which are established at 20-foot intervals. Waste rock is stripped where necessary and hauled to waste dumps. Vertical holes are drilled with Joy and Gardner-Denver rotary drills and wagon drills and are blasted electrically. The broken ore or waste is loaded by 2½-cubic-yard diesel-driven shovels into 15-cubic-yard-capacity trucks and is transported to stockpiles or to the crushing plant. Ore is crushed in three stages, and a concentrate is made by magnetic separators. The fine concentrate is conveyed to storage bins and then to the concentrator. In the concentrator it is ground in ball mills and classified. The classifier discharge is pumped to flotation cells, where a copper concentrate is made. The flotation tailings are passed over wet magnetic separators, and a magnetite concentrate is recovered. This concentrate is dried in a rotary kiln and is conveyed to a stockpile.

A new loading-dock was built to replace the dock destroyed December 5th, 1956, by a slide of marine silt.

In 1957, 209,271 tons of magnetite concentrates was shipped. Approximately 100 men were employed.

VANCOUVER ISLAND*

BENSON (ELK) LAKE (50° 127" S.E.)

Iron

Company office, 736 Granville Street, Vancouver; mine office, Empire Development Company Limited, Port McNeill. J. A. C. Ross, general manager; A. Shaak, mine manager. This property is south of Benson and Kathleen Lakes in the Quatsino-Nimpkish area of Vancouver Island. It is reached by a 25-mile road from Port McNeill on Broughton Strait. Magnetite ore is mined from two open pits on the Merry Widow orebody at an elevation of 2,500 feet. Vertical blast-holes are drilled by Gardner-Denver rotary drills. Broken rock is loaded by 2½-cubic-yard diesel-driven shovels on to trucks and hauled about 1 mile to a crushing plant. Crushed material is conveyed to a loading-bin at the head of an inclined surface tram. Ore is loaded into R-ton-capacity skips which operate in counterbalance. The ore is dumped from the skips into a bin and is then conveyed to the concentrator, at an elevation of 800 feet, where it is crushed and ground to proper size. The magnetite concentrate is separated magnetically and is stockpiled. The concentrate is trucked to Port McNeill, where it is again stockpiled for shipment. The surface tram, crushing plant, concentrator, and stockpiling and ship-loading facilities were built during the year.

The mine produced 121,423 tons of ore, yielding 82,668 tons of magnetite concentrate, of which 65,033 tons was shipped.

ZEBALLOS (50° 126° S.W.)

Gold

Company office, Powell River. C. J. L. Lawrence, president; White Star (Cascade Lode Mines Limited), H. A. Thielman, managing director. This property is on Spud Creek, a tributary of Zeballos River, and is about 5 miles from the village of Zeballos. The workings of the White Star mine were rehabilitated and some drifting was done. In December, 1957, a shipment of 5 tons of hand-sorted ore was shipped to the Tacoma smelter.

*By R. B. King, except as noted.

UPPER QUINSAM LAKE (49° 125" N.W.)

Iron

Iron Hill
(Argonaut Mine
Division of Utah
Co. of the
Americas)

Company office, Campbell River. A. F. Geiger, general manager. This property is near Upper Quinsam Lake, 23 miles by road from Campbell River. It was in operation from April to July, 1957, and during that time a final clean-up of ore and concentrate was completed. All operations were suspended and the machinery and equipment removed from the property. Since work commenced in January, 1951, 2,660,527 cubic yards of material was stripped, 4,027,337 tons of ore was mined, and 2,193,917 tons of concentrate was shipped.

TSOLUM RIVER (49° 125" N.E.)

Copper

Domineer
(Mt. Washington
Copper Co. Ltd.)

Company office, 1111 West Georgia Street, Vancouver. Gordon C. Murray, resident and managing director. This company holds ninety-six claims by record and four Crown-granted mineral claims known as the Domineer group. The claims are on Mount Washington, at the headwaters of the Tsolum River, and are 14 miles northwest of Courtenay. Noranda Exploration Company, Limited, optioned the property and explored it by a geological and geophysical survey, surface trenching, and diamond drilling. During 1957, 1,200 feet of diamond drilling was done.

TRANQUIL INLET (49° 125" S.W.)

Gold

Fandora and Gold
Flake (**Moneta**
Porcupine Mines,
Limited)

Company office, 408 West Pender Street, Vancouver. R. H. Seraphim, exploration manager. Moneta Porcupine Mines, Limited, acquired management control of this property in 1957. The property includes the Edmar, Gold Flake, Bell, and E.M. groups of claims on Tranquil River, about 6 miles from the head of Tranquil Inlet. Tranquil Inlet is on Vancouver Island about 115 miles by air west of Vancouver airport. During the year a crew of six men completed some road work and constructed a light tram-line from the road to the mine at an elevation of 1,500 feet.

ALBERNI CANAL (49° 124" S.W.)

Copper

H. P. Killoran, president. This group of claims consists of two Kitchener (Mineral Crown-granted claims, the Kitchener and the Modoc, and seven-Research Limited) teen claims held by record. The claims are about 16 miles south of Port Alberni on Chesnuknuw Creek, which flows westward into Alberni Canal. Surface prospecting, trenching, and 750 feet of diamond drilling were carried out during the year.

[Reference: *Minister of Mines, B.C., Ann. Rept. 1931, p. 166.1*

COWICHAN LAKE (48° 124" N.E.)

Copper

Head office, 620 Howe Street, Vancouver; mine office, Lake Blue Grouse Cowichan. Oswood G. McDonald, president and general manager; J. R. Billingsley, mine manager; D. C. Rotherham, geologist. This property consists of three Crown-granted mineral claims and sixty claims held by record. It includes two old properties, the Blue Grouse and Sunnyside, and is on the south side of Cowichan Lake about 3 miles by motor-road northwest of Honeymoon Bay.

* BY N. D. McKechnie and R. B. Kin&

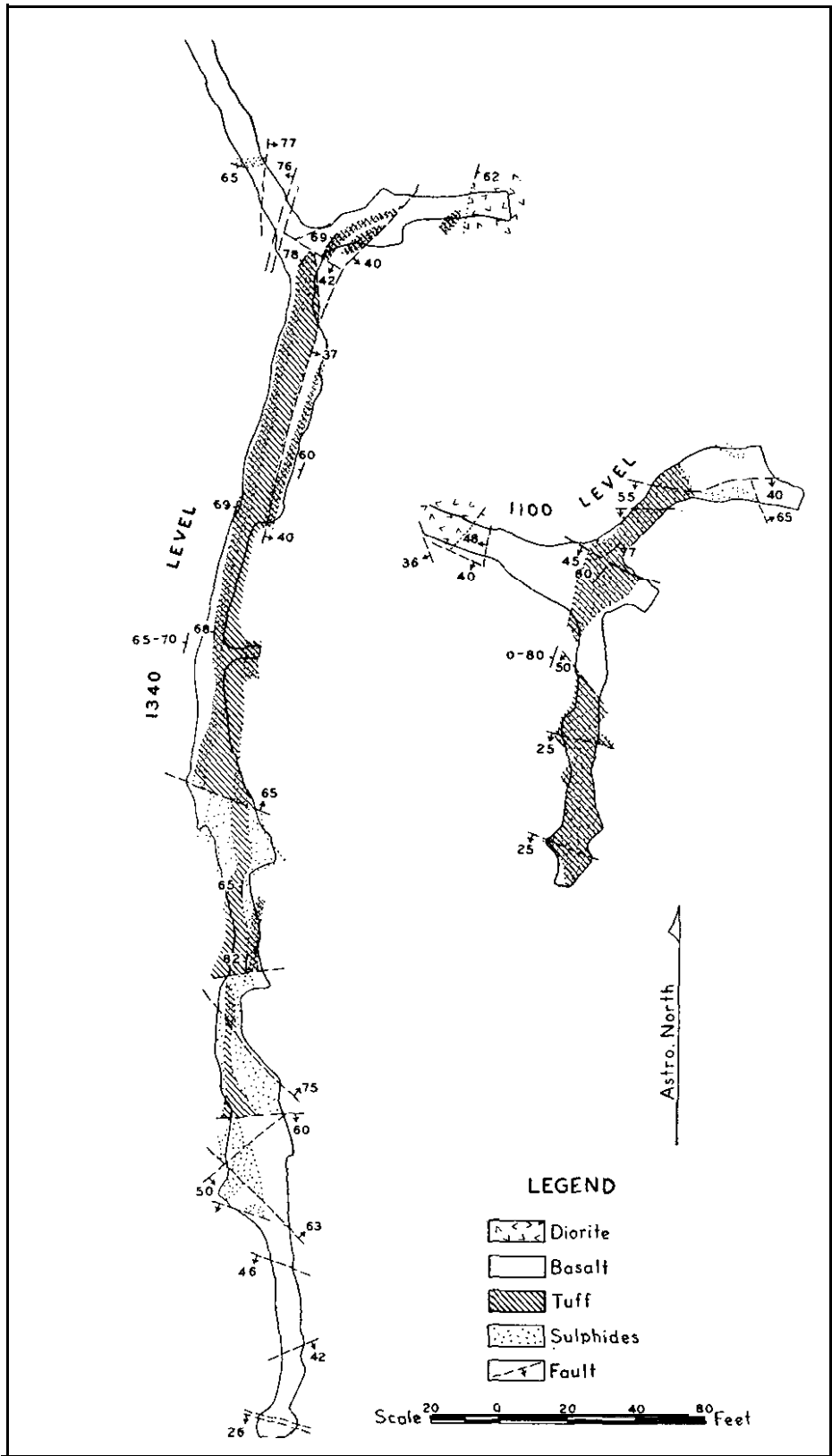


Figure 3. Cowichan Copper Co. Ltd. "E" zone on 1340 level and possible extension on 1100 level.

The property has been partially explored on two levels—the 1100 and the 1340—and on two sublevels—the 1280 and 1430.

Aside from development carried out in preparation for milling, the principal work done was drifting and raising on the “E” zone on the 1340 level. The “E” zone is a mineralized tuffaceous horizon 10 to 15 feet wide which, on the 1340 level, lies about 1,000 feet due south of the G-H orebody (see Ann. Rept., 1956, pp. 120-122). It is exposed for about 300 feet on a strike of north 10 degrees east, and for some 150 feet on a dip of 65 to 70 degrees west in a raise at the north end of the zone. On the 1100 level a similar zone is exposed for a length of 100 feet, with a similar dip to the west, but this zone lies some 200 feet east of the projection down dip of the zone on the 1340 level. Diorite is exposed east of the north end of the zone on the 1340 level and west of the zone on the 1100 level; it is not known whether or not these exposures are parts of the same diorite body. On both levels the zones are cut by post-mineral faults of small displacement; on the 1340 level the zone terminates both northerly and southerly against such faults. The principal mineralization is pyrrhotite, which in places has almost completely replaced the bedded rock. The pyrrhotite is irregularly veined with small stringers and irregular masses of chalcopyrite and pyrite. Small grains of specular hematite occur sparsely.

The zones on the two levels (see Fig. 3) may be interpreted as (a) parts of the same bed with a fold lying east of the 1340 level and above the 1100, (b) parts of the same bed separated by a fault, or (c) two separate tuffaceous horizons. Exploratory drilling was continuing at the end of 1957.

The following summary, provided by the management, shows details of the operation since the present company started working in 1953:—

	Ft.
Crosscutting	2,899
Drifting	8,439
Sublevelling	854
Raising	2,915
Diamond drilling—	
Surface	14,247
Underground	38,869

Mill construction on the property was started in the early spring, and the mill went into operation in December at 300 tons per day.

In 1957, 9,234 tons of ore was shipped to the smelter at Tacoma.

[References: *Minister of Mines*, B.C., Ann. Repts., 1952 to 1956; B.C. Dept. of Mines, Bull. 37, *Geology of the Cowichan Lake Area*, pp. 54-57.]

NITINAT (48° 124' N.W.)*

Copper

Nadira Miner Limited

Company office, 620 Howe Street, Vancouver. OSWOOD G. McDonald, manager. This property of fifty-two recorded claims is west of the Nitinat River and north of the headwaters of Horne Creek. The property was described and previous references were

listed in the Annual Report for 1956 (p. 123).

In 1957 an adit on the O.G.M. 20 mineral claim at about 1,200 feet elevation was driven south 10 degrees west to intersect a shear zone exposed on the hillside about 50 feet higher in elevation. The shear zone strikes north-south and dips 72 degrees west; it is about 40 feet wide and is sparingly mineralized with chalcopyrite. The rock is andesitic lava and amphibolite; limestone is exposed south of and slightly higher in elevation than the shear-zone exposure. The rocks strike north 40 degrees west and dip 65 degrees southwest.

* By N. D. McKechnie.

The shear is exposed on surface by an open-cut for a strike length of about 50 feet. The face of the adit, at 102 feet from the portal, had just reached the zone when work was suspended.

Company office, 620 Howe Street, Vancouver. **Oswood G. Mc-Avallin Mines Ltd.** Donald, manager. The property, held by record, consists of seventy-eight claims situated about half a mile southeast of the Nitinat River at Tenas and Granite Creeks.

The rocks are basaltic to dacitic volcanic flows with some thin tuffaceous horizons and minor limestone lenses. They are intruded by diorite. Locally the volcanic rocks are altered to amphibolite, ilvaite-garnet skarn, and epidote-garnet skarn.

The formations are folded into open northwestward-trending flexures of small amplitude.

Faulting in two directions was recognized, one fault striking north 83 degrees west, dipping 80 degrees south, and apparently post-mineral; the other striking north to north 10 degrees east, dipping 50 to 86 degrees east, and sparsely mineralized. The stronger north-south faults show a subsidiary shearing striking north 45 degrees east and dipping 55 degrees southeast, and their intersection plunges at 30 degrees to the south. Other related structures which might influence mineralization could plunge in the same direction.

Mineralization is chiefly pyrite with chalcopyrite and, rarely, magnetite. It is associated, in the main, with the skarns and amphibolites. The principal showings are on the northeast side of Tenas Creek at about 1,500 feet elevation on mineral claims O.G.M. 182 and O.G.M. 184. Mineralization, varying from sparse chalcopyrite to perhaps 10 per cent chalcopyrite, is exposed in eight small open-cuts for a strike length of 1,000 feet. Not enough work has been done to establish continuity. The strongest mineralization is in the two southeasternmost open-cuts, where chalcopyrite occurs in a grey dacite flow about 30 inches thick on the west limb of an anticline. The grey dacite is overlain by green dacite of comparable thickness and underlain by amphibolite; amphibolite also forms the hangingwall of the green dacite. These rocks appear to be terminated immediately to the northwest by a fault. The fault is not exposed, but the distribution of outcrops indicates that it may be a north-south fault.

JORDAN RIVER (48" 124" SE.)

Copper

Sunloch and Gabbro (Sunro Mines Limited)

Head office, Tadanac; mine office, River Jordan. This property is on the Jordan River about 1 mile upstream from the mouth. The present workings are reached by a branch road, 1 mile long, that leaves the Provincial highway from Victoria about half a mile east of River Jordan post office. An adit about 100 feet above sea-level was started and was driven 4,349 feet. This adit is to explore the downward extension of an extensive shear zone in basalt and gabbro that is well mineralized with chalcopyrite. A compressor-house, machine-shop, and explosives magazine were constructed. Forty-seven men were employed.

Placer

ATLIN*

SPRUCE CREEK (59" 133° N.W.)

Noland Miner Limited This underground placer mine is at the confluence of Dominion Creek with Spruce Creek and is 12 miles by road from Atlin. Mining consisted of salvaging pillars. Old workings along the original J-drive on the north side of the channel were re-entered in the hope of reclaiming what appeared to be a substantial pillar, but values on mining did not stand up to those obtained in testing. As a result, the crew was reduced to a minimum in September from a maximum of nine men. Pay gravel mined consisted of 1,485 cubic yards from pillar salvage and 55 cubic yards from general cleanup. Recovery: Gold. 755 crude oz.

Mr. Falconer worked alone on a drift on his lease.

Dan Langevin staked a lease adjoining Mr. Falconer's property, started a drift, and did some sniping.

WRIGHT CREEK (59" 133° N.E.)

The property of nineteen leases owned by the Compagnie Francaise des Mines d'Or du Canada is operated by Walter W. Johnston and associates, of San Francisco. Some work was done in the old shaft on the 104 level. The heading had been driven 40 feet upstream when work was stopped due to failure of the pump.

MCKEE CREEK (59" 133" S.W.)

Three placer-mining leases on McKee Creek, about 10 miles south of Atlin, are owned by Joe and Louis Piccolo and George Watt. They hydraulicked approximately 10,000 yards of gravel between the middle of May and the early part of October.

BOULDER CREEK (59° 133" S.W.)

Seven placer leases on Boulder Creek, approximately 15 miles northeast of Atlin, owned by Norman Fisher and Ole Olson, of Atlin, are under option to purchase by W. S. Weber, of Abbotsford. Mr. Weber and a crew of five began operations in May and finished in the early part of October. This hydraulic has not been worked for some years and setting up of the new plant prevented an early start.

OMINECA*

QUILL CREEK (54" 128" N.E.)

Three partners headed by Mr. McKenzie worked in a short drift headed upstream on Quill (Porcupine) Creek, about 3 miles west of Ritchie.

LORNE CREEK (54" 128° N.E.)

Some work was done on Lorne Creek by a partnership headed by George B. Rolph, of Prince Rupert.

* By D. Smith.

CARIBOO*

HIXON CREEK (53° 122" S.W.)

Company office, 2032 Third Avenue, Seattle, Wash.; mine office, **Hixon Placers Inc.** Hixon P.O. H. W. Hargood, president; C. J. Norris, superintendent. This property, consisting of twenty-one placer leases, is 3 miles up Hixon Creek from the Cariboo Highway. A pipe-line from a diversion dam on Hixon Creek was completed and 10,000 yards was hydraulicked.

WILLOW RIVER (53° 121" S.W.)

Coulter Creek.-D. D. Clarke hydraulicked some gravel on Coulter Creek, a tributary of Slough Creek.

Williams Creek.-Thomas Crawford hydraulicked some gravel on the east bank of Williams Creek near Richfield.

Lowhee Creek.-R. E. MacDougall continued to hydraulic in the Lowhee pit. Five men were employed.

LIGHTNING CREEK (53° 122" S.E.)

Lightning Creek.-Angus Creek Placers Ltd. did a small amount of hydraulicking on its lease at the junction of Angus Creek and Lightning Creek.

Mostique Creek.-Mr. and Mrs. P. J. Macdonald hydraulicked gravel from a gravel bank about 75 feet high.

Gagen Creek.-G. S. Gagen sluiced a small amount of gravel on Gagen Creek.

KEITHLEY CREEK (52° 121° N.E.)

Keithley Creek.-Thomas Payne ground-sluiced for a short period on his lease near the junction of Four Mile Creek with Keithley Creek.

L. Fournier ground-sluiced during the summer on his lease.

E. Mitchell constructed a boomer dam and ground-sluiced 60,000 cubic yards of overburden on his lease at the junction of Keithley and Little Snowshoe Creeks.

Cariboo Falls Placer.-G. A. Goldsmith drilled several churn-drill holes to test ground on his placer lease near the junction of Keithley and Honest John Creeks.

Nigger Creek.-Thomas Payne hydraulicked a small amount of gravel on his lease at the headwaters of Nigger Creek, a tributary of Cariboo Lake.

Jack Monet ground-sluiced a small amount of gravel on his lease.

Barr Creek.-R. H. Grant did some testing of his placer lease on Barr Creek, a tributary of McMartin Creek, which flows into the Swift River.

Rollie (Duck) Creek.-A. E. Sandberg and partner drove a short rock tunnel and intersected gravel which had been located by drilling.

FRASER RIVER*

LILLOOET AREA (50° 121° N.W.)

Fountainview This lease is on the Fraser River opposite the Pacific Great Eastern Railway station at Fountain. The property is 13 miles by road from the Lillooet-Bridge River road. A bulldozer is used to mine the gravel and push it to a hopper at the top of a washing plant. About 3,000 cubic yards of gravel was washed during the year.

* By R. B. King.

BRIDGE RIVER*

Hurley River.-(50" 122" N. W.). W. Haylmore and one man did some work on his lease on Hurley River near Gold Bridge.

SIMILKAMEEN†

TULAMEEN RIVER (49" 120" N.W.)

G. Francis worked for about one month on his placer claim 3 miles west of Princeton.

M. Heap did 2,500 feet of stripping by bulldozer on his lease 2 miles west of Princeton.

GRANITE CREEK (49° 120" N.W.)

John G. Craigie and A. Pecton did 21 feet of drifting on their placer lease half a mile south of the mouth of Granite Creek.

VERNON‡

HARRIS CREEK (50" 118" S.W.)

R. Fosberry did some hydraulicking on his leases on Harris Creek.

MONASHEE CREEK, SOUTH FORK (50" 118" S.E.)

L. R. Callahan and J. R. Hemmett worked on their lease on Monashee Creek half a mile south of the junction with Sugar Creek. Operations this season were confined to removing overburden by bulldozer and to installing a small hydraulic.

COLUMBIA RIVER‡

KIRBYVILLE CREEK (51" 118° N.W.)

West Columbia Gold Placers Ltd. Company office, 2360 Abbott Street, Kelowna. J. H. Buckland, president. This company owns Special Placer Mining Lease No. 462, an area of 3.9 square miles on the west side of the Columbia River at the confluence of Kirbyville Creek and opposite the mouth of Goldstream River. The property is reached by boat from Mile 56 on the Big Bend Highway, north of Revelstoke. Activity in 1957 was restricted to exploratory drilling.

LARDEAU‡

LARDEAU CREEK (50" 117" N.E.)

W. Hladinec and A. Bobicki, of Beaton, own Placer Mining Lease No. 465 at the main falls on Lardeau Creek, 5 miles by road from Ferguson. A short access road was built to the falls from the Lardeau Creek road. Living quarters were erected. It is the intention of the partners to divert the creek around the falls through a 40-foot diversion tunnel.

FORT STEELE§

Fort Steele Gold and Silver Mines Ltd. (49" 115" N.W.). Registered office, 1442 Bay Avenue, Trail; mine office, Box 1720, Cranbrook. D. Shirling, president; C. F. Gorse, manager. Four placer leases on Wild Horse River at the mouth of Fisher Creek are held by C. F. Gorse. A crew of four men, after installing a bucket conveyor, a sluice assembly, a 4-inch monitor, and a 2,700.gallons-per-minute pump, washed about 10,000 cubic yards of gravel.

*By R. B. King.

† By a. R. C. James.

‡By J. W. Peck.

§ By J. E. Merrett.

Structural Materials and Industrial Minerals

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ASBESTOS

Cassiar Asbestos Corporation Limited*

Mount McDame (59° 129° S.W.). Head office, 1001 Richmond Street West, Toronto; mine office, Cassiar. F. M. Connell, president; J. D. Christian, general manager; N. F. Murray, general superintendent. A gravel road 86 miles long connects the property with the Alaska Highway at mile 648.8 west of Watson Lake. The property consists of forty-two claims, of which thirty-nine are Crown-granted. The mine is on Mount McDame at an elevation of 6,300 feet. The modern company town of Cassiar and the mill are located in the valley of Troutline Creek at an elevation of 3,540 feet.

At present mining is by open pit at 6,110 feet elevation. No underground development was done in 1957. The ore, high-grade chrysotile asbestos, occurs in fractures in a serpentine dyke which strikes north 15 degrees west and dips 45 degrees east. The crushing plant at the mine was relocated in 1957.

In 1957 mining was carried on from April 17th to November 6th. During that time 413,615 tons of ore and 876,349 tons of waste were broken. The aerial tram-line operated from April 24th to October 15th and carried 225,884 tons of ore; the other 188,943 tons of ore was carried by trucks operating under contract to the company. At an average daily rate of 1,100 tons, the mill processed 402,198 tons of ore to produce the following grades of fibre:

Spinning grades—	Tons
No. 1 Crude.....	19.00
AAA.....	9.60
AA.....	1,362.10
A.....	5,786.00
Cement grades—	
AC.....	8,100.95
AK.....	11,113.95
AS.....	2,280.45
AX.....	2,771.20
Total.....	31,443.25

* By David Smith.

During the year a crew averaging 354 men was employed.

Additional buildings constructed in 1957 included a 70- by 150-foot fibre-storage shed, a 40- by 160-foot mechanical and electrical shop, a 40- by 120-foot carpenter-shop, a 70- by 140-foot heavy-duty garage (incomplete), a 20- by 65-foot power-house addition (incomplete), a 36- by 90-foot office, a 30- by 10-foot addition to the recreation hall, and seven Pan-Abode dwellings.

The lunchroom and drill repair-shop at the mine was destroyed by a serious fire in August, and was immediately replaced by a semi-permanent structure. Safety has been given every consideration, and under the direction of Peter Davies, safety officer, a safety programme is helping to reduce the accident rate materially. Dust control within the mill has been improved by the addition of a bank of Wheelabrator dust collectors.

BARITE

Mountain
Minerals
Limited*

Company office, **Meech** Building, P.O. Box 273, Lethbridge, **Alta.**; quarry office, **Brisco**. R. A. Thrall, managing director; William **MacPherson**, superintendent. This company **owns** one barite quarry 7 miles west by road from Parson siding and another 5 miles west by road from **Brisco**, both in the Windermere Valley, south of Golden. The Parson quarry (51° 116' S.W.) was operated for a short period, during which time 425 tons of barite was shipped to the company's processing plant at Lethbridge.

The **Brisco** quarry (50° 116' N.E.) operated for a ten-month period, during which time a crew of seven men quarried, crushed, and shipped 19,647 tons of barite to the Lethbridge plant. Two new quarry faces were developed at the north end of the outcrop.

Prospecting revealed two barite outcrops extending as far south as 2,200 feet from the quarry. Approximately 350 feet of surface stripping was completed by bulldozer on the outcrops and between them and the quarry. The work completed was not able to demonstrate continuity between any of these occurrences.

Approximately 500 feet east of the north end of the quarry and on the south bank of Templeton River, an **adit** was begun 25 feet below a 14-foot-wide outcrop of barite. The drifting was stopped after an advance of 25 feet when the barite disappeared either by pinching or faulting. A second **adit**, directed to intersect the north end of the main barite body, was begun 200 feet west of the initial **adit**, and was driven 220 feet without intersecting the main barite zone.

Five hundred feet of diamond drilling was completed in six surface holes. The average number of persons employed was nine, of which two were employed underground.

Larabee Mining
Exploration
Company*

Invermere (50° 116' SE.). Company office, 221 Eighth Avenue West, Calgary, Alta. Chris Hansen, manager. This company owns a group of four claims on the south side of **Toby** Creek, 8 miles west of Invermere. The property adjoins the **Bunyan** claims. A crew of four men was employed diamond drilling and bulldozer stripping an outcrop of barite.

BUILDING-STONE

ANDESITE

(50° 127' N.E.) Company office, I. A. and C. H. McDonald Haddington Island Limited, 1571 Main Street, Vancouver; quarry, Haddington Island **Quarry**†

Andesite is quarried to obtain dimension stone for building purposes. The quarry face slopes about 45 degrees, following the main jointing of the deposit. Stone is undercut by drilling and blasting; the ends of the stone are formed by a secondary joint system. Drilling is done with air machines

* By J. E. Merrett.

† By S. B. King.

using conventional steel with a spade-shaped bit. Holes are drilled 3 to 4 inches apart for shaping the stone and are blasted with black powder. The blocks removed weigh up to 20 tons. Derricks are used to **move** the stone to scows, by which it is transported to Vancouver for finishing. Six men were employed.

GRANITE

Valley Granite Products Ltd.*
Cheam View (49° 121' S.W.). Company office, 410 Mayfair Avenue, Chilliwack; plant, Bridal Falls. Kenneth Jessiman, general manager. The quarry is on the Tram-Canada Highway 11 miles east of Rosedale. Rock is mined by drilling vertical blast-

holes with jackhammers. It is broken to approximately 8 inches and is piled under temporary shelters and dried with open-flame kerosene burners. The dried rock is loaded on to wheelbarrows and transported to a dry-process crushing and screening plant. The plant produces turkey, chicken, and bird grits, stucco dash, sand-blasting material, filler for asphalt roofing, and sand material for automotive vehicles. Twenty men were employed.

Little Mountain Quarry.†—Chilliwack (49° 121' S.W.). This pit is on the north slope of Mount Shannon about 1 mile northeast of Chilliwack. It is operated intermittently by the Fraser Valley Dyking Commission to obtain rock for dyke repairs. During 1957 about 13,400 tons of rock was quarried.

Gilley Bros. Limited*
Pitt River (49° 122' S.W.). Company office, 902 Columbia Street, New Westminster; quarry office, Pitt River. J. H. Gilley, general manager; Francis J. MacDonald, superintendent. Quartz diorite is quarried to obtain rock for jetties, dykes, and concrete aggregate.

Rock is broken from a quarry face, which is nearly 100 feet high, mainly by coyote-hole method of mining. Broken rock is loaded by a 2-cubic-yard diesel-driven shovel into 12-cubic-yard-capacity trucks and is transported to a crushing plant. The crushing plant consists of a 42- by ho-inch jaw crusher which discharges crushed rock over an inclined 6-inch grizzly to a conveyor belt for loading scows. Undersized material (--h-inch) is stockpiled. Hydro-electric power to run the plant is produced on the property. Twenty-five men were employed..

Nelson Island (49° 124' N.E.). Company office, 744 West Hastings Street, Vancouver; quarry, Nelson Island. W. C. Ditmars, president. Rock for building purposes, monuments, jetty rock, and rubble are mined at this quarry. The mining is done by drilling the rock to sire, following a mineral lineation pattern, and blasting and wedging for removal. Derricks are used to **move** the stone to scows, by which it is transported to Vancouver for cutting and finishing. Approximately 1,200 tons of stone was produced during the operating year. Six men were employed.

SLATE

McNab Creek Slate Quarry*
Howe Sound (49° 123' N.E.). Head office, Richmix Clays Limited, 2890 East Twelfth Avenue, Vancouver; quarry, McNab Creek. G. W. Richmond, manager. Slate is quarried for flagstones, roofing granules, and filler. Rock is broken from a 30-foot quarry face by drilling and blasting horizontal holes. Broken slate is hand-loaded into scows. The product is shipped to Vancouver for grading and sizing. The quarry is operated intermittently.

*By R. B. King.

† By J. W. McCammon.

**British Columbia
Slate Co. Ltd.***

Jervis Inlet (50° 123" SW.). Philip Graham, president; J. Ehlers, quarry superintendent. This property is on an Indian reservation west of Deserated Bay on the south side of Princess Royal Reach in **Jervis Inlet**. Slate is mined by slashing it from the quarry face.

Broken slate is hand-sorted, and marketable sizes are split to 1/2-inch thickness. Some of the stone is trimmed with a diamond saw.

In 1957 approximately 200 tons of flag-stone slate and 3,000 slate tiles were produced and shipped to Vancouver.

CLAY AND SHALE

CENTRAL BRITISH COLUMBIA†

In the 1957 field season seventeen samples of clay and shale were collected from central British Columbia. The samples were submitted to the Industrial Minerals Division of the Department of Mines and Technical Surveys, Ottawa, for ceramic testing. The results of this testing are recorded in I.M. Report 496, December 13th, 1957. A summary of test results is on pages 80 to 82.

LOWER MAINLAND AND VANCOUVER ISLAND

**Clayburn-Harbison
Ltd.***

(49° 122" S.E.) Head office, 302 Credit **Foncier** Building, Vancouver; plants, Kilgard and Abbotsford. R. M. Hungerford, managing director; G. H. Peterson, manager; A. G. **Westaway**, assistant plant manager. The name of the company was **changed**

from Clayburn Company Limited in June when Harbison Walker Refractories Company purchased a partial interest. Two plants are operated by this company; one, in which sewer-pipe and flue-linings are manufactured, is at Kilgard; the other, in which facebrick, refractories, special refractory shapes, and refractory specialties are made, is at **Abbotsford**.

In the Kilgard plant, sewer-pipe and flue-lining are extruded through dies, pre-dried, and burned in down-draught beehive kilns. At this plant a new Bonnet horizontal **extru-**sion machine was installed and the kilns were converted from oil to natural-gas firing.

In the Abbotsford plant, bricks are dry-pressed or extruded through dies, hand set on cars, and passed through a drier.

From the drier the bricks pass into a tunnel kiln 300 feet long. At this plant a third International dry press and a second **Clearfield** dry pan were installed. This plant was also converted to the use of natural gas for firing the ware. Some shale used in the manufacture of refractories is **precalcined** in a 150-foot rotary kiln. The rotary kiln is also used for bloating of certain shales.

Shale is mined from certain members of the Huntingdon formation on **Sumas** Mountain. Three underground mines and two open pits produce shale for the plants. A **room-**and-pillar method of mining is used in the underground mines, and extensive use is made of roof-bolting for ground support. Holes are drilled with tungsten-carbide-tipped augers which are driven by air-operated drills. Stumping-powder is used in blasting down the shale. Scrapers, operated by **30-horsepower** electrically driven hoists, are used to move broken shale directly to mine cars. In the open pits, shale is mined in 20-foot benches by drilling and blasting vertical and horizontal holes. Broken shale is hauled to the plants by truck.

Shale mined during 1957 **totalled** 75,547 tons, of which 32,454 tons was used in the production of facebrick and firebrick and 10,827 tons was used for sewer-pipe and **flue-**lining. Calcined shale and light-weight aggregate produced in the rotary kiln amounted to 12,359 tons. Twenty men were employed in the mining operation.

* By R. B. King.

† By I. W. McCammon.

Clay and Shale Test Results

No.	Location	Description	Workability	Drying Characteristics	P.C.E.	Fired Characteristics					Remarks
						Cone	Shrinkage	Absorption	Colour	Hardness	
1	Australian Creek, 1 mile east of Highway No. 2.	60-foot bank, light-grey non-calcareous clay.	27.8 per cent water; works well and good plasticity.	Safe drying; 5.6 per cent shrinkage.	5	06 04 02 1	Per Cent 3.7 3.1 7.6 11.7	Per Cent 15.3 15.2 6.7 1.3	Salmon Salmon Dark salmon Poor red	Fairly hard. Fairly hard. Very hard. Steel hard.	Scummed moderately. Probably suitable for drain-tiles, common brick and building-tile. A common clay.
2	Australian Creek, ½ mile east of Highway No. 2.	Mixed thin-bedded series of shales above main coal seam.	26.6 per cent water; works well and good plasticity.	Slight cracking in rapid drying; 6 per cent shrinkage.	6	06 04 02 1	4.8 5.3 10.5 10.3	12.8 10.8 2.5 0.0	Dark salmon Dark salmon Light red Brownish red	Fairly hard. Hard. Steel hard. Slightly overfired.	A common clay which scums slightly. Would likely be difficult to dry. Firing range inclined to be short. Indication that difficulty would be encountered in the manufacture of clay products.
3	Mile 380.5 on P.G.E. 3½ miles south of Quesnel.	High bank, light-grey non-calcareous clay.	37 per cent water; works fair, very plastic and sticky.	Cracks in slow drying; 12 per cent shrinkage.	16+	06 04 02 1	6.0 6.7 8.0 8.0	7.2 5.3 1.5 0.8	Brownish salmon Brownish salmon Brownish salmon Light brown	Very hard. Very hard. Steel hard. Steel hard.	The drying characteristics are not favourable. Fired shrinkage inclined to be high. A common clay with a fairly high P.C.E.
4	North side of Cottonwood Creek, 2.1 miles southwest of Cinema.	Grey clay under 1 foot lignite.	36.1 per cent water; works well and good plasticity.	Cracks slightly in rapid drying; 8.3 per cent shrinkage.	26	06 04 02 1	8.3 8.3 11.7 12.3	14.9 12.4 6.7 6.7	Buff Buff Salmon buff Salmon buff	Fairly hard. Fairly hard. Hard. Hard.	A plastic low-grade fireclay having a high drying and fired shrinkage.
5	Canyon Creek by P.G.E., centre Lot 3182 northeast of Strathnaver.	30-foot bank, varved, brown calcareous clay.	25.7 per cent water; fairly plastic but flabby.	Safe drying; 4.9 per cent shrinkage.	4-5	04 02 1	0.0 2.0 3.8	20.1 16.3 13.2	Brownish red Brownish red Brownish red	Fairly soft. Fairly soft. Fairly hard.	Could possibly be used for drain-tile, common brick, and building-tile. The clay is very calcareous and consequently has a short firing range in which a hard, dense product could be obtained.
6	Mile 18¼ on C.N.R. west of Prince George.	15-foot bed of grey-brown-cream bentonitic clay.	27.3 per cent water; works well and very plastic.	Cracks in rapid drying; 7.2 per cent shrinkage.	26-	06 04 02 5	2.7 3.0 6.5 7.7	17.6 16.4 11.6 6.9	Light buff Light buff Buff Buff	Fairly hard. Fairly hard. Hard. Very hard.	Vanadium efflorescence. This is a plastic low-grade fireclay.

	Mile 19 on C.N.R. west of Prince George.	10-foot bank of cream bentonitic clay.	21.9 per cent water; works well and very plastic.	Cracks in rapid drying; 6.5 per cent shrinkage.	20	06 04 02 5	Per Cent 0.7 0.3 1.0 1.3	Per Cent 14.0 13.9 12.3 12.0	Cream Cream Cream buff Light buff ..	Fairly hard Fairly hard Hard. Hard.	Vanadium efflorescence. This is a plastic semi-refractory cream to buff firing low-grade fireclay.
8	In creek at Mile 13 on C.N.R. west of Prince George.	Grey silty clay under black diatomaceous clay.	35 per cent water; works well and good plasticity.	Cracks in rapid drying; 5.7 per cent shrinkage.	12+	06 04 02 1	9.0 8.5 10.7 12.0	12.8 11.7 9.4 7.8	Dark salmon Dark salmon Red Red	Fairly hard. Fairly hard. Hard. Hard.	The poor drying characteristics and the high firing shrinkage make this an undesirable material for clay products.
9	Hart Highway road cut 1 mile east of East Pine Bridge.	Brown, very calcareous clay.	28.6 per cent water; works well and good plasticity.	Safe drying; 8.1 per cent shrinkage.	3	06 04 02 1	0.5 1.0 6.3 8.0	17.5 17.7 5.5 1.7	Salmon Salmon Light red Red	Fairly hard. Fairly hard. Very hard. Steel hard.	Scummed, not a desirable material, although it may possibly be used for drain-tile, common brick, and building-tile.
10	Hart Highway at Fox Creek, 2¼ miles east of Progress.	15-foot bank, brown to black calcareous clay.	28.6 per cent water; works fairly well.	Safe drying; 8.1 per cent shrinkage.	3	06 04 02	0.8 1.5 8.2	17.9 17.0 2.4	Salmon Salmon Light red	Fairly hard. Fairly hard. Very hard.	Scummed, not a desirable material, although it may possibly be used for drain-tile, common brick, and building-tile.
11	Hart Highway at Tremblay Creek, 3 miles east of Arras.	45-foot bank, varved blue-black and brown calcareous clay.	28.6 per cent water; works well and good plasticity, somewhat flabby.	Safe drying; 8.6 per cent shrinkage.	3	06 04 02	1.5 2.1 8.3	16.9 16.5 0.7	Salmon Salmon Red	Fairly hard. Fairly hard. Steel hard.	Scummed, not a desirable material, although it may possibly be used for drain-tile, common brick, and building-tile.
12	Pump station by river due east of Pouce Coupe.	Tough black to grey clay.	35 per cent water; very plastic and inclined to be greasy and sticky.	Safe drying; 9.1 per cent shrinkage.				Bloated badly.			No fired results could be obtained because of the bloating characteristic. This material may be suitable for light-weight aggregate.
13	Road cut ¼ mile east of north landing of Rolla ferry on Peace River.	Black Fort St. John shale.	20.8 per cent water; works well and fairly plastic.	Slight cracking in rapid drying; 5.9 per cent shrinkage.	10+	06 04 02	5.1 3.6 6.0	5.6 4.7 1.7	Light red Light red Red	Very hard. Very hard. Steel hard.	Slightly scummed, cracks slightly in drying. Bloated at cone 04 and slightly bloated at 02. Not suitable for clay products. Might be suitable for light-weight aggregate.

Clay and Shale Test Results—Continued

Loc.	Description	Workability	Drying Characteristics	P.C.E.	Fired Characteristics					Remarks	
					Cone	Shrinkage	Absorption	Colour	Hardness		
14	Bank ¼ mile west of north end of highway bridge over Peace River at Taylor.	Black Fort St. John shale.	18.9 per cent water; plastic and works well.	Tendency to crack in rapid drying; 5.4 per cent shrinkage.	6½	06	2.0	10.4	Light red	Fairly hard. Fairly hard. Very hard.	Slight tendency to scum, would be difficult to dry. Indications are it may be suitable for brick and tile with care in drying.
						04	3.5	10.1	Light red		
						02	4.8	5.3	Red		
15	Peace River coal mine, head of Peace River Canyon.	4 to 5-foot shale roof of main coal seam.	15.6 per cent water; fairly plastic and works well.	Safe drying; 3.4 per cent shrinkage.	14±	04	1.0	10.9	Light grey:	Fairly hard. Fairly hard. Fairly hard. Hard.	This shale has a low firing range and dries safely. Indications are that it is suitable for facebrick, tile, sewer-pipe, flue-liners.
						02	1.0	9.1	Light grey:		
						1	1.3	9.9	Light grey:		
						5	1.7	7.1	Grey		
16	Road cut at Bear Flats, 18 miles west of Fort St. John.	Black Fort St. John shale.	17.5 per cent water; fairly plastic and works well.	Safe drying; 4.2 per cent shrinkage.	14±	04	1.3	11.4	Salmon	Fairly soft. Fairly soft. Fairly hard. Hard.	Slightly scummed. Indications are that this shale should be suitable for facebrick, tile, sewer-pipe, and flue-liners.
						02	2.3	9.5	Salmon		
						1	2.3	8.9	Salmon		
						5	3.0	7.4	Light brownish red		
17	Road cut, east bank of Beaton River at bridge on Cecil Lake road.	Black Fort St. John shale.	21.6 per cent water; good plasticity and works well.	Tendency to crack in rapid drying; 6.7 per cent shrinkage.	10	06	1.7	11.6	Salmon	Fairly hard. Very hard. Steel hard. Steel hard.	Slight tendency to scum, care would be required in drying. Short firing range, not recommended for production of clay products.
						04	5.5	5.5	Light red		
						02	6.7	2.0	Red		
						1	7.1	1.2	Red		

Lafarge Cement of North America Ltd.* Fort Langley (49° 122" SE.). This company opened a clay pit about 8 miles east of Fort Langley on River Road. A large electrically powered scraper is used to scrape clay from the deposit to a bin. Water is mixed with the clay in large tanks to form slurry. The slurry is pumped to barges for transportation to the company cement plant on Lulu Island.

Bear Creek Brick Company* Surrey (49° 122" SW.). Head office, Victoria Tile & Brick Co. Ltd., Vancouver; plant, Archibald Road, Surrey Municipality. James McBeth, plant manager. During 1957 there was no production from this plant. An enclosed drying area was built, and plant repairs were carried out.

Haney Brick and Tile Ltd.* Haney (49° 122" S.W.). Company office, 846 Howe Street, Vancouver; plant, Haney. E. G. Baynes, president; J. Hadgkiss, managing director. During the year the company name was changed from Port Haney Brick Company Limited. Plastic clay is mined from a low pit face adjacent to the plant by a 'Y-cubic-yard gasoline-driven shovel and is transported by truck to a covered air-drying area. The clay is dried in a rotary wood-fired kiln and conveyed to a dry pan for grinding. Brick and tile are formed by a stiff-mud extrusion process and dried in a controlled-temperature drying-room. The products are burned in down-draught beehive kilns. Conversion of the drying-rooms and kilns to burn natural gas was almost complete by the end of the year. During 1957, 14,700 tons of clay products were produced. Sixty men were employed.

Mainland Clay Products Limited* Barnet (49° 122" S.W.). Head office, 8699 Angus Drive, Vancouver; plant, Barnet. Surface clay is mined from a pit adjacent to the plant and is transported to a covered air-drying area. Some fireclay is obtained from Kilgard. Bricks are formed and dried in a heated drying building. Common brick, Roman brick, and firebrick are burned in rectangular oil-fired kilns. Seven men were employed.

Deeks-McBride Ltd. (Clay Division)* Bazan Bay (48° 123" N.E.). K. Bruce, plant manager. This company operates a clay pit and brick and tile plant at Bazan Bay near Sidney, Vancouver Island. Surface clay is mined by scrapers and stockpiled for drying. It is then ground in a dry pan and elevated to a storage hopper. Brick and tile are formed by a stiff-mud extrusion process and dried in a temperature- and humidity-controlled drying-room. The products are burned in an oil-fired shuttle-type kiln. Common brick, building-tile, and drain-tile are produced.

Baker Brick & Tile Company Limited* Victoria (48° 123" S.E.). Office and works, 3191 Douglas Street, Victoria. Surface clay is mined near the plant and transported by truck to storage bins. The clay is air-dried, ground, and formed into shapes by soft-mud extrusion process and then dried with waste heat from kilns. Down-draught kilns are used to burn the ware. During 1957, 3,500 tons of clay was mined.

GYPSUM

Western Gypsum Products Limited† Windermere (50° 115° S.W.), Company office, 306 Electric Railway Chambers, Winnipeg 2, Man.; quarry office, Athalmer. A. E. Portman, superintendent. This company commenced operations on July 6th, 1957, having acquired the Columbia Gypsum

* By R. B. King.
† By J. E. Merrett.

Company Limited holdings and operating equipment in the Windermere area. The quarry is on Windermere Creek, 10 miles by road from Lake Windermere station at Athalmer on the Kootenay Central Railway.

A D-8 Caterpillar tractor was purchased and used to strip the overburden in advance of the north and west walls of the quarry. The quarrying method was modified by replacing the chum drill with a wagon drill and jackhammers and by dividing the high advancing face into three shorter benches.

A crew averaging sixteen men quarried and crushed 67,257 tons of gypsum and shipped 50,561 tons. During the period of operation by Columbia Gypsum Company 15,642 tons was quarried and 21,957 tons was shipped.

The destination and approximate distribution of the total tonnage shipped was as follows: Canada Cement Company, Exshaw, Alta., 24 per cent; Western Gypsum Products Ltd., Calgary, Alta., 20 per cent; Columbia Gypsum Company, Austin, Wash., 22 per cent; Ideal Cement Company, Irvin, Wash., 15 per cent; Lehigh Portland Cement Company, Metaline Falls, Wash., 15 per cent; and Richmond, B.C., 4 per cent.

LIMESTONE AND CEMENT

LIMESTONE IN THE PRINCE GEORGE AND DAWSON CREEK AREAS*

During the 1957 field season a search was made for possible commercial sources of limestone in the vicinities of Prince George and Dawson Creek. Three limestone deposits are known near Prince George. These are at Hansard, **Beaverley**, and Red Rocky Creek. Marl has been reported? at five localities in this area also, but in each case the quantity available is too small to be of economic significance. In the Dawson Creek region the closest calcareous deposits of economic interest are limestone outcrops along the Hart Highway near Pine Pass and banks of calcareous tufa along the Peace River at Hudson Hope.

Hansard

Limestone forms a ridge south of Highway No. 16 and the Canadian National Railway tracks 50 miles east of Prince George. Outcrops are on Lots 3073, 3070, and 2681 and extend along the highway for 1½ miles between 1 and 2½ miles northwest of the railway crossing at Hansard. The limestone is exposed in an intermittent series of bluffs which reach a maximum height of 320 feet above road level.

The largest exposure is 1,000 feet southwest of the highway at a point 1.1 miles northwest of the Hansard railway crossing. This exposure consists of a bluff which extends for 1,000 feet parallel to the road. The rock is fine-grained light-grey limestone of uniform appearance. It does not show recognizable bedding and is highly fractured. Scattered fossils, probably archcoccyathids, are present in some places. A chip sample taken horizontally across 200 feet at the centre of the base of the bluff face had the following percentage composition: Insol., 1.04; R_2O_3 , 0.26; Fe_2O_3 , 0.10; MnO , 0.01; MgO , 0.42; CaO , 55.10; P_2O_5 , 0.01; S, 0.02; Ig. Loss, 43.38; H_2O , 0.08.

A second exposure of similar rock is behind a cabin 1.5 miles northwest of the railway crossing. It forms an isolated knoll 200 feet long, 75 feet wide, and 20 feet high.

At a point 1.6 miles northwest of the crossing a bluff of limestone at least 60 feet high parallels the road for more than 150 feet.

A large bluff of streaked dark- and light-grey limestone occurs 100 feet south of the road 0.3 mile northwest of the last-mentioned bluff.

A fifth outcrop, 2½ miles northwest of the railway crossing, consists of a small bluff of dark-grey limestone at the edge of the road. A sixth outcrop, 0.2 mile farther to the northwest, is a small bluff of light-grey limestone.

* By J. W. McCammon.

† *British Columbia Soil Survey*, Report No. 2, 1946, pp. 53-54.

Except for one or two gullies, the main ridge is continuous between the outcrops just described, but overburden and vegetation hide the bedrock. Undoubtedly these isolated exposures are all part of one limestone band of **considerable** size. The band is probably a continuation of the belt of Lower Cambrian limestone found in the Grand Canyon on the Fraser River 15 miles to the southeast.

[References: B.C. Dept. of *Mines*, Bull. 11, 1941, p. 21 and Fig. 3; Bureau of *Mines*, Canada, Publ. No. 811, 1944, pp. 220-221.1

Beaverley

A low knoll of limestone projects through the glacial till near the **centre** of Lot 1893, 3½ miles southwest of Beaverley, a settlement 13 miles southwest of Prince George. A farm road in fair condition leads to the southwest corner of Lot 615, whence a disused trail extends for a mile to the limestone outcrop. A reserve **once** put on the limestone by the Department of Agriculture has been removed.

The limestone is fine-grained **light-grey** rock. It occurs in thin beds that enclose small lenses and minute layers of white **cherty** material. The beds strike north 75 degrees east and dip 55 degrees **to** the south. Bedrock is exposed for 250 feet along the strike, and for 100 feet across the strike at the widest point. The limestone plunges under glacial cover in all directions.

On the south side of the exposure the rock forms a steep face about 20 feet high. A few tons of limestone has been quarried from this face. The remains of an old pot kiln lie beside the quarry.

A second small outcrop has been reported* 600 feet from the one described above.

A sample consisting of chips taken at 5-foot intervals across 100 feet of beds at the widest section of the outcrop had the following percentage composition: **Insol.**, 5.50; **R₂O₃**, 0.30; **Fe₂O₃**, 0.11; **MnO**, 0.005; **MgO**, 0.35; **CaO**, 52.40; **P₂O₅**, 0.04; **S**, 0.08; **Ig. Loss**, 41.53; **H₂O**, 0.07.

Redrocky Creek

A prominent bluff of limestone occurs along the side of a hill north of **Redrocky** Creek, just east of the Hart Highway 55 miles north of Prince George. The south tip of the hill lies within Lot 3022 and the rest is in **unsurveyed** land to the north of this lot.

Limestone is exposed for more than 1,000 feet along the bluff parallel to and a quarter of a mile northeast of the highway. Additional intermittent exposures are present on the Westcoast Transmission pipe-line right-of-way that runs parallel to the bluffs 400 to 500 feet farther to the northeast; they extend for half a mile along the right-of-way. At the northwesternmost outcrop the limestone is in contact with highly sheared argillite. No other contacts were seen, since at all other terminations the limestone plunges beneath overburden. The highest point on the hill is 300 feet above the highway.

The limestone consists of a dark-grey to black matrix crowded with round and ellipsoidal pellets 1 to 10 millimetres in diameter. The pellets are composed of ankerite or **ferroan** dolomite, and are pale buff on fresh surfaces but weather to reddish brown; they **give** the rock a porphyritic appearance. Stringers of calcite are abundant throughout the rock. Fractures are numerous and closely spaced. No bedding is discernible at close range, but **varicoloured** horizontal lines that may represent bedding can be seen from the highway.

This rock is very similar in appearance to some parts of the Lower Cambrian limestone on the Fraser River at the Grand Canyon and also to parts of the **Cunningham†** limestone of the Cariboo district.

A sample consisting of chips taken at 10-foot intervals for 600 feet along the base of the bluff starting at the southeast end had the following percentage composition:

* *British Columbia Soil Survey*, Report No. 2, 1946, pp. 52-53.

† *B.C. Dept. of Mines*, Bull. 38, 1957, p. 23.

Insol., 2.80; R_2O_3 , 0.36; Fe_2O_3 , 0.21; MnO , 0.005; MgO , 0.38; CaO , 53.82; P_2O_5 , 0.03; S , 0.02; Ig. Loss, 42.61; H_2O , 0.08.

Pine Pass

The closest accessible limestone to Dawson Creek is exposed in rock cuts along the Hart Highway 110 miles west of the town. In this locality, east of the Pine Pass summit, the highway cuts through the Murray Range, which is composed of sedimentary rocks, predominantly calcareous.

Samples were obtained at four rock cuts in the vicinity of the highway bridge over the Pine River 105 miles west of Dawson Creek.

The first sample was from a long rock cut 15.1 miles west of the bridge. In this cut, dark-grey to black limestone occurs in thin, peculiarly crinkled beds. Interbedded with the limestone are scattered 6-inch to 2-foot thick beds of light-grey dolomite. A sample taken across 50 feet perpendicular to the bedding, with obvious dolomite bands omitted, had the following percentage composition: Insol., 38.56; R_2O_3 , 2.90; Fe_2O_3 , 2.03; MnO , 0.04; MgO , 5.56; CaO , 25.70; P_2O_5 , 0.12; S , 0.12; Ig. Loss, 27.29; H_2O , 0.22.

Limestone of similar appearance outcrops along the road for nearly 4 miles toward Dawson Creek.

The second sample was taken across a 150-foot stratigraphic thickness of beds exposed in a road cut 3.2 miles west of the bridge. The limestone in this location is fine-grained black rock with highly developed cleavage. The uppermost beds are inter-layered with chert. The sample had the following percentage composition: Insol., 25.5; R_2O_3 , 0.70; Fe_2O_3 , 0.91; MnO , 0.01; MgO , 1.94; CaO , 38.2; P_2O_5 , 0.03; S , 0.33; Ig. Loss, 32.6; H_2O , 0.09.

This cut is across the end of the long narrow ridge that runs northwestward from the peak of Solitude Mountain.

The third sample was taken across 200 feet at the east end of a long outcrop 1 mile west of Pine River bridge. The limestone is thick-bedded, fine-grained, black, brittle siliceous rock. The sample had the following percentage composition: Insol., 47.9; R_2O_3 , 1.22; Fe_2O_3 , 2.09; MnO , 0.02; MgO , 2.94; CaO , 20.8; P_2O_5 , 0.16; S , 1.40; Ig. Loss, 24.1; H_2O , 0.27.

A fourth sample was taken across 100 feet of black siliceous limestone exposed in a small road cut 1.3 miles east of the bridge. The sample had the following percentage composition: Insol., 48.8; R_2O_3 , 0.64; Fe_2O_3 , 0.63; MnO , 0.03; MgO , 8.30; CaO , 18.1; P_2O_5 , 0.06; S , 0.27; Ig. Loss, 23.3; H_2O , 0.08.

Hudson Hope

Extensive deposits of calcareous tufa have formed along the north bank of the Peace River at Hudson Hope, 51 miles by road west of Fort St. John.

One deposit extends from the ferry landing at Hudson Hope for 300 feet upstream along the river bank. It is at least 30 feet thick in the centre and covers the slope for about 100 feet up from river level. The tufa has been deposited from a spring and deposition is still taking place. A sample consisting of chips taken at random from the surface of the tufa had the following percentage composition: Insol., 0.82; R_2O_3 , 0.18; Fe_2O_3 , 0.09; MnO , 0.003; MgO , 0.97; CaO , 53.38; P_2O_5 , 0.01; S , 0.08; Ig. Loss, 44.48; H_2O , 0.22.

The remains of two pot kilns stand near by. Lime burned in the kilns is reported to have been of good quality.

A second deposit of comparable size is on the river bank 100 yards farther upstream.

A third and larger deposit covers the river bank for nearly 800 feet on Lot 11, 2.4 miles by road upriver from Hudson Hope. The deposit forms steep cliffs more than 100

feet high. Chunks of tufa are ploughed up in a field more than 300 feet back from the edge of the cliffs. The deposit is a surface coating overlying black silty shales. Its thickness is unknown but may be at least 100 feet in some parts. A sample of chips taken at random from the base of the cliff had the following percentage composition: Insol., 5.28; R_2O_3 , 0.80; Fe_2O_3 , 0.30; MnO , 0.009; MgO , 1.59; CaO , 49.98; P_2O_5 , 0.03; S, 0.04; Ig. Loss, 42.30; H_2O , 0.16.

Fife ($49^\circ 118''$ S.E.). Head office, Trail. G. S. Ogilvie, property The Consolidated Mining and Smelting Company of Canada, Limited* superintendent; Oscar Tedesco, quarry foreman. The quarry is alongside the Kettle Valley branch of the Canadian Pacific Railway, half a mile north of Fife. The limestone quarried here was shipped to Trail for use as a flux in the smelter. On May 15th the quarry was closed down for an indefinite period following arrangements by the company to obtain limestone from a cheaper source of supply in Washington.

A crew of twelve men was employed on a two-shift basis during the four and a half months of operation. The limestone shipped amounted to 23,433 tons.

Agassiz Lime Quarry.†—Agassiz ($49^\circ 121''$ S.W.). Hiram Cutler, owner. Limestone is quarried to produce agricultural limestone, crushed rock, and chicken grit. Limestone is blasted from a low quarry face and is transported by a $\frac{1}{4}$ -cubic-yard loader from the quarry to the crushing plant. Three men were employed.

Fraser Valley Lime **Supplies**† Popkum ($49'' 121''$ S.W.). Thomas Mairs, manager; Arthur Isaacs, superintendent. Limestone is quarried to produce agricultural limestone and industrial filler. The quarry is being worked in benches nearly 25 feet high. Rock is blasted from the quarry face, loaded into trucks by a 1-cubic-yard front-end loader and transported to the crushing plant. About 5,000 tons of limestone was quarried during 1957. Six men were employed.

Beale Quarries Limited Vananda ($49^\circ 124''$ N.W.). Head office, 744 West Hastings Street, Vancouver; quarry office, Vananda. Lafarge Cement of North America Ltd., owner; W. D. Webster, superintendent. Limestone is quarried to produce pulp rock for paper mills, agricultural limestone, crushed limestone, and cement rock. The quarry is worked on levels with faces about 40 feet high. Vertical blast-holes are drilled with a Joy Heavy-weight Champion drill. Broken rock is loaded by a 3-cubic-yard Bucyrus shovel into Euclid 63T trucks and transported to a new crushing plant. This plant is equipped with an Allis-Chalmers 60-by 48-inch primary jaw crusher, an Allis-Chalmers 36-by 48-inch secondary jaw crusher, and a Pennsylvania impactor. Screens and belt-conveyors are installed to accommodate two main sizes of rock-pulp rock from 6 to 12 inches and cement rock which is minus three-quarters of an inch.

A loading-dock has been built which will load limestone on scows at the rate of 1,000 tons an hour.

W. S. **Beale (1955) Ltd.** Vananda ($49^\circ 124''$ N.W.). Office and quarry, Vananda. Stanley Beale, manager. This quarry is at Marble Bay near Vananda. Limestone is quarried to produce pulp rock and cement rock. The quarry is worked with one face nearly 80 feet high and sloping 45 degrees to the horizontal. Horizontal blast-holes are drilled parallel to the quarry face by air-leg machines. Blasted rock is loaded by a $\frac{1}{2}$ -cubic-yard diesel-driven shovel and transported by trucks to a coarse scalping screen. Large sizes of rock are loaded on to scows and sold as pulp rock; smaller sizes are stockpiled and sold as cement rock. Seven men were employed.

*BY A. R. C. James.

† By R. B. King.

McKay Quarry" Vananda (49° 124" N.W.). Don McKay, owner. This quarry is on the main road about 2 miles south of Vananda. White limestone is mined and sold for stucco dash and whiting. The white, bleached limestone occurs as irregular masses in a blue-grey limestone. Open-pit mining with low benches allows a selective recovery of the white limestone. Grey limestone is sold for pulp rock and also exported for use in the glass industry.

During 1957, 2,400 tons of white limestone and 5,000 tons of blue-grey limestone were produced. Three men were employed.

Gypsum Lime and **Alabastine**, Canada, Limited* Blubber Bay (49° 124" N.W.). Head office, 50 Maitland Street, Toronto 5; British Columbia office, 1105 West Pender Street, Vancouver; quarry office, Blubber Bay; lime plants, Blubber Bay and Vancouver. W. M. Tully, British Columbia area manager; Arthur Pitt, Blubber Bay, plant manager. Limestone is quarried approximately 2 miles from the Blubber Bay plant. The quarry is worked in benches with faces nearly 25 feet high. Horizontal and vertical blast-holes are drilled with wagon drills and Gardner-Denver rotary drills. Broken rock is loaded by diesel-driven shovels on to trucks and hauled to the Blubber Bay plant. There limestone is crushed, sized, and stockpiled for use in lime-burning facilities at Blubber Bay and Vancouver, and also for sale.

Products are crushed stone, including sized rock, **spalls**, and fines or screenings, quicklime (lump, crushed, and pulverized), and hydrated lime. Stone is supplied to such industries as pulp and paper, cement, smelting and refining, iron and steel, agriculture, etc. Lime is supplied for building, mining, pulp and paper, chemicals, agriculture, steel and sugar industries.

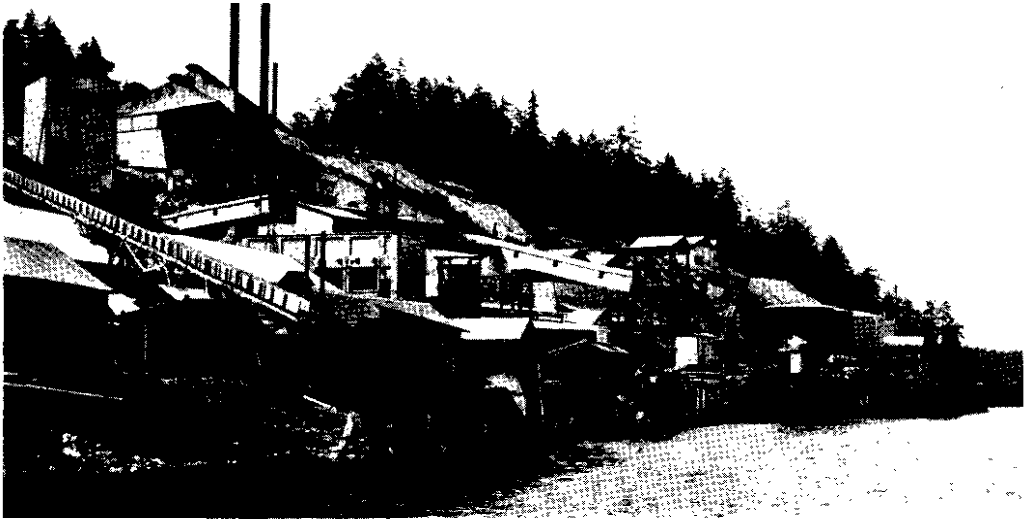
The total number of men employed at Blubber Bay in 1957 was sixty.

Koeye River (51° 127" N.W.), P. O. Christensen, president; A. A. Koeye Limestone Christensen, secretary-treasurer. This company operates a **lime**-Co. Ltd.* stone quarry on **Koeye** River, less than a mile from its mouth on Fitzhugh Sound, 6 miles south of **Namu**. The limestone is mined by drilling vertical holes with a small portable drill. The broken rock is hand-loaded into narrow-gauge cars and hand-trammed to a scow-loading ramp. The 1957 production was 12,500 tons, all of which was shipped to Ocean Falls pulp plant of Crown-Zellerbach Canada Ltd.

Alaska Pine & **Cellulose** Limited* Jeune Landing (50° 127° S.W.). Head office, 1111 West Georgia Street, Vancouver. Nils Erickson, quarry superintendent. This quarry is on the east shore of Neroutsos Inlet about 1¼ miles north of **Jeune** Landing. Limestone is quarried for pulp rock for the Port Alice pulp plant. The quarry is worked by advancing a low face and using an air-leg type of drill for drilling horizontal blast-holes. Broken rock is loaded by a f/z-cubic-yard diesel-driven shovel and transported by truck to a ramp, where it is dumped over a scalping grizzly. The coarse material is loaded on scows and fine material is trucked to a stockpile. Three men were employed.

Head office, 500 Fort Street, Victoria. Gordon Farrell, president; British Columbia B. Franklin Cox, vice-president and general manager; R. E. **Has-**Cement Company kins, general superintendent. Gordon Farrell became president in September, 1957, and B. Franklin Cox became vice-president and general manager in December, 1957. British Columbia Cement Company Limited was incorporated August 1st, 1957, taking over all assets and business from the original British Columbia Cement Company Limited, which changed its name to Ocean Cement and Supplies Ltd., and is now a holding company.

* By R. B. King.



Cement works at Bamberton, under construction in 1912.



British Columbia Cement Company Limited plant at Bamberton to-day

Quarries are operated at Bamberton (48° 12.3' N.W.) and Cobble Hill (48° 123' N.W.) on Vancouver Island. At Bamberton, limestone is mined by drilling horizontal holes with wagon drills. Broken rock is loaded by electric and diesel-driven shovels and transported to the crushing plant by trucks.

At Cobble Hill the quarry face is about 80 feet high. Churn drills are used to drill vertical blast-holes which have a 26-foot spacing and burden. Broken rock is loaded by diesel-driven shovels into 15- and 30-cubic-yard-capacity trucks and transported over 7 miles of private road to the plant at Bamberton.

At Blubber Bay (49° 124' N.W.) a quarry was worked until May, 1957, and then discontinued.

A new kiln, capable of producing cement at a daily rate of 3,000 barrels, was installed at the Bamberton plant and commenced production in June, 1957.

In 1957, 685,119 tons of rock was mined. Of this, 501,743 tons of limestone was quarried at Cobble Hill, 161,638 tons of rock was quarried at Bamberton, and 21,738 tons of rock was quarried at Blubber Bay. The production of cement was 2,652,000 barrels.

MARL

Cheam Marl Products Ltd.* Popkum (49° 121° SW.). Office, Chilliwack. A. M. Davidson, manager. Marl and overlying humus are mined from a post-Glacial deposit which has accumulated on the floor of Cheam Lake. This material, on the north shore of the lake, is as much as 12 feet thick and is dug by dragline and loaded on to trucks. Wet and semi-dry humus and marl are produced for agricultural purposes. Two men were employed.

Popkum Marl Products Limited* Popkum (49° 121' SW.). W. A. Munro, manager. Marl and humus are mined from a post-Glacial deposit on the east shore of Cheam Lake. Draglines are used to dig marl and humus. Some of the material is dried in an oil-fired rotary kiln. Wet, semi-dry, and dry humus and marl are produced for agricultural purposes. Three men were employed.

SAND AND GRAVEL†

Louis Salvador and Son‡ Wynndel (49° 116' S.W.) and Creston (49° 116' SE.). The Wynndel pit is at the north end of Duck Creek road adjoining Scaman's pit. Gravel was mined from low faces using a loader and was screened and crushed when necessary. The production was used principally in road construction. In July the crushing and screening plant was moved to a gravel bench on Goat River, 2 miles east of the Creston-Rykerts Highway.

Merriam and Werner‡ Wynndel (49° 116' S.W.). F. Merriam and J. Werner, owners. This pit is on the Creston-Kootenay Bay Highway 4 miles north of Wynndel. Gravel is mined from a steep face by angle bulldozing and is pushed over a coarse grizzly to remove large rocks. Approximately 4,200 cubic yards was produced for building and road construction and for dyke riprap.

Scaman's Gravel Pit.‡—Wynndel (49° 116' S.W.). G. Scaman, Creston, owner. This pit is at the north end of Duck Creek road, 3 miles north of Wynndel. Approximately 400 cubic yards of road gravel is produced annually. The gravel is mined from low faces by a front-end loader.

* By R. B. King.

† By R. B. King, except as noted.

‡ By J. E. Merrett.

Company office, Box 461, Nelson. C. Ross, president; R. Bain Premier Sand and Oliver, manager. Capital: 10,000 shares, \$1 par value. This Gravel Company company operates a gravel pit on the outskirts of Nelson, part of Limited* which was formerly owned by the city. Work in the past has been intermittent, but a modern plant was installed about two years ago and has operated steadily since then. The gravel is removed by dragline and then crushed and sized. Production in 1956 was 42,700 yards; in 1957, 42,500 yards. Seven men were employed.

Abbotsford (49° 122" S.E.). This pit is 7 miles west and 6 miles south of Abbotsford. Gravel is mined by shovel and scraper. A plant, adjacent to the pit, crushes, washes, and sizes the gravel. The products are used as aggregate in a ready-mix concrete plant or are sold locally. Four men were employed.

Clearbrooke (49° 122" S.E.). **Dueck Building Supplies Ltd.**, Gravel Pit owner. This pit is about 1 mile north of Clearbrooke. Sand and gravel are dug from low gravel faces by an overhead loader and transported to a bucket elevator, by which they are elevated to a crushing, washing, and sizing plant. Pit-run, washed, and sized gravel are produced. A ready-mix plant furnishes concrete for local sales. Seven men were employed.

Aldergrove (49° 122" S.E.). C. N. Foster, owner. This pit is Foster's Gravel Pit about 3 miles south of Aldergrove. Sand and gravel are mined from low faces by a front-end loader. Pit-run gravel is sold locally. The production in 1957 was 4,084 cubic yards. One man was employed.

Border Sand and Gravel Company.-White Rock (49° 122" S. W.). Office and plant, Boundary Road, R.R. 4, White Rock. T. Lapiere, manager. Gravel is dug from low faces by an overhead loader. It is transported for washing and sizing to a plant or is sold as pit-run gravel. Three men were employed.

C&brook Sand & Gravel Company Limited. — Cloverdale (49° 122" SW.). Office and plant, Bayview Road, R.R. 1, Cloverdale. F. Bray and J. Bray, owners and operators. Sand and gravel are mined by an overhead loader, loaded on to trucks and hauled to a semi-portable washing and screening plant. Washed and sized products or pit-run gravel are sold locally. Two men were employed.

Sunshine Properties Ltd.-Newton (49° 122" SW.). This pit is about 1 mile south and 3 miles west of Newton on the British Columbia Electric Railway. Gravel is mined from a low face by a diesel-driven shovel. Pit-run gravel is sold locally.

Corporation of the District of Surrey.-Cloverdale (49° 122° S.W.). Several gravel pits are operated within the township for the purpose of road maintenance and construction. Gravel is mined by diesel-driven shovels or by scrapers and is crushed in portable crushers or used as pit-run gravel.

Corporation of the Township of Langley.-Murrayville (49° 122" S.W.). Several gravel pits are operated within the township for the purpose of road maintenance and construction. Gravel is mined by diesel-driven shovels and is transported to crushers by trucks or is used directly as pit-run gravel.

Hornby General Machinery Company.-Langley Municipality (49° 122° SW.). Office, Cloverdale; pit, Gobsell Road. Harry Hornby, owner. Run-of-pit gravel is mined by a small diesel shovel from low pit faces. The pit is operated intermittently. Gravel is sold locally.

S.U.B. Quarries Ltd.-Port Mann (49° 122" SW.). Office, 611 No. 3 Road, Brighouse. This company also operates the Richmond Bulldozing Co. Ltd. pit. Gravel

*BY J. W. Peck.

is mined by digging low gravel faces with diesel-driven shovels. Most of the production is supplied as pit-run gravel to a crushing plant and ready-mix plant adjacent to the pit. Five men were employed.

Corporation of the District of **Coquitlam**.—Coquitlam (49° 122" SW.). Several gravel pits are operated within the township for the purpose of road maintenance and construction. Gravel is mined by a small diesel shovel. Gravel is either crushed in a portable crusher or used as pit run. In 1957 the production from all pits was 20,773 cubic yards.

Jack **Cewe**
Blacktop Ltd. Coquitlam (49° 122" S.W.). Jack Cewe, manager. This pit is about 3 miles north of Coquitlam on Pipe Line Road. Gravel is mined from low gravel faces by a diesel-driven shovel and is trucked to a portable crusher. Run-of-pit gravel and crushed products are sold locally or used by an adjacent asphalt road-materials plant. Six men were employed.

Gilley Bros.
Limited (**Maryhill**
Division) Coquitlam (49° 122" S.W.). Company office, 902 Columbia Street, New Westminster. J. H. Gilley, general manager; E. Johnston, superintendent. This pit and plant is on the Fraser River near Coquitlam. Sand and gravel are mined from 30-foot faces by a 2½-cubic-yard diesel-driven shovel and trucked by 12-cubic-yard trucks to a crushing plant. Crushed rock is distributed to two washing plants. Sand, gravel, and crushed products produced from this property are transported by scows to markets. Forty-five men were employed.

S. and **S.** Gravel Pit Coquitlam (49° 122" S.W.). N. P. Stromgren and C. B. Scott, owners. This pit is on Pipe Line Road north of Coquitlam. Gravel is mined from gravel faces 50 feet high by digging with a diesel-driven shovel or an overhead loader and is either crushed in a portable crusher or sold locally as run of pit. Four men were employed.

Corporation of the Municipality of **Burnaby**.—Burnaby (49° 122" SW.). **S.** Thompson, works superintendent. The pit, on Stride Avenue, is operated by E. R. Taylor Construction Co. Ltd. for the Municipality of Burnaby. Gravel is mined by digging with a 1-cubic-yard diesel-driven shovel. It is loaded into trucks and transported to a portable crusher or is used as run-of-pit gravel.

Decks-McBride
Ltd. Company office, 105 1 Main Street, Vancouver. J. W. Shape, general manager. Two gravel pits and crushing plants were operated during 1957 by this company. One pit is near Coquitlam (49° 122" S.W.) and the other is near the mouth of Seymour Creek (49° 123" S.E.). At the Coquitlam pit, gravel is dug with a 1-cubic-yard-capacity dragline and is transported by a conveyor belt to a jaw crusher and then to the washing plant. The washed and sized gravel is stored in steel bunkers and is sold locally or used in a ready-mix cement plant. Ten men were employed.

At the Seymour plant, gravel is mined by a ¾-cubic-yard dragline at the edge of **Burrard** Inlet. Gravel is transported by conveyor to the washing plant. Crushed, washed, and sized gravel is shipped by scow or truck. Thirty men were employed.

Highland Sand
and Gravel
Company Limited Lynnmour (49° 123" SE.). Company office, Lynnmour. W. J. Barrett-Leonard, manager. D. F. Spankie, director. This company operates two plants--one on East Keith Road, Lynnmour, and one at 2962 **Lambert** Road, Langley Municipality. At the Lynnmour plant, sand, gravel, crushed products, and road materials are produced. Material is mined from low gravel faces by a ¾-cubic-yard diesel-driven

shovel and is transported to a crushing, screening, and washing plant. Gravel purchased from local supplies is also prepared in this plant.

At the Langley plant, gravel is mined by scraping, using two 1%-cubic-yard crescent scrapers driven by an electrically powered double-drum donkey engine. Gravel is conveyed to the plant, where it is washed, crushed, and sized.

During 1957, 216,471 cubic yards of material was handled by these plants, which involved the following products: Crushed rock, 37,494 cubic yards; sand and gravel, 46,246 cubic yards; crushed fills, 83,741 cubic yards; bank-run fill, 48,990 cubic yards.

Maclynn Gravel Co. Ltd.-Lynn timer (49° 123" S.E.). Company office, Keith Road, Lynn timer. A. D. MacMillan, owner and operator. Gravel is dug by dragline from the bottom of Lynn Creek. The run-of-pit gravel is sold locally. Three men were employed.

Capilano Crushing Co. Ltd. West Vancouver (49° 123" S.E.). C. W. Bridge, general manager. This company operated two crushing and washing plants in 1957—plant No. 1 at 606 Marine Drive, West Vancouver, and plant No. 2 at 33 East First Avenue, Vancouver. Gravel is mined by dredging the foreshore near the mouth of the Capilano River. Two diesel-driven draglines are used to remove the gravel. One of these loads gravel on trucks for transport to plant No. 1; the other loads gravel on scows for transport to plant No. 2. Total 1957 production from both plants was approximately 330,000 cubic yards.

Routledge Gravel Ltd. West Vancouver (49° 123" S.E.). Office, Lower Capilano Post Office. T. C. Routledge, president. This company operates two pits—No. 1 on the Indian reservation at the lower end of Lower Capilano Road and No. 2 at the mouth of Lynn Creek at the lower end of Brooksbank Avenue, North Vancouver. In both pits, gravel is scraped by a 7-cubic-yard scraper from underwater deposits and is conveyed to crushing, screening, and washing plants. The production in 1957 was 213,000 cubic yards from plant No. 1 and 55,000 cubic yards from plant No. 2.

Construction Aggregates Ltd. Britannia Beach (49° 123° N.E.). Company office, 628 Carnarvon Street, New Westminster. Production from this pit started in 1957. Gravel is mined by scraping material from a high bank into a large hopper. The oversize rock is removed and the finer sizes of gravel are conveyed by an inclined belt to a washing and screening plant. The fine sand is treated in an Aitkens classifier to remove fine deleterious material. The sand and gravel are shipped by scow to railroad to markets. Ten men were employed.

Hillside Sand & Gravel Limited Hillside (49° 123" S.E.). Company office, 1075 Main Street, Vancouver; plant, Hillside. J. E. Buerk, manager; Ray Kehoe, superintendent. This pit is on the west shore of Howe Sound and is accessible by road by Gibsons Landing. Gravel is mined by washing with a constant flow of water cascading over the high pit face. Gravel is loaded by a ¾-cubic-yard diesel-driven shovel into 15-cubic-yard Euclid trucks and transported to a crushing and washing plant. Washed and sized gravel is loaded on to scows for transportation. The 1957 production from this pit was 320,000 cubic yards.

Butler Brothers Supplies Ltd. Royal Oak (48° 123" SE.). Office and plant, Keating Crossroad. Claude Butler, manager. Gravel is blasted or dug from gravel faces by diesel-driven shovels and an overhead loader. It is transported to a washing and sizing plant or is sold as pit run. A ready-mix plant furnishes concrete for local sales. In 1957, 154,000 cubic yards of gravel was mined. Five men were employed.

Saanich (48° 123" N.E.). Company office and plant, Royal Oak Post Office, Saanich. Gravel is dug from gravel faces by ½-cubic-yard diesel-driven shovels and is transported by trucks to a chute and grizzly. It is then conveyed to a washing and screening plant. Sand, gravel, and washed and sized products are produced. A concrete plant for making concrete bricks, building-blocks, and drain-tile is also operated. In 1957, 47,673 cubic yards of gravel was produced. Twenty-five men were employed.

Albert Head (48" 123" S.E.). Company office, 900 Wharf Street, Victoria; plant, Royal Bay. D. E. Smith, manager; A. Parker, plant superintendent. Two plants are operated by this company, both of which are in the vicinity of Royal Bay. At plant No. 1, sand and gravel are mined by using a scraper on a slack-line cable-way to loosen packed gravel from the high face. Gravel is loaded by a 1¼-cubic-yard shovel into a hopper, where it discharges on a conveyor belt and is conveyed to the plant. Gravel is crushed, screened, washed, and classified, and the products are shipped by scow to markets.

At plant No. 2, gravel is dug by a diesel-driven shovel from a low face, loaded on to trucks and transported to a washing and screening plant.

Sand, gravel, and crushed products are sold locally. The production from both pits was 425,000 cubic yards in 1957.

Duncan (48" 123" N.W.). Company office, Duncan. In October, A. V. Richardson, Butler Brothers Supplies Ltd. purchased this company and continued to operate it under the same name. The pit is 4 miles from Duncan on the Lake Cowichan Road. Pit-run gravel and washed and screened sand, gravel, and rock are produced. Gravel is mined by an overhead loading machine and also by scraping. Pit-run gravel that is not used directly as fill or road dressing is washed and sized in an adjoining plant. A ready-mix plant uses the washed products as aggregate in concrete for local sales. During the year 30,000 cubic yards of gravel was produced. Three men were employed.

SILICA

Rimrock Mining Corporation Limited*

Cranbrook (49" 115° SW.). Registered office, 530 Rogers Building, Vancouver; general office, 809 Eighth Avenue West, Calgary, Alta.; mine office, Cranbrook. D. J. Fulton, president. The property is at the south end of a ridge between Kiakho and Jim Smith Lakes and is reached by 5 miles of road west of Cranbrook. A bulldozer was used to complete 450 feet of surface stripping, and fourteen diamond-drill holes, averaging 100 feet deep, were drilled at different locations on the property. A crew of four men was employed.

Oliver (49" 119" S.W.). Pacific Silica Limited. Registered office, 717 West Pender Street, Vancouver; quarry office, Box 397, Oliver. W. M. Hemphill, president; Ivan A. Hunter, manager, Oliver. This silica quarry is on the Gypo mineral claim, owned by The Consolidated Mining and Smelting Company of Canada, Limited, and is 1 mile north of the village of Oliver and from 800 to 1,200 feet west of the main highway.

The silica is blasted from the quarry face and is loaded into trucks by a diesel-driven shovel. There are two crushing and screening plants. Selected white rock is treated at No. 1 plant, where it is crushed, screened, and sacked, and is shipped for sale as stucco

* By J. E. Merrett.

† By A. R. C. James.

dash, roofing rock, poultry grit. and other silica products. The No. 2 plant, consisting of a crushing and screening plant, was built in 1956 for the purpose of processing rock for bulk shipments. The product is trucked from the plant to ~~the~~ Great Northern Railway at Oroville, Wash., and from there is shipped to metallurgical plants in Washington and Oregon.

Throughout the greater part of 1957 the No. 1 plant was operated by Pacific Silica Limited, while the quarrying and operation of No. 2 plant was by the Interior Contracting Company Limited on contract. At the end of September this contract was terminated by mutual consent, and since then Pacific Silica Limited has been operating both plants and the quarry. Bulk shipments of rock have, however, been substantially reduced in the last quarter of the year due to customers holding large stockpiles. To the end of September a total crew of seventeen men was employed by both companies. From then until the end of 1957 approximately eight men were employed. A total of 7,486 tons of silica products was shipped from No. 1 plant. Bulk shipments of rock totalled 62,470 tons, and a stockpile of approximately 25,000 tons of rock was on the ground at the end of the year; thus total production in 1957 was approximately 95,000 tons.

Petroleum and Natural Gas

By S. S. Cosburn

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PRODUCTION

At the end of 1957 twenty-two oil wells and 130 gas wells, all in northeastern British Columbia, were capable of producing from one or more zones in the Lower Cretaceous, Triassic, Permo-Pennsylvanian, Mississippian, or Devonian formations. Because of market limitations, not all of these wells produced commercially during the year.

Oil was produced from the Boundary Lake, West Buick Creek, and Fort St. John fields. Gas was produced from the Fort St. John, Southeast Fort St. John, West Buick Creek, Montney, Kiskatinaw, and West Kiskatinaw fields. Field production figures for 1957, by formations, are shown in the following table. Previous production data are included where applicable.

Oil Production (in Barrels)

Field	Pool	Year			Cumulative (Pool)
		1955	1956	1957	
Boundary Lake.....	Triassic Schooler Creek Boundary.....	582 ¹	107,439	199,220	307,241
Fort St. John.....	Basal Gething.....	.....	.....	3,997	3,997
	Triassic "C".....	.....	31,919	126,776	158,695
	Permo-Pennsylvanian.....	.....	9,096	7,866	16,962
West Buick Creek.....	Nikanassin.....	.....	.....	3,086	3,086
	Totals.....	582	148,454	340,945	489,981

¹ Test.

Gas Production (M S.C.F.)¹

Field	Pool	Year				Cumulative (Pool)
		1954	1955	1956	1957	
Fort St. John.....	Cadomin.....	.....	18,362	25,330	69,493	113,185
	Triassic "A".....	60,883	150,289	162,516	543,850	917,538
	Triassic "A" and "B".....	.....	.....	.....	1,142,154	1,142,154
	Triassic "D".....	.....	.....	.....	1,931,032	1,931,032
	Permo-Pennsylvanian.....	.....	.....	.....	713,327	713,327
Fort St. John Southeast.....	Cadomin.....	.....	.....	.....	13,046	13,046
	Triassic "A".....	.....	.....	.....	185,208	185,208
	Triassic "D".....	.....	.....	.....	351,101	351,101
	Permo-Pennsylvanian.....	.....	.....	.....	1,361,374	1,361,374
	Nikanassin.....	.....	.....	.....	629,522	629,522
Buick Creek West.....	Triassic "D".....	.....	.....	.....	1,234	1,234
	Triassic "D".....	.....	.....	.....	94,117	94,117
Montney.....	Permo-Pennsylvanian.....	.....	.....	.....	448,851	448,851
Kiskatinaw.....	Devonian.....	.....	.....	.....	623,544	623,544
Kiskatinaw West.....	Triassic "C".....	.....	.....	.....	167,089	167,089
Totals.....	.....	60,883	168,651	187,846	8,274,942	8,592,322

¹ M S.C.F.=thousands of standard cubic feet. A standard cubic foot is measured at a pressure of 14.4 pounds per square inch and a temperature of 60° F.

PIPE-LINE SYSTEM

At the end of 1957 the 650-mile 30-inch pipe-line of Westcoast Transmission Company Limited was completed, and approximately 300 million cubic feet of gas per day was being transported from Taylor. At Kamloops gas is supplied to Inland Natural Gas Co. Ltd. for distribution through the Okanagan and to Trail and Nelson; at Sumas gas is delivered to B.C. Electric Co. Ltd. for distribution and is exported to Pacific Northwest Pipeline Corporation. Construction started in the fall of 1955 and the system was opened on October 7th, 1957.

A 26-inch trunk line extends 83 miles along the Alaska Highway north from Taylor and gathering lines branch from it. Pipe-line gas is brought from Alberta to the compressor station at Taylor as well as sweet gas from British Columbia fields south and east of Taylor. Gas from the Fort St. John field and northern fields is sour and is treated in the absorption plant.

REFINERY INSTALLATIONS

At Fort St. John a small absorption plant is operated by Plains Western Gas Company to remove from fuel gas hydrogen sulphide and other by-products.

The XL Refinery at Dawson Creek has a nominal design capacity of 1,700 barrels of crude oil per day. This will be increased to 2,500 barrels per day by the end of 1958 and to 3,500 barrels per day by the end of 1959. The petroleum products from this refinery are finding a local market.

The McMahon plant at Taylor includes a scrubbing plant, jointly owned by Westcoast Transmission Company Limited and Pacific Petroleums Ltd.; a refinery jointly owned by Pacific Petroleums Ltd. and Phillips Petroleum Company; and a sulphur plant owned by Jefferson Lake Sulphur Company. Pipe-line gas from the scrubbing plant is delivered to the No. 1 compressor station of the Westcoast pipe-line.

EXPLORATION

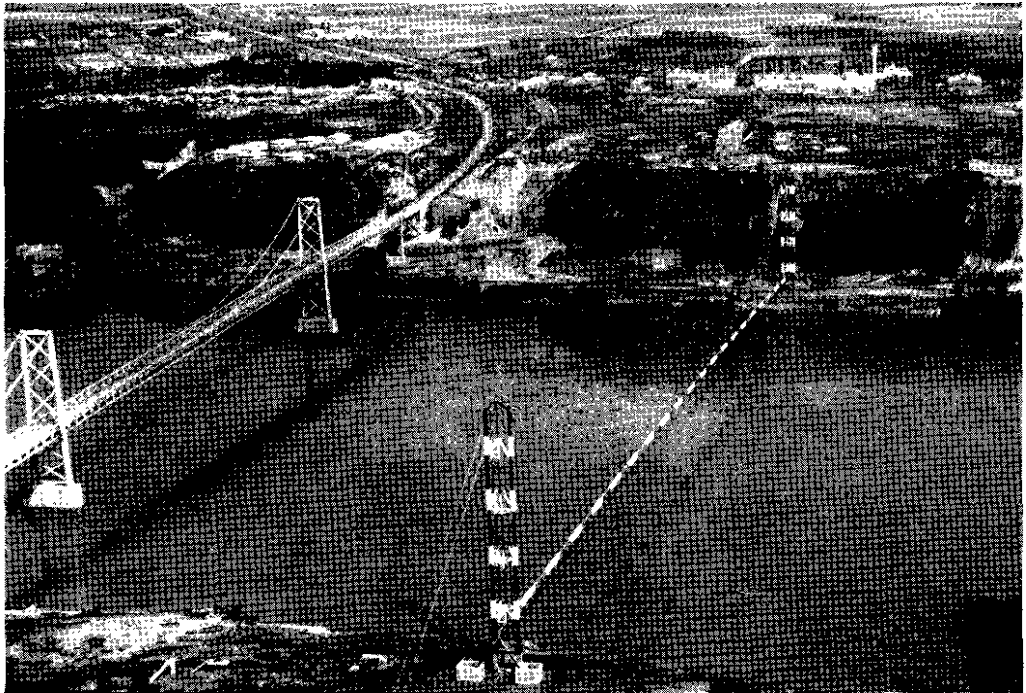
During 1957 seismic surveys were conducted by at least thirty-five crews and core-hole drilling was done in two areas in northeastern British Columbia. Surface geological and photogeological studies were continued in the same region and in the Fernie area and the Nanaimo basin.

Footage drilled increased 24.7 per cent over the 1956 total to 495,885 feet. One hundred and eighteen wells were drilled or worked on during 1957, of which twelve were completed as oil wells, forty-two were completed as gas wells (including one in process of completion at the end of the year), two wells were deepened, three wells were suspended, and forty wells were abandoned; two wells were being abandoned and eighteen were being drilled at the end of 1957. These wells were all in northeastern British Columbia, except two in the Vancouver area and one in the Victoria area. The table on page 100 lists all wells operated in 1957.

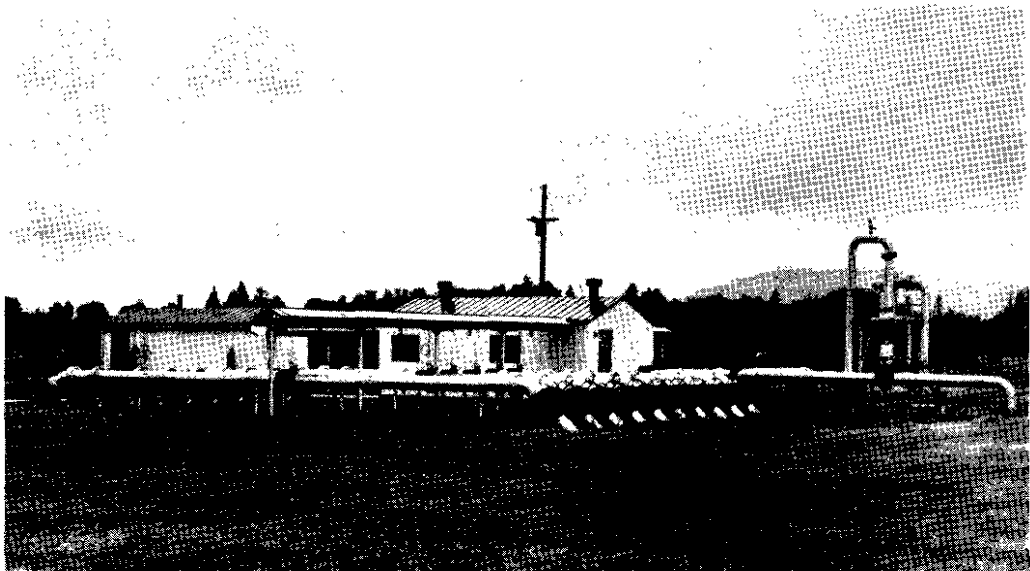
Oil was found in commercial quantities in the basal Gething of the Fort St. John field, the Nikanassin of the Buick Creek field, and the Mississippian of the Blueberry field. These formations previously had produced only gas. The proven limits of the Boundary Lake field were extended to the south and west.

Favourable structural and depositional conditions and the existence of many reservoir horizons have resulted in an exceedingly high rate of gas and oil discovery. Of 308 wells drilled from 1942 to the end of 1957, 152 were completed as oil or gas wells.

The following table lists the status and footage of wells drilled from 1942 to the end of 1957:—



The McMahon plant at Taylor and Westcoast Transmission Company Limited pipe-line right of centre. (Bilvic Studio, Dawson Creek.)



Huntingdon metering station. the southern end of the Westcoast natural-gas pipe-line, (Abbotsford, Sumas and Matsqui News.)

Record of Wells Drilled since 1942

Year	Comp. Oil Wells	Cum. Comp. Oil Wells	Comp. Gas Wells	Cum. Comp. Gas Wells	Wells Abandoned	Cum. Wells Abandoned	Total Wells Drilled	Cum. Total Wells Drilled	Yearly Footage	Cum. Footage
1942		—	—	—	1	1	1	1	6,940	6,940
1947	(1)	—	—	—	—	—	—	—	3,893	10,833
1948	—	—	3	3	5	6	8	9	17,250	28,083
1949	—	—	—	3	6	12	6	15	11,289	39,372
1950	—	—	—	3	6	18	7	22	32,664	72,036
1951	—	—	3	6	12	30	16	38	56,062	128,098
1952	—	—	10	16	5	35	16	53	140,028	268,126
1953	—	—	17	33	20	55	39	92	193,225	461,351
1954	—	—	15	48	9	64	28	120	147,895	609,246
1955	1	1	8	56	24	88	37	157	231,836	841,082
1956	8	10	35	90	15	103	58	215	397,817	1,238,899
1957	12	22	40	130	41	144	93	308	495,885	1,734,784

¹ No completions.

NOTE.—Because of reclassifications of some wells, these columns may not balance.

Oil and Gas Wells Producing and Capable of Producing

Year	Oil Wells Producing	Oil Wells Capable of Producing	Gas Wells Producing	Gas Wells Capable of Producing
1953	—	—	—	33
1954	—	—	2	48
1955	1	1	3	56
1956	9	10	3	90
1957	19	22	46	130

WELL SAMPLES

Unless otherwise directed, any operator who drills a well for petroleum or natural gas is required to take samples of the bit cuttings representing interval depths of 10 feet or lesser intervals.

The operator may be required to take samples by means of a **CORE** barrel. All cores taken **must** be put in suitable boxes, not more than 36 inches long, which must be **accurately labelled**, properly protected and stored, and must be delivered as required.

So far as possible, cores taken in 1957 were examined and logged in the field. All core from wells drilled in northeastern British Columbia is being stored in the Dawson Creek area. Those companies without core-storage facilities in the Dawson Creek area stored their core in the Department of Mines core-storage depot (Pan-Abode building) in **Pouce Coupe** until September, 1957, when all core-storage space in that building became filled. For the remainder of the year, and until more storage facilities may be provided by the Department, the operators were notified to provide their own core storage.

Samples of well cuttings are received at the Stratigraphic Laboratory in Victoria during the drilling of each well. A part of each 10-foot sample is washed, dried, and stored in a **labelled** glass bottle in sequence with other samples from the same well so that a complete set of samples from each well is available for examination. A duplicate set of samples is bottled and sent to the laboratory of the Geological Survey of Canada at Calgary. During 1957, 26,678 samples were washed and bottled in Victoria.

Wells Drilled or Worked On, 1957

Well Name	No.	Date Spudded	Date Rig Released	Total Depth	1957 Footage	Status as at Dec. 31, 1957
<i>Northeastern British Columbia</i>						
B. A.-Shell Klua Creek	2			Ft.		Location.
Dome-Basco-Laprise Creek	35-H-94-G-8	Dec. 26, 1957			641	Drilling.
F.P.C. Richfield Brenot Creek	1	Nov. 8, 1957			701	Drilling.
(Gulf States) Clark Lake	1	Dec. 27, 1957			510	Drilling.
(Gulf States) Gundy Creek	3	Mar. 8, 1957	June 17, 1957	8,137	8,137	Gas well, Triassic.
(Gulf States) Gundy Creek	4	July 6, 1957	Oct. 1, 1957	7,018	7,018	Gas well, Triassic.
(Gulf States) Gundy Creek	5	Nov. 11, 1957	Dec. 5, 1957	4,425	4,425	Abandoned.
(Gulf States) Gundy Creek	6	Oct. 4, 1957	Dec. 7, 1957	4,467	4,467	Gas well, Triassic.
(Gulf States) Kotcho Lake	1	Feb. 3, 1957	Mar. 8, 1957	2,450	2,450	Abandoned.
(Gulf States) Kotcho Lake	2	Dec. 20, 1957			2,185	Drilling.
(Gulf States) Kwokwullie	1	Jan. 18, 1957	Feb. 11, 1957	2,033	2,033	Abandoned.
(Gulf States) Petitot River	1					Location.
(Gulf States) Prophet River	1	Oct. 28, 1956	Jan. 28, 1957	6,957	294	Gas well, Devonian.
H. B.-Union-Imperial-Gutah Creek	1	Jan. 7, 1957	Feb. 4, 1957	4,420	4,420	Abandoned.
Hudson's Bay-Union-B.A.-Milligan	4	Jan. 1, 1957	Feb. 12, 1957	3,760	3,760	Abandoned.
Hudson's Bay-Union-B.A.-Milligan	5	Feb. 17, 1957	Mar. 11, 1957	3,590	3,590	Abandoned.
Imperial-Calvan-Farrell Creek	9-E-94-A-5	Nov. 8, 1956	Apr. 17, 1957	8,005	3,473	Abandoned.
Imperial Pacific Alces	1-23-84-14	Mar. 6, 1957	Apr. 17, 1957	4,516	4,516	Oil well, Triassic.
Imperial Pacific Alces	3-30-84-14	Feb. 24, 1957	Apr. 1, 1957	4,612	4,612	Abandoned.
Imperial Pacific Alces East	14-20-84-13	Sept. 27, 1957	Nov. 18, 1957	4,850	4,850	Oil well, Triassic.
Imperial Pacific Boundary	6-11-85-14	Aug. 23, 1957	Sept. 19, 1957	4,225	4,225	Oil well, Triassic.
Imperial Pacific Boundary	8-16-85-14	July 25, 1957	Sept. 8, 1957	4,383	4,383	Abandoned.
Imperial Pacific Boundary	11-10-85-14	Dec. 29, 1956	Feb. 14, 1957	4,553	3,559	Oil well, Triassic.
Imperial Pacific Boundary	16-4-85-14	May 29, 1957	July 20, 1957	3,989	3,989	Oil well, Triassic.
Imperial Pacific Cameron River	3-17-87-23	July 30, 1957	Dec. 18, 1957	7,830	7,830	Abandoned.
Imperial Pacific Flatrock	2-21	Apr. 7, 1957	May 15, 1957	4,737	4,737	Abandoned.
Imperial Pacific Golata	8-29-83-15	June 21, 1957		12,287	12,287	Abandoning.
Imperial Pacific Groundb'rch	5-5-84-24	Oct. 22, 1956	Apr. 22, 1957	8,678	3,934	Abandoned.
Imperial Pacific Kilkerran	12-31			12,040		Abandoned, July 26, 1957.
Imperial Pacific Siphon Creek	1-26-86-16	Nov. 4, 1956	Mar. 15, 1957	10,913	3,923	Abandoned.
Pacific Airport	94	July 11, 1957	July 31, 1957	4,225	4,225	Abandoned.
Pacific Airport	97	Aug. 7, 1957	Oct. 21, 1957	6,549	6,549	Gas well, Triassic.
Pacific Beaton	1		Mar. 29, 1957	5,027	733	Deepened and abandoned.
Pacific Boundary	8-15	June 3, 1957	Aug. 1, 1957	4,601	4,601	Gas well, Triassic.
Pacific Buick Creek	6	Jan. 9, 1957	Feb. 28, 1957	4,751	4,751	Gas well, Nikanassin.
Pacific Buick Creek	7	Jan. 15, 1957	Feb. 10, 1957	4,025	4,025	Abandoned.
Pacific Buick Creek	8	Feb. 23, 1957	Apr. 1, 1957	4,022	4,022	Gas well, Triassic.
Pacific Buick Creek	9	Mar. 8, 1957	May 1, 1957	4,782	4,782	Gas well, Nikanassin.
Pacific Buick Creek	10	Apr. 24, 1957	June 2, 1957	4,029	4,029	Gas well, Nikanassin.
Pacific Buick Creek	11	May 9, 1957	June 20, 1957	4,859	4,859	Gas well, Nikanassin.
Pacific Buick Creek	12	June 5, 1957	July 2, 1957	4,141	4,141	Gas well, Nikanassin.
Pacific Buick Creek	13A	June 4, 1957	July 24, 1957	4,020	4,020	Oil well, Nikanassin.
Pacific Buick Creek	15	July 27, 1957	Aug. 27, 1957	4,145	4,145	Oil well, Nikanassin.

				Ft.		
Pacific Charlie Lake	93	May 28, 1957	Sept. 26, 1957	6,525	6,525	Oil well, Basal Gething.
Pacific Fort St. John	38		Mar. 8, 1957	5,046	11	Deepened, gas well, Triassic.
Pacific Fort St. John	72	Nov. 1, 1956	Feb. 2, 1957	5,953	863	Gas well, Triassic.
Pacific Fort St. John	75	Nov. 15, 1956	Feb. 7, 1957	4,475	1,404	Abandoned.
Pacific Fort St. John	79	Nov. 27, 1956	Feb. 8, 1957	6,474	1,504	Gas well, Permo-Pennsylvanian.
Pacific Fort St. John	80	Nov. 27, 1956	Jan. 17, 1957	4,600	121	Gas well, Cadomin.
Pacific Fort St. John	81	Dec. 17, 1956	Jan. 18, 1957	4,446	572	Oil well, Triassic.
Pacific Fort St. John	83	Feb. 9, 1957	Mar. 8, 1957	3,093	3,093	Gas well, Triassic.
Pacific Fort St. John	84	Jan. 22, 1957	Feb. 8, 1957	4,005	4,005	Abandoned.
Pacific Fort St. John	86	Mar. 16, 1957	Apr. 5, 1957	3,845	3,845	Abandoned.
Pacific Fort St. John	98	Dec. 4, 1957			4,331	Drilling.
Pacific Imperial Cache Creek	1	Dec. 8, 1957			4,212	Drilling.
Pacific-Imperial Red Creek	82	Dec. 29, 1956	Mar. 12, 1957	5,841	5,219	Abandoned.
Pacific-Imperial Stoddart	85	Feb. 13, 1957	Apr. 27, 1957	6,619	6,619	Gas well, Permo-Pennsylvanian.
Pacific-Imperial Stoddart	91	May 17, 1957	July 22, 1957	6,695	6,695	Abandoned.
Pacific Pouce Coupe	10-13	Oct. 24, 1957	Nov. 14, 1957	2,400	2,400	Abandoned.
Pacific Red Creek	87	Mar. 20, 1957	May 14, 1957	5,571	5,571	Abandoned.
Pacific Red Creek	88	Apr. 1, 1957	May 21, 1957	5,256	5,256	Gas well, Triassic.
Pacific Red Creek	92	May 22, 1957	Aug. 3, 1957	6,775	6,775	Abandoned.
Pacific Red Creek	95	July 28, 1957	Sept. 9, 1957	4,990	4,990	Abandoned.
Pacific Scurry Dawson Creek	1	Sept. 30, 1957	Oct. 26, 1957	2,900	2,900	Gas well, Cadotte.
Pacific Scurry Dawson Creek	2	Nov. 7, 1957	Dec. 5, 1957	3,020	3,020	Gas well, Cadotte.
Pacific Scurry Dawson Creek	3	Nov. 8, 1957	Dec. 8, 1957	2,760	2,760	Gas well, Cadotte.
Pacific Scurry Dawson Creek	4	Dec. 10, 1957		2,935	2,935	Completing as a gas well, Cadotte.
Pacific Scurry Dawson Creek	5	Dec. 9, 1957	Dec. 26, 1957	3,100	3,100	Abandoned.
Pacific Stoddart	90	May 3, 1957	July 6, 1957	6,423	6,423	Gas well, Permo-Pennsylvanian.
Pacific Sunray Montney	5	Aug. 27, 1957	Oct. 1, 1957	4,932	4,932	Gas well, Triassic.
Pan-Am-Beaver River	A-1					Location.
(Phillips) Beaton River	A-1					Location.
(Phillips) Blair	A-1	Sept. 3, 1957		8,700	8,700	Abandoning.
(Phillips) Highway	2	June 27, 1956	June 19, 1957	8,435		Gas well, Triassic.
(Phillips) Highway	3	June 20, 1957	Nov. 14, 1957	7,440	7,440	Gas well, Triassic.
(Phillips) Highway	4	Jan. 15, 1957	June 10, 1957	7,905	7,905	Gas well, Triassic and Mississippian.
(Phillips) Kobes	2	Dec. 6, 1957		3,012	3,012	Drilling.
(Phillips) Kobes	3	Nov. 23, 1957			4,547	Drilling.
(Phillips) Kobes	A-1	May 28, 1956	May 30, 1957	8,197	562	Gas well, Triassic.
(Phillips) Kobes	A-2					Location.
(Phillips) Kobes	A-3	May 13, 1957	Nov. 16, 1957	7,575	7,575	Abandoned.
(Phillips) Kobes	A-4	Aug. 3, 1957	Oct. 28, 1957	5,128	5,128	Abandoned.
(Phillips) Kobes	A-4-A	Nov. 8, 1957			5,116	Drilling, approximately 200 ft. northwest of (Phillips) Kobes A-4.
(Phillips) Kobes	B-1					Location.
(Phillips) Milligan	A-1					Location.
(Phillips) Sikanni	1	Mar. 12, 1957	June 16, 1957	7,206	7,206	Abandoned.
(Phillips) Town	A-1	Dec. 5, 1957			4,028	Drilling.
(Phillips) Townsend	A-1	Feb. 26, 1956	May 4, 1957	7,296	354	Gas well, Mississippian.
(Phillips) Townsend	A-2	Apr. 2, 1957	July 23, 1957	7,448	7,448	Gas well, Triassic and Mississippian.
(Phillips) Umbach	1	Nov. 29, 1957			4,201	Drilling.
Richfield-Canadian Decalta Big Arrow Creek	1	Jan. 31, 1956	Mar. 30, 1957	5,070		Gas well, Triassic.
Richfield-C. F. des P. Caliph Grizzly Valley	1	Jan. 18, 1956	Nov. 25, 1957	12,631	3,749	Abandoned.
Richfield Prespatou Creek	1	Jan. 14, 1957	Mar. 9, 1957	4,761	4,761	Gas well, Triassic.

Wells Drilled or Worked On, 1957—Continued

Well Name	No.	Date Spudded	Date Rig Released	Total Depth	1957 Footage	Status as at Dec. 31, 1957
				Ft.		
Sinclair-Canadian Atlantic	B-2-3	Feb. 12, 1957	May 29, 1957	5,630	5,630	Gas well, Triassic.
Sinclair-Canadian Atlantic	B-3-1	Jan. 20, 1957	Sept. 4, 1957	12,450	12,450	Abandoned.
Sinclair-Canadian Atlantic	B-5-1	Feb. 5, 1957	.....	.....	6,235	Drilling.
Sinclair-Canadian Atlantic	B-6-1	Jan. 23, 1957	Nov. 26, 1957	12,685	12,685	Gas well, Mississippian.
Sinclair-Canadian Atlantic	B-13-2	Oct. 23, 1957	.....	.....	6,139	Drilling.
Texaco N.F.A. Beaton River	2	Nov. 22, 1956	Mar. 6, 1957	10,445	5,103	Abandoned.
Texaco N.F.A. Boundary Lake	4	Jan. 23, 1957	Feb. 27, 1957	4,824	4,824	Abandoned.
Texaco N.F.A. Boundary Lake	6	Feb. 11, 1957	Mar. 19, 1957	4,192	4,192	Suspended.
Texaco N.F.A. Boundary Lake	7	Dec. 24, 1957	.....	.....	2,426	Drilling.
Texaco N.F.A. Buick Creek	11	Sept. 10, 1957	Oct. 19, 1957	4,545	4,545	Gas well, Nikanassin.
Texaco N.F.A. Buick Creek	12	Oct. 26, 1957	Nov. 29, 1957	4,220	4,220	Gas well, Bluesky.
Texaco N.F.A. Buick Creek	13	Oct. 21, 1957	Nov. 16, 1957	4,958	4,958	Abandoned.
Texaco N.F.A. Buick Creek	14	Nov. 21, 1957	Dec. 15, 1957	4,705	4,705	Abandoned.
Texaco N.F.A. Buick Creek	15	Dec. 19, 1957	.....	.....	3,486	Drilling.
Texaco N.F.A. Nig Creek	7	Sept. 19, 1957	Nov. 13, 1957	5,095	5,095	Gas well, Triassic.
Triad Beaton River	1	.....	.....	.....	.....	Location.
Triad Conroy Creek	1	Jan. 26, 1957	Mar. 18, 1957	5,670	5,670	Abandoned.
Triad Prairie Creek	1	Dec. 17, 1957	.....	.....	294	Drilling.
Union Buick Creek	1	Nov. 17, 1957	Dec. 29, 1957	4,932	4,932	Gas well, Triassic.
Union-H.B.-Milligan Creek	73-G	Feb. 27, 1957	Mar. 21, 1957	3,800	3,800	Suspended.
Union Snyder Creek	2	Oct. 27, 1957	Nov. 15, 1957	4,018	4,018	Abandoned.
(White & Lloyd) Blueberry	11	Sept. 20, 1956	July 16, 1957	7,045	.....	Oil well, Mississippian.
White & Lloyd-Fargo O'Is Ltd.-Blueberry	12	Jan. 24, 1957	June 16, 1957	8,158	8,158	Gas well, Triassic.
White & Lloyd-Fargo O'Is Ltd.-Blueberry	13	Feb. 12, 1957	Dec. 30, 1957	6,886	6,886	Oil well, Mississippian.
White & Lloyd-Fargo O'Is Ltd.-Blueberry	14	Aug. 10, 1957	Sept. 18, 1957	4,147	4,147	Gas well, Nikanassin.
White & Lloyd-Fargo O'Is Ltd.-Blueberry	15	July 27, 1957	Sept. 16, 1957	4,198	4,198	Gas well, Nikanassin.
White & Lloyd-Fargo O'Is Ltd.-Blueberry	16	June 15, 1957	Sept. 5, 1957	7,300	7,300	Oil well, Mississippian.
White & Lloyd-Fargo O'Is Ltd.-Blueberry	18	Dec. 5, 1957	Dec. 28, 1957	3,562	3,562	Abandoned.
White & Lloyd-Fargo O'Is Ltd.-Blueberry	19	Dec. 20, 1957	.....	.....	3,128	Drilling.
(White & Lloyd) Halfway	3	June 31, 1956	Jan. 22, 1957	7,701	.....	Gas well, Triassic.
<i>Vancouver Area</i>						
Hercon-Key Evans	1	Feb. 12, 1957	.....	7,846	188	Suspended.
Royal Can-Van Tor-Big Horn Kuhn	1	Oct. 15, 1955	Oct. 15, 1957	5,202	3,780	Abandoned.
<i>Victoria Area</i>						
Charter <i>et al.</i> Saturna	1	Oct. 30, 1957	.....	.....	1,575	Drilling.

Inspection of Lode Mines, Placer Mines, and Quarries

By H. C. Hughes, Chief Inspector of Mines

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PRODUCTION

The output of metal mines for 1957 was 7,282,436 tons. This tonnage was produced from fifty-nine mines, of which forty produced 100 tons or more.

FATAL ACCIDENTS

During 1957 there were eight fatal accidents connected with actual mining operations in metal mines and quarries. This was six less than in 1956. There were 4,840 persons employed below and above ground in metal mines, and 838 persons employed in concentrators in 1951.

The ratio of fatal accidents per 1,000 persons employed in mines and concentrators was 1.41, as compared with 2.15 in 1956.

Tonnage mined per fatal accident during the last ten-year period was 663,116 tons.

The following table shows the mines at which fatal accidents occurred during 1957, with comparative figures for 1956:—

Mine	Mining Division	Number of Fatal Accidents	
		1957	1956
Mineral King	Golden .....	...	3
Sullivan	Fort Steele .....	...	2
Jersey	Nelson .....	...	1
Sunshine Lardeau	Revelstoke .....	...	1
Britannia	Vancouver	3	...
Western Nickel	Vancouver	1	...
Yreka	Nanaimo .....	...	1
Torbrüt Silver	Skeena .....	...	1
Granduc	Skeena	1	...
Tulsequah	Atlin	2	2
Big Bull	Atlin .....	...	1
Cassiar Asbestos	Skeena .....	...	2
Violamac	Slocan	1	...
Totals		8	14

The following table classifies fatal accidents as to cause and location:—

Cause	Number	Location
Run of muck	3	Underground.
Crushed by mucking-machine	1	Underground.
Fell down shaft	1	Underground.
Gassed	1	Underground.
Struck by falling rock	1	Underground.
Returned too soon to scene of blast	1	Underground.
T o t a l	8	

A description of all fatal accidents follows.

Kenneth Irvin Van **Buskirk**, aged 38, Canadian, married, and employed as a shaft captain by the Pogue Exploration and Mine Development Co. Ltd., shaft contractors at the Granduc mine, was instantly killed when he fell about 40 feet down the Granduc shaft on January 15th, 1957, at 3.30 p.m. He was a man with very extensive shaft experience, having worked for the Pogue Company for the past seven years.

The Granduc shaft is a vertical, three-compartment, internal shaft collared at the 3250 level. The over-all dimensions are 8 by 22 feet and each compartment is 6 by 6 feet inside the timbers. The shaft had been sunk to a depth of 400 feet below the collar, with stations cut at the 150- and 300-foot levels. A Cryderman shaft mocker was used for excavating the broken rock. Conventional shaft timbers with a blasting set were installed to within 20 feet of the shaft bottom. The sinking-bucket was in the centre compartment. A great deal of difficulty was being experienced with water, and in recent weeks a flow of over 100 gallons per minute had been tapped. This necessitated putting in cement plugs and drilling holes in advance, and grouting under pressure to seal off the fissures.

Shortly before the accident, a heavy flow of water had been struck in one corner of the shaft bottom, necessitating putting in a cement plug. Two men, Harold Odne and Albert Deschamps, were working in the shaft bottom pumping the water into the shaft bucket. Two buckets were being used for the job. About 3.20 pm. Van **Buskirk** descended the shaft in the other bucket with W. Tinker, an engineer on loan, who was advising on shaft-sinking problems. Van **Buskirk** got off at the blasting set (sixty-fourth set) 20 feet above the shaft bottom. It was his announced intention to connect up, through the manway compartment, a hose-line to a tank on the sixty-first set, 3X feet above the shaft bottom, so that water could be pumped from the bottom to this tank and thence to the collar in stages, thus freeing the bucket for bringing down sand and cement for the plug. After Van **Buskirk** got off the bucket, Tinker continued to descend to the shaft bottom and joined the two men there. About ten minutes after Tinker arrived at the bottom a hat fell down the shaft and twenty to thirty seconds later Van **Buskirk** himself fell, his body striking the lip of the water-filled bucket and then falling into it. He was immediately pulled out, but was apparently dead. He was taken out of the mine and death was later confirmed by a doctor, Dr. B. Firsckse, of Stewart, who was flown into the mine camp from Stewart. It would appear that he slipped or lost his footing from the sixty-first or sixty-second set and fell into the shaft.

An inquest was held in Stewart on January 19th, and the Coroner's jury returned the following verdict:-

" We, the jury, find that the deceased, Kenneth Van **Buskirk**, came to his death by accident from falling from an unknown height into the shaft at the Granduc mine."

This accident does not appear to be due to any specific unsafe condition, apart from the ordinary hazards of shaft sinking. The conditions at the shaft bottom were certainly difficult due to the large amount of water.

Felix Heron, aged 24, Irish, single, and John Ivan Rukli, aged 26, Yugoslavian, single, both employed as miners by Tulsequah Mines, Limited, Tulsequah, were instantly

killed when they were caught in a run of muck in 6246 No. 3 **Boxhole** raise in the **Tulsequah** Chief mine on January 22nd, 1957, at about 10.30 p.m.

The 6246 No. 3 **Boxhole** raise is a 6- by 6-foot raise which was being driven from 6204 drift to connect with 6246 stope at a point where the stope was filled with about 15 feet of broken ore. The raise was driven as a knuckleback. It was driven in a westerly direction at a slope of 50 degrees, and at a point about 20 feet from the collar was turned back in an easterly direction to connect with 6246 stope. The length of the knuckleback portion was about 18 feet.

The raise was being driven on two shifts, and on the night of January 19th the drilling of the last round was started. Five S-foot holes were drilled on that shift, eleven 7-foot holes on the day shift of January 20th, and on the night shift of January 21st six additional h-foot holes were drilled and the round was loaded and blasted. The round failed to break through to the stope, although it was reported that one of the last six holes had broken into the stope, after being drilled 5 feet.

On the morning of January 22nd, the raise was inspected by the mine foreman, P. Badyk, and the day shiftboss, J. Kerush. They found the face still intact except for a hole 8 inches to 1 foot in diameter on the right side, which was blocked by a large rock. There appeared to be no misfires or bootlegs. It was estimated that the remaining shell of solid rock was about a foot thick. After some discussion, it was decided that, as there was no movement, it would be safe to place a heavy concussion charge close to the face. Preparations were made to do this. The day-shift men, J. Kubiak and J. Jagozinski, were instructed to go into the raise and set a sprag just above the knuckleback, and to put a staging there. Kubiak went into the raise but came down a short time afterward and told Kerush that he was afraid to work there, and asked to be transferred to another job. The shiftboss then transferred him to some other work.

On the night shift of January 22nd, F. Southam, the night shiftboss, instructed Rukli and Heron to go and wait in the drift at the foot of the raise until he arrived. He came there about 9 p.m. and went up into the raise to within about 5 feet of the breakthrough. The conditions were the same as in the morning when the foreman examined the place. There was no movement and he was of the opinion that it was safe to go ahead with preparations to fire the concussion charge. He and Rukli set a steel sprag at the knuckle of the raise. He then instructed the men to prepare a charge of thirty to forty sticks of powder and lay it on the footwall 2 or 3 feet back from the face, with a 12-foot bulldoze stick. The charge was to be fired by an electric detonator. Rukli was instructed to place the charge and Heron was to wait on the platform and pay out the lead wire as it was needed. Southam spent about an hour with the men until he was satisfied they knew exactly what to do. He left them about 10.15 p.m.

Arrangements were made to inform J. Walejna and his partner, working in the near-by 6145 stope, when the charge was to be fired. However, when these two men came out to the lunchroom on the 6200 level at 11.15 p.m. there was no sign of Rukli or Heron, and they decided to investigate. On arriving at the bottom of the raise they saw Heron's body in the muck at the back of the chute gate. Help was summoned and Heron's body was recovered a short time later. There was no sign of life and he was taken out of the mine, where death was confirmed by the mine doctor. The body of Rukli was not recovered until some hours later after 216 tons of muck had been drawn from the chute. Both men died of asphyxia, concussion, and fracturing.

The concussion charge had apparently not been fired. It was evident that, while both men were in the raise, a break-through occurred and the men were buried in the muck before they had a chance to escape.

An inquest was held at Tulsequah on January 26th. The Coroner's jury returned the following verdict:-

" We, the jury, find that Felix Heron and John Rukli came to their death as a result of accidental death on January 22nd at approximately 11.15 p.m. We, the jury, would

recommend that the C.M. & S. Co. at Tulsequah put all their new employees through a stricter mining test."

The judgment of the mine foreman and two shiftbosses as to conditions in the raise was at fault. However, there is no doubt that these men were sincere in their opinion, as all were in the raise at one time or another and for a considerable period of time.

Matthew Henry Henderson, aged 24 years, Canadian, single, and employed as a mucker by Britannia Mining and Smelting Co. Limited, was killed when he was covered by a run of wet muck at the 35-25 control chute on the 3500 level of the Britannia mine at 4.25 p.m. on July 6th, 1957.

The 35-25 control chute is at the lower end of the 35.26 transfer raise system, through which ore is passed from the Bluff and Jane sections of the mine. The chute is 4 feet 10 inches wide and is controlled by three heavy steel fingers, each of which is actuated by a separate 12-inch-diameter air cylinder. A safety cable, anchored to the solid rock on one side and operated by an air cylinder on the other, is available to hold down the fingers. In addition, there is a down-cutting sand board at the lip of the chute controlled by a 10-inch-diameter air cylinder. The operation of the chute is controlled from a platform 7 feet above the track. A substantial steel plate set vertically at the side of the chute gives protection to the man at the control valves. Normally one man operates the chute from the platform, while the other operates the locomotive, moving the cars, etc.

For many years, difficulty has been experienced in handling very wet muck in the transfer system and occasionally very large spills have occurred. This danger has been largely overcome by various precautions which are now taken. When muck is very wet, only small quantities are passed through the transfer raise at a time. Arrangements have been made to drain as much water as possible from the muck at by-pass points. Chute punchers at by-pass points make a daily written report of the condition of the muck for the guidance of the following shift. Finally, if the muck appears to be very wet, the chute puncher at the by-pass warns the man on the next chute by phone to sprag the chute fingers so there will be no danger of a spill.

Henderson and his partner, William Duchesne, found a small spill at 35-25 chute when they came on shift. They started to clean this up. As the muck looked wet, Duchesne said later that he intended to keep two of the fingers closed and bring muck down through one finger only. Meanwhile, as they were cleaning up the spill, Henderson went down to the level. While there, he apparently answered a phone call from R. M. Matson, the chute puncher at the by-pass on the 3100 level above. Matson says he phoned and told Henderson that he was letting down some muck, and, as it was wet, advised him to sprag the chute fingers. Henderson returned to the platform, but did not deliver the message or say anything about the call he had just received. After the spill was cleaned up, Duchesne decided to draw the chute through one finger. While he was doing this, he saw all three fingers being lifted by the pressure of the wet muck. Realizing that a spill was coming, he called to Henderson, who was ahead of him on the chute platform near the stairway, to run. Duchesne ran to the stairway and down to the level, but Henderson turned aside, apparently trying to set the safety cable valve. Duchesne was now ahead of Henderson and did not see him alive again.

When Duchesne returned, he found some 60 to 70 tons of wet muck spilled out. He probed in the muck to see if he could locate Henderson, without success. Help was summoned and the body was finally recovered near the bottom of the chute platform about 6.45 p.m., about two and one-quarter hours after the accident. It was covered by about 3 feet of wet muck.

It would appear that this accident was caused by failure in the system of precautions established for the safety of this type of work. The spill was not extensive, and undoubtedly the deceased could have saved himself had he not delayed after receiving the warning from his partner.

An inquest was held at Mount Sheer on Monday, July 9th. The jury returned the following verdict:-

“ We, the jury, find that Matthew Henry Henderson came to his death accidentally due to suffocation as the result of being buried in spoil muck at the approximate time of 4.25 p.m. on July 6th, 1957, at 35-25 chute on 3500 level at Britannia Mine.

“ The jury attach no blame to any person or persons.”

Raymond Albert Lank, aged 40 years, Canadian, single, and employed as a miner by Western Nickel Limited, died as a result of injuries received when he was crushed between a mucking-machine and the side of a crosscut on the 3550 level of the Western Nickel mine on September 7th, 1957, at about 4.15 a.m.

The accident occurred at the Pride of Emory ore-pass on the 3350 level, where the crosscut was being enlarged to make room for a control chute. It had been slashed out to the required width, and was being mucked out by a track-mounted Eimco 630 overhead loader operated by Lank.

Three men were working with Lank, and one, Edward Harold Partridge, a mucker boss, was an eyewitness to the accident. The others, Olaf Gunderson and Russel McLean, were miners, and were engaged in scaling above the muck pile which Lank was cleaning up. According to Partridge, Lank had been warned three times to stay away from the wall, and Partridge was on the point of warning him again when the accident occurred. The step of the mucking-machine fitted into a recess in the wall as it was being backed up, and Lank was crushed between the wall and the body of the machine. Assistance was obtained immediately, and Lank was taken to the Chilliwack Hospital, where he died at 9.10 a.m. Death was attributed to brain hæmorrhage, with antecedent conditions of ruptured spleen, liver, and kidneys.

The Coroner's inquest was held in Hope on September 16th and the jury returned the following verdict:-

“ We, the jury, empanelled to enquire into the death of Raymond Albert Lank, find that he came to his death accidentally on the 7th day of September, 1957, at Western Nickel Limited while operating a mucking machine in reverse, backing the machine into a rock face. The deceased was crushed between the machine and rock face, receiving internal injuries causing death, as per doctor's autopsy report. Death was accidental and no blame attached to anyone.”

Anders Marius Karsten Anderson, aged 43, Canadian, married, and employed as a diamond driller by Violamac Mines Limited, died as a result of being overcome by gas in a stub crosscut off 7-54 raise in the Victor mine on November 26th, 1957, at about 8.30 a.m.

The working place was about 2,100 feet from the portal of No. 7 level. The 7-54 raise had been driven about 25 feet above the No. 7 south drift, which was parallel to and about 40 feet south of the main No. 7 level. From this a subdrift had been driven about 40 feet in an easterly direction to where a 25-foot raise was driven. A diamond-drill station about 15 feet long had been cut at the top of this second raise. The 7-54 raise is about 40 feet off the main ventilating current. Ventilation for this raise, the sublevel, and the raise to the diamond-drill station was provided by compressed air. No ventilation difficulties had been experienced in driving these workings and all appeared normal on the shifts preceding the accident. Only a day shift was employed. The diamond-drill hole was 72 feet long.

On November 26th Anderson evidently reached his drilling site about 8.15 a.m. At 11.30 a.m. the mine geologist visited the drill to check core and found him lying face down near the machine. The geologist nearly collapsed himself, but was able to retreat and to obtain help near by on No. 7 level. The rescuers used compressed-air hoses to reach Anderson, who was then lowered to the sublevel. Artificial respiration was started at once and continued until 2 p.m., when the doctor arrived and pronounced the man dead.

An autopsy was held, and the man was found to have died from asphyxia. As there was no indication of carbon monoxide, death must have resulted from lack of oxygen.

An inquest was held on December 12th, 1957, and the Coroner's jury returned the following verdict:—

“Anders Marius Karsten Anderson, on November twenty-sixth (26th), nineteen hundred and fifty-seven (1957), between the hours of 8.15 a.m. and 2.00 o'clock p.m., met his death by accident at his diamond drill station at the top of the box-hole off seven hundred and fifty-four (754) raise in the number seven (7) tunnel of the Victor mine (Violamac Mines Ltd.) near Sandon, B.C.

“From the evidence produced we deduce that the cause of death was the result of asphyxia, due to the reduction of the oxygen content of the air below the point necessary to sustain life.”

It is difficult to reconcile the facts that the working place was safe one day and fatal the next. Two air samples were taken the day after the accident—one in the 7-54 raise and one at the drill set-up. The first contained 0.39 per cent carbon dioxide and 20.00 per cent oxygen, and the second 0.52 per cent carbon dioxide and 19.62 per cent oxygen. Carbon monoxide and other gases were nil in both samples. On December 12th the scene was again visited, after similar conditions had been simulated. The safety lamp went out in the raise from the sublevel, indicating less than 16.5 per cent oxygen. The working place was wet, which may have been a factor in depleting the air of oxygen. A suggested explanation is that the drill on the previous shift might have encountered a pocket of gas high in nitrogen which was under sufficient pressure and in a large enough quantity to flood the small working place.

A letter was sent to all mines in which similar conditions might exist, requiring them to ventilate all working places before a shift is allowed to enter.

Albert Jackson, aged 49, Canadian, married, and employed as a miner at Britannia mine, was instantly killed by a blast in the 49-017 stope, No. 8 mine, on December 3rd, 1957, at about 11 a.m.

The 49-017 stope is a square-set stope being worked from the 4900 to the 4800 level. It is about 70 feet long and 30 feet wide, the greater dimension being east and west. A manway from the east end of the stope connects with the 4800 level. The stope had been advanced eleven floors above the 4900 level and a grizzly and scraper hoist installed on the ninth floor at the east end near the manway.

Jackson and his partner, Bryan Worthington, were working in the stope. Jackson was scraping muck on the ninth floor and Worthington was working on the eleventh floor, which was the mining floor. Just before 11 a.m., the men decided to blast four bulldoze charges—one on the eleventh floor (mining floor) and three on the ninth floor (scraping floor). Five-foot fuses and two sticks of powder were used for each shot. Worthington, in the presence of Jackson, placed one bulldoze on the eleventh floor and trimmed off 1 inch of fuse, preparing it for lighting. Both men then descended to the ninth floor, where Jackson placed three bulldozes near the manway and prepared them for lighting. Both lit hot-wire lighters at the same time. Jackson went to his bulldozes on the ninth floor and Worthington climbed to the eleventh floor to light his shot. He looked down the manway and saw Jackson on his way down below the ninth floor. Worthington lit his shot and went up the manway to the thirteenth floor. He heard three shots go off close together and the fourth two or three minutes later. After waiting several minutes for the smoke to clear and having received no all-clear signal from Jackson, he went down to investigate. He found Jackson lying on the muck pile badly blasted. Assistance was obtained immediately and Jackson's body removed. The doctor stated that the top part of the body was severely lacerated and that the injuries were comparable to those resulting from a blast.

An inquest was held at Britannia Beach on December 4th, 1957, and the Coroner's jury returned the following verdict:—

“After hearing the evidence of witnesses at an inquest regarding the death of Albert Jackson, who was killed in a blasting accident in 49-017 stope No. 8 mine, Britannia Beach, B.C., on December 3rd, 1957, at 11.20 a.m., we find that Albert Jackson for some reason not disclosed in the evidence returned to the scene of the blast too soon after the last shot and walked back into a delayed shot. We believe he miscounted the number of shots. We return a verdict of accidental death with no blame attached to any person or persons. As a rider we remind those concerned that the rule calls for a 30-minute interval before returning to a misfire.”

It seems obvious that Jackson returned too soon to the scene of the blast and was caught by the fourth shot.

Piotr Orłowski, aged about 40, Polish, single, and employed as a miner by Britannia Mining and Smelting Co. Ltd., died as a result of injuries received when he fell in a chute from the 31-227A cut-and-till stope in the Victoria mine on December 19th, 1957, at about 5 a.m.

The 31-227A stope is a cut-and-fill stope which has been worked to within about 25 feet of the 2950 level. It is about 100 feet long in an east-west direction and is 8 to 12 feet wide. A cribbed ore-chute and manway lead to the 3150 level below at the east end, and the west end is connected to the 2950 level by a short, steep raise with a service chute and ladder. At the time of the accident there was 8 to 10 feet of broken ore on top of the fill in the stope, the top of this ore being 6 feet below the back. The cribbed chute at the east end had been drawn until the ore in it was about 4 feet below the top of the cribbing. Previous to the ore being blasted, a bulkhead had been put over the top of the manway to the 3150 level.

At the beginning of the shift, Orłowski and his partner, Frank Markovich, drew ore from the chute on the 3150 level until lunch time, about 3 a.m. After lunch they entered the stope from the 2950 level and began washing down the muck pile and barring. When the muck pile was sloped off to the chute, both men started to clean off the bulkhead over the manway. Orłowski was working on the north side of the stope and was barring loose from over the chute. Markovich was on the south side. Markovich heard a crash and on turning around saw Orłowski in the chute. Help was obtained immediately but Orłowski died on the way to the hospital.

An inquest was held at Mount Sheer on December 27th.

Dr. E. A. Jarman, medical practitioner, read the report of the autopsy, which was as follows:-

“Death was due to ruptured liver and fractured sternum.”

The Coroner's jury brought in the following verdict:-

“ We, the jury, find Piotr Orłowski came to his death accidentally in 227A stope, 3150 level, Victoria mine, Britannia Beach, B.C., on December 19th, 1957, at approximately 5.00 a.m., with no blame attached to any person or persons.”

From the findings, it appears that Orłowski was struck in the abdomen by a rock or rocks falling from the back and footwall of the stope from a height of about 8 to 10 feet. He may have slid down the bulkhead and was under the rock as it fell. In any case he slid down the muck on the bulkhead into the chute. The severe damage to his liver could only have been done by falling rock.

FATAL ACCIDENTS AND ACCIDENTS INVOLVING LOSS OF TIME

Eight fatal accidents and 182 accidents involving a loss of time of seven days or more were reported to the Department. These were investigated and reported on by the Inspectors of Mines.

The following three tables classify these accidents as to cause, occupation, and as to the parts of the body injured.

REPORT OF THE MINISTER OF MINES, 1957

ACCIDENTS CAUSING DEATH OR INJURY CLASSIFIED AS TO CAUSE

Cause	Number of Accidents	Percentage of Total
Blasting	7	3.7
Falls of ground.....	35	18.4
Falls of material and flying material	16	8.4
Falls from ladders, staging, etc.....	1	0.5
Slipping and falling.....	33	17.4
Lifting and handling material, etc.....	50	26.3
Machinery and tools	34	17.9
Run of ore or waste	5	2.6
Burns and shock.....	6	3.2
Gassed.....	1	0.5
Miscellaneous.....	2	1.1
Totals.....	190	100.0

ACCIDENTS CAUSING DEATH OR INJURY CLASSIFIED AS TO THE OCCUPATION OF THOSE INJURED

Occupation	Number of Accidents	Percentage of Total
Underground—		
Barmen	2	1.1
Chutemen	5	2.6
Haulagemen.....	19	10.0
Miners.....	96	50.7
Muckers.....	12	6.4
Timbermen.....	13	6.7
Repairmen.....	3	1.6
Trackmen and pipe-fitters.....	4	2.1
Skip-tenders.....	1	0.5
Miscellaneous.....	9	4.7
Supervisors and staff.....	4	2.1
Surface—		
Shops	2	1.1
Mill	7	3.7
Surface, general	13	6.7
Totals	190	100.0

ACCIDENTS CAUSING INJURY CLASSIFIED AS TO PARTS OF THE BODY INJURED

Location	Number of Accidents	Percentage of Total
Head and neck	15	7.9
Eyes.....	5	2.6
Trunk.....	14	7.4
Back (including shoulders)	42	22.1
Arms (including wrists)	10	5.3
Hands and fingers.....	35	18.4
Legs and ankles.....	34	17.9
Feet.....	25	13.1
Shock.....	2	1.1
Fatal	8	4.2
Totals.....	190	100.0

DANGEROUS OCCURRENCES

Eighteen dangerous occurrences were reported as required by section 9 of the "Metalliferous Mines Regulation Act" and investigated by the Inspectors of Mines. This represents a decrease of 47 per cent from the thirty-four reported for 1956.

Of these occurrences, three were connected with hoisting, six with explosives, three with fires (two underground), two with scraping operations, two with hung-up ore-passes, one with caves, and one with machinery failure.

On January 12th, 1957, a hang-up in a" abandoned transfer raise on the 1600 level of Britannia mine released itself and allowed a large amount of water to flow along the level and down No. 1 shaft. No serious damage resulted.

On January 22nd, 1957, a rubber-lined sand-pump in the lead-zinc concentrator of Canadian Exploration Limited flew apart with a loud report. This pump handles sands from the classifier next to the rod mill and pumps them to the ball mill. No one was injured, although the force of the explosion moved the 500-pound pump a distance of 4 feet. The cause of the explosion could not be determined.

On January 31st, 1957, two miners were lighting a drift round of twenty-five holes in the Duthie mine. Ten-foot fuse and hot-wire lighters were used. Some difficulty was experienced in lighting the last five holes. One miner insisted it was time to leave and urged his partner to follow him. The first holes detonated when one man was "ear the face and the other 60 feet away. The man" suffered severe injuries for their disregard of elementary safety precautions.

On February 5th, 1957, a Koehring Dumptor used in the Dodger mine of Canadian Exploration Limited caught fire. The vehicle was being used when the battery box dropped down, causing the insulation of the battery cables to be stripped off against the jagged edges of the battery box. A short circuit started the insulation smouldering. The fire was put out with the carbon dioxide extinguisher which is carried on all vehicles.

On March 5th, 1957, the cage-tender was unloading material at the 3300 level of the H.B. interior shaft when a hoisting signal was given from another level. The cage was stopped in time, but the one responsible for giving the signal could not be located. A stricter compliance with hoisting procedure was instituted.

On March 7th, 1957, a foreman at the Sullivan mine received minor superficial injuries when he walked into a reblast of two holes. There were five entrances to the blast to be guarded. The instructions to the guards at one entrance were not specific as to time, and they allowed the foreman to proceed into the blast area. A revision of operational instructions was made to prevent a recurrence of this type of accident.

On March 7th, 1957, in the Sullivan mine a miner was standing "ear the top of the muck-raise in a scraper drift while the scraper was in operation. When the slusher caught on a" obstacle, the haul-back cable flipped across the miner's neck, causing him to fall into the raise. He fell 8 feet and received superficial injuries.

On March 28th, 1957, two experienced miners were loading a 3-inch-diameter 36-foot vertical hole in a" open pit at Copper Mountain mine. There was a" obstruction in the hole about 8 feet from the collar. The men" were attempting to push 1½-inch-diameter cartridges of 75 per cent Dygel powder past the obstruction when a" explosion occurred. Both men were peppered with fine rock and suffered numerous small puncture wounds about the face and neck. The most reasonable explanation for this incident was that the tamping had been done with unnecessary vigour.

On April 17th, 1957, a fire occurred in a timbered drawhole of a scraper drift in No. 8 section of Britannia mine. The fire was brought under control by mine-rescue men" using self-contained apparatus. Carbon monoxide contaminated the ventilation system, and all men" were evacuated from the section until the air was cleared. The fire was caused by the "use of a" acetylene torch to remove steel plates from damaged timber in

the drawhole. The mechanic had left without wetting down the timber, which **smouldered** and eventually flamed sufficiently to burn almost completely several 12- by 18-inch timbers.

On May 1st, 1957, at the **fireclay** mine of Clayburn Company Limited a subsidence occurred measuring about 450 by 550 feet which affected most of the mine. The mine is worked by room and pillar. All men were prohibited from entering this area.

On June 5th, 1957, two miners were **preparing** to blast seven short holes to "square up" a drift face in Britannia mine. Only 4-foot fuses were used, the working place was damp, and two hot-wire lighters were required. When the first hole detonated, the men had only retreated a short distance and one man was injured slightly by flying rock. The blasting certificates of both miners were suspended.

In September, 1957, the combination lunchroom and drill-shop of Cassiar Asbestos Corporation Limited was completely destroyed by fire. It was suspected the oil stove had become overheated.

On October 4th, 1957, a miner in the Sullivan mine was caught by the blast effect of the detonation of two cases of explosives. The miner and a partner had been instructed to destroy the two cases, which had been declared defective. They were placed on end with their open faces toward one another. Two 3-foot fuses with 1-inch trim were used to fire the shot. While spitting the fuses some trouble was encountered, and, after walking 50 feet, one of the miners was knocked to the ground by the force of the exploding powder. His hat was broken and lamp cord severed. It is presumed that there was too much delay in igniting the fuse or that a side spit of the fuse may have impinged on the old powder, causing an early detonation.

On November 12th, 1957, the cage and shaft timbers at No. 3 shaft of Pioneer mine were damaged when the cage came in contact with the sheave bearing-timber. The hoistman answered a telephone call during hoisting and did not slow the hoist when the cage passed the upper warning signal. The cam on the Lilly control had been moved from its normal position so that the automatic stopping of the hoist could not take place before the cage reached the sheave bearing-timbers. The Lilly controls have been sealed to prevent adjustments by unauthorized persons.

On November 27th, 1957, a miner was injured in the Sullivan mine while operating a scraper hoist. The scraper became jammed on a large rock, and this caused the haul-back cable to whip back toward the hoist. A loop formed in the cable, passed around the hoist operator and drew him into the hoist. The operator's partner quickly stopped the hoist, but not before the operator had received some injury. All scraper hoists should have adequate cable guards to prevent this type of accident.

On November 27th, 1957, a workman in the Jersey mine of Canadian Exploration Limited was repairing a scraper cable while knowingly standing on the muck pile over a drawhole. The muck subsided suddenly when a train crew operated the chute on the level below. The workman was trapped and it took four hours to extricate him. He suffered injury to his right arm.

On December 6th, 1957, at the Reeves MacDonald mine, three holes, 40 feet long and drilled through to the level below, were being cleared by the detonation of light charges of explosives. The mine foreman was in the vicinity of the bottom of these holes when the charges exploded. His lamp was broken, but no injuries were received. The miners responsible for the blast had their blasting certificates suspended for six months for failing to guard the blast. One week's suspension from work was given by the employer.

On December 13th, 1957, the hoisting-rope in the east side compartment of No. 2 shaft of Pioneer mine was found to be kinked and was removed. Hoisting of muck is done in the west compartment, and whenever this is done a counterbalance weight is placed in the east side cage. On December 12th the cage had been repaired but the counterbalance weight was not replaced. When hoisting was done, the hoist circuit-

breaker tripped several times due to hoisting at excessive speed when the skip was approaching the dump. The sudden stopping is thought to have caused the east cage to bounce, allowing the safety dogs to catch. The kink in the rope is attributed to lowering the rope while the cage was hung up on the dogs.

PROSECUTIONS

There were no prosecutions in **metalliferous** mines and quarries in 1957.

There were violations of the provisions of the "Metalliferous Mines Regulation Act" in regard to the use of explosives and blasting procedure. Five offenders had their blasting certificates suspended from three to six months, according to the type of offence.

EXPLOSIVES USED IN MINES

The table below shows the quantities of explosives and blasting accessories used in metal mines and quarries in British Columbia in 1953, 1954, 1955, 1956, and 1957:—

	1953 Total	1954 Total	1955 Total	1956 Total	1957 Total	1957	
						Mines	Quarries
High explosives (lb.)	9,237,700	7,652,574	8,420,791	8,560,000	7,103,000	6,736,000	367,000
Blasting-caps	1,890,000	1,815,250	1,982,900	2,184,000	1,676,000	1,567,000	109,000
Electric blasting-caps	141,000	232,270	151,685	52,000	64,000	56,000	8,000
Delay electric blasting-caps (short period)	182,771	191,513	283,000	205,000	160,000	150,000	10,000
Delay electric blasting-caps (sure-fire delays and X107 delays)	138,055	70,300	144,875	263,000	127,000	127,000	.....
Primacord (ft.)	647,000	824,000	399,000	226,000	261,000	202,000	59,000
B-line detonating fuse (ft.) .....	.....	.....	.....	2,436,000	2,049,000	1,690,000	359,000
Safety fuse (ft.)	17,679,000	13,429,800	17,744,900	17,218,000	13,367,000	12,845,000	522,000
Ignitercord (ft.)	142,000	206,180	418,800	498,000	639,000	639,000	.....
Ignitercord connectors	114,000	160,501	371,000	563,000	750,000	750,000	.....
Ammonium nitrate .....	.....	.....	.....	.....	5,000	1,000	4,000

An innovation in blasting was the use of ammonium nitrate. This compound, when sensitized with a hydrocarbon such as fuel oil, constitutes a powerful explosive. As such, the preparation comes under the control of the Chief Inspector of Explosives at Ottawa. Written permission must first be obtained from him before the blasting agent can be mixed or used. Permission must also be obtained from the Chief Inspector of Mines, Victoria, when the blasting agent is used in mines and quarries in British Columbia. Two permits were granted in 1957—one to an open-pit mine and one to a quarry. The main condition of the permits was that the blending of "prilled" ammonium nitrate with fuel oil take place on site as it is being loaded into the bore-hole.

UNDERGROUND DIESEL EQUIPMENT

The use of underground diesel equipment remained fairly constant in 1957. Locomotives in use amounted to sixteen, and miscellaneous pieces of equipment, such as trucks, loaders, bulldozers, etc., totalled thirty. Three of the locomotives were used in coal mines; the remainder of the equipment was used in metal mines.

DUST CONTROL AND VENTILATION

Problems in dust control and ventilation have continued to receive the attention of mine operators and Government departments. Dust counts and ventilation surveys were made by the staff of the Chief Inspector, Silicosis Branch of the Workmen's Compensation Board, and the results of these surveys made available to the Inspectors of Mines. The following information is taken from his report, "Summary of Dust Conditions at British Columbia Metalliferous Mines during the Year 1957":—

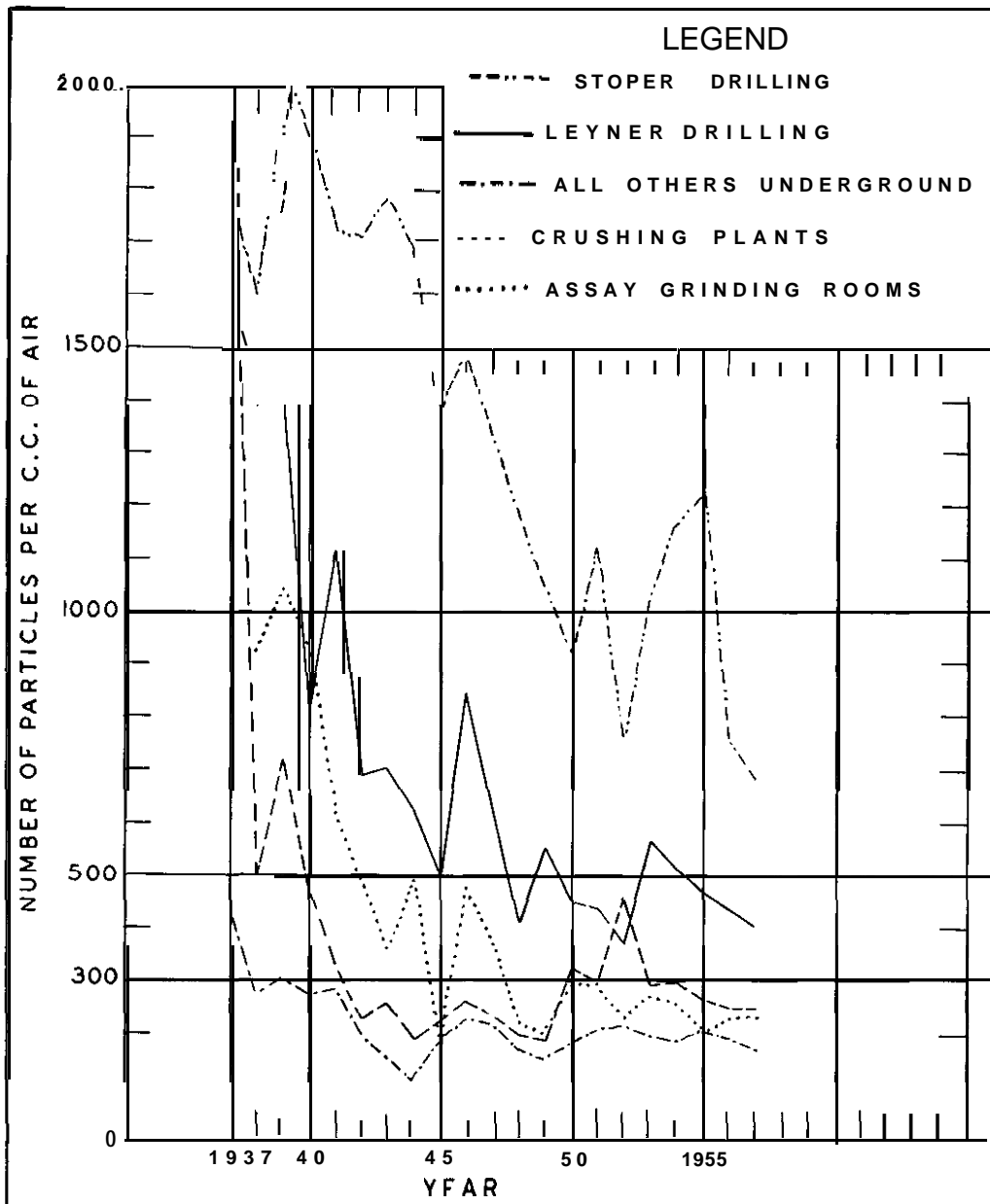


Figure 4. Average dust counts obtained each year since 1937.

" 1. During the year 1957, seventy-seven ventilation and dust-control surveys were made at the metalliferous mines of British Columbia. These were made at fifty-one mining operations, twenty-six of which were inspected for the second time.

" 2. The main object of this inspection work is to lower the amount of dust breathed by the workmen as much as possible. It is not known what concentration of silica dust is considered safe, to breathe without producing silicosis as several other factors besides the dust concentration must be taken into consideration. The figure of 300 particles per C.C. of air has been chosen as an objective to work towards. When this figure is attained, it indicates a very great improvement over conditions existing several years ago.

" 3. Blasting operations produce dense concentrations of dust, but the workmen are generally not subjected to this dust or subjected to it for short periods of time only. Most of the blasting operations can be arranged to occur at the ends of the shifts and allow sufficient time for ventilation to remove the dust from the workings before the following shift goes to work. A certain amount of blasting operations, such as in chutes, may be considered necessary so that the production of ore may not be interfered with, but this should be reduced to the very minimum.

" 4. **Stoper** drilling operations consistently produce the highest concentrations of dust during the time the men are working. The dust counts used to be 2,000 or more particles per c.c. of air at these operations. Seventy per cent of the surveys made in 1957 gave averages of less than 1,000 particles.

" 5. At **leyner, jackleg,** and plugger drilling operations the dust concentrations are not as high as at **stoper** drilling operations. Ninety-two per cent of the surveys gave averages of less than 1,000 particles per c.c. of air. Since most of the surveys gave less than 1,000 particles, it is probably better to adopt the figure of 500 particles for the purpose of comparison. Sixty-seven per cent of the surveys gave averages of less than 500 particles per c.c. of air.

" 6. The averages for 'All Other Underground Locations ' are very satisfactory. Seventy-seven per cent of the surveys made during 1957 gave averages of less than 300 particles. The percentages for the past eight years have remained fairly constant, varying between 76 and 83 per cent. This condition is particularly satisfactory when considering the fact that the **great** majority of the men work in this lower dust concentration.

" 7. The dust concentrations in the crushing plants during 1952 **were** not satisfactory. During 1953 and subsequent years, a special **effort** was made to control the dust in these plants and satisfactory results have been obtained. Sixty-two per cent of the surveys made in 1957 gave averages of less than 300 particles per c.c. of air.

" 8. Seventy-seven per cent of the surveys made in assay grinding-rooms gave averages of less than 300 particles. This is very satisfactory, as it is the second highest percentage that has been obtained during the past eight years.

" 9. The percentage of certificates of fitness held by the employers for their workmen who require a medical examination has steadily increased during the past four years. In 1957, certificates in good standing for 96.2 per cent of the workmen who require same were held by the employers. This is a very satisfactory condition as there are numerous difficulties to overcome.

" 10. **Aluminium-powder** prophylaxis treatments for the prevention of silicosis were given at eight mines during the year. One mine discontinued operations during the year so there were seven mines that were dispersing the powder at the end of 1957. No **aluminium-therapy** treatments were given at the Rehabilitation Clinic of the Workmen's Compensation Board in Vancouver to men who have silicosis.

" 11. The main measures for dust prevention, suppression, and elimination are receiving good attention at the mines. The more important of these are good ventilation, thorough wetting of the rock before it is handled in any manner, not subjecting the workmen to dust and fumes from blasting operations, using good exhaust systems in crushing plants and assay grinding-rooms, etc. Full application of all these measures at all times has not been obtained but the results obtained have been quite satisfactory.

" 12. The accompanying graph (Fig. 4) shows the median of all the averages obtained each year since 1937."

MINE-RESCUE, SAFETY, AND FIRST AID

During 1957 the mine-rescue stations at Cumberland and Femie were fully maintained and an instructor, qualified in mine-rescue and first aid, was on duty at each station. Each station is equipped with several sets of **McCaa** 2-hour self-contained oxygen breathing apparatus, at least one set of **Chemox** %-hour self-contained breathing apparatus, **all-**

service gas masks, self-rescuers, methane and carbon monoxide detectors of the latest type, one or more H.H. inhalators, and a complete supply of first-aid equipment. Supplies and facilities for charging and servicing all this equipment are maintained.

In the latter half of 1957 the mine-rescue station at Princeton was converted to a mobile unit. A large panel truck was purchased and cupboards were custom fitted to hold the rescue equipment. Ambulance facilities were also installed. The mine-rescue building continued to be used as an office and repair base.

The mobile mine-rescue unit stationed at Nelson in 1950 continued to be of great assistance in promoting and giving instruction in mine-rescue and first aid at mines in the East and West Kootenay areas.

In addition to courses in mine-rescue given at the Cumberland and Fernie stations, the following centres received help in instruction, checking of equipment, and training of teams: Remac, Yale Lead & Zinc mine, Canadian Exploration, H.B. mine, Riondel, Highland-Bell mine, Wells, and Western Nickel mine.

Classes in first aid were held at the following mines and localities: New Denver, Kaslo, Remac, Salmo, Fernie, Princeton, Hedley, and Oliver. A number of candidates for industrial certificates were given assistance.

Two emergency calls for oxygen breathing apparatus were handled by the Cumberland station. Both were necessitated by underground heating at the Tsable River mine.

Equipment from the Nelson mobile unit was used to help rescue a mining engineer who got into difficulties while inspecting mineral claims in the Crawford Bay area.

The Princeton mine-rescue building was made available to the St. John Ambulance Association for lectures and instruction in first aid. The building was also used by the Motor-vehicle Branch for the purpose of giving drivers' examinations.

In addition to the mine-rescue equipment maintained at the Government mine-rescue stations, there are several complete sets of McCaa and Chemox apparatus at the Sullivan mine, a set of McCaa at Canadian Exploration and Michel mines, miscellaneous rescue equipment at the Trail smelter, and complete sets of Chemox at Wells, the Bridge River camp, Britannia, H.B. mine, and Riondel. Minor amounts of mine-rescue equipment are kept at the Yale Lead & Zinc mine at Ainsworth, the Mineral King mine at Toby Creek, and the Toric mine at Alice Arm.

A certificate of competency in mine-rescue work is granted to each man who takes the full training course and passes the examination set by the Department of Mines. During 1957, in addition to the regular teams in training, eighty-one men took the full course and were granted certificates, as follows:-

Certificate No.	Name	Where Trained	Certificate No.	Name	Where Trained
2934	Joseph Tomasi	Cumberland.	2953	Charles Stanley Kinrade	Kimberley.
2935	Robert Holmes	Cumberland.	2954	Kenneth Richard Graham	Kimberley.
2936	Alexander R. Bell	Cumberland.	2955	Harold Dean Johnson	Kimberley.
2937	Clarence Verne Stockand	Cumberland.	2956	Eric William Erickson	Kimberley.
2938	Albert William Stockand	Cumberland.	2957	Raymond William Serediak	Kimberley.
2939	Frederick R. Polkinghorne	Cumberland.	2958	William Muir, Jr.	Kimberley.
2940	John Halten Miller	Garison, Mont.	2959	Rudolf Iskra	Kimberley.
2941	Clarence Farramond Littler	Yellowknife, N.W.T.	2960	Ambjorn James Hallgren	Kimberley.
2942	Kenneth Wilson Bassett	Calgary, Alta.	2961	Frederick Charles McDonald Ross	Kimberley.
2943	William Dextor McArthur	Kimberley.	2962	Arthur Lawrence Phenuff	Kimberley.
2944	Frederick Aldred Pearson	Kimberley.	2963	Percy Moody	Kimberley.
2945	Robert Lorne Ralph	Kimberley.	2964	Louis Luini	Fernie.
2946	James O'Donnell Quinn	Kimberley.	2965	Boyd Dalton Corrigan	Fernie.
2947	Ronald Eugene Olson	Kimberley.	2966	Phillip Lloyd Broster	Fernie.
2948	Arthur Ernest Ball	Kimberley.	2967	George Archibald Price	Fernie.
2949	Ian Fairlie Morton	Kimberley.	2968	Joseph Roger Sirjanni	Fernie.
2950	Leonard Elmer Cox	Kimberley.	2969	Roy Dennis Eckersley	Fernie.
2951	Robert Alan Dunsworth	Kimberley.	2970	John Henry Hartley	Fernie.
2952	John Alvin Demers	Kimberley.	2971	George Michael Hryciuk	Fernie.
			2972	Emil Bourree	Pioneer Mine.

Certificate No.	Name	Where Trained	Certificate No.	Name	Where Trained
2973	Allan David Stanley	Pioneer Minc.	2994	James H. Steele	Remac.
2974	Walter Thiessen	Pioneer Mine.	2995	Donald Charles Pleccash	Remac.
2975	Alan Wakely	Pioneer Mine.	2996	Norman Idwal Poole	Remac.
2976	Geno Volpatti	Natal.	2997	David John Hughes	Salmo.
2977	Nilio Quarin	Natal.	2998	Leopold Herbert Fuerst	Salmo.
2978	Harvey Ross Travis	Natal.	2999	David McArthur Carty	Salmo.
2979	Eric John Huryn	Natal.	3000	A. J. H. Hewitt	Wells.
2980	Joseph Panice	Natal.	3001	Edward Hedley	Wells.
2981	Thomas Matthew Murphy	Riondel.	3002	J. F. Rex Muise	Wells.
2982	Oliver Richard Koenig	Riondel.	3003	Joseph Chlopan	Mount Sheer.
2983	Edward Carl Ingham	Gray Creek.	3004	Clifford Frame	Mount Sheer.
2984	Eric John Takala	Riondel.	3005	Peter Stiles	Mount Sheer.
2985	Kenneth Paul Munro	Riondel.	3006	Albert Malvern Heath	Ainsworth.
2986	Alexander Robert Schram	Riondel.	3007	Lawrence O'son	Ainsworth.
2987	Johannes Christian Schu'tz	Riondel.	3008	Frank Preis	Ainsworth.
2988	George Arthur Sutherland	Salmo.	3009	Leo Paul Poupart	Fernie.
2989	William Semrtoff	Salmo.	3010	Benedict Cupiol	Fernie.
2990	William Clifford Shannon	Remac.	3011	Silvio Maio	Fernie.
2991	Robert Ruthuan MacD. nald	Remac.	3012	Thomas Alan Cairns	Fernie.
2992	Robert Archibald Gibson	Remac.	3013	Frances Henry Webster	Salmo.
2993	Ordie A. Jones	Remac.	3014	Stanley Williams	Wells.

The Mine Safety Associations in **different** centres of the Province, sponsored by the Department of Mines and aided by company **officials**, safety supervisors, Inspectors of **Mines**, and mine-rescue instructors, continued to promote mine-rescue, first aid, and safety education in their respective districts.

The Similkameen Valley Mine Safety Association did **not** hold its annual competition at Princeton because of the closure of the near-by Copper Mountain mine. From the time the association was formed in 1930, twenty-seven annual competitions have been held.

The Vancouver Island Mine Safety Association held its annual competition in **Cumberland** on June 1st, 1957. Three **teams** competed—two from Tsable River and a visiting team from Britannia **mine**. The winning team was from Tsable River and was captained by **J. Thomson**.

The Central British Columbia Mine Safety Association held its annual competition at Pioneer Mine on June Xth, 1957. Five teams took part in this competition. They represented **Britannia, Bralorne, Cariboo Gold Quartz, and Pioneer** mines. The **Cariboo Gold Quartz** team, captained by J. E. White, took first place.

The West Kootenay Mine Safety Association held its annual competition at **Salmo** on June 15th, 1957. Six teams took part in this competition—two from the Bluebell mine, one from Canadian Exploration Limited, **one** from the H.B. mine, one from the Yale Lead & Zinc mine, and one from **the** Reeves MacDonald mine. A Bluebell team, captained by J. D. McDonald, took first place.

The East Kootenay Mine **Safety** Association held its annual competition at **Fernie** on June 22nd, 1957. Six teams took part in this competition—two from Michel, two from Kimberley, one from Coal Creek, and one from Fernie. First place was won by a Kimberley team captained by T. O. Bloomer.

At all meets, competitions were held in first aid as well as mine-rescue work. In all these competitions, events were held for women and juniors. Representatives from other industries and organizations not necessarily directly connected with mining also participated.

Two mine-rescue competitions were sponsored by mining companies. One was held at Chapman Camp on May 25th, 1957, and was confined to employees of The Consolidated Mining and Smelting Company, Limited. The **other** was held at Michel on June 1st, 1957, and was confined to employees of The Crow's Nest Pass Coal Company Limited.

The second Provincial mine-rescue competition was held at Nelson on September 7th, 1957. The winning teams from the Cumberland, Pioneer, Nelson, and Femie events competed for a trophy and medals. The event was won by the Bluebell team, captained by J. D. McDonald. In conjunction with the competition the Workmen's Compensation Board sponsored the first Provincial first-aid competition. Teams competed which had won local events at Cumberland, Pioneer Mine, Nelson, Fernie, Victoria, and Powell River. The winning team was from Trail and was captained by K. H. Hill.

JOHN T. RYAN TROPHY

The John T. Ryan Regional Safety Award for the metal mine with the lowest accident-frequency record for 1957 was won by the Bluebell mine of The Consolidated Mining and Smelting Company of Canada, Limited, at Riondel. To win this trophy, the Bluebell mine completed the year without a lost-time accident. This record also won the Dominion Ryan Trophy, which has **never** before been won by a mine in British Columbia. The company's safety organization, officials, and employees are to be highly commended.

The 1957 regional safety award for coal mines was won by the **Tsable** River mine of Canadian Collieries Resources Limited, near Cumberland. This is the third year in succession that this mine has won the award. The company's safety programme has thus been quite effective.

WEST KOOTENAY MINE SAFETY ASSOCIATION TROPHY

Because the West Kootenay District contains many small mines not eligible for the John T. Ryan awards, and in order to encourage and promote safety in these operations, the West Kootenay Mine Safety Association in 1951 donated a safety trophy for annual competition. In 1955 the area covered by this award was extended to take in all southern British Columbia, and further extended in 1956 to include the whole Province.

The award is made to the mine having the lowest accident rate and working a total of from 2,500 to 30,000 shifts per year, one-third of these having been worked underground. An accident is taken as one which involves more than three days' loss of time.

In 1957 the award was won by the Mineral King mine of Sheep Creek Mines Limited near Athlmerre and was presented at a joint meeting of the West Kootenay Mine Safety Association and the Nelson Branch of the Canadian Institute of Mining and Metallurgy held in Nelson on February 8th, 1958.

Coal

By Robert B. Bonar, Senior Inspector of Coal Mines

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PRODUCTION

The gross output in short tons of the coal mines of the Province for 1957 was 1,221,766 tons, a decrease of 367,632 tons or 23.1 per cent from 1956. A total of 275,918 tons came from strip mines at Michel, Tent Mountain (near Corbin), and Blakeburn.

The Vancouver Island District produced 200,205 tons, a decrease of 142 tons or 0.07 per cent from 1956.

The Northern District production was 8,149 tons, a decrease of 5,046 tons or 38.2 per cent from 1956.

The Nicola-Princeton District production was 18,777 tons, a decrease of 54,494 tons or 74.4 per cent from 1956.

The East Kootenay District production was 994,635 tons, a decrease of 307,949 tons or 23.6 per cent from 1956.

OUTPUT AND PER CAPITA PRODUCTION, 1957

Colliery and Mine	Gross Output Mined during Year (Tons)	Days Worked	Total Number of Employees	Daily Output per Employee (Tons)	Yearly Output per Employee (Tons)	Number of Employees Underground	Daily Output per Underground Employee (Tons)	Yearly Output per Underground Employee (Tons)
Tsable River Colliery.....	195,442	239	312	2.62	626	223	3.67	876
Chambers No. 5 mine	1,332	142	5	1.87	266	4	2.34	333
Loudon No. 6 mine	1,001	198	3	1.69	334	2	2.52	500
Lewis mine (Timberlands)	850	196	3	1.44	283	3	1.44	283
Carruthers and Wakelam No. 3.....	474	157	2	1.51	237	2	1.51	237
Stronach No. 2 mine	308	151	2	1.02	154	2	1.02	154
Undun mine	538	140	2	1.92	269	2	1.92	269
Big Flame mine	7	18	2	.....	.....	2	.....	.....
Extension mine (Brodrick).....	191	160	2	0.53	96	2	0.53	96
White mine	60	51	2	0.60	30	2	0.60	30
Wellington Blue Flame No. 2	2	10	1	.....	.....	1	.....	.....
Taylor Burson (Blue Flame).....	1,601	203	4	1.97	400	4	1.97	400
Coldwater Coal mine	1,081	291	3	1.24	360	3	1.24	360
Mullin's strip mine (Blakeburn)	16,095	74	12	18.12	1,341	.....	.....	.....
Bulkley Valley Collieries	4,991	100	17	2.94	294	16	3.12	312
Reschke mine	1,300	143	6	1.51	217	4	2.27	325
Gething No. 3 mine	1,858	126	7	2.10	265	6	2.46	310
Elk River Colliery.....	237,162	188	311	4.06	763	239	5.28	992
Michel Colliery (underground).....	497,650	183	647	4.20	769	503	5.40	989
Michel Colliery (strip)	149,680	183	21	38.95	7,128	.....	.....	.....
Coleman Collieries (strip)	110,143	.....	16	.....	6,884	.....	.....	.....

DISTRICT OUTPUT AND PER CAPITA PRODUCTION, UNDERGROUND MINES, 1957

District	Gross Output Mined during Year (Tons)	Total Number of Employees at Producing Collieries	Yearly Output per Employee (Tons)	Number of Men Employed Underground in Producing Collieries	Yearly Output per Underground Employee (Tons)
Vancouver Island	200,205	336	596	245	817
Nicola-Princeton	2,682	7	383	7	383
Northern	8,149	30	272	26	313
East Kootenay	734,812	958	767	742	990
Whole Province	945,848	1,331	711	1,020	927

OUTPUT PER MAN-SHIFT, UNDERGROUND MINES, 1948-57

Year	Man-shifts ¹	Tonnage	Average per Man-shift (Tons)
1948	434,074	1,281,530	2.95
1949	520,188	1,589,131	3.05
1950	460,159	1,481,813	3.22
1951	442,170	1,434,974	3.24
1952	383,422	1,388,732	3.62
1953	333,922	1,171,932	3.51
1954	280,353	1,064,023	3.79
1955	304,139	1,157,813	3.86
1956	307,821	1,100,434	3.57
1957	226,536	945,848	4.17

¹ Includes both surface and underground workers.

COLLIERIES OF BRITISH COLUMBIA, 1957—PRODUCTION AND DISTRIBUTION, BY COLLIERIES AND BY DISTRICTS (IN SHORT TONS)

Mine	Gross Output	Washery Refuse	Net Output	Used under Companies' Boilers, etc.	Used in Making Coke	Stocks				Sales				Total Coal Sold and Used ¹
						On Hand First of Year	On Hand Last of Year	Added To	Taken From	In Canada	In U.S.A.	Else-where	Total Sales	
Vancouver Island District														
Canadian Collieries Resources Ltd.—	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons
Tsable River Colliery.....	195,442	28,499	166,943	439	-----	12,733	20,426	7,693	-----	158,511	300	-----	158,811	159,250
Chambers No. 5 mine.....	1,332	-----	1,332	-----	-----	-----	-----	-----	-----	1,332	-----	-----	1,332	1,332
Loudon No. 6 mine.....	1,001	-----	1,001	-----	-----	-----	-----	-----	-----	1,001	-----	-----	1,001	1,001
Lewis mine (Timberlands).....	850	-----	850	-----	-----	-----	-----	-----	-----	850	-----	-----	850	850
Carruthers and Wakelam No. 3 mine.....	474	-----	474	-----	-----	-----	-----	-----	-----	474	-----	-----	474	474
Stronach mine.....	308	-----	308	-----	-----	-----	-----	-----	-----	308	-----	-----	308	308
Undun mine.....	538	-----	538	-----	-----	-----	-----	-----	-----	538	-----	-----	538	538
Big Flame mine.....	7	-----	7	-----	-----	-----	-----	-----	-----	7	-----	-----	7	7
Extension mine (Brodrick).....	191	-----	191	-----	-----	-----	-----	-----	-----	191	-----	-----	191	191
Wellington Blue Flame No. 2 mine.....	2	-----	2	-----	-----	-----	-----	-----	-----	2	-----	-----	2	2
White mine.....	60	-----	60	-----	-----	-----	-----	-----	-----	60	-----	-----	60	60
Totals, Vancouver Island District.....	200,205	28,499	171,706	439	-----	12,733	20,426	7,693	-----	163,274	300	-----	163,574	164,013
Nicola-Princeton District														
Taylor Burson mine (Blue Flame).....	1,601	-----	1,601	-----	-----	-----	-----	-----	-----	1,601	-----	-----	1,601	1,601
Coldwater Coal mine.....	1,081	-----	1,081	-----	-----	-----	-----	-----	-----	1,081	-----	-----	1,081	1,081
Mullin's strip mine.....	16,095	-----	16,095	-----	-----	-----	-----	-----	-----	16,095	-----	-----	16,095	16,095
Totals, Nicola-Princeton District.....	18,777	-----	18,777	-----	-----	-----	-----	-----	-----	18,777	-----	-----	18,777	18,777
Northern District														
Bulkley Valley Collieries.....	4,991	-----	4,991	-----	-----	-----	-----	-----	-----	4,991	-----	-----	4,991	4,991
Reschke mine.....	1,300	300	1,000	-----	-----	200	300	100	-----	900	-----	-----	900	900
Gething No. 3 mine.....	1,858	-----	1,858	-----	-----	-----	-----	-----	-----	1,858	-----	-----	1,858	1,858
Totals, Northern District.....	8,149	300	7,849	-----	-----	200	300	100	-----	7,749	-----	-----	7,749	7,749
East Kootenay District														
Crow's Nest Pass Coal Co. Ltd.—														
Elk River Colliery.....	237,162	22,478	214,684	3,420	-----	1,149	563	-----	586	178,199	33,651	-----	211,850	215,270
Michel Colliery (underground and strip).....	647,330	66,552	580,778	14,410	199,754	1,953	1,673	-----	280	308,778	58,116	-----	366,894	581,058
Coleman Collieries (strip).....	110,143	11,353 ²	98,790	-----	-----	-----	-----	-----	-----	98,790	-----	-----	98,790	98,790
Totals, East Kootenay District.....	994,635	100,383	894,252	17,830	199,754	3,102	2,236	-----	866	585,767	91,767	-----	677,534	895,118
Coal														
Grand totals for Province.....	1,221,766	129,182	1,092,584	18,269	199,754	16,035	22,962	7,793	866	775,567	92,067	-----	867,634	1,085,657
Coke														
Crow's Nest Pass Coal Co. Ltd.—														
Michel Colliery.....	153,494	-----	153,494	-----	-----	6,387	11,076	4,689	-----	77,026	71,779	-----	148,805	-----

¹ Includes coal used in making coke and coal used under company stationary and locomotive boilers, etc. ² Estimated.

COLLIERIES OF BRITISH COLUMBIA, 1957—MEN EMPLOYED, DISTRIBUTION BY COLLIERIES AND BY DISTRICTS

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REPORT OF THE MINISTER OF MINES, 1957

Mine	Supervision and Clerical			Miners			Helpers			Labourers			Mechanics and Skilled Labour			Boys			Total Men Employed		
	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 Resources Ltd.—																					
Tsable River Colliery.....	14	15	29	129	—	129	—	—	—	22	36	58	58	38	96	—	—	—	223	89	312
Chambers No. 5 mine.....	1	—	1	3	—	3	—	—	—	—	1	1	—	—	—	—	—	—	4	1	5
Loudon No. 6 mine.....	—	1	1	1	—	1	1	—	1	—	—	—	—	—	—	—	—	—	2	1	3
Lewis mine (Timberlands).....	1	—	1	2	—	2	—	—	—	—	—	—	—	—	—	—	—	—	3	—	3
Carruthers and Wakelam No. 3 mine.....	—	—	—	2	—	2	—	—	—	—	—	—	—	—	—	—	—	—	2	—	2
Stronach mine.....	—	—	—	2	—	2	—	—	—	—	—	—	—	—	—	—	—	—	2	—	2
Undun mine.....	—	—	—	2	—	2	—	—	—	—	—	—	—	—	—	—	—	—	2	—	2
Big Flame mine.....	—	—	—	1	—	1	1	—	1	—	—	—	—	—	—	—	—	—	2	—	2
Extension mine (Brodrick).....	—	—	—	2	—	2	—	—	—	—	—	—	—	—	—	—	—	—	2	—	2
White mine.....	—	—	—	2	—	2	—	—	—	—	—	—	—	—	—	—	—	—	2	—	2
Wellington Blue Flame No. 2 mine.....	—	—	—	1	—	1	—	—	—	—	—	—	—	—	—	—	—	—	1	—	1
Totals, Vancouver Island District.....	16	16	32	147	—	147	2	—	2	22	37	59	58	38	96	—	—	—	245	91	236
Nicola-Princeton District																					
Taylor Burson mine (Blue Flame).....	1	—	1	3	—	3	—	—	—	—	—	—	—	—	—	—	—	—	4	—	4
Coldwater Coal mine.....	1	—	1	2	—	2	—	—	—	—	—	—	—	—	—	—	—	—	3	—	3
Mullin's strip mine.....	—	2	2	—	—	—	—	—	—	10	10	—	—	—	—	—	—	—	—	12	12
Totals, Nicola-Princeton District.....	2	2	4	5	—	5	—	—	—	10	10	—	—	—	—	—	—	—	7	12	19
Northern District																					
Bulkley Valley Collieries.....	1	1	2	13	—	13	2	—	2	—	—	—	—	—	—	—	—	—	16	1	17
Reschke mine.....	—	1	1	2	—	2	2	—	2	1	1	—	—	—	—	—	—	—	4	2	6
Gething No. 3 mine.....	1	1	2	4	—	4	1	—	1	—	—	—	—	—	—	—	—	—	6	1	7
Totals, Northern District.....	2	3	5	19	—	19	5	—	5	1	1	—	—	—	—	—	—	—	26	4	30
East Kootenay District																					
Crow's Nest Pass Coal Co. Ltd.—																					
Elk River Colliery.....	18	10	28	134	—	134	47	—	47	18	25	43	22	35	57	—	2	2	239	72	311
Michel Colliery (underground).....	32	22	54	250	—	250	99	—	99	40	57	97	82	61	143	—	4	4	503	144	647
Michel Colliery (strip).....	—	4	4	—	—	—	—	—	—	—	—	—	—	17	17	—	—	—	—	21	21
Coleman Collieries (strip).....	—	2	2	—	—	—	—	—	—	—	—	—	—	14	14	—	—	—	—	16	16
Totals, East Kootenay District.....	50	38	88	384	—	384	146	—	146	58	82	140	104	127	231	—	6	6	742	253	995
Grand totals for Province.....	70	59	129	555	—	555	153	—	153	80	130	210	162	165	327	6	6	6	1,020	360	1,380

NOTE.—U.=underground; A.=above ground; T.=totals.

COAL-PREPARATION PLANTS

There were no additions or extensive alterations made to existing plants in 1957. For full details of plants see 1954 Annual Report.

COKE-MAKING

Coke is made at only one plant in the Province, that of the Michel Colliery, The Crow's Nest Pass Coal Company Limited, Femie. There were no alterations or extensions made at this plant during the year. For full details see 1954 Annual Report.

BRIQUETTING

Briquettes are made at only one plant in the Province, that of the Michel Colliery, The Crow's Nest Pass Coal Company Limited, Femie. There were no alterations or extensions made at this plant during the year. For full details of this plant see 1954 Annual Report.

LABOUR AND EMPLOYMENT

In 1957, 1,380 persons were employed in and about the coal mines of the Province, an increase of fourteen over 1956.

Because of the five-day week in force throughout the Province at the larger mines, and the legal holidays, the maximum number of working-days was 241. In the Vancouver Island District the one large mine, the Tsable River mine, worked 239 days. In the East Kootenay District the Michel and Elk River Collieries worked 188 and 183 days respectively.

COMPETITION FROM COAL PRODUCED OUTSIDE
OF BRITISH COLUMBIA

In 1957 the shipment of Alberta coal and briquettes to British Columbia totalled 672,527 and 24,834 tons respectively. The following table shows the amount of Alberta coal brought into British Columbia during the past ten years:-

Year	Short Tons	Year	Short Tons
1948.....	9 4 5 , 7 0 0	1953.....	8 5 9 , 3 8 5
1949.....	8 9 1 , 1 3 2	1954.....	8 9 1 , 1 9 4
1950.....	8 7 3 , 5 5 8	1955.....	9 3 2 , 7 6 4
1 9 5 1	8 9 8 , 5 3 3	1956.....	8 6 0 , 3 2 9
1 9 5 2	1 , 0 2 1 , 4 8 4	1957.....	6 7 2 , 5 2 7

Of the 867,634 tons of British Columbia coal marketed, 306,473 tons was sold for domestic and industrial use in Alberta, Saskatchewan, Manitoba, Ontario, and Yukon Territory; 148,427 tons was sold for railroad use in Canada; 92,067 tons was exported to the United States; and 4,737 tons was sold for ships' bunkers.

The amount sold for domestic and industrial use in the Province was 275,999 tons.

ACCIDENTS IN AND AROUND COAL MINES

In 1957 two fatal accidents occurred, as compared with six in 1956. The number of fatal accidents per 1,000 persons (underground and strip-mine personnel) employed was 1.45, compared with 4.39 in 1956, 3.38 in 1955, 0.69 in 1954, 3.22 in 1953, 1.78 in 1952, 3.11 in 1951, 2.21 in 1950, 0.43 in 1949, and 2.04 in 1948. The average for the ten-year period was 2.18.

The number of fatal accidents per 1,000,000 gross tons of coal (underground and strip-mine coal) produced in 1957 was 1.63, compared with 3.77 in 1956.

The following table shows the collieries at which fatal accidents occurred in 1957, with comparative figures for 1956:—

Company	Colliery	1957	1956
The Crow's Nest Pass Coal Co. Ltd.	Michel Colliery	1	2
The Crow's Nest Pass Coal Co. Ltd.	Elk River Colliery	1	2
Canadian Collieries Resources Ltd.	Tsable River		2
Totals		2	6

The following two tables classify the fatal accidents in coal mines as to cause and quantity of coal per accident:—

FATAL ACCIDENTS CLASSIFIED AS TO CAUSE

Cause	1957		1956	
	Number	Per Cent	Number	Per Cent
By falls of roof and coal	1	50.00	1	16.67
Collapse of roof supports			2	33.33
Haulage (underground)			1	16.67
Switching railroad cars			2	33.33
Rolling coal or rock	1	50.00		
Totals	2	100.00	6	100.00

FATAL ACCIDENTS, UNDERGROUND MINES, CLASSIFIED AS TO QUANTITY OF COAL MINED

Cause	1957		1956	
	Number of Fatal Accidents	Coal Mined per Fatal Accident	Number of Fatal Accidents	Coal Mined per Fatal Accident
By falls of roof and coal	1	Tons 945,848	1	Tons 1,100,434
Collapse of roof supports			2	550,217
Haulage (underground)			1	1,100,434
Switching railroad cars			2	550,217
Rolling coal or rock	1	945,848		
Totals	2	472,924	6	183,406

NOTE.—There were no fatal accidents in strip-mining operations during 1957.

RATIO OF FATAL ACCIDENTS, UNDERGROUND MINES

District	Accident Death Rate			
	Per 1,000 Persons Employed		Per 1,000,000 Tons of Coal Mined	
	1957	1956	1957	1956
Vancouver Island		8.03		9.98
Nicola-Princeton				
East Kootenay	2.09	4.05	2.72	4.53
Northern				
Province, 1957	1.50		2.11	
Province, 1956		4.65		5.43

In 1957 there were two fatal accidents at the mines in the Province, both of which occurred underground.

On April 16th, 1957, at about 1 p.m., John Baher, aged 53, Czechoslovakian, single, and employed as a miner in No. 3 mine, Elk River Colliery, was killed by a fall of ground.

The accident occurred in No. 3 split off No. 2 Left roadway off No. 5 incline. No. 3 split is driven 12 feet wide and high up the pitch along an old roadway in order to extract the pillar on the left side of that roadway. The split is supported by four rows of posts, two on each side of a shaker-conveyor used for advancing the split. There was a 4-foot downthrow fault showing at the face of the split. The fall of ground came from the roof where it was cut by the fault. It fell between the front row of posts, which were 4 to 5 feet from the face, and the fault.

Baher and his partner, Horst Otto, were working at the face when the accident occurred. Baher was digging a hole for another post when a rock 8 feet by 4 feet by 20 inches thick, weighing 4 to 5 tons, fell, almost covering him. Help was obtained immediately and Baher's body removed.

The face had been examined the day before the accident by the fireboss and overman, who both recognized the hazardous situation caused by the fault but apparently were satisfied that the ground was in a safe condition.

On June 20th, 1957, at about 11.45 a.m., Jacob Manser, aged 52, Swiss, married, and employed as a miner in "A" West mine, Michel Colliery, was killed when he was struck on the head by a piece of rock or coal while pushing coal down a chute in No. 2 raise off No. 9 belt-road.

No. 2 raise is an ordinary roadway driven on an incline of about 30 degrees. A chute which serves several working-places off the raise is on the left-hand side. It is 4 feet wide with sheet-metal bottom and 2-inch planked sides about 3 feet high. Barricades have been built at points on the chutes where roadways have been driven from the raise. The lower end of the chute discharges on to a short chain conveyor which carries the coal to the No. 9 belt. Usually the coal runs down such a chute freely but, when slightly damp, sometimes hangs up and has to be started again by pushing it with a short stick from the side of the chute. These conditions existed at the time of the accident, and Manser was engaged in this work.

There were no witnesses. Steve Vasek, conveyor loader, and Manser were attending to the chute on No. 2 raise. They had just eaten their lunch, and Vasek went to start the chain conveyor while Manser went up the chute to keep the coal coming down. Vasek unloaded coal for about ten minutes, when it stopped coming down the chute. He went up the raise to investigate and found his partner 200 feet up the raise in a kneeling position against the side of the chute, his head resting against a post. He had a large wound on the right side of his head just below the ear, was bleeding profusely from the mouth and nose, and there was no sign of life. Apparently a piece of rock or coal had come rolling down the chute and was deflected in such a manner that it struck Manser on the head.

Including the foregoing fatal accidents, 259 accidents involving loss of seven days or more were reported to the Department by the management of the various mines. All these accidents were investigated and reported on by the District Inspectors of Mines.

The following three tables classify the accidents in coal mines in 1957 as to occupation of the men involved, as to cause, and as to injury. The fatal accidents are included in the totals:—

ACCIDENTS CLASSIFIED AS TO OCCUPATION

Occupation	Number of Accidents	Percentage of Accidents
Underground—		
Miners	137	52.90
Drillers and facemen		
Haulage and conveyer men	40	15.44
Trackmen and mechanics	6	2.32
Supervisors	6	2.32
Timbermen	12	4.63
Coal-cutters		
Miscellaneous	16	6.18
Surface—		
Shops	11	4.25
Surface	12	4.63
Preparation and coke-ovens	14	5.40
Miscellaneous	5	1.93
Totals	259	100.00

ACCIDENTS CLASSIFIED AS TO CAUSE

Cause	Number of Accidents	Percentage of Accidents
Fall of ground	68	26.25
Fall of material and flying material	16	6.19
Lifting and handling equipment and material ..	74	28.57
Machinery and tools	35	13.51
Slipped and tripped	46	17.16
Falling off staging and platforms	7	2.70
Miscellaneous	13	5.02
Totals	259	100.00

ACCIDENTS CLASSIFIED AS TO INJURY

Injury	Number of Accidents	Percentage Of Accidents
Head and neck	17	6.56
Eyes	5	1.93
Trunk	54	20.85
Back	41	15.83
Arms	12	4.63
Hands and fingers	50	19.31
Legs	54	20.85
Feet	20	1.12
Toes	6	2.32
Totals	259	100.00

EXPLOSIVES

The following table shows the quantity of explosives used in underground coal mines in 1957, together with the number of shots fired, tons of coal produced per pound of explosive used, and the average number of pounds of explosive per shot fired (these quantities include all the explosives used for breaking coal and rock work in coal mines) ;—

VANCOUVER ISLAND DISTRICT

Colliery	Quantity of Explosives Used (Pounds)	Coal Mined (Tons)	Total Number of Shots Fired	Average Tons of Coal per Pound of Explosive Used	Average Pounds of Explosive per Shot Fired
Tsable River Colliery.....	100,405	195,442	138,100	1.95	0.73
Chambers No. 5 mine.....	900	1,332	650	1.48	1.38
Loudon No. 6 mine.....	1,700	1,001	1,830	0.59	0.93
Lewis mine (Timberlands).....	1,150	850	900	0.74	1.28
Carruthers and Wakelam No. 3.....	450	474	894	1.05	0.50
Stronach No. 2 mine.....	250	308	300	1.23	0.83
Wellington Blue Flame No. 2.....	4	2	18	0.50	0.22
Undun mine.....	200	538	300	2.19	0.67
Big Flame mine.....	50	7	45	0.14	1.11
Extension mine (Brodrick).....	150	191	90	1.27	1.67
White mine.....	25	60	40	2.40	0.62
Totals for district.....	105,284	200,205	143,167	1.90	0.73

NICOLA-PRINCETON DISTRICT

Taylor Burson (Blue Flame).....	1,200	1,601	1,200	1.33	1.00
Coldwater Coal mine.....	350	1,081	600	3.09	0.58
Totals for district.....	1,550	2,682	1,800	1.73	0.86

NORTHERN DISTRICT

Bulkley Valley Collieries.....	4,090	4,991	3,650	1.22	1.12
Reschke mine.....	1,500	1,300	2,000	0.87	0.75
Gething No. 3 mine.....	1,250	1,858	1,858	1.47	0.68
Totals for district.....	6,840	8,149	7,508	1.19	0.91

EAST KOOTENAY DISTRICT

Elk River Colliery.....	9,342	237,162	11,598	25.39	0.80
Michel Colliery (underground).....	108,500	497,650	93,370	4.59	1.16
Totals for district.....	117,842	734,812	104,968	6.24	1.12

PROVINCE

Totals for Province.....	231,516	945,848	257,443	4.08	0.90
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QUANTITY OF DIFFERENT EXPLOSIVES USED

	Lb.
Monobel of different grades.....	219,593
Permissible rock powder.....	11,923
Total	231,516

MACHINE-MINED COAL

In 1957, mining-machines produced approximately 24,791 tons or 2.6 per cent of the total output from underground mining. A total of 275,918 tons of strip-mined coal was removed by mechanical means.

District	Machines Driven by—		Type of Machine Used	
	Electricity	Compressed Air	Chain Cutting	Rotary
Vancouver Island	---	---	---	---
Nicola-Princeton	---	---	---	---
Northern District	1	---	1	---
East Kootenay	1	2	2	1
Totals	2	2	3	1

SAFETY LAMPS

There were 1,285 safety lamps in use in the mines of the Province. Of this number, eighty-nine were flame safety and 1,196 were approved electric lamps, mostly of the Edison type.

APPROVED SAFETY LAMPS-ELECTRIC AND FLAME

The following is a list of approved safety lamps, electric and flame:-

The Wolf lamp, flame type.

The Koehler lamp, flame type,

The Edison electric lamp (cap) as Approval No. 18 of the United States Bureau of Mines, and all Edison lamps up to and including Model P, carrying the Approval Certificate No. 26 of the United States Bureau of Mines, Model R-4, Approval No. 29.

The Wheat electric lamp and having Approval No. 20, as issued by the United States Bureau of Mines.

The Wolf electric lamp, No. 830C.

The electric lamp manufactured by the Portable Lamp and Equipment Company, under Approval No. 27 of United States Bureau of Mines.

M.S.A. single-cell trip lamp, carrying United States Bureau of Mines Approval No. 1009, approved for use on haulage trips in mines.

The Davis M.L. model pneumatic electric lamp.

ELECTRICITY

Electricity is used for various purposes on the surface and underground at five collieries. A total of 15,782 horsepower was used in and about these mines. Detailed information as to how and where this power was used is given in the report of the Electrical Inspector of Mines.

INSPECTION COMMITTEES

The provisions of the "Coal-mines Regulation Act," section 65, General Rule 19, require that an inspection committee of workmen shall inspect the mine regularly on behalf of the workmen and make a true report of the conditions found. In all the larger mines of the Province this rule is fully observed, and copies of the report are sent to the Inspectors for the district. The work of these committees is valuable and assists in furthering the interests of safety at the various mines.

COAL DUST

The danger of accumulations of coal dust on the roadways and in the working-places is fully realized, and as a rule the regulations regarding the control of coal dust are adequately carried out. Large quantities of limestone dust are used continually in the larger mines to combat this hazard. It is used in the roadways, working-places, and for the tamping of shots.

Dust samples are taken regularly from roof, sides, and floor of mine roadways and analysed. The reports of the analyses are forwarded to the District Inspector each month.

DIESEL LOCOMOTIVES

Early in August, 1950, the first diesel underground locomotive to be used in any mine in British Columbia made its trial runs in No. 9 mine, Elk River Colliery, The Crow's Nest Pass Coal Company Limited.

The locomotive is a **15-ton 100-horsepower** North British type and is fully permissible for use in coal mines. This locomotive is still in use at the Elk River Colliery. Two **75-horsepower** diesel locomotives were purchased in 1956 for use in hauling the output from the "A" North mine to the tiple at the Michel Colliery.

MILLISECOND DELAY DETONATORS

In February, 1951, an amendment to the "Coal-mines Regulation Act" was passed to allow, with the permission of the Chief Inspector of Mines, more than one shot to be fired at a time in any coal mine or district of a mine. For further details see 1954 Annual Report.

DANGEROUS OCCURRENCES

On **February 5th**, 1957, two premature blasts occurred during shot-firing operations at Tent Mountain strip mine, Coleman Collieries Limited, when three charged holes in the coal detonated during a severe wind-storm. The holes were part of a total of sixty holes which had been drilled and charged. The first incident occurred when the detonator wires were being connected preparatory to blasting, when two loaded holes detonated simultaneously. A single shot exploded two hours later, after the area had been fenced off and no one was in the immediate vicinity. No one was injured in either instance.

A thorough investigation indicated that the blasts were caused by charges of static electricity being developed when particles of dust and frozen snow were being blown across the area.

On **June 25th**, 1957, a dense atmosphere consisting of haze and smoke was discovered in some idle workings in No. 6 Right section, Tsable River mine, Canadian Collieries Resources Limited. A search by members of the colliery mine-rescue squad, equipped with all-service breathing apparatus, located the fire at the face of a crosscut off No. 6 Right entry. A quantity of fine coal, estimated at about 20 tons, was found to be in the later stages of heating, with considerable smoke issuing. The pile of coal was very liberally covered with limestone dust and sealed off by erecting two stoppings about 1 foot apart, close to the pile. The interval between the stoppings was filled with limestone dust.

At a later date the seals were removed and the pile of coal, now cooled, was loaded out.

On **July 17th**, 1957, a **600-horsepower** electric motor, used for driving a compressor on the surface of Elk River Colliery, caught fire and the **stator** coils suffered extensive damage. A severe electrical storm in progress at the time of the fire is thought to have contributed to the incident by overloading the electrical system.

On **August 23rd**, 1957, in "A" North mine, Michel Colliery, The Crow's Nest Pass Coal Company Limited, the rear end of the **borecat** continuous-mining machine skidded on the inclined **footwall** at the face of the drainage level and jammed a **rubber-insulated** electric cable against a lagging on the low-side rib. A severe flash occurred and the cable was later found to have been punctured. No one was injured.

On **September 16th**, 1957, in No. 1 East mine, Elk River Colliery, The Crow's Nest Pass Coal Company Limited, four loaded cars of coal broke away from a seven-car trip

being lowered on No. 1 Incline. No one was injured but the cars were extensively damaged. Investigation disclosed that a coupling pin had worked loose.

On November 22nd, 1957, in No. 9 mine, Elk River Colliery, The Crow's Nest Pass Coal Company Limited, the eye of a socket on the No. 1 Slope rope broke while two loaded 10-ton-capacity cars were being hoisted. Although the last car was derailed by the drag, the two cars ran back about 700 feet. Three sets of timbers were dislodged and a 6-inch compressed-air line was broken in three places.

BUMPS AND OUTBURSTS

There were no bumps or outbursts of gas in the mines of the Province.

PROSECUTIONS

Mihaly Takago, supplyman, Michel Colliery, was prosecuted on October 25th, 1957, under Rule 112 of the Crow's Nest Pass Coal Company's "Special Rules" for subjecting himself to danger not necessary in the course of his occupation. He was found guilty and fined \$10 and costs.

SUPERVISION OF COAL MINES

During 1957 nineteen companies operated twenty-seven mines, employing 1,020 men underground. In the supervision of underground employees there were 4 managers, 11 overmen, 3 shiftbosses, and 63 firebosses, or approximately 1 official for every 13 men.

"COAL SALES ACT"

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 of Coal	Colliery and Location	Producing Company
Comox	Tsable River mine, Comox Colliery (Cumberland)	Canadian Collieries Resources Ltd.
Hi-Carbon	Mixture of Canadian Collieries coal and B.C. Electric coke	Canadian Collieries Resources Ltd.
Old Wellington	No. 9 mine (Wellington)	Canadian Collieries Resources Ltd.
Chambers-Extension	Chambers-Extension	R. H. Chambers.
Cassidy-Wellington	Cassidy mine (Cassidy)	A. H. Carroll.
Taylor Burson	Blue Flame No. 2 mine (Princeton)	Taylor Burson Coal Co. Ltd.
Hat Creek	Hat Creek (Lillooet)	Canada Coal and Development Co. Ltd.
Bulkley Valley	Bulkley Valley (Telkwa)	Bulkley Valley Collieries.
Crow's Nest, Elk River	Elk River (Coal Creek)	Crow's Nest Pass Coal Co. Ltd.
Crow's Nest, Michel	Michel (Michel)	Crow's Nest Pass Coal Co. Ltd.
Coldwater	Coldwater No. 3 mine (Merritt)	S. Gerrard.
Black Prince	Black mine (Princeton)	R. B. Savage.
Bowron River Coal	Bowron River mine (Prince George)	Central Industries Ltd.
Comac	Tsable River Colliery (Cumberland) and McLeod River Colliery (Alberta)	Canadian Collieries Resources Ltd.

BOARD OF EXAMINERS FOR COAL-MINE OFFICIALS

FIRST-, SECOND-, AND THIRD-CLASS CERTIFICATES AND MINE SURVEYORS CERTIFICATES

The Board of Examiners, formed on July 10th, 1919, consists at present of H. C. Hughes, Chief Inspector of Mines, chairman; A. R. C. James, Inspector of Mines, member; and Robert B. Bonar, Senior Inspector of Mines, secretary and member.

The meetings of the Board are held in the office of the Department of Mines in Victoria. The examinations are held in accordance with the amended rules of the Board of Examiners and approved by the Minister. The examinations are held at least

once a year, and more often if necessary. Examinations were held in 1957 on the following dates: May 15th, 16th, and 17th at **the Fernie centre** and at **Cumberland** and **Prince Rupert** in November.

The total number of candidates at these examinations was as follows: For **third-class certificates**, 1 (passed); **Second-class certificates**, 1 (failed); **First-class certificates**, 1 (passed); **mine surveyors' certificates**, 1 (passed).

The following were the successful candidates: **Third class-George McDonald Watson**; **first class-David Smith**; **mine surveyor—Allan W. Britton**.

All officials, before engaging in multiple blasting with millisecond delay detonators, are required to obtain a permit to do so from the Board of Examiners (Coal-mine Officials). This permit is issued only after the applicant has successfully passed oral and practical examinations in such work.

In addition to the examinations and certificates already specified as coming under the Board of Examiners, the Act provides that every coal-miner shall be the holder of a certificate of competency as such. Examinations are held regularly in coal-mining districts, and no certificate is granted where the candidate has failed to satisfy the Board as to his fitness, experience in a coal mine, and a general working knowledge of the English language.

During 1957 there were sixty-nine candidates for coal-miners' certificates, two of whom were unsuccessful. In addition to the certificates granted above, substitute certificates were issued to those who had lost their original certificates. Permits to act as coal-miners, as provided by the Act, have been granted to younger men by Inspectors in their respective districts. This method allows promising men with less than one year's experience underground to work at the coal face as miners under the guidance of an experienced miner.

The Board of Examiners desires to thank the different coal-mining companies for the use of their premises for holding examinations where necessary.

NOTES ON COAL MINES

VANCOUVER ISLAND INSPECTION DISTRICT

By R. B. **Bonar**

The gross output of coal from the Vancouver Island Inspection District was 200,205 tons, a decrease of 142 tons or 0.07 per cent from the 1956 output. Only one large coal mine, the **Tsable River mine**, is now in production on the Island. Operations in the **once** important **Nanaimo coalfield** are now restricted to eight very small mines, providing employment for no more than twenty-four men. These mines operate in outcrop, pillars, and barriers left during earlier working.

The Island coal-mining industry has suffered a rapid decline in the past few years. Production has declined by as much as 60 per cent since 1951. This condition has resulted from loss of markets due to competition from other fuels, high costs of production, and from the depletion of reserves in the **Nanaimo coalfield**. However, indications are that the bottom of the decline has been reached and that the present production will be maintained for several years.

In 1957 there were two accidents classified as serious, both of which occurred underground at the **Tsable River mine**.

In addition to these, forty-six minor accidents were reported and investigated. There was one dangerous occurrence reported from the mines of the Island—a fire that broke out in the **Tsable River mine**. This incident is reported fully under "**Dangerous Occurrences.**"

The annual mine-rescue and first-aid meet organized by the Vancouver Island Mine Safety Association was held at **Cumberland** on Saturday, June 1st. Two teams from Tsable River mine and a visiting team from Britannia mine participated in the mine-rescue competition, and a very high standard of performance was maintained. The winning team was the Tsable River team No. 1, captained by John Thomson.

NANAIMO (49° 123" SW.)

R. H. Chambers and associates, operators; R. H. Chambers, manager. This mine is in Section 14, Range 7, in the Douglas district, Mine, Extension near Extension. The area was first opened up as a stripping operation in the latter part of 1952 and comprised a small section of the Wellington seam lying close to the surface in the vicinity of the old Vancouver slope workings. By the end of 1954 all available surface coal was depleted, and early in January, 1955, the present slope was started to test the continuity of the seam underground. Early in 1957 the slope broke into the old Extension workings after being driven well over 600 feet from the portal. The slope pillars and the room pillars are now being mined on the retreat.

The coal is mined by picking out the middle band of carbonaceous shale with hand-picks. It is then blasted and hand-loaded into cars which are hauled to the tippie by a gasoline-driven hoist. A small shaker screen sorts the coal into over 2-inch, 1-to 2-inch, and under 1-inch sizes.

Total production in 1957 was 1,332, tons over a working period of 142 days, with a crew of five men. Working conditions were found to be satisfactory in the course of inspections. No accidents were reported.

Lewis Mine (Timberlands) Glyn Lewis, operator and fireboss. This property comprises two small mines operating in the Wellington seam in a small area of outcrop coal that was left when No. 8 mine was abandoned by Canadian Collieries (Dunsmuir) Limited. The seam outcrops on the side of a ridge parallel to and immediately south of the Nanaimo River valley at an elevation of 540 feet above sea-level. The coal measures dip southward at 8 degrees. The two mines are one-third of a mile apart.

The new mine, which commenced production in May, 1951, is in Range 1, Section 2, of the Cranberry district. It operates in an area of coal outcrop about 1 acre in extent, which is bounded on the west by a thrust fault that also formed the western boundary of the old No. 8 mine. The seam is 6 feet thick, including two thin rock bands.

The coal is blasted off the solid and hand-loaded into cars which are hauled to the surface up the slope by a small gasoline-driven hoist. A shaker screen sorts the coal into lump, nut, and pea sizes. Total production in 1957 was 8.50 tons over a working period of 196 days, with a crew of three men. Working conditions were found to be satisfactory, and no accidents were reported.

Blue Flame No. 2 Mine, Wellington (Timberlands) F. Vlasich, operator and fireboss. This mine is about 500 feet southeast of the Blue Flame No. 1 mine, which is on Lot 194 in the Bright district, about 600 feet west of the Timberlands road and 16 miles by road from Nanaimo. It is a prospect started in a continuation of the outcrop from Blue Flame No. 1 mine. The prospect was abandoned on January 9th, 1958, because shaly coal was encountered, the quality of which did not improve as the measures were entered.

Undun Mine J. Unsworth and A. Dunn, operators; A. Dunn, fireboss. This mine, which was brought into production in August, 1954, is three-quarters of a mile northwest of the village of Extension. It

operates in the Wellington seam, and the output comes from the mining of pillars and small areas of coal left near the outcrop in the workings of the old Extension No. 6 mine. The Wellington seam is variable in thickness, but the coal is of excellent quality. The measures dip about 10 degrees southwest. The roof is strong conglomerate.

The coal is blasted off the solid and hand-loaded into cars which are hauled via the slope to the surface by a small gasoline-driven hoist. Production in 1957 amounted to 538 tons over a working period of 140 days, with a crew of two men. Working conditions were found to be satisfactory in the course of inspections, and no accidents were reported.

Big Flame Mine Albert Addison, operator. This mine is in Range 5, Section 13, of the Cranberry district. Reopening of this mine, formerly known as the Clifford mine, was commenced early in 1955. During the year, only prospecting was done in the mine in an attempt to find coal of economical thickness and grade.

Extension Mine H. Brodrick and associates, operators; H. Brodrick, fireboss. This mine is located partly on Lot 6, Douglas district, and on Section 12, Range 1, Cranberry district, and is about 2 miles west of Extension village. The mine was started early in the year in outcrop coal near the portal of the No. 2 slope, old Extension colliery.

The coal is blasted off the solid and hand-loaded into cars which are hauled to the surface by a small gasoline-driven hoist. Production in 1957 amounted to 191 tons over a working period of 160 days, with a crew of two men. Working conditions were found to be satisfactory in the course of inspections, and no accidents were reported.

NORTH WELLINGTON (49" 124" SE.)

Loudon No. 6 Mine W. Loudon and associates, operators; W. Loudon, fireboss. This mine is about 1 mile southeast of Wellington and has been opened up by a flat-dipping slope driven in a small area of outcrop coal in the No. 2 Upper Wellington seam adjacent to the old No. 9 mine workings. The top portion of the seam, varying from 2 to 3 feet and consisting of carbonaceous shale, is blasted off the solid and stowed. The bottom 20 inches to 2 feet of coal is broken up with light shots and hand-loaded into cars which are hauled to the surface by a small gasoline-driven hoist. Production in 1957 amounted to 1,001 tons over a working period of 198 days, with a crew of three men. Working conditions were found to be satisfactory during the course of inspections, and no accidents were reported.

Carruthers and Wakelam No. 3 Mine R. B. Carruthers and W. Wakelam, operators; R. B. Carruthers, fireboss. This mine, near the Loudon mine, is also in the No. 2 or Upper Wellington seam adjacent to the abandoned workings of the old No. 9 mine. Production in 1957 amounted to 474 tons over a working period of 157 days, with a crew of two men. Working conditions were found to be satisfactory in the course of inspections. No accidents were reported.

Stronach No. 2 Mine Charles Stronach, operator; H. Gilmour, fireboss. This mine is in a section of the No. 2 or Upper Wellington seam adjacent to the old No. 9 mine. All of the output comes from the mining of pillars and small areas of coal left in the early workings. Production in 1957 amounted to 308 tons over a period of 151 days, with a crew of two men. Working conditions were found to be satisfactory in the course of inspections. No accidents were reported.

White Mine Joseph White, operator; John McArthur, fireboss. This mine is about 200 feet south of Stronach No. 2 mine and was operated as a prospect in search of pillars of coal thought to have been left during the early working of the old Wellington slope and latterly the Pacific No. 2 mine. These mines operated in the lower Wellington seam, which averages 6 to 8 feet in thickness and is of excellent quality. After considerable difficulty in passing through a gob area, a small pillar of coal was located. About 60 tons of coal was mined from this pillar when a cave-in occurred on December 20th, 1957, which will, in all probability, permanently close the mine.

COMOX (49" 124" N.W.)

Head office, 566 Homby Street, Vancouver. F. Ronald Graham, Canadian Collieries chairman of the board; N. R. Whittall, president; E. O. T. Simpson, vice-president, mining; W. W. Johnstone, district superintendent. The company name was changed from Canadian Collieries (Dunsmuir) Limited on March 20th, 1957. In 1957 this company operated one mine on Vancouver Island, the Tsable River mine.

Tsable River Mine.—S. J. Lawrence, manager; T. Ecclestone, overman; L. Cooper, A. Cullen, and A. Somerville, shiftbosses; W. Bennie, J. Cochrane, M. Frobisher, W. High, L. Hutchinson, C. Lewis, G. Nicholas, J. Thomson, and A. Maxwell, firebosses; S. Gough, surface foreman.

The layout and method of operating this mine are fully described in the 1954 Annual Report. In 1957 production came from the extraction of pillars formed by earlier development in the seam and from development work in the northeast section beyond the second fault system. This latter section, which was penetrated by an inclined rock tunnel near the end of 1955, is being rapidly expanded in spite of the difficulties encountered when penetrating a downthrow fault of varying displacement that was met by the two levels driven from the top of the rock tunnel.

The two slopes started from the levels, one on either side of the downthrow fault, are still being advanced in virgin territory, and the seam at the face of the slopes is of normal height and clean. The width of this section has not been limited, and the levels driven to the left and right off the slopes are still advancing in coal, although thinning of the seam has been encountered in certain levels. The immediate roof is composed of thinly bedded sandstone which contains numerous slips and joints and requires closer timbering than is usual. A rock tunnel started to the rise off No. 10 level parting will, when completed, intersect the slope workings in this section and will greatly facilitate haulage in the mine.

All the coal, both in development and pillar-extraction workings, is blasted off the solid. Electrical multiple blasting with millisecond delay detonators is used throughout the mine. Totals of 100,405 pounds of Monobel No. 4 explosive and 138,000 detonators were used during the year.

Total production in 1957 amounted to 195,442 tons over a working period of 239 days, with a crew averaging 223 men underground and eighty-nine on the surface.

Conditions at the mine were usually found to be satisfactory in the course of inspections.

First-aid arrangements have been maintained at a satisfactory standard. A suitably equipped first-aid room is provided on the surface, and an ambulance is held in readiness for emergencies. Five employees hold industrial first-aid certificates, and twenty-four employees hold other first-aid certificates. Two mine-rescue teams of six men each are maintained, and these attend periodic practices at the Cumberland mine-rescue station.

Forty accidents occurring at or in the mine were reported and investigated, two of which were classed as serious. This mine won the Ryan Trophy, emblematic of having the lowest accident record in a British Columbia coal mine, in 1956, and has again won

the award for 1957. This excellent record is due to the maintaining of the intensified safety programme put into effect by the management and ably assisted and advised by the Director of the Safety Division of the British Columbia Mining Association.

Regular inspections of the mine were made each month by the inspection committee appointed by the workmen, and copies of its reports were forwarded to the office of the District Inspector through the courtesy of the committee.

NICOLA-PRINCETON INSPECTION DISTRICT

By A. R. C. James

By the end of 1957, only two small coal mines were operating in this district. Total production for the year was 18,771 tons, only a quarter of the 1956 production. The greater part of this much-reduced output was from the **Mullins** strip mine at **Blakeburn**, which was closed in April when the Granby steam-electric power plant was shut down following cessation of operations at Copper Mountain.

The Coldwater mine at Merritt continued to be operated on a small scale and produced coal chiefly for local domestic use. The Blue Flame mine near Princeton, formerly operated by the Taylor **Burson** Coal Company, continued to be worked by a group of former employees. By the end of 1957, however, the last remaining pillars of coal were being extracted at this mine.

Coal Licence No. 12, covering 640 acres in the Hat Creek area, was renewed in favour of Inland Resources Company Ltd. In the latter half of the year some diamond drilling was done on the lignite deposits in this area.

Coal Licence No. 17, covering 320 acres in the Blakeburn area, was renewed in favour of Collins Gulch Collieries Ltd. Coal Lease No. 38, covering 630 acres southwest of Princeton, was renewed in favour of Wilson Mining Corporation. Coal Licence No. 59, covering 80.9 acres near Grindrod, was renewed in favour of Edward Pechr. No activity of any importance was reported from any of these properties.

No accidents were reported from any of the coal mines in 1957, nor were there any prosecutions under the "Coal-mines Regulation Act."

For the first time in many years the Similkameen Valley Mine Safety Association was unable to hold an annual field day in 1957. The closure of Copper Mountain made it impossible to secure sufficient entries to permit the organizing of mine-rescue and first-aid competitions.

COALMONT (49° 120" S.W.)

Blakeburn Strip Mine

Mullin's Strip Mine Ltd.-Edward Mullin, manager, Princeton.

This company operated a strip mine at the site of the old Coalmont Collieries Ltd. Nos. 3, 4, and 5 mines at Blakeburn. The property is 5 miles by road from Coalmont. A D-8 bulldozer was used to remove the overburden and a TD-14 2-yard loader was used to load the coal into trucks. The entire production was trucked to the Granby steam-electric power plant near Princeton. This plant was closed down at the end of April, when the Granby company ceased operations at Copper Mountain and **Allenby**. There were no other markets available for the coal, and so the strip mine was also closed down. Total production since the strip mine was started in 1954 was 163,439 tons. Production in 1957 was 16,095 tons. A crew of five men was employed at the pit and ten men in trucking the coal to the power plant.

MERRITT (50° 120" S.W.)

Coldwater Coal Mines

This property, 1 mile south of Merritt, is operated by the owners, S. Gerrard and partners. **Fireboss** (on permit), S. Gerrard. **Activities** were again confined to the Coldwater No. 5 mine and consisted of splitting pillars and extracting remnants of coal left between the

abandoned workings of the Middlesboro No. 5 mine and the surface, in the area adjacent to and west of the old water-tank and about 250 feet west of the old Middlesboro No. 4 mine. The seam is from 4 to 5 feet thick and includes two partings consisting of 3 inches of bone and 1 inch of hard shale. The coal is blasted from the solid and is hand-loaded into cars which are hauled to the surface by a small gasoline-driven hoist. Total production in 1957 was 1,081 tons. The crew varied from two to three men. Working conditions were usually found to be satisfactory in the course of inspections. No methane was detected.

PRINCETON (49° 120" S.W.)

**Blue Flame
Colliery**

James Fairley, overman; Thomas Brydon, fireboss. This mine is about 10 miles by road south of Princeton and about half a mile west of the Hope-Princeton Highway. In 1957 mining operations were confined to the extraction of pillars between No. 2 level and the outcrop. By the end of the year the last remaining pillars were being mined. Production for 1957 was 1,601 tons, and a crew of three men was employed. Conditions were usually found to be satisfactory in the course of inspection and no gas was found.

HAT CREEK (50° 121" N.W.)

Inland Resources Limited Company office, 602 West Hastings Street, Vancouver. R. R. Wilson, president, Vancouver. This company holds Coal Licence No. 12, covering 640 acres in the Hat Creek area. The property is at Upper Hat Creek, 30 miles from Ashcroft and 15 miles from Pavilion. An unusually thick deposit of lignite coal occurs in a small basin of Tertiary sedimentary rocks. Little is known of the structure of the coal measures, but near the coal outcrop they appear to be steeply folded and to have undergone some faulting. The Hat Creek coal deposit has been known of for many years and was reported on by Dawson in 1877. Various early attempts were made to develop the property. In 1925 the Hat Creek Coal Company drilled seven drill-holes and drove an adit 100 feet in an attempt to explore the property. Mining for local requirements on a very small scale was carried on from 1933 to 1945. The property remained inactive from 1945 to 1957.

In 1957, under the technical direction of Victor Dolmage, eight holes totalling 5,700 feet were diamond drilled on the west side of the creek with the object of further exploring the extent and structure of the deposit. Drilling began about August 23rd and was continued to the end of the year. A crew averaging eight men was employed and a camp was established at the property. It is reported that further work is planned for 1958.

[Reference: Minister of Mines, B.C., Ann. Rept., 1925, pp. 305-333; *Geol. Surv., Canada, Mem. 262*, pp. 108-110.]

EAST KOOTENAY INSPECTION DISTRICT

By D. R. Morgan

The production of coal from the East Kootenay Inspection District in 1957 was 994,635 tons, a decline of 307,949 tons or 23.6 per cent less than the quantity produced in 1956. There were two companies in operation, and their activities were confined to the Crowsnest Pass area. The Crow's Nest Pass Coal Company Limited, with mines at Michel and Coal Creek, produced 884,492 tons, a decrease of 303,642 tons from the corresponding figure obtained in 1956, and Coleman Collieries Limited, operating a large strip mine on the interprovincial boundary on Tent Mountain near Corbin, produced 110,143 tons, a decrease of 4,307 tons. Most of the mines were in operation throughout the year, but their activities were curtailed considerably by the present state of the coal market.

The accident record in 1957 showed an improvement in both frequency and severity. Ten serious accidents were reported under section 59 of the "Coal-mines Regulation Act," of which two were fatal. These were two fatalities less than in 1956 and four fewer serious accidents. The fatal accidents occurred in the underground operations, one being at Michel Colliery and the other at Elk River Colliery. Minor accidents resulting in one or more days absent from work totalled 282, of which 239 occurred underground and forty-three on the surface. This number was sixty-five less than in 1956. All the accidents were investigated, and the serious accidents were classified as follows: Five caused by falls of rock and coal (including one fatal); four involving haulage and machinery; and one by being struck by flying coal from chute (fatal). Four dangerous occurrences were also reported and were investigated. They are described more fully in another part of the report under the heading of "Dangerous Occurrences." No accidents involving injury to workmen were reported from the stripping operations on Tent Mountain.

The East Kootenay Mine Safety Association held its thirty-sixth annual mine-rescue and first-aid competitions at Fernie on June 22nd, and they were very well attended. Six teams from Fernie, Michel, and Kimberley entered the mine-rescue competition, and the Department of Mines shield was won by the Kimberley No. 1 team, captained by T. O. Bloomer. There were 118 competitors in the first-aid competitions, and the men's first-aid cup and shield were won by the Sullivan Concentrator team from Chapman Camp, captained by A. Nixon. These two teams also represented the East Kootenay in the Provincial mine-rescue and first-aid competitions held at Nelson on September 7th.

T. G. Ewart, president, Fernie; Thomas Balmer, vice-president, The Crow's Nest Pass Coal Company Limited, 305 Great Northern Railway Building, Seattle, Wash.; H. H. Gardner, general manager, Fernie; James Littler, general superintendent, Fernie; W. R. Prentice, secretary, Fernie; R. A. Colleaux, treasurer, Fernie. This company has carried out large-scale mining operations in the East Kootenay District since 1897. The operations are directed from a head office at Fernie, and they include the Michel Colliery at Michel and Elk River Colliery at Coal Creek. Most of the production is sold on the industrial market; and a large amount is utilized for briquetting and the making of coke. The operations include both underground and open-cast mining, of which a short description follows.

MICHEL COLLIERY.—(49° 114° N.W.) William Chapman, manager; Irving Morgan, senior overman; Walter McKay, safety supervisor. This colliery is situated at Michel, on the Crowsnest branch of the Canadian Pacific Railway, 24 miles east of Fernie. It is the oldest and largest operation in the district, and includes underground workings on both sides of Michel valley and a stripping operation on Baldy Mountain, near Michel. Modern briquette and by-product plants are located on the colliery-site. Six mines were in operation in 1957, including the strip mine, and most of the production was obtained from those located in the "A" and "B" seams. Four of the mines have been developed from a pair of rock tunnels which have been driven into the synclinal measures on the south side of the valley. They operate on both limbs of the syncline and arc named according to the seam worked and the direction of development. The method of working, in general, is by the room-and-pillar system, and the pillars are extracted on the retreat. The colliery is highly mechanized, and the chief motive power in use underground is compressed air. Most of the haulage on the main roadways is carried out by compressed-air locomotives. Electricity is used to drive belts at some of the mines. Haulage at "A" North mine is by diesel and battery locomotives. The output from all the mines is brought to a large preparation plant on the colliery-site, where it is cleaned and treated for the market.

The underground operations are under the direct supervision of six overmen and twenty-five firebosses.

"A " East Mine.-William Gregory, overman; Frank McVeigh, Harry Sanders, David Thewlis, Sr., Frederick Nash, Gordon Murdoch, Robert Woods, and Thomas Taylor, firebosses. This mine is in the "A" seam and has been developed to the left side of the main rock tunnels, on the eastern limb of the Michel syncline. The seam is 10 to 12 feet thick and dips at an average of 20 degrees in a southwesterly direction. The coal is of good quality and is friable and gassy; the roof is weak and requires careful attention for its support, and the pillars are extracted on the retreat.

During development the coal in the rooms is cut by compressed-air coal-cutters or is blasted from the solid with millisecond delay detonators and is loaded by duckbill conveyors. The rooms are connected by crosscuts or splits which later form shortwall faces, and the pillars are usually extracted by pneumatic picks. The coal from the pillars is loaded by hand on to shaker or belt conveyors and transferred to various loading points in the rooms or levels by other conveyors. From these loading points the coal is hauled in trips of cars by compressed-air hoists,

Most of the production in 1957 came from two slope sections of workings known as the No. 1 and No. 3 Slope districts, and the remainder came from a small panel of pillars left above the main east level. The average daily production was 600 tons with a crew of 123 men. No. 3 Slope district is located at the inner section of the mine. It has been in operation for many years and is rapidly nearing depletion, with only the pillars left alongside the slopes to be worked. No. 1 Slope district is located outby the No. 3 slope and is at present being developed preparatory to completion of the other district, with some pillar extraction having already taken place. The main slopes in this district have been driven to the base of the syncline, and rooms have been developed on both limbs of the syncline. The conditions in general were found to be satisfactory during the course of inspections, but considerable difficulties have been experienced due to excessive roof pressures in the lower part of the district. These have resulted in considerable breakage of the timber supports and in restricted clearances on the roadways in that part of the district. Difficulties were experienced on some occasions with the ventilation at the lower section of the No. 3 Slope district; these were later rectified.

The mine is ventilated by an electrically driven aerodyne fan which delivers 90,000 cubic feet of air per minute to the workings at a 5.6-inch water-gauge. This quantity was found to be sufficient for the requirements of the mine.

"A " West Mine.-Harry Corrigan, overman; James Walsh, Reginald Taylor, Robert Taylor, John McInnis, Stanley Menduk, William Cytko, Thomas Krall, Richard Hughes, Roger Pasiaud, and Paul Kusnir, firebosses. This mine has been developed in the "A" seam on the eastern limb of the Michel syncline similar to the "A" East mine, but is on the right side of the tunnels. All the present workings are toward the outcrop. The seam is of good quality, ranging from 12 to 2X feet in thickness, and dipping 20 to 35 degrees in a westerly direction. It is worked on the room-and-pillar system, and the layout is so arranged that most of the extraction is obtained along the strike of the seam. The pillars are extracted on the retreat, and, in the upper section of the workings where the coal is 28 feet thick, the pillars are extracted by the caving system.

The mine is the largest producer at the colliery and averaged 900 tons per day in 1957 with a crew of 150 men. Most of the production was obtained from the workings in the upper section of the mine, where the pillars are extracted by the caving system. The roadways in this area are driven along the footwall of the seam and the top coal is supported by timber sets. All the rooms are driven along the strike of the seam, at 45-foot centres, and the coal is mined by shortwall coal-cutters and then blasted. In the faces of the working-places advancing to the rise the coal is blasted from the solid by the use of millisecond delay detonators. During extraction of pillars the timber supports on the roadways are withdrawn and the top coal is allowed to fall or is blasted into the roadways. The loading operations in the rooms during pillar extraction are carried out by duckbill-equipped conveyors which are provided with extension pans to prevent the

workmen from being exposed under the caved area. The coal from the faces is transferred by a series of shaker, chain, and belt conveyors to a central loading point on the main west level at the bottom of No. 4 incline. All production from the mine is loaded into cars at this point, and large trips are taken from the mine by compressed-air locomotives via the rock tunnel to the preparation plant. Most of the equipment in the mine at present is operated by electricity, but all the equipment in the near vicinity of the faces is operated by compressed air.

The mine is ventilated by an electrically driven axivane fan which delivers 85,000 cubic feet of air per minute at a 3.5-inch water-gauge. This quantity was found to be sufficient for the needs of the mine, and no trace of gas was found in the workings during the course of inspections. Other conditions in general were also found to be satisfactory. A close check was maintained on the sealed area in the No. 3 left beltroad section where a gob fire occurred in 1956, and monthly samples of the air inside the seals indicated that the fire was inactive.

Upper "A" South Mine.—Vans H. Hulbert, overman. This operation is on the west or Sparwood limb of the Michel syncline and is driven from the right side of the main rock tunnel. The operation was commenced in October, 1956, and to the end of 1957 has comprised the driving of two inclines in No. 1 seam for later entry into a virgin area of "A" seam coal located between the abandoned "A" South mine workings and the outcrop. The seams are 175 feet apart and the two inclines are being driven in the lower seam, with the intention of entering the top seam at a later date by means of rock raises.

The coal in No. 1 seam is 12 to 15 feet thick and pitches at an angle of 35 to 40 degrees. Both inclines are driven up the full pitch of the seam, and the roof is supported by timber sets, the collars of the sets on the main incline being further supported by roof bolts. The coal at the faces is blasted from the solid with millisecond delay detonators and is transported to a central loading point on the level at the bottom of No. 1 incline by chutes and conveyors. At this point it is loaded into cars and taken from the mine by compressed-air locomotives.

Operations in 1957 were confined to a single shift with a crew of twenty-four men, activity being concerned chiefly with driving the two inclines. The 650-ton-capacity underground coal-bin mentioned in the 1956 Annual Report was completed but to date has not been put to use. The inclines were driven 350 feet in the coal of No. 1 seam, making a total of 1,200 feet, beyond which they have been continued as rock raises toward the upper seam. The raises are 10 by 8 feet and 8 by 6 feet, and by the end of December had been driven 250 feet at an angle of 43 degrees. Both raises are supported by posts and roof bolts, and the conditions in general were found to be satisfactory.

The mine is ventilated by the old No. 3 seam fan, which also ventilates the "A" West mine workings. This system was found to be satisfactory to meet the requirements of the workings during the present stage of development. Electricity was introduced into the mine in 1956 and is used to operate most of the equipment.

"A" North Mine.—John Whittaker, overman; Sidney Hughes, Henry Eberts, Ronald Saad, Thomas Sice, and Joseph Fortunasso, firebosses. This mine is operated in the "A" seam, on the north side of the Michel valley, approximately half a mile east of the preparation plant. It is being developed by a modified room-and-pillar system, and it is the intention to extract the pillars during both the advance and retreat. The mine is entered by four main levels which have been driven along the strike of the seam from the outcrop. Two inclines have been driven to the rise from the levels in order to develop a large area of coal above the levels. The seam is 12 feet thick where normal but is very irregular; it dips 15 to 20 degrees in a southerly direction. The coal is of good quality and at most of the working-places is mined by pneumatic picks or is blasted from the solid with millisecond delay detonators. It is usually loaded by hand on to shaker or chain conveyors and transported to various loading points on the levels, where it is loaded

into 10-ton-capacity bottom-dumping cars and taken from the mine by battery or diesel locomotives. Two of the main levels are highly mechanized, one being advanced by a new type of continuous miner, which is being tested, and the other by a coal-cutter and mechanical loader.

During 1957 the average daily production from the mine was 300 tons of coal with a crew of fifty-two men. The chief activity was the advancement of the main levels, but this was considerably hampered by thinning of the seam at various points and by the presence of several small faults. These conditions involved ripping the roof or floor in order to maintain sufficient height on the roadways. Two of the main levels were driven 1,100 feet during the year, and the faces are now over 5,000 feet from the portal of the mine. The other two levels are not so far advanced, one having been commenced in 1955 to provide access to the mine from the steel bridge that was built across the valley in that year. This level will eventually become the main haulage roadway, through which the production of the mine will be hauled via the steel bridge to the preparation plant. Most of the equipment in the mine is operated by electricity and is of the permissible type. Compressed air, which is chiefly used for operating the pneumatic picks, is supplied by two portable electric compressors located inside the mine on the main intake airway.

The conditions in general in 1957 were found to be satisfactory during the course of inspections. The mine was ventilated by a small centrifugal fan which delivered 30,000 cubic feet of air per minute but was replaced with a larger fan of axivane type driven by a 100-horsepower electric motor. This fan delivers 90,000 cubic feet of air per minute at a 1.5-inch water-gauge.

"B" South Mine.-William Davey, overman; John Krall, Henry Batchelor, and Robert Doratty, firebosses. This mine is operated in the "B" seam, on the western limb of the Michel syncline, and has been developed to the left side of the main rock tunnels. This seam is 5½ feet thick, dips 30 degrees in an easterly direction, and is overlain by a strong sandstone roof. The coal is of excellent quality, friable, and gassy. It is mined by pneumatic picks, and no shot-firing operations are allowed. The workings are developed by the room-and-pillar system, and the pillars are extracted on the retreat.

The mine has been in operation for many years and for a long period was the largest operation at the colliery. It is now considerably reduced in size, however, and most of the work in 1957 was confined to a restricted area of workings known as the No. 3 Slope district. This district is in by the old No. 1 Slope district, and is entered by two slopes driven across the pitch to the east side of the main south level. Most of the workings are on the south side of the slope, where rooms have been driven along the strike of the seam and the pillars are later extracted by a modified shortwall system between the rooms. The extraction of pillars above the No. 5 room has been completed, and all production from this section of the mine in 1957 was obtained from the workings below this room. Extraction of pillars was also continued from a few scattered points above and below the main south level, where a small amount of coal had been left from former workings. The coal from all the working-places is hand-loaded on to shaker, chain, or belt conveyors, and is transferred to various loading points, and taken from the mine by compressed-air locomotive. All the equipment at the mine is operated by compressed air, with the exception of two pumps in the No. 3 Slope that are operated by electricity.

Production of coal in 1957 was 500 tons per day with a crew of eighty men. Conditions in general were found to be fairly good during the course of inspections, but considerable difficulty was experienced in maintaining sufficient height on the roadways following extensive pillar extraction. Some difficulty was experienced at times in directing a sufficient quantity of air to the faces of the pillar extractions in the No. 3 Slope district owing to the large extent of the gob areas. This was usually overcome by installing small auxiliary fans to boost the ventilation to the faces or by rearranging the brattice partitions to direct the air nearer to the working-places.

The mine is ventilated by an **axivane** fan which delivers 74,000 cubic feet of air per minute to the workings at a 4-inch water-gauge. Of this quantity, 47,500 cubic feet is directed to the slope workings and the remainder to the gob areas in the old workings situated above the main south level.

In 1957, 97,750 pounds of **Monobel** No. 4, 10,750 pounds of **CXL-ite**, and 93,370 electric detonators were used at the colliery for coal and rock blasting. Eleven misfired shots were reported.

Three hundred and seventy-eight tons of limestone dust was used for application to the roadways at the various mines to minimize the coal-dust hazard and for tamping shots. Monthly mine-dust samples were taken at all the mines and analysed. All the samples were above the minimum requirements of incombustible content.

Monthly examinations were made by the miners' inspection committees at all the mines, and a regular meeting was held at the colliery office each month by the pit safety committee. All the report books kept at the mines in accordance with the "Coal-mines Regulation Act" were examined periodically and found to be in order.

Baldy Mountain Mines-William Chapman, manager; C. M. Matson, foreman. This stripping operation is on Baldy Mountain, 4 miles east of Michel. Two pits were operated in 1957, and both operations were carried out by **Mannix Limited**, of Calgary, on a contract basis. The pits are known as the No. 2 and No. 3 pits. Access to both pits is by means of a private road leading up the mountain from Natal.

Most of the production in 1957 was obtained from the No. 3 pit, which is located at a high elevation on the mountainside above Natal. Operations were commenced in this pit in 1955, and since that time a large area of overburden has been removed to expose the coal seam. The overburden has been removed to a ratio of 2 to 1, and has been taken back to a predetermined cut line which provides a slope ranging from 45 to 50 degrees on the wall above the pit. The coal is 45 feet thick and is extracted in 15-foot lifts along the strike of the seam. The coal is of fairly good quality but some sections have inferior coking qualities, and difficulties are sometimes experienced because of a high moisture content. The coal is blasted, loaded into trucks by power-shovels, and hauled to the preparation plant at Michel, a distance of approximately 5 miles.

No. 2 pit is located a short distance west of the No. 3 pit and at a slightly lower elevation. The pit has been in intermittent operation for several years, and a description of it is included in past Annual Reports.

The production of the strip mines is governed by the requirements of the market and the output of the underground mines. In 1957, operations were curtailed to a single-shift basis for the greater part of the year. Most of the production was from the No. 3 pit and usually averaged 750 tons per day.

Conditions in general were found to be satisfactory during the course of inspections. Difficulties were experienced on a few occasions owing to the friable nature of the wall above the No. 3 pit, but this condition was carefully checked and the wall was frequently scaled of loose rock.

By-product Plant.-The plant comprises four batteries of Curran-Knowles ovens, operated on the colliery premises at Michel, and a large number of bee-hive ovens which are operated only when market requirements exceed the capacity of the other ovens. A full description of the plant is included in the 1954 Annual Report, and there has been very little change in the plant since then.

Operations in 1957 were confined to the Curran-Knowles ovens, and the total production of coke was 153,494 tons, a decline of 35,718 tons from 1956. The ovens were in operation throughout the year, but the output was curtailed by the market. Periodical inspections were made, and the conditions in general were found to be satisfactory.

Briquette Plant.-This plant is adjacent to the preparation plant, and a description of it is included in the 1954 Annual Report. Operations in 1957 were curtailed con-

siderably and the plant produced only 84,436 tons of briquettes, as compared with a production of 188,355 tons in 1956. This was due to lack of markets for the briquettes, and the plant was operated on a single-shift basis for most of the year.

ELK RIVER COLLIERY.—(49° 114" S.W.) James E. Morris, manager; Walter McKay, safety supervisor. This colliery is at Coal Creek, 4 miles east of Fernie, and is connected to the Canadian Pacific Railway by a branch line operated by the Morrissey, Fernie and Michel Railway, a subsidiary company of The Crow's Nest Pass Coal Company Limited. The colliery at present comprises three mines which are operated in two different seams. Two other mines were in operation for part of 1957, but were abandoned in July owing to the fact that the quality of the coal was unsuitable for the market. The mines are entered from the outcrops of the seams, and are all on the south side of the valley. They are driven from various elevations on the mountainside, but all production is brought to the same surface landing and treated at a modern preparation plant on the colliery-site. A description of the plant is included in the 1954 Annual Report.

The chief motive power in use at the mines is compressed air, which is supplied by two electrically driven compressors at the surface. Transportation on the main levels and entries is by diesel or battery locomotives, but in some instances horses are used. The combined underground operations are under the direct supervision of three overmen and fourteen firebosses. A description of the individual mines follows.

No. 1 East Mine.—Arnold Webster, overman; Leonard Brett, Eric Singleton, and Ronald White, firebosses. This mine is the oldest operation at the colliery and was once part of the old Coal Creek Colliery which was closed in 1943. Most of the older workings have been abandoned, and the present operations are confined to a small area of coal left between the old No. 1 East mine workings and a barrier pillar of coal left to isolate the old No. 1 South mine workings.

The mine is operated in the No. 10 seam and has been developed by the room-and-pillar system of working, all the pillars being extracted on the retreat. The coal is 12 to 25 feet thick, but only the top 12 feet is extracted. It is of excellent quality and, being friable, is broken down by pneumatic picks without the aid of shot-tiring. The broken coal is loaded directly into cars by hand, and the cars are hauled to the various gathering partings by horses. From these partings they are formed into seven-car trips and hoisted to the surface via the new portal and lowered to the No. 4 surface landing. The cars from the landing are taken in large trips to the preparation plant by steam locomotives.

The mine was in operation throughout the year and averaged 400 tons of coal daily with a crew of seventy-two men. Conditions in general were found to be fairly good during the course of inspections, but considerable difficulty was experienced in some sections of the mine in maintaining sufficient clearance on the roadways owing to excessive roof pressures brought about by extensive pillar extraction. The ventilation was also found to be satisfactory in general, but on a few occasions small quantities of explosive gas were found at the roofs of some of the faces because of defective bratticing. A careful check was kept on the sealed area in the No. 3 West section where a gob fire occurred in 1956, and on one occasion some of the seals had to be repaired. Results of the analyses of the atmosphere inside the seals indicated that the fire was inactive.

The mine is ventilated by an electrically driven double-inlet Sirocco fan which delivers 56,000 cubic feet of air per minute to the workings at a 2-inch water-gauge. This quantity was found to be sufficient for present requirements.

No. 9 Mine.—Daniel Chester, overman; Ralph Larner, Albert Littler, William Waller, Henry O'Neil, and Louis Sclipa, firebosses. This mine is in No. 9 seam and is the largest operation at the colliery and a very important producer. It is entered by four main levels driven from the outcrop of the seam at a high elevation on the mountain, and the workings have been developed to both the rise and dip of the levels. It is

a large mine which has been developed by the room-and-pillar system, but severe geological complications experienced during the past few years have restricted further development. Activities at present are confined to extraction of pillars in both past and present workings and are gradually nearing completion. The workings are widely scattered, and most of the production in 1957 was obtained from No. 1 Slope district, which entered a portion of the old No. 2 mine workings for the purpose of extracting two large pillars left in that region.

The coal in No. 9 seam is 9 feet thick where normal, is of excellent quality, and is overlain by a hard sandstone roof. The coal is mined by pneumatic picks or is blasted off the solid with millisecond delay detonators. It is loaded on to conveyors by hand and conveyed to various loading points where it is loaded into cars. In the main section of the mine, trips of cars are brought to the main level by compressed-air hoists and taken from the mine by a 100-horsepower diesel locomotive. In the No. 1 Slope district, which is entered by a separate slope driven from the mountainside, the coal is loaded into 10-ton-capacity bottom-dumping cars and hauled to the surface by a 300-horsepower electric hoist situated outside the mine. The cars are unloaded on a ramp at the portal of the slope, and the coal is conveyed by a short belt conveyor to a retarding conveyor near by which transports the entire production of the mine down the mountainside to the preparation plant.

Conditions in general were found to be fairly good during the course of inspections in 1957. Difficulties were experienced in maintaining sufficient clearance on some of the roadways in the No. 5 Slope district, but this section of the mine was abandoned during the year owing to depletion of the coal reserves. Considerable subsidence has taken place on the portion of the main levels in the No. 5 Slope district due to pillar extraction, but the operations are rapidly retreating from this area. The average daily production of coal from the mine in 1957 was 500 tons with a crew of 104 men.

The mine is supplied with two fans, one of which ventilates the main tunnel, or inner section of the mine, and the other ventilates the No. 1 Slope section. Both the fans in 1957 were replaced with others of greater capacity. The main tunnel section is now ventilated by a Sirocco double-inlet fan which delivers 45,000 cubic feet of air per minute at a 0.8-inch water-gauge, and the No. 1 Slope section is ventilated by an axivane fan delivering 96,000 cubic feet of air per minute at a 3.9-inch water-gauge. Both these quantities were found to be sufficient to meet requirements.

No. 1 Mine.—James Anderson, overman; William Verkerk, Michael Tymchuk, and Brindley Morris, firebosses. This mine is operated in No. 10 seam, and the workings are adjacent to the old abandoned dip workings in No. 1 East mine, which is operated in the same seam. The mine is in the initial stage of development, and work has centred on the advancement of four main slopes down the pitch of the seam. Other activity has been the development of a small section of workings to the south of the main slopes.

Conditions in general were found to be fairly good during 1957. Most of the working-places operated on a three-shift basis, and the mine averaged a daily production of 250 tons of coal with a crew of forty-five men. The coal is usually blasted from the solid by the use of millisecond delay detonators and is loaded into conveyors for transportation to various loading points. The coal is loaded into cars at these points, and seven-car trips are formed and hoisted to the surface by a compressed-air hoist.

The mine is ventilated by a 5-horsepower auxiliary fan which delivers 7,500 cubic feet of air per minute to the working-places by means of metal tubing. A small part of the workings is also ventilated by the No. 1 East mine fan. These two systems of ventilation have been found to be sufficient for present requirements, but preparations have already been made for increasing the ventilation when necessary. A rock raise has been driven from the No. 4 slope to the surface to become the main return airway, and

a double-inlet Sirocco fan has been installed at the fan drift but has not yet been put to use.

No. 3 No. 4 *Mines*.—James E. Anderson, overman. Operations at these two mines were suspended in July, 1958, because the quality of the coal was not suitable for the present market. Since that time, work has consisted of dismantling and removing equipment, and when finished both mines will be sealed. A description of the workings of both the mines is included in the 1956 Annual Report.

During 1957, 8,369 pounds of Monobel No. 4, 973 pounds of CXL-ite, and 11,598 electric detonators were used at the mines of the colliery for rock and coal blasting. No misfired shots were reported.

To neutralize the coal dust, 107 tons of limestone dust was applied to the underground roadways of the mines and used in shot-fixing. Monthly mine-dust samples were collected from all the mines and analysed. All the samples were above the minimum requirements of incombustible dust.

Monthly inspections were made at all the mines by the miners' inspection committee, and a copy of each inspection report was forwarded to the office of the District Inspector through the courtesy of the committee members. Meetings were held at the colliery office each month by the pit safety committees. All the report books kept at the various mines in accordance with the "Coal-mines Regulation Act" were examined regularly and found to be in order.

(49" 114" N.W.) D. B. Young, general manager, Coleman, Alta.;
Coleman Collieries Limited J. C. Shearer, strip-mine manager. This company has directed large-scale coal stripping operations on the interprovincial boundary at Tent Mountain, near Corbin, for many years. Most of the property is in the Province of Alberta, but where the coal seams extend into British Columbia, arrangements have been made by the company to extend their operations into this Province. Access to the property is by means of a private road leading from the No. 3 highway near Crowsnest to the top of the mountain, a distance of 8 miles. Several seams have been worked across the border, but activity in 1957 was confined to the No. 2 pit, half the operation being in each Province.

The coal in No. 2 pit is in a synclinal basin and in places is over 100 feet thick. It is of fairly good quality, although some parts are very inferior. All the overburden has been removed, and the coal is loaded with power-shovels and is transported in 15-ton-capacity trucks to the company's preparation plant at Coleman.

Conditions in general were found to be fairly good during the course of inspections in 1957, with the exception of a premature blast which occurred during blasting operations early in the year. This is reported under "Dangerous Occurrences."

(50" 114" S.W.) The Utah Company of the Americas carried
Fording River Area out a geological survey for a few weeks as part of the exploration programme that was started in 1956. Activity centred chiefly in the vicinity of Smith Creek. In November a few small samples of coal were obtained from three of the prospect tunnels driven in 1956 on Todhunter Ridge.

NORTHERN INSPECTION DISTRICT

By A. R. C. James

The coal mines of the Northern District produced a total of 8,149 tons of coal in 1957, a decrease of 4,862 tons or 37 per cent from the 1956 output. The decrease was mainly in the production from Bulkley Valley Collieries Limited; with only a local domestic market available to it, the operations of this company are now restricted to the winter season only.

Two small mines continued in operation in the Hudson Hope area of the Peace River district on a seasonal basis. Production from these mines also declined in 1957.

No accidents or dangerous **occurrences** were reported from the coal mines of this district during 1957.

TELKWA (54° 127" N.E.)

Bulkley Valley Collieries Limited Company office, Telkwa. F. M. Dockrill, president; F. Bond and L. Gething, firebosses. This is a private company mining coal on a royalty basis on property comprising six Crown-granted lots, Nos. 388 to 392 and No. 401. The property is on Goat Creek, a tributary of the Telkwa River, about 7 miles southeast of Telkwa. The mine is connected by a good road with the Canadian National Railway and Highway No. 16 at Telkwa.

Total production in 1957 was 4,991 tons, a very substantial decrease from the previous year's output. The mine was closed from April 1st to September 1st. At the time of inspection in October, a crew of nineteen men was employed. Operations were confined to the No. 4 mine, which has been described fully in previous Annual Reports. Pillars of coal previously blocked out to the east of the levels were mined on a retreat-ing system.

The coal is screened with a Tyler Tyrock three-deck vibrating screen. Four sizes of coal are produced for sale; namely, lump, egg, nut, and stoker. The bunker capacity is 230 tons and comprises five bins.

Conditions in the mine were usually found satisfactory in the course of inspections. No accidents were reported. No methane was detected during inspections. The mine is ventilated by a 30-inch Sirocco axial-flow fan which circulates approximately 10,000 cubic feet of air per minute.

PEACE RIVER (56° 122" SE.)

King Gething Mines Quentin F. (King) Gething, operator and fireboss. This property is on Lot 1039, on the southeastern slope of Portage Mountain; it is 12 miles by road from Hudson Hope and 72 miles from Fort St. John. The mine was described in detail in the 1954 Annual Report. In 1957 it operated continuously in the six fall and winter months and inter-mittently in the spring and summer. Mining has been confined to the upper level, which has now been driven 700 feet from the portal. A series of 20-foot rooms have been set off from the level at 50-foot centres and have been driven up dip. In 1957 two rooms were worked, and total development work done in the year was about 200 feet. One of the rooms was driven through to surface, providing an additional airway and means of exit. Total production was 1,858 tons. In October a crew of three men was employed. Conditions were usually found to be satisfactory in **the** course of inspections. No methane was detected. No accidents were reported.

Reschke Coal Ltd. Company office, Fort St. John. E. B. Summer, operator and fire-boss. This property is at about 2,600 feet elevation on the steep southern end of a spur of Butler Ridge, 1 mile north of the Peace River. It is 23 miles by road from Hudson Hope and 83 miles from Fort St. John. The seam at present being worked is 4 feet thick and dips at 46 degrees west. Both roof and floor of the seam are a silty shale.

The mine has been developed from two parallel **adit** levels driven north along the strike of the seam from the outcrop. The lower level is the main haulage level, and the upper level, until it was abandoned in March, 1956, provided a return airway and second exit. The face of the lower level is now 1,257 feet in from the portal.

The coal is mined from a series of 30-foot-wide rooms set off from the lower level at 50-foot centres and driven up the full dip of the seam. Pillars of coal 15 feet wide are left between the rooms to support the roof. Nineteen rooms were driven through to the upper level, 330 feet up dip. In 1956, No. 20 room was driven 825 feet up dip to the surface and now forms the return airway and second exit. In 1957 mining was continued in Nos. 23 and 24 rooms.

The coal is blasted off the solid, using millisecond delay detonators, and is transported by gravity chutes into cars on the main level. In 1957 the mine was shut down on March 14th and reopened on September 23rd. Total production was 1,300 tons. In October a crew of five men was employed. Conditions were usually found to be satisfactory in the course of inspections, and no methane was detected. No accidents were reported.

Inspection of Electrical Equipment and Installations at Mines, Quarries, and Well Drilling Rigs

By L. Wardman, Electrical Inspector of Mines

ELECTRIC POWER

In 1957 electric power was used by forty-two mining companies in operations at thirty concentrators, thirty-seven lode mines, two placer mines, two non-metallic mineral mines, five collieries, three coal-cleaning plants, and one coking plant. Electric power was also used at six quarries for loading, crushing, separating, and conveying materials. Forty-six drilling rigs using electric power for lighting and driving motors were used in drilling operations at 115 wells. Ninety-six of these wells were completed.

LODE-METAL MINES

In 1957 operations at seven mines were terminated either permanently or indefinitely. Operations at six other mines were intermittent. Five mills were built and put into operation.

The kva. generating capacity of privately owned plants which were operated in 1957 was as follows:-

Prime Mover	Generator Kva. Capacity
Steam turbines	.... 19,300
Diesel engines	.... 14,120
Water-wheels	.... 13,220
T o t a l	4 6 , 6 4 0

The electric power produced by these plants was approximately 92,649,023 kilowatt-hours during 1957. The figures are approximate because many of the small power plants are not equipped with recording meters and, therefore, the power generated by these plants was estimated. The power purchased from public utilities and from the generating division of The Consolidated Mining and Smelting Company of Canada, Limited, amounted to 211,278,668 kilowatt-hours. The total amount of power used in the Province for mining and concentrating purposes was 303,927,691 kilowatt-hours.

Approximately 8,920 horsepower was produced by diesel engines, water-wheels, and gas engines for direct-driven equipment such as air compressors. The power was produced as follows:-

Prime Mover	Horsepower
Diesel engines	6,205
Water-wheels	... 1,750
Gasoline engines	9 6 5
T o t a l	8 , 9 2 0

The connected load of lode mines and concentrators which operated in 1957 shows an increase of 6,573 horsepower over that recorded for 1956. This increase was due to the building of five concentrators and the installation of equipment for development operations at one property. It more than offsets the connected load lost by the closing-down of two concentrators and three small properties at the end of 1956. A general breakdown of the connected load for those properties which operated in 1957 is as follows:-

Equipment	Horsepower
Hoists	7,187
Scraper hoists	6,921
Ventilating fans	4,745
Pumps	5,144
Rectifiers and M.G. sets	9,060
Air compressors	18,808
Crushing equipment	9,916
Sink float	1,265
Milling and concentrating equipment	47,563
Workshop	2,833
Miscellaneous	11,715
Total	125,217

On surface and underground haulage systems there were in use 141 battery locomotives, 106 trolley locomotives, and 13 diesel locomotives.

PLACER MINES

Electric power was used at two placer mines. The generating capacity was as follows:—

Diesel-engine-driven generators	Kva. 110
Hydro-electric	600
Total	710

The connected load was as follows:—

Shaft hoists	Horsepower 40
Ventilating fans	5
Air compressors	75
Screening equipment	20
Miscellaneous	5
Total	145

NON-METALLIC MINES AND QUARRIES

Electric power was used at two non-metallic mines, one non-metallic mill, and six quarries.

COAL MINES

One colliery did not operate in 1957, thus reducing the number of collieries using electric power to five.

The distribution of electric power was as follows:—

Surface—	Horsepower
Compressed air	5,595
Ventilation	1,090
Hoisting	1,075
Haulage	317
Coal washing and screening	3,284
Pumping	515
Briquetting	642
Coke production	1,180
Miscellaneous	722
Total	14,420

Underground—	Horsepower
Ventilation	200
Hoisting	24
Haulage	76
Pumping	80
Coal-cutters	303
Conveyors	100
Compressed air	565
Miscellaneous	14
Total	1,362
Total for surface and underground	
	15,782

Four permissible battery locomotives and three permissible diesel locomotives were in use underground.

WELL DRILLING RIGS

Twenty-two drilling rigs were operated in 1957. One hundred and eighteen wells were operated during the year; of these, forty-two were gas wells, twelve were oil wells, and eighteen were drilling at the end of the year.

An outline of the electrical equipment normally used on drilling rigs is given in the 1955 Annual Report.

ELECTRICAL INSTALLATIONS

LODE MINES

In 1957 operations at the following mines were terminated for an indefinite period: Tulsequah Mines, Limited, Copper Mountain, Mother Lode, Velvet, I.X.L. and O.K., Silver Giant, A.M., and Iron Hill.

Operations at the following mines were suspended at the end of 1956 and were not recommenced in 1957: Silver Hill, Iron Mask, Midnight, and Kenville Base Metals concentrator.

The following is a brief outline of electrical installations which were made at operating mines in 1957.

UNUK RIVER

(56° 130" SE.) A No. 8 A.W.G. armoured cable was installed **Granduc (Granduc** along the 3250 level from the portal to the shaft and down the Mines, Limited) shaft to the 2625 shaft station where three 50-kva, 2,300-440-volt single-phase 60-cycle transformers were installed. TWO Ingersoll-Rand 2-stage pumps driven by two 75-horsepower 440.volt motors were installed on the 2625 level. A 19.inch fan was also installed on this level. One Ingersoll-Rand 2-stage pump driven by a 25-horsepower motor was installed on the 2950 level and a similar installation was made on the 2800 level.

In the portal power-house a 350.kw. 2,300.volt D-397 Caterpillar diesel-electric unit was installed and also a Joy Sullivan 1 1¼- by 7- by 7-inch compressor driven by a 125-horsepower squirrel-cage motor.

HAZELTON

Silver Standard Mines **Limited.**—(55° 127" S.W.) The hoist motor and the mine ventilating fans were removed from the mine. An electrically driven abrasive cut-off wheel and bit grinder was installed in the shop.

SMITHERS

Duthie (Sil-Van Mines Limited).—(54" 127" N.E.) A diesel-driven air compressor, a diesel-driven electric generator, and a battery locomotive were operated while a small programme of development and diamond drilling was in progress.

LILLOOET

Bridge River (50" 122" N.W.)

Bralorne (Bralorne Mines Limited) Three 100-kva. 4,600–440-volt transformers were installed on the 3100 level of the Queen shaft. A 75-horsepower sinking-hoist was installed on the 3200 level of the Queen shaft. Two 48-inch fans were installed—one on the 3100 level and one on the 3200 level. Two pumps driven by 50-horsepower motors were also installed in the Queen shaft.

Pioneer (Pioneer Gold Mines of B.C. Limited) A new concrete-tile main substation building was built on the old main substation site. New switchgear will be installed with the transformers from the old substation. The Hummer screen in the crushing plant was replaced with a Symons rod deck screen. New refrigeration equipment was installed in the cook-house, and the 440-volt service was rebuilt to take care of the load. Electric immersion heaters, of 50-kw. total capacity, were installed in the inlets of No. 1 and No. 2 pipe-lines at the Hurley River dam, replacing the wood-fired steam plant.

An unusual occurrence was investigated in November. It was reported that electric shocks were received from time to time from the cages and shaft timbers in the mine. It was found that the neutral conductor of the 110-volt lighting and signal systems in both shafts had been grounded at several stations, allowing the neutral current to divide between the neutral conductor and other conductive materials (water pipes, shaft cables, etc.). A high-resistance connection in the neutral conductor in one of the shafts increased the amount of current leaving the neutral conductor. The difference in potential between various conductive materials in the shaft was as high as 10 volts. Ten volts is sufficient to give a mild shock to anyone contacting it with wet hands. To prevent such occurrences, the neutral conductors of electrical systems in a mine should be grounded only at the source of supply.

COPPER MOUNTAIN

Copper Mountain (The Granby Consolidated Mining Smelting and Power Company Limited).—(49" 120" S.W.) Operations at this property were terminated on May 1st, 1957. In this period of operation a 25-horsepower pumping unit, a 7½-horsepower pumping unit, and a 240-horsepower synchronous condenser were installed. Since May 1st all power-lines and electrical equipment have been dismantled at Copper Mountain, and some of the equipment has been reconditioned and transferred to other properties.

HEDLEY

French Mine (The Cariboo Gold Quartz Mining Company Limited).—(49° 120° S.E.) A mill was built on the property and put into operation. The connected load for this mill is as follows:-

	Horsepower
Crushing plant	... 23
Milling equipment	1 6 5
Miscellaneous	1 0
	—
Total	... 198

Power is purchased from the West Kootenay Power Company.

BEAVERDELL

Highland-Bell (Highland-Bell Limited).-(49° 119" SE.) The 25-horsepower motor on the mine ventilating fan was replaced with a 40-horsepower motor. The fused lighting panels in the mill were replaced with a circuit-breaker panel. A 22-inch Symons cone crusher driven by a 25-horsepower motor was installed in the crushing plant.

PHOENIX

(49° 118° S.W.) A dry, an office and engineering building, a Phoenix Copper machine-shop, a carpenter's shop, a core-shed, and a compressor-Company Limited room have been built and wired. A main 2,200-volt switchroom containing four cubicles switches was built to supply 2,200.volt power to the mill, the crusher, the 2,200-440-volt transformers supplying the compressor motors, and the pumping equipment. A 2,200-440-volt transformer-station was built to provide 440-volt power for the compressor and the machine-shop. A switchroom for the 2,200.volt crusher switchgear is under construction. Overhead distribution-lines have been built for the camp and pumping-station.

SALMO

(49° 117" S.E.) Three underground substations which had been Jersey, Emerald, taken out of service were refitted and returned to service. A new and Dodger (Canada- underground substation consisting of a 200-kva. transformer and dian Exploration switchgear was installed to supply slushers and fans in the Jersey Limited) 4200 mine. Two underground substations have been dismantled. A substation was set up during exploratory operations at the In-vincible mine but was removed when these operations were terminated. A permanent pumping system was installed in the Emerald shaft. An inclined conveyor 350 feet long was installed between the shaft dumping point and the tungsten ore-bin at the under-ground crushing plant. A fan driven by a 60-horsepower motor was added to the mine ventilating system. Six more slusher units, mostly of 20-horsepower capacity, were put into service. A 5-ton battery locomotive was converted to diesel-electric.

(49° 117" S.E.) A distribution centre was installed on the 3200 H.B. (The level to supply six slushers. A 500,000.c.m. armoured cable supplies this station from the underground transformer-station. Two Consolidated slushers driven by 60-horsepower motors and a 5-kva. lighting Mining and Smelt- transformer were installed underground. In the concentrator a ing Company of regrind ball mill driven by a 125-horsepower wound-rotor motor Canada, Limited) was installed. A Wilfley pump driven by a 15-horsepower motor was installed to pump the reground pulp. A 400-ampere Airco welder was installed in the machine-shop.

NELWAY

(49° 117° S.E.) The 2,300.volt 4/0 A.W.G. overhead cables to Reeves MacDonald the mill were replaced with 250,000.cm. cables. In the mill two Mines Limited S.R.L. pumps driven by 3-horsepower motors were installed. A 7½-horsepower motor was installed on the conditioner. In the crushing plant the 400-ampere fused disconnect was replaced with an air circuit-breaker. A new 220-volt 4-wire service was also installed. A 100-kva, substation was built at the mine to serve the B.L. slusher drift.

NORTH KOOTENAY LAKE

Riondel (49° 116° N.W.)

The new mine ventilating system was completed with the installation of three 50,000-c.f.m. 48-inch Aerofoil fans driven by 60-horsepower motors. The new 6,900-volt transmission-line men-
 Bluebell (The Consolidated Mining and Smelting Company of Canada, Limited) tioned in the 1956 report was completed, and a transformer-station consisting of three 150-kva. 6,900-550-volt single-phase trans-
 formers was built to supply the fan motors and the dock installations. On completion of this installation the 50,000-c.f.m. 40-horsepower Jeffrey fan was transferred to standby service.

To handle the increased inflow of mine water, two 500-imperial-gallons-per-minute pumps driven by two 150-horsepower motors were installed, bringing the number of pumps on the 525 level to six. Three 300-imperial-gallons-per-minute pumps driven by 40-horsepower motors were installed on the 675 level, bringing the number of pumps there to five. Two 200-imperial-gallons-per-minute pumps driven by 7-horsepower motors have been temporarily installed on the 825 level until the main pump is installed. The Bluebell shaft pumping-stations were reorganized. On the 300 level three 300-imperial-gallons-per-minute pumps driven by 40-horsepower motors and one 400-imperial-gallons-per-minute pump driven by a 50-horsepower motor are in use. On the 375 level three 400-imperial-gallons-per-minute pumps driven by 20-horsepower motors are in use. Both these stations operate automatically.

A Titan battery locomotive was added to the haulage equipment.

A desliming plant for desliming mill tailings for underground backfill was installed in the mill. This plant consists of 3- by 12-inch dorrcloves, three 5- by 4-inch SRL-C solids pumps each driven by a 20-horsepower motor, one 3- by 3-inch SRL-C solids pump driven by a 10-horsepower motor, and a booster pump driven by a 5-horsepower motor.

Ainsworth (49° 116" N.W.)

Highlander (Yale Lead & Zinc Mines Limited).-Mine ventilation was increased by the installation of a fan driven by a 25-horsepower motor.

Kootenay Florence (Western Mines Limited).-The air compressors, shop equipment, and mine pumps were used from April 1st to September 6th while diamond drilling was in progress.

PADDY PEAK

(49° 117" N.E.) The mill which was at the Silver Hill mine was moved to the Utica property and rebuilt as it was originally built
 Utica (Lajo Mines Limited) at the Kootenay King property. The diesel plant is 178 horsepower, and the connected load is as follows: Crushing plant, 34 horsepower; mill, 111 horsepower; and miscellaneous, 8 horsepower. Further details may be obtained from the 1951 Annual Report on the Kootenay King property.

SLOCAN LAKE

(49° 117° N.E.) Arrangements have been made to build a sub-
 Western Exploration Company Limited station for connection to the British Columbia Power Commission power-lines. The substation will consist of three 100-kva. 6,900-440-volt transformers. The high-tension side of these transformers will be connected star to the 12,000.volt Power Commission power-line. The low-tension side will be connected delta to provide 440-

volt power for the mill. A system of interlocked switches will prevent the use of Western Exploration power when the British Columbia Power Commission power is in use and vice versa.

NORTH LARDEAU

Spider (Sunshine Lardeau Mines Limited).-(SO" 117" N.W.) A 1½-ton battery locomotive and a diesel-driven battery charging unit were installed at the mine.

KIMBERLEY

(49" 115" N.W.) Electrical installations at the mine consisted of the following: A new electrical service and lighting panel for the Sullivan (The Consolidated Mining and Smelting Company of Canada, Limited) tractor repair-shop and a new extension, a new electrical service and wiring in McDougal Hall, additional lights in the machine-shop, and new lights and standards along the mine road. Two 75-horsepower pumps were installed in the basement of the old compressor plant to supply fresh water to underground. Eight electric slusher hoists were purchased and installed underground.

New electrical installations at the mill consisted of the following: A 100-ton pilot test mill; a 100-horsepower auxiliary motor and drive installed on the rod mill for spotting when changing liner plates; and miscellaneous small installations add 425 horsepower to the mill connected load. The float-disposal system was extended 200 feet. The polarity of the 3700 haulage system was changed to negative trolley to correspond with the mine system, and 1 mile of welded track was replaced with track having expansion joints and bonds.

WINDERMERE

Mineral King (Sheep Creek Miner Limited).-(50" 116" S.E.) A 440-volt power system was installed from the transformer-station along No. 3 level and down the shaft to serve Nos. 4, 5, 6, and 7 levels. A 50-horsepower hoist was installed on No. 7 level for the new shaft.

HOPE

(49" 121° SW.) A crushing plant and concentrator were built and put into operation at the beginning of January, 1958. The main units in the crushing plant are a 24- by 36-inch Traylor jaw crusher and a 4-foot Symons cone crusher. The main units in the concentrator are three 7- by 10-foot ball mills, two classifiers, twenty-two flotation cells, pumps, thickeners, and filters. The connected load for the crushing plant is 252 horsepower and for the concentrator is 1,152 horsepower.

Two main transformer-stations were installed and are fed from a line which branches off the 12,000-volt B.C. Electric power-line at Choate. One of these stations, consisting of three 1,250-kva. 12,000-2,300-volt transformers, supplies the mill and the 2600 level equipment. The other station, consisting of three 200-kva. 6,900-2,300-volt transformers connected star-delta, will supply on the 3550 level a 100-horsepower air-compressor motor, five 50-horsepower slusher motors, one 15-horsepower slusher, and one 150-horsepower motor generator set for trolley power. Three 300-kva. 2,300-440-volt transformers in a vault in the mill supply the 440-volt mill motors. Three 100-kva. 2,300-440-volt transformers supply the shops, No. 1 compressor, and the 2600 level equipment. A Jeffrey vibrating feeder was installed under the coarse-ore bin, and a Bellis & Morcom compressor driven by a 100-horsepower motor was installed in the power-house.

HOWE SOUND

Britannia
(**Britannia** Mining
and Smelting Co.
Limited)

(49° 123" N.E.) Two new rod mills driven by two 400-horsepower 400-volt 900-r.p.m. auto-synchronous motors were installed in the mill. Two 7½-horsepower motors, one 3-horsepower motor, and one 1-horsepower motor were installed to drive conveyors, screen, and distributors. Lighting circuits damaged by corrosion were replaced. A 10-ton crane was installed for the primary mill floor. Six slushers, three driven by 20-horsepower motors and three driven by 30-horsepower motors, were installed underground.

TEXADA ISLAND

Texada Mines Ltd.

(49° 124" N.W.) During the winter the loading-dock was wrecked by a storm and it was necessary to build a new one. This dock is similar to the old one and provides a connected load of 445 horsepower. This does not include a 250-horsepower scraper installed for moving concentrates in the stockpile. A conversion to B.C. Electric power was made early in 1958. To effect this change-over, 2 miles of 12,000-volt power-line was built and a 2,250.kva. transformer-station was installed.

VANCOUVER ISLAND

Benson (Elk) Lake (50" 127" S.E.)

Empire Develop-
ment Company
Limited

A crushing plant, separating plant, and surface tram were built and put into operation in September. The connected load is as follows: Crushing plant, 110 horsepower; separating, screening, and conveying equipment, 245 horsepower; water-pumps, 118 horsepower; tram, 210 horsepower; scraper hoists, 80 horsepower; and workshops and miscellaneous, 70 horsepower.

Power is produced at 460 volts by three 250-kva. 60-cycle 3-phase generators driven by three D-375 Caterpillar diesel engines.

The tram motor, when lowering ore, produces regenerative power, which is consumed by the crushing and separating plant motors when they are operating. When there are not sufficient motors operating to consume the extra power, one, two, or three 60-kw. elements of an electric boiler may be switched on as required to provide load.

Cowichan Lake (48" 124" N.E.)

Blue Grouse
(**Cowichan** Copper
Co. Ltd.)

A concentrator was built during the summer and put into operation in December. Power is purchased from the British Columbia Power Commission at 2,300 volts and 440 volts. The crushing units consist of a 20- by 36-inch jaw crusher and a 3-foot cone crusher, which, together with screen and conveyors, make a connected load of 97 horsepower. The main units in the mill are one 6- by 12-foot ball mill, two 6- by 14-foot ball mills, one classifier, two banks of flotation cells; these, together with thickener, filter, and pumps, provide a connected load of 525 horsepower.

Jordan River (48° 124" S.E.)

Sunloch and
Gabbro (**Sunro**
Mines Limited)

Two air compressors driven by a 125-horsepower synchronous motor and a 50-horsepower induction motor provide air for the driving of a 7,500-foot adit. Two 5-horsepower fans provide ventilation in the adit. A pump driven by a 15-horsepower motor was installed to pump water from the river for the drills. B.C. Electric power is purchased at 2,300 volts and is stepped down to 440 volts by three 100-kva. transformers.

PLACER MINES

Atlin Placers Limited on Wright Creek operated briefly in 1957. Noland mine on Spruce Creek was operated by a lessee. Hixon Placers Inc. on Hixon Creek was operated. No alterations were made in the electrical equipment at the mines mentioned.

NON-METALLIC MINES

The British Columbia Cement Company's quarry at Blubber Bay was closed. The Kootenay Granite Products quarry at Sirdar was not operated. The following were operated but no major changes were made to the electrical installations: British Columbia Cement quarry, Bamberton; Clayburn-Harbrison Limited mine, Kilgard; Columbia Gypsum Co. Ltd. quarry, Windermere.

MCDAME

Cassiar Asbestos Corporation Limited (59° 120' S.W.) A Wheelabrator dust-collecting system was installed to filter the mill air and return it to the mill. Recirculation of the air will permit the mill to be kept at a higher temperature during cold weather. The connected load of this unit is 211 horsepower. Additions to the screening, collecting, and conveying system, and the addition of a pilot test plant added 125 horsepower to the connected load. Dust-collecting and bagging equipment taken out of service removed 43 horsepower. The increase in mill load amounted to 294 horsepower, making the mill load 2,048 horsepower.

A 15-horsepower portable welder was added to the tram equipment, increasing the connected load to 323 horsepower.

BLUBBER BAY (49° 124° N.W.)

Gypsum Lime and Alabastine, Canada, Limited.-A transfer from company-produced power to B.C. Electric power was made early in 1957. The diesel plant was dismantled to make room for the step-down transformers in the power-house.

COQUITLAM

Gilley Bros. Limited.-(49° 122' S.W.) A new power-line was built from the plant to the quarry to supply the electric shovel.

COAL MINES

NANAIMO (49° 123° S.W.)

Union Bay **Washery** (Canadian Collieries Resources Limited).-A 7½-horsepower motor and a 5-horsepower motor were installed in the washery to drive equipment which would facilitate the unloading of Alberta coal into the washery. The lower floor of the washery was rewired for lighting.

EAST KOOTENAY (49° 114' SW.)

Michel Colliery (The Crow's Nest PassCoal Company Limited) A 900-r.p.m. fan driven by a 100-horsepower 550-volt 3-phase induction motor was installed at "A" North mine for ventilation of the mine. Four 100-horsepower 900-r.p.m. 550-volt 3-phase motors and switch-gear were installed to drive drier fans on the tipple. These motors replace two 150-horsepower 2,200-volt motors and switchgear. A concrete switchroom was built at the

by-product plant to house the switchgear for twenty-two motors on the coke tipple. Two 15-horsepower 220-volt motors were installed on the slack conveyor for the No. 5 slack-bin.

On Sunday, July 7th, 1957, it was found that the fans at "A" North mine had stopped. The power-line fuses had blown and the main circuit-breaker had tripped on earth leakage. Investigation disclosed that the conductors of the main cable had faults to ground.

On the morning of July 8th, 1957, it was found that the main circuit-breaker controlling power to "A" West "B" seam and No. 1 seam had faults to ground on all three phases.

A lightning discharge from an electric storm which occurred on July 6th, 1957, at 6.30 p.m. is thought to be the cause of the above occurrences.

On August 23rd, 1957, in "A" North mine at the drainage level face the section of cable serving the borecat was damaged when the machine skidded against the lagging on the low-side rib. A severe electric arc occurred which tripped the circuit-breaker for that district. No one was injured and no damage other than that to the cable was done. The cable was moved to a more protected place on the machine to prevent a repetition of this occurrence.

In October, 1957, a fault to ground occurred on one phase of a 1,000-foot section of 6,600-volt cable which made replacement necessary. The cause of the ground fault is unknown.

Elk River Colliery (The Crow's Nest Pass Coal Company Limited).-A 6,900-volt 3-phase power-line of No. 4 A.W.G. H.D. copper was built between the power-house and No. 1 mine, a distance of 1 mile, and three 100-kva. 6,900-575-volt transformers were installed at the No. 1 mine. One thousand two hundred feet of 600-volt No. 0 A.W.B. armoured cable was installed down the slope to a 50-horsepower motor driving a pump.

On July 17th, 1957, at 5.20 a.m., the 600-horsepower motor driving No. 2 compressor caught fire. Fifty per cent of the stator coils were damaged. At the same time the switchgear serving several mine ventilation-fan motors tripped, stopping the fans. It is thought that an electric storm caused this occurrence.

Tent Mountain Strip Mine (Coleman Collieries Limited) (49" 114" N.W.) On February 5th, 1957, premature detonations of loaded holes occurred. At 11 a.m. the driller had connected in series the cap leg wires for ten holes of a group of sixty holes which were to be connected in series parallel, and was about to connect the cap leg wires of the eleventh hole when holes Nos. 1 and 10 detonated. Work was immediately stopped and the area was fenced off. At 1 p.m., while the area was being watched, hole No. 2 detonated.

During these occurrences a strong wind carrying particles of snow and dust was blowing. Static electricity produced by the rapidly moving particles and collected by the leg wires of the series of ten caps was considered to be the cause of the premature ignitions.

To prevent the possibility of future premature blasts, it was decided to suspend shot-firing during unfavourable weather conditions unless shot-firing was mandatory; then blasting would be done with primacord.

Lode-metal Deposits Referred to in the 1957 Annual Report

The names of the properties are arranged alphabetically within five areas. Each area consists of the mining divisions listed below. The table shows the principal metals produced or indicated in the deposits in 1957:—

Northern *British Columbia*.—Atlin, Liard.

Central British Columbia.—Cariboo, Clinton, Omineca.

Coast and Islands.—Albemi, Nanaimo, New Westminster, Skeena, Vancouver, Victoria.

South Central British Columbia.—Greenwood, Kamloops, Lillooet, Nicola, Osoyoos, Similkameen, Vernon.

Southeastern British Columbia.—Fort Steele, Golden, Nelson, Revelstoke, Slokan, Trail Creek

Property	Mining Division	Latitude and Longitude	Metals													Page	
			Gold	Silver	Copper	Lead	Zinc	Tungsten	Cadmium	Iron	Manganese	Uranium	Chromium	Tin	Nickel		Molybdenum	Cobalt	Sulphur
<i>Northern British Columbia</i>																	
Big Bull	Atlin	58° 133' N.W.	2	1	1	1	1	2									5
Copper Canyon	Liard	57° 131' S.E.			3												5
Janet-Vega	Atlin	58° 133' N.W.	3	3	3	3	3										5
Maid of Erin	Atlin	59° 136' N.W.			1												A43
Opal	Liard	58° 131' N.W.												3			5
Tulsequah Chief	Atlin	58° 133' N.W.	2	1	1	1	1	2									5
<i>Central British Columbia</i>																	
Aurum	Cariboo	53° 121' S.W.	2	1													14
Bob Creek	Omineca	55° 126' S.E.					3										12
Boss Mountain	Cariboo	52° 120' S.W.													3		18
Cariboo Gold Quartz	Cariboo	53° 121' S.W.	2	1													14
Cronin-Babine	Omineca	54° 126' N.W.	2	1	2	1	1	2									12
Duthie	Omineca	54° 127' N.E.		3	3	3											10
Ferguson	Omineca	56° 125' N.E.				3	3										13
Firesteel	Omineca	57° 127' S.E.		3		3	3										13
Iron Mountain	Cariboo	52° 122' S.E.			3												16
Limonite Creek	Omineca	54° 127' N.W.							3								12
Lucky Ship	Omineca	54° 127' S.W.													3		12
McDonald Island	Omineca	54° 126' N.E.			3												13
Mariner	Cariboo	52° 121' N.E.	3														14
Pollyanna	Cariboo	52° 122' S.E.			3												17
Silver Standard	Omineca	55° 127' S.W.	2	1	2	1	1	2									9
Sunset	Cariboo	52° 122' S.E.			3												17
Swannell	Omineca	56° 125' N.E.				3	3										13
<i>Coast and Islands</i>																	
A.M.	New Westminster	49° 121' S.E.			3												66
Anyox	Skeena	55° 129' S.W.			3												8
Avallin	Victoria	48° 124' S.E.			3												72
Blue Chip	New Westminster	49° 121' S.W.	3														66
Blue Grouse	Victoria	48° 124' N.E.		2	1												69
Britannia	Vancouver	49° 123' N.E.	2	2	1	2	1	2									67
Domineer	Nanaimo	49° 125' N.E.				3											69
Double Ed	Skeena	55° 129' S.W.			3												8
Ecstall	Skeena	53° 129' N.W.														3	9
Fandora	Alberni	49° 125' S.W.	3														69
Gabro	Victoria	48° 124' S.E.			3												72
Gold Flake	Alberni	49° 125' S.W.	3														69
Granduc	Skeena	56° 130' S.E.			3												6
Iron Hill	Nanaimo	49° 125' N.W.							1								69
Kingfisher	Nanaimo	50° 127' S.E.							1								A44
Kitchener	Alberni	49° 124' S.W.			3												69
Maple Bay	Skeena	55° 130' S.E.			3												7
Merry Widow No. 5	Nanaimo	50° 127' S.E.							1								68

Shipping Mines.—(1) Metal contributed at least 10 per cent of gross value of the shipment. (2) Metal contributed less than 10 per cent of gross value of the shipment. Production for 1957 is listed in Table XV.

Non-shipment Mines.—(3) Metal present, indicated by assay or mineralogical determination.

LODE-METAL DEPOSITS REFERRED TO IN THE 1957 ANNUAL REPORT—Continued

Property	Mining Division	Latitude and Longitude	Gold	Silver	Copper	Lead	Zinc	Tungsten	Cadmium	Iron	Manganese	Uranium	Chromium	Tin	Nickel	Molybdenum	Cobalt	Sulphur	Page
Southeastern British Columbia —Continued																			
Bayonne	Nelson	49° 116° S.W.	3	3		3	3												47
Beatrice	Revelstoke	50° 117° N.W.	3	3		3	3												58
Belle Aire	Slocan	49° 116° N.W.				3	3												49
Berengaria	Slocan	49° 116° N.W.		2		1	1												48
Blue Star	Nelson	49° 116° S.E.		3		3	3												62
Bluebell	Slocan	49° 116° N.W.		2	2	1	1			2									48
Boomerang	Slocan	49° 117° N.E.		3		3	3												57
Bosun	Slocan	49° 117° N.E.		2	1	1	1			2									56
Buffalo	Slocan	49° 117° N.E.		2	1	1	1			2									A47
Caledonia	Slocan	50° 117° S.E.			3		3												52
Camden	Trail Creek	49° 117° S.W.	3																41
Can-Amer	Slocan	49° 116° N.W.		3		3	3												51
Cariboo	Trail Creek	49° 117° S.W.	3																41
Cork	Slocan	50° 117° S.E.		3		3	3												52
Daybreak	Slocan	49° 117° N.E.		3		3	3												51
Deadman	Slocan	49° 117° N.E.		3		3	3												53
Dodger	Nelson	49° 117° S.E.						1											44
Eclipse	Revelstoke	50° 117° N.W.		2	1	2	1	1		2									58
Elmor	Trail Creek	49° 117° S.W.	3																41
Emerald	Nelson	49° 117° S.E.						1											44
Enterprise	Slocan	49° 117° N.E.		3		3	3												54
Feeney	Nelson	49° 117° S.E.						1											44
Galena Farm	Slocan	49° 117° N.E.		3		3	3												56
Gertrude	Fort Steele	49° 115° N.W.		3		3	3												63
Golden Eagle	Nelson	49° 117° S.E.		3	3		3												41
Goodenough	Nelson	49° 117° S.E.		3	3		3	3											43
H.B.	Nelson	49° 117° S.E.		2		1	1			2									46
Hercules	Slocan	49° 116° N.W.		3		3	3												50
Hewitt	Slocan	49° 117° N.E.		2	1		1			2									56
Hidden Treasure	Revelstoke	50° 117° N.E.		3		3													59
Highlander	Slocan	49° 116° N.W.		2	2		1	2											49
Hinckley	Slocan	49° 117° N.E.		3		3	3												54
Homestake	Slocan	49° 117° N.E.		3		3	3												57
Hope	Nelson	49° 116° S.W.		1		1	1												47
I.X.L.	Trail Creek	49° 117° S.W.	3																41
Index, Index Creek	Revelstoke	50° 117° N.E.		3		3													59
Index, Keen Creek	Slocan	49° 117° N.E.		1		1	1												51
Invincible	Nelson	49° 117° S.E.						3											45
J.G.	Slocan	50° 116° S.W.		3		3	3												60
Jersey	Nelson	49° 117° S.E.		2		1	1			2									44
Joy, Index Creek	Revelstoke	50° 117° N.E.		3		3													59
Joy, Wild Horse River	Fort Steele	49° 115° N.W.		3		3	3												63
Kicking Horse	Golden	51° 116° S.E.		3		3	3												65
King	Nelson	49° 116° S.W.		1		1													60
Kitchener	Nelson	49° 116° S.E.								3									61
Kootenay Florence	Slocan	49° 116° N.W.		3		3	3												50
Lakeview	Nelson	49° 116° S.W.		3		3	3												47
Last Chance	Slocan	49° 117° N.E.		3		3	3												53
Laura M	Slocan	49° 116° N.W.		2		1	1												A46
Leah	Fort Steele	49° 115° S.E.				3													64
L'Nora	Trail Creek	49° 117° S.W.				3	3												40
Lone Bachelor	Slocan	49° 117° N.E.		1		1	2												53
Lost Atlantis	Slocan	50° 117° S.E.		1		1	1												52
Lost Chord	Revelstoke	50° 117° N.W.		3		3	3												59
Lucky Jim	Slocan	50° 117° S.E.		3		3	3												52
Mammoth	Slocan	49° 117° N.E.		2	1		1	1		2									54
May-Bee	Nelson	49° 116° S.E.			3														60
Midnight	Trail Creek	49° 117° S.W.	3																41
Min	Slocan	50° 117° S.E.		3		3	3												52
Mineral King	Golden	50° 116° S.E.		2	2	1	1			2									64
Molly Hughes	Slocan	50° 117° S.E.		1		2	2												54
Monarch, Field	Golden	51° 116° S.E.		2		1	1			2									65
Monarch, Silverton	Slocan	49° 117° N.E.		3		3	3												54
Moonshine	Slocan	50° 116° S.W.		2	2	1	1												60
New Springfield	Slocan	49° 117° N.E.		1		1	1												54
Noble Five	Slocan	49° 117° N.E.		3		3	3												53
Nugget, Rossland	Trail Creek	49° 117° S.W.	3																41

Shipping Mines.—(1) Metal contributed at least 10 per cent of gross value of the shipment. (2) Metal contributed less than 10 per cent of gross value of the shipment. Production for 1957 is listed in Table XV.
 Non-shipment Mines.—(3) Metal present, indicated by assay or mineralogical determination.

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