Minister of Mines and Petroleum Resources

PROVINCE OF BRITISH COLUMBIA

ANNUAL REPORT

for the Year Ended December 31

1966

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1967

BRITISH COLUMBIA
DEPARTMENT OF MINES AND PETROLEUM RESOURCES
VICTORIA, B.C.

HON. DONALD L. BROTHERS, *Minister.*

K. B. BLAKEY, *Deputy Minister.*

J. W. PECK, *Chief Inspector of Mines.*

S. METCALFE, *Chief Analyst and Assayer.*

M. S. HEDLEY, *Chief, Mineralogical Branch.*

R. H. MCCRIMMON, *Chief Gold Commissioner.*

R. E. MOSS, *Chief Commissioner, Petroleum and Natural Gas.*

J. D. LINEHAM, *Chief, Petroleum and Natural Gas Conservation Branch.*

Major-General the Honourable GEORGE RANDOLPH PEARKES,
V.C., P.C., C.B., D.S.O., M.C., C.D.,
Lieutenant-Governor of British Columbia.

MAY IT PLEASE YOUR HONOUR:

The Annual Report of the Mineral Industry of the Province for the year 1966 is herewith respectfully submitted.

DONALD L. BROTHERS,
Minister of Mines and Petroleum Resources.

Minister of Mines and Petroleum Resources Office,
March 31, 1967.

Hamilton Cleaver Hughes, retired Chief Inspector of Mines, died in Victoria on January 23, 1967, after a short illness. "Cleave," as he was known to a host of friends and associates, was born in Vancouver on November 17, 1892. He attended public and high schools in that city as well as the former branch of McGill University, and in 1914 graduated from McGill University, Montreal, with a degree in Mining Engineering. For three years after graduation he worked for the British Columbia Hydrographic Survey. Thereafter, save for an interval of ranching, he devoted himself entirely to mining, including employment with The Granby Mining Company Limited and Cominco Ltd. and experience in operation, scouting, and consulting practice. He joined the Department of Mines in January, 1938, as Inspector of Mines at Nelson and was transferred to the Victoria office in 1946. He became the first Senior Inspector of Metalliferous Mines in April, 1947, and in February, 1950, was appointed Chief Inspector of Mines. He retired in January, 1958. He was a member of the Canadian Institute of Mining and Metallurgy and Secretary of the Victoria Branch for some years after its formation in 1950, and also served as British Columbia representative on the Institute's Medal for Bravery Committee and on the John T. Ryan Committee. He was Counsellor for District 6 from 1953 to 1955, and Institute Vice-President for the 1955–56 term. He was a member of the Association of Professional Engineers of British Columbia. Mr. Hughes is survived by his wife Dorothy, two daughters, and a son.

Major Harold T. Nation, retired field assistant and librarian, who was associated with the Department of Mines for more than 40 years, died in Victoria on April 24, 1967, in his 92nd year. He was born in Dunedin, New Zealand, on April 15, 1876. He received his early education in California and Nevada where his father practised law. In 1890, he was sent to Bedford School, England, and later studied engineering at the University of London. Between 1897 and 1906 he worked as a surveyor's assistant on preliminary surveys for railway lines in the Kootenays and on mining claims. In 1906 and 1907 he was field assistant to William Fleet Robertson, Provincial Mineralogist. He and Fleet Robertson made field trips to Northern and Central British Columbia, and Vancouver and Queen Charlotte Islands. In 1908 he was appointed engineer with the Port Arthur mines in Manchuria. He returned to Victoria in 1909 and rejoined the Bureau of Mines as general technical and field assistant. Between 1909 and 1914 he and Fleet Robertson visited many remote areas of the Province, travelling by canoe, horseback, wagon, and on foot. He served with the Canadian Expeditionary Force from November, 1914, to October, 1917, and was discharged with the rank of major. Following his discharge from the Army, he served as general technical assistant to the Provincial Mineralogist and as librarian. His familiarity with the geography of the Province and with mining activities fitted him uniquely for the task of indexing the Department's publications as they were issued, and for preparing the Index to the Annual Reports of the Minister of Mines, 1874 to 1936, published in 1938, and Index to Annual Reports of the Minister of Mines, 1937 to 1943, and Bulletins 1 to 17, published in 1944. Major Nation was active in the British Columbia Historical Society, the British Columbia Natural History Society, Royal Overseas League, St. Mary's Church, and for many years served as British Columbia Secretary of the Old Boys' Association of Bedford School. He retired from the Department on September 30, 1946. He was predeceased by his wife Audrey, whom he had married in England in 1916, and he is survived by a daughter and two sons.

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ANNUAL REPORT OF THE MINISTER OF MINES AND PETROLEUM RESOURCES, 1966

Introduction

A report of the Minister of Mines of the Province of British Columbia has been published each year from 1874 to 1959. Beginning in 1960, it is the Report of the Minister of Mines and Petroleum Resources.

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 and Petroleum Resources 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.

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 safety and some of the activities of the Inspection Branch of the Department of Mines and Petroleum Resources is contained in the section on Inspection of Lode Mines, Placer Mines, and Quarries, and early in the section on Coal, and in the section dealing with Inspection of Electrical Equipment and Installations at Mines, Quarries, and Well Drilling Rigs.

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

By M. S. Hedley

The mineral industry of British Columbia had a very good year in 1966. The annual total value of production set a new record for the fifth successive time. The total of $338,265,799 was 20.5 per cent above the previous record set in 1965, and brought the all-time total value to $5.9 billion.

A record value was set in each of the four categories of Metals, Industrial Minerals, Structural Materials, and Fuels. The comparison with 1965 follows:—

	1965	1966	Gain Per Cent
Metals	$177,101,733	$208,756,760	17.9
Industrial minerals	20,409,649	22,217,369	8.1
Structural materials	32,325,714	46,821,264	44.7
Fuels	50,815,252	60,470,406	19.0
Totals	$280,652,348	$338,265,799	20.5

Metals, in terms of total value, staged a recovery from the minor setback experienced in 1965 to a high that was not due entirely to increased production, but was the result of two separate factors: One the high price of copper and the other the expanding production of molybdenum. Metals in the category of smelter by-products, antimony, bismuth, cadmium, indium, and tin, together showed about a million-dollar increase compared with 1965. The value of production of gold and of iron concentrates was virtually unchanged and increases were shown in the values of nickel and silver, due to increased output.

Copper production did not quite recover from the 1965 decline, brought about largely by labour troubles, but although the output was not a record, the total value of $56 million was. Prior to 1964 the total molybdenum production had been about $46,000; this figure was equalled in 1964, whereas in 1965 the value was $12 million and in 1966 it was $28 million. Lead and zinc, for many years the most valuable products of the industry, were both down in quantity and in value. Production at the Sullivan mine has been curtailed because a considerable amount of Trail smelter capacity has been taken up by ore and concentrates from the Pine Point mine on Great Slave Lake. The quantity of lead produced in 1966 was the lowest since 1924 and the quantity of zinc the lowest since 1950.

The advance in Industrial Minerals was due almost entirely to an increase in the price of sulphur. Production of sulphur at Kimberley continued to increase, but the total quantity from all sources was very little more than in 1965. Asbestos production has been increasing since the start of operations, and in 1966 grossed $15 million for the first time.

The rise in value of Structural Materials was due in part to an increased production of cement, coupled with an increase in price. By far the greatest increase was in sand and gravel, because of increased consumption and also because of listing material from sources not previously included.

The substantial increase in value of Fuels was due to increases in production of oil and gas coupled with a very slight rise in price. Crude oil became the third most valuable commodity, exceeded only by copper and zinc. Coal production was down 10 per cent from 1965.

The Canadian prices for gold and silver remained essentially unchanged from 1965 because the United States prices were fixed and the premium on United States funds fell only fractionally. Prices for lead and zinc maintained a fairly high level, the Canadian price for lead falling almost 1 cent and that for zinc a small fraction of 1 cent per pound from the 1965 figures.

The average Canadian price for copper was an unprecedented 53.344 cents per pound. This was almost 15 cents (39 per cent) above that of the previous record year, 1965.

The Trail smelter operated at a high level, accepting from British Columbia non-Cominco mines all crude ores, 24.6 per cent of the lead concentrates, and 32.8 per cent of the zinc concentrates produced. The remaining lead and most of the zinc concentrates were exported to United States smelters; a small amount of zinc concentrates went to Japan. All copper concentrates were exported, 10 per cent to the Tacoma smelter and 90 per cent to Japan. Japanese smelters took all of the nickel, all of the magnetic iron concentrates, and some of the molybdenum concentrates. In all, about 38 per cent of the total value of British Columbia metal production was exported to Japan in the form of concentrates. This is equivalent also to 23.5 per cent of the total mineral industry.

Another stage in the utilization of ore from the Sullivan mine was reached in June, with completion of a steel ingot plant at Kimberley. This plant, with a capacity of about 80,000 tons per year, is near the iron smelter and converts molten iron to steel. This is the ultimate step in utilizing the iron contained in the iron sulphide tailings which for many years had been segregated and stockpiled by far-seeing men. The steel is the first made in British Columbia from British Columbia ores. Cominco Ltd. is fabricating this steel in the plant of its subsidiary, Western Canada Steel Limited at Vancouver, thus establishing the first fully integrated steel operation in Western Canada.

Molybdenum was mined on a major scale for the first full calendar year. The Boss Mountain mine milled more than 1,000 tons per day, and the Endako mine, while expanding its capacity, averaged more than 15,000 tons per day for the year. The Red Mountain mine came into production at about the middle of the year at 400 tons per day. The British Columbia Molybdenum property at Alice Arm was being readied for operation at 6,000 tons per day in 1967. Bulk sampling was completed at the Brenda molybdenum-copper property west of Peachland, and work continued on molybdenum-bearing deposits in various parts of the Province. The future for molybdenum in British Columbia is undeniably bright, and the Province already provides about one-sixth of the free world's output of that metal.

Apart from the greatly enhanced value of production, the copper situation was good. Bethlehem continued to increase mill capacity; Craigmont completed open-pit mining and started underground; and other producers had a good year, although the Mount Washington operation closed. Granisle Copper Limited came into production late in 1966, and Western Mines Limited at the end of the year. Wesfrob Mines Limited was well advanced with construction for the production of iron and copper concentrates in 1967. Granduc Mines Limited made a good start in driving the 11.6-mile adit from the camp at Tide Lake to the mine on the Leduc glacier; work was also done at the Leduc end. Copper and copper-molybdenum deposits of promise in various parts were further investigated.

Exploration continued at a high rate in 1966, and although other metals were looked for, copper and molybdenum were the principal ones sought. More than 300 companies were engaged in some form of exploration and of these 35 could be classed as majors which participated directly or through subsidiaries.

One direct measure of activity is the number of mineral claims recorded—a total of 91,703 in 1966, far exceeding the previous records of 29,244 claims in 1964, and 41,882 in 1965. The 56,138 certificates of work also established a record in 1966.

The Department has for a great many years endeavoured to report annually as much current activity as possible. In the last ten years it has become obvious that a summary of exploration and development costs would be very useful, and to this end forms were sent out for the past three years to all active companies, seeking information on the year's expenditures. The figures, unfortunately, are not directly comparable from year to year, but a start has been made. In 1966 the following approximate expenditures were made: Exploration (search for new deposits not classed as mines), $29 million; development (work done to put new mines into production), $44 million; total spent in search of new mines and in preparing new mines for production, $73 million.

Ten staff geologists of the Mineralogical Branch, Department of Mines and Petroleum Resources, carried out geological mapping and field studies of mining properties and mineralized areas. Results of this work are found in the Lode Metals section of this report.

The Geological Survey of Canada reported 36 projects involving field work in British Columbia. These ranged from geological mapping at 4 miles to 1 inch and 1 mile to 1 inch to palæontological and mineralogical studies. Air-borne magnetometer surveying continued under a cost-sharing agreement between the Geological Survey and the Department of Mines and Petroleum Resources. A three-year contract was signed, the first area, roughly between Merritt and Quesnel Lake, being flown late in 1966. The aeromagnetic maps from such work are expectable one year later.

Figures on expenditures by mining companies have been given as in Table XI for many years. These have not been complete and are not directly comparable from year to year because of inclusion of different factors. Salaries and wages of the petroleum industry have been included for several years but have been incomplete. For two years, figures on mining exploration and development have been forthcoming. It is believed that for 1966 and subsequent years comprehensive figures will be available for exploration and development of all sorts, capital expenditures, etc. It is only possible to give the following total and approximate figures for the mining industry (including metals, industrial minerals, structural materials, and coal):—

Mining and quarrying operations—	
Salaries and wages	$72,324,000
Compensation, silicosis, unemployment	3,199,000
Fuel and electricity	12,283,000
Process supplies	28,120,000
Capital expenditures	31,565,000
Exploration and development	73,577,000
Total	$221,068,000

The production records set by petroleum and natural gas were the latest in an almost unbroken rise in output since the first production. Total drilling was slightly less than in 1965, but still more than 1 million feet. Development footage was down and exploratory footage was up. Thirty-six exploratory wells and 55 development wells resulted in oil and gas completions. There were 19 gas discoveries and five oil discoveries. The most significant discovery was that of the Inga oilfield.

The Sedco 135-F semi-submersible drilling vessel under construction at Victoria neared completion, and one company (Shell Canada Limited) carried out seismic surveys off the West Coast.

Additions were made to the oil-gathering system, and the capacity of the pipe-line from Taylor to Kamloops was increased. Construction of an oil refinery commenced at Prince George for completion in 1967. The gas transmission-line of Inland Natural Gas Co. Ltd. was increased in length and capacity.

Figures for the net cash expenditures for the petroleum industry are available for the second year. In summary form these expenditures were in 1966:—

Exploration, including land acquisition and drilling	$49,200,000
Development drilling	9,100,000
Capital expenditures	15,200,000
Operations of natural-gas plants	4,000,000
Operations of wells	6,500,000
General (excluding income tax)	9,200,000
Total	$93,200,000

Direct revenue to the Government from the entire mineral industry is listed below:—

Free miners' certificates, recording fees, lease rentals, assessment payments, etc.	$1,359,880
Royalties payable on iron concentrates	263,182
Payments on industrial minerals and structural materials	165,981
Ten-per-cent production tax on net value of metals	5,527,153
Coal licences	6,426
Petroleum and natural-gas rentals, fees, etc.	10,208,939
Sale of Crown reserves	15,839,477
Royalties on oil, gas, and processed products	7,767,956
Miscellaneous	18,073
Total	$41,157,067

Statistics

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

CO-OPERATION WITH DOMINION BUREAU OF STATISTICS

In the interests of uniformity and to avoid duplication of effort, beginning with the statistics for 1925, the Dominion Bureau of Statistics and the various Provincial departments have co-operated in the collection and processing of mineral statistics.

Producers of metals, industrial minerals, structural materials, coal, and petroleum and natural gas are requested to submit returns in duplicate on forms prepared for use by the Province and by the Dominion Bureau of Statistics.

So far as possible both organizations follow the same practice in processing the data. The final compilation by the Dominion Bureau is usually published considerably later than the Report of the Minister of Mines and Petroleum Resources for British Columbia. Differences between the figures published by the two organizations arise mainly from the facts that the Dominion Bureau bases its quantities of lode metals on returns made by smelter operators, whereas the British Columbia mining statistician uses the returns covering shipments from individual mines in the same period, and the Dominion Bureau uses average prices for metals considered applicable to the total Canadian production, whereas the British Columbia mining statistician uses prices considered applicable to British Columbia production. Peat, included under the classification of fuel by the Dominion Bureau, has not been regarded as mineral or fuel, and accordingly has not been included in the British Columbia statistics of mineral production.

METHOD OF COMPUTING PRODUCTION

The tabulated statistics are arranged so as to facilitate comparison of the production records for the various mining divisions, and from year to year. From time to time, revisions have been made to figures in earlier reports as additional data became available or errors came to light.

Data are obtained from the certified returns made by producers of lode metals, industrial minerals and structural materials, and coal, and are augmented by data obtained from customs smelters. For placer gold, returns from operators are augmented by data obtained from the Royal Canadian Mint and from Gold Commissioners and other sources. For petroleum, natural gas, and liquid by-products, production figures are supplied by the Petroleum and Natural Gas Branch of the Department of Mines and Petroleum Resources and are compiled from the monthly disposition reports and the Crown royalty statement filed with the Department by the producers.

Values are in Canadian funds. Weights are avoirdupois pounds and tons (2,000 lb.) and troy ounces.

METALS

Prior to 1925 the value of metals produced was not uniformly calculated. The true average prices for gold and copper were used, and the smelter loss of copper was taken into account. The value of other metals was obtained by applying to the gross content of ores or concentrates a percentage of the average price as follows: 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, in accordance with the procedures adopted by the Dominion Bureau of Statistics and the Department of Mines and Petroleum Resources.

Gross and Net Contents and Calculated Value

In past years there have been different methods of calculating net contents, particularly in the case of one metal contained in the concentrate of another. The present method was established in 1963.

The gross contents for any metal are the total assay contents of ore, concentrates, or bullion as shipped to the smelter or refinery. The net contents are the gross contents less smelter and refinery losses.

In the statistical tables the values are calculated by applying the average price for the year to the gross contents of gold, and the net contents of other metals, as in the following table, starting in 1963:—

	Lead Concentrates	Zinc Concentrates	Copper Concentrates	Copper-Nickel Concentrates	Copper Matte
	Per Cent	Per Cent	Per Cent	Per Cent	Per Cent
Silver	98	98	98	....	98
Copper	Less 26 lb./ton	....	Less 10 lb./ton	85	Less 10 lb./ton
Lead	98	50	50	....	50
Zinc	50	90	50	....	....
Cadmium	....	70	70	....	....
Nickel	....	....	....	88	....

Values of by-product metals are determined by multiplying the average price by the quantity of refined metal shipped. Tin and tungsten concentrates exported for treatment are valued on the basis of the reported metal content. Iron concentrate exported to Japan is valued at the price received by the shippers. The value of by-product iron ore used in making pig iron at Kimberley is taken as the average value per ton of ore of comparable grade, at the point of export from British Columbia. The value of molybdenum is calculated by applying the average price to the reported metal content of concentrates (molybdenum sulphide) and of molybdenum trioxide.

Average Prices

The methods of computing prices have varied because of changing conditions. The prices are now arrived at by methods given in footnotes to the table of average prices on page A 20.

Placer Gold

Beginning with 1962, Mint reports giving the fine-gold content have been available for all but a negligible part of the reported placer-gold production, and the value of the fine-gold content has been used. Previously the value had been calculated, taking the average fineness as 822½.

Industrial Minerals and Structural Materials

Prices for these materials approximate the prices at the point of origin.

Fuel

Coal

The price per ton used in valuing coal (*see* p. A 20) is the weighted average of the f.o.b. prices at the mines for coal sold and used.

Petroleum and Natural Gas

The values for natural gas, natural-gas liquid by-products, and for petroleum, including condensate/pentanes plus, are the aggregates of amounts received for the products at the well-head.

NOTES ON PRODUCTS

Antimony.—Production began in 1939. 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 at the Trail smelter. *See* Tables I, III, and VIIc.

Arsenious Oxide.—Production began in 1917. Principal productive periods: Omineca, 1928, 16,997 pounds, $340; Osoyoos, 1917–30 and 1942, 22,002,423 pounds, $272,861. *See* Tables I and VIID.

Asbestos.—Production began in 1952. From 1953 to 1961 asbestos was valued at the shipping point in North Vancouver. Beginning with 1962 it has been valued at the mine and the values for the preceding years have been recalculated on that basis. *See* Tables I, III, and VIID.

Barite.—Production began in 1940. *See* Tables I, III, and VIID.

Bentonite.—Principal productive period, 1926–44, 791 tons. *See* Tables I and VIID.

Bismuth.—Production began in 1929. Recovered as by-product at Trail smelter. *See* Tables I, III, and VIIc.

Butane.—Recovered as a by-product at the gas plant at Taylor and at oil refineries. *See* Tables I, III, and VIIA.

Cadmium.—Production began in 1928. Cadmium assigned to individual mining divisions is the reported content of custom shipments to the Trail smelter and to foreign smelters. Cadmium " not assigned " is the remainder of the reported estimated recovery at the Trail smelter from British Columbia concentrates. *See* Tables I, III, and VIIc.

Chromite.—Produced in 1918 and 1929. *See* Tables I and VIIc.

Coal.—All coal produced, including that used in making coke, is shown as primary mine production. Quantity from 1836 to 1909 is gross mine output and includes material lost in picking and washing. For 1910 and subsequent years the quantity is that sold and used. First production: Cariboo, 1942; Fort Steele, 1898; Kamloops, 1893; Liard, 1923; Nanaimo, 1836; Nicola, 1907; Omineca, 1918; Osoyoos, 1926; Similkameen, 1909; Skeena, 1912. For washery loss, change in stock, and differences between gross mine output and coal sold, refer to the table " Production and Distribution by Collieries and by Districts " in the section headed " Coal " or " Coal-mining " in this and preceding Annual Reports. 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* Tables I, III, VIIA, VIIIA, and VIIIB.

Cobalt.—Production of 1,730 pounds, 1928. *See* Tables I and VIIc.

Crude Oil.—Production began in 1955 and is shown in Tables I, III, and VIIA. The quantity is reported in barrels of 35 imperial gallons. Quantities given prior to 1962 under " petroleum, crude " are total sales and from 1962 to 1965 include field and plant condensates. Beginning in 1966, total production of crude oil is given, and field and plant condensates are listed separately. Full details are given in the Petroleum and Natural Gas section of this report. *See* Tables I, III, and VIIA.

Diatomite.—First production, 1928. *See* Tables I, III, and VIID.

Field Condensate.—Liquid produced in the field from gas wells. Listed as condensate/pentanes plus in the Petroleum and Natural Gas section of this report. *See* Tables I, III, and VIIA.

Fluorspar.—Principal productive periods: Greenwood, 1918–29 and 1942, 35,309 tons, $783,578; Osoyoos, 1958, 32 tons, $1,386. *See* Tables I, III, and VIID.

Fluxes.—First reported, 1911, mainly quartz and limestone. *See* Tables I, III, and VIID.

Gold, Lode.—Gold is mainly the product of lode-gold mines, but a substantial part is a by-product from copper and silver-lead-zinc mines. *See* Tables I, III, VI, and VIIB.

Gold, Placer.—A substantial part of the production, including much of the gold recovered from the Fraser River from Yale upstream (New Westminster Mining Division) and much of the early Cariboo production, is based on early estimates and cannot be accurately assigned to individual mining divisions. In 1965 changes were made in the allocation of placer gold to the New Westminster and Similkameen Mining Divisions, and not assigned, to reconcile those figures with data incorporated in Bulletin No. 28. First year of production for major placer-producing divisions: Atlin, 1898; Cariboo, 1858; Liard, 1873; Lillooet, 1874; Omineca, 1869. *See* Tables I, III, VI, and VIIA.

Granules.—First production, 1930. *See* Tables I, III, and VIID.

Gypsum and Gypsite.—First production, 1911. *See* Tables I, III, and VIID.

Hydromagnesite.—First production, 1904. Principal productive periods: Atlin, 1915–16, 1,450 tons, $20,325; Clinton, 1921, 803 tons, $7,211. *See* Tables I and VIID.

Indium.—Production began in 1942. Not reported as individual metal since 1958, but value taken into total value of all metals.

Iron Concentrates.—Principal productive period began in 1951. Includes calcine used in making pig iron at Kimberley beginning in 1961. The entire production credited to the Fort Steele Mining Division is of calcine. *See* Tables I, III, VI, and VIIC.

Iron Oxide and Ochre.—Principal productive periods: Golden, 1927–39, 27 tons, $920; Nelson, 1948–50; 7,292 tons, $55,901; Vancouver, 1918–50, 10,669 tons, $97,389; Victoria, 1923, 120 tons, $840. *See* Tables I and VIID.

Lead.—Revisions were made in 1958 to some yearly totals for lead and zinc to bring them into agreement with the best records of recoveries of lead and zinc from slags treated at the Trail smelter. *See* Tables I, III, VI, and VIIB.

Magnesium.—Produced 204,632 pounds, 1941 and 1942. *See* Tables I and VIIC.

Magnesium Sulphate.—Principal productive periods: Clinton, 1918–20, 1,923 tons, $39,085; Kamloops, 1918–42, 8,742 tons, $193,967; Osoyoos, 1915–19, 3,229 tons, $21,300. *See* Tables I and VIID.

Manganese.—Principal productive period, 1918–20. *See* Tables I and VIIC. Total includes estimated manganese content of about 40 tons of ore shipped for testing in 1956 by Olalla Mines Ltd.

Mercury.—Principal productive period, 1940–44. *See* Tables I and VIIC.

Mica.—First production, 1932. *See* Tables I, III, and VIID.

Molybdenum.—Principal productive periods, 1914–18 and beginning in 1964. *See* Tables I, III, VI, and VIIC.

Natro-alunite.—Principal productive period, 1912–27, 522 tons. *See* Tables I and VIID.

Natural Gas.—Commercial production of natural gas began in 1954. The production shown in Tables I, III, and VIIA is the total amount sold of residual gas from processing plants plus dry and associated gas from the gas-gathering system; that is, the quantity delivered to the main transmission-line. The quantity is net after deducting gas used on leases, metering difference, and gas used or lost in the cleaning plant. The quantity is reported as thousands of cubic feet at standard conditions (14.4 pounds per square inch pressure, 60° F. temperature, up to and including the year 1960, and thereafter 14.65 pounds per square inch pressure, 60° F. temperature). Gross well output, other production, delivery, and sales data are tabulated in the Petroleum and Natural Gas section of this report.

Nickel.—Production began in 1958. *See* Tables I, III, and VIIC.

Palladium.—Production recorded, 1928. *See* Tables I and VIIC.

Perlite.—In 1953, 1,112 tons valued at $11,120 was produced. *See* Tables I and VIID.

Petroleum, Crude.—*See* " Crude Oil."

Phosphate Rock.—Produced 1927–33, 3,842 tons. *See* Tables I and VIID.

Plant Condensate.—Liquid produced from natural gas at field plants or at the Taylor gas-processing plant. Listed as condensate/pentanes plus in the Petroleum and Natural Gas section of this report. *See* Tables I, III, and VIIA.

Platinum.—Produced intermittently 1887–1963. *See* Tables I, III, and VIIC.

Propane.—Recovered as a by-product at the gas plant at Taylor and at oil refineries. *See* Tables I, III, and VIIA.

Rock.—Rubble, riprap, and crushed rock. *See* Tables I, III, and VIIE.

Selenium.—Produced 731 pounds in 1931. *See* Tables I and VIIC.

Silver, Lode.—Produced yearly, beginning 1887, mainly from silver-lead-zinc ore and as a by-product from copper ore. *See* Tables I, III, VI, and VIIB.

Sodium Carbonate.—Principal productive periods: Clinton, 1921–49, 9,524 tons, $109,895; Kamloops, 1931–35, 968 tons, $9,088. *See* Tables I and VIID.

Structural Materials.—Unclassified materials valued at $5,972,171 in Table VIIE is the total for structural materials in the period 1886–1919 that cannot be allotted to particular classes of structural materials or assigned to mining divisions, and includes $726,323 shown against 1896 in Table II that includes unclassified structural materials in that and previous years not assignable to particular years. The figure $3,150,828 in Table VIIE under other clay products is the value in the period 1886–1910 that cannot be allotted to particular clay products or assigned to mining divisions. *See* Tables I, II, III, VIIA, and VIIE.

Sulphur.—From 1916 to 1927 the figures include the sulphur content of pyrites shipped. From 1928 the tonnages include the estimated sulphur content of pyrites shipped plus the sulphur contained in sulphuric acid made from waste smelter gases. Iron sulphide roasting at the Kimberley acid plant commenced in 1953, and the sulphur content is included. Elemental sulphur has been recovered from the natural-gas plant at Taylor since 1958. *See* Tables I, III, and VIID.

Talc.—Principal productive periods: Golden, 1927, 5 tons, $356; Lillooet, 1916–36, 296 tons, $5,129; Victoria, 1919–35, 1,504 tons, $29,386. *See* Tables I, III, and VIID.

Tin.—First production 1941. *See* Tables I, III, and VIIC.

Tungsten.—Principal productive period, 1937–58. *See* Tables I, III, and VIIC.

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 ,,	19.28 ,,	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 ,,	7.566 ,,	......
1918	......	......	91.93 ,,	24.63 ,,	6.67 ,,	6.94 ,,	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	......	......	56.370 ,,	12.920 ,,	5.256 ,,	6.194 ,,	......
1928	......	......	58.176 ,,	14.570 ,,	4.575 ,,	5.493 ,,	......
1929	......	......	52.993 ,,	18.107 ,,	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	38.261 ,,	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 ,,	11.750 ,,	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 ,,	12.800 ,,	6.750 ,,	7.810 ,,	4.68
1947	28.78	35.00	72.000 ,,	20.390 ,,	13.670 ,,	11.230 ,,	5.12
1948	28.78	35.00	75.000 Mont.	22.350 U.S.	18.040 ,,	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	94.550 ,,	27.700 ,,	18.400 ,,	19.900 ,,	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	28.39	34.52	87.851 ,,	38.276 ,,	14.926 ,,	12.127 ,,	6.74
1956	28.32	34.44	89.373 ,,	39.787 ,,	15.756 ,,	13.278 ,,	6.59
1957	27.59	33.55	87.057 ,,	26.031 ,,	14.051 ,,	11.175 ,,	6.76
1958	27.94	33.98	86.448 ,,	23.419 ,,	11.755 ,,	10.009 ,,	7.45
1959	27.61	33.57	87.469 ,,	27.708 ,,	11.670 ,,	10.978 ,,	7.93
1960	27.92	33.95	88.633 ,,	28.985 ,,	11.589 ,,	12.557 ,,	6.64
1961	29.24	35.46	93.696 ,,	28.288 ,,	11.011 ,,	11.695 ,,	7.40
1962	29.25	37.41	116.029 ,,	30.473 ,,	10.301 ,,	12.422 ,,	7.43
1963	29.31	37.75	137.965 ,,	30.646 ,,	12.012 ,,	13.173 ,,	7.33
1964	29.96	37.75	139.458 ,,	33.412 ,,	14.662 ,,	14.633 ,,	6.94
1965	28.93	37.73	139.374 ,,	38.377 ,,	17.247 ,,	15.636 ,,	7.03
1966	29.08	37.71	139.300 ,,	53.344 ,,	16.283 ,,	15.622 ,,	7.28

[1] *See* page A 15, under placer 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.

Volcanic Ash.—Cariboo, 30 tons. *See* Tables I and VIID.

Zinc.—For 1905–08, inclusive, records show shipments of a combined total of 18,847 tons of zinc ore and zinc concentrates of unstated zinc content. Revisions were made in 1958 to some yearly totals for lead and zinc to bring them into agreement with the best records of recoveries of lead and zinc from slags treated at the Trail smelter. *See* Tables I, III, VI, and VIIB.

TABLE I.—MINERAL PRODUCTION: TOTAL TO DATE, PAST YEAR, AND LATEST YEAR

Products[1]	Total Quantity to Date	Total Value to Date	Quantity, 1965	Value, 1965	Quantity, 1966	Value, 1966
Metals		$		$		$
Antimony .... lb.	48,592,140	13,982,044	1,301,787	689,947	1,405,681	745,011
Bismuth .... lb.	6,201,542	11,192,141	144,630	446,907	47,435	198,848
Cadmium .... lb.	34,980,173	58,294,680	466,586	1,297,110	1,144,477	2,952,751
Chromite .... tons	796	32,295				
Cobalt .... lb.	1,730	420				
Copper .... lb.	3,545,363,290	700,013,845	85,197,073	32,696,081	105,005,750	56,014,267
Gold—placer .... oz.	5,232,957	96,886,289	866	25,053	1,535	44,632
,, —lode .... oz.	16,557,330	486,236,108	117,124	4,419,089	118,700	4,476,177
Iron concentrates .... tons	18,102,813	159,329,902	2,165,403	21,498,581	2,151,804	20,778,934
Lead .... lb.	14,963,645,244	1,214,936,580	250,183,633	43,149,171	211,490,107	34,436,934
Magnesium .... lb.	204,632	88,184				
Manganese .... tons	1,724	32,668				
Mercury .... lb.	4,170,730	10,444,758	1,520	12,301		
Molybdenum .... lb.	24,655,016	40,570,199	7,289,125	12,405,344	17,306,343	28,071,594
Nickel .... lb.	28,230,859	22,427,270	3,322,000	2,790,480	3,622,400	3,104,397
Palladium .... oz.	749	30,462				
Platinum .... oz.	1,407	135,008				
Selenium .... lb.	731	1,389				
Silver .... oz.	459,669,517	303,215,704	4,972,084	6,929,793	5,539,884	7,717,058
Tin .... lb.	16,836,845	13,974,365	377,207	735,554	710,752	916,870
Tungsten (WO_3) .... lb.	16,019,324	38,663,751				
Zinc .... lb.	13,286,573,916	1,216,335,952	311,249,250	48,666,933	305,124,440	47,666,540
Others		8,616,501		1,339,389		1,632,747
Totals		4,395,440,515		177,101,733		208,756,760
Industrial Minerals						
Arsenious oxide .... lb.	22,019,420	273,201				
Asbestos .... tons	591,230	114,771,818	85,851	14,491,195	88,771	15,070,786
Barite .... tons	252,276	2,942,149	17,466	182,931	21,888	176,240
Bentonite .... tons	791	16,858				
Diatomite .... tons	3,797	144,070	82	4,420	70	3,755
Fluorspar .... tons	35,563	152,369	70	2,419	152	4,986
Fluxes .... tons	3,940,052	7,008,563	59,231	240,076	23,913	112,314
Granules .... tons	271,003	4,085,350	29,033	447,954	23,956	424,667
Gypsum and gypsite .... tons	3,057,713	11,543,798	207,858	602,788	206,026	576,873
Hydro-magnesite .... tons	2,253	27,536				
Iron oxide and ochre .... tons	18,108	155,050				
Jade .... lb.	238,285	108,768	7,129	9,249	11,633	13,225
Magnesium sulphate .... tons	13,894	254,352				
Mica .... lb.	12,822,050	185,818				
Natro-alunite .... tons	522	9,398				
Perlite .... tons	1,112	11,120				
Phosphate rock .... tons	3,842	16,894				
Sodium carbonate .... tons	10,492	118,983				
Sulphur .... tons	5,974,907	68,446,296	341,873	4,428,617	342,478	5,834,523
Talc .... tons	1,805	34,871				
Volcanic ash .... tons	30	300				
Totals		210,947,562		20,409,649		22,217,369
Structural Materials						
Cement .... tons	10,190,223	159,543,052	601,878	11,199,607	707,506	15,959,293
Clay products		60,092,957		3,899,634		4,100,192
Lime and limestone .... tons		41,105,787	1,420,085	2,482,451	1,483,949	2,696,011
Rock .... tons		35,945,215	2,715,411	1,938,088	1,590,189	1,890,992
Sand and gravel .... tons		164,267,124	20,936,994	12,686,959	24,320,013	21,959,733
Stone .... tons	1,154,471	9,080,211	2,252	118,975	76,720	215,043
Not assigned		5,972,171				
Totals		476,006,517		32,325,714		46,821,264
Fuels						
Coal .... tons	139,724,702	595,272,391	950,763	6,713,590	850,821	6,196,219
Crude oil .... bbl.	66,810,754	137,167,280	13,470,757	28,693,662	16,638,181	36,268,288
Field condensate .... bbl.	121,171	263,083	31,782	70,874	39,571	86,660
Plant condensate .... bbl.	7,602,008	4,632,359	947,429	576,107	974,564	312,360
Natural gas to pipe-line M s.c.f.	940,603,683	88,667,933	138,814,144	14,493,255	161,264,334	17,339,587
Butane .... bbl.	3,141,079	1,005,146	477,990	152,956	500,973	160,312
Propane .... bbl.	1,814,242	580,555	358,776	114,808	334,315	106,980
Totals		827,588,747		50,815,252		60,470,406
Grand totals		5,909,983,341		280,652,348		338,265,799

[1] *See* notes on individual minerals listed alphabetically on pages A 16 to A 19.

TABLE II.—TOTAL VALUE OF PRODUCTION, 1836-1966

Year	Metals	Industrial Minerals	Structural Materials	Fuels	Total
	$	$	$	$	$
1836–86	52,808,750		43,650	10,758,565	63,610,965
1887	729,381		22,168	1,240,080	1,991,629
1888	745,794		46,432	1,467,903	2,260,129
1889	685,512		77,517	1,739,490	2,502,519
1890	572,884		75,201	2,034,420	2,682,505
1891	447,136		79,475	3,087,291	3,613,902
1892	511,075		129,234	2,479,005	3,119,314
1893	659,969			2,934,882	3,594,851
1894	1,191,728			3,038,859	4,230,587
1895	2,834,629			2,824,687	5,659,316
1896	4,973,769		726,323	2,693,961	8,394,053
1897	7,575,262		150,000	2,734,522	10,459,784
1898	7,176,870		150,000	3,582,595	10,909,465
1899	8,107,509		200,000	4,126,803	12,434,312
1900	11,360,546		250,000	4,744,530	16,355,076
1901	14,258,455		400,000	5,016,398	19,674,853
1902	12,163,561		450,000	4,832,257	17,445,818
1903	12,640,083		525,000	4,332,297	17,497,380
1904	13,424,755	2,400	575,000	4,953,024	18,955,179
1905	16,289,165		660,800	5,511,861	22,461,826
1906	18,449,602		982,900	5,548,044	24,980,546
1907	17,101,305		1,149,400	7,637,713	25,888,418
1908	15,227,991		1,200,000	7,356,866	23,784,857
1909	14,668,141		1,270,559	8,574,884	24,513,584
1910	13,768,731		1,500,000	11,108,335	26,377,066
1911	11,880,062	46,345	3,500,917	8,071,747	23,499,071
1912	18,218,266	17,500	3,436,222	10,786,812	32,458,800
1913	17,701,432	46,446	3,249,605	9,197,460	30,194,943
1914	15,790,727	51,810	2,794,107	7,745,847	26,382,491
1915	20,765,212	133,114	1,509,235	7,114,178	29,521,739
1916	32,092,648	150,718	1,247,912	8,900,675	42,391,953
1917	27,299,934	174,107	1,097,900	8,484,343	37,056,284
1918	27,957,302	281,131	783,280	12,833,994	41,855,707
1919	20,058,217	289,426	980,790	11,975,671	33,304,104
1920	19,687,532	508,601	1,962,824	13,450,169	35,609,126
1921	13,160,417	330,503	1,808,392	12,836,013	28,135,325
1922	19,605,401	251,922	2,469,967	12,880,060	35,207,350
1923	25,769,215	140,409	2,742,388	12,678,548	41,330,560
1924	35,959,566	116,932	2,764,013	9,911,935	48,752,446
1925	46,480,742	101,319	2,766,838	12,168,905	61,517,804
1926	51,867,792	223,748	3,335,885	11,650,180	67,077,605
1927	45,134,289	437,729	2,879,160	12,269,135	60,720,313
1928	48,640,158	544,192	3,409,142	12,633,510	65,227,002
1929	52,805,345	807,502	3,820,732	11,256,260	68,689,839
1930	41,785,380	457,225	4,085,105	9,435,650	55,763,360
1931	23,530,469	480,319	3,538,519	7,684,155	35,233,462
1932	20,129,869	447,495	1,705,708	6,523,644	28,806,716
1933	25,777,723	460,683	1,025,586	5,375,171	32,639,163
1934	35,177,224	486,554	1,018,719	5,725,133	42,407,630
1935	42,006,618	543,583	1,238,718	5,048,864	48,837,783
1936	45,889,944	724,362	1,796,677	5,722,502	54,133,485
1937	65,224,245	976,171	2,098,339	6,139,920	74,438,675
1938	55,959,713	916,841	1,974,976	5,565,069	64,416,599
1939	56,216,049	1,381,720	1,832,464	6,280,956	65,711,189
1940	64,332,166	1,073,023	2,534,840	7,088,265	75,028,294
1941	65,807,630	1,253,561	2,845,262	7,660,000	77,566,453
1942	63,626,140	1,434,382	3,173,635	8,237,172	76,471,329
1943	55,005,394	1,378,337	3,025,255	7,742,030	67,151,016
1944	42,095,013	1,419,248	3,010,088	8,217,966	54,742,315
1945	50,673,592	1,497,720	3,401,229	6,454,360	62,026,901
1946	58,834,747	1,783,010	5,199,563	6,732,470	72,549,790
1947	95,729,867	2,275,972	5,896,803	8,680,440	112,583,082
1948	124,091,753	2,358,877	8,968,222	9,765,395	145,184,247
1949	110,219,917	2,500,799	9,955,790	10,549,924	133,226,430
1950	117,166,836	2,462,340	10,246,939	10,119,303	139,995,418

TABLE II.—TOTAL VALUE OF PRODUCTION, 1836–1966—*Continued*

Year	Metals	Industrial Minerals	Structural Materials	Fuels	Total
	$	$	$	$	$
1951	153,598,411	2,493,840	10,606,048	10,169,617	176,867,916
1952	147,857,523	2,181,464	11,596,961	9,729,739	171,365,687
1953	126,755,705	3,002,673	13,555,038	9,528,279	152,841,695
1954	123,834,286	5,504,114	14,395,174	9,161,089	152,894,663
1955	142,609,505	6,939,490	15,299,254	9,005,111	173,853,360
1956	149,441,246	9,172,792	20,573,631	9,665,983	188,853,652
1957	125,353,920	11,474,050	25,626,939	8,537,920	170,992,829
1958	104,251,112	9,958,768	19,999,576	10,744,093	144,953,549
1959	105,076,530	12,110,286	19,025,209	11,439,192	147,651,217
1960	130,304,373	13,762,102	18,829,989	14,468,869	177,365,333
1961	128,565,774	12,948,308	19,878,921	18,414,318	179,807,321
1962	159,627,293	14,304,214	21,366,265	34,073,712	229,371,484
1963	172,852,866	16,510,898	23,882,190	42,617,633	255,863,587
1964	180,926,329	16,989,469	26,428,939	42,794,431	267,139,168
1965	177,101,733	20,409,649	32,325,714	50,815,252	280,652,348
1966	208,756,760	22,217,369	46,821,264	60,470,406	338,265,799
Totals	4,395,440,515	210,947,562	476,006,517	827,588,747	5,909,983,341

TABLE III.—QUANTITY AND VALUE OF MINERAL PRODUCTS FOR YEARS 1957 TO 1966

Description	1957		1958		1[illegible]		1960		1961	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Metals		$		$		$		$		$
Antimony ..... lb.	1,360,731	577,344	858,633	284,208	1,657,797	540,276	1,651,786	538,482	1,331,297	469,948
Bismuth ..... lb.	145,634	314,569	154,034	308,068	181,843	345,502	213,009	419,628	283,363	637,567
Cadmium ..... lb.	1,946,397	3,172,627	1,425,108	2,166,164	1,695,821	2,170,651	1,778,866	2,525,990	907,432	1,451,891
Copper ..... lb.	31,387,441	8,170,465	12,658,649	2,964,529	16,233,546	4,497,991	33,064,429	9,583,724	31,692,412	8,965,149
Gold—placer, crude ..... oz.	2,936	80,990	5,650	157,871	7,570	208,973	3,847	107,418	3,416	99,884
„ —lode, fine ..... oz.	223,403	7,495,170	194,354	6,604,149	173,146	5,812,511	205,580	6,979,441	159,821	5,667,253
Iron concentrates ..... tons	357,342	2,200,637	630,271	4,193,442	849,248	6,363,848	1,160,355	10,292,847	1,335,068	12,082,540
Lead ..... lb.	281,603,346	39,568,086	294,573,159	34,627,075	287,423,357	33,542,306	333,608,699	38,661,912	84,284,524	42,313,569
Molybdenum ..... lb.	—	—	—	—	—	—	9,023	9,500	—	—
Nickel ..... lb.	—	—	1,408,490	996,507	1,061,532	743,072	3,779,878	2,645,915	4,180,677	3,194,037
Platinum ..... oz.	—	—	4	260	—	—	—	—	—	—
Silver ..... oz.	8,129,348	7,077,166	7,041,058	6,086,854	6,198,101	5,421,417	7,446,643	6,600,183	7,373,997	6,909,140
Tin ..... lb.	709,102	555,936	795,496	625,260	747,443	627,852	621,718	522,243	1,119,350	727,578
Tungsten (WO_3) ..... lb.	1,921,483	5,240,479	690,976	1,884,209	—	—	—	—	—	—
Zinc ..... lb.	449,276,797	50,206,681	432,002,790	43,234,839	402,342,850	44,169,198	403,399,319	50,656,726	87,951,190	45,370,891
Others	—	693,770	—	117,677	—	632,933	—	760,364	—	676,327
Totals	—	125,353,920	—	104,251,112	—	105,076,530	—	130,304,373	—	128,565,774
Industrial Minerals										
Asbestos ..... tons	31,714	7,342,966	30,078	6,398,679	33,883	7,878,947	40,748	9,482,923	45,113	8,648,503
Barite ..... tons	20,072	433,200	16,144	341,700	23,142	187,368	23,573	279,716	15,478	151,388
Diatomite ..... tons	120	2,400	27	540	5	100	44	1,430	214	8,817
Fluorspar ..... tons	—	—	32	1,386	—	—	—	—	—	—
Fluxes (quartz, limestone) ..... tons	137,433	442,204	90,603	310,244	70,570	248,913	83,370	294,559	53,335	190,500
Granules (quartz, limestone, granite) ..... tons	17,295	221,864	22,674	284,330	19,072	254,251	19,063	257,067	17,463	253,015
Gypsum and products ..... tons	66,499	142,751	70,498	211,494	112,223	282,030	107,900	337,200	153,300	459,900
Jade ..... lb.	—	—	—	—	15,000	5,000	50,300	10,325	69,751	20,876
Mica ..... lb.	180,000	1,200	—	—	—	—	122,000	3,186	250,000	8,025
Sulphur ..... tons	228,882	2,887,465	211,300	2,410,395	251,552	3,253,677	264,705	3,095,696	242,377	3,207,284
Totals	—	11,474,050	—	9,958,768	—	12,110,286	—	13,762,102	—	12,948,308
Structural Materials										
Brick—common ..... No.	663,828	24,345	427,550	15,125	385,810	11,954	2,262,653	187,673	244,532	14,809
„ —other	—	1,003,954	—	749,618	—	966,666	—	766,956	—	911,315
Clays ..... tons	3,849	29,495	4,105	12,579	6,250	17,001	8,003	22,671	7,908	28,396
Structural and drain tile	—	897,827	—	762,050	—	830,085	—	700,700	—	732,751
Pottery and other clay products	—	86,480	—	100,803	—	127,812	—	395,708	—	679,193
Cement ..... tons	443,469	7,078,108	414,396	6,755,619	427,181	7,049,638	384,853	6,432,752	417,336	7,122,046
Lime and limestone ..... tons	334,303	1,494,578	269,747	997,819	519,580	1,481,292	565,945	1,602,019	758,882	1,864,315
Rubble, riprap, crushed rock ..... tons	2,364,301	4,272,768	1,866,950	2,098,952	1,169,854	1,128,353	1,148,305	1,075,373	1,539,640	1,016,086
Sand and gravel ..... tons	16,829,816	10,503,274	14,173,169	8,442,676	11,349,121	7,342,698	12,355,955	7,597,278	11,424,958	7,439,710
Stone ..... tons	2,403	236,110	2,141	64,335	13,710	69,710	4,328	48,859	5,400	70,300
Totals	—	25,626,939	—	19,999,576	—	19,025,209	—	18,829,989	—	19,878,921
Fuels										
Coal—sold and used ..... tons	1,085,657	7,340,339	796,413	5,937,860	690,011	5,472,064	788,658	5,242,223	919,142	6,802,134
Crude oil ..... bbl.	345,320	763,751	513,718	1,009,609	864,750	1,573,227	867,873	1,531,049	1,015,568	1,900,104
Field condensate ..... bbl.	—	—	—	—	—	—	—	—	159	297
Plant condensate ..... bbl.	27,964	—	590,079	380,072	895,784	367,797	750,848	459,741	813,565	737,761
Natural gas delivered to pipe-line ..... M s.c.f.	8,274,942	433,830	58,039,491	3,368,327	64,525,633	3,928,839	80,115,399	7,101,949	95,967,110	8,818,891
Butane ..... bbl.	—	—	81,609	26,115	207,029	66,249	293,368	93,878	321,706	102,946
Propane ..... bbl.	—	—	69,095	22,110	96,925	31,016	125,091	40,029	163,079	52,185
Totals	—	8,537,920	—	10,744,093	—	11,439,192	—	14,468,869	—	18,414,318
Provincial totals	170,992,829	170,992,829	—	144,953,549	—	147,651,217	—	177,365,333	—	179,807,321

Description	[illegible]		1963		1964		1965		1 6	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Metals		$		$		$		$		$
Antimony ____ lb.	1,931,397	748,223	1,601,253	624,489	1,591,523	700,270	1,301,787	689,947	1,405,681	745,011
Bismuth ____ lb.	228,601	507,494	157,099	348,760	213,428	480,213	144,630	446,907	47,435	198,848
Cadmium ____ lb.	2,086,692	3,839,513	1,981,004	4,754,410	1,864,255	6,040,186	466,586	1,297,110	1,144,477	2,952,751
Copper ____ lb.	108,979,144	3,209,215	118,247,104	36,238,007	115,554,700	38,609,136	85,197,073	32,696,081	105,005,750	56,014,267
Gold—placer, crude ____ oz.	3,315	96,697	4,620	135,411	1,842	55,191	866	25,053	1,535	44,632
„ —lode, fine ____ oz.	158,850	5,942,101	154,979	5,850,458	138,487	5,227,884	117,124	4,419,089	118,700	4,476,177
Iron concentrates ____ tons	1,793,847	18,326,911	2,060,241	20,746,424	2,002,562	20,419,487	2,165,403	21,498,581	2,151,804	20,778,934
Lead ____ lb.	335,282,537	4,537,454	314,974,310	37,834,714	268,737,503	39,402,293	250,183,633	43,149,171	211,490,107	34,436,934
Mercury ____ lb.	—	—	—	—	5,548	22,848	1,520	12,301	—	—
Molybdenum ____ lb.	—	—	—	—	28,245	47,063	7,289,125	12,405,344	17,306,343	28,071,594
Nickel ____ lb.	3,476,467	2,902,850	3,699,402	3,107,498	3,398,560	2,854,790	3,322,000	2,790,480	3,622,400	3,104,397
Platinum ____ oz.	5	375	2	150	—	—	—	—	—	—
Silver ____ oz.	6,189,804	7,181,907	6,422,680	8,861,050	5,269,642	7,348,938	4,972,084	6,929,793	5,539,884	7,717,058
Tin ____ lb.	650,941	442,640	927,062	648,943	352,350	535,572	377,207	735,554	710,752	916,870
Zinc ____ lb.	413,430,817	1,356,376	402,863,154	53,069,163	400,796,562	58,648,561	311,249,250	48,666,933	305,124,440	47,666,540
Others ____	—	535,537	—	633,389	—	533,897	—	1,339,389	—	1,632,747
Totals ____	—	9,627,293	—	172,852,866	—	180,926,329	—	177,101,733	—	208,756,760
Industrial Minerals										
Asbestos ____ tons	55,133	0,297,360	63,215	11,681,337	67,460	11,714,494	85,851	14,491,195	88,771	15,070,786
Barite ____ tons	6,511	57,062	8,207	69,588	10,588	119,370	17,466	182,931	21,888	176,240
Diatomite ____ tons	211	10,228	458	16,030	1,143	64,555	82	4,420	70	3,755
Fluorspar ____ tons	—	—	—	—	—	—	70	2,419	152	4,986
Fluxes (quartz, limestone) ____ tons	62,743	228,477	60,490	223,012	73,021	237,298	59,231	240,076	23,913	112,314
Granules (quartz, limestone, granite) ____ tons	18,251	311,902	19,444	348,543	19,289	397,639	29,033	447,954	23,956	424,667
Gypsum and products ____ tons	147,900	443,700	160,954	482,862	188,303	581,873	207,858	602,788	206,026	576,873
Jade ____ lb.	56,935	20,760	16,000	15,529	11,537	13,804	7,129	9,249	11,633	13,225
Sulphur ____ tons	239,191	2,934,725	254,197	3,673,997	278,385	3,860,436	341,873	4,428,617	342,478	5,834,523
Totals ____	—	4,304,214	—	16,510,898	—	16,989,469	—	20,409,649	—	22,217,369
Structural Materials										
Brick—common ____ No.	1,179,165	54,849	1,086,688	63,499	614,288	49,826	582,305	27,662	288,234	16,956
„ —other ____	—	949,889	—	1,050,543	—	872,166	—	1,329,849	—	1,816,845
Clays ____ tons	8,105	30,027	2,573	33,151	1,853	38,585	454	18,234	1,282	34,861
Structural and drain tile ____	—	935,573	—	877,578	—	1,102,341	—	1,361,227	—	1,063,333
Pottery and other clay products ____	—	537,100	—	799,812	—	945,240	—	1,162,662	—	1,168,197
Cement ____ tons	397,435	7,112,890	476,071	8,546,768	537,396	10,040,776	601,878	11,199,607	707,506	15,959,293
Lime and limestone ____ tons	559,028	1,513,579	907,203	1,723,796	1,211,320	2,055,195	1,420,085	2,482,451	1,483,949	2,696,011
Rubble, riprap, crushed rock ____ tons	1,897,272	1,284,301	1,913,906	1,259,002	1,449,449	1,285,318	2,715,411	1,938,088	1,590,189	1,890,992
Sand and gravel ____ tons	17,757,391	8,862,767	17,387,026	9,514,095	17,708,225	10,013,970	20,936,994	12,686,959	24,320,013	21,959,733
Stone ____ tons	8,023	85,290	1,827	13,946	846	25,522	2,252	118,975	76,720	215,043
Totals ____	—	1,366,265	—	23,882,190	—	26,428,939	—	32,325,714	—	46,821,264
Fuels										
Coal—sold and used ____ tons	825,339	6,133,986	850,541	6,237,997	911,326	6,327,678	950,763	6,713,590	850,821	6,196,219
Crude oil ____ bbl.	8,904,938	6,827,118	12,515,137	24,900,381	11,525,476	23,396,716	13,470,757	28,693,662	16,638,181	36,268,288
Field condensate ____ bbl.	9,621	18,184	13,671	27,205	26,367	63,436	31,782	70,874	39,571	86,660
Plant condensate ____ bbl.	837,824	674,644	841,740	536,193	922,211	587,685	947,429	576,107	974,564	312,360
Natural gas delivered to pipe-line ____ M s.c.f.	108,699,997	0,226,323	105,525,373	10,719,298	118,959,880	12,192,816	138,814,144	14,493,255	161,264,334	17,339,587
Butane ____ bbl.	387,558	124,019	409,087	130,908	461,759	147,763	477,990	152,956	500,973	160,312
Propane ____ bbl.	216,995	69,438	205,162	65,651	244,804	78,337	358,776	114,808	334,315	106,980
Totals ____	—	4,073,712	—	42,617,633	—	42,794,431	—	50,815,252	—	60,470,406
Provincial totals ____	—	9,371,484	—	255,863,587	—	267,139,168	—	280,652,348	—	338,265,799

TABLE IV.—MINERAL PRODUCTION OF BRITISH COLUMBIA—VALUE, 1887–1966

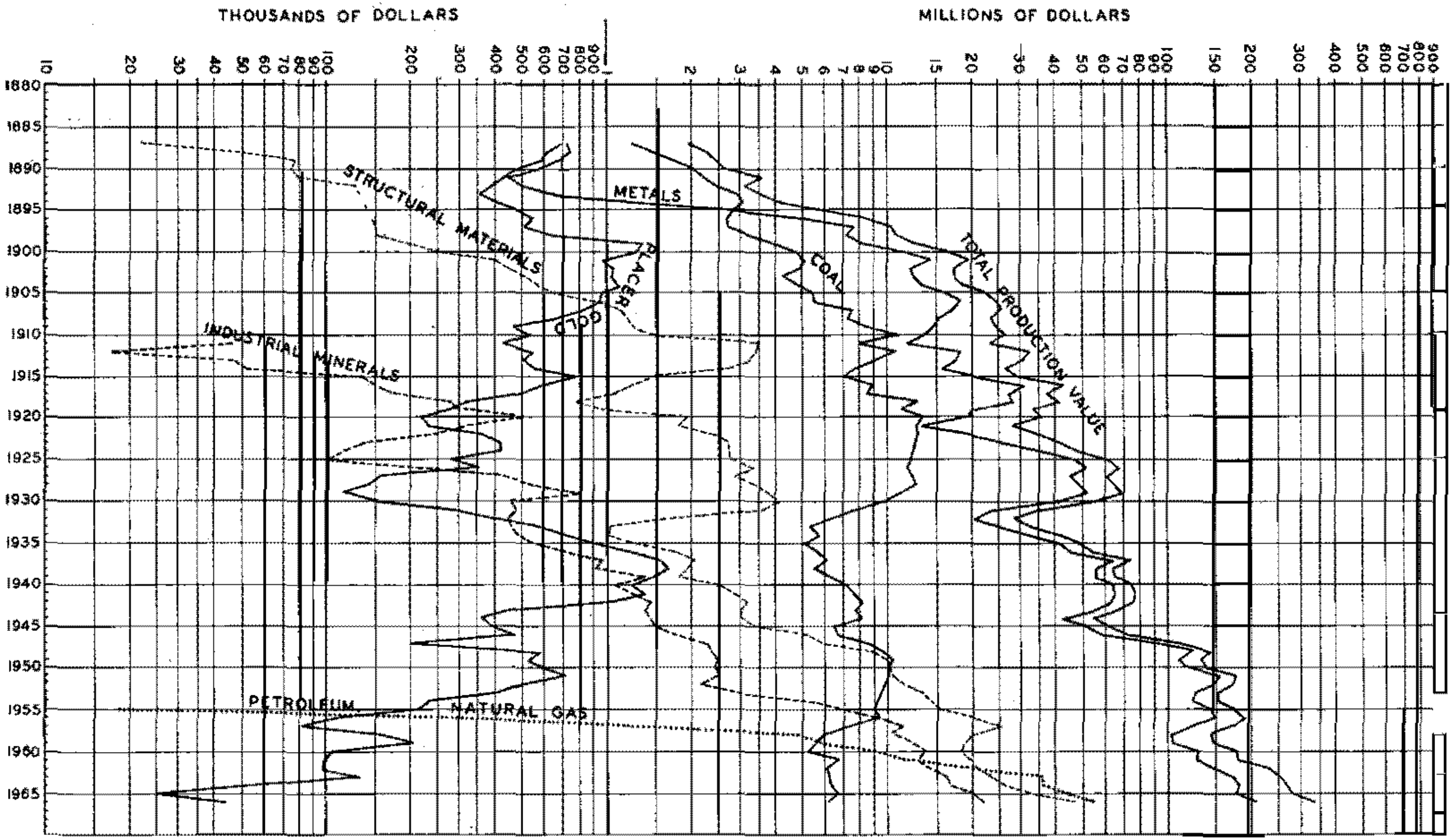

Table V.—Mineral Production of British Columbia—Quantity, 1897-1966

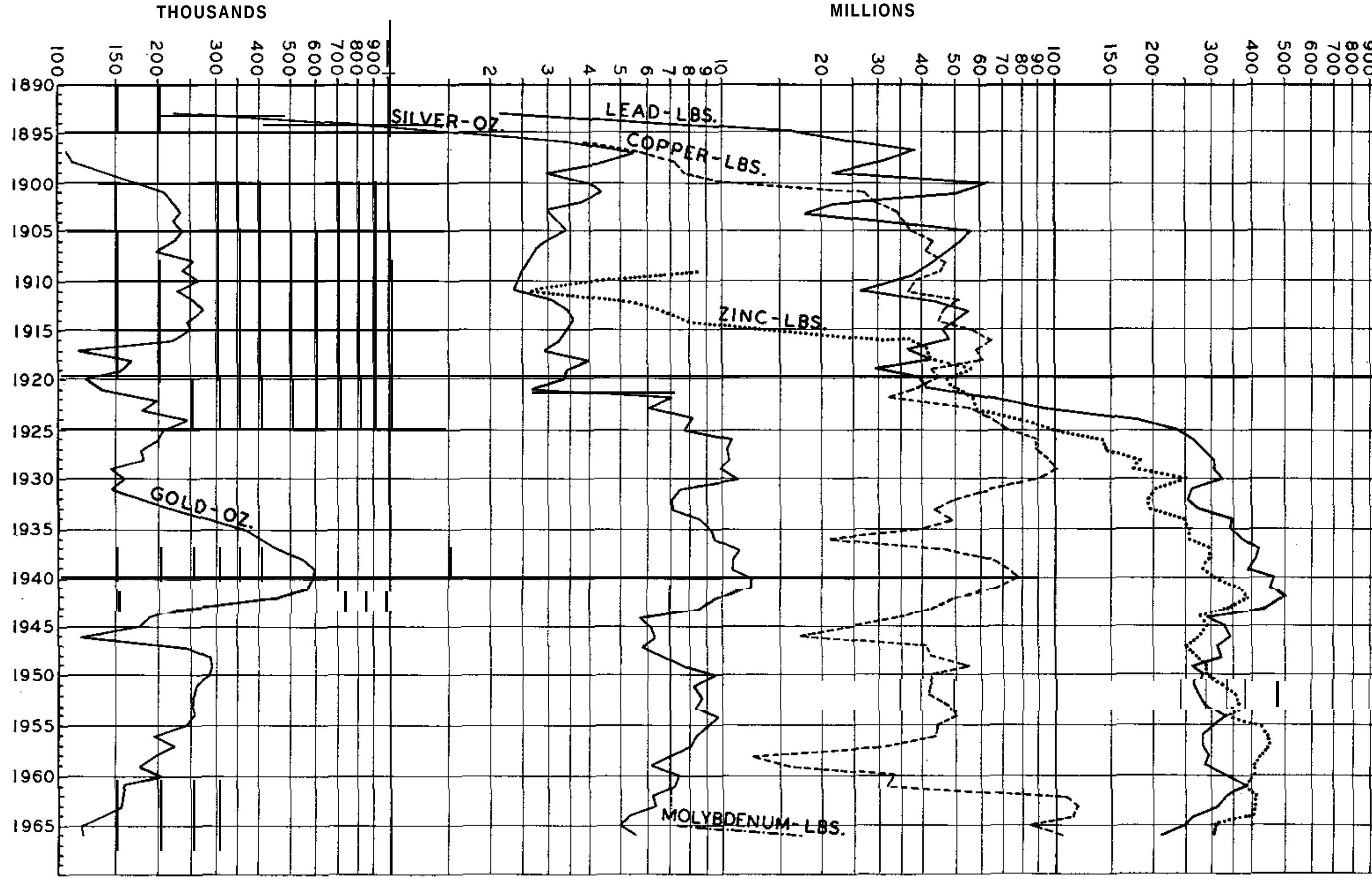

TABLE VI.—PRODUCTION OF GOLD, SILVER, COPPER, LEAD, ZINC, MOLYBDENUM, AND IRON CONCENTRATES, 1858-1966

Year	Placer Gold (Crude)		Gold (Fine)		Silver		Copper	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
	Oz.	$	Oz.	$	Oz.	$	Lb.	$
1858-90	3,246,585	55,192,163			221,089	214,152		
1891-1900	376,290	6,397,183	632,806	12,858,353	22,537,306	13,561,194	35,416,069	4,365,210
1901	57,060	970,100	210,384	4,348,637	4,396,447	2,462,008	27,603,746	4,446,963
1902	63,130	1,073,140	236,491	4,888,269	3,817,917	1,891,779	29,652,043	3,450,291
1903	62,380	1,060,420	232,828	4,812,554	2,996,204	1,521,472	34,359,921	4,547,878
1904	65,610	1,115,300	222,042	4,589,608	3,222,481	1,719,516	35,710,128	4,578,037
1905	57,020	969,300	238,660	4,933,103	3,439,417	1,971,818	37,692,251	5,876,222
1906	55,790	948,400	224,027	4,630,639	2,990,262	1,897,320	42,990,488	8,288,565
1907	48,710	828,000	196,179	4,055,020	2,745,448	1,703,825	40,832,721	8,166,544
1908	38,060	647,000	255,582	5,282,879	2,631,389	1,321,483	47,274,614	6,240,249
1909	28,060	477,000	238,224	4,924,090	2,532,742	1,239,270	45,597,245	5,918,522
1910	31,760	540,000	267,701	5,533,380	2,450,241	1,245,016	38,243,934	4,871,512
1911	25,060	426,000	228,617	4,725,512	1,892,364	958,293	36,927,656	4,571,644
1912	32,680	555,500	257,496	5,322,442	3,132,108	1,810,045	51,456,537	8,408,513
1913	30,000	510,000	272,254	5,627,595	3,465,856	1,968,606	46,460,305	7,094,489
1914	33,240	565,000	247,170	5,109,008	3,602,180	1,876,736	45,009,699	6,121,319
1915	45,290	770,000	250,021	5,167,934	3,366,506	1,588,991	56,918,405	9,835,500
1916	34,150	580,500	221,932	4,587,333	3,301,923	2,059,739	65,379,364	17,784,494
1917	29,180	496,000	114,523	2,367,191	2,929,216	2,265,749	59,007,565	16,038,256
1918	18,820	320,000	164,674	3,403,811	3,998,172	3,215,870	61,483,754	15,143,449
1919	16,850	286,500	152,426	3,150,644	3,403,119	3,592,673	42,459,339	7,939,896
1920	13,040	221,600	120,048	2,481,392	3,377,849	3,235,980	44,887,676	7,832,899
1921	13,720	233,200	135,765	2,804,197	2,673,389	1,591,201	39,036,993	4,879,624
1922	21,690	368,800	197,856	4,089,684	7,101,311	4,554,781	32,359,896	4,329,754
1923	24,710	420,000	179,245	3,704,994	6,032,986	3,718,129	57,720,290	8,323,266
1924	24,750	420,750	247,716	5,120,535	8,341,768	5,292,184	64,845,393	8,442,870
1925	16,476	280,092	209,719	4,335,069	7,654,844	5,286,818	72,306,432	10,153,269
1926	20,912	355,503	201,427	4,163,859	10,748,556	6,675,606	89,339,768	12,324,421
1927	9,191	156,247	178,001	3,679,601	10,470,185	5,902,043	89,202,871	11,525,011
1928	8,424	143,208	180,662	3,734,609	10,627,167	6,182,461	97,908,316	14,265,242
1929	6,983	118,711	145,223	3,002,020	9,960,172	5,278,194	102,793,669	18,612,850
1930	8,955	152,235	160,836	3,324,975	11,328,263	4,322,185	92,362,240	11,990,466
1931	17,176	291,992	146,133	3,020,837	7,550,331	2,254,979	64,134,746	5,365,690
1932	20,400	395,542	181,651	4,263,389	7,150,655	2,264,729	50,608,036	3,228,892
1933	23,928	562,787	223,589	6,394,645	7,021,754	2,656,526	43,149,460	3,216,701
1934	25,181	714,431	297,216	10,253,952	8,613,977	4,088,280	49,651,733	3,683,662
1935	30,929	895,058	365,343	12,856,419	9,269,944	6,005,996	39,428,208	3,073,428
1936	43,389	1,249,940	404,578	14,172,367	9,547,124	4,308,330	21,671,711	2,053,828
1937	54,153	1,558,245	460,781	16,122,767	11,305,367	5,073,962	46,057,584	6,023,411
1938	57,759	1,671,015	557,522	19,613,624	10,861,578	4,722,288	65,769,906	6,558,575
1939	49,746	1,478,492	587,336	21,226,957	10,821,393	4,381,365	73,254,679	7,392,862
1940	39,067	1,236,928	583,524	22,461,516	12,327,944	4,715,315	77,980,223	7,865,085
1941	43,775	1,385,962	571,026	21,984,501	12,175,700	4,658,545	66,435,583	6,700,693
1942	32,904	1,041,772	444,518	17,113,943	9,677,881	4,080,775	50,097,716	5,052,856
1943	14,600	462,270	224,403	8,639,516	8,526,310	3,858,496	42,307,510	4,971,132
1944	11,433	361,977	186,632	7,185,332	5,705,334	2,453,293	36,300,589	4,356,070
1945	12,589	398,591	175,373	6,751,860	6,157,307	2,893,934	25,852,366	3,244,472
1946	15,729	475,361	117,612	4,322,241	6,365,761	5,324,959	17,500,538	2,240,070
1947	6,969	200,585	243,282	8,514,870	5,708,461	4,110,092	41,783,921	8,519,741
1948	20,332	585,200	286,230	10,018,050	6,720,134	5,040,101	43,025,388	9,616,174
1949	17,886	529,524	288,396	10,382,256	7,637,882	5,671,082	54,856,808	10,956,550
1950	19,134	598,717	283,983	10,805,553	9,509,456	7,667,950	42,212,133	9,889,458
1951	23,691	717,911	261,274	9,627,947	8,218,914	7,770,983	43,249,658	11,980,155
1952	17,554	494,756	255,789	8,765,889	8,810,807	7,326,803	42,005,512	13,054,893
1953	14,245	403,230	253,552	8,727,294	8,378,819	7,019,272	49,021,013	14,869,544
1954	8,684	238,967	258,388	8,803,279	9,826,403	8,154,145	50,150,087	14,599,693
1955	7,666	217,614	242,477	8,370,306	7,903,149	6,942,995	44,238,031	16,932,549
1956	3,865	109,450	191,743	6,603,628	8,405,074	7,511,866	43,360,575	17,251,872
1957	2,936	80,990	223,403	7,495,170	8,129,348	7,077,166	31,387,441	8,170,465
1958	5,650	157,871	194,354	6,604,149	7,041,058	6,086,854	12,658,649	2,964,529
1959	7,570	208,973	173,146	5,812,511	6,198,101	5,421,417	16,233,546	4,497,991
1960	3,847	107,418	205,580	6,979,441	7,446,643	6,600,183	33,064,429	9,583,724
1961	3,416	99,884	159,821	5,667,253	7,373,997	6,909,140	31,692,412	8,965,149
1962	3,315	96,697	158,850	5,942,101	6,189,804	7,181,907	108,979,144	33,209,215
1963	4,620	135,411	154,979	5,850,458	6,422,680	8,861,050	118,247,104	36,238,007
1964	1,842	55,191	138,487	5,227,884	5,269,642	7,348,938	115,554,700	38,609,136
1965	866	25,053	117,124	4,419,089	4,972,084	6,929,793	85,197,073	32,696,081
1966	1,535	44,632	118,700	4,476,177	5,539,884	7,717,058	105,005,750	56,014,267
Totals	5,232,957	96,886,289	16,557,330	486,236,108	459,669,517	303,215,704	3,545,363,290	700,013,845

TABLE VI.-PRODUCTION OF GOLD, SILVER, COPPER, LEAD, ZINC, MOLYBDENUM, *AND* IRON CONCENTRATES, 1858–1966—*Continued*

Year	Lead		Zinc		Molybdenum		Iron Concentrates	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
	Lb.	$	Lb.	$	Lb.	$	Tons	$
1858–90	1,044,400	45,527	—	—	—	—	29,869	70,879
1891–1900	205,037,158	7,581,619	—	—	—	—	13,029	45,602
1901	51,582,906	2,010,186	—	—	—	—	5,746	20,111
1902	22,536,381	824,832	—	—	—	—	10,017	35,060
1903	18,089,283	689,744	—	—	—	—	2,290	8,015
1904	36,646,244	1,421,874	—	—	—	—	—	—
1905	56,580,703	2,399,022	—	139,200	—	—	—	—
1906	52,408,217	2,667,578	—	17,100	—	—	—	—
1907	47,738,703	2,291,458	—	46,100	—	—	1,500	5,250
1908	43,195,733	1,632,799	—	99,296	—	—	—	—
1909	44,396,346	1,709,259	8,500,000	400,000	—	—	—	—
1910	34,658,746	1,386,350	4,184,192	192,473	—	—	—	—
1911	26,872,397	1,069,521	2,634,544	129,092	—	—	—	—
1912	44,871,454	1,805,627	5,358,280	316,139	—	—	—	—
1913	55,364,677	2,175,832	6,758,768	324,421	—	—	—	—
1914	50,625,048	1,771,877	7,866,467	346,125	1,987	662	—	—
1915	46,503,590	1,939,200	12,982,440	1,460,524	3,618	2,000	—	—
1916	48,727,516	3,007,462	37,168,980	4,043,985	12,342	20,560	—	—
1917	37,307,465	2,951,020	41,848,513	3,166,259	6,982	11,636	—	—
1918	43,899,661	2,928,107	41,772,916	2,899,040	960	1,840	—	—
1919	29,475,968	1,526,855	56,737,651	3,540,429	—	—	1,000	5,000
1920	39,331,218	2,816,115	47,208,268	3,077,979	—	—	1,230	6,150
1921	41,402,288	1,693,354	49,419,372	1,952,065	—	—	1,472	7,360
1922	67,447,985	3,480,306	57,146,548	2,777,322	—	—	1,010	5,050
1923	96,663,152	6,321,770	58,344,462	3,278,903	—	—	1,200	3,600
1924	170,384,481	12,415,917	79,130,970	4,266,741	—	—	243	1,337
1925	237,899,199	18,670,329	98,257,099	7,754,450	—	—	—	—
1926	263,023,936	17,757,535	142,876,947	10,586,610	—	—	—	—
1927	282,996,423	14,874,292	145,225,443	8,996,135	—	—	—	—
1928	305,140,792	13,961,412	181,763,147	9,984,613	—	—	20	—
1929	307,999,153	15,555,189	172,096,841	9,268,792	—	—	—	—
1930	321,803,725	12,638,198	250,479,310	9,017,005	—	—	—	—
1931	261,902,228	7,097,812	202,071,702	5,160,911	—	—	—	—
1932	252,007,574	5,326,432	192,120,091	4,621,641	—	—	—	—
1933	271,689,217	6,497,719	195,963,751	6,291,416	—	—	—	—
1934	347,366,967	8,461,859	249,152,403	7,584,199	—	—	—	—
1935	344,268,444	10,785,930	256,239,446	7,940,860	—	—	—	—
1936	377,971,618	14,790,028	254,581,393	8,439,373	—	—	—	—
1937	419,118,371	21,417,049	291,192,278	14,274,245	—	—	—	—
1938	412,979,182	13,810,024	298,497,295	9,172,822	—	—	—	—
1939	378,743,663	12,002,390	278,409,102	8,544,375	—	—	—	—
1940	466,849,112	15,695,467	312,020,671	10,643,026	—	—	—	—
1941	456,840,454	15,358,976	367,869,579	12,548,031	—	—	—	—
1942	507,199,704	17,052,054	387,236,469	13,208,636	—	—	—	—
1943	439,155,635	16,485,902	336,150,455	13,446,018	—	—	—	—
1944	292,922,888	13,181,530	278,063,373	11,956,725	—	—	—	—
1945	336,976,468	16,848,823	294,791,635	18,984,581	—	—	—	—
1946	345,862,680	23,345,731	274,269,956	21,420,484	—	—	—	—
1947	313,733,089	42,887,313	253,006,168	28,412,593	—	—	—	—
1948	320,037,525	57,734,770	270,310,195	37,654,211	—	—	679	3,735
1949	265,378,899	41,929,866	288,225,368	38,181,214	—	—	5,472	27,579
1950	284,024,522	41,052,905	290,344,227	43,769,392	—	—	—	—
1951	273,456,604	50,316,015	337,511,324	67,164,754	—	—	113,535	790,000
1952	284,949,396	45,936,692	372,871,717	59,189,656	—	—	900,481	5,474,924
1953	297,634,712	39,481,244	382,300,862	40,810,618	—	—	991,248	6,763,105
1954	332,474,456	45,482,505	334,124,560	34,805,755	—	—	535,746	3,733,891
1955	302,567,640	45,161,245	429,198,565	52,048,909	—	—	610,930	3,228,756
1956	283,718,073	44,702,619	443,853,004	58,934,801	—	—	369,955	[illegible]
1957	281,603,346	39,568,086	449,276,797	50,206,68	—	—	357,342	2,200,637
1958	294,573,159	34,627,075	432,002,790	43,234,839	—	—	630,271	4,193,442
1959	287,423,357	33,542,306	402,342,850	44,169,198	—	—	849,248	6,363,848
1960	333,608,699	38,661,912	403,399,319	50,656,726	5,414	9,500	1,160,355	10,292,847
1961	384,284,524	42,313,569	387,951,190	45,370,891	—	—	1,335,068	12,082,540
1962	335,282,537	34,537,454	413,430,817	51,356,376	—	—	1,793,847	18,326,911
1963	314,974,310	37,834,714	402,863,154	53,069,163	—	—	2,060,241	20,746,424
1964	268,737,503	39,402,293	400,796,562	58,648,561	28,245	47,063	2,002,562	20,419,487
1965	250,183,633	43,149,171	311,249,250	48,666,933	7,289,125	12,405,344	2,165,403	21,498,581
1966	211,490,107	34,436,934	305,124,440	47,666,540	17,306,343	28,071,594	2,151,804	20,778,934
Totals	14,963,645,244	1,214,936,580	13,286,573,916	1,216,335,952	24,655,016	40,570,199	18,102,813	159,329,902

TABLE VIIA.—PRODUCTION, 1965 AND 1966, AND

Division	Period	Placer Gold		Lode Metals	Industrial Minerals	Structural Materials
		Quantity (Crude)	Value			
		Oz.	$	$	$	$
	1965			10,021,157		121,359
Alberni	**1966**			**6,745,495**		**174,161**
	To date	1,617	83,253	52,895,256	9,398	1,849,827
	1965	139	4,188	27		2,584
Atlin	**1966**	**19**	**556**	**4**		**6,038**
	To date	735,628	17,383,670	38,047,111	20,325	318,047
	1965	556	16,186	3,183,162	4,420	704,250
Cariboo	**1966**	**622**	**17,163**	**6,603,381**	**3,755**	**1,619,973**
	To date	2,608,551	54,110,602	51,589,611	287,550	9,290,353
	1965					45,085
Clinton	**1966**					**56,498**
	To date	10,171	243,069	848,377	162,427	244,345
	1965			69,449,859	1,054,050	306,940
Fort Steele	**1966**			**55,437,725**	**1,865,100**	**304,305**
	To date	20,531	468,450	1,934,088,805	10,465,571	5,962,977
	1965			2,108,259	798,331	188,553
Golden	**1966**			**1,716,665**	**753,113**	**381,964**
	To date	469	11,268	58,659,417	7,859,767	2,310,016
	1965			5,243,049		97,789
Greenwood	**1966**			**6,395,783**		**156,704**
	To date	5,074	115,662	149,196,412	2,323,897	1,113,191
	1965	3	75	8,623,408		672,347
Kamloops	**1966**			**14,861,590**		**1,040,519**
	To date	27,595	604,785	41,531,086	6,528,308	12,652,592
	1965				16,217,699	548,605
Liard	**1966**			**124**	**16,796,035**	**641,364**
	To date	50,184	1,248,151	6,522	124,830,723	4,076,330
	1965			2,086,810	5,249	317,196
Lillooet	**1966**	**836**	**25,356**	**1,641,589**	**4,577**	**143,010**
	To date	92,752	1,919,660	140,370,245	98,849	2,487,872
	1965			14,021,578	68,904	2,988,741
Nanaimo	**1966**			**19,692,301**	**68,786**	**3,561,079**
	To date	866	19,300	134,740,273	1,034,300	45,954,941
	1965			18,436,152	127,459	104,101
Nelson	**1966**			**16,505,791**	**118,368**	**427,106**
	To date	3,585	88,988	302,832,939	485,859	4,225,491
	1965			3,442,889	98,995	8,348,601
New Westminster	**1966**			**3,930,536**	**50,000**	**8,398,108**
	To date	31,265	593,573	26,700,284	1,215,256	103,554,332
	1965			11,467,337		5,650
Nicola	**1966**			**17,660,303**		**134,219**
	To date	234	4,764	91,203,159	10,050	701,276
	1965	24	340	9,955,286	2,000	697,057
Omineca	**1966**			**22,715,732**		**998,139**
	To date	56,279	1,499,180	65,741,041	15,860	6,182,148
	1965	6	151	1	382,419	78,289
Osoyoos	**1966**				**304,673**	**394,683**
	To date	240	5,466	51,140,485	5,562,437	1,769,337
	1965					32,819
Revelstoke	**1966**					**48,083**
	To date	7,582	164,477	11,237,458		1,540,453
	1965			1,084		109,450
Similkameen	**1966**					**279,687**
	To date	45,507	878,204	120,195,258	18,558	3,136,964
	1965			3,502,540		677,086
Skeena	**1966**			**5,643,654**		**592,571**
	To date	4,603	105,569	227,952,343	1,229,400	9,100,257
	1965			10,215,872		85,294
Slocan	**1966**			**9,275,129**		**86,049**
	To date	366	9,397	229,889,537		1,258,375
	1965			8,630		95,609
Trail Creek	**1966**			**758,086**		**250,614**
	To date	851	24,260	84,509,837		2,411,333
	1965			2,087,792	110,063	7,503,777
Vancouver	**1966**			**5,339,748**	**40,322**	**10,193,600**
	To date	182	5,306	232,508,144	6,610,513	80,887,375
	1965					151,006
Vernon	**1966**			**664**		**271,748**
	To date	2,732	72,885	198,535	3,978	3,374,405
	1965				60	7,283,938
Victoria	**1966**			**992,729**	**140**	**10,330,132**
	To date	628	15,680	13,921,485	188,651	149,211,707
	1965	138	4,113	3,221,782	1,540,000	1,208,988
Not assigned	**1966**	**58**	**1,557**	**12,795,099**	**2,212,500**	**6,330,910**
	To date	1,525,465	17,260,670	238,550,606	41,985,885	22,392,573
	1965	866	25,053	177,076,680	20,409,649	32,325,714
Totals	**1966**	**1,535**	**44,632**	**208,712,128**	**22,217,369**	**46,821,264**
	To date	5,232,957	96,886,289	4,298,554,226	210,947,562	476,006,517

Total to Date, by Mining Divisions—Summary

Fuels								Division Total
Coal		Crude Oil and Condensates		Natural Gas Delivered to Pipe-line		Butane and Propane		
Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	
Tons	$	Bbl.	$	M S.C.F.	$	Bbl.	$	$
								10,142,516
								6,919,656
								54,787,734
								6,799
								6,598
								55,769,158
								3,908,018
								8,244,272
	1,100							115,270,[illegible]
								45,085
								56,498
								1,498,218
913,778	[illegible]							77,110,129
823,350	[illegible],919,353							63,526,483
57,274,532	259,658,504							2,210,644,307
								3,095,143
								2,851,742
								68,840,468
								5,340,838
								6,552,487
								152,749,162
								9,295,830
								15,902,109
15,087	59,765							61,376,536
		14,449,968	29,840,643	138,814,144	14,493,255	836,766	267,764	60,867,960
		17,652,316	36,667,308	161,264,334	17,339,587	835,288	267,292	71,711,710
99,433	699,521	74,533,933	142,062,722	940,603,683	88,667,933	4,955,321	1,585,701	363,177,603
								2,409,255
								1,814,532
								144,876,626
31,085	349,310							17,428,583
15,496	169,091							23,401,257
74,324,004	301,137,888							482,886,702
								18,667,712
								17,051,265
								307,633,277
								11,890,485
								12,378,644
								132,063,445
								11,472,987
								17,794,522
2,929,584	11,080,836							103,000,085
5,900	59,000							10,713,083
11,975	107,775							23,821,646
463,172	3,075,928							76,514,157
								460,860
								699,356
1,122	5,008							58,482,733
								32,819
								48,083
								12,942,388
								110,534
								279,687
4,617,442	19,553,725							143,782,709
								4,180,232
								6,236,225
86	116							238,387,685
								10,251,166
								9,361,176
								231,157,309
								104,239
								1,008,700
								86,945,430
								9,701,632
								15,573,670
								320,011,338
								151,006
								272,412
								3,649,803
								7,283,998
								11,323,001
								163,337,523
								5,974,883
								21,340,066
								320,189,734
950,763	6,713,590	14,449,968	29,840,643	138,814,144	14,493,255	836,766	267,764	280,652,348
850,821	6,196,219	17,652,316	36,667,308	161,264,334	17,339,587	835,288	267,292	338,265,799
139,724,702	595,272,391	74,533,933	142,062,722	940,603,683	88,667,933	4,955,321	1,585,701	5,909,983,341

TABLE VIIB.—PRODUCTION, 1965 AND 1966, AND TOTAL TO DATE, BY MINING DIVISIONS-LODE GOLD, SILVER, COPPER, LEAD, AND ZINC

Division	Period	Lode Gold		Silver		Copper		Lead		Zinc		Division Total
		Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	
		Oz.	$	Oz.	$	Lb.	$	Lb.	$	Lb.	$	$
Alberni	1965											
	1966	**1**	**38**	**14**	**20**	**1,818**	**970**					**1,028**
	To date	303,758	11,365,025	162,698	79,073	2,292,517	344,488	121,344	5,419	67	8	11,794,013
Atlin	1965											
	1966			**3**	**4**							**4**
	To date	344,197	12,126,732	3,375,336	2,895,587	24,777,661	8,160,266	23,765,211	3,437,907	91,067,749	10,864,497	37,484,989
Cariboo	1965	18,481	697,288	3,236	4,510							701,798
	1966	**20,312**	**765,966**	**3,476**	**4,842**							**770,808**
	To date	1,196,770	43,140,333	143,140	107,048	2,352	920	24,560	3,724	505	19	43,252,044
Clinton	1965											
	1966											
	To date	23,390	827,328	31,564	14,237	57,548	5,905	193	7			847,477
Fort Steele	1965	281	10,602	2,808,166	3,913,853			183,513,420	31,650,560	195,010,020	30,491,767	66,066,782
	1966	**226**	**8,522**	**3,099,543**	**4,317,663**			**164,266,495**	**26,747,513**	**136,493,338**	**21,322,989**	**52,396,687**
	To date	6,863	210,650	224,619,924	143,038,207	28,592	6,193	12,573,756,398	982,172,150	9,352,321,446	785,667,316	1,911,094,516
Golden	1965	1	38	59,183	82,486			3,063,804	528,414	9,082,414	1,420,126	2,031,064
	1966			**46,299**	**64,494**	**3,244**	**1,730**	**3,160,034**	**514,548**	**6,856,694**	**1,071,153**	**1,651,925**
	To date	170	4,882	4,069,918	3,419,891	1,171,455	367,261	249,923,134	24,668,792	310,503,839	29,206,966	57,667,792
Greenwood	1965	16,442	620,357	724,286	1,009,466	8,902,490	3,416,508	604,674	104,288	537,269	84,007	5,234,626
	1966	**13,894**	**523,943**	**832,185**	**1,159,234**	**8,293,102**	**4,423,872**	**1,024,939**	**166,891**	**705,324**	**110,186**	**6,384,126**
	To date	1,248,740	28,626,591	38,157,271	26,503,809	497,604,424	90,159,183	20,438,332	1,876,595	21,473,202	1,875,908	149,042,086
Kamloops	1965	1,595	60,179	84,215	117,374	21,818,680	8,373,355					8,550,908
	1966	**503**	**18,968**	**97,798**	**136,233**	**27,532,516**	**14,686,945**					**14,842,146**
	To date	55,966	1,913,975	705,384	739,906	100,190,876	38,561,696	538,097	45,030	438,023	29,826	41,290,433
Liard	1965											
	1966			**39**	**54**			**319**	**52**	**115**	**18**	**124**
	To date	114	4,120	579	507	56	22	10,421	1,776	115	18	6,443
Lillooet	1965	54,589	2,059,643	10,666	14,866							2,074,509
	1966	**43,222**	**1,629,902**	**8,390**	**11,687**							**1,641,589**
	To date	3,978,316	139,634,653	951,301	649,502	400	41	62,513	2,548	15	2	140,286,746
Nanaimo	1965	22,046	831,796	179,319	249,924	16,723,599	6,418,016					7,499,736
	1966	**24,088**	**908,359**	**255,355**	**355,710**	**20,415,533**	**10,890,462**					**12,154,531**
	To date	169,198	5,115,761	1,250,339	1,228,482	93,732,527	31,667,842					38,012,085
Nelson	1965	1,037	39,126	133,090	185,493			22,319,008	3,849,360	83,265,553	13,019,402	17,093,381
	1966	**1,137**	**42,876**	**125,311**	**174,558**			**19,498,654**	**3,174,966**	**76,631,663**	**11,971,398**	**15,363,798**
	To date	1,336,273	41,812,237	8,926,393	5,929,313	14,915,405	1,689,196	442,579,238	54,915,426	1,164,452,332	150,907,754	255,253,926
New Westminster	1965					1,700,000	652,409					652,409
	1966					**1,548,700**	**826,139**					**826,139**
	To date	4,466	114,164	15,114	7,720	12,223,349	4,149,530	28,425	1,119	12,755	481	4,273,014
Nicola	1965					29,880,753	11,467,387					11,467,337
	1966					**33,106,447**	**17,660,303**					**17,660,303**
	To date	8,541	235,481	275,599	134,205	260,259,043	90,731,596	2,239,124	90,923	323,735	10,954	91,203,159
Omineca	1965	22	830	26,643	37,133			164,575	28,384	206,922	32,354	98,701
	1966	**1,423**	**53,661**	**23,212**	**32,334**	**2,067,930**	**1,103,117**	**147,841**	**24,073**	**231,923**	**36,231**	**1,249,416**
	To date	26,576	830,458	9,628,035	7,690,576	8,815,992	2,649,142	28,445,252	3,620,061	32,114,665	3,990,865	18,781,102

		Oz.	$	Oz.	$	Lb.	$	Lb.	$	Lb.	$	$
Osoyoos	1965											
	1966											
	To date	1,655,733	50,313,477	599,877	400,001	2,843,616	417,190	140,765	7,208	16,164	1,589	51,159,405
Revelstoke	1965											
	1966											
	To date	37,300	1,069,260	4,108,010	2,767,119	153,686	51,037	36,046,708	3,853,366	27,123,973	3,311,432	11,052,214
Similkameen	1965			10	14	417	160			5,819	910	1,084
	1966											
	To date	184,016	6,327,410	4,219,551	2,582,429	601,197,638	111,137,983	382,677	13,376	78,094	4,874	120,066,072
Skeena	1965	669	25,241	14,886	20,747			7,463	1,287	12,834	2,007	49,282
	1966	**8,199**	**309,184**	**165,554**	**230,817**	**273**	**146**	**43,851**	**7,140**	**108,982**	**17,025**	**564,112**
	To date	2,422,609	61,294,150	68,956,888	44,313,688	689,106,543	98,026,153	60,000,228	5,438,209	17,194,846	2,541,146	211,618,346
Slocan	1965	24	906	693,235	826,815			25,482,463	4,304,060	20,868,871	4,670,297	9,892,978
	1966	**41**	**1,546**	**495,091**	**689,662**			**25,059,507**	**4,080,440**	**27,103,767**	**4,234,150**	**9,006,798**
	To date	16,047	465,379	74,393,781	49,497,334	13,662	1,861	1,010,093,214	89,368,599	824,666,435	86,188,172	225,521,345
Trail Creek	1965	222	8,376	63	88			464	80	552	86	8,630
	1966											
	To date	2,984,548	63,339,534	3,673,070	2,102,504	122,561,732	18,245,404	146,421	12,293	133,571	16,242	83,715,977
Vancouver	1965	1,246	47,012	18,249	25,434	4,981,250	1,911,654	5,754	992	621,256	97,140	2,082,232
	1966	**3,717**	**140,168**	**34,441**	**47,976**	**9,017,161**	**4,810,114**	**51,194**	**8,336**	**2,006,190**	**313,407**	**5,320,001**
	To date	490,553	15,858,304	5,088,694	3,276,086	1,011,790,092	180,011,308	18,543,939	1,879,362	234,017,994	30,330,800	281,355,860
Vernon	1965											
	1966	**6**	**226**	**164**	**229**			**1,014**	**165**	**296**	**45**	**664**
	To date	5,230	176,308	12,987	8,338	654	100	25,927	3,098	11,102	1,191	189,085
Victoria	1965											
	1966	**400**	**15,084**	**3,920**	**5,461**	**1,822,480**	**972,184**					992,729
	To date	41,120	942,799	913,060	554,180	50,800,406	12,085,298	210,097	19,848	3,568,709	283,923	18,886,048
Not assigned[1]	1965	469	17,695	316,725	441,433	1,189,884	456,642	15,022,008	2,590,846	1—7,362,260	1—1,151,168	2,355,453
	1966	**1,531**	**57,734**	**349,089**	**486,281**	**1,196,546**	**638,285**	**1—1,763,741**	**1—287,190**	**54,986,158**	**8,589,939**	**9,486,048**
	To date	16,836	487,097	5,370,197	5,275,962	50,823,064	11,544,230	496,123,026	43,499,744	1,206,964,580	111,101,969	171,909,002
Totals	1965	117,124	4,419,089	4,971,972	6,929,636	85,197,073	32,696,081	250,183,633	43,149,171	211,249,250	48,666,933	135,860,910
	1966	**118,700**	**4,479,177**	**5,539,884**	**7,717,058**	**105,005,750**	**56,014,267**	**211,490,107**	**34,436,934**	**305,124,440**	**47,966,540**	**150,310,976**
	To date	16,557,330	486,236,108	459,648,710	303,215,704	3,545,363,290	700,013,845	14,963,645,244	1,214,936,580	13,286,573,916	1,216,335,952	3,920,738,189

[1] Metals recovered from operations at the Trail smelter but not assignable to individual mines. The minus quantities for lead and zinc are bookkeeping adjustments between the Trail smelter input and output.

TABLE VIIc.—PRODUCTION, 1965 AND 1966, AND TOTAL TO DATE, BY MINING DIVISIONS—MISCELLANEOUS METALS

Division	Period	Antimony Quantity	Antimony Value	Bismuth Quantity	Bismuth Value	Cadmium Quantity	Cadmium Value	Chromite Quantity	Chromite Value	Iron Concentrates Quantity	Iron Concentrates Value	Manganese Quantity	Manganese Value	Mercury Quantity	Mercury Value
		Lb.	$	Lb.	$	Lb.	$	Tons	$	Tons	$	Tons	$	Lb.	$
Alberni	1965									026,328	10,021,157				
	1966									44,459	6,744,467				
	To date									3,70,177	41,101,243				
Atlin	1965														
	1966														
	To date					319,212	561,762								
Cariboo	1965														
	1966														
	To date														
Clinton	1965														
	1966														
	To date							126	900						
Fort Steele	1965					411,944	1,145,205			155,038	1,502,318				
	1966					274,036	707,013			163,950	1,417,155				
	To date					1,206,489	3,536,538			554,632	5,395,202				
Golden	1965					27,768	77,195								
	1966					25,093	64,740								
	To date	40,062	14,906			498,987	976,719								
Greenwood	1965					3,030	8,423								
	1966					4,518	11,657								
	To date					62,203	122,931	670	31,395						
Kamloops	1965														
	1966														
	To date									21,167	95,851			10,987	5,795
Liard	1965														
	1966														
	To date														
Lillooet	1965													1,520	12,301
	1966														
	To date	13,466	4,321											8,851	38,704
Nanaimo	1965									688,585	6,521,842				
	1966									808,205	7,537,770				
	To date									11,902,693	96,728,188				
Nelson	1965					483,011	1,342,771								
	1966					442,633	1,141,993								
	To date					6,840,408	13,660,324								
New Westminster	1965														
	1966														
	To date														
Omineca	1965					1,800	5,004								
	1966					1,870	4,825								
	To date	104,489	15,217			268,911	531,268							4,150,892	10,400,259
Osoyoos	1965														
	1966														
	To date											16			

		Lb.	$	Lb.	$	Lb.	$	Tons	$	Tons	$	Tons	$	Lb.	$
Revelstoke	1965														
	1966														
	To date	9,394	4,455			103,612	176,102								
Similkameen	1965														
	1966														
	To date														
Skeena	1965									395,442	3,453,264				
	1966									**535,190**	**5,079,542**				
	To date					141,890	316,764			1,753,594	16,007,493				
Slocan	1965					11649	322,894								
	1966					**104,392**	**269,331**								
	To date	31,865	8,133			[illegible]	4,351,899					541	8,160		
Trail Creek	1965														
	1966														
	To date					115	210			550	1,925				
Vancouver	1965					2,000	5,560								
	1966					**7,654**	**19,747**								
	To date					548,826	1,152,284								
Vernon	1965														
	1966														
	To date														
Victoria	1965														
	1966														
	To date					7,000	10,929					1,167	24,508		
Not assigned[1]	1965	1,301,787	689,947	144,630	446,907	1–579,116	1–1,609,942								
	1966	**1,405,681**	**745,011**	**47,435**	**198,848**	**284,281**	**733,445**								
	To date	48,392,864	13,936,012	6,201,542	11,192,141	22,772,323	32,890,950								
Totals	1965	1,301,787	689,947	144,630	446,907	466,586	1,297,110			2,165,403	21,498,581			1,520	12,301
	1966	**1,405,681**	**745,011**	**47,435**	**198,848**	**1,144,477**	**2,952,751**			**2,151,804**	**20,778,934**				
	To date	48,592,140	13,982,044	6,201,542	11,192,141	34,980,173	58,294,680	796	32,295	18,102,813	159,329,902	1,724	32,668	4,170,730	10,444,758

[1] Metals recovered from operations at the Trail smelter but not assignable to individual mines. The minus quantity for cadmium in 1965 is a bookkeeping adjustment between the Trail smelter input and output.

TABLE VIIc.—PRODUCTION, 1965 AND 1966, AND TOTAL TO DATE, BY MINING DIVISIONS—MISCELLANEOUS METALS—*Continued*

Division	Period	Molybdenum		Nickel		Palladium		Platinum		Tin		Tungsten (WO_3)		Other, Value	Division Total
		Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value		
		Lb.	$	Lb.	$	Oz.	$	Oz.	$	Lb.	$	Lb.	$	$	$
Alberni	1965														10,021,157
	1966														**6,744,467**
	To date														41,101,243
Atlin	1965														
	1966														
	To date											292	360		562,122
Cariboo	1965	1,615,223	2,481,264												2,481,264
	1966	**3,534,893**	**5,832,573**												**5,832,573**
	To date	5,150,116	8,313,837					59	2,299			27,698	21,431		8,337,067
Clinton	1965														
	1966														
	To date														900
Fort Steele	1965									377,207	735,554				3,383,077
	1966									**710,752**	**916,870**				**3,041,038**
	To date									16,836,845	13,974,365			88,184[1]	22,994,289
Golden	1965														77,195
	1966														**64,740**
	To date														991,625
Greenwood	1965														8,423
	1966														**11,657**
	To date														154,326
Kamloops	1965	51,900	72,500												72,500
	1966	**13,850**	**19,444**												**19,444**
	To date	93,995	139,007												240,653
Liard	1965														
	1966														
	To date							2	79						79
Lillooet	1965														12,301
	1966														
	To date	1,469	2,440					3	113			32,353	37,921		83,499
Nanaimo	1965														6,521,842
	1966														**7,537,770**
	To date														96,728,188
Nelson	1965														1,342,771
	1966														**1,141,993**
	To date	15,035	18,378									13,739,939	33,900,311		47,579,013
New Westminster	1965			3,322,000	2,790,480										2,790,480
	1966			**3,622,400**	**3,104,397**										**3,104,397**
	To date			28,230,859	22,427,270										22,427,270
Omineca	1965	5,622,002	9,851,580												9,856,584
	1966	**13,229,852**	**21,461,491**												**21,466,316**
	To date	18,852,814	31,314,911					3	154			2,210,692	4,697,710	420	46,959,939
Osoyoos	1965														
	1966														
	To date	612	1,020												1,020

		Lb.	$	Lb.	$	Oz.	$	Oz.	$	Lb.	$	Lb.	$	$	$
Revelstoke	1965	....	....	....	....	....	....	....	....	....	....	....	....	....	
	1966	....	....	....	....	....	....	....	....	....	....	....	....	....	
	To date	....	....	....	....	....	....	....	....	....	....	7,784	5,687	....	185,244
Similkameen	1965	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	1966	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	To date	....	....	....	....	....	....	1,287	129,186	....	....	....	....	....	129,186
Skeena	1965	....	....	....	....	....	....	....	....	....	....	....	....	....	3,453,264
	1966	....	....	....	....	....	....	....	....	....	....	....	....	....	**5,079,542**
	To date	7,813	13,020	....	....	....	....	....	....	....	....	366	331	1,389[3]	16,338,997
Slocan	1965	....	....	....	....	....	....	....	....	....	....	....	....	....	322,894
	1966	....	....	....	....	....	....	....	....	....	....	....	....	....	**269,331**
	To date	....	....	....	....	....	....	....	....	....	....	....	....	....	4,368,192
Trail Creek	1965	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	1966	**527,748**	**758,086**	....	....	....	....	....	....	....	....	....	....	....	**758,086**
	To date	527,748	758,086	....	....	749	30,462	53	3,177	....	....	....	....	....	793,860
Vancouver	1965	....	....	....	....	....	....	....	....	....	....	....	....	....	5,560
	1966	....	....	....	....	....	....	....	....	....	....	....	....	....	**19,747**
	To date	....	....	....	....	....	....	....	....	....	....	....	....	....	1,152,284
Vernon	1965	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	1966	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	To date	5,414	9,500	....	....	....	....	....	....	....	....	....	....	....	9,500
Victoria	1965	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	1966	....	....	....	....	....	....	....	....	....	....	....	....	....	....
	To date	....	....	....	....	....	....	....	....	....	....	....	....	....	35,437
Not assigned	1965	....	....	....	....	....	....	....	....	....	....	....	....	1,339,389	866,301
	1966	....	....	....	....	....	....	....	....	....	....	....	....	**1,632,747**	**3,310,051**
	To date	....	....	....	....	....	....	....	....	....	....	....	....	8,616,501	66,641,604
Totals	*1965*	*7,289,120*	*12,405,544*	*3,322,000*	*2,790,480*	....	....	....	....	377,207	735,554	....	....	1,339,389	41,215,613
	1966	**17,306,343**	**28,071,594**	**3,622,400**	**3,104,397**	....	....	....	....	**710,752**	**916,870**	....	....	**1,632,747**	**58,401,152**
	To date	24,655,016	40,570,199	28,230,859	22,427,270	749	30,462	1,407	135,008	16,836,845	13,974,365	16,019,324	38,663,751	8,706,494	377,816,037

[1] Magnesium, page A 17. [2] Cobalt, page A 16. [3] Selenium, page A 18.

TABLE VIID.—PRODUCTION, 1965 AND 1966, AND TOTAL

Division	Period	Asbestos		Barite		Diatomite		Fluxes (Quartz and Limestone)		Granules (Quartz, Limestone, and Granite)	
		Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
		Tons	$	Tons	$	Tons	$	Tons	$	Tons	$
Alberni	1965										
	1966										
	To date										
Atlin	1965										
	1966										
	To date										
Cariboo	1965					82	4,420				
	1966					**70**	**3,755**				
	To date					3,797	144,070			48	168
Clinton	1965										
	1966										
	To date										
Fort Steele	1965										
	1966										
	To date			8	80						
Golden	1965			17,466	182,931			3,259	12,612		
	1966			**21,888**	**176,240**						
	To date			252,268	2,942,069			3,259	12,612		
Greenwood	1965										
	1966										
	To date							1,790,502	1,540,319		
Kamloops	1965										
	1966										
	To date										
Liard	1965	85,851	14,491,195								
	1966	**88,771**	**15,070,786**								
	To date	591,230	114,771,818								
Lillooet	1965										
	1966										
	To date										
Nanaimo	1965							24,266	68,904		
	1966									**3,583**	**68,786**
	To date							780,097	965,514	3,583	68,786
Nelson	1965									4,473	127,459
	1966									**4,184**	**118,368**
	To date							7,601	8,174	16,668	421,784
New Westminster	1965									6,260	98,995
	1966									**3,100**	**50,000**
	To date									88,847	1,215,256
Nicola	1965										
	1966										
	To date										
Omineca	1965										
	1966										
	To date										
Osoyoos	1965							31,700	158,500	18,300	221,500
	1966							**23,899**	**112,174**	**13,089**	**187,513**
	To date							757,464	3,429,877	122,560	1,803,670
Similkameen	1965										
	1966										
	To date										
Skeena	1965										
	1966										
	To date							601,019	1,050,722		
Vancouver	1965										
	1966										
	To date									29,692	418,606
Vernon	1965										
	1966										
	To date										
Victoria	1965							6	60		
	1966							**14**	**140**		
	To date							110	1,345	9,605	157,080
Not assigned	1965										
	1966										
	To date										
Totals	1965	85,851	14,491,195	17,466	182,931	82	4,420	59,281	240,076	29,033	447,954
	1966	**88,771**	**15,070,786**	**21,888**	**176,240**	**70**	**3,755**	**23,913**	**112,314**	**23,956**	**424,667**
	To date	591,230	114,771,818	252,276	2,942,149	3,797	144,070	3,940,052	7,008,563	271,003	4,085,350

Other: *See* notes on individual minerals listed alphabetically on pages A 16 to A 19.

1 Arsenious oxide.
2 Bentonite.
3 Fluorspar.
4 Hydromagnesite.
5 Iron oxide and ochre.
6 Magnesium sulphate.

TO DATE, BY MINING DIVISIONS—INDUSTRIAL MINERALS

	Gypsum and Gypsite		Jade		Mica		Sulphur		Other, Value	Division Total
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value		
	Tons	$	Lb.	$	Lb.	$	Tons	$	$	$
									9,3987	8.398
									20,3256	20,325
										4,420
										3,755
					10,013,800	143,012			30012	287,550
	873	6,236							156.1914 6 ' 0	162,427
							87,473	1,054,050		1,054,050
							124,340	1,865,100		1,865,100
	112,878	298,824					652,527	10,149,773	16,8949	10,465,571
	207,858	602,788								798.331
	206,026	576,873								753,113
	1,694,387	4,903,810							1,2765 11	7,859,767
									783,5783	2,323,897
	1,246,918	6,323,178			424,700	2,075			203,0556 ' 0	6,528,308
			2,000	2,000			91,364	1,724,504		16,217,699
			8,469	8,648			66,461	1,716,601		16,796,035
			10,493	10,648			493,999	10,048,257		124,830,723
			4,129	5,249						5,249
			3,140	4,577						4,577
			225,592	98,720					6.12811	98,849
										68,904
										68,786
										1,034,300
										127,459
										118,388
									55,9015	485,859
										98,995
										50,000
										1,215,256
	2,407	10..060								10,050
			1,000	2,000						2,000
			2,200	4,400					11,4601 8	15,860
									2,4193	382,419
										304,673
					1,588,800	25,938			302,9521 3 6	5,562,437
	250	1,700							18,0681	18,558
							41,624	178,678		1,229,400
							9,036	110,063		110,063
							848.848	40,322		40,322
					634,250	10,815		6,083,703	WI.8895	6,610,513
					160,500	3,978				3,978
										60
										140
									30,22611	188,651
							154,000	1,540,000		1,540,000
							147,500	2,212,500		2,212,500
			1,129	8,248			4,139,808	41,985,885	2.418	41,985,885
	207,858	602,788					341,873	4,428,617		20,409,649
	206,026	576,873	11,633	13,225			342,478	5,834,523	4,986	22,217,369
	3,057,713	11,548,798	288,285	108,768	12,822,050	185,818	5,974,907	68,446,296	1,710,932	210,947,562

7 Natro-alunite.
8 Perlite.
9 Phosphate rock.
10 Sodium carbonate.
11 Talc.
12 Volcanic ash.

TABLE VIIE.—PRODUCTION, 1965 AND 1966, AND TOTAL

Division	Period	Cement	Lime and Limestone	Building-stone	Rubble, Riprap, and Crushed Rock	Sand and Gravel
		$	$	$	$	$
Alberni	1965				15,635	105,724
	1966				**19,389**	**154,772**
	To date				234,511	1,615,816
Atlin	1965					2,584
	1966					**6,038**
	To date		1,108		98,478	218,461
Cariboo	1965				53,481	650,769
	1966				**182,939**	**1,432,024**
	To date		7,500		1,293,294	7,940,672
Clinton	1965					45,085
	1966				**6,772**	**49,726**
	To date				8,378	235,967
Fort Steele	1965				130,142	176,798
	1966				**66,912**	**237,393**
	To date		43,873	71,941	1,508,892	4,322,353
Golden	1965			2,000		168,472
	1966			**24,840**	**850**	**356,274**
	To date		1,000	50,840	126,189	2,100,252
Greenwood	1965			6,000		91,789
	1966			**16,368**		**139,836**
	To date		42,560	53,368	171,319	724,661
Kamloops	1965				185,558	486,789
	1966				**225,577**	**814,942**
	To date		12,000	18,000	6,422,020	6,128,193
Liard	1965				60,341	488,264
	1966				**50,917**	**590,447**
	To date				147,923	3,928,407
Lillooet	1965				80,576	236,620
	1966				**73,508**	**69,502**
	To date		100	2,000	681,412	1,804,360
Nanaimo	1965		2,234,790	87,000	267,921	399,030
	1966		**2,336,751**	**164,478**	**127,305**	**932,545**
	To date		35,893,441	3,460,735	939,884	4,491,889
Nelson	1965			28,975	2,600	77,526
	1966		**72,601**	**3,611**	**4,838**	**346,056**
	To date		107,144	416,580	503,827	3,175,966
New Westminster	1965		179,166		862,165	4,449,744
	1966		**231,098**		**312,443**	**4,315,711**
	To date		2,003,082	20,974	9,985,490	43,773,761
Nicola	1965					5,650
	1966					**134,219**
	To date			8,000	133,341	559,935
Omineca	1965				268,075	428,982
	1966				**169,711**	**828,428**
	To date		8,077		1,127,384	5,046,413
Osoyoos	1965				2,600	75,689
	1966				**44,951**	**349,732**
	To date		33,784	14,850	198,198	1,522,505
Revelstoke	1965				4,313	28,506
	1966				**5,278**	**42,805**
	To date		1,000	5,575	349,244	1,184,684
Similkameen	1965				14,925	94,525
	1966				**64,500**	**215,187**
	To date	10,500	11,571	24,000	615,769	2,461,769
Skeena	1965		49,685		371,837	256,164
	1966		**42,061**		**10,638**	**539,872**
	To date		1,634,173	144,000	1,838,177	5,470,658
Slocan	1965				7,185	28,109
	1966					**86,049**
	To date		1,000	115,143	118,534	1,023,698
Trail Creek	1965		4,500		651	90,458
	1966			**4,036**	**375**	**246,208**
	To date		82,500	85,520	224,424	2,068,889
Vancouver	1965	5,267,945			9,467	2,226,865
	1966	**7,020,763**		**1,200**	**449,872**	**2,721,765**
	To date	34,771,718	40,885	4,012,560	7,958,260	33,015,860
Vernon	1965				36,579	114,427
	1966				**6,372**	**265,376**
	To date		46,499	81,052	248,381	2,837,219
Victoria	1965	5,931,662	14,310		886	813,053
	1966	**8,938,530**	**13,500**	**10**	**2,511**	**819,255**
	To date	124,760,834	873,992	55	459,810	16,748,804
Not assigned	1965				63,151	1,146,837
	1966				**65,334**	**6,265,576**
	To date		315,498	505,018	552,076	11,866,982
Totals	1965	11,199,607	2,482,451	118,975	1,938,088	12,686,959
	1966	**15,959,293**	**2,696,011**	**215,043**	**1,890,992**	**21,959,733**
	To date	159,543,052	41,105,787	9,080,211	35,945,215	164,267,124

TO DATE, BY MINING DIVISIONS-STRUCTURAL MATERIALS

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	Unclassified Material	Division Total
$	$	$	$	$	$	$	$	$	$
									121,359
									174,161
									1,849,827
									2,584
									6,038
									318,047
									704,250
							5,010		1,619,673
1,193	184	4,651	15,807				27,052		9,290,358
									45,085
									56,498
									244,345
									306,940
									304,305
7,800							8,118		5,962,977
							18,081		188,553
									381,964
							31,735		2,310,016
									97,789
									156,704
114,361			6,922						1,113,191
									672,847
									1,040,519
72,379									12,652,592
									548,605
									641,364
									4,076,330
									317,196
									143,010
									2,487,872
									2,988,741
									3,561,079
1,104,295	38,939		35,758						45,954,941
									104,101
									427,106
19,110	2,864								4,225,491
27,662	576,173	753,676	18,234	23,299	1,337,928	24,894	595,660		8,848,601
16,956	**994,175**	**822,670**	**34,861**	**59,815**	**1,003,518**	**25,568**	**581,293**		**6,399,108**
1,825,391	7,042,966	15,225,329	1,005,310	2,992,902	15,950,783	429,693	8,298,651		103,554,332
									5,650
									134,219
									701,276
									697,057
									998,139
5,274									6,182,148
									78,280
									394,683
									1,769,337
									82,819
									48,083
									1,540,453
									109,450
									279,687
			1,363				11,992		8,136,964
									677,686
									562,571
			4,925				8,324		9,100,257
									35,294
									89,049
									1,258,375
									95,609
									250,614
									2,411,838
									7,508,777
									10,193,600
142,208	241,216	580,778	12,724			23,362	88,304		80,887,375
									151,006
									271,748
131,467	6,202	1,011	5	18,224	4,325		[illegible]		8,374,405
							524,027		7,283,988
							556,326		10,330,132
1,814,647	29,552	119,930	1,050	705,821	1,072,346	136,504	2,488,362		149,211,707
									1,208,988
									6,330,910
							3,180,828	5,972,171	22,892,578
27,662	576,173	753,676	18,234	28,299	1,337,928	24,894	1,137,768		32,325,714
16,956	**994,175**	**822,670**	**34,861**	**59,815**	**1,003,518**	**25,568**	**1,142,629**		**46,821,264**
5,238,125	7,361,923	15,931,699	1,083,864	3,716,947	17,027,454	589,559	9,143,386	5,972,171	476,006,517

TABLE VIIIA.—QUANTITY[1] 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	1914	2,237,042	$7,745,847
1860	15,956	56,988	1915	2,076,601	7,114,178
1861	15,427	55,096	1916	2,583,469	8,900,675
1862	20,292	72,472	1917	2,436,101	8,484,343
1863	23,906	85,380	1918	2,575,275	12,833,994
1864	32,068	115,528	1919	2,433,540	11,975,671
1865	36,757	131,276	1920	2,852,535	13,450,169
1866	28,129	100,460	1921	2,670,314	12,836,013
1867	34,988	124,956	1922	2,726,793	12,880,060
1868	49,286	176,020	1923	2,636,740	12,678,548
1869	40,098	143,208	1924	2,027,843	9,911,935
1870	33,424	119,372	1925	2,541,212	12,168,905
1871	55,458	164,612	1926	2,406,094	11,650,180
1872	55,458	164,612	1927	2,553,416	12,269,135
1873	55,459	164,612	1928	2,680,608	12,633,510
1874	91,334	244,641	1929	2,375,060	11,256,260
1875	123,362	330,435	1930	1,994,493	9,435,650
1876	155,895	417,576	1931	1,765,471	7,684,155
1877	172,540	462,156	1932	1,614,629	6,523,644
1878	191,348	522,538	1933	1,377,177	5,375,171
1879	270,257	723,903	1934	1,430,042	5,725,133
1880	299,708	802,785	1935	1,278,380	5,048,864
1881	255,760	685,171	1936	1,352,301	5,722,502
1882	315,997	846,417	1937	1,446,243	6,139,920
1883	238,895	639,897	1938	1,388,507	5,565,069
1884	441,358	1,182,210	1939	1,561,084	6,280,956
1885	409,468	1,096,788	1940	1,662,027	7,088,265
1886	365,832	979,908	1941	1,844,745	7,660,000
1887	462,964	1,240,080	1942	1,996,000	8,237,172
1888	548,017	1,467,903	1943	1,854,749	7,742,030
1889	649,411	1,739,490	1944	1,931,950	8,217,966
1890	759,518	2,034,420	1945	1,523,021	6,454,360
1891	1,152,590	3,087,291	1946	1,439,092	6,732,470
1892	925,495	2,479,005	1947	1,696,350	8,680,440
1893	1,095,690	2,934,882	1948	1,604,480	9,765,395
1894	1,134,509	3,038,859	1949	1,621,268	10,549,924
1895	1,052,412	2,824,687	1950	1,574,006	10,119,303
1896	1,002,268	2,693,961	1951	1,573,572	10,169,617
1897	999,372	2,734,522	1952	1,402,313	9,729,739
1898	1,263,272	3,582,595	1953	1,384,138	9,528,279
1899	1,435,314	4,126,803	1954	1,308,284	9,154,544
1900	1,781,000	4,744,530	1955	1,332,874	8,986,501
1901	1,894,544	5,016,398	1956	1,417,209	9,346,518
1902	1,838,621	4,832,257	1957	1,085,657	7,340,339
1903	1,624,742	4,332,297	1958	796,413	5,937,860
1904	1,887,981	4,953,024	1959	690,011	5,472,064
1905	2,044,931	5,511,861	1960	788,658	5,242,223
1906	2,126,965	5,548,044	1961	919,142	6,802,134
1907	2,485,961	7,637,713	1962	825,339	6,133,986
1908	2,362,514	7,356,866	1963	850,541	6,237,997
1909	2,688,672	8,574,884	1964	911,326	6,327,678
1910	3,314,749	11,108,335	1965	950,763	6,713,590
1911	2,541,698	8,071,747	1966	850,821	6,196,219
1912	3,211,907	10,786,812			
1913	2,713,535	9,197,460	Totals	139,724,702	$595,272,391

[1] Quantity from 1836 to 1909 is gross mine output and includes material lost in picking and washing. For 1910 and subsequent years the quantity is that sold and used.

TABLE VIIIB.—QUANTITY[1] AND VALUE OF COAL SOLD AND USED[2]

Mining Division and Period	Total Sales	Used under Company Boilers	Used in Making Coke	Total Sold and Used	
	Tons	Tons	Tons	Tons	$
Cariboo—					
Total to 1950	257	33	———	290	1,100
Total to date	257	33	———	290	1,100
Fort Steele—					
Total to 1950	31,287,472	2,006,789	9,704,778	42,999,039	166,468,348
1951–60	7,014,784	145,624	2,195,744	9,356,152	58,606,978
1961	619,828	14,698	200,190	834,716	5,979,805
1962	532,289	10,788	191,454	734,531	5,255,540
1963	557,939	17,089	191,879	766,907	5,454,401
1964	639,265	17,452	189,342	846,059	5,668,799
1965	692,535	15,314	205,929	913,778	6,305,280
1966	580,279	15,988	227,083	823,350	5,919,353
Total to date	41,924,391	2,243,742	13,106,399	57,274,532	259,658,504
Kamloops—					
Total to 1950	14,348	739	———	15,087	59,765
Total to date	14,348	739	———	15,087	59,765
Liard—					
Total to 1950	58,417	266	———	58,683	325,395
1951–60	36,083	20	———	36,103	333,461
1961	2,062	———	———	2,062	17,000
1962	1,389	———	———	1,389	12,501
1963	1,146	———	———	1,146	10,414
1964	50	———	———	50	750
Total to date	99,147	286	———	99,433	699,521
Nanaimo—					
Total to 1950	67,181,037	4,280,602	558,985	72,020,624	278,647,173
1951–60	1,951,075	11,071	———	1,962,146	19,134,499
1961	76,009	———	———	76,009	736,814
1962	83,534	———	———	83,534	801,294
1963	76,728	———	———	76,728	711,085
1964	58,382	———	———	58,382	588,622
1965	31,085	———	———	31,085	349,310
1966	15,496	———	———	15,496	169,091
Total to date	69,473,346	4,291,673	558,985	74,324,004	301,137,888
Nicola—					
Total to 1950	2,731,340	188,884	———	2,920,224	10,985,359
1951–60	9,016	———	———	9,016	91,725
1961	159	———	———	159	1,717
1962	125	———	———	125	1,375
1963	60	———	———	60	660
Total to date	2,740,700	188,884	———	2,929,584	11,080,836
Omineca—					
Total to 1950	214,126	4,095	———	218,221	1,034,134
1951–60	202,931	———	———	202,931	1,616,775
1961	5,850	———	———	5,850	64,024
1962	5,760	———	———	5,760	63,276
1963	5,700	———	———	5,700	61,437
1964	6,835	———	———	6,835	69,507
1965	5,900	———	———	5,900	59,000
1966	11,975	———	———	11,975	107,775
Total to date	459,077	4,095	———	463,172	3,075,928
Osoyoos—					
Total to 1950	1,122			1,122	5,008
Total to date	1,122			1,122	5,008
Similkameen—					
Total to 1950	4,055,080	349,235	———	4,404,315	18,426,725
1951–60	212,781	———	———	212,781	1,124,226
1961	346			346	2,774
Total to date	4,268,207	349,235	———	4,617,442	19,553,725
Skeena—					
Total to 1950	36			36	116
Total to date	36			36	116
Provincial totals—					
Total to 1950	105,543,235	6,830,643	10,263,763	122,637,641	475,953,123
1951–60	9,426,670	156,715	2,195,744	11,779,129	80,907,664
1961	704,254	14,698	200,190	919,142	6,802,134
1962	623,097	10,788	191,454	825,339	6,133,986
1963	641,573	17,089	191,879	850,541	6,237,997
1964	704,532	17,452	189,342	911,326	6,327,678
1965	729,520	15,314	205,929	950,763	6,713,590
1966	607,750	15,988	227,083	850,821	6,196,219
Total to date	118,980,631	7,078,687	13,665,384	139,724,702	595,272,391

[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 this and preceding Annual Reports.

[2] The totals "sold and used" include "all coal sales," "coal used under company boilers," "coal used in making coke."

TABLE IX.—COKE AND BY-PRODUCTS FOR YEARS 1895 TO 1925 AND BY YEARS 1926 TO 1966

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	1,422,763	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	27,044	6,556,142
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	—	2,142,019
1958	224,158	1,420,328	—	—	173,920	2,253,102	—	—	173,920	2,253,102	14,600	97,803	—	2,365,505
1959	173,227	1,135,222	—	—	134,134	1,789,906	—	—	134,134	1,789,906	14,600	76,891	—	1,881,397
1960	186,960	1,124,760	—	—	139,040	1,948,370	—	—	139,040	1,948,370	79,458	108,360	—	2,136,188
1961	200,190	1,201,140	—	—	153,843	2,232,690	—	—	153,843	2,232,690	85,081	115,291	—	2,433,062
1962	191,454	1,196,588	—	—	152,885	2,171,128	—	—	152,885	2,171,128	81,363	116,499	—	2,368,990
1963	191,879	1,247,214	—	—	154,844	2,203,689	—	—	154,844	2,203,689	81,634	120,468	—	2,405,791
1964	189,342	1,183,387	—	—	149,759	2,134,792	—	—	149,759	2,134,792	80,470	152,423	—	2,367,685
1965	205,929	1,338,539	—	—	167,271	2,478,575	—	—	167,271	2,478,575	87,520	127,466	—	2,693,561
1966	227,083	1,532,806	—	—	173,336	2,753,493	—	—	173,336	2,753,493	96,510	144,411	—	2,994,414
Totals	17,278,274	76,064,740	6,223,241	35,571,124	3,585,129	4[illegible] 182,363	1,829,283	11,777,717	11,636,750	89,531,204	83,861,975	4,733,083	553,717	178,679,979

[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 X.—DIVIDENDS PAID BY MINING COMPANIES, 1897-1966

Dividends Paid during 1965 and 1966

	1965	1966
Aetna Investment Corporation Ltd. (formerly Sheep Creek Mines Ltd.)	$151,240	$151,360
Bethlehem Copper Corporation Ltd.	1,562,500	2,086,200
Bralorne Pioneer Mimes Ltd.	646,050	80,872
Brynnor Mines Ltd.	6,220,000	2,000,000
Cassiar Asbestos Corporation Ltd.	2,748,750	2,865,000
Cominco Ltd.	30,036,524	30,036,000
Craigmont Mines Ltd.	3,807,956	3,807,956
Crows Nest Industries Ltd.	583,865	587,156
Giant Mascot Mimes Ltd.	140,429	175,409
Reeves MacDonald Mines Ltd.	584,500	584,500
Others	3,310	10,810
Totals	$46,485,124	$42,385,263

Dividends Paid Yearly, 1917 to 1966, Inclusive

Year	Amount Paid
1917	$3,269,494
1918	2,704,469
1919	2,494,283
1920	1,870,296
1921	736,629
1922	3,174,756
1923	2,983,570
1924	2,977,276
1925	5,853,419
1926	8,011,137
1927	8,816,681
1928	9,572,536
1929	11,263,118
1930	10,543,500
1931	4,650,857
1932	2,786,958
1933	2,471,735
1934	$4,745,905
1935	7,386,070
1936	10,513,705
1937	15,085,293
1938	12,068,875
1939	11,865,698
1940	14,595,530
1941	16,598,110
1942	13,627,104
1943	11,860,159
1944	11,367,732
1945	10,487,395
1946	15,566,047
1947	27,940,213
1948	37,672,319
1949	33,651,096
1950	34,399,330
1951	$40,921,238
1952	32,603,956
1953	22,323,089
1954	25,368,262
1955	35,071,583
1956	36,262,682
1957	24,247,420
1958	14,996,123
1959	16,444,281
1960	20,595,943
1961	20,720,239
1962	24,394,297
1963	30,213,090
1964	39,511,808
1965	46,485,124
1966	42,385,263
Total	$846,155,693

Dividends Paid by Category, 1897–1966

Metals	$843,005,433
Industrial minerals	20,233,750
Coal	37,732,834
Miscellaneous	7,809,883
'Total	$908,781,900

The Annual Report since 1936 has contained tables listing dividends paid by all British Columbia mining companies, listed by category. This practice has had merit, inasmuch as it has provided a historical summary not readily available elsewhere. However, it has become of doubtful value because many mining companies have diverse sources of income, not all directly related to mining or not all in British Columbia. The amounts of current dividends are readily ascertained elsewhere.

The dividend table will be discontinued in the future, and the gross amount paid per year will be mentioned *in* the review section of the Annual Report. The 1965 Report was the last to contain details of present and past dividends paid.

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

Class	Salaries and Wages	Fuel and Electricity	Process Supplies
Metal-mining	$59,092,687	$8,212,449	$23,692,229
Exploration and development	17,597,100		
Placer	3,012		
Coal	2,851,367	208,214	16,365
Petroleum and natural gas (exploration and production)	3,488,095		
Industrial minerals	4,426,041	1,143,572	1,792,580
Structural materials industry	5,951,226	2,719,242	2,619,005
Totals, 1966	$93,409,528	$12,283,477	$28,120,179
Totals, 1965	74,938,736	11,504,343	30,590,631
1964	63,624,559	10,205,861	27,629,953
1963	57,939,294	10,546,806	12,923,325
1962	55,522,171	9,505,559	14,024,799
1961	50,887,275	8,907,034	17,787,127
1960	52,694,818	7,834,728	21,496,912
1959	49,961,996	7,677,321	17,371,638
1958	48,933,560	8,080,989	15,053,036
1957	56,409,056	8,937,567	24,257,177
1956	57,266,026	9,762,777	22,036,839
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	8,557,845	27,024,500
1951	52,607,171	7,283,051	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	6,139,470	11,532,121
1947	32,160,338	5,319,470	13,068,948
1946	26,190,200	5,427,458	8,367,705
1945	22,620,975	7,239,726	5,756,628
1944	23,131,874	5,788,671	6,138,084
1943	26,051,467	7,432,585	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	22,357,035	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

NOTE.—This table has changed somewhat through the years, so that the items are not everywhere directly comparable. Prior to 1962 lode-mining referred only to gold, silver, copper, lead, and zinc. Prior to 1964 some expenditures for fuel and electricity were included with process supplies. Process supplies (except fuel) were broadened in 1964 to include " process, operating, maintenance, and repair supplies . . . used in the mine/mill operations; that is, explosives, chemicals, drill steel, bits, lubricants, electrical, etc. . . . not charged to Fixed Assets Account . . . provisions and supplies sold in any company operated cafeteria or commissary." Exploration and development other than in the field of petroleum and natural gas is given, starting in 1966.

TABLE XII.—AVERAGE NUMBER EMPLOYED IN THE MINING INDUSTRY, 1901–66

Year	Placer	Lode Metals: Mines: Under	Lode Metals: Mines: Above	Lode Metals: Exploration and Development	Lode Metals: Concentrators	Lode Metals: Smelters	Lode Metals: Total	Coal Mines: Under	Coal Mines: Above	Coal Mines: Total	Structural Materials: Quarries and Pits	Structural Materials: Plants	Industrial Materials	Petroleum and Natural-gas Exploration and Development	Total
1901	...	2,736	1,212	...	...	...	3,948	3,041	933	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	...	2,680	1,303	...	...	...	3,983	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	...	...	...	3,836	5,275	1,855	7,130	...	...	...	...	10,966
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	...	3,290	2,198	...	...	...	5,488	3,760	1,410	5,170	...	...	...	...	10,658
1918	...	2,626	1,764	...	...	...	4,390	3,658	1,769	5,427	...	...	...	...	9,617
1919	...	2,513	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	299	2,606	1,735	...	808	2,461	7,610	3,757	1,565	5,322	493	324	124	...	14,172
1927	415	2,671	1,916	...	854	2,842	8,283	3,646	1,579	5,225	647	138	122	...	14,830
1928	355	2,707	2,469	...	911	2,748	8,835	3,814	1,520	5,334	412	368	120	...	15,424
1929	341	2,926	2,052	...	966	2,948	8,892	3,675	1,353	5,028	492	544	268	...	15,565
1930	425	2,316	1,260	...	832	3,197	7,605	3,389	1,256	4,645	848	344	170	...	14,032
1931	688	1,463	834	...	581	3,157	6,035	2,957	1,125	4,082	460	526	380	...	12,171
1932	874	1,355	900	...	542	2,036	4,833	2,628	980	3,608	536	329	344	...	10,524
1933	1,134	1,786	1,335	...	531	2,436	6,088	2,241	853	3,094	376	269	408	...	11,369
1934	1,122	2,796	1,729	...	631	2,890	8,046	2,050	843	2,893	377	187	360	...	12,985
1935	1,291	2,740	1,497	...	907	2,771	7,915	2,145	826	2,971	536	270	754	...	13,737
1936	1,124	2,959	1,840	...	720	2,678	8,197	2,015	799	2,814	931	288	825	...	14,179
1937	1,371	3,603	1,818	...	1,168	3,027	9,616	2,286	867	3,153	724	327	938	...	16,129
1938	1,303	3,849	2,266	...	919	3,158	10,192	2,088	874	2,962	900	295	369	...	16,021
1939	1,252	3,905	2,050	...	996	3,187	10,138	2,167	809	2,976	652	311	561	...	15,890
1940	1,004	3,923	2,104	...	1,048	2,944	10,019	2,175	699	2,874	827	334	647	...	15,705
1941	939	3,901	1,823	...	1,025	3,072	9,821	2,229	494	2,723	766	413	422	...	15,084
1942	489	2,920	1,504	...	960	3,555	8,939	1,892	468	2,360	842	378	262	...	13,270
1943	212	2,394	1,699	...	891	2,835	7,819	2,240	611	2,851	673	326	567	...	12,448
1944	255	1,896	1,825	...	849	2,981	7,551	2,150	689	2,839	690	351	628	...	12,314
1945	209	1,933	1,750	...	822	2,834	7,339	1,927	503	2,430	921	335	586	...	11,820
1946	347	1,918	1,817	...	672	2,813	7,220	1,773	532	2,305	827	555	679	...	11,933
1947	360	3,024	2,238	...	960	3,461	9,683	1,694	731	2,425	977	585	869	...	14,899
1948	348	3,143	2,429	...	1,126	3,884	10,582	1,594	872	2,466	1,591	656	754	...	16,397
1949	303	3,034	2,724	...	1,203	3,763	10,724	1,761	545	2,306	2,120	542	626	...	16,621
1950	327	3,399	2,415	...	1,259	3,759	10,832	1,745	516	2,261	1,916	616	660	...	16,612
1951	205	3,785	3,695	...	1,307	4,044	12,831	1,462	463	1,925	1,783	628	491	...	17,863
1952	230	4,171	3,923	...	1,516	4,120	13,730	1,280	401	1,681	1,530	557	529	...	18,257
1953	132	3,145	2,589	...	1,371	3,901	11,006	1,154	396	1,550	1,909	559	634	...	15,790
1954	199	2,644	2,520	...	1,129	3,119	9,412	1,076	358	1,434	1,861	638	584	...	14,128
1955	103	2,564	2,553	...	1,091	3,304	9,512	1,100	378	1,478	1,646	641	722	...	14,102
1956	105	2,637	2,827	...	1,043	3,339	9,846	968	398	1,366	1,598	770	854	...	14,539
1957	67	2,393	2,447	...	838	3,328	9,006	1,020	360	1,380	1,705	625	474	...	13,257
1958	75	1,919	1,809	...	625	3,081	7,434	826	260	1,086	1,483	677	446	...	11,201
1959	99	1,937	1,761	...	618	3,008	7,324	765	291	1,056	1,357	484	459	...	10,779
1960	86	1,782	1,959	...	648	3,034	7,423	894	288	1,182	1,704	557	589	...	11,541
1961	74	1,785	1,582	...	626	3,118	7,111	705	237	942	1,828	508	571	...	11,034
1962	35	1,677	1,970	270	949	3,356	8,228	548	228	776	1,523	481	517	...	11,560
1963	43	1,713	2,012	460	850	3,239	8,264	501	247	748	909	460	528	...	10,952
1964	5	1,839	1,967	772	822	3,281	8,681	446	267	713	1,293	444	509	...	11,645
1965	2	1,752	2,019	786	965	3,529	9,051	405	244	649	1,079	422	639	441	12,283
1966	**2**	**2,006**	**2,296**	**1,894**	**1,014**	**3,654**	**10,864**	**347**	**267**	**614**	**1,269**	**393**	**582**	**478**	**14,202**

NOTE.—These figures refer only to company employees and do not include the many employees of contracting firms.

TABLE XIII.—LODE-METAL OPERATIONS' EMPLOYMENT DURING 1966[1]

Name of Mine or Operator (Producing Mines)	Days Operating		Tons		Average Number Employed	
	Mine	Mill	Mined	Milled	Mine	Mill
Bethlehem Copper Corporation Ltd. (including Floods Mining and Aggregate Co.)	365	365	2,572,803	3,027,281	129	69
Bluebell (Cominco Ltd.)	356	348	246,390	246,390	151	11
Bralorne Pioneer Mines Ltd.	261	208	116,722	105,813	211	13
Britannia (The Anaconda Co. (Canada) Ltd.)	350	250	505,777	503,685	400	35
Brynnor Mines Ltd. (Boss Mountain Div.)	365	365	433,832	433,832	178	25
Brynnor Mines Ltd. (Kennedy Lake Div.)	170	170	347,739	369,747	124	11
Canadian Exploration Ltd. (Jersey)	365	365	422,882	417,440	196	15
Cariboo Gold Quartz Mining Co. Ltd.	365	365	28,877	28,877	103	9
Coast Copper Co. Ltd.	365	365	282,832	282,832	183	11
Cowichan Copper Co. Ltd.	255	255	107,680	107,680	56	49
Craigmont Mines Ltd.	254	253	1,374,098	1,359,432	283	140
Empire Development Co. Ltd.	300	102	161,084	161,084	55	4
Endako Mines Ltd. (including Pooley Bros. Ltd.)	365	365	9,085,076	5,561,000	199	200
Giant Mascot Mines Ltd. (Pride of Emory)	247	247	327,164	327,164	149	20
Giant Soo Mines Ltd. (Estella)	153	153	11,141	11,141	18	10
Granby Mining Co. Ltd. (Phoenix)	250	365	667,922	700,743	101	30
Granisle Copper Ltd.	45	45	232,855	205,630	8	10
H.B. (Cominco Ltd.)	304	304	388,902	388,902	92	14
Jedway Iron Ore Ltd.	363	363	863,298	889,281	114	19
Johnsby Mines Ltd.	155	119	5,928	7,133	10	3
London Pride Silver Mines Ltd. (Cork Province)	119	119	5,035	5,035	23	7
Mastodon-Highland Bell Mines Ltd.	244	251	26,394	24,138	41	10
Mineral King (Aetna Investment Corporation Ltd.)	365	365	114,737	114,737	80	9
Minoca Mines Ltd. (Yreka)	353	353	83,205	73,960	50	11
Mt. Washington Milling Co. Ltd.	127	322	172,502	179,502	28	50
Orecan Mines Ltd. (Iron Mike)	253	253	186,000	184,108	26	14
Red Mountain Mines Ltd.	208	194	74,394	74,094	8	15
Reeves MacDonald Mines Ltd.	350	350	395,921	395,921	116	16
Silbak Premier Mines Ltd.	132	344	8,716	14,189	7	8
Sullivan (Cominco Ltd.)	254	254	2,135,669	2,135,669	726	135
Texada Mines Ltd.	365	365	1,243,890	1,315,858	227	42
Zeballos Iron Mines Ltd.	305	274	365,576	365,576	104	3

[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.

TABLE XIV.—METAL PRODUCTION IN 1966

Property or Mine	Location of Mine	See Page	Owner or Agent	Ore Shipped or Treated	Product Shipped	Gross Metal Contents					
						Gold	Silver	Copper	Lead	Zinc	Cadmium
				Tons		Oz.	Oz.	Lb.	Lb.	Lb.	Lb.
Alberni Mining Division											
Brynnor Mine	Kennedy Lake	75	Brynnor Mines Ltd., Kennedy Lake Division	369,747	Iron concentrates, 321,157 tons						
Burmont	Tofino	—	Walter Guppy, Tofino	8	Crude ore	1	14	1,898			
F.L.	Zeballos	72	Zeballos Iron Mines Ltd.	365,576	Iron concentrates, 323,302 tons						
Atlin Mining Division											
Nil											
Cariboo Mining Division											
Aurum	Wells-Barkerville	120	The Cariboo Gold Quartz Mining Co. Ltd.	28,877	Bullion	20,312	3,390				
Boss Mountain Mine	Big Timothy Mountain	133	Brynnor Mines Ltd., Boss Mountain Division	433,832	Molybdenite concentrates, 3,069 tons containing 3,534,893 lb. of molybdenum						
Clinton Mining Division											
Nil											
Fort Steele Mining Division											
Estella	Wasa	241	Giant Soo Mines Ltd.	11,141	Lead concentrates, 710 tons; zinc concentrates, 1,885 tons	3	22,309		1,027,536	2,179,660	6,105
Sullivan Mine	Kimberley	238	Cominco Ltd.	2,135,660	Lead concentrates, 120,247 tons; zinc concentrates, 142,533 tons; tin concentrates, 364 tons containing 710,752 lb. of tin; iron sinter, 163,950 tons	223	3,140,490	384,790	176,097,686	155,297,686	385,375
Golden Mining Division											
Mineral King	Windermere	237	Aetna Investment Corporation Ltd.	114,737	Lead concentrates, 2,438 tons; zinc concentrates, 6,686 tons		47,244	66,632	3,224,524	7,618,549	35,847
Greenwood Mining Division											
Barnato	Kettle River	193	Amcana Gold Mines Ltd.	21	Crude ore	7	72	123			
Highland-Bell Mine	Beaverdell	191	Mastodon-Highland Bell Mines Ltd.	24,138	Lead concentrates, 2,879 tons; zinc concentrates, 521 tons; jig concentrates, 195 tons	899	745,278		1,056,373	971,618	6,455
Phoenix Mine	Phoenix	194	The Granby Mining Co. Ltd., Phoenix Copper Division	700,743	Copper concentrates, 17,154 tons	12,988	103,818	8,464,642			

TABLE XIV.—METAL PRODUCTION IN 1966—*Continued*

Property or Mine	Location of Mine	See Page	Owner or Agent	Ore Shipped or Treated	Product Shipped	Gross Metal Contents					
						Gold	Silver	Copper	Lead	Zinc	Cadmium
				Tons		Oz.	Oz.	Lb.	Lb.	Lb.	Lb.
Kamloops Mining Division											
Bethlehem Mine	Highland Valley	152	Bethlehem Copper Corporation Ltd.	3,027,281	Copper concentrates, 45,688 tons; molybdenite concentrates, 15 tons containing 13,850 lb. of molybdenum	503	99,794	27,989,398	......	......	......
Liard Mining Division											
McDame Belle	Cassiar	....	Ventures Mining Ltd.	1	Crude ore	......	40	......	326	230	......
Lillooet Mining Division											
Bralorne Mine	Bridge River	138	Bralorne Pioneer Mines Ltd.	105,813	Bullion	43,222	8,269	......	......	......	......
Nanaimo Mining Division											
Copper Road	Quadra Island	71	R. I. Bennett, Heriot Bay	1,748	Crude ore	11	665	118,427	......	......	......
Mount Washington Mine	Courtenay	71	Mount Washington Milling Co. Ltd.	179,502	Copper concentrates, 8,511 tons	1,980	99,860	3,266,483	......	......	......
Iron Mike	Sayward	68	Orecan Mines Ltd.	149,664	Iron concentrates, 91,341 tons	......	......	......	......	......	......
Merry Widow and Kingfisher	Quatsino-Port Hardy	66	Empire Development Co. Ltd.	161,084	Iron concentrates, 66,628 tons	......	......	......	......	......	......
Old Sport	Quatsino-Port Hardy	66	Coast Copper Co. Ltd.	282,832	Copper concentrates, 14,081 tons; iron concentrates, 73,361 tons	18,358	36,287	9,041,346	......	......	......
Texada Mine	Texada Island	72	Texada Mines Ltd.	1,315,858	Iron concentrates, 576,875 tons; copper concentrates, 8,248 tons	2,835	40,072	3,469,555	......	......	......
Yreka	Quatsino Port Hardy	65	Minoca Mines Ltd.	73,960	Copper concentrates, 11,628 tons	904	83,682	4,961,881	......	......	......
Nelson Mining Division											
Gold Belt	Salmo, Sheep Creek	213	A. Endersby, Fruitvale	39	Crude ore	11	4	......	78	155	......
H.B.	Salmo, Aspen Creek	213	Cominco Ltd.	388,902	Lead concentrates, 4,872 tons; zinc concentrates, 28,995 tons	......	43,225	......	6,921,900	32,588,520	250,312
Jersey	Salmo, Iron Mountain	214	Canadian Exploration Ltd.	417,440	Lead concentrates, 3,947 tons; zinc concentrates, 21,916 tons	......	25,663	......	6,498,752	25,750,888	215,960
New Arlington	Salmo, Erie Creek	212	G. D. Fox, Trail	7,017	Siliceous ore	1,003	3,573	......	67,392	93,166	......
Reeves MacDonald Mine	Nelway	215	Reeves MacDonald Mines Ltd.	395,921	Lead concentrates, 7,065 tons; zinc concentrates, 25,023 tons	......	49,767	......	7,978,502	27,771,533	166,062

				Tons		Oz.	Oz.	Lb.	Lb.	Lb.	Lb.
Silver Dollar	Salmo, Erie Creek	212	D. H. Norcross, Nelson	286	Crude ore	123	5,636		8,854	11,335	
New Westminster Mining Division											
Pride of Emory	Hope	58	Giant Mascot Mines Ltd.	327,164	Nickel-copper concentrates, 18,387 tons; nickel content, 3,622,400 lb.			1,822,000			
Nicola Mining Division											
Craigmont Mine	Merritt	166	Craigmont Mines Ltd.	1,359,432	Copper concentrates, 67,496 tons			33,781,407			
Omineca Mining Division											
Cronin	Smithers	82	New Cronin Babine Mines Ltd.	1,000	Lead concentrates, 91 tons; zinc concentrates, 137 tons	7	10,045		110,926	177,243	2,293
Emerald	Tahtsa Lake	105	Emerald Glacier Mines Ltd.	400	Lead concentrates, 36 tons; zinc concentrates, 81 tons	1	2,238		41,208	93,325	379
Endako	Endako	117	Endako Mines Ltd.	5,561,000	Molybdenite concentrates, 4,175 tons; molybdenum trioxide, 2,439 tons containing 13,229,852 lb. of molybdenum						
Granisle Mine	Babine Lake	97	Granisle Copper Ltd.	205,630	Copper concentrates, 3,583 tons	1,415	11,403	2,103,760			
Osoyoos Mining Division											
Nil											
Revelstoke Mining Division											
Nil											
Similkameen Mining Division											
Nil											
Skeena Mining Division											
Hope	Terrace	51	S. Piskulski, Terrace	6	Crude ore		242	333	643		
Jessie, Adonis, Rose	Moresby Island	53	Jedway Iron Ore Ltd.	889,281	Iron concentrates, 539,190 tons						
Silbak Premier Mine	Stewart	39	Silbak Premier Mines Ltd.	[illegible]	Gold-silver concentrates and precipitates, 742 tons	[illegible]	[illegible]		[illegible]	[illegible]	
Slocan Mining Division											
Altoona	Sandon	222	S. Hallgren and J. H. MacMillan, Nelson	725	Lead concentrates, 14 tons; zinc concentrates, 27 tons	1	834		14,374	22,808	142
Bluebell	Riondel	226	Cominco Ltd.	246,300	Lead concentrates, 18,183 tons; zinc concentrates, 27,573 tons		341,228	402,000	25,157,920	29,118,600	134,360
Caledonia	Retallack-Three Forks	224	Blue Star Mines Ltd.	4,500	Lead concentrates, 124 tons; zinc concentrates, 294 tons	12	11,436		198,401	315,979	1,225
Charleston	Retallack-Three Forks	222	Buchanan Mines Ltd.	785	Lead concentrates, 17 tons; zinc concentrates, 31 tons		1,601		21,744	38,065	297

TABLE XIV.-METAL PRODUCTION IN 1966—*Continued*

Property or Mine	Location of Mine	See Page	Owner or Agent	Ore Shipped or Treated	Product Shipped	Gross Metal Contents: Gold	Silver	Copper	Lead	Zinc	Cadmium
				Tons		Oz.	Oz.	Lb.	Lb.	Lb.	Lb.
Slocan Mining Division—Continued											
Cork Province Mine	Keen Creek	224	London Pride Silver Mines Ltd.	10,050	Lead concentrates, 185 tons; zinc concentrates, 798 tons	1	11,597	—	277,221	829,907	7,495
Deadman	Sandon	221	L. and O. Fried, New Denver	5	Crude ore	—	418	—	5,094	1,473	—
Galena Farm	Silverton	221	Red Deer Valley Coal Co. Ltd.	1,700	Lead concentrates, 21 tons; zinc concentrates, 105 tons	2	2,941	—	30,580	117,806	998
Hecla	Silverton	220	Johnsby Mines Ltd.	7,133	Lead concentrates, 274 tons; zinc concentrates, 556 tons	—	43,348	—	341,319	613,590	4,407
Hewitt	Silverton	220	J. Kelly, Silverton	329	Lead concentrates, 21 tons; zinc concentrates, 26 tons	1	5,070	—	23,277	28,918	205
Monarch	Silverton	221	M. Fryters, Silverton	74	Crude ore	1	10,022	—	50,185	13,284	—
Myrtle	Springer Creek	219	Kirsch Silver Mines Ltd.	51	Crude ore	—	828	—	1,128	1,906	—
Ottawa	Springer Creek	218	Lamint Mining Corporation Ltd. and Slocan Ottawa Mines Ltd.	929	Crude ore	1	73,014	—	4,703	3,201	—
Slocan Sovereign	Sandon	221	P. Leontowicz and A. Maxinuk, New Denver	14	Crude ore	—	1,260	—	18,593	1,064	—
Victor	Sandon	222	Kam-Kotia Mines Ltd.	63	Crude ore	10	8,277	—	88,781	2,569	—
Winona	Retallack-Three Forks	223	Hilroy Mines Ltd.	¼	Crude ore	—	81	—	272	13	—
Trail Creek Mining Division											
Coxey	Rossland	207	Red Mountain Mines Ltd.	74,094	Molybdenite concentrates, 309 tons containing 527,748 lb. of molybdenum	—					
Vancouver Mining Division											
Britannia Mine	Howe Sound	57	The Anaconda Co. (Canada) Ltd.	503,685	Copper concentrates, 14,346 tons; zinc concentrates, 2,075 tons	3,717	35,144	9,160,621	102,387	2,229,100	10,935
Vernon Mining Division											
Bright Star Trio	Mabel Lake	—	W. C. Rotar, Enderby	4	Crude ore	—	161	—	993	365	—
St. Paul	Monashee	—	St. Paul Mines Ltd.	8	Siliceous ore	6	8	—	82	115	—
Victoria Mining Division											
Sunloch, Gabbro	Jordan River	79	Cowichan Copper Co. Ltd. and Aetna Investment Corporation Ltd.	107,680	Copper concentrates, 3,552 tons	400	4,000	1,858,000			

Departmental Work

RETIREMENTS

Patrick Joseph Mulcahy retired as Deputy Minister on October 31, 1966, after serving more than 47 years with the Government. Mr. Mulcahy was born on January 7, 1901, in Esquimalt, where he attended public and high schools. He entered Government service as a clerk in the Attorney-General's Department in May, 1919, and was transferred in May, 1923, to the Department of Mines. He became departmental accountant in 1927 and in October, 1942, was appointed Chief Gold Commissioner. In 1952 he assumed as well the duties of Chief Commissioner, Petroleum and Natural Gas. He was appointed Deputy Minister in October, 1958. He is an associate member of the Canadian Institute of Mining and Metallurgy. He is married and has a son and daughter.

Hartley Sargent, who retired as Chief of the Mineralogical Branch on November 30, 1966, was born in Pendennis, Man., on November 18, 1901. He received his early schooling in Victoria and graduated from the Provincial Normal School as a teacher in 1923. He taught school in the East Kootenay for two years before furthering his education. He received a B.A. and a B.A.Sc. (Mining Engineering) from the University of British Columbia, an M.Sc. (Miniig Engineering) from Toronto University, and a Ph.D. (Geology) from Massachusetts Institute of Technology. Prior to joiniig the Department in July, 1935, as Resident Engineer at Nelson, he worked in the Slocan for the Victoria Syndicate, as manager of the Island Lake Gold Mines Ltd., Man., and as field engineer for Col. H. H. Yuill in the Bridge River area and Arizona. In 1938, he was transferred to the Vancouver office as Resident Engineer. Upon the retirement of P. B. Freeland in April, 1943, he succeeded him as Chief Mining Engineer at Victoria. This title was later changed to Chief, Mineralogical Branch. He is a member of the Canadian Institute of Ming and Metallurgy and served on the Institute Council for the period 1944-46. He is a member of the American Institute of Mining and Metallurgical Engineers and the Association of Professional Engineers of British Columbia, serving on the latter council from 1946-49. He was president of the Victoria Branch of the United Nations Association in Canada for 1962-64. He is married and has two sODS.

William H. Player retired as lapidary on October 31, 1966, after serving 26 years with the Department of Mines. He was born in London, England, on October 31, 1901. He joined the Royal Navy in the First World War and served with the Grand Fleet in the North Sea and the Gulf of Finland. After his discharge from the Royal Navy in 1923, he came to Canada. During the Second World War he served with the Fifth British Columbia Coast Brigade. He joined the Analytical and Assay Branch in April, 1940, as crusherman, and in November, 1946, was transferred to the Mineralogical Branch as lapidary. Mr. Player is married with four sons.

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.

Upon *retirement* of P. J. Mulcahy, K. B. Blakey was appointed to the position of Deputy Minister. R. H. McCrimmon was appointed as Chief Gold Commissioner, and R. E. Moss was appointed Chief Commissioner, Petroleum and Natural Gas. E. J. Bowles and W. Ross were appointed to the positions of Deputy Chief Gold Commissioner and Deputy Chief Commissioner, Petroleum and Natural Gas, respectively, effective November 1, 1966.

Gold Commissioners, Mining Recorders, and Sub-Ming Recorders, whose duties are laid down in the Mineral Act and *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 Ming Recorder for the mining division in which the property is situated or from the Department's offices at Victoria, and Room 320, 890 West Pender 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 55.

CENTRAL RECORDS OFFICES (VICTORIA AND VANCOUVER)

Transcripts of all recordings 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 surveyed 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 320, 890 West Pender Street. The approximate position of mineral claims held by record and of placer-mining leases are plotted from details supplied by locators.

During 1966, 18 investigations were carried out pursuant to section 80 of the *Mineral Act.* Seven investigations were with regard to certificates of work being wrongfully or improperly obtained, which resulted in 54 certificates of work being cancelled. Eleven investigations were with regard to mineral claims having been located or recorded otherwise than in accordance with the Mineral *Act*, which resulted in 5.73 mineral claims being cancelled.

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	D. P. Lancaster	D. P. Lancaster.
Cariboo	Quesnel	F. E. P. Hughes	F. E. P. Hughes.
Clinton	Clinton	R. H. Archibald	R. H. Archibald.
Fort Steele	Cranbrook	B. J. H. Ryley	B. J. H. Ryley.
Golden	Golden	W. G. Mundell	W. G. Mundell.
Greenwood	Grand Forks	R. Macgregor	R. Macgregor.
Kamloops	Kamloops	F. J. Sell	F. J. Sell.
Liard	Victoria	E. J. Bowles	E. A. H. Mitchell (Deputy).
Lillooet	Lillooet	J. A. Baker	J. A. Baker.
Nanaimo	Nanaimo	E. B. Offin	E. B. Offin.
Nelson	Nelson	G. L. Brodie	G. L. Brodie.
New Westminster	New Westminster	J. F. McDonald	E. W. Pedersen.
Nicola	Merritt	T. S. Dobson	T. S. Dobson.
Omineca	Smithers	G. H. Beley	G. H. Beley.
Osoyoos	Penticton	T. S. Dalby	T. S. Dalby.
Revelstoke	Revelstoke	D. V. Drew	D. V. Drew.
Similkameen	Princeton	B. Kennelly	B. Kennelly.
Skeena	Prince Rupert	T. H. W. Harding	T. H. W. Harding.
Slocan	Kaslo	T. P. McKinnon	T. P. McKinnon.
Trail Creek	Rossland	W. L. Draper	W. L. Draper.
Vancouver	Vancouver	J. Egdell	Mrs. S. Jeannotte (Deputy).
Vernon	Vernon	W. T. McGruder	W. T. McGruder.
Victoria	Victoria	E. J. Bowles	E. A. H. Mitchell (Deputy).

GOLD COMMISSIONERS' AND MINING RECORDERS' OFFICE STATISTICS, 1966

Mining Division	Free Miners' Certificates		Lode-mining						Placer-mining					Revenue		
	Individual	Company	Mineral Claims	Certificates of Work	Cash in Lieu	Certificates of Improvements	Bills of Sale, Etc.	Leases	Placer Claims	Leases	Certificates of Work	Cash in Lieu	Bills of Sale, Etc.	Free Miners' Certificates	Mining Receipts	Total
Alberni	78	5	1,035	1,619	$9,032.00	—	105	7	1	—	10	$250.00	10	$1,090.00	$27,623.75	$28,713.75
Atlin	174	4	828	607	5,400.00	—	47	11	1	28	24	3,600.00	19	1,466.00	22,135.75	23,601.75
Cariboo	1,205	12	7,933	3,895	4,500.00	—	158	1	8	93	325	2,250.00	114	8,076.00	87,583.50	95,659.50
Clinton	76	1	3,651	434	4,100.00	—	67	8	—	15	15	—	49	580.00	28,187.25	28,767.25
Fort Steele	277	7	1,556	2,789	7,300.00	—	122	5	—	20	30	500.00	10	2,485.00	34,066.75	36,551.75
Golden	140	2	7,088	2,452	3,700.00	—	245	11	—	14	4	—		894.00	51,765.75	52,659.75
Greenwood	191	5	2,494	1,697	1,008.00	—	151	42	—	8	11	—	3	1,805.00	32,572.00	34,377.00
Kamloops	440	12	9,230	8,497	17,400.00	—	378	3	1	10	13	1,000.00	2	4,801.00	133,725.80	138,526.80
Liard	330	3	5,840	3,968	21,300.00	5	175	2	—	17	38	250.00	15	2,246.00	84,356.00	86,602.00
Lillooet	181	2	2,046	1,064	3,000.00	—	87	1	—	26	18	1,500.00	10	1,105.00	26,337.22	27,442.22
Nanaimo	178	1	851	1,808	10,824.00	—	170	4	—	—	1	—	—	1,090.00	26,660.75	27,750.75
Nelson	404	9	1,340	578	3,600.00	—	74	30	—	25	10	250.00	13	3,458.00	18,886.50	22,344.50
New Westminster	427	5	3,305	1,675	3,800.00	—	106	3	—	4	19	750.00	55	2,833.00	34,414.75	37,247.75
Nicola	192	8	6,691	3,768	10,400.00	—	350	2	—	1	—	—		2,360.00	76,303.00	78,663.00
Omineca	611	4	12,968	10,142	16,000.00	5	398	8	—	23	89	—	40	3,735.00	151,516.00	155,251.00
Osoyoos	429	4	7,766	1,753	4,300.00	23	325	16	—	—	—	—		2,637.00	66,365.50	69,002.50
Revelstoke	110	6	953	701	3,700.00	—	47	13	—	2	19	—	—	1,746.00	15,969.50	17,715.50
Similkameen	361	6	6,184	1,678	7,400.00		203	20	—	108	94	2,250.00	235	2,505.00	70,735.73	73,240.73
Skeena	153	—	1,953	4,097	25,812.00	44	149	55	—	—	3	—		765.00	63,300.25	64,065.25
Slocan	226	5	2,244	1,004	4,744.00	—	231	22	—	18	—	—	4[illegible]	2,130.00	28,341.25	30,471.25
Trail Creek	132	4	464	264	1,016.00	—	34	5	—	—	—	—	—	1,470.00	7,317.50	8,787.50
Vancouver	2,913	584	1,828	485	6,096.00	—	62	3	—	—	5	—	1	123,980.00	37,066.12	161,046.12
Vernon	420	5	2,361	107	200.00	—	53	1	1	11	27	—	2	1,801.00	15,677.50	17,478.50
Victoria	438	52	1,094	1,056	1,100.00	—	39	2	—	5	3	—	4	11,578.00	32,336.18	43,914.18
Totals for 1966	10,086	746	91,703	56,138	$175,732.00	77	3,776	275	12	428	758	$12,600.00	58[illegible]	$186,636.00	$1,173,244.30	1,359,880.30
Totals for 1965	7,818	521	41,882	43,013	$128,482.00	6	2,380	172	16	329	818	$9,100.00	21[illegible]	$130,525.00	$705,685.14	$836,210.14

Coal, Petroleum, and Natural Gas

The Administration Branch is responsible for the administration of the *Petroleum and Natural Gas Act* and for the *Coal Act.* 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 and Petroleum Resources, 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 and Petroleum Resources, 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 the required fee.

Information concerning the ownership and standing of coal licences and coal leases may be obtained upon application to the office of the Chief Gold Commissioner, Department of Mines and Petroleum Resources, Victoria, B.C. Maps showing location of coal licences and coal leases are also available upon application and payment of the required fee.

Coal Revenue, 1966

Licences—		
Fees	$2,350.00	
Rental	4,076.32	
		$6,426.32
Leases—		
Fees	------	
Rental	------	
Cash in lieu	------	
Miscellaneous (purchase coal rights)	------	
		$6,426.32

As at December 31, 1966, 41,214,803 acres, or approximately 64,398 square miles, of Crown petroleum and natural-gas rights, issued under the *Petroleum and Natural Gas Act,* were held in good standing by operators ranging in stature from small independent companies to major international ones. The form of title held, total number issued, and acreage in each case were as follows:—

Form of Title	Number	Acreage
Permits	392	29,716,610
Natural-gas licences	3	27,815
Drilling reservations	35	503,603
Leases (all types)	3,890	10,966,775
Total		41,214,803

Petroleum and Natural-gas Revenue, 1966

Rentals and fees—		
Permits	$1,661,591	
Drilling reservations	113,496	
Natural-gas licences	1,466	
Petroleum, natural-gas, and petroleum and natural-gas leases	8,432,386	
Total rentals and fees		$10,208,939
Disposal of Crown reserves—		
Permits	$6,982,439	
Drilling reservations	4,657,510	
Leases	4,199,528	
Total Crown reserve disposals		15,839,477
Royalties—		
Gas	$2,256,725	
Oil	5,449,663	
Processed products	61,568	
Total royalties		7,767,956
Miscellaneous fees		18,073
Total petroleum and natural-gas revenues		$33,834,445

ANALYTICAL AND ASSAY BRANCH

Rock Samples

A reasonable number of samples are assayed without charge for a prospector who makes application for free assays and who satisfies the 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.

During 1966 the chemical laboratory in Victoria issued reports on 2,871 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 spectographic 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 in the table below.

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	Spectrographic Analyses	Assays
Prospectors (not grantees)	2,435	2,432	6,329
Prospectors (grantees)	205	205	533
Departmental engineers	231	70	857
Totals	2,871	2,707	7,719

An additional 146 spectrographic analyses were done for Departmental engineers, but the results were not reported.

Samples submitted to the laboratory for identification are examined by the Mineralogical Branch of the Department. During the year 106 such samples were examined.

Petroleum and Natural-gas Samples

Reports were issued on 50 samples. Of this number, 17 were samples of formation waters from wells being drilled for gas and oil in the Province, two were crude-oil samples, and five were suspected oil seeps. The remaining 47 samples were drill cores which were spectrographed for lead and zinc, and assays for the same two metals were conducted on eight of the samples. In this category 45 spectrographic analyses and 24.5 assays were reported.

Coal Samples

Reports were issued on 45 samples of coal submitted by the Purchasing Commission for proximate anlaysis and calorific value.

Miscellaneous Samples

Reports were issued on 573 samples of a miscellaneous nature. One thousand and thirty-three assays and 41 spectrographic analyses were reported in this category. An additional 42 spectrographic analyses were not reported.

For the Department of Mines and Petroleum Resources, for the Inspection Branch, two coal samples were analysed; for the Petroleum and Natural Gas Branch, a rock sample was spectrographed.

For the Department of Highways, Materials Testing Branch, 60 water samples were analysed; 18 water samples were examined for the presence of rhodamine-B and fluorescein; 13 samples of a miscellaneous nature were spectrographed; chloride was determined in three samples of clay; calcium and sodium were determined in material from a slide; and two ore samples were assayed for precious and base metals. For the Superintendent of Aircraft Maintenance of tbe same Department, a spectrographic analysis was conducted on a sample of salt which had formed on the wings of a plane.

For the Water Resources Service, Ground Water Division, the resistivity of three samples of drilling mud was determined, spectrographic analyses were performed on both the soluble and insoluble solids of seven water samples, and chemical analyses were made on the same samples. For the Comptroller of Water Rights, an analysis was made of a water sample, the dissolved salts of which were spectrographed.

For the Department of Labour, one ore sample was assayed and spectrographed.

For the Department of Agriculture, one sample of soil was examined by spectrograph for the presence of arsenic.

For the Minister of Industrial Development, Trade, and Commerce, gold and silver assays were performed on 29 samples, four of which were assayed for platinum in addition, and seven of which were spectrographed.

For tbe Typewriter Shop of the Parliament Buildings, sulphur was determined in a sample of gear-box oil.

For the Royal Canadian Mounted Police, three gold alloys were spectrographed, one sample of sand was assayed for gold and silver and examined by spectrograph as well, 20 samples of pulped rock material were assayed for gold and platinum.

For the City of Victoria, for Smoke Inspection, determination was made of the weight of residues collected in 357 bottles of water placed in various locations in the city.

For a citizen of the Province, material from a suspected oil seep was examined.

For a private mining company, platinum assays were conducted on seven samples of pulped material.

For the Outdoor Club of Victoria, two samples of water were analysed.

For a professor on the staff of the University of British Columbia, gold, silver, and platinum assays were performed on three samples of fine material.

X-RAY POWDER DIFFRACTION ANALYSES

Eighty-nine analyses of this type were performed for identification purposes.

EXAMINATION FOR ASSAYERS

The Provincial Government examinations for certificates of efficiency were held in May and December. As a result of the May examination, one candidate passed, four candidates were granted supplementals, and five failed the examination. In the December examination, eight candidates were examined, of whom six passed and two failed.

INSPECTION BRANCH

ORGANIZATION AND STAFF

Inspectors and Resident Engineers

J. W. Peck, Chief Inspector .... Victoria
Robert B. Bonar, Deputy Chief Inspector of Mines .... Victoria
L. Wardman, Senior Electrical Inspector of Mines .... Victoria
E. R. Hughes, Senior Inspector of Mines .... Victoria
W. C. Robinson, Inspector and Resident Engineer .... Victoria
R. J. Craig, Senior Inspector of Mines, Siicosis Control .... Vancouver
S. Elias, Inspector, Silicosis Control .... Vancouver
J. E. Merrett, Inspector and Resident Engineer .... Vancouver
A. R. C. James, Inspector and Resident Engineer .... Vancouver
D. R. Morgan, Inspector and Resident Engineer .... Cranbrook
David Smith, Inspector and Resident Engineer .... Kamloops
T. M. Waterland, Inspector and Resident Engineer .... Kamloops
Harry Bapty, Inspector and Resident Engineer .... Prince Rupert
P. E. Olson, Inspector and Resident Engineer .... Nelson
W. G. Clarke, Inspector and Resident Engineer .... Prince George

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. The Silicosis Control Inspectors make dust and ventilation surveys at all mines and quarries. E. R. Hughes supervises the Department's roads and trails programme and prospectors' grub-stakes. W. C. Robinson inspects mineral claims and carries out special investigations under the *Mineral Act.*

Instructors, Mine-rescue Stations

Arthur Williams .... Fernie Station
W. H. Childress .... Nanaimo Station
T. H. Robertson .... Kamloops Station
G. J. Lee .... Nelson Station

staff changes

T. M. Waterland was appointed to the Kamloops district in June, 1966, to administer the northern part of this area. W. C. Robinson was transferred from Kamloops to Victoria.

Board of Examiners for Coal-mine Officials

Robert B. Bonar, Chairman and Secretary .... Victoria
A. R. C. James, Member .... Vancouver
D. R. Morgan, Member .... Cranbrook

R. B. Bonar, A. R. C. James, D. R. Morgan, and the mine-rescue instructors for the district in which an examination is being held form the Board for granting certificates of competency to coal-miners.

An Inspector is empowered to grant provisional certificates to coal-miners for a period not exceeding 60 days between regular examinations.

Board of Examiners for Shiftbosses (Metalliferous Mines)

Robert B. Bonar, Chairman .... Victoria
A. R. C. James, Member .... Vancouver
J. E. Merrett, Member .... Vancouver

The Board conducts written examinations in various mining centres for applicants for underground shiftboss certificates. The Board is also empowered to grant provisional certificates without examination and under such conditions as the Board considers necessary.

MINERALOGICAL BRANCH

Field work by officers of the Mineralogical Branch includes geological mapping, detailed geological mapping and examinations of mineral deposits, and studies related to engineering geology. The results are published partly in the Annual Report of the Mister of Mines and Petroleum Resources 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 31, 1966, the professional staff included the following geologists, all stationed at Victoria:-

M. S. Hedley .... Chief of the Branch
Stuart S. Holland .... Senior Geologist
J. W. McCammon .... Geologist
N. D. McKechnie .... Geologist
G. E. P. Eastwood .... Geologist
James T. Fyles .... Geologist
A. Sutherland Brown .... Geologist
J. M. Carr .... Geologist
W. G. Jeffery .... Geologist
A. F. Shepherd .... Geologist
E. W. Grove .... Geologist
N. C. Carter (on leave of absence from October, 1966) .... Geologist
R. V. Kirkham (on leave of absence from November, 1966) .... Geologist

All are Registered Professional Engineers or are applying for registration. Most hold the Ph.D. degree.

A total of nine field assistants was employed on the various projects undertaken in 1966.

Hartley Sargent retired at the end of November, after 23 years as Chief of the Branch. He was succeeded by M. S. Hedley, whose position as Senior Geologist was then filled by Stuart S. Holland.

R. V. Kirkham, a field assistant of several years, was appointed to the staff. He was granted leave of absence in November to continue postgraduate studies at the University of Wisconsin.

N. C. Carter, in October, was granted leave of absence to continue postgraduate studies at the University of British Columbia.

Technical editing of the Annual Report of the Minister of Mines and Petroleum Resources and of other publications was directed by M. S. Hedley. Copy for printiug was prepared by and under the direction of Mrs. Rosalyn J. Moir. 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 selected areas and of mineral deposits. Mr. McCammon is responsible for studies of industrial minerals and structural materials, and Mr. Shepherd for records and library.

FIELD WORK, 1966 SEASON

A. Sutherland Brown, with one assistant, examined mining properties and mineral showings between Williams Lake, Omineca River, and Terrace, concentrating on seven copper and molybdenum properties currently under exploration. At the same time he investigated the presence of mercury halos at each of these properties.

N. C. Carter, with one assistant, carried out regional mapping and detailed investigations around several disseminated copper prospects north of Babine Lake. A month was spent in the vicinity of Alice Arm examining properties under active development. 'Most were molybdenum deposits.

J. M. Carr spent most of the summer season finalizing for publication the results of field work carried out in past seasons in the Highland Valley area. A period of five weeks was spent examining properties in the Highland Valley and Brenda Lake areas and at Pemberton. These were all copper and molybdenum deposits.

G. E. P. Eastwood, with one assistant, spent most of the season making a detailed examination of molybdenum deposits on Red Mountain, near Rossland. This work was centred on the Coxey and Giant Crown-granted claims. About two weeks were spent examining certain rocks near Harrison Lake suspected of containing nickel. This was an extension of past work at the Giant Nickel mine, near Hope.

James T. Fyles, with one assistant, spent most of the field season in structural mapping on Mount Copeland, west. of Revelstoke, and in examining lead-zinc mineralization there. This completed the work begun in 1965. The remainder of the season was spent examining mining properties and showings in Revelstoke, Lardeau, and Golden-Windermere areas.

E. W. Grove, with three junior assistants and the senior assistance of R. V. Kirkham and N. E. Haimila, mapped a region north of Stewart, chiefly in the Bowser River, Treaty Creek, and south Unuk River areas. This was a helicopter-assisted undertaking in otherwise inaccessible country. It was in part an extension of the past two seasons' work and in part a checking and updating of older mapping done north of the Granduc mine.

Stuart S. Holland examined properties south of Smithers, studied Devonian limestone on the Alaska Highway, and performed a number of Departmental duties such as rock collection and investigation of activities in various parts of northern British Columbia.

W. G. Jeffery, with one assistant, examined properties and showings in the general Stikine River region. Fifteen separate mineral showings were examined on or near Iskut River, Scud River-Galore Creek, Barrington River, Schaft Creek, Dease Lake, and upper Stikiie River.

R. V. Kirkham, both before and after the work north of Stewart, visited Hudson Bay Mountain at Smithers and continued studies carried out there during the two preceding years, chiefly at and in the vicinity of the large molybdenum deposit at Glacier Gulch.

J. W. McCammon spent part of the field season performing Departmental duties and in starting compilations for eventual publication. Visits were paid and examinations made of limestones in Port Renfrew-Lake Cowichan area; stone quarries in the southern Okanagan; deposits of talc, gypsum, barite, fluorspar, diatomite, and pozzolan in various parts of the Province; and shale plants on Saturna and Saltspring Islands.

N. D. McKechnie examined 45 properties in various parts of southern British Columbia from Vancouver Island to Nelson.

AIR-BORNE MAGNETOMETER MAPPING

The project of air-borne magnetometer mapping, jointly financed by the Geological Survey of Canada and the British Columbia Department of Mines and Petroleum Resources, continued in 1966. The contractor, Spartan Air Services Ltd., did the field work covering 35 map sheets mostly in 92P and parts of 82L, M; 921, o; and 93A, B lying between latitudes 51 degrees and 52 degrees 30 minutes north.

No aeromagnetic maps based on the above work were published in 1966.

PETROLEUM AND NATURAL GAS BRANCH

The Petroleum and Natural Gas Branch is responsible for the administration of the Regulations Governing the Drilling of Wells and the Production and Conservation of Oil and Natural Gas, and the Regulations Establishing Gas-Oil Ratio Adjustment Factors, Oil Production Allowables, Overproduction and Underproduction, made pursuant to the *Petroleum and Natural Gas Act*.

The former provides for the use of efficient and safe practices in the drilling, completion, and abandonment of wells; for the orderly development of fields discovered within the Province; and for the conservation and prevention of waste of oil and natural gas within the reservoir and during production operations.

The regulation concerning gas-oil ratio factors, production allowables, and overproduction and underproduction provides for conservation of reservoir energy by limiting the volume of oil that can be produced during any day, month, or year from a well or pool in accordance with the schedule of gas-oil ratio adjustment factors. The factors, which are applied against oil production, are applicable when the average volume of gas produced with each barrel of oil exceeds a specified level, and when applied result in reduction of the producing rate. Overproduction and underproduction are adjusted on a monthly basis.

Every well location must be approved by the Branch before the well is drilled. All operations related to drilling and production are inspected frequently to ensure compliance with the provision of all regulations, including such features as facilities and practices used, adequate plugging of abandoned wells, surface restoration of well-sites, well testing and measurement procedures employed, disposal of produced water, protection of installations against fire, and general conservation.

Investigations are made of complaints of property damage resulting from drilling and producing operations, and from geophysical work programmes.

Comprehensive records of all drilliig and producing operations are maintained at Victoria and are made available for study, or are published, for the use and benefit of anyone interested in oil or gas development in British Columbia. Samples of bit cuttings, as well as all core, obtained from every well drilled in the Province, are collected and retained at the field office located at Charlie Lake, where they may be studied by interested persons. Charlie Lake is adjacent to the Alaska Highway about 5 miles northwest of Fort St. John.

Detailed reservoir engineering and geological studies are conducted on the basis of technical information submitted to the Branch from operating companies, as well as information acquired through field work by Branch personnel. Estimates of the reserves of oil and natural gas are made twice a year, at the end of June and December. Crown-owned oil and natural-gas rights are evaluated prior to being disposed of by public tender.

ADMINISTRATION

The Petroleum and Natural Gas Branch is subdivided for administrative purposes into three sections. These sections and their supervisors are as follows: Reservoir Engineering, R. R. McLeod; Development Engineering, W. L. Ingram; and Geology, S. S. Cosburn.

The field office at Charlie Lake, which includes the core and sample laboratory, is supervised by the District Engineer, G. E. Blue.

STAFF

Headquarters, Victoria

J. D. Lineham	Chief of Branch
R. R. McLeod	Deputy Chief of Branch and Senior Reservoir Engineer
K. C. Gilbart	Reservoir Engineer
G. V. Rehwald	Reservoir Engineer
P. K. Huus	Reservoir Technician
W. L. Ingram	Senior Development Engineer
M. B. Hamersley	Development Assistant
J. F. Tomczak	Statistician
S. S. Cosburn	Senior Petroleum Geologist
J. E. Hughes	Petroleum Geologist
D. L. Griffin	Petroleum Geologist
H. B. Fulton	Petroleum Geologist
D. M. Callan (until September 30th)	Petroleum Geologist

The headquarters staff includes also two geological draughtsmen, one clerk-stenographer, three clerks, and three clerk-typists.

Field Office, Charlie Lake

G. E. Blue	District Engineer
D. L. Johnson	Field Engineer

M. A. Churchill (until July 31st) .... Field Technician
D. A. Selby .... Field Technician
G. T. Mohler .... Field Technician
W. B. Holland .... Field Technician

The field-office staff includes also three core and sample laboratory assistants, one clerk-stenographer, and one clerk.

Staff Changes

D. M. Callan, petroleum geologist, resigned effective September 30th.

M. A. Churchii, field technician, resigned effective July 31st.

W. B. Holland, field technician, a graduate of the British Columbia Institute of Technology, joined the staff on June 20th.

BOARD OF ARBITRATION

Chairman: A. W. Hobbs, solicitor, Department of the Attorney-General. Members: R. R. McLeod, engineer, Department of Mines and Petroleum Resources; S. G. Preston, agrologist, Department of Agriculture.

The Board of Arbitration is responsible to the Minister of Mines and Petroleum Resources, and is established under the authority of the ***Petroleum and Natural Gas*** Act. The Board grants right of entry by oil and gas companies upon alienated land and determines conditions of entry and compensation therefor. It also terminates the right of entry when the company has ceased to use the land.

The Board held no hearings in 1966 but made seven orders for immediate right of entry with respect to which it may be necessary to fix compensation at some future time in the event of the parties concerned failing to dispose of the matters by agreement; also, amendments were made to three orders that were made in 1965.

CONSERVATION COMMITTEE

Chairman: K. B. Blakey, Deputy Minister of Mines and Petroleum Resources. Mr. Blakey was appointed Chairman on Odober 27th following the retirement of P. J. Mulcahy.

Members: N. D. McKechnie, geologist, Department of Mines and Petroleum Resources; M, H. A. Glover, economist, Department of Industrial Development, Trade, and Commerce.

The Conservation Committee is responsible to the Minister of Mines and Petroleum Resources and was established originally on October 11, 1957, under the authority of the ***Petroleum and Natural*** Gas Act. Its duties are as follows:—

(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 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.

The Conservation Committee did not meet in 1966.

GRUB-STAKING PROSPECTORS

Under authority of the ***Prospectors' Grub-stake*** Act the Department has provided grub-stakes each year since 1943 to a limited number of applicants able to qualify. The normal maximum grab-stake is $300, with an additional amount up to $200 for travelling expenses. A limited number of experienced prospectors of proven ability may be granted top priority grub-stakes of as much as $400, plus a maximum of $300 for travelling expenses, where prospecting is to be done in approved areas where air transportation is necessary. Items such as guns, fishing-gear, stoves, boats, and outboard motors are not a legitimate charge against the grant and must be provided by the applicant. Costly items such as geophysical survey equipment, mineralights, Geiger counters, berylometers, packsack diamond drills, two-way radios, horses, and packsaddles are not expendable in any one season and cannot be accepted at full cost against the grant, but a reasonable rental charge may be considered.

To qualify at the present time, the Department requires that the applicant shall be a bona fide prospector holding a free miner's certificate. He must be a British subject, between the ages of 18 and 70 years, and must have resided in British Columbia during the year preceding the date of application. He must be able to identify common rocks and minerals. He should have bush experience and be physically and mentally fit. He must agree to abide by the regulations which the Department may make. The grub-staked prospector is provided with maps, a current list of prices of metals and ores, and information on prospecting and related matters.

It is required that in order to obtain the maximum grub-stake, he agree to spend at least 60 days actually prospecting in the area of his choice in British Columbia considered favourably by officers of the Department. If he prospects a lesser time, the grant will be reduced proportionately. The grub-stakes are not intended for week-end prospecting or for short trips from a home base. The grant is usually made in two payments; the first at the beginning of the season, and the second after he has completed 60 days in the field and has submitted a diary. 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. A field engineer is employed, who contacts as many prospectors as he is able during the field season and gives advice and direction to those who need it. Grantees are permitted a reasonable number of free assays.

The grub-stakes are granted with the object of maintaining the search for mineral occurrences with mine-making possibilities. The grants are not intended for the purpose of exploring and developing occurrences already found, but one year is allowed to prospect ground that has been staked by a grantee while on the grub-stake. No interest is retained by the Government in any discovery made by a grantee, other than that which applies in common with all free miners. Time is not allowed for prospecting on old properties which have had work done on them, unless mineral deposits of present economic importance have been discovered on them for the first time. Grub-stakes are not given for prospecting for placer deposits or gem-stones. The grantee must not accept pay from other sources for services rendered during the period credited to the grub-stake.

It is recognized that competent and experienced prospectors are capable of looking after themselves in wilderness areas. Nevertheless, experience has shown that less hazard may result when prospecting is done by two or three men in a team. A man working alone may be injured or be taken seriously ill and, if alone, he may have to endure extreme hardship and pain.

Grub-stake grantees are not working for the Government but are self-employed and are not covered under the provisions of the *Workmen's Compensation Act.* Therefore, it is recommended that prospectors make their own arrangements concerning insurance coverage to provide for medical and other expenditures that may be incurred in the event of an accident.

The grants are intended only to assist grantees to go out and prospect and are not intended for the support of dependents. Therefore, applicants who are married and have dependents are required to give assurance that their dependents will be adequately provided for during the time the applicant is absent in the field.

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
1958	24,850	47	287	211
1959	21,575	38	195	202
1960	28,115	50	358	241
1961	29,175	47	309	325
1962	26,730	52	233	189
1963	29,000	50	150	843
1964	31,751	53	213	351
1965	24,717	42	241	219
1966	26,787	43	224	239

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

Fifty-five applications were received in 1966, and 43 grub-stakes were authorized. Two grantees were unable to go out, and their initial payments were returned. Grantees who were unable to complete the terms and conditions of the grant received only partial payment. Twenty prospectors were given grants for the first time. Four grantees proved to be unsatisfactory. Several grantees used aircraft for transportation to their prospecting areas. One grantee was taken ill and was unable to continue prospecting.

D. H. Rae interviewed applicants in Vancouver and contacted 23 grantees in the field and gave advice and direction to those who needed it. The following notes comprise Mr. Rae's summaries of the prospecting activities and results and are. based on observations made by him in the field and from information contained in the diaries of the grantees.

Alberni Mining Division.-A considerable amount of work was done in the Pachena River area not far from Bamfield. Crushed and faulted outcrops of diorite and monzonite were common in the river valley. These contained some pyritized quartz and calcite stringers which contained small amounts of molybdenum and copper.

The upper Klanawa River area is underlain by diorite; near Black Lake outcrops of diorite showing minor alteration and brecciation were found. No mineral finds were reported.

Atlin Mining Division.—A base camp was established close to Sbini Lake. Shale and other iron-stained sedimentary rocks were seen in Goldrun Creek; at Shii Lake, diorite and sedimentary rocks were found; in Shini Creek valley a gossan area was investigated; and nearby a considerable amount of malachite float was found. Further prospecting showed up iron-stained limestone, sandstone containing quartz stringers, a wide mineralized zone which returned fair assays in copper, and a narrow quartz-galena vein which assayed moderately well in silver and copper. At Parton River, more iron-stained limestone and some shale were. encountered. The whole area warrants further prospecting.

In the Goat Creek valley some short fibre asbestos was found, and a small gossan was prospected without success. Up Blanchard River, the principal rocks exposed appear to be micaceous and gneissic. Pyrite was evident in quartz stringers. A base camp was established on Kelsall Lake, and a considerable amount of argillite contact was prospected. Some brown-stained granite rocks, and gneiss and argillite exposures were encountered. Nothing of economic importance was found.

Cariboo Mining Division.—Small amount of work was done along the Fraser River about 14 miles south of Prince George, where a porphyry dyke with a minor amount of visible gold was reported. Some pyritized andesite was also prospected.

From a base camp near the West Road River about 40 miles southwest of Prince George, a large area was carefully investigated. Rock outcrops are scarce except in main river canyons, creek beds, and a few open ravines. Volcanics, shales, and slate are common, some partly serpentinized rocks were observed, and a few thin beds of lignite were seen.

The Euchiniko River exposes some volcanics, vesicular lava, shale, and limestone; a few granite and granodiorite outcrops were. examined. In general the area is a poor one to prospect and the results were discouraging. In the Stone Creek valley, quartz stringers were observed, and some outcrops of micaceous granite were examined.

Clinton Mining Division.—Some inconclusive work was done near Pavilion Lake on numerous limestone outcrops and in an area underlain by basalt near Maiden Creek. Some geochemical testing was done on streams entering Chilco Lake.

Greenwood Mining Division.—Along the Kettle River, narrow quartz veins were examined, near Bruer Creek small amounts of molybdenite were reported, and at Lynch Creek some mica-bearing intrusive rocks were investigated. Near Baldy Mountain an area underlain by coarse granite received some attention; pegmatite dykes, limestone, gneiss, and sericite schist are present in the same area.

In the Conkle Lake area the underlying rocks are mainly sedimentary with smaller amounts of volcanic rocks. An exposure of iron oxide was examined near Red Ochre Creek. The following brief information was included in the same report: On Seal Creek, syenite and porphyry are present; on Texas Creek, a limestone belt showing minor amounts of pyrrhotite was prospected; on Day Creek, limestone and porphyry occur; on McRae Creek there is minor molybdenite mineralization in greenstone; on Iron Creek some galena float was picked up, old workings in a fairly strong mineral zone were examined, and a wide exposure of limestone was examined. Near Sheep Lake and Blueberry Creek, exposures of granite are very common.

Liard Mining Division.—South of the Alaska Highway near Mile 380 some unsuccessful prospecting was done in an area which showed many sedimentary rock exposures.

East of Cartmel Lake, outcrops of basalt, lava, and sedimentary rocks were encountered. A short time was spent prospecting northeast of the north end of Dease Lake. At Quartz Creek, north of Dease Lake, a brown-stained micaceous rock outcrop was examined and sampled; assay returns were very low.

Lillooet Mining Division.-Some prospecting was done from a base camp at Gold Bridge and the following information was recorded: Serpentine, schist, argillite, limestone, peridotite, chert, and granite exposures were noted over an appreciable length of Noel Creek valley and large boulders of jade were also found, on Hog Creek, chert, talcose schist, and diorite are exposed; on Hurley River, quartz, schist, and diorite occur; on Piebiter Creek (a tributary of Cadwallader Creek), scheelite float, granite, skarn, basalt, breccia with some sulphides, and a dunite dyke showing some copper sulphides were found; on tributaries of Tyaughton Creek, cinnabar float, quartz float, and some volcanic rocks were found. Apart from the jade boulders there were no discoveries of economic interest in these areas.

Nanaimo Mining Division.-Prospecting was carried on about 30 miles up the Salmon River valley and near the headwaters of Gold River. Some chalcopyrite both in place and as float was found in an area underlain by quartzite and volcanics. Chalcopyrite float was also found near both Tyee Mountain and Chetwood Lake but its source was not located. At Horseshoe Mountain favourable geology was encountered. Several samples assayed contained good values in copper, but no mineral occurrence of economic importance was found.

Nelson Mining Division.-A considerable amount of work was done in the Cultus Creek-Laib Creek area on the west side of Kootenay Lake above Tye. Fair copper-silver assays were obtained from samples taken from mineralized zones in both shale and quartzite; minor copper mineralization in oxidized limestone was found 8 miles up Cultus Creek, and nearby a limestone-granite contact showed a considerable amount of oxidation and minor sulphide mineralization. Between Hughes and Laib Creeks, the underlying quartzite contains numerous quartz stringers, and a small pegmatite dyke in argillite was prospected. In the Midge Creek valley, minor amounts of galena were found in altered limestone.

Across Kootenay Lake from Boswell, an unsuccessful attempt was made to locate the source of galena float found near the shore of the lake. At Wilkinson Creek, outcrops of serpentine and granite showing pyritized stringers of quartz were prospected, and at Dale Creek numerous outcrops of serpentine were reported. The following information was submitted by two prospectors who covered an extensive area on the west side of Kootenay Lake. They report the occurrence of pegmatite dykes in Blazed and Toby Creek basins; of quartzite, granodiorite, and pegmatite dykes containing some tourmaline in Topaz Creek valleys; of a considerable amount of mica and much coarse quarts near Jersey Creek; of granite hosting pegmatite dykes of varying widths, some placer gold, narrow quartz stringers in fine-grained diorite showing minor amounts of galena and some copper stain, and some rock outcrops carrying garnet crystals at Shaw Creek; and of interesting mineralized float in Cultus and Pass Creeks. Nothing of economic interest was reported.

Some inconclusive work was done in the Lost Creek valley, and up Beaver Creek a narrow quarts vein containing small amounts of copper and molybdenite was prospected.

A considerable amount of work was done in the Boundary Creek area. At Monk Creek, pyritized schist was reported, and a fine-grained dyke containing small amounts of galena and pyrite was investigated. In the North Star Creek valley a few barren-looking quartz veins were investigated, and at the headwaters of Priest River outcrops of conglomerate and some float showing small amounts of molybdenite were found.

New Westminster Mining Division.-A small amount of prospecting was done in the Harrison Lake area, and the following information was submitted: Small amounts of molybdenite in rhyolite and a dark-coloured dyke showing small amounts of pyrite and chalcopyrite were found on Bear Mountain. Some work was done near Hicks and Deer Lakes and up Mahood Creek, but nothing important was found. In the Ruby Creek valley some ultrabasic rocks are exposed, as well as serpentine and volcanics.

Omineca* Mining Division.-Some** prospecting was done on a small gossan at the south end of Manson Lakes. ***At the headwaters of Gaffney Creek. outcrops of altered, pyritized limestone were investigated. Near Mount Gillis a granite-argillite contact was found, and an attempt was made to locate the source of quartzite float showing copper mineralization. At Burden Lake ***(east*** of Wolverine Range) a limestone-pegmatite contact was investigated. West of Germansen Lake a rock exposure showing numerous small quartz veinlets received some attention.

A considerable amount of prospecting was done from a base camp established about 60 miles north of Finlay Forks. In the Police-Chowika Creeks area, pyritized garnet schist and limestone showing minor copper mineralization were reported. In the Davis River valley, limestone and schist were the most prominent rocks; up Rubyred Creek minor copper mineralization was noted; in Deserters Canyon, limestone and schist were exposed, and in the Tom Creek valley the limestone contains quartz and calcite stringers showing minor copper mineralization. In the Ingenika River valley, pegmatite dykes, limestone, and schist were reported. No showings of economic interest were found in these areas.

A base camp was established at a high elevation near the Lorraine mine on Mount Cronin, northeast of Smithers. Snow and weather conditions interfered with prospecting. Rock exposures are mainly rhyolite and breccia, and quartz veins and stringers are common. Some of the quartz veins are mineralized wtih varying amounts of pyrite, chalcopyrite, galena, and sphalerite; some good assays were obtained. Near Mount Hyland the area is underlain by altered sedimentary rocks.

A considerable amount of prospecting was done in the Vanderhoof area, and the following information was submitted: Outcrops of granite, volcanics, argillite, andesite, limestone, and chert in the Copley Lake area were examined; diorite and volcanics outcrop at Tetachuck Lake: various types of sedimentary rocks, andesite, volcanics, and oxidized pyritized quartzite were noted in the Redfern Creek valley; north of Nulki Hills prospecting was done along a fault zone and in outcrops of grey granite, gneiss, and diorite. A short distance north of the east end of Fraser Lake, volcanic rocks containing barren quartz veins were examined, and at Tahultzu Lake, outcrops of Topley granite and diorite were seen. No interesting mineral showings were found.

A considerable amount of prospecting was done from a base camp established on Oppy Lake, just south of Eutsuk Lake. Rock outcrops are numerous, and the area appears to be underlain by reddish-coloured syenite, monzonite, quartz-diorite, and considerable rhyolite containing quartz and pyrite. Quartz veins and masses in the rhyolite show fair amounts of malachite and chalcopyrite. Some interesting assays were obtained from samples taken from these zones. The area merits further work.

Osoyoos Mining *Division.*—Some work was done in the Apex Mountain-Dividend Mountain area in a section where there is a considerable amount of heavy sulphide mineralization over a large area. Near Allendale Lake, 15 miles east of Okanagan Falls, in an area underlain by a coarse granodiorite (at times syenitic), a considerable amount of copper mineralization was found, both bornite and malachite. The area warrants further investigation.

Revelstoke Mining Division.—In the Willis Lake area a few outcrops of mica schist and gneiss, fine-grained pegmatite, and pyritized limestone were observed. In the Craigellachie Creek valley, light-coloured pegmatite dykes were found, and some prospecting was done along a major fault zone. At Gorge Creek nothing of interest was reported; at Crazy Creek an iron-stained schistose rock containing some pyrrhotite was investigated.

Similkameen Mining Division.—Some work was done west of Princeton, and the following information was submitted: Some sulphide mineralization occurs along a major fault zone, close to a granite contact in the Three Brothers Mountain-Copper Creek area. Iron sulphides in Nicola andesite were found along Lost Chain and McNulty Creeks. Chalcopyrite and copper carbonates in Nicola schists and pyrite and pyrrhotite in andesite occur on Sunday Creek. Southeast of Mount Thynne there is a considerable amount of iron and copper sulphides.

Skeena Mining Division.—Some prospecting was done northwest of the centre of Kitsumkallum Lake.

Slocan Mining Division.—Some work was done 8 miles west of Edgewood on a small occurrence of molybdenite in granite. Work is continuing on this showing.

In the Bjerkness Creek valley, on the flanks of True Blue Mountain, the underlying rocks are schist containing quartz stringers and minor amounts of serpentine showing specks of magnetite. Some small stringers of short fibre asbestos and diorite dykes were investigated. In Campbell Creek outcrops of pegmatite dykes and mica schist were reported.

Vancouver Mining Division.—Up Matsiu Creek, flowing into Knight Inlet, granodiorite and limestone were encountered, but heavy timber and thick undergrowth impeded prospecting. At Walsh Cove (Redonda Island), pink granite outcrops were examined. Some inconclusive work was done at Butterfly Bay, on Thurlow Island.

In the Powell River area, in Appleton River valley, prospecting was done along a granite contact where mineralization of magnetite, chalcopyrite, and pyrite occurs.

Vernon Mining Division.—In Monashee Pass some granitic outcrops were investigated. At Camels Hump, east of Lumby, the underlying rock is limestone, argillite, and gneiss. Some work was done near Echo Lake, and in Bonneau Creek valley. Near Creighton Creek, outcrops of granite, gneiss, volcanics, and andesite were observed. Near Mount Aberdeen much overburden was encountered, and outcrops of lava were reported. At Bluenose Mountain, volcanics and gneissic granites were seen. At Duteau Creek, gneiss containing narrow pyritized quartz veins was prospected, and similar veins were investigated at Vidler Creek. Nothing of economic interest was reported from any of these areas.

Victoria Mining Division.—Some prospecting was done in the Port Renfrew area and the following information was submitted: Granodiorite with inclusions of lens-shaped bodies of basalt showing mineralization of pyrite along the contact was found in the Hemmingsen Creek valley. In one small creek in the area no rock outcrops were found except in the canyons where basalt was common. Diorite is exposed and limestone float containing some arsenopyrite was picked up near Garnett Creek. Near the headwaters of this creek some magnetite float was found. At Mount Todd, on the San Juan River, diorite and granite appear to be the most common underlying rocks. At Mount Bolduc, four claims were staked on a fairly large zone mineralized with chalcopyrite and malachite. Considerable stream and silt testing were done in this area.

MINING ROADS AND TRAILS

Provision is made in the *Department of Mines and Petroleum Resources Act* whereby the Minister may, with the approval of the Lieutenant-Governor in Council, authorize the expenditure of public funds for the construction or repair of roads and trails into mining areas. Assistance on a half-cost basis may also be provided on roads and trails to individual properties.

Requests for road and trail assistance must be made to the Department before the commencement of work. The type of access upon which assistance may be given depends upon the value of the property, the stage of development, and the amount of work to be done. A trail is sometimes sufficient for initial exploration, and a tractor-road may be adequate for preliminary work. Subsequent development might warrant assistance on the construction of a truck-road. A carefully drawn sketch or plan of the location of the road is required to be submitted and, where warranted by the amount of assistance requested, a report on the property by a professional geological or mining engineer may be required. An engineer from the Department may be required to report on the property before a grant is made and to inspect the road after the work has been done.

Total mileages and disbursements under " Grants in Aid of Mining Roads and Trails " during the year ended March 3 1, 1967, were as follows:—

	Miles	Cost
Roads—		
Construction	168.05,	$181,242.36
Maintenance	255.5	46,440.94
Bridges-maintenance		2,870.00
Total		$230,553.30

In addition to the above, work was continued on the Stewart-Cassiar road. The construction is supervised by the Department of Highways on behalf of the Department of Mines and Petroleum Resources. The only new road construction was on Project No. 1391. This is the 29.08-mile section between Burrage River and Ningunsaw River. The contract was awarded on November 18, 1965, to Ben Ginter Construction Company in the amount of $3,978,553.50. Work on the project was stopped on October 5th for the winter. At the end of the first year's work the project was 14.4 per cent completed.

Benray Bridge Company Limited continued work on the construction of the substructure for the Bell-Irving No. 1 bridge located about 58 miles from Stewart. On June 16, 1966, a contract was awarded to Canada Iron Foundries Limited, Western Bridge Division, in the amount of $384,696.40, for the fabrication and erection of the steel work for the bridge which is to be built in 1967.

MUSEUMS

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

Specimens from the collection in Victoria, accumulated in a period of more than 60 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 Petroleum Resources and specimens donated by property-owners. The collection also includes type specimens purchased from distributors. Other valuable 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 and Petroleum Resources, bulletins, and other publications of the Department, with prices charged for them, are listed in the Department of Mines and Petroleum Resources List of Publications, available from the Chief of the Mineralogical Branch.

Publications may be obtained from the offices of the Department in Victoria and from the office of the Geological Survey of Canada in Vancouver. They are also available for reference use in the Department's Library (Mineralogical Branch) at Victoria, in the reading-room of the office of the Geological Survey of Canada 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-MMING 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 and Petroleum Resources in Victoria and Vancouver. Copies of these maps may be obtained on request made to the Chief Gold Commissioner, Victoria. The boundaries of surveyed claims and leases are shown on the reference maps and other maps of the British Columbia Department of Lands, Forests, and Water Resources.

OFFICES OF THE BRITISH COLUMBIA DEPARTMENT OF MINES AND PETROLEUM RESOURCES AND THE DEPARTMENT OF ENERGY, MINES AND RESOURCES, CANADA.

The Provincial Inspectors of Mines and Resident Engineers for the Vancouver Island and Lower Mainland districts, the Silicosis Control Inspectors, and the Gold Commissioner and Mining Recorder for Vancouver Mining Division occupy offices at Room 320, 890 West Pender Street, Vancouver. Nearby, at 326 Howe Street, officers of the Geological Survey of Canada are stationed, and a technical library is maintained.

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

Topographic Mapping and Air Photography

The Annual Report of the British Columbia Lands Service, 1966, describes in full detail the activities of the Legal Surveys, Topographic, Air, and Geographic Divisions of the Surveys and Mapping Branch. The following is a summary of activities of interest to the mineral industry:—

A large proportion of the field efforts of the Topographic Division were concentrated in northern British Columbia. Surveys for pondage mapping took place on the upper and lower Stikine, lower Iskut, and sections of the Kechika, Gataga, Fort Nelson, and Liard Rivers. Field control was completed for seven National Topographic map-sheets around the Stikine and Iskut Rivers. In response to a request by the Department of Mines and Petroleum Resources, additional horizontal and vertical control was placed in and around the Clarke Lake, Yoyo, Kotcho Lake, and Petitot River natural-gas fields. Full aerial photographic coverage of the area preceded the field work.

Photographic units of the Air Division exposed more than 29,000 aerial photographs during 1966. A few of the 71 projects completed for Government agencies and departments were: 8,800 square miles in National Topographic blocks 941, 94J, 94O, and 94P (northeastern comer of British Columbia); 3,200 square miles in National Topographic blocks 104F and 104G (Stikine River region); and 3,100 square miles in block 104.4 (northeast of Stewart), all at 40 chains scale, and 12,515 square miles at 20 chains scale in the North Thompson, Purden Lake-Bowron Lake, Queen Charlotte Islands, Rivers Inlet, Sayward, and Slocan-Nakusp areas. Sales and loans of aerial photographs reached their highest levels in the past decade, being 76,956. Mining companies were responsible for 32,217 photographs loaned or reprinted, an increase of 34 per cent over 1965. As a comparison of growth over the past decade, the mining industry borrowed or purchased only 2,186 aerial photographs during all of 1956. Today, the mining industry is by far the largest private user.

The Geographic Division released four new land status maps in 1966. These were National Topographic sheets 93B (Quesnel) and 93G (Prince George) at 1:250,000 scale and 82K/NW (Beaton) and 82K/NE (Invermere) at 1 inch to 2 miles.

The new Gazetteer of British Columbia, 1966, was published by the authority of the Canadian Permanent Committee on Geographical Names. It is being distributed by the Queen's Printer, Ottawa.

Indexes to published maps, reference maps, manuscripts, and air photographic cover are available through the Director, Surveys and Mapping Branch, British Columbia Lands Service, Victoria, B.C.

Department of Energy, Mines and Resources

The Canadian Government Department of Energy, Mines and Resources performs many functions related to mining and the mineral industry in general. The Mines Branch, Geological Survey of Canada, Surveys and Mapping Branch, and the Mineral Resources Division provide services of the Department of direct interest to the mineral industry.

GEOLOGICAL SURVEY OF CANADA

The Geological Survey of Canada each year has several geological parties in the field in British Columbia.

Over a period of nearly a hundred years many reports and maps covering areas of British Columbia have been published by the Geological Survey of Canada. These publications have provided geological information that has greatly benefited mining and prospecting activities in the Province.

A branch office of the Geological Survey of Canada is maintained at 326 Howe Street, Vancouver 1, with Dr. J. E. Armstrong in charge. Geological reports and maps of British Columbia may be obtained there.

FIELD WORK BY GEOLOGICAL SURVEY OF CANADA IN BRITISH COLUMBIA, 1966

Geological mapping and special studies were done in the following areas:-

R. B. Campbell in the 93 H map-area.

J. E. Muller on Vancouver Island completed the Alberni area, 92 F, 92 L, 92 G, and 92 K.

N. Rotter, superficial geology of the Peace, Finlay, and Parsnip River valleys, parts of 93 N, 0; 94 B, C, F.

R. J. Fulton, superficial geology in vicinity of Duncan Dam and Arrow Lakes, parts of 82 E, F, K, L, M, N; 83 C, D.

R. Mulligan investigated the metallogeny of the Cassiar batholith, 104 0, P.

J. G. Souther continued the Cordilleran volcanology project in the vicinity of Edziza Peak, 104 G, 104 B/7.

C. A. Giovanella began a study of the structure and metamorphism of the gneisses straddling the Rocky Mountain Trench, 83 D/11 E, 83 D/6 E, 83 D/7 W, and 83 D/10 W.

S. F. Learning began inventory mapping of superficial deposits and landforms in the vicinity of Prince George, 93 G.

J. E. Reesor continued his study of the granitic rocks of Canada in the Thor-Odin area, 82 L/8 and 82 L/9.

J. A. Coates continued work in the Manning Park area, part of 92 H.

W. W. Hutchison made a study of plutonism and tectonics of part of the northern Coast Mountains, 103 J/E, 103 I/W.

B. E. Lowes began a structural study of the Cascade Mountains, 92 H/5, 92 H/12.

H. W. Tipper began work on the Mesozoic stratigraphy of the Skeena River region, 93 M, 94 D/W, 103 P.

J. W. H. Monger studied the structure and Permian stratigraphy of part of the Atlin Horst, 104 J/7-10, 15, 16.

W. J. McMillan worked on a structural problem at Ratchford Creek, 82 M/2,7.

V. A. Preto completed a structural and petrographic study of the Grand Forks Group, 82 E/1 W.

E. T. Tozer studied the stratigraphy and structure of the Triassic system in northeastern British Columbia, 94 G, K, J.

J. A. Jeletzky studied the Cretaceous and late Upper Jurassic biostratigraphy in parts of 92.

J. 0. Wheeler revised the mapping of the northeastern part of the Rogers Pass area, parts of 82 N, in British Columbia and Alberta.

G. B. Leech studied part of the western face of the Stanford Range near Windermere, 82 J/W.

R. A. Price, J. D. Aitken, E. W. Mountjoy, and D. G. Cook continued operation Bow-Athabasca with reconnaissance geology of unmapped parts of the southern Rocky Mountains in British Columbia and Alberta.

Publications of the Geological Survey

Publications of the Geological Survey of Canada relating to British Columbia were received by the library of the British Columbia Department of Mines and Petroleum Resources in 1966.

MINES BRANCH

The Mines Branch has divisions dealing with mineral dressing and process metallurgy, physical metallurgy, radioactivity, and fuels and explosives. Publications of the Mines Branch pertaining to British Columbia were received by the library of the British Columbia Department of Mines and Petroleum Resources in 1966.

MINERAL RESOURCES DIVISION

The Mineral Resources Division publishes studies on mineral resources, mineral economics, mineral legislation, mineral taxation, mining technology, and miscellaneous subjects related to the mineral industry. Publications published by the Mineral Resources Division were received by the library of the British Columbia Department of Mines and Petroleum Resources in 1966.

LODE METALS

CONTENTS

NOTES ON METAL **MINES—*Continued***

Mine	Latitude and Longitude	Metals	Page
New Westminster Mining Division-			
Hope-			
Pride of Emory	49” 121” **S.W.**	**Ni, Cu**	**58, A51**
A.P.M., Bear, King, Calico, Len	**49° 121° S.E.**	**Cu, Mo, Pb, Zn, Ag**	**59**
Bab, Barbara, **Joan**	**49°** 121” S.E.	**Mo**	**60**
Bea	49” **121° S.E.**	**Ni, Cu**	**60**
Iago, Mac, Max, Bar	49’ 121” N.E.	**Mo, Cu**	**61**
Chilliwack—			
Mt. Cheam No. 2	49” 121” **S.W.**	**Cu**	**61**
Harrison Lake—			
Meg, Bailey, Sash	49” 121” N.W.	**Mo**	**61**
PF, Midnight	49” 1219 **S.W.**	**Cu**	**62**
Ascot, Jes, Gloria, J	49” 121” **S.W.**	**Cu**	**62**
Stave Lake—			
Friendship	49” 122” N.E.	**Cu, Mo**	**63**
Nanaimo Mining Division—			
Quatsino-Port Hardy—			
HPH	**50°** 127” N.W.	**Zn**	**63**
Hep	50” 127” N.W.	**Cu**	**64**
Bay	**50°** 127” N.W.	**Cu**	**65**
Lake	**50°** 127” N.W.	**Cu**	**65**
Ace, Flats, Kaye, Rick, Etc.	**50°** 128’N.E.	**Cu**	**65**
Yreka	**50°** 127” *S.W.*	**Cu**	**65, A50**
Merry Widow, Kingfisher	**50°** 127” S.E.	**Fe**	**66, A50**
Old Sport	50” 127” **S.E.**	**Cu, Fe**	**66, A50**
Nimpkish—			
Kinman, Alpha	**50°** 126” **S.W.**	**Cu, Zn**	**68**
N.C.	49” 126” N.E.	**Cu**	**68**
Sayward—			
White	**50° 125° S.W.**	**Ag, Pb, Zn, Cu, Cd**	**68**
Iron Mike	50’ **125° S.W.**	**Fe**	**68, A50**
Campbell River—			
Chal	**50° 125° S.E.**	**Cu**	**69**
Lark	50” 125” **S.W.**	**Cu**	**70**
Iron River	49” 125” N.E.	**Fe, Cu**	**70**
Ivy	49” **125°** N.E.	**Fe**	**71**
Quadra Island—			
Copper Road	50’ 125’S.E.	**Cu**	**71. A50**
Courtenay—			
Mount Washington Mine (Domineer No. 22)	49” 125” N.E.	**Cu**	**71, A50**
Texada Island—			
Texada Mine	49” 124” N.W.	**Fe, Cu**	**72, A50**
Alberni Mining Division—			
Zeballos—			
F.L.	50” 126” **S.W.**	**Fe**	**72, A49**
Hiller, Churchill	50” 126” **S.W.**	**Fe**	**73**
Sonny, Black Knight	**50°** 126” **S.W.**	**Cu**	**74**
Flores Island—			
Ormond, Contact	49” 126” **S.E.**	**Cu, Zn**	**74**
Tofino—			
Moly, Tofino, Tofino Nickle	49” 125” **S.W.**	**Cu, Ni, Mo**	**74**
Kennedy Lake—			
Brynnor Mine	49’ **125° S.E.**	**Fe**	**75, A49**
Alberni Inlet—			
Mary	49” 124” SW.	**Cu**	**75**
Andy, Pak	49” 124” **S.W.**	**Cu, Mo**	**76**
SR	**48°** 124” N.W.	**Mo**	**77**
Oma, Sunny, Fid, Kathy	48” 124” N.W.	**Au, Ag, Cu**	**77**
Buttle Lake—			
Lynx, Paramount, Price	49’ 125” N.W.	**Au, Ag, Cu, Pb, Zn**	**77**

Notes on Metal Mines—*Continued*

NOTES ON METAL MINES—*Continued*

	Latitude and Longitude	Metals	Page
Cariboo Mining Division—Continued			
Horsefly—			
Wood	52° 121° S.E.	Cu	132
GI	52° 121° S.E., 52° 120° S.W.	Cu	132
Horsefly Lake—			
Sue	52° 120° S.W.	Cu, Au, Ag	132
Crooked Lake—			
EN	52° 120° S.W.	Cu	132
Big Timothy (Takomkane) Mountain—			
Boss Mountain Mine	52° 120° S.W.	Mo	133, A49
Clinton Mining Division—			
Taseko Lakes—			
Rowbottom	51° 123° S.E.	Cu, Mo	134
KH, Granite	51° 123° S.E.	Cu, Mo	134
Eggs	51° 123° S.W.	Cu, Mo	135
Lac la Hache—			
Peach, Fly, Tim	51° 121° N.E.	Cu	135
FF	51° 121° N.E.	Cu, Pb, Zn	135
70 Mile House—			
Pot, I.D.S.	51° 121° S.E.	Cu	135
C-Soo	51° 120° S.W.	Cu	136
Poison Mountain—			
Giant, PM, Fish, Copper, Cheap	51° 122° S.W.	Cu, Mo	136
Lillooet Mining Division—			
Poison Mountain—			
Hill	51° 122° S.W.	Cu, Mo	136
Churn	51° 122° S.W.	Cu, Mo	137
Yalakom River—			
Yalakom, Ridge	50° 122° N.E.	Mo	137
J.C., J.B	50° 122° N.E.	Ni	137
Eagle	50° 122° N.E.	Hg	137
Tyaughton Creek—			
Silverquick, Quicksilver, Dot, Bob, Kim, Etc.	51° 122° S.W.	Hg	137
Empire Mercury Mine	51° 122° S.W.	Hg	138
Bridge River—			
Bralorne Mine	50° 122° N.W.	Au	138, A50
Texas Creek—			
Index	50° 122° N.E.	Mo	140
Nesikep Creek—			
Rickhill, Rusty—see *under* Kamloops Mining Division.			
Pemberton—			
Sal, R, EE, Etc.	50° 123° N.E.	Mo	140
Kamloops Mining Division—			
Little Fort—			
Mo	51° 120° N.E.	Mo	143
TC	51° 120° N.E.	Cu, Mo, Pb, Zn	143
RO, SO, TC	51° 120° N.E.	Mo, Cu, Pb, Zn, Ag, Au	143
Silver	51° 120° N.E.	Cu, Pb, Zn	144
Birch Island—			
Sinbad, Lucky Star	51° 119° N.W.	Au, Ag, Cu, Pb, Zn	144
Barriere—			
Bar, Don, GM, George, Tim, Barriere, Joe, Glen	51° 119° S.W.	Mo	144
CC	51° 119° S.W.	Cu	144
Ultima, Good Luck, Creek, Harper, Ruth	51° 119° S.W.	Cu, Pb, Zn, Ag	145
Leemac, Boomac	51° 119° S.W.	Cu, Ag, Pb, Zn	145

NOTES ON METAL MINES—*Continued*

	Latitude and Longitude	Metals	Page
Kamloops Mining Division—*Continued*			
Squaam (Agate) Bay—			
Joe, Art	51° 119° S.W.	Cu, Pb, Zn	145
Elmoore	51° 119° S.W.	Ag, Cu, Pb, Zn	145
Shuswap Lake—			
Garnet, D, S, Pat	50° 119" N.B., 51' 119° S.E., SW.	Pb, Zn, Ag, Au, Cu	146
Annis, Dawn, Lakeview	50° 119° N.E.	Zn, Pb, Cu	146
Greenstone Mountain—			
TC, Spur	50° 120° N.w.	Cu, Mo	148
Kamloops-			
Vanco Explorations Limited	50° 120" N.E., N.W.	Cu	148
Nesikep Creek—			
Mud, Cherry, Rickhill, Rusty, Joyce, Sharon	50° 121" N.W.	Cu, Mo, Ag, Ni	148
Lytton—			
Tetra, Gene	50' 121" S.W.	Cu	148
Ashcroft—			
Red Hill	50° 121" N.E.	Cu	149
Highland Valley—			
Krain	50° 121" N.E.	Cu, Mo	151
Lux, Cindy	SO" 120" N.W.	Cu	151
Trojan	50" 120" N.W.	Cu, Mo	152
Bethlehem Mine	50° 120" S.W.	Cu, Mo	152, A50
April, UP	50" 120" S.W.	Cu, Mo	153
Eden, Ezra, Job, C.L.	50" 120" N.W.	Cu	153
RAF, TAM, MER, JAC, CM	50° 121" N.E.	Cu, Mo	154
A.L., I.C., Etc.	50° 121° S.E.	Cu	154
Ezz, O.K.	50° 121" S.E.	Cu	154
Bethsaida	50° 121" S.E.	Cu, Mo	155
Royal, Cana, R.C.	50" 121" S.E.	Cu	155
Lornex	50° 121° S.E.	Cu, Mo	155
Calco, Shorty	50" 121" S.E.	Cu	158
Victor	50° 121" S.E.	Cu	158
AM, IDE, Etc.	SO" 121" S.E.	Cu, Mo	158
AM, IDE, Etc	50° 120" S.W.	Cu, Mo	159
Jericho, Bob, Gem, Stibbard, Mark	50° 120" S.W.	Cu, Mo	159
Lake, Laken, Bron, PM, PIM	50° 121" S.E.	Cu, Mo	159
Merv, Bet, Lee, B.J., Etc	50° 121" S.E.	Cu	160
Cris	50" 121" S.E.	Cu, Mo	160
BO	50° 120" S.W.	Cu	161
Rio	50' 121" S.E.	Cu	161
Gem, Hal, Fir, Curmo	50" 121" S.E.	Cu	161
Yubet	50° 120" S.W.	Cu, Mo	162
Cal	50' 120" S.W.	Cu	162
Price, Oro, M.M.	50° 120" S.W.	Cu	163
Rain	50° 120" S.W.	Cu	163
Chataway	50° 120" S.W.	Cu	164
Nicola Mining Division—			
Highland Valley—			
Jericho, Bob, Gem, Stibbard, Mark—see *under* Kamloops Mining Division.			
Price—see *under* Kamloops Mining Division.			
Chataway—see *under* Kamloops Mining Division.			
Swakum Mountain-			
Lee, Sunshine, Lo	50" 120° S.W.	Zn, Cu	165

Notes *on* **Metal Mines**—*Continued*

	Latitude and Longitude	Metals	Page
Slocan Mining Division-Continued			
Sandon—			
Deadman	49’ **117° N.E.**	**Ag,** Pb, **Zn**	221, A52
Shady	**49° 117° N.E.**	**Ag,** Pb, **Zn**	221
Slocan Sovereign	49’ 117’ **N.E.**	**Ag,** Pb, Zn	**221,** A52
Victor	49’ 117’ **N.E.**	**Ag,** Pb, **Zn**	**222,** A52
Altoona	49’ 117” **N.E.**	**Ag,** Pb, **Zn**	222, **A51**
Silmonac	49’ **117°** N.E.	**Ag,** Pb, **Zn**	222
Retallack-Three Forks-			
Charleston	**50°** 117’S.E.	**Ag,** Pb, **Zn**	**222,** A5 1
Antoine	**50° 117°** S.E.	A& Pb, **Zn**	222
Winona	**50°** 117’S.E.	**Ag,** Pb, **Zn**	**223,** A52
Hillside	**50° 117° S.E.**	**Ag,** Pb, **Zn**	223
Miner Boy. McAllister	**50° 117° S.E.**	**Ag,** Pb. **Zn, Cu**	223
JoJo	50” **117° S.E.**	**Ag, Pb, Zn**	223
Caledonia	**50° 117° S.E.**	**Ag,** Pb, **Zn**	224, **A51**
Ohio	50’ **117° S.E.**	**Ag,** Pb, **Zn**	224
Keen **Creek—**			
Cork Province Mine	**49°** 117’ N.E.	**Ag, Pb, Zn**	224, A52
Ainsworth—			
Jewel, Greenacres	49’ 116’N.W.	**Ag,** Pb, **Zn**	224
Union	49’ **116° N.W.**	**Ag,** Pb, **Zn**	225
Donna, Linda, Sharon	49” **116° N.W.**	**Ag,** Pb	225
Brian	49’ **116° N.W.**	**Ag,** Pb	225
Krao and Lead **Coin**	49’ 116” N.W.	**Ag,** Pb, **Zn**	225
Duncan Lake—			
Duncan Mine	50’ **116° S.W.**	Ag, Pb, **Zn**	225
Riondel—			
Bluebell Mine	49’ **116° N.W.**	Ag, Pb, Zn	226, A51
Crawford Creek-			
Silver Hill	**49°** 116’S.W.	**Ag,** Pb	227
Humbolt	49” **116° N.W.**	**Ag,** Pb, **Zn**	227
Revelstoke Mining Division-			
Revelstoke—			
J & I	**51°** 118” S.E.	Au, **Ag,** Pb, **Zn**	227
S Group	51’ **118° S.E.**	**Cu**	228
Joan	51’ **118° S.E.**	**Mo**	228
River Jordan, King Fissure	51’ **118° S.E.**	Pb. **Zn**	229
North **Lardeau—**			
True Fissure, **Broadview**	**50° 117° N.E.**	A& Pb, Zn	229
Silver **Cup**	**50°** 117’N.E.	Ag, Pb, **Zn**	229
Ethel	50’ **117° N.W.**	Ag	230
Golden Mining **Division—**			
Parson—			
Ruth Vermont Mine	50’ 116” N.W.	Ag, Pb, Zn	230
Alpha, Maud S., Standby	**50° 117° N.E.**	**Ag,** Pb, **Zn, Cu**	235
FE, **HIL,** Etc.	**50°** 116” N.W., **50°** 117’ N.E., 51’ 117’S.E.	Au, **Ag, Pb, Zn**	236
Atlas	50” 116’ N.W.	Ag, Pb, Zn	236
Spillimacheen—			
Lead **Mountain**	50’ 116’ N.W.	Pb, Zn	237
Windermere—			
Mineral **King**	**50° 116° S.E.**	**Ag,** Pb, **Zn**	237, A49
Fort Steele Mining **Division—**			
Kimberley—			
Sullivan Mine	49” 115” N.W.	Ag, Pb, **Zn**	238, A49
Western **Exploration**	49’ **115° N.W.**	**Pb, Zn**	239
Joe	**49°** 116’ N.W.	**Cu**	239
Warhorse, Granite	49’ 116’ N.E.	**Ag,** Pb, **Zn**	240

GENERAL REVIEW OF MINING AND EXPLORATION

By Stuart S. Holland

***Production.*—The** value of metals produced in 1966 was **$208,756,760, an** increase of 17.9 per cent over 1965. This new record is the result of a large increase in copper production at the record average price of 53.34 cents per pound, a 138-per-cent increase in molybdenum production at an average price of $1.62 per pound, offset by small decreases in zinc, silver, and iron production, and the single large decrease, of 19.4 per cent, in lead production.

This value of metals was contained in 20,008,060 tons of ore mined at 56 mines, of which five produced 1 million tons or more each, 19 produced 100,000 tons or more each, and 12 produced 1,000 tons or more each.

The quantity of gold produced increased slightly over that of 1965. This reflects the increasing contribution made to the total by base-metal producers, who now produce 39 per cent of the Provincial gold production. Production at Bralorne, the Province's largest gold mine (contributing 36.4 per cent of the total gold), again declined substantially in 1966, and the early closure of the Cariboo Gold Quartz mine at Wells is anticipated.

Silver production, which has been declining gradually since 1950, increased slightly owing mainly to increased production at the Sullivan, Silbak Premier, and Highland Bell mines.

Copper production increased by 23.5 per cent to 105 million pounds, contributed by a full year's production at Britannia, resumption of production at Craigmont, increased mill capacity at Bethlehem, resumption of production at the Sunloch and Gabbro, initiation of production by the new mine at Granisle, combined with sustained production from the Old Sport, Mount Washington, Yreka, Texada, Phoenix, Pride of Emory, and others.

The immediate future for copper-mining appears good despite lower copper prices. Both the Tasu mine, an iron-copper operation, and the Lynx (Western), a copper-zinc operation, will begin shipments of concentrates in 1967, and Granisle will contribute a full year's production.

The production of lead and zinc is dominated by the three Cominco properties, the Sullivan, Bluebell, and H.B. mines, by Canadian Exploration Limited's Jersey mine, and Reeves MacDonald Mines Limited's Reeves MacDonald mine. Production of lead and zinc declined to 211 million and 305 million pounds respectively.

The production of iron concentrates decreased very slightly. Brynnor's production was greatly reduced owing to a strike, that of the F.L. and Jedway (Jessie, Adonis, and Rose) were increased. There was, in addition, production from the Merry Widow and Kingfisher, and the Iron Mike. The Iron Mike, brought into production late in 1965, closed in September, 1966.

Facilities at the Tasu mine of Wesfrob Mines Limited on Moresby Island were under construction, and a very large production of iron concentrates will begin in 1967.

The production of molybdenum increased by 138 per cent to 17.3 million pounds, contributed by the more than doubled production at the Boss Mountain and Endako mines, and new production from the Coxey at Rossland.

A further increase in molybdenum can be expected in 1967 from a full year's production at the Coxey, a further increase in concentrator capacity at Endako, and new production from British Columbia Molybdenum Limited at Alice Arm. Since 1964 British Columbia has become an important producer of molybdenum in the free world.

In 1966, 36 mills were in operation, 14 treated silver-lead-zinc ores, 7 treated copper ores, 3 treated molybdenum ores, 1 treated copper-molybdenum ore, 1 treated nickel-copper ore, 5 treated iron ore, 2 treated iron-copper ore, and 3 treated gold ore. Trial production of copper by bacterial leaching is being attempted at the Victor in Highland Valley and at Mount Sicker.

In 1966 five new mills were constructed and came into production. These were at the Coxey (Red Mountain Mines Limited), treating molybdenum ore at Rossland, at the Estella (Giant Soo Mines Limited) at Wasa, treating silver-lead-zinc ore, and at Granisle (Granisle Copper Limited) at Babine Lake, treating copper ore. A mill erected at the Emerald (Emerald Glacier Mines Ltd.) at Tahtsa Lake operated for a short time and treated a small tonnage of silver-lead-zinc ore. The mill of Western Mines Limited at Buttle Lake was completed and in December began initial, intermittent operation during a tune-up period.

The capacity of the mill at Bethlehem Copper Corporation Ltd. was increased from 6,000 to 10,000 tons per day, and a further increase to 12,000 tons per day in 1967 is planned. Milling operations were resumed at Craigmont Mines Liited in April when a labour dispute was settled.

Milling operations terminated at the Cork Province mine on Keen Creek, at the Iron Mike at Sayward, at the H.B. at Salmo, at the Brynnor mine at Kennedy Lake owing to a strike, and at the Sunloch and Gabbro at Jordan River owing to financial problems.

New mills were under construction at Tasu by Wesfrob Mines Limited, to treat iron-copper ore, and at Alice Arm by British Columbia Molybdenum Limited, to treat molybdenum ore.

The Trail smelter, owned and operated by Cominco Ltd., received 143,302 tons of lead concentrates and 199,101 tons of zinc concentrates from its three British Columbia mines. It treated on a custom basis 4,718 tons of lead concentrates and 4,407 tons of zinc concentrates from 13 British Columbia mines, 1,395 tons of crude ore from 10 mines, and 742 tons of gold and silver concentrates from 1 mine. The smelter also treated a large tonnage of ore and concentrates from sources outside the Province, of which the company's Pine Point mine was the main source.

Concentrates exported to American smelters were: Copper concentrates (including 1,134 tons of copper matte and 14 tons of copper ore), 17,242 tons; lead concentrates, 13,450 tons; and zinc concentrates, 74,819 tons, The value of these concentrates is $21,711,539, which is about 10.4 per cent of the metal production of the Province.

Concentrates exported to Japanese smelters were: Copper concentrates, 176,389 tons; nickel-copper concentrates, 18,387 tons; zinc concentrates, 3,638 tons; iron concentrates, 1,987,854 tons; molybdenite concentrates, 1,644 tons. The value of these concentrates is $79,408,680, which is about 38 per cent of the metal production of the Province. The importance of Japanese participation in British Columbia's mineral economy is obvious.

Molybdenite concentrates and molybdic trioxide were shipped to Japan, England, Austria, Holland, France, and eastern Canada.

Development.-Pre-production development culminated in 1966 in new mines coming into production at the Granisle on Babine Lake and at the Coxey at Rossland, and an old mine, the Estella at Wasa, resumed production with a new mill. Development of the Tasu property by Wesfrob Mines Limited has been extremely costly, and production of iron and of copper concentrates will begin in 1967; development of the Lynx by Western Mines Limited was completed in 1966, and production will begin early in 1967. Development of the Alice property by British Columbia Molybdenum Limited continues, and completion of its 6,000-tons-per-day mill will initiate molybdenum production in 1967. Development at Granduc continues. The Leduc camp was occupied in order to drive a drainage tunnel into the shaft. The Tide Lake camp was continuously occupied. The face of the tunnel at year-end was 17,986 feet from the Tide Lake portal, its total length ultimately is to be 11.6 miles. Late in the year, Utica Mines Ltd. announced the early building of a 300-ton mill to bring its Horn Silver mine into production in 1967.

Statistical returns received from mining companies indicate that in 1966, about $44 million was spent on mine development, largely by British Columbia Molybdenum Limited, Wesfrob Mines Limited, Western Mines Limited, Giant Soo Mines Limited, Granduc Mines Limited, The Anaconda Company (Canada) Ltd., Endako Mines Ltd., and others.

Exploration.—In 1966 the number of mineral claims recorded again has exceeded that of any previous year. In 1966, 91,703 claims were recorded, a 119-per-cent increase over tbe 41,882 recorded in 1965. The great increase in 1966 was due to a resurgence of activity in the Omineca, Cariboo, and Clinton Mining Divisions, stimulated by copper discoveries in the vicinity of Babine Lake and Likely and by molybdenite mineralization east of Lac la Hache. Widespread locating of claims in the Brenda Lake area accounts for the large increase of recorded claims in the Osoyoos, Similkameen, and Nicola Mining Divisions.

A record was set in the number of certificates of work issued, 56,138 or 30 per cent more than the 43,013 certificates issued in 1965. The increase in the number of certificates of work is a measure of the increased amount of exploration work that is being done currently.

For the first time, more than 10,000 free miners' certificates were issued. Every statistic indicates that 1966 was a record year.

The focal points of major exploration programmes which in 1966 consisted mainly of diamond drilling and (or) percussion drilling were the HAB copper deposit at Galore Creek, the Glacier Gulch molybdenite deposit at-Smithers, the Newman copper deposit at Babine Lake, the Cariboo Bell copper deposit at Bootjack Lake, the Lornex and Highmont copper deposits in Highland Valley, the Brenda copper-molybdenum deposit at Brenda Lake, and the Copper Mountain and Ingersoll Belle copper deposits at Princeton. III 1966 more than 10,000 feet of diamond drilling was done at each of the following: Ajax, Bay, Bird, Giant, Gibraltar, Huber, and Red Bid copper and (or) molybdenum deposits; at the Ruth Vermont and Far East silver-lead-zinc deposits; at the Hiller iron deposit; and at the Empire mercury deposit. The present knowledge of these and other deposits has been gained through the expenditure of many millions of dollars by exploration companies, both large and small. This flow of exploration money must not be impeded if British Columbia's mineral industry is to continue at its present high rate of discovery and production.

Statistical returns received from mining exploration companies indicate that about $22 million was spent in the exploration of 169 properties.

The Department distributed a questionnaire to exploration companies, and information regarding work done by them on 265 properties is tabulated below.

Mining Division	Number of Properties	Type of Work Done					Number of Properties	Drilling	
		Geological Mapping	Geophysical Surveys	Geochemical Surveys	Surface Work	Underground Work		Diamond	Percussion
Alberni	10	7	6	4	3	----	10	17,969	3,670
Atlin	1	1	----	----	----	----	----	----	----
Cariboo	16	9	8	11	11	----	2	32,700	7,000
Clinton	7	5	4	5	6	----	2	13,052	----
Fort Steele	4	3	1	1	1	----	3	2,466	----
Golden	4	4	1	----	3	----	4	37,714	----
Greenwood	7	4	5	3	4	1	5	13,530	89
Kamloops	36	15	21	19	22	1	20	35,504	24,580
Liard	20	11	11	6	10	2	9	50,572	----
Lillooet	7	4	3	3	4	1	5	8,362	23,206
Nanaimo	7	5	6	4	2	----	5	21,756	----
Nelson	6	----	1	1	1	1	4	7,890	----
New Westminster	10	4	3	1	5	----	5	11,883	163
Nicola	21	14	12	9	10	----	12	23,560	8,585
Omineca	47	32	17	22	26	3	27	122,201	----
Osoyoos	9	5	3	5	6	2	3	44,143	8,123
Revelstoke	4	3	1	----	1	1	4	13,079	----
Similkameen	12	6	8	6	8	----	7	23,651	58,122
Skeena	18	13	5	7	10	5	7	33,761	----
Slocan	6	1	----	1	4	1	2	697	----
Trail Creek	2	2	1	----	----	----	2	32,718	----
Vancouver	6	5	1	2	1	3	3	3,900	----
Vernon	1	----	----	1	----	----	----	----	----
Victoria	4	2	3	1	1	----	2	849	----
Totals	265	155	121	112	139	21	143	551,957	133,538

Out of 265 properties enumerated, geological mapping was done on 155, surface work done on 139, underground work done on 21, drilling done on 143, geophysical surveys were made on 120, and geochemical surveys made on 112.

It is apparent from these figures to what extent the use of geophysical and geochemical techniques have become important adjuncts to applied geology in exploration. It is also notable how few properties (21) currently are being explored by means of underground workings. The modem tendency is to proceed directly from surface work to diamond driiig and to devote increasing amounts of drilling to investigate geochemical or geophysical anomalies.

Information submitted shows that a total of not less than 551,957 feet of diamond drilling and 133,538 feet of percussion drilling was done on 143 properties.

NOTES ON METAL MINES

ATLIN MINING DIVISION

ATLIN

Silver-Lead-Zinc

Atlin-Ruffner (Silver, Barber) (59" 133" N.W.) Company office, 625, 925 West Georgia Street, Vancouver 1. R. J. Bradshaw, mining engineer. This group of 87 mineral claims is on Fourth of July Creek about 10 miles by road west from the highway connecting Atlm to tbe Alaska Highway. The claims and old workings were surveyed and some geological mapping was done. Shield Geophysics Limited did some surface drilling. Five men were employed on the property for three months. The property was not visited.

Armore Mines Limited
By H. Bapty

[References: Minister of Mines, B.C., Ann. Repts., 1925, pp. 115-117; 1951, p. 73; 1952, p. 75; 1965, p. 8.]

LIARD MINING DIVISION

ALASKA HIGHWAY

TOOTSEE RIVER

Silver-Lead-Zinc

Silvertip A, B, C, D, Rod, Ruby (59" 130" N.E.) Company office, 409, 612 View Street, Victoria; field office, Whitehorse. The property consists of tbe original 32 Silvertip claims, the Rod 1 to 6, and the Ruby 1 to 62 held by Rodstrom Yellowknife Mines Ltd. The property is on tbe east side of Tootsee River, 2 miles northeast of Tootsee Lake. It is 12 miles south of the Alaska Highway and is connected by a road suitable for four-wheel-drive vehicles that is 17 miles from the ford at Mile. 701 or 22 miles from the bridge to the microwave station at Mile 706.

Silverknife Mines Ltd.
By W. G. Clarke

The showing is an old one and has been explored by Conwest Exploration Limited (1957), Canex Aerial Exploration Ltd. (1958), Noranda Exploration Company, Limited (1960), and Chapman, Wood and Griswold Ltd. (1961 and 1962). In 1966, Rodstrom Yellowknife Mimes Ltd. drilled 2,243 feet in four holes, using a 4½-inch rotary drii mounted on a Nodwell carrier. In addition, geophysical and geological surveying was done and 10 trenches (total length, 800 feet) were excavated by bulldozer. Six men worked for four months under H. R. Jones, field manager. The property was not visited.

[References: Assessment Reports Nos. 352 and 370.1

Silver

Key (59° 130° N.E.) The Key group of five claims is owned by Bentley M. McMullin, of Aurora, Colo. It is on Freer Creek and is accessible by 6 miles of truck-road south of the Alaska Highway at Mile 706. High-grade silver mineralization is reported to be in narrow veins in a vertical shear zone in altered granite. Three *men* under the direction of Leroy Davis, prospector, worked for two weeks improving ‘the access road and digging 100 feet of trenches by hand.

By W. G. Clarke

RACING RIVER

Copper

Churchill, Davis, Bird, Caribou, Etc.
Churchill Copper Corporation Ltd.
By W. G. Clarke

(58° 125° S.E.) Head office, 308, 540 Burrard Street, Vancouver 1. These several groups, amounting to about 467 claims, under agreement to Canex Aerial Exploration Ltd., are toward the head of Racing River, 1 mile southwest of the junction of Churchill Creek and Goat Creek. A base camp at the foot of the mountain is accessible by a 35-mile truck-road from Mile 419 on the Alaska Highway.

In 1966, 12 men worked four months under the direction of R. McKamey. A detailed geological survey of the showings was made by R. W. Cannon and 2,100 feet of trenching was done in rock. Because of the steep terrain, two short adits (total length, 80 feet) were driven to provide diamond-drill stations. There was 692 feet of diamond drilling done in five holes. Five camp buildings were erected. The property was not visited.

CASSIAR

Molybdenum

S.Q.E., Kon, Rex
New Jersey Zinc Exploration company (Canada) Ltd.
By W. G. Clarke

(59° 129° S.W.) Head office, 160 Front Street, New York; field office, 905, 525 Seymour Street, Vancouver 2. R. C. Macdonald, assistant to the president. This group of 54 claims, formerly called the Storie, is about 4 miles south of Cassiar. It is owned by W. J. Storie, of Cassiar, and is under option to New Jersey Zinc Exploration Company (Canada) Ltd. The pyrite and molybdenite mineralization occurs both as disseminations and in quartz veinlets in *granite* and quartz feldspar porphyry.

Geological and geophysical surveys were made in 1964 and 1965. In 1966, work consisted of 5,600 feet of access-road construction and diamond drilling. A total of 6,715 feet of BQ size was drilled in 13 holes. The property was not visited.

DEASE LAKE

Copper-Molybdenum

Horn
United States Smelting, Refining and Mining Company
By W. G. Clarke

(58° 129° S.W.) Head office, 235 East 42nd Street, New York; field office, 935,470 Granville Street, Vancouver 2. R. D. Westervelt, geologist. This group of 95 claims, owned by a syndicate *managed* by the company, is south of Tanzilla Butte and may be reached by helicopter from the Stewart-Cassiar highway near Dease Lake, a distance of 5 miles.

In 1966 five men spent three months working on geological, geophysical, and geochemical surveys under K. F. Bickford, geologist. The area of interest is reported to be a shear structure in Triassic volcanics close to an intrusive contact. The property was not visited.

[Reference: Assessment Report No. 849.1

Copper-Molybdenum

Les
United States Smelting, Refining and Mining Company
By W. G. Clarke

(58° 129° S.W.) Head office, 235 East 42nd Street, New York; field office, 935, 470 Granville Street. Vancouver 2. R. D. Westervelt, geologist. Thii group of 20 claims, owned by a syndicate managed by the company, is south of Tanzilla Butte and may be reached by helicopter from the Stewart-Cassiar highway near Dease Lake, a distance of 8 miles.

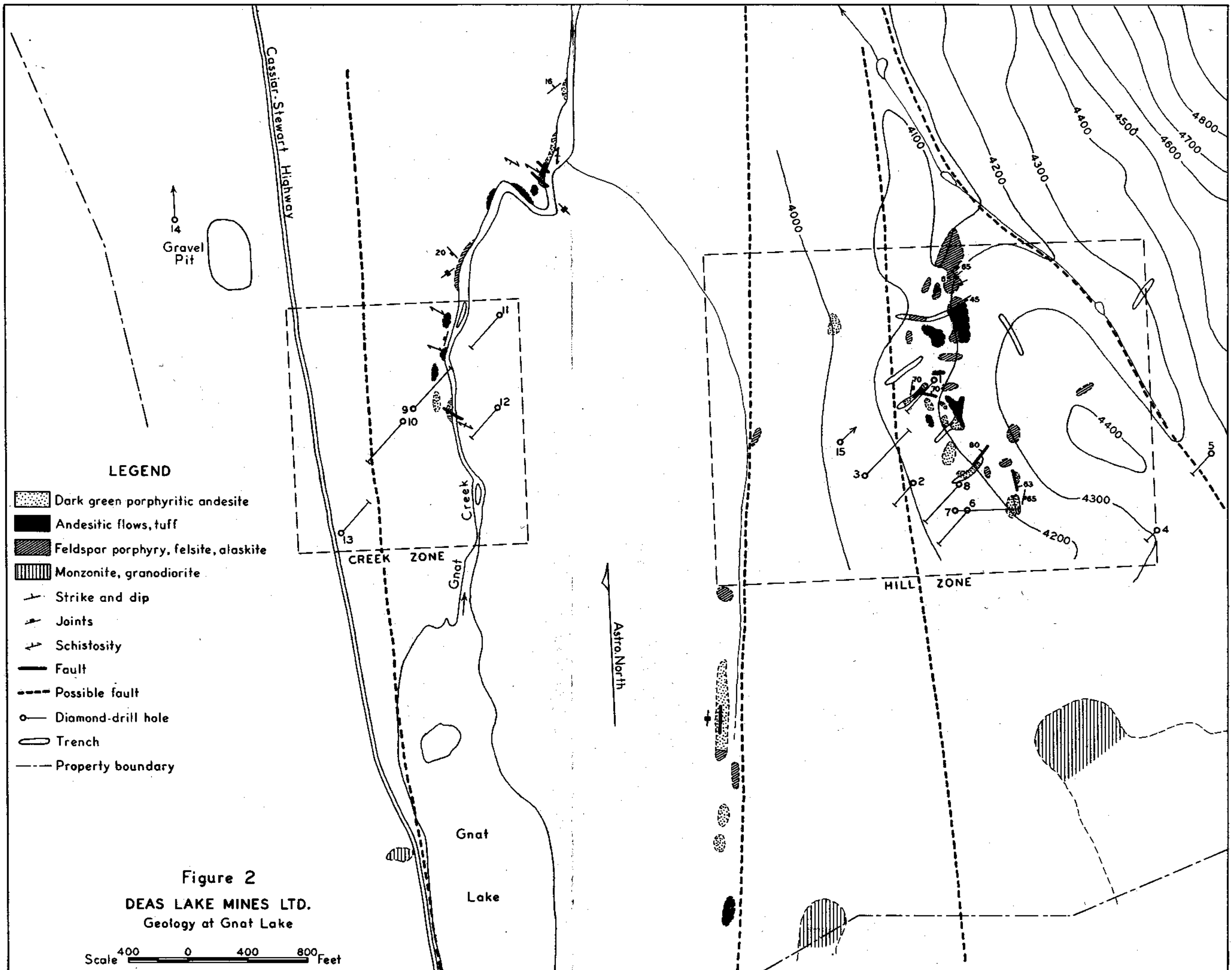

Figure 2
DEAS LAKE MINES LTD.
Geology at Gnat Lake

In 1966 three men spent two weeks prospecting and making a reconnaissance geochemical survey under K. F. Bickford, geologist. The property was not visited.

Copper

Moss (58° 129° S.W.) Head office, 519, 602 West Hastings Street, Vancouver 2. This group of 18 claims, owned by the company, is on the west side of the northern Gnat Lake and is crossed by the Cassiar-Stewart highway. The claims are about 16 miles south of the south end of Dease Lake.

Lytton Minerals **Limited**
BY W. G. Clarke

In 1966 six men under M. Bradford, geologist, spent three months making geological, geophysical, and geochemical surveys.

[Reference: Assessment Report No. 845.]

Copper

June, Stikine, September, Etc. (58° 129° S.W.) Company office, 519, 602 West Hastings Street, Vancouver 2. The property comprises the June 1 to 12, Stikine 1 to 20, September 1 to 35, and July 1 to 5 claims and is adjacent to the Cassiar–Stewart highway 20 miles south of Dease Lake. The property is held by Deas Lake Mines Ltd., to whom the claims have been transferred by Lytton Minerals Limited, a subsidiary of the Patiiio Mining Corporation Ltd. Mineralization was first discovered in 1960, and intermittent work was done up to 1964, when fairly extensive exploration of the widespread low-grade copper mineralization commenced.

Deas Lake Mines Ltd.
BY W. G. Jeffery

The highway passes on the west side of two small lakes known as the Gnat Lakes, which occupy a flat area about 2 miles in width trending north. The Gnat Lakes drain northward to the Tanzilla River, but immediately south of the lakes, drainage is southward directly to the Stikine River. The property *lies* north and east of the northern Gnat Lake at an elevation just below 4,000 feet. To the east, hills form the Three Sisters Range up to heights of approximately 7,000 feet. On the sooth and west is the rounded form of Thenatlodi Mountain, rising to an elevation of 6,100 feet. The property area is covered with overburden and largely devoid of outcrop. The initial mineral discovery was found in outcrops on the eastern side of tbe flat area at the base of the hills, and in some small outcrops along Gnat Creek where it flows northward from the Gnat Lakes (see Fig. 2).

Regional work by the Geological Survey of Canada indicates that the rocks are Upper Triassic or earlier volcanic andesite and basalt flows, tuffs, and breccias with some sediments intruded by small stocks and sills of porphyritic andesite and basalt. The property is adjacent to the contact of the Hotailuh batholith, *a* large platonic body of hornblende quartz monzonite and granodiorite. Thenatlodi Mountain is, in part, underlain by an apophysis of this batholith.

Locally the geology remains obscure due to the extensive overburden, and the alteration of the rocks exposed. Quartz monzonite of the Hotailuh batholith occurs south of the main areas of mineralization. In natural exposures and trenches in the vicinity of mineralization the rocks consist of dark-green porphyritic hornblende andesite, fine-grained andesitic greenstone, volcanic breccia, and tuff. Basaltic rocks and basaltic lithic tuffs were observed in specimens from the diamond-drill cores. All the volcanic *rocks* are intruded by an apparently irregular mass of fine-grained broken feldspar porphyry rock that has a great deal of textural variation. Much of the rock indicated as feldspar porphyry on the geological map is a leucocratic reddish-stained fine-gained felsite or alaskite that could be in part highly altered versions of the volcanic rocks. Feldspar phenocrysts are commonly lacking. Rare quartz phenocrysts were observed.

In the vicinity of the two main mineralized areas known as the Hill zone and the Creek zone, all the rocks exhibit considerable alteration. Carbonate is widespread throughout the rocks and also as veinlets. Sericite is patchily distributed. The feldspar porphyry and possibly some of the volcanic rocks have been bleached, patchily silicified, and have much widespread iron-oxide staining and hematite on many irregular fractures. Chlorite occurs on fractures in the volcanic rocks together with dense black veins of tourmaline. In places fine-grained potash feldspar occurs in the volcanic rocks. All the rocks exhibit in many places cataclastic breccia textures and variable evidence of squeezing and over-all deformation due to pervasive movement throughout the rock.

The feldspar porphyry outcrops, which are few in number and scattered, and the irregular distribution of the rock in the diamond-drill core prevent, as yet, a clear idea being obtained of the shape and extent of this intrusive rock.

Structurally the only definite attitudes are those in greywackes and basic volcanic rocks exposed above 4,500 feet elevation on the eastern slopes above the property. These beds are reported to dip between 35 and 40 degrees to the northeast. In the area of the mineralization, only one attitude was observed along Gnat Creek. The rock exposures at the Hill zone are strongly fractured and broken by joints and small faults, but no dominant direction was evident. The information from the diamond-drill core shows that much of the rock has been crackled or brecciated, and there are some strong fault zones. In the Creek zone the rocks are fractured, and in places they are irregularly schistose in a northwesterly direction. Large parts of the area are covered by overburden where the geology remains unknown. However, sparse drii-core information, combined with a study of the topographic forms and the aerial photographs, suggests that major north-trending faults pass through the area, and these are shown on the geological sketch-map.

The Gnat Lakes lie in a north-trending valley, and a concentration of faults together with crackled zones in the rocks adjacent to the irregular contact of the Hotailuh batholith at this point appears to be fairly evident.

The mineralization consists of dispersed and disseminated chalcopyrite with a little bornite. The sulphide occurs in the altered andesitic greenstones, and the dark-green porphyritic andesites in blebs, wisps, and along fracture planes. There are occasional pods of richer mineralization, but no massive sulphides were seen. Pyrite occurs in minor to negligible amounts. Magnetite is noticeable in all the volcanic rocks. and in places there appears to be strong concentrations of magnetite with chalcopyrite.

In 1966 the company completed 8,900 feet of diamond drilling in 14 holes. In addition, mapping, magnetometer surveys, and geochemical work were done under the direction of M. Bradford, geologist in charge at the. property. An average of 13 men was employed.

[Reference: Assessment Report No. 660.1

Copper-Molybdenum

Cap, Flat
United States Smelting, Refining and Mining Company
BY W.G.Clarke

(58” 129° S.E.) Head office, 235 East 42nd Street, New York; field office, 935,470 Granville Street, Vancouver 2. R. D. Westervelt, geologist. This group of 56 claims, owned by a syndicate managed by the company, is near Glacial Lake at the head of McBride River. It is accessible by helicopter a distance of 14 miles east from the Stewart–Cassiar highway.

In 1966, three men spent one month on reconnaissance geological, geophysical, and geochemical surveys, under K. F. Bickford, geologist. The property was not visited.

Copper-Molybdenum

Let, Tak
United States Smelting, Refining and Mining Company
By W. G. Clarke

(58" 129" S.E.) Head office, 235 East 42nd Street, New York; field office, 935, 470 Granville Street, Vancouver 2. R. D. Westervelt, geologist. *This* group of 60 claims, owned by a syndicate managed by the company, is 10 miles southeast of Glacial Lake at the head of McBride River. It is accessible by helicopter, a distance of 21 miles east from the Stewart-Cassiar highway.

In 1966 four men spent one month on reconnaissance geological, geophysical, and geochemical surveys, under K. F. Bickford, geologist. The property was not visited.

Copper

Dalvenie, Mac, New Deal
Copper Pass Mines Ltd.
BY W. G. Jeffery

(58" 129° S.W.) B. Linton, 14432—79th Avenue, Edmonton, Alta., is a principal of Copper Pass Mines Ltd. The property consists of the Dalvenie 2 to 9, Mac, and New Deal 1 to 4 Crown-granted claims together with the Frac, Rac, Tac, Nat, Fog, Pass, and Lin claim groups held by record.

Access is from the Cassiar highway at a point 22 miles south of Dease Lake. The recorded claims extend along the west side of the highway. The showings on the Crown grants are at an elevation of approximately 5,100 feet on the flanks of Thenatlodi Mountain, and are reached by a tote-road of about 1 mile from the highway.

The mineralization on the Crown grants was first discovered in 1899. The claims were Crown-granted in 1935, but little work has been done on the property since that time.

The property lies on the western flank of the Hotailuh batholith, composed mainly of granodiorite and quartz monzonite. The intrusive rock in the immediate vicinity of the showings has been described as basic, probably basaltic to gabbroic plutons. These basic rocks have intruded an assemblage of porphyritic andesite and strongly folded argillite, quartzite, and chert. There are some diabase dykes.

Mineralization has been &posed in trenches across a shear or fault zone up to 60 feet wide trending north 16 degrees east. This zone, with variations in the width and intensity of shearing, can be traced over a distance of about 2,500 feet. Overburden is extensive and the exposures are oxidii with much iron staining. Linear depressions suggest a pattern of generally north-trending faults underlying the property.

Mineralization is reported to consist of pyrite, chalcopyrite, arsenopyrite, bornite, and magnetite, along with a gangue of altered rock, quartz, and some barite. There are values in gold and silver.

Geological mapping, induced polarization and soil geochemical surveys, trenching, and some short X-ray diamond-drill holes were put down under the over-all direction of M. A. Roed.

[References: *Minister of Mines, B.C.,* Ann. Rept., 1935, p. B 22; *Geol. Surv., Canada,* Maps 9-1957, 29-1962; Assessment Reports Nos. 896, 897, 898, and 899.1
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CRY LAKE

Molybdenum

Bartle
Bartle Explorations Ltd.
By W. G. Clarke

(58° 129° N.E.) Head office, 360 Raymond Avenue, Richmond. John Bartle, director. The Bartle group of 22 claims is 2½ miles north of the mid-point of Cry Lake, and 110 miles by air from Watson Lake. Twenty-two open cuts, averaging 5 to 6 feet deep, were made by hand-drilling and blasting. The property was not visited.

TURNAGAIN RIVER

Copper-Nickel

Turn, Pyrrhotite, Cobalt
Falconbridge Nickel Mines Limited
By W. G. Clarke

(58° 128° S.W.) Western office, 504, 1112 West Pender Street, Vancouver 1. The property is on the Turnagain River just east of Flat Creek and is accessible from Dease Lake, 45 miles away, by trail or helicopter. The Cobalt claim has been optioned from E. Larson, the Pyrrhotite claim from W. Thompson, and the Turn group of 78 claims is held by agreement.

The chalcopyrite, pyrrhotite, and pentlandite arc reported to occur as replacements in shears in peridotite. In 1966 eight men spent two months under J. J. McDougall, geologist, making geological and geophysical surveys. One 30-foot hole was diamond-drilled. The property was not visited.

STIKINE RIVER

BARRINGTON RIVER

Copper

Gordon
Kennco Explorations, (Western) Limited
By W. G. Jeffery

(57° 131° N.W.) Company office, 730, 505 Burrard Street, Vancouver 1; C. J. Sullivan, president. The Gordon group consists of 30 recorded claims, situated across the junction of Limpoke Creek and the Barrington River, about 30 miles west of Telegraph Creek. The terrain is very precipitous, and both streams at this point form deep gorges with steep cliis and slopes in the order of 1,000 feet from the water. The slopes above these gorges are gentle, covered with dense brush and alder, and expose little outcrop. The difficult access to tbe rocks exposed by the Barrington River and the lower part of Limpoke Creek has prevented earlier observation of the rocks and the discovery of mineralization on the cliffs. An anomalous geochemical sample collected from Liipoke Creek at its junction with the Barrington River was initially attributed to mineralization discovered higher upstream on the Poke group (see Annual Report, 1965, p. 18).

Helicopter reconnaissance in the gorges of the Barrington River and Liipoke Creek revealed small areas of green copper stain on the cliffs, the most widespread being on the cliffs on the north side of Limpoke Creek.

The regional geology indicates that the area is underlain by Triassic or Permian volcanic and sedimentary rocks. South and west of the junction of Limpoke Creek and the Barrington River there is a large granitic stock.

A brief examination of the rocks forming the uppermost cliffs on the north side of Limpoke Creek was made. The mineralized rocks at this point consist of pink syenite porphyry and fine-grained dark-green and pink porphyritic rocks that may be volcanic in origin. The syenite porphyry is a mottled pink and grey markedly magnetic rock. There are pink potash feldspar phenocrysts averaging 1 centimetre in length in an aggregate of cream altered feldspar, green anhedral masses of aegirine-augite partly altered to chlorite, and variably abundant flakes of green biotite. Widespread but minor accessory minerals include apatite and sphene. Associated rocks that are fine-grained, dark green in colour, and appear to be volcanic consist of essentially similar but more dispersed minerals as described above. Most of the rocks are porphyritic to some degree and are magnetic. All the rocks are cut by veinlets of potash feldspar, and there are pockets of coarse biotite, epidote, and magnetite. Garnet was observed in a small veinlet. There are dykes of hornblende syenite porphyry where the amphibole is altered to biotite and chlorite, and there is much dispersed carbonate. Coarse-grained grey syenite dykes or sills up to several feet wide also occur.

No clear structural relations between syenite porphyry and the green fine-grained rocks were observed. On the cliis there are planar weathered-out rusty-brown features that suggest faults striking roughly east and dipping steeply to the south. Scattered patches of weak chalcopyrite mineralization were observed on the outcrops in the small area seen. More copper mineralization is reported in other parts of the claim group. Dispersed and disseminated pyrite mineralization is widespread. The areas of finely disseminated chalcopyrite mineralization are irregular in extent but are noticeable on the cliis due to the local patches of green copper oxide stain, and it was this feature that first drew attention to the area.

In the 1966 field season an average number of eight men under the direction of G. Rayner carried out topographic and geologic reconnaissance mapping, line-cutting, and induced polarization and geochemical surveys.

[References: *Minister* of Mines, B.C., Ann. Rept., 1965, p. 18; Assessment Report No. 847.]

Iron

MH
Stikine Iron Mines Ltd.
By W. G. Jeffery

(57" 131" N.W.) Company office, 409 Granville Street, Vancouver 1. The MH group of 70 recorded mineral claims is at the head of Shakes Creek, 20 miles directly west of Telegraph Creek and 34 miles distant by a rough four-wheel-drive road. No work was done on the property in 1966. A brief visit was made in the 1966 field season, and some samples were collected. The area of interest lies between 3,300 and 4,300 feet elevation in gently undulating countryside, and natural outcrops are rare. Bedrock was uncovered by trenching and stripping with a bulldozer in 1965 through overburden depths that generally vary from 2 to 12 feet in thickness.

The iron mineralization is magnetite. The host rock is an equigranular pyroxenite composed mainly of augite with a minor amount of biotite flakes and abundant disseminated magnetite. The pyroxenite varies in grain size from place to place, with the coarse-grained fractions up to one-eighth inch in size. The biotite, apart from individual flakes in the rock fabric, also occurs as scattered concentrations and pockets from place to place. The magnetite occurs interstitially throughout the rock in rounded grains and blebs, and the size range does not appear to be directly related to the local grain size of the pyroxenite. In isolated instances the magnetite penetrates cracks in pyroxene or surrounds broken pyroxene grains. There are scattered veins up to 2 inches in width of dark-grey very fine-grained rock composed of pyroxene, very finely disseminated magnetite, and some feldspar. These veins commonly have selvedges of pink potash feldspar with some pyroxene and biotite grains. There are also narrow stringers of pink potash feldspar and epidote through the pyroxenite, but they are not abundant, and in general the pyroxenite outcrops show considerable uniformity as a dark-green massive crystalline rock. A natural exposure at the junction of two small creeks was observed to have a distinct layered structure by grain size, with an approximate northeast strike and a dip of 30 degrees to the southeast. The stripping has uncovered bedrock close to the northern contact of the pyroxenite. The exposure reveals weathered and shattered non-magnetic andesitic greenstone which, according to regional mapping, is either Permian or Triassic in age. This was the only country rock observed. However, the ground magnetometer work completed in 1965 indicates strongly that the pyroxenite is an intrusive plug with a roughly oval shape at the surface. The long axis is about 14,000 feet long in an east-northeasterly direction, and the plug is at least 5,000 feet across in a north-northwesterly direction.

A chip sample taken over a length of 59 feet from a bulldozed exposure near the centre of the plug assayed as follows: Total iron, 12.67 per cent; magnetite iron, 6.51 per cent; titanium, 0.83 per cent; phosphorus, 0.14 per cent.

Another chip sample taken over 51 feet at a natural exposure that had been extended by a bulldozer assayed: Total iron, 14.38 per cent; magnetite iron, 8.25 per cent; titanium, 0.80 per cent; phosphorus, 0.05 per cent.

[Reference: Assessment Report No. 773.1

Copper

Edson By W. O. Jeffery (57° 132° N.E.) The Edson group of 64 recorded mineral claims lies on the south side of the headwaters of the Barrington River. The claims were recorded in the names of Edward Sonnenberg, Egil H. Lorntzsen, and A. David Ross. In 1966 the property was under agreement by Cominco Ltd., and S. Pedley was the engineer in charge. An average number of four men carried out geological mapping, geophysical work, hand-trenching, and 141 feet of diamond drilling in three holes.

The property is at an elevation of about 3,500 feet in gently undulating fairly open country. The underlying rocks are Middle and Upper Triassic sediments that have been crumpled and folded, with a predominant east-northeast trend in this area.

A brief examination of the property showed scattered outcrops and small bluffs of severely crumpled and folded quartz-chlorite-mica schists and phyllites. The rocks strike north 80 degrees east, and all dips are steep, mostly to the north. Fold axes plunge 60 to 70 degrees west, and a lesser number plunge about 20 degrees westward. Lineations plunging to the west in the order of 20 to 30 degrees were commonly observed.

The contorted sediments are shot through with much white quartz in irregular masses, gashes, and disconnected pods making up 5 per cent of the rock in places and locally up to 10 per cent. The mineralized outcrops are along the south shore of a small lake that is elongated in the direction of the regional grain; that is, east-northeast. South of this mineralized area there is a shallow swampy draw devoid of rock exposure, except for some black graphitic slates striking north 80 degrees east and dipping 80 degrees south that occur in a small creek. South of the draw there are low bluffs forming the base of a prominent ridge with the same east-northeast trend. The lowermost bluffs of this ridge are composed of a green andesitic volcanic rock, which is generally fairly massive but partly schistose in places.

Immediately south of the small lake, chalcopyrite and pyrite mineralization was observed disseminated through the sediments and in granular pods and massive blebs at least in part connected with the folds. These outcrops are scattered over a strike distance of about 1,000 feet. Nowhere did the zones appear to be greater than a few feet wide. The longest mineralized exposure was traced over approximately 100 feet, and a chip sample over a width of 7 feet assayed: Gold, 0.01 ounce per ton; silver, 0.6 ounce per ton; copper, 0.70 per cent. A greater amount of chalcopyrite is dispersed through the chloritic and micaceous schists than in the finely granular quartzitic schist. Chalcopyrite also occurs with leases of coarse-grained quartz and feldspar in places. Small pods of chalcopyrite are in or close to crests of folds, and it appears that mineralization is connected with the folds and dispersed in the schists close to the crests of folds. The massive white quartz veins and gashes are deficient in sulphides, except that a little chalcopyrite and a small amount of bomite were observed in a fissure in white quartz in one place.

copper

GALORE CREEK

HAB, BUY, GC (Galore Creek)
Stikine Copper Limited
BY H. Bapty

(57° 131° S.E.) Company office, 1111, 1030 West Georgia Street, Vancouver 5. C. H. Burgess, president; S. K. Smyth, development engineer; J. A. McAusland, project engineer. The Galore Creek copper property consists of a very large number of recorded mineral claims held as the HAB, BUY, and GC claims in the headwaters of Galore Creek.

Work on the property commenced in mid-April and continued until the end of the year. The working crew averaged 35 men on the property. Work accomplished: the 30-mile access road begun in 1965 was completed, 19,564 feet of surface diamond drilling was completed, and 2,000 feet of underground driving in the adit and drifts was done.

A camp at the adit portal was installed in September. This consisted of a trailer-prefab camp of six units, a repair-shop, a compressor-house for a 600-cubic-foot-per-minute compressor, a change-house, and a generator-shack to house a 75-kw. generator. An airstrip suitable for a Beaver aircraft was constructed at the junction of Galore Creek and Scud River. Shipments were made to the camp during the summer by barge and truck, and during the early spring, autumn, and winter by aircraft.

[References: *Minister* of *Mines, B.C.,* Ann. Rept., 1965, pp. 24-29; Assessment Reports Nos. 367, 368, 371 to 373, 444, and 445.]

Copper

BIK
Silver Standard Mines Limited
By H. Bapty

(57° 131° S.E.) Company office, 808, 602 West Hastings Street, Vancouver 2. R. W. Wilson, president; W. St. C. Dunn, superintendent of exploration. This is a joint venture of Silver Standard Mines Limited and American Smelting and Refining Company. This property consists of 118 recorded claims known as the BIK and is divided into two areas termed Stikine North and Stikine East. The claims straddle central Galore Creek and extend eastward from the upper part of Galore Creek along the northern slopes of the East Fork almost to Copper Canyon.

Two men were on the property for a month during the summer. Eight trenches were made with a D-7 bulldozer tractor for a total length of 3,400 feet. The geology exposed by the trenches was mapped. The property is reached by helicopter, and the newly constructed road from the mouth of the Scud River passes through the property on the east side of Galore Creek. The property was not visited while work was being performed.

[References: Minister of *Mines, B.C.,* Ann. Rept., 1965, pp. 29-31; Assessment Reports Nos. 589 to 593, 622 to 623, 687 to 688, 692, and 694.]

C.W.
Conwest Exploration Company Limited
By W. G. Clarke

(57° 131° S.E.) Head office, 1001, 85 Richmond Street West, Toronto, Ont.; western office, 901, 675 West Hastings Street, Vancouver 2. P. 0. Hachey, western manager. The C.W. group of 69 claims, owned by the company, is on Galore Creek, 2 miles south of the. Scud River, and may be reached by the Stikine Copper access road.

In 1966 seven men spent one month making geophysical (induced polarization) and geochemical (soil and stream sediment) surveys. The property was not visited.

[Reference: Assessment Report No. 937.1

Copper-Molybdenum

MESS CREEK

Bird, Sno, Bud
Liard Copper Mines Ltd.
By W. G. Jeffery

(57° 130° S.W.) Company office, 807, 602 West Hastings Street, Vancouver 2. R. W. Wilson, president. The property comprising the Bird 1 to 4, Sno 1 to 16, and Bud 1 to 28 mineral claims is just east of the junction of Hickman Creek with Schaft Creek. It is 36 miles south of Telegraph Creek and is accessible by aircraft a distance of 150 miles from Stewart. Copper mineralization was discovered by N. Bird in 1957, and the Bird group of claims was recorded by prospectors of the BIK Syndicate, which comprised Silver Standard Mines Limited, McIntyre Porcupine Mines Limited, and Kerr-Addison Gold Mines Limited. Prospecting done in 1957 and 1959 revealed low-grade copper mineralization within an area 1,000 feet long and 500 feet wide extending along and on the western slopes of a north-striking ridge east of Schaft Creek and between elevations of 4,000 and 4,500 feet. In 1964 the Sno group of claims was recorded by Silver Standard Mines Limited and Kerr-Addison Gold Mines Limited, and the Bud group of claims was recorded by Silver Standard Mines Limited, and some trenching and mapping were done.

Liard Copper Mines Ltd. was formed in 1966 and holds all the claims in the Bird, Bud, Sno, Nov, I.D., and Gav groups. Silver Standard Mines Liited has a 66per-cent interest in the company, with most of the remainder held by McIntyre Porcupine Mines Limited, Kerr-Addison Mines Limited, and Dalhousie Oils Ltd. Liard Copper Mines Ltd. reached an agreement with American Smelting and Refining Company whereby the latter would explore and develop the properly. The work done in 1966 consisted of geological and induced polarization geophysical work, extensive bulldozer clearing, and 10,939 feet of diamond drilling in 24 holes. An average of 18 men spent five months on the property. T. C. Osborne, of American Smelting and Refining Company, Vancouver office, was responsible for the field operations.

Schaft Creek is a broad valley with a widely braided stream. Mineralization was first discovered on the western slopes of a low saddle that crosses the ridge between Schaft and Mess Creeks. The saddle slopes gently down to a *flat* area forming the east side of Schaft Creek valley, where there are very few rock exposures.

The property lies on the east flank of the Hickman batholith that underlies the precipitous mountain and glacier area of which Mount Hickman is the highest point (9,700 feet). The eastern batholith contact trends north along the course of Schaft and Hickman Creeks.

Adjacent to the batholith are volcanic rocks that have been classified as Permian or older in age.

Mapping at a scale of 1,000 feet to 1 inch has shown that these rocks can be divided into two groups that in the field were termed the green volcanics and the purple volcanics (see Fig. 3).

The green volcanics *consist* of green andesitic flows, tuffs, and volcanic breccias. This unit is the main host to copper mineralization, and these rocks underlie the large low area west of the low saddle where outcrops are very sparse. The andesites are dense fine-grained rocks that are usually porphyritic with subhedral plagioclase and pyroxene phenocrysts. The pyroclastic rocks are mainly fine-grained tuffaceous rocks, a large number of which'&. not readily recognizable as such in hand specimen. There is a considerable amount of crystal tuff with broken irregular feldspar crystals in a fine-grained matrix. These tuffs range up to coarser more distinct volcanic lithic breccias with fragments up to 1 to 2 inches in size. The finer-grained tuffaceous rocks are much more abundant than the volcanic breccias. Throughout this sequence there is considerable alteration of the original rocks to epidote, chlorite, calcite, and some quartz.

Overlying the green andesitic volcanic rock unit is a dark-green aogite porphyry basalt, and in the area of mineralization this unit roughly separates the green and purple volcanic units. South of the mineralized area, green volcanic rocks arc seen above the porphyry basalt. The porphyry basalt may be either a sill or a flow unit. Within the low-lying area of mineralization it can be recognized in sparse outcrops and is also intersected in the diamond-drill holes. The distribution of the porphyry basalt exposures could indicate that there is more than one layer of this rock. However, the interpretation of the geological structure in the area suggests that there is only one unit of porphyry basalt. An outcrop in a creek in the centre of the low-lying area shows the porphyry basalt overlying a 6-inch to l-foot thick brecciated Bow top of a porphyritic andesite flow and dipping 20 degrees to the southeast. There is evidence here of a relatively thin (25 feet approximately) layer of andesite intercalated at the base of the porphyry basalt. Further evidence of thii interlayering of green andesite and dark-green porphyry basalt can be seen in the outcrops at higher elevations on the slopes south of the saddle, but strong northerly faults confuse the relationships in the creek exposures. An examination of the ridge south of the mineralized area showed a zone of basalt approximately 50 feet thick only partially porphyritic and overlain by featureless green andesitic rocks with some thin cherty beds in places. However, in the area immediately south of the saddle the rocks above the porphyry basalt are dark-purple basic pyroclastics, purple olivine porphyry basalts, hematite-stained volcanic flows with ropy flow tops in places, and coarse angular purple and green volcanic breccias with fragments commonly 6 inches across and rarely to 2 feet across. The exposures of these rocks and the porphyry basalt reveal a confused relationship. In places large blocks of porphyry basalt appear caught up in the purple volcanic rocks. The porphyry basalt contains patches of epidote and a little copper stain along fractures. Elsewhere the porphyry basalt is spotted with reddish-purple coloration as though including ashy phases of the purple volcanic rocks. At elevations of about 4,800 feet the porphyry basalt appears to be in the form of an irregular dyke about 75 to 100 feet wide intruding purple and green tuffs.

On the slopes north of the saddle the porphyry basalt was not observed, except for scattered thin occurrences on the west-facing slopes north of the mineralized area.

The variable occurrence and thickness of the porphyry basalt suggest that it is an intrusive and perhaps contemporaneous phase of the purple volcanic pyroclastic deposition, and that its main zone of intrusion was at the top of the underlying green volcanic rocks.

On the ridge immediately north of the saddle, the upper contact of the green volcanic rocks was not seen distinctly. However, there must be a relatively sharp change from highly fractured and locally mineralized green andesitic volcanics to relatively fresh unmineralized purplish basaltic flows and purple tuffs and fragmentals which are lithologically similar to the purple volcanic rocks seen on the ridge sooth of the saddle. At higher elevations along the flanks of the northern ridge there are purplish-green amygdaloidal porphyritic flows, green volcanic fragmental rocks, and on the eastern slopes purple volcanic rocks both porphyritic and aphanitic, green and reddish pyroclastic rocks similar to those seen south of the saddle, and greenish bedded tuffs. At elevations above about 5,500 feet some thin-bedded fine-grained sediments are intercalated with these volcanic rocks. These volcanic rocks are similar to tbe volcanic rocks observed on the ridge south of the saddle.

The relationship of the purple volcanic rocks to the mineralized green andesitic rocks remains uncertain, but they appear to be structurally conformable. Limited exposures in lower areas of the contact between the green volcanics and the porphyry basalt show uniform dips to the east in the order of 20 to 40 degrees. The dips in the overlying purple volcanics become steeper to the east. The ridges north and south of the saddle show strikes trending east, and with steep north and south dips on the north and south sides of the saddle respectively. Although not conclusive, these attitudes suggest the presence of a large steep easterly plunging antiform with its axis coinciding approximately with the saddle.

The igneous rocks of the Hickman batholith are well exposed in Hickman Creek immediately south of the main showing, and in scattered sparse outcrops in the low areas east of Schaft Creek. The intrusive rock is a pinkish-brown medium-grained monzonite to quartz monzonite that has intruded the volcanic rocks. The contact is seen in a small creek flowing into Schaft Creek. On one side of the creek the contact dips steeply southwest in a zone marked by numerous faults in both the intrusive and the volcanic rocks. The other side of the creek shows that the intrusive is brecciated and foliated with a general northerly trend against irregularly schistose volcanic rocks.

A dioritic dyke trending north and about 20 feet wide is exposed on the slope below the western side of tbe saddle. The diamond-drill holes have intersected feldspar porphyry and quartz feldspar porphyry dykes with intersections up to 25 feet. These granitic dykes and the volcanic rocks are cut by fresh fine-grained dark-green basaltic dykes with no evident over-all trend, though some were observed with an east strike and steep to vertical dips.

Faults are the most important structural feature of the geology and appear to be the feature with the strongest relationship to mineralization. There is a large amount of cover, and there are limited exposures of some of the faults. However, the fault pattern as shown on the map has been determined using the air photographs, known exposures, diamond-drill core, rock alteration, and the interpretation of the volcanic stratigraphy assuming only one layer of the distinctive augite porphyry basalt. To some degree the fault pattern has been substantiated by the geophysical induced polarization surveys and the associated broad pattern of known sulphide mineralization.

The major faults have a dominant north trend and dip steeply east. There are fault exposures with clay gouge and sheared and shattered iron-stained zones along the higher slopes south of the saddle in several creeks, and this has been termed the Wolverine fault by previous observers. The northward extension of this fault is along the western edge of the saddle, and it is believed to extend farther northward into the overlying purple volcanic rocks. Some of the attitudes of the faults seen in the creeks indicate that a branch of the fault extends west of north under the covered area, and that this may diverge and coalesce with other major north-trending faults in the low-lying area. The same north trend of the fault pattern as interpreted from some exposures in creeks and also from the distribution of the volcanic rock types seen whilst mapping appears to persist farther north on the slopes north of the saddle.

Some faults with an east trend were observed, but they are not as persistent nor as important as those having a north trend. Planar structures that may be either faults or prominent joint planes occur within the Hickman batholith.

The green andesite rocks are extensively jointed and fractured. As with the faults, the joints have two trends, north and east, with the north joint system being the stronger and more prominent. The joints have vertical to steep dips, with steep westerly dips being most common.

Sulphide mineralization consisting of chalcopyrite, bomite, molybdenite, and pyrite is widespread in the green volcanic rocks of the low-lying area and slopes west of the saddle. The copper minerals and pyrite occur finely disseminated and as wisps and clots on minute irregular cracks through the andesite breccias, tuffs, and flows. In the breccias the sulphide may be in both the matrix and the fragments, usually replacing the mafic constituents. Chalcopyrite, bomite, and pyrite also occur in distinct veinlets, commonly with quartz and calcite. Chalcopyrite is also widespread as tie coatings on the surfaces of the joint planes through the volcanic rocks, and this type of occurrence forms a substantial part of the copper mineralization. Molybdenite is dominantly distributed on fractures and joint planes, and commonly exhibits polished surfaces due to post-mineral movement. To a lesser extent, molybdenite has been seen with copper minerals, quartz, and calcite in distinct veinlets. Pyrite has a widespread distribution in all the forms described above, and no spatial relationship to other minerals has been recognized so far.

Calcite, epidote, quartz, sericite, chlorite, and feldspar are all associated with the sulphide mineralization. The most prominent alteration is the over-all brown-pink to pink-red coloration of the volcanic rocks due to fine-gained blurred feldspar development in the rock matrix. The intensity of the alteration appears to be related spatially to the north faults, with diminishing alteration away from them. The greatest intensity of alteration may occur at fault junctions. The apparent effect of the feldspathization has been to heal the original faults, but in places the feldspathized rock is itself brecciated, with some chalcopyrite and pyrite mineralization occurring between the breccia fragments. All the other minerals are much more widespread in their distribution, and so far there is no evident pattern to their extent or relationship to sulphide mineralization.

A small knoll very close to the batholith contact exposes a north-trending zone of strong fracturing and disruption in the volcanic rocks, which in places contains veinlets, lenses, and crumpled wisps of granitic rock. There are patches of massive sulphides, mainly chalcopyrite with some hematite, replacing and filling fractures in a skarny assemblage of coarse green epidote, actinolite, and chlorite. This area has abundant green copper stain on the many rock fractures.

Fragments of float with green copper stain are also relatively widespread on the western slopes leading down from the saddle.

In summary the copper-molybdenum mineralization occurs as disseminated sulphide and along joints in altered volcanic rocks adjacent to a large monzonite intrusion. The major structural controls appear to be dominant north-trending reverse faults and associated joints that may be connected with a regional steep easterly plunging fold structure in the volcanic rocks.

[Reference: Assessment Report No. 588.]

Copper-Molybdenum

Nabs
Paramount Mining Ltd.
By W. O. Jeffery

(57" 130° S.W.) Company office, 1008, 789 West Pender Street, Vancouver 1. The property consists of 34 recorded claims, two of which are fractions, known as the Nabs group, which adjoins immediately to the north of Liard Copper Mines

Ltd. It is 36 miles south of Telegraph Creek, 150 miles north of Stewart, and on the eastern slopes of Schaft Creek, a tributary to Mess Creek.

The property covers the low-lying area that narrows to the north and the slopes east of Schaft Creek extending northward from the saddle described in the property of Liard Copper Mines Ltd. (see Fig. 3). Almost the entire low-lying area is covered and has no exposures of bedrock. Traverses on the higher slopes reveal similar regional geology to that described on the property to the south. A broken green andesitic series of flows, tuffs, and breccias is overlain with apparent conformity by more basic purple-covered flows and breccias similar in many respects to rocks seen at higher elevations to the south. In scattered occurrences there is evidence of a dark-green basaltic flow or sill intervening between the two volcanic units, but it appears to be considerably thiier and more inconsistent than where observed to the south. Underlying the main part of the Schaft Creek valley is the easternmost margin of the Hickman batholith. In most of the area the granitic rocks are not seen, but quartz-rich phases of the monzonite, mineralized with finely disseminated chalcopyrite and a little bomite, are seen in the northern part of the property on slopes above Schaft Creek where the valley becomes narrower. There is noticeable green copper oxide stain on weathered joint and fracture surfaces of the outcrops.

Apart from pyrite, very small amounts of chalcopyrite and some green copper oxide stains were seen associated with those volcanic rocks exposed on the higher slopes. These locations were in the north end of the property and close to the outcrops of mineralized granitic rocks described above. However, the lower covered portion of the area is most likely underlain by the green volcanic rock unit that farther south carries dispersed copper and molybdenum sulphide mineralization.

The relatively few dip and strike determinations made indicate that the volcanic rocks have moderate dips in a northwesterly direction. One steep dip was noted adjacent to the intrusive rocks.

Faults are the major structural features. There is evidence of these faults in the creek exposures on the higher slopes where there are outcrops which are broken and highly altered with iron oxide stains. In places they weather out to form slight depressions along the slope as the main trend is west of north roughly parallel with the slope. No direct observation of formation offset was seen on these faults, but the rock distribution and location of faults seen in traversing, together with linear features on the air photographs, indicate the structure as shown on the map. Most of the dips are steeply east, though one observation was an apparent flat fault structure dipping 24 degrees northeasterly where a wedge of the purple volcanic rocks may have been thrust over the green volcanic rocks. Part of the drainage off the slope into Schaft Creek was noted to come from springs that emerge at elevations that roughly coincide with the outcrops of the faults and about the position of the contact between the two volcanic units. In the small amount of outcrop observed, no dominant joint direction, such as seen farther to the south, was apparent.

The most prominent joint direction in the granitic rocks was vertical to steep-dipping planar structures with a north trend. There was no clear evidence seen that the northwesterly trending faults intersected the batholith.

The copper mineralization in the granitic rocks occurs as finely dispersed chalcopyrite in a crackled monzonite that carries introduced quartz and chlorite. Insufficient work has been done to delineate the extent of this mineralization.

Work done on the property in 1966 included line-cutting, induced polarization and ground magnetometer geophysical surveys, and soil geochemical sampling for copper and molybdenum. The work was done under the direction of C. A. R. Lammle.

[Reference: Assessment Report No. 900.1

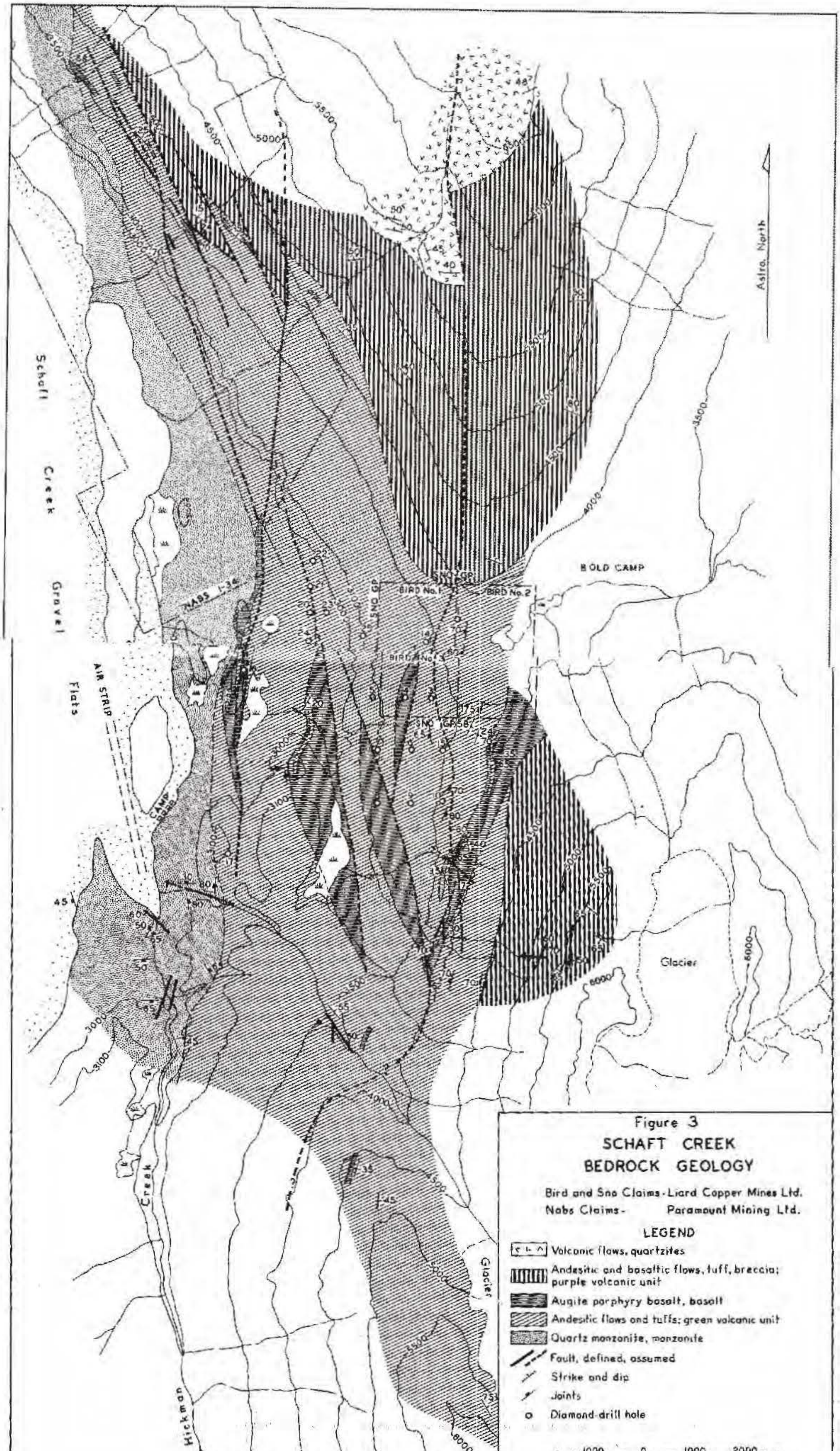


Figure 3
SCHAFT CREEK
BEDROCK GEOLOGY

Copper-Silver

Arctic, Ann, Bam
The Shawinigan Mining and Smelting Company Limited
By W. G. Clarke

(57° 130° S.W.) Head office, 385 St. Patrick Street, Lasalle, Que.; western office, 1030 West *Georgia* Street, Vancouver 5. Douglas Parent, general manager. The property consists of 103 claims held under option by the company. The claims are east of Arctic Lake near the head of Mess Creek. Three drii camps were built, in preparation for diamond drilling in 1967. Ten men worked for two months. The property was not visited.

[Reference: Assessment Report No. 695.1

ISKUT RIVER

Nickel-Copper

E and L
Silver Standard Mines Limited
By W. G. Jeffery

(56” 130” N.W.) The E and L group of 40 recorded mineral claims is controlled by Silver Standard Mines Limited, 808, 602 West Hastings Street, Vancouver 2, with some interest by Kerr-Addison Gold Mines Limited and McIntyre Porcupine Mines Limited, in the claims E and L Nos. 1 and 2. The property is on the north side of the headwaters of Snippaker Creek, a tributary of the Iskut River (see Fig. 4). The surface showing is at 6,200 feet elevation, and a drill tent was set up on the property supported by a base camp on Snippaker Creek at 2,800 feet elevation. For two months in 1966 an average of four men was employed under the direction of William St. C. Dunn. A total of 1,248 feet of diamond drilling in five holes was completed.

The mineral showings occur in a rocky exposed area at the top of steep cliffs on the south, and at the edge of an extensive permanent snowfield to the north and east. The accessible rock exposures lie along the generally east-trending ridge between 5,800 and 6,400 feet elevation south of the snowfield.

At the eastern end of the ridge there are green and grey volcanic breccias and cherty tuffs striking northeasterly and dipping 70 degrees to the northwest. The remainder of the rocks seen on the ridge consist of bedded cherts, tuffaceous cherts, and thin-bedded shaly argillites intruded by coarse-grained gabbro, part of which is mineralized with sulphides. Mineralization occurs within two distinct areas of gabbro, probably connected, and almost completely surrounded by sedimentary chert beds. These two areas are termed the Northwest and the Southeast zones.

The ridge exposures east of the main showings are of gabbro that has a distinct northeasterly foliation imparted by diabase dykes, local epidote and carbonate alteration, and a strong vertical joint pattern. Some of these rocks may be highly metamorphosed tuffs. In the vicinity of the mineralization the contacts of yellow and green bedded cherts and the gabbro are sharp. The gabbro-chert relationships and the variable southwest to south dip of the sediments indicate a forceful intrusion of the gabbro with disruption of the sediments into blocks or panels. North and west of the mineralized area are outcrops of homogeneous gabbro cut by northeasterly trending diabase dykes. A large dyke 70 to 80 feet wide separates the gabbro from sediments to the west. The sediments are brown to black sub-fissile shaly argillites that have been weathered to frost-riven shattered debris along the ridge. Beyond the highest point where the ridge trends southwesterly, some poorly preserved fossils were found. The highest parts of the ridge expose more gabbro, but the contacts against the shaly sediments are indistinct and gradational and with possible inclusions of sediments within the gabbro.

The unmineraliied and mineralized gabbro is medium to coarse grained with a granular to ophitic texture. Coarse plagioclase and pyroxene is accompanied by variable amounts of olivine ranging up to about 20 per cent in one unmineralized

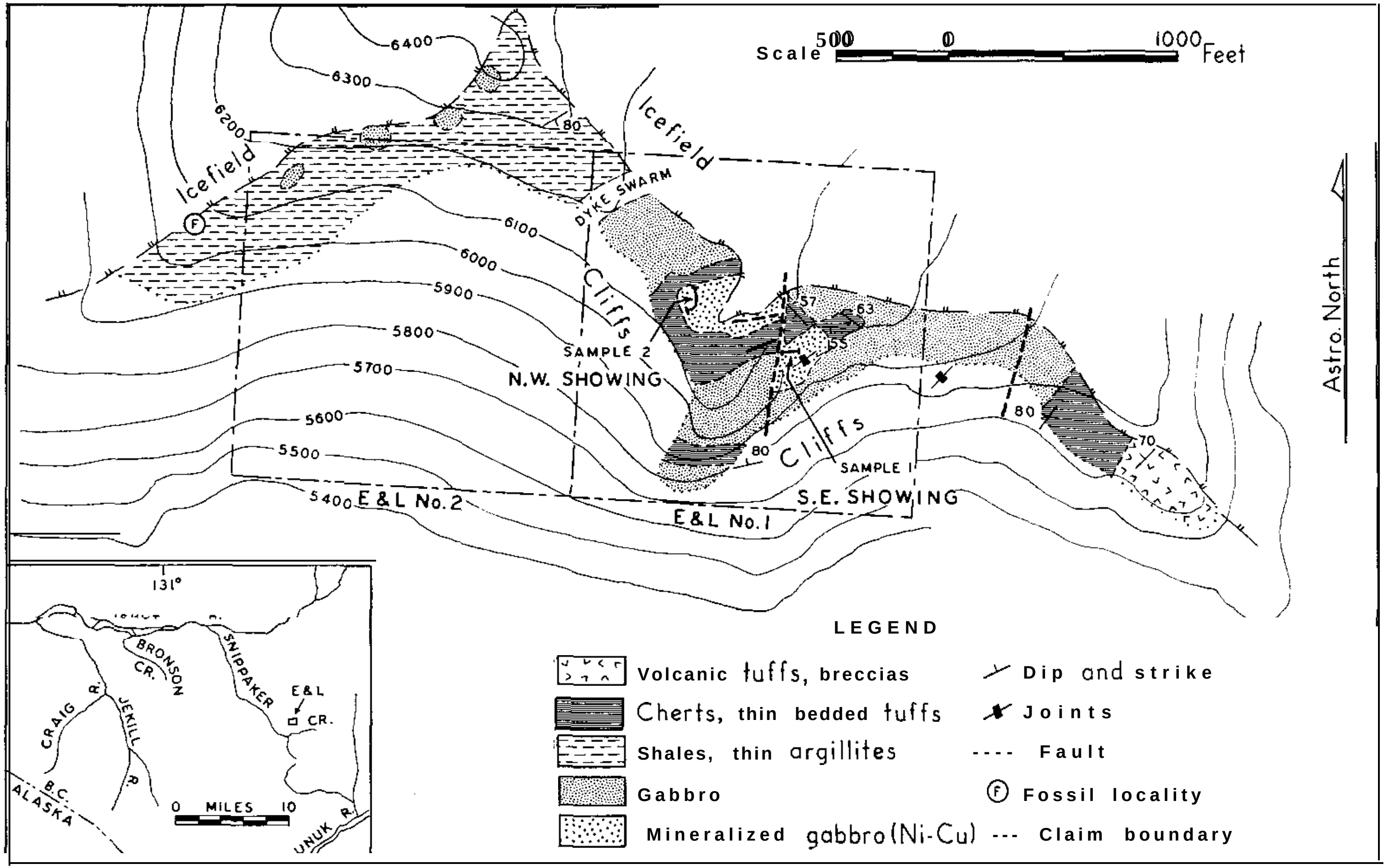


Figure 4. Silver Standard Mines Limited. **Geology of the E and L.**

specimen. There appears to be no relation between olivine content and sulphide mineralization. Interstitial patches of chlorite, altered feldspar, prehnite as veinlets and scattered grains, white mica, and other fibrous fine-grained minerals, amphibole, biotite, carbonate, epidote, and some quartz are usually present. There is abundant evidence of fractures and deformed minerals to show that the gabbro has been squeezed and deformed.

Mineralization consists of pyrrhotite, pentlandite, and chalcopyrite, with lesser pyrite and magnetite. In the main the sulphides occur as coarse blebs averaging between one-half to 1 centimetre across and distributed fairly evenly through the gabbro. In places, pyrrhotite with lesser chalcopyrite occurs in massive form and also in veinlets. Diamond drilling has so far shown that the dispersed mineralization extends very uniformly to at least 400 feet below the surface exposures. A little pyrite with chalcopyrite and pyrrhotite in tiny fractures in the cherty tuffs close to the gabbro contact was seen in the outcrops. Diamond-drill hole No. 1 at minus 60 degrees in the Northwest showing passed through normally mineralized gabbro with coarse splotches of sulphide and some marked fracture zones. Close to the gabbro contact there is a dense finer-grained chilled zone with disseminated sulphide extending over 7 feet in the core, followed by 2 feet of massive (approximately 60 per cent sulphide) pyrrhotite-pentlandite, chalcopyrite, and magnetite. Beyond this, grey line-grained homfelsed sediments with brown basaltic hornblende and fine-grained pyrrhotite and chalcopyrite, both dispersed and in minute fractures, extend over a distance of about 8 feet in the core. Further sediments seen in the core contain only wisps of pyrite.

The distribution of sulphides at surface in the gabbro is in the two rather irregular areas of the Northwest and Southeast zones.

Most of the gabbro outcrop of the Northwest zone is mineralized. The gabbro is surrounded by bedded chert outcrops on three sides and covered by rubble, snow, and ice to the east. Thus the mineralized zone forms a roughly triangular area approximately 200 and 140 feet along two sides at right angles. Strong mineralization persists up to the gabbro-chert contact. A chip sample (No. 2 on Fig. 4) along a trench over a distance of 90 feet gave: Gold, trace; silver, 0.2 ounce per ton; platinum, 0.003 ounce per ton; nickel, 0.44 per cent; copper, 0.70 per cent. The gabbro exposed north and west of this Northwest zone beyond the sediments is unmineralized, apart from some minute specks of pyrrhotite observed in thin calcite veinlets at one place.

The Southeast zone is also roughly triangular in shape and has approximately the same dimensions as the Northwest zone. The gabbro is partly bounded by bedded cherts but joins unmineralized gabbro that outcrops eastward along the ridge. However, in this zone the strongly mineralized gabbro does not extend up to the gabbro chert contact but grades out to unmineralized gabbro. This is noticeable on the north side, where there is about 10 feet of weakly mineralized gabbro between the contact and the main mineralized area. The western margin of mineralization in the Southeast zone is covered by rubble. A chip sample (sample No. 1 in Fig. 4) from outcrop over a distance of 51 feet gave: Gold, trace; silver, 0.2 ounce per ton; platinum, 0.003 ounce per ton; nickel, 0.30 per cent; copper, 0.35 per cent.

The outcrops of the two zones are separated by a steep talus-filled draw which, from evidence on the western wall, appears to be underlain by a fault striking slightly east of north. The west wall of the draw also reveals unmineralized gabbro underlying the bedded cherts exposed on the surface south of the Northwest zone. At the head of the draw close to the permanent snowfield, a shallow trench to bedrock through the rubble, probably situated on the west side of the draw fault, exposes heavy sulphide mineralization in gabbro.

In addition to the two main zones of mineralization, a little chalcopyrite and pyrrhotite were observed in the gabbro east of the Southeast zone, but this is only local in distribution.

In the area of the two zones there are, as yet, no clear controls to account for the sulphide distribution. Numerous fractures in the gabbro and textural evidence show that the mineralized gabbro has been deformed and squeezed. The most prominent direction of fracturing in the gabbro is in a northeasterly direction. The possibility of the Southeast zone being a southward faulted extension of the Northwest zone has been suggested. If this is the case, there is the possibility that the mineralization has a northeast trend through the gabbro that probably extends under the snowfield.

In a vertical sense tbe diamond drilling has proved that the mineralization and grade are persistent to a depth of 400 feet below surface, and that the mineralized bodies may have a pipe-lie form.

An ore estimate reported by the company at the end of 1966 *was* 3,227,000 tons of ore containing 0.80 per cent nickel and 0.62 per cent copper.

Reference: Assessment Report No. 741.]

Gold-Silver-Lead-Zinc

Ray, Joann
Iskut Silver Mines Limited
By W. O. Jeffery

(56° 131" N.E.) Company office, 625,925 West Georgia Street, Vancouver 1. R. D. Wesemann, president. There are 34 recorded mineral claims

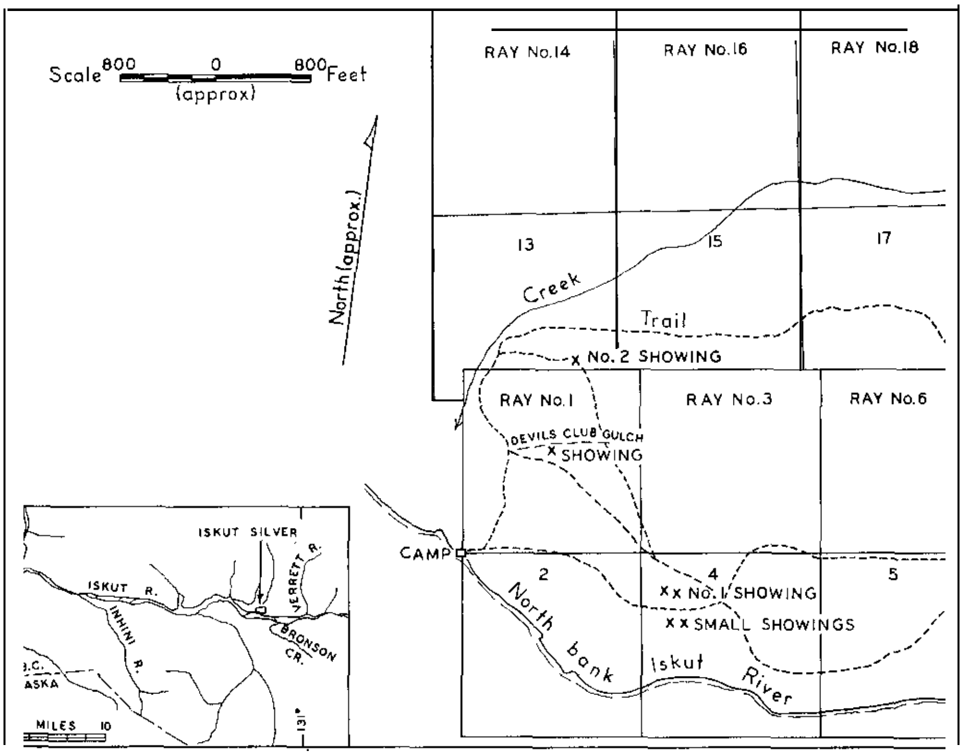


Figure 5. Iskut Silver Mines Limited. Sketch of showings, from enlarged air photographs.

situated on the north side of the Iskut River, 3½ miles east of Twin River and 3 miles northwest of the mouth of Bronson Creek (see Fig. 5). The property is accessible by aircraft, which land on a short airstrip on a sandbar in the Iskut River. In 1965 and 1966 work, under the direction of R. D. Wesemann, has consisted of geochemical soil-sampling, a ground magnetometer survey, hand trenching and stripping, and 228 feet of packsack diamond drilling in four holes.

The property is on the north bank of the Iskut River in heavily timbered rolling and gullied country, at approximately 500 feet elevation. The area has very few natural outcrops. Geochemical prospecting provided the initial indications of mineralization. Further detailed geochemical soil-survey work led to the exposure of mineralization in several hand-made cuts and trenches. Excavations in some places have failed to reach bedrock due to excessively deep overburden.

Lead-zinc mineralization with values in gold and silver and in places some copper mineralization occur in showings Nos. 1 and 2 and Devils Club Gulch (see Fig. 5).

Showing No. 1 consists of several cuts on either side of a steep-sided gully (see Fig. 6).

Cut No. 2 reveals quartz-biotite and biotite-quartz-feldspar schists with some garnet and chloritoid in places. At one end of the cut is a 1- to 2-foot band of coarsely crystalline limestone with faults along both contacts. The faults and margins of the limestone are irregularly mineralized with sphalerite and galena. The limestone bed, the foliation in the schists, and the faults all strike northwesterly and dip at 55 degrees to the southwest. Chip samples were taken across the mineralized zone. On the hangingwall of the limestone bed a sample over 1.1 feet consisted of sulphides with iron and manganese oxide stained fault rock and clay gouge assayed: Gold, 0.04 ounce per ton; silver, 1.3 ounces per ton; lead, 0.14 per cent; zinc, 2.0 per cent.

The limestone bed with scattered blebs and masses of sulphide over a width of 1.7 feet assayed: Gold, 0.04 ounce per ton; silver, 4.5 ounces per ton; lead, 0.96 per cent; zinc, 10.30 per cent.

The limestone footwall sample over 1.1 feet included fault material and 3 inches of strongly schistose rock on the footwall of the fault. The results were: Gold, 0.22 ounce per ton; silver, 43.8 ounces per ton; lead, 1.37 per cent; zinc, 1.80 per cent.

Cut No. 3 exposes strongly fractured and faulted biotite-quartz schists with muscovite, some cherty siliceous patches, and areas of dispersed pyrite. The over-all schistosity is northwesterly to westerly with a 55-degree dip to the south and west. Massive sphalerite, chalcopyrite, galena, pyrite, and quartz occur in an irregular lens or pod cutting across the schistosity and cut by some of the faults. A chip sample over 2.4 feet at the widest part of the mineralization assayed: Gold, 0.53 ounce per ton; silver, 51.6 ounces per ton; lead, 2.68 per cent; zinc, 9.3 per cent; copper, 8.92 per cent.

At showing No. 1 there are three other small cuts, all in fractured quartz-biotite schists with pyrite, each showing small lenses and stringers of quartz and pyrite with a little sphalerite. Cut No. 4 exposes a distinct overturned fold with a gentle southerly plunge in the schists. The core of the fold is a cherty siliceous zone with traces of sphalerite.

Showing No. 2 is approximately 2,000 feet northwest of showing No. 1, with no outcrop discovered on the line between the two showings. At showing No. 2, stripping and trenching has partly uncovered bedrock and mineralization over an

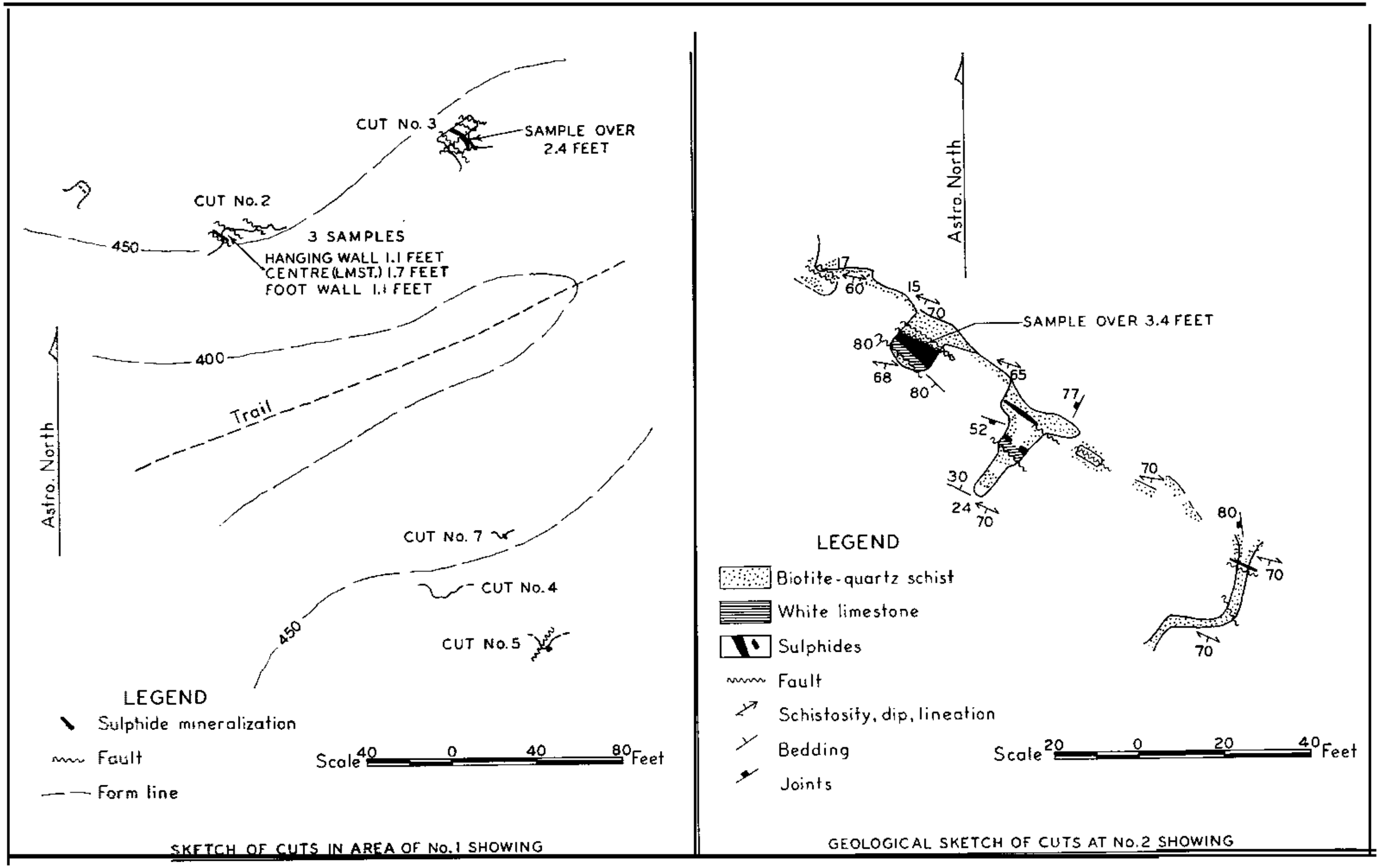


Figure 6. Iskut Silver Mines Limited. Sketch of cuts in No. 1 and No. 2 showings.

area about 130 feet long and up to 25 feet wide. The rock is mainly quartz-biotite schist, with the quartz and biotite in varying proportions. Some parts of the scbiit have a feldspar-quartz matrix, and some dispersed garnet was observed in two specimens. The foliation strikes northwest and dips southwest at 70 degrees. A crystalline limestone lens up to 2 feet wide with a strongly faulted hangingwall contact is exposed in part of the cut. The limestone strikes northwest and dips 80 degrees southwest. Another strike fault occurs in the schists a few feet from the footwall of the limestone. Sphalerite occurs as massive pods, dispersed in siliceous schists along the footwall of the limestone, and as thin stringers along the fault in the quartz-biotite schists. The sulphide is associated with quartz, biotite, muscovite, chlorite, and small amounts of garnet. A chip sample over a 3.4-foot width of dispersed stringers of sphalerite in schist on the footwall of tbe limestone bed assayed: Gold, 0.02 ounce per ton; silver, 0.2 ounce per ton; lead, 0.04 per cent; zinc, 5.6 per cent; cadmium, 0.03 per cent.

In Devils Club Gulch, about 800 feet south of No. 2 showing, a small cut reveals thin stringers of sphalerite along the foliation of an open fold in quartz-biotite schist that plunges to the west at 30 degrees. There is also a little sphalerite and quartz on a fault plane.

In summary the cuts have exposed small amounts of sulphide mineralization with some high values in gold and silver. There is evidence that in different places, faults, fractures, and folds in the host rock can all be features that control the mineralization.

Approximately 1½ miles east-northeast of the sulphide showings a trench has exposed magnetite with a little disseminated chalcopyrite. The magnetite is variably dispersed through an epidote-quartz-tremolite skarn, probably an altered volcanic rock. The overburden is considerable, and the extent of this mineralization is unknown. This magnetite showing is approximately 1,000 feet north of the contact to a syenite porphyry stock. Kerr (1948) has mapped this intrusive stock straddling the Iskut River. A specimen taken not far from the contact showed zoned orthoclase phenocrysts set in a matrix of altered feldspar with about 5 per cent quartz. There are clusters of brown biotite, calcite, and possibly allanite that may represent exotic fragments.

[References: Kerr, F. A., 1948, *Geol. Surv., Canada,* Mem. 246; Assessment Report No. 921.1

Copper-Gold

Bron, Don, Son, Pang (56° 131" N.E.) Field office, 1150 Bay Avenue, Trail.
Cominco Ltd. T. W. Muraro, senior exploration geologist. This group
By H. Bapty of 89 recorded claims and 14 Crown-granted claims held under option is at the mouth of Bronson Creek on the south side of the Iskut River, 28 miles from the Stikine River. The original work was done by F. E. Bronson between 1908 and 1919 on the south side of the creek at 3,000 feet elevation. A crew of four under the supervision of L. J. Nagy worked for a month on the Don 1 to 4 mineral claims on Mount Johnny. A topographic map made by Hunting Survey Corporation Liited of an area 4 miles by 1 mile was used as a base for geologic mapping by L. J. Nagy. Bedrock was stripped by hand and blasted over an area 1,400 square feet. The property was serviced by a helicopter based at Stewart. The camp was not visited.

[Reference: Minister of *Mines,* B.C., Ann. Rept., 1965, p. 43.]

SKEENA MINING DMSION

TIDE LAKE

Copper

Granduc
Granduc Mines Limited
By E. W. Grove and H. Bapty

(56° 130" S.E.) Company office, 520, 890 West Pender Street, Vancouver 1; mine office, Stewart. M. A. Upham, president; N. Gritzuk, vice-president and general manager; D. E. Howard, resident manager. The Granduc mine is located at the head of the Leduc River, 25 miles north-northwest of Stewart. The property consists of 64 Crown-granted claims, 319 recorded claims, and 10 mineral leases. The Tide Lake camp, mill-site, and mine access tunnel are at the toe of tbe Berendon Glacier, about three-quarters of a mile due north of Summit Lake and about 30 miles by road from Stewart.

The Leduc camp was operated from mid-April until early December by Haste Mine Development Ltd. The face of the drainage adit, which measures 9 by 11 feet, was advanced through metasediments from 814 to 6,700 feet from the portal and to within 300 feet of tbe internal shaft at the mine. A branch drift to a future crushing-chamber was advanced 211 feet. Eight drain holes were drilled into the 2475 level from points in the drainage adit between 5,600 and 5,900 feet from the portal. Slashing for layby, fan, and canton switches amounted to 47,414 cubic feet, and 500 feet of test drift, 12 by 10 feet, was driven as a crosscut in mineralization on tbe 3100 level. There was no exploration diamond drilling at Leduc in 1966.

A combined shop and power-house, a new explosives magazine, and an extension to the warehouse were constructed in the main camp area. A tote-road was built from the camp to 3100 portal, a distance of 1.5 miles. A 1,200-foot-long airstrip capable of handling an Otter aircraft was constructed in the camp area late in the year. Tbe crew at Leduc averaged 47 men during the period, with a maximum of 58 men. Freight was taken into Leduc over the Salmon Glacier route by " cat " train and Nodwell carrier in April and May, and the camp was serviced by Otter and helicopter for the entire season.

The Tide Lake camp operated continuously, with a work interruption of one month caused by a labour strike. The tunnel was driven 11,678 feet to 17,986 feet from the portal. Slash for laybys and equipment amounted to 81,000 cubic feet. The total rock removed was 189,000 tons. The tunnel was driven through the Summit Lake hornblende diorite stock and intersected the main sediment contact under the Berendon Glacier. Sediments west of this contact are blocky incompetent siltstones and lithic wackes cut irregularly by granitic dykes. Diamond drilling amounted to 63 feet. Dual fans were installed at 5,000 and 9,000 feet, each with a capacity of 16,000 cubic feet per minute and drawing 100 horsepower per set. A Jacobs sliding floor was installed to assist the tunnelling operation. This is a hydraulically moved trackway system 451 feet long and 11.5 feet wide, weighing 201 tons. A scavenger fan is mounted near the front of the floor, rated at 7,200 cubic feet per minute and drawing 10 horsepower. A pump-station for supplying water to the face was installed at 5,841 feet. An air-drier with capacity of 4,700 cubic feet per minute at 100 pounds per square inch was installed at 14,677 feet. Additional rolling-stock put into use during the year included two IO-ton Goodman battery trolley locomotives, one 24-man Hudson man-car, one 5-cubic-yard ballast-car, one 2- by 30-foot direct-current-powered conveyor to work with the ditch-digger, and four flat cars. A rectifier, substation, and transformers were installed at 9,000 feet.

New buildings added during the year at the main camp-site included a single story 40-man bunk-house, four two-story 60-man bunk-houses, a 500-man cafeteria, a cold-storage building, a snowblast garage, a two-sheet curling rink with artificial ice plant. A fully serviced trailer park for 18 trailers was constructed at Betty Creek on Tide Lake Flats about 1.5 miles east of the main camp. Auxiliary buildings for this park included a power-house, a primary pump-house, and a second pump-house. A rented 60-man trailer-camp complex was installed to house construction personnel during the summer and was removed before year-end.

Site driig was done using a Becker drill for mill-site soil-testing, townsite soil-testing, and water-supply testing. In the mill-site area 850 feet of drilling was done, and in the townsite area 943 feet was done. Site preparation for mill and service building, the main power-house, and the permanent tank-farm were almost completed. Rock excavation amounting to 64,900 cubic yards, glacial moraine and other material excavation amounting to 119,700 cubic yards, access road construction amounting to 3,200 feet, and culvert installations amounting to 1,169 feet were completed. The tunnelling crew averaged 130 men. Contract crews reached a maximum of 90 men at peak construction. The Tide Lake camp was serviced by road from Stewart.

After the flood damage of 1965, part of the Alaskan road section was relocated above the narrow portion of the Salmon River at Nine Mile and 6,700 feet of new road was built. A further 40,000 feet of new road was built following the old Premier road right-of-way, making a total of 46,700 feet of new road built in Alaska.

The tote-road in British Columbia section was widened and improved along its entire length from the Alaskan border to the Tide Lake camp. A total of 173 culverts ranging up to 18 feet in diameter were installed. The road crew averaged 50 men, reaching a peak of 65 men in July. Eleven miles of new road was built.

Summary of Work Accomplished

	Tunnel	Drifts, Crosscuts	Slash	Underground Diamond Drilling
	Ft.	Ft.	Cu. Ft.	Ft.
Leduc	5,886	711	47,400	....
Tide Lake	11,678	......	81,000	63
Totals	17,564	711	128,400	63

PORTLAND CANAL

STEWART

Gold-Silver-Lead-Zinc

Silbak Premier Mine (56° 130° S.E.) Company office, 355 Burrard
Silbak Premier Mines Limited Street, Vancouver 1. A. E. Bryant, president.
By E. W. Grove

Bralorne Pioneer Mines Limited continued management of the property, which has operated almost continuously since 1916. Adam 0. Krainec, mine manager, supervised the operation during 1966.

Mining was confined to the south side of the main glory-hole, where sulphide-rich ore has been located.

Ore from the glory-hole was trucked to the mill and stockpiled for winter mill operation. Production in 1966 was 14,189 tons.

[References: *Minister of Mines, B.C.,* Ann. Repts., 1964, pp. 21-22; 1965, p. 49.]

Gold-Silver-Lead-Zinc

Big Missouri (56° 130° SE?.) Company office, 2100,
Falconbridge Nickel Mines Limited 7 King Street East, Toronto 1, Ont. D. H.
By E. W. Grove and H. Bapty Brown, geologist in charge on the property.
The Stewart-Wikstrom group consists of the M 51, M 52, and M 118 mineral leases, comprising 10 Crown-granted mineral claims, the Province, and the Day group of five Crown-granted claims. Five men were employed, over a three-month period running grid lines for geological mapping and geochemical sampling, resampling old trenches in the area, and clearing and draining the Province adit in the Hog Lake camp-site area. Parts of the Big Missouri-Premier tote-road which were washed out in the spring of 1965 were rebuilt to allow access by truck or four-wheel-drive vehicle. The Big Missouri property lies 4 miles due north of Premier and is approximately 21 miles by road north of Stewart.

In the period 1927-42, 847,615 tons of ore containing 58,384 ounces of gold and 52,677 ounces of silver as well as minor lead and zinc were produced from the Province mineral claim. The camp was abandoned because of the low gold values and has remained inactive to date.

[Reference: Assessment Report No. 912.]

Silver-Lead-Zinc

Mobile (56° 129° S.W.) Company office, 1905, 7 King
Anglo United Development Corporation Limited Street East, Toronto 1, Ont. Work during 1966
By E. W. Grove consisted of geochemical soil-sampling and surface prospecting of areas not completed in 1965.

[References: *Minister of Mines, B.C.*, Ann. Repts., 1964, p. 22; 1965, p. 51; Assessment Report No. 745.]

Copper

Rufus, Ven (56° 129° S.W.) Company office, 10, 558
Crest Copper Company Limited Howe Street, Vancouver 1. A. C. A. Howe
By H. Bapty & Associates Ltd. are consultants for Crest
Copper Company Limited. This group of 86 Crown-granted and recorded claims is on the upper Bear River valley at Erickson Creek, 20 miles north of Stewart. The property was formerly known as the Rufus Argenta (see Ann. Rept., 1928, p. 109). For a three-month period 10 men and two geologists, J. C. Willars and R. Mottershead, worked on the property doing geological mapping and digging trenches. Access to the claims is by trail or helicopter. The property was not visited.

[Reference: *Minister of Mines, B.C.*, Ann. Rept., 1928, pp. 108–109.]

Gold-Silver-Zinc

Goat (56° 129° SW.) Company office, 425 Howe Street,
Noradco Mines Limited Vancouver 1. D. N. Cameron, president; K. C. Rose,
By E. W. Grove geologist in charge. During 1966 a crew of 10 employees supervised by E. Foran worked a period of five months completing the tram-line and extending the lower adit 150 feet. The main camp was relocated close to the Stewart–Cassiar road because of deep snow problems at the old glacier site.

[References: *Minister of Mines, B.C.*, Ann. Repts., 1964, p. 23; 1965, pp. 55–57.]

Silver

Radio, Mayou, Roosevelt (56° 129° S.W.) Company office, 10, 558 Howe Street, Vancouver 1. A. C. A. Howe & Associates Ltd. are consultants for Crest Silver Company Limited. This group of 34 Crown-granted mineral claims is on Bitter Creek, 12 miles northeast of Stewart. During a two-month period 10 men and two geologists, J. C. Willars and B. Mottershead, were engaged in geological mapping. Transportation to the property was by helicopter. The claims were not visited.

Crest Silver Company Limited
By H. Bapty

[Reference: *Minister of Mines, B.C.*, Ann. Rept., 1935, pp. 4-5.]

Silver-Lead-Zinc

Moonlight (56° 129° S.W.) Company office, 642 Clark Drive, Vancouver 6. The claims were under agreement during 1966. Work consisted of prospecting, trenching, and sampling. The claims are located on the west side of American Creek about 13 miles north of the American Creek-Bear River junction. Access was by helicopter. Mineralization consists of quartz sulphide veins in volcanic sediments.

Frontier Exploration Limited
By E. W. Grove

[References: *Minister of Mines, B.C.*, Ann. Rept., 1932, p. A 60; *Geol. Surv., Canada*, Mem. 175, p. 134.]

Lead-Zinc-Silver

Dunwell (55° 129° N.W.) Company office, 800, 789 West Pender Street, Vancouver 1. F. S. Hofman, president. Work conducted in the summer of 1966 consisted of trenching along the extensions of the known vein system.

Silver Arrow Explorations Ltd.
By E. W. Grove

[References: *Minister of Mines, B.C.*, Ann. Repts., 1964, p. 22; 1965, p. 51.]

Silver-Lead-Zinc

Porter Idaho (55° 129° N.W.) Company office, 1831 Marine Building, 355 Burrard Street, Vancouver 1. W. R. Wheeler, president and manager; A. C. Skerl, consulting geologist. The property consists of 91 Crown-granted mineral claims and eight Crown-granted claims held by option. These claims all lie southeast of Stewart on Mount Rainey. Work on the property commenced in May and continued on throughout September with a crew of five men directed by W. R. Wheeler. Surface work on the Red Reef claim was done with a D-8 bulldozer tractor, which stripped and built a tote-road for 3,500 feet on Mount Rainey immediately across the Bear River from Stewart. At the "I" tunnel of the Porter Idaho, 300 feet of new drifting was done to by-pass incompetent blocky country rock, and 200 feet of the old drift was retimbered. Twelve hundred feet of old tunnel was cleaned up and the drainage ditch cleared. Transportation to the property is by Stewart-based helicopter.

Cassiar Consolidated Mines Ltd.
By E. W. Grove and H. Bapty

[Reference: *Minister of Mines, B.C.*, Ann. Rept., 1965, pp. 50–51.]

OBSERVATORY INLET

Anyox

Copper

Red Wing (55° 129° S.W.) Company office, 116, 744 West Hastings Street, Vancouver 1. Roderick Macrae, engineer in charge. The

Anaconda American Brass Limited
By E. W. Grove and H. Bapty

Red Wing property (held by Canusa Mines Limited) is under option to Anaconda American Brass Limited. The property lies west of Granby Bay at the head of Tauw Creek. It consists of 126 claims, of which three are Crown-granted and one is a mineral lease and all others are held by record. Work commenced in May and was completed by the end of September. Eleven men were at work extending No. 2 adit by 770 feet (7 by 8 feet) and cutting underground diamond-drill stations. Eighteen AX diamond-drill holes were driven from No. 2 adit to extend and explore the mineralized shear zone drilled in 1965 (see Fig. 7). A total of 5,622 feet of drilling was completed. Mining and drilling equipment as well as supplies were transported to Granby Bay by Prince Rupert barge and thence to the work area on Tauw Creek by helicopter. The property was also serviced by helicopter from Alice Arm.

Surface work completed during the same period included a 9,000-foot geophysical induced polarization survey (400- and 800-foot spreads), a magnetometer survey, as well as detailed and reconnaissance geological mapping.

[Reference: *Minister* of Mines, *B.C.,* Ann. Rept., 1965, p. 59.]

ALICE ARM

Copper-Gold

Vanguard
Canex Aerial Exploration Ltd.
By H. Bapty

(55° 129° N.W.) Company office, 700 Burrard Building, Vancouver. The Vanguard group of eight mineral claims, held by M. Peterson, of Alice Arm, is under option to Canex Aerial Exploration Ltd. The workings are between 2,750 and 3,200 feet elevation on the west slope of the Kitsault River valley, 1 mile north of the west fork. S. J. Tennant, field geologist, and three assistants spent three months on the property. Work comprised surveying the old workings, geological mapping, makiig an electromagnetic survey of *an* 800- by 4,400-foot area, and soil-sampling the same grid area. The property was not visited.

[References: *Minister of Mines, B.C.,* AM. Rept., 1951, pp. 88-90; Assessment Report No. 956.]

Silver-Lead-Zinc

Dolly Varden, Wolf, North Star, Toric
Dolly Varden Mines Ltd.
By H. Bapty

(55” 129° N.W.) Company office, Suite 1400, United Kingdom Building, Vancouver 2; mine office, Alice Arm. P. E. Cromie, president; T. E. Swanson, project engineer. This block of 73 mineral claims extends north from the Dolly Varden (Torbrit) Camp 5 miles to the Clearwater hydro-power plant. Twenty-one mineral claims are Crown-granted, 21 claims are held under option, and the remainder of the claims are held by record. The camp is connected with Alice Arm by 17 miles of good gravel road. The Torbrit 1000 adit was driven through to the Kitsault River, and a 70-foot Bailey bridge was erected to span the river and to join up with the North Star portal. Two adits were advanced 200 feet, and two raises were advanced 125 feet each. Fifteen hundred feet of roadway was built between the Torbrit 1000 level portal and the Toric 1900 (Torbrit 1150) adit. Sii company personnel and 12 contractors were employed for six months under the supervision of T. E. Swanson.

[Reference: *Minister* of *Mines, B.C.,* Ann. Rept., 1964, pp. 41–43.]

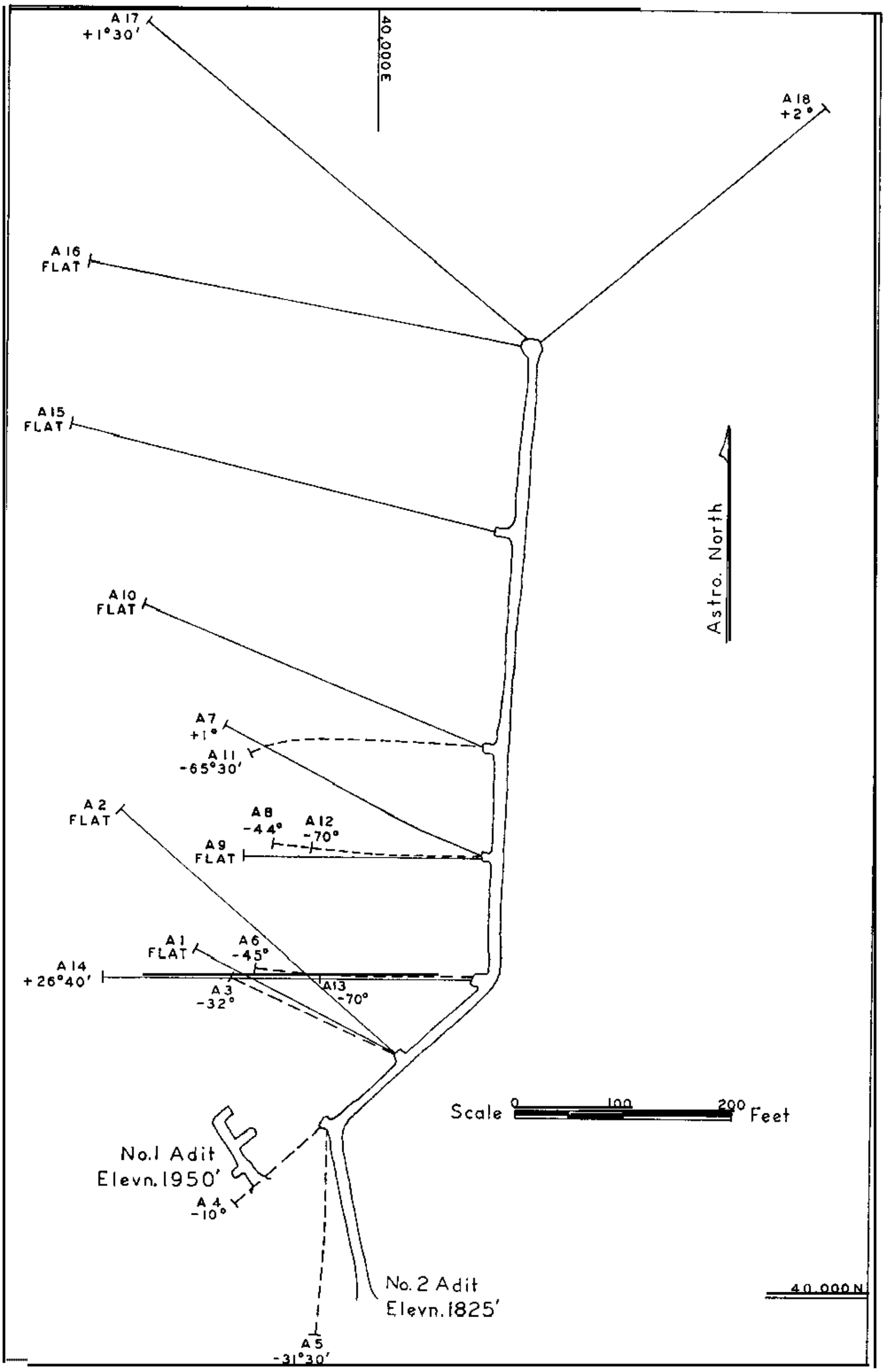


Figure 7. Anaconda American Brass Limited. Underground exploration at the Red Wing.

Molybdenum

THM (55° 129° N.E.) Company office, 1111, 505 Burrard Street, Vancouver 1. C. S. Ney, project manager. This group of 18 recorded mineral claims is at the head of White River, 24 miles north of Alice Arm between 2,000 and 4,000 feet elevation.

Kennco Explorations, (Western) Limited

By H. Bapty

The property is served by Alice Arm-based helicopter. It is reported that molybdenite and some galena and sphalerite occur in scattered veinlets in quartz monzonite and hornfels. A reconnaissance geophysical survey over 12 claims and a geological map of the property were made. Three men spent a month on the property. The claims were not visited.

Silver

KIT (55° 129° N.E.) Vancouver office, 1521 Pemberton Avenue, North Vancouver. The KIT group of 17 recorded mineral claims is 20 miles north of Alice Arm and along the south side of Kitsault (Clearwater) Lake.

Coranex Limited

By H. Bapty

Some geological mapping was done on the KIT No. 2 claim by J. R. Woodcock and four trenches were dug on the same claim. The property was not visited.

[Reference: Assessment Report No. 1001.]

Molybdenum

Ajax (55° 129° N.E.) Vancouver office, 604, 744 West Hastings Street, Vancouver 2. D. M. Cannon, vice-president. This property, consisting of 102 full and fractional recorded claims, is on the eastern slope of Mount McGuire, 8 miles northeast of Alice Arm.

Newmont Mining Corporation of Canada Limited

By N. C. Carter

Access is by helicopter or by a track-road from Alice Arm up the Dak River valley to the exploration camp at an elevation of 2,400 feet.

During 1966, exploration work was carried out over a six-month period by 6 company and 17 contractor employees under the supervision of D. M. Cannon. A semi-permanent exploration camp was constructed and 2 miles of road was built from the camp to an elevation of 3,600 feet on the steep mountain slope. Fifteen NX-wireline size. holes were drilled, totalling 13,731 feet. Detailed geologic mapping of the central part of the claims group was carried out by T. Takeda, geologist. Other work included some soil-sampling and an air-borne magnetometer survey of the Mount McGuire area.

The main part of the claim group includes the steep east-facing slope of Mount McGuire and elevations range from 1,500 feet along Dak River to 5,374 feet at the summit. Slide alder and isolated small areas of standing timber extend to an elevation of 3,200 feet. Bedrock is well exposed in several east-flowing creeks and in steep ridges above the 3,200-foot level.

Argillaceous sedimentary rocks and some interbedded volcanics are intruded by four small closely spaced stocks of quartz-monzonite porphyry in the central part of the claim group (see Fig. 8). Molybdenite mineralization occurs both in the intrusive rocks and adjacent hornfelsed sediments.

Sedimentary rocks, striking north-northwest and dipping steeply east, underlie most of the eastern half of Mount McGuire and consist of black argillites, siltstones, and microgreywackes. Banding on both microscopic and macroscopic scales is well developed in the sedimentary rocks, and shaly partings were noted northwest of the top of Mount McGuire. At lower elevations, near Dak River, calcareous argillites and buff-coloured limy siltstones were noted. Dark-grey to black argillaceous sediments in all parts of the area mapped were seen to contain 2 per cent 0.05-millimetre plates of brown biotite and up to 5 per cent pyrite and pyrrhotite as fine disseminations and as coatings on fracture planes. With increasing proximity to the quartz-monzonite porphyry stocks, the sediments grade to biotite homfels.

Augite andesites, weathering to a reddish-brown colour, occur as 3-foot-thick interbeds within the sedimentary rocks. The rock is medium grained and consists essentially of augite, partly altered to fibrous actinolitic hornblende, and plagioclase, exhibiting varying degrees of sericite alteration. A larger area of volcanic rocks, on the west slope of Mount McGuire, consists of purple tuffs and breccias.

Intrusive rocks, in the form of four small stocks of quartz-monzonite porphyry, are grouped close together in a 2,500-foot-square area in the central part of the claim group between 3,000 and 4,200 feet elevation. The stocks are roughly rectilinear in plan, and the largest, the most southerly one, is elongate in a north-northwesterly direction, measuring 1,500 by 1,000 feet. The remaining three measure 1,000 by 500 feet and are elongate in an east-northeast direction. The area between the stocks is featured by an abundance of dykes of similar composition. The largest stock and the one immediately northwest of it are composed of leucocratic white to pink quartz-feldspar porphyry. Twenty-five to thirty per cent of the rock consists of 3- to 6-millimetre phenocrysts of anhedral quartz, subhedral sericitized plagioclase, and ragged perthitic orthoclase in a fine-grained matrix of quartz, feldspar, and sericite. Sericite, in part an alteration of original biotite, is the major mafic mineral. One-eighth to one-quarter inch quartz veinlets are common.

The other two intrusive bodies, which are essentially a network of closely spaced east-northeast and north-northwest dykes, are of similar composition, but differ from the quartz-feldspar porphyries by being medium grey in colour and by having a biotite content of between 7 and 10 per cent, with some chlorite and hornblende. Two- to four-millimetre phenocrysts of quartz and normally zoned oligoclase-andesine make up 25 per cent of the rock. In contrast to the quartz-feldspar porphyries, plagioclase is essentially fresh and potash feldspar is largely restricted to the matrix. Some of the narrow dykes have a seriate texture.

Dykes of quartz-feldspar porphyry and biotite-bearing quartz-monzonite porphyry, striking east to east-northeast and not exceeding 25 feet in width, cut sedimentary rocks on top of Mount McGuire. Felsite dykes, porphyritic in part and containing some disseminated pyrite, were noted south of the main area of intrusive rocks.

Northeast-striking 6-foot-wide dykes of fine-grained hornblende and biotite lamprophyres were noted south and east of the quartz-monzonite porphyry stocks. These weather to a brown colour, have chilled contacts, and contain no sulphide minerals.

Contact metamorphism associated with the intrusion of the porphyry stocks has converted a large area of sedimentary rocks in the central part of the property to brown- and purple-coloured biotite homfels. The hornfels zone surrounding the stocks, elongate in a north-northwest direction, and measuring 7,000 by 5,000 feet, is gradational outwards from a fine-grained granoblastic-textured rock consisting of anhedral quartz and biotite to an alternating sequence of banded black argillite and brown homfels. The biotite homfels is featured by closely spaced fracturing and widespread limonite stain due to abundant disseminated pyrrhotite and pyrite. The inner zone of homfels, extending outward from the stocks a distance of between 500 and 1,000 feet, has been affected by a more intense alteration, resulting in the transformation of biotite homfels to a pale-green fine-grained quartz-albite-epidote homfels. In the outer part of tbis zone, hairline fractures in biotite hornfels containing quartz and actinolite and lesser amounts of clinopyroxene and pyrrhotite are rimmed by 4-millimetre-wide zones of quartz-albite-epidote homfels. Adjacent to and between the four stocks where fracturing is most intense, quartz-albite-epidote hornfels has almost completely replaced biotite hornfels, and is probably a reflection of the degree of quartz veining and silicification within and adjacent to the intrusive rocks coupled witb higher temperatures prevailing near the contacts. East of the stocks, near the outer limits of the zone of quartz-albite-epidote homfels, a narrow band of similar composition contains 4-millimetre porphyroblasts of pink garnet.

The effects of contact metamorphism on interbedded augite andesites includes partial to complete alteration of original clinopyroxene to fibrous actinolitic hornblende and sericitization of plagioclase.

Alteration of the intrusive rocks is most widespread in leucocratic quartz-feldspar porphyries and includes the sericitization of plagioclase phenocrysts, the alteration of biotite to muscovite, and the development of ragged porphyroblasts of potash feldspar. Flakes of biotite in the quartz-monzonite porphyries may be of secondary origin. Drilling information indicates light-grey pervasive silicification adjacent to quartz veinlets in deeper parts of tbe intrusive bodies.

Sedimentary and volcanic rocks underlying Mount McGuire represent the steep east limb of a regional anticlinal structure. East and west of the porphyry stocks, strikes are uniformly north-northwest, while attitudes north and south of the stocks indicate contortion of the sediments along strike. Adjacent to the stocks, attitudes suggest the presence of a large dragfold modified by doming associated with the intrusion of the stocks.

Most of the creeks on Mount McGuire follow faults, which strike north-northwest and east-northeast. The rectilinear nature of the porphyry stock contacts, which follow steep fractures, and the trends of smaller dykes also reflect the north-northwest and east-northeast fault and fracture pattern, indicating the importance of major faults in the localization of the stocks.

Evidence of later movement of the faults is seen on the south slope of Mount McGuire, where lamprophyre and felsite dykes are offset along a north-northwest-striking fault.

Pyrrhotite and lesser amounts of pyrite coat fracture planes and occur as fine disseminations in the sedimentary rocks on the east slope of Mount McGuire. Pyrrhotite is particularly widespread in the intrusive rocks and adjacent altered sedimentary and volcanic rocks. Limonite staining is prominent.

Molybdenite mineralization occurs in both the intrusive rocks and in the marginal zone of homfels affected by quartz-albite-epidote alteration. The most common form of occurrence is that of fine-grained quartz and molybdenite coating randomly oriented hairline fractures. Disseminated molybdenite also occurs in a stockwork of ⅛- to %-inch quartz veinlets and in the silicified zones in the deeper parts of tbe stocks. At least two stages of quartz-molybdenite mineralization follow an initial stage of quartz-pyrrhotite mineralization. The latest stage of mineralization is represented by coarse-grained quartz veins several inches wide, containing sphalerite and lesser amounts of pyrite, galena, and chalcopyrite. On surface these veins strike north-northeast and dip to the west at shallow angles. Chlorite-filled fractures cut mineralized veinlets, and gouge zones containing molybdenite indicate post-mineral shearing.

[Reference: Minister of Mines, *B.C.,* Ann. Rept., 1965, pp. 63–65.]

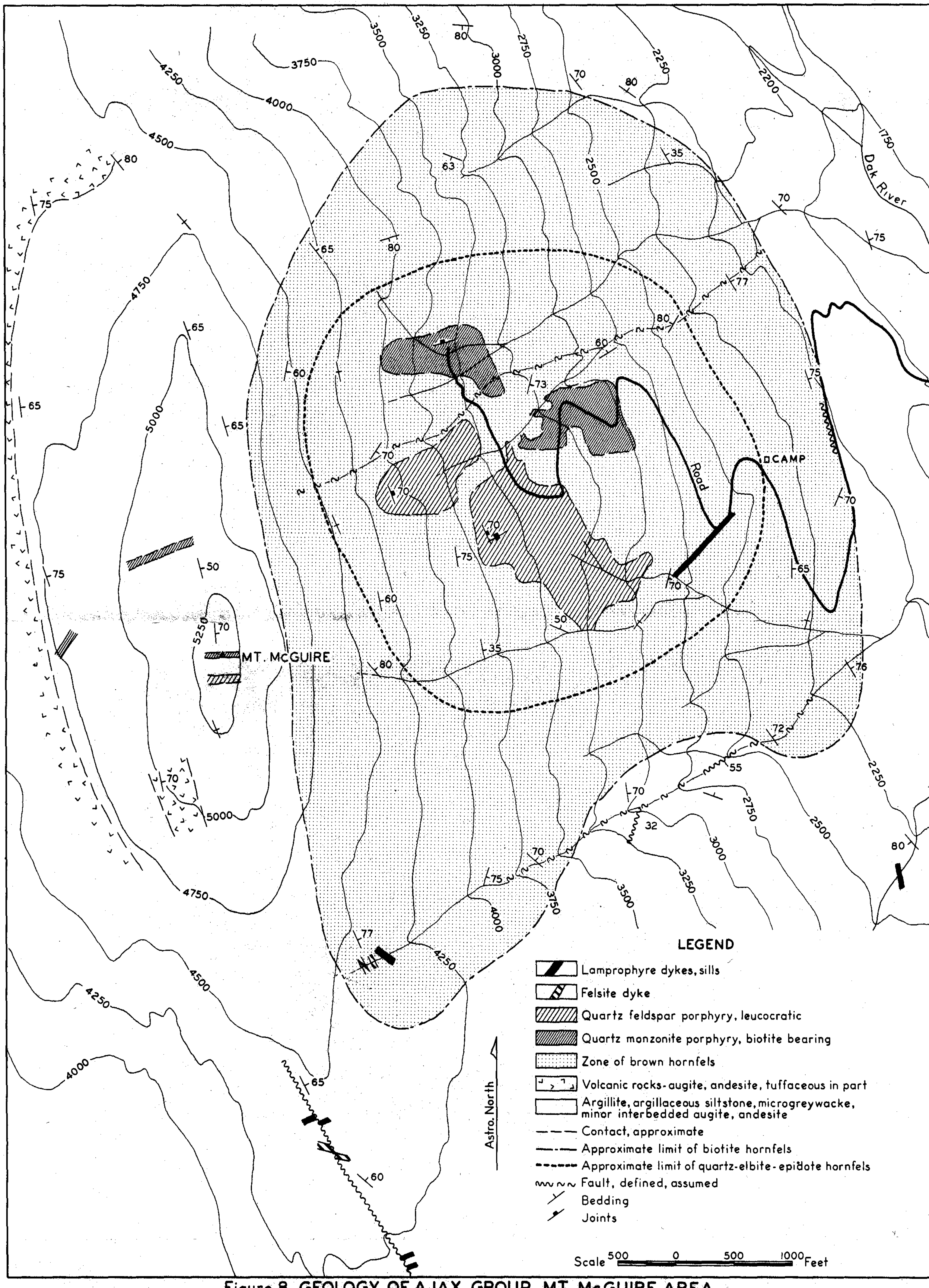


Figure 8. GEOLOGY OF AJAX GROUP, MT. McGUIRE AREA

Copper

Kinskuch, Reina Blanca, King, Etc.
Forest Kerr Mines Ltd.
By N. C. Carter

(55° 129° N.E.) Company office, 404, 510 West Hastings Street, Vancouver 2. E. A. Glick, president. This group of 201 claims is situated around the south end of Kinskuch Lake, 13 miles northeast of Alice Arm. Access is by helicopter or float-equipped aircraft. Kinskuch Lake, which occupies a glacially scoured basin is at an elevation of 3,790 feet. Relatively low hills surround the western side of the lake, while elevations of the east side of the lake rise sharply from lake-level to Lavender Peak, at 7,620 feet, the highest point in the Alice Arm district. Glaciers, extending from near the summit of Lavender Peak down to lake-level, have receded more than 1,000 feet since copper mineralization was discovered on the southeast shore of the lake by local prospectors in the 1930's.

In 1955 and 1956, Northwestern Explorations Limited held options on claims around the southeast shore of the lake and drilled 25 holes totalling 7,262 feet. Forest Kerr Mines Ltd. acquired claims in the area in 1965 and took up an option on the claims covering the copper showings. Work performed on the property in 1965 included geological mapping, geophysical surveys, and 1,247 feet of diamond drilling. Cyprus Exploration Corporation, Ltd., optioned the wholly owned claims of Forest Kerr Mimes Ltd. in 1966 and engaged Stokes Engineering and Management Company to carry out geological mapping, a geochemical survey, and to supervise drilling near the southwest end of the lake. An average crew of eight men was employed for three months under the supervision of Ronald B. Stokes.

The area around the southern part of Kinskuch Lake is underlain mainly by northwest-striking easterly dipping fine- to medium-grained andesite flows and tuffs exhibiting varying degrees of albite, chlorite, carbonate, and epidote alteration. Sedimentary rocks, mainly thiiy laminated argillaceous siltstones, are interbedded with the volcanic rocks west of the lake. Red felsitic tuffs and breccias, apparently overlying the andesites, make up most of Lavender Peak. East- and north-striking dykes of porphyritic hornblende diorite and quartz monzonite porphyry intrude andesitic rocks along both the south and west sides of the lake. Narrow northeast-striking dykes of lamprophyre cut all rocks in the area.

Pyrite in fractures and as fine disseminations *is* widespread in the andesites and hornblende diorites along the western margin of Kinskuch Lake. Easterly trending brecciated and silicified zones up to 10 feet in width, and containing 25 per cent pyrite, occur in andesite rocks on small islands near the south end of the lake. Chalcopyrite occurs with pyrite as disseminations and in irregular lenses and quartz veins in shattered andesites on a small peninsula near the southeast end of Kinskuch Lake. Most of the mineralized quartz veins and fractures are less than 1 inch wide, but a few of the mineralized zones attain a width of 3 feet. The best grades of copper mineralization occur in easterly trending veins and fractures which are offset by north-striking quartz-pyrite v&lets. A sample of andesite containing disseminations of chalcopyrite assayed 0.10 per cent copper. A second sample with chalcopyrite in closely spaced fractures assayed: Gold, 0.07 ounce per ton; silver, 0.20 ounce per ton; and copper, 3.14 per cent.

[References: Minister of Mines, B.C., Ann. Repts., 1956, p. 21; 1965, p. 65; Assessment Report No. 712.]

Molybdenum

Bel, Norm, Mac, Sun, Dak, Standard
Mayfair Molly Mines *Ltd.*
By H. Bapty

(55° 129° N.E.) Company office, 34, 845 Hornby Street, Vancouver 1. N. E. Jenkinson, president; Harold A. Quinn, consulting geologist. The company holds 180 claims, an area of 12 square miles that includes all of McGrath Mountain, 3 miles northeast of the hamlet of Alice Arm. A geologist and a helper spent the month of August investigating old showings and soil-sampling. Transportation to the property is by boat across the Kitsault River and thence by trail to the old workings. The property was not visited.

Molybdenum

Roundy Creek
Sileurian Chieftain Mining Company Limited
BY N. C. Carter

(55° 129° S.E.) Company office, 846 West Hastings Street, Vancouver 1. Walter Eilers, president. This property of 40 full and fractional claims is on Roundy Creek 1½ miles from tidewater. A 2½-mile road leads from the site of the British Columbia Molybdenum townsite on the south shore of Alice Arm to the exploration camp at an elevation of 500 feet. Forty-three drill-holes totalling 8,863 feet were drilled during 1966, and a geochemical survey was carried out over much of the claim group. An average crew of 10 men was employed for most of the year under the direction of A. P. Fawley, geological consultant.

During the early part of 1966, drilling was concentrated on a faulted-off section of the quartz monzonite porphyry intrusive body on the east side of Roundy Creek. Fairly uniform molybdenite mineralization in quartz veinlets and fractures was indicated throughout the intrusive, which in this area is in the form of a wedge, with near vertical north, east, and south contacts and a western contact dipping at moderate angles to the east.

Drilling was continued in the vicinity of a relatively high-grade zone of molybdenite mineralization on Sunshine Creek, a northwesterly flowing tributary of Roundy Creek. Irregular zones of similarly good grades of mineraliiation were intersected to the south and east of the exposed high-grade zone. The molybdenite occurs as uniform disseminations and in irregular blebs and lenses with and *without* quartz in both the quartz monzonite porphyry and fine-grained alaskite. North-northeasterly trending dykes of diorite and andesite, later than tbe mineralization, were intersected in a number of drill-holes.

[References: Minister of *Mines, B.C.,* Ann. Repts., 1964, pp. 36-39; 1965, pp. 62–63.]

Molybdenum

Moly
Bell Molybdenum Mines Limited
BY N.C. Carter

(55° 129° S.E.) Company office, 502, 1200 West Pender Street, Vancouver 1. W. R. Bacon, exploration manager. The property, consisting of 135 recorded claims located in 1965, is on Clary Creek at an elevation of 2,400 feet. Access is by helicopter from Alice Arm, 6 miles to the west. The relatively gentle topography of much of the claim group is broken on the southern end of the property by the presence of two mesas of Tertiary basalt which rise 300 to 700 feet above the surrounding terrain. The flat-lying basalts, characterized by steep columnar-jointed walls, unconformably overlie a sedimentary sequence of greywacke and microgreywacke. Rock exposures are sparse in the central and northern areas of the claim group, being confined to creeks and small hummocks. An elliptical stock of quartz monzonite porphyry, elongated in a northeasterly direction and measuring approximately 1,900 by 1,400 feet, has metamorphosed sedimentary rocks in the central part of the property to brown biotite hornfels. The quartz monzonite porphyry varies from a mesocratic type containing flakes of fresh biotite in the northeast part of the stock to a leucocratic type near the southwest contact, which is characterized by the presence of 4- to 8-millimetre phenocrysts of anhedral glassy quartz and euhedral feldspars.

Mineralization, consisting of molybdenite and pyrite, occurs in randomly oriented quartz veinlets and fractures which cut both the porphyry and homfels along the northern and eastern margins of the stock.

Exploration work during 1966 included a geochemical programme of silt and soil sampling and the drilling of 12 holes totalling 3,169 feet. An average crew of 10 men was employed for three months under the supervision of W. R. Bacon.

[Reference: Assessment Report No. 814.1

Molybdenum

Alice *British Columbia Molybdenum Limited* BY H. Bapty — (55° 129" S.E.) Company office, 402 West Pender Street, Vancouver 3. C. D. Michaelson, president; C. C. Kamm, project manager. The property, consisting of 102 full and fractional claims held by record, is on Patsy Creek, the east fork of Lime Creek, and is 5 miles southeast of Alice Arm. The ore-body is an annular ring of molybdenite mineralization with an east-west axis of 2,200 feet and a north-south axis of 1,500 feet. Work was continuous throughout the year. The average number of men employed on the property throughout the year was 149. There was 4,800 feet of ore and waste haul roadway constructed during the year. Open-pit development was started, and 46,000 tons of ore was stockpiled. The concentrator building and secondary crusher building were completed during the year. The primary crusher building has steel erection completed. A 220-man camp accommodation, with cookery and recreation hall, was constructed at the concentrator-site. Foundations were completed for the office. At the foreshore the staff-house and one residence were built, and a garage and warehouse had been completed. The main transportation for construction equipment, supplies, and mill equipment has been via barge. The camp is served by coastal shipping and regular air service.

[Reference: *Minister* of Mines, *B.C.*, Ann. Rept. 1964, pp. 30–36.]

Gold-Silver-Copper-Lead-Zinc-Molybdenum

Silver Bow, MCC *Marshall Creek Copper Co. Ltd.* By N. C. Carter — (55° 129° S.E.) Company office, 734 Fort Street, Victoria. James M. McNulty, president. This property, comprising 63 recorded claims and three optioned mineral leases, is situated 5 miles south of Alice Arm near the headwaters of both Roundy Creek and the southwest fork of Lime Creek. Access to the property is by helicopter. The property includes numerous workings and mineral showings referred to in various Annual Reports and Memoir 175 of the Geological Survey of Canada. The first record of work in the area is contained in the Annual Report for 1916, and intermittent work was done on the Sunset, Verona, Theda Bara, and Basin claims by individuals and companies up to 1927.

The mineral showings on the claims arc in the form of quartz-carbonate-sulphide veins which follow north-northeast shear zones in dark argillaceous micro-greywackes near their contact with granodiorites and quartz diorites of the Coast Intrusions. The most northerly showings include those of the Sunset claims, on which the Keystone Mining Company Limited drove two adits and erected three cabins between the years of 1921 and 1927. The upper adit, situated 1,000 feet east of Roundy Creek at an elevation of 2,225 feet, was driven 40 feet along a north-striking 4-inch-wide mineralized shear zone. A sample of the vein material from the adit dump, containing quartz, carbonate, pyrite, sphalerite, and galena, assayed: Gold, 0.05 ounce per ton; silver, 0.40 ounce per ton; copper, 0.05 per cent; lead, 0.32 per cent; zinc, 2.2 per cent. The lower adit, north of the upper adit at an elevation of 2,075 feet, trends south-southeast and is over 700 feet in length. North-striking shear zones and lamprophyre dykes cut microgreywackes from the portal to a distance of 400 feet in the adit, where medium-grained quartz diorites are in fault contact with the sedimentary rocks. Pyrite is disseminated in and adjacent to the shear zones.

The Verona showing is exposed in the southwest fork of Lie Creek at an elevation of 3,150 feet. Quartz-carbonate-baritesulphide veins follow bedding shears in north-northeast-striking westerly dipping microgreywackes. Intrusion of porphyritic basic sills along these same zones of weakness following the period of mineralization has resulted in great variation of width of the veins along strike. Both the sills and the veins are offset by northwest faults. The main sill, exposed on the east side of the creek, over a distance of 200 feet, and varying in width from 6 to 15 feet, is of andesite composition, containing 1-centimetre phenocrysts of augite, plagioclase, and olivine. Chiied margins of the sill render the rock a light-green colour, characterized by 0.50-millimetre augite phenocrysts. Quartz veins, variable in width and length, occur as inclusions within the main sill. At the northern end of the sill, a near massive sulphide lens, varying in width from 9 to 28 inches, and exposed over a distance of 20 feet, contains pyrite, pyrrhotite, sphalerite, and galena in a quartz gangue. A chip sample taken from the widest section of the vein assayed: Gold, 0.32 ounce per ton; silver, 2.4 ounces per ton; copper, 0.10 per cent; lead, 2.04 per cent; zinc, 13.3 per cent; cadmium, 0.47 per cent. On the west side of the creek, quartz veins containing varying amounts of sulphides occur on both hangingwall and footwall of a l-foot-wide fine-grained lamprophyre sill. The mineralized zone is 30 inches wide adjacent to a west-striking shear zone near the south end of the sill. Veins and sills pinch out a short distance to the south at an elevation of 3,200 feet, near the Coast Intrusions contact.

The Theda Bara showings are situated 1,500 feet west of the Verona showing, and consist of north-northeast-striking quartz veins, exposed on surface and in two short adits on a north-facing slope. The quartz veins, generally less than 1 foot wide, occur in shear zones in microgreywackes which have been intruded by granodiorite and lamprophyre dykes, and contain varying amounts of carbonate, pyrrhotite, sphalerite, and galena. Eight hundred feet south of the adits, a 4-foot-wide quartz vein of similar trend, and containing near massive lenses of pyrrhotite, occurs adjacent to a fine-grained gabbroic rock.

The Basin showing is exposed over a distance of 200 feet on the side of a ridge at an elevation of 3,750 feet west of the headwaters of the southwest fork of Lime Creek. A quartz vein, 1 to 2 feet wide, and pinching out on both north and south ends, follows a shear zone in sedimentary rocks adjacent to granodiorites of the Coast Intrusions. A chip sample taken across a 2-foot width near the south end of the vein assayed: Gold, 0.18 ounce per ton; silver, 18.1 ounces per ton; copper, 0.8 per cent; lead, 19.76 per cent; zinc, 6.0 per cent.

Several other showings were investigated, including several narrow quartz veins in Roundy Creek containing some galena and sphalerite, and some disseminated molybdenite in granitic rocks on Dawson Ridge, 1 mile west of Roundy Creek.

During 1966 the company erected a camp near the old Keystone workings and cleaned out the old adits. All of the showings were mapped in detail, and a geological survey was made of the claim group. Some trenching and stripping were carried out in the vicinity of the mineral showings, and some silt-sampling was done. An average crew of three men was employed for 3½ months under the supervision of I. M. Watson, geologist.

Molybdenum-Copper

NASS RIVER

Valley, Ridge, Bolo, Vetter, Guias (55° 129° S.E.) Company office, 55 Yonge Street, Toronto 1, Ont. P. H. McCloskey, president. These claim groups, consisting of 91 full and fractional recorded claims, are on the south side of the Nass River approximately 12 miles southwest of Aiyansh. The company also holds under option two groups (Snafu and Kay) totalling 52 claims in the immediate vicinity. Access to the property is by the Columbia Cellulose private logging-road from Terrace. The company was incorporated in 1966, with Madsen Red Lake Gold Mines Ltd. having controlling interest. Other participating companies include Canadian Nickel Company Limited, Newconex Canadian Exploration Ltd., Noranda Mines, Limited, and Union Carbide Canada Limited.

Nass River Mines Limited
By N. C. Carter and H. Bapty

The claim groups include an area of the contact between tbe Coast Intrusions and northeast-trending hornfelsed greywackes and argillites of the Bowser Group. Several small intrusions of leucocratic quartz monzonite porphyry, containing 2- to 4-millimetre phenocrysts of potash feldspar and quartz, cut both tbe sediments and the Coast Intrusions. Basalt lava flows of Recent age cover a large area north and east of the claim groups.

On the Valley claim group, molybdenite mineralization occurs in quartz veinlets and fractures and as disseminations in quartz monzonite porphyry, fine-grained alaskite, and hornfelsed greywacke. On the other claim groups, shear zones in the sedimentary rocks contain pyrite, pyrrhotite, and some chalcopyrite.

Two geologists and two helpers were employed full time from May 1st until December 1st on geophysical prospecting and geological mapping. An induced polarization geophysical survey was carried out over 4.7 miles of line by McPhar Geophysics Limited. Rock trenches, totalling more than 262 lineal feet, were excavated, and T. Connors diamond-drilled a number of holes totalling 3,241 feet. A Terrace-based helicopter was used to move diamond-drilling equipment from one site to another and to shift geologists to fly camps at higher elevations.

[Reference: Assessment Report No. 914.]

Lead-Zinc-Copper

TERRACE

Hope (54° 128° N.W.) Two claims, Hope Nos. 1 and 2, recorded in the names of C. L. M. Giggey and Kenneth Mayner, of Terrace, are on Cedar River 15 miles north of Kitsumkalum Lake. They were worked during the summer by means of a small-tracked tractor and a ¾-yard shovel. Fifteen tons of ore removed from a pit was hand-cobbed into 80 sacks of shipping-grade material. The property may be reached from the private logging-road of Columbia Cellulose Company Ltd., north from Terrace. The property was not visited.

By H. Bapty

Molybdenum

Big, Joe (54° 128° N.W.) Company office, 808, 602 West Hastings Street, Vancouver 2. N. W. Burmeister, geologist. The Big and Joe claims are near the head of Cedar River, 32 miles north of Terrace, and between 1,000 and 3,000 feet elevation. The property may be reached from the Columbia Cellulose Company Ltd.'s logging-roads. Molybdenite is reported to occur in quartz monzonite. Soil samples were taken at 100-foot intervals along 33 miles of line. Ten 10-foot trenches totalling 100 feet were dug. Eight men spent one month on the property. The property was not visited.

Silver *Standard Mines Limited*
By H. Bapty

[Reference: Assessment Report No. 857.]

Molybdenum

KITIMAT RNBR

Barbs, Ell
Amax Exploration, Inc.
BY W. O. Clarke

(54° 128° SE.) Western office, 601, 535 Thurlow Street, Vancouver 1. R. A. Barker, manager. This group of 131 claims, owned by the company, is on the upper reaches of the Kitimat River. It is accessible by helicopter from Terrace, 32 miles away. The molybdenite and minor chalcopyrite and pyrite are reported to occur in quartz veins and stockworks in granitic quartz porphyry and granodiorite. In 1966 nine men spent 3½ months under P. W. Richardson, geologist, making geological and geochemical surveys of an area 3 miles square and doing some trenching and chip-sampling. The property was not visited.

[References: Assessment Reports Nos. 818 and 819.1

Molybdenum

PORCHER ISLAND

Blue Jay, Mac, Ray, Star, Zero
Five Star Petroleum & Mines Ltd.
By H. Bapty

(53° 130° N.E.) Company office, 9918—109th Street, Edmonton, Alta. The company owns 56 mineral claims, the Blue Jay, M.J., Mac, Star, Ray, and Zero groups, south of Porcher Inlet on Porcher Island, 20 miles west of Prince Rupert. The showing is close to tidewater and less than 100 feet in elevation. Three men and two contractors worked on the Blue Jay Nos. 1 and 2 claims for two months during the summer doing surface geological mapping, sinking a 20-foot shaft, and diamond drilling one X-ray hole to a depth of 147 feet. The work was supervised by J. Foster Irwin Engineering and Management Services, Limited, consulting engineers. The property was not visited.

QUEEN CHARLOTTE ISLANDS

MORESBY ISLAND

Iron-Copper

Tasu
Wesfrob Mines Limited
By H. Bapty

(52° 132° N.E.) Wesfrob Mines Limited is a wholly owned subsidiary of Falconbridge Nickel Mines Limited, 7 King Street East, Toronto 1, Ont. Vancouver office, 504, 1112 West Pender Street, Vancouver 1. P. N. Pitcher, president; F. A. Godfrey, mine manager; L. W. Hall, construction manager. The property consists of 21 Crown-granted mineral claims and 83 recorded claims. Work was continuous throughout the year, except for a shutdown in September caused by a strike of construction carpenters. The crew throughout the year averaged 400 men. The property is served by barge, coastal ship, and aircraft.

The primary crushing plant has been built underground, and ore is to be fed to it by transfer raises from the surface pits. The crushed ore will then be conveyed to the cobbing plant and from there to the fine-ore bins. The concentrating plant *will* produce a copper concentrate and an iron-ore concentrate. This plant has been constructed near the shoreline in Tasu Harbour so that concentrates can be stored near the deep-sea loading-dock for overseas shipment.

Work Accomplished

Underground work—
Diamond drilling ft. 460

	Advance (Ft.)	Slashing (Cu. Ft.)
Adit	321	......
Ore-passes	2,117	
Crusher-station	......	65,307
Ore-bins	......	73,101

	Advance (Ft.)	Slashing (Cu. Ft.)
Pit preparation-		
No. 1 zone, waste mined .... cu. yd.		91,640
No. 2 zone, waste mined .... cu. yd.		2,401,269
Ore mined and stockpiled .... tons		281,000
Plant-site excavation .... cu. yd.		123,296

Surface Buildings Installed

The townsite, consisting of 67 buildings, was substantially completed. Construction of the mining plant was 75 per cent completed. This consists of underground crushing-station, crushing and cobbiig plant, concentrator, concentrate-storage facility, concentrate reclaim and ship-loading, deep-sea dock, power plant, fresh-water impoundment and pipeline.

[Reference: Minister of *Mines, B.C.,* Ann. Rept., 1965, pp. 68–69.]

Copper-Iron-Molybdenum

Garnet, Ruby (52" 132" N.E.) *Moresby Mines Limited* BY H. Bapty

Company office, 1327, 510 West Hastings Street, Vancouver 2. R. E. Dale, president; David Arscott, resident geologist. The property consists of 61 recorded mineral claims, of which 56 are owned by the company and 5 are held by option. The claims cover Botany Island and the peninsula between Gowing Island and Botany Island.

Prospecting, trenching, and geological mapping were carried on continuously throughout the year. Line-cutting and a magnetometer survey were started in February, and the survey was completed in April. Approximately 9 miles of line was cut and picketed for the magnetometer survey. Diamond drilling commenced in July and is continuing. Total diamond-drilling footage during the year amounted to 1,600 feet in 12 short exploratory boles.

Roadwork, trail-cutting, buildings, and heliports were completed as required. A tractor-road 1.5 miles long was completed, along with approximately 2 miles of trail. Four heliports were built, and a floating wharf 60 by 10 feet was constructed in order to facilitate the moving of supplies. Four frame buildings were constructed during the year.

The camp is serviced by radio-telephone to Vancouver, Sandspit, or Prince Rupert. The property is serviced by air from Sandspit or by unscheduled barge service from Vancouver. Local transportation is provided by a small company-owned boat.

Iron

Jessie, Adonis, Rose (52° 131° S.W.) *Jedway Iron Ore Limited* BY H. Bapty

Companyoffice, 1111 West Georgia Street, Vancouver 5; mine office, Jedway. L. T. Postle, president; N. G. Cornish, mine manager; F. Walters, mine superintendent; L. McGinnis, mill superintendent. The mine is on Harriet Harbour, near the southeastern tip of Moresby Island. The property consists of 61 mineral claims held by record, 10 Crown-granted claims, and 4 mineral leases. Ore zones are magnetite in limestone and in volcanics. Work was continuous throughout the year, and an average of 130 men was employed full time. The following work was done during the year:—

Drifting	ft.	3,216
Raising	ft.	1,168
"Coning" by long-hole drill	cu. ft.	64,697
Slashing	cu. ft.	82,112

Test-hole drilling	ft.	3,360
Blast-hole drilling	ft.	98,185
Road construction	ft.	7,400
Waste stripping	tons	1,202,481
Ore mined—		
Open pit	tons	643,009
Underground	tons	220,015
Ore milled	tons	889,281
Concentrate produced	dry short tons	5 15,299
Concentrate shipped	dry short tons	539,190

The property is serviced by weekly scheduled coastwise boat and freighter and a daily aircraft service from Sandspit.

[References: *Minister* of *Mines,* B.C., Ann. Repts., 1959, pp. 11-14; 1961, pp. 13-15; 1962, pp. 11-12; 1963, p. 16.1

Pyrite-Zinc-Copper

ECSTALL RIVER

Ecstall
Texas Gulf *Sulphur Company*
By H. Bapty

(53° 129" N.W.) Company office, 34 King Street East, Toronto I, Ont.; Vancouver office, 355 Burrard Street. C. 0. Stephens, New York. president; R. H. Clayton, engineer in charge. The company owns 21 Crown-granted claims on Red Gulch Creek, a tributary of the Ecstall River. The property is 45 miles southeast of Prince Rupert. The orebody consists of a massive pyrite body containing minor amounts of sphalerite and chalcopyrite. Three week's work was done by six men during August. The old adit was reopened, and 10 tons of ore was slashed from various areas and shipped for bulk assay and metallurgical testing. Transportation to the property is by boat or float-plane. The property was not visited.

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

Copper-Molybdenum

GAMSBY RNER

Ice
Cominco Ltd.
By W. G. Clarke

(53" 127" S.E.) Head office, Box 1510, Station B, Montreal 2, Que.; field office, 1150 Bay Avenue, Trail. The Ice group of eight claims, optioned by the company, is on the west side of the Gamsby River near its headwaters. It is accessible from Burns Lake by helicopter. It is reported that chalcopyrite and molybdenite mineralization is sparsely distributed on widely spaced fractures in granite. Two men spent one week on a geological survey under the supervision of G. Parsons, exploration geologist. The property was not visited.

[Reference: Assessment Report No. 732.1

Copper

PGOLEY ISLAND

H and C, Rod
Rainbow Mines Limited
BY H. Bapty

(52° 128" N.E.) Company &ice, 1132 West *Georgia* Street, Vancouver 5. William Howden, president. This group consists of one Crown-granted mineral claim (Lot 1553), the Rod group of 10 claims, and the H and C group of 10 claims held by record. The claims are on tbe west side of Pooley Island, 35 miles northwest of Ocean Falls.

A small crew of men, under the direction of J. P. Elwell, consulting engineer, commenced work in early April and finished late in October. Showings were explored by trenching and by 4,000 feet of diamond drilling. Transportation to the property is by coastal boat or aircraft. The property was not visited.

[Reference: Minister of Mines, B.C., Ann. Rept., 1963, p. 21.]

BELLA COOLA

Copper

Bella Coola Chief
Cominco Ltd.
By H. Bapty

(52" 126" N.W.) British Columbia office, 11.50 Bay Avenue, Trail. G. Parsons, exploration geologist. The property, comprising the Bella Coola Chief, Torger Copper, Queen Sulphur, and Red Deer, was formerly known as the Salloomt Copper and Torger Copper, and was explored in 1954 by Noranda Mines, Limited, and in 1956 by Silver Standard Mines Limited. These four mineral claims are on the Salloomt River 12 miles north of Hagensborg, and may be reached by trail or by helicopter. Two company geologists, M. R. Wolfhard and M. R. Murrell, mapped the property. One diamond-drill hole 351 feet long was drilled, and six trenches (total length, 80 feet) were dug by hand. The property *was* not visited.

[Reference: Minister of Mines, *B.C.,* Ann. Rept., 1910, p. 83.1

VANCOUVER MINING DMSION

KNIGHT INLET

Copper-Molybdenum

BHA
Kennco Explorations, *(Western) Limited*
BY J.E. Merrett

(51" 125" S.E.) Company office, 1030 West Georgia Street, Vancouver 5. This company owns the BHA group of 28 recorded claims lying between elevations of 4,000 and 6,500 feet on the southwest side of Mount Waddington, 15 miles up Franklin River and Glacier from the head of Knight Inlet. The mineralization is molybdenite, chalcopyrite, and magnetite in a poorly developed stockwork of quartz veinlets in silicified and sericitized quartz monzonite. A crew of four men under C. S. Ney made a geological map, sampled stream sediments of an area of 1.5 square miles, and drilled seven AX diamond-drill holes.

BUTE INLET

Gold-Silver-Copper-Molybdenum

Colossus
Alquin Mines Ltd.
By J. E. Merrett

(50° 125° N.E.) Company office, 203, 1515 Pemberton Avenue, North Vancouver. This company owns the Colossus (Lot 256), Blue Bell (Lot 258), Portage (Lot 259), and Champness (Lot 260) Crown-granted claims and the Lou group of 29 recorded mineral claims, 1½ miles northwest of Estero Basin off Cordero Channel at the mouth of Bute Inlet. Access is by way of 3 miles of logging-road from the entrance to Estero Basin. The companies having previously operated this property are B.C. Copper Co. (1899-1912) and Colossus Copper Co. Ltd. (1929). The mine workings comprise three adits at elevations of 1,300, 1,460, and 1,550 feet, with interconnecting raises. Mining completed on these levels by former companies included 2,600 feet of drifting and 270 feet of raises. This work was done to explore occurrences of chalcopyrite and molybdenite in *a* silicified shear zone in granodiorite.

W. R. Quinn *was* in charge of a crew of four men for seven months. Geological, geomagnetometer, and self-potential surveys of the property were made, and 16 diamond-drill holes, totalliig 1,600 feet, were drilled. In addition, 1,700 feet of access road was built and three camp buildings were constructed.

POWELL RIVER

Copper-Molybdenum

L.L. (50° 124° S.W.) Company office, Britannia Beach. The L.L. group of 74 claims is 8 miles by road north of Powell River. Molybdenite and chalcopyrite mineralization occurs in quartz seams and fractures *in* granodiorite and quartz diorite. Geological and geochemical (soil and stream sediment) surveys were made of the claims by a four-man crew. J. M. McAndrew was geologist in charge of the work.

Anaconda American Brass Limited
By J. E. Merrett

Copper-Lead-Zinc

Norco, Canyon (50° 124° S.W.) Company office, 310, 1425 Marine Drive, West Vancouver. This property, formerly known as the Copper King and operated by Theodosia Mines Limited, comprises five Crown-granted mineral claims (Lots 1831 to 1835) and the Norco, Canyon, Bell, and Ace groups. The claims are 4 miles up Theodosia River from the head of Theodosia Arm and are 1 to 2 miles south and west of Olsen Lake. Access to the camp is by way of 5 miles of trail from Powell Lake.

Norco Resources Ltd.
By J. E. Merrett

The mineralization is magnetite, chalcopyrite, galena, and sphalerite in a narrow northwesterly trending skarn zone which is exposed along the southeast flank and across the summit of a ridge about 1 mile south of Olsen Lake. A crew of three men was employed for three months making a topographical map of the mineralized area.

[Reference: *Minister* of *Mines, B.C.,* Arm. Rept., 1960, p. 90.1

Iron

Snowfall, **Sunshine** (49° 124° N.W.) The group consists of 11 claims, Snowfall Nos. 3 and 4, Sunshine Nos. 1 to 9, held by record by Frank Lehman of Victoria. The claims are 7 miles up Appleton Creek, a southward-flowing tributary of Sliammon Creek, which flows into the Strait of Georgia about 2½ miles northwest of Powell River.

By N. D. McKechnie

The rocks are. basaltic lavas, with some limestone, of the Vancouver Group. These are intruded by grey quartz diorite, which in turn is intruded by a lighter-grey granodiorite and a diorite porphyry. Except along a logging-road, outcrops are scarce.

Skarn, chiefly coarse dark-brown garnet, epidote, and quartz, and tremolite amphibolite occur in and near limestone. The basalt, normally fine grained, along some joints and fractures shows a coarse texture, which grades into quartz diorite and apparently is a recrystallization related to the quartz diorite.

Only three formational contacts were seen; one limestone contact strikes east and dips 55 degrees south, two flow contacts respectively strike north 30 degrees and north 60 degrees west and dip 65 degrees northeastward and 88 degrees southwestward.

On Snowfall No. 3 mineral claim there are some small exposures of magnetite, as stringers and blebs in skarn. The magnetite contains small quantities of pyrite and a very little chalcopyrite. Magnetite also occurs elsewhere as blebs in the coarse-grained altered basalt, where it is accompanied by minor hematite.

The quartz diorite carries tine-grained disseminated pyrite and chalcopyrite up to about 1 per cent combined sulphides.

A number of high dip-needle readings which show little or no pattern and which were obtained by Frank Lehman in areas of scant outcrop probably are caused by magnetite in the recrystallized basalt.

Copper

ALTA LAKE

London, Axe
New Jersey Zinc Exploration Company (Canada) Ltd.
By A. R. C. James

(50° 122° S.W.) Company office, 905, 525 Seymour Street, Vancouver 2. R. C. Macdonald, assistant to the president. The company holds Mineral Lease M9, comprising the London, Royal Edward, Hard Cash, Iron Hat, Albany, Tonopah, and Iron Wedge Fraction Crown grants and also the eight-claim Axe group on the southwest side of Fitzsimmons Creek about 5 miles from Alta Lake. A jeep-road connects the property with the Squamish–Pemberton road.

The property was described in some detail in the 1963 Annual Report. Copper mineralization, including chalcopyrite and malachite, occurs near the westerly dipping contact of green schistose tuffs and underlying granodiorite. The present company has been active since 1963. In 1966 an exploration adit 917 feet long was driven at the 3950 level, below the surface showings. A crew of nine men was employed for seven months. The work was supervised by M. R. Swanson.

[Reference: *Minister of Mines*, B.C., Ann. Rept., 1963, p. 64.]

Copper-Zinc

HOWE SOUND

Britannia Mine
The Anaconda Company *(Canada) Ltd.*
By A. R. C. James

(49° 123° N.E.) Registered office, 1600, 409 Granville Street, Vancouver 2; mine office, Britannia Beach. D. F. Cornish, president; J. B. Knaebel, vice president, Western Division; B. B. Greenlee, manager, Britannia Operations; L. Pollish, general superintendent; J. C. S. Moore, mine superintendent; W. R. Stern, mill superintendent; R. N. Lovlin, maintenance superintendent.

The Britannia mine is on the east side of Howe Sound, 40 miles by road from Vancouver. The main haulage adit of the mine is on the 4100 level, with the main portal at Britannia Beach. This now extends for approximately 4 miles along the Britannia shear structure. Orebodies are at present being mined in the Victoria, Bluff, and No. 8 sections of the mine. The Victoria section is serviced by the Victoria shaft, which extends from the surface above the 1800 level down to the main haulage at 4100 level, 3.8 miles from the portal. The Victoria workings extend from 2900 to 4100 levels and include stopes in the Beta vein, a large long-hole stope in the West Victoria or 188 orebody, and development in the " G " vein. The Bluff section is serviced by No. 7 shaft, which extends from the 2200 level to 4100 level, and is 2.25 miles from the portal, and also by No. 4 incline shaft, which is in operation between 2700 and 3500 levels. Production in the Bluff section has come mainly from an orebody above 2700 level and one above 4000 level. Development is proceeding in a large ore block in the vicinity of No. 4 shaft. The No. 8 section is mined from the No. 8 shaft, 1.8 miles from the 4100 portal, which extends from 4100 level to 5700 level. The present No. 8 workings extend from 4400 to 5250 levels. Development and exploration are being carried an at various levels, but especially on 5250, 5400, and 5700 levels. A main ventilation *raise* and escapeway was driven from the 5700 level to the 5400 and 5250 levels. Methods of mining at Britarmia include shrinkage, square-set, and long-hole methods. The following is a summary of development work done in 1966:—

	Ft.
Drifting and crosscutting	12,098
Raising	5,355
Diamond drilling	49,288
Rotary drilling	2,767

Further work was done in 1966 on the Jane Basin project. Access roads were completed to all the glory-holes above the Mount Sheer townsite, and a considerable amount of drilling and sampling was done to evaluate the mineral reserves in the old upper workings. In conjunction with this study, some of the old underground upper workings are being rehabilitated, using the 1050 portal at Jane Basin for access. Other workings and raises are being reconditioned so as to control the flow of underground waters and increase the leaching of copper.

A settling-pond was constructed in the mill yard at the beach, through which all classifier overflows and other solutions from the mill pass before being discharged into the sound.

The concentrator milled 503,685 tons of ore, from which 14,346 tons of copper concentrate and 2,075 tons of zinc concentrate were produced.

A total crew of 452 men was employed in December, of whom 272 were employed underground.

NEW WESTMINSTER MINING DIVISION

HOPE

Nickel-Copper

Pride of Emory
Giant Mascot Mines Limited
By G. E. P. Eastwood and T. M. Waterland

(49° 121° S.W.) Administrative office, 1825, 355 Burrard Street, Vancouver 1; mine address, Box 820, Hope. L. P. Starck, vice-president and general manager; F. Holland, resident manager; K. Dahlke, mine superintendent; G. Bosnich, mill superintendent.

The mine is at the head of Stulkawhits (Texas) Creek, which flows eastward into the Fraser River about 8 miles north of Hope. A gravel road about 5 miles long leads from the Tram-Canada Highway 8 miles north of Hope to tbe mine plant at the 2600 portal.

The geology has been described in the Annual Reports for 1954, 1964, and 1965. Briefly, a body of ultramafic rocks is surrounded and irregularly intruded by diorite. Some 17 steeply plunging, pipe-like orebodies occur in the ultramafic rocks near the diorite contact. They are variously designated by name, name and number, or number alone. Stopes developed in them bear the same designations. The ore minerals are pyrrhotite, pentlandite, and chalcopyrite, which in most orebodies are disseminated in peridotite and pyroxenite, but in parts of the 600 and the lower part of the 1500 orebody they form steep pegmatitic veins a foot or two thick. These veins are closely spaced in the lower part of the 1500 orebody and increase its grade considerably. They appear to terminate, both above and below, at tight slips dipping gently northeast. The lower slip is also the bottom of the 1500 orebody. From 50 feet above the 2600 level it dips almost to the level.

The pegmatitic veins are light yellow-bronze in colour, and have the appearance of massive pentlandite. However, a grab sample of this material from the 1500 orebody assayed: Platinum, 0.06 ounce per ton; palladium, 0.21 ounce per ton; copper, 0.90 per cent; nickel, 2.6 per cent. Much of the vein material, therefore, is pyrrhotite rather than pentlandite.

The mine is developed from two adit levels at elevations of approximately 3,550 and 2,600 feet, the 2600 level being the main haulage level. These and three intermediate levels are joined and serviced by an internal inclined shaft. Workings above the 3550 are serviced by various raises, and development headings in the 1500 orebody are serviced by a raise from the 2600 level. An ore-pass near the shaft transfers ore from the 3550 and intermediate levels to loading-chutes on the 2600.

Tbe ore is mined by horizontal and vertical blast-hole stoping methods. Two-inch-diameter blast-holes are drilled with 4- and 4½-inch deep-hole drills using sectional drill steel and tungsten carbide bits. The blast-holes are loaded with a commercial brand of AN/FO explosive and primed with 75 per cent gelatin dynamite and detonating-cord. All production blasts are initiated with short-period electric blasting-caps. Ore is loaded into 6-ton Grauby cars by 9-cubic-foot-capacity track-mounted mucking-machines and hauled to the mill on 2600 level via trolley locomotive. Development work done during 1966 was as follows:—

3550 level:

- Development of the 512 orebody was completed and the stope placed in production.
- Pride of Emory " C " zone pillar at 3840 was removed and the stope backfilled.
- Development of Pride of Emory " D " zone was completed from 3550 to 3800 levels and stoping started.
- Ore was drawn from Pride of Emory stopes at 3,400 feet elevation and transferred via ore-pass to 3250 level.
- The 1900 stope was mined above 3550 level to 3,584 feet elevation.
- The Brunswick 2A stope *was* explored, developed, and readied for production.

3250 level:

- The Brunswick 10 orebody was developed and put into production to 3,480 feet elevation.
- The Brunswick 11 orebody was developed to elevation 3,400 feet and the 3400 level pillar was removed.
- Removal of caved ore from the Brunswick 5 stope was resumed.
- The 600 stope was operated throughout the year.
- Production from the 1900, 1600, and 1500 stopes was completed.
- Development was carried out in the 1400 orebody.

2950 level: The 600 orebody raise was completed to 3250 level.

2600 level: The 2200 orebody was developed to 3250 level and placed in production.

The 2000 orebody was developed.

Development was accelerated in the 1500 orebody after diamond drilling indicated that this high-grade orebody continued to the 2600 level. At year-end long-hole drilling in it was under way between 2600 and 2900 levels, and development was continuing between 2900 and 3250 levels.

The above development work aggregated: Drifting and crosscutting, 3,496 feet; raising, 4,788 feet; diamond drilling, 38,969 feet; and blast-hole drilling, 168,002 feet.

At year-end, ore was being obtained from the 512, the Pride of Emory, the Brunswick 1, 2, 5, and 10, the 2663, and the 1500 stopes.

During the year the mill treated 327,164 tons of ore at an average rate of 1,325 tons per day, producing 18,387 tons of bulk concentrate containing 3,622,400 pounds of nickel and 1,822,000 pounds of copper.

The concentrate was hauled by company-owned trucks to Vancouver and there delivered to the buyers, Sumitomo Shoji Canada Ltd., for shipment to Japan.

Copper-Molybdenum-Lead-Zinc-Silver

A.P.M., Bear, King, Calico, Len
Allison Pass Mining Ltd.
By T. M. Waterland

(49" 121° S.E.) Company office, 7, 515 Granville Street, Vancouver 2; field office, Hope. One hundred and forty-eight claims are owned and six are held under agreement in the Sumallo Basin area about 7 miles south of the Hope-Princeton highway. Access to the property is via a logging-road which leaves the Hope-Princeton road just east of the " big slide " at the Allison Pass Sawmill.

Mineralization consists of galena, sphalerite, molybdenite, chalcopyrite, pyrrhotite, and pyrite in altered and silicitied argillites of the Hozameen Group. The area is intruded by dioritic rocks and by numerous basic dykes. The zone of brecciation, alteration, and mineralization varies from 300 to 1,600 feet wide and has been traced for a length of 2 miles.

Work has been continuous, with six to seven men working under the supervision of William Howard Myers. Geological mapping was carried out by Mr. Myers, and an induced polarization survey was conducted by Geofax Surveys Ltd., of Calgary. Two short trenches have been dug by hand and about 1 mile of road was constructed. Four 2-inch holes were drilled to bedrock, and these were later deepened by diamond drilling. Seven AX diamond-drill holes were drilled for a total of 4,050 feet.

Molybdenum

Bab, Barbara, Joan
American Smelting and Refining Company, Canadian Exploration Division
By T. M. Waterland

(49° 121° S.E.) Company office, 504, 535 Thurlow Street, Vancouver 5. Thirty-six claims, comprising the Bab, Barbara, and Joan groups on Sowaqua Creek, some 1.5 miles southwest of Hope, are owned by American Smelting and Refining Company. Access to the property is by helicopter.

Two men supervised by D. L. McKelvie, geologist, worked for two weeks and blasted five trenches in rock for a total length of 200 feet. It is reported that molybdenite occurs in quartz stringers in monzonite.

Nickel-Copper

Bea
Kelso Explorations Ltd.
By G. E. P. Eastwood

(49° 121° S.E.) Company office, 411, 470 Granville Street, Vancouver 1. S. D. Faider, president. The property comprises a large number of recorded claims extending in a block north from Schkam Lake to the west of the Tram-Canada Highway. In August, Kelso Explorations Ltd. acquired an interest in the claims from Impad Holdings Ltd. and proceeded to deepen the diamond-drill hole that had been put down 300 feet by Impad. Access to the drill-site is through the Cariboo Road Auto Court.

In addition to the workings mentioned in the report for 1965, there is an adit, 900 feet long, which is partly on the Murphy property and partly on the Bea group. The portal is about 200 feet west of the Tram-Canada Highway at a point about 1.2 miles north of Schkam Lake, and is reached by a short dirt road. This adit was driven in 1934-35 by Ideal Gold & Nickel Mines, Ltd. Samples taken by the Resident Engineer of the Department of Mines in 1934 contained only traces of gold and silver. Pyrite and chalcopyrite are locally discernible.

The rocks lie within the Fraser River fault zone, and have been greatly modified, both structurally and chemically. The principal rock in the adit appears to have been a granite or granodiorite that was crushed and strongly silicified. This silicified rock contains many dark bands and lenses, some of which are clearly lamprophyre, others of which resemble argillite, and still others which appear to consist largely of amphibole and pyroxene. This complex has been further broken by a sheeting which dips about 30 degrees east, and which is locally warped or folded, creating an illusion of bedding.

[References: *Minister of Mines, B.C.,* Ann. Repts., 1934, p. F 19; 1965, p. 217.]

Molybdenum-Copper

Iago, Mac, Max, Bar
Iago Mines Ltd.
By T. M. Waterland

(49° 121° N.E.) Company office, 514,615 West Pender Street, Vancouver 2. D. G. McRae, president. The Iago, Mac, Max, and Bar groups consist of 90 claims held by location and lying some 15 miles northeast of Hope. Access from Hope is via 20 miles of logging-road and trail.

It is reported that pegmatitic granite is cut by dykes carrying molybdenite and chalcopyrite.

Work extended over a four-month period with two to four men working under the supervision of G. LeBrun. Work included geological mapping, soil-sampling, and digging some 60 shallow exploration pits.

copper

CHILLIWACK

Mt. Cheam No. 2
By J. W. McCammon

(49° 121° S.W.) Since 1957 Louis Herman, of Agassiz, has held one claim, the Mt. Cheam No. 2, on a copper showing on the north slope of Cheam Peak. The showing is six-tenths of a mile southeast of and 1,700 feet above the Tram-Canada Highway at the point where it is crossed by the power-line from the generating-station at Cheam View. It is near the centre of the Northeast Quarter of Section 10, Township 3, Range 28, west of the 6th meridian. Access is via an overgrown logging-road for 1½ miles to its end and thence 800 feet southeast through the bush.

At the showing two irregular, more or less parallel and vertical, vuggy quartz veins 7 feet wide and 50 feet apart trend southward up the face of a limestone bluff. Within the veins are scattered veinlets of chalcopyrite and irregular masses of pyrrhotite. Some sulphide extends into the limestone wallrock in a few places. More sulphide is reported to occur higher up the hill above the bluff. The limestone is crystalline and in spots is altered to garnet. It has been mapped as part of the Pennsylvanian(?) Chilliwack Group.

A pit 20 feet wide and 5 feet deep was blasted out of the rock on the west vein at the base of the bluff, but is now caved.

Four samples were collected for assay. No. 1 was a 7-foot channel sample cut across the east vein, No. 2 was a ‘I-foot channel sample cut across the west vein, Nos. 3 and 4 were selected samples of massive sulphide mineralization from patches in the west vein. The results of the assays are as follows: No. 1 -gold, trace; silver, nil; copper, 0.08 per cent; No. 2—gold, nil; silver, nil; copper, 0.11 per cent; No. 3-gold, trace; silver, trace; copper, 0.025 per cent; No. 4-gold, *nil;* silver, trace; copper, 0.17 per cent; tungsten, trace.

[Reference: *Geol. Surv., Canada,* Map 737A.]

Molybdenum

HARRISON LAKE

Meg, Bailey, Sash
Gem *Explorations Limited*
By A. R. C. James

(49° 121° N.W.) Company office, 1272 West Pender Street, Vancouver 1. R. W. Caskey, president; J. A. McAskill, managing director. The company owns 101 recorded mineral claims, called the Meg, Bailey, and Sash groups, near the crest of the Lillooet Range at the head of Clear Creek, a tributary of Big Silver Creek. A series of logging-roads along the east side of Harrison Lake give access to the property for four-wheel-drive vehicles. The camp on Clear Creek is at about 2,500 feet elevation. Exploration has been done by Utah Construction & Mining Co. by agreement. In 1966, four holes totalling 3,550 feet were diamond-drilled. A crew of 11 men was employed for three months.

[Reference: *Minister* of Mines, *B.C.,* Ann. Rept., 1965, p. 219.]

cower

PF, Midnight (49° 121° S.W.) Company office, 1821, 355 Burrard Street, Vancouver 1. C. J. Coveney, manager.
Bethex Explorations Ltd.
By N. D. McKechnie

The property consists of 76 mineral claims and three fractional mineral claims known as the PF, Midnight, Rex, Jay, and Blondie, all held by record and situated south of the Harrison River between the summits of Agassiz Mountain and Mount Woodside. The showings are near the junction of Midnight Nos. 1 and 2 and PF Nos. 31 and 32 mineral claims, at an elevation of about 475 feet. They are reached by a jeep-road which leaves from a farmyard at Mountain Slough, about one-half mile north of the Agassiz–Harrison Mills highway.

The geology of the area is shown on Geological Survey of Canada Map 737A, Hope.

The rocks underlying the working area are greywackes of the Upper Jurassic(?) or Lower Cretaceous Agassiz Group. They show little alteration, chiefly the development of secondary calcite and chlorite. They are massive, and bedding contacts are hard to recognize; one possible such contact had a strike of north 35 degrees east. The only intrusive rock recognized is an andesite dyke about 2 feet wide exposed near the sooth end of the working area, striking north 30 degrees west and dipping 85 degrees southwestward. It is some 500 feet southwest of the principal mineral showing.

The principal mineral showing is in a stripping measuring about 50 by 120 feet. Here the rock is fractured on planes striking north 15 degrees east, dipping 85 degrees southeastward, and striking north 45 degrees west, dipping 80 degrees northeastward. These fractures are best developed in an area about 20 feet square at the northeast side of the stripping, and here they are mineralized with coarse pyrite and chalcopyrite and minor quartz. At a distance of 200 feet eastward, a similar mineralization occurs sparsely in fractures striking north 50 degrees west, dipping 80 degrees southwestward; striking north 25 degrees west, dipping 70 degrees northeastward; and striking north 35 degrees west, dipping 45 degrees northeastward. There appeared to be no connecting structure between the two exposures; outcrops between and immediately south of a connecting line show only a sparse mineralization of fine-grained pyrite unrelated to visible fractures. They are not on a common greywacke bed.

Remains of a shack and scattered segments of drill core near these showings suggest that the occurrence has been tested before; the 1955 Annual Report, page 74, notes a test of a copper showing on Mount Agassiz.

In 1966 an induced polarization survey was carried out, some geological mapping was done, six trenches totalling 1,950 feet were dug by bulldozer, and two holes totalling 1,056 feet were diamond-drilled. A crew of about eight men was employed for three months.

Copper

Ascot, Jes, Gloria, J (49” 121” S.W.) Company office, 1211, 1030 West Georgia Street, Vancouver 5. The company holds by record tbe Ascot 1 to 16, Jes 1 to 8, Gloria 1 to 10, and the J 1 to 10, on the north side of the Fraser River, on the southward slope of Mount Woodside, about 3 miles east of Harrison Mills.
Ascot Mines Ltd.
By N. D. McKechnie

A jeep-road which leaves the highway 2% miles east of Harrison Mills leads through the property toward Stacey Lake, near the top of the mountain. The working area is on the J No. 6 and Ascot No. 4 mineral claims at between 400 and 600 feet elevation.

The working area is underlain by andesitic flows and flow breccias that are Lower Jurassic (*Geol. Surv., Canada,* Paper 64-1, p. 29).

In a trench at the side of the jeep-road, on J No. 6 mineral claim and at elevation 550 feet, chalcopyrite occurs in a shear in porphyritic andesite. The shear is about 6 inches wide, strikes north 70 degrees west and dips 65 degrees southwestward, and is parallel to a band of grey cherty rock (tuff?) about 10 feet wide. The cherty rock is well mineralized with pyrite.

On Ascot No. 4 and also on the jeep-road, at about 400 feet elevation, there is 350 feet of rock trenching and stripping in andesite flow breccia. The rock is locally silicified and strongly pyritized; it is cut by somewhat irregular quartz-filled fractures striking generally west-northwest and dipping steeply northeastward. The quartz carries pyrite, chalcopyrite, and sphalerite. Similar rock and mineralization is exposed in a trench about 200 feet to the southwest and 25 feet lower in elevation. All of the quartz-sulphide mineralization is sparse. No contacts of the breccia with other rocks were seen, so its strike and dip are not known.

Copper-Molybdenum

STAVE LAKE

Friendship
New Jersey Zinc Exploration Company (Canada) Ltd.
By A. a. c. James

(49" 122° N.E.) Company office, 905, 525 Seymour Street, Vancouver 2. R. C. Macdonald, assistant to the president. The Friendship group of 10 recorded claims is 4½ miles northeast of the north end of Stave Lake and was under option to the company in 1966. Access is from the north end of Stave Lake, by road for 4% miles and by trail for 1% miles. The showings consist of molybdenite, chalcopyrite, and minor amounts of pyrite occurring as scattered aggregates from 0.1 to 1 inch in diameter in granodiorite and leucogranite.

In 1966 five holes were diamond-drilled, totalling 2,327 feet. An access road 1½ miles long was built on the east side of Winslow Creek and a helicopter landing was made at 2,200 feet elevation. A crew of seven men was employed for three months under the supervision of J. B. Seaton and R. C. Macdonald. The option was terminated at the end of the season.

NANAIMO MINING DIVISION

Zinc

QUATSINO-PORT HARDY

HPH
Giant Explorations Limited
By N. D. McKechnie

(50" 127° N.W.) Company office, 1825, 355 Burrard Street, Vancouver 1. R. A. Sutherland, geologist in charge. The company holds 28 mineral claims by record and 82 claims by agreement at Nahwitti Lake. Access is by logging-road from Port Hardy, 15 miles distant.

The claims are underlain by Quatsino Limestone, older Karmutsen andesitic and basaltic lavas, and younger Bonanza sediments, tuffs, and lavas. The volcanic and sedimentary rocks are intruded by diabase and felsite dykes, and by younger monzonites which are believed to be a part of the Coast Range Intrusions.

The bedded rocks strike generally north of west and dip gently southward. The Quatsino Limestone is displaced along a mylonite zone striking north 25 degrees west; north-striking faults also have been recognized.

Mineralization, chiefly by pyrite and sphalerite, with minor galena and chalcopyrite, is prominent in three areas, all south of the lake or of Nahwitti River: toward the west end of the lake, on R.A.S. No. 4, Norman Nos. 1 and 2, and HSW No.

3 mineral claims; 1 mile east of the east end of the lake, on the HPH Nos. 1 and 3 mineral claims; and 3 miles east of the east end of the lake, on the Rain Nos. 1 and 2 mineral claims. All of the showings are in or at the contacts of Quatsino Limestone.

The westernmost showing, on R.A.S. No. 4 mineral claim, is about 700 feet south of the lake and just east of the creek known locally as Monzonite Creek. Massive magnetite-ilvaite pods in limestone carry sphalerite and coarse pyrite. Monzonite outcrops about 200 feet east of these showings. On the Norman Nos. 1 and 2 mineral claims, at the creek known as Contact Creek and about 400 feet south of the lake, a S-foot width of mylonite is exposed striking north 75 degrees east and dipping 70 degrees southward; it is not mineralized. Just upstream, and on the west bank of the creek, is a small cliff of skarn mineralized with pyrite, sphalerite, and minor chalcopyrite. The chalcopyrite is associated with epidote in reticulate fractures. Limestone is exposed in the creek-bed about 100 feet away. About SO feet downstream from the mylonite, Karmutsen lavas are in contact with monzonite.

On the HPH No. 3 mineral claim, about 400 feet south of the Port Hardy road, a shear 4 to 5 feet wide, striking north 75 degrees east and dipping 80 degrees southward, is in limestone exposed in an old pit. No sulphides were seen in this shear. The pit is about 200 feet east of Ida Creek, and old trenches recur for about 500 feet farther eastward. Some breccia was seen, but very little mineral; most of the old trenches are caved. On the HPH No. 1 mineral claim, toward its eastward boundary, a shaft and adit have been opened in limestone near the Karmutsen contact. They expose a 20-foot-wide felsite dyke striking north 80 degrees east and dipping SO degrees northwestward; the felsite carries scattered stringers of galena and sphalerite. There is some magnetite along its contact with the limestone. The working leads downward in steps and exposes a 3- to 4-foot shear striking north 20 degrees east and dipping 65 to 70 degrees northwestward. In the shear are carbonate masses which carry galena. The shear is cut off to the northeast by a narrow fault striking north 60 degrees west and dipping SO degrees northeastward. In the hangingwall of the shear is what appears to be a solution chamber some 20 to 30 feet in diameter. No sulphides were seen except in the shear.

On the Rain No. 2 mineral claim near the eastern end of the property, several stringers in limestone of massive sphalerite carrying appreciable gold values have been exposed by stripping.

Work during 1966 included a compass and chain survey of the claims, a geochemical survey, and 2,863 feet of diamond drilling in 21 holes. Five men were employed.

[References: Minister of *Mines*, B.C., Ann. Repts., 1930, p. 297; 1931, p. 171; 1932, p. 207; 1936, Part F, pp. 47 and 49; *Geol. Surv. Canada, Sum.* Rept., 1931, Pt. A, pp. 36–45; Assessment Report No. 30.1

Copper

Hep
Utah Construction &Mining Co.
BY N. D. McKechnie and J. E. Merrett

(50° 127" N.W.) Company exploration office, 718, 510 West Hastings Street, Vancouver 2. This company owns the Hep group of 86 mineral claims, lying between 1,300 and 1,800 feet elevation south and west of Nahwitti Lake and 20 miles by logging-road from Port Hardy. Chalcopyrite and pyrite *occur* as fracture *fillings in* chloritized andesite of the Vancouver Group adjacent to a diorite stock. A crew of three men employed for a period of two months completed 14 X-ray diamond-drill holes totalling 1,340 feet.

[Reference: Assessment Report No. 684.1

Copper

Bay
Utah Construction & Mining Co.
BY N. D. McKechnie and J. E. Merrett

(50° 127° N.W.) Company exploration office, 718, 510 West Hastings Street, Vancouver 2. This company holds by agreement the Bay group of 112 mineral claims, lying between sea-level and 500 feet elevation on the north side of Rupert Inlet, 12 miles by road southwest of Port Hardy.

Chalcopyrite and pyrite occur as fracture fillings in a complex shear zone in volcanic rocks of the Bonanza Formation.

A crew of 12 men was employed for a period of 11 months, during which time a topographical map was made of the property; a geological survey and map were completed of an area of 2½ square miles; an induced polarization survey was made of an area half a mile square; and geochemical and magnetic surveys were made of the entire claim group. In addition, 77 diamond-drill holes totalling 15,000 feet of drilling and extensive surface trenching were completed. The work was supervised by A. G. Humphrey.

[References: Assessment Reports Nos. 710 and 731.1

Copper

Lake
Falconbridge Nickel Mines Limited
By J. E. Merrett

(50” 127” N.W.) Vancouver office, 504, 1111 West Pender Street. S. N. Charteris, manager. The Lake group of nine. mineral claims is north of Nahwitti Lake and east of Nahwitti River and is under option to the Falconbridge Nickel Mines Limited. It is reported that the mineralization is chalcopyrite and magnetite in skarn.

A crew of five men employed for two months made topographical, geological, geophysical (self-potential and magnetometer), and geochemical surveys on the Lake mineral claim. Three test-pits were excavated, and 200 feet of EX core-sized diamond drilling was done in six holes. The work was under the supervision of J. J. McDougall.

Copper

Ace, Flats, Kaye, Rick, Etc.
Holberg Mines Ltd.
BY J. E. Merrett

(50” 128” N.E.) Company office, 709 Dunsmuir Street, Vancouver 1. This company owns 104 recorded mineral claims between elevations of 300 and 500 feet about the head of Holberg Inlet, 25 miles by logging-road from Port Hardy. The Rick claims cover the former Millington group, which was explored between 1918 and 1928, and between 1954 and 1959 by Noranda Exploration Company, Limited. The mineralization is reported to be bomite disseminated in basalt, in fracture fillings, and as a replacement of orthoclase and quartz. In 1966 a crew of four men employed for eight months under the supervision of Moore Schram campleted 80 feet of rock trenching and did 1,946 feet of diamond drilling in six holes.

Copper

Yreka
Minoca Mines Ltd.
By N. D. McKechnie and J. E. Merrett

(50” 127° S.W.) Company office, 543 Granville Street, Vancouver 2. The company is 51 per cent owned by Mitsubishi Metal Mining Co. Ltd. and

49 per cent by Yreka Mines Limited, which, in turn, is controlled by Noranda Mines, Limited; J. R. Biigsley, general manager; George Dvorak, mine manager.

Underground, 1,293 feet of drifting and crosscutting and 748 feet of raising were completed in the development of the "A," "B," and "C," orebodies, where 83,205 tons of ore was mined. The concentrator milled 73,960 tons of ore to produce 11,628 tons of copper concentrate.

Surface construction included the building of a concentrate-loading dock with a loading capacity of 200 tons per hour, a 4,000-ton capacity concentrate-storage shed, and a camp recreation hall.

The average number of men employed was 41, of whom 23 were employed underground.

Operations during 1966 were confined to mining; little new geological information is available. Stoping has indicated that there are two fault directions in the mine. The faults strike north 40 degrees east, dip 65 degrees southeast, and strike north 30 degrees west, dip 80 degrees northeastward. The oreshoots tend to lie along the north 40-degree east set; the north 30-degree west set contains some mineralization. The lime of intersection of these faults rakes south 40 degrees east at 65 degrees, and is nearly parallel to the rake of the oreshoots as shown by stoping. It is probable, therefore, that these faults are a part of the structure which controlled the deposition of ore in the skarn.

[References: *Minister* of Mines, B.C., Ann. Repts., 1953, p. 167; 1955, p. 76; 1965, p. 228; *Geol. Surv., Canada, Sum.* Rept., 1929, Pt. A, p. 124.1

Iron

Merry Widow, Kingfisher (50" 127° S.E.) Company office, 1017, *Empire Development Company Limited* 736 Granville Street, Vancouver 2; BY J. a. Merrett mine office, Port McNeill. E. C. Oates, general manager; J. J. Hogan, mine manager. The Empire mine adit is at an elevation of 1,911 feet on Merry Widow Mountain, on the west side of the Benson River valley, approximately 2 miles south of Benson Lake. The camp and concentrator are at an elevation of 800 feet. A 3-mile tote-road connects the adit and camp, and 2.5 miles of gravel road provides access to the camp from Port McNeil1 on the east coast of Vancouver Island. Ore is crushed at the portal and conveyed by means of a jig-back aerial tramway to the concentrator.

Underground development work, comprising 830 feet of drifting and crosscutting and 560 feet of raising, was completed in the Merry Widow ore zone. Blasthole mining was used to produce the ore, of which 145,371 tons was removed from five mucking-machine draw points.

A magnetic scalping conveyor pulley was installed between the portal crasher and the tramway ore-storage bii. A repair-shop was constructed near the portal, and the 4,000-ton-per-day concentrating plant, destroyed by fire in January, was replaced.

The iron concentrate produced was trucked to the loading-dock at Port McNeil1 for shipment to Japan.

The average number of men employed was 53, of whom 27 worked underground.

Copper-Iron

Old Sport (50" 127" S.E.) Company office, Tadanac; *Coast Copper Company Limited* mine office, Port McNeill. Cominco Ltd. is By N. D. McKechnie and J. E. Merrett the principal shareholder of Coast Copper

Company Limited and manages the operation. H. G. Barker, property superintendent; R. T. Trenaman, mine superintendent; G. M. Dorland, mill superintendent. This property, comprising 48 Crown-granted claims, 5 recorded claims, and 1 mineral lease, extends southward from Benson Lake on the west side of Benson River. The claims adjoin those held by Empire Development Company Limited. This company and Cominco Ltd. have an option agreement whereby the latter company may explore for and mine copper ores in the Benson Lake property of Empire Development Company Limited. Access is by way of a 26-mile gravel road from Port McNeill, where an employee residence townsite is located.

A total of 11,435 feet of drifting and crosscutting was done, most of which was on the south headings of the 5100, 4900, and 4700 levels and on the north headings of the 5500 and 5300 levels. The principal drifting was on the 4700 south drift, which has been extended to explore an area of copper mineralization in the vicinity of the Empire concentrator. In the stopes, 1,942 feet of subdrifting and 4,521 feet of raising were completed. Other exploration work included 35,419 feet of diamond drilling.

A crew of 190 men, of whom 120 were employed underground, mined and milled 282,832 tons of ore. Copper and iron concentrates were produced and trucked to the Port McNeill loading terminal for shipment to Japan.

The following account of the geology is intended to supplement the previously published report in the Annual Report for 1960, page 100.

The Old Sport deposit lies in the upper part of the Karmutsen Formation in a layer of skarn and sills known as the Old Sport horizon. Stratigraphically above the Old Sport horizon and at the base of the Quatsino Limestone is an intrusive sill termed the Included Diorite, which also contains ore. The Old Sport and Included Diorite Formations strike west-northwest and dip 30 to 35 degrees westward toward a diorite-gabbro stock, the Coast Copper stock.

A series of faults striking north 40 degrees east to north 60 degrees east cross the Old Sport and Included Diorite Formations. They lie chiefly to the northwest and to the southeast of a northeastward salient of the Coast Copper stock. Ore occurs at the intersections of these faults with the Old Sport and Included Diorite Formations. The faults to the southeast of the salient include the Kingfisher and Merry Widow faults of the neighbouring Empire Development property. Also, there are fractures striking west of north which are occupied chiefly by dykes of felsite and andesite; they and the dykes are mineralized and are therefore at least in part pre-mineral. It has been observed that where wide sections of felsite are in contact with the Old Sport skarn, the felsite is mineralized for only a few feet from the contact, the Old Sport having been, apparently, the principal locus of deposition.

On the 4700 level a contact between Coast Copper diorite and Karmutsen volcanics is well exposed in the southward-trending main crosscut. The sequence of events illustrated there is interpreted to be: fracturing of the Karmutsen and development in it of red garnetite; the garnetite zone intruded by a fine-grained dark rock; the dark rock intruded by the diorite and the development of porphyroblasts of feldspar in the dark rock; intrusion of andesite and felsite dykes; emplacement of the sulphides. Possibly some sulphide mineralization preceded the dyke intrusion since mineralization in these dykes is less usually than in contiguous skarn.

Felsite at this exposure is of two kinds—a light-grey aphanitic rock, and a darker-grey to slightly greenish rock with a faint, finely porphyritic texture. In thin-section both are seen to be of the composition of granite, but the second or darker rock has phenocrysts of plagioclase, micrographic texture, and shows thin chains and irregular aggregates of garnet and (or) calcite. The lighter rock is equigranular, shows no micrographic texture, and no garnet, although some calcite is present. The presence of garnet in the darker porphyritic rock would suggest that it is the older. They were not seen in contact.

The metallic minerals are magnetite, which is contemporaneous with the skarn, chalcopyrite, bornite, pyrrhotite, and pyrite. Bornite occurs with chalcopyrite closer to the intrusive stock than does chalcopyrite alone; pyrrhotite is almost entirely confined to the ore along one fault; pyrite is scarce.

NIMPKISH

Copper-Zinc

Kinman, Alpha
Empire Development Company Limited
By J. E. Merrett

(50° 126° S.W.) Company office, 736 Granville Street, Vancouver 2. The Kinman and Alpha groups, totalling 14 claims, are located at the headwaters of Kinman Creek, which flows into the southeast side of Nimpkish Lake. The property was formerly known as the Kinman Copper group (1929). The mineral showings, which are between elevations of 2,000 and 3,300 feet, contain chalcopyrite, sphalerite, pyrrhotite, pyrite, and magnetite in garnet epidote skarn. Chalcopyrite and molybdenite mineralization is also reported to occur in fractures in granodiorite. The geology of the claims was mapped, and an induced polarization survey was made of a U-shaped block 1,600 by 7,700 feet. A crew of five men for 2½ months was under the supervision of John Lamb.

Copper

N.C.
Empire Development Company Limited
By J. E. Merrett

(49° 126° N.E.) Company office, 736 Granville Street, Vancouver 2. The N.C. group of 20 claims is located at the headwaters of Nimpkish River, 5 miles southeast of Vernon Camp. The mineral showings, which are between elevations of 2,000 and 3,100 feet, contain chalcopyrite and bornite in a skarn zone in limestone. A crew of two men in two weeks completed 54 feet of EX core-size diamond drilling in three holes.

[Reference: Assessment Report No. 728.]

SAYWARD

Silver-Lead-Zinc-Copper-Cadmium

White
Newconex Canadian Exploration Ltd.
By J. E. Merrett

(50° 125° S.W.) Company office, 914, 525 Seymour Street, Vancouver 2. This property comprises the White group of 36 recorded mineral claims and is in the White River valley 11 miles by logging-road south of Sayward. The mineral occurrence is mainly sphalerite, with minor quantities of galena, chalcopyrite, and greenockite, confined mainly to northwest- and northeast-trending fractures and shears in a skarn zone in limestone. The claims were geologically mapped, as was the trenched area, a geochemical survey by " total heavy metals " of an area 2,400 by 7,200 feet was made, and nine trenches were drilled and blasted on the White Nos. 1 and 3 claims. A crew of four men was employed for two months under the supervision of J. S. Ives.

Iron

Iron Mike
Orecan Mines Ltd.
By N. D. McKechnie and J. E. Merrett

(50° 125° S.W.) Company office, 519, 355 Burrard Street, Vancouver 1. H. H. Upton, president; L. J. Manning, manager; Hill, Manning & Associates Ltd., consulting engineers. The property is 4 miles southwest of Sayward and 3 miles west of the junction of the White and Salmon Rivers, and comprises 48 recorded mineral claims, of which 13 are in the name of Orecan Mines Ltd. and 35 are held by the Hartt-Caldwell interests.

The geology of the magnetite deposit is described in the Annual Reports for 1965 and earlier. The following notes are supplementary.

Mapping by the Orecan staff in the mining area has shown a set of faults striking north 40 to 60 degrees east and dipping from near vertical to 60 degrees southeastward, which seem to be spatially related to higher-grade magnetite. In the higher-grade area, too, are two faults striking about north 30 degrees west; the dips are not certainly known. The relationship between the two sets of faults is not known.

In the No. 1 pit the crest of an anticlinal fold was exposed, but by the time of the writer's visit it had been destroyed by mining. This would correspond to the arch postulated in the 1965 Report (p. 227).

Open-pit bench-mining methods were used to remove 61,885 tons of waste rock and 186,000 tons of ore, of which 149,664 tons was milled to produce 91,341 tons of concentrate having a grade of 62.25 per cent iron. A crew of 40 men was employed until operations were suspended on September 10, 1966.

Copper

CAMPBELL RIVER

Chal

Menzies Bay Mining Ltd.

By N. D. McKechnie

(50° 125° S.E.) Company office, 7, 250 East Esplanade, North Vancouver. The group, comprising four full mineral claims (Chal 1 to 4) and one fractional mineral claim (Chal No. 5 Fraction), located by record, is one-half mile west of the Island Highway on the Menzies Bay–Mohun Lake road, some 12 miles north of Campbell River.

The claims include copper-bearing mineral showings described as the Menzies group in the 1916 Annual Report. More recent activities, in 1953, 1955, and 1959, are briefly described in the 1959 Annual Report, page 131, under the name Chalco.

The predominant rock underlying the claims, and the region surrounding them, is amygdaloidal basalt of the Vancouver Group.

In the basalt at the centre of the Chal group there is a lenticular-shaped exposure of tuff about 40 feet long and 5 feet thick at the widest place. It strikes north and dips 15 degrees east. Along the hangingwall of the tuff, and to a lesser extent along the footwall, there is a well-developed seam of gouge which, however, thins and disappears in both directions on strike as it passes into the basalt. The tuff and the basalt in the immediate footwall are mineralized with chalcocite, bornite, and minor chalcopyrite. The gouge shows almost no copper staining; the tuff and its immediate footwall are well stained with malachite and minor azurite, the latter concentrated in a narrow band at the tuff-gouge contact.

West of Mohun Lake road from, and about 600 feet east of, the above showing there are some surface workings at an elevation of about 100 feet above the road. The writer was told by a local resident that this is the site of the shaft and adit described in the 1916 Report, but more recent rock blasting has covered these workings. The rock there is amygdaloidal basalt and is fractured along two principal planes, one striking north 65 degrees east and dipping 80 degrees northwestward, and the other striking north 85 degrees east and dipping 25 degrees northward. The fractures, up to 1 inch in width, erratically distributed and infrequent, are mineralized with chalcocite. Some larger pieces of chalcocite in the spoil indicate that wider mineralized fractures exist. In thin-section the mineralized basalt is seen to be altered largely to prehnite both in the amygdules and along fractures. A very little epidote was seen. The basalt is fragmental, and there are some tuffaceous bands indicating that the mineralization probably is in a flow top.

Similar copper mineralization occurs at Brown Bay, 2½ miles to the northeast, and in some old surface cuts about 6 miles to the north, again just west of the Island Highway.

Copper

Lark
Teknol Mining Co. Ltd.
By N. D. McKechnie

(50° 125° S.W.) Head office, 902, 470 Granville Street, Vancouver 2. Don Johnston, president. The Lark group consists of eight claims recorded by J. Sirola and located 14 miles west-northwest from Quinsam, on the Campbell River–Camp 5 road. The south boundary of the group crosses the north end of Boot Lake. The camp-site is on a narrow dirt road about 100 yards north of the Camp 5 road. All the workings are at short distances on either side of the Camp 5 road.

The rocks are amygdaloidal andesites and basalts of the Upper Triassic Vancouver Group. No intrusive rocks were recognized at or near the working area. The volcanic rocks strike north 35 degrees west and dip about 60 degrees southwestward. Two exposures of unmineralized faults were seen, the widest being about 2 feet, striking north 5 degrees east and dipping 65 degrees west, and the other striking north 20 degrees west and dipping 75 degrees westward. The exposures could be on a single, curving fault zone.

A 75-foot-long trench on the southwest side of the Camp 5 road near the junction with the Teknol camp road exposes dark basaltic lava with carbonate-healed fractures. No sulphides were seen here.

On the same side of the Camp 5 road and 700 feet southeastward is a 50- by 150-foot stripping in andesitic and basaltic lava with numerous carbonate threads and stringers. No sulphides were seen here.

At from 200 to 300 feet northeast of the road, andesite flow breccias are exposed in two trenches which are about 350 feet apart on the north 35 degrees west strike. The southeasterly trench is about 500 feet northwest of the junction of the Teknol camp road. The breccia in the northwesterly trench is about 2 feet wide, contains interstitial calcite and scattered grains and veinlets of malachite. No sulphides were seen; a finely disseminated black opaque mineral is thought to be iron oxide. The breccia in the southeasterly trench is about 3 feet wide and has fragments of red rhyolite. The strike and dip here are uncertain, but since this exposure is nearly in line of strike of the northwesterly exposure, it is presumed that a single breccia horizon is represented. Prehnite is present in this rock, and there are scattered grains and veinlets of native copper, some of which can be seen with the naked eye, in both the fragments and the matrix. The only other metallic mineral recognized is hematite. The breccia is truncated to the southeast by the fault striking north 20 degrees west.

Iron-Copper

Iron River
Texada Mines Ltd.
By J. E. Merrett

(49° 125° N.E.) Registered office, 626 West Pender Street, Vancouver 2; mine office, Box 10, Gillies Bay. This company optioned Lot 242 from Canadian Collieries Resources Limited. Access is by 21 miles of road from Campbell River. The mineral occurrence is adjacent to the Iron River, a tributary of Quinsam River, and is 1½ miles east of Middle Quinsam Lake. It consists of magnetite and chalcopyrite in garnetite.

A five-man crew was employed for four months; some mapping and 2,715 feet of diamond drilling were done.

Iron

Ivy
Cominco Ltd.
By A. R. C. James

(49° 125° N.E.) Company office, Trail. The company holds the Ivy group of eight claims by agreement. The property is at an elevation of about 2,500 feet on Iron Hill, between Sihun and Mine Creeks and south of east Upper Quinsam Lake, about 23 miles from Campbell River. Magnetite and chalcopyrite occur in skarn at or near the contact of the Karmutsen-Quatsino Limestone and the Quinsam intrusive. From 1951 to 1957 the Argonaut Mine Division of Utah Co. of the Americas mined a total of 4,027,337 tons of ore from its Iron Hill mine, from which 2,193,917 tons of concentrate was shipped.

In 1966 a magnetometer survey and geological mapping were conducted over an area of 0.8 square mile. Two holes totalling 546 feet were diamond-drilled. A crew of two men was employed for a month under the supervision of R. G. Gifford.

Copper

QUADRA ISLAND

Copper Road
Ribco Leasing Limited
By J. E. Merrett

(50° 125° S.E.) Company office, Heriot Bay. R. I. Bennett, manager. This property, on the west side of Quadra Island about 2 miles north of Deepwater Bay, comprises 11 recorded mineral claims held by E. G., John, Blanche, and Antoinette Adams and leased to Mr. Bennett, who also holds an additional eight recorded mineral claims in that area. The mine is connected by road to Deepwater Bay and the ferry terminus at Quathiaski Cove.

Three men completed 85 feet of drifting and 50 feet of raising in the shaft area. In addition, 1,748 tons of copper ore was shipped to the Britannia concentrator and, after smelting, produced 118,427 pounds of copper.

Copper

COURTENAY

Mount Washington Mine (Domineer No. 22)
Mount Washington Milling Co. Ltd.
By A. R. C. James

(49° 125° N.E.) Company office, 204, 569 Howe Street, Vancouver 1; mine office, Box 1809, Courtenay. A. Southwell, president; G. F. Groves, general manager. A short history and description of the property was given in the Annual Report for 1964, and the geology has been described in some detail in the Annual Reports for 1959, 1960, and 1963. The mine is on the Domineer No. 22 mineral claim, near the summit of Mount Washington at about 4,400 feet elevation, 18 miles from Courtenay by logging-road. It is designated Domineer No. 22 to differentiate it from the old Domineer gold showing on Murex Creek to the east. The orebody is a flat-lying quartz vein mineralized with chalcopyrite, bornite, and other minerals. The mineralization also extends into adjacent rocks, which consist of Cretaceous sediments and intrusive porphyry and breccia. The average width of the orebody is 10 feet, and it is overlain with waste of an average thickness of 20 feet. So far all mining has been by open-pit methods, using four air-track drills, one 1½-yard and one 2½-yard shovel, and three D-8 bulldozers. Waste is removed in two 14-cubic-yard Euclid trucks, and ore is transported to the mill in seven 11- to 14-cubic-yard trucks. In 1966 the mine was operated from the beginning of June to the end of November; heavy snow conditions on Mount Washington normally curtail operations in the winter and early spring.

The concentrator is situated on the northeasterly slope of Mount Washington at an elevation of 2,400 feet and 4½ miles by road from the mine. A crushing, grinding, and flotation plant of 750-tons-per-day capacity operated continuously throughout 1966. Sufficient ore is stockpiled near the mill to enable it to operate during the winter months when the mine is closed.

A total crew of 79 men was employed on the property when the mine was in full operation. This included employees of the mining contractors, which totalled 28 men.

Production in 1966 was as follows: Total ore mined, 172,052 tons; ore milled, 179,502 tons; copper concentrate produced, 8,511 tons; 301,137 tons of waste and overburden was removed from the open pit.

TEXADA ISLAND

Iron-Copper

Texada Mine
Texada Mines Ltd.
By J. E. Merrett

(49° 124° N.W.) Registered office, 626 West Pender Street, Vancouver 2; mine office, Box 10, Gillies Bay. A. D. Christensen, San Francisco, Calif., president; A. M. Walker, general manager. The mine and plant are at Welcome Bay on the southwest coast of Texada Island, 8 miles by road south of Vananda. The major portion of the ore mined came from underground, where long-hole stoping was used to produce 1,025,211 tons. Included in this was ore produced in the slope or decline being driven at minus 13 degrees down pitch on the Lake ore zone. An additional 85,405 tons was produced by open-pit mining at the bottom of the Paxton and Lake pits. The combined tonnage of open-pit and underground ore milled was 1,315,858 tons, from which 576,875 tons of iron concentrate and 8,248 tons of copper concentrate were produced. During open-pit operations, 26,539 cubic yards of waste rock was mined and removed.

The development of the Le Roi and Lake decline areas for diesel haulage greatly increased the amount of drifting completed in 1966. The total of 13,513 feet included 4,943 feet of haulage drifts, 8,459 feet of scraper subdrifts, and 111 feet of ventilation subdrift. Other development work included 4,190 feet of raises. Diamond drilling amounted to 43,875 feet underground and 4,763 feet on the surface.

Extensive use was made of diesel-powered equipment. The Lake decline and adjacent room-and-pillar stopes employed a three-machine Jumbo mounted on a remodelled Kenworth 802 truck and a No. ST-5A Wagner scooptram. Two TL-55 Joy transloaders were employed in the Le Roi area on the 1855 level and transported approximately 25 per cent of the mine production.

The flotation section of the concentrator was improved by a bank of scavenging cells added to the copper-recovery circuit.

The number of persons employed was 302, of whom 137 were underground.

ALBERNI MINING DIVISION

ZEBALLOS

Iron

F.L.
Zeballos Iron Mines Limited
By A. R. C. James

(50° 126° S.W.) Company office, 504, 1112 West Pender Street, Vancouver 1. P. N. Pitcher, president; C. E. Gordon Brown, manager. The property comprises 13 Crown-granted and 15 recorded claims and is 4 miles north of Zeballos. A high-grade magnetite orebody outcrops on the west side of Zeballos River valley at an elevation of approximately 2,600 feet. The outcrop of magnetite extends in a northerly direction for 1,500 feet, averaging 70 feet thick, and dips westward at about 40 degrees. The hangingwall is a complex of tuff, intrusive andesite, diorite, and granodiorite locally altered to skarn, and the footwall is composed of grey Quatsino Limestone.

The present company commenced work on the property in 1959. Open-pit mining began in 1962, but the property was closed on February 27, 1963. After a complete reorganization of the company and change of control, the property was re-opened on November 1, 1963, and prepared for renewed production as an underground mine. Operations have been continuous since that time. The mine is developed from a main haulage level at 2,280 feet elevation, and the method of mining is long-hole blasting with mucking-machine drawpoints. In 1966 the stopes in "A" zone were mined out, leaving only the ribs and crown pillars. Development work was continued in the " B " zone, to the north of "A" zone, and two stopes in this zone were brought into production. The ore from these stopes is loaded out at drawpoints on " B " level at 2,440 feet elevation and put through an ore-pass to the main haulage at 2,280 feet elevation. The following is a summary of underground development work completed in 1966:—

	Ft.
Drifting	164
Subdrifting	870
Crosscutting	1,011
Raising	945
Drilling (long-hole)	161,515

The ore is trucked from the mine to the primary crusher at 2,100 feet elevation. It then passes through a secondary crusher and into a 100-ton surge bin. From there it is withdrawn in 9-ton steel skips which descend over a standard-gauge triple-track surface tram to the crude-ore stockpile just above the mill. The tramway is 2,500 feet long and extends from elevation 1,900 feet to the mill horizon at 1,200 feet. At the mill the ore is beneficiated by magnetic separation. It is then trucked to a loading-dock at the head of Zeballos Inlet, where a stacker conveyor delivers the ore to a stockpile, which may contain up to 80,000 tons. An underground conveyor system removes ore from the stockpile and loads directly into the holds of ocean-going freighters at a rate of 900 tons an hour.

A total crew of 100 men was employed, 45 being employed underground. Total production of ore trammed to the mill was 365,576 tons. Total iron concentrates produced was 323,302 tons.

Iron

Hiller, Churchill
Falconbridge Nickel Mines Limited
By A. R. C. James

(50° 126° S.W.) Company office, 504, 1112 West Pender Street, Vancouver 1. The property comprises 42 claims, situated at the headwaters of Lime Creek and Fault Creek and on the divide between these creeks and the Kaouk and upper Artlish Rivers. The claims are at an average elevation of 3,400 to 3,600 feet, and are 10 miles by helicopter from Zeballos and 4 miles north-northwest of Zeballos Iron mine. The showings are reported to consist of magnetite, with some pyrite and pyrrhotite associated with skarn alteration of Bonanza Group volcanic rocks. In 1944 Privateer Mines Limited did a little work on the Churchill group, which was described in Bulletin 27, 1950, pages 131 to 134. In 1951 The Argonaut Mining Co. Ltd. drilled 12 holes totalling 817 feet on the same group. In 1960 Ventures did some work, and in 1962 Utah Construction & Mining Co. did 2,500 feet of diamond drilling on the Artlish group, which forms part of the present property. Falconbridge Nickel Mines Limited commenced work on the property in 1964.

In 1966 the company did geological mapping on both the Churchill and Hiller groups. A magnetometer survey was completed on both groups. Twenty-one holes were diamond drilled, totalling 11,000 feet, on the Hiller group, and two holes were diamond drilled, totalling 1,024 feet, on the Churchill group. A crew of 12 men was employed for four months under the supervision of R. N. Saukko. The property was serviced by helicopter.

Copper

Sonny, Black Knight
Consolidated Skeena Mines Ltd.
By A. R. C. James

(50° 126° S.W.) Company office, 716, 602 West Hastings Street, Vancouver 2. The property consists of seven Sonny and Black Knight claims situated about 5 miles in a direct line northeast of Zeballos and east of Goldvalley Creek. Chalcopyrite, pyrite, and bornite mineralization occurs at a granite-skarn contact. Three surface holes totalling 1,110 feet were diamond drilled, and one hole was diamond drilled from an old underground adit for a length of 531 feet. An electromagnetic survey and some topographical mapping were done. The property was serviced by helicopter, although it is also accessible by trail. A crew of eight men was employed for about five months. The work was under the general supervision of W. M. Sharp.

FLORES ISLAND

Copper-Zinc

Ormond, Contact
Falconbridge Nickel Mines Limited
By A. R. C. James

(49° 126° S.E.) Company office, 504, 1112 West Pender Street, Vancouver 1. The property comprises 34 claims in the southeast part of Flores Island near the village of Ahousat, and at an average elevation of 600 feet. Access is by about 1½ miles of trail from Matilda Inlet. The property was under option to Falconbridge Nickel Mines Limited from Van-West Minerals Limited, but the option was terminated before the end of the year. It is reported that chalcopyrite and sphalerite mineralization occurs in andesite volcanics and chert in several old adits.

An induced polarization geophysical survey was done by Van-West early in 1966. Later, Falconbridge did self-potential and magnetometer surveys, soil-sampling, and geological mapping. Three holes were diamond drilled, totalling 538 feet, and four holes were drilled by packsack drill totalling 268 feet. A crew varying from 8 to 10 men was employed for one month under the supervision of R. N. Saukko.

[Reference: Assessment Report No. 465.]

TOFINO

Copper-Nickel-Molybdenum

Moly, Tofino, Tofino Nickle
Sun-West Minerals, Limited
By A. R. C. James

(49° 125° S.W.) Company office, 803, 1636 Haro Street, Vancouver 5; field office, Box 111, Tofino. Lorne Hansen, president. The company owns a total of 75 recorded claims at the head of Tofino Inlet, extending from an elevation near sea-level to 850 feet. Access to the property is by boat from Tofino, a distance of 18 miles.

A detailed description of the property was given in the Annual Report for 1963. The mineralization comprises irregular masses and disseminations of molybdenite, chalcopyrite, and magnetite, associated with skarn alteration. The property has been explored intermittently since 1898, and by the present company since 1962.

It is reported that in 1966 geophysical and geochemical surveys were carried out by Falconbridge Nickel Mines Limited, a total of 730 feet of trenching was done, and two holes were diamond drilled totalling 200 feet. A crew of four men was employed under the supervision of Lorne Hansen.

Iron

KENNEDY LAKE

Brynnor Mine
Brynnor Mines Limited (Kennedy Lake Division)
By A. R. C. James

(49° 125° S.E.) British Columbia office, 1050 Davie Street, Vancouver 5; mine office, Ucluelet. T. R. Wearing, manager; T. Salmon, pit supervisor; A. M. Cormie, underground superintendent; A. W. Hagerty, mill superintendent. This company is a wholly owned subsidiary of Noranda Mines, Limited.

The mine is situated about 2½ miles southeast of Kennedy Lake, near the headwaters of Draw Creek. Access is by the Alberni–Tofino road as far as Kennedy Lake and by a logging road from there to the mine. Ore is trucked from the crushing plant to the mill and loading-dock at Toquart Bay, a distance of 8 miles. Here the magnetite is loaded from a large storage pile into ocean-going ore-carriers for shipment to Japan.

The geology of the mine and surrounding area has been described in the Annual Reports for 1962, 1963, and 1965. All the ore produced up to the present time has been by open-pit methods. The open pit is worked by standard benching methods, the benches being approximately 30 feet apart. Down holes are drilled with a 9-inch Bucyrus Erie 40-R and a 6-inch C.I.R. Drillmaster rotary drill and are loaded with AN/FO in conjunction with M.2 and M.4 aluminum-TNT slurry explosives. Lifter holes are drilled with air-tracks and are loaded with conventional explosives. Muck is loaded by two Dominion and one Bucyrus Erie shovel into Dart end-dump trucks and hauled to the crusher or waste dump. Operations are now confined to the north-central section of the pit, and present workings are 360 feet below the rim of the pit.

Preliminary excavations were begun in August, 1963, for the sinking of a three-compartment shaft to give access to a deeper orebody lying to the southeast of the open-pit orebody. By the end of 1965, the Brynnor No. 1 shaft had been sunk 1,062 feet. In 1966 the shaft was sunk a further 172 feet to a depth of 1,234 feet. Extensive stope development was done at the 600- and 750-foot levels. A summary of development work done in 1966 is as follows:—

	Ft.
Drifting	1,815
Raising	1,002
Shaft-sinking	172
Diamond drilling	9,502

A new office building and a well-equipped dry and shifters' office building were completed and put into use in 1966.

In July, operations at Brynnor ceased as a result of a strike and had not been resumed by the end of the year. The total amount of ore mined up to the beginning of the strike was 369,747 tons. This yielded 321,157 tons of concentrate. The number of men employed immediately previous to the strike was 189.

Copper

ALBERNI INLET

Mary
Gunnex Limited
By N. D. McKechnie

(49° 124° S.W.) Company office, 1019, 409 Granville Street, Vancouver 2. The company holds by record 72 mineral claims on Mount Spencer, at the head of the south fork of Museum Creek, 16 miles southeast of Port Alberni and 8 miles east of Alberni Canal. Access is by logging-roads from Port Alberni to Franklin River, thence to Museum Creek and up its south fork to the end of the road at about 2,000 feet elevation. From there the remainder of the distance to the camp at elevation 4,100 feet on Mount Spencer is by helicopter, or on foot along the creek.

In 1966 all the claims were prospected, geological mapping and geophysical surveys were made, comprising induced polarization, magnetometer, self-potential, and electromagnetic, in selected areas, and eight holes totalling 3,064 feet were drilled. A crew of eight men was employed for five months under the supervision of T. F. Schorn.

The general geology is shown on Geological Survey of Canada Map 49-1963, Alberni Area. Mount Spencer is in Karmutsen volcanics, and an area south of the peak, drained by the south fork of Museum Creek, is shown as probable Bonanza Formation.

The working area is on a broad hogback, about one-quarter mile south of the peak of the mountain, lying between 3,900 feet elevation on the westward side and 3,300 feet on the eastward. It is underlain by Karmutsen basaltic lavas and flow breccias. Limestone is exposed south of the creek gully; its stratigraphic position is not evident, but its position corresponds to the Karmutsen-Bonanza contact shown on Map 49-1963. Feldspar porphyry dykes, in steep fractures striking northwestward and westward, cut both the Karmutsen lavas and the limestone.

The two principal mineral showings are: No. 1 showing in the gully of Museum Creek, on the westward slope, at 3,900 feet elevation, and No. 2 showing on an eastward-trending nose about one-half mile east of No. 1 showing and at an elevation of 3,700 feet.

No. 1 showing, the original discovery, is a rusty fault zone about 5 feet wide striking north 80 degrees east and dipping 40 degrees southeastward. The footwall is limestone breccia with fragments composed of garnet, hornblende, orthoclase, and plagioclase. The limestone is veined with serpentine, and the whole is veined and replaced with quartz containing euhedral crystals of clinopyroxene. The hangingwall of the fault is limestone. The limestone breccia contains an appreciable amount of pyrrhotite; the fault zone carries chalcopyrite, sphalerite, minor galena, and locally prominent biotite.

No. 2 showing is a banded fracture zone striking north 85 degrees east and dipping 80 degrees northward. The rock is a dark-green basalt breccia. The fragments are large, are composed of fibrous hornblende, epidote, and albite, and are cut by fractures lined with fibrous brown hornblende and filled with calcite and sodic hornblende and pyroxene. The matrix is basalt which is only slightly altered. The mineralization is almost entirely in fractures in the matrix and consists of pyrrhotite and chalcopyrite. A pit about 200 feet northwestward exposes a banding in the breccia which strikes north 40 degrees east and dips 75 degrees northwestward. Breccia and mineralization are found in isolated exposures to elevation 3,300 feet, and if they are on a single structure indicate a possible width of some 500 feet. Company officials state, however, that the results of induced polarization surveys and a small amount of test drilling do not support this possibility.

The occurrence of sulphides at a probable Karmutsen-Quatsino-Bonanza contact zone suggests that the area may have merit for prospectors.

Copper-Molybdenum

Andy, Pak
Noranda Exploration Company, Limited
By A. R. C. James

(49° 124° S.W.) British Columbia office, 1050 Davie Street, Vancouver 5. The property comprises 38 claims in the vicinity of Corrigan Creek, east of Alberni Inlet and 17 miles south-southeast of Port Alberni. Access is by road from Port Alberni. It is reported that copper and molybdenum mineralization occur as disseminations and in quartz veins within a host rock consisting mainly of granodiorite. In 1966 electromagnetic and magnetometer surveys were made over an area of 640 acres on the Andy 5 to 10 and 19 to 24 claims. Soil samples were taken over the same area. Six holes totalling 1,549 feet were diamond drilled, and three-quarters of a mile of road was constructed. An average crew of seven men was employed for five months under the supervision of R. C. Heim.

Molybdenum

SR
Marshall Creek Copper Co. Ltd.
By A. R. C. James

(48° 124° N.W.) Company office, 734 Fort Street, Victoria. James M. McNulty, president. This company has 101 recorded mineral claims, the SR group, in the vicinity of Sarita River, 7½ miles east of Bamfield. Access to the property is by government and logging roads from Cowichan Lake. The showings comprise molybdenite occurring in fractures, shears, and quartz veins in felsite, diorite, monzonite, and feldspar porphyry. A crew of five men was employed on the property for 1½ months under the supervision of I. M. Watson. Twenty-one holes totalling 3,670 feet were diamond drilled.

Gold-Silver-Copper

Oma, Sunny, Fid, Kathy
Peel Resources Limited
By A. R. C. James

(48° 124° N.W.) Company office, 501, 535 Thurlow Street, Vancouver 5. The company holds, by option agreement, more than 100 claims in the vicinity of Sarita River, 7½ miles northeast of Bamfield. The property includes a group of old Crown-granted claims (Black Bear, Eureka, etc.), on which some work was done in the early years of the century, a description of this being given in the 1906 Annual Report on page 189.

It is reported that in 1966 a magnetometer survey was done over an area of 2,000 by 2,400 feet on the Oma 1 to 4 claims. Four trenches were excavated totalling 1,100 feet. A number of test-pits were dug, and 1¼ miles of road was made. Two holes totalling 180 feet were diamond drilled. An average crew of three men was employed for a period of six months under the supervision of W. T. Smith and R. J. Billingsley.

BUTTLE LAKE

Gold-Silver-Copper-Lead-Zinc

Lynx, Paramount, Price
Western Mines Limited
By J. E. Merrett

(49° 125° N.W.) Company office, 802, 850 West Hastings Street, Vancouver 1; mine office, Box 8000, Campbell River. C. M. Campbell, Jr., general manager; J. B. C. Lang, general superintendent. Western Mines Limited, together with its wholly owned subsidiaries Myra Falls Mines Ltd. and Price Creek Mines Ltd., holds a total of 23 Crown-granted mineral claims, two mineral leases, and 158 recorded claims in the Myra Creek area at the south end of Buttle Lake. The mine is reached by 55 miles of road from Campbell River.

Construction, which had begun in 1965, continued in 1966 with the completion of a combined service building and the erection of a 750-tons-per-day crushing plant and concentrator in the mine camp area. A steel penstock having a water head of 2,160 feet and a 4,500-horsepower electrical generating plant were constructed on Tennent Lake, 1 mile west of the camp. At Painter's Spit in Campbell River the Argonaut mine dock was reconstructed and an ancillary concentrate-storage building with ship-loading facilities was nearly completed. The Myra Creek and Buttle Lake roads were linked with the construction of 25 miles of road along the east shore of the lake.

Immediately east of No. 10 level adit a large area has been stripped by the removal of 280,000 cubic yards of overburden and waste rock to establish an open pit for surface mining. The waste removed was used for road and tailings-pond fill. During an eight-month operational period, underground development mining included the driving of 3,210 feet of drifts and crosscuts, 1,009 feet of subdrifts, and 1,457 feet of raises. In addition, 38,845 feet of diamond drilling was completed in 169 holes.

The crushing plant and concentrator began intermittent operation in December while various phases of milling were being co-ordinated.

A total of 246 men was employed, of whom 55 worked underground.

VICTORIA MINING DIVISION

NITINAT LAKE

Silver-Copper-Zinc

Mal and S
Marshall Creek Copper Co. Ltd.
By J. E. Merrett

(48° 124° N.W.) Company office, 734 Fort Street, Victoria. James M. McNulty, president. The company owns the Mal and S groups of 23 recorded mineral claims on Marchand Creek, which flows westward into Nitinat Lake, 5½ miles from the head of the lake. Access is by logging-roads, either from Port Alberni or from Lake Cowichan, to the head of Nitinat Lake and thence by boat to the property.

The mineral showings, about 1,000 feet from the lake, are bands or lenses of chalcopyrite, sphalerite, and pyrite in a shear zone in altered granitic rock cut by andesite dykes and quartz monzonite.

Two men employed for four months did extensive stripping and drilled twelve 6-foot holes to obtain sludge for sampling.

CHEMAINUS RIVER

Copper-Lead-Zinc

Yam
Cominco Ltd.
By J. E. Merrett

(48° 124° N.E.) Cominco Ltd. owns the Yam group of 41 recorded mineral claims south of Coronation Mountain in the headwaters of Chipman (Boulder) Creek, a south-flowing tributary of the Chemainus River. Access to the property from Duncan is by way of 25 miles of public roads and logging-roads. As the claims lie within the Esquimalt and Nanaimo Railway land grant block, an option agreement for the base-metal rights was obtained from the Canadian Pacific Oil and Gas Limited. A geological map and an induced polarization survey were made of an area 6,000 by 10,000 feet underlain by rocks of the Sicker Group, but no mineral occurrences of significance were found. Work was supervised by A. De Voogd.

[Reference: Assessment Report No. 935.]

COWICHAN LAKE

Copper

Alpha, Beta, Taboga
Albeta Mines Ltd.
By J. E. Merrett

(48° 124° N.E.) Company office, 170 Craig Street, Duncan. This company owns 3 Crown-granted and 18 recorded mineral claims in the vicinity of the confluence of Long Creek and Robertson River. The mineralization is chalcopyrite and magnetite, with minor amounts of silver and gold occurring in bodies in a skarn zone in volcanic rocks adjacent to a massive granite intrusive. A crew of three men employed for a period of three months made a magnetometer survey of 78 acres of the claims, took soil samples for geochemical analysis, constructed half a mile of access road, and diamond drilled 777 feet in six holes. G. E. Apps was in charge of the work.

Copper

JORDAN RIVER

Sunloch and Gabbro
Cowichan Copper Co. Ltd.
By J. E. Merrett

(48° 124° S.E.) Company office, 620 Howe Street, Vancouver 1; mine office, River Jordan. O. G. MacDonald, president. This property is on the Jordan River about 1 mile upstream from its mouth and is connected by road to the Victoria highway about one-half mile east of the River Jordan Post Office. Cowichan Copper Co. Ltd. has an operating lease from Sunro Mines Limited (controlled by Cominco Ltd.) to mine on 18 contiguous claims, within which are the Cave, Central, and River ore zones. Aetna Investment Corporation Limited, which had a management agreement with the company, on September 16th suspended operations at the mine, and Cowichan Copper Co. Ltd. assumed the necessary maintenance responsibilities for the balance of the year.

During the operating period a considerable amount of development work was completed in the " D " ore zone and in the shaft area or lower " B " ore zone. Stope-development work was started in the " D " orebody on the 5100 level, and a raise driven to the surface to intersect the Cave zone adit. In the lower " B " an ore transfer raise was driven from the shaft crushing-station to intersect 5100 level south of the main crushing plant. Development drifting and crosscutting totalled 1,587 feet and raising 1,592 feet. Underground diamond drilling totalled 6,947 feet. Most of the ore that was mined and milled was obtained from the " C " ore zone.

While in production, a crew of 127 men was employed, of whom 57 were mining and 30 were in the underground mill. Since mid-September, 10 men have been employed underground and 2 on the surface.

Copper-Lead-Zinc

MOUNT BRENTON

Tot, Rum
Cominco Ltd.
By J. E. Merrett

(48° 123° N.W.) Cominco Ltd. owns the Tot and Rum groups of 29 recorded mineral claims south of Mount Brenton and west of the Chemainus River between Silver Creek and Holyoak Creek. Access to the property from Duncan is by way of 20 miles of public roads and logging-roads. As the claims lie within the Esquimalt and Nanaimo Railway land grant block, an option agreement for the base-metal rights was obtained from the Canadian Pacific Oil and Gas Limited. A geological map and an induced polarization survey were made of the claim group, which is underlain by rocks of the Sicker Group intruded by Franklin Creek intrusions.

[Reference: Assessment Report No. 936.]

OMINECA MINING DIVISION

Copper

ZYMOETZ RIVER

Zym, Zymoetz
Native Explorations Limited
By H. Bapty

(54° 128° S.E.) Company office, 807, 900 West Hastings Street, Vancouver 1. C. Shipclark, president; H. W. Agnew, geologist. The company holds 154 mineral claims, which include the Zymoetz group of 58 claims and Zym 1 to 9 held by option, and the balance are held by record. The claims are on the south side of Zymoetz River 15 to 19 miles from the confluence of Zymoetz and Skeena Rivers.

The showings consist of chalcopyrite, chalcocite, and bornite in volcanic tuffs and breccias which overlie quartz-feldspar porphyry. An average of 10 men, under the supervision of T. D. Wilkinson, worked from mid-May until the end of October. Work completed consisted of an induced polarization survey over 7.3 miles of line, 20.5 miles of geochemical survey, 13 diamond-drill holes totalling 2,947 feet, 1.5 miles of access road and trails, 1,650 feet of trenching, about 1 square mile of detailed geological mapping, and reconnaissance mapping and prospecting of most of the claims.

The main camp, on Zymoetz River 17 miles upstream from Highway No. 16, was serviced by excellent gravel road, owned and maintained by Columbia Cellulose Company Ltd. Much of the reconnaissance elsewhere in the area was completed from fly camps moved into the areas by Terrace-based helicopter.

LEGATE CREEK

Copper-Lead-Silver

Hub, FM
Hub Mining & Exploration Ltd.
By H. Bapty

(54° 128° N.E.) Company office, 85 Commercial Street, Nanaimo. B. C. Clements, president. The 26 Hub and FM claims, covering ground originally known as the M & M and M & K groups, are at the head of Legate Creek.

In May, 1966, they were optioned to Sileurian Chieftain Mining Company Limited. A small crew, under the direction of A. P. Fawley, consulting geologist, cut line and made a geophysical (electromagnetic) survey during June and July. At one time a good packhorse trail ran up Legate Creek, but transportation to the property is now by Terrace-based helicopter. The property was not visited.

[Reference: *Minister of Mines, B.C.*, Ann. Rept., 1928, pp. 148–149.]

Copper

Grizzley, Glen, Snowshoe, Sno, Etc.
Glen Copper Mines Limited
By H. Bapty

(54° 128° N.E.) Company office, 1307, 1030 West Georgia Street, Vancouver 5. D. Parent, general manager; E. W. Johnson, geologist. This group of 366 recorded mineral claims is 30 miles east of Terrace between 4,500 and 6,000 feet elevation. For an eight-month period 7 company employees and 11 contractors worked on the property. Geological mapping was done on 18 claims in the Legate Creek area. Twenty-two AX diamond-drill holes totalling 7,955 feet were drilled. Sixty-three trenches, having a total length of 5,300 feet, were excavated by bulldozer and by hand, 35,000 square feet of bedrock was stripped, and 7 miles of four-wheel-drive truck-road was built. The property is reached by helicopter or by the Columbia Cellulose Copper River logging-road and thence along the road to the B.C. Telephone Copper River microwave station.

[Reference: *Minister of Mines, B.C.*, Ann. Rept., 1930, p. 136.]

FIDDLER CREEK

Molybdenum

Lynda, Sno
Amax Exploration, Inc.
By H. Bapty

(54° 128° N.E.) British Columbia office, 601, 535 Thurlow Street, Vancouver 5. R. A. Barker, manager; P. W. Richardson, geologist. The Lynda and Sno groups of 16 recorded mineral claims are on the west side of Fiddler Creek 20 miles northeast of Terrace, between 3,200 and 4,000 feet elevation. Two geologists, P. Kennedy and J. N. Schindler, with two assistants, spent three weeks on the claims mapping the geology and taking soil, silt, and rock samples in an area 5,000 by 6,000 feet. Transportation was by Terrace-based helicopter. The property was not visited.

[References: Assessment Reports Nos. 843 and 866.]

HAZELTON

Silver-Lead-Zinc

Bill, PB
Frontier Exploration Limited
By H. Bapty

(55° 127° S.W.) Company office, 642 Clark Drive, Vancouver 6. Ivan Todd, president. The 16 Bill and PB recorded claims and two mineral leases M 54 and M 57 lie on Nine Mile Mountain at 4,000 feet elevation in the Silver Cup Basin approximately 13 miles northeast of Hazelton. The claims surround the old Silver Cup Crown grant, and cover showings formerly known as the Barker Bill.

From early July until the end of August four men completed 1,000 feet of road and extended the known length of the Tunnel vein from 230 to 370 feet by 500 feet of trenching. The Tunnel vein lies at 4,100 feet elevation and averages 2.8 feet wide. Other veins are known on the property, and a large amount of mineralized float material exists in the talus slopes extending down the cirque. Transportation to the property is by four-wheel-drive truck from Hazelton. The property was not visited.

[Reference: *Geol. Surv., Canada,* Mem. 223, pp. 29, 64.]

SKEENA MOUNTAINS

Atna Range

Molybdenum

Fog, Frost
Amax Exploration, Inc.
By H. Bapty

(55° 127° N.E.) British Columbia office, 601, 535 Thurlow Street, Vancouver 5. R. A. Barker, manager; P. W. Richardson, geologist. The Fog and Frost claims cover showings formerly known as the Ole group. They comprise 20 recorded mineral claims lying at an elevation of 6,500 feet at the head of Goathead Creek on Kisgegas Peak, 36 miles north of Hazelton. Nine men under the supervision of R. H. MacMillan, geologist, drilled and blasted two trenches, having a total length of 138 feet, on the Fog No. 3 mineral claim. The geology of an area 2,400 by 4,800 feet was mapped, and one diamond-drill hole was drilled to a depth of 1,486 feet. Transportation was by helicopter from the Kisgegas camp, 8 miles from the claims. The property was not visited.

Sicintine Range

Copper

Motase A
Kennco Explorations, (Western) Limited
By W. G. Clarke

(56° 127° S.E.) Office, 730, 505 Burrard Street, Vancouver 1. P. T. Black, project manager. The Motase A group of 70 claims, owned by the company, is 16 miles northwest of Motase Lake. It is accessible by air from Smithers, 100 miles away. It is reported that pyrite and chalcopyrite are disseminated in porphyry and felsite. In 1966 six men spent a month on the property; two AXT holes totalling 182 feet were diamond drilled. The property was not visited.

Copper-Molybdenum

Motase B
Kennco Explorations, (Western) Limited
By W. G. Clarke

(56° 126° S.W.) Office, 730, 505 Burrard Street, Vancouver 1. P. T. Black, project manager. The Motase B group of 54 claims, owned by the company, is 3 miles east of Motase Lake. It is accessible by air from Smithers, 87 miles away. It is reported that pyrite, chalcopyrite, molybdenite, sphalerite, and galena occur in fractures and disseminated in diorite porphyry. The property was first explored by W. P. Hammond in 1951.

In 1966 eight men were employed for six weeks under the supervision of P. T. Black. Four holes totalling 474 feet were diamond drilled. The property was not visited.

Copper

CARIBOO HEART RANGE

Fred, Etc.
Northstar Copper Mines Ltd.
By W. G. Clarke

(56° 126° S.E.) Company office, 325, 1155 West Georgia Street, Vancouver 5; field office, Box 937, Smithers. Robert M. Tait, president. This group of 92 claims, comprising the Fred, Bobo, Marg, Kiwi, Maori, etc., is on Ominicetla Creek in the Cariboo Heart Range at an elevation of 5,200 feet. Access is by air from Smithers, a distance of 100 miles. In 1966 geological surveys were made, and some trenching, stripping, and test-pitting were done on the Fred group. The work was under the supervision of R. M. Tait. The property was not visited.

[Reference: Assessment Report No. 833.]

Copper-Molybdenum-Silver-Gold

MCCONNELL RANGE

Marmot
New Wellington Mines Limited
By W. G. Clarke

(56° 126° N.W.) Head office, 607, 1405 Douglas Street, Victoria. W. D. Savage, field manager. This property, consisting of 101 claims owned by the company, is on Menard Creek near the headwaters of the Ingenika River. It may be reached by flying from Fort St. James to Thorne Lake, a distance of approximately 200 miles, from there a " Cat " road leads to the camp, which is approximately 10 miles southeast of the lake.

A geological map of the entire group was made, and an induced polarization survey was made on five claims. Eleven trenches (total length, 2,500 feet) were made by bulldozer, and about 10 acres of bedrock was stripped. Access roads were built and temporary buildings erected. Four men spent six months on the property, working under the direction of W. D. Savage. The property was not visited.

Silver-Lead-Zinc

SMITHERS

Cronin
New Cronin Babine Mines Limited
By W. G. Clarke

(54° 126° N.W.) Company office, 610, 890 West Pender Street, Vancouver 1. L. C. Creery, president; Hill, Manning & Associates Ltd., consulting engineers. The property consists of the Sunrise No. 7 Crown-granted mineral claim and seven claims held under option, on the east slope of Mount Cronin, about 30 miles from Smithers by road.

Kindrat Mines Ltd. is controlled by Paul Kindrat, Box 1057, Smithers, and was formed in 1966, primarily to operate the Cronin mine, on which it has a lease running for 1966, 1967, and 1968.

During 1966 a crew of two to three men worked from June to November, during which time 147 feet of raising and 30 feet of drifting were done, and 1,000 tons of ore was mined and milled. Production was 137 tons of zinc concentrate and 91 tons of lead concentrate, containing 7 ounces of gold, 10,045 ounces of silver, 110,926 pounds of lead, 177,243 pounds of zinc, and 2,293 pounds of cadmium. P. Kindrat was in charge of the work.

Lead-Zinc-Silver

Silver Queen, New Strike, Extension
Native Mines Limited
By W. G. Clarke

(54° 126° N.W.) Head office, 15, 558 Howe Street, Vancouver 1; field office, c/o Box 986, Smithers. This group of 18 claims is at the head of Higgins Creek, 34 miles by road from Smithers. The access road goes up Higgins Creek from the Cronin mine road. The property was formerly known as the Lorraine. Quartz veins in argillite are mineralized with galena, sphalerite, and tetrahedrite. In 1966 nine men spent 10 months working on the property under C. Amyotte, mine foreman. Detailed geological mapping in the vicinity of the showings was done, the main adit was driven 800 feet, and 15 holes totalling 1,760 feet were diamond drilled.

Copper-Molybdenum

Big Onion
Texas Gulf Sulphur Company
By A. Sutherland Brown

(54° 126° N.W.) This property, locally called the Big Onion, is on Astlais Mountain, 12 miles east of Smithers. The property consists of 99 claims of the Astlais, Ast, and several other groups, either held by or under option to Texas Gulf Sulphur Company (company office, 420, 1033 Davie Street, Vancouver 5; J. R. Louden, manager; A. L'Orsa, geologist on the property).

This property has been known also as Cimbria, and much of the original prospecting was done by Axel Elmstead and Ben Muller. Two adits were driven in the early 1920's. Recent work started in 1963–64, when Noranda Exploration Company, Limited, ran geochemical and some electromagnetic surveys, and then did some stripping and drilled two short diamond-drill holes. In 1966 work performed by Texas Gulf Sulphur Company included over 3,000 feet of bulldozer stripping, detailed geological, geochemical, and induced polarization surveys, and 1,241 feet of BQ-WL diamond drilling in three holes.

Geology

The Big Onion property is underlain principally by Hazelton volcanic rocks that are intruded by an elongated complex pluton (*see* Fig. 9). The Hazelton Group here is mapped as the lowest volcanic division and is overlain on the property by part of the lower sedimentary division. The volcanic rocks, which are the site of the intrusion of the pluton, consist of green and maroon andesites. The green andesites are microporphyritic rocks, now composed of fine sericitized plagioclase in a matrix of chlorite and minor fine epidote. Some are clearly fragmental rocks; others may be massive flow rocks. The maroon andesites are all fine-grained tuffs in which the original glassy and lithic fragments are highly stained by very finely disseminated iron oxides. Reliable bedding attitudes are rare, but in the volcanic rocks areal distribution indicates they form a northeasterly trending anticline into the core of which the pluton is intruded.

The Big Onion pluton is formed of two phases—an early quartz feldspar porphyry and a later quartz diorite porphyry. In general the quartz feldspar porphyry forms a sheath around the quartz diorite. Dykes of quartz feldspar porphyry are common in the andesites near the margin of the pluton, and a few dykes of quartz diorite extend into the quartz feldspar porphyry, although only one is shown on the geological map, Figure 9.

The quartz feldspar porphyry is a white aphanitic rock with a few scattered quartz bipyramidal crystals 1 to 4 millimetres in diameter. Feldspar phenocrysts are rarely recognized in hand specimens and are seen microscopically to be highly sericitized. Most of the feldspars were plagioclase, but some appear to have been potash feldspar. In addition, a few biotite phenocrysts occur now entirely converted to muscovite plus opaque minerals. Feldspar phenocrysts form 5 to 10 per cent of the rock; quartz, 3 to 5 per cent; and muscovite, less than 1 per cent. Pyrite may form up to 3 per cent of the rock. Matrix is formed of sugary textured quartz and feldspar sheathed in muscovite. Average matrix grain size is 0.015 to 0.02 millimetre. Commonly natural exposures are coated with jarosite or limonite.

The quartz diorite porphyry is superficially a medium-grained grey rock with plagioclase and mafic phenocrysts 3 to 7 millimetres in diameter forming 50 to 65 per cent of the rock. Plagioclase, about An_{35}, occurs in chunky crystals in which complex twinning is common. Alteration to sericite and kaolinite commonly is fairly intense. Mafic phenocrysts are now entirely chlorite, sphene, and opaque minerals derived mostly from original hornblende and with minor biotite. The matrix is a sugary mosaic of plagioclase, quartz, chlorite, and opaque minerals about 0.1 millimetre in average diameter. In aggregate, feldspar forms 55 to 64 per cent of the rock; chlorite, 23 to 25 per cent; quartz, 10 to 15 per cent; and opaque minerals, sphene, and calcite total 3 to 5 per cent. Very commonly the quartz diorite porphyry is so highly altered that it is only recognized with difficulty. On the basis of the petrography it is unlikely that the quartz diorite porphyry is just a coarser phase of the quartz feldspar porphyry.

In addition to the main plutonic rocks, there is a wide post-mineralization quartz monzonite dyke and several varieties of small late hornblende andesite dykes. The quartz monzonite is a distinctive dark-grey medium-grained rock with prominent biotite plates. It is formed of about 33 per cent plagioclase, 25 per cent orthoclase, 10 per cent feldspar, 5 per cent micrographic granite, 20 per cent biotite, 6 per cent opaques, pyrite, and magnetite, and 1 per cent hornblende. The plagioclase is simply zoned andesine and is fairly well sericitized with minor alteration to clinozoisite. Much of the plagioclase is mantled by orthoclase. The mafic minerals are partly converted to chlorite and epidote.

Structure of the pluton is obscured partly by alteration and partly by insufficient exposure. Primary foliations are observable in the quartz diorite porphyry, where it is least altered. The margins of both bodies are cut by small shears subparallel to the contacts, and some evidence of primary foliation parallel to the contacts exists. In addition, volcanic rocks have a secondary foliation parallel to the contact that decreases rapidly with distance from the contact. Many small faults exist. The most continuous one follows the northwest margin of the western quartz diorite body. Another important fault follows the southeastern contact of the eastern quartz diorite body.

Mineralization

Copper and molybdenum mineralization is widely distributed in minor amounts in the Big Onion pluton, particularly near the contacts of the two phases and of the peripheral volcanic rocks. Ore minerals present include chalcopyrite, molybdenite, and minor bornite. Pyrite is ubiquitous but most abundant in volcanic rocks near the contact. The mineralization is contained largely in a stockwork of fine quartz-filled fractures but is also disseminated. In general, the best copper mineralization occurs in the quartz diorite near the quartz feldspar porphyry contact. It also occurs selectively along the quartz feldspar porphyry-andesite contact. Molybdenite occurs chiefly in stockworks in the quartz feldspar porphyry near the quartz diorite contact. No significant orebodies have yet been discovered.

Mercury Geochemistry

Three profiles were run by the writer along lines cut across the pluton and a fourth along the Babine Lake road. These all show background readings (0.01 to 0.04 p.p.m.) in the centre of the pluton and where traverses were carried well beyond the margins; peaks (0.05 to 0.12 p.p.m.) centre on the contact areas (*see* Fig. 10).

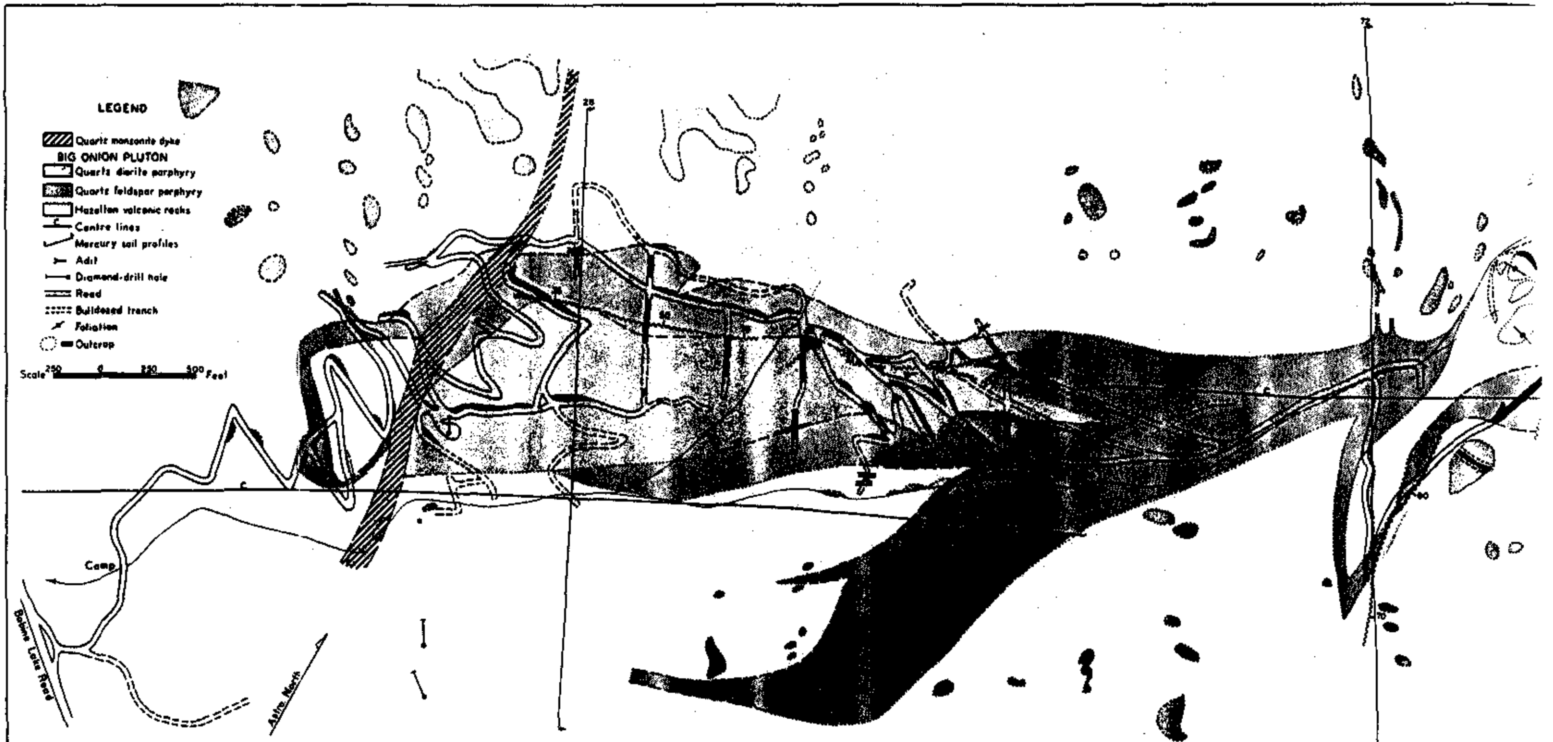


Figure 9
GEOLOGY OF THE BIG ONION

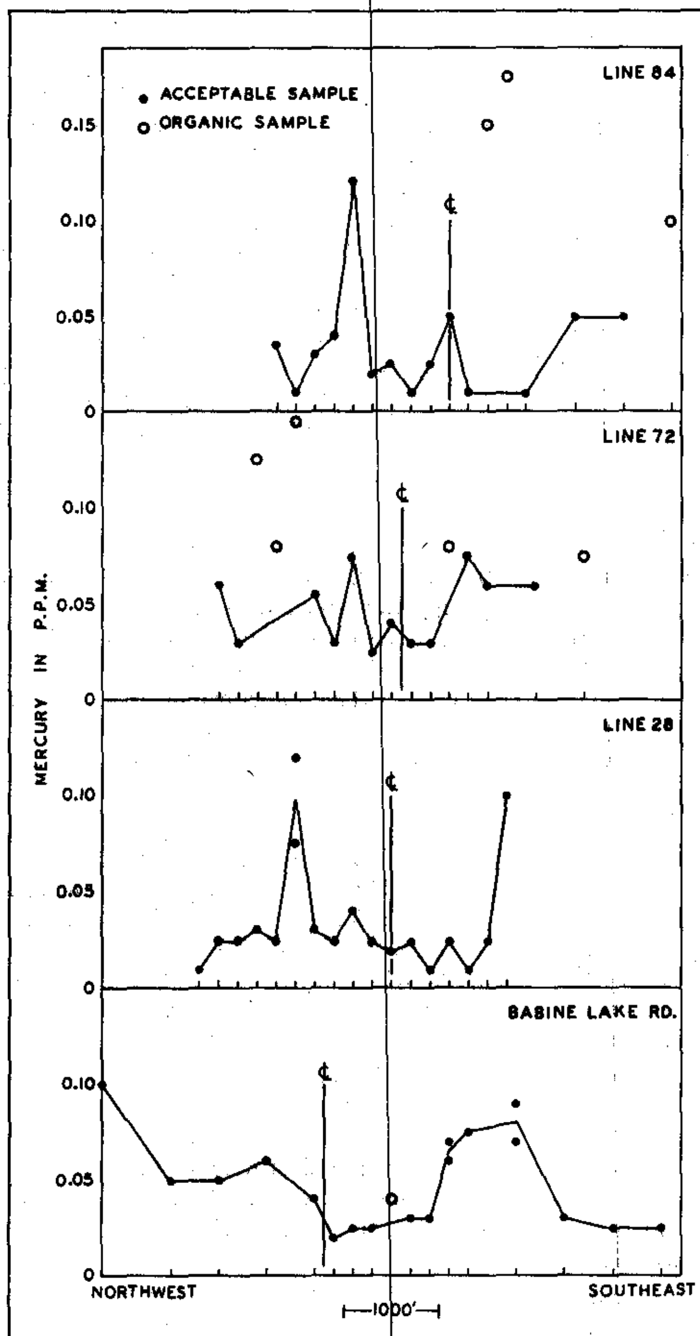


Figure 10. Texas Gulf Sulphur Company. Mercury in soils at the Big Onion.

[References: *Minister of Mines, B.C.*, Ann. Repts., 1927, p. 138; 1964, p. 52; *Geol. Surv., Canada*, Sum. Rept., Pt. A, 1924, p. 33; Assessment Report No. 830.]

Silver-Lead-Zinc

Silver Creek, Silver Lake, Trade Dollar, Iron Vault (54° 127° N.E.) Company
Hudson Bay Mountain Silver Mines Ltd. office, 602 West Hastings
By R. V. Kirkham Street, Vancouver 2. The property consists of 20 claims, comprising the Silver Creek, Silver Lake, Trade Dollar, Iron Vault, and Cee, between 5,000 and 7,000 feet elevation on the northwest shoulder of Hudson Bay Mountain. It is 14 miles from Smithers and is reached by the Toboggan Creek road. A crew of nine men worked from June through October under the direction of H. B. Gilleland, manager.

In 1966 the company continued to explore the same two groups of showings that had been worked in 1965. These consist of an upper group of small but high-grade silver-lead-zinc veins and a lower group of both high- and low-grade replacement bodies in limestone lenses. The two groups of showings are about half a mile apart.

On the upper showings two prospect shafts totalling 91 feet were sunk on high-grade shoots in the silver-lead-zinc veins. A sublevel was driven 97 feet from the bottom of one of the shafts. It is reported that the veins exposed in these shafts are offset by numerous small faults. At the time of the writer's visit in early September, the shafts were almost completely filled with ice.

Underground exploration continued on the lower showings. The 5375 level was extended 238 feet, and seven EX diamond-drill holes totalling 712 feet were drilled from the 5375 and 5150 levels. This underground work was done mainly to test the continuity of a replacement pod of silver-lead-zinc ore that is exposed at an elevation of 5,620 feet on surface and in a winze on the 5525 level.

Molybdenum

Glacier Gulch (54° 127° N.E.) Vancouver office, 535
Climax Molybdenum (B.C.) Ltd. Thurlow Street; field office, Box 696,
By R. V. Kirkham Smithers. J. K. Sturgess, vice-president. The company holds a total of 393 recorded claims and fractions and 14 Crown-granted claims centred on Glacier Gulch on the east side of Hudson Bay Mountain. The 14 Crown-granted claims and 30 recorded claims are held under lease and option from W. Yorke-Hardy and partners, of Smithers.

In 1966 the company continued to explore this large molybdenum deposit. An adit was collared at an elevation of 3,500 feet on the east slope of Hudson Bay Mountain south of Glacier Gulch and driven south 66 degrees west for 6,000 feet. Since 1958 a total of 79,000 feet of diamond drilling in 41 holes has been completed from surface. The company plans to extend the adit and to do additional drilling from underground. The adit, some of the drill-holes, and the geology are shown on Figure 11.

During the summers of 1963, 1964, and 1965 the writer studied the geology and mineral deposits in the Hudson Bay Range. The work is continuing, and the following is a brief summary of the results to date.

The Hudson Bay Range is an isolated group of mountains about 200 square miles in extent which has Hudson Bay Mountain as its dominant feature. It is immediately west of the Bulkley River at Smithers and lies about 40 miles east of

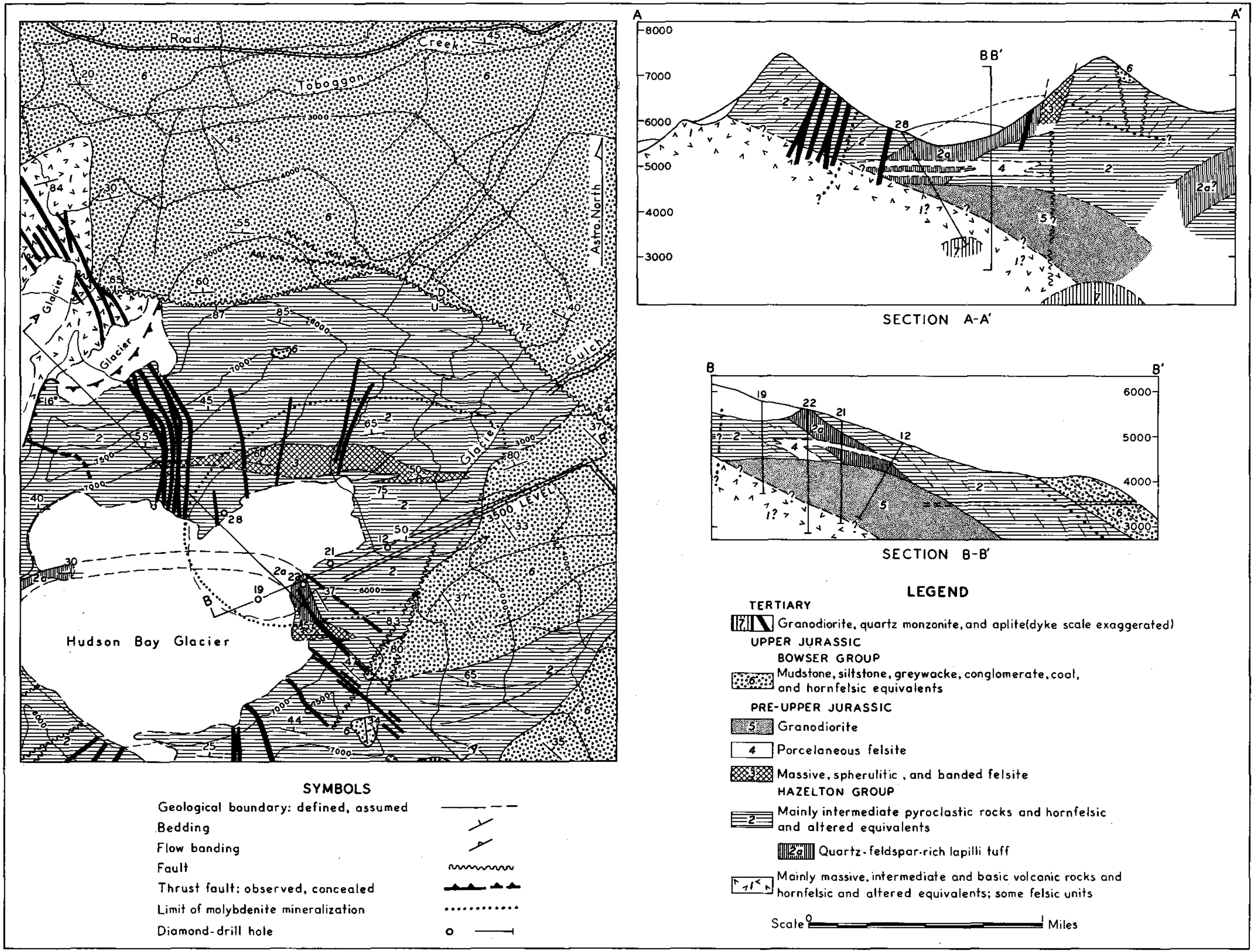
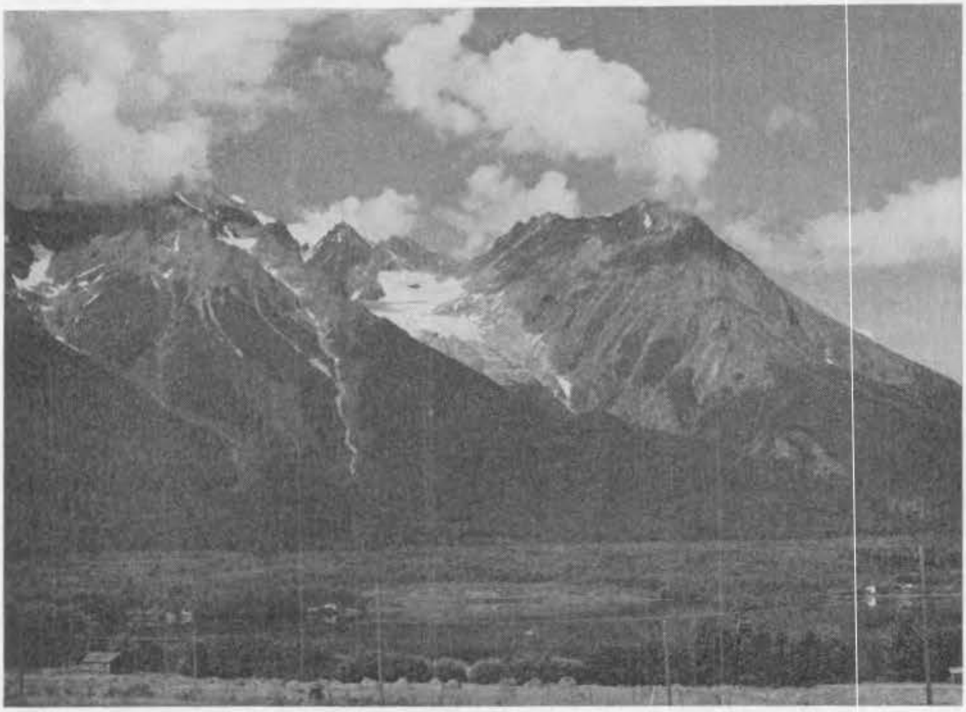


Figure 11. GEOLOGY IN THE VICINITY OF GLACIER GULCH, HUDSON BAY MOUNTAIN



View across Lake Kathlyn to Glacier Gulch on the east side of Hudson Bay Mountain.

Unfrozen " bubble " channel extending eastward across Babine Lake
to Granisle mine.

the Coast Mountains. The 50 to 60 known mineral deposits occur in the eastern half of the range.

The range is underlain mainly by volcanic and sedimentary strata of the Hazelton Group and sedimentary strata of the Bowser Group. Most of these rocks are probably Jurassic; however, the relative ages of many of the volcanic sequences within the Hazelton Group have not been established accurately. A few small bodies of granodiorite and quartz monzonite are exposed in the northern and western parts of the range, and numerous porphyry dykes and some small plugs and stocks occur near the molybdenum deposit in Glacier Gulch. Greenstone, diabase, and diorite dykes and felsitic intrusions are abundant in most volcanic sequences.

Structural geology of the range is complex. Most of the major structural features are the result of doming and faulting with minor associated folding. Thrust faulting appears to have been of major tectonic importance, although individual thrust faults are difficult to define. The lack of internal features in some volcanic units, absence of good marker horizons, scarcity of fossils in the volcanic units, and presence of numerous alteration zones make a clear understanding of the regional structures difficult.

The main ore minerals of the district are pyrite, pyrrhotite, arsenopyrite, chalcopyrite, sphalerite, galena, magnetite, molybdenite, scheelite-powellite, tetrahedrite, and ruby silver minerals. Most of the known mineral deposits are relatively small, complex sulphide-sulphosalt veins rich in zinc and lead. These deposits are open-space fillings and replacement bodies within sheeted and brecciated fracture zones and are crudely arranged in zones surrounding a centrally located molybdenum deposit. An inner zone of molydenum-copper-tungsten mineralization is surrounded successively by a barren quartz zone, a zone of zinc-gold-copper-arsenic mineralization, and a zone of lead-silver-copper-arsenic mineralization. The mineral deposits appear to be genetically related, but their zonal arrangement is complicated by the fact that there were several stages of mineralization which in some areas resulted in outer zone mineralization being superimposed on inner zone mineralization.

On surface the molybdenum mineralization occurs over an area of about 1 by 1½ miles in Glacier Gulch, on the eastern side of Hudson Bay Mountain, and in places it is known to extend to depths greater than 3,000 feet. Most of this area is underlain by a bedded pyroclastic sequence of highly altered and metamorphosed Hazelton volcanic rocks of intermediate composition. Aphanitic felsitic intrusions, probably related to volcanism, cut this pyroclastic sequence. A small part of the mineralized area is underlain by Upper Jurassic clastic sediments of the Bowser Group that unconformably overlie the volcanic strata.

A concealed discordant and differentiated granodiorite sheet up to 1,700 feet thick is present at depth beneath most of the mineralized area. Some parts of this sheet have aplitic, porphyritic, and granophyric textures, and other parts have a fine-grained granitic texture. Most of the sheet is highly altered, and the original mafic minerals have been destroyed. Numerous basic dykes and irregular bodies have intruded both the granodiorite sheet and the volcanic rocks but do not cut the Bowser sediments; hence it is believed that the granodiorite is pre-Upper Jurassic.

Three porphyry bodies and numerous small quartz-feldspar porphyry and aplite dykes, tentatively dated as early Tertiary, occur in the Glacier Gulch area. Two concealed bodies are thought to be small stocks, and a partly exposed body may be a small plug. The dykes, which have a modified radial pattern, both cut and are cut by molybdenite-bearing quartz veinlets, hence have been designated intra-mineral dykes.

One of the concealed stocks is porphyritic granodiorite which probably has a sub-outcrop under the glacier. Biotite from this stock has been dated as 67 ± 5 million years (Paleocene) by the Geological Survey of Canada. At present there is no evidence to suggest that this stock is directly related to the mineralization.

The second concealed stock is quartz monzonite porphyry which underlies the ridge south of the toe of the Hudson Bay Mountain glacier. The top of the stock occurs about 3,000 to 3,500 feet below the crest of the ridge. The upper contact of this stock is marked by a quartz latite chilled zone containing unusual fine "wormy" quartz veinlets, by an intensely silicified zone which extends into the overlying volcanic rocks and the granodiorite sheet, and by a number of intra-mineral quartz porphyry dykes. It is believed that this quartz-monzonite porphyry stock is the source of the first stage of molybdenum mineralization.

The third body is granodiorite porphyry and is partly exposed in a crevasse near the toe of the glacier. Its shape and dimensions are unknown, but it may be a small plug. Apparently it post-dates the surface molybdenite mineralization but is cut by numerous veinlets containing chalcopyrite.

The structural history of the mineralized area remains uncertain. The granodiorite sheet was probably intruded along a thrust plate. Subsequently the volcanic rocks above the granodiorite sheet were partly eroded and the continental and marine strata of the Bowser Group were deposited on them. Then, probably sometime in the lower Tertiary, a number of small porphyry intrusions were emplaced in the Glacier Gulch area. There appears to have been some faulting, and the attitudes of the Bowser sediments show that there was broad gentle doming associated with the intrusive activity. It is difficult to evaluate the importance of doming in the structural evolution of the area because the volcanic units were inclined prior to the doming.

Hydrothermal alteration and bleaching are common both inside and outside the area of molybdenum mineralization. Although no specific type of alteration can be directly related to molybdenum deposition as a whole, there is quartz, sericite, carbonate, and minor potash feldspar alteration that seems vaguely associated with areas of more intense mineralization. Quartz, sericite (and muscovite), carbonate, potash feldspar, biotite, chlorite, hornblende, epidote, garnet, magnetite, and pyrite are widespread alteration minerals. In the vicinity of the molybdenum deposit, most of the hydrothermal alteration is superimposed on an area of thermal metamorphism.

Bleaching, a removal of mafic constituents (pigment material) without significant alteration of the remaining minerals, is extensive in the area. Many veinlets in the deposit have bleached halos (borders), some have alteration halos, and others have none.

Molybdenite, the main ore mineral, occurs almost entirely in a stockwork of quartz veinlets. Most of the veinlets are less than one-half inch wide; they average between one thirty-second and one-quarter inch. The largest veins are 2 feet wide, but these are very rare. The mineralogy, texture, structure, and chronology of the veins are very complex. Minerals found in the veins are quartz, magnetite, pyrite, molybdenite, hornblende, biotite, chlorite, potash feldspar, muscovite, calcite, pyrrotite, chalcopyrite, scheelite-powellite, gypsum, sphene, stilbite, bismuthinite, tennantite, arsenopyrite, and native arsenic. Sphalerite and galena have been found in the deposit, but they occur in quartz-carbonate veins that cut the stockwork of the quartz veinlets.

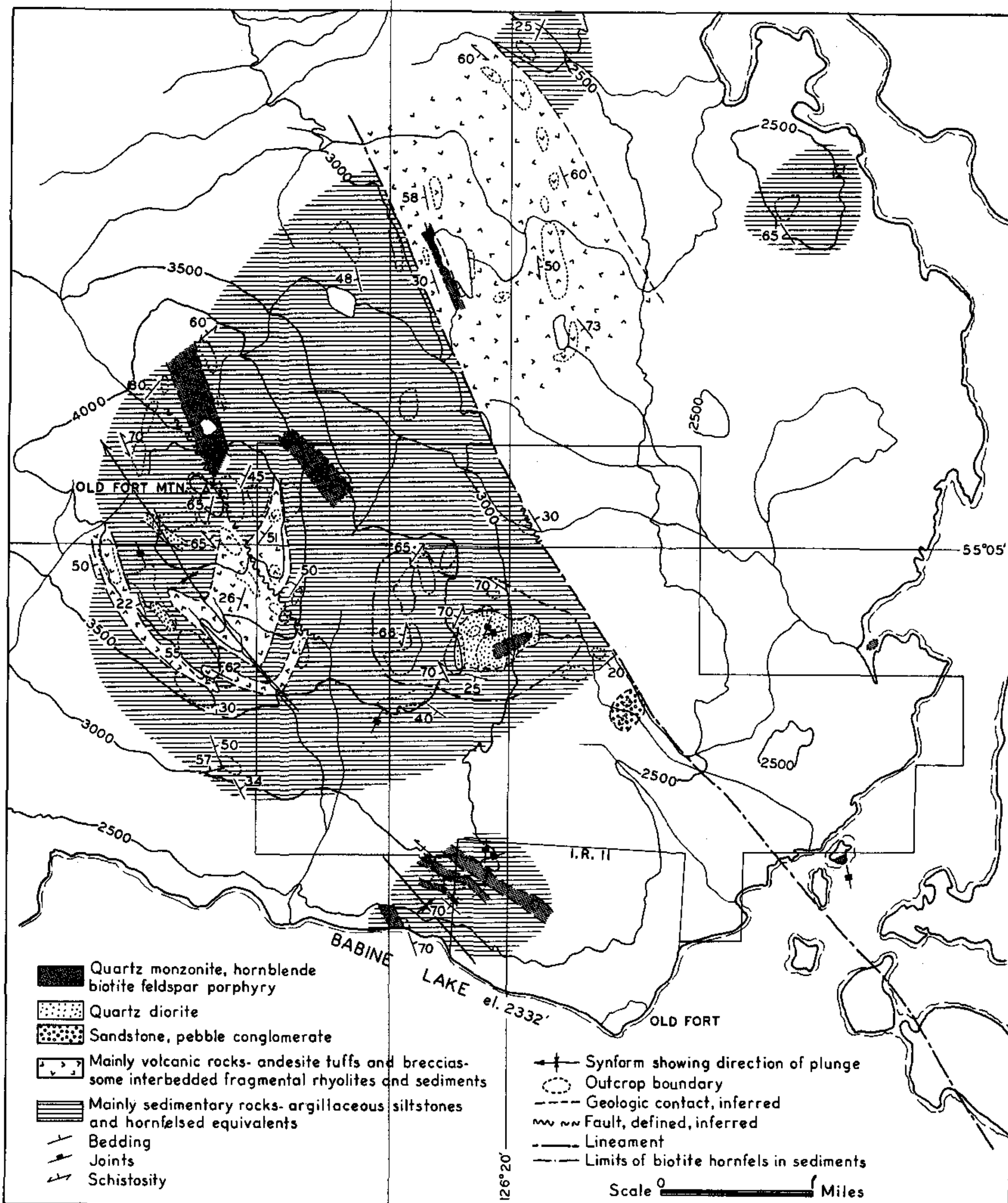


Figure 12. OLD FORT MOUNTAIN AREA

It is reasonably well established that there were at least two main periods of molybdenum mineralization. Veinlets belonging to these periods have been designated Type I and Type II (*see* the following table), but it has been found that contradictory age relationships between vein sets exist, that many veinlets are difficult to classify as either Type I or Type II, and that molybdenite-bearing veinlets, some of which are similar to Type I, cut veinlets of Type II. The first stage of molybdenum mineralization was preceded by the emplacement of a stockwork of barren quartz veinlets. These veinlets are concentrated in the contact region of the quartz monzonite stock, where they coalesced to form a rock that ranges from 80 to 99 per cent silica. Molybdenite veinlets of Type I seem to radiate outward from this region. The "wormy" quartz veinlets in the upper chilled contact zone of the stock pre-date the barren quartz veinlets. The molybdenite veinlets of Type II cut the veinlets of Type I and form regular sets that dip moderately and gently to the southwest. They are concentrated in a zone 500 to 1,000 feet above the stock. Their source is unknown. The granodiorite sheet was a particularly favourable host for mineralization. Some of the best-grade mineralization occurs in it where veinlets of Types I and II intersect. However, lower zones composed primarily of veinlets of Type I contain good-grade material.

Features of Molybdenite-bearing Veinlets of Type I and Type II

	Mineralogy	Texture and Structure
Type I (early).	Quartz, molybdenite, magnetite, pyrite, sericite, calcite, chlorite, biotite, hornblende, scheelite-powellite, pyrrhotite, chalcopyrite, sphene.	All minerals fine grained, sugary; many have well-developed banded (ribbon) structure; many sets mainly steeply dipping.
Type II (late).	Quartz, molybdenite, pyrite, pyrrhotite, chalcopyrite, potash feldspar, muscovite, calcite, gypsum, chlorite, biotite, hornblende, scheelite-powellite.	All minerals coarse grained; drusy cavities are common; mainly in sets that dip gently to moderately westerly.

The area of quartz veining is far more extensive than that of molybdenite mineralization. The quartz veins on Hudson Bay Mountain related to molybdenum deposition occur over an area of about 10 to 15 square miles. The attitudes of the veins become more uniform away from the central area. Most of these veins strike approximately north and dip moderately to steeply west.

Intrusive activity was very complex in the Glacier Gulch area; hence it is impossible yet to evaluate accurately the relative importance of each pluton in the formation of the deposit. However, the presence of intra-mineral dykes should be stressed because such dykes prove that there was magmatic activity concomitant with mineralization. It is believed that hydrothermal solutions, derived from one or more of the stocks of the area, followed permeable joints to the positions of ore deposition. These joints probably were formed during cooling following thermal metamorphism or possibly from relaxation of the magmatic forces that caused the doming. The fact that the granodiorite was the most favourable host could have been for chemical or structural reasons or purely fortuitous. It is concluded that the evidence indicates that the molybdenum mineralization of Hudson Bay Mountain was a product of hydrothermal activity associated with the emplacement of porphyritic early Tertiary intrusions.

Silver-Lead-Zinc-Copper

Midnight, Zobnic, Seymour, Canadian Citizen, American Citizen

Buval Mines Ltd.

By R. V. Kirkham

(54° 127° N.E.) Company office, 200, 535 Thurlow Street, Vancouver 5. The company holds a total of 175 claims located immediately west of Smithers on the lower slopes of Hudson Bay Mountain. These claims include the old Snowshoe, Zobnic, Canadian Citizen properties, and part of the Vancouver (*see* Kindle, 1954).

Work in 1966 included geological, geochemical, and geophysical surveys, trenching, road construction, and construction of a heliport. Most of the work was done on the Midnight Nos. 2 and 4 claims and Crown-grant Lots 7171 and 7238. Thirty trenches were drilled and blasted, and 2 miles of road was completed. Most of the work was of a preliminary nature and was intended to provide access to areas of interest and outline exploration targets for future work. The trenching was done in an effort to extend the previously known mineralization on the Zobnic and Midnight claims. The old Snowshoe vein was exposed in some of these trenches for a few hundred feet to the north of the old workings.

The part of Hudson Bay Mountain covered by these claims is underlain mainly by relatively unaltered, massive, purple, red, and grey volcanic rocks of the Hazelton Group. The known mineral deposits of the area are relatively small silver-lead-zinc-arsenic-copper veins that belong to the outer zone of mineralization of Hudson Bay Mountain (*see* p. 88). More veins of this type may occur in some of the covered areas. The copper mineralization on the Canadian Citizen (Lot 7171) and American Citizen (Lot 7238) is of unknown affinities (*see* Ann. Rept., 1963, pp. 25–26).

Two chip samples for assay were taken from the highest-grade material exposed in the trenches on the Snowshoe vein. A massive sulphide vein ranging from 6 to 12 inches wide, exposed in a trench near the old workings, assayed: Gold, 0.21 ounce per ton; silver, 152.7 ounces per ton; lead, 43.94 per cent; zinc, 9.71 per cent; copper, 0.70 per cent. A 9-inch massive sulphide vein exposed in a trench about 300 feet north of the old workings assayed: Gold, 0.11 ounce per ton; silver, 84.3 ounces per ton; lead, 46.30 per cent; zinc, 8.22 per cent; copper, 1.35 per cent. In the trenches between these two areas the vein consists primarily of relatively barren quartz that apparently post-dates much of the sulphide mineralization.

A crew of seven men under the supervision of W. Yorke-Hardy worked on the property for six months. William Sharp was the consulting geological engineer.

[References: Kindle, E. D., *Geol. Surv., Canada,* Mem. 223, 1954; *Minister of Mines, B.C.,* Ann. Rept., 1963, pp. 25–26.]

Molybdenum

Katie A, B, C, and Petra A *Amax Exploration, Inc.* By W. G. Clarke (54° 127° N.W.) Western office, 601, 535 Thurlow Street, Vancouver 5. R. A. Barker, manager. The Serb Creek property of 151 claims, owned by the company, is near the head of Serb Creek, tributary of Zymoetz River, 26 miles south-west of Smithers. It is accessible by helicopter.

In 1966, 14 men worked 3½ months under the direction of H. W. Sellmer, exploration geologist. Geological, geophysical, and geochemical surveys were made, and 5,000 feet of diamond drilling was done in five holes.

[Reference: *Minister of Mines, B.C.,* Ann. Rept., 1965, pp. 76–80.]

TELKWA RIVER

Copper

A *Phelps Dodge Corporation of Canada, Limited* By W. G. Clarke (54° 127° S.W.) Western office, 404, 1112 West Pender Street, Vancouver 1. Larry M. Appelgate, project geologist. The A group of 104 claims, owned by the company, lies between 3,500 and 6,000 feet at the headwaters of the Telkwa River. It is accessible by helicopter from Smithers, 30 miles away.

Bornite and chalcopyrite are reported to occur in veins and fractures in feldspar porphyry. In 1966 eight men and a diamond-drill crew spent four months under M. J. Beley, geologist, making topographic and geological maps, trenching, and drilling 2,453 feet in four diamond-drill holes. The property was not visited.

Copper-Silver

Joker, PR, SQ
Norcan Mines Ltd.
By H. Bapty

(54° 127° S.E.) Company registered office, 675 West Hastings Street, Vancouver 2. S. J. Hunter, consulting engineer. This group of 255 mineral claims is between elevations 3,500 and 5,000 feet in Howson Basin, 22 miles southwest of Smithers. The key claims, which were originally the Duchess, Santa Maria, War Eagle, Jefferson, Evening, etc., were worked by Telkwa Mining and Development in 1907–10, Dockrill Syndicate in 1916–17, Cominco Ltd. in 1928–29, and Kennecott Copper Corporation in 1952.

Five men and three contractors were employed for eight months on the property under the supervision of W. Tompson, geologist. An area 12,000 by 15,000 feet was surveyed and geologically mapped. Electromagnetic and self-potential surveys were made over three claims by GeoCal Limited, and an induced polarization survey was conducted over the Santa Maria and War Eagle zones by Sulmac Exploration. An aerial electromagnetic survey was flown by GeoCal Limited and some soil-sampling was done. A bulldozer tractor dug 20 trenches for a total length of 25,000 feet. Three and a half miles of road was constructed and a small bridge was built across the Telkwa River. Ten AX-BX diamond-drill holes were drilled, totalling 5,350 feet. Transportation is by Smithers-based helicopter or by Telkwa road to within 5 miles of the property. The property was not visited.

[Reference: Assessment Report No. 919.]

BABINE LAKE

Copper

French
Kennco Explorations, (Western) Limited
By W. G. Clarke

(55° 126° S.W.) Office, 730, 505 Burrard Street, Vancouver 1. The French group of 20 claims, owned by the company, is 3 miles north of French Peak and 47 miles northeast of Smithers, whence it is accessible by air. It is reported that the mineralization consists of pyrite disseminated in a porphyry host rock. One AXT hole 105 feet deep was drilled on the French No. 20 claim. Five men spent two weeks under the direction of P. T. Black. The property was not visited.

Old Fort Mountain Area

By N. C. Carter

Old Fort Mountain, rising to 5,148 feet at the head of the main part of Babine Lake, is accessible by road and boat from Smithers, 55 miles southwest. A rough trail leads from a point north of McKendrick Island to a Forest Service lookout on top of the mountain. A few families spend the summer months at Old Fort Indian reservation.

Tree cover, broken by grassy meadows on the south slope, extends to within a few hundred feet of the summit of the mountain. Glacial deposits of gravel, sand, and clay limit good rock exposures to ridges and higher elevations on Old Fort Mountain.

Much of the area is underlain by a succession of interbedded sedimentary and volcanic rocks (*see* Fig. 12). Sedimentary rocks are most widespread and consist of dense black argillites and light- to dark-grey banded argillaceous siltstones. Volcanic rocks include medium-green andesite tuffs and breccias, purple amygdaloidal andesites, and some acid fragmental rocks.

A stock of fine- to medium-grained quartz diorite intrudes sedimentary rocks on the east flank of the mountain, and similar rocks occur as small dykes and sills in the central part of the area. Quartz monzonites and associated dykes of hornblende-biotite-feldspar porphyry cut quartz diorites in the central part of the small stock and also occur as sills in sedimentary rocks near the higher parts of the mountain and the north boundary of the Indian reservation.

Sedimentary rocks adjacent to the quartz diorite stock have been metamorphosed to fine-grained chocolate-brown biotite hornfels with abundant disseminated pyrite. In addition to this well-defined zone, irregular areas of hornfelsed sedimentary rocks occur near the summit of the mountain and adjacent to sills of quartz monzonite on the Indian reservation.

Well-sorted lithic and feldspathic sandstones and pebble conglomerates, apparently overlying the sedimentary and volcanic sequence, were noted southeast of the quartz diorite stock.

The sedimentary and volcanic sequence has been folded into a northwest-plunging synform, the axis of which extends in a northwesterly direction across the southwest slope of Old Fort Mountain. Some dragfolding was noted on the west limb of the fold, and sediments on the east limb are domed adjacent to the small quartz diorite stock. A prominent north-northwest-striking fault extends across the top of Old Fort Mountain, and creek courses reflect the regional northeast-northwest fracture pattern. The east flank of the mountain is characterized by a series of step-like ridges bounded by north-northwest lineaments suggestive of high-angle block faulting. The most prominent of these is roughly on strike with a fault extending southeast across Newman Peninsula.

[Reference: *Minister of Mines, B.C.*, Ann. Rept., 1965, pp. 90–93.]

Copper-Molybdenum

Off, Raid, DDT
Falconbridge Nickel Mines Limited
By N. C. Carter

(55° 126° S.E.) Vancouver office, 504, 1112 West Pender Street. S. N. Charteris, exploration manager. This property, consisting of 116 claims, is on the southeast slope of Old Fort Mountain. Elevations range from 2,332 feet at Babine Lake to 4,700 feet near the northwest boundary of the property. Access from the lake to the central part of the property is by a 3-mile tractor-road.

The majority of the claims were located in 1965 following a soil-sampling programme. An additional 36 claims were located in 1966, and exploration work included detailed geologic mapping and the drilling of 17 holes totalling 3,652 feet. Ten men were employed between June and September under the supervision of G. D. Bysouth, geologist.

Much of the claim group is mantled by glacial deposits of gravel, sand, and clay. Above 3,000 feet elevation, bedrock is exposed only on prominent ridges and in a few creeks. An elliptical stock of quartz diorite, elongated in an easterly direction and measuring 3,000 by 2,000 feet, intrudes argillaceous siltstones and interbedded andesite tuffs in the central part of the property. Within the stock, quartz diorites have been intruded by a small elongate mass of quartz monzonite and related hornblende-biotite-feldspar porphyry dykes. Chalcopyrite and lesser amounts of molybdenite occur as disseminations and in fractures in both the quartz diorite and porphyry dykes adjacent to the western margin of the inner quartz monzonite body.

The quartz diorite which constitutes the greater part of the stock is a fine- to medium-grained light-grey equigranular rock having an average composition of 67 per cent euhedral, normally zoned oligoclase-andesine, 15 per cent quartz, 10 per cent hornblende, and 5 per cent biotite, with the remainder consisting of apatite, epidote, and opaque minerals. Alignment of 3-millimetre hornblende needles was noted near the margins of the stock. The quartz diorite is an essentially fresh rock, with only local sericitization of feldspar and chloritization of mafic minerals.

Contacts between the quartz diorite and later quartz monzonite are sharp to gradational. The quartz monzonite is distinguished by a slightly coarser equigranular to seriate texture, and a lighter-grey colour with pinkish cast due to the presence of ragged, poikilitic potash feldspar. Biotite is the dominant mafic mineral, and occurs both as 1- to 2-millimetre books and flakes, and as a fine alteration of hornblende. A typical specimen is composed of 45 per cent euhedral, normally zoned oligoclase-andesine, 20 per cent orthoclase, 15 per cent quartz, 10 per cent biotite, 5 per cent hornblende, and 5 per cent accessory minerals including apatite, epidote, and opaque minerals. Varying degrees of argillic alteration of feldspar and bleaching of mafic minerals were noted in some sections of drill core. A porphyritic texture is developed along the western margin of the quartz monzonite body, and dykes of hornblende-biotite-feldspar porphyry, not exceeding 100 feet in width, radiate outward from this zone into the quartz diorites. Two-millimetre phenocrysts of euhedral oligoclase-andesine and plates and books of fresh brown biotite constitute 30 per cent of the rock, the remainder being composed of finer-grained quartz, plagioclase, and amphibole, largely altered to fine biotite.

Argillaceous siltstones, including dense dark-grey and light- to dark-grey well-banded varieties, have been metamorphosed to chocolate-brown-coloured biotite hornfels, for a distance of between 1,000 and 3,000 feet outward from the quartz diorite stock, indicating a probable larger size of the stock with depth. Disseminated pyrite and pyrrhotite with resultant limonite stain is a common feature of the hornfelsed rocks. Andesite tuffs are interbedded with the sedimentary rocks south and west of the stock. A small area of grey hornblende feldspar porphyry, apparently conformable with essentially unmetamorphosed sediments 1,500 feet southeast of the stock, may be of volcanic origin.

Exposures near the western stock contact and information obtained from drilling indicate steep contacts. Forceful intrusion of the stock is suggested by a break in the regional sedimentary trend, resulting in a general conformity in strike between sedimentary rocks and the stock contacts. Drainage patterns and cleavages in sedimentary rocks adjacent to the quartz diorite stock reflect regional northeast and northwest structural trends. Within the stock, steep fractures and shear zones having northeast, northwest, and north strikes are most common. Shear zones, several feet wide, were noted in sections of drill core.

Pyrite and pyrrhotite are widely disseminated in all intrusive and adjacent sedimentary rocks. Several small isolated zones containing variable amounts of copper mineralization are grouped in a semicircular pattern within the area of porphyry dykes adjacent to the western margin of the central quartz monzonite mass. Chalcopyrite and minor bornite occur with magnetite as disseminations and in fractures in both the quartz diorite and hornblende-biotite-feldspar porphyry dykes. Molybdenite flakes are found in some fracture planes rimmed by ⅛- to ¼-inch fine-grained pink potash feldspar veinlets.

The most northerly zone of mineralization, near the central part of the stock, has been exposed in a 200-foot-long trench. Copper mineralization is most widespread in the eastern half of the trench, where porphyry dykes intrude quartz diorites. Chalcopyrite occurs as disseminations in both rock types and in north-trending fractures and irregular 1-inch zones rich in mafic minerals and magnetite in quartz diorites. A grab sample from the east end of the trench assayed 0.43 per cent copper.

[Reference: *Minister of Mines, B.C.*, Ann. Rept., 1965, pp. 103–104.]

Copper

Trek
Bethex Explorations Ltd.
By W. G. Clarke

(55° 126° S.E. and 54° 126° N.E.) Company office, 1818, 355 Burrard Street, Vancouver 1. C. J. Coveney, exploration manager. The Trek group of 100 claims is a new property located 4 miles northeast of Granisle Copper Limited. It is accessible by boat from Topley Landing. Nine men spent three months making geological and geophysical surveys in an area that is mostly drift covered. The property was not visited.

[Reference: Assessment Report No. 893.]

Copper

Haut, BI
Noranda Exploration Company, Limited
By N. C. Carter

(55° 126° S.E.) Vancouver office, 1050 Davie Street. B. O. Brynelsen, president. The Haut and BI groups of 46 claims are situated 4 miles southeast of Nakinilerak Lake. Access is by air or by a 15-mile tractor-road from Hatchery Arm on Babine Lake. Northerly trending andesite tuffs underlie most of the claim groups. In the central part of the property, as exposed in a creek, andesite tuffs exhibiting crude columnar jointing are cut by an easterly trending 25-foot-wide biotite-feldspar porphyry dyke of quartz diorite composition. Within the porphyry dyke, north- and east-striking narrow quartz-filled fractures, rimmed by potash feldspar, contain pyrite and some chalcopyrite.

Geochemical work was carried out on the property during the field season under the supervision of R. Woolverton, geologist.

Copper

DA, AX
Noranda Exploration Company, Limited
By N. C. Carter

(55° 126° S.E.) Vancouver office, 1050 Davie Street. B. O. Brynelsen, president. The DA and AX groups, consisting of 54 recorded claims, are 2 miles east of Nakinilerak Lake. Access is by aircraft or by a 15-mile tractor-road from Hatchery Arm on Babine Lake. A considerable amount of exploration work was done on the property in 1964 and 1965. It consisted of geochemical and geophysical surveys, diamond drilling, and trenching. Additional trenching was done during 1966 under the supervision of R. Woolverton, geologist.

Elevations in the area of the claims range from 3,000 to 4,100 feet. Glacial deposits of gravel, sand, and clay cover much of the area, and good rock exposures are limited to ridges and some creek valleys. A north-northwest-striking easterly dipping succession of andesite and rhyolite tuffs and breccias and grey to black argillites is intruded by stocks, sills, and dykes of granodioritic biotite-feldspar porphyry, and related intrusive rocks in various parts of the property (*see* Fig. 13). Conglomerates, possibly correlative to the Sustut Group of Upper Cretaceous age, and containing 1- to 2-inch rounded quartz pebbles, are exposed near Nakinilerak Lake in the extreme western part of the property.

The major rock type underlying the claims is light-green propylitized andesite tuff, containing 4- to 8-millimetre fragments of chert and andesite. Apple-green epidote alteration is a common feature. These andesites, and some acid volcanics

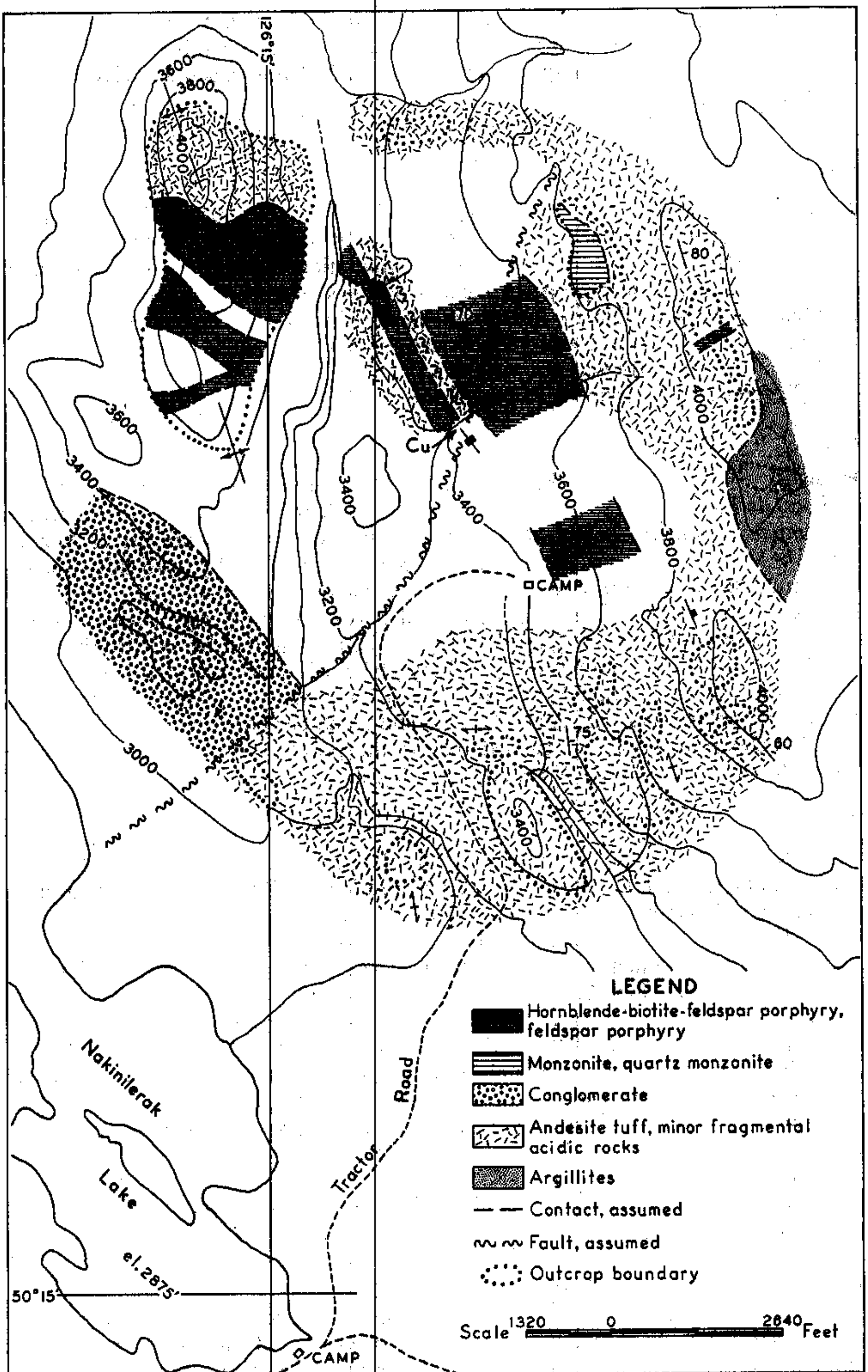


Figure 13. Noranda Exploration Company, Limited. Geological map of the DA and AX, Nakinilerak Lake.

and argillites, near the central part of the property at 3,500 feet elevation, have been intruded by an elongated porphyry stock. Contacts are not well defined, but it appears that the intrusive is more than 2,000 feet long in a north-northwest direction and 1,800 feet wide. The stock is composed mainly of hornblende-biotite-feldspar porphyry of granodiorite composition with subordinate amounts of buff feldspar porphyry and equigranular quartz diorite. The stock is bordered on its west side by a 300- to 400-foot-wide sill of similar composition which has been traced 2,500 feet in a north-northwest direction. Some 2,000 feet south of the main stock, a poorly exposed mass of hornblende-biotite-feldspar porphyry may represent a southern extension of the main intrusive. Similar intrusive rocks underlie much of the prominent hill 1 mile west of the main porphyry stock. Medium-to coarse-grained equigranular monzonite and quartz monzonite intrude andesite tuffs to the north and east of the main stock. The age relationship of this rock type to the porphyritic intrusive rocks is not known.

Copper mineralization is exposed over an area 200 feet square on the extreme south end of the porphyry sill immediately west of the main stock. Chalcopyrite, pyrite, and minor bornite occur as disseminations in feldspar porphyry and in ⅛-inch quartz veinlets in hornblende-biotite-feldspar porphyry and equigranular quartz diorite. A grab sample of mineralized feldspar porphyry assayed 0.35 per cent copper. Disseminated pyrite is widespread in most of the volcanic and sedimentary rocks of the area.

[Reference: *Minister of Mines, B.C.*, Ann. Rept., 1964, p. 53.]

Copper

Penn (54° 126° N.E.) Company office, 1825, 355 Burrard Street, Vancouver 1. E. R. Gayfer, chief engineer.
Giant Explorations Limited
By N. C. Carter

This group, consisting of 64 claims, is in the central part of Newman Peninsula. Access is by boat from Topley Landing. Giant Explorations Limited, which carried out work on the claims during 1966, has a one-quarter interest in the claim group, with the remaining interest being held by R. W. Falkins, of Vancouver.

Six men worked for 2½ months carrying out a geochemical survey, geological mapping, and drilling of three holes totalling 720 feet. Work was under the supervision of H. Fader, geologist.

[References: *Minister of Mines, B.C.*, Ann. Rept., 1965, p. 103; Assessment Report No. 664.]

Copper

Granisle Mine (54° 126° N.E.) Head office, 1111 West Georgia Street, Vancouver 5. L. T. Postle, president; A. J. McDougall, mine manager.
Granisle Copper Limited
By W. G. Clarke

The mine is on McDonald Island (also known as Copper Island), 10 miles north of Topley Landing. The property consists of 31 Crown-granted mineral claims and 15 claims held by record. In addition, the company holds 44 recorded claims on Sterrett Island and on an adjoining island to the south. Access to the property is by ferry from the townsite of Granisle, which is on the west side of Babine Lake and is connected to Topley Landing, 7 miles away, by a good gravel road.

The plant started production on November 16, 1966. By the end of the year 205,630 tons had been milled and 3,583 tons of concentrate had been produced, containing 2,103,760 pounds of copper.

At the pit, 353,000 tons of overburden had been stripped by March 1st. During the remainder of 1966, 500,000 tons of waste rock was removed; about 415,000 tons was used to build a causeway between Sterrett Island and Copper Island for a tailings disposal area, and 85,000 tons was used for road construction. Approximately 270,000 tons of ore was mined and hauled to the crusher, a distance of 5,000 feet.

The pit is being developed in 30-foot benches, with a safety berm of 25 feet every second bench. Most of the blasting is done with ammonium nitrate and fuel-oil.

The mine crew consists of 21 hourly-rated employees and three staff. There are 12 mining shifts per week. Pit equipment includes one P. & H. electric shovel with a 5-cubic-yard bucket; one Bucyrus Erie shovel with a 3½-cubic-yard bucket; five trucks, 35 tons capacity; one rotary drill to drill 9-inch holes; one air-track drill, including a 600-cubic-feet-per-minute compressor; one D-8 Caterpillar tractor; one motor grader; one crew bus; and two pick-up trucks.

The primary crusher is a 42- by 65-inch gyratory. Minus ⅝-inch material from the crusher goes to the fine-ore storage bins, and the remainder goes to a 5,000-ton live-load-capacity stockpile. From this stockpile the ore goes to a 13- by 84-inch hydrocone secondary crusher, and the minus ⅝-inch material goes to the fine-ore bins, with the remainder recirculating to the tertiary crusher. The fine-ore bins have a live-load capacity of 15,000 tons.

The grinding plant in the concentrator consists of one rod mill and two ball mills, all 12 feet in diameter by 15 feet long, and all driven by 1,100-horsepower motors. Mill discharge is classified in Krebs cyclones. The pulp, 65 per cent minus 200 mesh, is distributed to four banks of 48-inch Agitair cells. The rougher concentrate is pumped to the third stage of 24-inch Denver cleaner cells. Four stages of cleaning are employed. The middling concentrate is pumped to the first stage of the cleaner cells. The scavenger concentrate, along with the tails from the cleaner cells, is pumped back to the head of the flotation circuit.

After flotation the concentrate is pumped into a 30-foot-diameter double-tray thickener tank, from which the underflow goes to a 14- by 12-foot stock tank. It is then filtered by a 6- by 6-foot disk filter and carried by conveyor to a 4- by 28-foot rotary kiln drier. The concentrate is carried by a conveyor from the drier to a 300-ton-capacity storage building.

Tailings are pumped 800 feet through a 12-inch wood-stave pipe, or 2,600 feet through an 8-inch pipe to the tailings-disposal area.

Concentrates are hauled by truck to Topley, and then by Canadian National Railway freight cars to a dock at Prince Rupert for shipment to Japan.

Power for the plant and townsite is supplied by 11 diesel-electric generating units with a total capacity of 5,500 kilowatts. Fuel for the units is stored in ten 20,000-gallon-capacity tanks. Approximately 11 per cent of the produced power is directed to the ancillary buildings on the plant-site, and to the townsite via 20,000 feet of overhead transmission-line, and four underwater transmission-lines of 7,000 feet each. The remainder is distributed to the concentrator (65 per cent), crusher (17 per cent), and open pit (7 per cent).

The plant includes an office-warehouse, a dry, an assay building, and a maintenance-shop. Major equipment purchased during the year, in addition to the pit equipment, includes one ambulance, one 3-ton fuel truck; five pick-up trucks; one front-end loader, 2½-cubic-yard bucket; one Kerry Krane; one 49-passenger bus; one 29-passenger bus; one mobile welding unit; one 175-horsepower 600-cubic-feet-per-minute compressor.

At the end of the year 107 men were employed, 84 on the hourly payroll and 23 on staff. Most of the contractor's work was completed by mid-October. At one time 200 men were employed on plant construction.

Granisle, the townsite for the mine, was built in 1966 and consists of 25 houses and 20 row houses. In addition, an eight-man staff-house, a cook-house unit, and six 16-man trailer bunk-houses were erected. A school was under construction at the end of the year.

Copper

Newman
Noranda Exploration Company, Limited
By W. G. Clarke

(54° 126° N.E.) Western office, 1050 Davie Street, Vancouver 5. G. C. Camsell, project supervisor. This group of 169 claims, owned by the company, is on Newman Peninsula, on the northeast side of Babine Lake. The property may be reached by boat from Smithers Landing, Granisle, or Topley Landing. It is 45 miles by air from Smithers. Six men worked throughout 1966 making geophysical and geochemical surveys and six men were diamond drilling. A total of 42,325 feet was drilled.

Morrison Lake Area

By N. C. Carter

Morrison Lake, 9 miles long and approximately 1 mile wide, is 2½ miles north of the northeast arm of Babine Lake. The lake is accessible by aircraft or by a tractor-road from Babine Lake. The area has been the scene of a considerable amount of exploration activity since copper mineralization was discovered near the southeast end of the lake in 1962.

Elevations in the area range from Morrison Lake at 2,405 feet to between 3,500 and 4,500 feet. Gentle slopes predominate, with the exception of the relatively steep west slope of Hearne Hill, near the southeast end of the lake.

Much of the area around the south and central parts of Morrison Lake is underlain by northwest-striking, buff to grey, massively bedded siltstone. Banded argillaceous siltstones were noted in a few areas. Brown to purple andesite and basalt tuffs, commonly containing 2- to 4-millimetre calcite amygdules, are interbedded with the siltstones east and west of the central part of Morrison Lake. Rhyolite tuffs make up an isolated area of outcrop ridges 2 miles west of the south end of the lake.

Hearne Hill is chiefly underlain by light-green andesite tuffs and breccias, with minor amounts of schistose, hematite-stained felsite tuffs. Near the north end of Hearne Hill, these rocks have been intruded by a stock-like body of fine- to medium-grained quartz diorite, monzonite, and quartz monzonite. The intrusive rocks consist, for the most part, of nearly equal proportions of orthoclase, oligoclase-andesine, and quartz, with interstitial ragged hornblende and chlorite. Limits of this intrusive body were not completely defined during the course of field mapping.

Interbedded lithic and feldspathic sandstones and pebble conglomerates, striking north-northwest and dipping moderately to the east, outcrop near the north end of Morrison Lake and are believed to be correlative with the Sustut Group of Upper Cretaceous age.

Dykes, sills, and small stock-like bodies of hornblende-biotite-feldspar porphyry and quartz monzonite intrude siltstones near the southeast and west central parts of Morrison Lake. Varying amounts of disseminated pyrite and chalcopyrite are associated with these rocks.

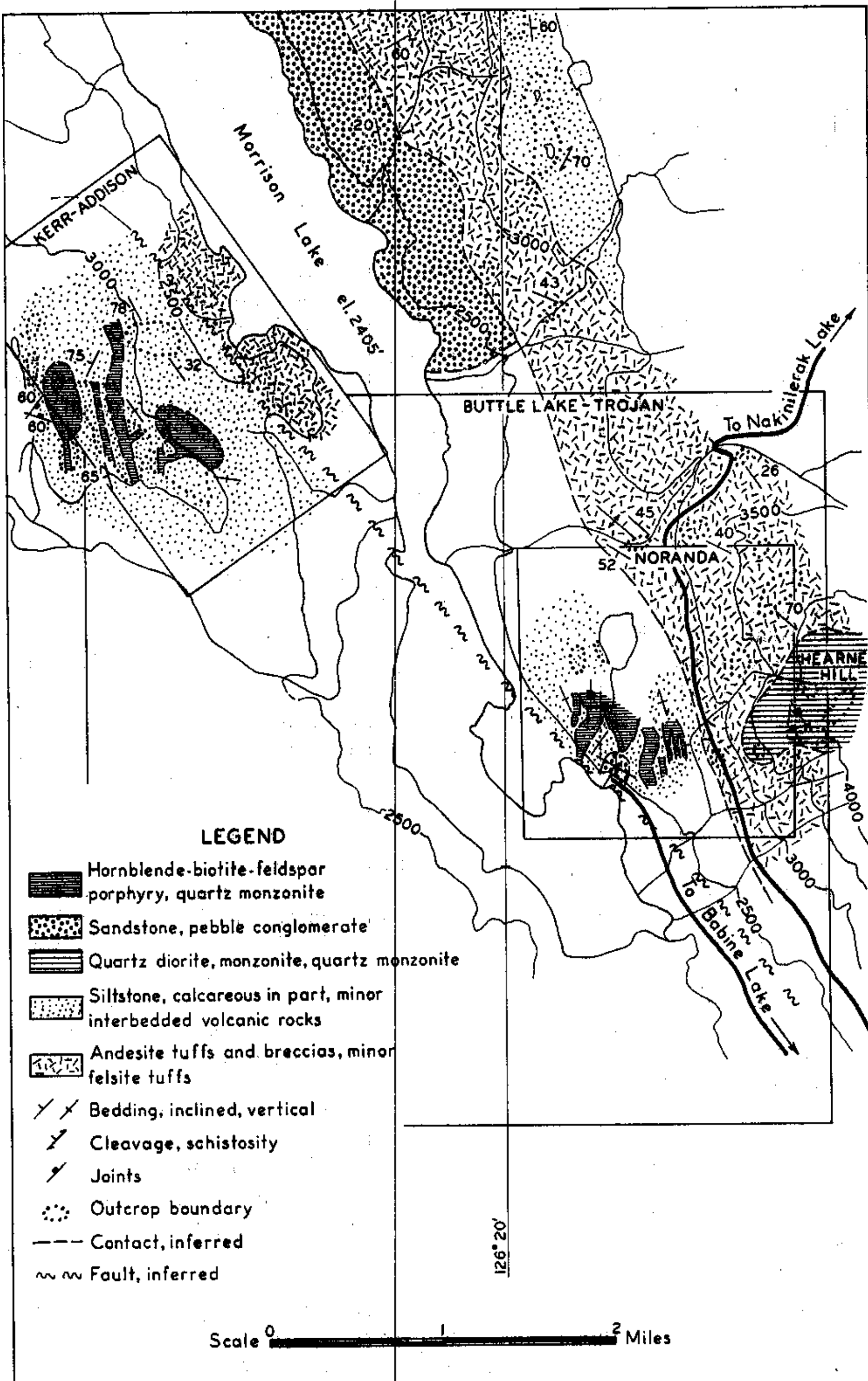


Figure 14. Geological map of the Morrison Lake area.

Prominent linear features, which may represent faults, include a northerly trending lineament marking the west base of Hearne Hill and a northwest-trending lineament extending across the south end of Morrison Lake. The spatial relationship of intrusive rocks to the latter lineament suggests that it may have been instrumental in the localization of the intrusive bodies.

Copper

Morrison
Noranda Exploration Company, Limited
By N. C. Carter

(55° 126° S.E.) Company office, 1050 Davie Street, Vancouver 5. B. O. Brynelsen, president. This property, consisting of 22 recorded claims, is at the southeast end of Morrison Lake. Access to the property is by aircraft or a 5-mile tractor-road linking Morrison and Babine Lakes. The claims were located in 1962 following a reconnaissance geochemical survey. Subsequent work has included line-cutting, geological, geophysical, and geochemical surveys, 10,000 feet of bulldozer trenching, and the drilling of seven holes totalling 2,406 feet. No work was done in 1966.

The claims cover a relatively flat area which rises gently to about 300 feet above the level of Morrison Lake. Two areas of east-west trenches, separated by a creek valley, expose north- to northwest-striking grey siltstones which have been intruded by sill-like masses of hornblende-biotite-feldspar porphyry and feldspar porphyry.

The siltstones are mainly massively bedded, but some banded varieties indicate considerable contortion and dragfolding along strike. There is a grey carbonate-rich type of siltstone and some silicification and hornfelsing adjacent to intrusive rocks.

Quartz pebble conglomerates and thinly laminated shales and greywacke are exposed near the south end of the creek between the two areas of trenches, and are similar to the Sustut Group rocks exposed farther north on Morrison Lake. Sill-like bodies of feldspar porphyry were noted intruding these rocks both in the creek and in one of the trenches.

Hornblende-biotite-feldspar porphyry and feldspar porphyry sills, closely spaced and varying in width from 10 to 200 feet, intrude siltstones in and adjacent to the two trench areas. Contacts between the siltstones and intrusive rocks are fairly sharp, commonly along fractures. Angular fragments of siltstone were noted in the intrusive rocks in several locations. The grey hornblende-biotite-feldspar porphyries are of quartz diorite composition, with one-quarter to one-third of the rock consisting of 2- to 3-millimetre phenocrysts of fresh, euhedral, normally zoned oligoclase-andesine. Abundant 0.5- to 1-millimetre plates and books of fresh brown biotite, partly an alteration of hornblende, are also a characteristic feature of these rocks. The buff to light-grey feldspar porphyries have sharp to gradational contacts with the aforementioned rock type, and may represent an intensely altered variety of hornblende-biotite-feldspar porphyry. The feldspar porphyry consists of chalky-white plagioclase phenocrysts set in a fine-grained matrix of quartz and carbonate. Information obtained from drilling suggests that the porphyry sills exposed in the trenches may be peripheral to an unexposed mass of intrusive rock lying between the two trench zones.

All rocks exposed in the trenches are intensely fractured, the density of fracturing being one fracture per 2 inches. The major fracture orientations are north and east, and many, particularly those in the hornblende-biotite-feldspar porphyries, are healed by ⅛- to ¼-inch quartz veinlets, commonly rimmed by potash feldspar. Pyrite and lesser amounts of chalcopyrite occur as disseminations in the matrix and in fractures and quartz veinlets in all rocks exposed in the trenches. A composite grab sample, collected from one of the northern trenches in the west trench zone, including mineralized siltstone, feldspar porphyry, and hornblende-biotite-feldspar porphyry, assayed 0.40 per cent copper. A sample from a sill of rhyolite and quartz breccia, collected in the same area, assayed a trace of molybdenite. (*See* Annual Report, 1965, p. 104.)

Copper

Bee
Kerr-Addison Gold Mines Limited
By N. C. Carter

(55° 126° S.E.) Vancouver office, 1112 West Pender Street. William M. Sirola, manager. This group of 40 recorded claims is on the west side of Morrison Lake, 4 miles north of its south end. Grey banded siltstones, which contain disseminated pyrite and strike north-northwest, underlie much of the claim group. The siltstones, locally with interbeds of andesite tuff, have been intruded by small stock-like bodies of equigranular quartz monzonite, and by dykes and sills of hornblende-biotite-feldspar porphyry. The medium-grained quartz monzonite consists of partly sericitized euhedral, zoned oligoclase-andesine, quartz, orthoclase, and ragged hornblende crystals partially altered to brown biotite. The porphyry dykes and sills, peripheral to the larger bodies of quartz monzonite, are of similar composition, with 2- to 3-millimetre phenocrysts of plagioclase making up 25 per cent of the rock. Pink aplite veinlets, consisting of quartz and potash feldspar, and one-half inch wide, were noted in some of the dykes and sills.

During the 1966 field season, two men spent six weeks conducting geochemical and geophysical surveys under the supervision of William M. Sirola.

[Reference: Assessment Report No. 761.]

HOUSTON

Molybdenum

Huber
Molymine Explorations Ltd.
By W. G. Clarke

(54° 126° N.W.) Company office, 200, 535 Thurlow Street, Vancouver 5. W. D. Yorke-Hardy, president. The Huber property, comprising 131 claims, some owned and some optioned, is about 8 miles north of Houston and 1 mile east of Highway 16. In the spring of 1966, Cominco Ltd. optioned the property and spent four months diamond drilling and mapping. The option was terminated during the summer. Exploration work was continued by Anco Explorations Ltd. under contract with Molymine Explorations Ltd., with a crew of 10 men for seven months. Geological, geochemical, and geophysical surveys were made, 26 trenches totalling 6,500 feet were drilled and blasted, about 3,000,000 square feet of bedrock was stripped by bulldozer, an access road 3,500 feet long was built, and 15 diamond-drill holes totalling 7,300 feet were drilled.

[References: *Minister of Mines, B.C.*, Ann. Rept., 1965, pp. 75–76; Assessment Reports Nos. 509, 510, and 757.]

Copper

Lakeview
Plateau Metals Limited
By W. G. Clarke

(54° 126° N.W.) Head office, 102, 402 West Pender Street, Vancouver 1. C. Riley, consulting geologist. This group of 11 claims, optioned by the company, is 5 miles northwest of Knockholt siding on the Canadian National Railway. It is accessible by 6 miles of truck-road from Highway 16. Two men spent two months, under the direction of C. Riley, stripping and trenching with a bulldozer. The property was not visited.

Molybdenum

Barr, Lybdenum
Amax Exploration, Inc.
By W. G. Clarke

(54° 126° S.W.) Company Office, 601, 535 Thurlow Street, Vancouver 5. R. A. Barker, manager. The Barr and Lybdenum claims, lying 4 miles west of Barrett at an elevation of 3,200 feet, are under option to Amax Exploration, Inc. During the summer six men, under the direction of N. Shepherd, carried out 7 miles of induced polarization survey and additional soil-sampling.

[Reference: Assessment Report No. 869.]

Copper-Molybdenum

Klondike
Normont Copper Ltd.
By W. G. Clarke

(54° 126° S.W.) Company office, 200, 535 Thurlow Street, Vancouver 5. The Klondike group consists of 34 claims on Dungate Creek, 6 miles by road from Houston. In 1966 Anco Explorations Ltd. did the field work on contract. Two men spent two months on geological, geophysical, and geochemical surveys of the Klondike 1, 2, 7, and 8 claims. The property was not visited.

[References: *Minister of Mines, B.C.*, Ann. Rept., 1965, p. 80; Assessment Report No. 909.]

Copper

B
Phelps Dodge Corporation of Canada, Limited
By W. G. Clarke

(54° 127° S.E.) Western office, 404, 1112 West Pender Street, Vancouver 1. L. M. Appelgate, project geologist. The B group of 96 claims, owned by the company, is 18 miles west of Houston on Houston Tommy Creek on the southeast slopes of the Telkwa Mountains. It is accessible by helicopter.

Chalcocite, chalcopyrite, and bornite mineralization are reported to occur in veins and shear zones in andesite and limestone. In 1966 eight men spent 3½ months on topographic, geological, and geophysical mapping. In addition, 12 miles of "Cat" road was constructed, and 75 bulldozed trenches totalling 21,000 feet were excavated. The property was not visited.

Copper-Molybdenum

Van, Wid, Gerry
Amax Exploration, Inc.
By W. G. Clarke

(54° 126° S.W.) Western office, 601, 535 Thurlow Street, Vancouver 5. R. A. Barker, manager. This group of 50 claims is on the west flank of Morice Mountain. It is 15 miles by road from Houston and is accessible by four-wheel-drive vehicle. Molybdenite and chalcopyrite mineralization is reported to occur in a quartz vein stockwork and as disseminations in quartz porphyry and granodiorite.

In 1966 two men and a diamond-drill crew spent three months working under the direction of N. Shepherd, staff geologist. Geological, geophysical, and geochemical surveys were made, and 600 feet of trenching was done by bulldozer. Two miles of access road was built. There was 3,232 feet of diamond drilling done in four holes. The property was not visited.

[Reference: Assessment Report No. 797.]

Silver-Copper-Zinc-Molybdenum

Far, Mo
Normont Copper Ltd.
By W. G. Clarke

(54° 126° S.W.) Company office, 200, 535 Thurlow Street, Vancouver 5. There are 204 claims in the Far and Mo groups on Tsalit Mountain, 22 miles by road south from Houston. The mineralization is reported to be in shear zones in volcanics. In 1966 the field work was done on contract by Anco Explorations Ltd., who employed 10 men for four months. Geological, magnetometer, and geochemical surveys were made. Thirty trenches (total length 1,000 feet) were drilled and blasted, some 8,000 square feet was stripped to bedrock by bulldozer, and 80 test-pits were dug to an average depth of 2 feet. Three miles of access road was built. The property was not visited.

Silver-Lead-Zinc

Silver Queen
Nadina Explorations Limited
By W. G. Clarke

(54° 126° S.W.) Head office, 1003, 789 West Pender Street, Vancouver 1; field office, Owen Lake. J. B. Magee, general manager. The company holds 17 Crown-granted mineral claims and fractions under agreement with Canadian Exploration Limited and 33 recorded mineral claims. The property is on the east side of Owen Lake, between elevations of 2,500 and 3,500 feet. Access is by good gravel road 27 miles south of Highway 16 from a point 2 miles west of Houston.

During 1966, 295 feet of No. 1 level (elevation 2,985 feet) and 2,830 feet of No. 2 level (elevation 2,710 feet) were rehabilitated, widened where necessary, and new ties, track, and pipe were installed. A manway raise 292 feet in length was driven to connect the two levels. There was 1,296 feet of drifting and crosscutting advanced on both levels. Short diamond-drill holes (total length 600 feet) were drilled at regular intervals from the development drifts and crosscuts.

During the summer further surface stripping by bulldozer exposed the veins to the east of Wrinch Canyon for a total length of 3,000 feet.

Ore- and waste-dumping facilities were erected at No. 2 level portal, and a service road was built from No. 2 portal to No. 1 portal.

Camp facilities consist of dining and sleeping accommodation for 12 men, assay office, powerhouse, and repair-shop. Mine equipment includes two portable compressors, three battery locomotives and chargers, twelve 2-ton rocker dump cars, two loaders, drills, etc. An average of eight men was employed during 1966.

[Reference: *Minister of Mines, B.C.*, Ann. Rept., 1965, pp. 81–84.]

Silver-Lead-Zinc

Bell, Van
Frontier Exploration Limited
By W. G. Clarke

(54° 126° S.W.) Head office, 642 Clark Drive, Vancouver 6. This group of 22 claims, optioned by the company, is east of Owen Lake and adjoins the Silver Queen group on the east. The property is 30 miles south of Houston. Four men spent three months on the property under the direction of Rae Jury, engineer. Geological and geophysical surveys were made, soil samples were taken for geochemical analysis, and 1,048 feet of diamond drilling was done in seven holes.

MORICE LAKE

Molybdenum

Lucky Ship, Sam
Amax Exploration, Inc.
By W. G. Clarke

(54° 127° S.E.) Western office, 535 Thurlow Street, Vancouver 5. R. A. Barker, manager. This group of 105 claims is held under agreement with Plateau Metals Limited. The property is south of Morice Lake and may be reached by road in a four-wheel-drive vehicle, 59 miles from Houston.

In 1966, 30 men under T. J. R. Godfrey spent five months on exploration. Geological, geophysical, and geochemical surveys were made, 2,000 feet of trench-

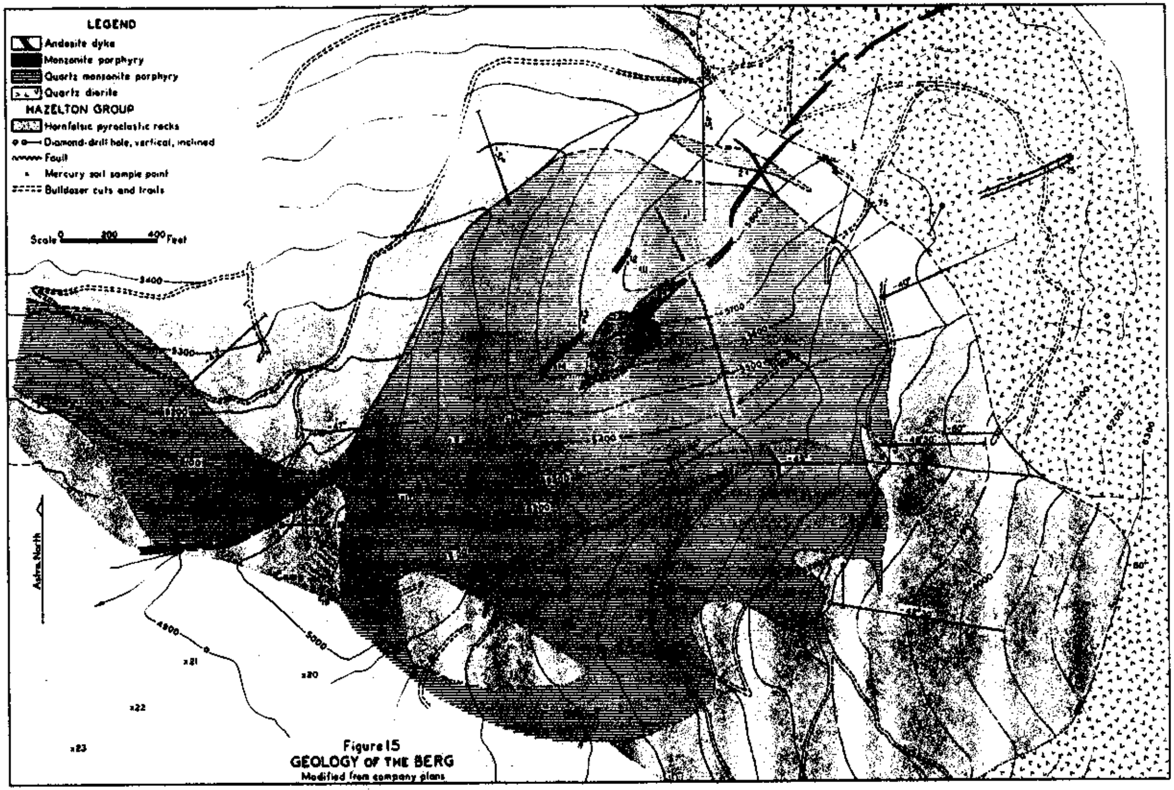


Figure 15
GEOLOGY OF THE BERG
Modified from company plans

ing was done with a small bulldozer, and seven diamond-drill holes totalling 7,783 feet were drilled.

[Reference: *Minister of Mines, B.C.*, Ann. Rept., 1965, pp. 84–87.]

TAHTSA LAKE

Lead-Zinc-Silver

Emerald
Emerald Glacier Mines Ltd.
By W. G. Clarke

(53° 127° N.E.) Head office, 4635 Lazell Avenue, Terrace. Darrell Foote, mine manager. This property consists of mineral lease No. 15, comprising 9 old Crown-granted mineral claims and 27 claims held by record. The mine is near the crest of Sweeney Mountain at an elevation of 6,000 to 6,500 feet, 5 miles north of Tahtsa Lake. It is about 60 miles by road from Houston, via the Morice Lake and Owen Lake roads and the Alcan highway. The mill and camp are on the side of the road at the foot of the Sweeney Mountain road and are connected to the mine by 6 miles of switchback road suitable for trucks.

The main vein and others which have been developed at the Emerald Glacier mine are mineralized shears or fault zones in bedded tuffs and argillites which are intruded by aplitic and granitic dykes. There are two granodiorite stocks to the north and east. The eastern margin of the Coast Intrusions is about 15 miles to the west.

The deposit was originally staked by W. J. Sweeney and others in 1915, who did some surface work. In 1917 James Cronin leased the property. During the next two years he did further surface work and drove an adit. In 1927 Cominco Ltd. took an option. The adit was advanced and two others were collared at a lower elevation. This option was terminated in 1931.

In 1950 the Alcan highway was constructed from Burns Lake to the east end of Tahtsa Lake. In 1951 Emerald Glacier Mines Limited reopened the upper level, did some development work and mining, and shipped 1,700 tons of ore to a custom mill at Nelson. In 1952, 2,908 tons was shipped, and a final shipment of 12 tons was made in 1953, when the mine closed.

The present owners acquired the property in 1965. During 1966 the camp was built and a 75-tons-per-day mill installed. Most of the mill equipment came from the old Silver Standard mine at Hazelton. About 400 tons of ore was mined by taking down backs in the old upper adit. This ore, when milled, produced 117 tons of concentrate, which was shipped to Trail.

Work started on April 8th by ploughing snow from the road to the mill-site. The mill started operations on October 15th. Ore is trucked from the mine to the coarse-ore bin, which is of log construction and has a capacity of 200 tons. It is fed to a 9- by 16-inch jaw crusher, which discharges to a hexagonal fine-ore bin of laminated plank construction having a capacity of 100 tons. The ball mill is 5 by 5 feet. A lead concentrate and a zinc concentrate made by differential flotation are trucked to Houston for shipment on the Canadian National Railway.

The power-house contains two diesel generators. Camp buildings include a cook-house, dry-house, office, two bunk-houses, two cottages, and one trailer. An average crew of 20 men was employed for seven months.

Copper-Molybdenum

Berg
Kennco Explorations, (Western) Limited
By A. Sutherland Brown

(53° 127° N.E.) This property is in the Tahtsa Range 6 miles north of Tahtsa Lake and 9 miles west of Sibola Peak. It consists of 108 recorded claims held by Kennco Explorations, (Western) Limited (730, 505 Burrard Street, Vancouver 1; J. A. Gower, manager of exploration). The property is serviced by a 26-mile " Cat " road from Twinkle Lake on the road from Houston to Tahtsa Lake.

The Berg was located in the autumn of 1961 as a result of geochemical reconnaissance surveys. Exploration has been continuous since 1962 and has included detailed geochemical, geological, and magnetometer surveys, and since 1964 some 13,000 feet of drilling of all types. In 1966 about 10 NX-WL holes were cored, totalling about 6,000 feet. George O. M. Stewart was geologist-in-charge.

Geology

The Tahtsa and Sibola Ranges are chiefly underlain by massive and clastic volcanic rocks of the Hazelton Group of Middle Jurassic age. These are moderately folded with north-trending axes. The volcanic rocks are intruded by a series of small plutons, two of which occur in the vicinity of the Berg copper-molybdenum deposit. One is a quartz diorite with a surface area of 4 or 5 square miles; the other is a subcircular plug of quartz monzonite porphyry about 2,400 feet in diameter. Both are important hosts of the mineral deposit, and the porphyry appears to have a genetic relation to it. These plutons cut the Hazelton rocks on the east flank of a north-trending anticline. In the vicinity of the deposit, dips of 20 to 35 degrees to the east are characteristic.

Mineral Composition, Intrusive Rocks at Berg Copper-Molybdenum Deposit

(Volume per cent.)

	Phenocrysts							Total						
	Quartz	Plagioclase	Orthoclase	Hornblende	Biotite	Opaques	Matrix	Quartz	Plagioclase	Orthoclase	Hornblende	Biotite	Opaques	Average Of
Quartz diorite (1)	—	—	—	—	—	—	—	10.8	57.6	8.0	16.6	4.6	3.9	5
Quartz monzonite porphyry (2)	4.1	27	2.4	2.1	3.5	1.0	58.9	20.3	38.8	30.0	3.0	6.1	1.4	4
Latite monzonite porphyry (4)	3.0	20	—	7.5	3.7	1.5	64.0	4.2	49.0	23.0	13.5	5.0	3.0	2
Andesite (5)	—	—	—	—	—	—	—	6.5	68.0	—	18.5	1.5	5.5	2

Geology close to the quartz monzonite porphyry plug is shown on Figure 15. Much of the area is covered with felsenmeer, so that true outcrop is relatively rare. In the map-area the Hazelton rocks are cut by a series of five intrusive bodies, which, in the probable order of intrusion from oldest (1) to youngest (5), are:—

(1) Quartz diorite and diorite stock.
(2) Quartz monzonite porphyry plug.
(3) Quartz monzonite porphyry breccia pipe.
(4) Monzonite porphyry dykes.
(5) Small andesite dykes.

The order of breccia pipe and monzonite porphyry dykes may be reversed, but both seem to post-date the main sulphide mineralization The breccia pipe is just south of the map-area. Its areal extent is poorly known because it occurs in a deeply drift-covered area.

The accompanying table lists the average mineral compositions of the main intrusive phases. Percentages were estimated, using charts for all specimens and some were checked by point count. The petrology of all intrusive phases and the wallrocks is discussed in sequence.

The Hazelton rocks in the immediate vicinity are dominantly andesitic tuffs, lapilli tuffs, and volcanic sandstones. Minor marine shales occur. The andesite tuffs, where only slightly metamorphosed, are dark-green to purple rocks composed of irregular fragments, most of which are of identical mineralogy if differing grain size. These are microporphyritic rocks of felted to trachytic texture composed of andesine and hornblende in a cryptocrystalline matrix. The lapilli are contained in a fine dust of similar composition plus much non-sulphide opaque matter. Such rocks in the hornfelsic aureole may be converted into rusty-weathering purply-brown biotitic hornfels or into metasomatized rocks in which the original texture is scarcely visible, if at all. The most common skarn is composed of a mosaic of fine new quartz, biotite, and potassium feldspar with palimpsest remnants of original grains shown by varying proportions of these minerals and earlier chlorite, plagioclase, and kaolinite. Locally, mottled greisen-like rocks are produced by the metasomatism.

Quartz diorite (1) specimens range either side of 10 per cent quartz, so that some are diorites, others quartz diorites, but the average is the latter. The fresh quartz diorite is a fine medium-grained light-grey rock that contains scattered hornblende phenocrysts. The average grain is slightly coarser than 1 millimetre in diameter. The hornblende phenocrysts are up to 8 millimetres long and are commonly aligned in a lineation and vague foliation not evident in the other minerals. Predominant slightly rounded laths of labradorite occur surrounded by cuspate and poikilitic hornblende with random minor biotite and opaque minerals. Plagioclase is uniformly zoned from An_{60} to An_{50}, and Carlsbad albite twins are common. Quartz and slightly perthitic orthoclase occur in both interstitial accumulations and in small dispersed anhedral grains. Most feldspar is fresh, but hornblende and biotite may be altered to chlorite.

Near their contacts these rocks are chilled to fine nearly aphanitic rocks that are generally quartz poor. Where thermally metamorphosed, these greatly resemble hornfels derived from volcanic rocks, so that the contact appears gradational over short distances. The main metamorphic change in the quartz diorite within the hornfelsic aureole of the quartz monzonite porphyry is that hornblende has entirely been converted to new brown biotite

Quartz monzonite porphyry (2) is a coarsely porphyritic rock that is grey where fresh, but in natural outcrops is coated with geothite, and on freshly broken surfaces the feldspars are stained brown. Characteristic features include abundant feldspar tablets, prominent biotite books, and irregularly scattered corroded quartz. Maximum grain size of phenocrysts approaches 1 centimetre long. Biotite books may be 3 to 4 millimetres in section and up to 7 millimetres in the Z crystalographic axis. Phenocrysts form 35 to 50 per cent of the rock. Plagioclase phenocrysts are stubby crystals commonly showing combined form and complex twinning. Carlsbad albite twins, however, are absent. Most crystals show many oscillatory zones, seven to nine being common. Average composition is about An_{30}. Most plagioclase is partly sericitized, and some in addition is altered partly to kaolinite and calcite. The potassium feldspar is slightly perthitic orthoclase. Biotite folia may be bent and may be interleaved with chlorite. Hornblende is completely altered to chlorite plus opaque minerals. The matrix has an average grain size of 0.02 to 0.04 millimetre and is chiefly a mosaic of either subequal amounts of plagioclase and orthoclase with less quartz or of perthite with quartz. Chlorite and opaque minerals are minor.

The *breccia* (3) is a cream to faintly green coloured rock dominantly composed of fragments of quartz monzonite porphyry with minor other types such as unmetamorphosed siltstone and andesite. Most fragments are irregular to subangular and of 15 millimetres or less, contained in an abundant similar finely comminuted matrix. Large fragments are very rare. The breccia is altered by intense kaolinization of feldspar and complete change of biotite to muscovite, and minor carbonatization. Widely disseminated well-crystallized pyrite, on which octahedral faces are prominent, is common, but chalcopyrite is very rare. Some fragments contain quartz veinlets.

The quartz-bearing *monzonite porphyry* (4) is superficially very similar to the quartz monzonite because its phenocrysts, mineralogy, and content are similar. It is, however, distinguished readily in thin-section by the relative absence of quartz in the matrix and by the abundance of hornblende both in the matrix and as middle-sized grains. By Kennecott geologists it has been called quartz-latite porphyry. The fresh rock is grey and contains about 30 to 40 per cent phenocrysts. Chilled monzonite porphyry is dark grey and slightly foliated. Quartz phenocrysts are nearly as common as in the quartz monzonite porphyry but are very deeply embayed and skeletal. Plagioclase is also similar, about An_{35}, but seemingly not as highly zoned. It may be fresh, or sericitized. Biotite occurs chiefly in books elongated in Z direction. Bent plates are common. Hornblende is much commoner than in the quartz monzonite porphyry and occurs in long prisms of diamond-shaped section. Sphene is a common accessory phenocryst. It is in the matrix that most difference occurs between the quartz monzonite porphyry and monzonite porphyry. Here visible quartz is nearly absent and a very fine-textured plagioclase, hornblende, and opaques occur surrounded by slightly larger poikilitic potassium feldspar. Alteration of monzonite porphyry is rarely intense, but some replacement of plagioclase and hornblende by epidote and chlorite is fairly common.

The *andesite dykes* (5) are small middle-grey aphanitic dykes that contain up to 2 per cent feldspar phenocrysts. They have a texture that is between trachytic and felted, and consist of plagioclase, chlorite after hornblende, quartz, opaques, and minor biotite. Plagioclase is generally highly altered to kaolinite and calcite and hornblende to chlorite and calcite.

Structure

The quartz diorite stock and the quartz monzonite porphyry plug cut the tilted panel of Hazelton rocks without visible distortion. Reliable attitudes are rare in the metamorphic aureole but generally confirm that the walls have been deformed only locally, if at all. The quartz diorite was intruded first, for, although it is not in contact at the surface with the quartz monzonite porphyry, it is metamorphosed by the latter. Also some small inclusions have been found in the quartz monzonite that are similar to the quartz diorite. The quartz monzonite porphyry plug is subcircular in outline, but its margins are quite irregular. One or more large tongue-like masses extend from the main mass. Despite the plug's small size, the wallrocks have been intensely metamorphosed. On the whole the plug resembles a volcanic neck. The breccia pipe is near the south margin of the plug in an area that would be expected to be in the ore zone, but it is only mineralized with minor pyrite and rare chalcopyrite probably originally present in the fragments. The monzonite porphyry is almost certainly a late phase of the quartz monzonite porphyry even though it is less silicic. It forms a blob-like mass roughly co-axial with the quartz monzonite plug, and from this a group of segmented dykes extends to the northeast and southwest (striking north 40 to 80 degrees east). The monzonite porphyry has a chilled foliated facies in contact with the quartz monzonite porphyry. Dykes cut mineralization but contain no significant mineralization themselves. The quartz-bearing andesite dykes are not only younger than the mineralization and monzonite, but also unrelated to the quartz monzonite porphyry. Most are small steep dykes striking about north 60 degrees west, hence nearly normal to the monzonite.

Berg property—looking northward past the Kennco camp to the conical hill comprising a quartz monzonite plug.

View northeastward across Haven Lake to Red Bird Mountain. The Red Bird porphyry plug is left of centre between two main creeks.

Primary Mineralization

The Berg deposit consists of a broad annulus co-axial with the quartz monzonite porphyry plug and is contained in this body and its peripheral hornfels and diorite. Primary mineralizing sulphide minerals include chalcopyrite, molybdenite, and pyrite with minor sphalerite, galena, and arsenopyrite. A gossan zone from weathered pyrite extends over an area slightly larger than that of Figure 15. Deep oxidation, leaching, and enrichment have affected the deposit so that chalcocite and ferrimolybdite are common.

Mineralization extends from well within the porphyry to approximately 800 feet beyond. Economic mineralization is mostly outside the plug. Primary copper and molybdenum mineralization overlap, but in general the best molybdenum mineralization is near the quartz monzonite contact and may be just within the plug, whereas the best primary copper mineralization is 200 feet or more beyond the contact. Primary mineralization occurs principally in a fine-textured stockwork of quartz-filled veinlets, and as disseminations and in a few major veins. A fracture stock-work extends over a wider zone than the quartz veining and includes most of the quartz monzonite plug and well beyond the mineralization into the walls. This stockwork does not have obvious preferred orientations where it is intense, but a flat joint set striking about north 20 degrees west and dipping 15 to 25 degrees southwest is common in the less fractured areas with other sets less uniform. Fracturing occurred in at least three stages and probably more. Well-defined fracture-filling stages include an early quartz-pyrite-molybdenite-chalcopyrite stage, a later pyrite or pyrite-sphalerite-galena stage, and finally an anhydrite-gypsum stage. It is likely that the main mineralizing stage was divided into overlapping substages. Molybdenite is chiefly found in the stockwork in quartz veinlets or more rarely as dry fracture coatings. Chalcopyrite occurs in these modes, but also in the higher-grade areas occurs as widespread disseminations replacing secondary biotite in diorite or hornfels. Pyrite likewise occurs disseminated and in veinlets. Dry pyrite-filled fractures extend well beyond the economic mineralization and appear to represent products of both the first and second stages. Anhydrite-filled fractures cut the breccia pipe, although all fractures in the breccia are rare.

Alteration

The effects of hydrothermal alteration are not entirely separable on the basis of present study from the thermal metamorphism and metasomatism, and in fact probably were closely related in time. Hydrothermal alteration did, however, continue after the period of significant sulphide mineralization. The characteristic thermal metamorphic mineral is fine felted biotite which replaces former mafic minerals and also feldspars. Silicification is characteristic of the metasomatism, and this grades into widespread hydrothermal alteration, in which plagioclase is initially sericitized and finally kaolinized, and biotite is converted to muscovite, and some plagioclase is mantled or partially replaced by orthoclase. The rocks of the breccia pipe which post-date mineralization are intensely kaolinized and biotite entirely converted to muscovite. Widespread anhydrite-gypsum veining and local minor replacement are a still later stage.

Secondary Mineralization

The primary mineralization of the Berg deposit has been subjected to intense oxidation, leaching, and enrichment. The depth of leaching is related to the topography and to present and past water-tables. In interfluve areas barren leached rock may extend to 200 feet or more below the surface and secondary mineralization may extend to 400 feet or more. In present stream valleys the barren zone may be just a few or a few tens of feet deep. Molybdenum has been oxidized to ferrimolybdite over a lesser depth than chalcopyrite has been leached. Chalcocite appears as coatings on disseminated pyrite. Secondary copper mineralization partly obscures the original good zonation of copper and molybdenum.

Distribution

It is evident that the southeastern half of the annular zone contains the highest-grade material. This area is the one of greatest complexity as a result of multiple intrusion and has the greatest variety of host rocks, quartz monzonite porphyry, volcanic hornfels, and quartz diorite. The company has made no statement regarding grade or reserves.

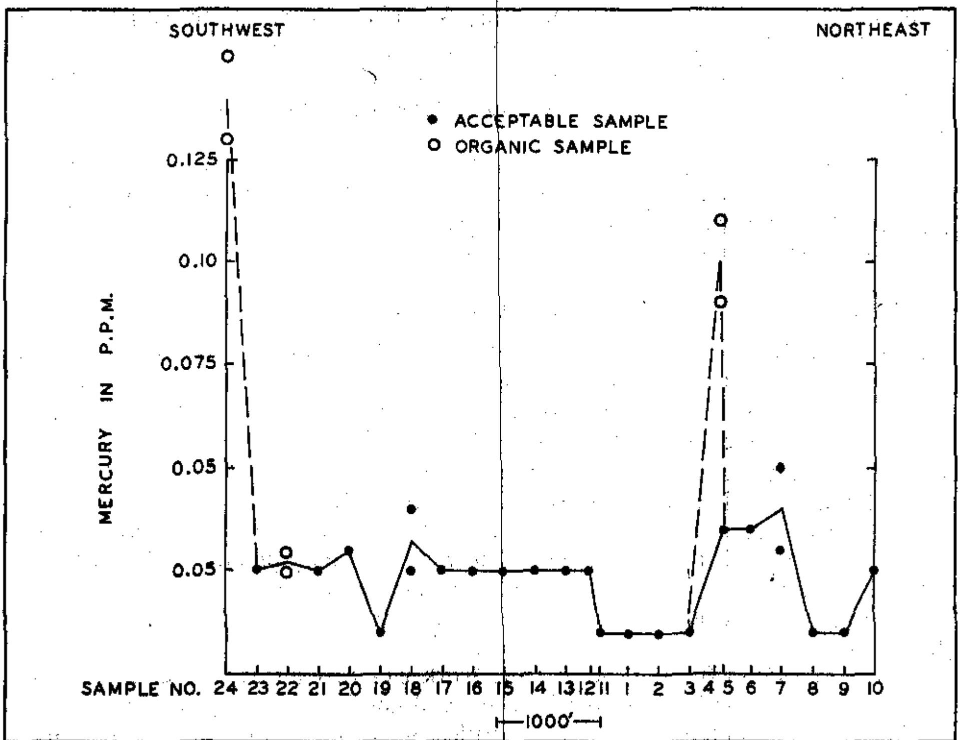


Figure 16. Kennco Explorations, (Western) Limited. Mercury in soils at the Berg.

Mercury Soil Profile

Figure 16 is a profile showing analyses by Lemaire S-1 mercury detector of soil samples taken at points shown on the map (Fig. 15). If the organic samples are rejected, the profile is of interest because both peaks and background readings are so low. Nevertheless, the "anomalies" are symmetrical with regard to the sulphide zones. A possible explanation of the low readings is that deep weathering and leaching of sulphides resulted in early release of mercury.

[Reference: *Minister of Mines, B.C.,* Ann. Rept., 1965, p. 87.]

Copper

TROITSA LAKE

OVP
Silver Standard Mines Limited
By W. G. Clarke

(53° 127° N.E.) Head office, 808, 602 West Hastings Street, Vancouver 2. N. W. Burmeister, geologist. The OVP group of 76 claims, optioned by the company, is at the southwest end of Troitsa Lake. It is about 75 miles by air from either Burns Lake or Terrace.

Four men spent one month on the property. The geology on the OVP 1 and 2 was mapped, and 225 feet of trenching was done in rock. The property was not visited.

Copper-Molybdenum

WHITESAIL LAKE

Ace, Deuce, Trey
Cominco Ltd.
By W. G. Clarke

(53° 127° S.E.) Head office, Box 1510, Station B, Montreal 2, Que.; field office, 1150 Bay Street, Trail. This property, under option to Cominco Ltd., is on the north side of Chikamin Mountain between Whitesail and Eutsuk Lakes. It is accessible from Burns Lake, 75 miles distant, by helicopter. There are 35 claims in the group, which was optioned from C. V. Harrison, who has explored the mountain since 1915.

It is reported that chalcopyrite and molybdenite mineralization is disseminated in volcanics and granite on the Ace and Trey groups and in skarn on the Deuce group.

In 1966 six men spent six weeks making geological and geochemical surveys. G. Parsons, geologist, was in charge of the work. Two X-ray holes totalling 230 feet were diamond drilled. The property was not visited.

[References: Assessment Reports Nos. 729 and 730.]

Molybdenum

EUTSUK LAKE

Red Bird (CAFB)
Ashfork Mines Limited
By A. Sutherland Brown

(53° 127° S.E.) This property consists of a large group of claims (239) centred on a partly separated minor peak of Red Bird Mountain, which is between Haven Lake and the west end of Eutsuk Lake. The property has previously been called CAFB after the original claim group and informally called Bone Lake and Haven Lake. It is held by Ashfork Mines Limited (head office, 55 Yonge Street, Toronto, Ont.; president, H. Z. Stuart; resident geologist, John L. DeLeen). Ashfork Mines Limited is a wholly owned Canadian subsidiary of Phelps Dodge Corporation, New York. A. J. Schmidt is the company's geologist at the property.

Claims were located in the late 1930's on minor copper showings on Red Bird Mountain. Phelps Dodge prospected in the vicinity in 1958 and located many of the claims in 1959. From 1960 to 1962 work included surface trenching and geophysical surveys. Drilling started in 1963 and continued each year since with 10 AX-WL holes, totalling 11,060 feet, drilled in 1966. Total drilling to date is 45,299 feet in 58 holes.

The main access previously has been by float-plane to Haven Lake and by helicopter to the drill camp and sites. In 1966 a 2,500-foot-long airstrip was built in open country near the outlet of Bone Creek on Eutsuk Lake, an 11-mile road from there to Haven Lake, and an additional 2-mile road from the lake at about 3,400 feet to a portal site which was cleared and faced at about 4,800 feet.

Geology

The geology of the area of Bone Creek and Haven Lake is shown on Figure 17. This slightly amends the geology shown on Map 1064A, Whitesail Lake (Duffell, 1959). The area is mainly underlain by the upper volcanic division of the Hazelton Group as mapped by Duffell. In the vicinity of Haven Lake these are mostly clastic

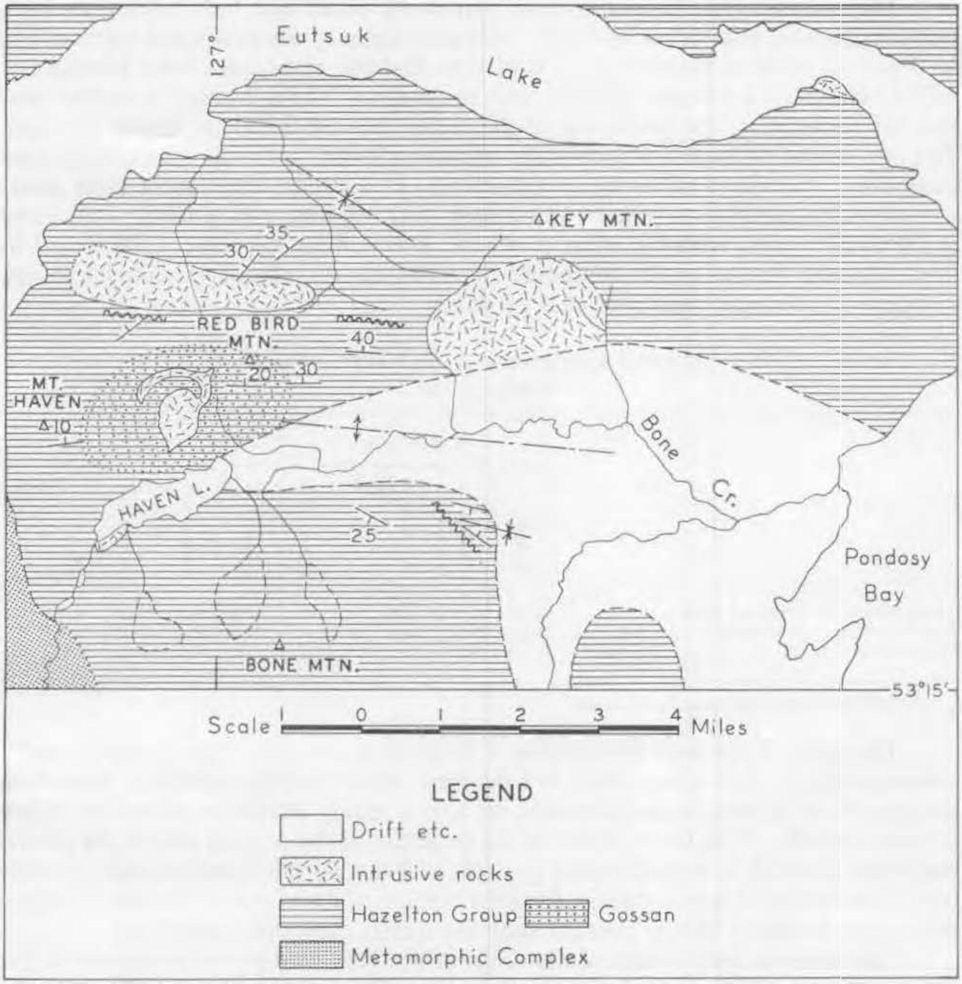


Figure 17. Ashfork Mines Limited. Geology in the vicinity of Haven Lake.

rocks of volcanic origin, chiefly tuffs and volcanic sandstones. The fragments are dominated by finely porphyritic andesites, but scoriaceous and massive basalt and welded rhyolite tuff fragments are present. A mile west of Haven Lake these rocks are in contact with a metamorphic complex. The valley of Bone Creek is eroded from the core of an anticline. Three small intrusive bodies cut the Hazelton Group: a red granite on Key Mountain; a granodiorite tongue, similar to Coast Range rocks, north of Red Bird Mountain; and a quartz monzonite porphyry west of Red Bird Mountain. The latter body is the host of the Red Bird molybdenum deposit and is the subject of the remaining discussion.

The Red Bird pluton is an irregular elliptical cylinder with a semicircular concentric ring-dyke around the northern circumference (*see* Fig. 18). In plan the main mass is about 2,500 by 3,500 feet in major and minor axes. At depth the pluton rakes southward at about 75 degrees. The northern dyke is about 150 to 500 feet wide and is separated by a screen of hornfels some 800 feet wide. The contacts are irregular in detail, and interleaving of small peripheral concentric dykes and hornfels screens is normal. Radial dykes occur in lesser degree.

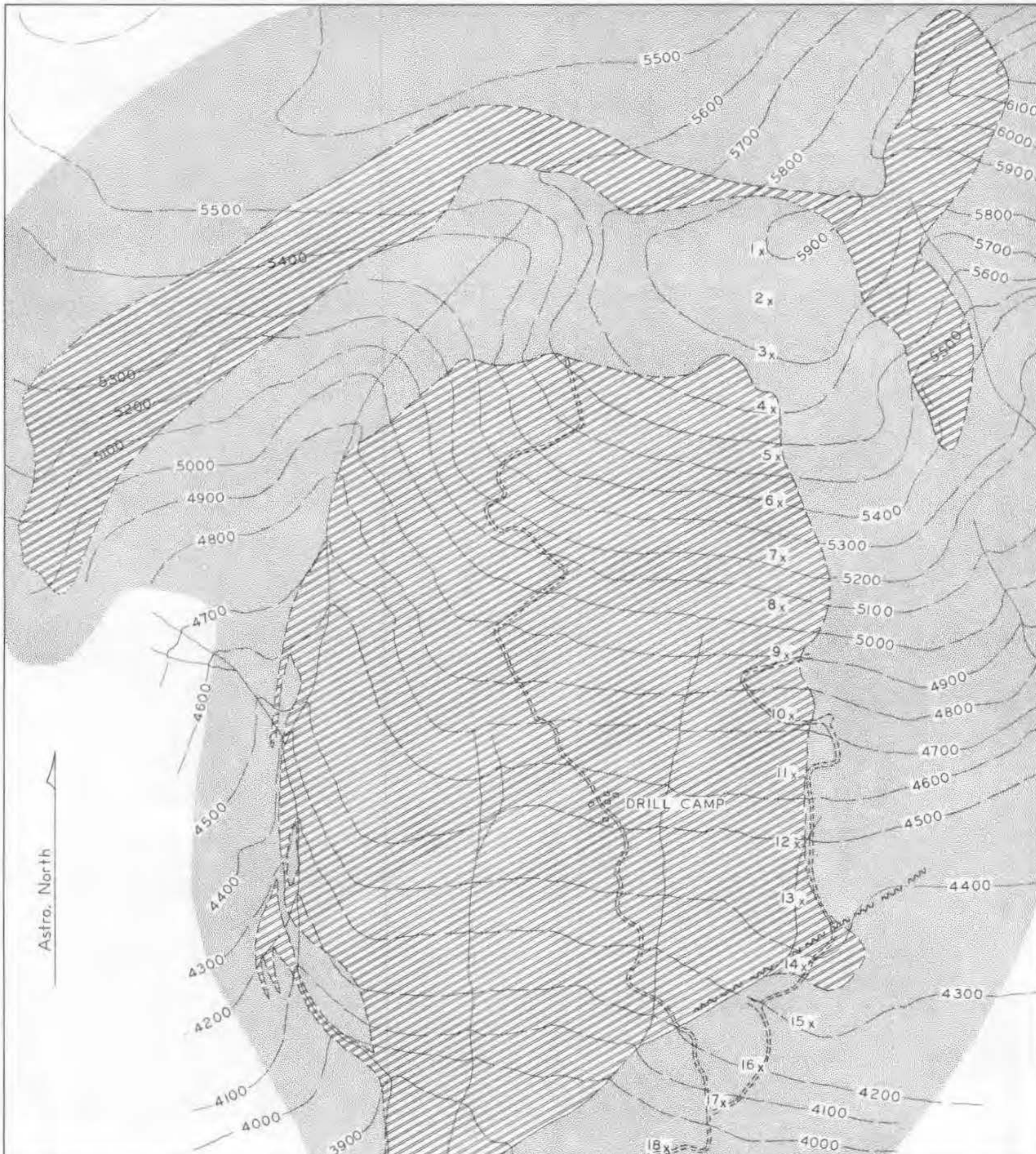


Figure 18
GEOLOGY OF THE RED BIRD
From company plans

Scale 400 0 400 800 Feet

Fault

x Mercury soil sample point

RED BIRD PLUTON

Quartz monzonite porphyry

HAZELTON GROUP

Hornfelsic pyroclastic rocks etc.

The wallrocks are almost entirely pyroclastic rocks that have been deformed, metamorphosed, and metasomatized. Not uncommonly where original textures can be observed close to the contact, it is evident that the rocks have been flattened or rolled out, giving a foliation parallel with the contact. At a distance from the contact the rocks show the gentle dip of the north limb of the Bone Creek anticline. The pyroclastic rocks are all thermally metamorphosed to biotite grade, and some show initial transition of biotite to actinolite. In addition, most have been metasomatized by addition of potash, silica, iron, and sulphur. As a result, orthoclase is the chief or only feldspar, most rocks are pyritic, and some are transformed to white vaguely banded rocks composed of a fine mosaic of quartz with interstitial orthoclase and minor muscovite and pyrite.

Mineral Composition, Red Bird Pluton

(Volume per cent.)

	Phenocrysts					Total				
	Quartz	Plagioclase	Orthoclase	Biotite	Other	Quartz	Plagioclase	Orthoclase	Mafic	Average Of
Quartz monzonite porphyry, fresh	11.8	31.2	5.0	3.5	0.5	34.7	36.5	26.0	4.5	6
With orthoclase porphyroblasts	11.7	17.3	20.0	3.0	—	31.0	19.0	44.0	6.0	3
Monzenite porphyry	1.3	16	?	2.3	1.7	1.0	55.0	34.0	10.0	3[1]

[1] Only one coarse enough to count matrix.

The bulk of the Red Bird pluton is formed of one rock type, a quartz monzonite porphyry, that where fresh is light grey, where slightly altered is pink from the growth of orthoclase poikiloblasts, or where highly altered as described below is white or buff. With the evidence of the structure of the contact and of the partial ring-dyke in mind, it at least seems possible that not all the quartz monzonite porphyry was intruded in one pulse. A minor portion of the pluton is formed of a grey monzonite porphyry that is younger than the quartz monzonite porphyry.

The mineral composition of the rocks of the Red Bird pluton is shown on the accompanying table. The fresh quartz monzonite porphyry is characterized by prominent only slightly corroded quartz crystals that closely approach being six-sided double pyramids. Plagioclase phenocrysts are highly zoned with three to six oscillatory cycles over the range An_{85} to An_{20}. Complex joined crystals and twins are common, although Carlsbad twinning is absent. Sericitic alteration may be slight. The potassium feldspar phenocrysts are orthoclase and may be slightly poikilitic. Biotite occurs in part in fairly equidimensional books. A few crystals of apatite or sphene are big enough to be called phenocrysts. Opaque minerals, either ilmenite or pyrite, are minor. Quartz and feldspar phenocrysts range from 0.2 to 5 millimetres in long dimension. Matrix ranges from 0.01 to 0.015 millimetre and is composed of subequal amounts of quartz and feldspar, only a small part of which is plagioclase.

The slightly altered quartz monzonite porphyry differs from the above chiefly in containing a much higher percentage of orthoclase " phenocrysts " of much larger size and in being pink in colour. The " phenocrysts " are poikilitic, may be up to 15 millimetres in section, and are shown to be porphyroblasts by the nature of the inclusions. For example, plagioclase phenocrysts may be seen only partly enclosed by orthoclase and yet show complete six-cycle oscillatory zoning, whereas in the interior adjacent irregularly rounded plagioclase inclusions may be seen to be palimpsest remnants of one crystal by identical twinning. Most of the potassium feldspar is slightly perthitic. Plagioclase is commonly completely altered to sericite, kaolinite, or both plus minor calcite. The quartz phenocrysts may be recrystallized.

The alteration appears to grade between the two types described, although some core shows sharp transitions that may indicate early phases exist that were altered and then intruded by later unaltered porphyry.

Alteration proceeds beyond the type described above to a rock that is scarcely different than some metasomatized wallrocks; that is, composed of a mosaic of fine quartz in a matrix of potassium feldspar. In such cases the rocks are criss-crossed by a stockwork of quartz veins. Between the extreme alteration and the slightly altered porphyry is a stage in which former plagioclase phenocrysts are recognized as rectangular clots in which kaolinite is predominant, quartz phenocrysts are strained and recrystallized, potassium feldspar is perthite, and biotite is replaced in part by calcite. The matrix will have been recrystallized to a coarser mosaic about 0.075 millimetre in average grain size.

The dark monzonite porphyry is a separate younger phase. It is seen as slightly chilled small crosscutting dykes, and as larger masses. Its relation to mineralization is not fully established; however, it appears to cut some quartz molybdenite veins but is cut by some quartz pyrite veins. It is most likely related to the quartz monzonite porphyry but differs in its colour, by its quartz and mafic content, and its total percentage of phenocrysts. It is a grey rock that contains scattered highly corroded phenocrysts of quartz. The matrix is also nearly free of quartz. Plagioclase is commonly altered to sericite, kaolinite, and carbonate. Hornblende invariably accompanies biotite in subequal amounts (2 to 3 per cent). The opaque minerals are chiefly pyrite; sphene and apatite are common accessories. In relatively coarse-grained specimens, phenocrysts may be as large as 4 millimetres in diameter and the matrix may average about 0.05 millimetre. In such specimens the matrix is composed largely of antiperthite, orthoclase, and minor biotite.

Mineralization

The Red Bird pluton is host to a concentric zone of molybdenum mineralization that is chiefly contained within a peripheral ring of the main mass of the pluton but extending a variable amount outward into the walls (*see* Fig. 18). In varying degree the pluton has been fractured and cut by a stockwork of quartz veinlets, particularly near the contact where the veining and alteration are intense and the mineralization is highest grade. Preferred fracture directions in the stockwork are in decreasing order, north 40 degrees east, north 20 degrees west, and north, all with near vertical dips. The intensity of veining decreases sharply beyond the pluton, but veins occur for several thousand feet radially. In some of these chalcopyrite is common. A pyritic halo extends for one-half to 1 mile beyond the pluton colouring the weathered rocks in a characteristic gossan (*see* Fig. 17).

The sequence of veining and mineralization is complicated. Beyond the ore zone most veins are barren quartz with some scattered pyrite. A few contain traces of molybdenite; others which contain galena, sphalerite, and pyrite or fluorite and calcite appear to be successively younger. In the ore zone, barren quartz veins predate mineralized veins and three stages of barren veins may be recognizable. Three stages of quartz-molybdenite-pyrite veins are likely, but two types occur, banded veins and drusy veins. These may be parallel in major veins. In general, drusy veins seem youngest. Both drusy and banded veins may be cut by late barren quartz with minor pyrite. Potassium feldspar forms up to 10 per cent of many veins. Banded veins appear to have been repeatedly open and mineralized. In the smallest veinlets, laminæ containing platelets of molybdenite are commonest at the margins or centre. Dry fractures coated with molybdenite and pyrite are only common in the hornfels wallrocks.

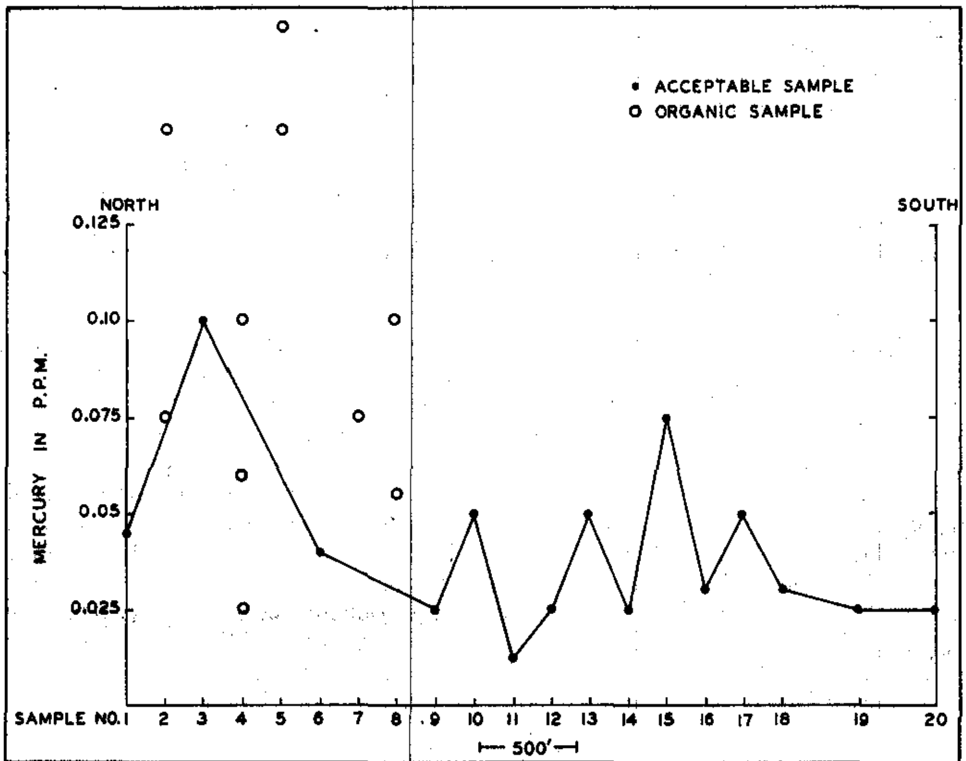


Figure 19. Ashfork Mines Limited. Mercury in soils at the Red Bird.

In the Red Bird deposit, oxidation has been deep, and on the surface much pyrite has been leached and molybdenite changed to ferrimolybdite. In surface veins the latter has been flushed out so that the veins look barren. Only in veins exposed in the major rapidly eroding creeks is much ferrimolybdite or molybdenite seen even over the ore zones. No figures on grade or tonnage have been released by the company.

The writer collected soil samples for mercury analysis along a cut line at the edge of the pluton (*see* Fig. 18). Many samples were too organic to be used, but the resulting profile, Figure 19, shows peaks of 0.10 and 0.75 p.p.m. just outward from the ore zone and a background of 0.025 p.p.m. south of the pluton.

[References: *Minister of Mines, B.C.*, Ann. Repts., 1960, p. 14; 1962, p. 17; 1963, p. 29; 1964, pp. 57–58; 1965, p. 88; Duffell, S., 1959, *Geol. Surv., Canada*, Mem. 299, Whitesail Lake.]

Copper-Molybdenum

Pondosy
Kennco Explorations, (Western) Limited
By W. G. Clarke

(53° 126° S.W.) Office, 730, 505 Burrard Street, Vancouver 1. The Pondosy group of 70 claims, owned by the company, is 3 to 4 miles southeast of Pondosy Bay and 120 miles south of Smithers. The mineralization consists of pyrite and chalcopyrite disseminations in volcanics and porphyry. In 1966, four men under P. T. Black spent one month at the property. A total of 236 feet of AXT hole was diamond drilled. The property was not visited.

Copper-Silver

AT, TA
Meteor Mining Co. Ltd.
By W. G. Clarke

(53° 126° S.W.) Company office, 574 Yates Street, Victoria. T. Kirk, managing director. This group of 34 claims, owned by the company, is on the south side of Tesla Lake and is accessible from Burns Lake by air, a distance of 90 miles. Chalcopyrite, tetrahedrite, and galena mineralization is in siliceous replacement in volcanics and in barite veins in andesite.

In 1966 three men spent five months under the direction of T. Kirk. Geological and geochemical surveys of an area 800 by 2,000 feet were made, and two holes totalling 75 feet were diamond drilled. The property was not visited.

ENDAKO

Molybdenum

Endako Mine
Endako Mines Ltd.
By W. G. Clarke

(54° 125° S.E.) Company office, 1218, 1030 West Georgia Street, Vancouver 5; mine office, Endako. T. H. McClelland, president; H. J. Matheson, mine manager. This company, which is controlled and managed by Canadian Exploration Limited, holds 229 mineral claims and fractions, of which 13 are held under mineral lease. The property lies north of the east end of Francois Lake, 115 miles west of Prince George.

At present the open pit is being mined within an area some 5,000 feet long by 1,000 feet wide. Benches are 35 feet high, and the slope of the final wall is 45 degrees.

During 1966, 10,147,800 tons of material was removed from the pit. Of this quantity, 5,561,000 dry tons was milled, producing 4,175 tons of molybdenite concentrate and 2,439 tons of molybdenum trioxide. Total production amounted to 13,229,852 pounds of molybdenum. Nearly a third of the concentrate was shipped to Japan; the remainder was sold to England, France, Holland, Italy, and West Germany. A very small amount remained in Canada.

Some 489,000 cubic yards of overburden was stripped in 1966. A total of 2,963,612 cubic yards has been stripped from the pit.

Twenty diamond-drill holes were drilled during the year. The total length was 10,993 feet.

While the plant was designed to mill 10,000 tons of ore a day, it averaged more than 15,235 tons a day in 1966. The increase was accomplished without making any major modifications.

During most of the year, mining was done on 34 shovel shifts per week. In December the schedule was changed to continuous production, with 42 shovel shifts per week. Pit equipment consists of two 5-yard shovels, one 8-yard shovel, sixteen 35-ton haul trucks, two rotary drills for drilling 9-inch holes, three tractors, two graders, one ammonium nitrate truck, two secondary drills, one lubrication truck, one water and sand truck, one 25-ton truck crane, two flat-bed trucks with 3-ton cranes, one bus, one 600-cubic-feet-per-minute compressor, and numerous lesser items.

At the end of the year there was a total of 428 employees, 320 on the hourly payroll and 108 on staff.

[Reference: *Minister of Mines, B.C.*, Ann. Rept., 1965, pp. 136–138.]

Molybdenum

K, S, Poop, End
United Buffadison Mines Limited
By W. G. Clarke

(54° 125° S.E.) Company office, 305, 100 Adelaide Street West, Toronto 5, Ont. L. Lahman, president; C. J. Cryderman, consulting engineer; I. F. Morton, consulting geologist. This property consists of 84 claims in two groups straddling the Canadian National Railway 3 miles north of Savory station. There is an access road from Highway 16. In 1966 work consisted of geological mapping and geophysical and geochemical surveys on the K and S groups. In addition, some 10,000 feet of trenching and stripping was done by bulldozer, and 13 " B " wire-line diamond-drill holes totalling 5,991 feet were drilled. A crew of 4 to 10 men worked for 10 months.

[References: *Minister of Mines, B.C.*, Ann. Rept., 1965, p. 135; Assessment Report No. 867.]

Molybdenum

Enco, Molly, Jen, Beaver, Nithi
Canex Aerial Exploration Ltd.
By W. G. Clarke

(53° 124° N.W.) Head office, 700 Burrard Building, 1030 West Georgia Street, Vancouver 5. This group of 47 claims, optioned by the company, is on Nithi Mountain at the eastern end of Francois Lake, and is 8 miles by road from the village of Fraser Lake. Geological, geophysical, and geochemical surveys were made and one hole was diamond drilled 190 feet. B. Patsch and A. D. Drummond, geologists, supervised the six-man crew, who spent six weeks on the ground. The property was not visited.

FORT ST. JAMES

Mercury

K, Belle, M
Ajax Mercury Mines Limited
By W. G. Clarke

(54° 124° S.E. and N.E.) Head office, 16, 425 Howe Street, Vancouver 1; field office, Fort St. James. The K, Belle, M, and other claims, totalling 250 owned and 15 under option, are on the highway 6½ miles north of Fort St. James. Cinnabar occurs in sedimentary and volcanic rocks in the general area of the Pinchi fault. In 1966 five men spent nine months making 15 miles of access roads and doing exploratory trenching and stripping in preparation for future exploration. Some geological mapping was done.

Mercury

Geo, Toad, Darbar, RAF
Cominco Ltd.
By W. G. Clarke

(54° 124° S.E. and N.E.) Western office, 1150 Bay Avenue, Trail. A. B. Mawer, exploration geologist. This group of 164 claims, partly owned and partly optioned, is 10 to 20 miles north and northwest of Fort St. James. It is accessible by road. In 1966 eight men spent four months, under R. Wynne and L. Azzaria, geologists, on exploration. Soil samples for geochemical analysis were taken over the claim area, 16 trenches totalling 1,900 feet were bulldozed, and three holes totalling 470 feet were diamond drilled.

Mercury

CIN
Highland Mercury Mines Limited
By A. Sutherland Brown

(54° 124° N.E.) Company office, 300, 999 West Pender Street, Vancouver 3. The company is controlled by Mastodon-Highland Bell Limited. The property consists of 80 claims in three groups located to the northwest and southeast of the Pinchi mine property. An extensive soil-sampling programme was carried out in 1965, which was followed in 1966 by about 6,000 lineal feet of bulldozer trenching. Trenches were cut to the southwest from bluffs exposing serpentine and ferrodolomite of Trembleur Intrusion on Pinchi Mountain east of the main Pinchi fault. Overburden is very deep over much of the area. To the southwest of the fault, quartz-muscovite-ankerite schists, andesitic tuffs, and minor graphitic schists of the Cache Creek Group are variably exposed in the parts of the trenches that reached bedrock. The sandy limestone band that is the main host at the Pinchi mine is not exposed.

[Reference: Assessment Report No. 686.]

Mercury

KWANIKA CREEK

Pine
Bralorne Pioneer Mines Limited
By W. G. Clarke

(55° 125° N.E.) Company office, 320, 355 Burrard Street, Vancouver 1. E. Bronlund, geologist. The Pine group of 32 claims is north of the junction of Kwanika and West Kwanika Creeks. It is accessible from Fort St. James by 175 miles of gravel road. Bedrock is covered by a thick mantle of overburden, and there are no outcrops. In 1966, 16 trenches of a total length of 6,653 feet were made by bulldozer, and 93,000 square feet of bedrock was stripped. Five men worked for two months under the supervision of Emil Bronlund.

Copper-Molybdenum

Boom, Frankie, CV, TX, CHO, MG, OVP, JAM
Hogan Mines Ltd.
By W. G. Clarke

(55° 125° S.E. and N.E.) Head office, 301, 550 Burrard Street, Vancouver 1. This group of 214 claims is on Kwanika Creek east of Tsayta Lake. The property in 1966 was being explored by Canex Aerial Exploration Ltd. under agreement with Hogan Mines Ltd. A crew of 15 men spent five months working under the supervision of W. S. Pentland and B. Patsch, geologists. Geological, geophysical, and geochemical surveys were made, 738 feet of trenching was done by bulldozer, 11 diamond-drill holes totalling 2,807 feet were drilled, and 9,500 feet of access road was built.

Copper

TAKLA LAKE

Bol
Helicon Explorations Limited
By W. G. Clarke

(55° 125° S.W.) Head office, 133 East 14th Street, North Vancouver; field office, Williams Lake. D. Milburn and M. Erskine, geologists. This group of 60 claims, owned by the company, is on the west side of Takla Lake, 3 miles southwest of Takla Landing. It is accessible by river boat from Fort St. James. Geophysical and geochemical surveys were made, and seven rock trenches totalling 110 feet were excavated. Six men spent two months on the property. The property was not visited.

Molybdenum

OSILINKA RIVER

Slide
Kennco Explorations, (Western) Limited
By W. G. Clarke

(56° 125° S.W.) Office, 730, 505 Burrard Street, Vancouver 1. R. W. Stevenson, senior geologist. This group of 40 claims, owned by the company, is on the west side of Haha Creek, tributary of Osilinka River, 12 miles southwest of Uslika Lake. Access is by road from Germansen Landing to the Osilinka Crossing, and thence by helicopter to the property. Four men spent one month under R. W. Stevenson making geological and geochemical surveys. The property was not visited.

CARIBOO MINING DIVISION

MOUSE MOUNTAIN

Copper

Wanda
The Granby Mining Company Limited
By W. G. Clarke

(53° 122° S.E.) Head office, 507, 1111 West Georgia Street, Vancouver 5. K. C. Fahrni, chief geologist. This group of 28 claims, optioned by the company from Clarence Fuller, is on Mouse Mountain 13 miles east of Quesnel and is accessible by road. Geological and geophysical surveys were made, and trenching and bedrock stripping were done by bulldozer. Three men worked for two months. The property was not visited.

WELLS-BARKERVILLE

Gold

Aurum
The Cariboo Gold Quartz Mining Company Limited
By W. G. Clarke

(53° 121° S.W.) Company office, 617 West Pender Street, Vancouver 2; mine office, Wells. J. R. Morris, president; Marcel Guiguet, mine manager; Charles McNiel, mine superintendent. The mine is on the east side of Island Mountain, at Wells. The Cariboo Gold Quartz Mining Company Limited acquired the property in 1954 from Island Mountain Mines Limited, who had worked the mine for 20 years. Ore is trucked from the mine to the Cariboo Gold Quartz mill on Cow Mountain, which is the location of the original mine that is now depleted. The offices, warehouse, shops, and power-house are at the mill-site.

Recently practically all mining was done in the Burnett-Mosquito area. Development in 1966 consisted of 3,268 feet of drifting and crosscutting and 271 feet of raising. A total of 11,897 feet of diamond drilling was done, and 2,663 feet of test-holes was drilled with percussion drills.

In 1966, 28,877 tons of ore was milled having a grade of 0.73 ounce gold per ton. From this, 20,312 fine ounces of gold and 3,390 fine ounces of silver were recovered. A crew of 90 men was employed.

Lead-Silver

Space, Ma
Mount Agnes Mines Ltd.
By W. G. Clarke

(53° 121° S.W.) Head office, 514, 615 West Pender Street, Vancouver 2. D. G. McRae, president. This group of 51 claims, owned by the company, is on Mount Agnes, 5 miles southwest of Barkerville. It may be reached via 3 miles of gravel road and 2 miles of " Cat " road. In 1966 a crew of two to three men spent three months stripping bedrock and trenching. Some detailed geological mapping was done, and soil samples at 200-foot intervals were taken for geochemical analysis. The property was not visited.

McLEESE LAKE

Copper

Mayday, Remo, Brenda, Sue
Earlcrest Resources Ltd.
By W. G. Clarke

(52° 122° S.E.) Head office, 213, 678 Howe Street, Vancouver 1. R. Stokes, consulting geologist. This block of 98 claims, optioned by the company, is on the road to Likely 4 miles northeast from McLeese Lake. In 1966 five men spent six weeks on geophysical surveys (ground magnetometer and induced polarization). The property was not visited.

Copper

Ann
Fidelity Mining Investments Limited
By W. G. Clarke

(52° 122° S.E.) Head office, 11th floor, 20 Toronto Street, Toronto, Ont. The Ann group of 38 claims, optioned by the company, is 2 miles northeast of McLeese Lake and is accessible by road. Three men spent six months making geological, geophysical, and geochemical surveys. The property was not visited.

[Reference: Assessment Report No. 908.]

Geology of the Granite Mountain-Cuisson Lake Area

By A. Sutherland Brown

The area east of Cuisson Lake around Granite Mountain is underlain principally by granitoid rocks with only minor occurrences of tuffs, limestones, or their metamorphic equivalents. The stratified rocks in all probability are part of the Permo-Pennsylvanian Cache Creek Group. The age of the granitoid rocks is not known. A small map of the area was published in the Annual Report for 1957, page 15.

The geology of the Gibraltar and Pollyanna properties is very similar and is here treated together. Figure 20 is a sketch showing the general claim areas of the Pollyanna and Gibraltar properties and the location of diamond-drill holes prior to July, 1966. The area is entirely underlain by granodiorite of the Granite Mountain batholith or schists derived from it. Other rock types, except for minor aplites, seemingly are absent. The granitoid rocks were originally foliated and have been subjected to a long history of deformation and low-grade regional metamorphism. They now range from slightly cataclastic granodiorite to chloritic quartz muscovite schist and do so in a reticulate network in plan and section and on all scales. Major through-going shears are rare compared to the irregular discontinuous, reticulate schist zones.

The least deformed specimens of granodiorite are medium-grained rocks consisting of about 50 per cent plagioclase, 20 per cent quartz, 13 per cent biotite, 7 per cent hornblende, and 10 per cent of low potash alkali feldspar. Accessory minerals include pyrite, sphene, apatite, and rutile. The composition of this rock is marginal between granodiorite and quartz diorite and by some would be called quartz diorite. Plagioclase occurs as unzoned laths of An_{35} that have been extensively replaced by sericite and clinozoisite, except for a thin clear rim. Hornblende is fresh, euhedral, and slightly poikilitic; biotite is partly replaced by chlorite and epidote; and quartz occurs in large anhedral crystals. Interstitial to these minerals, an alkali feldspar occurs that resembles perthite, in that its patchy twinning resembles intergrowths, but there is no internal relief, and indices of refraction are relatively high so that the mineral is largely sodic. Even the least deformed specimens show some cataclasis; most biotite books have been bent and fractured and many extended like a deck of cards, some plagioclase laths have been fractured and bent, and a few quartz grains shattered and recrystallized. Such rocks are progressively transformed first into cataclastic granodiorites and then to mylonitic granodiorite and finally to chloritic quartz muscovite schists. In the cataclastic granodiorites, most plagioclase laths are aligned and others fractured and bent, the quartz is highly strained and fractured or recrystallized, and former mafic minerals are now elongated clots of chlorite and epidote. With further cataclasis and probably mild metamorphism, plagioclase laths are progressively eliminated by growth of trains of aligned muscovite and finally complete recrystallization and drawing-out of musco-

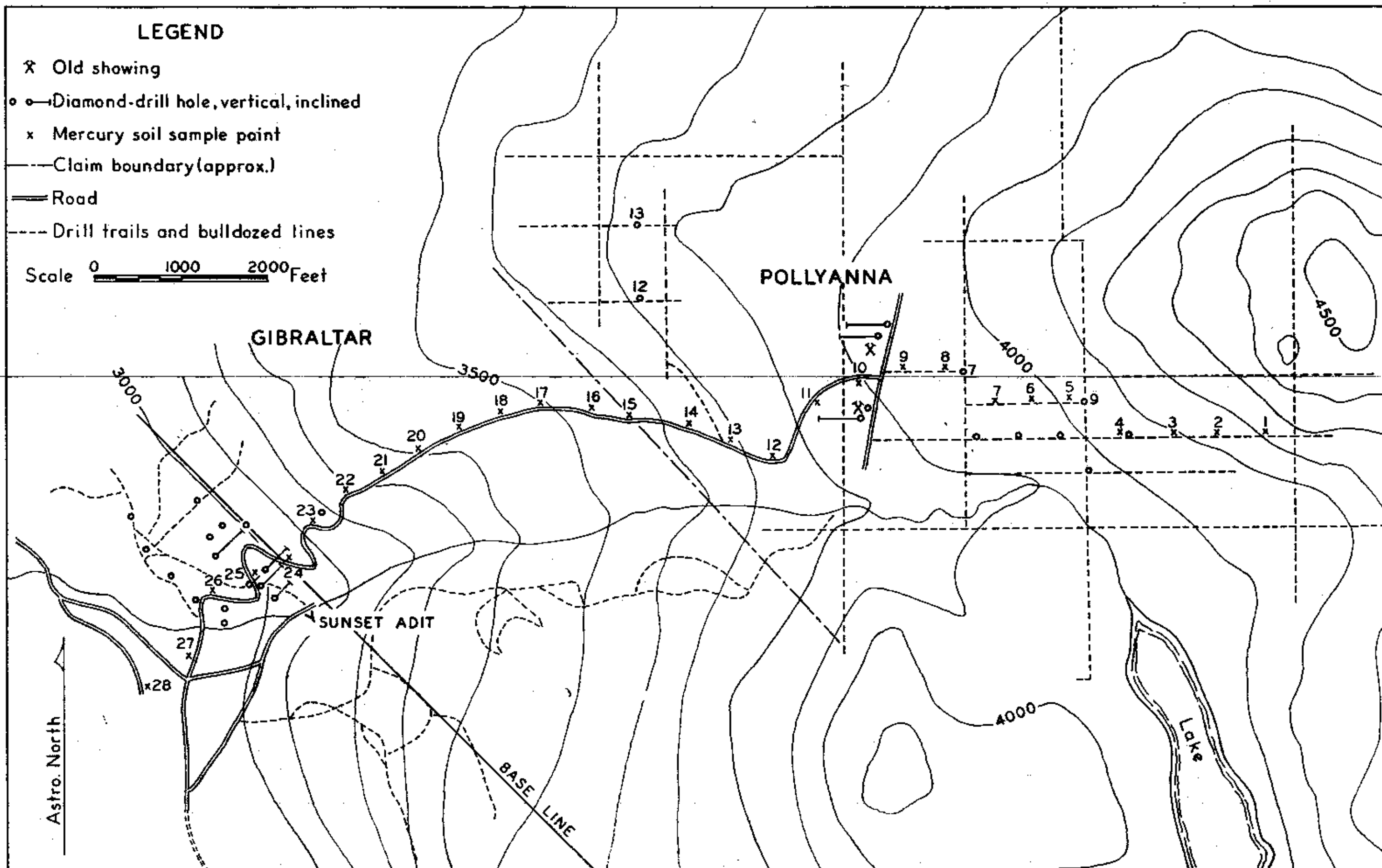


Figure 20. Sketch showing the location of the Gibraltar and Pollyanna.

vite-rich areas into lenses or bands. Further deformation produces a variable schist with quartz eyes or bundles of mosaic quartz separated by layers that are muscovite- or chlorite-rich but include quartz, epidote, and possibly new plagioclase or calcite. These micaceous bands are subject to further microfolding or kinking, giving a marked lineation on micaceous folia oriented along the strike to the northwest.

The only dyke rocks present are small aplites related to the granodiorite. These are composed of the following minerals: Sericitized plagioclase, 65 per cent; quartz, 20 per cent; alkali feldspar with patchy twinning, 10 per cent; and chlorite, carbonate, and opaque minerals, 5 per cent. The aplites may be transformed into clinozoisite quartz rocks in some localities.

The pattern of deformation is extremely intricate. Primary foliation of the granodiorite appears to have been oriented north 70 degrees west and to have dipped about 20 degrees southward. Later movement has been channelled partly on these planes and partly on steeper planes (35 to 65 degrees) generally oriented more northerly (north 35 to 60 degrees west). The whole area is cut into a reticulate network in which fairly massive blocks are surrounded by more schistose zones. On a large scale, blocks of fairly massive granodiorite are isolated by schist zones, and on a small scale relatively undeformed eyes are isolated by micaceous folia. Transition from massive to schistose normally is gradational but may be fairly sharp. In addition to the reticulate shearing, some younger fault shears are present, oriented north 40 degrees west and north and dipping steeply west.

Mineralization

Chalcopyrite and pyrite are widely distributed in the area of Figure 20, particularly in areas where drilling has been concentrated. Molybdenite is of more restricted occurrence; chalcocite occurs replacing pyrite in certain near-surface localities. Pyrite and chalcopyrite both occur disseminated in transecting quartz veins, and in quartz-rich segregations and blebs parallel to schistosity. Disseminations commonly occur in streaks and networks following chlorite-rich micaceous laminæ. On a larger scale, schist zones are commonly the best mineralized. Pyrite may have been deposited more than once because in adjacent schistose bands some occur as undistorted cubes with quartz shadows and others as striated and smeared-out masses. Chalcopyrite may mantle pyrite cubes; more commonly it is separate and may occur in adjacent separate streaks. Some pyrite-rich areas contain little chalcopyrite. Quartz veins are commonest near late transecting shears, and these may be the main source of mineralizing fluids further distributed by the reticulate network.

Mercury in Soils

Figure 21 is a profile of samples collected at the points shown on Figure 20 and analysed by Lemaire S1 detector for mercury. The peaks are relatively low but well separated from background values and well located in regard to known showings.

[Reference: *Minister of Mines, B.C.,* Ann. Rept., 1957, pp. 14–18.]

Copper

Gibraltar
Gibraltar Mines Ltd.
By A. Sutherland Brown

(52° 122° N.E.) This property includes 182 claims that cover much of the valley north and east of Cuisson Lake and the lower slopes of Granite Mountain. The latter is about half-way between Quesnel and Williams Lake. The property is centred on the old Sunset adit and has had sporadic exploration in the past, notably in 1957 by Kimaclo Mines Limited, a private company, and in 1962–63 by Keevil Mining Group Limited. The property is held by Gibraltar Mines Ltd., Vancouver.

In 1965 and the spring of 1966, Gibraltar conducted geochemical and geophysical surveys, drilled a large number of percussion holes and 15 BQ diamond-drill holes. Supervision was by W. Meyer, geologist. In May, 1966, Cominco Ltd. took an option on the main part of the property, and since then Cominco has conducted 19 line miles of induced polarization survey, an equivalent amount of geochemical soil surveys, and drilled about 14,000 feet of BQ holes. Total diamond drilling to date is 21,195 feet. R. C. Armstrong was in charge of the work. Cominco has recently concluded an agreement with Mitsubishi Metal Mining Co. Ltd. to explore the property jointly.

[Reference: *Minister of Mines, B.C.*, Ann. Rept., 1957, p. 17.]

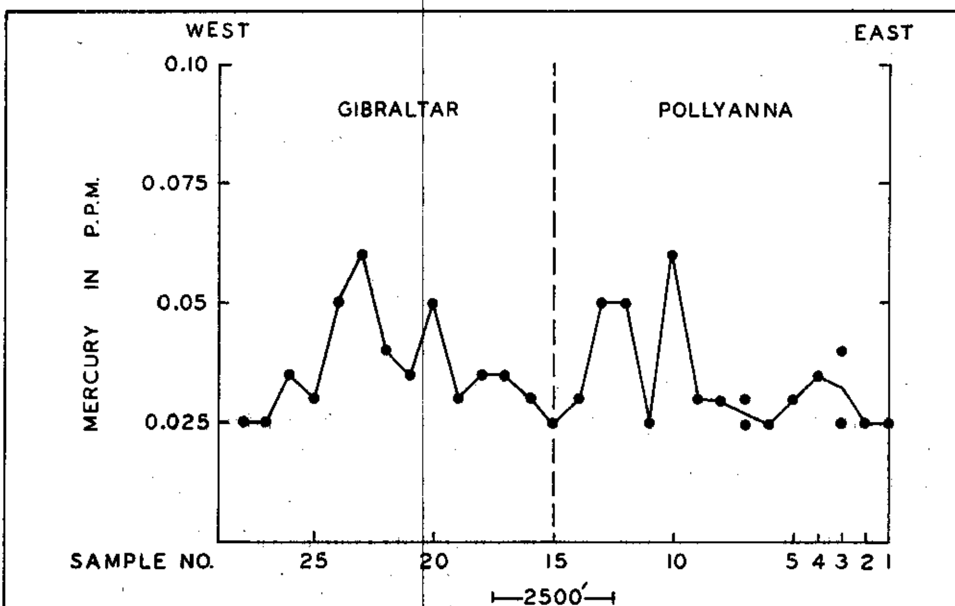


Figure 21. Mercury in soils at the Gibraltar and Pollyanna.

Copper

Pollyanna (52° 122° N.E.) This property includes most of the western part of Granite Mountain, which is about half-way between Quesnel and Williams Lake. The property consists of 80 located claims and includes the old Pollyanna showings at about 3,900 feet, northwest of the lake at the source of Granite Creek. The company's head office is in Houston, Texas, and Vancouver office, 506, 675 West Hastings Street; R. E. Gale, manager of exploration; J. C. Hamm and F. J. Humphrey, geologists on the property.

Duval Corporation

By A. Sutherland Brown

Intensive exploration of the area started with geochemical and geophysical surveys by Keevil Mining Group Limited in 1962–63. In 1965 Duval Corporation took an option on the Pollyanna property and conducted an induced polarization survey along 4 miles of line and drilled four NQ holes near the old showings. In 1966 a further 6 line miles of induced polarization survey and detailed geological and geochemical soil surveys were conducted, and nine NQ holes were drilled. An agreement has recently been signed with Canex Aerial Exploration Ltd. to continue joint exploration on the property.

[Reference: *Minister of Mines, B.C.*, Ann. Rept., 1957, pp. 17–18.]

LIKELY

Copper

CE, CHA
Chataway Exploration Co. Ltd.
By T. M. Waterland

(52° 121° N.W.) Company office, 1926 Ogden Avenue, Vancouver 9. The company holds the CE and CHA claims on Jacobie Lake near Likely. Six men were employed during the summer under the direction of Harry Mayson. The crew lived in a cabin to the west of the lake. Lines were slashed on a grid pattern for a soil-sampling programme that covered 255 mineral claims. Magnetometer work was tentatively planned. During September some 1,200 lineal feet of bulldozer trenching and stripping was carried out and some access roads were cleared.

[Reference: Assessment Report No. 885.]

Copper

Liz
New Jersey Zinc Exploration Company (Canada) Ltd.
By T. M. Waterland

(52° 121° N.W.) Company office, 905, 525 Seymour Street, Vancouver 2. The company has a 16-claim group on Jacobie Lake, southwest of Likely. Two men supervised by J. B. Seaton, geologist, spent a month making a magnetometer and soil-sampling survey of the claims.

[Reference: Assessment Report No. 871.]

Copper

CGQ
The Cariboo Gold Quartz Mining Company Limited
By W. G. Clarke

(52° 121° N.W.) Company office, 913 Royal Bank Building, 675 West Hastings Street, Vancouver 2. The CGQ group of 59 claims, lying west of Maud Lake, is held by The Cariboo Gold Quartz Mining Company Limited. A geochemical survey was made of the claims. No copper anomalies worth further work were found.

[Reference: Assessment Report No. 960.]

Copper

Polley, Red Rock, Bee, Herb
Giant Explorations Limited
By T. M. Waterland

(52° 121° N.W.) Company office, 1825, 355 Burrard Street, Vancouver 1. This block of 109 claims held by the company lies between 2,400 and 3,400 feet elevation and is reached by about 4 miles of road from Likely. Early in the season, Vanmetals Exploration Limited made geochemical and magnetometer surveys on the Polley and Red Rock. These claims subsequently were acquired by Giant Explorations Limited.

During 1966 four men worked on the property for a two-month period under the supervision of R. Devaney. Some geochemical work was done, as well as about 6,500 feet of bulldozer trenching and some stripping.

Copper

Bayshore, B.I., Key
Torwest Resources (1962) Ltd.
By T. M. Waterland

(52° 121° N.W.) Company office, 702, 850 West Hastings Street, Vancouver 1. Seventy claims are owned by the company south and west of Polley Lake in the Likely area. Mineralization consists of chalcopyrite disseminated through granodiorite and volcanic rocks. Work during the year was done by three men in a two-month period and was under the direction of W. E. Hainsworth. A geochemical sampling programme was carried out on all claims.

Copper

Carmadon, Don (52° 121° N.W.) Company office, 844 West Hastings Street, Vancouver 1. The company holds a large group of claims immediately to the north of the Cariboo Bell property at Bootjack Lake. Work during the season was under the direction of P. Fox and included soil-sampling and magnetometer surveys. Later in the season some trenching was done on a geochemical anomaly, and about 2 miles of road was constructed. Unsuccessful attempts were made to drill through overburden on the property.

Croydon Mines Ltd.
By T. M. Waterland

Copper

Cariboo Bell (52° 121° N.W.) Cariboo-Bell Copper Mines Limited owns the B.J. 1 to 60, 63 to 132, 141 to 168, and Bootjack No. 1 and No. 2 fractional recorded claims, which lie along both sides of Bootjack Lake, extending to Polley Lake on the east and to Trio Lake on the west. Bootjack Lake is 6 miles southwest of the village of Likely. The claims were located and explored by Mastodon-Highland Bell Mines Limited, 999 West Pender Street, Vancouver 1, but in December, 1965, a new company, Cariboo-Bell Copper Mines Limited, was formed to acquire these recorded claims and to continue exploration and development. Camp superintendent of the property is G. M. Newcombe, and geologist Dr. Toru Kikuchi. In October, 1966, letters of intent regarding further development were exchanged with three Japanese companies, Mitsui Mining & Smelting Co., Ltd., Sumitomo Metal Mining Co. of Canada Ltd., and Nippon Mining Company, Limited. In the agreement, development was to progress in two stages with preparation for production a third stage.

Cariboo-Bell Copper Mines Limited
By A. Sutherland Brown

During 1964 and 1965 a large amount of geochemistry, geophysics, and bulldozer stripping was done on the property. This was followed in 1966 by a large amount of drilling with two BX wireline drills and one Copco drill and, in addition, detailed geological, geochemical, and ground magnetometer surveys. Drilling started in February, 1966, and most holes were drilled to 400 feet. The percussion holes were drilled wet to an equivalent depth. Total footage to the end of the first development stage in March, 1967, was: Diamond drilling, 48,301 feet, 123 holes; percussion drilling, 6,585 feet, 32 holes. At the time of the writer's visit in June, only some 13,000 feet had been drilled. The following account depends largely on information gathered by the writer at that time but is augmented by company information of more recent date.

Geology

The property is in a strip between Horsefly and the Quesnel River at Moorehead Creek, in which outcrop, although scarce, is almost entirely Lower Jurassic purple and green andesite tuffs, breccias, and flows. In the vicinity of the property, at Mount Polley and Bootjack Mountain, these volcanic rocks are intruded by a sequence of fine quartz-free granitoid rocks and porphyries ranging from syenodiorite to syenite. Outcrop is fairly common on hilltops and steeper slopes but is rare elsewhere, hence the over-all outline of the intrusions is not well known. Two centres that are not entirely separate are apparent—one on Bootjack Mountain and one on Mount Polley. The following description is concerned only with the Mount Polley stock and principally with the central area of this stock. There natural outcrop and extensive trenches reveal evidence of a sequence of intrusion, brecciation, metasomatic alteration, and mineralization so involved that only a most thorough study could unravel the details. This report is preliminary.

The Mount Polley stock is formed of a suite of rocks that have so many characteristics in common that a family relationship can be assumed. In particular all rock types contain similar augite as the main mafic mineral; all contain about 5 per cent magnetite, most specimens have some stubby apatite phenocrysts and an abnormal amount of sphene, and none contain quartz or feldspathoids. In composition they range from syenodiorite through at least three types of monzonite porphyries to syenite and pyroxene lamprophyre. Inclusions and screens of metavolcanic rocks, skarns, and early phases are abundant. Multiple intrusion, brecciation, intense alteration, and mineralization form part of the plutonic sequence. Unaltered rocks are either fine grained or have a fine matrix, and vugs and drusy cavities are abundant in the breccias, and former miarolitic cavities occur in some specimens of porphyry; therefore, the intrusions occurred at shallow depth.

Figure 22 shows an interpretation of the geology of the central area. The oldest rocks are dark-green slightly porphyritic massive or clastic andesites which occur in greatest amount in trench 19 in the southeast; however, as metavolcanic skarns these are common as inclusions and screens, particularly within the breccia areas. In such settings they are commonly irregularly banded or mottled rocks composed of varying amounts of garnet, pyroxene, magnetite, potash feldspar with clinozoisite, calcite, chalcopyrite, muscovite, plagioclase, apatite, and rarely some zeolites. Some volcanic rocks are so metasomatized in the breccia areas that they are distinguishable from intrusive porphyries in the same setting only by the rocks into which they grade.

The relative age of the various intrusive phases, the brecciation, and alteration are not fully known. The intrusive phases included a granitic-textured syenodiorite, three monzonite porphyries, and a lamprophyre dyke phase. The main element of doubt is where the syenodiorite fits in the sequence.

Mineral Composition, Fresh Intrusive Rock, Cariboo Bell

(Volume per cent.)

	Plagioclase	Potash Feldspar	Augite	Biotite	Magnetite	Other	Total Phenocrysts	Average Of
Crowded porphyry (1)	60.1	14.2	17.5	—	4.8	3.4	55	4
Porphyry (2)	44.4	25.6	16.2	5.8	6.8	1.2	65	5
Porphyry (3)	12	2	14	0.5	2	69.5 matrix	30.5	2
Syenodiorite	46.2	18.7	19.4	8.0	6.4	1.3	—	8
Lamprophyre	28	30	35	—	7	—	—	1

The preceding table shows the mineral composition of all fresh intrusive rocks. The porphyry phases will be described first from oldest to youngest. These are all similar and will be called monzonite porphyries, although this name is not entirely suitable for the first phase (1). This is typically a foliated crowded porphyry with prominent plagioclase laths in an aphanitic matrix of grey, brown, or pink. On casual inspection it may look as if it is granitic textured. Normally the augite is fresh but may be partly altered to chlorite or hornblende. The plagioclase occurs in laths up to 5 millimetres long and stubby compound grains with complex twinning. It is nearly completely sericitized. It appears to have been zoned over the interval An_{50-30}. Potash feldspar occurs as rare phenocrysts and forms half the fine-grained matrix together with plagioclase. Magnetite is partly in large grains. Biotite is absent. Accessories include stubby phenocrysts of apatite and prisms of sphene. Common alteration minerals in small amounts include clinozoisite and prehnite.

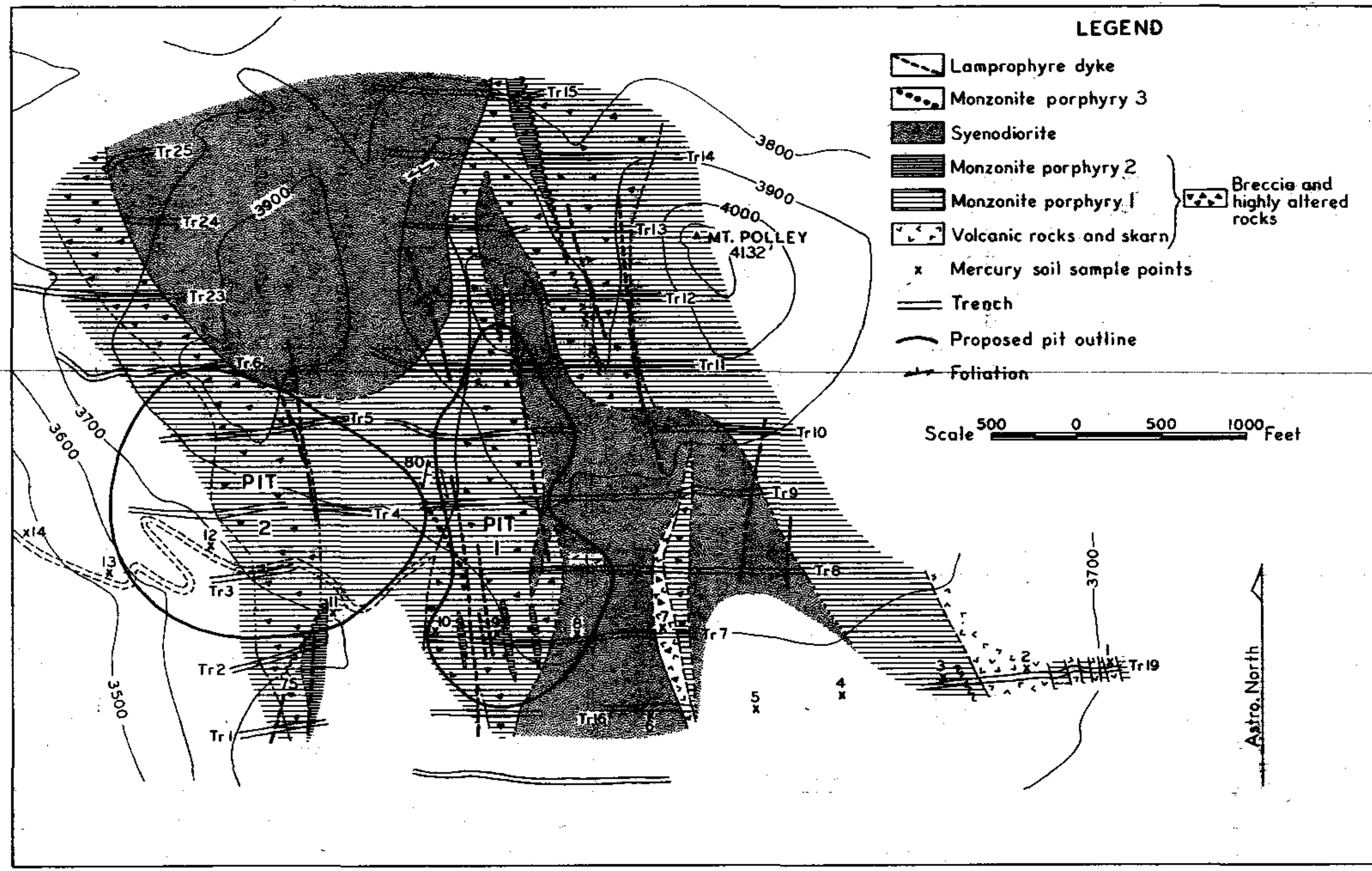


Figure 22. Cariboo-Bell Copper Mines Limited. Geology of the Cariboo Bell.

The second phase (2) is also a crowded porphyry with an even smaller percentage of matrix and even less obviously a porphyry. It is normally grey with a fine intersertal texture. Occasional large white (3 by 2 millimetres) plagioclase phenocrysts are characteristic. Augite may be fresh or partly altered to biotite or more rarely prehnite, chlorite, and epidote. Biotite is present also as a primary mineral as ragged middle-sized grains. The plagioclase was zoned andesine but is almost completely sericitized except for a thin rim. Potash feldspar occurs chiefly in the matrix. Accessory sphene and apatite are common. Zeolites occur in addition to the alteration minerals mentioned.

The third phase (3), as far as is known, is a minor dyke phase. It is similar to (1) but contains fewer phenocrysts in a finely aphanitic, chocolate-coloured matrix. It is generally quite fresh, but plagioclase may be partly altered to muscovite or prehnite. It appears to be a post-mineral phase.

The syenodiorite is a fine- to fine-medium-grained (0.5 to 2 millimetres) granitic-textured rock that is normally dark grey but without being greatly altered may be pinkish. Occasionally large mafic phenocrysts are common. At many localities it has a fair foliation, at others a lathy intersertal texture. Plagioclase was zoned from An_{70-30} but is now highly sericitized. Potash feldspar generally is interstitial. Mafic minerals other than the magnetite are associated in a characteristic manner. Fresh pyroxene may be mantled by hornblende or biotite, and either one may extend away from the mantle as a large poikilitic grain with inclusions of small plagioclase laths. Biotite is more common than hornblende, and all three may occur in one specimen. The biotite may be partly altered in an interleaved fashion to chlorite. Sphene and apatite are common accessories. Prehnite is a rare alteration after plagioclase.

The lamprophyre is an unusual rock of prominent zoned augite (1 to 5 millimetres) in a finer matrix of highly zoned sericitized plagioclase (An_{75-50}) and magnetite with interstitial potash feldspar. The rocks weather rapidly to a dark sand, and some dykes can be identified in the trenches by this means. In addition, a number of small post-mineral dykes occur that are unrelated to the main plutonic suite. These are mostly sugary-textured light greenish-grey andesites.

On the geological map an additional unit is shown called breccias. This is a simple term for the complex of breccias and altered rocks that are of major importance in regard to the economic mineralization. The range of types present is large, and the commonest feature is the salmon colour of most rocks, resulting from extensive potash metasomatism. The original rock type of many specimens cannot be definitely identified, but amongst those that have been are the following:—

(1) Metavolcanic skarns and breccias of these in a plutonic matrix.
(2) Breccias of porphyry in a different igneous matrix.
(3) Breccias of porphyry only slightly expanded with a drusy matrix filled with potash feldspar, biotite, amphibole, magnetite, chalcopyrite, and stilbite.
(4) Highly altered porphyry with or without many inclusions and with or without large poikilitic porphyroblasts of potash feldspar.

Where alteration is least, it is the crowded porphyry (1) that is generally recognizable as the main type that occurs as breccia fragments or original host. In some cases this porphyry is entirely converted into a syenite or even an orthoclase rock with just palimpsest plagioclase, augite, or magnetite. This altered salmon porphyry may be contained in a greyer matrix composed chiefly of large irregular orthoclase or rarely microcline crystals with biotite. The porphyry (2) is present in lesser amounts and may contain definite fragments of porphyry (1).

Rocks of normal mineralogy and alteration may, upon brecciation, be subjected to further alteration, in which much plagioclase in the matrix is replaced by potash feldspar and phenocrysts may be either only sericitized, or mantled, or entirely replaced by orthoclase. Augite may be fresh or replaced by clinozoisite, talc, serpentine, biotite, sphene, carbonate, or some combination. Prehnite is relatively common, and apatite and sphene more common than in original porphyries. Many of the breccias and altered rocks are also fairly porous, and most contain some chalcopyrite preferentially in the breccia matrix as well as in small seams and disseminated. Late zeolite veinlets are common.

The geological map, Figure 22, is partly diagrammatic. The geology in the breccia areas is very complex. The plutonic sequence that seems most likely is as follows:—

(1) Intrusion of porphyry (1).
(2) Intrusion of porphyry (2) overlapped or followed by brecciation and main alteration and mineralization. Closely followed by—
(3) Intrusion of syenodiorite.
(4) Dykes of porphyry (3).
(5) Dykes of lamprophyre.

The cause of brecciation is most likely tectonic, in that the belts of breccia are fairly linear, trending generally northward but seeming to diverge about a "core" of syenodiorite. Brecciation may have occurred in advance of intrusion of one of the later phases, either porphyry (2) or the syenodiorite. One of the unexplained complexities is that foliation in the syenodiorite appears disconformable with the contacts. This could be taken to indicate it was an early phase, later truncated, although dykes of the porphyries have not been identified in the main syenodiorite masses, and alteration of the syenodiorite is slight. Both of the latter facts strongly suggest the syenodiorite was a late phase.

The lamprophyre dykes follow late small northerly trending steep faults. One fairly important shear zone follows the altered rocks in this same orientation.

Mineralization

The Mount Polley stock is extensively mineralized with chalcopyrite, particularly in the breccia zones. Pyrite occurs as in a partly peripheral halo. Chalcopyrite is chiefly distributed in the matrix of breccia very commonly within biotite or in drusy cavities. It also coats dry fractures and occurs as disseminated grains. Extensive replacement has also occurred of some metavolcanic inclusions in breccia zones, in which case calcite is the most readily replaced mineral. Bornite is present in very minor amounts. Pyrite either in the ore zone or peripheral halo tends to be more truly disseminated than chalcopyrite.

Many secondary copper minerals, notably malachite, azurite, traces of cuprite and chrysocolla, and native copper, occur in the outcrop and trenches, and in the upper part of drill-holes.

The company has stated that drilling has outlined approximately 37,000,000 tons of ore of an average grade of copper, 0.50 per cent, and gold, 0.015 ounce per ton before dilution. This reserve is in three blocks. Block A contains 15,549,000 tons averaging 0.458 per cent copper with a waste to ore ratio of approximately 1 to 1, but has 3,700,000 tons assaying 0.65 per cent copper and 0.015 gold with a waste to ore ratio of 1 to 1. Block B contains 20,432,000 tons averaging 0.524 per cent copper with a waste to ore ratio of 1.9 to 1. Block C contains 1,184,000 tons averaging 0.664 per cent copper with a waste to ore ratio somewhat in excess of

2 to 1. The proposed pits for blocks A and B, pits 1 and 2 respectively, are outlined on the geological map. Block C is a small area about trench 14.

The writer collected samples for analysis by a Lemaire S1 mercury detector along a line from trench 19 to trench 16, then by trench 7 to the access road and on down to Bootjack Lake. The profile is shown as Figure 23. A peak of 0.10 to 0.11 was recorded from a sample from the west end of trench 16.

[Reference: *Minister of Mines, B.C.,* Ann. Rept., 1965, pp. 140–141.]

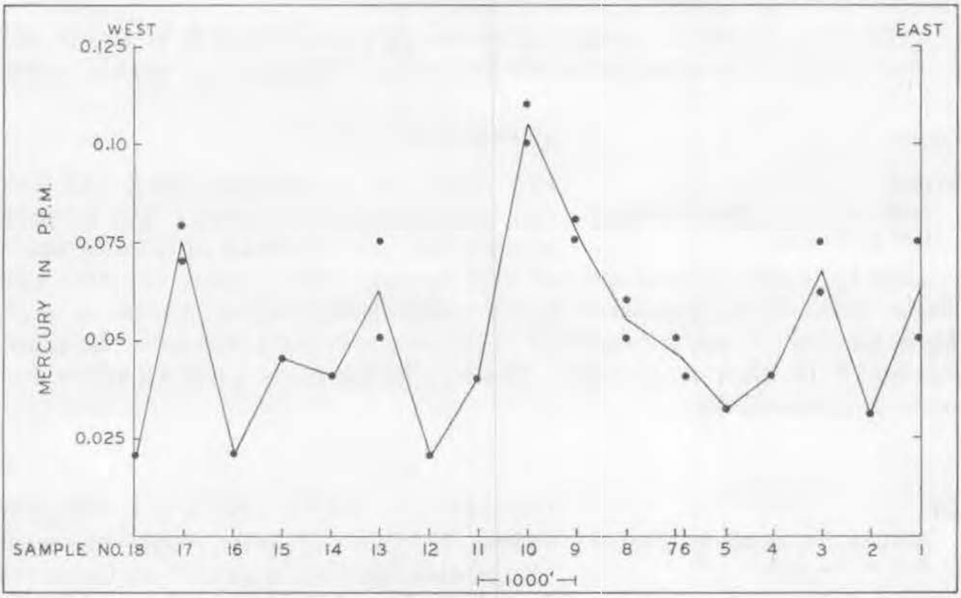


Figure 23. Cariboo-Bell Copper Mines Limited. Mercury in soils at the Cariboo Bell.

Copper

Carex Mines Ltd.
By T. M. Waterland

(52° 121° N.W. and 52° 122° N.E.) Company office, 303, 550 Burrard Street, Vancouver 1. The company holds a large number of claims in six groups as follows: 120 claims near Jacobie Lake, 100 claims (Gay group) on the Quesnel River near Hydraulic, 40 claims on Buxton Creek, 60 claims east-southeast of Buxton Creek, 18 claims on Dragon Creek west of Quesnel, and 42 claims 11 miles north of Quesnel.

C. S. Powney directed a crew of six taking soil samples on the various claim groups. This was to be followed by magnetometer work.

Silver-Lead-Zinc

QUESNEL LAKE

Mae, S.F.
Helicon Explorations Limited
By T. M. Waterland

(52° 120° N.W.) Company office, 133 East 14th Street, North Vancouver. The 56-claim property is on Maeford Lake, some 30 miles southeast of Wells, and is reached by helicopter or fixed-wing aircraft. Five men were employed for a period of one month under the direction of D. Millburn, geologist. Galena and sphalerite are reported to occur as fracture fillings and replacement lenses in siliceous limestone.

The area was prospected, and the S.F. Nos. 3 and 5 claims were geologically mapped and soil sampled, and 12 shallow pits were drilled and blasted.

Lead-Silver

Joy
Bralorne Pioneer Mines Limited
By T. M. Waterland

(52° 120° N.E.) This property, formerly the Bob and Joe, consisting of four claims held by Bralorne Pioneer Mines Limited, 320, 355 Burrard Street, Vancouver 1, is located 5 miles northeast of the east arm of Quesnel Lake. Access is by boat and helicopter from Likely, a distance of 70 miles.

Galena, sphalerite, and minor chalcopyrite occur as blebs and disseminations in quartz-barite veins parallel to deformed limestone beds.

Two men, employed for one month under the supervision of P. Weishaupt, did a small amount of trenching on the Joy No. 1 claim. The property was not visited.

HORSEFLY

Copper

Wood
Helicon Explorations Limited
By T. M. Waterland

(52° 121° S.E.) Company office, 133 East 14th Street, North Vancouver. The 68-claim property is 7 miles southeast of Horsefly and is reached by 10 miles of road and trail from Horsefly. The property was discovered late in 1966. Work consisted of digging several shallow pits and general prospecting in the area. It was accomplished in one month by three men under the supervision of P. H. Blanchet, geologist. Chalcopyrite and minor pyrite are reported to occur in a granodiorite.

Copper

Gl
Helicon Explorations Limited
By T. M. Waterland

(52° 121° S.E. and 52° 120° S.W.) Company address, 133 East 14th Street, North Vancouver. This 80-claim property is on Gibbons Creek and is reached by 10 miles of road east from Horsefly. Chalcopyrite, pyrite, pyrrhotite, and magnetite are reported to occur as a contact metasomatic deposit near an intrusion of diorite into volcanics.

Work included geological mapping and electromagnetic, induced polarization, ground and airborne magnetometer, and geochemical surveys. In addition, about 4 miles of road was constructed and 400 feet of bulldozer trenching and 75,000 square feet of bulldozer stripping were carried out. Seventy-five feet of trench was drilled and blasted in bedrock.

Six men were employed for a five-month period under the direction of W. Shuttleworth, geologist.

HORSEFLY LAKE

Copper-Gold-Silver

Sue
Helicon Explorations Limited
By T. M. Waterland

(52° 120° S.W.) Company office, 133 East 14th Street, North Vancouver. The 56-claim property is on Suey Bay in Horsefly Lake and is reached by boat from Horsefly Landing, a distance of about 28 miles. This prospect was discovered late in 1966. Work on the property was under the direction of G. M. Hurd and P. H. Blanchet, geologists. Four men were employed for two months. Chalcopyrite and pyrite are reported to occur as fracture fillings in andesite.

Preliminary work on the property consisted of a geochemical reconnaissance survey and drilling and blasting about 15 feet of trench in bedrock.

Copper

CROOKED LAKE

EN
Helicon Explorations Limited
By T. M. Waterland

(52° 120° S.W.) Company office, 133 East 14th Street, North Vancouver. The property, comprising 172 recorded claims, is on Eureka Mountain, north of Crooked Lake near the head of Mackay River. Access to the property is via 50 miles of road from Horsefly. Work on the property for a six-month period was supervised by W. Shuttleworth, geologist, and consisted of geological mapping, electromagnetic, induced polarization, geochemical, and aeromagnetic surveys. An adit 105 feet long was driven, and a hole 700 feet in length was diamond drilled. In addition, several pits and trenches were excavated and about 5 miles of road was constructed.

Mineralization is reported to consist of chalcopyrite and pyrrhotite occurring as fracture fillings and disseminated in diorite.

Molybdenum

BIG TIMOTHY (TAKOMKANE) MOUNTAIN

Boss Mountain Mine
Brynnor Mines Limited
By T. M. Waterland

(52° 120° S.W.) Company office, 1050 Davie Street, Vancouver 5; mine office, Box 247, 100 Mile House. L. R. Redford, manager; K. G. Collins, mine superintendent; J. Austin, mill superintendent; A. Ozols, plant superintendent. The Boss Mountain mine is on the east slope of Big Timothy (Takomkane) Mountain, about 35 miles northeast of 100 Mile House, and is reached by 57 miles of road via Forest Grove and Canim Lake. The mine townsite is on Hendrix Lake, about 6 miles from the mine.

Molybdenite occurs as pockets and veinlets in two quartz breccia zones, as seams in quartz diorite slips, and as seams, pockets, and veinlets in quartz veins.

The Main quartz breccia orebody approximates a vertical prism 70 feet thick by 300 feet long. The South breccia orebody was further explored during 1966 from the 5R47 drive west, which was extended for that purpose. The Fracture orebody, which is about half the size of the Main orebody, is a block of unbrecciated quartz diorite with well-mineralized slips and quartz veins. The High Grade vein consists of quartz and molybdenite in a sheared lamprophyre.

Ore-reserve tonnages have been maintained since the start of production in 1965.

The main entry to the mine is the 5045 level adit, which was driven about 1 mile from the portal (mine plant area) to the orebodies.

Mining is by vertical long-hole stoping methods, with ore being loaded into 130-cubic-foot Granby cars on the 5045 haulage level by 21-cubic-foot-capacity mucking-machines. The average output per mucking-machine shift is 244 tons. The stoping method consists of drilling long-holes with an average length of 53 feet from sublevel fringe drifts spaced 60 feet vertically on the sides of the orebody. The holes are drilled with 4½-inch deep-hole drills and are blasted into transverse slots previously excavated by long-hole blasting. Primary explosives requirements are 0.49 pound per ton of ore, and secondary blasting in the drawpoints consumes 0.22 pound per ton.

Sublevels are driven with air-leg drills and rubber-tired air-powered mucking-machines. Level-development mucking is with track-mounted mucking-machines.

During the year, sublevels for the 5N50 stope were completed on the 5,340, 5,400, and 5,430 elevations, and sublevels for the 5N54 stope were completed on the 5,340, 5,400, and 5,450 elevations. Service for the sublevels was from surface via the 5N50 raise.

Two raises were driven to surface from 5,280 elevation—one at the north end of the orebody and the other through the pillar between the two stopes.

On the main 5045 level drawpoint, development was carried out for the 5L53 and 5056 stopes. Service and slot raises were driven in these new stopes to 5,160 elevation.

A summary of development work at the mine during the year is as follows:—

	Ft.
Drifting and crosscutting	2,531
Sublevel drifting	4,784
Raising	1,981
Diamond drilling (underground)	17,867
Diamond drilling (surface)	5,539
Blast-hole drilling	272,462

Ventilation of the mine is by means of a 100-horsepower Axivane electric fan at the top of the 5R47 exhaust raise. Sixty thousand cubic feet per minute of fresh air is drawn in through the main portal, where in the winter it is preheated to 40 degrees Fahrenheit with a 5.5 million B.t.u. oil-fired heater.

A total of 433,832 tons of ore was milled during 358 days of operating time. From the ore milled, 3,069 tons of concentrates was produced, containing 3,534,893 pounds of molybdenum. The concentrates were purchased by four different companies in England, one in France, and one in the United States.

Two outside contractors were engaged during the year for diamond-drill work and for overburden removal.

Company employment totalled 201, of whom 62 were underground.

CLINTON MINING DIVISION

TASEKO LAKES

Copper-Molybdenum

Rowbottom
Phelps Dodge Corporation of Canada, Limited
By T. M. Waterland

(51° 123° S.E.) Company office, 404, 1112 West Pender Street, Vancouver 1. The Rowbottom group of 24 claims is 11 miles southeast of Taseko Lakes on the east side of the head of Granite Creek. Access is by fixed-wing aircraft and helicopter from Vancouver. It is reported that chalcopyrite and molybdenite occur as coarse to fine disseminations and occasionally as fracture fillings in altered quartz diorite and siliceous dykes.

Work consisted of drilling and blasting of trenches totalling 163 feet. Three men were employed for one month under the direction of M. H. Sanguinetti, geologist.

Copper-Molybdenum

KH, Granite
Mesa Mines Limited
By T. M. Waterland

(51° 123° S.E.) Company office, c/o Phelps Dodge Corporation of Canada Limited, 404, 1112 West Pender Street, Vancouver 1. Mesa Mines Limited owns 124 KH and Granite claims, 8 miles southeast of Taseko Lakes. Access to the property is by fixed-wing aircraft and helicopter, a distance of approximately 140 miles from Vancouver. Previous work was done on the property by Phelps Dodge Corporation in 1964 and 1965. Chalcopyrite and molybdenite reportedly occur as coarse blebs to fine disseminations in quartz diorite.

Ten men under the direction of M. H. Sanguinetti worked for a period of four months.

Work by the company consisted of geological mapping, induced polarization and magnetometer surveys, and soil and silt sampling. Six trenches with a total length of 85 feet were dug by hand, and 10 holes with a total footage of 4,640 feet were drilled.

Copper-Molybdenum

Eggs
Falconbridge Nickel Mines Limited
By T. M. Waterland

(51° 123° S.W.) Company office, 504, 1112 West Pender Street, Vancouver 1. The seven-claim Eggs group, held under agreement, is between 5,000 and 8,000 feet elevation on Tchaikazan River west of Taseko Lakes. Access is via helicopter or fixed-wing aircraft from Williams Lake or Vancouver.

Mineral showings are reported to consist of chalcopyrite and molybdenite as disseminated replacements in quartz monzonite.

Work during 1966 was carried out by a three-man crew over a three-week period and consisted of drilling and blasting trenches having a total volume of about 190 cubic yards. Work was supervised by J. J. McDougall, geologist.

Copper

LAC LA HACHE

Peach, Fly, Tim
Coranex Limited
By T. M. Waterland

(51° 121° N.E.) Company office, 1521 Pemberton Avenue, North Vancouver. The Peach, Fly, and Tim claims, totalling about 450 in number, are 12 miles northeast of Lac la Hache. Work on the property was conducted over a four-month period by six men under the supervision of J. R. Woodcock. It is reported that chalcopyrite occurs as fracture fillings and as disseminations in Nicola volcanic rocks.

Work during 1966 consisted of geological mapping, a geochemical survey, about 33,000 square feet of bulldozer stripping, a small amount of hand trenching, and the construction of about 5 miles of road.

Copper-Lead-Zinc

FF
Anaconda American Brass Limited
By T. M. Waterland

(51° 121° N.E.) The company owns 94 claims by location 6 miles northeast of Lac la Hache. The showing consists of vein material carrying galena, chalcopyrite, and sphalerite with associated malachite and azurite in andesite. Seven men were employed for a period of 2½ months under the supervision of John M. McAndrew, geologist.

A geologic map of the property was made, an induced polarization survey run over 14,600 feet of line, and soil and stream sediments sampled on a grid covering the claims. One small trench was dug by hand on the FF No. 34 claim. The property was not visited.

Copper

70 MILE HOUSE

Pot, I.D.S.
Cominco Ltd.
By T. M. Waterland

(51° 121° S.E.) Cominco Ltd. holds 45 Pot claims and has options on the 16-claim I.D.S. group, some 15 miles due east of 70 Mile House. It is reported that bornite occurs on the property as fracture fillings and minor disseminations in syenite. Three men were employed for one month under the direction of D. L. Cooke, geologist, mapping geology and running magnetometer and geochemical surveys.

[Reference: Assessment Report No. 859.]

Copper

C-Soo
Copper Soo Mining Company Limited
By T. M. Waterland

(51° 120° S.W.) The 84-claim C-Soo group is east of 70 Mile House near District Lot 4919 at the head of Campeau Creek and is reached by road from 70 Mile House. Alrae Explorations Ltd., of Vancouver, is consulting for the company, and during 1966 conducted geophysical (induced polarization) and geochemical surveys. The property was not visited.

[References: Assessment Reports Nos. 938 and 939.]

Copper-Molybdenum

POISON MOUNTAIN

Giant, PM, Fish, Copper, Cheap
Homestake Mineral Development Company
By T. M. Waterland

(51° 122° S.W.) The property, consisting of 180 claims comprising the Giant, Cheap, Fish, PM, and Copper groups, has been optioned from Copper Giant Mining Corporation Limited by Homestake Mineral Development Company. The principal showings are on the east side of Poisonmount Creek and north of Copper Creek. Present access to the property is via the Yalakom River road to Blue Creek and thence about 14 miles by jeep-road to the property.

Interbedded argillite, greywacke, and conglomerate have been intruded by two kinds of dacite porphyry. These are a biotite porphyry which extends for about 1 mile along Copper Creek and a hornblende porphyry which occurs in two bodies, each measuring about 2,500 feet by several hundred feet.

All rocks are affected by alteration, which includes biotitization, silicification, and feldspathization. Mineralization as both disseminations and fracture fillings consists of pyrite, chalcopyrite, and lesser amounts of bornite, molybdenite, and magnetite.

Work during 1966 extended over a period of six months and was under the direction of H. Toohey, project engineer. It was largely restricted to an area 8,000 by 8,000 feet on Copper Creek, a tributary of Poisonmount Creek.

This area was geologically mapped by B. Kaehlert, induced polarization surveys were conducted by Seigel Associates Limited, and geochemical surveys by Chapman, Wood & Griswold Ltd. Some 3,000 feet of bulldozer trenching was done, and 1½ miles of new road was constructed. About 7 miles of old access roads within the claims was reopened.

Diamond drilling was carried out by Cameron-McCutcheon Drilling Limited and consisted of six NX holes with a total footage of 1,898 feet and 19 BQ holes totalling 6,714 feet.

A total of 21 men was employed at the property and lived in a well-constructed tent camp.

[Reference: *Minister of Mines, B.C.*, Ann. Rept., 1961, pp. 23–24.]

LILLOOET MINING DIVISION

Copper-Molybdenum

POISON MOUNTAIN

Hill
Burlington Mines Ltd.
By T. M. Waterland

(51° 122° S.W.) Company office, 418, 510 West Hastings Street, Vancouver 2. The company owns 60 claims on the northeast slope of Poison Mountain at about the 5,500-foot elevation. Access to the property is from Lillooet via the Yalakom River road, a distance of 58 miles. Work during 1966 and done over a three-month period by five men under the direction of Ralph Sostad consisted of magnetometer and geochemical surveys and the construction of 3 miles of road.

Copper-Molybdenum

Churn
Canzac Mines Ltd.
By T. M. Waterland

(51° 122° S.W.) Company office, 418, 510 West Hastings Street, Vancouver 2. The property consists of 60 claims on the east side of Poison Mountain at the headwaters of Yalakom River. A camp was established on the property, and access was from Lillooet via the Yalakom River road. Seven men worked under the direction of Ralph Sostad for a period of four months. Work included an aerial magnetometer survey, a geochemical survey over the entire claim area, 1½ miles of bulldozer trenching, and 3 miles of road construction.

[References: *Minister of Mines, B.C.*, Ann. Repts., 1956, p. 35; 1961, p. 23; Assessment Report No. 926.]

Molybdenum

YALAKOM RIVER

Yalakom, Ridge
Yalakom Mines Limited
By T. M. Waterland

(50° 122° N.E.) Company address, 745 West Broadway, Vancouver 9. The property is at about the 6,500-foot elevation in the Shulaps Range. Access is via a newly constructed jeep-road which begins at the 2,000-foot elevation some 2 miles past the Barton Ranch on the Yalakom River. At the time of the writer's visit, the construction of an 8-mile access road was nearing completion and a drill programme was planned.

Nickel

J.C., J.B.
Silver Standard Mines Limited
By T. M. Waterland

(50° 122° N.E.) Company office, 808, 602 West Hastings Street, Vancouver 2. Eight claims, J.C. 1 to 4 and J.B. 1 to 4, on Yalakom River, about 40 miles by road from Lillooet, were under option to Silver Standard Mines Limited. Four men worked for a period of one month under the direction of N. W. Burmeister, geologist, drilling and blasting 10 trenches totalling 150 feet and drilling two XRT drill-holes totalling 40 feet.

It is reported that nickel silicate occurs in a silica-carbonate zone in serpentinite.

Mercury

Eagle
Lillooet Mercury Mines Ltd.
By T. M. Waterland

(50° 122° N.E.) The Eagle group of 10 claims is on the northeast side of the Yalakom River just above the mouth of Shulaps Creek and 8 miles from the Bridge River road. The property (formerly Golden Eagle and Red Eagle) was optioned from F. R. Christy, of Lillooet, by Lillooet Mercury Mines Ltd., with Fred Matthieu acting as manager. After a short period of ore-testing at the mine, the Gould mill of Silverquick Development Co. (B.C.) Ltd. was leased and a small tonnage was trucked 60 miles from the mine to the mill at Mowson Pond. Production was suspended in late December.

Mercury

TYAUGHTON CREEK

Silverquick, Quicksilver, Dot, Bob, Kim, Etc.
Silverquick Development Co. (B.C.) Ltd.
By T. M. Waterland

(51° 122° S.W.) The claims held by the company straddle Tyaughton Creek just west of Relay Creek. A good road leads from the Manitou mine (Empire Mercury) road to the property. The Manitou mine road leaves the Bridge River road near Mowson Pond. Mineralization on the property consists of cinnabar associated with quartz, calcite, limonite, and dickite. The cinnabar is present as disseminated grains, streaks, and as small lenses in brecciated conglomerate, as smears on slickenside fault surfaces, and in the mud of gouge seams. The host rocks are a sequence of conglomerate and argillaceous shale beds.

During 1966 three companies had options on the claims and in the latter part of the year the companies' Gould retort mill on Mowson Pond was leased to Lillooet Mercury Mines Ltd.

Canex Aerial Exploration Ltd. did about one month's work on the property. The work, under the direction of W. Pentland, consisted of geochemical and mercury sniffer surveys over a 2- by 3-mile area and about 800 feet of bulldozer trenching. Canex Aerial dropped its option on the property.

S. H. Glassmire and associates, of Santa Fe, New Mexico, report having done some 6,500 feet of bulldozer trenching on the property.

Pyramid Mining Co. Ltd. drilled 538 feet of BX wireline hole by contract. This work was under the direction of C. Millar, geologist, and employed five men for a period of two months.

[Reference: *Minister of Mines, B.C.*, Ann. Rept., 1964, pp. 81–83.]

Mercury

Empire Mercury Mine
Empire Mercury Corporation Ltd.
By T. M. Waterland

(51° 122° S.W.) Company office, 558 Howe Street, Vancouver 1; mine postal address, Gold Bridge. E. Lorentzen, president; W. Selnes, mine manager. The property is located at the confluence of Mud, Relay, and Tyaughton Creeks, some 17 miles north of the Bridge River road via the Tyaughton Creek–Tyax Lake road. A total of 72 claims are owned or are held under option agreement.

Cinnabar and native mercury occur in a shear zone within purple amygdaloidal and green even-grained lavas. The rocks consist of interbedded ribbon cherts, slates and lavas, intrusive serpentine, massive arkosic sandstone, and felsite dykes or sills. The cherts, slates, and lavas have been intensely folded and usually have very steep dips, while the more massive sandstone and interbedded shaly material have gentler dips.

During 1966 construction work was carried out by both the company and the Department of Highways on the mine access road.

Work during 1966 was done on the Mercury, Grizzly, Iris, and Florence claims. It included building drill access roads, trenching, retimbering of some mine workings, and drilling 128 holes (a total of 23,206 feet) with an overburden percussion drill.

A crew of eight men under the direction of Walter Selnes worked for 11 months during 1966. The crew lived in a modern camp at the mine property.

[Reference: Stevenson, J. S., *B.C. Dept. of Mines,* Bull. No. 5, 1940, p. 70.]

BRIDGE RIVER

Gold

Bralorne Mine
Bralorne Pioneer Mines Limited
By T. M. Waterland

(50° 122° N.W.) Company office, 355 Burrard Street, Vancouver 1; mine office, Bralorne. G. H. Davenport, president; W. E. Field, resident manager; D. B. Cameron, mine superintendent; E. H. Hall, mill superintendent; M. J. Mitchell, plant superintendent. The company operates the Bralorne mine on Cadwallader Creek, which is reached by 75 miles of road from Lillooet. Production from the Bralorne mine has been continuous since 1930, and the underground workings are extensive.

No. 8 level is the main adit and haulage level. No. 8 level is connected to the mine workings by the Empire service shaft, which extends from No. 3 level to No. 26 level and the main hoisting shafts; the Crown shaft, which extends from No. 8 level to No. 26 level; and the Queen shaft, which connects No. 26 intermediate haulage level to the lower producing section of the mine.

The bottom level of the mine is No. 43 level and is now in the process of being developed.

Rock temperature on No. 43 level is 128 degrees Fahrenheit, and it is this condition together with the ore grade that will determine the future life of the mine. Much depends on finding, at lower levels, ore of a higher grade than that on No. 43 level.

The company's report for the third quarter states that ore in the 77 vein on No. 43 level is developed for a length of 460 feet and averages 12.8 feet in width with a grade of 0.70 ounce gold per ton. Initial diamond drilling below No. 43 level has not indicated the presence of a higher grade ore zone.

It is anticipated that, at a production rate of 8,000 tons per month, the present ore reserves will maintain the operation until 1968.

A summary of development work carried out during the year is as follows:—

Drifting and crosscutting	ft.	2,312
Raising	ft.	589
Bore-hole raises	ft.	1,404
Miscellaneous excavation	cu. ft.	31,000
Diamond drilling	ft.	5,186

Production, which totalled 105,813 tons, was primarily from tailings-filled " cut and fill " stopes in the 77 and 79 veins with a minor amount from the 52 vein. Some 43,222 ounces of gold was recovered.

At year-end, employment totalled 190 men, of which 128 were underground personnel.

Ventilation and cooling of the mine, a major problem, is accomplished by two 150-horsepower Jeffrey fans in series supplying approximately 100,000 cubic feet per minute of air to the ventilation raise and lower Queen shaft levels. Auxiliary fans draw air off onto the levels as required. Air is exhausted through the Queen 77 and 79 workings and to surface via the Crown and Empire shafts.

Specially designed insulated vent ducting is used for supplying air to working-places on the lower levels. The insulated ducting was designed by W. E. Field, mine manager, and consists of an inner lining of 15 mil polytubing, a middle layer of 1-inch fibre glass, and an outer layer of waterproof mildew-resistant canvas.

During 1966, in further attempts to keep ventilation air to acceptable temperatures, Bralorne successfully used a portable urethane foam spraying system to insulate the walls and back of No. 43 level with rigid urethane foam. The spraying system consists of a spray gun and one tank each of pre-foamed resin, pre-foamed catalyst flushing solvent, and nitrogen. The resin and catalyst are metered and passed through a " pre-expansion " and mixing chamber before leaving the gun. Upon contact with the rock a further 100 per cent expansion occurs, and the foam sets up almost immediately.

The difficulties encountered in raising operations under extreme temperature conditions prompted the purchase by Bralorne of a Robbins raise-boring machine. This machine is used to bore 48-inch-diameter holes between levels. The bore-holes will be used for ventilation airways. To the end of 1966, five bore-holes had been completed, the longest being 345 feet in length. The company is pleased with the performance of the machine, and but for it the provision of airways to the lower levels would have been extremely difficult.

Raising with the bore-hole machine is accomplished by drilling a 9-inch-diameter pilot hole from the upper level to the lower level and then by replacing the 9-inch bit with a 48-inch reaming head and reaming the hole to 48 inches from the lower level to the upper level.

All bore-holes to date have been bored in diorite and quartz, and pilot-hole penetration rates have ranged from 9.2 to 14.5 feet per hour. Reaming rates have been from 3.9 to 5.3 feet per hour.

In keeping with Bralorne's constant quest to increase efficiency and reduce cost, the company worked with the Federal Department of Energy, Mines and Resources in the installation of automatic reagent feeding devices in the cyanide mill. The devices installed and tested were the alkalinity probe and the continuous cyanide titrator.

Molybdenum

TEXAS CREEK

Index
Texas Creek Mines Limited
By T. M. Waterland

(50° 122° N.E.) The Index property consists of 13 Crown-granted claims and a number of recorded claims on the summit between the north fork of Texas Creek and Phair Creek. Access is via an 11-mile jeep-road which follows Texas Creek from its confluence with the Fraser River. The property is at about the 8,000-foot elevation, and the camp at a considerably lower elevation.

W. Inverarity was in charge of work at the property, which consisted of diamond drilling, soil-sampling, trenching, and road construction. At the time of the writer's visit, some 1,300 feet of diamond drilling had been completed. Mineralization reportedly consists of molybdenite, pyrite, and pyrrhotite in shears and fractures in a granite stock.

Molybdenum

PEMBERTON

Sal, R, EE, Etc.
Amax Exploration, Inc.
By J. M. Carr

(50° 123° N.E.) Company office, 535 Thurlow Street, Vancouver 5. R. A. Barker, manager. This company controls the Sal, Plug, R, EE, Win, Toy, and Day groups, totalling 245 recorded claims, of which about 76 are held under option from the joint owners, Norpax Nickel Mines Limited and Purdex Minerals Limited. The property covers the western part of a mountain some 6 miles west of Downton Lake between the Bridge River and the forks of Salal Creek, which is tributary to the Lillooet River. Elevations range from 5,000 to 8,500 feet, and access is by helicopter from Pemberton Meadows, some 40 air miles to the southeast. The property partly covers ground held in 1960 and 1961 by Phelps Dodge Corporation of Canada, Limited (*see* Annual Report, 1961, p. 28).

Indications of molybdenum mineralization were discovered in 1960 on the precipitous slopes of Float Creek, a south-flowing tributary of Salal Creek, by Phelps Dodge exploration parties. No further work was done, but in 1963 the Pemberton syndicate staked claims on Float Creek. The property was optioned to Norpax Nickel Mines Limited in 1964, who signed an agreement with Amax in 1965. Amax commenced work in that year and completed a second season's work in 1966. During that time further indications of molybdenite and other mineralization were found over a wide area. Work in 1966 was directed by D. K. Mustard and included geological mapping and 7,134 feet of diamond drilling in 12 holes. A crew of 23 men, including drillers on contract, camped at the head of the east fork of Salal Creek from July to September.

The following notes are based on a short visit made in September and on information provided by the company. The property is largely underlain by a stock with poorly exposed contacts emplaced in the Coast Range intrusions. The stock is 7 miles long in a northeasterly direction, as much as 5 miles wide, and consists of a coarser-grained envelope surrounding a finer-grained central core. The envelope, which in places is as much as 1 mile wide, is a more or less porphyritic medium-grained quartz monzonite whose composition approaches granite and which contains phenocrysts, some as large as three-quarters of a centimetre, variously composed of quartz, perthitic orthoclase, plagioclase, and biotite, set in a granitic groundmass. The central core likewise has a composition approaching granite and consists of quartz monzonite porphyry and aplite, which both possess an aplitic texture and differ from each other mainly in the number and size of phenocrysts present. The porphyry contains phenocrysts, partly as large as one-half centimetre, similar to those in the surrounding quartz monzonite, whilst the aplite has few phenocrysts and is partly so light coloured as to be alaskite. The relationship between porphyry and aplite is unknown, but the central core as a whole is believed to have been emplaced slightly later than the quartz monzonite. The latter may have formed a roof over the central core, since isolated bodies of quartz monzonite are enclosed by the finer-grained rocks at high surface elevations. Seen in drill core, the contact between the core and the envelope is relatively sharp, unchilled, and contains unusual textures that probably resulted from magmatic reaction or alteration. On a larger scale, the contact, where examined at surface, shows peculiar features that include the occurrence of intrusion breccias, in which angular to rounded blocks of assorted grey and green fine-grained foreign rocks are crowded closely together in one or other phases of the stock. It also shows evidence that locally the edge of the finer-grained mass was formed by intrusion of successive dykes of porphyry and aplite. Similar dykes and other, possibly distinct quartz porphyry dykes are reported to occur widely in the quartz monzonite envelope. Basalt dykes also occur and are no doubt related to a late vulcanism, at least partly post-glacial in age, which produced small flows and plugs of lava and agglomerate that variously overlie and penetrate the plateau-like top of the mountain.

Mineralization occurs widely and is spatially related to shears, veins, and fractures which partly form widely spaced sets and locally make stockworks and breccias. As mapped by company geologists, the more prominent of these structures mostly trend easterly or northeasterly and many of them possess steep dips. On the southern slopes, a northward-dipping sheeting is apparent. In the fractured rocks, biotite is altered partly to chlorite, and plagioclase to a yellowish clay mineral which gives these feldspars a bright pink colour and is reported to be illite. The shears and fractures commonly contain quartz veins which may be multiply emplaced and are partly vuggy, and their walls are silicified and contain sericite and locally secondary green biotite. Magnetite is prominently disseminated in some of the altered rocks examined and is considered by company geologists partly to be a product of mineralization. Sulphides partly fill fractures and partly occur near the latter as fine disseminations and streaks. Pyrite is most abundant and is partly accompanied by molybdenite and in places by small amounts of chalcopyrite, sphalerite, and, according to reports, galena. Surface oxidation has partly destroyed sulphides and has produced widespread limonite, local copper stains, and conspicuous platings of manganese wad. The steeply gullied southern slopes of the mountain are extensively rusty and weathered, and their loose precarious nature has rendered exploration difficult. This is the area which first attracted the attention of Phelps Dodge Corporation in 1960 and was subsequently explored by the Norpax and Purdex companies (*see* Annual Report, 1964, p. 84). In 1966 the present company

Salal Creek camp of Amax Exploration, Inc.

The Jersey open pit of Bethlehem Copper Corporation Ltd. View eastward, July, 1966.

was unable to find secure set-ups for further drilling in this area, and most of its work was done farther northeast on Big Creek, where two holes were drilled, and a wide area at high elevations some 2 or 3 miles farther north, more or less on the northern contact of the core of the stock. Here exploration is hindered by glaciers, which with volcanic rocks obscure much of the top of the mountain. In these and other areas, long surface samples and drill-core assays are reported to show mostly sub-commercial amounts of molybdenite. However, the mineralized region is large and only partly explored to date, and the possibility of commercial deposits being found remains good.

KAMLOOPS MINING DIVISION

LITTLE FORT

Molybdenum

Mo
Falconbridge Nickel Mines Limited
By T. M. Waterland

(51° 120° N.E.) Company office, 504, 1112 West Pender Street, Vancouver 1. The Mo group of 42 claims, held under option, is east of Taweel Lake, some 17½ miles northwest of Little Fort, whence it is accessible by car and jeep-road. The property was formerly called the Anticlimax.

Molybdenite with minor pyrite, wolframite, and scheelite is reported to occur in quartz veins and as disseminations in granite.

Work consisted of 2,032 feet of AX diamond drilling in five holes. Detailed geology was done around the showings. Four men were employed for a period of four months under the direction of H. S. Lazenby, geologist.

[Reference: *Minister of Mines, B.C.*, Ann. Rept., 1961, pp. 49–51.]

Copper-Molybdenum-Lead-Zinc

TC
Anaconda American Brass Limited
By T. M. Waterland

(51° 120° N.E.) The Anaconda American Brass Limited, of Britannia Beach, holds 131 claims located as the TC claims 10 miles northwest of Little Fort. Access is by road from Little Fort.

Pyrite, magnetite, pyrrhotite, and chalcopyrite occur in fracture fillings in dioritic and volcanic rocks.

A crew of seven men was employed for a period of six months under the direction of H. E. Bradshaw, geologist.

Work during 1966 included construction of access roads, bulldozer trenching, induced polarization and magnetic surveys, soil and stream-sediment sampling, and geological mapping. The property was not visited.

[References: Assessment Reports Nos. 905, 907, and 910.]

Molybdenum-Copper-Lead-Zinc-Silver-Gold

RO, SO, TC
Anaconda American Brass Limited
By T. M. Waterland

(51° 120° N.E.) Anaconda American Brass Limited, of Britannia Beach, holds 207 claims at Friendly Lake. Access is by 20 miles of road from Bridge Lake. Sulphides including pyrite, galena, molybdenite, chalcopyrite, and bornite are disseminated and as seams and blebs in fractures in andesites and tuffs.

Work during 1966 was under the supervision of W. M. Reed, geologist, and consisted of geological mapping, induced polarization survey, soil and stream-sediment sampling, construction of access roads, 10,300 feet of bulldozer trenching, and 430 feet of diamond drilling.

A crew of 18 men was employed for a period of six months. The property was not visited.

[References: Assessment Reports Nos. 753, 754, 788, 789, 790, 791, 792, and 952.]

Copper-Lead-Zinc

Silver
United Copper Corporation Limited
By T. M. Waterland

(51° 120° N.E.) Company address, 601, 475 Howe Street, Vancouver 1. The Silver Nos. 1 to 56 mineral claims held by United Copper Corporation Limited are on the southwest side of Silver (Deer) Lake, near the head of Nehalliston Creek. Access is by four-wheel-drive vehicle from Little Fort.

It is reported that Rae G. Jury, of Alrae Explorations Ltd., supervised a contract geochemical soil-sampling programme for the company. Work was carried out over a four-month period, with three men being employed by the company and six by the contractor.

[Reference: Assessment Report No. 981.]

BIRCH ISLAND

Gold-Silver-Copper-Lead-Zinc

Sinbad, Lucky Star
Crowpat Minerals Ltd.
By T. M. Waterland

(51° 119° N.W.) Company address, 365 Bay Street, Toronto, Ont. The Sinbad and Lucky Star groups of claims are on the south slope of Mount McClennan and are reached via a logging-road which leaves the No. 5 highway 6½ miles east of Birch Island. Engineering work on the property is being done by James P. Elwell, consulting engineer, with Tom Smart in charge. Diamond drilling started in October, with about 2,000 feet contracted to Midwest Drilling Company. Drilling was expected to carry through December. Nine men were employed at the time of the writer's visit.

[Reference: Assessment Report No. 436.]

BARRIERE

Molybdenum

Bar, Don, GM, George, Tim, Barriere, Joe, Glen
West Moly Mines Limited
By T. M. Waterland

(51° 119° S.W.) Company office, Aloha Motel, 3630 McLeod Trail, Calgary, Alta.; mine address, Box 219, Barriere. The property, which consists of 96 claims owned by the company, is located on the east flank of Harper Creek valley. Access to the property is via the Harper Creek road from the North Barriere Lake road at the junction of Birk Creek and the Barriere River.

It is reported that molybdenite occurs on joints and as disseminations in granitic rocks that are cut by numerous felsite dykes.

Work carried out over an eight-month period by five men under the direction of G. E. Midgley consisted of some 5,000 feet of side-hill cutting and 4,750 feet of diamond drilling in 10 holes.

Copper

CC
Mining Corporation of Canada (1964) Ltd.
By T. M. Waterland

(51° 119° S.W.) Company office, 1800, 44 King Street West, Toronto 1, Ont.; field office, 514, 402 West Pender Street, Vancouver 1. The CC claims are about 2 miles west of North Barriere Lake. Access is via the Harper Creek road, which leaves the main Barriere Lake road at the confluence of Birk Creek and Barriere River.

Seven men were employed for a one-month period under the direction of W. Rainboth, geologist, and ran self-potential, magnetometer, and geochemical soil-sampling surveys over 11 claims. An area of 100,000 square feet of bedrock was stripped by bulldozer.

Copper-Lead-Zinc-Silver

Ultima, Good Luck, Creek, Harper, Ruth
Barriere Lake Mines Ltd.
By T. M. Waterland

(51° 119° S.W.) Company office, 2010 Rattenbury Place, Victoria. Barriere Lake Mines Ltd. holds 37 claims, comprising the Ultima, Good Luck, Creek, Harper, and Ultima East claims, on the north side of North Barriere Lake and the Ruth group of 62 claims.

Work in 1966 was being done on the claims on the north side of east Barriere Lake by Scurry-Rainbow Oil Limited, of 539 Eighth Avenue Southwest, Calgary, Alta., with Paul La Fleur, geologist, in charge. Nine men were employed cutting line in preparation for magnetometer and electromagnetic surveys. At the time of the writer's visit, Boyles Bros. Drilling Company Ltd. had contracted for some 5,000 feet of drilling and was moving an AX wireline drill rig onto the property.

Copper-Silver-Lead-Zinc

Leemac, Boomac
Kamstar Mines Ltd.
By T. M. Waterland

(51° 119° S.W.) Company office, 203, 156 Victoria Street, Kamloops. The Leemac and Boomac claims are on Fennell Creek, 2 miles east of North Barriere Lake. Work during 1966 commenced early in March and was under the direction of T. McMahon. Sulmac Exploration Services Ltd. cut 43 miles of line, over which an electromagnetic survey was run. Some geological mapping was done, and 20 trenches, totalling 5,000 feet, were dug. About 5 miles of road was constructed, and 1,514 feet of diamond drilling was done. The crew lived in a camp on the North Barriere Lake road.

Company prospectors report that blebs and streaks of pyrite, galena, sphalerite, and chalcopyrite accompany massive quartz veins intruding a shear zone in metamorphosed sediments.

[Reference: Assessment Report No. 807.]

SQUAAM (AGATE) BAY

Copper-Lead-Zinc

Joe, Art
Buchanan Mines Ltd.
By T. M. Waterland

(51° 119° S.W.) Company office, 15816—112th Avenue, Edmonton, Alta. Claims on the northwest side of Squaam (Agate) Bay have been optioned from Ivan Bennett. Four men were employed under the direction of G. H. Gaven and lived in a camp on the property. Diamond drilling by a company-owned BX wireline truck-mounted drill was under way at the time of the writer's visit, and at that time 1,165 feet had been drilled in two holes. Rock in the area is talcose schist, which is cut by small quartz veins. Pyrite and chalcopyrite were visible near the quartz veins.

Silver-Copper-Lead-Zinc

Elmoore
Cannon Mines Limited
By T. M. Waterland

(51° 119° S.W.) Company address, 1946 Weston Road, Weston, Ont. The Elmoore group of eight claims, formerly the Old Wallace, is on the east side of Adams Lake opposite Agate Bay. Sulmac Exploration Services Limited is reported to have carried out geological, geochemical, and geophysical surveys on the Elmoore claims, which were under option to Cannon Mines Limited.

[Reference: Assessment Report No. 904.]

Lead-Zinc-Silver-Gold-Copper

SHUSWAP LAKE

Garnet, D, S, Pat
Giant Metallics Mines Limited
By T. M. Waterland

(50° 119° N.E. and 51° 119° S.E., S.W.) The Adams Plateau property of Giant Metallics Mines Limited, of 457 Credit Union Building, Salmon Arm, consists of 141 claims comprising the Garnet, D, S, and Pat groups owned by the company. The property was formerly known as the Mosquito King.

Access is via a 6-mile logging-road from a booming-ground on the north side of Shuswap Lake 5 miles from the main Trans-Canada Highway at Squilax.

Silicified bands carrying pyrite, pyrrhotite, galena, sphalerite, and other sulphides in minor amounts replace metamorphic rocks. The metamorphic complex is intruded by felsitic to basaltic dykes.

A grid was cut to facilitate geophysical work, and topographical maps were prepared by Allen Geological Engineering Ltd. This firm also conducted a magnetometer survey, a soil-sampling survey on a 100- by 300-foot grid, and a geological mapping programme. Huntec Limited conducted an induced polarization survey.

Some 400 feet of bulldozer trenching and about 2 acres of stripping to bedrock were done. Drill-site roads and extensions of existing roads were done by contract.

Ascot Mines Ltd. diamond drilled some 2,000 feet of BQ hole. Big Indian Drilling Co. Ltd. drilled 625 feet of 4¼-inch hole with a Mayhew down-the-hole drill. The company drilled 600 feet of ¾-inch hole.

A crew of 15 men was employed for a period of five months.

Zinc-Lead-Copper

Annis, Dawn, Lakeview
Annis Mines Ltd.
By N. D. McKechnie

(50° 119° N.E.) Company office, 280, 180 Seymour Street, Kamloops. Donn Spankes, president; S. F. Kelly, consultant. The company holds 35 claims, located as the Annis, Dawn, and Lakeview groups and situated between Mara Lake and the Salmon Arm of Shuswap Lake. From the Trans-Canada Highway 5 miles southwest of Sicamous, a dirt road leads eastward about a quarter-mile to the camp on Annis No. 5 mineral claim.

The working area is between elevations 2,600 and 2,800 feet, and lies along and southwest of the boundary between Annis No. 5, No. 8, and No. 11 and Annis No. 6, No. 7, and No. 12. Most of the work has been done on Annis No. 5 and No. 6. The following discussion refers only to the working area and is based on a two-day examination of exposures and diamond-drill cores.

The claims are underlain by the Mara Formation of the Mount Ida Group of pre-Windermere(?) age (*Geol. Surv., Canada,* Mem. 296, p. 21). The Mara Formation here is composed of interbedded mica schist and granitoid gneiss. Bedding and schistosity strike nearly west. A small number of reliable bedding attitudes indicate a dip to the north of about 60 degrees; schistosity dips about 35 degrees north.

The schist and gneiss are intruded by dykes of granite porphyry and pegmatite which lie in fractures striking north 80 degrees east to south 80 degrees west and dipping 40 degrees to 55 degrees northward, and striking north 30 degrees west and dipping 70 degrees northeastward. Only two fractures of the second set were recognized; the rock in the two sets is of the same kind, but there is no direct evidence of their relative ages. The granite porphyry and pegmatite appear to be facies of the same rock. In the working area they are seen almost entirely within the granitoid gneiss. They range in thickness from a few inches to more than 30 feet.

A crenulated schistosity, best developed near the walls of the thicker granite and pegmatite dykes, strikes from north 35 degrees west to north 60 degrees west and dips 40 degrees to 75 degrees northeastward. The sulphide mineralization is found in this structure. The granite-pegmatite dykes truncate this and the west-striking schistosity, which is parallel to axes shown on Geological Survey of Canada Memoir 296, Figure 2, as those of the " younger deformation " and " older deformation " respectively.

The mineralization consists of sulphides with minor quartz which lie along the schist planes and in the crests and troughs of the crenulations of the " younger " foliation. The sulphides are pyrite, sphalerite, and galena with locally prominent but generally minor chalcopyrite. Pyrrhotite is prominent in two places; the first is in a series of pits crossing the boundary between Annis No. 5 and Annis No. 6 mineral claims, where a west-striking fracture, dipping 40 degrees north, contains massive pyrrhotite 6 inches and more in width, with chalcopyrite, sphalerite, and minor galena; the second is in a pit about 800 feet south of these trenches, where a 3-inch band of massive pyrrhotite strikes north 30 degrees west and dips 45 degrees southwestward. Chalcopyrite was seen to vein and include sphalerite; pyrrhotite veins and includes chalcopyrite and also has inclusions of quartz, suggesting that it post-dates all the other mineralization. Sphalerite and galena occur only in the granitoid gneiss; chalcopyrite was seen as a few threads at one place in a granite drill core; quartz and pyrite are common in the dykes.

The relationship of the granite-pegmatite dykes to the mineralization is not directly apparent. A clue may exist in the fact that completion of a theoretical conjugate fracture pattern which includes the two dyke directions requires a plane striking north and dipping 80 degrees east. A pit in the southeast corner of Annis No. 7 exposes a pyrite, sphalerite, galena, and chalcopyrite mineralization that strikes north and dips 70 degrees east. The dykes and the mineralization may therefore be contemporary.

The workings consist of an adit about 160 feet in length at elevation 2,630 feet and starting 120 feet southeast of the initial post of Annis 5, 6, 7, and 8. It follows the structure for 120 feet then crosscuts it northward for 40 feet. Above and just south of the adit a series of pits exposes mineralization at intervals for a strike length of 400 feet. The company reports assays along this zone of 1 to 13 per cent lead and trace to 4.3 per cent zinc across width of from 2 to 11 feet. The crosscut portion of the adit passes through the projection of this zone, but chip samples taken here by the writer assayed only fractions of 1 per cent in lead and zinc. Diamond-drill holes Nos. 3, 4, and 5 were drilled from surface to pass between the trench and the adit. The massive pyrrhotite appeared in the highest of the holes at the projection of the dip from the trench, together with a little pyrite and chalcopyrite for a length of 6 inches. The two deeper holes showed sparse pyrite, chalcopyrite, sphalerite, and galena for 12 feet and for 5 inches respectively; the deeper hole carried a thin stringer of pyrrhotite. Diamond-drill holes Nos. 1 and 2, drilled from surface 250 feet farther east, also cut the downward projection of the zone but carried only sparse sulphides. Mineralization is exposed in a trench 500 feet south of the above zone, at elevation 2,795 feet, and again in three trenches at 350 feet farther south. They appeared comparable to the first zone.

In summary, mineralization is confined to the granitoid gneiss, it is structurally controlled by crenulations in the " younger " foliation, and it may be related to the granite-pegmatite dykes. Sphalerite and galena are the principal sulphides; they are uneven in their distribution.

[References: *Minister of Mines, B.C.*, Ann. Rept., 1965, p. 205; *Geol. Surv., Canada*, Map 143A, Shuswap Lake; Map 1059A, Vernon.]

Copper-Molybdenum

GREENSTONE MOUNTAIN

TC, Spur
Tro-Buttle Explorations Limited
By David Smith

(50° 120° N.W.) Company office, 118, 815 West Hastings Street, Vancouver 1; field office, 233 Cypress Avenue, North Kamloops. This property, comprising 250 recorded mineral claims, of which the key groups are the TC and Spur, lies 16 miles to the southeast of Kamloops in the vicinity of Dominic and Roper Lakes, which are south of Greenstone Mountain. Access is by forestry road from the Cherry Creek junction. In 1966 geochemical and magnetometer surveys were carried out on the Spur group. Some 1,500 feet of surface trenching was done, and 8 miles of new road was built. A crew of eight men was employed under the supervision of G. A. Burdett.

Copper

KAMLOOPS

Vanco Explorations Limited
By David Smith

(50° 120° N.E., N.W.) Company office, 900, 1111 West Hastings Street, Vancouver 1. This company, owned and financed jointly by Steep Rock Iron Mines Ltd. and Labrador Mining and Exploration Co. Ltd., was set up in 1965 to explore a block of more than 600 claims in the vicinity of the Iron Mask batholith comprising the holdings of the following companies: Kamloops Copper Consolidated Ltd., Makaoo Development Company Limited, Galaxy Copper Ltd., Western Beaver Lodge Mines Ltd., Consolidated Negus Mines Limited, Continental Potash Corporation Limited, Rolling Hills Copper Mines Limited, Comet Mining Corporation Ltd., and Bata Resources Limited. In 1965 Vanco drilled seven diamond-drill holes totalling 2,100 feet and carried out an induced polarization survey. In 1966 Vanco drilled 24 diamond-drill holes totalling 7,250 feet. Surface exploration was continuous up to May 31, 1966, when Vanco terminated the option. A crew of 18 was employed under the direction of D. H. Nicholson, geologist in charge.

[References: Assessment Reports Nos. 192, 604, 605, 624, 625, 634, 640, 655, 689, 723, 724, 727, 742, and 891.]

Copper-Molybdenum-Silver-Nickel

NESIKEP CREEK

Mud, Cherry, Rickhill, Rusty, Joyce, Sharon
Dalex Mines Ltd.
By T. M. Waterland

(50° 121° N.W.) Company office, 205, 402 West Pender Street, Vancouver 3. The Mud, Cherry, Rickhill, Rusty, Joyce, and Sharon claims are on Nesikep Creek, on the west side of Fraser River, 26 miles by road south from Lillooet. Work was carried out for a three-month period under the direction of L. Ostensoe, geologist, and consisted of 1,300 feet of bulldozer trenching and the construction of 1,200 feet of road.

Copper

LYTTON

Tetra, Gene
By N. D. McKechnie

(50° 121° S.W.) The Tetra 1 to 17 and the Gene 1 to 10 claims are held by Bernard Dupuis, R.R. 2, Petrolia, Ont. They are on the east side of the Fraser River at Izman Creek, 10½ miles north of Lytton. The Lytton–Lillooet highway passes through the west side of the group, and the right-of-way for a British Columbia Hydro and Power Authority transmission-line crosses it from north to south near the middle.

The geology of the area is shown on Geological Survey of Canada Map 1010A, Ashcroft. A small mass of Cache Creek sediments about one-half mile wide by 1 mile long lying at the mouth of Izman Creek is bordered on the eastward side by a tabular mass of altered granitic rock less than one-quarter mile wide and about 6 miles long. Both these rocks are intruded by and included in the Mount Lytton diorite.

The altered granitic rock is buff coloured with, in hand specimen, quartz and feldspar as the prominent constituents. It is weakly to strongly foliated and locally, particularly along shear planes, well silicified. Its contact with Cache Creek quartzites was seen in a limited area where the strike of the sediments was north 10 to 20 degrees east and the dip 45 degrees eastward. The trend of the altered granitic rock is northwest, across the strike of the sediments. Bitumen occurs in the Cache Creek near the contact.

Specular hematite and azurite occur sparingly in fracture zones, striking north 30 to 40 degrees west and dipping 45 to 80 degrees northeastward, in the altered granitic rock, and to a minor extent in the quartzite. A few northward-striking and eastward-dipping and eastward-striking northward-dipping mineralized fractures also were seen. No primary copper minerals were recognized.

ASHCROFT

Copper

Red Hill
Delkirk Mining Ltd.
By T. M. Waterland

(50° 121° N.E.) Company office, 206, 713 Columbia Street, New Westminster. E. Gordon, president. The Company owns 99 claims about half a mile from the Trans-Canada Highway 7 miles south of Ashcroft. Work for the year was supervised by Hill, Manning & Associates Ltd. and consisted of about 1,200 feet of bulldozer trenching and 300 feet of X-ray diamond drilling.

HIGHLAND VALLEY

During the year the Bethlehem mine further expanded from 6,000 to 10,000 tons per day capacity, and the Lornex deposit, some 4 miles to the south of Bethlehem, was shown to be several hundred million tons in size. Spurred by these developments, exploration continued actively in the Highland Valley porphyry copper camp. Many of the properties shown on Figure 24 received attention, some for the first time. In the last year or two, numerous new roads have greatly improved access to properties in the southern part of the camp.

Numbered properties on Figure 24 are as follows:—

1. Bear (North Pacific Mines Ltd.).
2. Krain (North Pacific Mines Ltd.).
3. Lux, Cindy (Canzac Mines Ltd.).
4. W.D.R., Nona.
5. Transvaal.
6. Salmo Prince Mines Ltd.
7. Trojan (South Seas Mining Ltd.).
8. Sam (Burlington Mines Ltd.).
9. NIM (New Indian Mines Limited).
10. RAF, TAM, MER, JAC (Cleveland Mining & Smelting Co. Ltd.).
11. Beaver, Lodge, Dave, Outrider (Valley Copper Mines Ltd.).

12. JB (North Pacific Mines Ltd.).
13. EZZ (Alwin Mining Company Ltd.).
14. AL, IC (Continental Consolidated Mines Ltd.).
15. Bethlehem Copper Corporation Ltd.
16. BX (B.X. Mining Company Limited).
17. Eden, Ezra, Job, C.L. (New Indian Mines Limited and Vananda Mines Limited).
18. Bethsaida, Tom, BL (Valley Copper Mines Ltd.).

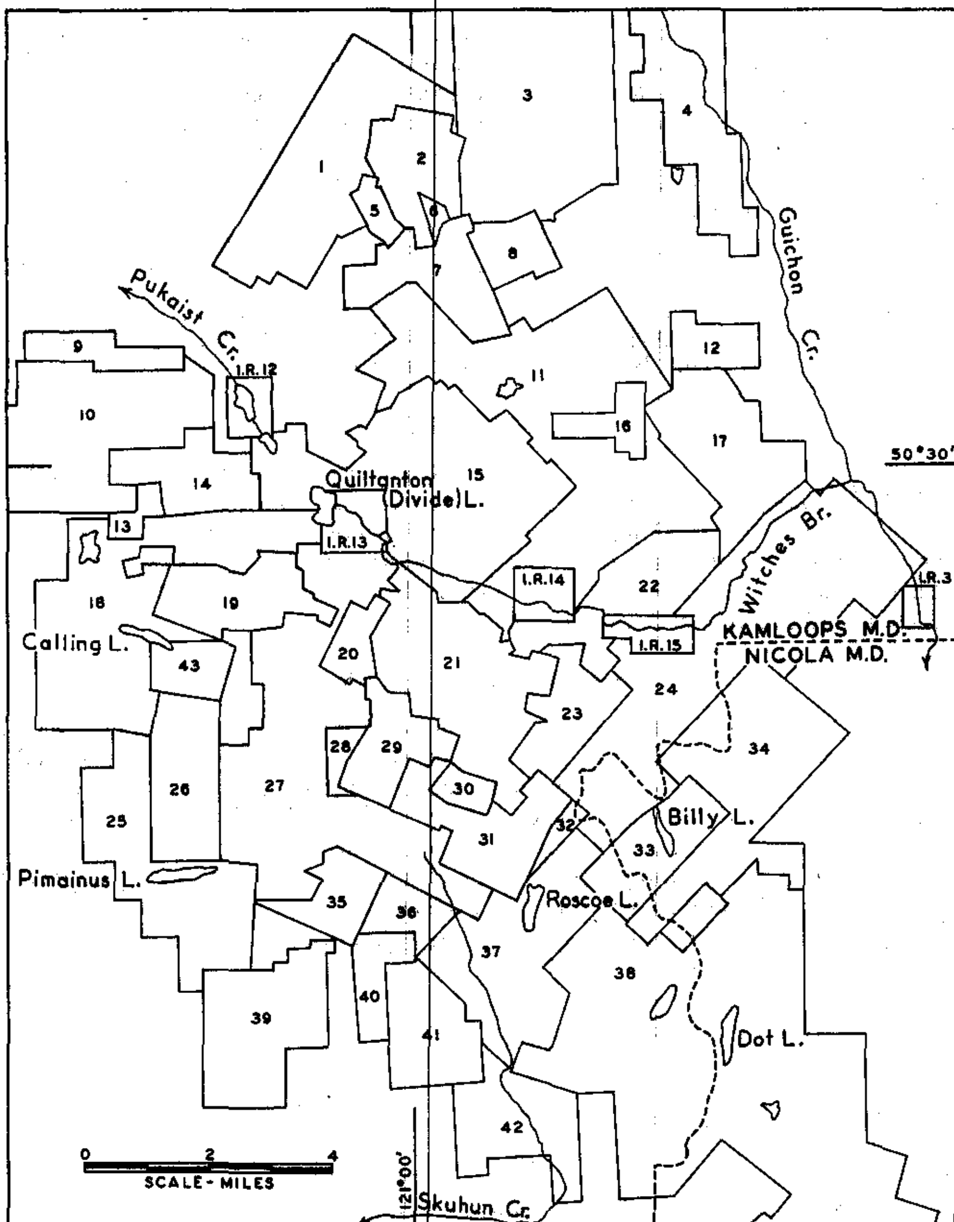


Figure 24. Index map of the Highland Valley area.

19. Noranda Exploration Company, Limited.
20. Victor (Consolidated Skeena Mines Ltd.).
21. Sheba (Peel Resources Limited).
22. April, UP (Red Rock Mines Ltd.).
23. Gaza Mines Ltd.
24. Jericho Mines Ltd.
25. Lake, Laken, etc. (T.C. Explorations Ltd.).
26. Lorex (Northlode Exploration Ltd.).
27. Lornex Mining Corporation Ltd.
28. Ken (Kennco Explorations, (Western) Limited).
29. Highmont Mining Corporation Ltd.
30. Ann (B.X. Mining Company Limited).
31. Award, etc. (Minex Development Ltd.).
32. Cal (General Resources Ltd.).
33. Bornite Ridge Mines Ltd.
34. Price (Oro Mines Ltd.).
35. BO (Benson Mines Ltd.).
36. Cris (General Resources Ltd.).
37. Yubet (Stellako Mining Co. Ltd.).
38. Chataway Exploration Co. Ltd.
39. Rio (Rio Tinto Canadian Exploration Limited).
40. Jae (Earlcrest Resources Ltd.).
41. Alamo (San Jacinto Explorations Limited).
42. Oro, M.M. (Oro Mines Ltd.).
43. Royal, Cana, R.C. (Royal Canadian Ventures Ltd.).

Copper-Molybdenum

Krain (2)
North Pacific Mines Ltd.
By J. M. Carr

(50° 121° N.E.) Company office, 408, 409 Granville Street, Vancouver 2. R. J. Wiley, president; A. R. Allen, consulting engineer. This company controls about 32 recorded claims in the Krain and D.W. groups east of the north peak of Forge Mountain. The property was optioned until July by Canex Aerial Exploration Ltd., which did 735 feet of diamond drilling in two holes under the direction of C. C. Rennie. Prior to this, in 1965 the same company drilled 14 holes totalling 5,872 feet and did soil-sampling. All the work was done in the same area as earlier drilling, on or near the Krain copper mineral claim.

[References: *Minister of Mines, B.C.,* Ann Rept., 1965, p. 145; Asssessment Reports Nos. 172 and 207.]

Copper

Lux, Cindy (3)
Canzac Mines Ltd.
By J. M. Carr

(50° 120° N.W.) Company office, 418, 510 West Hastings Street, Vancouver 2. R. A. Sostad, president. This company holds about 145 recorded claims in the adjoining Lux and Cindy groups, which lie to the east of the Krain property and partly occupy ground formerly held by Salmo Prince Mines Ltd. (*see* Ann. Rept., 1956, p. 43 and Fig. 2). Work in 1966 consisted of surveying and soil-sampling on the Cindy claims.

[References: *Minister of Mines, B.C.,* Ann. Rept., 1965, p. 146; Assessment Report No. 781.]

Copper-Molybdenum

Trojan (7)
South Seas Mining Ltd.
By J. M. Carr

(50° 120° N.W.) Company office, 404, 510 West Hastings Street, Vancouver 2. Benjamin H. Swig, president; A. G. Pentland, manager. This company controls about 56 claims, including 24 which are Crown granted, to the north and east of the south peak of Forge Mountain. After Mitsui Mining & Smelting Company, Ltd., dropped its option in early 1965, the company on its own did work in 1965 and 1966 which included stripping and trenching variously at the Trojan mine and on the C.N. and S.B. groups of claims and diamond drilling two holes at a lake north of the mine area, near the old Salmo Prince camp. Late in 1966 the Trojan mine shaft was dewatered, part of the workings cleaned out and partly retimbered, some track laid, and 115 feet of drifting completed, all by Highland Development Co. Ltd. under agreement with the company.

The trenches at the Trojan mine were partly caved when examined. They lie variously southeast, east, and northeast of the shaft in parts of the breccia pipe which were explored earlier by stripping and diamond drilling, and they do not significantly extend the known areas of breccia and mineralization. Trenches on the C.N. group are close to the Novak road, about 2,000 feet south of the Highland shaft, and are near a mineralized outcrop. They expose Guichon quartz diorite which is cut by fractures of several sets, along which chalcopyrite occurs in small amounts with tourmaline. Other new trenches are farther northwest, close to the volcanic contact and to old trenches, and they expose similarly fractured and altered rock with less evident mineralization. Trenches on the S.B. group are also close to old ones and are about 2,000 feet to the northeast of the Highland shaft. They show Guichon quartz diorite which is brecciated and contains tourmaline, epidote, quartz, and chalcopyrite, or malachite, on and near fractures.

[References: *Minister of Mines, B.C.,* 1964, p. 85; Assessment Report No. 342.]

Copper-Molybdenum

Bethlehem Mine (15)
Bethlehem Copper Corporation Ltd.
By David Smith

(50° 120° S.W.) Company office, 1821, 355 Burrard Street, Vancouver 1; mine office, Box 520, Ashcroft. P. M. Reynolds, president; T. P. Liss, general manager; D. S. Stevens, manager, engineering; C. W. Overton, manager, mill production; H. G. Ewanchuk, manager, mine production. The company holds 56 Crown-granted and 146 recorded claims and fractions immediately east of Quiltanton (Divide) Lake. Access to the mine is by about 30 miles of paved road from Ashcroft. A dirt-surface airstrip 2,400 feet long has been built approximately 6 miles by road from the mine-site.

Mining is carried out under contract. Production from the Jersey pit was 3,983,600 tons of waste and 2,131,424 tons of ore. In addition, 895,857 tons of stockpiled ore was moved to the crusher.

Equipment placed in service in 1966 included one 5-cubic-yard diesel shovel, one front-end loader, three 35-ton trucks, and one Caterpillar tractor.

In 1966 the mill capacity was increased from 6,000 to 10,000 tons per day. Additions to the plant were two 12½- by 15-foot rod-and-ball mills, one 30-foot-deep air cell, six No. 30 cleaner cells, twelve No. 30 D-R flotation cells, and two 200-foot-diameter tailings thickeners. Construction of a new research laboratory and a warehouse was started.

Copper concentrates produced in 1966 totalled 45,688 tons. Molybdenite concentrates totalled 15 tons. Concentrates are hauled by truck to Vancouver Wharves in North Vancouver for shipment to Japan.

Fresh water is obtained from a deep well on Shula Flats capable of supplying 1,200 gallons per minute. In 1966 a second well was drilled, having a capacity of 800 gallons per minute.

In 1965 the tailings dam was replaced by a rock dam 95 feet high built from mine waste. Work continued on this dam throughout 1966.

In 1966 further exploration work was done on the Iona, White, Snowstorm, and Hank ore zones. This comprised 1,870 feet of diamond drilling on the Jersey, 3,365 feet on the Iona, and 2,113 feet on the White, and geophysical work on 7.3 miles of line done on the White zone.

In 1966 the number of persons employed was 246, of whom 150 were employed by the company and 96 by the contractors. No housing is provided at the property; the employees commute from Ashcroft.

Copper-Molybdenum

April, UP (22)
Red Rock Mines Ltd.
By David Smith

(50° 120° S.W.) Company office, 8, 558 Howe Street, Vancouver 1. This property consists of 37 recorded claims in the April and UP groups. The property is north of Witches Brook and accessible from the Highland Valley road. In 1966 some bulldozer trenching was done, but depth of overburden was excessive and bedrock was not exposed. A crew of two men was employed under the direction of D. M. Morgan.

Copper

Eden, Ezra, Job, C.L. (17)
By J. M. Carr

(50° 120° N.W.) This property of about 78 recorded claims is held jointly by New Indian Mines Limited (company office, 714, 789 West Pender Street, Vancouver 1; T. E. Blossom, president; F. J. Hemsworth, consulting engineer) and Vananda Explorations Limited (661 Hornby Street, Vancouver 1; T. E. Blossom, president and managing director; F. J. Hemsworth, consulting engineer). It lies at about 4,000 feet elevation north of Witches Brook and west of Guichon Creek and is accessible by a road leaving the Highland Valley road a short distance west of the Jericho camp. Work in 1966 was supervised by D. R. Foster, and it included soil-sampling 10 claims, an induced polarization survey on 20 claims, 1,840 feet of trenching, and 3,000 feet of diamond drilling in nine holes.

A showing immediately northeast of the camp was visited and is on the former Giselle group held in 1956 by Deer Horne Mines Limited. It is about 4,000 feet south of trenches made by North Pacific Mines Ltd. (*see* Ann. Rept., 1964, p. 88) and is some 6,000 feet due east of B.X. (Faw) Lake. Stripping along a Z-shaped gully in bedrock, formerly a glacial meltwater channel, exposed a mineralized north-northeasterly fault which dips steeply to the west and is in quartz diorite of the younger type. The mineralization is oxidized and is apparently a lode adjoining the fault, near to which the quartz diorite is bleached and sericitized and contains random slender quartz veins. Of two holes drilled near the showing, a vertical hole drilled west of the fault intersected breccia and altered younger quartz diorite with chrysocolla and malachite for about 10 feet. Part of the adjacent rock is unaltered older quartz diorite, which apparently forms a screen in the younger rock. Core from holes drilled elsewhere on the property showed no more than a trace of chalcopyrite.

[References: *Minister of Mines, B.C.,* Ann. Rept., 1965, p. 147; Assessment Reports Nos. 606, 608, and 711.]

Copper-Molybdenum

RAF, TAM, MER, JAC, CM (10)

Cleveland Mining & Smelting Co. Ltd.

By J. M. Carr

(50° 121° N.E.) Company office, 615, 850 West Hastings Street, Vancouver 1. J. E. Cleveland, president; F. J. Hemsworth, consulting engineer. The company controls about 122 recorded claims in these and other groups that form a single property to the southwest of Pukaist Creek. Access to the property is from the O.K. mine road at a point 3½ miles from Highland Valley Lodge. Work in 1966 was supervised by D. R. Foster, and it included an induced polarization survey on 30 claims in the JAC, RAF, and MER groups and soil-sampling on the remaining claims of the property. In 1966, 1,500 feet of trenching was done and 8 miles of new road was built. Using a percussion drill, eight 3-inch holes totalling 2,500 feet were drilled on the MER Nos. 5 and 6 claims, where drilling was previously done. (*See* Annual Report, 1965, p. 148.)

A showing was visited on these two claims and is about 3 miles due west of of the southwestern corner of Indian Reserve No. 12, at about 4,700 feet elevation. It occurs immediately to the north of a prominent northwesterly slough and was apparently discovered by Henry Krause, of Merritt. Stripping exposes Guichon quartz diorite that is cut by a west-northwesterly narrow dyke of Bethlehem porphyritic quartz diorite, and both rocks show argillic bleaching, partial chloritization of hornblende crystals, some sericitization, and the local introduction of irregular quartz veins as much as 3 inches wide. Bornite is locally disseminated in chloritized patches in the rocks and is partly concentrated near quartz veins and fractures. The showing is apparently limited on the southeast by a northeasterly fault which dips west at about 60 degrees. About 100 feet farther north, malachite occurs weakly on north-dipping joints that contain quartz and epidote veins. Drill-holes are reported to have indicated grades of between one-half and 1 per cent copper. Examination of air photographs suggests that the showing lies at a broad intersection of northerly, northeasterly, and other lineaments, which may represents faults.

A trench seen farther to either the west or the southwest, on the JAC No. 17 claim, is close to an old east-facing adit and is in quartz diorite which is weakly mineralized for a visible length and width of 200 feet and 20 to 30 feet, respectively. The mineralization mostly adjoins northerly fractures which dip steeply to the west, and it consists of nests and platings of coarsely crystallized chalcopyrite and molybdenite. One hundred and fifty feet farther west, weakly chloritized rock with trace amounts of sulphides is exposed to the east of a northerly gully which may overlie a fault.

Copper

A.L., I.C., Etc (14)

Great Northern Petroleums & Mines Ltd.

By J. M. Carr

(50° 121° S.E.) Company office, 809, 525 Seymour Street, Vancouver 2. B. I. Nesbitt, president. This company holds by option from Continental Consolidated Mines Ltd. about 40 recorded claims named A.L., I.C., and Ezz which adjoin the O.K. road about 1 mile west of Quiltanton (Divide) Lake. Work in 1966 was supervised by Carl Stephenson, and it included magnetometer surveying on the I. C. claims.

Copper

Ezz, O.K. (13)

Alwin Mining Company Ltd.

By J. M. Carr

(50° 121° S.E.) Company office, 311, 850 West Hastings Street, Vancouver 1. H. E. Jacques, president. This company controls about 12 recorded claims named Ezz and O.K. which lie immediately north of the old O.K.

mine and until recently were held partly by Royal Canadian Ventures Ltd. (*see* Annual Report, 1961, p. 29). In 1966 trenching was done on the O.K. Nos. 5 and 6 claims under the supervision of K. Owens.

[References: Assessment Reports Nos. 380 and 381.]

Copper-Molybdenum

Bethsaida (18)
Valley Copper Mines Ltd.
By J. M. Carr

(50° 121° S.E.) Exploration office, 1150 Bay Avenue, Trail. This company, which is under the management of Cominco Ltd., holds about 400 mineral claims in the Highland Valley area, of which 42 are in the Bethsaida property and include the M.D. and D.F. groups and several Crown-granted claims. Work in 1966 was directed by J. M. Allen and included 4,500 feet of diamond drilling in nine holes on the Bethsaida property, chiefly or entirely near showings on Crown-granted claims where drilling and other work was done by Bethsaida Copper Mines, Limited, in 1956 and by the present company in 1965.

[References: *Minister of Mines, B.C.* Ann. Repts., 1956, p. 45; 1965, p. 147; Assessment Report No. 537.]

Copper

Royal, Cana, R.C. (43)
Royal Canadian Ventures Ltd.
By David Smith

(50° 121° S.E.) Company office, 270, 180 Seymour Street, Kamloops. The Royal, Cana, and R.C. groups consist of 29 recorded mineral claims, which are southeast of Calling Lake and are reached by a road south of the lake. In 1966 a geological survey was carried out, a geophysical survey was made, and soil-sampling was done on half the claims. A crew of five men was employed under the supervision of N. B. Vollo.

[References: Assessment Reports Nos. 380, 381, 848, and 854.]

Copper-Molybdenum

Lornex (27)
Lornex Mining Corporation Ltd.
By J. M. Carr and T. M. Waterland

(50° 121° S.E.) Company office, 558 Howe Street, Vancouver 1; mine office, Box 658, Ashcroft. E. H. Lorntzsen, chairman; Robert D. Armstrong, president; J. W. Scott, mine manager; W. Marsh, resident geologist; A. C. Skerl, consulting geologist. This company controls about 200 recorded mineral claims which extend southward from Indian Reserve No. 13 in the Highland Valley and include a number of claims on option variously from Skeena Silver Mines Ltd. and Kennco Explorations, (Western) Limited. Exploration of the property since 1965 has been financed by Rio Algom Mines Limited in association with The Yukon Consolidated Gold Corporation Ltd., which took options on treasury shares and thereby gained control of the company at the end of 1966. A very large low-grade deposit of copper and molybdenum has been partly outlined by pattern drilling on the Award, Skeena Copper, and A.M. claim groups and the Lornex No. 1 fractional claim, at a distance of about 4 miles southwest of the Bethlehem mine. Late in the year the company, having announced its intention to sample this deposit in bulk from underground and to erect a small mill for the purpose, awarded a contract for underground work to Gremac Construction Limited.

Work in 1966 included 38,295 feet of diamond drilling in 33 holes, 52,925 feet of percussion drilling in 215 holes, and about 8,000 feet of trenching. A Becker hammer drill was used to prepare collars through overburden for some of the diamond-drill holes, and experimental drilling was done with rotary, churn, and hammer drills. Induced polarization surveys were extended to the Discovery zone and the Kennco claims, and preparations were made for shaft-sinking and mill construction.

During late summer, services for a 200-man trailer camp were installed, and living accommodation and dining facilities for 100 men have since been completed. In addition, a 25- by 40-foot shop and warehouse, a sample preparation building, an assay trailer laboratory, two guest trailers, and core storage and splitting additions were installed.

A 4,000-volt power-line was built from the British Columbia Hydro and Power Authority transmission-line to the camp, and at year-end this line was being extended 1½ miles to the proposed pilot mill and shaft sites.

The following notes are based on a four-day examination of surface exposures and drill core made in July and supplemented by maps and other information kindly supplied by the company. As well as showing the geology, Figure 25 shows the location of diamond-drill holes then completed and of most of the trenches on the North and Discovery zones. Some trenches failed to reach bedrock, and others were partly caved at the time of examination and afforded exposures as indicated. Later drilling on the North zone, which is the main part of the deposit so far as known, was partly on intermediate lines spaced at 400 feet and partly on lines farther to the south. Holes on line No. 3N are 800 feet south of those on line No. 11N and are reported to show a probable connection between the North and Discovery zones, which together may form a deposit 5,000 feet long in a southeasterly direction and in places as much as 1,600 feet wide. The maximum elevation of mineralized outcrops is 5,200 feet, and the deepest mineralized intersections are at 3,625 feet elevation, giving a known vertical range of mineralization of nearly 1,600 feet. Superficial deposits as much as 250 feet deep overlie the western part of the North zone, roughly along Award Creek, where they occupy a glacial valley from which at some stage meltwater escaped eastward and cut bedrock channels that are conspicuous topographic features at the Discovery zone.

The Lornex deposit occurs in the Bethlehem (Skeena) quartz diorite partly at the eastern contact of a younger stock of the Bethsaida granodiorite. In holes Nos. 20 and 21 the contact is steeply and strongly faulted in a northerly direction and is the western limit of strong alteration and mineralization. Its position is inferred nearly 1 mile farther south, between holes Nos. 4 and 6, which are outside the deposit and show the two rocks as mineralized about equally. Existing maps suggest that here the contact possesses a northwesterly strike and continues southeastward to the vicinity of upper Skuhun Creek.

The mineralized rocks are strongly fractured and altered. Altered quartz diorite is partly darker and partly lighter than the fresh rock, and it contains quartz grains that are enlarged by silicification. Pink perthitic orthoclase feldspar remains largely unaltered, whereas plagioclase becomes either chalky or yellow. Hornblende and some of the biotite are chloritized. Elsewhere biotite is partly bleached and in places new biotite is formed. Quartz fills abundant fractures, mostly as slender veins that are margined by sericite and chlorite and by silicified and argillized rock. The veins and fractures contain sulphides as well as coarse sericite, or calcite and zeolites which are variously pink and white in colour. A late generation of quartz veins is barren of sulphides. Faults are numerous in the drill-holes and mostly possess gouge which is either sericitic or chloritic and calcitic. The walls of the faults are extensively altered and commonly mineralized. Evidence of post-mineral movement is seen in crushed sulphides and quartz veins. Fault attitudes are poorly known, but a 30-foot-wide fault exposed at the Discovery zone has a northwesterly strike and a steep dip.

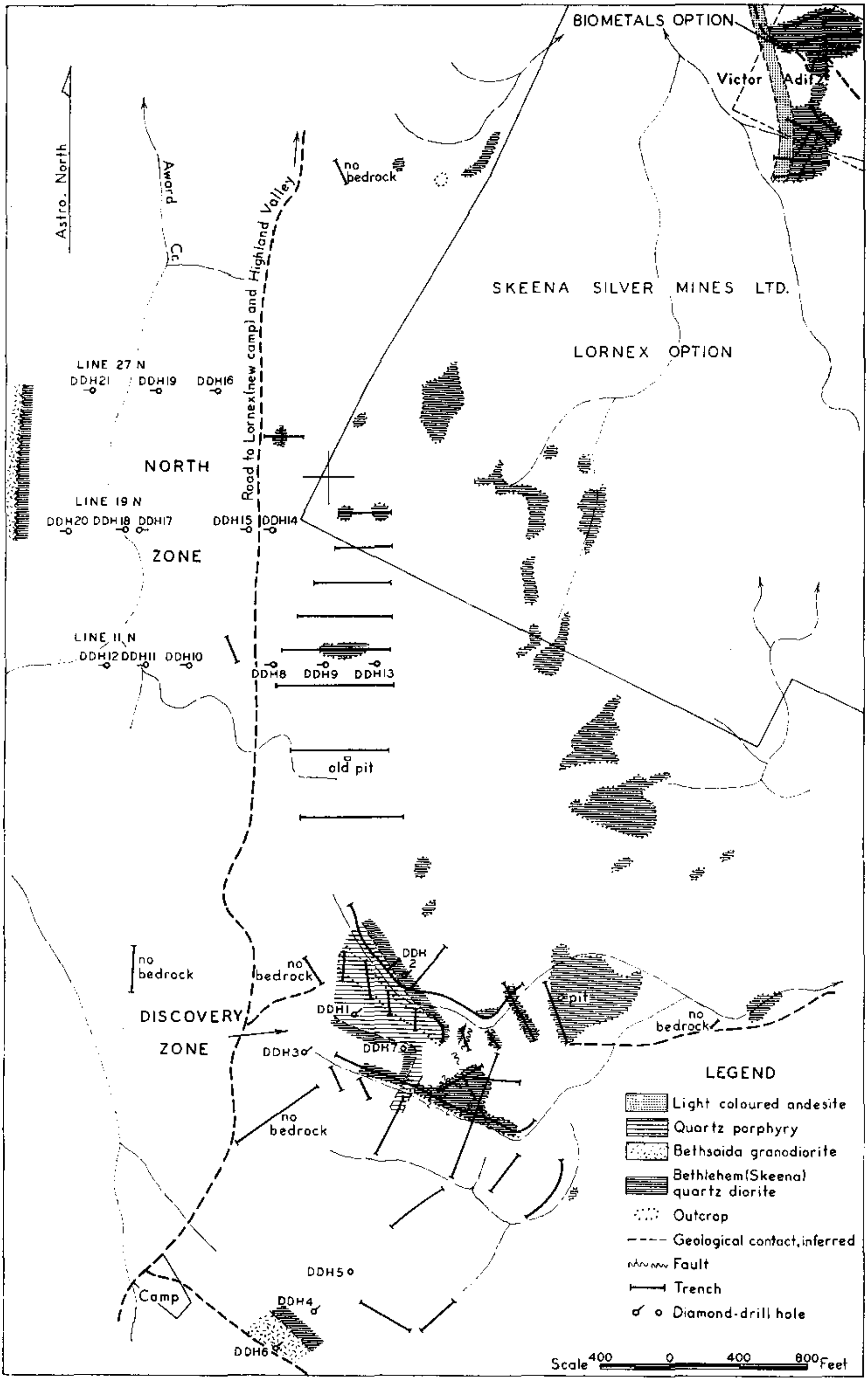


Figure 25. Lornex Mining Corporation Ltd. Geological map of part of the Lornex.

Bornite, chalcopyrite, pyrite, and molybdenite occur mostly in or close to quartz-filled fractures, either as stringers or as disseminations which may be quite coarse. Locally the sulphides are well crystallized in voids. Eastward near the edge of the North zone the assemblage bornite, chalcopyrite, and molybdenite gives way to chalcopyrite, pyrite, and molybdenite. Partial oxidation of sulphides has produced limonite, malachite, azurite, tenorite, cuprite, and locally native copper generally at shallow depths and without causing appreciable supergene enrichment. Due no doubt to glacial erosion, the oxidized surface zone is missing from the western part of the deposit.

[Reference: *Minister of Mines, B.C.*, Ann. Rept., 1965, p. 148.]

Copper

Calco, Shorty (19)
Noranda Exploration Company, Limited
By David Smith

(50° 121° S.E.) Company office, 1050 Davie Street, Vancouver 5. The 14 Calco and Shorty recorded mineral claims partly adjoin the north end of the Lornex property and are 1½ miles southwest of Quiltanton Lake. In 1966 an induced polarization survey was performed and two holes were diamond drilled. A crew of six men, including four contractors, was employed under the direction of R. C. Heim.

Copper

Victor (20)
Bio Metals Corporation Ltd.
By J. M. Carr

(50° 121° S.E.) Company office, 1515 Pemberton, North Vancouver. C. L. Emery, president. This company holds an option from Consolidated Skeena Ltd. on a part of the Divide Copper claims (20) measuring 800 by 1,000 feet and enclosing the Victor mine, at which a small copper orebody was outlined by work completed in 1957 (*see* Ann. Repts., 1956, p. 46; 1957, p. 27). In 1965 some 750 tons of material, believed to contain about 1 per cent copper, was blasted from the Victor vein on surface and stockpiled nearby to form a heap for experimental leaching and recovery of copper. The heap stands on polyethylene sheeting and an underlying sand cushion, and, at the time of visit in August, acidic water in the amount of 2,000 gallons per day was flushed constantly through it and recirculated. Copper was expected shortly to be recovered from this heap, and preparations were being made to construct a 50,000-ton heap of similar material. Ralph Mason was in charge of the operation.

Copper-Molybdenum

AM, IDE, Etc. (29)
Highmont Mining Corporation Ltd.
By J. M. Carr

(50° 121° S.E.) Company office, 702, 850 West Hastings Street, Vancouver 1. This company is controlled by Torwest Resources (1962) Limited (R. W. Falkins, president; W. G. Hainsworth, consulting geologist), and it owns 34 recorded claims named AM, IDE, Ann, and Phyllis on the west slopes of Gnawed Mountain adjoining the Lornex property. For two years prior to 1966 this property was explored by Anaconda American Brass Limited, which did extensive geological, geochemical, and geophysical work and some drilling before terminating its option at the end of 1965. On its own in 1966 the company did work which included 20,000 feet of percussion drilling in 80 holes, 1,800 feet of diamond drilling in three holes, 1,486 feet of trenching, soil-sampling, on the IDE Nos. 19 and 20 claims, and induced polarization surveying by McPhar Geophysics Ltd. This programme, which from October was financially supported by Nippon Mining Company, Limited, employed a crew of 32 men, including 22 on contract, supervised by M. Mathieu. A winter camp was constructed, which included an assay office.

Under light overburden, East and West zones of low-grade copper-molybdenum mineralization have been explored and outlined mainly by the systematic drilling of eastward-inclined holes to depths vertically exceeding 250 feet. The East zone is mainly on the IDE Nos. 1 and 3 claims, and it includes mineralization previously intersected by diamond drilling (*see* Ann. Rept., 1962, p. 49). The West zone is mainly on the IDE No. 7 claim, where some drilling was done in 1965 by the Anaconda company. Other mineralized zones occur within the large area explored by recent drilling. In February the company published an estimate of ore reserves in the East zone to a depth of 250 feet, as follows: 72,300,000 tons grading 0.25 per cent copper and 0.064 per cent molybdenite. The West zone is reported to possess a much smaller tonnage of material, mainly containing values in molybdenite.

Copper-Molybdenum

AM, IDE, Etc. (31)
Minex Development Limited
By J. M. Carr

(50° 120° S.W.) Company office, 8, 558 Howe Street, Vancouver 1. D. M. Morgan, president and engineer. This company owns 33 recorded claims named AM, IDE, Ann, V.M., and Snow which are on Gnawed Mountain, mainly south and east of the Lornex and Highmont properties and accessible through them. In 1966 work was done mostly on the IDE No. 2. Eight trenches totalling 6,300 feet were bulldozed and geologically mapped. Thirteen percussion holes totalling 3,235 feet were drilled by Lornex Mining Corporation Ltd.

Copper-Molybdenum

Jericho, Bob, Gem, Stibbard, Mark (24)
Jericho Mines Ltd.
By David Smith

(50° 120° S.W.) Company office, 71, 553 Granville Street, Vancouver 2. H. B. Hatch, president. This company holds 167 claims comprising the Jericho, Bob, Gem, Stibbard, and Mark south of Witches Brook, about 7 miles east of Quiltanton (Divide) Lake. In 1966 all work was carried out under the supervision of Canadian Superior Exploration Limited, 7 King Street East, Toronto 1, Ont., which holds the property under an option agreement. Surface exploration consisted of a geochemical survey over the entire group and an induced polarization survey carried out over three-quarters of the claims to the south. Seven trenches were bulldozed totalling in length 1,300 feet. One packsack diamond-drill hole to a depth of 118 feet was drilled. A crew of 14 men was employed under the direction of R. A. Dujardin.

[References: Assessment Reports Nos. 483 and 922.]

Copper-Molybdenum

Lake, Laken, Bron, PM, PIM (25)
T. C. Explorations Ltd.
By J. M. Carr

(50° 121° S.E.) Company office, 201, 569 Howe Street, Vancouver 1. Howard T. James, president; A. C. Skerl, consulting geologist. This company holds about 81 recorded claims partly in the Lake and Laken groups near Pimainus Lake. Work by a small crew began in November, 1965, continued to August, 1966, and was supervised by L. Ostensoe and later by A. F. Roberts. It included road construction, line-cutting, geochemical, magnetometer, and induced polarization surveys, and, in the north part of the property, 2,000 feet of trenching and 720 feet of percussion drilling in 17 holes, eight or more of which reached bedrock. Access to the property from Highland Valley is by about 12 miles of road which passes through the Lornex property.

Trenches on the Laken claims were visited in early August. The road roughly follows the old trail northwards from the west end of Pimainus Lake. Just west of the road between lines 65N and 70N, which are about 6,000 feet north of the lake, a trench on the east side of a marsh exposes somewhat chloritized Bethsaida granodiorite in which small amounts of malachite occur partly near an east-northeast shear that dips southward at about 30 degrees. To the south a caved trench on line 65N contains debris of a pale-coloured quartz porphyry which may occur as dykes in the granodiorite. Due south on line 60N seven holes were drilled and are reported partly to have intersected small amounts of copper and molybdenite mineralization. Still farther due south a trench on line 50N straddles a north-trending slough, on either side of which granodiorite is exposed and contains slender, irregular quartz veins in which are bornite and malachite. Assays of less than 1 per cent copper are reported from the trench. Along this line westward the Bethsaida granodiorite is succeeded by outcrops of the Bethlehem (Skeena) quartz diorite, which occur at a distance of about 2,100 feet west of the trench. One thousand feet farther west, across a broad north-northwesterly slough, the Guichon quartz diorite is exposed in a trench and is cut by a wide fault that strikes more or less parallel to the slough. Exposures of the fault are weathered and partly caved, and no mineralization was seen, although low copper assays are reported. In general, known mineralization in the explored area is apparently localized near faults, some of which may follow prominent northerly or north-northwesterly topographic depressions, and others may follow inconspicuous northeasterly topographic lineaments that are visible on air photographs of the area.

[References: Assessment Reports Nos. 853 and 855.]

Copper

Merv, Bet, Lee, B.J., Etc.
Highland Chief Mines Ltd.
By David Smith

(50° 121° S.E.) Company office, 202, 475 Howe Street, Vancouver 1. This company holds 275 recorded claims in the Merv, Bet, B.J., Lee, and Brad groups to the southwest of Pimainus Lake. The property, which is accessible by road through the Lornex property, partly covers the same ground as the former Eye and B.J. groups that were held in 1958 by Northwestern Explorations, Limited (*see* Ann. Rept., 1958, p. 24). Work in 1966 consisted of geological and geochemical mapping, and bulldozer trenching on the B.J. and Merv groups. A crew of five men was employed under the supervision of H. P. Killoran.

[References: Assessment Reports Nos. 230 and 231.)

Copper-Molybdenum

Cris (36)
General Resources Ltd.
By J. M. Carr

(50° 121° S.E.) Company office, 213, 678 Howe Street, Vancouver 1. W. E. Simpson, president; R. B. Stokes, consulting engineer. This company holds six claims in the Cris group between Skuhost and Skuhun Creeks, 2 to 3 miles west of Roscoe Lake. Access to the property is by a road leading north from the Skuhun Creek road. The main area of interest was on the Cris Nos. 9 and 10 claims, where a large swamp lies south of north-northwesterly gullies at which trenches expose the Bethsaida granodiorite, partly strongly sheared, altered, and weathered and containing some sericite-quartz veins with traces of bornite. Work early in 1966 was supervised by B. McKnight, and it consisted of a magnetometer reconnaissance survey and approximately 1,400 feet of diamond drilling in as many as three holes, making the total drilling done on the property in 1965 and 1966, 2,292 feet in six holes. The core was not examined by the writer but is reported to contain minor amounts of copper and molybdenum. Anomalous results obtained in the drilled area by previous induced polarization surveys were explained as due to argillic material in faults.

[Reference: *Minister of Mines, B.C.,* Ann. Rept., 1965, p. 151.]

Copper

BO (35)
Benson Mines Ltd.
By J. M. Carr

(50° 120° S.W.) Company office, 207 Rogers Building, 470 Granville Street, Vancouver 2. R. Devente, president; H. Cohen Engineering Ltd., managing engineers. This company holds about 40 recorded claims partly in the BO group on Skuhost Creek, south of the Lornex property. Work in 1966 continued from the previous year and brought the total drilling done to five holes of unspecified aggregate length. The drilled and trenched area is near the camp, a mile or so north of the area explored by General Resources Ltd. on the Cris group, and the trenches expose the Bethsaida granodiorite, which is sheared and contains a visible trace of bornite.

[Reference: *Minister of Mines, B.C.,* Ann. Rept., 1965, p. 151.]

Copper

Rio (39)
Rio Tinto Canadian Exploration Limited
By J. M. Carr

(50° 121° S.E.) Vancouver office, 404, 1111 West Georgia Street, Vancouver 5. L. B. Gatenby, manager. In 1965 and 1966 this company held about 74 recorded mineral claims in the Rio group southeast of Spaist Mountain and mainly west of Skuhost Creek. From June to August, 1966, a small crew under G. T. Warren camped east of the property near the road leading north to the General Resources camp and did work which included geochemical and magnetometer surveys and geological mapping. The property is largely underlain by the Bethsaida granodiorite, in which numerous minor occurrences of bornite are reported, mostly on irregular fractures in the rock.

[Reference: Assessment Report No. 780.]

Copper

Gem, Hal, Fir, Curmo
Glen Echo Mines Ltd.
By N. D. McKechnie

(50° 121° S.E.) Head office, Suite 710, 60 Yonge Street, Toronto 1, Ont. H. S. Wilson, geologist. The company holds by record some 50 mineral claims, the Gem, Hal, Fir, and Curmo groups, on Skwilkwakwil Mountain, north of Skuhun Creek, which flows westward into the Nicola River 3 miles southeast of Clapperton. The property is south of the Rio group (39) and access to it is from the Merritt–Spences Bridge highway by the Skuhun Creek road. About 4 miles upstream a jeep-road leads northward up the mountain, some 2 miles to the working area at an elevation of 4,450 feet.

The claims are underlain by the Guichon Creek batholith (*Geol. Surv., Canada,* Map 1010A, Ashcroft) and are near its southwestern margin.

The principal showing, at the time of the writer's visit in June, was on the Fir No. 1 mineral claim. An area about 20 by 40 feet in grey Guichon quartz diorite is mineralized by disseminated chalcopyrite. The mineralization is in part along joints striking north 20 degrees east. The mineralized area is bounded by dykes, striking north 30 degrees west, of dacite porphyry; a small dacite porphyry dyke cuts through the middle of the mineralized area. The dykes are not mineralized.

About 200 feet southwest and 100 feet lower in elevation from the above showing a dacite porphyry dyke is exposed to a width of about 60 feet. It has an undulating contact with the quartz diorite, striking about north 30 degrees west. The quartz diorite here shows some copper stain but almost no sulphides.

West and south from the Fir No. 1 showing, and 300 feet lower in elevation, a bulldozer stripping crosses a fault zone on the Fir No. 3 mineral claim. The zone is about 300 feet wide, strikes 5 to 10 degrees west of north, and dips nearly vertically. The zone is intruded by dykes of dacite porphyry; there is minor post-dyke movement. No mineralization was seen in the fault zone.

On the boundary between Curmo No. 1 mineral claim and Curmo No. 3 mineral claim, at about 4,000 feet elevation, on the south side of a west-trending gorge and about a mile northwest of the Fir No. 1 showing, a 6-inch shear is exposed in quartz diorite. The shear strikes north and dips 80 degrees west, and it is mineralized with quartz, chalcopyrite, bornite, and pyrite. The shear and the mineralization are cut by two vertically dipping dacite porphyry dykes which strike north 50 degrees west. Post-dyke movement along the shear has produced small shear planes in the dykes which carry malachite but no sulphides. At about 30 feet in the footwall of the 6-inch shear there is a fault zone about 6 feet wide striking north 63 degrees east and dipping 80 degrees northwestward. The zone is mineralized with white quartz; no sulphides were seen. The fault zone is heavily stained with malachite, which lies along joint planes in both quartz diorite and quartz.

[Reference: Assessment Report No. 786.]

Copper-Molybdenum

Yubet (37) (50° 120° S.W.) Company office, 716, 602 West Hastings Street, Vancouver 2. J. R. Trepanier, president; W. M. Sharp, consulting geologist. This company holds about 70 recorded claims at Roscoe Lake, the main showing being on the Yubet Nos. 7 and 8 claims a short distance south of the lake. In 1965 Noranda Exploration Company, Limited, financed and directed a programme of exploration and diamond drilling near the main showing, continuing into 1966 and employing as many as 24 men. As many as 21 holes were drilled, totalling an unknown footage. Work in 1966, subsequent to this programme, was by the company on its own and included magnetometer and soil-sampling surveys by a small crew under Len Hachey.

Stellako Mining Co. Ltd.
By J. M. Carr

The main showing is briefly described in the Annual Report for 1965 (p. 151) and is a north-trending zone of mineralization containing bornite, chalcopyrite, and molybdenite for a known length of about 800 feet and a width in places as much as 60 feet. The sulphides are associated with quartz veins in the Skeena variety of the Bethlehem quartz diorite and, although at surface the structures appear to dip steeply, drilling failed to show that mineralization persists to depth. There are aplite or aplitic quartz porphyry dykes, chloritic alteration is in places strong and sericite is abundant on faults, which may partly explain the occurrence of induced polarization anomalies. A molybdenite showing is reported elsewhere on the property, and is west of Roscoe Lake.

Copper

Cal (32) (50° 120° S.W.) Company office, 213, 678 Howe Street, Vancouver 1. W. E. Simpson, president; R. B. Stokes, consulting engineer. This company holds 12 recorded claims and fractions in the Cal group at Clifford (Deer) Lake, 1 mile to the north of Roscoe Lake. Access is from the Stellako Mining Co. Ltd. camp farther south. Work in 1966 was mainly on Cal No. 7 claim and included an induced

General Resources Ltd.
By J. M. Carr

polarization survey by McPhar Geophysics Ltd. and 1,052 feet of diamond drilling in two holes inclined under Clifford Lake from the east shore, where copper mineralization had previously been exposed. The drilling, which was paid for by Cyprus Exploration Corporation, Ltd., under an agreement with the company, is reported to have intersected copper mineralization of no commercial interest.

[Reference: *Minister of Mines, B.C.*, Ann. Rept., 1965, p. 153.]

Copper

Price (34), Oro, M.M. (42)
Oro Mines Ltd.
By J. M. Carr

(50° 120° S.W.) Company office, 201, 846 West Hastings Street, Vancouver 1. Neville Lohn, president; Alrae Exploration Ltd., consulting and managing engineers. This new company owns about 100 mineral claims mainly in the Price group, which form the North Oro property, and about 85 claims in the Oro and M.M. groups, which form the South Oro property. Work on both properties in 1966 was by a small crew directed by D. K. Bragg and operating from a camp established at Skuhun Creek on or near the South Oro property. On both properties it included road construction, line-cutting and soil-sampling on all claims, induced polarization surveys on selected claims, geological mapping, and trenching. Access is by road extending from Mile 14 on Highway No. 8 up Skuhun Creek past the camp (a distance of 14 miles) and thence a further 14 miles past Chataway and Billy Lakes to the Highland Valley road at a point one-half mile west of the Jericho camp. The properties were visited in company with Mr. Bragg briefly in August, and an imperfect examination was made in failing evening light; consequently not all details of the geology can be given.

(*a*) *North Oro Property.*—A trench on the west side of the road about 1,600 feet south of Billy Lake extends west-northwest across a water-filled northeasterly draw. It exposes the older quartz diorite, of Billy Lake or Chataway Lake type, in which to the west of the draw a bornite-bearing lode persists along the trench for a distance of about 70 feet and dies out westward. Its width is several inches to a foot, and it possesses an offshoot which extends into the southwest wall of the trench and dips to the southwest. Disseminated copper mineralization is reported to occur locally in the quartz diorite. Three trenches farther west failed to reach bedrock.

(*b*) *South Oro Property.*—Trenches on the M.M. Nos. 9, 10, 11, and 12 claims lie at about 4,800 feet elevation a short distance to the west of the old Skuhun Creek trail, which is shown on National Topographic Series maps. They are spaced for a distance in excess of 1,000 feet in a north-northeasterly direction, and they expose the Bethsaida granodiorite, which is cut by several prominent sericitic faults that strike approximately north 15 degrees east. The granodiorite contains strongly fractured quartz veins, some of which are several feet wide, that possess easterly strikes and steep dips. Bornite and malachite occur in restricted amounts, mainly in the quartz veins close to the faults. Red zeolite, which is probably heulandite, also occur.

[References: Assessment Reports Nos. 973, 974, and 975.]

Copper

Rain
Vanmetals Exploration Limited
By J. M. Carr

(50° 120° S.W.) Company office, 213, 678 Howe Street, Vancouver 1. This company holds about 15 recorded claims in the Rain group to the east of Skuhun Creek and more or less adjoining the eastern boundary of the M.M. group of Oro Mines Ltd. (42). Access is by 16 miles of road from Mile 14 on Highway No. 8. Work in 1966 was supervised by B. K. McKnight and included 1,400 feet of trenching.

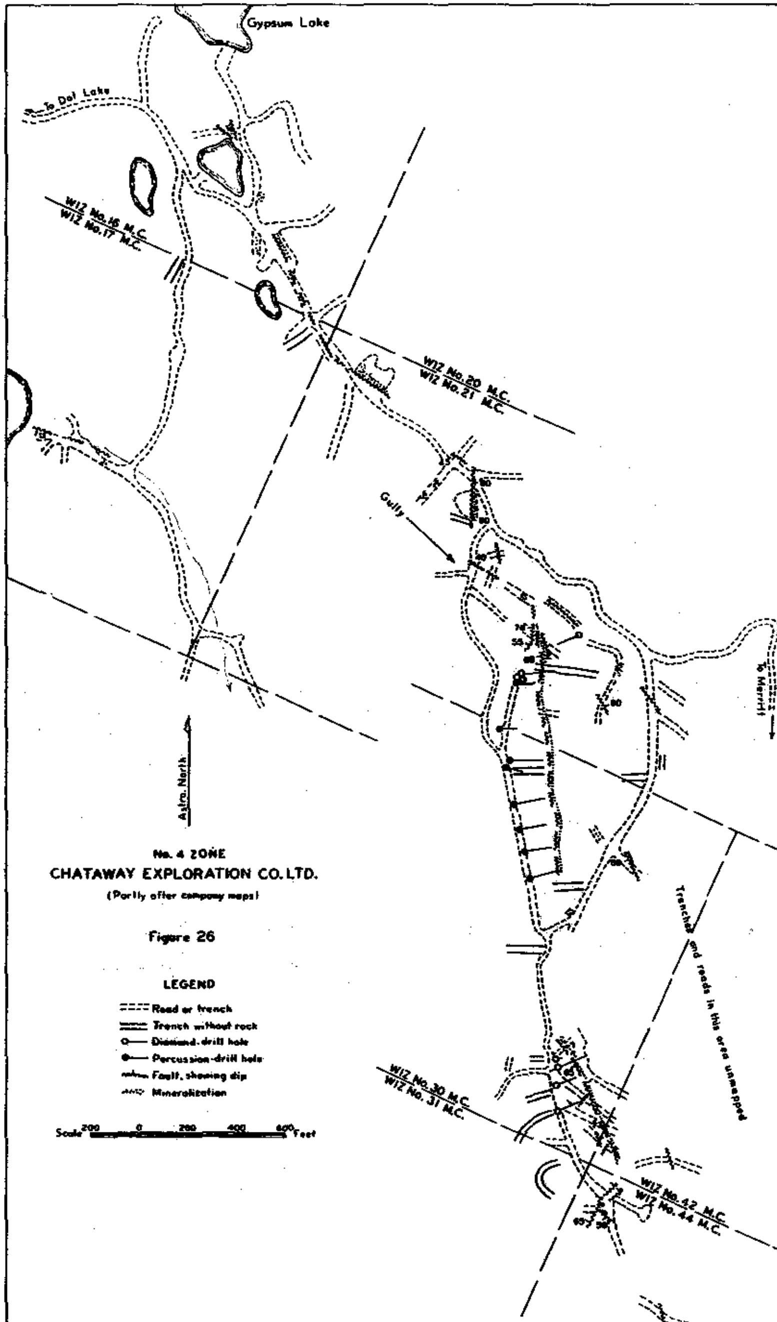
[Reference: *Minister of Mines, B.C.*, Ann. Rept., 1965, p. 153.]

Copper

Chataway (38)
Chataway Exploration Co. Ltd.
By J. M. Carr

(50° 120° S.W.) Company office, 301, 550 Burrard Street, Vancouver 1. S. W. Wright, president and managing director. This company owns approximately 360 mineral claims in the southeastern part of the Highland Valley camp, extending nearly from Roscoe Lake southeastward to the Mamit Lake road north of Broom Creek. One hundred and forty-eight of the claims in the southern part of the property are under option to Bralorne Pioneer Mines Limited (company office, 320, 355 Burrard Street, Vancouver 1; J. P. Weeks, chief geologist) and associated companies, which did work in 1966 that was supervised by E. Meyers and included geological mapping, induced polarization surveys, trenching, sampling, 1,118 feet of diamond drilling in four widely spaced holes, and 4,649 feet of percussion drilling in 21 holes. Work by Chataway Exploration included soil-sampling, trenching, induced polarization and magnetometer surveys, and 410 feet of diamond drilling in two holes southeast of Roscoe Lake.

The main showing on the optioned part of the property was examined in August after new trenching had been done. Known as the No. 4 zone, it lies at about 4,500 feet elevation on the Wiz No. 21 and adjoining claims, and it was discovered early in 1965 and partly described in the 1965 Annual Report (p. 149). As shown by Figure 26, which is adapted from a map made for Chataway Exploration by A. G. Hodgson and includes information provided by Bralorne Pioneer, it includes a series of trenches extending for about 5,000 feet south-southeastward from Gypsum (Cougar) Lake toward an old caved adit some 2,000 feet farther distant and off the map. The area is underlain by somewhat porphyritic younger quartz diorite, more or less of the Bethlehem type, except immediately south of Gypsum Lake, where the older quartz diorite projects southward as a small body in the younger rock. The younger quartz diorite is partly fresh and has a primary foliation that dips steeply westward and strikes about north-northeast. Near Gypsum Lake one or more dacite porphyry dykes occur which strike west-northwestward and are partly of crowded porphyry. To the south, narrow basalt or lamprophyre dykes are exposed in trenches and possess a similar strike and a dip to the south. Trenches partly expose a large number of faults which mostly have northerly or northwesterly strikes and dips that are mostly either westerly at 65 degrees or steeper angles, or are steep to the east. Exploration has shown that several principal faults each persist for distances of several hundreds of feet and together constitute a fault zone which persists throughout the length of the No. 4 zone. Four principal faults occur variously near the northern claim intersection, north and south of the gully, and near the southern claim intersection respectively. The fault south of the gully was explored in 1966 by percussion drilling and has a known length of as much as 1,000 feet; its northern exposure, in a trench at the southeastern end of the gully, is the northernmost of the two showings described in the 1965 Annual Report. The faults contain gouge and breccia, in places several feet wide, and possess walls that are altered strongly either to a dark chloritic rock or to a light-coloured sericitic and kaolinitic rock. A red zeolite, which is probably heulandite, occurs in the less-altered rock at some distance from the faults. Well-mineralized pods of quartz occur in places in the faults, and sulphide veins and seams partly with quartz extend upward and outward along widely spaced parallel fractures in the wallrock of one side or the other. Poorly mineralized cross-faults in places dislocate the mineral-


Gypsum Lake
To Dot Lake
WIZ No.16 M.C.
WIZ No.17 M.C.
WIZ No.20 M.C.
WIZ No.21 M.C.
Gully
To Merritt
Astro. North
Trenches and roads in this area unmapped
WIZ No.30 M.C.
WIZ No.31 M.C.
WIZ No.42 M.C.
WIZ No.44 M.C.
No. 4 ZONE
CHATAWAY EXPLORATION CO. LTD.
(Partly after company maps)
Figure 26
LEGEND
Road or trench
Trench without rock
Diamond-drill hole
Percussion-drill hole
Fault, showing dip
Mineralization
Scale 200 0 200 400 600 Feet

ized structures and may account for their restricted continuity along strike. The copper mineralization is partly oxidized and consists of chalcopyrite, bornite, chalcocite, malachite, and azurite. Drilling and company sampling of trenches indicate that, in places on the faults, copper contents are in the order of several per cent across widths of a few feet or between 1 and 2 per cent across widths of several tens of feet. At other places on the faults, mineralization is apparently weak. Faults which lie to the east, in the southern part of the zone, are reported to be mineralized and have been explored by trenches, most of which are not shown on the accompanying map. Weak pyrite disseminations accompany minor amounts of malachite near poorly mineralized faults that are shown in the east-central part of the zone.

[References: Assessment Reports Nos. 611, 737, 749, and 764.]

NICOLA MINING DIVISION

HIGHLAND VALLEY

Part of the claim holdings of the following Highland Valley properties—Jericho Mines Ltd. (Jericho, Bob, Gem, Stibbard, Mark), Oro Mines Ltd. (Price), and Chataway Exploration Co. Ltd.—lie in the Nicola Mining Division. These properties are described under Kamloops Mining Division, pages 159, 163, and 164.

Zinc-Copper

SWAKUM MOUNTAIN

Lee, Sunshine, Lo
Vastlode Mining Company Limited
By N. D. McKechnie

(50° 120° S.W.) Company office, 1330, 510 West Hastings Street, Vancouver 1. A. D. Gavelin, president; S. F. Kelly, director and consulting geologist. The company holds 68 claims by record on the westerly slope of Swakum Mountain between elevations of 4,000 and 5,500 feet at the headwaters of Steffens and Tolman Creeks. Access is through the Lazy L Ranch by a dirt road which leaves the Mamit Lake road about 7½ miles from its junction with the Merritt–Spences Bridge highway.

Two diamond-drill holes were drilled under the mineralized shear on the Sunshine No. 8 mineral claim; the shallower of these cut some silicified material, but in neither was the surface structure certainly recognized.

Three more holes were drilled on the boundary between the Sunshine Nos. 11 and 13 claims. The company supplied the following assay results from split core samples:—

Interval (Ft.)	Silver (Oz.)	Copper (Per Cent)	Lead (Per Cent)	Zinc (Per Cent)
Diamond-drill hole 11—				
67– 72	0.05	0.10	0.10	2.13
72– 77	Trace	0.32	0.57	5.22
77– 82	0.10	0.30	0.30	7.67
82– 87	0.10	0.31	0.62	3.59
87– 92	0.05	0.16	0.25	4.25
92– 94	Trace	0.11	Trace	1.30
Diamond-drill hole 12—				
94– 98	Trace	0.25	Trace	0.18
98–104	0.10	0.09	Trace	7.95
104–109	0.30	0.14	0.20	18.15
109–111	0.10	0.05	Trace	21.27
111–114	Trace	0.05	Trace	5.50
114–118	Trace	0.04	Trace	0.24
118–120	0.25	0.11	Trace	3.60
120–122	Trace	0.04	Trace	0.18
122–123	1.20	0.20	Trace	13.75

There still is not enough data to correlate the assays with a structure.

[Reference: *Minister of Mines, B.C.*, Ann. Rept., 1965, p. 150.]

MERRITT

Copper

Craigmont Mine
Craigmont Mines Limited
By David Smith

(50° 120° S.W.) Company office, 700, 1030 West Georgia Street, Vancouver 5; mine office, Box 3000, Merritt. J. D. Simpson, president; R. E. Hallbauer, mine manager. This company holds 106 mineral claims and fractions, of which 22 claims and fractions are held in 10 separate leases. The Craigmont orebodies are on the Merrell Nos. 7 and 8 claims and the McLeod Nos. 5 and 6 claims and are between the forks of Birkett Creek at original surface elevations between 3,800 and 4,200 feet. Access to the property is by road north from Lower Nicola on No. 8 highway, 5 miles west of Merritt.

Mining and milling were not continuous in 1966. There was no production between January 1, 1966, and April 18, 1966, when a strike by hourly employees was settled. Production was from the open-pit and from the underground operations. The copper concentrate was loaded at the Coyle siding and hauled by Canadian Pacific Railway for shipment to Japan. In 1966 the company excavated 9,420,410 tons of material, including glacial till, waste rock, and stockpiled ore, and mined 1,359,432 tons of open-pit ore, containing 67,496 tons of copper concentrates. Underground work was continued on all levels and is summarized as follows:—

Development—	Ft.
Lateral development	6,575
Raising	4,117
Shaft-sinking	470
Ore production—	Tons
Cut-and-fill stopes	69,637
Blast-hole stopes	67,825
Development	13,347

Diamond drilling was continued underground. The cut-and-fill system of mining, using tailings as backfill material, was to be discontinued in favour of a method of sublevel caving, an adaptation of a method used in iron mines in other countries. In 1966 the engineering office was busy laying out all phases of this new programme. Some of the new mobile equipment had arrived on the property by the year-end and was undergoing testing under actual mining conditions. In 1965 a new method of placing cement as a ground support was tried. It proved so successful that in 1966 shaft No. 1 was completely lined by this means as sinking progressed.

In 1966 the number of persons employed was 537. No housing is provided on the property, and the crews commute from Merritt, a distance of approximately 8 miles.

[References: *Minister of Mines, B.C.*, Ann. Repts., 1960, pp. 35–40; 1961, pp. 31–37.]

Copper

Len, Law
American Smelting and Refining Company
By David Smith

(50° 120° S.W.) Office of the Canadian Exploration Division, 504, 535 Thurlow Street, Vancouver 5. The Len and Law comprise 76 recorded claims lying 5 miles west of Merritt. Access is by 12 miles of road from Merritt. In 1966 some bulldozer trenching was done and 11 percussion holes totalling 1,115 feet were drilled. A crew of eight men, of whom six were contractors, was employed under the supervision of S. A. Anzalone.

Copper

Keith, Bill, Mickey, Jarl, Night
Merritt Copper Co. Ltd.
By N. D. McKechnie

(50° 120° S.W.) Company office, 248 Second Avenue, Kamloops. The company holds about 100 mineral claims, located as the Keith, Bill, Mickey, Jarl, and Night claims, and situated on the south side of the Nicola River between 1 and 3 miles west of Merritt. The claims include the old Anaconda and Copper Belle showings (*see* Ann. Rept., 1915, pp. 230–231).

The property is underlain by Upper Triassic Nicola lavas. At the Copper Belle workings, toward the western end of the property, a buff-coloured fine-grained feldspathic rock, which may be intrusive, is exposed; no undisturbed contacts of this rock with the lavas were seen.

At the Copper Belle workings on Bill No. 33 mineral claim, there are four adits having a vertical range of 20 feet; the distance between the two farthest apart is about 250 feet in a direction of about north 80 degrees west. The elevation is about 2,500 feet. All of the workings expose separate fractures, and these do not form a recognizably coherent pattern. Strikes range from north 30 degrees west to north 80 degrees east and dips from 55 to 6 degrees. Widths of fracturing range from 1 to 5 feet, and in no instance is there evidence of strongly developed shearing. Mineralization, which is sparse, consists of quartz and calcite with chalcopyrite and specularite; the latter is later than the quartz and sulphide. One fracture striking north 55 degrees east and dipping 25 degrees northwestward contains rutile-bearing quartz with chalcopyrite, hematite, and calcite and is exposed for a width of 1½ feet and a length of 10 feet. It is the best exposure of copper mineralization seen by the writer on the property and would possibly assay 1 per cent copper.

The Anaconda showings, on Keith No. 3 and No. 4 mineral claims, are described as containing only specular hematite. The only working seen by the writer was the 200-foot adit near road level. This adit exposes a zone of intersecting fractures near a water-filled sump about 150 feet from the portal. The fractures carry quartz and carbonate but no sulphides.

At elevation 2,700 feet, and directly above the Anaconda showings, the present company drilled a vertical hole to a depth of 438 feet in andesite and basalt flows and flow breccias. Sulphides comprise sparse pyrite and rare chalcopyrite; specular hematite occurs along some joint planes.

[Reference: Assessment Report No. 736.]

NICOLA

Gold-Silver-Copper-Molybdenum

Guichon
Quilchena Mining & Development Co. Ltd.
By David Smith

(50° 120° S.W.) Company office, 10, 815 West Hastings Street, Vancouver 1. This property comprises seven Crown-granted mineral claims including the Spitfire and Sonny Boy, held under agreement with Guichon Mine Limited, a mineral lease covering 12 former Crown-granted claims, and 67 claims comprising the Joe, Gail, and Quill groups held by record, all on the west side of Quilchena Creek and south of Nicola Lake. A road leads about 1 mile to the property from the Nicola–Kamloops highway. In 1966 work on the Sonny Boy and Joe claims consisted of soil-sampling. Two diamond-drill holes totalling 520 feet were drilled. A crew of five was employed under the supervision of P. Schutz.

Copper

Cam, Gary
Ramada Mines Limited
By David Smith

(50° 120° S.E.) Company office, U.K. Building, Granville and Hastings Street, Vancouver. The Cam and Gary claims are 8 miles southeast of Douglas Lake. In 1966 three bulldozed trenches of 590 feet in length were made and soil samples were taken on four of the Cam claims. A crew of four was employed under the supervision of R. Filardeau.

ASPEN GROVE

Copper-Molybdenum

Ski
Chataway Exploration Co. Ltd.
By J. M. Carr

(49° 120° N.W.) Company office, 550 Burrard Street, Vancouver 1. S. W. Wright, president. The company controls 140 claims, partly in the Ski group, mainly on the east side of Quilchena Creek about 2 miles north of Pothole Lake. The property is accessible by 4 miles of road leaving Highway No. 5 at the Kentucky Lake turn-off 4 miles north of Aspen Grove. Work on the property was done from a camp on Quilchena Creek and included soil-sampling, induced polarization surveying by Canadian Aero Surveys, road-building, trenching, and 990 feet of diamond drilling in two holes. A small crew was employed under the direction of S. W. Wright.

A very brief visit was made, and the main showing was examined. It consists of rock cuts along an access road on the east bank of Quilchena Creek, in which weathered latite porphyry is exposed for distances of about 300 feet in a northwesterly direction and 100 feet in a northeasterly direction. The porphyry is traversed by closely spaced fractures in several dominant sets, which give it a partly sheeted appearance. Slender quartz veins fill many of the fractures, which are commonly mineralized and now contain limonite, malachite, azurite, and remnants of chalcopyrite. One or more northeasterly trending dykes of darker latite or andesite porphyry cut the earlier porphyry, are less strongly fractured, and contain disseminated pyrite. For 100 feet to the south of a 2-foot-wide gossanized fault which strikes eastward and dips to the north, the earlier porphyry appears especially well mineralized. Similar porphyry in drill core from a vertical hole in the nearby hillside exhibited argillic, chloritic, and sericitic alteration and contained chalcopyrite, pyrite, and small amounts of molybdenite in quartz veins and on fractures.

This prospect is about 1 mile east of an area near Tule Lake explored by the Granby company in 1958, where diorite and other intrusive bodies are described as occurring in volcanic strata of the Nicola Group.

[References: Assessment Reports Nos. 250 (K.M. group) and 925.]

Copper

CM
Vananda Explorations Ltd.
By David Smith

(49° 120° N.W.) Company office, 661 Hornby Street, Vancouver 1. Vananda Explorations Ltd. owns the CM group of 12 recorded mineral claims 4 miles northeast of Aspen Grove and accessible by 16 miles of road from Merritt. In 1966 nine percussion-drill holes were drilled totalling 620 feet. A crew of four was employed under the direction of F. J. Hemsworth.

Copper

Pay
Alscope Consolidated Ltd.
By David Smith

(49° 120° N.W.) Company office, 549 Howe Street, Vancouver 1. The Pay group of 40 mineral claims is west of Alleyne Lake, 3 miles southeast of Aspen Grove. The property is reached by a dirt road that turns north from Kentucky Lake road about 2½ miles east of the Princeton–Merritt highway. The claims are being worked under an option agreement with Payco Mines Ltd. In 1966 an induced polarization survey was carried out and six diamond-drill holes totalling 1,040 feet were drilled. A crew of eight men was employed under the supervision of F. Kangas.

Copper

June
Magnet Explorations Ltd.
By N. D. McKechnie

(49° 120° N.E.) Company office, 325, 1155 West Georgia Street, Vancouver 5. The company holds by record 15 mineral claims and 4 fractional mineral claims on Quilchena Creek 3½ miles northeast of the village of Aspen Grove. Access is by a dirt road eastward from the Princeton–Merritt highway about 2 miles north of Aspen Grove.

Work done to July, 1966, consisted of about 1,800 feet of trenching and 1,321 feet of diamond drilling in three holes, all at 2,950 feet elevation on the west side of Quilchena Creek on the June No. 9 mineral claim.

The rocks are andesitic and basaltic lavas of the Upper Triassic Nicola series. They are propylitized, and some specimens show a fresh secondary clinopyroxene. Small local patches of epidote-garnet skarn also occur in them. No intrusive rocks were recognized in the trenches; 2½ feet of altered and brecciated granitic rock shows in one of the drill cores.

Six unmineralized faults are exposed, of which two, about 400 feet apart, 15 and 7 feet wide respectively, strike north 5 degrees west. The eastern fault dips 85 degrees westward; the other dips 75 degrees eastward. Most of the trenching is between these faults and along the eastern one. The four remaining faults all are exposed on the west side of the 75-degree dipping fault; three are westerly striking and dip 75 degrees to 80 degrees northward, and one strikes north 20 degrees east and dips 80 degrees northwestward.

Mineralization is of two kinds—pyrite and chalcopyrite without quartz occurring as sparse disseminations and along some joint planes, and pyrite and chalcopyrite in quartz threads and stringers. The quartz stringers lie in a fracture pattern composed of northeasterly striking fractures dipping 15 to 30 degrees northwestward, east-southeasterly striking fractures dipping 70 to 80 degrees northward, and a few easterly striking fractures dipping steeply northward. They are sparsely distributed in a zone of well-developed east jointing and light fracturing toward the northern end of the trenching, in the northeast quadrant of the claim.

Copper

Echo, Toe
Consolidated Skeena Mines Limited
By David Smith

(49° 120° N.E.) Company office, 716, 602 West Hastings Street, Vancouver 1; field office, Box 1179, Merritt. The Echo and Toe groups, comprising 117 mineral claims, lie 1 mile northeast of Paradise Lake, 20 miles southeast of Aspen Grove. A geologic map was made. Soil-sampling was carried out over all claims by a crew of two men under the direction of J. White.

MISSEZULA LAKE

Copper

Strike, Lorna
Plateau Metals Limited
By David Smith

(49° 120° N.W.) Company office, 102, 402 West Pender Street, Vancouver 3. Plateau Metals Limited owns the Strike and Lorna groups of 22 recorded claims lying 22 miles to the north of Princeton. Access is by 5 miles of logging-road from

Highway No. 5. In 1966 the claims were under option to Adera Mining Limited. This company dug 14 bulldozer trenches totalling 2,640 lineal feet and drilled six diamond-drill holes totalling 1,475 feet in addtion to making geological, magnetometer, and induced polarization surveys over all the 22 claims. On completion of that work, Plateau Metals drilled one hole to a depth of 210 feet. All work was supervised by C. A. R. Lammle.

[References: Assessment Reports Nos. 977 and 978.]

SELISH MOUNTAIN

Copper

Selish (49° 120° N.W.) Company office, 702, 850 West Hastings Street, Vancouver 1; field office, Box 1101, Merritt. The Selish group of 54 mineral claims is held by record in the name of Selish Mines Ltd. of Merritt. The group is on Selish Mountain, east of the Coldwater River and 9 miles south of Merritt. Access is by a jeep-road which leaves the Merritt–Tulameen highway about 7 miles south of Merritt. The jeep-road, some 6 miles long, leads to the Torwest camp and working area at elevation 5,100 feet, about 1 mile due west of the peak of Selish Mountain.

Torwest Resources (1962) Ltd.
By N. D. McKechnie and David Smith

In 1966 geological and induced polarization surveys were made of all claims. Two trenches totalling 145 lineal feet were bulldozed, and seven diamond-drill holes totalling 1,500 feet were drilled. A crew of six men was employed under the supervision of W. G. Hainsworth.

The principal working is a stripped area about 200 feet square in Nicola volcanic rocks. The prevalent rock type exposed is a hard green fragmental rock, probably tuffaceous. This rock is cut by weak fractures striking north 65 degrees west and dipping 75 degrees northward. In some places this fracturing is sufficiently well developed to form small local fault breccias in which threads of quartz, pyrite, and chalcopyrite may occur.

An unmineralized fault zone 5 feet wide, striking north 65 degrees west and dipping 75 degrees northward, crosses the stripping near the middle. This fault is parallel to and probably contemporaneous with the sparsely mineralized fracturing.

Exposures of the "red granodiorite" of Geological Survey of Canada Memoir 243, page 38, lie about 1,200 feet southeast of the stripping.

Cores from seven diamond-drill holes of up to 252 feet depth are stored at the camp. Cursory examination showed no appreciable mineralization.

MOUNT THYNNE

Copper

B & R, Dawn (49° 120° N.W.) Company office, 901, 736 Granville Street, Vancouver 2; R. E. Dale, president. The company holds 40 mineral claims by record situated northwest of the summit of Mount Thynne, 13 miles northwest of Tulameen, at between approximately 5,500 and 6,000 feet elevation. Access is by the forestry road which leads southwestward from the Brookmere road just east of Brookmere; the distance to the property is 8 miles.

Lawless Creek Mines Ltd.
By N. D. McKechnie

The general geology is shown on Geological Survey of Canada Map 888A, Princeton. The property is underlain by Nicola volcanic rocks, which are cut by granitic intrusions. Both are overlain, at the eastward side of the claim group, by Kingsvale andesite porphyries.

The working area is on the height of land between tributaries of Lawless Creek, to the southward, and of Brook Creek. Unmineralized fault zones, 30 to 50 feet wide, cut Nicola volcanic flows. The faults strike north 20 to 35 degrees west and dip 65 to 70 degrees southwestward. The rocks are weakly schistose near the faults; the schistosity strikes north 50 degrees west and dips about 45 degrees southwestward.

Chalcopyrite is sparsely distributed in the volcanic rocks; pyrite is more evident but is not markedly developed. Some joint planes are coated with red iron oxide.

[Reference: Assessment Report No. 659.]

Gold-Silver-Lead-Zinc

COQUIHALLA

Hope
Anaconda American Brass Limited
By David Smith

(49° 121° N.E.) Company office, Britannia Beach. This group of nine mineral claims held by option is located 1 mile by road north of Mile 14 on the Kettle Valley Railway, midway between Coquihalla station and Juliet. It was formerly known as the Keystone group. A geological map and a geochemical survey were made of the Hope Nos. 1, 2, and 5 and the Padala Fraction. On the surface 14 trenches totalling 1,925 feet in length were bulldozed. A crew of three men was employed under the supervision of P. A. Lindberg.

[References: *Minister of Mines, B.C.*, Ann. Repts., 1936, pp. 30–32; 1954, p. 113; Assessment Report No. 696.]

Lead-Zinc-Copper

LY, Ford, Snow, Dora, Etc.
Dorian Mines Ltd.
By N. D. McKechnie

(49° 121° N.E.) Head office, 549 Howe Street, Vancouver 1. Fred Kangas, manager; Dorian Roy, property superintendent. The LY, Ford, Snow, Dora, B & L, J & A, and King claims are held by Dorian Mines Ltd. This company is 80 per cent owned by Alscope Consolidated Ltd. The claims are on the west side of the Coldwater River, on an eastward-flowing tributary, 1½ miles north of the former Coquihalla station on the Kettle Valley right-of-way. A gravel road on the old railroad grade can be entered from Brookmere or, by arrangement with the logging companies concerned, from Hope. A jeep-road leads to the working area half a mile west of the river at about 3,700 feet elevation.

The general geology in the vicinity of the claims is shown on the following maps of the Geological Survey of Canada: Map 46A, Tulameen; Map 1988, Coquihalla River Area; and Map 737A, Hope. The group is underlain by the Eagle granodiorite and lies near the easterly contact of the granodiorite with Nicola volcanic rocks.

The rock in which the mineralization occurs is a light-grey to pale-buff rock which presents on a weathered surface a clayey or limy appearance. It does not react to hydrochloric acid. The texture is finely porphyritic and in places fragmental, with subangular fragments up to one-half inch in diameter. In thin-sections the rock is seen to be an altered porphyry, a quartz monzonite or quartz diorite, in which the feldspars are extensively sericitized and the somewhat scarce ferromagnesian minerals are wholly altered to aggregates of chlorite, hematite, and carbonate. The original minerals have been well fractured and, locally, comminuted so that the texture ranges from a fine breccia to a mylonite. The fractures have been filled by quartz and minor orthoclase; the later quartz veins and embays the earlier.

A small number of exposures indicates the altered porphyry has a northwestward strike and dips of 50 degrees or steeper to the northeast. Mr. Roy states that diamond drilling indicates a maximum width of about 150 feet. The drill cores of completed holes were not available at the time of the writer's visit.

Core from a current hole in the footwall side of the porphyry was of a grey locally porphyritic quartz feldspar rock containing a sparsely distributed green amphibole.

The altered porphyry is mineralized with pyrite, sphalerite, galena, and, sparsely, chalcopyrite. Their distribution in the porphyry seems to be erratic. The sulphides occur as disseminated grains; pyrite occurs both as grains and in veinlets cutting the other minerals. The sphalerite grains are anhedral with serrated outlines, and there are some indications that they have been replaced by pyrite. Where the rock has a streaky texture, the sulphide grains, particularly the sphalerite, are aligned with the foliation. Pyrite is prominent in the footwall rock, but no other sulphide was recognized.

This occurrence and that of the Mag group adjoining on the south are on line of strike with the granite porphyry dyke in which the chalcopyrite-chalcocite-sphalerite-molybdenite mineralization of the Independence property occurs 4 miles to the southeast. This dyke is shown on Maps 46A and 1988 and is stated (*Geol. Surv., Canada,* Mem. 139, p. 110) to attain a maximum width of 1,500 feet and a length of 5 miles. It was not known to cross the Coldwater River. It is possible that the altered porphyry on the Dorian is either a continuation or, more likely, a recurrence of this rock type. It possibly marks the locus of a mineralized zone of movement extending some 15 miles from Law's Camp, on the southeast, along the northeastward contact of the Eagle granodiorite.

Copper-Zinc

Mag By N. D. McKechnie (49° 121° N.E.) The Mag 1 to 4 mineral claims are held by John E. Nott, 1276 Edgewood Drive, Penticton. They are on the west side of the Coldwater River 1½ miles north of the former Coquihalla station on the Kettle Valley right-of-way. A gravel road on the former railroad grade can be entered from Brookmere or, by arrangement with the logging companies concerned, from Hope. The working area is immediately west of the main road.

The mineralized rock, exposed by trenching on the Mag No. 3 mineral claim, is the same brecciated and altered porphyry as described at the Dorian showings, and probably is a continuation of that body. On the Mag it is exposed by stripping over an area of about 300 by 200 feet. The walls were not exposed.

Toward the westward, or footwall, side there is a shear about 5 feet wide which strikes north 50 degrees west and dips 85 degrees northeast.

The showing is weathered and locally resembles a coarse conglomerate where orbicular weathering is prominently developed. Black sooty material, probably a manganese oxide, occurs in considerable quantity in some of the fractures.

Pyrite, chalcopyrite, and sphalerite are disseminated through the altered porphyry. Their amount is hard to assess in the weathered material, but it might be 1 to 3 per cent combined sulphides. The north 50 degrees west shear is cut by a narrow vein of comb quartz carrying manganese oxides; its strike is south 50 degrees west and its dip is nearly vertical. A similar vein 3 inches wide, striking south 75 degrees west and dipping 80 degrees southeastward, is exposed at one point in unsheared altered porphyry. No fresh sulphides were seen in either quartz vein.

BRENDA LAKE

Part of the holdings of Noranda Mining Company, Limited (North Brenda), and of BrenMac Mines Ltd. are in the Nicola Mining Division, but the reports on these properties will be found on pages 184 and 185 under the Osoyoos Mining Division.

Copper-Molybdenum

Marn, Visc, Cam, Rob, Bob (1) (2)
Kel-Glen Mines Ltd.
By J. M. Carr

(49° 120° N.E.) Company office, 1614, 1030 West Georgia Street, Vancouver 5. Gordon V. Murray, president; Carson A. Murray, manager; E. J. Lees, supervising engineer. The company owns about 92 recorded claims in the Marn, Visc, Cam, Rob, and Bob groups, which are at the north and west boundaries of the North Brenda property, mostly in a single block. The property is numbered (1) and (2) on Figure 27 on page 180, and access is chiefly from the Cameo Lake road, on which the company in 1966 established a trailer camp to accommodate a crew of about 11 men. The general elevation of the property is 4,700 feet, and much of it is drift covered.

Work began in March, continued to October, and included surveying, line-cutting, road-building, soil-sampling, geological mapping, an induced polarization survey by Canadian Aero Mineral Surveys Limited, stripping and blasting, 1,461 feet of diamond drilling in four holes, and 2,201 feet of rotary percussion drilling in 23 holes.

The property was visited briefly in August, and a recently discovered molybdenum showing was seen on or near the Marn No. 18 claim, which is about 3 miles due north of Brenda Lake. The showing is near the top of a bluff on the southwest side of a short steep ravine which heads to the northwest and probably was a glacial meltwater channel. The ravine is strewn with talus blocks, and its far side is occupied by granodiorite, or quartz diorite, which is medium grained and contains only a small amount of pink feldspar. At the showing, this rock, which is probably a marginal phase of the nearby Brenda granodiorite, intrudes dark fine-grained Nicola greywacke at an unchilled contact whose strike is north of west and is parallel to that of foliation in the granodiorite and of bedding in the greywacke. This contact, although locally irregular and dyke-like, probably dips mainly steeply to the south, as does the granodiorite foliation. The Nicola beds dip southward at about 60 degrees at the contact and rather less steeply farther from it. Molybdenite and traces of chalcopyrite were seen in fractures and slender quartz veins in granodiorite at intervals along the bluff for 150 feet. The mineralized fractures and veins are spaced widely and have various attitudes; some possess northwesterly strikes and moderate northeasterly dips; others possess north-northeast strikes and steep dips, or are quite irregular. Molybdenite is not abundant; it occurs partly as coarse plates accompanied by blebs of pyrite. Pyrite, or pyrrhotite, also occurs finely disseminated in the otherwise unmineralized greywacke. Some drilling is reported to have been done at this showing subsequent to the visit.

[Reference: Assessment Report No. 875.]

Copper-Molybdenum

Wilson, Ian, McK, Etc.
Komo Explorations Ltd.
By David Smith

(49° 120° N.E.) Company office, 201, 846 West Hastings Street, Vancouver 1. This property, which by record consists of 162 mineral claims partly named Wilson, Ian, and McK, is in fact much smaller because of overstaking. It lies close to Brenda Lake and is not shown on Figure 27. In 1966 work was directed by Alrae Explorations Ltd. Geological and geochemical surveys were made of an area 4,000 by 8,000 feet, and an induced polarization survey was made over 13 line miles at 600-foot spacing. A crew of six men, including four contractors, was employed for six months under the supervision of R. Philp.

[Reference: Assessment Report No. 864.]

SIMILKAMEEN MINING DIVISION

BRENDA LAKE

Part of the Maria group (T. C. Explorations Ltd.) and some claims held by BrenMac Mines Ltd. lie in the Similkameen Mining Division. These properties are reported under Osoyoos Mining Division, pages 187 and 185.

Copper-Molybdenum

Pinta, Copco, May
Fort Reliance Minerals Limited
By David Smith

(49° 120° N.E.) Company office, 302, 550 Burrard Street, Vancouver 1. The Pinta, Copco, and May groups, comprising 133 recorded mineral claims, are about 4 miles southwest of Brenda Mines Ltd. Access is by 20 miles of road from Peachland. In 1966 work consisted of a reconnaissance magnetometer survey and soil-sampling and some bulldozer trenching. For two months a crew of five men was employed under the direction of A. D. Wilmot.

TROUT CREEK

Part of the X and D groups (Lodestar Mines Ltd.) lie in the Similkameen Mining Division. This property is reported under Osoyoos Mining Division, page 187.

TULAMEEN

Copper

PR, David, Skidoo
Bethex Explorations Ltd.
By N. D. McKechnie

(49° 121° S.E., N.E. and 49° 120° S.W.) Company office, 1821, 355 Burrard Street, Vancouver 1. The property, comprising 78 recorded claims, lies along Jim Kelly Creek, a southeasterly flowing tributary of the Tulameen River, 13 miles southwest of the village of Tulameen. From the Tulameen River road a jeep-road leads about 5 miles to the Bethex camp at elevation of about 4,150 feet. Jim Kelly Creek is on the southeastward slope of Coquihalla Mountain, in the Hozameen Range of the Cascade Mountains.

Work done on the claims during 1966 was 4½ miles of access road built; topographical, geological, and geophysical (induced polarization) surveys made; 35 trenches totalling 18,060 feet excavated; and five diamond-drill holes totalling 2,832 feet drilled.

The general geology of the area is shown on Geological Survey of Canada Map 737A, Hope. Eagle granodiorite underlies the Jim Kelly Creek basin; southwest of the creek the granodiorite is overlain by the younger Lower Cretaceous Pasayten sediments.

The mineralization occurs only in the igneous rocks. The principal showings are on the northeastward side of and from 300 to 1,000 feet from the creek, on the David Nos. 1, 2, 3, and 4 mineral claims.

The rock in which mineralization occurs differs markedly from the Eagle granodiorite as described (*Geol. Surv., Canada,* Mem. 26, pp. 76–82) in that it is extensively altered and contains hematite rather than magnetite as a minor constituent. In hand specimen the rock is medium to coarse grained, crystalline, and unevenly porphyritic, with a dark-green matrix. In thin-section it is seen to be composed largely of secondary minerals, uralite, chlorite, calcite, garnet, saussurite, secondary orthoclase, and an optically positive hornblende, possibly cummingtonite. It is an altered rock which may represent either a structurally controlled zone of alteration within the Eagle granodiorite or an inclusion of an older igneous rock.

Near the creek, and only a few tens of feet from an outcrop of Pasayten sandstone and shale, there is a small exposure of recognizable granite, but its contact with the altered rock was not seen.

Pyrrhotite and chalcopyrite occur erratically in the metamorphic rock. Higher concentrations of the two sulphides seem to favour those parts of the host rock having higher proportions of ferromagnesian minerals.

Copper

Lode
Copper Mountain Consolidated Limited
By David Smith

(49° 120° N.W.) Company office, Medical Dental Building, West Georgia Street, Vancouver. This company holds the Lode group of 16 claims which lie 3 miles west of Tulameen and are accessible by a forestry access road. In 1966 some bulldozer trenching was done on the Lode Nos. 7, 10, 11, 15, and 16 claims. A geochemical survey was carried out. Two men were employed by R. Collishaw.

Iron

H-G, Iron, BD, DB
Imperial Metals and Power Ltd.
By David Smith

(49° 120° S.W.) Company office, 501, 535 Thurlow Street, Vancouver 5. N. H. McDiarmid, president. This company owns about 180 claims encompassing the area of Lodestone and Olivine Mountains and Tanglewood Hill. The property lies about 15 miles due west of Princeton and is accessible by logging-roads from the community of Coalmont. Work up to and including 1965 consisted of trenching in the vicinity of the old workings and five diamond-drill holes totalling 1,250 feet. In 1966 sampling was carried out systematically on a grid pattern used for a magnetometer survey. Using percussion drills, 44 holes totalling 8,400 feet were drilled. Some bulldozer trenching and road-building were carried out. A crew of seven men was employed. All work was under the supervision of Wright Engineers Limited.

PRINCETON

Copper

K.R.
Plateau Metals Limited
By David Smith

(49° 120° N.W.) Company office, 102, 402 West Pender Street, Vancouver 3. The company owns the K.R. group of 40 recorded claims lying 20 miles north of Princeton. They are 6 miles from Highway No. 5 by way of the road to the microwave station. Roads were built and a camp-site established. Surface exploration was performed on the K.R. Nos. 3, 7, and 9 claims, and three diamond-drill holes totalling 817 feet were drilled. Work was supervised by C. Riley.

[References: Assessment Reports Nos. 517, 530, and 985.]

Copper

Ron
McIntyre Porcupine Mines Limited
By David Smith

(49° 120° N.E.) Company office, 409 Granville Street, Vancouver 2. The company owns the Ron group of 40 recorded claims in the vicinity of Rampart Lake, 20 miles north of Princeton. Access is by logging-road. In 1966 soil samples were taken on grid lines spaced 750 feet apart. Two men were employed under the supervision of A. E. Angus.

Lead-Zinc-Copper

Snow, Pine, Tom, F.C., Leo (49° 120° N.E.) Company office, 801, 900 West Hastings Street, Vancouver 1. This company holds 170 recorded mineral claims known as the Snow, Pine, Tom, F.C., and Leo groups. The claims lie to the south of Missezula Lake, about 16 miles by road north of Princeton.
Coin Canyon Mines Ltd.
By David Smith

In 1966 work consisted of a magnetometer survey, four trenches bulldozed totalling 1,000 feet, and two 5-inch percussion-drill holes totalling 1,008 feet. A crew of seven men was employed under the direction of Frank Cooke.

Copper

Primer (49° 120° N.E.) Company office, 501, 1111 West Georgia Street, Vancouver 5. The company holds 109 mineral claims by record, located along Dillard Creek east of the south end of Missezula Lake. A jeep-road connects the showings with the Missezula Lake road, which leaves the Princeton–Merritt highway at the sawmill 6 miles north of Princeton.
Primer Group Minerals Ltd.
By N. D. McKechnie

Additional stripping was done on the Primer No. 21 claim, and three diamond-drill holes were drilled on Primer Nos. 47 and 55 to depths of about 400 feet each.

On the Primer No. 21 claim, an altered hornblende diorite, intruded by monzonite porphyry, carries a small amount of chalcopyrite in fractures. The fractures in the main lie in two systems striking respectively northward and westward. The limits of neither the diorite nor of the fracturing were exposed.

The drill cores all were in Nicola basaltic and andesitic flows with minor tuff and breccia. Copper mineralization was fairly consistently in or near the several intersections of hornblende diorite. Grab samples of split core, approximately equal quantities taken at 5-foot intervals, assayed as follows:—

Diamond-drill hole No. 1: 0–76 feet, 0.15 per cent copper; 195–295 feet, 0.29 per cent copper.

Diamond-drill hole No. 4: 0–50 feet, 0.15 per cent copper.

The samples assayed *nil* and trace in gold and silver.

[References: *Minister of Mines, B.C.*, Ann. Repts., 1963, p. 57; 1965, p. 157; Assessment Report No. 493.]

Copper

Copper Mountain Mine (49° 120° S.W.) Company office, 507, 1111 West Georgia Street, Vancouver 5; field office, Allenby. This company owns 79 Crown-granted claims covering the workings of the Copper Mountain mine, which suspended operations in 1956. In 1966 an extensive drill programme was carried out. The drilling was based on information derived from magnetometer and induced polarization surveys and a geological survey by K. C. Fahrni. Percussion drilling, using 2¼-inch bits, comprised 307 holes with total footage of 49,204 feet. A crew of six men, including contractors, was employed under the direction of K. C. Fahrni.
The Granby Mining Company Limited
By David Smith

Copper

Bem, May, Queen (49° 120° S.E.) Company office, 302, 550 Burrard Street, Vancouver 1; field office, Princeton. E. M. Wilson, exploration manager. The company holds 50 recorded claims located as the Bem, May, and Queen groups, as well as 10 mineral
Cumont Mines Limited
By N. D. McKechnie

leases. The property is in the vicinity of Copper Mountain, 10 miles south of Princeton, and extends from Voight Camp, on Wolfe Creek, westward to about half a mile west of the Hope–Princeton highway. The present working areas are reached from Princeton by the Copper Mountain road to Voight Camp.

Geological, geophysical, and geochemical surveys have been made over the whole property. During 1966 bulldozer trenching was done on the Duke of York and Alabama mineral claims and on Mineral Lease No. 39. Surface diamond drilling amounted to 8,106 feet in 16 holes. Seven men were employed.

The writer examined trenches on the Alabama (Lot 2429), June Bug (Lot 3029), and Margaret Fractional (Lot 2310 S) mineral claims. These claims are underlain chiefly by Nicola volcanic rocks. The Alabama claim, where the work was centred, is some 3,000 feet west of the Voight stock and about a mile northeast of the Copper Mountain stock.

The trenching exposed intrusive rocks similar, in hand specimen, to those of the outer zone of the Copper Mountain stock, reddish syenodiorites and syenogabbros. The Copper Mountain rocks are intruded, chiefly along northeastward strikes, by grey augite diorites and reddish syenite porphyries which possibly relate to the Voight stock. Both rocks are cut by unmineralized, usually steeply dipping faults striking in the northwest and northeast quadrants. The Copper Mountain and Voight rocks and the faults are cut by felsite dykes, the "Mine dykes" (*Geol. Surv., Canada,* Mem. 171, p. 17).

Sulphide mineralization consists of chalcopyrite, pyrite, and bornite sparsely disseminated in the Copper Mountain rocks; pyrite and chalcopyrite are very sparsely present in the later rocks. Veinlets and small veins of magnetite, some of them vuggy, also occur; most include grains of chalcopyrite.

Company assay results indicate averages in excess of 0.5 per cent copper in trench lengths of up to 118 feet. No related structural pattern or continuity has yet been established.

[Reference: Assessment Report No. 838.]

Copper-Gold

Whip, M.J., Axe, Ski (49° 120° S.W.) Company office, 202, 1533 West Pender Street, Vancouver 5. D. F. Hamelin, president. A block of 148 claims, including the Whip, M.J., Axe, and Ski groups, is on Whipsaw Creek and also south of Copper Mountain. This ground was formerly held by Friday Creek Development Co. Ltd. Access is by road 10 miles south of Princeton.

Kalco Valley Mines Ltd.

By David Smith

In 1966 some surface exploration, including soil-sampling and trenching by bulldozer, was carried out. Two holes were drilled totalling 235 feet in length. Access roads were built under contract. A crew of three men was employed under the supervision of D. F. Hamelin.

[References: Assessment Reports Nos. 314, 362, and 409.]

Copper

Ingersoll Belle (49° 120° S.W.) Vancouver office, 604, 744 West Hastings Street. D. M. Cannon, vice-president. This company holds by agreement 63 claims on Kennedy Mountain along the Hope–Princeton highway 12 miles south of Princeton. Most work in 1966 was done on the Ingersoll Belle and La Reine Crown-granted claims, which straddle the highway, but showings of copper mineralization have been found by present and

Newmont Mining Corporation of Canada Limited

By James T. Fyles

past exploration on the Lela to the northwest and on the Red Buck and Magnetic Crown grants, which lie to the east on the steep slope between the highway and the Similkameen River.

Showings on the Lela claim and on the Ray group, which lies north of the Red Buck, are described in the Annual Report for 1963 (pp. 62–63). Cumont Mines Limited holds the ground to the south and east.

About 26,000 feet of bulldozer trenching was done in 1966 on the relatively flat ground west of the highway. In the same area, seventeen 5-inch churn-drill holes were drilled on a grid to a total footage of 7,865 feet, and 14 diamond-drill holes totalling 11,706 feet were drilled to check the best mineralization found in the churn drilling. The work was done in June, July, and September under the direction of T. N. Macauley, company geologist.

The rocks in the area are altered dark-green and grey volcanics of the Nicola Group, extensively intruded by dykes of syenodiorite porphyry and latite porphyry. In the trenches they are highly fractured, faulted, and generally rusty with widespread copper stain. Fine chalcopyrite and pyrite are present over wide areas, and minor bornite is present locally. Geological mapping by the company shows a set of fractures, dykes, and faults trending northeast and another trending northwest.

The drill-core is dark-green metavolcanic and fine-grained porphyritic dyke rocks. Locally breccias and thin bands or beds are seen in the volcanics. A green alteration, probably rich in epidote and feldspar and associated with magnetite, pervades the volcanics and the dykes, and extends outward from minute fractures. Fine-grained chalcopyrite, pyrite, and rarely molybdenite occur along fractures, and chalcopyrite is disseminated in the volcanics and locally in the dykes adjacent to the fractures. Silicified zones apparently later than the green alteration and the sulphides are found in the drill core and on surface.

Copper mineralization occurs in a poorly defined northeasterly trending zone (several hundred feet wide) continuing across the Ingersoll Belle and La Reine claims dipping steeply to the southeast. In this zone, grades as high as 1 per cent copper over widths of more than 100 feet are indicated.

Copper

Deep Gulch
Copper Mountain Consolidated Limited
By David Smith

(49° 120° S.W.) Company office, Medical Dental Building, West Georgia Street, Vancouver. This company holds 45 claims, on which the main showings are immediately east of the Hope–Princeton highway, to the south of Deep Gulch Creek, about 12 miles south of Princeton. A geochemical survey was made in 1966.

MANNING PARK

Zinc-Copper

Hope-Summit
Giant Explorations Limited
By G. E. P. Eastwood

(49° 120° S.W.) Mineral showings near the headwaters of the Similkameen River, about 2 miles north-northeast of Allison Pass, have been covered successively by the Sparkler group, Big Ben group, and Hope-summit group of claims. The Hope-Summit group consisted of eight recorded claims, owned principally by B. E. Williams, of Keremeos. From a point on the Hope–Princeton highway about a mile east of the Department of Highways depot at Allison Pass, a rough tote-road leads off along the west side of a large gravel pit and continues north and north-northwest along the slope west of the river, crossing a small creek 3.3 road miles from the highway. About 200 feet above the tote-road a small open cut had previously been made in the bank of this creek, near the southwest corner of Hope-Summit No. 3. In 1966 Giant Explorations Limited diamond drilled 1,029 feet in three holes near the open cut.

The country rock is sandstone and pebble conglomerate of the Dewdney Creek Group, which contain bands and fragments of black argillite. It is traversed by veins and veinlets of pyrrhotite and sphalerite, with less chalcopyrite and arsenopyrite. Chunks of almost massive sulphide as much as 3 inches in diameter can be found on the dump of the open cut, indicating the presence of veins of at least this width, but in the drill core the veins are only 0.1 to 0.5 inch wide.

[References: *Minister of Mines, B.C.*, Ann. Repts., 1925, p. 212; 1927, p. 248; Rice, H. M. A., 1947, *Geol. Surv., Canada,* Mem. 243, p. 113.]

OSOYOOS MINING DIVISION

BRENDA LAKE

By J. M. Carr

The continued development of a very large copper and molybdenum deposit by Brenda Mines Ltd. was accompanied by considerable exploration activity on surrounding properties, some of whose locations are shown on Figure 27. Recorded claims are almost continuous from Okanagan Lake on the east to Missezula Lake and Aspen Grove on the west, and properties in the Brenda Lake camp lie in the Osoyoos, Nicola, and Similkameen Mining Divisions. The area shown has a total relief greater than 3,000 feet, with the highest ground trending more or less along the eastern boundary of the Nicola Mining Division. Eastward the ground descends irregularly and is incised deeply by the valleys of creeks draining to Okanagan Lake. Bedrock exposures occur mostly on the higher ground and in the creek walls. Westward the plateau surface is largely drift covered and swampy, with bedrock exposures being few or non-existent.

The area is largely underlain by granitic rocks of the Okanagan batholith and by Upper Triassic strata of the Nicola Group, into which the batholith is emplaced. The edges of the batholith are shown on Figure 27 in the positions determined by company mapping. West of the batholith the Nicola strata consist variously of hornfelsed banded tuffs, greywacke, andesite and dacite flows or tuffs, and black argillite and limestone. Attitudes of these strata suggest the existence of a major syncline trending north and possessing a core of sheared argillite and limestone which lies close to Brenda Lake. The edge of the batholith occupies the east limb of the syncline and curves northwestward around its nose. Large bodies of Nicola rocks are isolated farther east in the batholith and, between Greata and Peachland Creeks, they include a sequence of limestones and associated greywackes which possess dips partly to the southwest.

In the western marginal part of the batholith within the area, the prevalent rock is a grey granodiorite, or quartz diorite, similar to that in which the Brenda deposit occurs. From place to place this rock, which may be termed the Brenda granodiorite, varies from fine grained to medium grained, but otherwise its appearance changes little. It contains as much as 20 per cent of biotite and hornblende which, like plagioclase feldspar, occur mostly as well-shaped crystals rarely exceeding one-half centimetre in size. Pink orthoclase feldspar, or microcline, forms sieve-like crystals as much as 1½ centimetres in size. The plagioclase is strongly zoned and is partly as calcic as andesine (An_{38}). The rock possesses a foliation which is due to crystal alignment and which dips to the west at steep to moderate angles. The foliation commonly strikes toward the north or northeast but locally is parallel to the outer contact, and thus is partly northwesterly. Small dark inclusions scattered in the rock are partly angular and partly rounded. North and east of Peachland Lake this rock gives way to quartz diorites partly with a crudely banded appearance, which predominate farther east.

The Brenda granodiorite is cut in places by chilled dykes of trachyte which may be of pre-mineral age, and others of lamprophyre which are probably later and may be mainly post-mineral. Dykes composed of biotite-andesite porphyry are reported in drill-holes but were not examined. Most dykes near the mine appear to strike between west-northwest and due west. Light-grey biotite-andesite porphyry occurs apparently as a wide northeastward-trending dyke in faulted granodiorite on the Red Rock claims adjoining the old road north of Peachland Lake. It is post-mineral and resembles dykes of probable Eocene age in the Highland Valley camp.

North of Brenda Lake an indurated conglomerate overlies Nicola rocks and is either Cretaceous or Tertiary. It seems strictly local in its distribution.

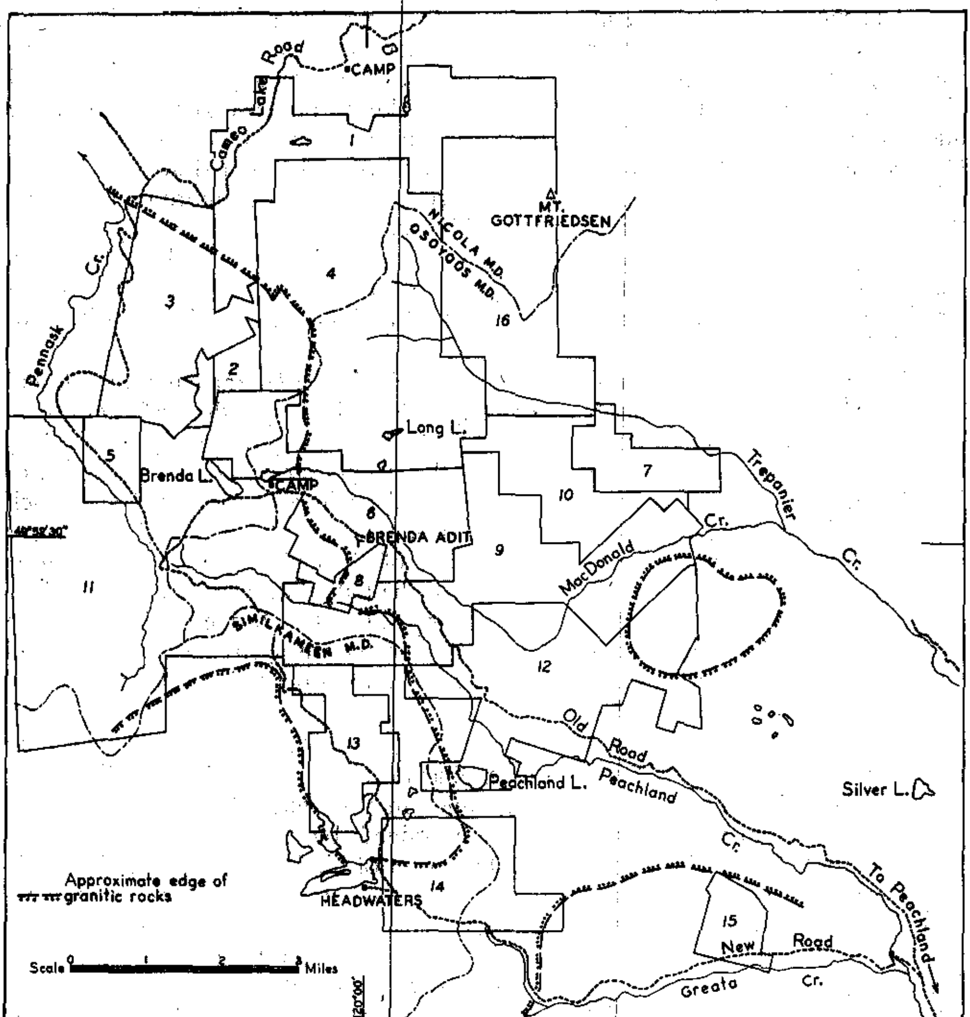


Figure 27. Index map of the Brenda Lake area.

Molybdenite, chalcopyrite, and pyrite occur together in the Brenda deposit and at small showings elsewhere in the Brenda granodiorite. Pyrite and pyrrhotite are widely disseminated in the Nicola tuffs and volcanic rocks. In the eastern part of the area on Sandberg Mountain, an enclosed body of Nicola limestones and associated rocks contains small masses of skarn and sulphides which are largely pyrrhotite, chalcopyrite, and pyrite with some molybdenite.

[References: H. M. A. Rice, *Geol. Surv., Canada,* Mem. 243, Princeton Map-area, 1947; H. S. Little, Map 15-1961, Kettle River (West Half); *Minister of Mines, B.C.,* Ann. Rept., 1965, p. 163; *B.C. Dept. of Mines,* Bull. 46, 1962.]

Properties shown on Figure 27 are as follows:—

1, 2. Marn, etc. (Kel-Glen Mines Ltd.).
3. Slim, F.W.P. (Quinalta Petroleum Ltd. and Fleetwood Resources Ltd.).
4. North Brenda (Noranda Exploration Company, Limited).
5. Penmex (Cascade Molybdenum Mines Ltd.).
6. Brenda (Brenda Mines Ltd.).
7. Ram (Kellcam Exploration Limited).
8. Mac (Anuk River Mines Ltd.).
9. WP, Bill, etc. (Buttle Lake Mining Company Limited and Trojan Consolidated Mines Ltd.).
10, 11, 12, 15. BrenMac Mines Ltd.
13. Head, Tail, Sun, Moon (Christina Lake Mines Ltd.).
14. Maria (T.C. Explorations Ltd.).
16. JO (Lakeland Base Metals Ltd.).

Copper-Molybdenum

Brenda Mine (6)
Brenda Mines Ltd.
By J. M. Carr and David Smith

(49° 120° N.E.) Company office, 1030 West Georgia Street, Vancouver 5; field office, 44 Padmore Street West, Penticton. B. O. Brynelsen, president; Peter Stym, mine superintendent; Chapman, Wood & Griswold, consulting engineers. The company owns 51 mineral claims which include seven Crown-granted claims 1 mile east of Brenda Lake. A trailer camp is established at MacDonald Lake, about 2 miles by road from the mine.

Work in 1966 included surveying, geological mapping, soil-sampling jointly with Noranda Exploration Company, Limited, and induced polarization surveying by McPhar Geophysics Ltd. In 74 holes 42,573 feet of diamond drilling was done by Mutch Diamond Drilling Company using BQ wireline equipment, and 7,323 feet of rotary-percussion drilling in 19 holes of 5½-inch diameter was done by Gulf Drilling Company. Underground work was contracted to Haste Mine Development Ltd., and it included 1,475 feet of drifting, 400 feet of crosscutting, and 960 feet of inclined raising. A 100-ton pilot mill designed by Wright Engineers Ltd. was built by Klassen Construction Ltd., and a crushing plant was provided by Dawson Construction Ltd. Including men on contract, an average crew of 48 men was employed.

The mineralized zone forms outcrops at elevations between 5,100 and 5,600 feet on a southeasterly spur between tributaries of MacDonald and Peachland Creeks. As outlined by induced polarization surveys and subsequent drilling, the zone measures about 2,000 feet in a north-northwesterly direction and is as much as 1,500 feet wide. Sampling of the zone has followed a rectangular grid laid out on 400-foot centres and orientated with grid north on a bearing north 30 degrees west. Holes inclined at 63 degrees were drilled from these centres, in the direction of either grid-north or grid-south, mostly in pairs from the same set-up, and to a uniform elevation of 4,750 feet. The deepest hole was more than 1,000 feet long. All core was crushed and used for sampling and preliminary mill tests. In March, 1967, the company released estimates giving the total content of the orebody as 167,498,900 tons of material containing 0.19 per cent copper and 0.087 per cent molybdenite. Starting in June, 1966, and using trackless mining methods, an 8- by 10-foot adit was driven northerly on a grid line for a length of 1,230 feet from a portal at 5,140 feet elevation. At a point in the adit about 900 feet from the portal, a west crosscut 400 feet long was made to connect with north and south drifts, each about 110 feet long. Three raises each followed up a drill-hole for a length of 240 feet or more, one being northerly from a point in the adit 1,180 feet distant from the portal and the others being northerly and southerly respectively, and converging upward from the ends of the drifts. Muck from each round taken from the adit, drifts, and raises was crushed to ½-inch maximum size, split, and sampled. A one-third portion was treated in a 100-ton pilot mill erected at the portal, and separate concentrates of copper and molybdenum were produced. Approximately 7,500 tons of mill feed was treated.

Between two and three days in August were spent examining the surface showings and an 800-foot length of the adit. The mineralized zone is in the Brenda granodiorite, which is fresh appearing in outcrop and is cut in places by narrow aplite dykes that mostly strike northwestward and dip to the east, partly at steep angles. The granodiorite is strongly fractured on planes that are mostly steep and follow numerous directions, which company investigation has shown to fall partly into three sets with strikes that are east of north, north of east, and due northwest respectively. The intensity of fracturing varies in the zone and lessens outside it. The fractures in a set may be spaced as close as 2 inches, although 8 to 10 inches is probably their average spacing in the mineralized zone. Chalcopyrite, pyrite, and molybdenite lie in the fractures and occur weakly disseminated within a distance of one-quarter inch of them. In outcrop the walls of the fractures are weathered and the sulphides partly oxidized. Many fractures contain mineralized veins, which apparently formed by replacement of the wallrock and are mostly of two kinds. The veins of one kind have a granitic appearance and consist mainly of quartz and vivid pink potassium feldspar. They mostly have widths between one-eighth inch and 1 inch and may possess well-sealed walls and partly vuggy centres. In thin-section, one of these veins was seen to contain mosaic-textured quartz, turbid microcline partly in crystals as large as those in the adjacent rock, and green biotite, calcite, chlorite, and sulphides. The adjacent rock appears unaltered, except that hornblende and biotite are partly changed to secondary green biotite. The second kind of vein consists mainly of quartz, with which there may be calcite and locally epidote. Such veins occasionally exceed 2 inches in width, and they may be vaguely banded. Seen underground, either kind of vein may show bleached margins and the quartz veins appear mainly to lie on sheared fractures. Sulphides occur mostly as coarse disseminations and, in the quartz veins, partly as coalescing masses and fine streaks and disseminations. Slender calcite veins contain lesser amounts of sulphide than the quartz veins which they cut. Examination of a polished section of sulphides in a quartz vein suggests that pyrite is mostly earlier than chalcopyrite, which surrounds and slightly replaces it, and that molybdenite may be later than chalcopyrite.

Faults and lamprophyre dykes are seen underground and possess strikes that are more or less easterly and dips that are mostly fairly steep to the south. The faults contain as much as 3 feet of gouge and brecciated altered rock and are either dark and chloritic or white and argillic. Narrow slips and shears of varied attitude occur widely, and they commonly have molybdenite smeared on their surfaces. A fault seen in drill core contains graphite as well as molybdenite. The walls of the faults and shears are argillized and bleached, and they contain chlorite and epidote.

Surface outcrop of the Brenda orebody showing mineralized fractures in granodiorite.

Brenda mine sampling operation showing the crusher and fine-ore bins, August, 1966.

The lamprophyre dykes are each as much as 1 foot wide and do not all lie in faults. They are generally unmineralized, although one was seen to contain small amounts of chalcopyrite in veinlets at its margin.

The structural control of mineralization is unknown and was presumably related to intense fracturing of the granodiorite. Fault movement alone is probably not responsible since many intersecting fractures show no offset and were therefore produced by means other than faulting.

[Reference: Assessment Report No. 189.]

Copper-Molybdenum

North Brenda (4)
Noranda Exploration Company, Limited
By J. M. Carr

(49° 120° N.E.) Company office, 1050 Davie Street, Vancouver 5. B. O. Brynelsen, manager. The company holds about 133 recorded claims adjoining the north boundary of the Brenda Mines property and accessible by road either from Brenda Lake or from near the Brenda Mines adit. Work in 1966 was supervised by R. C. Heim and included soil-sampling, geological mapping by D. H. MacDonald, induced polarization surveys, property surveys, trenching, road-building, and 4,196 feet of diamond drilling in 11 holes. A crew of approximately 20 men occupied a camp which is situated on the property about 1½ miles northwest of Long Lake.

The property was visited briefly in August, and two newly discovered chalcopyrite and molybdenite showings were seen in the northeastern part of the property, which is largely drift covered. The showings are in the Brenda granodiorite, nearly a claim length apart in an easterly direction on the Jeff Nos. 41 and 43 claims respectively. At an eastern showing a small outcrop of rather fresh granodiorite contains narrow dykes of aplite and is cut by numerous irregular fractures along which the granodiorite is brecciated, altered, and mineralized. Seams of breccia occupy the fractures and enclose fragments of granodiorite and rarely of aplite. Small masses of quartz have secondary textures and may not be fragments despite their angularity. The matrix of the seams is largely of quartz and biotite, possibly with chlorite, and it contains molybdenite and lesser amounts of pyrite and chalcopyrite. In places the seams contain quartz vugs. At the western showing a small outcrop of fresh or only slightly chloritized granodiorite contains slender quartz veins that chiefly occupy closely spaced north-northeasterly fractures which dip westward at a shallow angle. The fractures contain biotite and also pyrite, molybdenite, and very small amounts of chalcopyrite, which are further weakly disseminated in the walls of the fractures. About 1,000 feet to the southwest of the showing, an easterly diamond-drill hole intersected granodiorite that is partly sheared and strongly chloritized and contains streaks and disseminations of pyrite.

[Reference: *Minister of Mines, B.C.*, Ann. Rept., 1965, p. 163.]

Copper-Molybdenum

Mac (8)
Anuk River Mines Ltd.
By J. M. Carr

(49° 119° N.W.) Company office, 535 Howe Street, Vancouver 1. A. Briden, president; N. Zora, managing director; Alrae Exploration Ltd., consulting and management engineers. The company holds about 18 recorded claims in the Mac group adjoining the southern boundary of the Brenda Mines property. The camp is near the old Brenda Lake road at about 5,000 feet elevation. Work in 1966 included 23 percussion-drill holes and 3,960 feet of diamond drilling in 15 holes, all spaced near the boundary of the Brenda Mines property.

The property was visited but no drill core was examined. According to company information, all the diamond-drill holes were in the granodiorite body, and the assays provided by the company show molybdenite occurring mostly in sub-commercial amounts. Small amounts of copper were also recorded. Outcrops seen along two adjacent creeks which flow southeast from the Brenda Mines property are of fractured granodiorite containing small amounts of chalcopyrite and pyrite on or near veins similar to those on the adjoining property. Lamprophyre and trachyte porphyry dykes trend more or less easterly and are each several feet wide.

Copper-Molybdenum

BrenMac Mines Ltd. Company office, 312, 510 West Hastings Street, Vancouver 2. I. Shulman, president; A. D. K. Burton, manager.
By J. M. Carr

This and associated companies (BrenColl Mines Ltd., BrenCap Mines Ltd., and BrenSand Mines Ltd.) together control about 500 claims, of which 11 are Crown granted and the remainder are held by record, in several widely distributed properties in the Brenda Lake area. These properties were explored from June onward by a crew of 15 men, supervised by A. D. K. Burton and W. C. McLoughlin. Work done included surveying, geological mapping, soil-sampling, induced polarization surveys by McPhar Geophysics Ltd., 5 miles of road construction, trenching, test-pitting, percussion drilling in 100 holes, and rotary drilling in four holes totalling 800 feet.

Notes on the two properties visited briefly in August are given below.

(*a*) *Sandberg Property* (15) (49° 119° N.W.).—About 19 recorded claims in the Iron Horse and Sandi groups occupy the eastern part of Sandberg Mountain, between Greata and Peachland Creeks, at elevations between 4,000 and 5,000 feet and 11 miles distant by road from Peachland. The Iron Horse claims are reverted Crown-granted claims whose showings are believed to date from the 1930's, and on which in 1956 Noranda Exploration Company, Limited, did work that included a self-potential survey, trenching, and diamond drilling. The property is underlain by limestones and associated strata of the Nicola Group, which in places are cut by dykes and sills variously of diorite, quartz diorite, and granite. The granite dykes, which may be later than the others, are reported to trend northerly and to be unmineralized where they cut mineralized rocks.

The property was visited briefly and showings were seen at two localities spaced nearly one claim length apart in an easterly or southeasterly direction. The eastern showing is judged to be on the southeastern part of the George claim and is reached from the south by a newly built road ascending steeply to the eastern spur of the mountain. The showing consists of a bulldozed trench which extends easterly and exposes limestone and greywacke beds that strike north 65 degrees west and dip at about 20 degrees northward. The beds are overlain by an intrusive sill of dark diorite, which has an unknown thickness and possesses in part a hornfelsed texture. Other bodies of diorite occur in outcrop variously to north and south of the showing. In the trench at the showing, the limestone and associated beds are more or less converted to skarn and skarny marble across a stratigraphic width of as much as 10 feet and for a distance along the trench of about 100 feet. Epidote, actinolite, garnet, calcite, and some magnetite now chiefly form the rocks, which contain veins and patches of milky quartz as much as 3 inches wide. A few slickensided shear surfaces were observed, their strike being east-northeasterly and their dips mostly southerly. The skarny rocks are locally mineralized by disseminated sulphides, which are partly on fractures and include molybdenite in rosettes, chalcopyrite, and pyrite. The grade in both copper and molybdenum is judged to be very low. Eleven percussion-drill holes were made around the showing to depths of about 40 feet in an area which measured approximately 150 by 100 feet.

The showings at the western locality are judged to be mostly on the Iron claim and are reached by a road which follows the spur from the eastern locality to a ridge near the summit of the mountain. They occur in an area measuring about 1,500 by 800 feet that crosses the ridge and is mainly on its south slope, which is steep. The area is underlain by medium- to thick-bedded limestones and greywackes with northerly to northwesterly strikes and dips that are mostly to the west and are locally steep. As exposed west of the area, some of the limestone is graphitic. Limestone in the area locally exhibits compressed dragfolds whose plunges are partly steep to the north-northeast. Skarn that is composed variously of garnet, wollastonite, epidote, and quartz appears largely to be developed as discrete bodies at limestone-greywacke contacts adjacent to faults or shear zones whose attitudes are various. Contacts of the skarn bodies with recrystallized limestone are commonly sharp and are partly curved and fold-like. Sulphide mineralization is more or less massive in the skarns and consists mostly of pyrite, pyrrhotite, and chalcopyrite. Small amounts of zinc and cobalt are shown to be present by a spectrochemical analysis. Limited oxidation has produced small amounts of chalcocite and malachite and gives an over-all rusty appearance to the showings. Copper content of the best mineralization is estimated to be of the order of 4 per cent across widths of a few feet. In places, sulphides are disseminated in hornfelsed greywacke, and they include small amounts of molybdenite. The continuity of mineralization between individual showings is unknown. Showings high on the north slope have been exposed by stripping in an area where diamond drilling was done in 1956. They involve two or more mineralized skarn bodies, one of which appears to be a lens striking northwestward for a distance of about 30 feet and having a width of several feet, the other a shorter bulbous-shaped body of northeasterly trend. The latter is partly surrounded by unmineralized limestone. On the south slope numerous pits, mostly of recent origin, have explored an area about 1,000 feet long and 400 feet wide which extends obliquely uphill to the northeast through a vertical interval of several hundred feet. The pits are mostly in two groups separated by outcrops of unmineralized limestone. Pits of the lower group lie due south of the showings on the north slope and are spaced at least 100 feet apart. They mostly expose sulphides which are partly more or less massive in skarn and partly disseminated in greywacke, in each case for distances of as much as 10 or 20 feet. Contacts with unmineralized wallrock are seen in places, but the shapes of the mineralized bodies are nevertheless unknown.

(*b*) *Ila and Red Rock Groups* (12) (49° 119° N.W.).—These groups, which are about 2 miles southeast of the Brenda Mines property, contain large unexposed areas and are accessible from the old Brenda road. At the road on the Red Rock group the exposed Brenda granodiorite is weathered and strongly fractured, contains limonite after sulphides, and is intruded on the west by a north-northeasterly trending dyke of light-coloured andesite. It is believed that this dyke, which is unmineralized, largely occupies a fault. Several holes drilled by the company immediately east of this exposure failed to reach bedrock. On the Ila group to the east, holes were drilled north of the road near unmineralized outcrops of crudely banded quartz diorite which is steeply foliated in a northwesterly direction.

[Reference: Assessment Report No. 886.]

Copper-Molybdenum

Marn, Visc, Cam, Rob, Bob (1) (2)
Kel-Glen Mines Ltd.

(49° 120° N.E.) *See under* Nicola Mining Division, page 173.

Copper-Molybdenum

Wilson, Ian, McK, Etc.
Komo Explorations Ltd.

(49° 120° N.E.) *See under* Nicola Mining Division, page 173.

Copper-Molybdenum

Pinta, Copco, May
Fort Reliance Minerals Limited

(49° 120° N.E.) *See under* Similkameen Mining Division, page 174.

Copper-Molybdenum

Maria (14)
T.C. Explorations Ltd.
By J. M. Carr

(49° 119° N.W.) Company office, 201, 569 Howe Street, Vancouver 1. Howard T. James, president; A. C. Skerl, consulting geologist. This company holds about 53 recorded claims in the Maria group near the new Brenda Lake road some 4 miles south of the Brenda mine. An airborne magnetometer survey was made in 1966 but no ground work was done.

[Reference: Assessment Report No. 861.]

TROUT CREEK

Copper-Molybdenum

X, D
Lodestar Mines Ltd.
By David Smith

(49° 119° N.W.) Company office, 303, 540 Burrard Street, Vancouver 1. The X and D groups consist of 100 recorded mineral claims held by Lodestar Mines Ltd. The property, which is near Kirton on Trout Creek, is accessible by 18 miles of forestry access road from Summerland. In 1966 some geochemical soil-sampling was done at 100-foot intervals over 9 miles of line, and seven trenches totalling 900 feet in length were bulldozed. For two months a crew of five men was employed under the direction of G. L. Mill.

PEACHLAND

Copper-Molybdenum

Astra, Baal, Calumet, Ida
Boundary Exploration Limited
By David Smith

(49° 119° N.W.) Company office, 148 Tenth Street, Grand Forks. The property, of 22 recorded mineral claims, comprising the Astra, Baal, Calumet, and Ida claims, is near Silver Lake, northwest of Peachland. Access is by 8 miles of logging-road from Peachland. In 1966 about 400 feet of bulldozer trenching was done and 2 miles of road was built. A crew of three men was employed under the supervision of J. W. Carson.

ASHNOLA RIVER

Copper-Molybdenum

Ash, Nola, Cat, Dry, Car
Meridian Exploration Syndicate
By David Smith

(49° 120° S.E.) Company office, 808, 837 West Hastings Street, Vancouver 1. This property, formerly known as the Rick, consists of 157 recorded claims grouped as the Ash, Nola, Cat, Dry, and Car and lies southeast of Placer Mountain near the head of McBride Creek, a tributary of the Ashnola River. Access is by 14 miles of road from Similkameen Falls. In 1966 seven trenches totalling 3,100 feet were bulldozed on the Nola group, and geological, geophysical, and geochemical work was done. A crew of five men was employed under the supervision of J. H. Montgomery.

Copper

OLALLA

Kopr, Papex, Paychex *Apex Exploration and Mining Company, Ltd.* By N. D. McKechnie

(49° 119° S.W.) Company office, 306 Martin Street, Penticton. W. J. Weymark, consultant. The property comprises 107 mineral claims held by record and four mineral leases situated at the headwaters of Cedar and Loak Creeks on the southeastward slope of Apex Mountain and about 25 miles southwest of Penticton. A road passable for two-wheel-drive vehicles leads 3½ miles up Loak Creek from the Keremeos–Penticton highway. From this point, at a creek junction, a jeep-road leads southwestward 0.4 mile to the southerly of two working areas at 5,200 feet elevation. The other lies 2,300 feet to the northward at 5,350 feet elevation and is reached by a tractor-trail, also from the Loak Creek road. The southerly working area is at the junction of Kopr 1, 2, 3, and 4 mineral claims; the northerly one is on the boundary between Papex 5 and 6 mineral claims, near its mid-point.

The geology of the region is shown on Geological Survey of Canada Map 628A, Olalla. The rocks from Beaconsfield Mountain southward to Olalla Creek are discussed by H. E. O. Neugebauer in an unpublished Master of Arts thesis "Lithology and Structure of the Late Paleozoic Rocks of the Apex Mountain Area, British Columbia," University of Oregon, 1965.

The claims are underlain by the Shoemaker and Old Tom Formations, sediments, and volcanic rocks, shown on Map 628A as of Triassic or older age. Neugebauer states that fossils collected by him, from limestone bodies interbedded with greenstones, were determined to be Pennsylvanian or Permian. The southeastern part of the property is underlain by the band of Old Tom Formation shown on Map 628A trending northeastward across the headwaters of Olalla, Cedar, and Loak Creeks; the working areas are near its northwestward contact with the Shoemaker Formation.

The two working areas are on the sites of old workings, comprising short adits and rock cuts which cannot now be certainly identified but which probably were made during a period of considerable activity about 1900 to 1902. Recent work consists of bulldozer trenching in the vicinity of the older workings.

The rocks exposed in the working areas are sillimanite hornfels of the Shoemaker Formation; crystalline limestone and propylitized greenstone (andesite?) of the Old Tom Formation; skarn, associated with the greenstone; and diorite. The metallic minerals found in these rocks are pyrrhotite, pyrite, chalcopyrite, and magnetite. There is a marked tendency for chalcopyrite to occur in the Old Tom greenstone and derived skarn rather than in the Shoemaker rocks. Distinguishing between some Old Tom and Shoemaker rocks is not always possible in hand specimens, yet it may be important to do so as a guide in prospecting the property.

The Shoemaker sillimanite hornfels is a dark-grey rock typical of most of the Shoemaker exposed in this general area. In thin-section, sillimanite-rich aggregates enclose and are interbanded with quartz-feldspar masses. The sillimanite is associated with cordierite, orthoclase, uralite, quartz, and hematite; a few grains of forsterite and some apatite also were seen. The sillimanite hornfels has been replaced by quartz, so that the present rock is composed of embayed and serrated inclusions of the hornfels in a mosaic of anhedral quartz. This later quartz embays and veins the earlier quartz and all other minerals. Pyrite is common as a fracture filling; chalcopyrite occurs but is scarce; and magnetite may be locally prominent.

The Old Tom propylitized greenstone is a dark-grey to greenish fine-grained massive rock in which, with the aid of a hand-lens, an amygdaloidal texture is perceptible. Under the microscope the rock proves to be a mat of epidote, zoisite, and fibrous amphibole with some quartz and albite. The amygdules are an optically positive non-fibrous zeolite. In places this rock has been partly replaced by quartz and so made to resemble, megascopically, the Shoemaker silicified hornfels. The greenstone carries pyrite and, in places, appreciable chalcopyrite. Magnetite seems to be absent.

White fine-grained crystalline limestone, with uneven dark patches, occurs with the greenstone and appears to be part of the greenstone sequence. It was seen at only one place, a 10-foot-thick exposure in the Kopr workings.

Skarn (associated with greenstone) is exposed at both the Kopr and Papex workings. It is composed chiefly of brown garnet with calcite and quartz; the calcium-magnesium silicate akermanite was recognized in a specimen from the Papex workings. No magnetite was detected in the skarn from either workings. The skarn is mineralized with pyrite and chalcopyrite.

The only intrusive rock recognized is a grey medium-grained diorite with phenocrysts of hornblende in a fault zone in the Kopr workings. Megascopically, the rock shows no shearing or fracturing. It carries pyrrhotite as coarse disseminated grains.

At the Papex workings an unmineralized fault zone striking north 20 degrees east and dipping 80 degrees southeastward is exposed for a width of about 50 feet in Shoemaker hornfels. Projection of this fault on strike leads to the Kopr workings. At the Kopr workings a 40-foot-wide fault, also unmineralized, strikes north 80 degrees east and dips 75 degrees northward. Its relationship to the north 20 degrees east fault is not known. In the footwall of the north 80 degrees east fault a fault strikes north 60 degrees west and dips 85 degrees southwestward; it is in this fault that the diorite occurs.

The principal Papex showing is in a short adit driven in the footwall of the north 20 degrees east fault. In the adit, silicified Old Tom greenstone and skarn are mineralized with pyrite and chalcopyrite for a width of 8 to 10 feet. On the westward side it is bounded by a fracture zone in silicified Shoemaker hornfels 1½ feet wide, containing magnetite, pyrite, and some chalcopyrite, striking north 5 degrees east and dipping 80 degrees west. On the eastward side it is in fault contact with Shoemaker hornfels also. The north 20 degrees east fault is well developed for 50 feet eastward from the adit and contains fault blocks of Old Tom greenstone. There are two other exposures of more or less mineralized Old Tom greenstone to the southeast of the adit and still in the disturbed zone; they also are in fault contact with Shoemaker.

At the Kopr workings, pyrite and chalcopyrite occur in Old Tom greenstone in the footwall of the north 80 degrees east fault. The hangingwall of this fault is Shoemaker hornfels. An adit 50 feet in elevation below the fault exposure and on the footwall side of the fault is in Shoemaker hornfels at the portal, but the spoil is in part skarn and Old Tom greenstone. The skarn carries pyrite and chalcopyrite. The adit is in very poor condition and could not be properly examined.

The Papex and Kopr showings are in unmineralized fault zones; their relative positions suggest that the north 20 degrees east fault is the controlling structure. The mineralized Old Tom greenstones at the Papex workings are certainly blocks of limited extent contained in the fault zone cutting Shoemaker hornfels. The situation at the Kopr workings essentially is the same. It seems likely that the fault has cut mineralization in the Old Tom Formation at some point along its strike. The fault zone could be traced across the property and the Old Tom rocks on either side of it prospected.

Copper-Lead-Zinc

OSOYOOS

Copper Coin, Silver Coin
Coin Explorations Ltd.
By David Smith

(49° 119° S.W.) Company office, 800 Hall Building, 789 West Pender Street, Vancouver 1; field office, Box 230, Osoyoos. This property consists of 48 recorded mineral claims lying southeast of Kilpoola Lake and is accessible by 4 miles of dirt road from Highway 3A. In 1966 work consisted of 4,130 feet of trenching done on the Copper Coin 5 and 6 and Silver Coin 9 and 10 claims. Work was done under contract by Rayrich Mine Services Ltd.; three men were employed.

Gold-Silver

KEREMEOS

Horn Silver Mine
Utica Mines Ltd.
By N. D. McKechnie

(49° 119° S.W.) Company office, 904, 510 West Hastings Street, Vancouver 2; mine office, Box 47, Keremeos. Isaac Shulman, president; S. Radvak, manager; Egil Lygvard, geologist. The property comprises two Crown-granted and 41 recorded mineral claims situated on the western slope of Richter Mountain 16 miles south and east of Keremeos and 4 miles north of the International Boundary. Access to the mine plant at 2,622 feet elevation is by a 2½-mile road which leaves the Keremeos–Richter Pass highway at the foot of Mount Richter.

Development during 1966 has been principally on the 2570 sublevel, where two veins, termed the "A" vein and the "N" vein, are being investigated. The "A" vein is the one followed eastward on the 2600 level and lies on the footwall side of the shear zone. The "N" vein is well sheeted and strikes parallel to the "A" about 30 feet in the hangingwall. It is joined to the "A" by a cross-fracture striking somewhat north of east. A coarse pegmatite which has not been seen elsewhere in the mine is exposed in the sublevel. It is composed of pink potash feldspar, highly sericitized plagioclase, and biotite; it is cut by quartz-bearing fractures. It may be related to the "numerous small, pink feldspar dykes" mentioned in Geological Survey of Canada Summary Report, 1927, on page 49A.

[References: *Minister of Mines, B.C.*, Ann. Rept., 1965; pp. 162–163; *Geol. Surv., Canada*, Sum. Rept., 1927, Pt. A, p. 47; Map 341A, Keremeos.]

Gold-Silver-Copper

Buller, Bobbs, Eclipse, Kitchener
Iago Mines Ltd.
By David Smith

(49° 119° S.W.) Company office, 514, 615 West Pender Street, Vancouver 2. This property, formerly called the Mak Siccar, consists of four Crown-granted mineral claims, the Buller, Bobbs, Eclipse, and Kitchener, owned by Iago Mines Ltd. The property is 10 miles south of Keremeos and is accessible from Richter Manor by 6 miles of road. In 1966 a 2½-mile access road was built from the west ridge of Mount Kobau to a point at which underground work is contemplated. A crew of four men was employed under the supervision of S. Flodstrom.

Copper

OKANAGAN FALLS

Lynx
General Resources Ltd.
By David Smith

(49° 119° S.E.) Company office, 213, 678 Howe Street, Vancouver 1. The Lynx group of 29 recorded mineral claims, held by option, is in the vicinity of Allendale Lake, 11 miles northeast of Okanagan Falls. Access is by 14 miles of road from Okanagan Falls. In 1966 geological and geochemical surveys were made on eight claims. Surface exploration included 7,760 feet of trench dug by bulldozer and 800 feet of trench drilled and blasted in rock. A crew of seven men was employed under the supervision of R. B. Stokes and R. Beaton.

VERNON MINING DIVISION

LIGHTNING PEAK

Silver-Lead-Zinc

Waterloo
Bralorne Pioneer Mines Limited
By P. E. Olson

(49° 118° N.E., N.W.) Company office, 320, 355 Burrard Street, Vancouver 1. The company has optioned 52 mineral claims, the Don and Hope groups, in the Lightning Peak area, 18 miles due west of Needles. The property is reached by 30 miles of gravel road from Needles via the Monashee Pass. The area covers such old claims as the Waterloo, Dictator, and Pay Day, but current work was mainly directed toward locating extensions of the Waterloo vein. A geochemical survey of 17 claims was made under the direction of J. P. Weeks.

[References: *Minister of Mines, B.C.,* Ann. Repts., 1933, pp. 149–152; 1954, p. 119; *Geol. Surv., Canada,* Sum. Rept., 1930, Pt. A, pp. 99–103; Assessment Report No. 817.]

GREENWOOD MINING DIVISION

BEAVERDELL

Silver-Lead-Zinc

Highland-Bell Mine
Mastodon-Highland Bell Mines Limited
By David Smith

(49° 119° S.E.) Company office, 300, 999 West Pender Street, Vancouver 1; mine office, Beaverdell. B. Goetting, manager; P. Lessard, mine superintendent; R. Williams, mill superintendent. The former manager, O. S. Perry, resigned in September, 1966. The property consists of 32 Crown-granted and 14 recorded mineral claims on Wallace Mountain. In 1966 ore was mined from the 2850, 2900, and 3000 levels, and the production of the mill was maintained at 105 tons per day, of which a small tonnage is discarded as waste by hand-sorting on a washing and picking belt in the crusher-room. The lead and zinc concentrates were shipped to Trail. The main haulage is the 2900 adit.

Development work underground was continued on all levels and consisted of drifting and crosscutting, 3,289 feet; raising, 762 feet; and diamond drilling, 24,790 feet. An average crew of 51 men was employed, of whom 28 worked underground.

Silver-Lead-Zinc

Wellington, Bounty, Tiger, Ruby Silver, Etc.
Silver-Lee Mines Limited
By David Smith

(49° 119° S.E.) Company office, 509, 602 West Hastings Street, Vancouver 2. K. E. Wickstrom, president. Silver-Lee Mines Limited holds 27 claims, including the Crown-granted claims Bounty, Ruby Silver, Wellington, Tiger, and Kokomo Fraction. In former years extensive exploration and mining were done in this area. In 1966 some bulldozer trenching and stripping were done on the Tiger and Kokomo Fraction, and soil samples were taken on 35 miles of line covering all claims. A crew of three men was employed under the direction of K. E. Wickstrom.

[Reference: *Minister of Mines, B.C.,* Ann. Rept., 1949, p. 143.]

Silver-Lead-Zinc

Ester, Ed
Boundary Exploration Limited
By David Smith

(49° 119° S.E.) Company office, 148 Tenth Street, Grand Forks. This property, formerly the Inyo and Ackworth, and Dollar mine, consists of 50 recorded mineral claims known as the Ester and Ed groups. In 1966 seven trenches totalling 280 feet were bulldozed, 300 feet of old adit was opened, and three diamond-drill holes totalling 327 feet were drilled. A crew of five men was employed under the supervision of J. W. Carson.

Molybdenum

MO
Amax Exploration, Inc.
By N. D. McKechnie

(49° 119° S.E.) Company office, 601, 535 Thurlow Street, Vancouver 5. George Leary, project manager; John Arnason, geologist. The MO group of 27 recorded mineral claims, held by Amax Exploration, Inc., is on the west side of the Westkettle River between Tuzo and Big Goat Creeks. Access from Beaverdell is by a dirt road which parallels the Canadian Pacific Railway line southward for 5 miles then climbs from 2,500 to 4,700 feet elevation in an additional 4 miles to the Amax camp.

Geological Survey of Canada Map 15-1961 shows the area to be almost wholly underlain by plutonic rocks mapped as Nelson, Valhalla, and Coryell. A small remnant of Anarchist greenstones, about 1½ miles long by 1 mile wide, is mapped on the eastward face of the hill about 1 mile south of Tuzo Creek.

The following description summarizes information provided by Mr. Leary. The molybdenite mineralization is in plutonic rocks. The area of principal interest is included in the MO Nos. 6, 8, 17, 18, 19, and 20 mineral claims and underlies an area of some 2,300 feet in length and between 500 and 800 feet in width, with the longest dimension lying nearly east and west. The principal host rock is Valhalla quartz monzonite, which here is a medium-grained porphyritic rock with prominent quartz phenocrysts and a pink colour due to secondary potash feldspar. In drill cores the quartz monzonite is seen to grade into a fine-grained, feldspathic, pale buff-coloured quartz porphyry, locally termed the "white porphyry," which is possibly a marginal phase of the quartz monzonite. Granodiorite, a coarse-grained grey to greenish-white rock with prominent quartz, is known to be intruded by the "white porphyry" and therefore is presumably older than the quartz monzonite. All of these rocks are intruded by porphyry dykes, some of which are pre-mineral and some post-mineral. They strike in two principal directions, northward and northeastward, the northward-striking ones being chiefly post-mineral.

Mineralization in the granodiorite consists of sparsely disseminated pyrite and chalcopyrite; molybdenite is in fractures, with quartz, striking westward and west of north. In the quartz monzonite, molybdenite occurs in dry fractures with magnetite and, rarely, chalcopyrite. Some of the fractures contain quartz which is later than the metallic minerals. A magnetite-hematite mineralization in fractures has been recognized north and east of the molybdenite zone; it is thought that it may be peripheral.

[References: *Minister of Mines, B.C.*, Ann. Repts., 1961, pp. 63, 114; 1962, pp. 67, 130 (Matt); 1965, p. 167; Assessment Report No. 654.]

ROCK CREEK

Nickel

Old Nick
Utica Mines Ltd.
By N. D. McKechnie

(49° 119° S.E.) Company office, 1403, 1030 West Georgia Street, Vancouver 5. Egil Lygvard, geologist. The company holds by record 122 mineral claims and one fractional mineral claim of the 190-claim Old Nick group. The Old Nick 1 to 4 mineral claims, upon which work has been done, are held in the name of Estey Agencies Ltd., of Vancouver. The working area is about one-half mile southeast of the Osoyoos–Greenwood highway and is reached by a dirt road which leaves the highway 1¼ miles west of the Rock Creek bridge.

The general geology is shown on Geological Survey of Canada Maps 538A and 15-1961, Kettle River (West Half).

The rock is greywacke of the Permian and later Anarchist Group. It is locally silicified; in one exposure a bright-green micaceous mineral resembling mariposite occurs in highly silicified greywacke.

The only intrusive rock recognized was one small exposure of serpentine which here forms the matrix of a breccia composed of fragments of silicified greywacke. Thin-section examinations of cores from three test-holes drilled in the working area, however, show the greywacke to be cut by numerous fine fractures containing actinolite, cummingtonite, hypersthene, and biotite. The biotite has formed in fractures and may show as fine reticulate brown streaks in amphibole-rich sections of the greywacke.

The mineralization consists of quartz, pyrite, pyrrhotite, and chalcopyrite. Pyrite is by far the most evident. Pyrrhotite, and a lesser amount of chalcopyrite, is associated with the amphibole-bearing greywacke, where it generally lies in or near the streaks of biotite. It was seen only as scattered grains.

Mr. Lygvard states that assays up to 0.2 per cent nickel were obtained from the drill cores. So far as the writer knows, this is the first time nickel has been reported from this region.

Gold

KETTLE RIVER

Barnato
Amcana Gold Mines Limited
By P. E. Olson

(49° 118° N.W.) Company office, 825, 510 West Hastings Street, Vancouver 1. The Barnato is near the confluence of Dear Creek and the east fork of the Kettle River, about 25 miles north of Westbridge. Some mining was done on the property and 21 tons of ore was shipped to the Tacoma smelter.

Copper-Molybdenum

GREENWOOD

Iva Lenore
Crown Silver Development Ltd.
By P. E. Olson

(49° 118° S.W.) Company office, 511, 602 West Hastings Street, Vancouver 2. The property consists of 40 mineral claims 2 miles west of Greenwood. It is serviced by a dirt road which leads southward from the Greenwood–Deadwood road at about 1 mile northwest of Greenwood. Key claims on the property are the Iva Lenore and Salamanca Crown-granted mineral claims. This property is held jointly by Silver Dome Mines Limited and Crown Silver Development Ltd. Utah Construction & Mining Co. optioned the property in 1966.

Exploration work consisted of five holes totalling 2,110 feet of diamond drilling, and some bulldozer stripping was done. Magnetic, induced polarization, and geochemical surveys were also made in an effort to locate further anomalies to those found in 1965.

Copper

Wendy
Meridian Exploration Syndicate
By P. E. Olson

(49° 118° S.W.) Company office, 808, 837 West Hastings Street, Vancouver 1. The company holds options, from J. Foreshaw, of Greenwood, on 27 Wendy recorded mineral claims which lie 2 miles east of Greenwood. A geological map and self-potential and geochemical surveys of the claims were made by the company under the direction of R. Wolfe, company geologist. Diamond drilling amounted to 495 feet in three holes.

[Reference: Assessment Report No. 835.]

PHOENIX

Copper-Gold-Silver

Phoenix Mine
The Granby Mining Company Limited, Phoenix Copper Division
By P. E. Olson

(49° 118° S.W.) Company office, 1111 West Georgia Street, Vancouver 5; mine office, Box 490, Grand Forks. L. T. Postle, president; J. S. Kermeen, manager; J. Jewitt, mine superintendent; G. Hingley, mill superintendent. The property, centred around the old town of Phoenix, consists of 55 Crown-granted mineral claims as well as 137 claims held by record and under lease. All ore and waste mined in 1966 came from two pits, the Old Ironsides and the Stemwinder, as follows:—

Location	Tons of Ore	Tons of Waste
Old Ironsides pit	665,807	2,465,465
Stemwinder pit	12,115	458,895

Included in the waste figures are 388,420 tons of low-grade ore estimated to carry 0.30 to 0.50 per cent copper. This material is being stockpiled near the mill and will eventually be processed.

The mill treated 700,743 tons of ore grading 0.80 per cent copper. Mill recovery is adversely affected by the presence of oxides of copper, and also by the extreme fineness of some of the copper sulphide grains. Much wood is run through the mill since mining is in areas which were previously stoped by underground methods, including square setting. Provisions are made at three points to remove wood from the mill circuits.

The Stemwinder pit operation necessitated the relocation of the Greenwood–Phoenix road; it also supplied fill for a tailings and water-reclamation dam across the headwaters of Twin Creek. This dam, when completed, will satisfy all future requirements for tailings disposal from Phoenix milling operations.

The Old Ironsides pit was deepened one bench and was expanded considerably to the south and east on all upper benches. The pit and waste-disposal areas now cover 290 acres of land over and around the old town of Phoenix.

Pit workings embrace old abandoned underground mine workings. Much of the ore being mined is in the form of pillars, cave-ins, and marginal ore left behind when underground operations were stopped in 1919. Large quantities of ice encountered in old workings refreezes after blasting.

Six-inch blast-holes are drilled with down-the-hole drilling equipment, AN/FO, which is mixed at the hole, and commercial slurries are used for primary blasting. Ore and waste material is loaded with power-shovels into 30- and 40-ton haulage units for transport to the mill or waste dumps.

Equipment for handling concentrates was improved early in 1966, but only minor changes were made in the mill and crusher plants. The mill handles about 1,700 tons of ore per operating day.

Exploratory diamond drilling was done in the vicinity of the pits, as well as at several properties optioned by the company in the Greenwood area. The company employed an average of 140 men, 20 of whom were on staff.

Copper-Gold-Silver

B.C. Mine
The Granby Mining Company Limited, Phoenix Copper Division
By P. E. Olson

(49° 118° S.W.) The B.C. mine is on the north side of the Greenwood–Grand Forks highway, 4 miles northeast of Phoenix. The company completed a programme of diamond drilling and mapping started in 1965 and then dropped its option.

[Reference: Assessment Report No. 809.]

Copper-Gold-Silver

Oro Denoro (49° 118° S.W.) Company office, 104, 569 Howe Street, Vancouver 1. John Luttin, president; W. E. McArthur, Jr., project manager; W. J. Weymark, consulting engineer. The property is 1½ miles south of Eholt, a stop on the Kettle Valley line of the Canadian Pacific Railway about 7 miles by road east of Greenwood. A jeep-road to the property leaves the Greenwood–Grand Forks highway 1½ miles north of its junction with the Phoenix cut-off.

West-Coast Resources Ltd.
By P. E. Olson

Work done in 1966 included surface diamond drilling, 15 holes totalling 5,170 feet; underground diamond drilling, 15 holes totalling 4,378 feet; some surface trenching; and a geomagnetometer survey of the Oro Denoro claim. Bulk sampling was done on the upper workings, and the lowest adit (3440 level) was cleaned out.

[Reference: *Minister of Mines, B.C.*, Ann. Rept., 1965, pp. 171–172.]

Copper-Gold-Molybdenum

Stan (49° 118° S.W.) Company office, 1300 Elveden House, Calgary, Alta. Consulting geologist, M. C. Robinson. The property consists of 20 Stan mineral claims and fractions, situated 5 miles by bush road from Eholt. A geological and an induced polarization survey were made under the direction of the company consultant.

King Resources Company
By P. E. Olson

[References: Assessment Reports Nos. 768 and 889.]

MIDWAY

Copper

Texas (49° 118° S.W.) Company office, 511, 602 West Hastings Street, Vancouver 2. D. N. Johnstone, president; G. M. Rutherford, consulting engineer. The company holds eight mineral claims by record and two mineral leases situated on the east side of Ingram Creek and 3½ miles northwest of Midway. The southern boundary of the group is immediately northeast of the highway, and access is by jeep-road which leads through the northern boundary at about 3,100 feet elevation.

Mustang Explorations Company Limited
By N. D. McKechnie

The property includes the old Texas and Granada claims (Ann. Repts., 1894–1898), and the place once was known as the Graham Camp. The general geology is shown on Geological Survey of Canada Map 6-1957, Kettle River (East Half).

The northern and most of the eastern part of the claim group is underlain by sharpstone conglomerate similar to that exposed in the Greenwood area and mapped there as the oldest Triassic Formations (Geol. Surv., Canada, Paper 65-1, p. 56). The southern two claims of the recorded group, which surround the Granada, are underlain by recrystallized limestone striking south of west and dipping 45 degrees north. These rocks are intruded by a green to grey fine- to medium-grained diorite stock which in hand specimen appears to be composed mostly of grey feldspar and dark pyroxene with little or no quartz and which carries very sparse, finely disseminated chalcopyrite and bornite. It underlies most of the Texas claim and the area between the Texas and Granada claims. The only other intrusive rock recognized is a hornblende-diorite dyke striking east and dipping 85 degrees south, in the limestone near to and striking subparallel to the limestone-diorite contact. It was not seen in contact with the diorite stock.

The principal mineral showings are at the old Texas adit, at about 2,500 feet elevation; at some pits on the Granada claim and between a quarter and a half mile southward and at 2,600 feet elevation; and at an adit at 3,100 feet elevation westward from an abandoned farm known as the " Landers place."

The Texas adit is about 60 feet long on a due east bearing. The rock is an epidote garnet skarn in which some relicts of diorite can be seen. The skarn is cut by scattered veinlets of quartz. At the face there is a well-developed unmineralized fault, 2 feet wide, striking north 20 degrees west and dipping 70 degrees southwestward. The rock in the footwall is unmineralized diorite breccia. The skarn shows some malachite staining but no sulphides. On the dump is some coarse chalcopyrite in skarn, indicating that pockets of sulphides do occur. No controlling structure was recognized.

Three small pits, 25 feet apart, in limy skarn with magnetite in the Granada expose chalcopyrite-chalcocite mineralization in fine silicified fractures. The distribution of the sulphides is erratic; they tend to concentrate in discontinuous cherty sections, but no definite structure was recognized.

The adit at 3,100 feet elevation was driven about 50 feet westward into dark-grey massive more or less epidotized diorite carrying scattered blebs of chalcopyrite. A 45-degree down hole drilled under the adit from near the portal entered sharpstone conglomerate at 300 feet.

The most consistent, though sparse, mineralization is in the diorite stock. There is, however, no sign of widespread and persistent fracturing or brecciation in the stock nor of possible impounding structures in the contiguous limestone.

[Reference: Assessment Report No. 341.]

Copper

GRAND FORKS

Lucky John, Exchange
Fento Mines Ltd.
By N. D. McKechnie

(49° 118° S.E.) Company office, 308, 535 West Georgia Street, Vancouver 1. L. F. Pretty, president; R. E. Renshaw, consulting engineer. The company holds 170 mineral claims and fractions in the vicinity of the old Simpson mine. The claims are situated along and north of Pass Creek, which flows eastward into the Granby River about 11 miles north of Grand Forks. The east boundary of the property at Pass Creek is less than one-quarter mile west of the Grand Forks–Franklin Camp road. The working area is on Lucky John Nos. 1 and 2 and Exchange Nos. 1 to 6 claims at elevations (barometer) between 2,060 and 2,240 feet. No one was at the property at the time of the writer's visit.

The general geology is shown on Geological Survey of Canada Map 6-1957, Kettle River (East Half). The rocks are Permian(?) Anarchist sediments intruded by Lower Cretaceous(?) Nelson porphyritic granodiorite and granodiorite, which in turn are intruded by Paleocene(?) Coryell syenite, shonkinite, and pulaskite.

The principal showing is on the edge of the main valley at elevation 2,060 feet. A dark-grey crystalline fine-grained rock, micaceous but not noticeably foliated, containing finely disseminated pyrite and chalcopyrite is cut by, and included in, a fine-grained light-grey highly siliceous rock. Both are cut by fractures which are filled with iron oxides; rare fresh material in the fractures is quartz mineralized with pyrrhotite and chalcopyrite. Most fractures are fractions of an inch in width. Both rocks and mineralized fractures are cut by andesite dykes. The mineralized zone trends about east, is exposed for about 75 feet along strike, and is 40 feet wide. The north side is bordered by a coarse quartz poryphry which contains very little dark mineral; it is not mineralized. The quartz porphyry is intruded by white pegmatite. The relationship between the quartz porphyry and pegmatite and the andesite dykes is not evident.

About 500 feet from this showing, on bearing north 65 degrees west and 100 feet higher in elevation, is an exposure of similar rocks and mineralization but with fewer mineralized fractures. Rocks to the northward are also quartz porphyry. A fresh dark-grey syenite porphyry cuts across the westward strike of the zone.

During 1966 about 80 claims were geologically mapped by R. E. Renshaw, and magnetometer and induced polarization surveys were run on seven claims (Exchange 1, 2, 3, FNO 2, 16, 31, and Lucky John). Some stripping and trenching were done, and five holes totalling 1,050 feet were diamond drilled.

[Reference: *Minister of Mines, B.C.*, Ann. Rept., 1939, p. 91.]

Copper

Pathfinder, Little Bertha
Alwin Mining Company Ltd.
By N. D. McKechnie

(49° 118° S.E.) Company office, 311, 850 West Hastings Street, Vancouver 1; mine office, Grand Forks. Foster Irwin, manager. The property comprises 55 claims and fractions located as the Bat, Cedar, B, Path, and Hornet claims and mineral leases M-139 and M-253 (Pathfinder, Lot 782; Little Bertha, Lot 959; Lone Star; and Iron Bell Fractions). The claims are on Pathfinder Mountain, between Hornet and Pathfinder Creeks, westward-flowing tributaries of the Granby River, about 17 miles north of Grand Forks. Access is by gravel road north from Grand Forks; a dirt road leads along the north siding of Hornet Creek to the old Pathfinder showing at elevation 3,160 feet (barometer). The Little Bertha and Pathfinder showings are mentioned in Annual Reports from 1896 to 1932. The regional geology is shown at 1 inch equals 4 miles on Geological Survey of Canada Map 6-1957.

The rocks between Hornet and Pathfinder Creeks are shown on Map 6-1957 as Lower Cretaceous(?) Nelson intrusive rocks to the north and sediments of the Permian(?) Anarchist Group to the south. Paleocene(?) Coryell rocks are in intrusive contact with the Nelson rocks north of Pathfinder Creek. The sediments are a part of the large mass of Anarchist Group rocks which extend southward and westward to the International Boundary and to Deadwood. At about 1½ miles east of the Granby River, both Anarchist and Nelson rocks are in fault contact with the Grand Forks Group of metamorphic rocks.

The first recorded discovery of mineralization was on the Pathfinder in 1895. By 1905 this property had underground workings totalling 337 feet of " shaft work " and 800 feet of " tunnelling." Recorded production totalled 264 tons, from which was obtained 24 ounces of gold, 130 ounces of silver, and 5,136 pounds (0.97 per cent) copper. From the Little Bertha workings, about one-half mile west-northwest of the Pathfinder and 600 feet lower in elevation, 996 tons of ore was obtained, which yielded 426 ounces of gold, 3,867 ounces of silver, and 65 pounds of copper. In 1920 an adit was started, trending south of east, to cut the Little Bertha vein 200 feet below the workings; it was expected that the vein would be cut at about 130 feet from the portal. The project was unsuccessful, but the adit was extended, at different times, toward the downward projection of the Pathfinder showings, and by 1932 had reached a distance of about 1,000 feet from the portal. No appreciable mineralization in the adit is reported.

None of the underground workings, either at the Little Bertha or at the Pathfinder, were accessible at the time of the writer's visit.

The recent workings at the Little Bertha consist of a bulldozer trench some 1,000 feet long crossing the hillside in a northerly direction just above the portal of the long adit. At about 500 feet northward from the adit, Coryell pulaskite porphyry is in contact with interbedded Anarchist dark-grey quartzite and dark-grey limestone. The contact strikes north 50 degrees west and dips 25 degrees northward. The sediments, exposed for about 40 feet along the trench, strike north 55 degrees west and dip 55 degrees northward. At about 100 feet southward from the adit and at intervals to about 500 feet, greenish Nelson quartz porphyry is exposed. The quartzites and, to a lesser degree, the limestones are sparsely mineralized with disseminated pyrite and chalcopyrite; the quartz porphyry carries pyrite. No mineralization was seen in the pulaskite. The Little Bertha vein is stated (Ann. Rept., 1924, p. 164) to occur in "granodiorite intruded by porphyry dykes," and to consist of pyrite and galena in a quartz gangue. The copper included in the reported production suggests an appreciable occurrence of copper-bearing mineral, probably chalcopyrite.

At the Pathfinder workings an old shaft was being rehabilitated. At about 300 feet east of the shaft is a stripped area, about 50 by 100 feet and trending southwest, of brecciated rock heavily mineralized with pyrrhotite and chalcopyrite. The associated rocks were a light-grey quartz porphyry and, more intimately mixed with the sulphides, a fine-grained rock composed chiefly of zoisite, epidote, uralite, and quartz. The mineralized rock is intruded by unaltered pulaskite. In the stripping it is seen to be cut off on the southeast and southwest by the pulaskite; to the northeast and northward some 100 to 200 feet distant are frequent exposures of unaltered pulaskite with no sign of mineralization. An adit portal on bearing north 15 degrees west from and 40 feet below the stripping also is in pulaskite. It seems clear that the occurrence is an inclusion in the pulaskite and that the pulaskite is younger than the pyrrhotite-chalcopyrite mineralization.

The writer saw no direct evidence of the age relationship of the pulaskite to the Little Bertha mineralization, but its failure to show in the adit possibly is due to its having been cut off by the "porphyry dykes."

The uniformly fresh and unmineralized character of the rock at both the Little Bertha and Pathfinder workings suggests that it is younger than either mineralization. The Pathfinder occurrence, however, and the Fento Mines occurrence across the Granby River valley suggest that the pulaskite may have intruded along a zone mineralized with pyrrhotite and chalcopyrite. The valley of the Granby River and its northward extension into Burrell Creek through Franklin Camp is a locus of faulting and may mark the line of an older zone of structural weakness. The main mass of Coryell intrusive rocks, which includes the pulaskite, lies to the northward. Exploration southward along the valley into the Anarchist rocks may be worth consideration.

PAULSON

Gold-Lead-Zinc

Ajax
Christina Lake Mines Ltd.
By N. D. McKechnie

(49° 118° S.E.) Company office, 928, 736 Granville Street, Vancouver 2. The property consists of 20 mineral claims held by record and 5 mineral leases situated near the heads of Josh and Mollie Creeks, about 1 mile southwest of the Paulson bridge on the Christina Lake–Kinnaird highway. Access is by a jeep-road 2½ miles long which leaves the highway about 1 mile south of the bridge. The working area is on the slope northward toward Mollie Creek at about 4,500 feet elevation.

The property includes a claim group known earlier as the Motherlode, on which some underground development had been done (Ann. Repts., 1899, 1900, 1917, 1925, 1931, 1932). This ground is on Josh Creek, about a mile north of the present surface workings.

Regional geology is shown on Geological Survey of Canada Map 6-1957, Kettle River (East Half). The property lies in a northeasterly trending band of Pennsylvanian or Permian Mount Roberts sediments which is here about 2 miles wide. To the northward the sediments are in contact with Nelson plutonic rocks and to the southward with Coryell.

Recent stripping had been done in the area about 1,000 feet in diameter about one-half mile westward from the initial post of Als Gift No. 9 and No. 10 fractional mineral claims. The rocks here are limy siltstones interbedded with platy limestone. They are folded on northwest axes which plunge from 25 to 60 degrees northwestward. The axial planes dip steeply northeastward. The sediments are intruded by altered biotitic syenite dykes striking and dipping most commonly parallel to the axial planes of the folds. Pulaskite dykes striking northwestward also cut the sediments; their relationship to the syenite is not known.

The sediments are mineralized with dark-brown sphalerite, with magnetite, galena, and chalcopyrite. The mineralization is closely associated with an altered rock composed of pyroxene, calcite, amphibole, and hematite which is intrusive into the sediments along bedding planes and in the crests of folds and crenulations. It shows, locally, crosscutting relationships with the bedding. Width ranges from one-sixteenth inch to several inches. In every place that mineralization was seen, the sulphides were in this altered rock rather than in the sediments. The mineralization is spotty and not well exposed. Near the best showing, a width of about 10 feet, a diamond-drill hole had been started. The results are not known to the writer.

TRAIL CREEK MINING DIVISION

ROSSLAND

Copper-Gold

Velvet
Hydra Explorations Limited
By P. E. Olson

(49° 117° S.W.) Company office, 100 Adelaide Street West, Toronto 1, Ont. The company, in partnership with Rayrock Mines Limited, optioned the mine from Mid-West Mines Limited. The property is on the Rossland–Christina Lake highway immediately east of Big Sheep Creek.

Underground diamond drilling totalling 2,718 feet in 21 holes was done following a geological study in 1965. The company employed five men for four months under the direction of T. Antoniuk. The option was dropped upon completion of the drilling.

Gold

Midnight
Cinola Mines Ltd.
By G. E. P. Eastwood

(49° 117° S.W.) Company office, Suite 1322, 510 West Hastings Street, Vancouver 2; mine office, Rossland Motel, Rossland. William Thompson, president; A. Pompu, mine manager; S. Tan, geologist. The company controls the Midnight Crown-granted claim and 13 recorded claims and fractions, astride the old Rossland–Cascade highway about 2 miles west of Rossland. The workings on the Midnight claim are reached by about a mile of road that descends into the valley of Little Sheep Creek from a point on the old highway about 500 feet west of the junction with the Paterson highway.

The Midnight claim lies immediately east of the I.X.L. and O.K. claims, on which a considerable amount of work was done in the early years of the Rossland camp. Development of the Midnight began in 1924, and some work was done almost every year through 1952. In 1965 Cinola Mines Ltd. acquired an interest in the claim, and late in the year retained A. C. A. Howe & Associates Limited to conduct an exploration programme.

Work in 1966 was confined to the Midnight claim. The consulting firm dewatered and rehabilitated the workings, straightened 110 feet of drift, drove 25 feet of new drift and 12 feet of new raise, and did 3,000 feet of underground diamond drilling, all on the main level, which is identified as the lower Midnight adit in earlier reports. A further 2,000 feet was diamond drilled from surface. In September a new adit was established about 150 feet below the main level and had been driven 200 feet by the end of the year. Six men were employed under the direction of A. Pompu.

The country rock is dense to medium-grained andesite and augite porphyry which Little, Geological Survey of Canada Map 23-1963, assigned to the Rossland Group. A body of serpentinite lies a short distance to the south. Diamond-drill core discloses a small body of dark biotitic monzonite in the Rossland rocks. The andesite, augite, porphyry, and monzonite are traversed by two sets of quartz veins, and the veins in turn are transected by lamprophyre dykes and offset on cross-faults. The country rocks are extensively silicified adjacent to the veins.

The dominant veins on the Midnight claim strike north 20 to 30 degrees west and dip west at an average angle of 70 degrees. Two veins of the other set, which are actually extensions of veins on the adjoining I.X.L. claim, strike west-northwest and dip about 40 degrees north. The dominant veins tend to show an in echelon pattern. Any individual vein is not a continuous body of quartz, rather it is a fracture along which there is a succession of quartz disks or lenses. The disks are from 8 inches to 2 feet thick, and 50 to 150 feet long, and pinch and swell in both horizontal and vertical sections. Between disks the vein structure is normally traceable as a slip; that is, a tight fracture with slick walls. The horizontal interval between disks in a vein structure is of the order of 50 feet. Some of the in echelon veins overlap and continue side by side for as much as 100 feet; these are commonly connected at acute angles by branch veins of quartz that strike more northerly and dip less steeply. They are also connected in places by narrow quartz ladder veins.

In part the quartz disks are fairly massive quartz, and in part they are strongly brecciated, the interstices between fragments being a green material which probably consists mainly of chlorite. Pyrite, pyrrhotite, chalcopyrite, galena, and free gold occur both in the massive quartz and in the breccia, the concentration of metallic minerals appearing somewhat higher in the breccia. Gold is the only metal occurring in economic amounts. Some of it is visible with the naked eye or under a 10-power lens. It occurs in the chlorite and galena as well as in the quartz.

[References: Little, H. W., 1960, *Geol. Surv., Canada*, Mem. 308, p. 171; *Minister of Mines, B.C.*, Ann. Repts., 1924–1952.]

Geology of the Coxey-Giant Area

By G. E. P. Eastwood

The Coxey (Lot 1221) and Giant (Lot 997) are contiguous Crown-granted claims on the west slope of Red Mountain, 1½ miles in a direct line northwest of Rossland. Molybdenite ore on the Coxey claim is being mined by Red Mountain Mines Limited.

The claims are underlain by variably metamorphosed sedimentary rocks of the Mount Roberts Formation, by dioritic rocks of variable appearance and form, by intrusions of quartz diorite and quartz diorite breccia, and by many narrow dioritic and lamprophyric dykes. An ill-defined zone of mixed breccia underlies the north half of the Coxey claim and extends under claims adjoining on the east and west. The known molybdenite orebodies on the Coxey are in this zone. The rocks and mixed breccia have been broken by several north- and northwest-striking faults. To facilitate description of the rocks as they are now, several disparate sedimentary, metamorphic, plutonic, and structural units are shown by pattern and number in the accompanying sketch (Fig. 28).

Much of the zone of mixed breccia, together with some smaller areas to the north and south, was mapped in detail by plane-table, and a plane-table traverse was run to the Giant adits. The geology of the rest of the area is based largely on traverses along jeep-roads (most of which are omitted from the sketch) and little off-road traversing was done. Over most of the area the compass is virtually useless, owing to strong local attraction, and in the southwest part natural exposures are scarce.

Mount Roberts Formation

The Mount Roberts Formation presents widely varying aspects in the area owing to the effects of metamorphism and metasomatism. The unaltered rock is mostly fine-grained greywacke which consists essentially of plagioclase, hornblende, and quartz. Some beds contain very little quartz. The rock is uniformly fine grained in about half the thin-sections examined, and in the other half contains variable amounts of medium-sized clastic grains of quartz and plagioclase. The fine-grained quartz is fairly well rounded, whereas the medium-grained quartz is commonly angular or subangular. The hornblende is commonly confined to layers, some of which are thick enough to produce a banding visible in hand specimen. The hornblendic and non-hornblendic layers are of about equal thickness.

The sediments contain a variable amount of black colouring matter, presumably finely divided carbon, and range from light grey to black in hand specimen. This colouring is particularly intense in a section of the sedimentary sequence that is exposed on the south part of the Coxey and the west part of the Giant, and persists through a considerable degree of metamorphism. In outcrop the rocks appear as dark-grey to black argillite and silty argillite. They are shown as unit 1 on the sketch. Near the Giant No. 2 portal these dark sediments are interbedded with light-grey ones, and in this adit they are underlain by light- to dark-green rocks that also appear to be largely sedimentary in origin. The colour of these green rocks is due to detrital hornblende and metamorphic pyroxene and is not masked by the presence of black colouring matter. They are not exposed on surface within the area mapped, and hence do not appear on the sketch.

Bedding is generally prominent in the grey and black sediments. It is marked by a parting which separates beds of slightly different shades or textures and is parallel to the hornblendic banding. The beds strike between west-northwest and north-northwest and dip rather gently southwest. Dips as large as 45 degrees were measured near Jumbo Creek, but in most places they are less than 20 degrees and less than the slope of the hillside. As a consequence, the trace of bedding down the hillside is slightly north of west.

In the southeast part of the Coxey claim the dark sediments of unit 1 are overlain abruptly by light- to dark-green rocks showing little or no bedding and resembling bleached and fresh andesite (unit 3). The contact appears to be a normal bedding surface. Minor patches of bedded grey siltite occur in the green rocks. In thin-section the green rocks are seen to be silt-sized sediments, similar to the grey rocks, in which abundant fine-grained pyroxene is developed. Similar rocks continue north of the zone of mixed breccia to the limit of mapping.

The dark sediments of unit 1 grow lighter in colour to the east and southeast, and grade on strike to massive pale-buff rocks that are hard, brittle, bleached of their black colouring matter, and that seem to be highly siliceous (unit 2). One specimen in thin-section showed relics of the fine-grained sediments and also an

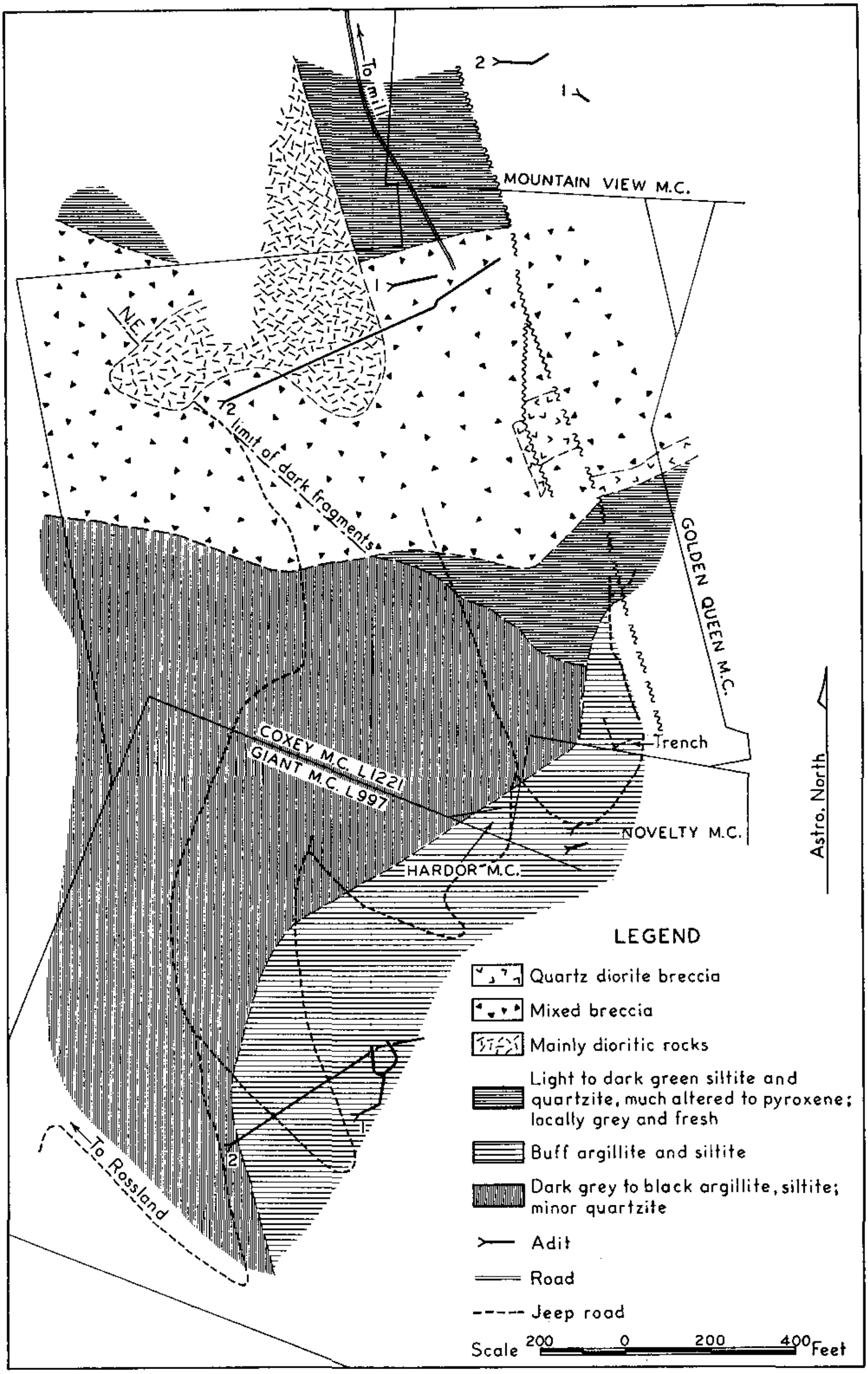


Figure 28. Geological sketch-map of the Coxey and Giant claims, Red Mountain.

intensive replacement by pyroxene and orthoclase. Since this specimen is fairly well mineralized, it may not be typical of the massive buff rocks.

Dioritic Rocks (Unit 4)

The dioritic rocks as a unit include a variety of rocks of more or less dioritic aspect, together with some small andesitic dykes and sills that intrude the dark sediments. Only one area of dioritic rocks is shown in the sketch. Smaller patches occur in unit 3 to the northeast of the road to the mill and in the southeast part of the Coxey claim. Small bodies of andesitic and dioritic rocks intrusive into units 1 and 2 are variously buff, light green, and light grey on fresh surfaces and weather light to medium brown. The buff ones can usually be distinguished in the field from the altered rocks of unit 2 by their slightly deeper colour and coarser grain. In the southeast part of the Coxey claim, around the trench and northward, patches of vaguely dioritic buff rock obscure the continuation of the contact between units 1 and 3.

East of the main haul road to the mill there are patches of grey to reddish-brown dioritic rock that appear to have gradational contacts with both fresh and altered sediments. A series of thin-sections from margin to core of one of these patches disclosed progressive metasomatism of pyroxenized sediments by introduction of plagioclase, biotite, and opaque minerals. These introduced minerals are scattered through the rock, in contrast to lensy veinlets or dykelets of plagioclase, amphibole, and pyroxene that occur in siltite about 100 feet to the northwest.

The central part of the area of dioritic rocks shown on Figure 28 is mainly fine grained and buff, locally light green, and is similar to the dioritic rocks intrusive into units 1 and 2. Northwest of Coxey No. 1 portal there is a relatively small patch of medium-grained dark greenish-grey rock that appears fresher than the other diorites and may be younger; it was not examined in thin-section. The rock in the southwest lobe of the dioritic area shown is strongly gneissic and weathered exposures are friable to a depth of a foot or more. In thin-section it consists of large crystals of hornblende, biotite, plagioclase, and pyroxene in a fine-grained semi-interlocking matrix of plagioclase, biotite, hornblende, and quartz. The gneissic texture is produced mainly by alignment of the large hornblende crystals. Although fine grained, the matrix is considerably coarser than the usual Mount Roberts sediment, and differs also in containing biotite. It is not clear whether this rock is a deformed quartz diorite intrusion or Mount Roberts sediment that has been drastically changed by recrystallization and metasomatism. In any case, it appears to be unrelated to the quartz diorite described below.

Mixed Breccia (Unit 5)

Three types of breccia are present in and near the Coxey open pit: a fault breccia along the headwall fault, a quartz diorite breccia which is clearly intrusive, and a mixed breccia which may be intrusive. These last two differ greatly in several respects and do not appear to be related. " Mixed " was selected as a simple term to distinguish the third type from the others because it implies nothing as to origin and it is descriptive of the fragments of several different aspects.

The mixed breccia comprises white, light-grey, light-green, buff, and, southwest of Coxey No. 2 portal, dark-grey to black blocks in a matrix of light- to dark-green andesite-like rock. Where the matrix and blocks are both light coloured, the blocks are identified with difficulty. A few blocks are of fist size, but most of them are more than 5 feet long, and blocks more than 30 feet long have been identified. They are generally irregular polygons with rounded corners. Few have sharp boundaries;

most grade into the matrix over 2 or 3 inches. The white and light-grey blocks probably constitute less than a quarter of the total, but they are the most conspicuous. Some contain narrow dark-grey bands and resemble the light-coloured sediments at the Giant No. 2 portal. This banding is diversely oriented in neighbouring blocks, demonstrating that they have been rotated.

In thin-section the varicoloured blocks all appear to be siltites that have been variably altered to pyroxene and locally potash feldspar. Some are traversed by narrow dykelets of fine- to medium-grained quartz diorite or diorite. Some of these dykelets are unaltered and others are considerably pyroxenized. The matrix appears to consist of smaller blocks of siltite and larger injections of fine- to medium-grained diorite and quartz diorite, both of which are intensely pyroxenized. It would appear that the sediments were shattered, the interstices filled by the intrusive rock, and the whole more or less pyroxenized. The three processes may or may not have been contemporaneous.

Toward the west the light-coloured blocks are no longer present, and scattered patches of dark argillite and silty argillite appear in a generally light-green matrix. These patches are probably blocks of the dark-coloured sediments of unit 1. Some of these blocks are clearly intruded by the light-green rocks, whereas others have contacts that are gradational through white siliceous rock. There probably has been some bleaching and alteration of the sediments, and it is unlikely that the light-green rock is entirely intrusive. The northeast limit of the dark blocks is shown on Figure 28, and it appears that this line is more or less a continuation of the contact between units 1 and 3.

The boundaries of the zone of mixed breccia are poorly known, and those shown on the sketch are approximate at best. The breccia is most readily identified in large clean exposures and where it contains white blocks. It so happens that outcrops are small—smaller than many blocks—and scattered in the boundary zones, and the white blocks seem to be less common. If the boundary were drawn around only those exposures that are clearly breccia, it would be exceedingly irregular, sending long tongues into unit 3. There would also be some doubt as to whether the zone is continuous down the hillside. Continuity is, however, indicated by truncation of the contact between units 1 and 3, and its continuation as a phantom contact through the breccia. The north limit of continuous dark sediments is here taken as the south limit of the breccia zone.

Only a minor amount of breccia was found in the Coxey No. 2 adit, near the face, despite the fact that breccia was mapped in several places on surface above it. Near the jog the adit passes through a considerable section of thinly banded greenish rocks which clearly are not breccia. Between the jog and the portal the non-dioritic rocks resemble massive andesite. It is conceivable that pyroxene alteration may have obliterated the distinction between fragments and matrix, or that the large blocks may not be recognizable in muddy walls and within the confines of an adit, but it must be reported that little evidence was found of the presence of mixed breccia in the adit. Diamond-drill holes are not helpful because the large blocks are virtually impossible to recognize in the core.

It is not clear what the relationships are between the mixed breccia and the diorites (unit 4) and quartz diorites (unit 6). Some blocks in the breccia resemble the buff diorite, but those examined in thin-section proved to be altered sediment. The mass of diorites projecting into the mixed breccia from the north does not appear to be brecciated. It does not seem likely that the buff diorite was responsible for the brecciation, for breccia has not been found associated with it elsewhere, and the gneissic diorite and quartz diorite appear to be too much the products of metasomatism to have caused widespread brecciation. The quartz diorite breccia appears to intrude the mixed breccia. However, the relationships are not clear.

Quartz Diorite Breccia (Unit 6)

The faulted segments of a large dyke of quartz diorite breccia are shown on Figure 28. Several much smaller bodies of quartz diorite and quartz diorite breccia are scattered along two zones, respectively near the north and south boundaries of the mixed breccia. These bodies range from irregular pockets as much as 20 feet across to wispy dykes a few inches wide. The dominant rock type is coarse-grained light-pink quartz diorite. The dyke shown in the sketch has a narrow marginal zone in which blocks of the country rock are caught up in a quartz diorite matrix, but most of the body consists of fragments of the pink quartz diorite thickly strewn through a medium-grained medium-green matrix. The fragments range from blocks 2 feet long down to individual crystals.

A thin-section from a small body of massive quartz diorite consists predominantly of coarse plagioclase, with less quartz, hornblende, and biotite, and a little orthoclase. In a thin-section of the breccia from the larger body the fragments are very similar to the massive quartz diorite, except for an absence of biotite and the presence of large euhedral crystals of sphene. The green matrix appears to be the same rock that has undergone comminution, loss of hornblende, extensive development of fine-grained pyroxene, and introduction of sphene. These several processes may or may not have been contemporaneous.

Dykes

The older rocks have been injected by many narrow dykes of varied aspect. Most of them are between 1 and 10 feet thick, but one dyke across the headwall of the open pit on the A orebody has an outcrop width of 65 feet. Most of the dykes strike north or north-northwest and dip steeply, transecting bedding at large angles.

The following lithologic aspects were noted:—

(1) Headwall type—medium-grained grey biotite gabbro containing scattered small vugs more or less filled with amphibole, quartz, and calcite. Disintegrates to green sand on weathering.

(2) Mottled porphyry—fine-grained dark greenish-grey rock mottled with ovoids, 0.1 to 0.3 inch across, consisting of a dark-green core and white to reddish rim.

(3) Diorite porphyry—dark-green aphanite crowded with light-green ovoidal phenocrysts of feldspar.

(4) Biotite porphyry—black to dark reddish-brown aphanite containing biotite phenocrysts.

(5) Hornblende porphyry—hornblende needles in a groundmass consisting largely of plagioclase.

(6) Sooty lamprophyre—fine-grained friable jet-black rock. One small dyke observed.

(7) Grey diorite—medium-grained medium-grey diorite.

The grey diorite dykes appear fairly constant in type. Many others show different aspects either from side to side or from end to end; for example, one dyke in the lower part of the open pit grades southward from headwall type to biotite porphyry, and exposures on strike to the south are again of headwall type. Some dykes of biotite porphyry aspect transect dykes of mottled porphyry aspect, but a reverse relationship was also observed. Possibly dykes showing the first five aspects are not greatly different in age or composition. Dykes of all lithologic types traverse the mixed breccia, and a dyke of headwall type transects the quartz diorite breccia. Some small quartz diorite bodies, however, appear to transect dykes of biotite porphyry and mottled porphyry aspect. Most of the dykes are strictly tabular, but some biotite porphyry forms intricate intrusions which defy description. Molybdenite and other sulphides are rare in the dykes, and most or all of them may be post-mineralization.

Faults

One fault only is shown on Figure 28. It strikes north-northwest and probably dips steeply. North of the split it is marked by a breccia zone as much as 20 feet wide, but this decreases to 3 to 5 feet along the westerly branch and to 10 inches on the main fault south of the split. The main fault separates the headwall dyke from the A orebody. The fault zone is exposed in the open pit, and extensions to the north and south are indicated by the topography. The only indication of the movement on the fault is the disruption of the dyke of quartz diorite breccia. This would indicate an apparent horizontal displacement on the main fault that is right hand and at least 100 feet. It would also suggest a vertical component of unknown sense and amount. The branch fault seems to have a horizontal component of opposite sense.

In the Coxey No. 2 adit, 18 shear, gouge, and breccia zones from 1 inch to 6 feet wide were mapped. Most of them strike northwest, but those near the face strike north. Dips are both gentle and steep, both southwestward and northeastward. Movement on some is only a few inches, on two others is greater than the adit dimensions (that is, 4 and 6 feet), and on most is unknown. Movements comparable to that on the headwall fault are not impossible, but they do not appear necessary to explain the rock distribution as presently outlined, either on surface or underground. The Giant No. 2 adit passes through many north-striking shear zones and two or three gouge and breccia zones, all of which probably result from some fault movement. Dips are generally steep, to both east and west. On several the throw is of the order of 10 feet. In Giant No. 1 adit the ruptures are small and movement is probably slight.

Mineralization

Two types of mineral deposit, differing both structurally and chemically, are present in the Coxey-Giant area. One type consists of molybdenite, pyrrhotite, and minor chalcopyrite in mixed breccia and adjacent rocks, and is hereafter referred to as the breccia type. The other comprises molybdenite, arsenopyrite, pyrite, pyrrhotite, cobaltite, and bismuthinite along slips and minor shear zones in the bleached altered sediments of unit 2 and is called the minor fracture type. Pyrrhotite is disseminated throughout the Mount Roberts Formation and the dioritic rocks, and is especially common in the dark sediments. Sparsely disseminated chalcopyrite was noted in a number of places. The other sulphides appear to be very largely restricted to the mineral deposits.

On surface, virtually all recognizable mixed breccia is more or less mineralized, and in three areas this mineralization is of ore grade. Diamond drilling on the Coxey has disclosed that the ore extends only about 50 feet below surface; the orebodies are tabular and dip with the hillside.

The breccia ore is somewhat unusual among molybdenum deposits in that vein quartz is rare. The molybdenite and other sulphides occur disseminated and as pockets, preferentially in the matrix and to a lesser extent in the blocks.

One typical molybdenite-quartz vein was seen. It is about a foot thick, dips 55 to 70 degrees southwest, and follows a shear and gouge zone for 60 feet northwest from the jog in Coxey No. 2 adit.

Minor fracture mineralization occurs in the trench in the southeast corner of the Coxey claim, in the two short adits in the northwest part of the Novelty claim, in the north part of the Giant claim, and in the Giant No. 1 adit. Some pockets of sulphides occur in the Giant working, but mostly the sulphides are disseminated in the bleached rock, in which some quartz, garnet, and epidote are present. The associated structures appear to be weak and local. The band of mineralization in the Coxey trench is about 50 feet long and 5 to 10 feet wide. It appears to lie along a locus of crossed sheeting and shearing, being related to it as a vertical stroke through the middle of an X. Very little of the sheeting and shearing can be detected more than 15 feet from the mineralization. At the portal of the southerly of the two Novelty adits, arsenopyrite and molybdenite are disseminated through 10 feet of bleached rock along the contact of a diorite dyke. Erythrite-bearing material obtained from winzes in the northerly adit may have come from a continuation of this zone. Another zone is suggested by scattered arsenopyrite and molybdenite in core from two diamond-drill holes on the Giant claim 130 feet to the west-southwest. The westerly branch of the Giant No. 1 adit is walled by slips and passes north into an inaccessible stope. The south elbow of this branch exposes some weak intervening slips, a square foot of fairly concentrated molybdenite, some erythrite, and a few additional spots of molybdenite. Arsenopyrite is disseminated here and there along the walls. Another slip is followed by the middle section of the adit, between the outer section and the junction of the branches. Molybdenite is finely disseminated in places along it.

[References: Drysdale, C. W., 1915, *Geol. Surv., Canada,* Mem. 77; Little, H. W., 1960, *Geol. Surv., Canada,* Mem. 308; *Minister of Mines, B.C.,* Ann. Rept., 1965, pp. 174–176.]

Molybdenum

Coxey
Red Mountain Mines Limited
By G. E. P. Eastwood and P. E. Olson

(49° 117° S.W.) Office, 1500, 355 Burrard Street, Vancouver 1. Brian Fillingham, resident manager. The company holds the Coxey, Ophir, Jumbo, Nevada, Mountain View, High Ore, Peak, Sam Hayes, Good Friday, and Ontario Crown-granted claims, two mineral leases, and eight recorded claims and fractions, mostly on the west and south slopes of Red Mountain just northwest of Rossland. Red Mountain Mines Limited is a company jointly owned by Torwest Resources (1962) Ltd., Metal Mines Limited, and Canadian Nickel Co. Ltd., and was formed to exploit a molybdenum orebody discovered by the Torwest company on the Coxey claim.

Plant construction, which was started in the autumn of 1965, was completed by April, 1966, and production started on April 24, 1966. Overburden stripping from the Coxey A orebody was completed early in the year, and ore-breaking was well under way before the 400-ton mill was completed. This orebody is tabular and lies parallel to the slope of Red Mountain and requires negligible waste removal during open-pit mining. Open-pit blast-holes are drilled with an air-track to an average depth of 30 feet, and blasting is done mainly with conventional explosives and primacord. A contractor loads the broken ore with a front-end loader and trucks the ore to the crushing plant about half a mile from the pit.

The mill treated 74,094 tons of ore which graded 0.43 per cent molybdenite. Since starting actual production, the company has employed 30 men.

The A orebody is one of three that have been more or less outlined by diamond drilling. The others are known as the Upper A and the B. All three lie essentially in the zone of mixed breccia (*see* p. 203), though some adjacent quartz-diorite breccia and diorite are also mineralized. The orebodies are local concentrations having assay boundaries. There are indications from diamond-drill core of a fourth orebody, called the Upper B, in or under the mass of dioritic rocks shown on Figure 28.

Production results disclose that the earlier estimates of grade derived from the diamond drilling are uniformly low. Thus it became necessary to recalculate ore reserves, and a re-evaluation of them was in progress in the latter part of the year.

The positions of the orebodies are indicated in general terms. The Upper A is bounded on the west by the headwall lamprophyre dyke and the headwall fault. To the south it may extend to the quartz-diorite breccia. Some exposures of molybdenite mineralization straddle the claim boundary between the Coxey and the Golden Queen. To the north, exposures are scattered and rubbly, and the extent of the orebody is unknown. The A orebody is bounded on the east by the headwall fault and dyke. On the southeast it includes a small part of the quartz-diorite breccia. To the north and west it extends approximately to the portal of the No. 1 adit. The B orebody lies north and west of No. 2 portal, in part beneath the lobe of dioritic rocks.

Molybdenum-Gold-Bismuth

Giant, Gold King, Little Darling, Evening, Etc.
Cascade Molybdenum Mines Ltd.
By P. E. Olson

(49° 117° S.W.) Company office, 539 Eighth Avenue Southwest, Calgary, Alta.; field office, Rossland Motel, Rossland. The company holds 10 Crown-granted mineral claims immediately south of Red Mountain Mines Limited holdings on Red Mountain. The company owns all of the claims except the Giant, which is held under lease from Cominco Ltd. Approximately 30,000 feet of AX wireline drilling in 117 holes was done, mainly on the Giant claim. Other work included mapping, stripping, and engineering studies. A new office of igloo design was erected at the junction of the Cascade highway and the Rossland–Paterson highway.

Molybdenum

Triumph
Cicada Mines Ltd.
By P. E. Olson

(49° 117° S.W.) Exploration office, Rossland Motel, Rossland. This company controls the Triumph group of 50 mineral claims 2 miles south of Rossland. Exploration work consisting of geological mapping, soil-sampling, and geophysical surveys was directed by A. C. A. Howe & Associates Limited, of Vancouver.

Chromite

Vandot
By P. E. Olson

(49° 117° S.W.) The property consists of five recorded mineral claims, owned by V. M. Van, of Rossland. It is on the Cascade highway at the first summit, 6 miles west of Rossland. Chromite has been found on the claims where previous operators did trenching and stripping. V. M. Van deepened some of the old cuts and sampled most of the showings.

NELSON MINING DIVISION

NELSON

Silver-Lead

Molly Gibson
Homestake Silver Ltd.
By N. D. McKechnie

(49° 117° N.E.) Company office, 1403, 1030 West Georgia Street, Vancouver 5; mine office, Box 560, Nelson. C. G. Newton, engineer in charge. The company holds by option from Cominco Ltd., Trail, five mineral claims and five fractional mineral claims, all Crown granted, situated at the head of Kokanee Creek, 12 miles by road from the Nelson–Balfour highway. The present working-level is at an elevation of 3,880 feet.

The Molly Gibson mine has a recorded production, 1899 to 1950, of 61,575 tons, which yielded 12 ounces of gold, 998,626 ounces of silver, 4,991,560 pounds of lead, and 20,376 pounds of zinc. Most of the ore was mined by 1910.

The general geology is shown on Geological Survey of Canada Map 1090A accompanying Memoir 308, Nelson Area, West Half.

The Molly Gibson deposit is in Nelson porphyritic granite (*Geol. Surv., Canada,* Mem. 173, p. 62). The porphyritic granite is cut by dark-grey fine-grained diorite porphyry with phenocrysts of quartz and feldspar.

The Molly Gibson vein system consists of two veins, the Florence and the Aspen, about 50 feet apart, striking north 35 degrees west and dipping 75 degrees southwestward. The veins were developed on five levels, and the distribution of stopes as shown on longitudinal section suggests that the oreshoots plunge to the southeast at nearly 45 degrees. All of the ore mined came from the third, fourth, and fifth levels, a vertical distance of about 500 feet. The fifth level is at 6,900 feet elevation.

The adit at 5,880 feet elevation is a crosscut, driven by Cominco Ltd. and finished in 1932, on bearing north 39 degrees east to a distance of 2,000 feet from the portal. A diorite dyke was intersected at about 1,000 feet and a mineralized shear, assaying 5 ounces of silver per ton, at about 1,300 feet. The Florence vein was expected at about 1,750 feet, but it has not been recognized. The present operators propose to drive northwestward from the adit toward the downward projection of the productive sections of the Florence vein, the stronger of the two in the upper workings.

An unsuccessful attempt was made to diamond drill from the 5880 level to the projected positions of the Molly Gibson vein.

A contract was let to extend the 5880 level to the vein, and this was a success. Where the vein was encountered, it is strong and carries values across 15 inches as follows: Silver, 14.85 ounces per ton; lead-zinc combined, 7.60 per cent. Mineralization occurs as bands, mainly of sphalerite, in chalcedony. The vein was followed by a drift, and was found to pinch out about 200 feet to the north.

High costs, resulting from running a winter operation, necessitated closure of the mine in the late part of the winter. Avalanche conditions also were avoided by the temporary shutdown.

[References: *Minister of Mines, B.C.,* Ann. Repts., 1896 to 1950 (1922, p. 206); Report of the Zinc Commission, *Mines Branch,* 1906, pp. 262–266; *Geol. Surv., Canada,* Ec. Geol. Series No. 8, Zinc and Lead Deposits of Canada, pp. 352–353.]

Gold-Silver-Copper

Silver King
New Cronin Babine Mines Limited
By P. E. Olson

(49° 117° S.E.) Company office, 844 West Hastings Street, Vancouver 1. The company holds a controlling interest in a large block of mineral claims embracing the old Silver King mine on Toad Mountain, 9 miles southwest of Nelson. The Silver King mine has been idle, except for minor leasing, since 1913.

The Dandy level was reopened to the shaft, about 2,000 feet from the portal. This level intersects the shaft about 40 feet above No. 8 level. Other levels, raises, and stopes were also made accessible and some sampling was done.

Surface diamond drilling amounting to about 3,000 feet completed the exploration programme started in 1965, leaving only engineering and feasibility studies to be made by the consulting engineers, Hill, Manning & Associates Ltd. Between four and eight men were employed most of the year under the direction of Robert Jennings.

Copper

Queen Victoria
Trans-Pacific Engineering & Management Ltd.
By P. E. Olson

(49° 117° S.E.) Company office, 1028, 736 Granville Street, Vancouver 1. A. R. Bullis, project manager. The company investigated the area surrounding the Queen Victoria mine, from which the last major shipments were made 50 years ago. The area immediately surrounding the mine was extensively drilled in 1955 without success. The company ran induced polarization and geochemical surveys over the area and discovered a mineralized skarn zone about half a mile west of the old mine. The bedrock was stripped and sampled, and found to be considerably weathered and to show small amounts of copper stain.

Gold

HALL CREEK

Fern Mine
Weland Mining Ltd.
By N. D. McKechnie

(49° 117° S.E.) Company office, 1316, 510 West Hastings Street, Vancouver 2. The company holds 49 mineral claims by record and 6 mineral leases at the site of the old Fern mine on Hall Creek, 9 miles by road south of Nelson. The workings are reached by 3 miles of jeep-road from the Nelson–Ymir highway and are on the south side of Hall Creek at an elevation of about 5,000 feet.

An exploration programme initiated in 1965 was continued under the direction of John Gilroy, who is also a director of the company.

Diamond drilling amounted to 1,020 feet from the surface and 2,600 feet from underground drill-sites. A road was built to the portal of No. 6 adit, and No. 6 level was cleaned out in preparation for a 1,200-foot drifting programme. Six men were employed until December, when the operation was shut down.

The geology of the Fern mine is discussed in detail in Memoirs 94 and 191 and need be only briefly summarized here. The Fern vein is a quartz vein containing some pyrite and, rarely, chalcopyrite in augite andesite of post-Sinemurian Rossland Formation (*Geol. Surv., Canada,* Mem. 308, pp. 62–67). The vein in part cuts an altered dyke of Nelson (Silver King) porphyry, and it is only within this dyke that oreshoots are known to be present. Vein and dyke strike about north 65 degrees east; the vein dips about 60 degrees northwestward and the dyke a few degrees flatter. The Fern vein is cut off by a fault, containing a lamprophyre dyke, striking northwest and dipping 75 degrees northeast. In 1945 and 1946, what was believed to be the Fern vein was found southwest of the fault and explored there by an adit. Assays were disappointing, and no futher work was done on the property until that begun by the present company in 1965.

Between 1896 and 1942 there was a recorded production of 12,430 tons, from which was obtained 6,316 ounces of gold and 531 ounces of silver, all mined from four levels to a depth of 425 feet below the apex of the vein. Of this, all but about 200 tons had been mined by 1909. The description of the vein, at three levels, in the Bureau of Mines Bulletin No. 3, 1897, indicates that the tonnage mined contained an appreciable proportion of oxidized material.

At an elevation of 90 feet above the third level portal and some 500 feet southwest of the Fern vein, an adit exposes a fracture striking north 50 degrees east and dipping 75 degrees northwestward. The footwall is porphyry, and the hangingwall is augite andesite. The fracture is marked by a calcite-healed breccia containing fragments of chloritized andesite and silicified porphyry. A quartz vein up to 6 inches wide and some 30 feet in length lies in the fracture and cuts the breccia. The quartz is very sparsely mineralized with disseminated arsenopyrite. In this it differs from the Fern vein and more nearly resembles the mineralization at the old Canadian Belle property (Ann. Rept., 1937, p. E 34), where quartz veins carrying arsenopyrite, with subsidiary pyrite, pyrrhotite, and chalcopyrite, are found in sediments of the post-Rossland Hall Formation. The Canadian Belle is on Keno Creek, a mile southeast of the Fern.

A bulldozer trench extends eastward from near the portal of No. 3 level; two small areas of mineralization are exposed. The first area is about 250 feet eastward from the portal and about 40 feet lower in elevation. Three quartz veins are exposed there. One composed of lenticular quartz bodies up to 5 inches wide occupies a thin shear in augite andesite striking north 80 degrees west and dipping 60 degrees northward; no sulphides were seen in the quartz. In the footwall of the north 80 degrees west vein are two short quartz veins that pinch out in lengths of 5 to 6 feet; they strike north 10 degrees west, dip 85 degrees southwestward, and contain vugs with quartz crystals and some rust, but no fresh sulphides. The second area, also in augite andesite and some 500 to 600 feet east of the portal, is in the vicinity of the Oldman vein (Mem. 191, p. 50). Two shears, each about 2 inches wide, strike north 15 degrees east and dip 75 degrees westward; these are connected by a similar shear striking north 35 degrees east and dipping 80 degrees southeastward. Quartz up to 4 inches wide occupies the north 35 degrees east shear near the intersections, and the quartz terminates in possibly a tension fracture striking north 57 degrees east and dipping 75 degrees southeastward. The quartz carries sparse pyrite. At about 15 feet westward from the converging shears, there is a 4- to 6-inch quartz vein having remarkably straight walls; it strikes north 23 degrees east, dips 80 degrees northwestward, and carries sparse very fine-grained pyrite. At about 15 feet eastward from the converging shears, there are two quartz stringers 1 to 2 inches wide; one with a comb structure along the centre line strikes north 50 degrees east and dips 80 degrees southeastward; the other contains a little pyrite, strikes north 20 degrees east and dips 85 degrees northwestward. At the eastward end of this trench a post-mineral fault is exposed striking north 15 degrees east and dipping 70 degrees northwestward.

[References: *B.C. Bureau of Mines,* Bull. No. 3, 1897, p. 86; *Minister of Mines, B.C.,* Ann. Repts., 1915, p. 148; 1933, p. 224; 1935, p. E 27; 1937, p. E 45; 1945, p. 99; 1946, p. 140; *Geol. Surv., Canada,* Mem. 191, p. 48; Mem. 94, p. 137; Paper 52-13, p. 29; Ann. Rept., 1894, Vol. 7, p. 35A.]

Gold

T.P.M., J
Nelway Mines Ltd.
By P. E. Olson

(49° 117° S.E.) Company office, 5989 Sprott Street, Burnaby 2; mine office, Nelson. The T.P.M. and J recorded mineral claims include the old Golden Age mine, which is on the Nelson–Salmo highway 1 mile north of Hall Creek. The company did some stripping and sampling around the old workings, opened the portal on the highway for retimbering and sampling, and erected a mine building below the highway near the main dump. Work was directed by Jim McMahon, of Greenwood, who employed three to five men for four months.

YMIR

Molybdenum

Fresnu
Copper Horn Mining Ltd.
By P. E. Olson

(49° 117° S.E.) The Fresnu group of 36 recorded mineral claims was located by R. Joy and associates, of Nakusp. The claims are on Quartz Creek, 1½ miles west of Ymir, and are owned by Copper Horn Mining Ltd., 125 Nanaimo Avenue, Penticton. Molybdenum mineralization was found in acid intrusives outcropping west of Ymir. Soil-sampling and some X-ray diamond drilling were done late in 1966.

Zinc

Jack Pot, Oxide, Last Chance
New Jersey Zinc Exploration Company (Canada) Ltd.
By P. E. Olson

(49° 117° S.E.) Company office, 905, 525 Seymour Street, Vancouver 2. R. C. Macdonald, manager. This company controls a group of 50 mineral claims extending northward from the summit between Hidden and Porcupine Creeks to the summit between Oscar and Ymir Creeks. The main showings are reached by jeep-road which leaves the Porcupine Creek road 3 miles from the Salmo River.

Sphalerite and pyrite mineralization occurs in dolomitized Reeves Limestone. This mineralization has been explored by adits and diamond drilling since 1949.

During 1966 two drill-holes, amounting to 885 feet of hole, were drilled on the Spot No. 3 fractional mineral claim.

Gold

Yankee Girl
Burlington Mines Ltd.
By P. E. Olson

(49° 117° S.E.) Company office, 418, 510 West Hastings Street, Vancouver 1. Company manager, Ralph Sostad. Portals were examined and the underground workings were checked for fallen rock and broken timber.

SALMO

ERIE CREEK

Gold-Silica

New Arlington
By P. E. Olson

(49° 117° S.E.) The New Arlington mine is on Rest Creek, a tributary of Erie Creek, about 7 miles by road from Salmo. The property is leased by G. D. Fox, of Trail. A tunnel on the Directorate Crown-granted mineral claim, which was started in 1964, was extended 75 feet. The No. 60 level was retimbered and the old workings made accessible. Levels and workings of this mine have not been systematically identified, largely because the workings are in a flat-lying vein similar in shape to an inverted saucer.

Shipments of old dump material to the Trail smelter amounted to 7,017 tons. This material contains gold, silver, lead, and zinc, as well as a high silica content. Loading and hauling are done under contract.

Silver-Lead

Silver Dollar
By P. E. Olson

(49° 117° S.E.) The Silver Dollar group of claims is immediately west of Salmo, on the north side of Erie Creek. D. Norcross, of Nelson, has leased the property from L. R. Clubine, of Salmo. Work started in 1965 was continued by Mr. Norcross, who shipped about 286 tons of ore to the Trail smelter. Mr. Norcross works alone, uses a small compressor, hand-tools, and a wheelbarrow. There was a noticeable improvement in size and grade of oreshoots encountered.

Gold-Silver

Dick, Ralph (49° 117° S.E.) The Dick and Ralph groups of recorded mineral claims are on the west side of Erie Creek, 12 miles by road from the Salmo–Trail highway. These claims cover an area which was previously Crown granted. Current exploration is about 2,000 feet southwest of the Second Relief mill-site, on ground previously known as the Union.
By P. E. Olson

R. Emel and H. Zikowski quarried about 50 tons of vein material but were unable to ship their ore to Trail owing to difficulties over ownership of the ground.

Gold-Silver

Sheep Creek

Gold Belt (49° 117° S.E.) The Gold Belt mine is a former producer on Sheep Creek, lying north of the Queen and south of the Reno mines. A. Endersby and son, of Fruitvale, continued to work a stope about 600 feet from the main portal. They mined 39 tons of ore, which was shipped to the Trail smelter.
By P. E. Olson

Lead-Zinc

Aspen Creek

H.B. (49° 117° S.E.) Company office, Trail; mine office, Salmo. R. R. McMichael, property superintendent; J. B. Burleson, mine superintendent; C. Sedeco, mill superintendent. The H.B. mine is on the west side of Aspen Creek, on the north side of Sheep Creek, 7 miles by road from Salmo.
Cominco Ltd.
By P. E. Olson

The ore occurs as a galena-sphalerite-pyrite replacement of dolomite zones within the Reeves limestone, a formation that contains similar orebodies at the Jersey and Reeves mines to the south. The H.B. orebodies are of three types. Most production has come from No. 1 zone, which is steeply dipping, has a lenticular cross-section, and a long axis which plunges gently to the south. This zone is mined by long-holes which are drilled from fringe drifts in vertical fans. There are several flat-lying tabular ore zones radiating from No. 1 zone, which are mined by conventional jackleg slashing. The Garnet zone outcrops above the 3300 level and is mined by open-pit and underground long-hole methods. All ore from the Garnet zone is transferred by raises to the 2800 level for eventual haulage by diesel-powered trains to the crushing plant and mill. Production from the various phases of the operation is tabulated hereunder:—

	Tons
No. 1 zone	127,329
Flat zones	132,665
Garnet zone (underground)	48,471
Garnet zone (open pit)	79,665
Total	388,130

Due to interlocking of mine openings adjacent to No. 1 zone, ventilation becomes sluggish and often results in flows of exhaust air to working-places. Although some difficulties were encountered, the over-all ventilation has been improved through the use of bulkhead, booster fans, and tighter regulations in the use of ventilation doors.

There was no exploratory drifting or raising done during the year.

Stope development amounted to 2,974 feet of sublevel drifting and 2,488 feet of raising. Surface diamond drilling totalled 4,507 feet, and underground drilling amounted to 11,161 feet, including 3,457 feet of BX wireline deep-hole drilling. Long-hole percussion drilling comprised 28,703 feet done from surface and 57,725 feet done from underground.

Ammonium nitrate and fuel-oil explosives (AN/FO), which are manufactured at Kimberley by Cominco, are the chief explosives used at the mine. Prilled AN/FO is loaded into long-holes by pneumatic chargers and is detonated with primacord and electric detonators. Secondary blasting is done with pulverized AN/FO in plastic bags. Caving in No. 1 zone has increased the amount of secondary blasting at drawholes. Electric slusher hoists are used to draw broken ore to ore passes which terminate at ore-chutes on the 2800 level.

The mill treated 388,902 tons of ore, the concentrates being shipped to the Trail smelter.

Although ore reserves at the mine had not been exhausted, the H.B. mine was closed on November 1st. The plant was prepared for a protracted shutdown before all the personnel left the mine. Up to November, the operation employed 130 people, 28 of whom were on staff payroll.

Lead-Zinc

IRON MOUNTAIN

Jersey
Canadian Exploration Limited
By P. E. Olson

(49° 117° S.E.) Head office, 700 Burrard Building, Vancouver 1; mine office, Salmo. C. E. Brown, mine manager; J. W. Robinson, mine superintendent; D. A. Knight, mill superintendent. This company is a wholly owned subsidiary of Placer Development Limited. The property comprises 56 Crown-granted mineral claims between Sheep Creek and Lost Creek. Access is by two roads which leave the Salmo–Nelway highway 4 and 6½ miles respectively south of Salmo, the north (Emerald) road being the main access road. The concentrator is located in the Salmo River valley, on the highway at the junction with the south access road. Ore is transferred to the mill from the crushing plant at the mine by a system of conveyors and raises. There are seven conveyor units totalling 6,970 feet, and the vertical drop from crusher to mill is about 1,700 feet.

The mine, offices, plant buildings, 60 company residences, and a two-room school are located at the 4,000-foot elevation on the southward-facing slope of Iron Mountain.

The lead-zinc ore of the Jersey mine occurs at the base of the Reeves limestone member, and is generally concentrated in the western limbs of two fold structures which are overturned to the west. The most westerly of these structures is the "A" zone, whose axis strikes about due north. The ore bands vary in thickness from a few inches to several feet, and the zone has an over-all thickness up to 80 feet. The eastern structure, the Dodger trough, strikes about north 15 degrees east and is more complex. The ore occurs in a variety of bands, lenses, and mantos which dip from flat to 30 degrees easterly. The structures have a gentle dip to the south.

Mining is by open-stope methods. Drilling is done by jacklegs, except for one three-boom jumbo which is used in large headings and on occasional benches. Most blasting is done with AN/FO. Muck is scraped to ore passes and chutes, or loaded with front-end loaders into Dumptors and hauled to pockets over the crushing plant. Ore-pass muck is hauled with DW-10's and semi-trailers to the crusher pockets.

New equipment obtained in 1966 includes a Caterpillar 966-B loader, a Wagner Scooptram, a 40-foot Trump Giraffe, and an 85-foot Trump Giraffe. Ventilation was augmented by an additional 60-horsepower 48-inch fan.

All production came from the Jersey zone. The mill treated 417,440 tons of ore, with a three-week shutdown in July for annual holidays. Monthly tonnage was approaching 40,000 tons per month at year-end. Lead concentrates were shipped to the Bunker Hill smelter at Kellogg, Idaho, and zinc concentrates were shipped to the Anaconda smelter at Black Eagle, Montana.

Development work consisted of 8,756 feet of drifting and crosscutting, 599 feet of raising, 10,348 feet of underground diamond drilling, and 2,691 feet of surface diamond drilling. Probable reserves carried at December 31, 1966, totalled 606,455 tons, slightly down from the previous year.

One mine-rescue team competed in the West Kootenay Mine Rescue Competition. Ten members of crew and staff successfully wrote shiftboss examinations. There were 225 men employed by the company, 94 of whom worked underground.

Lead-Zinc

NELWAY

Reeves MacDonald Mine
Reeves MacDonald Mines Limited
By P. E. Olson

(49° 117° S.E.) Company office, 410, 837 West Hastings Street, Vancouver 1; mine office, Remac. L. M. Kinney, general manager; F. R. Thompson, mine manager; M. B. Wiwchar, chief engineer; J. M. McDearmid, mill superintendent. The Reeves MacDonald mine is on the north side of the Pend d'Oreille River, on the Nelway–Waneta road 4 miles west of Nelway.

Lead-zinc-pyrite mineralization occurs in dolomitized zones of the steeply dipping Reeves limestone. Ore has been mined through a vertical range of more than 2,000 feet, and a lower limit has not been reached thus far.

Ore zones have been developed by the 1900 level main haulage and two internal shafts, the larger of which (No. 3 shaft) is the main production shaft. Orebodies are all steeply dipping, range up to 100 feet in width, are often several hundred feet long, and are fairly continuous down dip. Most of the ore comes from long-hole stopes, from which it is drawn through drawholes to ore passes which lead to an ore pocket above No. 3 shaft. Ore is hoisted to another pocket above the 1900 level main haulage. Trolley-powered trains haul the ore to the crushing plant. Mining is done from the O'Donnell zone above the 2350 level to the 480 level, with most ore coming from the vicinity of the 1100 level.

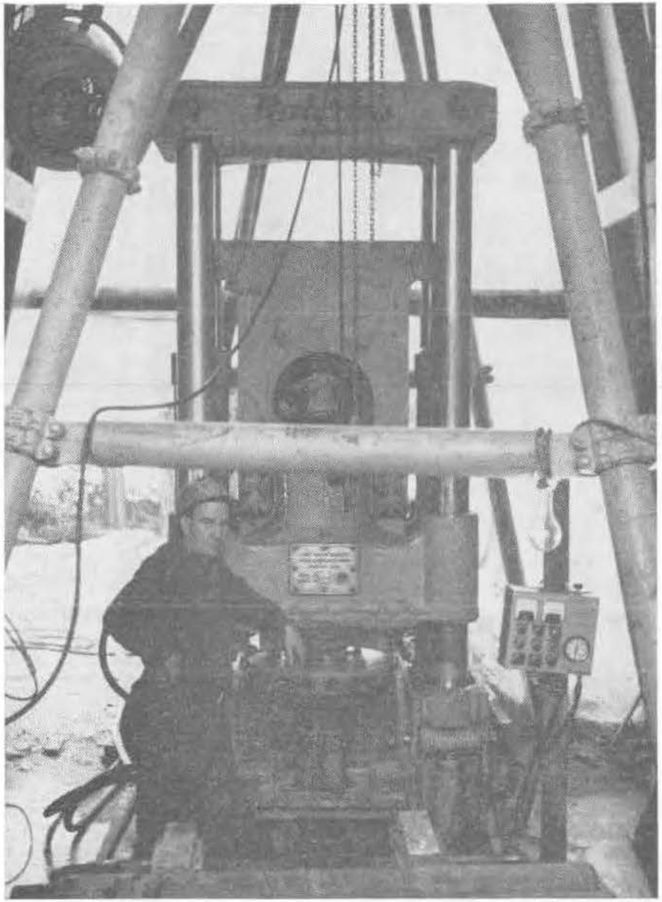
Five raises were mined by long-hole methods, using a reamed 6-inch hole for a central cut. All other raising and drifting was done by conventional methods. Development and exploration footages are as follows: Drifts and crosscuts, 4,829 feet; raises, 3,726 feet; surface diamond drilling, 3,495 feet; underground diamond drilling, 8,627 feet; production long-hole drilling, 62,222 feet; and test-hole percussion drilling, 3,043 feet.

Ore production is as follows:—

	Tons
O'Donnell zone	43,588
Upper Reeves zone	14,270
Lower Reeves zone	336,921
O'Donnell exploration	1,142

The company started a vigorous exploration programme on the Annex property, on the south side of the Pend d'Oreille River from Remac. To facilitate this work, a suspension bridge was built across the river to handle small equipment and personnel, and a twin-engined barge was used on the river to handle any heavy gear required. The Annex is owned outright by the company. At the end of 1966 a drift had been started about 60 feet above the river and about 200 feet south of the south shore.

The mill treated 395,921 tons of ore, with the grade slightly improved over the previous year. Heated water is used in the mill during the autumn and winter and results in an improved recovery and concentrate grade.



Robbins raise-boring machine reaming a vertical 48-inch 500-foot-deep hole from the surface at the Bluebell mine.

Using a giraffe while scaling underground at the Jersey mine. (Canadian Kenworth Ltd.)

The company employs 141 men, 23 of whom are on salary. A bunk-house and cook-house are operated by the company.

Lead-Zinc

PROCTER

Big Pay Off
Citation Silver Mines Ltd.
By P. E. Olson

(49° 116° N.W.) Company office, 522, 837 West Hastings Street, Vancouver 1; exploration office, Nelson. The company holds 64 recorded mineral claims on Kootenay Lake about 1 mile east of Procter. During the period from 1933 to 1938 Cominco Ltd. did a considerable amount of underground work on a marble bed which was a source of limerock. These workings are centrally located in the Big Pay Off group of claims.

A magnetometer survey was done on the property, followed by road-building designed to give access to diamond-drill sites. Work on the property was directed by M. K. Lorimer of Hill, Manning & Associates Ltd., of Vancouver, who are consultants for the company.

Molybdenum

CRAWFORD BAY

Ben Derby
United New Fortune Mines Ltd.
By P. E. Olson

(49° 116° N.W.) Company office, 502 Lancaster Building, Calgary, Alta. The company owns a large block of recorded mineral claims straddling the lower part of Gray Creek, which drains into Crawford Bay of Kootenay Lake. Soil-sampling and diamond drilling were done on the property following the discovery of molybdenite in the vicinity of the Gray Creek canyon, about 1 mile from Kootenay Lake.

Molybdenum

UNF
Kamalta Exploration Limited
By P. E. Olson

(49° 116° N.W.) Company office, 709 Lancaster Building, Calgary, Alta. R. W. Sargent, consulting engineer. The company owns 21 recorded mineral claims immediately east of Gray Creek. An electromagnetic survey was made by the consulting geologist. The property was not visited.

Gold-Silver

SUMMIT CREEK

Jordan
By P. E. Olson

(49° 116° S.W.) The property is on the south side of Summit Creek, 9 miles east of the summit on the Salmo–Creston highway. A drift was driven 55 feet into quartzitic rock containing scattered lenses of pyrite. A sample taken from the face of the tunnel assayed: Gold, *nil;* silver, *nil.* Work was suspended upon completion of the short drift. R. Weirtzba, of California, was in charge of this operation.

Silver-Lead-Zinc

GOAT RIVER

Leadville
By P. E. Olson

(49° 116° S.E.) The Leadville group of recorded mineral claims is on Goat River, about 6 miles north of Kitchener. The property is serviced by a dirt road which leaves the southern Trans-Canada Highway at Kitchener. Fred Smith, of Kitchener, optioned the property to Henry Zikowski, of Creston. The old workings on the east side of Goat River are caved and flooded, so a new shaft was started near the vein not far from the old shaft. After sinking about 15 feet, a heavy flow of water from Goat River entered the shaft through cracks, and the project was abandoned. The vein was not encountered.

SLOCAN MINING DIVISION

Zinc

PINGSTON CREEK

Odin
Northwest Zinc Company Ltd.
By P. E. Olson

(50° 118° N.E.) Company office, 675 West Hastings Street, Vancouver 2. The property is on the west side of Upper Arrow Lake on Pingston Creek. Low-grade zinc mineralization similar in character to mineralization on the Big Ledge property, which lies to the west, has been encountered on the Odin. Two bulldozers were used to establish drill-sites and put in trenches. Two diamond drills were in use during the summer and completed 4,000 feet of drilling. Nine men were employed from July to October under the direction of D. C. Malcolm.

Zinc

Big Ledge
Cominco Ltd.
By P. E. Olson

(50° 118° N.E.) Company office, 1150 Bay Avenue, Trail. The Big Ledge property consists of 44 Crown-granted and 25 recorded mineral claims, situated along the north side of Trout Creek, a tributary from the west of Pingston Creek. The property is owned by Cominco Ltd. Since 1964 the company has been conducting an exploration programme of geological studies and diamond drilling on the Big Ledge showings. Pyrite, pyrrhotite, and sphalerite occur in a layer of schistose rock which is part of the Shuswap metamorphic complex.

One diamond-drill hole was drilled to a depth of 397 feet on the BL No. 3 mineral claim. The operation was serviced by helicopter from Nakusp and was directed by H. Copper.

Silver-Lead-Zinc

SPRINGER CREEK

Colorado
Western Standard Silver Mines (1966) Ltd.
By P. E. Olson

(49° 117° N.E.) Company office, 850 West Hastings Street, Vancouver 1; mine office, Slocan. The company holds 22 mineral claims on Memphis Creek, 4 miles north of Slocan. Holdings embrace the White Hope and the Colorado mines, both of which were actively explored around the turn of the century.

The Colorado is reached by jeep-road that leaves the Slocan–New Denver highway about 4 miles north of Slocan. An adit started in 1965 was driven about 400 feet toward the downward projection of the Colorado lead, which has been explored by workings about 150 feet vertically above the new heading. Four men were employed under the direction of Ray Bentley.

Silver

Ottawa
Slocan Ottawa Mines Ltd.
By P. E. Olson

(49° 117° N.E.) Company office, 201, 569 Howe Street, Vancouver 1; mine office, Box 75, Slocan. The Ottawa mine is 5 miles from Slocan on the north side of Springer Creek. The company leased the property to W. Tyler, who subleased to Kirsch Silver Mines Ltd., who had been exploring on nearby properties.

Drifting on No. 9 level was continued, and a raise was put through from No. 9 level to No. 8 level, which provided natural ventilation. Mining was confined to an area immediately above No. 9 level and an area below No. 6 level. Production amounted to 929 tons of ore, which was shipped directly to the Trail smelter as a siliceous ore.

Kirsch Silver Mines Ltd. dropped its lease in November and operations ceased. Henry Marasek directed the mine crew for most of the year. About 10 men were employed up to the time of the mine closure.

Silver

Anna
Kirsch Silver Mines Ltd.
By P. E. Olson

(49° 117° N.E.) Company and mine office, Box 74, Slocan. Henry Marasek, mine manager. The property is immediately north of the Ottawa mine, 6 miles by road from Slocan. No. 4 level was extended northerly for 112 feet along the hangingwall of the main shear, and a 120-foot raise was driven up the shear zone at a point 960 feet from the portal of the No. 4 level. This work was done over a two-month period under the direction of Henry Marasek.

Silver-Lead-Zinc

Arlington
Arlington Silver Mines Ltd.
By P. E. Olson

(49° 117° N.E.) Company office, 809, 525 Seymour Street, Vancouver 2; mine office, Slocan. The property consists of 16 mineral claims on the north side of Springer Creek, 6.7 miles by road from Slocan. On the property there are several old adits which explore a northerly striking shear zone that cuts Nelson granite porphyry. Raising and stoping were done from these levels around the turn of the century, but since then these openings have mainly caved. The present company reopened the two lowest levels on the property by driving new drifts in the hangingwall of the shear zone. Diamond-drill holes were driven from the new workings to test pillars and new ground in the mineralized zone. "A" level was recollared and advanced 640 feet after the upper level (" B " level) was shut down. " B " level was advanced 55 feet early in 1966, and later about 900 feet of diamond drilling was done from it. S. Walsh directed a crew of seven men who lived in a camp at the mine.

Silver

Myrtle
Kirsch Silver Mines Ltd.
By P. E. Olson

(49° 117° N.E.) Company and mine office, Box 74, Slocan. Henry Marasek, mine manager. The Myrtle group of recorded mineral claims is 8 miles by road from Slocan via the Ottawa mine road. No. 100 level was widened by slashing to accommodate modern machinery and extended 30 feet in a southerly direction. About 80 feet of raise and sublevel drift were driven in the shear zone above the main level to explore the potential zone north of the main level. About 50 tons of ore was shipped to the Trail smelter in order to obtain a bulk assay. A 10-ton shipment of selected ore graded 76 ounces of silver per ton, with minor amounts of lead and zinc.

The company employed five men for five months under the direction of Henry Marasek.

Silver

Hampton Mine
By P. E. Olson

(49° 117° N.E.) The Hampton mine is in the Arlington Basin, 9 miles by road from Slocan via the Arlington mine. Kelly Lotze, of Trail, completed a road to the Hampton mine and stripped with a bulldozer in the vicinity of the old workings. The Hampton mine adit was repaired, and the underground workings were cleaned out.

ENTERPRISE CREEK

Silver-Lead-Zinc

Neepawa Mine
Silver Pegg Mines Ltd.
By P. E. Olson

(49° 117° N.E.) Company office, 700 St. Andrew's Road, West Vancouver. The company has optioned a group of recorded mineral claims covering the Neepawa mine, which is on the south side of Enterprise Creek, 5 miles from the Slocan–New Denver highway.

A Cully type of gravity mill was set up on the property near the portal of the Neepawa No. 3 adit. This mill was fabricated in Grand Forks and concentrates ores on a vibrating table.

No. 3 level was rehabilitated, and a few tons of ore from the stopes above this level was run through the mill, but no concentrates were shipped. A. Pegg directed a crew of two men at the property during the latter half of the year.

Silver-Gold

Boomerang and Richmond
By P. E. Olson

(49° 117° N.E.) The Boomerang and Richmond recorded mineral claims are on the south side of Enterprise Creek, about 12 miles by road from the Slocan–New Denver highway. George Forster, of Trail, completed a drift started in 1964 to go around a caved section of old adit.

Silver-Lead-Zinc

Enterprise Mine
By P. E. Olson

(49° 117° N.E.) R. T. Avison and J. Nesbitt, of Silverton, have a lease on the Enterprise mine from Western Exploration Company Limited. A raise was driven from No. 6 to No. 5 level, and some stoping was done under No. 5 level in the vicinity of the raise. Some ore was stockpiled at the mine, but no shipments were made. The work was done in July.

SILVERTON

Silver-Lead-Zinc

Hecla, Mammoth, Standard
Johnsby Mines Limited
By P. E. Olson

(49° 117° N.E.) Company office, 1011, 2200 Yonge Street, Toronto 12, Ont.; mine office, Silverton. R. C. Phillips, mine manager; C. Blaney, mill superintendent. The company property is on the north side of Silverton Creek, about 2 miles east of Silverton. The company operated the Hecla and the Mammoth mines as separate operations, and milled the ore at the Silverton mill. Ore on the mines was exhausted late in 1966; the entire operation was shut down and the properties reverted to Western Exploration Company Limited.

Ore shipments to the concentrator amounted to 7,133 tons, grading 6.69 ounces of silver per ton, 2.9 per cent lead, and 5.3 per cent zinc. Concentrates were shipped to the Trail smelter.

The mines and mill were idle at year-end, and most of the mining equipment had been sold.

Silver-Lead-Zinc

Hewitt
By P. E. Olson

(49° 117° N.E.) This mine, which is on the south side of Silverton Creek about 3 miles east of Silverton, is under lease to Jack Kelly, of Silverton. Kelly stoped 329 tons of ore from a shoot on No. 10 level, which was opened up during 1965. The ore was milled at the Silverton concentrator.

Silver-Lead-Zinc

Galena Farm
Red Deer Valley Coal Company, Limited
By P. E. Olson

(49° 117° N.E.) Company office, 634 Sixth Avenue Southwest, Calgary, Alta.; mine office, Silverton. W. MacLeod, mine manager. The property is 2½ miles south of Silverton, and is reached by a road that leaves the Slocan–New Denver highway at Silverton. The company owns a large group of claims including the Galena Farm group.

During January and February dump rock from the Galena Farm was trucked to the company concentrator, which is 1 mile south of Silverton. The mill treated 1,700 tons of this material and shipped 21 tons of lead concentrates and 105 tons of zinc concentrates to the Trail smelter.

During the summer and autumn the mine area was investigated by means of a geophysical survey and geochemical analyses. The mine and mill were idle at the end of the year.

Silver-Lead-Zinc

Monarch
By P. E. Olson

(49° 117° N.E.) A. Elsmore and M. Fryters leased on the Monarch, which is on the north side of Silverton Creek about 4 miles east of Silverton. Underhand stoping on an oreshoot below the Monarch adit produced about 74 tons of lead ore, which was shipped to the Trail smelter. The two men worked the property on week-ends from June to October.

SANDON

Silver-Lead-Zinc

Deadman
By P. E. Olson

(49° 117° N.E.) The Deadman lode, part of the Noble Five property at Cody, is held under lease by L. Fried, of New Denver. Failure of the Carnegie mill to operate in Sandon forced Fried to limit his efforts to extracting shipping ore rather than milling ore. Fried hand-sorted 5 tons of lead ore, which he shipped to the Trail smelter.

Silver-Lead-Zinc

Shady
Bralorne Pioneer Mines Limited
By P. E. Olson

(49° 117° N.E.) Company office, 320, 355 Burrard Street, Vancouver 1. The Shady and Shady Fractional mineral claims are on Carpenter Creek about 1 mile east of Cody. The property has been worked extensively as a source of high-grade galena, which is found as float in overburden on the north side of Carpenter Creek. The company did some trenching and put down a 300-foot diamond-drill hole on the Shady Fraction with a view of locating the source of the galena boulders, but did not intersect ore. Work was directed by J. P. Weeks.

Silver-Lead-Zinc

Slocan Sovereign
By P. E. Olson

(49° 117° N.E.) The Slocan Sovereign Crown-granted mineral claim is adjacent to the Reco mine about 1 mile northeast of Cody on the Cody–Reco mine road. P. Leontowicz and A. Maxinuk hold a lease on the property and did some mining and exploration in the vicinity of a discovery made during 1965. The property was worked on a part-time basis during the summer. Two small shipments of crude lead were made to the Trail smelter.

Silver-Lead-Zinc

Victor
Kam-Kotia Mines Limited
By P. E. Olson

(49° 117° N.E.) The Victor mine is immediately south of Three Forks, but is reached by a road which crosses Carpenter Creek at the Carnegie mill at Sandon. E. H. Petersen and E. Perepolkin, of Sandon, leased the mine and worked an area on and below No. 5 level. Work was done on an irregular basis; 63 tons of crude lead ore was shipped to the Trail smelter.

Silver-Lead-Zinc

Altoona
Hallmac Mining Syndicate
By P. E. Olson

(49° 117° N.E.) The Altoona Crown-granted mineral claim is on the abandoned Kaslo and Slocan railway grade about 1 mile northwest of Sandon. Access to the property is via a road built on the railway grade from Sandon to the portal of No. 2 level.

Some mining was done above No. 1 level, and 725 tons of ore was trucked to the Johnsby concentrator at Silverton. Lead and zinc concentrates, amounting to 14 and 27 tons respectively, were shipped to the Trail smelter.

No. 2 level was rehabilitated shortly before operations were suspended early in 1966. Five men were employed under the direction of Sven Hallgren.

Silver-Lead-Zinc

Silmonac
Silmonac Mines Limited
By P. E. Olson

(49° 117° N.E.) Company office, 808, 602 West Hastings Street, Vancouver 2; mine office, New Denver. The company is financed by a group of mining companies, with Kam-Kotia Mines Limited supplying management. The property consists of 69 Crown-granted claims lying west of Sandon.

Access to Silmonac is through the Ruth No. 5 level. This level was reactivated since being shut down in 1964, and was advanced several hundred feet farther into Idaho Peak. A northerly crosscut was started about 2,500 feet from the face of No. 5 level and advanced about 300 feet. Some lode strands were cut in this crosscut, which has led to the decision to diamond drill above and below the crosscut with a view to locating commercial zones of mineralization. John Black, of New Denver, directed a crew of 12 men.

RETALLACK-THREE FORKS

Silver-Lead-Zinc

Charleston
Buchanan Mines Ltd.
By P. E. Olson

(50° 117° S.E.) Company office, 15816—112th Avenue, Edmonton, Alta.; mine office, 917 Tenth Street, Nelson. The company owns the Keystone, Charleston, Corean, Colorado, and Kingston Crown-granted mineral claims, and has a mineral lease on the Irene Crown-granted mineral claim on the west side of Whitewater Creek, 2 miles north of Retallack.

The company explored the Colorado, Keystone, and Charleston veins extensively through stripping, diamond drilling, and underground drifting. The veins strike northwesterly and dip steeply to the southwest. The stripping and diamond drilling has disclosed a mineralized zone on the Colorado vein, but the depth of this showing has not been demonstrated. Work was directed by L. Siega but was suspended during the winter. Four to seven men were employed.

Silver-Lead-Zinc

Antoine
Antoine Silver Mines Ltd.
By P. E. Olson

(50° 117° S.E.) Company office, 114 West 15th Street, North Vancouver; mine office, New Denver. W. Wingert, mine manager. The property consists of the Antoine group of five Crown-granted and three recorded mineral claims and the Soho group of eight Crown-granted mineral claims at the head of McGuigan Creek. The property is reached by 9 miles of good mining-road which leaves the Kaslo–New Denver highway 3 miles east of Three Forks.

A good mining camp was set up near the Tom Moore adit, in a slide-free area. Work consisted of extending the Tom Moore crosscut 1,200 feet to the projected downward extension of the Antoine veins, where a thin veinlet, containing siderite and minor galena and sphalerite, was encountered and subsequently drifted for 200 feet. Diamond drilling amounted to 300 feet, from the Tom Moore crosscut. W. Wingert directed a crew of eight men during the latter part of 1966. Work stopped in December.

Silver-Lead-Zinc

Winona
Hilroy Mines Ltd.
By P. E. Olson

(50° 117° S.E.) Company office, 360 Homer Street, Vancouver 3. The company has an option on several claims centred about the Winona Crown-granted mineral claim on the east flank of Reco Mountain, 2 miles northeast of Sandon. The company repaired the old mining-road up Stenson Creek to the Jackson Basin mine, and constructed 3 miles of new road from Jackson Basin to the upper workings on the Boon Crown-granted mineral claims (elevation, 7,800 feet). Old workings were reopened and examined on the Dublin Queen, Boon, and Winona Crown grants. A small amount of ore from the old workings was shipped to the Trail smelter. Four men were employed during the summer under the direction of R. Ingleby.

Silver-Lead-Zinc

Hillside
Hilroy Mines Ltd.
By P. E. Olson

(50° 117° S.E.) Company office, 360 Homer Street, Vancouver 3. The Hillside workings are now covered by the Floyd recorded mineral claim on the Stenson Creek mining-road, 2 miles south of Retallack. Old workings were stripped and a tunnel reopened to permit an examination of the Hillside vein. Four men were employed for a month under the direction of R. Ingleby.

Silver-Lead-Zinc-Copper

Miner Boy, McAllister
By P. E. Olson

(50° 117° S.E.) The property is situated on the west slope of London Ridge and is reached by road from Three Forks by way of Kane Creek. R. A. Sostad, of 418, 510 West Hastings Street, Vancouver 2, directed exploration, which was a continuation of work started in 1965. A road built to No. 3 level of the McAllister mine was extended to the Miner Boy adit. Another road extends from the McAllister No. 3 level southward about 1 mile. Stripping was done on old showings, and the Miner Boy adit was retimbered and the level examined. Work was confined to the late summer and early autumn.

Silver-Lead-Zinc

JoJo
By P. E. Olson

(50° 117° S.E.) The JoJo is on the east side of Kane Creek, 3 miles from Three Forks and immediately north of the McAllister mine. A compressor was installed near the mine workings and underground drilling attempted on No. 3 level. Caving ground was encountered and prevented the drill from reaching the target zone where the JoJo vein was expected. Joe Hambly and Frank Mills did the work under the direction of Fred Hemsworth.

Silver-Lead-Zinc

Caledonia
Blue Star Mines Limited
By P. E. Olson

(50° 117° S.E.) Company office, 400, 837 West Hastings Street, Vancouver 2; mine office, Kaslo. E. L. Borup, managing director; W. Tyler, consulting engineer; C. Lind, manager. The property is on the north side of Kaslo Creek, 2 miles east of Retallack. The Kaslo–New Denver highway passes within 200 feet of the mine dumps.

Exploration work was started early in 1966, with ore being encountered about mid-year on the lowest level (No. 4). Ore-handling facilities were erected near the portal, and the mine went into production at a rate of 50 tons per day. The company mill at Ainsworth was put into operation in the autumn at a rate of 50 tons per day, working on a one-shift-per-day basis.

Drifting and raising explored the vein between No. 4 and No. 2 levels, which are 120 feet vertically apart. A sublevel was driven about 70 feet above No. 4 level to provide a second horizon from which to stope. Drifting and raising amounted to 888 feet, and diamond drilling, done mainly from No. 4 level, amounted to 481 feet.

The mill, which was supervised by F. Wood, of Kaslo, treated 4,500 tons of ore and produced 124 tons of lead concentrates and 294 tons of zinc concentrates, all of which was shipped by truck to the smelter at Trail.

The company employed 11 men at the mine and mill. Ore was hauled by a contractor from the mine to the mill, a distance of 32 miles.

Silver-Lead-Zinc

Ohio
By P. E. Olson

(50° 117° S.E.) The Ohio group of recorded mineral claims is on the west side of Lyle Creek, about 2 miles northwest of Retallack. Art Bennett, of Kaslo, who owns the property, had a road built to the Ohio mine workings, which consist of three short levels and some stopes.

KEEN CREEK

Silver-Lead-Zinc

Cork Province Mine
London Pride Silver Mines Ltd.
By P. E. Olson

(49° 117° N.E.) Company office, 611, 850 West Hastings Street, Vancouver 1; mine office, Kaslo. L. Olson, mine manager; C. Hartland, mill superintendent. The property consists of 21 mineral claims, 9 of which are Crown granted, on the east side of Keen Creek, 6 miles from the Kaslo–New Denver highway. The property was optioned by the company from Base Metals Mining Corporation Limited, with payment paid on a royalty basis.

The mine and mill were closed early in May, when known ore reserves were exhausted. Following the closure, the mine filled with water to No. 3 level.

All production came from stopes immediately above No. 8 level. No exploratory work has been done since the end of 1965.

The company operated a cook-house, bunk-house, and an assay office and employed 25 men prior to the closure of the operation. A watchman was engaged to protect the mine plant.

AINSWORTH

Silver-Lead-Zinc

Jewel, Greenacres
By P. E. Olson

(49° 116° N.W.) The Jewel Crown-granted mineral claim and the Greenacres recorded mineral claim are 1 mile north of Ainsworth. T. Lane and partner, of Ainsworth, sank 15 feet of shaft and did some stripping on a lead-zinc showing prospected during 1965. The shaft has yielded about 30 tons of mill-feed and several tons of crude lead ore, all of which has been stockpiled on the property. The workings are close to the boundary between the Jewel and Greenacres claims.

Silver-Lead-Zinc

Union

Coin Explorations Ltd. By P. E. Olson

(49° 116° N.W.) The Union recorded mineral claim is 2 miles west of Ainsworth, on the western edge of the mineral belt lying between Coffee Creek and Cedar Creek. The company optioned the claim from H. Currie, of Ainsworth, and put down several drill-holes to test a mineralized zone at depth. The option was dropped following the drilling programme.

Silver-Lead

Donna, Linda, Sharon

Bralorne Pioneer Mines Limited By P. E. Olson

(49° 116° N.W.) Company office, 320, 355 Burrard Street, Vancouver 1. The property is on the north side of Woodbury Creek, about 3 miles from the Ainsworth–Kaslo highway. The Sharon, Donna, and Linda recorded mineral claims are owned by T. D. Logan and Associates, of Nelson, who optioned them to the company.

Two diamond-drill holes totalling 505 feet at depth were put down on the Donna claim to test a zone which on surface is heavily oxidized and partly leached and which is locally referred to as the "soft lead." The option was dropped after the diamond drilling was completed.

Silver-Lead

Brian

Coin Explorations Ltd. By P. E. Olson

(49° 116° N.W.) Exploration office, Ainsworth. The Brian group of 16 mineral claims covers the old workings of the Silver Coin mine on the north side of Woodbury Creek, about 5 miles from Kootenay Lake. All the old levels were reopened, and the vein was sampled where found.

The property was last worked in the late 1930's, when various lessees shipped a few tons of cobbed ore assaying more than 100 ounces of silver per ton mined from a narrow vein containing scattered lenses of galena in thinly bedded and highly folded calcareous sediments.

Silver-Lead-Zinc

Krao and Lead Coin

Coin Explorations Ltd. By P. E. Olson

(49° 116° N.W.) Company office, P.O. Box 230, Osoyoos. The Krao Crown-granted mineral claim is on Krao Creek, about 3 miles by dirt road from Ainsworth. The property consists of 20 claims centred around the Krao. Surface exploration, including soil-sampling and stripping, was done by Rayrich Mine Services Ltd., under the direction of Ray Richards.

DUNCAN LAKE

Silver-Lead-Zinc

Duncan Mine

Cominco Ltd. By P. E. Olson

(50° 116° S.W.) Company office, 1150 Bay Avenue, Trail. The property extends from the south side of Glacier Creek to the north end of the large peninsula on Duncan Lake. The company has expended most of its efforts on exploring that portion of a limestone band which is on the peninsula.

Duncan Lake and much of the Duncan Valley will be flooded upon completion in 1967 of the Duncan Dam near the south end of Duncan Lake. The lake will be raised about 90 feet, and much of the company property will be flooded.

A crosscut driven 35 feet above Duncan Lake in 1959 was sealed with a substantial concrete plug, and the mine buildings were moved to ground higher than the anticipated flood-line.

Silver-Lead-Zinc

RIONDEL

Bluebell *Cominco Ltd.* By P. E. Olson (49° 116° N.W.) Company office, Trail; mine office, Riondel. J. B. Donald, property superintendent; A. J. Richardson, mine superintendent; T. F. Walton, mill superintendent. The Bluebell mine is on a peninsula in Kootenay Lake, 6 miles by paved road north of Kootenay Bay. The mine workings are below lake-level and are serviced mainly by the No. 1 shaft, inclined westward at 35 degrees near the footwall of a layer of limestone. The orebodies are replacements of limestone. They extend laterally from a series of steeply dipping fractures that cross the formation almost at right angles. Mineralization favours the hangingwall of the limestone bed.

Mining operations continue to encounter thermal conditions, especially in the lower workings. The flow of carbon dioxide into the mine has increased. Fresh air supplied to the underground workings amounts to 250,000 cubic feet per minute, with extra capacity available should need for it arise.

Exploration northward on No. 8 level continued, and ore was encountered about 1,000 feet north of No. 1 shaft. A Robbins raise-boring machine was ordered by the company with a view to providing a means for delivering fresh air to No. 8 level. This machine can drill 48-inch raises and eliminates the normal hazards of raise mining.

Pumping-stations on No. 5 level and No. 8 level, which are set to operate automatically, handle influent water, much of which is of thermal origin and contains dissolved solids which tend to precipitate on the walls of rising mains. A diamond-drilling machine specially adapted to ream rising mains of build-up obviates the need of dismantling the pipe-lines.

The mine produced 246,300 tons of ore. Mining is done by cut-and-fill or by open-stope methods. Deslimed tailings are used for backfill and are supplied to the mine stopes from the mill via a system of 4-inch plastic pipes. This system has proven itself over the years as a result of the ease for handling plastic pipe and the life of the pipe in spite of abrasion from the tailings. Tailings backfill has supported the walls of stopes more effectively than other methods used in the mine.

Ore is milled on the property, and tailings which are not used for backfill are discharged into Kootenay Lake at the extreme south end of the peninsula. Except during violent storms, the tailings vanish to the bottom of the lake and cannot be detected in nearby waters. The mill treated 246,300 tons of ore and produced 18,183 tons of lead concentrates and 27,573 tons of zinc concentrates, with all production going to the Trail smelter.

Employment at the operation is as follows: Staff, 42; surface, 31; mill, 15; underground, 135.

Two teams competed in the West Kootenay Mine Rescue Competition. The team captained by Ben Ramage won this competition and went on to win the Provincial competition held in Cranbrook.

The company won the Regional Ryan Trophy for safety.

Silver-Lead

CRAWFORD CREEK

Silver Hill
Ryslo Silver Mines Ltd.
By P. E. Olson

(49° 116° S.W.) Company office, 26, 425 Howe Street, Vancouver 1. This is a private company set up to explore the Silver Hill mine on the southwest side of Canyon Creek, which flows into Crawford Creek, about 6 miles from Crawford Bay. The property consists of the old Silver Hill Crown-granted mineral claims and recorded mineral claims which were recently located around the Crown grants.

Road-building and some geological work were done before winter weather forced operations to stop. Work was directed by David Sloan.

Silver-Lead-Zinc

Humbolt
Rose Pass Mines Ltd.
By P. E. Olson

(49° 116° N.W.) The Humbolt mine is about 1 mile west of Rose Pass and is reached by 15 miles of logging-road from Crawford Bay. The company maintained a mine office at Crawford Bay during the summer. An induced polarization survey was done over several claims embracing the known mineralized zones. Following this, bulldozer stripping and diamond drilling were done on anomalous areas. No mineralization was encountered. Work was directed by Glen Champion.

REVELSTOKE MINING DIVISION

Gold-Silver-Lead-Zinc

REVELSTOKE

J & L
Westairs Mines Limited
By James T. Fyles and T. M. Waterland

(51° 118° S.E.) Company office, Box 520, Bathurst, N.B.; mine office, Box 1318, Revelstoke. Ivan C. Stairs, president; T. W. Roynon, regional projects engineer. The company holds by option agreement nine Crown-granted and 48 recorded mineral claims. The property is on the south side of the east fork of Carnes Creek half a mile above its junction with the main creek. Carnes Creek joins the Columbia River 24 miles north of Revelstoke.

During the year 7.7 miles of access road was completed from the Columbia River highway along the south side of Carnes Creek to the property. The road was constructed under a half-cost grant from the Provincial Government. A cook-house, office building, and compressor-house were constructed. A total of 892 feet of drifting was carried out on the 2770 level adit, and 600 feet of AX diamond-drill hole was drilled.

A crew of 13 men was employed under the supervision of T. W. Roynon until work was suspended in August.

Showings on the J & L property are in fine-grained dark-grey and light greenish-grey phyllites, siliceous phyllites, and limestones that strike northwest and dip at moderate angles to the northeast. The rocks are highly sheared, isoclinally folded, and, because of the structure, the rock units are lenticular.

Over a period of years several siliceous zones containing arsenopyrite, pyrite, galena, sphalerite, pyrrhotite, and minor chalcopyrite have been discovered. They strike northwest, dip at moderate angles to the northeast, and are parallel to the schistosity of the enclosing rocks. Current work has been underground exploration of two zones, called the main vein and the middle vein, exposed on the south bank of the east fork of Carnes Creek. In 1965 and 1966 an adit, known as the 2700 level, was driven a few tens of feet above creek-level to follow these two zones. It was collared on the middle vein, which it followed southeastward for about 100 feet. In this length the vein is 2 to 4 feet wide, containing mainly arsenopyrite, quartz, and pyrite with disseminated sulphides in both walls for 1 or 2 feet from the vein. It is reported to carry 0.1 to 0.2 ounce per ton in gold.

From the middle vein the adit was turned to the northeast for about 100 feet to intersect the main vein, which was followed for about 500 feet to the southeast. In this distance the vein consists of irregular lenses of massive fine-grained sulphides in a light-green sericite schist containing disseminated sulphides. The massive sulphides are folded on small wrinkles with axes that plunge 25 to 30 degrees to the east. In the inner part of the adit, fractured white quartz containing medium- to coarse-grained sphalerite, galena, and pyrite makes up most of the vein. The vein has an average width of about 4 feet.

About 500 feet from the portal, a horizontal hole was diamond drilled 462 feet to the southwest. It encountered the middle vein but no other mineralization.

A vein exposed in old workings above and to the south of the 2700 level is thought to be the main vein. It is described in old reports (*see* Annual Report, 1922, pp. 215–217, and *Geol. Surv., Canada,* Sum. Rept., 1928, Pt. A, pp. 165–171). Considerable limestone, which does not occur at lower elevations, is exposed near the vein in that area.

Copper

S Group
By James T. Fyles

(51° 118° S.E.) The old Copper Queen property was restaked in 1966 as the 60-claim S group by T. W. Roynon for I. C. Stairs, of Bathurst, N.B. It is on the east slope of the Columbia River about 18 miles north of Revelstoke. Showings of disseminated chalcopyrite, pyrite, and locally sphalerite in fine-grained hornblende schist are exposed in small bluffs at an elevation of about 3,500 feet 1½ to 2 miles north of La Forme Creek. The hornblende schist trends northward and dips at moderate angles to the east into the hill. It is probably an altered volcanic rock locally containing small lenses of white crystalline limestone, disseminated carbonates, as well as chlorite. The sulphides occur in poorly defined lenses, the most highly mineralized of which, exposed in bluffs on either side of a small creek, is up to 30 feet thick and a few hundred feet long. Scattered sulphides occur in minor amounts to the north and south.

In June, Clearwater Mines Limited drilled five diamond-drill holes from a helicopter-supplied tent camp on a bench of slumped till beside a small pond above the showings. Two holes collared on the bench failed to reach bedrock, but three collared just above the showings intersected mineralized hornblende schist and were drilled to depths of 350 to 400 feet. Assays indicate an average grade of somewhat less than 0.5 per cent copper and 0.1 per cent zinc.

Molybdenum

Joan
King Resources Ltd.
By James T. Fyles

(51° 118° S.E.) Company office, 1300 Elveden House, Calgary, Alta. This company owns 156 claims, covering the ridge between Hiren and Copeland Creeks, about 15 miles northwest of Revelstoke. The principal showings are at an elevation of 7,200 feet on the north slope of the ridge about 2 miles west of Mount Copeland. Exploration, started in 1965 (*see* Annual Report, 1965, p. 205), was continued in August and September. The work consisted of prospecting and geological mapping both in the area of the principal showings and on the south side of the ridge. Molybdenite mineralization in syenite and lime silicate gneisses was traced eastward from the showings tested last year, and a zone with scattered mineralization, extending a total of 4,000 feet along the formational strike, was mapped and sampled in detail with the aid of a packsack drill and blasting. The work was under the direction of M. C. Robinson, consulting geologist, Calgary, and was done by a crew of about 15 men serviced by helicopter from Revelstoke.

[Reference: Assessment Report No. 679.]

Lead-Zinc

River Jordan, King Fissure
Bralorne Pioneer Mines Limited
By James T. Fyles and T. M. Waterland

(51° 118° S.E.) This property consists of 82 claims held under option from Consolidated Standard Mines Limited, 320, 355 Burrard Street, Vancouver 1, by Bralorne Pioneer Mines Limited. The property is on the upper northern slope of Mount Copeland, about 12 miles northwest of Revelstoke at an elevation of 5,500 to 8,000 feet. Mineralization consists of an aggregate of fine-grained pyrite, pyrrhotite, galena, and sphalerite in a sequence of limestone, schist, gneiss, and quartzite. The property was described by C. Riley in Transactions of the Canadian Institute of Mining and Metallurgy, 1961, pages 268–272.

Work in 1966 consisted of continuing the holes drilled in 1965 to complete a fan of four holes in the western part of the mineralized area and also of drilling one hole at the eastern end of the area. The fan was drilled by wedging. A total of four deep holes was drilled under contract by Canadian Longyear, with a total length of 7,979 feet. Work was started in June while there was more than 20 feet of snow at the drill-site from a camp at the west end of the property. The camp was moved in September to the eastern end of the property for the last hole. A total of eight men was employed using one drill. The work was under the direction of R. Walton and S. Pilcher, and G. Berry was the drill foreman.

NORTH LARDEAU

Silver-Lead-Zinc

True Fissure, Broadview
Columbia Metals Corporation Limited
By P. E. Olson

(50° 117° N.E.) Company office, 1002, 80 Richmond Street West, Toronto, Ont.; mine office, Trout Lake. D. Sloan, consulting engineer. The company controls property including the True Fissure, Great Northern, and Broadview Crown-granted mineral claims 2 miles northwest of Ferguson. The property is reached by 2½ miles of jeep-road from Ferguson.

The mine road to the old True Fissure camp was repaired, and new roads constructed to the Great Northern and Broadview showings. An induced polarization survey over these claims revealed an anomaly which more or less coincides with the projection of the main True Fissure vein toward the Broadview. Diamond drilling of this anomaly was stopped at a depth of 750 feet because of poor core recovery. No. 2 level of the True Fissure mine was then repaired and the face advanced 55 feet before the onset of winter forced closure of the operation. Explosives and equipment were left at the mine after the shutdown. J. Branca was in charge of a crew of nine men from July to November.

Silver-Lead-Zinc

Silver Cup
By P. E. Olson

(50° 117° N.E.) Reuben Bond, of Vancouver, and associates from Los Angeles, entered into a purchase agreement with E. C. Wragge, of Nelson, for the Silver Cup mine. This property is on Silver Cup Ridge, east of Trout Lake, and is reached by road from Ferguson via Trout Creek and Silver Cup Creek.

The Silver Cup mine was partly dewatered and examined by The Granby Mining Company Limited in 1952. Since then the mine has been idle.

Bond and associates had the road to No. 7 level cleared, but this road is still in poor condition. Plans were made to make a bulk concentrate from the old dumps by means of a gravity concentrator, and to haul this concentrate to Camborne, where separate lead and zinc concentrates would be made by selective flotation. Work at the mine employed five men, who were under the direction of C. A. Gilliard, of Ventura, California. Heavy snows in December forced a stoppage of work.

Silver

Ethel
Rexony Mining Company Limited
By James T. Fyles

(50° 117° N.W.) The Ethel is an old property at an elevation of 6,000 feet 3½ miles southwest of the community of Trout Lake. It is reached by a logging and " Cat " road which leaves the Galena Bay–Trout Lake road 4 miles west of Trout Lake. The mine was worked between 1898 and 1918, during which period five shipments of sorted ore totalling 76 tons were rawhided by means of a steep trail to Trout Lake; gross contents: Silver, 9,251 ounces, and lead, 12,664 pounds. Four adits, the longest about 300 feet, and several other workings were driven over a vertical range of 120 feet. Since that time the property has been idle, and the claims, which were Crown granted, have reverted.

In the summer of 1965 the ground was located by K. G. Sanders for Rexony Mining Company Limited, and a " Cat " road was built to the old workings from the logging-road. The workings were mapped and sampled, and in June, 1966, three holes were drilled which totalled 776 feet.

The showings consist of a series of closely spaced quartz veins in dark-grey phyllites and limestones. A layer of fine-grained limestone 50 to 75 feet thick contains the principal showings, but they extend beyond the limestone into the phyllite. The limestone dips 60 degrees to the northeast, essentially parallel to the schistosity in the phyllites. The quartz, containing scattered grains of galena, sphalerite, pyrite, and tetrahedrite, forms lenses up to 18 inches thick parallel to the schistosity. They have been mostly mined out, but judging from surface exposures and small stopes underground they formed an in echelon group of lenses with an average dip to the northeast of about 40 degrees. The old workings passed from one lens to the next, giving the appearance of a continuous vein. Selected pieces from surface containing sulphides or showing copper stain assayed as much as 80 ounces per ton silver. Three holes were drilled southwestward into the limestone and the mineralized zone but failed to encounter significant mineralization.

[References: *Minister of Mines, B.C.*, Ann. Rept., 1914, p. 317; *B.C. Dept. of Mines,* Bull. No. 45, 1962.]

GOLDEN MINING DIVISION

PARSON

Silver-Lead-Zinc

Ruth Vermont Mine
Columbia River Mines Ltd.
By James T. Fyles

(50° 116° N.W.) Registered office, 410, 470 Granville Street, Vancouver 2. The Ruth Vermont mine is on the south side of Vermont Creek 25 miles southwest of Golden and is reached from Parson via the Vowell Creek logging-road.

The property is an old one, originally consisting of 11 Crown-granted claims, on which more than a dozen short adits were driven before 1930. In 1956 and 1957 Rio Canadian Exploration Ltd. made an extensive survey of the property and did a small amount of drilling and soil-sampling. In 1964 the old Crown grants which had reverted were taken up by Mel Pardek, of Vancouver, as a mineral lease,

Camp of Columbia River Mines Ltd. on Vermont Creek.

Looking southwestward across the Duncan River and up Houston Creek from the Alpha property of Bonanza Explorations Ltd.

and about 40 claims surrounding the lease were located. The present company acquired the property in 1965 and began underground work in an old adit called the Old Timers level and subsequently referred to as the 6000 level.

The main activities in 1966 were directed to the development of the 6000 level. The level was driven from the footwall to the hangingwall of a mineralized zone containing appreciable values of lead, zinc, and silver, and was extended along the hangingwall for 1,200 feet. Contact was maintained with the zone by frequent drilling, which amounted to 132 holes totalling 20,000 feet by the year-end. A new level was opened at the 5,750-foot elevation and was extended 650 feet. It is expected that the 5750 will eventually become the main haulage level. Surface activities included the construction of an 88- by 20-foot power-house and machine-shop near the portal of the lower level. A new 4½-mile access road replacing the old road was built, partly on the south side of the valley of Vermont Creek to avoid snowslides as much as possible and to improve snow removal. Twenty men were employed the year round under the direction of T. E. Swanson, consulting engineer.

Rocks in the Vermont Creek area are grey slates; light-grey quartzites, grits, and pebble conglomerates; and minor limestones belonging to the Horsethief Creek Group of Late Precambrian age. The slates commonly carry disseminated pyrite, the quartzitic rocks contain white quartz veins and rusty iron carbonates, and the limestones are dark grey, fine grained, and more or less micaceous and cleaved. The slates and limestones are thin bedded, and beds crossed by cleavage are apparent in almost every exposure. Minor folds are fairly common, and from a distance major folds can be seen in cliffs.

In the mine area a bed of limestone 30 to 50 feet thick, here referred to as the Ruth limestone, lies between two thick slate formations. The lower slate, which is several hundred feet thick, is underlain by a greyish-brown quartzite that forms prominent cliffs on the Charlotte claim east of the mine and on the north side of Vermont Creek. It is buff-weathering to light-grey somewhat micaceous quartzite with rounded bluish-white quartz grains up to one-eighth inch in diameter. The quartzite has an irregular fracture cleavage, and contains local stockworks of barren white quartz veins.

A major asymmetric anticline trending northwest crosses Vermont Creek near the Ruth property. Reconnaissance suggests that it continues southeast and northwest of the mine for many miles and that most of the known showings of the region are near the hinge zone. On Vermont Creek the anticline plunges gently to the southeast and the axial plane dips steeply to the northeast parallel to the cleavage in the slates.

Figure 29 shows two large anticlines, the Charlotte on the northeast, the Sheba on the southwest, and between them the Ruth syncline. They are named from the old Crown-granted claims on which they are well exposed. All three folds are in the hinge zone of the major anticline just referred to and are local structures which change in form up or down the axial plane and along the axis of the anticline.

The Ruth syncline as outlined by the Ruth limestone is exposed near the portals of the 6000 level and is encountered underground on the level. The synclinal axis plunges at 5 degrees toward an azimuth of 135 degrees, and the axial plane dips 75 degrees to the northeast. In the inner part of the working the axis appears to swing to the west and steepen somewhat in plunge. The limestone on the southwest limb has a fairly uniform attitude with an average strike of 140 degrees and a dip of 30 degrees to the northeast. This southwest limb of the Ruth syncline contains the sulphide mineralization currently being developed.

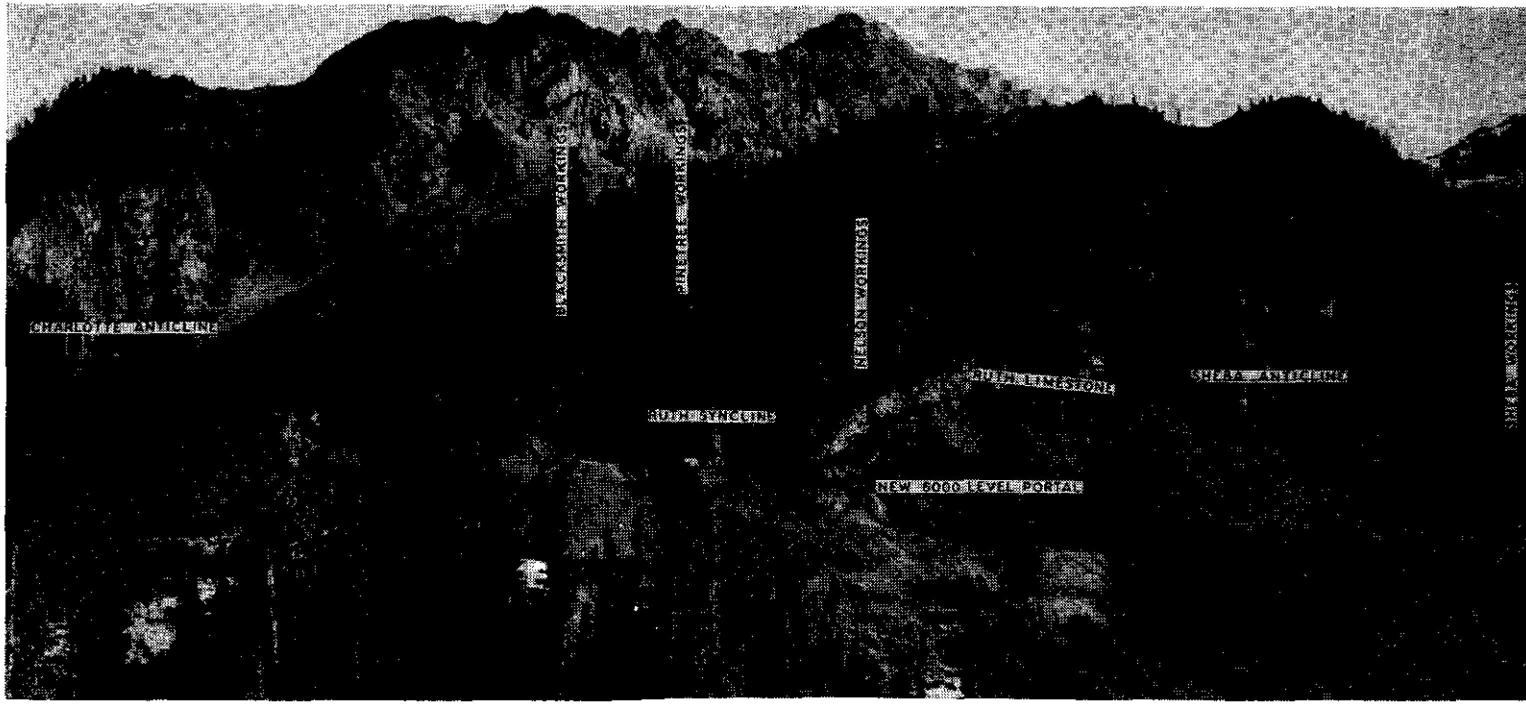


Figure 29. Panoramic view of the south side of Vermont Creek showing the main workings of the Ruth Vermont mine. This view is almost parallel to the axis of the Charlotte anticline and is oblique to the axes of the other folds. The portal of the 5750 level is obscured by the big trees in left foreground.

Quartz veins occur in well-defined sets of fractures. One set contains most of the sulphides, and the others are sparingly mineralized or barren. A set of barren quartz veins is perpendicular to the axis of the Ruth syncline. Other mineralized veins lie parallel to the bedding; the most prominent of them is on the footwall of the Ruth limestone.

The veins containing most of the sulphides trend 110 to 115 degrees and dip at moderate to steep angles to the south. They are well displayed in the 6000 level and in cliffs near the new portal. The veins are oblique to the structure transecting both the folds and the cleavage and occurring in the Ruth limestone and the slate above and below it. They contain galena, sphalerite, pyrite, and arsenopyrite and small amounts of chalcopyrite, boulangerite ($Pb_5Sb_4S_{11}$), argentiferous tetrahedrite, scheelite, and carbonates. The attitudes of these mineralized fractures which form a mineralized zone and the relationship of the mineralization to the Ruth limestone and the Ruth syncline are shown on Figure 30.

The veins in the slate beneath the limestone are up to a foot thick and most are only a few inches thick. They are lenticular and many pinch out in one direction or another where exposed in the workings. The largest one was stoped in the early days for about 80 feet along the level and for 15 feet above it. The veins are more numerous and richer in sulphides just under the limestone, and they extend

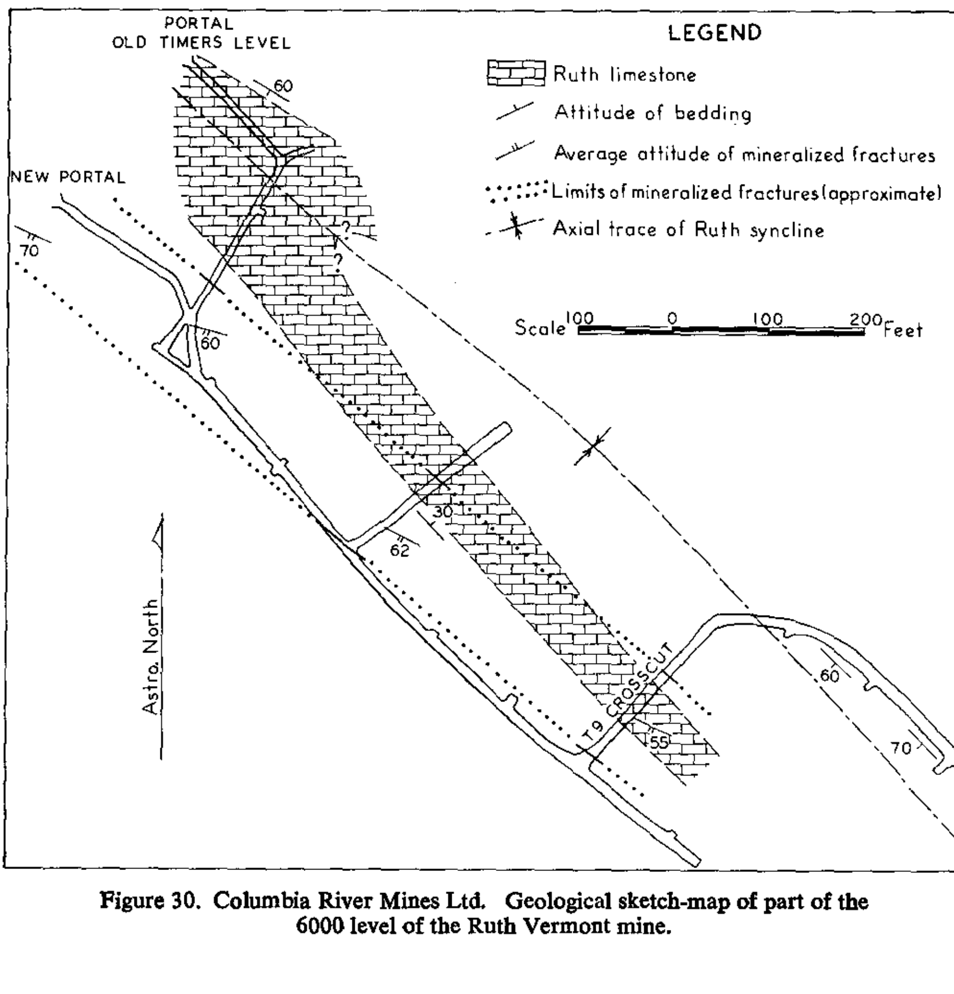


Figure 30. Columbia River Mines Ltd. Geological sketch-map of part of the 6000 level of the Ruth Vermont mine.

for several tens of feet beneath it, dying out irregularly down their dip. The quartz is vuggy and the sulphides are medium grained, occurring in clusters and pods which commonly occupy the entire width of a vein. The slates above the Ruth limestone contain veins which are more widely spaced than those below it.

In the limestone itself where a mineralized section is exposed in the T-9 crosscut, the sulphides are along mineralized fractures ranging from many very closely spaced ones a fraction of an inch thick to one fracture containing up to 5 feet of massive coarse-grained sulphides. Fine-grained sulphides, formed by replacement, are disseminated in the limestone adjacent to the fractures, but replacement ends abruptly and is very closely controlled by the fractures.

The veins have been explored by short adits and open cuts from the earliest days of discovery. This early work is described by Sargent (Annual Report, 1936, pp. E 37–E 41) and O'Grady (Annual Report, 1930, pp. 234–236), and the assays quoted are tabulated below. The veins and mineralized limestone in the 6000 level are known as the Nelson orebody and two groups of veins above the limestone as the Blacksmith and the Pine Tree veins.

Vein	Width	Gold	Silver	Lead	Zinc
	In.	Oz. per Ton	Oz. per Ton	Per Cent	Per Cent
Blacksmith	3–7	0.30	2.0	Trace	0.7
Pine Tree	12	0.14	29.0	35.1	1.6
Pine Tree	8½	0.10	32.0	18.8	14.4
Nelson	12	0.02	14.0	13.3	13.9

A shipment of sorted ore made in 1965 averaged: Silver, 63 ounces per ton; lead, 31 per cent; zinc, 19 per cent.

As indicated on Figure 30, the veins and the fractures that contain most of the sulphides form a mineralized zone with more or less well-defined margins that trends 130 degrees and probably dips steeply to the southwest. Within the zone are many in echelon veins and fractures which on the average strike 112 degrees and dip 50 degrees to the south. The veins transect the cleavage of the slates and are oblique to the trend of the Ruth syncline. Mineralization appears to have developed along tensional openings superimposed on the uniform and gently dipping southwestern limb of the Ruth syncline. The limestone obviously controlled the amount of fracturing and may also have aided the precipitation of the sulphides. Possible changes in the character of the mineralized zone as it impinges on the axial zone of the Ruth syncline underground to the southeast and as it crosses the Sheba anticline on surface to the northwest are of paramount importance in current exploration. The search for comparable zones along the southwestern limb of the Ruth syncline is continuing.

Silver-Lead-Zinc-Copper

Alpha, Maud S., Standby
Bonanza Explorations Ltd.
By D. R. Morgan

(50° 117° N.E.) Company office, 404, 510 West Hastings Street, Vancouver 2. The Alpha lies between the headwaters of Bobbie Burns and Bennison Creeks at elevations ranging from 7,500 to 8,500 feet on the Spillimacheen Range of the Purcell Mountains, 30 miles southwest of Golden. It comprises eight Crown-granted claims, including the Maud S. and Standby, and the seven-claim Alpha group held by record. It is an old showing that has been worked on a number of occasions since 1896.

Some geological mapping was done in 1966, and approximately 400 feet of trenching done by hand. Four AX holes totalling 610 feet were drilled from the surface, and seven AX holes totalling 2,100 feet were drilled from the old Kimpton tunnel. There were five men employed, who stayed in a camp on the property. Access to the camp was by helicopter. The operations, which were under the direction of G. R. Hilchey and L. DeBriske, were suspended toward the end of September.

Gold-Silver-Lead-Zinc

FE, HIL, Etc. (50° 116° N.W., 50° 117° N.E., 51° 117° S.E.)
Far East Minerals Ltd. Company office, 543 Granville Street, Vancouver 2.
By James T. Fyles

Far East Minerals Ltd. and associated companies hold 1,527 claims, mainly by record, in the Purcell Mountains between the headwaters of Vowell and McMurdo Creeks. The claims cover ground along a northwesterly trending belt including the valley of upper Vowell Creek near Conrad and Crystalline Creeks, Carbonate Mountain, the valley of Carbonate Creek, the Bobbie Burns basin to the northwest, and the basin of McMurdo Creek. The selection of the area where the claims were located was made on the basis of an airborne geophysical survey and photogeological interpretation. The claims include a number of old showings and old Crown-granted claims held by agreement.

The old showings are small lenticular quartz veins in slates, grits, quartzites, and minor limestones of the Horsethief Creek Group of late Precambrian age. Many carry a good grade of silver, lead, and zinc and locally up to 0.5 ounce per ton in gold. Although the values are confined mainly to veins, replacement of limestone and rarely of quartzite near the veins is known at a few localities (*see* Ruth Vermont, Atlas). Many of the old showings are described by Sargent (Annual Report, 1936, pp. 25–42).

During the summer, exploration of parts of the large area covered by the claims was carried on by diamond drilling and by geological mapping and a ground magnetometer survey of the claims on Vowell Creek. A total of 12,350 feet of diamond drilling was done in 28 holes, mostly along Vowell Creek between Crystalline and Conrad Creeks and in the basin on the north side of Carbonate Mountain and the Bobbie Burns basin to the northwest. Helicopters were used extensively for transport from Golden and from a base camp on Vowell Creek about 2 miles above the mouth of Crystalline Creek. A total of about 32 miles of "Cat" road was built principally up Conrad Creek and Bobbie Burns Creek to the mouth of Carbonate Creek.

Silver-Lead-Zinc

Atlas (50° 116° N.W.) Registered office, 801, 736
Purcell Range Mines Limited Granville Street, Vancouver 2. This company
By James T. Fyles

has optioned the Atlas group of recorded mineral claims from R. Renn, of Calgary. The claims are west of Vowell Creek between Vermont and Crystalline Creeks. The main work has been on showings at an elevation of 5,800 feet on the slope north of Crystal Creek, a small tributary of Crystalline Creek from the west. The workings are reached by a steep "Cat" road from a trailer camp at Mile 33 on the Vermont Creek logging-road. They are bulldozer strippings on a steep jack pine slope covering an area about 400 feet square which exposes showings of galena discovered by Renn in 1965. Two short diamond-drill holes were put down in the upper northwest corner of the stripped area in July, 1966.

The rocks exposed at the showings are dark-grey slates and grey to light brownish-grey micaceous quartzites. The slates are pyritic, and the quartzites contain rusty iron carbonates.

The showings consist of half a dozen scattered occurrences of gossan or galena, sphalerite, and pyrite in both the slates and the quartzites. The zones of gossan are mainly in slates, range from 2 to 4 feet wide, and are parallel to the cleavage. Samples 1 and 2 in the following table are of gossan. The sulphides are mainly in the quartzites. One showing consists of massive galena, minor pyrite, and sphalerite along a series of fractures in the quartzite that strike 120 to 125 degrees and dip steeply. They form a lens of sulphides 1 to 2 feet thick and several feet long more or less parallel to a bed of quartzite on the northeast limb of a small syncline. An assay from this lens is given in the table as sample 3. Another showing 300 feet to the southwest contains galena and minor sphalerite and pyrite disseminated in quartzite. The sulphide zone is irregular and poorly defined and is well mineralized over widths up to 5 feet. Samples 4, 5, and 6 are of mineralized quartzite, and 7 and 8 of a black gossan from this area.

The mineralized quartzites lie above the slates containing the gossans, and the rocks have the form of a shallow open syncline with an essentially horizontal axis and vertical axial plane trending 135 to 140 degrees. The folds are asymmetric and lie on the northeastern limb of an anticline. The exposures provide very slight evidence on the control of mineralization, but the mineralization appears to be associated with fractures principally in the quartzitic beds. Locally the quartzites near the fractures are replaced by the sulphides.

Sample	Width	Gold	Silver	Copper	Lead	Zinc
	Ft.	Oz. per Ton	Oz. per Ton	Per Cent	Per Cent	Per Cent
1	2	Trace	0.9	......	1.82	1.3
2	3	Trace	Trace	0.01	0.05	0.27
3	2	Trace	4.5	......	5.25	1.3
4	2	0.02	9.6	......	14.04	3.3
5	3	0.02	18.6	......	9.64	1.9
6	3	Trace	2.7	0.03	3.91	1.8
7	1.5	0.02	6.4	......	6.43	5.2
8	2	Trace	Trace	......	0.15	1.1

Lead-Zinc

SPILLIMACHEEN

Lead Mountain
Giant Mascot Mines Limited
By D. R. Morgan

(50° 116° N.W.) Head office, 1825, 355 Burrard Street, Vancouver 1. L. P. Starck, vice-president and general manager. This old property, comprising 12 claims (recorded as the Tony, Don, and Ron claims), is 6 miles by road northeast of the Silver Giant mine in the Spillimacheen Valley. A crew of three men drilled three holes totalling 450 feet during a period of three weeks in the summer of 1966. The work was under the direction of A. G. Ditto.

[Reference: *Minister of Mines, B.C.*, Ann. Rept., 1955, p. 73.]

Silver-Lead-Zinc

WINDERMERE

Mineral King
Aetna Investment Corporation Limited
By D. R. Morgan

(50° 116° S.E.) Head office, 170 Donway West, Don Mills, Ont.; mine office, Toby Creek. W. W. Cummings, resident manager. This mine is on Toby Creek, 28 miles southwest of Athalmer, and is reached by means of a good road from Wilmer. The workings are in a steep mountain ridge between Toby and Jumbo Creeks. They are entered by four levels, Nos. 2, 3, and 7 in descending order being driven from the Toby Creek side and No. 9 from the Jumbo Creek side, the latter two levels being used for main haulage. The mine is operated by the open-stope method, and the workings are in four irregular-shaped orebodies known as the "A," "B," "C," and "D" zones. A detailed description of the property is given in the 1959 and 1962 Annual Reports.

The mine produced 114,737 tons of ore during 1966. Most of the ore was mined from the open stopes in the upper levels, and the remainder by the development of the lower levels. The total development during 1966 was 1,701 feet of drifting, 987 feet of crosscutting, and 28,416 feet of diamond drilling. The difficulty experienced in contacting an ore zone in the lower levels that are being developed from No. 2 shaft below No. 9 level was overcome by the reported intersection of mineralization on No. 11 level at the 12,500 section at the end of 1966, and by the intersection of a mineralized zone by diamond drilling from No. 12 level. Further exploration is being done at both levels. Approximately 1,000 tons of barite was mined from No. 3 level in 1966.

The mine is ventilated by both mechanical and natural means. Approximately 36,000 cubic feet of air per minute is exhausted from the workings, of which 23,000 cubic feet per minute is supplied by a 15-horsepower electrically driven fan on No. 2 level. The ventilation in the lower workings is also boosted by a small auxiliary fan located on No. 9 level. These quantities were found to be sufficient for the present requirements of the workings.

The concentrator operated throughout the year and produced 6,686 tons of zinc concentrates grading 55.9 per cent zinc and 2,438 tons of lead concentrates grading 66.2 per cent lead. The average number of men employed at the mine and concentrator during the year was 95, of whom 56 were employed underground. The compensable accidents totalled 19, of which one was a fatality, and is reported more fully in this report under the heading of " Fatal Accidents."

FORT STEELE MINING DIVISION

KIMBERLEY

Silver-Lead-Zinc

Sullivan Mine
Cominco Ltd.
By D. R. Morgan

(49° 115° N.W.) Company office, Box 1510, Station B, Montreal 2, Que. W. S. Kirkpatrick, chairman; R. Hendricks, president; D. D. Morris, vice-president, operations. Western headquarters, Trail: J. H. Salter, vice-president, western region; S. M. Rothman, manager, western operations. Sullivan mine office, Kimberley: R. M. Porter, manager, Kimberley operations; O. E. Weightman, superintendent, Sullivan mine; R. M. Lauer, superintendent, Sullivan concentrator. The Sullivan mine is on Mark Creek, 2 miles north of Kimberley, and the concentrator is at Chapman Camp, 2 miles south of Kimberley. The holdings include 678 Crown-granted claims and fractions and 30 recorded claims. The following report, prepared by the management, is a synopsis of the operations:—

" During 1966, about 2,100,000 tons of Sullivan ore were treated at the Concentrator. In addition, the Concentrator treated ore from Pine Point Mines Limited, as capacity was available. A crushing plant to handle Pine Point ore on surface was completed and commenced operation in June. The Concentrator operated 254 days during 1966.

" Development driven totalled approximately 26,500 feet and core-hole diamond drilling about 7,600 feet. Backfill totalled 482,000 cubic yards of float rock, cave and development waste.

" The ventilation system handled approximately 850,000 cubic feet per minute of air. As part of the major ventilation circuit revision, No. 42 Shaft airway equipment installation was completed during the year.

" Construction of the first intake air heating plant at the Sullivan was nearly completed. Located at the collar of No. 41 airway it consists of an indirect type heating plant fired by natural gas and rated at 16 million B.T.U. per hour.

" Continued progress was made by the Rock Mechanics Section in developing systems of underground instrumentation. A number of pillar stress measurements were carried out during the year and a good start was made on the development of systems to indicate changes in stress resulting from various mining activities. An underground chamber for long-term testing of instruments under controlled environmental conditions was started. Further monitoring of surface subsidence features provided more knowledge on the behaviour of the hanging wall mass with respect to ore extraction.

" Technical developments relating to health and safety included methods for accurate tensioning of rock bolts hydraulically and for setting the outer anchorage perpendicular to the bolt. Noise suppression devices are in use on all rock drills and improvements have been made in muffler design and manufacture.

" Other technical subjects under development include improved blasting techniques using ammonium nitrate, improved reaming techniques for relief holes both in ordinary development rounds and in longhole winzes and application of trackless loaders.

" In 1966, the Sullivan mine had 20 lost-time accidents; there were 7 at the Concentrator. No fatalities were suffered at either mine or the mill. Accident frequency per 1,000,000 man hours worked was 16.83 at the mine and 18.75 at the Concentrator. The severity rate per 1,000,000 man hours worked was 1,789 calendar days at the mine and 1,401 at the concentrator.

" Eleven Sullivan mine and concentrator employees obtained or renewed their Industrial First-aid certificates, and 57 employees passed their St. John Ambulance First-aid examinations. Eleven Sullivan mine employees obtained their mine rescue certificates, making a total of 339 since training first started at the mine in 1929.

"A team from the Sullivan mine won the East Kootenay Mine Safety Association First-aid Competition.

" Employees at the year end totalled 657 at the mine and 255 at the concentrator."

Lead-Zinc

Western Exploration
Reeves MacDonald Mines Limited
By D. R. Morgan

(49° 115° N.W.) Head office, 410 Metropolitan Building, 836 West Hastings Street, Vancouver 1; mine office, Remac. L. M. Kinney, Metaline Falls, Wash., general manager; F. R. Thompson, superintendent. This property is between the east fork of Mark Creek and Mather Creek, and is approximately 10 miles north of Kimberley. It is at an elevation ranging from 5,000 to 7,000 feet, and may be reached by means of an old forestry road leading from the open-pit area of the Sullivan mine. The property consists of 110 Crown-granted claims, optioned from Western Exploration Company Limited of Silverton, and six mineral claims held by record.

A crew of three men drilled one BX-WL hole to a depth of 1,770 feet on the Bur No. 5 (Lot 12884). The drilling was done under contract and was supervised by D. C. Plecash, geologist.

Copper

Joe
Cominco Ltd.
By D. R. Morgan

(49° 116° N.W.) Field office, Trail. This property, also known as the Bracebridge, is on the west fork of the St. Mary River, 24 miles northwest of Kimberley, and is reached by a 32-mile road from Marysville. It comprises the 22-claim Joe and Goat groups held by record, and covers lenses of chalcopyrite and pyrrhotite in schistose dolomitic argillite of the Kitchener Formation. A 2-mile access road was built into the property, and six IEX holes totalling 658 feet were drilled. The three-man crew was under the direction of R. G. Gifford, exploration geologist. The option has since been relinquished.

Silver-Lead-Zinc

Warhorse, Granite
Hellroaring Silver Lead Ltd.
By D. R. Morgan

(49° 116° N.E.) Registered office, Creston. John Wolfe, president. This property, also known as the Boy Scout, is on the west fork of Hellroaring Creek, approximately 10 miles southwest of Kimberley, and is reached by road from Marysville. The property consists of four Crown-granted claims—Warhorse (Lot 13077), Granite (Lot 13079), Hope (Lot 13078), and Faith (Lot 13080)—optioned from Harold Bennett, of Cranbrook, and the 12-claim Granite group held by record. It includes the Warhorse mine, which was last operated in 1955. The present company is the successor of Wescan Developments Ltd., who held the property in 1965.

The three upper adits of the Warhorse mine were rehabilitated in the summer of 1966, and 11 diamond-drill holes totalling 471 feet were drilled from two of the adits. Some surface stripping and soil-sampling were done, and approximately 5 miles of the access road from St. Mary Lake was repaired. One BX-WL hole, length 310 feet, was drilled from the surface in the vicinity of the upper adit. The crew of five men was employed for four months and was under the supervision of John Wolfe.

CRANBROOK

Tin-Tungsten

Sko and Chuck
Newconex Canadian Exploration Ltd.
By D. R. Morgan

(49° 116° N.E.) This property is at an elevation of 8,500 feet on Rusty Ridge in the Selkirk Mountains, 40 miles by air northwest of Cranbrook. It comprises 36 claims, and covers cassiterite and wolframite mineralization in narrow quartz veins in metadiorite sills in the Moyie Formation. A crew of three men did some prospecting, mapping, and soil-sampling for a period of one month during the summer of 1966. Transportation was by means of helicopter, and the work was under the direction of J. S. Ives, geologist. The property was not visited.

Copper

Tom, Bety, Happy Day
Cindy Mines Ltd.
By D. R. Morgan

(49° 115° N.W.) This property, consisting of 134 claims, is near Eager Hill, 4½ miles northeast of Cranbrook. It covers narrow stringers and disseminated grains of chalcopyrite within a diorite sill of the Purcell series. The sill intrudes calcareous and argillaceous sediments of the Kitchener Formation. The company conducted a magnetometer survey in the summer of 1966, and more than 7 miles of line-cutting was done. Two men were employed under the direction of Richard Haering. The property was not visited.

[References: Assessment Reports Nos. 945, 946, and 964.]

Lead-Zinc

Helg
Cominco Ltd.
By D. R. Morgan

(49° 115° S.W.) Field office, 1150 Bay Avenue, Trail. This property, comprising 354 mineral claims held by record, is near Monroe Lake, 12 miles southwest of Cranbrook. It is reached by a 7-mile road leading from No. 3 highway at Green Bay, north of Moyie. The property is at an elevation of 4,600 feet and covers a showing of galena, sphalerite, and pyrrhotite in the Aldridge Formation. Geological, geophysical, and geochemical surveys were made, and one IEX hole 138 feet deep was drilled. Some 400 feet of trenching was done by bulldozer, and a 1-mile access road was built. A four-man crew was employed for six months under the direction of R. G. Gifford, exploration geologist.

[Reference: Assessment Report No. 834.]

Silver-Lead-Zinc

E.L., Bert, St. Joseph
Rimrock Mining Corporation, Limited
By D. R. Morgan

(49° 115° S.W.) This property, comprising 53 mineral claims, is at the south end of the ridge between Kiakho and Jim Smith Lakes, and is reached by 5 miles of road west of Cranbrook. It covers silver-lead-zinc mineralization in narrow quartz veins in the Aldridge Formation. A crew of two men conducted an electromagnetic and magnetometer survey during the summer of 1966. Some line-cutting was done. The work was under the direction of Brian Hamilton, geologist. The property was not visited.

[Reference: Assessment Report No. 895.]

MOYIE

Gold-Silver

Midway
Calix Mines Ltd.
By D. R. Morgan

(49° 115° S.W.) Registered office, 645 Hornby Street, Vancouver 1. This property, consisting of the Midway and a large number of other claims in the River, Mark, and Stan groups, is adjacent to No. 3 highway 6 miles southwest of Moyie. It has been worked intermittently since 1933, and was optioned by Calix Mines Ltd. in 1963. A description of the property is given in the 1933 and 1965 Annual Reports. The work done in 1966 was confined to a small amount of surface stripping on the mountainside above the adits.

Silver-Lead-Zinc

St. Eugene, St. Eugene Extension, Aurora
By D. R. Morgan

(49° 115° N.W.) This property is astride the lower Moyie Lake, south of Moyie, and consists of 23 Crown-granted claims owned by Cominco Ltd. and 81 Crown-granted claims owned by St. Eugene Mining Corporation Limited. A joint agreement was made in 1965 with Falconbridge Nickel Mines Limited to explore the property. In 1966 one diamond-drill hole 420 feet long was drilled on the east side of the lake. Six men were employed for five weeks.

WASA

Silver-Lead-Zinc

Estella
Giant Soo Mines Limited
By D. R. Morgan

(49° 115° N.W.) Head office, 1825, 355 Burrard Street, Vancouver 1. L. P. Starck, vice-president and general manager. Mine office, Box 249, Cranbrook. A. G. Ditto, resident manager; J. Coffey, mill superintendent. The Estella mine is in a basin at the head of Tracy Creek, 5 miles east of Wasa and 11 miles north of Fort Steele. The property comprises 12 Crown-granted and 42 mineral claims held by record, ranges from 6,000 to 7,000 feet in elevation, and is reached by road from Wasa. The mine was formerly operated by the Estella Mines Limited, and was purchased by the Copper Soo Mining Company Limited in 1962. The present company was formed lated in 1965 following a joint agreement with Giant

Mascot Mines Limited to build a mill and place the mine in production. A detailed description of the property is given in the 1963 Annual Report.

In the early part of 1966 the mill and a prefabricated camp, complete with cook-house and dining-room to accommodate 33 workmen, were built and the mine prepared for production. The mill was completed and put into operation on September 1st. It is located below the entrance to the Estella level, and has rated capacity of 150 tons per day. Water is supplied from the creek and the underground workings. Ore treated was 11,141 tons; production, 1,885 tons of zinc concentrates and 710 tons of lead concentrates. The concentrates were trucked to a railway siding at Wasa.

Most of the ore was obtained from an orebody known in two immediate levels above the Rover tunnel. The total underground development was 800 feet of drifting and raising. Other underground work included changing over 2,000 feet of track in the Estella tunnel to facilitate haulage of ore to the concentrator. The mine is ventilated by natural means, which are adequate for the present needs of the workings. Total men employed at the end of 1966 was 41, of whom 22 were underground.

Copper

GALLOWAY

Empire, Strathcona
Altamont Exploration Company Ltd.
By D. R. Morgan

(49° 115° S.E.) Registered office, 602, 543 Granville Street, Vancouver 2. Ross Stanfield, president. This property is on Sand Creek, approximately 4 miles north of Galloway and 26 miles southwest of Fernie. It comprises the Empire and Strathcona Crown-granted claims and 150 mineral claims held by record. The claims are at elevations ranging from 4,000 to 5,000 feet, and are reached by means of a private logging-road leading from No. 3 highway at Galloway. A detailed description of the property is given in the 1930 Annual Report.

During 1966 nine BX-WL holes totalling 4,000 feet were drilled at various points on the surface, and four holes totalling 700 feet were drilled in the tram-line tunnel, which is at an elevation of 4,100 feet. Track and pipe-lines were laid in the tunnel, and approximately 7 miles of access roadways was built to the drill-sites. In addition, a 30- by 60-foot garage was built near the camp, and a new bunk-house and dry were built at the camp. A 15-man crew was employed for 10 months; operations were suspended at the end of October. The work was under the direction of Ross Stanfield.

GEOLOGICAL, GEOPHYSICAL, AND GEOCHEMICAL REPORTS

The Annual Report for 1958 lists all geological, geophysical, and geochemical reports which to that time had been credited for assessment work on mineral claims or placer leases. Since then each annual report lists the reports accepted during the current calendar year.

A copy of each report is filed in the office of the Mining Recorder for the mining division in which the property is located and a second copy is in the office of the Chief of the Mineralogical Branch, Department of Mines and Petroleum Resources, Victoria. These reports are available for examination one year after their date of submission. Because of space limitations in the Victoria office, it is requested that appointments for examination be made in advance.

The property name is that which appears to be in most common use. It is not feasible to list all the claim names in each property. The author of each report is given and the principal for whom the report was written.

The co-ordinate given for each report is the southeast corner of the 1-degree quadrilateral within which the property lies.

REPORTS CREDITED FOR ASSESSMENT, 1966

Geographic Position		Property Owner or Principal Author of Report Date of Submission of Report	Report No.	Kind of Work		
1° Quadr.	Quarter			Geological	Geophysical	Geochemical
49° 115°	S.W.	Cat claims Placid Oil Company. J. S. Scott and R. A. Buckley. December 19, 1966.	863	×	×	----
49° 115°	S.W.	Helg claims Cominco Ltd. R. G. Gifford and J. Richardson. October 11, 1966.	834	×	×	×
49° 115°	N.W.	Lynn, Lead, M.S.S. claims King Resources Company. M. C. Robinson. February 1, 1966.	822	×	----	----
49° 115°	S.W.	Stoney claims Kennco Explorations, (Western) Limited. K. E. Northcote and J. A. Gower. August 5, 1966.	813	----	----	×
49° 116°	N.W.	Eagle and Ann claims Silver Eagle Explorations Ltd. H. Cohen. May 13, 1966.	783	----	×	----
49° 117°	S.W.	Grey Group Trojan Consolidated Mines Ltd. C. B. Selmser. January 24, 1966.	714	----	×	----
49° 117°	S.W.	Northern Belle, View, Snowshoe claims (Mineral Lease No. 17) Cascade Molybdenum Mines Ltd. J. E. Arteaga and M. K. Lorimer. August 18, 1966.	828	----	×	----
49° 118°	S.E.	Ann claims Chromex Nickel Mines Ltd. D. L. Hings. November 28, 1966.	860	----	×	----
49° 118°	S.W.	B.C. Mine, Moe, Lois, and Gilt Edge Groups The Granby Mining Company Limited. P. E. Lane and N. R. Paterson. September 22, 1966.	809	----	×	----

Reports Credited for Assessment, 1966—*Continued*

Geographic Position: 1° Quadr.	Geographic Position: Quarter	Property / Owner or Principal / Author of Report / Date of Submission of Report	Report No.	Kind of Work: Geological	Kind of Work: Geophysical	Kind of Work: Geochemical
49° 118°	S.W.	Boundary Creek No. 1 and July Creek No. 1 Groups (PP claims) Scurry-Rainbow Oil Limited. A. R. Rattew. October 8, 1965.	703	—	×	—
49° 118°	S.W.	Boundary Creek No. 1 Group (PP claims) Scurry-Rainbow Oil Limited. Earl F. Elstone. October 8, 1965.	706	×	—	×
49° 118°	S.W.	Brandon, Marshal, Tio Buracho, Glenside, Little Annie, and Little Brown claims H. H. Shear and I. McCallum. H. H. Shear. November 1, 1966.	827	—	×	×
49° 118°	N.E.	Don Nos. 47 and 48 Bralorne Pioneer Mines Limited. J. P. Weeks. September 2, 1966.	801	—	—	×
49° 118°	S.W.	H & M Groups (Lady of the Lake, Silver Duck, Rob Roy, Falcon) Joseph Paradis. S. A. Mouritsen. August 2, 1966.	805	×	—	×
49° 118°	N.E.	Hope and Don Claims (Waterloo Crown grant) Bralorne Pioneer Mines Limited. J. P. Weeks. October 5, 1966.	817	—	—	×
49° 118°	S.W.	July Creek No. 1 Group and Boundary Creek No. 1 Group (PP and Scurry claims) Scurry-Rainbow Oil Limited. P. E. Lane. October 8, 1965.	705	—	×	—
49° 118°	S.W.	July Creek No. 1 Group (PP claims) Scurry-Rainbow Oil Limited. Earl F. Elstone. October 8, 1965.	704	—	×	—
49° 118°	N.E.	Kingfisher, Dodge, and Par claims J. A. McDougall. S. A. Mouritsen. August 16, 1966.	812	—	×	—
49° 118°	S.W.	Moe Claim Group The Granby Mining Company Limited. P. E. Lane and G. W. Faessler. June 21, 1966.	785	—	×	—
49° 118°	S.W.	Stan Group (Eholt) King Resources Company. M. C. Robinson. May 20, 1966.	768	×	—	—
49° 118°	S.W.	Wendy Group James Forshaw. Robert Wolfe. October 14, 1966.	835	×	×	×
49° 119°	N.E.	Alta, Springfield, King Solomon, and Queen of Sheba claims King Resources Company and O. V. Burkinshaw. M. C. Robinson. April 19, 1966.	770	×	—	—
49° 119°	S.W.	Blue Bell, Bertha, Moly, Huts, Whistler, Treasury, Ianto, Cat, California, Chukar, Osoyoos-Heclar, Dividend, Manx, Eagle, Lakeview, Quail, Bullfrog, Bullseye, Gem, Copper King, Tiger, Molka, Orient, Lion claims Torbrit Silver Mines Limited. E. L. Gregotski and P. E. Lane. May 30, 1966.	808	—	×	—
49° 119°	N.W.	Camp Group (C.H. and Lyla claims) King Resources Company, O. V. Burkinshaw, D. Longacre, E. H. Ewer. M. C. Robinson. April 1, 1966.	766	×	—	—

REPORTS CREDITED FOR ASSESSMENT, 1966—*Continued*

Geographic Position 1° Quadr.	Quarter	Property / Owner or Principal / Author of Report / Date of Submission of Report	Report No.	Geological	Geophysical	Geochemical
49° 119°	S.W.	Penx Group (Penticton and Apex claims) W. Wallin and M. Streber. B. K. McKnight. August 18, 1966.	803	—	×	—
49° 119°	N.W.	Silver King Group (Rat and Big Daddy claims) O. V. Burkinshaw. M. C. Robinson. October 15, 1965.	718	×	—	—
49° 120°	S.E.	Bem Group (Voight Camp) Cumont Mines Limited. E. M. Wilson. November 18, 1966.	838	—	×	×
49° 120°	N.E.	Brenda Lake Group (McK, Wilson, and Ian claims) Komo Explorations Ltd. R. Philp. December 13, 1966.	864	—	—	×
49° 120°	N.W.	Doe, Gay, Kane, Salem, and A.K. claims T.C. Explorations Ltd. P. Sullivan. October 31, 1966.	840	—	×	—
49° 120°	S.W.	Elk, Ilk and Ni claims The Hanna Mining Company. Robert A. Bell. January 20, 1966.	751	—	×	—
49° 120°	N.E.	ELN Group D. W. Smellie. D. W. Smellie. April 29, 1966.	760	—	×	—
49° 120°	N.E.	ELN Group D. W. Smellie. D. W. Smellie. May 24, 1966.	779	—	×	—
49° 120°	N.W.	Independence Group (FRM, Low, Ponoka claims) Bethex Explorations Ltd. C. J. Coveney and R. P. Chilcott. October 29, 1965.	707	×	×	—
49° 120°	N.W.	Independence Group (Ponoka, FRM claims) Bethex Explorations Ltd. R. K. Watson and P. E. Lane. October 29, 1965.	708	—	×	—
49° 120°	N.E.	SHR and JOY Groups D. W. Smellie. D. W. Smellie. May 24, 1966.	778	—	×	—
49° 120°	N.E.	Tail, Head, Sun, and Noon Christina Lake Mines Ltd. D. W. Smellie and M. K. Lorimer. November 30, 1966.	850	—	×	—
49° 122°	N.W.	Max claims D. R. Cochrane. D. R. Cochrane. June 15, 1966.	782	—	—	×
49° 123°	N.E.	Zel claims Bralorne Pioneer Mines Limited. W. Leszczyszyn. August 30, 1965.	752	×	—	—
49° 125°	N.W.	Cream and Bear claims Frank A. Lang. D. L. Hings. September 23, 1966.	826	—	×	—
49° 125°	S.W.	Lone Cone No. 13 (Meares) Lindale Copper Mines Ltd. J. J. McDougall. March 9, 1965.	739	—	×	×
49° 125°	N.E.	ME Group Mt. Washington Copper Co. Ltd. W. G. Stevenson. November 10, 1966.	839	—	—	×

REPORTS CREDITED FOR ASSESSMENT, 1966—*Continued*

Geographic Position		Property / Owner or Principal / Author of Report / Date of Submission of Report	Report No.	Kind of Work		
1° Quadr.	Quarter			Geological	Geophysical	Geochemical
49° 125°	S.E.	Orphan Boy claims Alberni Mines Ltd. R. Jury. June 17, 1966.	777	×	×	—
49° 126°	N.E.	Nimpkish Copper Group (N.C. claims) Empire Development Company Limited. John C. Lund. February 3, 1966.	728	×	—	—
49° 126°	N.E.	Oktwansh Group Empire Development Company Limited. John C. Lund. February 2, 1966.	743	×	—	—
50° 116°	N.W.	Lead Queen Group Silverton Explorations Ltd. H. C. B. Leitch. June 14, 1966.	796	×	—	—
50° 117°	S.E.	KAT Group D. W. Smellie. D. W. Smellie. September 28, 1966.	824	—	×	—
50° 120°	N.E.	BEE Group Mineral Mountain Mining Co. Ltd. Joseph Sullivan. April 28, 1966.	772	—	×	—
50° 120°	N.W.	Bell, Bill, Keith claims Merritt Copper Syndicate. D. L. Hings. January 13, 1966.	736	—	×	—
50° 120°	S.W.	Bruce, Pick claims Cleveland Mining & Smelting Co. Ltd. F. J. Hemsworth. September 8, 1966.	802	—	—	×
50° 120°	N.W.	Eden 1–20 New Indian Mines Ltd. and Vananda Explorations Ltd. F. J. Hemsworth. January 19, 1966.	711	—	—	×
50° 120°	S.W.	Eve Group Arthur Lake. R. E. Renshaw. June 6, 1966.	795	—	—	×
50° 120°	N.E.	Hal claims Madison Oils Limited. E. P. Sheppard and John F. Schaefle. October 14, 1966.	820	—	×	—
50° 120°	N.E.	Hal claims Madison Oils Limited. E. P. Sheppard. September 28, 1966.	821	×	×	—
50° 120°	N.W.	Lux claims Canzac Mines Ltd. A. R. Dodds. February 4, 1966.	781	—	×	—
50° 120°	S.W.	Mid East, North, and South Groups Bralorne Pioneer Mines Limited. J. P. Weeks. April 26, 1966.	764	—	×	—
50° 120°	S.W.	Mid East, South East, South West, and North Groups Bralorne Pioneer Mines Limited. J. P. Weeks. March 21, 1966.	749	—	—	×
50° 120°	S.W.	Mid East, South West, South East, and North Groups Bralorne Pioneer Mines Limited. J. P. Weeks. March 2, 1966.	737	—	×	—
50° 120°	N.E.	Mix claims Continental Potash Corporation Limited. E. B. Nicholls. December 13, 1965.	725	—	×	—

REPORTS CREDITED FOR ASSESSMENT, 1966—*Continued*

Geographic Position: 1° Quadr.	Geographic Position: Quarter	Property / Owner or Principal / Author of Report / Date of Submission of Report	Report No.	Kind of Work: Geological	Kind of Work: Geophysical	Kind of Work: Geochemical
50° 120°	N.E.	Rolling Hills property Rolling Hills Copper Mines Ltd. E. B. Nicholls. January 4, 1966.	742	—	×	—
50° 120°	S.W.	Rick Group Ramada Mines Limited. F. J. Hemsworth. May 16, 1966.	763	—	×	—
50° 120°	S.E.	RO, Lorna, and I.C. claims Vanco Explorations Limited. W. G. Wahl, A. R. Rattew, and J. C. Denholm. December 14, 1965.	727	—	×	—
50° 120°	N.E.	RO claims Consolidated Negus Mines Ltd. E. B. Nicholls. December 13, 1965.	722	—	×	—
50° 120°	N.E.	RO and Mix claims Bata Resources Limited. E. B. Nicholls. December 13, 1965.	723	—	×	—
50° 120°	S.E.	Ruth and Esther claims Ramada Mines Limited. F. J. Hemsworth. March 24, 1966.	748	—	×	—
50° 120°	S.E.	Satan, Pam, Wade claims Rolling Hills Copper Mines Limited. A. R. Rattew and J. G. Denholm. January 4, 1966.	724	—	×	—
50° 120°	N.W.	Tyner Lake claims Boraway Mines Ltd. Harvey H. Cohen. March 21, 1966.	755	—	×	—
50° 120°	N.W.	W.D.R. Group No. 1 and No. 2 Valley Copper Mines Limited. J. M. Allen. May 18, 1966.	784	×	×	×
50° 121°	N.W.	Alamo Group San Jacinto Explorations Limited. Robert A. Bell and Philip G. Hallof. March 21, 1966.	762	—	×	—
50° 121°	S.E.	Cana and Royal claims Royal Canadian Ventures Ltd. G. E. White. December 13, 1966.	854	—	×	—
50° 121°	S.E.	Cana, Royal, and R.C. claims Royal Canadian Ventures Ltd. N. B. Vollo. November 25, 1966.	848	×	—	×
50° 121°	S.E.	Fir Group Glen Echo Mines Limited. H. S. Wilson. July 26, 1966.	786	×	×	—
50° 121°	S.E.	Lake, Laken, and Spot T.C. Explorations Ltd. Harold O. Seigel and A. C. Skerl. December 7, 1966.	855	—	×	—
50° 121°	S.E.	Marb and Apache claims Torwest Resources (1962) Ltd. A.C.A. Howe and J. C. Rowntree. February 9, 1966.	735	×	—	—
50° 121°	S.E.	P.M., P.I.M., Bron, IL, and Oversight T.C. Explorations Ltd. A. F. Roberts and A. C. Skerl. December 7, 1966.	853	—	×	×
50° 121°	N.E.	Rez 1–6 North Pacific Mines Ltd. Alfred R. Allen. July 5, 1966.	806	—	—	×

Reports Credited for Assessment, 1966—*Continued*

Geographic Position		Property / Owner or Principal / Author of Report / Date of Submission of Report	Report No.	Kind of Work		
1° Quadr.	Quarter			Geological	Geophysical	Geochemical
50° 121°	S.E.	Rio West and East Groups Rio Tinto Canadian Exploration Limited. L. B. Gatenby. May 10, 1966.	780	×	—	×
50° 121°	N.W.	Valley Copper Nos. 12 and 13 Groups Valley Copper Mines Limited. J. M. Allen. March 21, 1966.	750	×	—	—
50° 123°	S.E.	Elk claims Mining Corporation of Canada (1964) Limited. W. Rainboth. April 21, 1966.	756	—	×	×
50° 123°	S.W.	Robin and Stib claims G. Harold Clarke and Len Belliveau. E. Percy Sheppard. October 7, 1966.	837	×	—	—
50° 125°	S.E.	Nab and Lake Groups Big Lake Mines Ltd. Franklin L. C. Price. September 22, 1966.	852	—	—	×
50° 125°	N.E.	Salal Creek Molybdenite Property Amax Exploration, Inc. D. K. Mustard, P. E. Fox, and R. A. Barker. November 18, 1965.	709	×	—	—
50° 126°	S.W.	Hazel and Alpha claims Empire Development Company Limited. Andrew R. Dodds. October 26, 1966.	832	—	×	—
50° 126°	S.W.	Hazel, Alpha and Pie claims (Kinman Group) Empire Development Company Limited. John Lamb and John C. Lund. October 26, 1966.	831	×	—	—
50° 126°	S.W.	Zip claims Cominco Ltd. A. C. N. deVoogd. May 19, 1966.	765	—	×	—
50° 127°	N.W.	Bay claims Utah Construction & Mining Co. G. A. Noel. February 28, 1966.	731	—	—	×
50° 127°	N.W.	Bay claims Utah Construction & Mining Co. G. A. Noel. February 28, 1966.	738	—	—	×
50° 127°	N.W. N.E.	Bay and Cove claims Utah Construction & Mining Co. G. A. Noel. January 17, 1966.	710	×	×	—
50° 127°	N.W.	Wanokana 1–6 Utah Construction & Mining Co. G. A. Noel. September 9, 1966.	804	—	×	×
51° 117°	S.E.	Bobbie Burns Group (KM claims) Hellroaring Silver Lead Ltd. S. J. Hunter. December 21, 1966.	865	×	—	—
51° 118°	S.E.	Hiren, Copeland, Jordan, and Revelstoke Groups King Resources Company. George A. Wilson. April 29, 1966.	776	×	—	—
51° 119°	S.W.	Leemac, Boomac, B-Mac, and Star Kamstar Mines Ltd. Clemens T. Pasieka. June 17, 1966.	807	—	×	—
51° 120°	N.E.	Friendly Lake No. 1 (RO, SO) Anaconda American Brass Limited. P. E. Hirst. July 21, 1966.	788	—	—	×

REPORTS CREDITED FOR ASSESSMENT, 1966—*Continued*

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1° Quadr.	Quarter			Geological	Geophysical	Geochemical
51° 120°	N.E.	Friendly Lake No. 2 (RO) Anaconda American Brass Limited. P. E. Hirst. July 21, 1966.	789	—	—	×
51° 120°	N.E.	Friendly Lake No. 2 (SO) Anaconda American Brass Limited. P. E. Hirst. July 21, 1966.	754	—	—	×
51° 120°	N.E.	Friendly Lake No. 3 (RO, SO) Anaconda American Brass Limited. P. E. Hirst. July 21, 1966.	790	—	—	×
51° 120°	N.E.	Friendly Lake No. 4 (RO) Anaconda American Brass Limited. P. E. Hirst. July 21, 1966.	791	—	—	×
51° 120°	N.E.	Friendly Lake No. 4 (RO, SO) Anaconda American Brass Limited. P. E. Hirst. July 21, 1966.	753	—	—	×
51° 120°	N.E.	Friendly Lake No. 5 (RO, SO) Anaconda American Brass Limited. P. E. Hirst. July 21, 1966.	792	—	—	×
52° 121°	S.E.	Limecap, Copperridge, and Morehead Milestone Mining & Development Co. Ltd. C. B. Selmser. October 11, 1966.	815	—	×	—
52° 121°	N.W.	Marnie and Kate claims Chataway Exploration Co. Ltd. S. W. Wright. December 9, 1966.	862	—	—	×
52° 122°	N.E.	GM Group Keevil Mining Group Limited. Richard Addison. February 14, 1966.	744	—	—	×
53° 127°	S.E.	Ace claims Omineca Sixty Four Syndicate. D. C. Malcolm. February 3, 1966.	730	×	—	—
53° 127°	S.E.	Deuce claims Omineca Sixty Four Syndicate. D. C. Malcolm. February 3, 1966.	729	—	—	×
53° 127°	S.E.	Ice 1–8 Northwest 66 Syndicate. D. C. Malcolm. February 3, 1966.	732	×	—	—
54° 124°	N.E.	Ban claims Cominco Ltd. D. W. Heddle. November 16, 1965.	721	—	—	×
54° 124°	N.E.	Merc claims Cominco Ltd. D. W. Heddle. November 24, 1965.	716	—	—	×
54° 124°	N.W.	Ora claims Cominco Ltd. D. W. Heddle. December 29, 1965.	720	—	—	×
54° 124°	S.E.	Pinchi Group (Wilmar and Mar claims) Cominco Ltd. D. W. Heddle. June 7, 1966.	774	—	—	×
54° 124°	N.E.	Will claims Cominco Ltd. D. W. Heddle. December 29, 1965.	719	—	—	×

REPORTS CREDITED FOR ASSESSMENT, 1966—*Continued*

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1° Quadr.	Quarter			Geological	Geophysical	Geochemical
54° 125°	S.E.	Garnett Group (Poop and End claims) United Buffadison Mines Limited. Ian F. Morton. August 30, 1966.	867	—	—	×
54° 125°	S.E.	Lorne claims Amax Exploration, Inc. N. Shepherd and R. A. Barker. June 16, 1966.	787	×	×	×
54° 125°	S.E.	RI claims Glenn Explorations Limited. E. B. Nicholls. January 31, 1966.	715	×	—	×
54° 126°	N.W.	Big Onion Property Texas Gulf Sulphur Company. J. B. Boniwell. September 16, 1966.	830	—	×	—
54° 126°	N.E.	Code claims Julian Mining Co. Ltd. Roderick Macrae. June 9, 1966.	799	—	—	×
54° 126°	N.W.	Huber and Mineral Hill claims Molymine Explorations Ltd. A. R. Dodds. April 14, 1966.	757	—	×	—
54° 126°	N.E.	Jen claims R. Wolfe. D. R. Cochrane. August 18, 1966.	810	—	×	×
54° 126°	N.E.	Ketza claims J. H. Montgomery. D. R. Cochrane. September 9, 1966.	844	—	×	×
54° 126°	N.W.	Len, Wedge, Silver Fox, Ruth claims Copper Ridge Mines Ltd. C. B. Selmser. February 9, 1966.	726	—	×	—
54° 126°	S.W.	Morice Mountain Prospect (Van, Wid, Wyk claims) Amax Exploration, Inc. P. G. Hallof and D. B. Sutherland. August 8, 1966.	797	—	×	—
54° 126°	N.E.	Rum claims R. Wolfe. D. R. Cochrane. August 18, 1966.	811	—	×	×
54° 128°	N.E.	Dug claims Amax Exploration, Inc. D. J. Murphy and P. W. Richardson. August 25, 1966.	798	×	—	×
54° 128°	S.E.	Grade, ALG, ELM, T, DA, GR, DAKO claims Francois Lake Mines Limited and National Explorations Limited. E. Amendolagine. March 11, 1966.	758	×	—	—
54° 128°	S.E.	Kitimat River MoS_2 Property (Hony, Bee, Ell, Liza, Barbs, Mel, etc. claims) Amax Exploration, Inc. R. A. Bell and D. B. Sutherland. May 27, 1966.	775	—	×	—
54° 128°	S.E.	Kitimat River MoS_2 Property (Hony, Bee, Ell, Liza, Barbs, Mel, etc. claims) Amax Exploration, Inc. A. C. Gambardella and P. W. Richardson. August 26, 1966.	818	×	—	×
54° 128°	S.W.	Knob claims G. L. Oates. E. E. Mason. September 1, 1966.	823	—	×	—

Reports Credited for Assessment, 1966—*Continued*

Geographic Position: 1° Quadr.	Geographic Position: Quarter	Property / Owner or Principal / Author of Report / Date of Submission of Report	Report No.	Kind of Work: Geological	Kind of Work: Geophysical	Kind of Work: Geochemical
54° 128°	N.E.	Lynda and Sno claims Amax Exploration, Inc. P. R. Kennedy and P. W. Richardson. September 20, 1966.	843	×	—	×
54° 128°	N.E.	M.C. claims Coast Range Explorations Ltd. R. E. Chaplin. July 12, 1966.	829	×	—	×
54° 128°	N.E.	SQ claims Coast Range Explorations Ltd. Robert E. Chaplin and Donald W. Smellie. August 5, 1966.	800	×	×	×
55° 124°	S.W.	Night Hawk Group (S.K. and R.T. claims) David L. Moore. J. P. Jemmett and H. Veerman. November 24, 1966.	851	—	×	—
55° 125°	N.E.	Bob claims North Star Explorations Ltd. Gavin Dirom. September 19, 1966.	816	×	—	—
55° 126°	S.E.	Bee claims F. Chow and T. Rolston. W. M. Sirola. April 6, 1966.	761	—	×	×
55° 126°	S.E.	Kam claims D. MacRae, F. Chow, and T. Rolston. W. M. Sirola. March 10, 1966.	746	—	×	×
55° 127°	S.E.	Tee claims Falconbridge Nickel Mines Limited. B. E. Lowes and S. N. Charteris. August 1, 1966.	793	×	—	—
55° 129°	N.E.	Kinskuch Property Forest Kerr Mines Ltd. E. Amendolagine. September 17, 1965.	712	×	×	—
55° 129°	S.E.	Moly claims Bell Molybdenum Mines Limited. W. R. Bacon. September 26, 1966.	814	—	—	×
55° 129°	S.E.	Snafu claims Nass River Mines Limited. P. G. Hallof and F. Charlton. June 21, 1966.	794	×	×	—
56° 126°	S.E.	Kaza Group (Fred claims) North Star Explorations Ltd. W. H. White and A. J. Sinclair. September 19, 1966.	833	×	—	—
56° 129°	S.W.	Aztec Group (B.C. claims) Canex Aerial Exploration Ltd. G. Bird and L. Adie. April 13, 1966.	759	×	×	×
56° 129°	S.W.	Mobile claims Anglo United Development Corporation Limited. H. L. Hill and M. K. Lorimer. March 4, 1966.	745	—	—	×
56° 130°	N.E.	C. A. claims Silver Ridge Mining Co. Ltd. L. J. Manning. September 30, 1966.	836	—	—	×
56° 130°	N.W.	E and L claims Silver Standard Mines Limited. W. M. Sharp. February 4, 1966.	741	×	—	—

REPORTS CREDITED FOR ASSESSMENT, 1966—*Continued*

Geographic Position		Property / Owner or Principal / Author of Report / Date of Submission of Report	Report No.	Kind of Work		
1° Quadr.	Quarter			Geological	Geophysical	Geochemical
56° 131°	N.E.	Don, Son, Pang and Bron claims Tuksi Mining & Development Company Limited, Copper Soo Mining Company Limited, and Cominco Ltd. G. Parsons. May 6, 1966.	769	×	—	—
57° 130°	S.W.	AC and Alpha claims Stikine River Mines Ltd. R. H. Dawson and A. O. Hall. October 4, 1966.	846	×	—	×
57° 131°	S.E.	CW claims Conwest Exploration Company Limited. A. R. Dodds. March 21, 1966.	747	—	×	—
57° 131°	N.W.	Gordon claims Kennco Explorations, (Western) Limited. P. G. Hallof. August 29, 1966.	847	—	×	—
57° 131°	S.W.	Rex, Sal, Rum claims New Indian Mines Ltd. D. H. James. December 21, 1965.	733	×	—	—
57° 131°	S.W.	S.C. claims Bralorne Pioneer Mines Limited. D. H. James. December 20, 1965.	713	×	—	×
57° 131°	N.W.	Shakes East Group and Shakes West Group (MH claims) Stikine Iron Mines Ltd. J. F. McIntyre. March 8, 1966.	773	×	×	—
58° 128°	S.W.	B and N claims Francis Bull and Material Trucking Co. Ltd. C. F. Millar. September 26, 1966.	825	×	—	—
58° 129°	S.W.	Horn claims United States Smelting, Refining & Mining Co. R. D. Westervelt. December 6, 1966.	849	—	×	×
58° 129°	S.W.	May claims Newconex Canadian Exploration Limited. J. S. Ives. May 17, 1966.	771	×	×	—
58° 129°	S.W.	Moss claims Lytton Minerals Limited. D. W. Asbury. November 2, 1966.	845	—	×	×
58° 129°	S.W.	November claims Lytton Minerals Limited. D. W. Asbury. November 28, 1966.	842	—	×	×
58° 132°	N.W.	Sparling and Banker Groups New Taku Mines Limited. C. B. Selmser. September 9, 1966.	841	—	×	—
59° 127°	N.E.	Beaver, Bear, Moose claims Magnet Cove Barium Corporation Ltd. H. C. Bickel. April 21, 1966.	767	—	×	—
59° 130°	N.E.	Amy Group Rancheria Mining Company Limited. W. H. Gross. August 9, 1965.	734	×	×	×
59° 136°	N.W.	C and E claims G. J. Curzon and W. M. Erwin. W. M. Erwin. December 17, 1965.	740	×	×	×

Placer

CONTENTS

ATLIN MINING DIVISION

(By H. Bapty)

Squaw Creek (59° 137° N.E.)

Ad Astra Minerals Ltd. is reported to have bulldozed approximately 4,630 yards of gravel with a D-8 Caterpillar tractor.

Spruce Creek (59° 133° N.W.)

Noland Mines Limited employed two men who sluiced 3,500 yards of gravel.

Allan V. Mattson, helped by one other man, in 21 days sluiced 1,000 yards of gravel.

Assessment work was done on the leases of Spruce Creek Placers Limited.

Pine Creek (59° 133° N.W.)

On P.M.L. 705 Karl Sieger, with three helpers, sluiced 500 yards. On P.M.L. 1476 one man in early August stripped 1,000 yards of overburden with a bulldozer.

On P.M.L. 1382 Fred Graham, at intervals throughout the summer, sluiced 400 yards.

William Husselbee sluiced 1,250 yards. This was done between the end of June and the middle of September.

In August, S. R. Craft, with the help of two men, removed 1,500 yards by dragline.

McKee Creek (59° 133° S.W.)

Luigi Piccolo reported hydraulicking 10,000 yards of gravel. Two men were employed throughout the total working period. Time was also spent on flume-building and dam construction.

Bruce Morton, with the help of one man, hydraulicked 29,000 yards of gravel. Considerable time was spent on rebuilding flume and constructing a pressure box.

LIARD MINING DIVISION

(By W. G. Clarke)

McDame Creek (59° 129° S.E.)

George Zimick continued to work his leases at Centreville. Previously he moved gravel with a monitor, but now he is clearing the old tailings with a bulldozer. The upturned slate bedrock is cleaned and is bulldozed into a sluice-box. Some coarse nuggets were recovered.

Dease Lake (59° 130° N.E.)

Ben Seywerd and Ben Able reported a good year. They recovered several boulders of good-quality jade from the Greengold jade leases on Sawmill Creek.

John Stumpf, who has a lease farther up Sawmill Creek, recovered one jade boulder.

Wheaton Creek (58° 128° S.W.)

C. O. and D. Davis are reported to have had three men and a dragline scraper working on the lease they purchased from Eric Larson. They are producing jade as well as gold.

Jack Fillion and Walter Elliot worked Earl Faulkner's ground, on a royalty basis.

Gerry Davis flew several thousand pounds of jade out to Dease Lake from his lease on Wheaton Creek.

LIMPOKE CREEK (57° 131° N.W.)

It has been reported that a small suction dredge was flown into Limpoke Creek by helicopter to test old placer ground.

HYLAND RIVER (59° 128° N.E.)

Brycon Explorations Ltd. (742 Denman Street, Vancouver 5) made some tests on leases formerly worked by Steve Serli. The equipment consisted of a ⅓-yard back-hoe and a washing plant. Four men worked for about three months. Steve Serli was in charge of the work.

OMINECA MINING DIVISION

MANSON CREEK (55° 124° N.W.)

(By W. G. Clarke)

Two suction dredges worked for a short time on leases held by The Martin Mines Limited (Mrs. W. Tait, president). A small dredge, with an 8-inch suction head, built and owned by Ike Arn, of Penticton, operated on Manson Creek just below Slate Creek. A larger dredge, with an 11-inch suction head, owned by Grizzley Gold Mines Ltd. of Penticton and built by Mr. Arn, worked on Germansen River. Some gold recovery was reported.

Lincoln Enterprises Limited (Mrs. Letitia Bown, president) had a small washing plant on Manson Creek, south of the village. Mining was done with a small front-end loader which dumped onto an elevating conveyor, which discharged into a bin that fed five sluice-boxes. A crew of about six men worked all summer.

CARIBOO MINING DIVISION

LIGHTNING CREEK (53° 122° S.E.)

(By W. G. Clarke)

Tom Crawford rebuilt the road to his leases upstream from Stanley. He has installed a small monitor and is continuing to work upstream from the old Vancouver shaft.

COULTER CREEK (53° 121° S.W.)

(By W. G. Clarke)

Fleurmont Placer Development Ltd. reported that three men worked its leases for a short time.

WILLIAMS CREEK (53° 121° S.E.)

(By W. G. Clarke)

Benischke Mines Ltd. built a ditch into its lease east of the Barkerville museum.

GROUSE CREEK (53° 121° S.E.)

(By W. G. Clarke)

Grouse Creek Mines Ltd. Company office, 514, 615 West Pender Street, Vancouver 2. D. G. McRae, president. This property is 5 miles from Barkerville and is connected by a gravel road. In 1966 the No. 2 shaft, 9½ by 5½ feet, two compartments, was sunk to a depth of 61 feet and a drift was driven 56 feet below the collar for a distance of 69 feet. When the gutter could not be found, the shaft was abandoned. An attempt was made to reopen the old Heron shaft, but this had to be abandoned. A new incline was collared at the creek to intersect the old workings. At the bottom of the incline a drift was driven in bedrock parallel to the old stopes and slightly above them. Some 8 to 9 ounces of very coarse gold was reported to have been recovered. The camp has accommodation for 15 men and consists of a cook-house, dry-house, three bunk-houses, and a trailer. Mine equipment includes a 150-cubic-feet-per-minute compressor, a 30-horsepower hoist, a mucking-machine, three cars, pumps, drills, fans, etc. An average crew of seven to eight men worked throughout the year under various supervisors.

The Kloopman brothers continued hydraulicking on Andy McGuire's lease above Grouse Creek Mines Ltd.

Andy McGuire spent the summer farther up the creek on his other lease.

Antler Creek (53° 121° S.E.)

(By W. G. Clarke)

J. Warawa (Three J's Mining Company) had four men and a D-4 Caterpillar reopening an old channel on Beggs Gulch.

Mr. Kelly did some work at California Gulch.

Cedar Creek (52° 121° N.E.)

(By T. M. Waterland)

Spanish Placers Ltd. leased the Ogden placer-mining leases Nos. 5907 and 5908, located 600 feet above Quesnel Lake on the north side of Cedar Creek, and by early July had nearly completed preparatory work.

A 20- by 40- by 8-foot sluice plant has been built and lined with ⅜-inch M.S. plate. The sluice-plate was to feed a 30-inch sluice-box. Placer gravels are to be loaded into a truck with a caterpillar front-end loader and hauled to the sluice-plate. Water was to be pumped from a small dam by a 14- by 12-inch Myron Jackson diesel-powered pump and fed to a monitor through a 12-inch hydraulic pipe. Tailings were to be impounded by a brush dam built below the sluice-box. Two men worked at the property with Mr. Doug Harris acting as manager.

Keithley Creek (52° 121° N.E.)

(By T. M. Waterland)

Ernest Lang, with two men, worked on his underground placer operation on P.M.L. 3829, about 1,700 feet below the confluence of Snowshoe and Keithley Creeks. A 25-foot vertical shaft has been sunk in the placer gravels, and a drift is being driven in the opposite direction to the one driven the previous year. Compressed air is provided by a 100-cubic-feet-per-minute gasoline-powered compressor and water is removed with a gasoline-powered pump. Charles H. Pitt, of Vernon, is a partner in this operation.

The crew lives in a cabin at the mine. Access is via a dirt road for 8 miles from the mouth of Keithley Creek and thence by about 2 miles of jeep-road to the property.

Morehead Creek (52° 121° N.W.)

McMartin Explorations Ltd. (By T. M. Waterland) — Company office, 1232 Flury Road, Richmond. N. Pentecost, president. The company operated No. 9 and No. 6 monitors on Little Lake Creek, a tributary to Morehead Creek. Water for the monitors is fed through about 1,000 feet of 40-inch pipe, and the gravel is hydraulicked through a 40-inch sluice. Work at the property was supervised by Arthur Christmas.

CLINTON MINING DIVISION

Fairless Creek and Borin Creek (51° 122° S.W.)

Fairborn Mines Ltd. (By T. M. Waterland) Company office, 401, 402 West Pender Street, Vancouver 3. James L. Frese, field manager. The property consists of 12 placer leases on Fairless and Borin Creeks at about 5,000 feet elevation on Black Dome Mountain, some 50 miles northwest of Clinton. Access is by road from Clinton.

Work was done over a six-month period and consisted of surface clearing, some 2,000 feet of bulldozer trenching for testing purposes, and construction of 3 miles of road. All work was done by the company. An average of four men was employed under the supervision of Mr. Frese. The property was not visited.

LILLOOET MINING DIVISION

Fraser River (50° 121° N.W.)

P.M.L. 862 (Northwest Underwater Mining Co.) (By T. M. Waterland) Company address, Box 677, Lillooet. Marvin Allex, manager. The Big Slide Mining Company optioned P.M.L. 862, located on the Fraser River just upstream from the junction of Texas Creek from Northwest Underwater Mining Co., and at year-end was preparing a dredge for operation. The dredge consists of a compartmentalized plywood barge on which is mounted a centrifugal pump powered by an industrial gasoline engine. The placer gravels are to be pumped through a 4-inch-diameter pipe and run over riffles and an " undercurrent box." The intake pipe can be moved about by means of hydraulic cylinders. The coarse gravels and light sands are to be discharged into the river, and the black sands are then to be taken ashore and panned with a pan-o-matic panner powered by a gasoline engine.

NELSON MINING DIVISION

Goat River (49° 116° S.W.)

Goat River Placer (By P. E. Olson) Office address, 1222—18th Street Northwest, Calgary, Alta. Ten placer leases were located on Goat River, about 2 miles east of the Creston–Rykerts highway. A geologist, Stanley Lewicki, investigated the area for A. C. Halvorson, of Warner, Alta.

Some testing was done with a front-end loader near a government gravel pit on the north side of the river. Subsequently, a large-scale testing programme was launched, using a semi-portable concentrator, a 1-cubic-yard dragline, a 100-kva. generator, a D-6 bulldozer, and a double-deck vibrating screen. The concentrator, which was built in Edmonton, used some new principles, such as vortexes and cyclones, to remove placer gold from gravel. No gold was recovered, and the operation was shut down.

FORT STEELE MINING DIVISION

Moyie River (49° 115° S.W.)

(By D. R. Morgan)

Early in 1966 T. O. Bloomer and P. Kotush, of Kimberley, did a small amount of work in one of the adits on the Monilee at the lower end of the falls on Moyie River. Further operations were abandoned later in the spring.

Maus Creek (49° 115° N.W.)

Maus Minerals Ltd. (By D. R. Morgan) Registered office, 209 British Canadian Trust Building, Lethbridge, Alta. G. R. Castles, president. This company, formed in 1964, holds a controlling interest in four placer leases on Maus Creek, 4 miles east of Fort Steele. The property contains two shallow shafts that have been sunk to bedrock. A crew of three men extended a small drift at the bottom of the Strickland shaft during a short period in June, 1966.

Lisbon Creek (49° 115° N.W.)

(By D. R. Morgan)

R. F. Williams and W. Kludash, of Kimberley, extended the adit they have on their placer lease at the confluence of Lisbon and Perry Creeks a distance of 15 feet during the summer of 1966. The work was confined to week-ends.

GOLDEN MINING DIVISION

Findlay Creek (50° 115° S.W.)

(By D. R. Morgan)

Three placer-mining leases at and upstream from the confluence of Deer and Findlay Creeks, 12 miles west of Canal Flats, were held by A. E. Hobbs and A. C. Halvorson. The two partners made an attempt to operate equipment that was brought in at the latter part of 1965. The equipment was found to be unsuitable and was removed.

Roy McKellor, of Calgary, Alta., working alone for a few weeks during the summer of 1966, hydraulicked and sluiced approximately 150 yards of gravel from his P.M.L. 261 on the south side of Findlay Creek downstream from the confluence of Deer Creek, 12 miles west of Canal Flats.

Structural Materials and Industrial Minerals

CONTENTS

ASBESTOS

Cassiar Asbestos Corporation Limited (By W. G. Clarke) Mount McDame (59° 129° S.W.). Head office, 1001, 85 Richmond Street West, Toronto, Ont.; mine office, Cassiar. J. D. Christian, president; A. C. Beguin, general superintendent. The property, which consists of 42 Crown-granted claims and five leased claims, is 86 miles by road southwesterly from Mile 648.8 on the Alaska highway. The open-pit mine is on the top of Mount McDame, between 5,900 and 7,000 feet elevation, while the mill and townsite are in Troutline Creek valley at 3,500 feet elevation.

Annual production increased again in 1966. Slightly more than 900,000 tons of ore was mined from seven benches between 5,900 and 6,110 feet elevation, and almost 4,500,000 tons of waste was mined from 16 benches between 5,900 and 6,710 feet elevation. The rock-reject plant at the mine treated 642,217 tons, rejecting 181,477 tons or 28 per cent. A total of 720,231 tons of concentrates and raw ore was delivered to the mill, about 70 per cent by tram-line and the remainder by truck. The mill produced 87,901 tons of fibre. There were approximately 500 employees.

While there was no new plant construction in 1966, services were extended in the townsite and one Pan-abode and two frame houses were built. Two new power units were installed at the plant. A tractor and a front-end loader were purchased. (*See* Annual Report, 1960, pp. 127–128.)

Ace (Canadian Johns-Manville Company Limited) (By H. Bapty)

(58° 132° N.E.) Company office, P.O. Box 1500, Asbestos, Que.; British Columbia office, 1955 West Fourth Avenue, Vancouver 9. E. L. Mann, chief geologist. This company investigated 15 mineral claims held by record on a chrysotile asbestos showing. The claims are 77 miles southeast of Atlin, about 4 miles due west of Nahlin Mountain, at the head of Teditua Creek, a tributary of the Inklin River. Two geologists, C. Aspinal and C. Stadler, with two assistants worked for two months mapping the claims geologically. They also ran a magnetometer survey along a base-line. Some regional geochemical sampling and prospecting were done. Chrysotile fibre was found within serpentinized peridotite. Transportation was by helicopter. The property was not visited.

Kutcho Creek Asbestos (Kutcho Creek Asbestos Company Limited) (By J. W. McCammon and W. G. Clarke)

(58° 128° S.W.) Head office, 1001, 85 Richmond Street West, Toronto, Ont.; field office, Cassiar. This company is one of the Cassiar Asbestos Corporation group. The property, formerly known as the Letain Asbestos Prospect, consists of 318 claims—28 Crown granted and the rest held by record—all controlled by the company. The main showings are 2½ miles northeast of Letain Lake, about 50 miles east of the south end of Dease Lake. The deposit consists of cross-fibre chrysotile asbestos fissure fillings in a serpentinized peridotite stock. The serpentine host rock outcrops along the top of a ridge and is visible for miles.

During 1966, 17 men worked for five months under the direction of W. N. Plumb, chief geologist. M. S. Bell, geologist, was in charge of the field work. Early in the year some 290 tons of equipment and supplies were taken in by " Cat " train from Dease Lake. During the summer months there was a weekly supply flight from Good Hope Lake. A camp, consisting of eight tents on frames and one prefabricated building, was erected on the property. An access road, 12,000 feet long, was built from the camp to Letain Lake, where a small dock was constructed. A considerable area around the showings was mapped geologically, 10 line miles of ground magnetometer survey was run, 24,400 feet of trenching was bulldozed, and six NX-WL diamond-drill holes totalling 3,277 feet were drilled.

BARITE

Mountain Minerals Limited (By D. R. Morgan)

Company office, P.O. Box 700, 529 Sixth Street South, Lethbridge, Alta. R. A. Thrall, managing director; William McPherson, superintendent. This company owns and operates two barite properties in the Columbia valley, south of Golden. One is at Brisco (50° 116° N.E.) and the other at Parson (51° 116° S.W.). They are worked at alternate periods by the same crew of men. A detailed description of both properties has been given in past Annual Reports.

Most of the activity in 1966 was at the Brisco operation, where a crew of three men mined and crushed 7,353 tons of crude barite and shipped it to the company's processing plant at Lethbridge. The barite was mined from the underground drift below the No. 1 quarry, and was crushed at a small plant near the railway siding at Brisco. Approximately 140 feet of development work was done in the drift. The work was carried out over a period of 10 months.

From the Parson operation the men shipped 1,354 tons of chemical-grade barite to Montreal. Part of the production was mined from the underground drift and the remainder loaded from stockpile. The men were employed for two months.

Baroid of Canada, Ltd. (By D. R. Morgan) Spillimacheen (50° 116° N.E.). Company office, 44 King Street West, Toronto, Ont. J. A. Martino, president; H. K. Beggs, plant superintendent. This company, a subsidiary of National Lead Company, Ltd., of Houston, Texas, operates the old Giant Mascot lead-zinc property at Spillimacheen, south of Golden, for the purpose of producing barite. The property was purchased in 1960, and since that time most of the activities have been directed to the recovery of barite from a large tailings dump left from the former operation. The tailings are loaded by front-end loader, trucked to the old mill, and crushed to a slurry by a unit that was installed in 1960. A barite concentrate is then recovered by a set of separation tables, and dewatered by a Dorrco filter.

During 1966 a crew of seven men treated and recovered 12,000 tons of barite. The barite was trucked to a siding on the Kootenay Central Railway at Spillimacheen and shipped by rail to the Company's processing plant at Onaway, Alta. The men were employed for four months, and the work was suspended for the winter at the end of October. An official was left on the property for the winter months.

BUILDING-STONE

Layers Group (Interior Quarries Ltd.) (By J. W. McCammon) Whiskey Creek (52° 122° S.E.). Company address, Box 1298, Williams Lake. In 1966 this company began operating a stone quarry on the four-claim Layers group, 10 miles northwest of Williams Lake. The claims consist of the Layers and Layers 4, located by J. J. Reimer in August, 1965, and the Layers 2 and 3, located by R. E. Williams in August, 1965. The quarry and a treatment plant are on the east bank of the Fraser River about 1½ miles south of the mouth of Whiskey Creek. At a sharp curve 5.8 miles north of Williams Lake, on the old river road to Soda Creek, a side road branches off to the west and zigzags down to the river. The quarry is 6.6 miles down this side road from the junction.

At the quarry, nearly flat-lying interbedded cherts and argillites of the Permian(?) Cache Creek Group outcrop along the water at the edge of a narrow level bench. The beds are in the east limb of a north-trending anticline. Map 12-1959 of the Geological Survey of Canada shows the Cache Creek Group extending for more than 20 miles along the Fraser River in this vicinity. There cherts are in beds ranging from one-quarter inch to 8 inches or more thick. They are separated by films and thin beds of slaty argillite. The cherts vary in colour through red, rust, cream, green, and dark grey, and the argillites are brown, dark grey, and purple.

The thinner chert beds are quarried in flat slabs ranging up to 4 feet long by 3 feet wide, while the thicker beds are broken into brick-sized blocks. A crushing plant consisting of a jaw crusher followed by a cone crusher and shaking screen is used to produce ¼- to ½-inch chips of rock of the various colours for use as exposed aggregate and stucco dash.

International Marble & Stone Company Ltd. (By P. E. Olson) Sirdar (49° 116° S.W.). Company office, 4030 Seventh Street Southeast, Calgary, Alta.; plant office, Sirdar. H. Rennich, manager; A. Rennich, pit superintendent; W. Cyzborr, plant superintendent. The company operates a crushing, screening, and bagging plant near Sirdar and pits at Sirdar and Crawford Bay. Products, which are sold mainly in Alberta, include dolomite chips, limestone grit, quartzite chips, and granite poultry grit. A crusher was installed at Crawford Bay, and several women were employed to hand-sort dolomite to improve the final grade of chips.

Sheep Creek
(By P. E. Olson)

(49° 117° S.E.) About 150 tons of quartzite facing-stone was produced from talus slopes on Sheep Creek and Waldie Creek. The thickness of the stone varies from one-half inch to 4 inches.

Northwestern Quarries Ltd.
(By J. W. McCammon)

Twin Lakes (49° 119° S.W.) Office, 1650 West First Street, North Vancouver. In 1966 this company opened a small andesite quarry 4 miles northeast of Olalla. The quarry is 3.1 miles east of Highway No. 3, on the south road into Twin (Nipit) Lakes. The road joins the highway on the east side directly opposite the Apex Mountain road, 5 miles north of Olalla.

The rock in the quarry is medium to dark grey-green porphyritic andesite. It consists of scattered andesine phenocrysts 2 to 5 millimetres long with scattered pyroxene, altered olivine, and black mica phenocrysts 1 to 3 millimetres in diameter, in a groundmass of fine-grained feldspar with magnetite and secondary calcite and traces of quartz. Irregular fractures of various orientations are present. This rock is shown on Geological Survey of Canada Map 15-1961 as belonging to the Marron Formation of Eocene or Oligocene age. It is part of a lava series that strikes nearly north with a 15- to 20-degree dip to the east. It underlies an area about 16 miles long and 8 miles wide.

At the quarry, talus was removed to prepare a face 100 feet wide in bare rock at the base of a 40-foot-high bluff. A portable crushing and screening plant was used to process two large piles of rock for shipment. One pile consisted of 6- to 8-inch pieces for rock facings and the other, of 1-inch pieces, for exposed aggregate. The rock was trucked to a siding at Keremeos and then moved by rail from there to Vancouver for marketing.

Valley Granite Products Ltd.
(By A. R. C. James)

Cheam View (49° 121° S.W.). Company office, 10070 Timberline Place, Chilliwack; plant, Cheam View. K. Jessiman, general manager. The quarry and plant are on the west side of the Trans-Canada Highway about 10 miles west of Hope. A crew of six men produced approximately 8,000 tons of granite products, including poultry grits, stucco dash, and sand-blast materials. The market for sand-blast material is increasing, and a small roller crusher was installed in 1966 to increase production of this material.

Ocean Cement Limited (Gilley Quarry)
(By J. E. Merrett)

Pitt River (49° 122° S.W.). Company office, 1295 West 77th Avenue, Vancouver 14. N. D. MacRitchie, manager, Evco Aggregates Division; Francis J. MacDonald, quarry superintendent. The quarry is on the west bank of Pitt River immediately south of its confluence with Munro Creek. During a nine-month operating period, a crew of 14 men produced 87,000 tons of quartz diorite.

Columbia Marble Limited
(By J. E. Merrett)

Sechelt (49° 123° S.E.). Company office, 2356 Grandview Highway, Vancouver 12; quarry, Norwest Bay Road, Sechelt. K. Johnsen, manager. A crew of two men quarried 300 tons of black diorite for dimension-stone purposes from a rock outcrop one-half mile west of Wakefield Creek.

CEMENT

Ocean Cement Limited (B.C. Cement Division)
(By J. W. McCammon)

Bamberton (48° 123° N.W.). Head office, north foot of Columbia Street, Vancouver 4. W. F. Foster, president. In 1966 this company operated four of its five kilns to produce 416,031 tons of cement. Installation of a new computer-controlled kiln with an annual capacity of 2,000,000 barrels was begun.

Lafarge Cement of North America Ltd. (By J. W. McCammon) Lulu Island (49° 123° S.E.). During 1966 this company operated its plant over its rated capacity to produce 291,475 tons of cement. Work on plant expansion was begun to double the rated capacity by installing a second kiln, clinker-grinding mill, and raw mill.

CLAY AND SHALE

Mountain Minerals Limited (By D. R. Morgan) Canal Flats (50° 115° S.W.). Company office, P.O. Box 700, 529 Sixth Street South, Lethbridge, Alta. R. A. Thrall, managing director; Wm. McPherson, superintendent. This property is at the bottom of Thunder Hill, 2 miles west of Canal Flats. A crew of three men quarried and loaded 725 tons of shale at various periods in 1966. The shale was trucked to a siding at Canal Flats and shipped by rail to the company's processing plant at Lethbridge.

Clayburn-Harbison Ltd. (By J. E. Merrett) (49° 122° S.E.) Head office, 1690 West Broadway, Vancouver 9; plants, Kilgard and Abbotsford. R. M. Hungerford, president; G. H. Peterson, general manager; Brian Stephens, mine superintendent. Two plants are operated by this company—one at Kilgard, where sewer pipe and flue linings are manufactured, and the other at Abbotsford, where face and refractory bricks are made. Clay was produced from two underground and three open-pit operations. Nine men employed underground in the Fireclay and New Fireclay adits at Kilgard produced 29,289 tons of clay. Five men employed at the Kilgard No. 9 and Straiton pits at Kilgard and at the Selby pit, 2½ miles east of Abbotsford, produced 52,575 tons of clay. The combined production of the two manufacturing plants was 69,072 tons.

Richmix Clay Products Ltd. (By J. E. Merrett) Kilgard (49° 122° S.E.). Office and plant, 2890 Kent Avenue East, Vancouver 16; quarry, Kilgard. G. W. Richmond, manager. The quarry is immediately south of the New Fireclay portal of Clayburn-Harbison Ltd. One man quarried 8,177 tons of fireclay and trucked it to Vancouver.

Haney Brick and Tile Limited (By J. E. Merrett) Haney (49° 122° S.W.). Company office and plant, Haney. E. G. Baynes, president; J. Hadgkiss, managing director. Two men were employed removing clay from a pit and surface scraping clay from an area adjacent to the plant, which is on the north bank of the Fraser River at Haney. Twenty-seven men were employed at the plant, which produced 10,595 tons of clay products consisting of facebrick, common brick, drain and structural tile, flue lining, and flower-pots.

Pitkethly Brothers Building Supplies Limited (By J. E. Merrett) Barnet (49° 122° S.W.). Head office, 8699 Angus Drive, Vancouver 14; plant, Barnet. This company, formerly known as Mainland Clay Products Limited, employing a crew of three men, produced 1,059 tons of red clay building-bricks and firebricks at the plant adjacent to the highway on the north slope of Burnaby Mountain. Clay for the building-bricks was obtained from an adjacent pit, and fireclay was obtained from Kilgard. Operations were suspended on November 1, 1966.

Fairey & Company Limited (By J. W. McCammon) Vancouver (49° 123° S.E.). L. T. Fairey, president. This company produced a variety of fireclay bricks, shapes, and cements from local and imported raw materials.

British Columbia Lightweight Aggregates Ltd. (By J. W. McCammon) Saturna Island (48° 123° N.E.). Head office, 475 Howe Street, Vancouver 1. Since September, 1959, this company has produced coated light-weight aggregate by expanding shale in a plant located on the peninsula between Winter Cove and Lyall Harbour on the north end of Saturna Island. A good road extends from the Government ferry dock at Saturna around the head of Lyall Harbour and northwest to the shale pit and plant at Winter Cove.

The quarry is 100 feet south of the road one-quarter mile east of the head of Winter Cove. At the quarry an area about 500 feet wide and 1,500 feet long has been stripped of overburden. The exposed bedrock is shale of the Upper Cretaceous Nanaimo Group. It is blue-grey when fresh but weathers buff to brownish. The rock is well laminated in beds 1 to 4 inches thick that strike north 55 degrees west and dip 40 degrees northeast. Fresh rock is massive, but on exposure to the weather it soon breaks down into ½- to 1-inch cubes. In late September, 1966, the quarry was 320 feet wide and 700 feet long parallel to the strike of the rocks. About 200 feet at the east end of the opening was filled with broken rock ready for removal to the plant. Maximum face height was 25 to 30 feet. The shale is drilled and blasted, and the broken rock is loaded by diesel shovel into a truck for haulage to the treatment plant one-quarter mile to the southwest.

At the plant, raw shale is fed into a 4- by 4-foot log roll, from which it passes to a 36- by 24-inch Jeffrey hammer mill, and then to a ⅝-inch screen. The oversize is sent to a Miller hammer mill arranged in closed circuit with the screen. Material passing through the screen is conveyed to a storage silo " day tank " that holds sufficient shale for a 24-hour kiln run. When the silo is full, the crushed rock is stored in piles beside it. From the day tank the shale is fed into a 125- by 10-foot variable-speed counter-current oil-fired rotary kiln. The shale passes through the kiln in approximately 30 minutes and reaches a temperature of between 2,100 and 2,500 degrees Fahrenheit. This causes the shale fragments to " bloat " or expand to form porous cinder-like individuals that acquire a thin glassy skin or outer coating and a rounded shape. From the kiln the expanded shale goes to a 90-foot-long cooler and then to an elevator which passes it on to a screening plant. Here a separation is made into four sizes, ¾-inch, ⅜-inch, 4 to 8 mesh, and minus 8 mesh. The sized material is placed by a stacker into separate piles in a covered storage area. An underground recovery belt below the storage area reclaims the expanded shale and carries it through a tunnel in the ridge south of the plant to a swivel-spout loader at a deep-water floating dock on Lyall Harbour. An alternative closed-circuit screening and crushing arrangement at the end of the cooler can be used to produce smaller crushed particles for specific orders.

A crew of 18 men produces 325 cubic yards of expanded shale aggregate per day. The pit and primary crushing circuit operate one shift per day for five days per week, and the rest of the plant operates 24 hours per day for seven days per week.

In 1965 this company merged with Holdfast Pozzolan Limited, of Saltspring Island. The Holdfast company had produced calcined shale pozzolan at Long Harbour since 1963. British Columbia Lightweight Aggregates Ltd. uses the same shale and kiln to make pozzolan clinker as it does to make its aggregates, but the kiln is fired at a lower temperature and the shale does not expand. The calcined pozzolan clinker is shipped to a plant in South Westminster, where it is pulverized and prepared for distribution.

DIATOMITE

Fairey & Company Limited (By J. W. McCammon) Quesnel (53° 122° S.W.). Company office and plant, 661 Taylor Street, Vancouver 3. L. T. Fairey, president. About 70 tons of diatomite was quarried from the company-owned pit on Lot 6182 at Moose Heights and shipped to the Vancouver plant.

Crownite Diatoms Ltd. Quesnel (52° 122° N.W.). *See* write-up under "Pozzolan," page 271 in this Report.

DOLOMITE

International Marble & Stone Company Ltd. Crawford Creek (49° 116° N.W.). *See* report under "Building-stone," page 261 of this Report.

FLUORITE

Eaglet Group (Canex Aerial Exploration Ltd.) (By J. W. McCammon and T. M. Waterland) Quesnel Lake (52° 120° N.W.). Canex Aerial Exploration Ltd. optioned this fluorite prospect from the owners, H. H. Forster and C. D. P. Johnson. A description of the original showing was given on pages 263 and 264 in the Minister of Mines and Petroleum Resources Annual Report for 1965. The property is at the mouth of Wasko Creek, 2 miles northeast of the junction of the north and east arms of Quesnel Lake.

In the summer of 1966 the company made a geochemical soil survey of part of the property and used a bulldozer to do 8,600 feet of trenching and to build 5,200 feet of access road. Four main trenches 1,500 to 2,500 feet long were dug at intervals of approximately 100 feet elevation on contours across the face of the hill west from the canyon showings. Two other trenches, 250 and 1,000 feet long, were dug up the hill perpendicular to the top contour trench. Overburden proved disappointingly deep, and bedrock was reached in only a few relatively short stretches in the trenches. The bedrock exposed is gneiss injected with aplite and some pegmatite and vein quartz. Fracturing and shearing are intense and appear to be part of a wide northeast-trending zone parallel to the mineralized zone in the canyon showings to the east. Fluorite is widely dispersed, and some can be found in nearly every outcrop visible. It occurs in veinlets, as irregular pods, in brecciated fragments, as fracture-coating films, and as disseminated grains through the coarser-grained phases of the host rock. Commonly the more concentrated areas of fluorite, especially of dark-purple material, are accompanied by a fluffy brownish black powder. This material is hydrous manganese-iron oxide, probably a form of wad. Near the east end of the third trench above the lake, some silvery white pyrite occurs in a peculiar lamellar intergrowth with quartz in a small vuggy vein. Though mineralization is widespread, concentrations are not great and the grade is low. Bulk sampling has not yet been done, so no satisfactory estimations of grade can be made. Three men worked for two months on the property under the direction of C. C. Rennie, geologist.

View Group, Etc. (By J. W. McCammon) Whiteman Creek (50° 119° S.E.). In 1966 Canex Aerial Exploration Ltd. made an agreement with the owners, Fluorspar Minerals Company Ltd., to investigate a fluorite occurrence on the hill 2 miles southwest of the mouth of Whiteman Creek. This creek flows into Okanagan Lake from the west at a point 9½ miles from the north end of the lake. The main road down the west side of the lake passes within one-half mile east of the lower showings. Logging and other roads built by the company provide access from the main road to the showings.

The presence of fluorite at this locality has been known for many years. It was investigated by the Department of Mines in 1944. At that time it was called the Green Gables deposit. Little was done on it then except for surface examination. In 1954 new claims were located on the same area, but no development work was done. Again in 1963–64 interest was revived and some hand and bulldozer trenching was done. In the summer of 1966 Canex Aerial Exploration Ltd. did several thousand feet of bulldozer stripping and trenching and drilled a few short diamond-drill holes. Apparently no economic bodies of fluorite were uncovered by the work done.

On the property, pale-green to white and some purple fluorite occurs in irregular masses and lenses in quartz veins and fractures in granitic rock. The veining and mineralization are in a large fracture zone trending slightly west of north. The quartz veins pinch and swell rapidly, and within them the fluorite mineralization does the same. The largest fluorite masses seen were 6 inches or less thick and a few feet long. Most showings were mere films of fluorite on fracture faces. Although no large concentrations are exposed, mineralization is widespread on the hill.

Oliver Silica Quarry (By J. W. McCammon) (49° 119° S.W.) This quarry produced 150 tons of fluorite. *See* report under this name on page 276.

GYPSUM

Western Gypsum Mines Ltd. (By D. R. Morgan) Windermere (50° 115° S.W.). Head office, 2650 Lakeshore Highway, Clarkson, Ont.; Nigel Puttock, president; K. C. French, vice-president of production. Quarry office, P.O. Box 217, Invermere. A. E. Portman, quarry manager.

This company, formed in 1966 as a subsidiary of the Western Gypsum Products Limited, operates a large gypsum property on the north side of Windermere Creek, 8 miles east of Windermere. It comprises 84 claims, which are located at elevations ranging from 4,000 to 5,500 feet. Access is by means of an 11-mile private road from a company-owned crushing plant at Wilmer. The property has been in operation for many years, and a detailed description has been given in past Annual Reports.

Most of the activities in 1966 were directed to the No. 3 quarry, which has been in operation since 1964. The gypsum at the quarry is over 100 feet thick. It is mined in 20-foot lifts, using AN/FO explosives, and is loaded by front-end loader. It is later transported to the mill at Wilmer in 50-ton-capacity tandem trucks. The total production shipped by rail during 1966 was 205,924 tons, of which 203,880 tons was mined from the No. 3 quarry and the remainder loaded from stockpile at the mill. A new portable primary crusher, complete with screening conveyors and a 350-ton storage bin, was installed at the quarry, and a long portion of the roadway near the foot of the mountain was relocated to straighten the road and improve the grade. More overburden was removed from the No. 3 quarry to enlarge the pit, and 14 holes, totalling 1,040 feet, were diamond drilled as part of a current exploration programme. The quarry was active throughout the year. There were 25 men employed.

LIMESTONE

Terrace Calcium Products Ltd. (By H. Bapty) Terrace (54° 128° N.W.). Company address, P.O. Box 1269, Terrace; registered office, 4635 Lazelle Avenue, Terrace. A. Curfman, president. The company holds 16 mineral claims by record on Copper Mountain, 6 miles east of Terrace; 12 mineral claims west of the Terrace airport; a 20-acre quarry lease on Copper Mountain; and a 20-acre mill-site adjacent to the Terrace golf course. Four men worked throughout the year under the supervision of A. Curfman. Land surveys were made, as well as the survey of a proposed tram-line. A short road was made with a bull-dozer tractor, and 700 feet of heavy truck-road was constructed. One thousand tons of limerock was blasted for research and testing. A hammer mill and a stationary power plant were purchased. The property can be reached by driving up the British Columbia Telephone microwave road to Copper Mountain.

[Reference: *Minister of Mines, B.C.*, Ann. Rept., 1965, pp. 264–265.]

Harper Ranch Quarry (By J. W. McCammon and T. M. Waterland) Kamloops (50° 120° N.E.). Lawson, Lundell and Company, 409 Granville Street, Vancouver 2, owns a lease on a limestone deposit on the Harper Ranch, 11 miles due east of Kamloops. A quarry has been opened on a partly bare rock bench 500 feet above and three-quarters of a mile north of the South Thompson River. A rough road 1¼ miles long runs from the quarry to the main road, which extends along the north bank of the river. The junction is 12 miles east of Provincial Highway No. 5.

The deposit is near the south end of a limestone mass 2 miles long and up to 2 miles wide that forms a hill which is part of the valley wall of the river. The stone at the quarry is medium to fine grained, grey, and weathers light grey. In thin-section it is seen to consist of microfossils in a very fine-grained matrix and could be termed a biomicrite. Multi-directional fractures occur at 1- to 6-inch intervals. Most fracture faces are stained brown. No distinct bedding is evident at the quarry, but in an exposure 100 feet to the southeast, 2-inch-thick parallel bands of chert, that strike north 85 degrees east and dip 80 degrees south, probably indicate the attitude of the rocks. No chert was noted in the quarry. The limestone is part of a series of rocks mapped by Cockfield as belonging to the Carboniferous or Permian Cache Creek Group.

When examined in August, 1966, the quarry was a semi-circular opening about 60 feet in diameter with a maximum face height of 10 feet. The broken muck was mostly in cubical pieces ranging from 1 to 4 inches long. An analysis of a grab sample of pieces picked at random from the muck pile had the following percentage composition: Insol., 0.22; R_2O_3, 0.22; Fe_2O_3, 0.17; MgO, 0.66; CaO, 54.96; S, 0.001; P_2O_5, 0.012; H_2O, 0.01; Ig. Loss, 43.82.

The quarry was opened in the autumn of 1965, and about 400 tons of stone was shipped to Kamloops Pulp and Paper Company for testing. Apparently initial tests proved the rock unsuitable for use in the plant of this company.

[References: *Bureau of Mines, Canada,* Publication No. 811, 1944, p. 184; *Geol. Surv., Canada,* Map 886A; *Minister of Mines, B.C.,* Ann. Rept., 1959, pp. 167–170.]

Fraser Valley Lime Supplies (By A. R. C. James) Popkum (49° 121° S.W.). Head office, 7583 Edmonds Street, Burnaby 3. W. T. Mairs, manager. The quarry and crushing plant are on the east side of the Trans-Canada Highway, adjoining the southernmost tip of Indian Reserve No. 1, three-quarters of a mile east of Popkum station on the Canadian National Railway. The crushing and screening plant was operated partly with stone from the quarry and partly with stone trucked in from other sources. Both the total production and quarry production were the highest for some years. Production from the quarry in 1966 was 5,673 tons, and 1,756 tons was trucked in from other sources, making a total of 7,429 tons put through the plant. The products were sold for agricultural use and as an industrial filler. An average crew of seven men was employed.

Lafarge Cement of North America Ltd. (Beale Quarries Division) (By J. E. Merrett) Vananda (49° 124° N.W.). Head office, 1051 Main Street, Vancouver 4; quarry office, Vananda. W. D. Webster, quarry superintendent. Open-pit bench-mining methods were used to produce 705,000 tons of limerock, of which 481,340 tons was crushed and 467,000 tons shipped. A crew of 20 men was employed.

Ideal Cement Company (By J. E. Merrett) Vananda (49° 124° N.W.). British Columbia office, 210, 1033 Davie Street, Vancouver 5; quarry office, Vananda. W. S. Beale, general manager, Rock Products Division; J. K. Johnson, superintendent. Limerock, quarried by open-pit benching on Lot 25, 2 miles south of Vananda, was trucked to the processing plant at Marble Bay quarry for crushing, washing, and screening where necessary. A crew of 28 men quarried 607,136 tons of limerock, of which 514,188 tons was crushed and 434,093 tons was shipped.

Imperial Limestone Company Limited (By J. E. Merrett) Vananda (49° 124° N.W.). Office, 7309½ East Marginal Way South, Seattle, Wash. 98108; quarry office, Vananda. James H. Jack, general manager; A. Diewert, quarry superintendent. This company operated a limestone quarry at the summit of a small hill 1 mile west of Spratt Bay on the northeast coast of Texada Island. Two crushing plants were operated—one at Vananda dock, where stucco dash and whiting were produced, and the other, a larger one, at Spratt Bay, where whiting and coarse limerock were produced.

Open-pit bench mining was used to produce 140,601 tons of limerock, while 130,686 tons was crushed and shipped to the Seattle plant. A crew of 21 men was employed.

Domtar Chemicals Limited (Lime Division) (By J. E. Merrett) Blubber Bay (49° 124° N.W.). British Columbia office, 470 Granville Street, Vancouver 1; quarry office, Blubber Bay. W. G. Smith, Blubber Bay plant manager. Open-pit bench mining was used to produce 879,049 tons of limerock, of which 852,065 tons was crushed and shipped. The major portion of the limerock was obtained from a quarry 2 miles south of the Blubber Bay plant. A new quarry was opened one-half mile south of the plant. A crew of 42 men was employed.

Koeye River (Koeye Limestone (1962) Ltd.) (By J. E. Merrett) Koeye River (51° 127° N.W.). Company office, Bella Bella; quarry office, Namu. A. O. Widsten, manager. White limestone is quarried by benching methods from the west of two adjacent quarries on the north side of the mouth of Koeye River on Fitz Hugh Sound, 6 miles south of Namu. A crew of five men employed for a period of six months produced 11,920 tons of limerock, which was shipped to the Crown Zellerbach Canada Limited paper-mill at Ocean Falls.

Ocean Cement Limited (B.C. Cement Division)
(By J. W. McCammon)

Cobble Hill (48° 123° N.W.). This company employed an average crew of 34 men to produce 612,371 tons of limestone for use in the cement plant at Bamberton.

Cowichan Lake-Port Renfrew Area
(By J. W. McCammon)

(48° 124° N.W.) Discontinuous patches of limestone are widespread in the area between Cowichan Lake and Port Renfrew, on southern Vancouver Island. In the summer of 1966 samples were obtained from several of the larger masses that had been located previously by A. Sutherland Brown during a reconnaissance of the region. The rock in all outcrops examined is very uniform. On freshly broken surfaces it is dark grey to black and on weathered surfaces it is medium to light grey and relatively smooth. The grain is so fine that, except for scattered crinoid plates, individual crystals are indistinguishable even under a hand-lens. Bedding is only rarely displayed. Crinoid remnants are common, but other fossil remains are infrequent. For the most part, the limestone is of the high-calcium type, although magnesian beds are present in some places. Dykes are rare. Multi-directional joints occur abundantly at random spacings.

The limestone is associated with various types of volcanic rock. All of the rocks are highly folded and faulted. Although the stratigraphy has not been worked out in detail, the general geological setting suggests that the limestone is a correlative of the Upper Triassic Quatsino Formation of northern Vancouver Island.

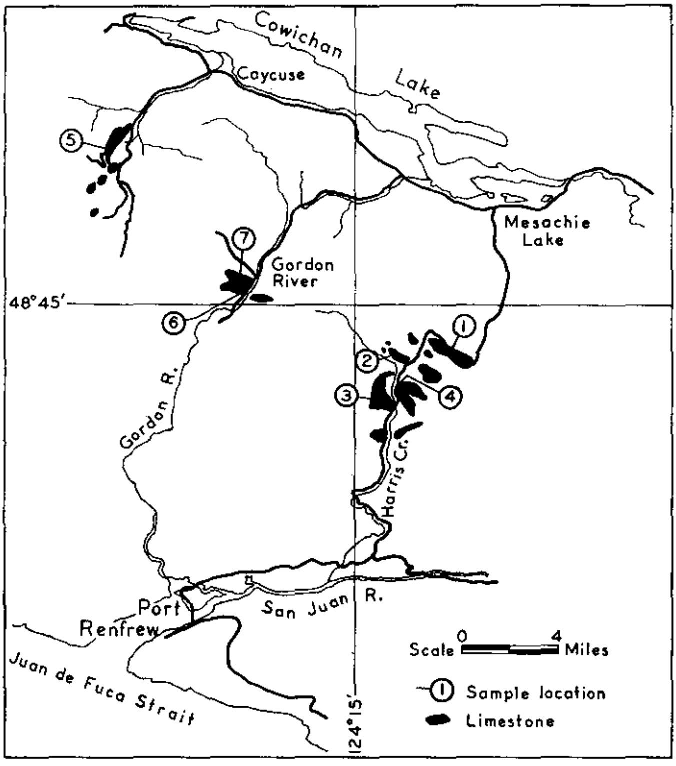


Figure 31. Limestone in the Cowichan Lake-Port Renfrew area.

Seven samples for analyses were collected at the locations indicated on the accompanying map (*see* Fig. 31). Sample 1 consisted of chips collected at 10-foot intervals along 350 feet in a cut on the Mesachie Lake–Port Renfrew road. Few impurities are visible in the section. Sample 2 consisted of chips taken at random spacings along 1,600 feet on a branch logging-road. The road runs at approximately 45 degrees to the apparent strike of the limestone. Weathered surfaces of the rock show scattered small siliceous protrusions. Several layers of magnesian limestone occur toward the apparent stratigraphic bottom of the deposit. Sample 3 was made up of chips taken at 20-foot intervals along 500 feet of exposures on a logging-road 1,200 feet in elevation above the main road. The road is perpendicular to the strike of the beds. Few impurities are visible in the outcrop. Sample 4 contained chips gathered at 10-foot intervals along 400 feet of rock cut on the main-line logging-road from Port Renfrew to Mesachie Lake. Sample 5 consisted of chips collected at 10-foot intervals along a 200-foot-long rock cut on road C-18 in the Nixon Creek logging area of British Columbia Forest Products Limited. Sample 6 was made up of chips collected at random along a 200-foot-long cut on road No. 4 south of Gordon River logging camp. Sample 7 consisted of chips gathered at random along 400 feet in a rock cut on an upper branch road 1,000 feet above and half a mile north of sample 6. Chemical analyses of the samples are shown in the following table:—

Analyses of Limestone from the Cowichan Lake-Port Renfrew Area

Sample	Insol.	R_2O_3	Fe_2O_3	MnO	MgO	CaO	P_2O_5	S	Ig. Loss	H_2O
1	0.84	0.31	0.29	0.04	0.60	54.48	0.02	0.011	43.50	0.07
2	1.33	0.36	0.30	0.02	0.90	53.82	0.02	0.015	43.39	0.04
3	0.39	0.16	0.07	<0.01	1.00	54.54	0.02	0.004	43.65	0.05
4	0.58	0.30	0.29	0.01	4.63	49.98	0.02	0.003	44.37	0.04
5	1.65	0.34	0.21	0.03	0.23	54.52	0.04	0.024	43.37	0.03
6	1.30	0.24	0.17	0.02	0.21	54.72	0.02	0.068	43.22	0.02
7	1.85	0.61	0.37	0.02	5.54	48.00	0.02	0.024	43.78	0.05

MAGNESITE

Rok (New Jersey Zinc Exploration Company (Canada) Ltd.) (By D. R. Morgan)

Invermere (50° 115° N.W.). Field office, 905 Seymour Street, Vancouver 2. This property is near Kootenay National Park, 25 miles northeast of Invermere. It comprises 68 claims ranging in elevations from 5,000 to 6,000 feet, and can be reached by horse-trail from the mouth of Cross River. It covers a showing of magnesite, dolomite, and calcite, in a carbonate formation. Some geological mapping was done in the summer of 1966, and in the late fall a crew of three men started constructing a 7-mile access road with a bulldozer on the south side of Cross River. The work was under the direction of J. B. Seaton, geologist.

MARL

Cheam Marl Products Limited (By A. R. C. James)

Popkum (49° 121° S.W.). Head office, 13 Fletcher Street South, Chilliwack. P. C. Woodward, general manager. This property consists of a lake deposit of marl ranging up to 10 feet thick. The deposit is post-glacial and accumulated on the bed of Cheam Lake, which was drained some years ago. The marl and topsoil are excavated by two small draglines and sold for agricultural purposes. The material is either trucked wet to the consumer or stockpiled on a drainage pad.

Production in 1966 was 28,450 tons of marl and 3,689 cubic yards of topsoil. A crew of three men was employed at the property.

PHOSPHATE

Western Co-operative Fertilizers Limited (By D. R. Morgan)

Flathead (49° 115° S.W.). Company office, P.O. Box 2500, Calgary, Alta. This company has conducted an exploration programme in the Lodgepole and Cabin Creek areas of the Flathead valley, southeast of Fernie, during the past three years in search of phosphate for its fertilizer plant at Calgary. The property comprises 600 claims ranging in elevations from 3,500 to 7,500 feet, and covers a showing of marine sedimentary rocks containing fluorapatite. It can be reached by a forestry road from Morrissey. During 1966 several miles of access roads were built by bulldozer, and a crew of five men drilled 17 holes, totalling 2,300 feet, at various points around the property. Some trenching was done, and a number of samples of rock sent for testing. The men stayed in a camp on the property, and were employed from April 15th until October 4th. The work was under the direction of C. Warren Hunt, geologist.

POZZOLAN

Crownite Diatoms Ltd. (By J. W. McCammon)

Quesnel (52° 122° N.W.). Company office, 507, 1640—16th Avenue Northwest, Calgary, Alta.; plant on Lot 906 in West Quesnel. This company dried and pulverized a " burnt " shale, quarried from Lot 222 just south of Quesnel, to produce a pozzolan product for use in work at the Portage Mountain Dam site. The " burnt " shale used as a pozzolan source forms a colourful bluff on the east bank of the Fraser River just below the mouth of the Quesnel River. The rock quarried is a hard vitreous to porcelaneous material resembling dense fired clayware. Colours range through red, pink, buff, yellow, blue, and black. Thin-sections show the material to be so extremely fine grained that it is indeterminable by optical means. Impressions of stems and twigs of plants are present in the rock. Geological maps of the area include the rock in the Tertiary coal measures found as scattered patches along this section of the Fraser River. It is generally considered that the rock was originally clay or shale that was " burnt " or baked by the combustion of interbedded coaly members. An alternative suggestion that the clay was baked by overlying lava, now eroded away, does not have much supporting evidence.

[References: *B.C. Dept. of Mines,* Bull. No. 3, 1940, p. 16; *Geol. Surv., Canada,* Rept. Prog., 1871–72, p. 59; Rept. Prog., 1875–76, p. 257; Sum. Rept., 1931, Pt. A, p. 60; Mem. 118, 1920, p. 16.]

British Columbia Lightweight Aggregates Ltd. (By J. W. McCammon)

Saturna Island (48° 123° N.E.). This company calcined shale on Saturna Island and ground it to make pozzolan at a plant in South Westminster. (*See* report on this company on page 264.)

SAND AND GRAVEL

Data on sand and gravel production are presented on the following pages. The abbreviations used in the table for the types of sand and gravel produced are as follows: AA=asphalt aggregate; SA=sized aggregate; WS=washed and sized aggregate; RP=run-of-pit material; AP=asphalt paving mix; RM=ready-mix concrete.

Sand and Gravel Pits

Location	Operator	Equipment and Plant	Men	Production
Kitkatlah Gravel Pit—Porcher Island	Rupert Cement Products (1965) Ltd.	Tractor, conveyor, and barge	3	RP=48,000 yd.
Sandspit—Moresby Island	Department of Highways	Front-end loader	2	RP.
Miller Creek—Graham Island	Department of Highways	Front-end loader	2	RP.
Highway No. 25—Terrace	Department of Highways	Front-end loader	2	RP.
Sandhill—Kitimat	Kitimat Concrete Products (1961) Ltd.	Sauerman dragline, conveyors, washing, screening, ready-mix concrete, concrete bricks	3	RP, WS, RM=126,957 tons.
Highway No. 16—Carnaby	Department of Highways	Front-end loader	2	RP.
Creston—Goat River	Louis Salvador & Sons	Front-end loader, crusher, screens	3	WS and RM.
Wynndel—Duck Creek	Louis Salvador & Sons	Front-end loader, crusher, screens	2	RP and RM.
Wynndel—Duck Lake	Frank Merriam & Sons	Front-end loader, screens	3	RP and AP.
Nelson—Anderson Creek	Premier Sand & Gravel Company Limited	Scraper, crusher, screens	5	RP, WS, and RM.
Trail—Casino Road	McGauley Ready-Mix Concrete Company	Scraper, washing plant, screens	5	RP, WS, and RM.
Castlegar—Columbia River	McGauley Ready-Mix Concrete Company	Front-end loader, screening plant	4	RP, WS, and RM.
Salmo—Erie Creek	Valley Concrete Products Ltd.	Front-end loader, screening	2	Concrete pipe.
North Vancouver — West end of East Keith Road, east of Seymour Creek	E. R. Taylor Construction Co. Ltd., 2645 Dollarton Highway	Gas shovel, paving plant	1[1]	Sand=7,900 yd.
Coquitlam Municipality—				
(1) West end of Westwood Road	Corporation of the District of Coquitlam	Front-end loader, portable crushing and screening	....	RP and SA.
(2) Pipeline Road, 3½ miles north of Lougheed Highway	Jack Cewe Ltd., 309 Cedar St., New Westminster	Shovel, screening, crushing, paving plant	20	RP and SA=175,000 yd.; asphalt paving.
(3) Pipeline Road, 3 miles north of Lougheed Highway	S & S Sand and Gravel Limited, 1101 Eighth Ave., New Westminster	Front-end loader, crushing, screening, and washing	6	WS and RP=155,144 yd.
(4) Pipeline Road, 2½ miles north of Lougheed Highway	D & R Sand and Gravel Ltd., 2321 Mary Hill Road, Port Coquitlam	Front-end loader	1	RP=10,000 yd.
(5) Pipeline Road, 1½ miles north of Lougheed Highway	Allard Concrete Construction Co., 1930 Pitt River Road, New Westminster	Front-end loader	1	RP=75,000 yd.
(6) Pipeline Road, 1 mile north of Lougheed Highway	Deeks-McBride Ltd., 1051 Main St., Vancouver 4	Shovel, 600-tons-per-day washing and screening plant, ready-mix	11	SA, WS, and RM=452,000 yd.
(7) Coquitlam River, east bank, 2 miles north of Lougheed Highway	Knight Gravel Ltd.	Front-end loaders	3	RP=346,000 yd.
(8) Fraser River at Mary Hill, 2 miles south of Port Coquitlam	Ocean Cement Limited, north foot of Columbia St., Vancouver 4	Shovels, etc., 500-tons-per-hour processing plant, barge-loading facilities	57	WS=1,182,000 yd.
Pitt Meadows District Municipality — Bonson Road (196th St.), 1 mile north of Fraser River	Lasser Trucking Co., P.O. Box 38, Pitt Meadows	Front-end loader	1[1]	RP=4,500 yd.
Maple Ridge Municipality—				
(1) Grant Hill, 1 mile east of Albion and also adjoining Kirkpatrick pit	Corporation of the District of Maple Ridge		....	Fill.
(2) Grant Hill, one-half mile north of municipal pit	McIntosh Sand and Gravel Limited, 10412 Industrial Ave., Whonock	Shovel, crushing and screening	3[1]	RP and SA=25,000 yd.
(3) Grant Hill, north of McIntosh pit	Henry Van Boeyen, Albion	Shovel	1[1]	RP=1,494 yd.

(4) Lougheed Highway south of Grant Hill	Valley Ready Mix Co. Ltd., Haney	Shovel, front-end loader, crushing, washing, screening, ready-mix	3	WS and RM=41,000 yd.
(5) East end No. 27 Road, Alouette River	Kirkpatrick Sand and Gravel Ltd., 22357—119A Ave., Haney	Shovel, crushing, screening, washing	2[1]	WS and RP=14,087 yd.
(6) Lougheed Highway, 1 mile east of Whonock	Ralph E. George	Front-end loader	1[1]	RP=1,831 yd.
Mission Municipality—				
(1) 1 mile and 3 miles east of Stave Falls power-house, 2 miles east of Ruskin power-house	Corporation of the District of Mission	Screening plants	....	RP and fill.
(2) 1.8 miles south of Steelhead, Dewdney Trunk Road	Department of Highways	....	....	....
(3) 2.3 miles south of Steelhead, Dewdney Trunk Road	Cannon Contracting Ltd., 33323 Broadway, Mission	Front-end loader	2[1]	RP=1,743 yd.
(4) Dewdney–Lougheed Highway, 2 miles west of Squakum	Department of Highways	Front-end loader	....	RP.
Kent Municipality—				
(1) West end of Cemetery Road, south of Mount Agassiz	Corporation of the District of Kent	Shovel and front-end loader	....	RP.
(2) McCallum Road, 1 mile west of Harrison Hot Springs Road	Department of Highways	Front-end loader	....	RP.
(3) McCallum Road, 1½ miles west of Harrison Hot Springs Road	Danielson Contractors Ltd., McCallum Road, Agassiz	Front-end loader	2[1]	RP=10,000 yd.
Chilliwhack Municipality—				
(1) Arnold Road—from Fraser River Bar	P. Heppner & Son, 7113 Sumas Prairie Road	Front-end loader	4[1]	RP=10,000 yd.
(2) Fraser River bars, etc.	Chilliwhack Municipality	Front-end loader	....	RP=13,391 yd.
Sumas Municipality—				
(1) At foot and east of Taggart Peak	Various operators but owned by H. Quadling, Yarrow	Front-end loader	....	Angular fragmental fill=19,135 yd.
(2) Vye Road, 3 miles south of Abbotsford	Corporation of the District of Matsqui	Shovel	....	RP.
Matsqui Municipality—				
(1) 1 mile east of Abbotsford	Blackham's Construction Ltd., Abbotsford	Screening and crushing	5	RP and SA=77,900 yd.
(2) Tretheway Road, ¾ mile north of Clearbrook	Department of Highways	Front-end loader	....	....
(3) Tretheway Road, ½ mile north of Clearbrook	M.S.A. Paving Co. Ltd., Box 101, Clearbrook	Front-end loader, screening	1	RP and SA=15,000 yd; asphalt paving.
(4) Clearbrook Road, ½ mile north of border	Abbotsford Gravel Sales Ltd., Box 8, Abbotsford	Scraper, front-end loader, screening, washing, and ready-mix plant of Totem Trucking Limited	3	WS, RP, and RM=29,579 yd.
(5) 12th Ave., ¼ mile west of Clearbrook Road	Valley Rite-Mix Ltd., Box 430, Clearbrook	Front-end loader, screening, washing, crushing, ready-mix plant	13	RP, SA, WS, and RM=44,487 yd.
(6) Corner of King (16th Ave.) and Foy Road (316th St.)	Lepp Trucking, Abbotsford	Front-end loader	1[1]	RP=6,000 yd.
(7) Lefevre Road, ¼ mile north of Eighth Ave.	Corporation of the District of Matsqui	Shovel	....	RP.
(8) Corner of Lefevre Road and Eighth Ave. —Caplette pit	E. Bird, Aldergrove	Front-end loader	2[1]	RP=6,731 yd.

[1] Part time.

Sand and Gravel Pits—Continued

Location	Operator	Equipment and Plant	Men	Production
Langley Municipality—				
(1) Northwest corner of Jackman Road and Eighth Ave.	Corporation of the Township of Langley	Shovel	....	RP.
(2) ½ mile west of Carvolth Road, north of 24th Ave.	Corporation of the Township of Langley	Shovel	....	RP.
(3) Kinch Road at 36th Ave.	Corporation of the Township of Langley	Shovel	....	RP.
(4) North of the northeast corner of Jackman Road and Eighth Ave.	Aldergrove Cement Tile Products, S. Omelaniec, manager	Front-end loader	1[1]	RP=1,860 yd.
(5) ¼ mile north of corner of Jackman Road and Eighth Ave.	J. Craig, Trans-Canada Highway, Langley	Front-end loader	1[1]	RP=2,105 yd.
(6) Dogwood Ave., off Brown Road	Kitsul Bros. Gravel Sales Ltd., 24306 Fraser Highway, Langley	Front-end loader	1[1]	RP=17,500 yd.
(7) Glen Valley Road at 252nd St.	Fort Langley Aggregates, J. K. McArthur, 11364—95th Ave., North Surrey	Front-end loader, crushing, screening	1	RP and SA=14,000 yd.
(8) 8802 Hudson Bay Road, Fort Langley	H. G. Clark, Box 145, Fort Langley	Front-end loader, screening, washing, and ready-mix	3	WS and RM=23,335 yd.
(9) Bradshaw and Berry Roads (Gun Club Pit)	B & B Trucking, Cloverdale	Shovel, crushing, screening, asphalt	1	SA and RP=37,800 yd.
(10) 2962 Lambert Road (Highland pit)	Ocean Cement Limited, north foot of Columbia St., Vancouver	Shovel, crushing, screening, and washing	7	RP and WS=87,000 yd.
(11) 32nd Ave. at Kinch Road	Oscar Rees, 3003—208th St., R.R. 2, Langley	Shovel	2[1]	RP=13,356 yd.
(12) 16th Ave. at Surrey boundary	Department of Highways	Shovel	....	Fill.
(13) Boundary Road at Surrey boundary	Border Sand & Gravel Ltd., Boundary Ave., R.R. 2, White Rock	Front-end loader, crushing, screening, and washing	3	RP, SA, and WS=21,500 yd.
Surrey Municipality—				
(1) Campbell River Road at Langley boundary	White Rock Sand and Gravel, C. E. Schuler, 2546—176th St., R.R. 2, Cloverdale	Shovel, screening	1[1]	RP, SA, and WS=8,500 yd.
(2) Northwest corner of 32nd Ave. and 206th St., Langley	Deeks-McBride Limited, 1051 Main St., Vancouver 4	Scraper, front-end loader, crushing, washing, screening, and ready-mix	4	WS, RP, and RM=89,000 yd.
(3) East end of Stokes Road (20th Ave.)	Corporation of the District of Surrey	Shovel	....	Fill.
(4) 53rd Ave. at Delta Boundary	Corporation of the District of Surrey	Shovel, paving plant	....	Fill and AP.
(5) 112th Ave. east of Pike (160th) St.	United Sand & Gravel Ltd., c/o Steeves and Mann Equipment Ltd.	Shovel, crushing, screening	2	RP and SA=87,183 yd.
(6) 114th Ave. at 144th St.	Knight Gravel Limited	Tractor and ramp	12[1]	Fill=18,000 yd.
(7) 58th Ave. and 148th St.	A & B Gravel Sales Limited, 2027—152nd St., White Rock	Front-end loader	2	RP=27,880 yd.
Delta Municipality—				
(1) ½ mile west of Scott Road at 68th St.	Lintons Gravel Sales Ltd.	Shovels, crushing, screening, and washing	4	RP and SA=118,540 yd.
(2) Corner of First Ave. and 56th St.	Century Manufacturing Co. Ltd.	Shovel	4[1]	RP=100,000 yd.
(3) 10720—84th Ave.	M & W Sand and Gravel Ltd.	Front-end loader	1	RP=17,051 yd.
(4) 11751 No. 10 Highway, North Surrey	B.C. Aggregates Ltd.	Shovel	1	RP=46,328 yd.
Howe Sound—				
(1) Britannia Beach and Furry Creek	Construction Aggregates Ltd.	Front-end loader, scraper, crushing, screening, and washing	33	WS, RP, and SA—1,050,000 yd.

(2) Mamquam River	PaCo Cement Products, Limited	Front-end loader	1[1]	RP=15,089 yd.
(3) Gower Point, Sechelt Highway	Ed Fiedler, Gibsons	Front-end loader	1	RP=2,500 yd.
(4) Veterans Road, Gibsons (Pacific pit)	Gibsons Building Supply, Gibsons	Front-end loader	1	RP=5,000 yd.
(5) Cemetery Road, Gibsons	P & W Development Co. Ltd., Gibsons	Front-end loader, crushing, screening, ready-mix	1[1]	RP=1,000 yd.
(6) Porpoise Bay Road, Sechelt	L. & W. Swanson Limited	Front-end loader, shovel, screening	1[1]	SA and RP=1,700 yd.
Powell River—Off Allen Road, 3 miles northeast	P. Nassichuk	Screening	2[1]	Sand=8,000 yd.
Vancouver Island—				
(1) Campbell River, south of Buttle Lake Road at Elk Falls Road	B & A Trucking Limited	Front-end loader	30[1]	RP=20,000 yd.
(2) Painter's Spit, Campbell River	Island Readimix Limited	High-line scraper, front-end loader, crushing, washing, and screening	3	WS, SA, and RM=14,060 yd.
(3) 2½ miles from Courtenay	Island Readimix Limited	Mobile loader, rotary screening	2	SA and RM=23,698 yd.
(4) Point Holmes	S. H. Marriott Sand and Gravel		—	RP=6,128 yd.
(5) Cassidy No. 4 pit—Island Highway at Cassidy	Ocean Cement Limited	Front-end loader, washing, crushing, and screening	4	WS, RP, and RM=41,427 yd.
(6) Duncan–Cowichan Lake Road	Butler Bros. (Duncan) Limited	Front-end loader, washing, crushing, screening, ready-mix	12	WS, RP, and RM=50,000 yd.
(7) Duncan–Koksilah	Doman Industries Limited, Duncan	Front-end loader, washing, crushing, screening, asphalt paving, ready-mix	7	WS, SA, and RM=40,000 yd.
(8) Sooke—Sooke Road east of Milnes Landing	Wickheim Sand and Gravel Ltd.	Front-end loader	4	RP=12,000 yd.
(9) Royal Bay	Ocean Cement Limited	Scraper, shovel, crushing, screening, and washing	12	WS, RP, and AA=264,859 yd.

[1] Part time.

SILICA

New Arlington (By P. E. Olson) (49° 117° S.E.) This property is on Rest Creek, a tributary of Erie Creek, about 7 miles by road from Salmo. In 1966, 7,017 tons of material from the old dump was shipped to Trail. This contained some gold, silver, lead, and zinc and had a high silica content.

Oliver Silica Quarry (By David Smith) (49° 119° S.W.) Pacific Silica Limited. Registered office, 717 West Pender Street, Vancouver 1; quarry office, P.O. Box 39, Oliver. I. A. Hunter, manager. The Oliver silica quarry is on the Gypo mineral claim, Lot 30985, owned by Cominco Ltd., and operated under lease by Pacific Silica Limited. The claim is less than one-quarter of a mile west of Highway No. 97, 1 mile north of Oliver. Production for 1966 was 36,500 tons, and shipments made were 9,000 tons sacked and 27,500 tons in bulk. In addition, 150 tons of fluorite was bagged and shipped. Further modifications were made to the dust-cleaning equipment in the plant. Twenty-three persons were employed.

North West Silica Ltd. (By J. W. McCammon and T. M. Waterland) North Bend (49° 121° N.E.). Company office, 308, 540 Burrard Street, Vancouver 1; plant, North Bend. This company operated a sand pit and plant at North Bend to produce a silica sand product. The sand pit is 12 miles by road from North Bend. The drying, screening, and bagging plant is on a Canadian National Railway siding at North Bend. In 1966 approximately 120 tons of sand was processed and sold in Vancouver and Kamloops.

TALC

Clover Leaf (Black Mastodon Minerals Ltd.) (By A. R. C. James) (49° 121° S.W.) Company office, 3450 West 35th Avenue, Vancouver 13. W. E. Harvey, manager. The property comprises 12 claims at the lower end of Ruby Creek, which flows south into Fraser River 8 miles west of Hope. It is reported that a shear zone in altered serpentine contains talc. Four holes totalling 400 feet were diamond drilled from the surface, and two holes totalling 500 feet were drilled underground. Two trenches totalling 100 feet long were stripped, and two 30-foot test-pits were dug. A crew of three men worked under the direction of W. E. Harvey.

Petroleum and Natural Gas

CONTENTS

Tables—*Continued*

GENERAL ADMINISTRATION

Administration of the *Petroleum and Natural Gas Act* in the Department is divided between a General Administrative Section and a Petroleum and Natural Gas Branch. The former, under the direction of the Chief Commissioner, is responsible for the administration of the *Petroleum and Natural Gas Act,* which includes all matters related to and affecting title to Crown petroleum and natural-gas rights. The regulations governing geophysical operations are also administered by the Chief Commissioner.

The Petroleum and Natural Gas Branch, under the direction of the Chief of the Branch, is responsible for administration of the "Regulations Governing the Drilling of Wells and the Production and Conservation of Oil and Natural Gas," pursuant to the *Petroleum and Natural Gas Act.* The regulations specify the conditions which must be employed for efficiency and safe practice in the drilling, completion, and abandonment of wells; for well spacing; prevention of waste; conservation; and all related matters.

As at December 31, 1966, 41,214,803 acres, or approximately 64,398 square miles, of Crown petroleum and natural-gas rights, issued under the *Petroleum and Natural Gas Act,* were held in good standing by operators ranging in stature from small independent companies to major international ones. The form of title held, total number issued, and acreage in each case were as follows:—

Form of Title	Number	Acreage
Permits	392	29,716,610
Natural-gas licences	3	27,815
Drilling reservations	35	503,603
Leases (all types)	3,890	10,966,775
Total		41,214,803

Details of land disposition for the years 1947 to 1960, inclusive, may be found on page A 61 of the 1960 Annual Report. Figures for 1961 to 1965 will be found in the respective Annual Reports for those years.

The Sedco-type drilling-platform being constructed by the Victoria Machinery Depot Co. Ltd. will be completed by mid-1967. As a result, the two-year drilling programme planned by Shell Canada Limited on acreage held off the west coast of British Columbia will commence.

The question of ownership of the offshore mineral rights was referred to the Supreme Court of Canada for decision. A hearing planned for November was delayed until early 1967.

During 1966, land disposition was changed by the following transactions:—

Form of Title	Issued	Terminated	Decrease (−) or Increase (+)
	No.	No.	No.
Permits	120	47	+73
Natural-gas licences	3	-----	+3
Drilling reservations	27	22	+5
Leases—			
Petroleum and natural gas	345	224	+121
Natural gas	-----	10	−10
Petroleum	-----	-----	-----

Petroleum and natural-gas revenue for the year 1966 was as follows:—

Rentals and fees—		
Permits	$1,661,591	
Drilling reservations	113,496	
Natural-gas licences	1,466	
Petroleum, natural-gas, and petroleum and natural-gas leases	8,432,386	
Total rentals and fees		$10,208,939
Disposal of Crown reserves—		
Permits	$6,982,439	
Drilling reservations	4,657,510	
Leases	4,199,528	
Total Crown reserve disposals		15,839,477
Royalties—		
Gas	$2,256,725	
Oil	5,449,663	
Processed products	61,568	
Total royalties		7,767,956
Miscellaneous fees		18,073
Total petroleum and natural-gas revenues		$33,834,445

Details of yearly revenue, 1947 to 1962, inclusive, are tabled on page 168 of the Annual Report for 1962. For 1963 to 1965 figures *see* the Annual Reports for those years.

Cumulative totals, April 1, 1947, to December 31, 1966, are as follows:—

Rentals and fees—		
Permits	$39,994,071	
Drilling reservations	818,756	
Natural-gas licences	65,254	
Petroleum, natural-gas, and petroleum and natural-gas leases	43,670,783	
Total rentals and fees		$84,548,864

Disposal of Crown reserves—		
Permits	$25,184,602[1]	
Drilling reservations	20,427,453	
Leases	52,862,255	
Total Crown reserve disposals		98,474,310
Royalties—		
Gas	$11,318,417	
Oil	19,713,596	
Processed products	811,130	
Total royalties		31,843,143
Miscellaneous fees		227,120
Total petroleum and natural-gas revenues		$215,093,437

[1] Amended to reflect adjustment regarding Crown reserve disposals in 1953 which were included under permits.

GENERAL REVIEW

The 1966 production of crude oil and natural gas increased over 1965 by 24 and 16 per cent respectively to 16,677,752 barrels and 199,420,439,000 cubic feet. The sales volume of extracted sulphur showed a 12-per-cent decrease, whereas volumes sold for condensate/pentanes plus, butane, and propane recorded increases of 2, 20, and 22 per cent respectively.

Production of natural gas from the Clarke Lake field greatly increased and supplied more than 20 per cent of the Provincial total. Crude-oil production increases were significant from the Milligan and Peejay fields as a result of secondary recovery methods employed.

Over-all footage drilled in 1966 was slightly less than the footage obtained in 1965. More drilling of exploratory wells and less development footage were done as an absence of undrilled proven pools existed. The majority of the wells drilled in 1966 were in the area between the Beatton River and Currant fields, near the depositional edge of the Triassic Halfway Formation. Significant gas discoveries were made in Mesozoic horizons in the southern part of the northeastern corner of the Province and in the Devonian in the northern half. The most important oil discovery of 1966 was made in the Charlie Lake Formation in the Inga area.

Seismic exploration, confined almost exclusively to the triangular area encompassed by the Rocky Mountains and the Provincial boundaries to the north and east, declined 22 per cent compared to 1965. Considerable interest was created in the area offshore from Vancouver Island as the drilling phase approached reality. At the end of 1966, construction of one of the largest offshore drilling-platforms was near completion in Victoria. The vessel, which employed several unique features in design and method of construction, will be the latest of all semi-submersible types.

Minor extensions were made to the oil- and gas-gathering facilities. Connection to the potent Kotcho Lake, Junior, and Sierra areas was under construction at the close of 1966, as was an oil refinery at Prince George.

Reserves of crude oil, gas, and the various by-products increased slightly in 1966. At December 31, 1966, crude-oil reserves were calculated to be 268,830,000 barrels; disposable natural gas, 7,057.3 billion cubic feet; natural-gas liquids, 114,407,000 barrels; and sulphur, 3,230,000 short tons.

FIELD OFFICE

Field Work

The Petroleum and Natural Gas Branch field office of the Department of Mines and Petroleum Resources is located at Charlie Lake on the Alaska Highway. During the winter drilling season a sub-office located at Fort Nelson is used periodically.

The field office is responsible for the administration and interpretation of the *Petroleum and Natural Gas Act* and "Regulations Governing the Drilling of Wells and the Production and Conservation of Oil and Natural Gas" at the field level.

During 1966, seven vehicles were used to conduct surveys and inspections in the drilling and production phases of the oil-gas industry. A specialized bottom-hole unit was used to conduct pressure surveys in 60 wells. The surveys are used to check pressure data submitted by operating companies and for studies made by Departmental personnel.

A standard for bottom-hole pressure bombs is maintained at Charlie Lake. All bottom-hole pressure bombs used in the Province are calibrated to this standard. During 1966, 251 pressure bombs were calibrated.

The continuing increase of oil and gas production resulted in an increase in the inspection of production facilities. Two hundred and ninety-eight gas meters were completely tested, and 46 fast meter inspections were done.

Before a gas well is allowed to produce, an absolute open-flow test must be witnessed and approved by an officer of the Branch. During 1966, 109 absolute open-flow tests were witnessed.

The rate for production from oil wells is established by the Victoria office. Five tests to determine special production characteristics of the oil wells were done in 1966.

Surface production equipment, storage facilities, and batteries were inspected on 73 occasions. Battery inspections are done in conjunction with the inspection of oil wells that produce into the batteries.

Lease inspections were done on 661 leases to ensure that the abandonment and completion procedures conform to the "Regulations Governing the Drilling of Wells and the Production and Conservation of Oil and Natural Gas."

GEOLOGICAL SECTION

Branch staff geologists were engaged in subsurface geological studies of oil and gas areas in northeastern British Columbia. In addition, they were responsible for evaluation of parcels of land requested by industry for disposition by the Crown on four occasions during 1966. Special projects included detailed lithofacies studies, semi-regional mapping, and numerous interdepartmental studies, particularly those dealing with industry submissions and well classifications. Wells continued to be classified according to the "Lahee" system in an attempt to standardize well statistics as defined by the American Association of Petroleum Geologists (A.A.P.G.). This system is based upon the geological interpretation at the time of approval of a well authorization.

Semi-annual estimates of oil and gas reserves were carried out in co-operation with the Reservoir Section for productive areas. This involved continuous up-dating and refining of maps. Incoming data from current wells were processed by the staff and placed on file as well as on regional, semi-regional, and field maps for various purposes. Numerous studies arising out of current drilling activity required core and sample examination, which was undertaken in Victoria and at the Charlie Lake core and sample library.

Geological Laboratories

Core and Well Samples

All cores from British Columbia wells must be preserved in labelled boxes having an inside length not greater than 30 inches and must be delivered to the geological laboratory for permanent storage. During 1966, 1,606 boxes of core from 151 wells were received at the laboratory. At the end of 1966, 24,142 boxes from 1,378 wells were stored.

Unless otherwise directed, any operator who drills a well for petroleum or natural gas is required to take a sample of drilled rock (bit cuttings) at least every 10 feet of depth. Each sample, consisting of several ounces of rock fragments, is placed in a small bag at the well, labelled, and submitted to the geological laboratory, where it is washed and bottled.

Each 10-foot sample is divided, resulting in three complete sets of samples for each well. One set is retained at the Charlie Lake sample library, one is sent to headquarters at Victoria, and the other to the Geological Survey of Canada in Calgary. The remainder of the 10-foot sample from the original sample-bag is retained at the laboratory for a period not exceeding one year should further samples be required. The main sample-examination facilities are at Charlie Lake, with limited facilities available at Victoria.

The Charlie Lake sample library and the Geological Survey of Canda sample library in Calgary each has a set of samples from wells drilled in British Columbia since 1948; the Victoria sample library has samples from wells drilled since September, 1957. At the end of 1966, the Charlie Lake sample library contained 498,879 samples, and the Victoria library contained 497,240 samples.

During 1966, samples were received at the laboratory from 218 wells. A total of 36,043 10-foot samples was washed and bottled in 1966.

Core and Sample Examination

A nominal fee is charged for the use of the core- and sample-examination facilities provided by the Department.

In 1966, 6,629 boxes of core from 407 wells were studied by oil company personnel and other interested individuals. Cores from 24 wells were temporarily removed from the laboratory by the operators for further studies. Samples from 29 wells were studied, using the laboratory facilities at Charlie Lake.

Since the core- and sample-examination laboratory at Charlie Lake was made available to the public in February, 1961, 48,556 boxes of core have been removed from the racks for examination.

Exploration

In 1966, 18 oil and gas companies did seismic work in northeastern British Columbia. In the Fernie area, seismic work was done by one company, and one company operated marine seismic parties off the west coast. In northeastern British Columbia 130 seismic crew-weeks were completed (Table 1). Surface parties were active in northeastern British Columbia and the Fernie area (Table 2). Five exploratory test-holes were drilled in 1966 (Table 3).

Thirty-six exploratory wells and 55 development wells resulted in oil and gas completions. The success ratio of British Columbia's drilling remained high during 1966, 44 per cent.

The majority of drilling was carried out in Mesozoic horizons. Much of the development activity centred around known Triassic and Lower Cretaceous pools. Continued interest was shown in the productive trend of oil and gas pools along the depositional edge of the Triassic Halfway Formation. Over 100 wells were drilled to the Halfway in 1966, the majority of these being development wells associated with known pools. In addition, seven successful explortaory wells increased interest in the trend. Baysel Sinclair Wolf d-93-B discovered Halfway oil west of the Peejay field. An oil well at Kewanee Terrebonne Woodrush d-47-H renewed interest in the Milligan Creek area. There were also four gas discoveries in the Halfway Formation during 1966, and four Lower Cretaceous Bullhead gas wells were completed in conjunction with drilling along the trend. Tenn Cdn-Sup Dahl d-53-J encountered gas along the Bullhead pinch-out edge north of any known production in the area. Sinclair Pacific Beavertail d-71-C, west of the Wolf pool, was completed as a Bluesky Gething-Halfway multiple gas well.

A significant gas discovery at Tenn Cdn-Sup et al Inga 13-7-23 in 1965 resulted in a follow-up oil discovery at Cdn-Sup et al Inga 10-25-88-24, where a thin Triassic sandstone in the Charlie Lake Formation proved to be productive. At the year-end 23 wells had drilled to this horizon in the Inga area, 13 of which were oil wells.

Other significant Mesozoic oil and gas discoveries included Triassic Charlie Lake gas wells at CEGO et al Flatrock 10-27-84-16, Pacific et al N Pine 7-11-85-18, and Pacific et al N Pine 6-27-85-18, all in the Fort St. John area; a Triassic Baldonnel Formation gas well southeast of the Rigel field was completed at Pacific West Prod E Siphon 6-4-87-15, and a possible extension to the Nig Creek field was completed at Whitehall Numac Nig a-49-J.

Palæozoic horizons provided some activity during 1966 south of latitude 57 degrees north. The main horizon of interest was the Permian Belloy Formation. Extensions to the Stoddart gas pool were made possible by two successful wells, Jeff Lake Altair Stoddart 6-11-86-19 and Uno-Tex Triad Stoddart All-5-86-19.

In the Fort Nelson area, exploration continued along the Middle Devonian potential gas trend. Eight wells were drilled in the Clarke Lake area, considerably extending known gas pools. Successful gas wells were drilled at Pacific et al Clarke d-69-H, Pacific IOE S Clarke c-50-K, and Pacific Imp Clarke c-56-L. In other areas, Middle Devonian gas discoveries were made at Atlantic Tees c-15-J, Pacific Shekilie b-24-A, and Socony Mobil Swat b-50-F.

Gas Discoveries, 1966

Well Authorization No.	Well Name	Total Depth	Status
	Mesozoic	Ft.	
1940	Apache et al Wilder 7-2-84-20	5,278	Baldonnel gas well.
1892	Ashland Ck TB Snowberry d-57-D	3,670	Halfway gas well.
1918	CDR Sun Evergreen d-54-J	3,800	Halfway gas well.
1954	CEGO et al Flatrock 10-27-84-16	6,230	Charlie Lake gas well.
1927	Dome et al W Peejay d-31-G	4,040	Halfway gas well.
1859	Kewanee CIGOL Melanie d-68-K	4,030	Halfway gas well.
1830	Pacific West Prod N Buick b-86-F	4,071	Dunlevy gas well.
1958	Pacific et al N Pine 6-27-85-18	5,860	Charlie Lake gas well.
1865	Pacific West Prod E Siphon 6-4-87-15	4,630	Baldonnel gas well.
1893	Sinclair Pacific Beavertail d-71-C	4,097	Bluesky Gething-Halfway gas well.
1849	Tenn Cdn-Sup Dahl d-53-J	3,911	Bluesky Gething gas well.
1905	Texcan N Nancy d-46-I	3,820	Gething gas well.
1825	Union HB Beaverdam d-64-L	3,815	Gething gas well.
2012	Whitehall Numac Nig a-49-J	4,402	Baldonnel gas well.
	Palæozoic		
1542	Atlantic Tees c-15-J	6,770	Slave Point gas well.
1833	Pacific Imp Clarke b-56-L	6,558	Slave Point gas well.
1913	Pacific IOE S Clarke c-50-K	7,083	Slave Point gas well.
1816	Pacific Shekilie b-24-A	6,507	Slave Point gas well.
1835	Socony Mobil Swat b-50-F	7,600	Sulphur Point gas well.

Oil Discoveries, 1966

Well Authorization No.	Well Name	Total Depth	Status
	Mesozoic		
1815	Baysel Sinclair Wolf d-93-B	4,080	Halfway oil well.
1776	Cdn Sup et al Inga 10-25-88-24	7,503	Charlie Lake oil well.
1843	Dome Provo Co-op Bulrush d-5-K	3,790	Halfway oil well.
1840	Kewanee Terrebonne Woodrush d-47-H	3,660	Halfway oil well.
	Palæozoic		
1983	Uno-Tex Triad Stoddart A11-5-86-19	6,320	Belloy oil well.

RESERVOIR SECTION

Maximum Permissible Rates

In 1966 the Reservoir Section established 50 maximum permissible rates for oil wells, of which two were initial rates and 48 were interim approvals granted pending further evaluation of reservoir data.

Five of the interim approvals were revisions of existing rates. One interim approval was cancelled as a result of the reclassification of the well to which it applied.

Two applications were received for approval of joint M.P.R.'s, and two for amendment of existing joint M.P.R.'s.

Union Oil Company of Canada Limited applied on behalf of itself and others for a joint M.P.R. of 4,014 barrels of oil per day for the wells in the Halfway pool of the Peejoy East and Crush areas of the Peejay field. Notice of the application was published in The British Columbia Gazette on July 14th and July 21st. Approval was subsequently granted to become effective on the date of unitization of the lands in question. The unit, which became known as Peejay Unit No. 2, was formed, effective November 1st.

Union Oil Company of Canada Limited applied for a joint M.P.R. of 389 barrels of oil per day for the wells in the Halfway pool of the Bulrush field. Notice of the application was published in the Gazette on November 24th and December 1st. Approval had not yet been granted on December 31st.

Union Oil Company of Canada Limited applied for an increase in the joint M.P.R. of the wells in the Upper Halfway pool of the Wildmint field from 1,566 barrels of oil per day to 3,665 barrels per day on the basis of increased recovery from water-flood. Notice of the application was published in the Gazette on May 19th and May 26th, and approval was granted on September 1, 1966.

Union Oil Company of Canada Limited applied for an increase in the joint M.P.R. of the wells in the Halfway pool of Peejay Unit No. 2 to 7,631 barrels of oil per day on the basis of increased recovery by water-flood. Notice of the application was published in the Gazette on December 15th. Approval had not yet been granted on December 31st.

The pool, project, and unit M.P.R.'s at December 31, 1966, are listed in Table 7.

Absolute Open-flow Potential Tests and Production Rate Limits

Reports of 275 absolute open-flow potential tests of gas wells were processed and the corresponding production rate limits were established during 1966.

The absolute open-flow potentials and production rate limits for all gas wells as of December 31, 1966, except for those in the confidential category, are shown in Table 8.

Dome Petroleum Limited, as operator of Laprise Creek Baldonnel Unit No. 1, applied for a joint gas production rate limit for the wells in the unit. Notice of the application was published in the Gazette on February 17th and 24th. The application was approved on April 1, 1966, and was revised on July 1, 1966.

Pacific Petroleums Limited applied for exemption from normal gas-well production rate limits for wells producing from the Halfway zone in the Kobes-Townsend field and for authority to produce gas in accordance with its judgment of good engineering practice. Notice of the application was published in the Gazette on March 10th and 17th and approval was granted on March 30th.

Pacific Petroleums Limited applied for exemption from normal gas-well production rate limit restrictions in the so-called pressure decline area of the Laprise Creek field and for authority to produce gas from that area in accordance with its judgment of good engineering practice. The application was not approved. Approval was granted, however, effective December 1st, for a joint production rate limit for the wells in the area similar to that applied for by Dome Petroleum Limited and approval for Laprise Creek Baldonnel Unit No. 1.

Gas Conservation and Pressure Maintenance

Union Oil Company of Canada Limited applied for approval of a scheme to inject gas produced from the Halfway pool of the Weasel field back into the pool for the purposes of conserving gas and reducing the gas-oil ratio to a net gas-oil ratio. Notice of the application was published in the Gazette on May 12th and 19th. Approval was granted on June 7th.

Union Oil Company of Canada Limited applied on behalf of itself and others for approval of a scheme to inject gas produced from the Halfway pool of the Bulrush field back into the pool for the purposes of conserving gas and reducing the gas-oil ratio to a net gas-oil ratio. Notice of the application was published in the Gazette on August 11th and 18th. Approval was granted on September 1st.

Union Oil Company of Canada Limited applied for approval to inject water into the Halfway pool of the Wildmint field through a well, Union HB Wildmint d-44-A, in addition to other wells into which injection of water had previously been approved. Notice was published in the Gazette on May 19th and 26th. The application was approved, effective September 1st.

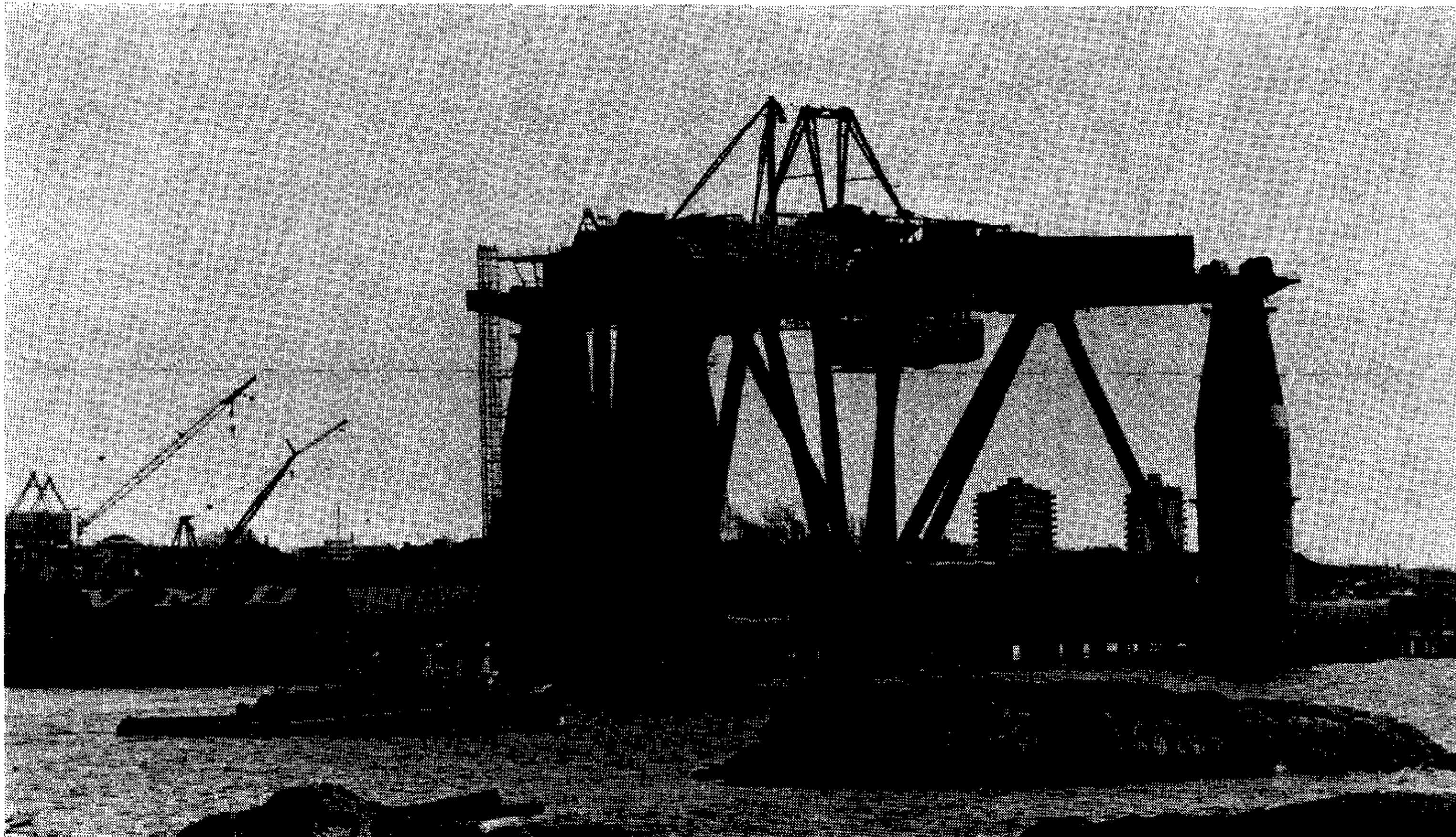
Union Oil Company of Canada Limited applied for approval of a scheme of pressure maintenance by water injection into the Halfway pool in that portion of the Peejay field comprising Peejay Unit No. 2. Notice of the application was published in the Gazette on September 29th and October 6th. Approval was granted on October 24th.

Water Disposal

Pacific Petroleums Limited applied for approval of a scheme of water disposal in the Jedney, Bubbles, and Beg fields by injection of produced water into the Baldonnel Formation through the wells Pacific et al Jedney b-68-J, Pacific Imperial Jedney c-78-H, Pacific Sunray Imp Bubbles b-22-I, and Pacific Imperial Beg c-24-B. Notice of the application was published in the Gazette on October 20th and 27th. The scheme was approved, effective December 1st.

Reserves

As a result of additional pools discovered and extensions to existing fields, the proved recoverable reserves of gas increased slightly during 1966 over the reserves of 1965.



Sedco 135-F semi-submersible drilling vessel being built for Southeastern Commonwealth Drilling Ltd. at Victoria Machinery Depot Co. Ltd. yards at Victoria. The vessel will be leased to Shell Canada Ltd. for exploratory work off the west Coast of Vancouver Island.

A summary of reserves of oil, gas, natural-gas liquids, and sulphur at the end of 1966, with explanatory notes, is given in Table 6.

Oilfield and gasfield reservoir data as compiled at the end of 1966 are given in Tables 4 and 5.

DEVELOPMENT SECTION

Drilling

The over-all footage drilled in British Columbia during 1966 decreased slightly compared to 1965. However, there was a notable change in the type of drilling done. Annual footage was down 1 per cent, but upon examination of the classifications of wells drilled, a significant increase in exploratory operations is noted with a reduction in development drilling. Development footage in 1966 was 442,512 feet, a decrease of 33 per cent in comparison to 1965, while exploratory footage was 644,188 feet, up 45 per cent. A further breakdown of the exploratory drilling indicates that the operators went far afield in their search for petroleum products. The wildcat footage increased 83 per cent, while the outpost footage was up only 27 per cent.

With the exception of one abandonment, BA CNP Fernie b-81-D, all drilling operations during 1966 were done in the northeastern corner of the Province.

The movement of drilling rigs in and out of the Province was increased, probably as a result of the current concentration of drilling activity in northwestern Alberta. Twice the number of new rig licences were issued in 1966 compared to 1965, and a decrease of 25 per cent in the number of rig licence renewals was recorded. Although British Columbia's drilling operations were decreased, there were more oil companies, drilling contractors, and drilling rigs operating than in 1965. During 1966, 49 operators employed 19 drilling contractors that used 53 individual drilling rigs to complete the drilling.

Well completions reflected the same trend as the drilling functions, showing an increase in the exploratory work and a significant decrease in development. Completed oil wells in known pools decreased 64 per cent, and abandonments, mostly exploratory in nature, gained 29 per cent. The number of gas-well completions, which were equally divided between exploratory and development, increased 25 per cent over 1965. During the past few years there have been oilfields in the development stage to encourage drilling, but this was not the case in 1966. Except for the Inga area, which only commenced development in 1966, a lack of oil pools to develop was apparent. The total wells drilled was down 12 per cent to 220. These consisted in part of 42 oil wells, 49 gas wells, and 116 abandonments, compared to 116 oil wells, 40 gas wells, and 89 abandonments recorded in 1965. In addition, three locations were drilled for service purposes to assist production, and 10 were considered as finished drilling with a final status undetermined. At the close of 1966, 25 locations were being actively drilled, with no wells in the suspended category awaiting further drilling.

The method of counting each zone of a multiple completion as a completed well was continued in 1966. There were 218 wells actually completed in 1966, of which two were multiple gas wells.

Wells drilled and drilling in 1966 are listed in Table 10. Monthly footages drilled since 1954 are given graphically on Figure 32, which shows the seasonal fluctuations throughout each year.

The number of work-overs reported during 1966 decreased significantly, but it is felt that this is due to a lack of reporting rather than a lack of activity. Work-overs are any operation performed on a well after rig release which changes the producing interval or alters, or intends to alter, the producing characteristics of the

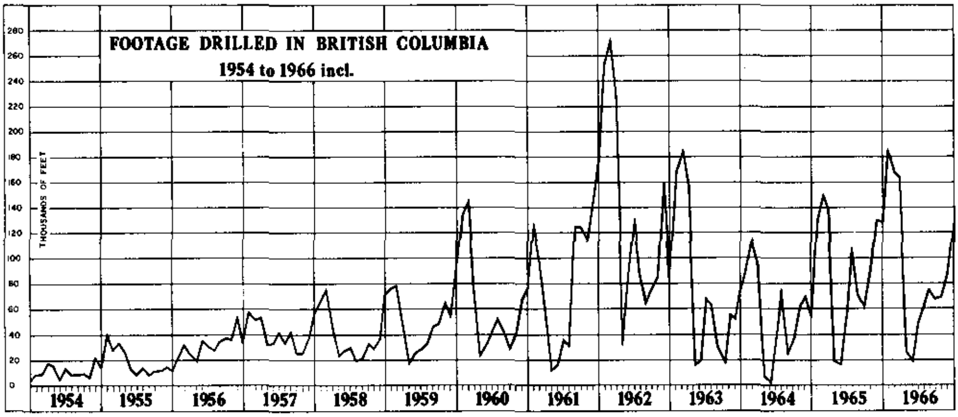


Figure 32. Footage drilled in British Columbia, 1954–66.

well. The producing interval of a well may be changed by perforating, cementing perforations, or by running casing or plugs. The producing characteristics of a well may be changed by any operation performed to increase the production of oil or gas. These operations include perforating, acidizing, fracturing, installing a pump, or changing a choke, but do not include the replacement of equipment.

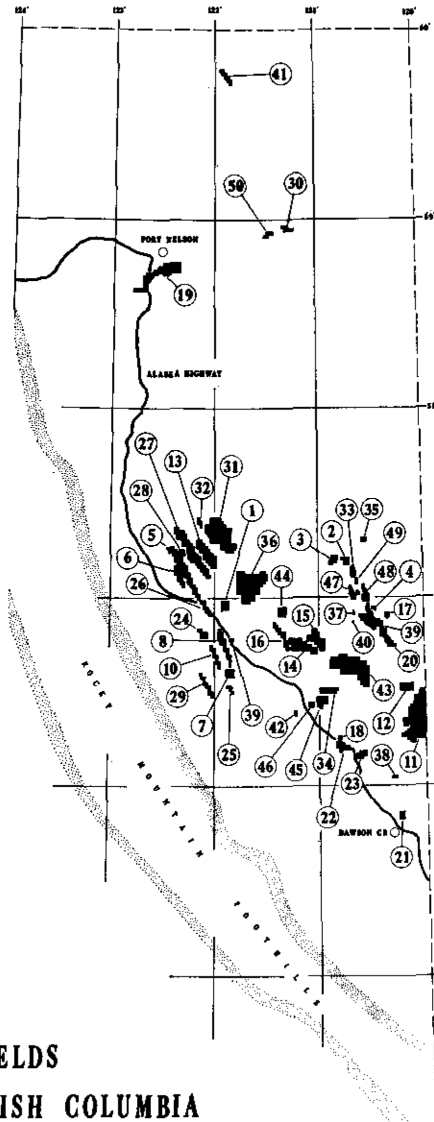
The Branch-designated fields, which are the basis for the release of well information, were reviewed quarterly. During 1966, four new fields were established and 11 field boundaries were amended. The newly designated fields were at Beaverdam, Nettle, Osprey, and Weasel. At the end of 1966 there were 50 oilfields and gasfields in British Columbia, which are listed in Table 11 and their locations are shown on Figure 33. New fields are designated when one or more wells are on continuous production or when three or more wells capable of production exist in contiguous spacing areas, provided that one year has elapsed since the rig-release date of the discovery well for the field. The boundaries of a newly designated field contain only full spacing areas and are primarily based upon a geological interpretation.

One of the prime duties of the Development Section is to study for approval all submissions made that are related to drilling operations. Such approvals must be obtained prior to the commencement of drilling a well, changing a well name, and abandoning a location or any alteration proposed to change the physical characteristics of the well. When any submission to the Development Section is received, a review is made of the proposed programme, the title under which the petroleum and natural-gas rights are held, and any other relevant requirements of the regulations. With each application for a well authorization, a surveyed position of the wellsite must be given. This position must conform to the regulations.

The Development Section also assigns a classification to each approved well location. The classifications are development, exploratory outpost, and exploratory wildcat. A development well may be defined as being in a location that is within a spacing area which is contiguous to a well capable of production. When a well is greater than 4½ miles from a capable well, it is called exploratory wildcat. Locations situated between wildcat and development are exploratory outposts. Development wells may be further classified as deep-pool or shallow-pool tests, when undeveloped pools below or above the known pool are being explored. These classifications are used as the basis for the requirements of various reports submitted to the Branch.

FIELDS & POOLS - DEC. 31, 1966

NO.	FIELD	PRODUCING HORIZON OIL	PRODUCING HORIZON GAS
1	AITKEN CR.	Gething	
2	BEATTON R.	Halfway	
3	BEATTON R. WEST	Bluesky-Gething	
4	BEAVERDAM	Halfway	
5	BEG		Baldonnel Halfway
6	BEG WEST		Baldonnel
7	BERNADET		Bluesky-Gething
8	BLUEBERRY	Mississippian	Dunlevy Baldonnel Charlie Lake
9	BLUEBERRY EAST		Baldonnel Halfway Mississippian
10	BLUEBERRY WEST		Dunlevy Baldonnel
11	BOUNDARY LAKE	Boundary Lake Halfway	Bluesky-Gething Gething Dunlevy Baldonnel
12	BOUNDARY L.N.		Halfway
13	BUBBLES		Baldonnel
14	BUICK CREEK		Dunlevy Charlie Lake
15	BUICK CR. EAST		Bluesky-Gething Dunlevy
16	BUICK CR. WEST	Dunlevy	Baldonnel Halfway
17	BULRUSH	Halfway	
18	CHARLIE LAKE	Gething	
19	CLARKE LAKE		Slave Point
20	CURRANT	Halfway	Halfway
21	DAWSON CREEK		Cadotte
22	FORT ST. JOHN	Charlie Lake	Cadomin Baldonnel Halfway Belloy
23	FORT ST. JOHN S.E.		Cadomin Baldonnel Halfway Belloy
24	GUNDY CREEK		Baldonnel Charlie Lake
25	HALFWAY		Baldonnel Halfway
26	HIGHWAY		Dunlevy Baldonnel Mississippian
27	JEDNEY		Gething Baldonnel Halfway
28	JEDNEY WEST		Baldonnel Halfway
29	KOBES-TOWNSEND		Dunlevy Charlie Lake Halfway Mississippian
30	KOTCHO LAKE		Slave Point
31	LAPRISE CREEK		Baldonnel
32	LAPRISE CR. WEST		Baldonnel
33	MILLIGAN	Halfway	
34	MONTNEY		Bluesky-Gething Charlie Lake Halfway
35	NETTLE	Bluesky-Gething	Halfway
36	NIG CREEK		Baldonnel
37	OSPREY	Halfway	
38	PARKLAND		Wabamun
39	PEEJAY	Halfway	
40	PEEJAY WEST	Halfway	
41	PETITOT RIVER		Slave Point
42	RED CREEK		Charlie Lake Halfway
43	RIGEL		Dunlevy
44	SNYDER CREEK		Dunlevy
45	STODDART		Belloy
46	STODDART WEST		Belloy
47	WEASEL	Halfway	
48	WILDMINT	Halfway	
49	WILLOW	Bluesky-Gething	Halfway
50	YOYO		Slave Pt.-Pine Pt.



OIL & GAS FIELDS OF NORTHEASTERN BRITISH COLUMBIA

Figure 33. Petroleum and natural-gas fields, 1966.

Any application that is received to alter the equipment in a well or the proposed programme for a well is handled in a similar manner. Details of the alteration are examined and given approval by the various sections of the Branch. Prior to the abandonment of wells, the operators must submit an abandonment programme to the field engineer for his approval, but all other alterations are studied at Victoria, when the official records are filed.

In 1966 the Development Section issued 220 well authorizations, which represents a decrease of 21 per cent from the 276 issued in 1965.

Several maps are prepared for distribution to the industry and other interested persons. Maps are maintained to indicate the designated fields and well locations as well as the major plant and pipe-line facilities. These maps are mailed to regular subscribers, or they may be obtained by writing to The Department of Mines and Petroleum Resources, Victoria.

Two minor fires involving production equipment were reported during 1966.

Three wells are now in operation for the specific purpose of disposing of salt water produced in conjunction with petroleum products. In 1966, 289,670 barrels were disposed of by injection into subsurface formations while 449,265 barrels were evaporated in flare pits.

Production

Significant increases were made in the production of crude oil and natural gas during 1966. Crude-oil production was up 24 per cent, compared to 1965, to 16,677,752 barrels, and natural-gas production increased 16 per cent to 199,420,439 M s.c.f.

The Boundary Lake field was again the largest oil-producer, but the greatest increases were made at the Peejay and Milligan Creek fields. The production of crude oil from Milligan Creek gained 60 per cent over the field's output of 1965, and Peejay's volume was 37 per cent higher. These three fields, Boundary Lake, Peejay, and Milligan, accounted for nearly 80 per cent of the oil produced in the Province.

In natural-gas production, the Clarke Lake field increased its output by 144 per cent over 1965 and became the largest gas-producer in British Columbia in 1966. The field, in its first full year of production, contributed 24 per cent of the Provincial volume or 42,622,967 M s.c.f. The other large producers, in order of volume, were: Laprise Creek, 19,493,628 M s.c.f.; Jedney, 18,362,633 M s.c.f.; Nig Creek, 15,920,031 M s.c.f.; Rigel, 12,642,150 M s.c.f.; and Beg, 11,869,563 M s.c.f.

Monthly crude-oil and natural-gas production by fields and pools for 1966 are given in Tables 13 and 14.

Graphs of the monthly production for 1954 to 1966 are shown in Figures 34 and 35.

Some changes were noted in the production and sales of condensate/pentanes plus, butane, propane, and sulphur compared to 1965. Most notable was the increase of 11 per cent in the production and 20 per cent in the sale of butane. Although the production of propane increased only 2 per cent, the volume sold was up 21 per cent compared to 1965, due mainly to nearly doubling the quantity exported. Propane sales showed a decrease of 71 per cent in export with a rise of 14 per cent in the volume sold in British Columbia.

General statistics showing well operation and production data are given in Table 15. The monthly dispositions of the various petroleum products are shown in Tables 16, 17, and 18. Monthly values to the producers are given in Table 19.

Pipe-lines

Oil-gathering System

Trans-Prairie Pipelines (B.C.) Ltd. added 39 miles to its main pipe-line and increased the throughput to more than 40,000 barrels per day. It also added 11 miles to its oil-gathering system to include production from the Wolf field.

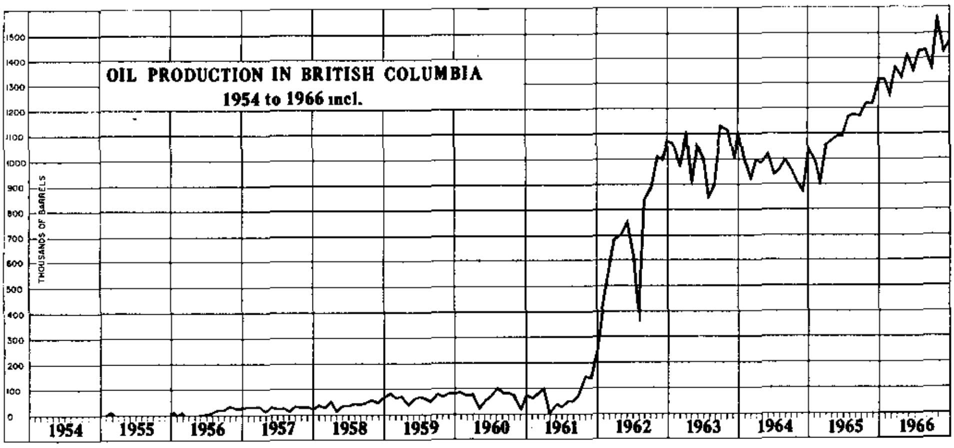


Figure 34. Oil production in British Columbia, 1954–66.

Figure 35. Gas production in British Columbia, 1954–66.

Oil-transmission System

The throughput of the pipe-line from Taylor to Kamloops operated by Western Pacific Products and Crude Oil Pipelines Ltd. was increased to 41,504 barrels per day, and the storage capacity was enlarged to hold 586,000 barrels during 1966.

Gas-gathering System

No changes were reported in the gas-gathering system in the Province for 1966.

Gas-transmission System

The most significant change in the gas-transmission systems for 1966 was completed by Inland Natural Gas Co. Ltd., which added 60 miles to the pipe-line network and raised the capacity to 78,600 M s.c.f. per day.

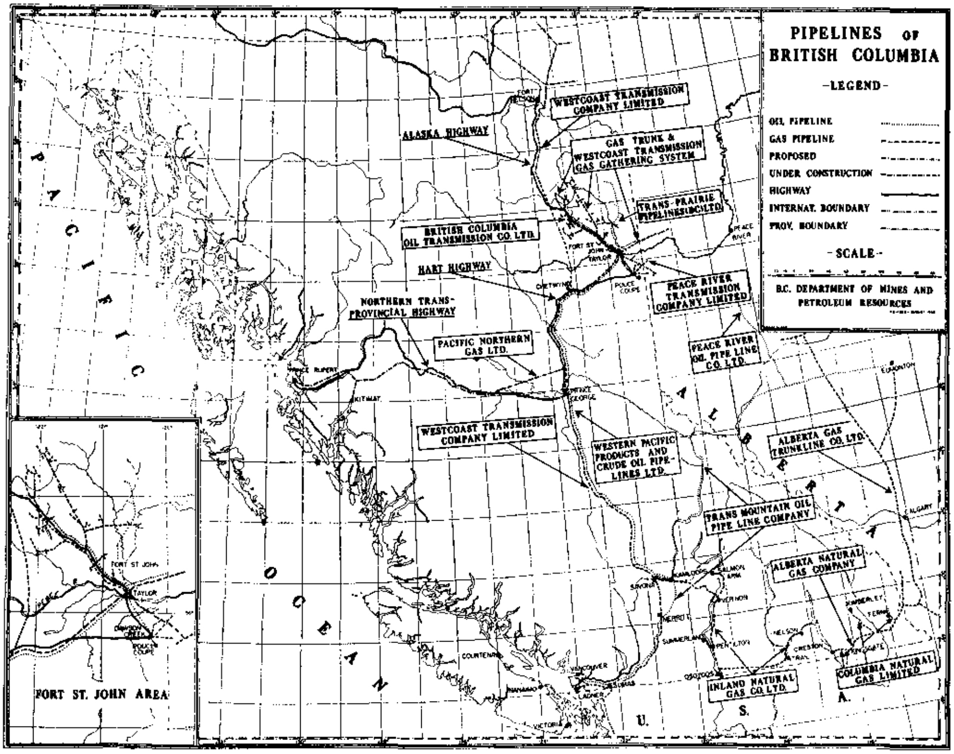


Figure 36. Petroleum and natural-gas pipe-lines.

Gas-distribution System

Minor expansions were completed to many of the gas-distribution systems in 1966. A total of 91 miles was constructed and put into operation.

Oil Refineries

Changes in three of the oil refineries were completed during 1966. The Provincial crude-oil capacity was increased to 100,400 barrels per calendar day and the storage capacity to 9,285,000 barrels. Construction began in 1966 of a refinery at Prince George, which will go on stream during 1967 with a planned capacity of 7,500 barrels per day.

Gas-processing Plant

No changes were made at the gas-processing plants during 1966.

Sulphur Plant

No change was made to the sulphur plant located at Taylor.

Tables 20, 21, 22, 23, and 24 provide data on the pipe-lines, oil refineries, gas-processing plants, and the sulphur plant.

Well Records

Information concerning the petroleum and natural-gas industry in British Columbia is collected and compiled by the Petroleum and Natural Gas Branch.

The data are made available to interested persons, in strict accordance with section 51 of the regulations. Location, elevation, current depth, casing, status, and monthly production of individual wells are released upon request. Other information is held confidential, depending upon the relationship of the well location to the designated fields.

Data obtained from wells located within a field are available 30 days after the release of the drilling rig, provided that one year has expired since the rig release date of the discovery well for the field. When a well location is not within a designated field, all data are confidential for one year after the release of the drilling rig. In the case of deep-pool and shallow-pool tests, the data from the exploratory portions of the wells are held confidential for the one-year period. Confidential well information may be released to an interested person, if a letter is received by the Branch from the operator of the well authorizing its release.

Information is released by publication, examination of Branch records, or reproduction of data. Cost-defraying charges are made by the Branch for these services.

The records maintained by the Branch are in constant use by the Reservoir, Development, and Geological Sections. Therefore, they must be kept up to date and in a manner suitable for many purposes. As the published reports are expanded to meet the requirements of the industry and of other government bodies, the systems of keeping records must be altered.

The Branch has representation on the Statistical Sub-committee which was established at the request of the Mines Ministers' Conference in 1955. This committee is composed of representatives from each Province actively engaged in the petroleum industry and personnel employed by oil companies. The objectives of the group are as follows:—

(1) Standardization of forms designed for the same purpose but which are required individually by both the Provincial and Federal Governments under different formats.

(2) Standardization of forms to accommodate machine accounting procedures for reporting production statistics to the Provincial Governments.

(3) Amendment of existing model report forms to conform with present requirements.

(4) Investigation of ways and means to obtain the co-operation of both Provincial and Federal Government agencies and provide earlier availability of information on all phases of the oil and gas industry.

One meeting of the Statistical Sub-committee was held in 1966, when revisions in the model forms were approved and discussions were held concerning the procedures and reports employed by the Provincial authorities. The Petroleum and Natural Gas Branch has adopted many features of these model forms and uses the following applications and reports:—

Form No.	Form Name
1.	Well Register.
2.	Application for a Well Authorization.
3.	Application to Amend a Well Authorization.
4.	Application to Change a Well Name.
5.	Application to Abandon a Well.
6.	Application to Alter a Well.
7.	New Oil Well Report.
8.	New Gas Well Report.
9.	Application for M.P.R.
10.	Report of Wells Connected to a Battery.
BC S1.	Monthly Production Report.
BC S2.	Monthly Disposition and Crown Royalty Statement.

Form No.	Form Name
15.	Monthly Gas-gathering Operations Report.
16.	Monthly Natural Gas Plant Statement.
17.	Monthly Natural Gas Processing Statement.
18.	Monthly Sulphur Plant Operations Report.
19.	Monthly Refinery Operations Report.
20.	Monthly Crude Oil and Condensate/Pentanes Plus Purchaser's Statement.
21.	Monthly Liquefied Petroleum Gas Purchaser's Statement.
22.	Well Completion Report.
23.	Supplement to Well Completion Report.
24.	Work-over Report No.
*25.	Work-over Card.
*26.	Monthly Operations Report.
27.	Application for a Rig Licence.
28.	Monthly Water Flood Operations Report.
29.	Monthly Water Receipts and Disposal Report.
30.	Statement of Nomination and Estimated Requirements for British Columbia Crude Oil, Condensate/Pentanes Plus.
31.	New Service Well Report.
32.	Well Allowable Report.
*33.	Drilling Report.
*7C.	Meter Inspection Report.
*7D.	Battery Inspection Report.
	†Monthly Natural Gas Distributor's Statement.
	†Monthly Report on Oil Pipeline Gathering Operations.

* For Departmental use only.
† Used in conjunction with the Dominion Bureau of Statistics.

The Branch has representation on the Provincial-Federal Committee on Oil and Gas Statistics, which held one meeting during 1966. The purpose of this committee is to establish and revise, as required, statistical forms on the production, transportation, and distribution of oil and gas and to foster the joint collection of these statistics, eliminating as much duplication by the Provincial and Federal agencies as possible.

Reports

Schedule of Wells

In 1966 a composite volume was compiled giving all non-confidential well information to 8 a.m., January 1, 1966. The data contained in previously published volumes were consolidated and expanded to include the releasable information for the 1965 wells.

The data are arranged by location and provide the following information where applicable: Well authorization number, well name, location, classification, co-ordinates, K.B. elevation, total depth, status, interval(s) open to production, casing size and depth, spud date, rig release date, logs taken, cored intervals, sampled interval, drill-stem test data, and geological formation depths determined by the petroleum geologists.

The information was condensed from reports submitted to the Branch by the various operators.

Weekly Report

A weekly report is published for Departmental use from data collected by the field office staff at Charlie Lake. The week reported is from 8 a.m. on Friday to the succeeding Friday. The following information is included:—

(1) Spudded wells.
(2) Cancelled locations.
(3) Changes of well names.
(4) Changes of well classification.
(5) Changes of well status.
(6) Suspended wells.
(7) Finished drilling wells.
(8) Abandoned wells.
(9) Oil wells.
(10) Gas wells.
(11) Work-overs.
(12) Operating wells.
(13) Approved wells not spudded.
(14) Summary of well count giving the following totals:—
  (*a*) Finished drilling wells.
  (*b*) Abandoned wells.
  (*c*) Oil wells.
  (*d*) Gas wells.
  (*e*) Water injection wells.
  (*f*) Gas injection wells.
  (*g*) Water source wells.
  (*h*) Observation wells.
  (*i*) Disposal wells.
  (*j*) Completed wells.
  (*k*) Locations drilled.
  (*l*) Multiple completions.
  (*m*) Drilling wells.
  (*n*) Suspended wells.
  (*o*) Approved but not spudded wells.
  (*p*) Locations in good standing.
  (*q*) Locations approved.
  (*r*) Locations cancelled.

The number of completed wells is calculated by two methods to provide verification. The number of wells of different status, counting each zone of a multiple completion as a well, is compared to the number of locations drilled less the multiple completions.

The number of locations in good standing is calculated also by two methods. The total number of locations drilled, drilling, suspended, and approved but not spudded is compared to the total number of locations approved less the number of locations cancelled.

Oil and Gas Production Report

The Oil and Gas Production Report is prepared monthly from returns made by the operators of the producing wells, pipe-lines, gas plants, refineries, and distribution facilities. The contents of the report are as follows:—

(1) Graphical presentations of the daily average oil production, the daily average marketable gas production, and the monthly footage drilled with comparative graphs of the totals for the preceding year.
(2) Monthly summary of the drilling and completion activity with cumulatives for the year and comparative figures for the same month of the preceding year.
(3) New oil- and gas-well reports received.

(4) The number of producing and producible oil and gas wells by field and pool and comparative figures for the same month of the preceding year.
(5) Production of crude oil, natural gas, condensate, and water by field and pool with comparative volumes produced in the same month of the preceding year. These quantities are given for the current month, the current year, and the all-time cumulative.
(6) Estimated oil production for the succeeding month.
(7) Crude oil and equivalent disposition.
(8) Value of crude-oil sales to British Columbia producers.
(9) Disposition of produced water.
(10) Tabulation of nominations and estimated requirement for British Columbia crude oil and condensate/pentanes plus.
(11) Approved maximum permissible rates.
(12) Withdrawn maximum permissible rates.
(13) Approved absolute open-flow potential tests.
(14) Natural-gas disposition.
(15) Value of natural gas to British Columbia producers and distributors.
(16) Production and disposition of condensate/pentanes plus, butane, propane, and sulphur.
(17) Value of sales of natural-gas liquids and sulphur to British Columbia producers.
(18) Water-flood operations showing the number of injection wells and the current monthly, current yearly, and all-time cumulative figures for each formation in each pool and field.

This report is compiled and mailed to subscribers approximately two weeks after receipt of the returns from the operators.

Drilling and Land Report

The Drilling and Land Report is published and distributed monthly concurrently with the Oil and Gas Production Report.

The Drilling Section is compiled from information forwarded by the Branch field office and contains the following:—

(1) Monthly summary of drilling and completion activity with cumulatives for the year, and comparative figures for the same month of the preceding year.
(2) Summary of the well count giving the following totals:—
    (*a*) Locations drilled.
    (*b*) Finished drilling wells.
    (*c*) Abandoned wells.
    (*d*) Oil wells.
    (*e*) Gas wells.
    (*f*) Water-injection wells.
    (*g*) Gas-injection wells.
    (*h*) Water-source wells.
    (*i*) Observation wells.
    (*j*) Disposal wells.
(3) Well authorizations approved.
(4) Locations cancelled.
(5) Locations outstanding.

(6) Changes of well status.
(7) Changes of well classification.
(8) Changes of well names.
(9) Suspended wells.
(10) Drilling and completed wells.
(11) Rig licences issued.
(12) Rig licences renewed.
(13) Rig licences cancelled.
(14) Well data released from confidential status.
(15) Descriptions of designated fields.

The Land Section is prepared by the Petroleum and Natural Gas Titles Section and contains the following:—

(1) Acreage synopses.
(2) Summary of changes in acreage held under the following titles:—
  (*a*) Permits.
  (*b*) Leases.
  (*c*) Natural-gas licences.
  (*d*) Drilling reservations.
(3) Geophysical licences issued and renewed.
(4) Notices regarding sales of Crown petroleum and natural-gas rights.
(5) Summary of disposition of permits, leases, natural-gas licences, and drilling reservations.

Publications

Various publications, maps, and services concerning petroleum and natural-gas operations in British Columbia are available. A catalogue containing descriptions and prices is available from the Chief Petroleum and Natural Gas Commissioner, Administration Branch, or the Chief, Petroleum and Natural Gas Branch, Department of Mines and Petroleum Resources, Parliament Buildings, Victoria, B.C.

Table 1.—Geophysical Exploration, 1966

Seismic Surveys

Note.—Unless otherwise shown, the exploration method used is the reflection seismic survey. For indicating location, the National Topographic Series grid system is used, except in the Peace River Block, where the township system is used.

Company	Location of Exploration	Number of Seismic Crews	Number of Crew-weeks
January			
Altair Oil & Gas	94-J-2, -7	1	4.5
Amerada Petroleum	94-J-2, -7, -8	1	4
Atlantic Refining	94-P-7, -10	1	3
Dome Petroleums	94-A-14, -15	1	1
Marathon Oil	94-P-7, -10, -11	1	4
Mobil Oil of Canada	94-I-11, -12, -13, -14	1	4.5
Monsanto Oils	94-G-1, -8; 94-H-4, -5	1	3
Pacific Petroleums	94-I-16	1	2
	94-J-9	1	1
Shell Canada	92-E	2	81
Tenneco Oil & Minerals	94-I-14	1	1

TABLE 1.—GEOPHYSICAL EXPLORATION, 1966—*Continued*

Company	Location of Exploration	Number of Seismic Crews	Number of Crew-weeks
February			
Altair Oils & Gas	94-J-2, -6, -7	1	4
Amerada Petroleums	94-J-2, -7, -8, -10	1	4
Atlantic Refining	94-P-11, -15, -16	1	4
Marathon Oil	94-P-10, -11, -15, -16	1	4
Mobil Oil Canada	94-I-11, -12, -13, -14	1	4
Shell Canada	92-D, -E	2	8[1]
Tenneco Oil & Minerals	94-I-14	1	3
Texaco Canada	94-H-10, -11	1	3.5
March			
Altair Oil & Gas	94-J-2, -11	1	1.5
	94-G-14; 94-C-15	1	3
Amerada Petroleums	94-J-10	1	0.5
	94-O-7, -8, -10, -11	1	3.5
Atlantic Refining	94-I-6	1	1
British American Oil Company	94-A-3	1	2
French Petroleum Company of Canada	Tps. 81, 82, R. 22, 23, W. of 6th M.	1	2
Marathon Oil	94-I-6	1	1
	94-J-10	1	0.5
Mobil Oil Canada	94-I-5, -11, -12, -13, -14	1	4
Pacific Petroleums	94-J-10	1	1.5
Shell Canada	92-D, -E	2	8[1]
Tenneco Oil & Minerals	94-I-14	2	4
Texaco Canada	94-H-6, -7	1	4
April			
British American Oil Company	93-P-14, -15; 94-A-3	1	4
May			
British American	93-P-14, -15; 94-A-2, -3	1	4
June			
Winter Oil	94-I-1, -2, -8	1	0.5
July			
Winter Oil	94-I-1, -8	1	6.2
August			
Placid Oil	82-G-5	1	4
Winter Oil	94-I-1; 94-H-16	1	4.2
September			
Pacific Petroleums	94-A-13	1	0.3
Triad Oil	93-P-3, -4, -5	1	3.5
Winter Oil	94-I-1	1	3.5
October			
Chevron Standard	94-H	1	1
Pacific Petroleums	94-J-10	1	1
Winter Oil	94-H-16	1	4
November			
Chevron Standard	94-H	1	3
Pacific Petroleums	94-H-7, -8, -9, -10	1	1
Texaco Canada	94-H-16	1	1.5
Winter Oil	94-I-1; 94-H-16	1	3.4
December			
Chevron Standard	94-H	1	1
Texas Gulf Sulphur	93-P-5	1	2
Winter Oil	94-H-16	1	3.2

[1] Marine seismic.

TABLE 2.—SURFACE GEOLOGICAL EXPLORATION, 1966

Company	Location of Exploration	Number of Geologists	Two-man Party-weeks
June			
Mobil Oil Canada	93-I-15	5	10
July			
Mobil Oil Canada	93-I-14, -15; 93-P-3, -4	5	10
August			
Imperial Oil Enterprises	93-K, -L	2	1
Mobil Oil Canada	93-O-8, -9, -10	5	10
Placid Oil	82-G-5	1	2
September			
Imperial Oil Enterprises	94-O, -P	2	1
October			
Placid Oil	82-G-5	1	1

TABLE 3.—EXPLORATORY TEST-HOLES DRILLED, 1966

Company	No.	Location	Ground Elevation (Ft.)
Altair Oil & Gas	1	N. 710′, E. 790′, S.W. corner Sec. 20, Lsd. 4, Sec. 20, Tp. 82, R. 12, W. of 6th M.	1,954
	2	b-2-C, 94-A-14	2,632
	3	Lsd. 6, Sec. 9, Tp. 86, R. 21, W. of 6th M.	2,206.5
	4	d-13-D, 94-A-14	2,503
	5	b-66-D, 94-A-13, S. 1,569′, W. 2,201′, N.E. corner Unit 66D	3,115

TABLE 4.—OILFIELD RESERVOIR DATA, DECEMBER 31, 1966

Field	Pool	Rock Type	Age	Trap	Drive Mechanism	Average Porosity (per Cent)	Average Reservoir Thickness (Net Ft.)	Average Permeability (Md.)	Average Water Saturation (per Cent)	Shrinkage Factor (Stock Tank Barrel per Reservoir Barrel)	Gravity Degrees (A.P.I.)	Original Pressure (Psig.)	Average M.P.R. (Bbl./Day)
Aitken Creek	Gething	Sandstone	Lower Cretaceous	Structural-stratigraphic	Depletion and gas cap	12	17	3,340	18	0.77	39.2	1,548	175[1]
Beatton River	Halfway	Sandstone	Triassic	Structural-stratigraphic	Depletion	20	10	288	24	0.86	40.4	1,172	205[1] 49[2]
Beatton River West	Bluesky-Gething	Sandstone	Lower Cretaceous	Structural-stratigraphic	Depletion and gas cap	14	8	65	31	0.80	42.1	1,031	76
Beaverdam	Halfway	Sandstone	Triassic	Stratigraphic	Depletion	12	20	16	14	0.83	38.8	1,300	580
Blueberry	Mississippian	Carbonate	Mississippian	Structural-stratigraphic	Gas cap and partial water	11	28	31[3]	17	0.75	42.4	2,715	256[1] 97[2]
Boundary Lake	Cadomin	Sandstone	Lower Cretaceous	Structural	Water	18	11	75	40	0.75	29.3	1,474	79
	Boundary Lake	Carbonate	Triassic	Structural-stratigraphic	Depletion	18	12	45	11	0.80	33.7	1,814	141[1] 89[2]
	Halfway	Sandstone	Triassic	Structural	Water and partial gas cap	13	11	14	26	0.82	42.6	1,699	74
Bulrush	Halfway	Sandstone	Triassic	Stratigraphic	Depletion and gas cap	15	6	212	18	0.83	41.1	1,350	62
Charlie Lake	Gething	Sandstone	Lower Cretaceous	Stratigraphic	Depletion	19	13	(4)	25	0.83	34.4	1,111	36
Currant	Halfway	Sandstone	Triassic	Stratigraphic	Depletion and gas cap	16	7	81	15	0.83	38.8	1,412	83
Fort St. John	Charlie Lake	Sandstone	Triassic	Stratigraphic	Gas cap	14	3	570	25	0.77	39.6	1,953	37
	Belloy	Carbonate	Permian	Structural-stratigraphic	Depletion	10	21	23	25	0.75	43.0	2,784	85
Milligan Creek	Halfway	Sandstone	Triassic	Structural-stratigraphic	Depletion	25	16	23	14	0.88	40.4	1,184	476[1] 157[2]
Nettle	Bluesky-Gething	Sandstone	Lower Cretaceous	Stratigraphic	Depletion	15	5	127	44	0.80	42.9	974	74
Osprey	Halfway	Sandstone	Triassic	Stratigraphic	Depletion	11	5	67	35	0.85	38.6	1,432	49
Peejay	Halfway	Sandstone	Triassic	Stratigraphic	Depletion	16	10	106	21	0.83	39.0	1,382	148[1] 107[2]
Peejay West	Halfway	Sandstone	Triassic	Stratigraphic	Depletion	22	20	82	31	0.83	39.0	1,440	170
Rigel	Dunlevy	Sandstone	Lower Cretaceous	Stratigraphic	Depletion	13	6	330	42	0.87	38.6	1,288	144
Stoddart	Belloy	Carbonate	Permian	Structural-stratigraphic	Depletion	11	9	8	24	0.85	38.6	2,466	82
Weasel	Halfway	Sandstone	Triassic	Stratigraphic	Depletion	20	12	400	24	0.88	40.0	1,284	147
Wildmint	Halfway	Sandstone	Triassic	Structural-stratigraphic	Depletion	20	13	202	23	0.87	40.0	1,226	262[1] 148[2]
Willow	Bluesky-Gething	Sandstone	Lower Cretaceous	Stratigraphic	Depletion	29	9	150	13	0.89	44.2	987	122

[1] Daily average M.P.R. obtained by dividing unit M.P.R. by the number of producible wells in the unit.
[2] Daily average M.P.R. of wells not included in a unit or pool M.P.R.
[3] Plus fractures.
[4] Not available.

TABLE 5.—GASFIELD RESERVOIR DATA, DECEMBER 31, 1966

Field	Pool	Rock Type	Age	Trap	Av. Porosity (per Cent)	Av. Reservoir Thickness (Net Ft.)	Av. Permeability (Md.)	Av. Water Saturation (per Cent)	Compressibility Factor	Specific Gravity (Air=1.0)	Original Pressure (Psig.)	Av. A.O.F.P. (M S.C.F./Day)
Beg	Baldonnel	Carbonate	Triassic	Structural	8	32	65	21	0.840	0.652	1,630	4,710
Beg	Halfway	Sandstone	Triassic	Structural	10	36	10	35	0.839	0.673	1,820	5,320
Beg West	Baldonnel	Carbonate	Triassic	Structural	8	86	23	23	0.848	0.653	1,674	1,380
Bernadet	Bluesky-Gething	Sandstone	Lower Cretaceous	Structural-stratigraphic	8	13	(1)	15	0.838	0.644	1,193	840
Blueberry	Dunlevy	Sandstone	Lower Cretaceous	Structural	11	33	10	33	0.840	0.659	1,363	1,700
Blueberry	Baldonnel	Carbonate	Triassic	Structural	10	17	38	37	0.837	0.673	1,611	760[2]
Blueberry	Charlie Lake	Sandstone	Triassic	Structural-stratigraphic	9	26	(1)	27	0.706	0.939	2,073	(2)
Blueberry East	Baldonnel	Carbonate	Triassic	Structural	10	30	48	25	0.832	0.675	1,715	1,920
Blueberry East	Mississippian	Carbonate	Mississippian	Structural	12	17	32	30	0.871	0.615	2,680	(2)
Blueberry West	Dunlevy	Sandstone	Lower Cretaceous	Structural	10	9	62	25	0.850	0.658	1,410	470
Blueberry West	Baldonnel	Carbonate	Triassic	Structural	9	16	84	23	0.824	0.648	1,715	(2)
Boundary Lake	Bluesky-Gething	Sandstone	Lower Cretaceous	Structural-stratigraphic	18	9	(1)	28	0.858	0.634	1,276	(2)
Boundary Lake	Gething	Sandstone	Lower Cretaceous	Structural-stratigraphic	17	57	(1)	16	0.843	0.648	1,371	8,170
Boundary Lake	Dunlevy	Sandstone	Lower Cretaceous	Structural	24	46	(1)	38	0.845	0.629	1,453	11,200
Boundary Lake	Baldonnel	Carbonate	Triassic	Structural	14	20	(1)	34	0.799	0.677	1,447	7,910
Boundary Lake	Halfway	Sandstone	Triassic	Structural	10	25	(1)	11	0.841	0.632	1,556	360
Boundary Lake North	Halfway	Sandstone	Triassic	Stratigraphic	15	28	57	25	0.845	0.657	1,566	13,650
Bubbles	Baldonnel	Carbonate	Triassic	Structural	10	52	33	17	0.843	0.663	1,596	8,250
Buick Creek	Dunlevy	Sandstone	Lower Cretaceous	Structural-stratigraphic	13	25	140	28	0.836	0.659	1,293	5,390
Buick Creek	Charlie Lake	Sandstone	Triassic	Structural-stratigraphic	13	6	(1)	33	0.859	0.613	1,554	1,500
Buick Creek East	Bluesky-Gething	Sandstone	Lower Cretaceous	Structural-stratigraphic	10	10	(1)	47	0.865	0.639	1,096	750
Buick Creek East	Dunlevy	Sandstone	Lower Cretaceous	Structural-stratigraphic	11	20	125	29	0.853	0.648	1,289	5,150
Buick Creek West	Dunlevy	Sandstone	Lower Cretaceous	Structural-stratigraphic	11	28	165	52	0.850	0.657	1,305	8,400
Buick Creek West	Baldonnel	Carbonate	Triassic	Structural-stratigraphic	11	18	45	27	0.817	0.698	1,467	1,460
Buick Creek West	Halfway	Sandstone	Triassic	Structural	11	39	21	31	0.782	0.748	1,721	(2)
Clarke Lake	Slave Point	Carbonate	Devonian	Stratigraphic	9	143	248	14	0.930	0.671	2,896	106,000
Dawson Creek	Cadotte	Sandstone	Lower Cretaceous	Structural-stratigraphic	16	49	33	25	0.921	0.580	686	1,360
Fort St. John	Cadomin	Sandstone	Lower Cretaceous	Structural	12	8	421	40	0.869	0.581	1,324	(2)
Fort St. John	Baldonnel	Carbonate	Triassic	Structural	14	33	1,212	25	0.822	0.661	1,604	3,490
Fort St. John	Charlie Lake	Sandstone	Triassic	Stratigraphic	15	6	(1)	10	0.825	0.648	1,906	(2)
Fort St. John	Halfway	Sandstone	Triassic	Structural	11	28	23	25	0.799	0.679	2,006	3,270
Fort St. John	Belloy	Carbonate	Permian	Structural-stratigraphic	12	11	59	25	0.828	0.655	2,756	2,410
Fort. St. John Southeast	Cadomin	Sandstone	Lower Cretaceous	Structural	16	32	64	40	0.876	0.581	1,389	900
Fort. St. John Southeast	Baldonnel	Carbonate	Triassic	Structural	18	12	30	28	0.778	0.702	1,634	3,200

[1] Not available.

[2] The average A.O.F.P. per well does not include wells which have been withdrawn from production. In some fields, all wells in a particular pool may have been withdrawn from production.

TABLE 5.—GASFIELD RESERVOIR DATA, DECEMBER 31, 1966—*Continued*

Field	Pool	Rock Type	Age	Trap	Av. Porosity (per Cent)	Av. Reservoir Thickness (Net Ft.)	Av. Permeability (Md.)	Av. Water Saturation (per Cent)	Compressibility Factor	Specific Gravity (Air=1.0)	Original Pressure (Psig.)	Av. A.O.F.P. (M S.C.F./Day)
Fort. St. John Southeast	Halfway	Sandstone	Triassic	Structural	10	16	14	25	0.821	0.693	2,072	4,690
Fort. St. John Southeast	Belloy	Carbonate	Permian	Structural-stratigraphic	9	16	62	25	0.842	0.640	2,814	8,030
Gundy Creek	Baldonnel	Carbonate	Triassic	Structural	9	9	69	20	0.850	0.636	1,731	(2)
Gundy Creek	Charlie Lake	Sandstone	Triassic	Structural-stratigraphic	7	10	(1)	25	0.810	0.653	2,339	(2)
Halfway	Baldonnel	Carbonate	Triassic	Structural	8	31	6	35	0.818	0.639	1,642	2,280
Halfway	Halfway	Sandstone	Triassic	Structural	16	7	49	25	0.800	0.650	2,212	(2)
Highway	Dunlevy	Sandstone	Lower Cretaceous	Structural	9	14	85	25	0.857	0.669	1,346	810
Highway	Baldonnel	Carbonate	Triassic	Structural	10	5	124	25	0.805	0.675	1,666	(2)
Highway	Mississippian	Carbonate	Mississippian	Structural	10	13	105	25	0.903	0.609	3,122	6,890
Jedney	Gething	Sandstone	Lower Cretaceous	Structural-stratigraphic	11	10	(1)	24	0.870	0.663	1,126	(2)
Jedney	Baldonnel	Carbonate	Triassic	Structural	10	57	34	13	0.852	0.693	1,602	6,140
Jedney	Halfway	Sandstone	Triassic	Structural	10	51	16	22	0.842	0.673	1,688	7,180
Jedney West	Baldonnel	Carbonate	Triassic	Structural	9	11	(1)	64	0.850	0.693	1,622	(2)
Jedney West	Halfway	Sandstone	Triassic	Structural	8	32	(1)	45	0.839	0.673	1,768	(2)
Kobes-Townsend	Dunlevy	Sandstone	Lower Cretaceous	Structural	12	26	18	20	0.782	0.651	1,486	1,580
Kobes-Townsend	Charlie Lake	Sandstone	Triassic	Structural-stratigraphic	11	12	(1)	29	0.820	0.629	2,470	1,370
Kobes-Townsend	Halfway	Sandstone	Triassic	Structural-stratigraphic	8	24	5	28	0.823	0.638	2,636	11,370
Kobes-Townsend	Mississippian	Carbonate	Mississippian	Structural-stratigraphic	5	21	10	16	0.841	0.647	3,025	10,480
Kotcho Lake	Slave Point	Carbonate	Devonian	Stratigraphic	10	19	46	8	0.920	0.670	2,550	825,000
Laprise Creek	Baldonnel	Carbonate	Triassic	Structural-stratigraphic	10	60	130	19	0.844	0.676	1,528	8,580
Laprise Creek West	Baldonnel	Carbonate	Triassic	Structural-stratigraphic	10	44	48	23	0.845	0.694	1,326	2,960
Montney	Bluesky-Gething	Sandstone	Lower Cretaceous	Structural-stratigraphic	17	6	(1)	45	0.843	0.670	1,250	(2)
Montney	Charlie Lake	Sandstone	Triassic	Structural-stratigraphic	20	5	(1)	30	0.830	0.664	1,746	(2)
Montney	Halfway	Sandstone	Triassic	Structural	15	15	67	33	0.805	0.702	1,846	3,180
Nig Creek	Baldonnel	Carbonate	Triassic	Structural-stratigraphic	10	51	61	21	0.849	0.678	1,642	11,080
Parkland	Wabamun	Carbonate	Devonian	Structural-stratigraphic	13	53	(1)	16	1.022	0.623	4,900	20,620
Petitot River	Slave Point	Carbonate	Devonian	Structural-stratigraphic	7	80	(1)	18	0.936	0.674	2,775	185,000
Red Creek	Charlie Lake	Sandstone	Triassic	Structural-stratigraphic	18	6	(1)	32	0.838	0.614	1,866	(2)
Red Creek	Halfway	Sandstone	Triassic	Structural	11	19	18	20	0.719	0.779	2,021	(2)
Rigel	Dunlevy	Sandstone	Lower Cretaceous	Structural-stratigraphic	14	19	25	25	0.848	0.654	1,274	12,720
Snyder Creek	Dunlevy	Sandstone	Lower Cretaceous	Structural-stratigraphic	12	11	(1)	30	0.858	0.664	1,275	1,050
Stoddart	Belloy	Carbonate	Permian	Stratigraphic	15	17	106	10	0.805	0.695	2,411	7,910
Stoddart West	Belloy	Carbonate	Permian	Stratigraphic	14	15	24	14	0.805	0.695	2,411	6,690
Yoyo	Pine Point	Carbonate	Devonian	Stratigraphic-structural	8	90	230[3]	15	0.927	0.740	2,900	95,000

[1] Not available.
[2] The average A.O.F.P. per well does not include wells which have been withdrawn from production. In some fields, all wells in a particular pool may have been withdrawn from production.
[3] Partial core coverage.

TABLE 6.—PROVED RESERVES OF CRUDE OIL AND ESTABLISHED RESERVES OF NATURAL GAS AND NATURAL-GAS PRODUCTS, DECEMBER 31, 1966

	Crude Oil[1] (Thousands of Barrels)	Established Disposable Gas (B S.C.F.[2] at 14.65 Psia. at 60° F.)	Disposable Gas (1,000 B.T.U./C.F. Basis B S.C.F.)	Producible Natural-gas Liquids (Thousands of Barrels)	Producible Sulphur (Thousands of Short Tons)
Reserves remaining at December 31, 1965	266,613	6,770.7	7,044.0	115,886	3,077
Revisions and extensions[3]	+18,855	+455.8	+468.5	+3,456	+232
Production, 1966	16,638	169.2	181.8	4,935	79
Reserves remaining at December 31, 1966	268,830	7,057.3	7,330.7	114,407	3,230

[1] Barrels of 34.97 imperial gallons. Includes only proved drilled reserves. There are an additional 16,800,000 barrels of probable reserves which are in effect proved undrilled reserves.

[2] B S.C.F.—Billion standard cubic feet. Associated gas is included only for pools wherein gas conservation schemes are operational.

[3] Includes discovery from new drilling and revisions arising from new information.

NOTE.—The production of residual gas, gas liquids, and sulphur are the quantities calculated from gas analyses to have been produced with the raw gas and are not the quantities actually extracted. The quantity of gas delivered to the transmission-line and distributed in 1966 was 161.3 B s.c.f., and the amounts of natural-gas liquids and sulphur actually extracted were 1,849,432 barrels and 56,594 short tons respectively.

TABLE 7.—POOL, PROJECT, AND UNIT M.P.R.S, DECEMBER 31, 1966

Field and Pool	Pool, Project, or Unit Name	Pool, Project, or Unit M.P.R. (Barrels per Day) and Date Approved	Revisions to Pool, Project, or Unit M.P.R. and Effective Date	Pool, Project, or Unit Area[1] (Acres)	Number of Producible Oil Wells	Number of Gas Injection Wells	Number of Water Injection Wells	Daily Average Gas Injected[2] (M S.C.F.)	Daily Average Water Injected[2] (Barrels)
Aitken Creek—Gething	(Union) Aitken Creek Gething pool	582 (1-1-64)	874 (1-5-65)	1,049	5	1	—	1,777	—
Beatton River—Halfway	(Triad) Beatton River Halfway pool	1,940 (15-10-63)	1,960 (1-9-64) 2,054 (1-7-65)	1,733	10	—	3	—	1,698
Blueberry—Mississippian	(Pacific) Blueberry Mississippian pool	4,600 (29-4-63)	—	3,798	18	1	—	1,050	—
Boundary Lake—									
Boundary Lake	(Dome) Boundary Lake Water-flood Project No. 1	2,225 (22-7-64)	2,343 (1-10-64) 2,429 (1-10-65)	3,520	24	—	7	—	4,091
Boundary Lake	(Dome) Boundary Lake Water-flood Project No. 2	733 (1-4-65)	—	640	6	—	2	—	1,530
Boundary Lake	(Imperial) Boundary Lake Unit No. 1	18,488 (1-6-64)	18,818 (1-2-65) 18,887 (1-4-65) 19,090 (1-9-65)	25,280	131	—	28	—	15,613
Boundary Lake	(Texaco) Boundary Lake Unit No. 2	9,754 (1-5-65)	9,892 (1-10-65)	12,960	63	—	19	—	14,132
Milligan Creek—Halfway	(Union) Milligan Creek Halfway Sand Unit No. 1	4,000 (20-9-62)	5,000 (28-6-63) 10,000 (1-1-64)	3,298	21	1	8	2,814	15,640
Peejay—									
Halfway	(Pacific) Peejay Unit No. 1	2,018 (3-12-63)	4,430 (16-4-64)	4,370	21	—	4	—	6,525
Halfway	(Union) Peejay Unit No. 2	4,014 (1-10-66)	—	6,475	37	—	—	—	—
Wildmint—Halfway	(Union) Wildmint Upper Halfway pool	1,100 (1-12-63)	1,191 (1-10-64) 1,566 (16-12-65) 3,665 (1-9-66)	1,740[3]	13	2	3	5,101	8,453

[1] Areas shown to nearest acre.
[2] Calculated as total injection for year divided by total days in the months of injection.
[3] Sum of N.T.S. unit areas in which wells are located.

TABLE 8.—AUTHORIZED ABSOLUTE OPEN-FLOW POTENTIAL TESTS AND PRODUCTION RATE LIMITS, DECEMBER 31, 1966

Field	Well Authorization No.	Well Name	Pool	Date of Test	A.O.F.P. (M S.C.F. per Day)	P.R.L. (M S.C.F. per Day)
Aitken Creek	400	Union Aitken Creek a-53-L (3)	Gething	31–10–63	19,500	(1)
	1310	Union Aitken d-45-L	Gething	24–10–64	56,000	(1)
	1338	Union Aitken d-25-L	Gething	19–10–64	34,250	(1)
Beg	539	Pacific et al Beg b-17-K	Baldonnel	2–7–66	5,044	2,000
	541	Pacific et al Beg d-10-G	Baldonnel	5–7–66	1,079	2,000
	711	Pacific et al Beg a-21-F	Baldonnel	23–7–65	658	(2)
	733	Pacific et al Beg d-64-F	Baldonnel	5–7–66	2,921	2,000
	740	Pacific et al Beg b-6-K	Baldonnel	5–7–66	1,520	2,000
	741	Pacific et al Beg b-84-F	Baldonnel	5–7–66	2,350	2,000
	747	Pacific et al Beg b-95-F	Baldonnel	4–7–66	3,575	2,000
	748	Pacific et al Beg b-42-F	Baldonnel	21–7–65	2,236	2,000
	749	Pacific et al Beg a-28-K	Baldonnel	6–7–66	4,342	2,000
	766	Pacific Pan Am Dome Beg a-4-D	Baldonnel	8–6–66	25,033	7,059
	806	Pacific Imperial Beg d-46-B	Baldonnel	11–7–66	8,557	2,589
	855	Pacific Pan Am Dome Beg d-15-D	Baldonnel	12–6–63	3,600	(2)
	1095	Pacific Imperial Beg d-57-B	Baldonnel	18–5–65	2,680	2,000
	1132	Pacific et al Beg b-82-L	Baldonnel	9–6–66	2,811	2,000
	1154	Pacific Imperial Beg d-35-B	Baldonnel	14–7–66	2,333	2,000
	1359	Pacific Imperial Beg c-24-B	Baldonnel	20–5–65	1,400	2,000
	541	Pacific et al Beg d-10-G	Halfway	7–7–66	5,516	2,000
	711	Pacific et al Beg a-21-F	Halfway	7–7–66	1,798	2,000
	733	Pacific et al Beg d-64-F	Halfway	7–7–66	2,553	2,000
	739	Pacific et al Beg a-A99-B	Halfway	7–7–66	3,952	2,000
	740	Pacific et al Beg b-6-K	Halfway	8–7–66	3,749	2,000
	741	Pacific et al Beg b-84-F	Halfway	6–7–66	1,996	2,000
	747	Pacific et al Beg b-95-F	Halfway	8–7–66	2,042	2,000
	748	Pacific et al Beg b-42-F	Halfway	29–8–61	2,100	(2)
	1154	Pacific Imperial Beg d-35-B	Halfway	12–7–66	7,554	2,196
	786	Pacific et al Beg b-59-K	Halfway	23–1–62	....	2,000[3]
	806	Pacific Imperial Beg d-46-B	Halfway	11–7–66	8,557	2,498
	1095	Pacific Imperial Beg d-57-B	Halfway	12–7–66	10,900	2,807
	1350	Pacific et al Beg b-88-D	Halfway	7–7–66	5,442	2,000
	1359	Pacific Imperial Beg c-24-B	Halfway	12–7–66	8,427	2,107

NOTE.—A minimum production rate limit of 2,000 M s.c.f. per day is allowed for a well in which the calculated P.R.L. would be less than 2,000 M s.c.f. per day.

1 Gas well in oil pool (for recycling only).

2 Well withdrawn from production. There is no P.R.L. The present potential of the well will depend on the amount of production taken from the field or area since the latest A.O.F.P. test was made.

3 Potential gas well, which has not gone on production. The present potential of the well will depend on the amount of production taken from the field or area since the latest A.O.F.P. test was made.

TABLE 8.—AUTHORIZED ABSOLUTE OPEN-FLOW POTENTIAL TESTS AND PRODUCTION RATE LIMITS, DECEMBER 31, 1966—*Cont'd*

Field	Well Authorization No.	Well Name	Pool	Date of Test	A.O.F.P. (M S.C.F. per Day)	P.R.L. (M S.C.F. per Day)
Beg	1233	Richfield Sohio Beg d-77-B	Halfway	27-11-63	2,030	2,000[3]
	1268	Richfield Sohio Beg d-13-B	Halfway	26-7-66	10,000	3,070
Beg West	620	Pacific et al W Beg a-79-F	Baldonnel	5-7-66	1,633	2,000
	622	Pacific et al W Beg c-84-C	Baldonnel	6-7-66	1,127	2,000
Bernadet	1106	West Nat et al Bernadet 8-1-88-25	Bluesky-Gething	15-7-66	837	2,000
Blueberry	70	West Nat et al Blueberry c-32-D	Dunlevy	22-12-58	285	2,000
	94	West Nat et al Blueberry d-A87-D	Dunlevy	13-7-66	1,131	2,000
	279	West Nat et al Blueberry 16-24-88-25	Dunlevy	15-7-66	2,360	2,000
	330	West Nat et al Blueberry a-29-K	Dunlevy	2-7-63	500	([2])
	357	West Nat el al Blueberry d-A50-K	Dunlevy	27-8-63	640	([2])
	581	West Nat et al Blueberry d-97-D	Dunlevy	11-7-66	3,013	2,000
	64	West Nat et al Blueberry d-87-D	Baldonnel	13-7-66	756	2,000
	71	West Nat et al Blueberry c-65-D	Baldonnel	7-7-65	825	([2])
	357	West Nat et al Blueberry d-A50-K	Baldonnel	1-11-63	183	([2])
	581	West Nat et al Blueberry d-97-D	Baldonnel	12-9-60	5,600	([2])
Blueberry East	103	West Nat et al E Blueberry b-38-C	Baldonnel	15-7-66	1,922	2,000
	331	West Nat et al E Blueberry b-36-C	Mississippian	28-10-58	3,256	([2])
Blueberry West	165	West Nat et al W Blueberry d-82-I	Dunlevy	13-7-66	387	2,000
	278	West Nat et al W Blueberry 2-20-88-25	Dunlevy	14-7-66	558	2,000
	241	West Nat et al W Blueberry d-19-L	Baldonnel	18-9-62	1,425	([2])
Boundary Lake	270	Pacific Boundary 8-15-85-14	Bluesky-Gething	27-9-62	830	([2])
	352	Pacific Boundary 12-10-85-14	Gething	26-5-66	11,636	3,965
	655	Pacific Boundary Lake A16-4-85-14	Gething	12-6-61	4,700	([2])
	799	Amerada Boundary 8-5-95-14	Dunlevy	27-10-61	11,200	2,800[3]
	270	Pacific Boundary 8-15-85-14	Baldonnel	26-5-66	3,352	2,000
	667	Pacific Boundary Lake 11-14-85-14	Baldonnel	29-5-63	1,650	([2])
	652	Sun Boundary Lake 8-23-85-14	Baldonnel	8-7-66	11,000	2,959
	687	Texaco NFA Boundary Lake 6-25-85-14	Baldonnel	24-6-66	6,800	2,000
	1137	Texaco NFA Boundary 6-30-85-13	Baldonnel	24-6-66	3,500	2,000
	1501	Huber et al Boundary 6-4-87-13	Halfway	12-11-64	360	2,000[3]
Boundary Lake North	1451	Texaco NFA N Boundary 10-9-87-14	Halfway	10-12-64	25,000	6,250[3]
	1881	Texaco NFA N Boundary 7-15-87-14	Halfway	11-3-66	2,300	2,000[3]
Bubbles	464	Dome Basco Bubbles b-19-A	Baldonnel	16-6-66	3,775	2,000
	526	Dome Provo Bubbles c-20-A	Baldonnel	16-6-66	700	2,000
	674	McCoy Dome Bubbles b-A62-B	Baldonnel	15-6-66	4,470	2,000
	791	McCoy Dome Bubbles d-42-B	Baldonnel	15-6-66	1,940	2,000
	451	Pacific Imperial Bubbles b-33-I	Baldonnel	7-6-66	19,324	6,020
	462	Pacific Imperial Bubbles d-88-I	Baldonnel	7-6-66	29,902	10,376
	466	Pacific Imperial Bubbles b-44-I	Baldonnel	7-6-66	11,407	3,930

	478	Pacific Imperial Bubbles d-77-I	Baldonnel	7-6-66	3,164	2,000
	480	Pacific Imperial Bubbles b-66-I	Baldonnel	7-6-66	4,747	2,000
	615	Pacific Dome et al Bubbles d-99-I	Baldonnel	10-6-66	3,419	2,000
Buick Creek	1360	Altair W Mineral Buick c-32-C	Dunlevy	23-6-66	13,000	6,266
	1492	Altair W Mineral Buick b-22-C	Dunlevy	25-1-65	1,020	2,000[3]
	457	Pacific Buick Creek b-4-B	Dunlevy	31-5-66	1,934	2,000
	469	Pacific Buick Creek c-14-B	Dunlevy	31-5-66	2,538	2,000
	1323	Pacific Buick a-85-I	Dunlevy	31-5-66	7,752	2,667
	744	Sun Buick c-16-B	Dunlevy	24-6-66	2,550	2,000
	756	Sun Buick d-19-B	Dunlevy	22-6-66	3,000	2,000
	818	Sun Buick d-11-C	Dunlevy	26-6-66	2,400	2,063
	45	Texaco NFA Buick Creek d-98-I (1)	Dunlevy	1-6-66	7,300	2,471
	65	Texaco NFA Buick Creek c-10-A (2)	Dunlevy	31-5-66	310	2,000
	96	Texaco NFA Buick Creek d-83-J (4)	Dunlevy	20-6-66	12,300	3,988
	110	Texaco NFA Buick Creek c-79-J (6)	Dunlevy	30-5-66	3,400	2,000
	728	Texaco NFA Buick d-93-J	Dunlevy	7-6-66	10,800	4,683
	787	Texaco NFA Buick d-96-I	Dunlevy	3-6-66	14,800	4,097
	1179	Texaco NFA Buick b-10-B	Dunlevy	30-5-66	2,350	2,000
	1213	Texaco NFA Buick c-40-B	Dunlevy	31-5-66	730	2,000
	96	Texaco NFA Buick Creek d-83-J (4)	Charlie Lake	6-6-66	1,500	2,000
Buick Creek East	1087	Texaco NFA E Buick c-80-D	Bluesky-Gething	20-7-66	750	2,000
	1286	Mic Mac et al E Buick d-17-D	Dunlevy	29-7-66	4,850	2,000
	295	Texaco NFA E Buick a-31-A	Dunlevy	29-7-66	16,000	4,124
	1087	Texaco NFA E Buick c-80-D	Dunlevy	12-7-66	6,000	2,000
	1088	Texaco NFA E Buick c-98-L	Dunlevy	14-7-66	3,025	2,000
	1185	Texaco NFA E Buick c-18-D	Dunlevy	14-7-66	4,350	2,000
	1508	Texaco NFA E Buick b-A46-A	Dunlevy	13-7-66	840	2,000
	1303	Whitehall E Buick b-62-A	Dunlevy	30-7-66	4,220	2,000
	1336	Whiehall E Buick c-34-A	Dunlevy	31-7-66	1,910	2,000
Buick Creek West	89	Pacific West Buick Creek b-78-C (2)	Dunlevy	1-6-66	3,293	2,000
	95	Pacific West Buick Creek c-14-C (3)	Dunlevy	19-7-62	5,100	(2)
	99	Pacific West Buick Creek d-95-K (4)	Dunlevy	1-6-66	5,557	2,567
	239	Pacific West Buick Creek c-2-E (6)	Dunlevy	31-5-66	5,900	2,000
	255	Pacific West Buick Creek b-91-D (9)	Dunlevy	31-5-66	3,055	2,000
	264	Pacific West Buick Creek c-5-C (11)	Dunlevy	1-6-66	2,559	2,000
	268	Pacific West Buick Creek d-89-C (12)	Dunlevy	31-5-66	2,057	2,000
	384	Pacific West Buick Creek d-17-C (17)	Dunlevy	1-6-66	36,414	13,500
	644	Pacific West Buick Creek a-78-C	Baldonnel	1-6-66	1,461	2,000
	86	Pacific West Buick Creek b-23-E (1)	Halfway	19-7-62	2,450	(2)
Clarke Lake	1528	Marathon Clarke a-65-G	Slave Point	28-6-66	20,000	5,000
	1966	Pacific et al Clarke a-55-J	Slave Point	21-9-66	———	37,500

2 Well withdrawn from production. There is no P.R.L. The present potential of the well will depend on the amount of production taken from the field or area since the latest A.O.F.P. test was made.

3 Potential gas well, which has not gone on production. The present potential of the well will depend on the amount of production taken from the field or area since the latest A.O.F.P. test was made.

TABLE 8.—AUTHORIZED ABSOLUTE OPEN-FLOW POTENTIAL TESTS AND PRODUCTION RATE LIMITS, DECEMBER 31, 1966—*Cont'd*

Field	Well Authorization No.	Well Name	Pool	Date of Test	A.O.F.P. (M S.C.F. per Day)	P.R.L. (M S.C.F. per Day)
Clarke Lake	1071	Pacific Apache Clarke b-76-G	Slave Point	8-8-66	14,000	3,514
	1554	Pacific Imperial Clarke c-92-I	Slave Point	7-8-66	285,830	71,672
	1578	Pacific Apache Clarke a-61-F	Slave Point	7-8-66	154,000	38,577
	1833	Pacific Imp Clarke c-56-L	Slave Point	8-3-66	227,600	56,900
	344	West Nat Imp Clarke Lake d-88-L	Slave Point	4-8-66	120,000	30,126
	397	West Nat Imp Clarke Lake c-94-L	Slave Point	9-8-66	66,500	16,678
	503	West Nat Imp Clarke Lake c-8-D	Slave Point	10-8-66	104,000	26,468
	505	West Nat et al Clarke c-78-I	Slave Point	6-10-66	158,000	39,500
	585	West Nat Imp Clarke Lake d-91-L	Slave Point	11-1-63	12,000	3,000[3]
	688	West Nat et al Clarke b-70-I	Slave Point	6-8-66	44,000	11,020
	856	West Nat et al Clarke a-52-J	Slave Point	5-8-66	22,600	5,664
Dawson Creek	302	Pacific Sc Dawson Ck 3-22-79-15 (2)	Cadotte	25-6-66	1,358	2,000
Fort St. John	75	Pacific Ft St John A3-29-83-18 (31)	Cadomin	19-7-53	29,000	(2)
	67	Pacific Ft St John 4-32-83-18 (26)	Baldonnel	29-5-66	1,365	2,000
	82	Pacific Ft St John 13-23-83-18 (34)	Baldonnel	30-5-66	4,830	2,000
	194	Pacific Ft St John 13-14-83-18 (54)	Baldonnel	12-10-66	2,238	2,000
	210	Pacific Ft St John 6-17-83-18 (72)	Baldonnel	30-5-66	5,926	2,727
	233	Pacific Ft St John 16-8-83-18 (83)	Baldonnel	30-5-66	3,177	2,000
	32	Pacific Ft St John 14-15-83-18 (7)	Baldonnel	11-10-66	3,171	2,000
	76	Pacific Ft St John 14-22-83-18 (32)	Baldonnel	30-5-66	4,097	2,000
	170	Pacific Ft St John 8-20-83-18 (43)	Baldonnel	27-5-66	3,816	2,000
	186	Pacific Ft St John C3-29-83-18 (56)	Baldonnel	27-5-66	3,314	2,000
	193	Pacific Ft St John B14-21-83-18 (62)	Baldonnel	30-5-66	3,476	2,000
	212	Pacific Ft St John A6-16-83-18 (73)	Baldonnel	26-5-66	2,997	2,000
	74	Pacific Ft St John 1-20-83-18 (30)	Halfway	27-5-66	3,596	2,000
	172	Pacific Ft St John 2-21-83-18 (46)	Halfway	27-5-66	5,294	2,675
	178	Pacific Ft St John A14-29-83-18 (51)	Halfway	27-5-66	4,855	3,125
	179	Pacific Ft St John B3-29-83-18 (52)	Halfway	27-5-66	3,905	2,061
	181	Pacific Ft St John 10-30-83-18 (53)	Halfway	24-5-66	1,824	2,000
	192	Pacific Ft St John A14-22-83-18 (61)	Halfway	30-5-66	125	2,000
	29	Pacific Ft St John 14-21-83-18 (4)	Belloy	30-5-66	2,112	2,000
	58	Pacific Ft St John 3-29-83-18 (23)	Belloy	27-5-66	2,702	2,000
Fort St. John Southeast	220	Pac Ft St John SE 10-31-82-17 (80)	Cadomin	26-5-66	897	2,000
	184	Pac Ft St John SE A4-10-83-17 (55)	Baldonnel	11-5-64	3,125	(2)
	213	Pacific Ft St John SE 13-2-83-17 (74)	Baldonnel	24-5-66	3,284	2,000
	60	Pac Ft St John SE 10-33-82-17 (22)	Halfway	25-10-56	9,000	(2)
	174	Pacific Ft St John SE 7-3-83-17 (49)	Halfway	5-8-58	3,814	(2)
	191	Pac Ft St John SE A10-4-83-17 (60)	Halfway	24-5-66	2,043	2,000
	197	Pac Ft St John SE 16-3-83-17 (66)	Halfway	24-5-66	7,238	3,666
	202	Pac Ft St John SE 7-5-83-17 (69)	Halfway	18-6-57	2,050	(2)

	320	Pac Ft St John SE A10-10-83-17 (98)	Halfway	11–5–64	2,675	(2)
	42	Pac Ft St John SE 4-10-83-17 (12)	Belloy	21–7–61	5,700	(2)
	52	Pacific Ft St John SE 8-5-83-17 (20)	Belloy	1–10–53	4,980	(2)
	166	Pacific Ft St John SE 4-9-83-17 (44)	Belloy	25–5–66	8,214	5,171
	173	Pac Ft St John SE 10-4-83-17 (47)	Belloy	24–5–66	10,199	4,498
	201	Pac Ft St John SE 11-32-82-17 (68)	Belloy	24–5–66	10,143	4,696
	219	Pac Ft John SE 10-10-83-17 (79)	Belloy	14–5–66	3,583	2,000
Gundy Creek	367	West Nat Gundy Creek d-2-G	Baldonnel	22–8–62	2,250	(2)
	253	West Nat Gundy Creek b-69-A	Baldonnel/Charlie Lake	15–4–59	5,000	(2)
Halfway	107	West Nat et al Halfway 5-1-87-25	Baldonnel	14–7–66	2,284	2,000
	351	West Nat et al Halfway 11-35-86-25	Baldonnel	29–10–58	8,200	(2)
	182	West Nat et al Halfway 8-11-87-25	Halfway	20–8–63	720	(2)
Highway	168	West Nat et al Highway b-3-I	Dunlevy	21–5–65	810	2,000
	112	Pacific Highway b-25-I (1)	Baldonnel	27–8–58	6,600	(2)
	180	Pacific Highway a-47-I (2)	Baldonnel	26–11–57	3,600	(2)
	229	Pacific Highway a-90-I (4)	Baldonnel	23–11–64	920	(2)
	274	Pacific Highway a-69-I (3)	Baldonnel	28–11–57	3,150	(2)
	229	Pacific Highway a-90-I (4)	Mississippian	13–7–66	6,885	2,000
Jedney	1366	Pacific Imperial Jedney a-95-C	Gething	17–10–53	13,600	(2)
	382	Pacific Imp Jedney d-99-J	Baldonnel	9–6–66	1,933	2,000
	427	Pacific et al Jedney b-88-J	Baldonnel	29–6–66	19,170	5,946
	460	Pacific Imperial Jedney b-30-B	Baldonnel	9–6–66	3,546	2,000
	473	Pacific Imperial Jedney b-10-B	Baldonnel	8–6–66	25,367	7,965
	475	Pacific Imperial Jedney b-66-J	Baldonnel	30–6–66	6,669	2,000
	484	Pacific Imperial Jedney d-77-J	Baldonnel	10–6–66	2,359	2,000
	498	Pacific et al Jedney b-68-J	Baldonnel	10–6–66	584	2,000
	651	Pacific et al Jedney d-97-C	Baldonnel	19–7–66	16,563	4,319
	778	Pacific et al Jedney c-86-C	Baldonnel	19–7–66	3,705	2,000
	820	Pacific Imperial Jedney d-53-C	Baldonnel	8–6–66	2,429	2,000
	868	Pacific Imperial Jedney b-73-C	Baldonnel	20–7–66	2,742	2,000
	944	Pacific Pan Am Dome Jedney b-28-F	Baldonnel	19–7–66	2,247	2,000
	1054	Pacific Imperial Jedney b-99-H	Baldonnel	30–6–66	3,438	2,000
	1082	Pacific Imperial Jedney c-100-H	Baldonnel	30–8–66	4,736	2,000
	1129	Pacific Imperial Jedney c-78-H	Baldonnel	24–6–63	1,450	(2)
	1178	Pacific Imperial Jedney d-31-C	Baldonnel	9–6–66	3,090	2,000
	1375	Pacific Imperial Jedney d-44-C	Baldonnel	9–6–66	5,486	2,000
	1152	Pacific Pan Am Dome Jedney c-8-F	Baldonnel	19–7–66	2,250	2,000
	1334	Skelly Jedney a-39-F	Baldonnel	5–11–66	4,250	2,000
	382	Pacific Imp Jedney d-99-J	Halfway	29–6–66	5,920	2,000
	453	Pacific Imperial Jedney d-42-C	Halfway	21–7–66	7,787	2,210
	461	Pacific Imperial Jedney a-65-J	Halfway	28–6–66	3,595	2,000
	475	Pacific Imperial Jedney b-66-J	Halfway	28–6–66	3,842	2,000

[2] Well withdrawn from production. There is no P.R.L. The present potential of the well will depend on the amount of production taken from the field or area since the latest A.O.F.P. test was made.

[3] Potential gas well, which has not gone on production. The present potential of the well will depend on the amount of production taken from the field or area since the latest A.O.F.P. test was made.

TABLE 8.—AUTHORIZED ABSOLUTE OPEN-FLOW POTENTIAL TESTS AND PRODUCTION RATE LIMITS, DECEMBER 31, 1966—*Cont'd*

Field	Well Authorization No.	Well Name	Pool	Date of Test	A.O.F.P. (M S.C.F. per Day)	P.R.L. (M S.C.F. per Day)
Jedney	484	Pacific Imperial Jedney d-77-J	Halfway	22-6-66	29,282	10,629
	651	Pacific et al Jedney d-97-C	Halfway	21-7-66	3,859	2,000
	691	Pacific Imperial Jedney b-84-C	Halfway	1-9-66	4,781	2,000
	778	Pacific et al Jedney c-86-C	Halfway	4-7-66	3,409	2,000
	779	Pacific et al Jedney a-17-F	Halfway	22-7-66	3,596	2,000
	820	Pacific Imperial Jedney d-53-C	Halfway	8-6-66	8,300	2,305
	868	Pacific Imperial Jedney b-73-C	Halfway	12-6-65	4,289	2,000
	944	Pacific Pan Am Dome Jedney b-28-F	Halfway	12-7-66	3,135	2,000
	1054	Pacific Imperial Jedney b-99-H	Halfway	28-6-66	15,125	4,324
	1082	Pacific Imperial Jedney c-100-H	Halfway	28-6-66	12,650	3,553
	1129	Pacific Imperial Jedney c-78-H	Halfway	29-6-66	13,648	4,361
	1152	Pacific Pan Am Dome Jedney c-8-F	Halfway	5-12-62	1,550	(2)
	1178	Pacific Imperial Jedney d-31-C	Halfway	9-6-66	6,181	2,000
	1183	Pacific Imperial Jedney c-57-H	Halfway	30-6-66	2,164	2,000
	1256	Pacific Imperial Jedney d-68-H	Halfway	29-6-66	7,644	2,000
	1366	Pacific Imperial Jedney a-95-C	Halfway	1-9-66	2,679	2,000
	1334	Skelly Jedney a-39-F	Halfway	4-11-66	1,680	2,000
Jedney West	1081	Pacific et al W Jedney b-84-K	Baldonnel	21-6-66	835	(2)
	1081	Pacific et al W Jedney b-84-K	Halfway	22-7-66	724	(2)
	1276	Pacific et al W Jedney b-6-C	Halfway	18-6-65	644	(2)
Kobes-Townsend	372	Pacific Kobes a-3-A (4)	Dunlevy	3-6-66	2,718	2,000
	489	Pacific Kobes b-24-A	Dunlevy	3-6-66	598	2,000
	496	Pacific Kobes b-82-I	Dunlevy	3-6-66	1,418	2,000
	141	Pacific Kobes d-94-I (1)	Charlie Lake	3-6-66	2,538	2,000
	177	Pacific Kobes b-35-A (A-1)	Charlie Lake	3-6-66	1,267	2,000
	251	Pacific Townsend d-21-G (A-2)	Charlie Lake	2-6-66	1,577	2,000
	299	Pacific Kobes c-73-I (2)	Charlie Lake	3-6-66	860	2,000
	314	Pacific Kobes a-99-A (B-1)	Charlie Lake	3-6-66	617	2,000
	141	Pacific Kobes d-94-I (1)	Halfway	2-6-66	10,898	2,842
	177	Pacific Kobes b-35-A (A-1)	Halfway	2-6-66	11,830	3,091
	164	Pacific Townsend a-20-H (A-1)	Mississippian	12-8-65	497	(2)
	314	Pacific Kobes a-99-A (B-1)	Mississippian	2-6-66	10,477	3,876
Kotcho Lake	404	West Nat Kotcho Lake c-67-K	Slave Point	13-2-60	825,000	206,250[3]
Laprise Creek	327	Dome Basco Laprise Ck a-35-H	Baldonnel	13-6-66	10,220	
	474	Dome Basco Laprise Creek d-13-H	Baldonnel	8-6-66	7,130	
	483	Dome Provo Laprise Creek b-2-H	Baldonnel	10-6-66	12,210	
	490	Dome Basco Laprise Creek a-81-A	Baldonnel	6-6-66	7,620	
	653	Dome Provo Laprise Creek d-91-A	Baldonnel	7-6-66	4,610	
	654	Dome Provo Laprise Creek a-25-H	Baldonnel	8-6-66	3,974	

	665	Dome Provo Laprise a-46-H	Baldonnel	9–6–66	5,400	
	666	Dome Provo Laprise Creek a-33-H	Baldonnel	10–6–66	7,620	40,963[4]
	809	Dome Provo Laprise d-91-H	Baldonnel	17–6–66	9,770	
	837	Dome Provo Laprise a-81-H	Baldonnel	12–6–66	6,035	
	1056	Dome Provo Laprise c-92-H	Baldonnel	18–6–66	8,710	
	1225	Dome Provo Laprise c-70-E	Baldonnel	14–6–66	7,655	
	1251	Dome Provo Laprise c-40-E	Baldonnel	23–6–66	16,820	
	1445	Dome Provo Laprise a-52-H	Baldonnel	11–6–66	5,345	
	1852	Dome Provo Laprise d-4-H	Baldonnel	29–3–66	6,548	
	1837	Dome Provo Laprise b-30-E	Baldonnel	4–4–66	——	
	516	Pacific Imperial Laprise d-68-E	Baldonnel	24–6–66	8,488	
	551	Pacific Imperial Laprise c-78-E	Baldonnel	23–6–66	9,386	
	650	Pacific Imperial Laprise c-56-E	Baldonnel	24–6–66	7,771	
	659	Pacific Imperial Laprise b-44-E	Baldonnel	22–6–66	21,216	
	670	Pacific Imperial Laprise d-55-E	Baldonnel	23–6–66	9,942	
	678	Pacific Imperial Laprise a-46-E	Baldonnel	24–6–66	9,673	
	690	Pacific Imperial Laprise a-33-E	Baldonnel	23–6–66	11,500	
	715	Pacific Imperial Laprise a-22-E	Baldonnel	22–6–66	4,892	40,566[4]
	1341	Pacific Imperial Laprise a-99-E	Baldonnel	23–6–66	11,000	
	1488	Pacific Imperial Laprise a-49-E	Baldonnel	23–6–66	15,936	
	1938	Pacific IOE Laprise a-29-E	Baldonnel	31–10–66	——	
	1948	Pacific IOE Laprise a-85-D	Baldonnel	14–9–66	7,300	
	1970	Pacific Imp Laprise b-90-C	Baldonnel	15–9–66	6,700	
	1979	Pacific IOE Laprise d-3-E	Baldonnel	5–10–66	——	
	1999	Pacific Imp Laprise b-100-C	Baldonnel	22–11–66	14,255	
	1177	Amerada Laprise c-56-D	Baldonnel	20–7–65	5,720	2,000
	1337	Amerada Laprise a-7-E	Baldonnel	8–11–63	5,300	(2)
	1378	Amerada Laprise d-77-D	Baldonnel	29–6–66	7,150	2,000
	1468	Amerada Laprise d-55-D	Baldonnel	2–7–66	15,500	3,883
	1477	Amerada Laprise d-95-D	Baldonnel	29–6–66	2,050	2,000
	1511	Pacific Imperial Laprise c-24-E	Baldonnel	24–11–64	3,400	2,000
	1371	Tenn Monsanto Laprise d-79-C	Baldonnel	20–7–65	6,600	2,000
	1392	Triad et al Laprise d-37-C	Baldonnel	20–6–66	2,000	2,000
Laprise Creek West	873	Dome CDP C&E W Laprise c-82-G	Baldonnel	7–6–66	2,958	2,000
Montney	119	Pac Sunray Montney 16-32-86-19 (3)	Bluesky-Gething	29–5–58	814	(2)
	104	Pac Sunray Montney 14-36-86-19 (2)	Charlie Lake	4–7–58	2,200	(2)
	289	Pac Sunray Montney 14-31-86-19 (5)	Halfway	26–7–61	2,250	(2)
	801	Pac White Rose Sec Montney 6-5-87-18	Halfway	27–5–66	3,179	2,000
Nig Creek	1139	Dome Provo Nig d-35-B	Baldonnel	2–8–66	6,740	2,000
	1004	Monsanto Nig d-13-B	Baldonnel	4–12–66	2,800	2,000
	1475	Monsanto Nig a-21-B	Baldonnel	4–12–66	5,550	2,000

[2] Well withdrawn from production. There is no P.R.L. The present potential of the well will depend on the amount of production taken from the field or area since the latest A.O.F.P. test was made.
[3] Potential gas well, which has not gone on production. The present potential of the well will depend on the amount of production taken from the field or area since the latest A.O.F.P. test was made.
[4] Pool or project P.R.L.

TABLE 8.—AUTHORIZED ABSOLUTE OPEN-FLOW POTENTIAL TESTS AND PRODUCTION RATE LIMITS, DECEMBER 31, 1966—*Cont'd*

Field	Well Authorization No.	Well Name	Pool	Date of Test	A.O.F.P. (M S.C.F. per Day)	P.R.L. (M S.C.F. per Day)
Nig Creek	1728	Pacific Nig b-4-B	Baldonnel	5–10–65	3,370	2,000[3]
	61	Texaco NFA Nig Creek a-79-B (1)	Baldonnel	27–11–66	18,450	4,933
	131	Texaco NFA Nig Creek a-12-G (6)	Baldonnel	25–7–66	11,400	3,130
	383	Texaco NFA Nig Creek b-70-B (9)	Baldonnel	17–12–66	13,200	3,666
	447	Texaco NFA Nig Creek b-2-G	Baldonnel	22–7–66	33,100	9,200
	456	Texaco NFA Nig Creek a-1-G	Baldonnel	8–7–66	12,700	3,361
	729	Texaco NFA Nig c-36-B	Baldonnel	13–7–66	6,900	2,000
	790	Texaco NFA Nig d-71-B	Baldonnel	25–6–66	2,750	2,000
	819	Texaco NFA Nig a-69-A	Baldonnel	25–6–66	1,870	2,000
	967	Texaco NFA Nig a-8-G	Baldonnel	18–7–66	34,100	8,870
	1161	Texaco NFA Nig c-90-B	Baldonnel	27–6–66	7,600	2,006
	1180	Texaco NFA Nig d-15-B	Baldonnel	29–6–66	10,800	2,840
	1654	Texaco NFA Nig c-6-H	Baldonnel	17–6–66	11,200	2,888
	1681	Texaco NFA Nig d-75-B	Baldonnel	7–7–66	7,600	2,000
	1707	Texaco NFA Nig c-14-H	Baldonnel	9–6–66	7,700	2,007
	1740	Texaco NFA Nig a-6-G	Baldonnel	24–11–66	14,000	3,523
	1762	Texaco NFA Nig a-77-B	Baldonnel	27–7–66	11,300	2,825
	1742	Texaco NFA Nig c-33-H	Baldonnel	13–6–66	22,500	5,896
	1373	West Nat Nig a-3-B	Baldonnel	23–8–66	3,393	2,000
	1613	Whitehall Nig b-6-B	Baldonnel	26–7–65	5,800	2,000
Parkland	153	Pacific Imp Parkland 6-29-81-15	Wabamun	3–6–65	27,653	20,000[4]
	1153	Pacific Imp Parkland 10-28-81-15	Wabamun	2–6–66	13,581	20,000[4]
Petitot River	533	West Nat Petitot River b-1-D	Slave Point	11–2–60	185,000	46,250[3]
Red Creek	93	Pacific Red Creek 5-27-85-21 (36)	Charlie Lake	27–5–65	3,308	([2])
	93	Pacific Red Creek 5-27-85-21 (36)	Halfway	27–5–65	2,434	([2])
Rigel	1372	Denison Rigel 6-31-87-16	Dunlevy	12–8–65	4,050	([2])
	1494	IOE Fina Rigel 11-11-88-18	Dunlevy	17–8–66	22,000	5,594
	130	Imp Fina Rigel 4-27-88-17	Dunlevy	12–8–66	4,061	2,000
	828	Imp et al Rigel 6-27-88-18	Dunlevy	16–8–66	16,541	4,255
	1032	Imp et al Rigel 6-30-88-17	Dunlevy	10–8–66	22,000	5,577
	1090	Imp Fina Rigel 6-10-88-17	Dunlevy	12–8–66	10,815	2,815
	1107	Imp et al Rigel 7-19-88-17	Dunlevy	11–8–66	19,200	5,035
	1118	Imp et al Rigel 6-21-88-18	Dunlevy	18–8–66	11,131	2,860
	1163	Imp et al Rigel 7-23-88-18	Dunlevy	17–8–66	7,280	2,000
	1187	Imp Fina Rigel 6-3-88-17	Dunlevy	12–8–66	19,400	5,025
	1208	Imp Fina Rigel 6-8-88-17	Dunlevy	12–8–66	7,414	2,000
	1465	Imp Fina Rigel 10-14-88-18	Dunlevy	16–8–66	11,650	2,982
	1978	Imp et al Rigel 7-13-88-18	Dunlevy	5–10–66	16,500	4,125
	1354	Monsanto Rigel 6-36-87-17	Dunlevy	19–8–66	11,500	2,958
	1293	Pacific Rigel 6-35-87-17	Dunlevy	25–8–66	4,400	2,000

	1324	Sun Rigel 10-24-88-18	Dunlevy	27–6–66	6,600	2,000
	195	Texaco NFA Rigel 9-31-88-18 (10)	Dunlevy	15–6–66	11,700	3,472
	1222	Texaco NFA Rigel 10-29-88-18	Dunlevy	21–2–63	4,850	2,000[3]
	1370	Texaco NFA Rigel a-28-K	Dunlevy	15–7–66	1,700	2,000
	1148	Whitehall Rigel 6-15-88-17	Dunlevy	14–8–66	35,000	9,380
	1365	Wintershall Rigel 10-34–87-17	Dunlevy	14–9–66	10,700	2,692
Snyder Creek	185	Union Snyder Creek a-28-K (1)	Dunlevy	4–5–66	1,050	2,000
Stoddart	1902	Dome Provo Stoddart 11-8-86-19	Belloy	3–8–66	6,300	2,000
	244	Pacific Stoddart 4-24-86-20 (85)	Belloy	19–5–66	20,000	6,830
	262	Pacific Stoddart 2-13-86-20 (90)	Belloy	17–5–66	6,926	2,590
	1473	Pacific et al Stoddart 11-16-86-19	Belloy	20–5–66	3,557	2,000
	1770	Whitehall Stoddart 6-17-86-19	Belloy	20–1–66	2,775	2,000
Stoddart West	1190	Pacific W Stoddart 11-10-86-20	Belloy	19–5–66	6,686	2,000
Weasel	1790	Sinclair Pacific Weasel d-93-J	Baldonnel	15–12–65	6,050	2,000[3]
	709	Pacific Sinclair Weasel d-50-A	Halfway	1–3–61	21,500	5,375[3]
Yoyo	1431	Frontier Yoyo c-18-L	Pine Point	1–4–64	143,000	35,750[3]
	1569	Placid Frontier Yoyo b-10-L	Pine Point	28–3–65	63,000	15,750[3]
	1313	West Nat et al Yoyo b-24-L	Pine Point	16–1–64	146,000	36,500[3]
	1405	West Nat Yoyo b-98-E	Pine Point	9–3–64	27,500	6,875[3]
Other areas	410	Imp Fina Altares a-83-A	Bluesky-Gething	21–1–60	22,000	5,500[3]
	641	Imp Pac Sunray Wargen c-58-C	Bluesky-Gething	5–10–60	14,500	3,625[3]
	707	Union ROC Firebird d-89-D	Gething	1–3–63	14,000	3,500[3]
	27	Pacific Airport 8-32-83-17 (3)	Cadomin	11–9–66	2,690	2,000
	1396	Gray Oil PRP NW Grizzly c-25-A	Dunlevy	23–6–64	9,300	2,325[3]
	1830	Pacific West Prod N Buick b-86-F	Dunlevy	1–6–66	1,340	2,000[3]
	1192	Texaco NFA N La Garde 10-12-88-16	Dunlevy	10–2–63	3,270	2,000[3]
	386	FPC Richfield Daiber c-76-D (1)	Baldonnel	9–1–59	10,000	2,500[3]
	737	Security Cypress a-28-F	Baldonnel	20–11–61	30,000	7,500[3]
	1326	Security Cypress d-87-C	Baldonnel	12–6–63	25,000	6,250[3]
	1339	Security Cypress a-65-C	Baldonnel	1–8–63	11,200	2,800[3]
	1970	Pacific Imp Laprise b-90-C	Baldonnel	15–9–66	6,700	2,000
	1335	Pan Am Dome Sikanni b-43-B	Baldonnel	25–9–63	5,500	2,000[3]
	304	Sinclair Julienne a-50-D	Baldonnel	15–9–58	4,950	2,000[3]
	1517	Triad BP Sukunka a-43-B	Baldonnel	23–9–65	120,000	30,000[3]
	1200	Tenn Osborn 6-35-87-15	Baldonnel	9–11–63	1,250	2,000[3]
	1130	White Rose Sec Montney 10-29-86-18	Baldonnel	24–9–62	1,640	2,000[3]
	62	Pacific Ft St John 12-7-84-18 (19)	Baldonnel	17–7–53	2,100	(2)
	287	Pacific Airport 9-32-83-17 (97)	Baldonnel	10–9–66	1,680	2,000[3]
	412	West Nat et al W Jeans a-22-B	Charlie Lake	15–5–59	5,050	2,000[3]
	470	West Nat et al W Jeans b-10-A	Charlie Lake	19–9–60	2,650	2,000[3]
	1194	Texaco NFA La Garde 10-29-87-15	Boundary Lake	5–3–63	23,280	5,820[3]

[2] Well withdrawn from production. There is no P.R.L. The present potential of the well will depend on the amount of production taken from the field or area since the latest A.O.F.P. test was made.

[3] Potential gas well, which has not gone on production. The present potential of the well will depend on the amount of production taken from the field or area since the latest A.O.F.P. test was made.

[4] Pool or project P.R.L.

TABLE 8.—AUTHORIZED ABSOLUTE OPEN-FLOW POTENTIAL TESTS AND PRODUCTION RATE LIMITS, DECEMBER 31, 1966—*Cont'd*

Field	Well Authorization No.	Well Name	Pool	Date of Test	A.O.F.P. (M S.C.F. per Day)	P.R.L. (M S.C.F. per Day)
Other areas	176	Ft St John Petroleums Farrell a-9-L	Halfway	18–11–61	5,600	2,000[3]
	35	Pacific Airport 12-34-83-17 (10)	Halfway	27–7–57	1,400	2,000
	47	Pacific Wilder 13-1-84-20 (14)	Halfway	1–12–53	5,500	2,000[3]
	750	Pac Imp N Bubbles d-95-B	Halfway	8–8–61	2,500	2,000[3]
	1271	Pacific SR CanDel W Dede b-45-K	Halfway	11–3–63	5,600	2,000[3]
	1266	Union et al W Milligan c-50-G	Halfway	11–3–63	14,000	3,500[3]
	304	Sinclair Julienne a-50-D (B13-2)	Halfway	31–9–58	7,000	2,000[3]
	658	Sinclair Pac Julienne Creek b-39-D	Halfway	24–6–61	4,000	2,000[3]
	1393	BA HB W Pocketknife d-33-I	Permo Carboniferous	20–8–64	121,083	30,271[3]
	1355	IOE Pac Parkland 10-26-81-16	Belloy	1–9–64	3,650	2,000[3]
	348	Pacific S Ft Nelson b-96-B (1)	Mississippian	9–5–58	2,350	2,000[3]
	468	HB Pacific Pocketknife c-37-L	Mississippian	19–7–60	26,600	6,650[3]
	385	Sinclair et al Lily d-12-K	Mississippian	23–4–59	24,900	6,225[3]
	507	West Nat et al Jeans a-57-A	Mississippian	21–9–60	2,060	2,000[3]
	926	Imp Junior c-98-C	Slave Point	21–3–62	90,000	22,500[3]
	562	Pacific North Kotcho b-44-C	Slave Point	5–4–60	105,000	26,250[3]
	877	Pan Am et al Dilly a-30-K	Slave Point	16–3–62	14,700	3,675[3]
	1570	Placid Louise c-80-L	Slave Point	20–3–65	2,950	2,000[3]
	704	Texaco NFA Tsea b-68-K	Slave Point	16–3–62	76,650	19,163[3]
	1426	Texaco NFA Tsea b-99-K	Slave Point	10–3–64	12,600	3,150[3]
	677	West Nat Kathy b-30-F	Slave Point	15–2–61	148,000	37,000[3]
	887	West Nat et al Yoyo a-74-H	Slave Point	21–3–62	185,000	46,250[3]
	1147	West Nat Kotcho a-12-C	Slave Point	12–2–63	42,000	10,500[3]
	1245	West Nat Cabin b-40-A	Slave Point	2–3–63	28,900	7,225[3]
	1406	West Nat Cabin a-19-G	Slave Point	12–2–64	31,200	7,800[3]
	1274	West Nat IOE S Clarke d-29-K	Slave Point	22–1–64	145,000	36,250[3]
	1249	IOE Junior c-3-C	Slave Point	26–3–63	12,700	3,175[3]
	1230	West Nat et al Yoyo b-29-I	Pine Point	20–1–64	3,500	2,000[3]
	682	Pan Am Beaver River d-73-K	Nahanni	6–3–62	85,000	21,250[3]
	154	FPC Kilkerran 12-31-79-14	Belloy	26–8–66	1,450	2,000[3]

[3] Potential gas well, which has not gone on production. The present potential of the well will depend on the amount of production taken from the field or area since the latest A.O.F.P. test was made.

TABLE 9.—AUTHORIZED MAXIMUM PERMISSIBLE RATES, DECEMBER 31, 1966

Field	Well Authorization No.	Well Name	Location	Pool	Maximum Permissible Rate (Bbl./Day)
Aitken Creek	1160	Union Aitken d-33-L	d-33-L/94-A-13	Gething	
	1205	Union Aitken d-34-L	d-34-L/94-A-13	Gething	
	485	Union Aitken Creek b-42-L	b-42-L/94-A-13	Gething	874[1]
	1173	Union Aitken d-43-L	d-43-L/94-A-13	Gething	
	1186	Union Aitken d-44-L	d-44-L/94-A-13	Gething	
Beatton River	1224	Triad Beatton b-28-J	b-28-J/94-H-2	Halfway	
	396	Triad Beatton River d-28-J	d-28-J/94-H-2	Halfway	
	395	Triad Beatton River d-29-J	d-29-J/94-H-2	Halfway	
	309	Triad Beatton River b-38-J	b-38-J/94-H-2	Halfway	
	393	Triad Beatton River d-39-J	d-39-J/94-H-2	Halfway	2,054[1]
	1419	Triad Beatton b-49-J	b-49-J/94-H-2	Halfway	
	896	Triad Beatton d-49-J	d-49-J/94-H-2	Halfway	
	816	Triad Beatton d-50-J	d-50-J/94-H-2	Halfway	
	1552	Triad Beatton b-58-J	b-58-J/94-H-2	Halfway	
	1038	Triad Beatton b-59-J	b-59-J/94-H-2	Halfway	
	869	Triad et al Beatton d-41-K	d-41-K/94-H-2	Halfway	49
Beatton River West	408	Triad West Beatton River d-39-K	d-39-K/94-H-2	Bluesky-Gething	47
	1604	Triad W Beatton a-40-K	a-40-K/94-H-2	Bluesky-Gething	115
	441	Triad West Beatton River d-48-K	d-48-K/94-H-2	Bluesky-Gething	94
	515	Triad West Beatton River d-57-K	d-57-K/94-H-2	Bluesky-Gething	78
	1398	Triad W Beatton d-58-K	d-58-K/94-H-2	Bluesky-Gething	30
	512	Triad West Beatton River d-59-K	d-59-K/94-H-2	Bluesky-Gething	78
	1408	Whitehall et al W Beatton d-21-L	d-21-L/94-H-2	Bluesky-Gething	105
Beaverdam	1653	Tenn Beaverdam d-38-L	d-38-L/94-A-16	Halfway	580
Blueberry	1333	Decalta Bluebrry d-57-D	d-57-D/94-A-13	Mississippian	97
	785	West Nat et al Blueberry d-19-K	d-19-K/94-A-12	Mississippian	
	549	West Nat et al Blueberry c-A29-K	c-29-K/94-A-12	Mississippian	
	746	West Nat et al Blueberry d-30-K	d-30-K/94-A-12	Mississippian	
	783	West Nat et al Blueberry d-40-K	d-40-K/94-A-12	Mississippian	
	242	West Nat et al Blueberry d-50-K (13)	d-50-K/94-A-12	Mississippian	
	851	West Nat et al Blueberry b-60-K	b-60-K/94-A-12	Mississippian	
	1317	West Nat et al Blueberry d-41-L	d-41-L/94-A-12	Mississippian	
	948	West Nat et al Blueberry c-71-L	c-71-L/94-A-12	Mississippian	
	205	West Nat et al Blueberry d-82-L (11)	d-82-L/94-A-12	Mississippian	4,600[1]
	1072	West Nat et al Blueberry b-92-L	b-92-L/94-A-12	Mississippian	
	1242	West Nat et al Blueberry d-93-L	d-93-L/94-A-12	Mississippian	
	1258	West Nat et al Blueberry b-24-D	b-24-D/94-A-13	Mississippian	
	1169	West Nat et al Blueberry d-25-D	d-25-D/94-A-13	Mississippian	

[1] Pool.

TABLE 9.—AUTHORIZED MAXIMUM PERMISSIBLE RATES, DECEMBER 31, 1966—*Continued*

Field	Well Authorization No.	Well Name	Location	Pool	Maximum Permissible Rate (Bbl./Day)
Blueberry	1146	West Nat et al Blueberry b-35-D	b-35-D/94-A-13	Mississippian	
	960	West Nat et al Blueberry d-36-D	d-36-D/94-A-13	Mississippian	
	745	West Nat et al Blueberry 6-25-88-25	6-25-88-25 W6M	Mississippian	
	850	West Nat et al Blueberry 14-25-88-25	14-25-88-25 W6M	Mississippian	
	272	West Nat et al Blueberry d-46-D (16)	d-46-D/94-A-13	Mississippian	78[2]
Boundary Lake	1033	Dome Boundary 6-22-85-14	6-22-85-14 W6M	Boundary Lake	
	768	Dome Boundary 8-22-85-14	8-22-85-14 W6M	Boundary Lake	
	1669	Dome Boundary 2-26-85-14	2-26-85-14 W6M	Boundary Lake	
	1672	Dome Boundary 4-26-85-14	4-26-85-14 W6M	Boundary Lake	
	550	Dome Boundary Lake 8-26-85-14	8-26-85-14 W6M	Boundary Lake	
	1673	Dome Boundary 10-26-85-14	10-26-85-14 W6M	Boundary Lake	
	1674	Dome Boundary 12-26-85-14	12-26-85-14 W6M	Boundary Lake	
	573	Dome Boundary Lake 14-26-85-14	14-26-85-14 W6M	Boundary Lake	
	1668	Dome Boundary 10-34-85-14	10-34-85-14 W6M	Boundary Lake	
	1470	Dome Boundary 14-34-85-14	14-34-85-14 W6M	Boundary Lake	
	1676	Dome Boundary 2-35-85-14	2-35-85-14 W6M	Boundary Lake	
	1471	Dome Boundary 4-35-85-14	4-35-85-14 W6M	Boundary Lake	
	488	Dome Boundary Lake 8-35-85-14	8-35-85-14 W6M	Boundary Lake	2,429[1]
	1667	Dome Boundary 10-35-85-14	10-35-85-14 W6M	Boundary Lake	
	1665	Dome Boundary 12-35-85-14	12-35-85-14 W6M	Boundary Lake	
	528	Dome Boundary Lake 14-35-85-14	14-35-85-14 W6M	Boundary Lake	
	1440	Dome Boundary 6-2-86-14	6-2-86-14 W6M	Boundary Lake	
	642	Dome Boundary Lake 8-2-86-14	8-2-86-14 W6M	Boundary Lake	
	1064	Dome Boundary 14-2-86-14	14-2-86-14 W6M	Boundary Lake	
	1666	Dome Boundary 2-3-86-14	2-3-86-14 W6M	Boundary Lake	
	1702	Dome Boundary 6-3-86-14	6-3-86-14 W6M	Boundary Lake	
	1156	Dome Boundary 8-3-86-14	8-3-86-14 W6M	Boundary Lake	
	764	Dome Boundary 8-11-86-14	8-11-86-14 W6M	Boundary Lake	
	808	Dome Boundary 8-14-86-14	8-14-86-14 W6M	Boundary Lake	
	1070	Dome Boundary 16-14-86-14	16-14-86-14 W6M	Boundary Lake	
	1670	Dome Boundary 2-12-85-14	2-12-85-14 W6M	Boundary Lake	
	1671	Dome Boundary 4-12-85-14	4-12-85-14 W6M	Boundary Lake	
	625	Dome Boundary Lake 8-12-85-14	8-12-85-14 W6M	Boundary Lake	733[1]
	1675	Dome Boundary 10-12-85-14	10-12-85-14 W6M	Boundary Lake	
	1677	Dome Boundary 2-13-85-14	2-13-85-14 W6M	Boundary Lake	
	603	Dome Boundary Lake 8-13-85-14	8-13-85-14 W6M	Boundary Lake	
	1041	Homestead et al Boundary 6-18-84-13	6-18-84-13 W6M	Boundary Lake	
	1108	Homestead et al Boundary 8-18-84-13	8-18-84-13 W6M	Boundary Lake	
	1104	Imp Pac Boundary 14-18-84-13	14-18-84-13 W6M	Boundary Lake	
	1098	Imp Pac Boundary 6-19-84-13	6-19-84-13 W6M	Boundary Lake	

1078	Imp Pac Boundary 8-19-84-13	8-19-84-13 W6M	Boundary Lake
998	Imp Pac Boundary 14-19-84-13	14-19-84-13 W6M	Boundary Lake
1117	Imp Pac Boundary 6-20-84-13	6-20-84-13 W6M	Boundary Lake
296	Imp Pac Boundary 14-20-84-13	14-20-84-13 W6M	Boundary Lake
1091	Imp Pac Boundary 6-29-84-13	6-29-84-13 W6M	Boundary Lake
1400	Imp Pac Boundary 8-29-84-13	8-29-84-13 W6M	Boundary Lake
1060	Imp Pac Boundary 14-29-84-13	14-29-84-13 W6M	Boundary Lake
1019	Imp Pac Boundary 6-30-84-13	6-30-84-13 W6M	Boundary Lake
1425	Imp Pac Boundary 16-29-84-13	16-29-84-13 W6M	Boundary Lake
1061	Imp Pac Boundary 8-30-84-13	8-30-84-13 W6M	Boundary Lake
975	Imp et al Boundary 14-30-84-13	14-30-84-13 W6M	Boundary Lake
931	Imp et al Boundary 6-31-84-13	6-31-84-13 W6M	Boundary Lake
930	Imp et al Boundary 8-31-84-13	8-31-84-13 W6M	Boundary Lake
888	Imp Pac Boundary 14-31-84-13	14-31-84-13 W6M	Boundary Lake
965	Imp Pac Boundary 6-32-84-13	6-32-84-13 W6M	Boundary Lake
935	Imp Pac Boundary 14-32-84-13	14-32-84-13 W6M	Boundary Lake
813	Imp Pac Boundary 6-5-85-13	6-5-85-13 W6M	Boundary Lake
878	Imp Pac Boundary 8-5-85-13	8-5-85-13 W6M	Boundary Lake
832	Imp Pac Boundary 14-5-85-13	14-5-85-13 W6M	Boundary Lake
789	Imp Pac Boundary 6-6-85-13	6-6-85-13 W6M	Boundary Lake
795	Imp Pac Boundary 8-6-85-13	8-6-85-13 W6M	Boundary Lake
792	Imp Pac Boundary 14-6-85-13	14-6-85-13 W6M	Boundary Lake
796	Imp Pac Boundary 16-6-85-13	16-6-85-13 W6M	Boundary Lake
763	Imp Pac Boundary 6-7-85-13	6-7-85-13 W6M	Boundary Lake
807	Imp Pac Boundary 8-7-85-13	8-7-85-13 W6M	Boundary Lake
368	Imp Pac Boundary 14-7-85-13	14-7-85-13 W6M	Boundary Lake
847	Imp Pac Boundary 6-8-85-13	6-8-85-13 W6M	Boundary Lake
906	Imp Pac Boundary 8-8-85-13	8-8-85-13 W6M	Boundary Lake
767	Imp Pac Boundary 14-8-85-13	14-8-85-13 W6M	Boundary Lake
889	Imp Pac Boundary 16-8-85-13	16-8-85-13 W6M	Boundary Lake
760	Imp Pac Boundary 6-17-85-13	6-17-85-13 W6M	Boundary Lake
738	Imp Pac Boundary 14-17-85-13	14-17-85-13 W6M	Boundary Lake
734	Imp Pac Boundary 6-18-85-13	6-18-85-13 W6M	Boundary Lake
523	Imp Pac Boundary 8-18-85-13	8-18-85-13 W6M	Boundary Lake
524	Imp Pac Boundary 6-20-85-13	6-20-85 13 W6M	Boundary Lake
774	Imp Pac Boundary 8-20-85-13	8-20-85 13 W6M	Boundary Lake
1386	Imp Pac Boundary 16-20-84-13	16-20-84-13 W6M	Boundary Lake
1166	Imp Pac Boundary 14-2-84-14	14-2-84-14 W6M	Boundary Lake
1369	Imp Pac Boundary 14-4-84-14	14-4-84-14 W6M	Boundary Lake
1358	Imp Pac Boundary 16-4-84-14	16-4-84-14 W6M	Boundary Lake
1450	Imp Pac Boundary 14-7-84-14	14-7-84-14 W6M	Boundary Lake
1357	Imp Pac Boundary 16-7-84-14	16-7-84-14 W6M	Boundary Lake
1164	Imp Pac Boundary 14-8-84-14	14-8-84-14 W6M	Boundary Lake
1367	Imp Pac Boundary 8-9-84-14	8-9-84-14 W6M	Boundary Lake
843	Imp Pac Boundary 14-10-84-14	14-10-84-14 W6M	Boundary Lake

[1] Pool.
[2] Included in pool M.P.R. but not to exceed individual M.P.R.

TABLE 9.—AUTHORIZED MAXIMUM PERMISSIBLE RATES, DECEMBER 31, 1966—*Continued*

Field	Well Authorization No.	Well Name	Location	Pool	Maximum Permissible Rate (Bbl./Day)
Boundary Lake	1127	Imp Pac Boundary 6-11-84-14	6-11-84-14 W6M	Boundary Lake	
	1136	Imp Pac Boundary 8-11-84-14	8-11-84-14 W6M	Boundary Lake	
	1080	Imp Pac Boundary 14-13-84-14	14-13-84-14 W6M	Boundary Lake	
	1085	Imp Pac Boundary 16-13-84-14	16-13-84-14 W6M	Boundary Lake	
	1059	Imp Pac Boundary 14-14-84-14	14-14-84-14 W6M	Boundary Lake	
	1084	Imp Pac Boundary 6-15-84-14	6-15-84-14 W6M	Boundary Lake	
	1076	Imp Pac Boundary 8-15-84-14	8-15-84-14 W6M	Boundary Lake	
	1035	Imp et al Boundary 6-16-84-14	6-16-84-14 W6M	Boundary Lake	
	1128	Imp et al Boundary 8-16-84-14	8-16-84-14 W6M	Boundary Lake	
	1143	Imp Pac Boundary 14-16-84-14	14-16-84-14 W6M	Boundary Lake	
	1102	Imp Pac Boundary 6-17-84-14	6-17-84-14 W6M	Boundary Lake	
	1151	Imp Pac Boundary 8-17-84-14	8-17-84-14 W6M	Boundary Lake	
	1220	Imp Pac Boundary 14-17-84-14	14-17-84-14 W6M	Boundary Lake	
	1273	Imp Pac Boundary 8-18-84-14	8-18-84-14 W6M	Boundary Lake	
	1343	Imp Pac Boundary 16-18-84-14	16-18-84-14 W6M	Boundary Lake	
	1189	Imp Pac Boundary 8-20-84-14	8-20-84-14 W6M	Boundary Lake	
	1228	Imp Pac Boundary 16-20-84-14	16-20-84-14 W6M	Boundary Lake	
	1120	Imp Pac Boundary 8-21-84-14	8-21-84-14 W6M	Boundary Lake	19,090[1]
	1172	Imp Pac Boundary 14-21-84-14	14-21-84-14 W6M	Boundary Lake	
	1157	Imp Pac Boundary 6-21-84-14	6-21-84-14 W6M	Boundary Lake	
	250	Imp Pac Boundary 1-23-84-14	1-23-84-14 W6M	Boundary Lake	
	1017	Imp Pac Boundary 6-23-84-14	6-23-84-14 W6M	Boundary Lake	
	929	Imp Pac Boundary 14-23-84-14	14-23-84-14 W6M	Boundary Lake	
	997	Imp Pac Boundary 16-23-84-14	16-23-84-14 W6M	Boundary Lake	
	1036	Imp Pac Boundary 6-24-84-14	6-24-84-14 W6M	Boundary Lake	
	978	Imp Pac Boundary 8-24-84-14	8-24-84-14 W6M	Boundary Lake	
	1010	Imp Pac Boundary 14-24-84-14	14-24-84-14 W6M	Boundary Lake	
	979	Imp Pac Boundary 6-25-84-14	6-25-84-14 W6M	Boundary Lake	
	928	Imp Pacific Boundary 8-25-84-14	8-25-84-14 W6M	Boundary Lake	
	1077	Imp et al Boundary 14-25-84-14	14-25-84-14 W6M	Boundary Lake	
	927	Imp Pac Boundary 6-26-84-14	6-26-84-14 W6M	Boundary Lake	
	966	Imp Pac Boundary 8-26-84-14	8-26-84-14 W6M	Boundary Lake	
	1111	Imp et al Boundary 14-26-84-14	14-26-84-14 W6M	Boundary Lake	
	861	Imp Pac Boundary 8-34-84-14	8-34-84-14 W6M	Boundary Lake	
	883	Imp Pac Boundary 14-34-84-14	14-34-84-14 W6M	Boundary Lake	
	833	Imp Pac Boundary 6-35-84-14	6-35-84-14 W6M	Boundary Lake	
	815	Imp Pac Boundary 8-35-84-14	8-35-84-14 W6M	Boundary Lake	
	805	Imp Pac Boundary 14-35-84-14	14-35-84-14 W6M	Boundary Lake	
	804	Imp et al Boundary 6-36-84-14	6-36-84-14 W6M	Boundary Lake	
	814	Imp et al Boundary 8-36-84-14	8-36-84-14 W6M	Boundary Lake	

793	Imp et al Boundary 14-36-84-14	14-36-84-14 W6M	Boundary Lake
761	Imp et al Boundary 6-1-85-14	6-1-85-14 W6M	Boundary Lake
770	Imp et al Boundary 8-1-85-14	8-1-85-14 W6M	Boundary Lake
521	Imp et al Boundary 14-1-85-14	14-1-85-14 W6M	Boundary Lake
501	Imp et al Boundary 6-2-85-14	6-2-85-14 W6M	Boundary Lake
788	Imp Pac Boundary 8-2-85-14	8-2-85-14 W6M	Boundary Lake
493	Imp Pac Boundary 14-2-85-14	14-2-85-14 W6M	Boundary Lake
362	Imperial Pacific Boundary 6-3-85-14	6-3-85-14 W6M	Boundary Lake
379	Imperial Pacific Boundary 8-3-85-14	8-3-85-14 W6M	Boundary Lake
363	Imperial Pacific Boundary 14-3-85-14	14-3-85-14 W6M	Boundary Lake
267	Imperial Pacific Boundary 16-4-85-14	16-4-85-14 W6M	Boundary Lake
1513	Imp Pac Boundary 16-9-85-14	16-9-85-14 W6M	Boundary Lake
1545	Imp Pac Boundary 3-10-85-14	3-10-85-14 W6M	Boundary Lake
360	Imperial Pacific Boundary 8-10-85-14	8-10-85 14 W6M	Boundary Lake
1495	Imp Pac Boundary 9-10-85-14	9-10-85 14 W6M	Boundary Lake
282	Imperial Pacific Boundary 6-11-85-14	6-11-85-14 W6M	Boundary Lake
769	Imp Pac Boundary 8-11-85-14	8-11-85-14 W6M	Boundary Lake
821	Imp Pac Boundary 14-11-85-14	14-11-85-14 W6M	Boundary Lake
759	Imp Pac Boundary 14-12-85-14	14-12-85-14 W6M	Boundary Lake
758	Imp Pac Boundary 6-13-85-14	6-13-85-14 W6M	Boundary Lake
1124	Imp Pac Boundary 6-14-85-14	6-14-85-14 W6M	Boundary Lake
848	Imp Pac Boundary 8-14-85-14	8-14-85-14 W6M	Boundary Lake
1037	Marathon Boundary 14-12-84-14	14-12-84-14 W6M	Boundary Lake
989	Marathon Boundary 6-13-84-14	6-13-84-14 W6M	Boundary Lake
1068	Marathon Boundary 8-13-84-14	8-13-84-14 W6M	Boundary Lake
1024	Mobil Boundary 6-10-84-14	6-10-84-14 W6M	Boundary Lake
1023	Mobil Boundary 8-10-84-14	8-10-84-14 W6M	Boundary Lake
895	Pacific Boundary 16-14-85-14	16-14-85-14 W6M	Boundary Lake
961	Pacific Bóundary 16-15-85-14	16-15-85-14 W6M	Boundary Lake
982	Sinclair et al Boundary 6-3-84-14	6-3-84-14 W6M	Boundary Lake
941	Sinclair Boundary 8-3-84-14	8-3-84-14 W6M	Boundary Lake
969	Sinclair et al Boundary 14-3-84-14	14-3-84-14 W6M	Boundary Lake
942	Sinclair Boundary 16-3-84-14	16-3-84-14 W6M	Boundary Lake
841	Sinclair Boundary 14-11-84-14	14-11-84-14 W6M	Boundary Lake
865	Sinclair Boundary 16-11-84-14	16-11-84-14 W6M	Boundary Lake
803	Sinclair Boundary 6-14-84-14	6-14-84-14 W6M	Boundary Lake
866	Sinclair Boundary 8-14-84-14	8-14-84-14 W6M	Boundary Lake
755	Sinclair Boundary 14-15-84-14	14-15-84-14 W6M	Boundary Lake
780	Sinclair Boundary 6-22-84-14	6-22-84-14 W6M	Boundary Lake
742	Sinclair Boundary 8-22-84-14	8-22-84-14 W6M	Boundary Lake
794	Sinclair Boundary 14-22-84-14	14-22-84-14 W6M	Boundary Lake
802	Sinclair Boundary 6-27-84-14	6-27-84-14 W6M	Boundary Lake
743	Sinclair Boundary 8-27-84-14	8-27-84-14 W6M	Boundary Lake
853	Sinclair Boundary 14-27-84-14	14-27-84-14 W6M	Boundary Lake
590	Amerada Cr BC-B Boundary 14-18-85-13	14-18-85-13 W6M	Boundary Lake
563	Amerada Cr BC-B Boundary 14-20-85-13	14-20-85-13 W6M	Boundary Lake

[1] Pool.

TABLE 9.—AUTHORIZED MAXIMUM PERMISSIBLE RATES, DECEMBER 31, 1966—*Continued*

Field	Well Authorization No.	Well Name	Location	Pool	Maximum Permissible Rate (Bbl./Day)
Boundary Lake	591	Amerada Cr BC-B Boundary 6-29-85-13	6-29-85-13 W6M	Boundary Lake	
	771	Amerada Boundary 14-29-85-13	14-29-85-13 W6M	Boundary Lake	
	629	Amerada Boundary Lake 14-13-85-14	14-13-85-14 W6M	Boundary Lake	
	639	Amerada Boundary Lake 6-24-85-14	6-24-85-14 W6M	Boundary Lake	
	608	Amerada Cr BC-B Boundary 8-24-85-14	8-24-85-14 W6M	Boundary Lake	
	692	Amerada Boundary Lake 11-24-85-14	11-24-85-14 W6M	Boundary Lake	
	918	Basin Boundary 6-17-86-13	6-17-86-13 W6M	Boundary Lake	
	962	Basin Boundary 14-17-86-13	14-17-86-13 W6M	Boundary Lake	
	618	Marathon Boundary 6-19-85-13	6-19-85-13 W6M	Boundary Lake	
	632	Marathon Boundary 8-19-85-13	8-19-85-13 W6M	Boundary Lake	
	635	Marathon Boundary 14-19-85-13	14-19-85-13 W6M	Boundary Lake	
	898	Marathon Boundary 14-5-86-13	14-5-86-13 W6M	Boundary Lake	
	949	Marathon Boundary 6-8-86-13	6-8-86-13 W6M	Boundary Lake	
	604	Marathon Boundary 14-8-86-13	14-8-86-13 W6M	Boundary Lake	
	646	Sun Boundary Lake 6-23-85-14	6-23-85-14 W6M	Boundary Lake	
	652	Sun Boundary Lake 8-23-85-14	8-23-85-14 W6M	Boundary Lake	
	643	Sun Boundary Lake 14-23-85-14	14-23-85-14 W6M	Boundary Lake	
	1137	Texaco NFA Boundary 6-30-85-13	6-30-85-13 W6M	Boundary Lake	
	1097	Texaco NFA Boundary 8-30-85-13	8-30-85-13 W6M	Boundary Lake	
	1171	Texaco NFA Boundary 14-30-85-13	14-30-85-13 W6M	Boundary Lake	
	183	Texaco NFA Boundary L 6-31-85-13	6-31-85-13 W6M	Boundary Lake	
	1150	Texaco NFA Boundary 8-31-85-13	8-31-85-13 W6M	Boundary Lake	
	167	Texaco NFA Boundary L 14-31-85-13	14-31-85-13 W6M	Boundary Lake	
	101	Texaco NFA Boundary Lake 6-6-86-13 (1)	6-6-86-13 W6M	Boundary Lake	
	972	Texaco NFA Boundary 8-6-86-13	8-6-86-13 W6M	Boundary Lake	
	152	Texaco NFA Boundary L 14-6-86-13	14-6-86-13 W6M	Boundary Lake	
	862	Texaco NFA Boundary 6-7-86-13	6-7-86-13 W6M	Boundary Lake	
	953	Texaco NFA Boundary 8-7-86-13	8-7-86-13 W6M	Boundary Lake	
	1100	Texaco NFA Boundary 14-7-86-13	14-7-86-13 W6M	Boundary Lake	
	811	Texaco NFA Boundary 6-18-86-13	6-18-86-13 W6M	Boundary Lake	9,892[1]
	995	Texaco NFA Boundary 8-18-86-13	8-18-86-13 W6M	Boundary Lake	
	1116	Texaco NFA Boundary 14-18-86-13	14-18-86-13 W6M	Boundary Lake	
	1074	Texaco NFA Boundary 6-19-86-13	6-19-86-13 W6M	Boundary Lake	
	1049	Texaco NFA Boundary 8-19-86-13	8-19-86-13 W6M	Boundary Lake	
	1123	Texaco NFA Boundary 14-19-86-13	14-19-86-13 W6M	Boundary Lake	
	1050	Texaco NFA Boundary 6-30-86-13	6-30-86-13 W6M	Boundary Lake	
	1167	Texaco NFA Boundary 8-30-86-13	8-30-86-13 W6M	Boundary Lake	
	1073	Texaco NFA Boundary 14-22-85-14	14-22-85-14 W6M	Boundary Lake	
	687	Texaco NFA Boundary Lake 6-25-85-14	6-25-85-14 W6M	Boundary Lake	
	1539	Texaco NFA Boundary 8-25-85-14	8-25-85-14 W6M	Boundary Lake	

	656	Texaco NFA Boundary Lake 14-25-85-14	14-25-85-14 W6M	Boundary Lake	
	924	Texaco NFA Boundary 6-27-85-14	6-27-85-14 W6M	Boundary Lake	
	845	Texaco NFA Boundary 8-27-85-14	8-27-85-14 W6M	Boundary Lake	
	971	Texaco NFA Boundary 14-27-85-14	14-27-85-14 W6M	Boundary Lake	
	857	Texaco NFA Boundary 8-34-85-14	8-34-85-14 W6M	Boundary Lake	
	662	Texaco NFA Boundary Lake 6-36-85-14	6-36-85-14 W6M	Boundary Lake	
	1058	Texaco NFA Boundary 8-36-85-14	8-36-85-14 W6M	Boundary Lake	
	657	Texaco NFA Boundary Lake 14-36-85-14	14-36-85-14 W6M	Boundary Lake	
	663	Texaco NFA Boundary Lake 6-1-86-14	6-1-86-14 W6M	Boundary Lake	
	1083	Texaco NFA Boundary 8-1-86-14	8-1-86-14 W6M	Boundary Lake	
	664	Texaco NFA Boundary Lake 14-1-86-14	14-1-86-14 W6M	Boundary Lake	
	860	Texaco NFA Boundary 16-1-86-14	16-1-86-14 W6M	Boundary Lake	
	829	Texaco NFA Boundary 6-12-86-14	6-12-86-14 W6M	Boundary Lake	
	1096	Texaco NFA Boundary 8-12-86-14	8-12-86-14 W6M	Boundary Lake	
	900	Texaco NFA Boundary 14-12-86-14	14-12-86-14 W6M	Boundary Lake	
	880	Texaco NFA Boundary 6-13-86-14	6-13-86-14 W6M	Boundary Lake	
	1101	Texaco NFA Boundary 8-13-86-14	8-13-86-14 W6M	Boundary Lake	
	952	Texaco NFA Boundary 14-13-86-14	14-13-86-14 W6M	Boundary Lake	
	885	Texaco NFA Boundary 6-24-86-14	6-24-86-14 W6M	Boundary Lake	
	1086	Texaco NFA Boundary 8-24-86-14	8-24-86-14 W6M	Boundary Lake	
	633	Texaco NFA Boundary Lake 14-24-86-14	14-24-86-14 W6M	Boundary Lake	
	1454	Amerada Boundary A6-24-85-14	6-24-85-14 W6M	Halfway	99
	736	Amerada Boundary 16-24-85-14	16-24-85-14 W6M	Halfway	96
	1368	Imp Pac Boundary 6-15-85-14	6-15-85-14 W6M	Boundary Lake	134
	667	Pacific Boundary Lake 11-14-85-14	11-14-85-14 W6M	Halfway	8
	895	Pacific Boundary 16-14-85-14	16-14-85-14 W6M	Halfway	102
	270	Pacific Boundary 8-15-85-14	8-15-85-14 W6M	Cadomin	79
	646	Sun Boundary Lake 6-23-85-14	6-23-85-14 W6M	Halfway	83
	1097	Texaco NFA Boundary 8-30-85-13	8-30-85-13 W6M	Halfway	56
	1720	Texaco NFA Boundary 6-29-86-13	6-29-86-13 W6M	Boundary Lake	35
	1482	Texaco NFA Boundary 16-30-86-13	16-30-86-13 W6M	Boundary Lake	20
	1858	Texaco NFA Boundary 14-21-85-14	14-21-85-14 W6M	Boundary Lake	194
	1798	Texaco NFA Boundary 16-21-85-14	16-21-85-14 W6M	Boundary Lake	150
	1786	Texaco NFA Boundary 6-28-85-14	6-28-85-14 W6M	Boundary Lake	118
	1680	Texaco NFA Boundary 8-28-85-14	8-28-85-14 W6M	Boundary Lake	152
	1751	Texaco NFA Boundary 14-28-85-14	14-28-85-14 W6M	Boundary Lake	145
	1543	Texaco NFA Boundary 16-28-85-14	16-28-85-14 W6M	Boundary Lake	143
	1767	Texaco NFA Boundary 6-33-85-14	6-33-85-14 W6M	Boundary Lake	127
	1717	Texaco NFA Boundary 8-33-85-14	8-33-85-14 W6M	Boundary Lake	140
	1810	Texaco NFA Boundary 4-34-85-14	4-34-85-14 W6M	Boundary Lake	74
	1558	Texaco NFA Boundary 8-25-86-14	8-25-86-14 W6M	Boundary Lake	86
Bulrush	1267	Union HB Sinclair Bulrush d-78-F	d-78-F/94-A-16	Halfway	23
	1629	Union HB Sinc Pac Bulrush d-88-F	d-88-F/94-A-16	Halfway	77
	1394	Union HB Sinc Pac Bulrush d-89-F	d-89-F/94-A-16	Halfway	26
	1551	Union HB Sinc Pac Bulrush d-99-F	d-99-F/94-A-16	Halfway	118
Charlie Lake	269	Imp Pac Charlie 13-5-84-18	13-5-84-18 W6M	Gething	36
Currant	1700	Sinclair et al Currant d-5-C	d-5-C/94-A-16	Halfway	107

[1] Pool.

TABLE 9.—AUTHORIZED MAXIMUM PERMISSIBLE RATES, DECEMBER 31, 1966—*Continued*

Field	Well Authorization No.	Well Name	Location	Pool	Maximum Permissible Rate (Bbl./Day)
Currant	1646	Sinclair et al Currant d-6-C	d-6-C/94-A-16	Halfway	29
	1752	Sinclair et al Currant b-15-C	b-15-C/94-A-16	Halfway	68
	1635	Sinclair et al Currant d-16-C	d-16-C/94-A-16	Halfway	161
	1590	Sinclair et al Currant d-17-C	d-17-C/94-A-16	Halfway	67
	1768	Union HB Currant d-28-C	d-28-C/94-A-16	Halfway	68
Fort St. John	34	Pacific Ft St John 3-14-83-18 (9)	3-14-83-18 W6M	Charlie Lake	46
	214	Pacific Ft St John 10-14-83-18 (76)	10-14-83-18 W6M	Charlie Lake	14
	171	Imp Pac Ft St John 9-19-83-18 (45)	9-19-83-18 W6M	Belloy	85
	225	Pacific Ft St John 1-23-83-18 (81)	1-23-83-18 W6M	Charlie Lake	23
	216	Pacific Ft St John 9-23-83-18 (78)	9-23-83-18 W6M	Charlie Lake	65
Milligan Creek	973	Union HB Milligan b-42-G	b-42-G/94-H-2	Halfway	
	409	Union HB Milligan Creek d-42-G	d-42-G/94-H-2	Halfway	
	435	Union HB Milligan Creek d-43-G	d-43-G/94-H-2	Halfway	
	909	Union HB Milligan b-52-G	b-52-G/94-H-2	Halfway	
	401	Union HB Milligan Creek d-52-G	d-52-G/94-H-2	Halfway	
	899	Union HB Milligan b-53-G	b-53-G/94-H-2	Halfway	
	398	Union HB Milligan Creek d-53-G	d-53-G/94-H-2	Halfway	
	402	Union HB Milligan Creek d-54-G	d-54-G/94-H-2	Halfway	
	826	Union HB Milligan b-62-G	b-62-G/94-H-2	Halfway	
	1001	Union HB Milligan d-62-G	d-62-G/94-H-2	Halfway	
	440	Union HB Milligan Creek d-63-G	d-63-G/94-H-2	Halfway	10,000[1]
	341	Union HB Milligan Creek d-64-G	d-64-G/94-H-2	Halfway	
	1182	Union HB Milligan c-72-G	c-72-G/94-H-2	Halfway	
	911	Union HB Milligan b-73-G	b-73-G/94-H-2	Halfway	
	248	Union HB Milligan Creek d-73-G	d-73-G/94-H-2	Halfway	
	436	Union HB Milligan Creek d-74-G	d-74-G/94-H-2	Halfway	
	1011	Union HB Milligan b-82-G	b-82-G/94-H-2	Halfway	
	875	Union HB Milligan b-83-G	b-83-G/94-H-2	Halfway	
	1014	Union HB Milligan d-84-G	d-84-G/94-H-2	Halfway	
	985	Union HB Milligan b-93-G	b-93-G/94-H-2	Halfway	
	1170	Union HB Milligan d-94-G	d-94-G/94-H-2	Halfway	
	1493	Union HB Milligan b-65-G	b-65-G/94-H-2	Halfway	157
Osprey	1610	Pacific SR CanDel Osprey d-4-J	d-4-J/94-A-15	Halfway	49
Nettle	1321	Union KCL ROC Nettle d-67-A	d-67-A/94-H-7	Bluesky-Gething	109
	1879	Union KCL ROC Nettle d-68-A	d-68-A/94-H-7	Bluesky-Gething	74
Peejay	1584	FPC Whitehall Peejay b-27-E	b-27-E/94-A-16	Halfway	
	1452	Medallion Mobil Peejay d-57-E	d-57-E/94-A-16	Halfway	
	981	Medallion AORCO Blair Peejay d-60-E	d-60-E/94-A-16	Halfway	
	1026	Medallion Ashland Peejay d-68-E	d-68-E/94-A-16	Halfway	
	902	Medallion Ashland Peejay d-69-E	d-69-E/94-A-16	Halfway	

	903	Medallion Ashland Peejay d-70-E	d-70-E/94-A-16	Halfway	
	1025	Medallion Ashland Peejay d-61-H	d-61-H/94-A-15	Halfway	
	990	Pacific SR CanDel Peejay d-81-H	d-81-H/94-A-15	Halfway	
	612	Pacific Sinclair Peejay d-18-E	d-18-E/94-A-16	Halfway	
	589	Pacific Sinclair Peejay d-28-E	d-28-E/94-A-16	Halfway	
	543	Pacific Sinclair Peejay d-29-E	d-29-E/94-A-16	Halfway	4,430[1]
	578	Pacific Sinclair Peejay d-38-E	d-38-E/94-A-16	Halfway	
	418	Pacific Sinclair Peejay d-39-E	d-39-E/94-A-16	Halfway	
	915	Pacific Sinclair Peejay d-47-E	d-47-E/94-A-16	Halfway	
	577	Pacific Sinclair Peejay d-48-E	d-48-E/94-A-16	Halfway	
	588	Pacific Sinclair Peejay d-49-E	d-49-E/94-A-16	Halfway	
	914	Pacific Sinclair Peejay d-58-E	d-58-E/94-A-16	Halfway	
	881	Pacific Sinclair Peejay d-59-E	d-59-E/94-A-16	Halfway	
	1329	Pacific SR CanDel Peejay d-79-E	d-79-E/94-A-16	Halfway	
	569	Pacific SR CanDel Peejay d-80-E	d-80-E/94-A-16	Halfway	
	1030	Pacific SR CanDel Peejay d-100-E	d-100-E/94-A-16	Halfway	
	1684	CIGOL Peejay d-100-C	d-100-C/94-A-16	Halfway	
	1691	CIGOL Peejay d-91-D	d-91-D/94-A-16	Halfway	
	1704	CIGOL Peejay d-1-E	d-1-E/94-A-16	Halfway	
	1718	CIGOL Mobil Peejay d-26-E	d-26-E/94-A-16	Halfway	
	1639	CIGOL Peejay d-33-E	d-33-E/94-A-16	Halfway	
	1690	CIGOL Mobil Peejay d-34-E	d-34-E/94-A-16	Halfway	
	1706	CIGOL Mobil Peejay d-35-E	d-35-E/94-A-16	Halfway	
	1575	CIGOL Peejay d-43-E	d-43-E/94-A-16	Halfway	
	1643	CIGOL Mobil Peejay d-46-E	d-46-E/94-A-16	Halfway	
	1715	CIGOL Peejay d-10-F	d-10-F/94-A-16	Halfway	
	1935	Texcan Texaco Peejay d-60-C	d-60-C/94-A-16	Halfway	
	1891	Texcan Texaco Peejay d-70-C	d-70-C/94-A-16	Halfway	
	1636	Texcan Peejay d-80-C	d-80-C/94-A-16	Halfway	
	1600	Texcan Peejay d-90-C	d-90-C/94-A-16	Halfway	
	1838	Texcan Texaco Peejay d-62-D	d-62-D/94-A-16	Halfway	
	1930	Texcan Texaco Peejay d-63-D	d-63-D/94-A-16	Halfway	
	1657	Texcan Peejay d-71-D	d-71-D/94-A-16	Halfway	
	1698	Texcan Peejay d-81-D	d-81-D/94-A-16	Halfway	
	1783	Union HB Peejay d-69-C	d-69-C/94-A-16	Halfway	4,014[1]
	1741	Union HB Sinc Pac Peejay d-79-C	d-79-C/94-A-16	Halfway	
	1821	Union HB Sinc Pac Peejay d-89-C	d-89-C/94-A-16	Halfway	
	1785	Union HB Sinc Pac Peejay d-99-C	d-99-C/94-A-16	Halfway	
	1759	Union HB Peejay d-72-D	d-72-D/94-A-16	Halfway	
	1784	Union HB Peejay d-73-D	d-73-D/94-A-16	Halfway	
	1722	Union HB Peejay d-82-D	d-82-D/94-A-16	Halfway	
	1749	Union HB Peejay d-83-D	d-83-D/94-A-16	Halfway	
	1708	Union HB Peejay d-92-D	d-92-D/94-A-16	Halfway	
	1725	Union HB Peejay d-93-D	d-93-D/94-A-16	Halfway	
	1721	Union HB Peejay d-2-E	d-2-E/94-A-16	Halfway	
	1732	Union HB Peejay d-3-E	d-3-E/94-A-16	Halfway	

[1] Pool.

TABLE 9.—AUTHORIZED MAXIMUM PERMISSIBLE RATES, DECEMBER 31, 1966—*Continued*

Field	Well Authorization No.	Well Name	Location	Pool	Maximum Permissible Rate (Bbl./Day)
Peejay	1736	Union HB Peejay d-12-E	d-12-E/94-A-16	Halfway	
	1735	Union HB Peejay d-13-E	d-13-E/94-A-16	Halfway	
	1764	Union HB Peejay d-22-E	d-22-E/94-A-16	Halfway	
	1699	Union HB Peejay d-23-E	d-23-E/94-A-16	Halfway	
	1694	Union HB Peejay d-24-E	d-24-E/94-A-16	Halfway	
	1641	Union HB Peejay d-25-E	d-25-E/94-A-16	Halfway	
	1598	Union HB Sinc Pac Peejay b-9-F	b-9-F/94-A-16	Halfway	
	1625	Baysel Peejay d-34-H	d-34-H/94-A-15	Halfway	38
	1487	Baysel SR Peejay d-96-H	d-96-H/94-A-15	Halfway	74
	1538	Baysel SR Peejay d-97-H	d-97-H/94-A-15	Halfway	145
	1515	CanDel SR Peejay d-44-H	d-44-H/94-A-15	Halfway	135
	1516	CanDel SR Peejay d-45-H	d-45-H/94-A-15	Halfway	119
	1678	CanDel SR Peejay d-51-H	d-51-H/94-A-15	Halfway	72
	1603	CanDel SR Peejay d-52-H	d-52-H/94-A-15	Halfway	98
	1498	CanDel SR Peejay d-53-H	d-53-H/94-A-15	Halfway	96
	1503	CanDel SR Peejay d-54-H	d-54-H/94-A-15	Halfway	131
	1507	CanDel SR Peejay d-55-H	d-55-H/94-A-15	Halfway	194
	1801	CanDel SR Peejay d-62-H	d-62-H/94-A-15	Halfway	84
	1521	CanDel SR Peejay d-63-H	d-63-H/94-A-15	Halfway	66
	1483	CanDel SR Peejay d-64-H	d-64-H/94-A-15	Halfway	138
	1476	CanDel SR Peejay d-65-H	d-65-H/94-A-15	Halfway	169
	1969	CIGOL Peejay b-11-E	b-11-E/94-A-16	Halfway	28
	1971	CIGOL Mobil Peejay b-45-E	b-45-E/94-A-16	Halfway	76
	1627	Pacific Sinclair Peejay d-21-H	d-21-H/94-A-15	Halfway	35
	1585	Pacific Sinclair Peejay d-31-H	d-31-H/94-A-15	Halfway	359
	1563	Pacific Sinclair Peejay d-32-H	d-32-H/94-A-15	Halfway	236
	1525	Pacific Sinclair Peejay d-33-H	d-33-H/94-A-15	Halfway	184
	1632	Pacific Sinclair Peejay d-41-H	d-41-H/94-A-15	Halfway	129
	1514	Pacific Sinclair Peejay d-42-H	d-42-H/94-A-15	Halfway	82
	1497	Pacific Sinclair Peejay d-43-H	d-43-H/94-A-15	Halfway	188
	1512	Pacific SR CanDel Peejay d-66-H	d-66-H/94-A-15	Halfway	170
	1540	Pacific SR CanDel Peejay d-67-H	d-67-H/94-A-15	Halfway	144
	1562	Pacific SR CanDel Peejay d-68-H	d-68-H/94-A-15	Halfway	66
	1851	Pacific SR CanDel Peejay d-71-H	d-71-H/94-A-15	Halfway	59
	1912	Pacific SR CanDel Peejay d-73-H	d-73-H/94-A-15	Halfway	70
	1522	Pacific SR CanDel Peejay d-A74-H	d-74-H/94-A-15	Halfway	74
	1467	Pacific SR CanDel Peejay d-75-H	d-75-H/94-A-15	Halfway	109
	1931	Pacific SR CanDel Peejay d-84-H	d-84-H/94-A-15	Halfway	103
	1407	Pacific SR CanDel Peejay d-85-H	d-85-H/94-A-15	Halfway	79
	1474	Pacific SR CanDel Peejay d-95-H	d-95-H/94-A-15	Halfway	159
	725	Pacific SR West Cdn Peejay d-33-I	d-33-I/94-A-15	Halfway	5

	1737	Pacific SR CanDel Peejay b-67-E	b-67-E/94-A-16	Halfway	98
	1478	Tenn Peejay d-76-H	d-76-H/94-A-15	Halfway	216
	1491	Tenn Peejay d-77-H	d-77-H/94-A-15	Halfway	95
	1505	Tenn Peejay d-78-H	d-78-H/94-A-15	Halfway	138
	1461	Tenn Peejay d-86-H	d-86-H/94-A-15	Halfway	160
	1490	Tenn Peejay d-87-H	d-87-H/94-A-15	Halfway	116
	1502	Tenn Peejay d-88-H	d-88-H/94-A-15	Halfway	64
	1961	Union HB Peejay d-59-C	d-59-C/94-A-16	Halfway	52
	1960	Union HB Peejay d-68-C	d-68-C/94-A-16	Halfway	21
Peejay West	1008	Pacific SR CanDel W Peejay d-44-G	d-44-G/94-A-15	Halfway	192
	956	Pacific SR West Cdn W Peejay d-54-G	d-54-G/94-A-15	Halfway	149
Rigel	1692	Monsanto IOE Fina Rigel 6-19-87-16	6-19-87-16 W6M	Dunlevy	117
	1616	Monsanto IOE Fina Rigel 11-19-87-16	11-19-87-16 W6M	Dunlevy	149
	1781	Monsanto Rigel 16-19-87-16	16-19-87-16 W6M	Dunlevy	71
	1555	Monsanto Rigel 6-13-87-17	6-13-87-17 W6M	Dunlevy	242
	1942	Monsanto Rigel 6-23-87-17	6-23-87-17 W6M	Dunlevy	139
Stoddart	1519	Uno-Tex et al Stoddart 10-31-85-19	10-31-85-19 W6M	Belloy	82
Weasel	1713	CanDel SR Weasel d-14-B	d-14-B/94-H-2	Halfway	41
	1709	CanDel SR Weasel d-15-B	d-15-B/94-H-2	Halfway	221
	1734	Dome Provo Weasel d-2-B	d-2-B/94-H-2	Halfway	56
	1726	Dome Provo Weasel d-3-B	d-3-B/94-H-2	Halfway	78
	1761	Pacific SR CanDel Weasel d-94-J	d-94-J/94-A-15	Halfway	429
	1631	Pacific Sinclair Weasel d-30-A	d-30-A/94-H-2	Halfway	297
	1748	Pacific SR CanDel Weasel d-4-B	d-4-B/94-H-2	Halfway	217
	1805	Pacific SR CanDel Weasel d-A5-B	d-5-B/94-H-2	Halfway	14
	1644	Pacific Sinclair Weasel d-13-B	d-13-B/94-H-2	Halfway	49
	1977	Pacific Sinclair Weasel b-23-B	b-23-B/94-H-2	Halfway	20
	1757	Tenn Ashland Weasel d-24-B	d-24-B/94-H-2	Halfway	99
	1637	Tenn Ashland Weasel d-25-B	d-25-B/94-H-2	Halfway	40
	1689	Tenn Ashland Weasel d-26-B	d-26-B/94-H-2	Halfway	102
	1794	Tenn Ashland Weasel d-34-B	d-34-B/94-H-2	Halfway	84
	1601	Tenn Ashland Weasel d-35-B	d-35-B/94-H-2	Halfway	249
	1662	Tenn Ashland Weasel d-36-B	d-36-B/94-H-2	Halfway	326
	1809	Tenn Ashland Weasel b-44-B	b-44-B/94-H-2	Halfway	40
	1655	Tenn Ashland Weasel d-45-B	d-45-B/94-H-2	Halfway	248
	1679	Tenn Ashland Weasel d-46-B	d-46-B/94-H-2	Halfway	73
	1688	Tenn Ashland Weasel d-56-B	d-56-B/94-H-2	Halfway	114
	1897	Union et al Weasel d-47-B	d-47-B/94-H-2	Halfway	98
	1811	Union et al Weasel d-57-B	d-57-B/94-H-2	Halfway	316
	1857	Union et al Weasel d-67-B	d-67-B/94-H-2	Halfway	179
Wildmint	840	Union HB Wildmint b-24-A	b-24-A/94-H-2	Halfway	
	1226	Union HB Wildmint d-24-A	d-24-A/94-H-2	Halfway	
	919	Union HB Wildmint d-25-A	d-25-A/94-H 2	Halfway	
	1195	Union HB Wildmint b-34-A	b-34-A/94-H-2	Halfway	
	1685	Union HB Wildmint d-34-A	d-34-A/94-H-2	Halfway	
	1766	Union HB Wildmint d-35-A	d-35-A/94-H-2	Halfway	
	1387	Union HB Wildmint b-46-A	b-46-A/94-H-2	Halfway	3,665[1]

[1] Pool.

TABLE 9.—AUTHORIZED MAXIMUM PERMISSIBLE RATES, DECEMBER 31, 1966—*Continued*

Field	Well Authorization No.	Well Name	Location	Pool	Maximum Permissible Rate (Bbl./Day)
Wildmint	530	Union HB Wildmint d-46-A	d-46-A/94-H-2	Halfway	
	1782	Union HB Wildmint b-55-A	b-55-A/94-H-2	Halfway	
	945	Union HB Wildmint b-56-A	b-56-A/94-H-2	Halfway	
	584	Union HB Wildmint d-56-A	d-56-A/94-H-2	Halfway	
	1733	Union HB Wildmint b-66-A	b-66-A/94-A-16	Halfway	
	1743	Union HB Wildmint d-66-A	d-66-A/94-H-2	Halfway	
	1758	Union HB Wildmint b-76-A	b-76-A/94-H-2	Halfway	
	1566	Pacific SR CanDel Wildmint d-84-I	d-84-I/94-A-15	Halfway	108
	1289	Texcan Wildmint d-94-I	d-94-I/94-A-15	Halfway	167
	1191	Tenn Wildmint d-95-I	d-95-I/94-A-15	Halfway	47
	1121	Tenn Wildmint d-5-A	d-5-A/94-H-2	Halfway	70
	1750	Tenn Wildmint d-7-A	d-7-A/94-H-2	Halfway	308
	984	Union HB Wildmint d-15-A	d-15-A/94-H-2	Halfway	102
	963	Union HB Wildmint d-26-A	d-26-A/94-H-2	Halfway	51
Willow	449	Union HB Willow d-20-H	d-20-H/94-H-2	Bluesky-Gething	122
Other areas	1972	Baysel Sinclair Wolf b-92-B	b-92-B/94-A-15	(3)	(3)
	1815	Baysel Sinclair Wolf d-93-B	d-93-B/94-A-15	(3)	(3)
	2006	Cdn Sup Whitehall Inga 6-4-88-23	6-4-88-23 W6M	(3)	(3)
	2020	Cdn Sup Whitehall Inga 16-5-88-23	16-5-88-23 W6M	(3)	(3)
	1843	Dome Provo Co-op Bulrush d-5-K	d-5-K/94-A-16	(3)	(3)
	1989	IOE Pac Inga 6-33-87-23	6-33-87-23 W6M	(3)	(3)
	1840	Kewanee Terrebonne Woodrush d-5-K	d-5-K/94-A-16	(3)	(3)
	1714	Monsanto Rigel 6-31-87-17	6-31-87-17 W6M	(3)	(3)
	1916	Pacific Sinclair Wolf d-82-B	d-82-B/94-A-15	(3)	(3)
	1991	Tenn Cdn Sup et al Inga 16-7-88-23	16-7-88-23 W6M	(3)	(3)
	1982	Tenn Cdn Sup et al Inga 6-19-88-23	6-19-88-23 W6M	(3)	(3)
	2015	Tenn Cdn Sup et al Inga 6-30-88-23	6-30-88-23 W6M	(3)	(3)
	1997	Tenn Cdn Sup et al Inga 6-12-88-24	6-12-88-24 W6M	(3)	(3)
	1974	Tenn et al Inga 6-13-88-24	6-13-88-24 W6M	(3)	(3)
	1968	Tenn Cdn Sup et al Inga 6-24-88-24	6-24-88-24 W6M	(3)	(3)
	1981	Tenn Cdn Sup et al Inga 16-24-88-24	16-24-88-24 W6M	(3)	(3)
	2004	Tenn Cdn Sup et al Inga 16-26-88-24	16-26-88-24 W6M	(3)	(3)

[3] Confidential at December 31, 1966.

TABLE 10.—WELLS DRILLED AND DRILLING, 1966

Well Authorization No.	Well Name	Date Spudded	Date Rig Released	Total Depth	1966 Footage	Status at Dec. 31, 1966
1824	Altair Penzl Tenaka d-11-D	Dec. 25, 1965	Feb. 14, 1966	8,140	7,435	Slave Point-Sulphur Point gas well.
1904	Altair et al Tenaka d-59-K	Feb. 28, 1966	May 2, 1966	8,830	8,830	Abandoned—dry.
2046	Amarillo Aspen d-55-E	Dec. 21. 1966			3,581	Drilling.
1828	Amax et al Dove d-41-L	Jan. 5, 1966	Jan. 20, 1966	3,770	3,770	Abandoned—dry.
1861	Amax et al Skwat a-80-B	Jan. 23, 1966	Feb. 3, 1966	3,580	3,580	Abandoned—dry.
1846	Amerada Boundary 6-20-85-14	Jan. 10, 1966	Jan. 31, 1966	4,711	4,711	Abandoned—dry.
2040	Amerada Shell Cheves a-2-D	Dec. 26, 1966			2,530	Drilling.
1863	Amerada et al Fontas a-61-K	Feb. 8, 1966	Mar. 18, 1966	7,630	7,630	Abandoned—dry.
2043	Amerada Laprise b-66-D	Dec. 21, 1966			3,891	Drilling.
1818	Apache et al Elm d-35-C	Dec. 20, 1965	Jan. 2, 1966	3,885		Abandoned—dry.
1940	Apache et al Wilder 7-2-84-20	June 1, 1966	July 3, 1966	5,278	5,278	Baldonnel gas well.
1990	ARCo Pan Am Bedji c-32-E	Oct. 10, 1966	Nov. 28, 1966	8,588	8,588	Abandoned—dry.
1892	Ashland CK Tb Snowberry b-57-D	Feb. 12, 1966	Feb. 24, 1966	3,670	3,670	Halfway gas well.
1855	Ashland CK Tb Wolf d-6-G	Jan. 23, 1966	Feb. 11, 1966	4,133	4,133	Abandoned—dry.
1542	Atlantic Tees c-15-J	Dec. 27, 1964	Feb. 16, 1966	6,770	5,416	Slave Point gas well.
1949	BA CNP Fernie b-81-D	Aug. 8, 1966	Oct. 21, 1966	8,500	8,500	Abandoned—dry.
1819	Baysel SR CanDel Grouse d-100-G	Dec. 18, 1965	Jan. 10, 1966	4,072	327	Abandoned—dry.
1924	Baysel SR CanDel Grouse d-7-J	Mar. 20, 1966	Mar. 30, 1966	3,949	3,949	Abandoned—dry.
1911	Baysel SR CanDel Falcon d-97-K	Mar. 3, 1966	Mar. 16, 1966	3,853	3,853	Abandoned—dry.
1886	Baysel SR CanDel Hun d-13-C	Feb. 7, 1966	Feb. 20, 1966	3,965	3,965	Abandoned—dry.
1972	Baysel Sinclair Wolf b-92-B	Aug. 23, 1966	Sept. 5, 1966	4,120	4,120	Halfway oil well.
1815	Baysel Sinclair Wolf d-93-B	Dec. 15, 1965	Jan. 4, 1966	4,080		Halfway oil well.
1874	Baysel Sinclair Wolf d-3-G	Jan. 26, 1966	Feb. 7, 1966	4,103	4,103	Halfway gas well.
1801	CanDel SR Peejay d-62-H	Feb. 14, 1966	Feb. 23, 1966	3,890	3,890	Halfway oil well.
1871	CanDel et al Prespatou d-19-D	Feb. 26, 1966	Mar. 12, 1966	4,050	4,050	Abandoned—dry.
1975	Cascade IOE Parkland 6-8-81-15	Aug. 26, 1966	Nov. 7, 1966	11,385	11,385	Finished drilling.
2006	Cdn Sup Whitehall Inga 6-4-88-23	Nov. 9, 1966	Nov. 26, 1966	5,470	5,470	Charlie Lake oil well.
2020	Cdn-Sup Whitehall Inga 16-5-88-23	Dec. 1, 1966	Dec. 18, 1966	5,430	5,430	Charlie Lake oil well.
2048	Cdn-Sup Whitehall Inga 16-8-88-23	Dec. 21, 1966			5,400	Drilling.
1988	Cdn-Sup Whitehall Inga 6-23-88-24	Oct. 3, 1966	Oct. 20, 1966	5,212	5,212	Abandoned—dry.
1776	Cdn Sup et al Inga 10-25-88-24	Nov. 10, 1965	Jan. 10, 1966	7,503	450	Charlie Lake oil well.
1917	Cdn Sup et al Nig d-53-J	Mar. 12, 1966	Apr. 7, 1966	4,512	4,512	Abandoned—dry.
1967	CDR Cutbank a-7-H	Aug. 27, 1966	Sept. 19, 1966	5,900	5,900	Abandoned—dry.
1887	CDR Evergreen d-3-B	Feb. 24, 1966	Mar. 10, 1966	3,796	3,796	Abandoned—dry.
1918	CDR Sun Evergreen d-54-J	Mar. 13, 1966	Mar. 26, 1966	3,800	3,800	Halfway gas well.
2028	CDR et al Hazel d-17-I	Dec. 10, 1966	Dec. 30, 1966	4,535	4,535	Abandoned—dry.
1954	CEGO et al Flatrock 10-27-84-16	July 16, 1966	Aug. 21, 1966	6,230	6,230	Charlie Lake gas well.
2003	CEGO Ashland Flatrock 11-35-84-16	Nov. 9, 1966	Nov. 22, 1966	4,345	4,345	Abandoned—dry.
1955	CEGO et al Peace 11-21-82-16	July 13, 1966	Aug. 3, 1966	4,550	4,550	Abandoned—dry.
1890	CIGOL Aorco Blair Beaverdam d-28-L	Mar. 10, 1966	Mar. 20, 1966	3,850	3,850	Abandoned—dry.

TABLE 10.—WELLS DRILLED AND DRILLING, 1966—*Continued*

Well Authorization No.	Well Name	Date Spudded	Date Rig Released	Total Depth	1966 Footage	Status at Dec. 31, 1966
1969	CIGOL Peejay b-11-E	Aug. 2, 1966	Aug. 9, 1966	3,890	3,890	Halfway oil well.
1719	CIGOL Peejay d-11-E	July 16, 1966	July 24, 1966	3,875	3,875	Abandoned—dry.
1953	CIGOL Peejay b-32-E	July 9, 1966	July 16, 1966	3,840	3,840	Abandoned—dry.
1962	CIGOL Mobil Peejay b-36-E	July 26, 1966	Aug. 2, 1966	3,900	3,900	Abandoned—dry.
1971	CIGOL Mobil Peejay b-45-E	Aug. 10, 1966	Aug. 16, 1966	3,890	3,890	Halfway oil well.
1872	CIGOL Skwat b-85-J	Feb. 7, 1966	Feb. 24, 1966	3,738	3,738	Abandoned—dry.
1827	CIGOL et al Snowberry d-17-D	Dec. 30, 1965	Jan. 9, 1966	3,700	2,112	Abandoned—dry.
2023	Decalta Ranger Peejay d-51-D	Dec. 15, 1966	Dec. 24, 1966	3,968	3,968	Finished drilling.
1844	Dome Boundary 10-33-85-14	Mar. 1, 1966	Mar. 12, 1966	4,285	4,285	Abandoned—dry.
1843	Dome Provo Co-op Bulrush d-5-K	Mar. 12, 1966	Jan. 22, 1966	3,790	3,790	Halfway oil well.
2007	Dome Provo Teck W Jeans d-79-I	Nov. 11, 1966	Nov. 27, 1966	4,820	4,820	Abandoned—dry.
1837	Dome Provo Laprise b-30-E	Jan. 18, 1966	Feb. 7, 1966	4,451	4,451	Baldonnel gas well.
1852	Dome-Provo Laprise d-4-H	Feb. 9, 1966	Feb. 24, 1966	4,505	4,505	Baldonnel gas well.
1923	Dome Provo Laprise d-48-H	Mar. 15, 1966	Apr. 1, 1966	4,505	4,505	Abandoned—dry.
1903	Dome Provo Laprise a-54-H	Feb. 26, 1966	Mar. 13, 1966	4,481	4,481	Abandoned—dry.
1876	Dome Provo Co-op Laurel d-9-C	Feb. 11, 1966	Feb. 22, 1966	3,770	3,770	Abandoned.
2052	Dome Provo Co-op Laurel b-10-C	Dec. 29, 1966			495	Drilling.
1927	Dome et al W Peejay d-31-G	Mar. 21, 1966	Apr. 1, 1966	4,040	4,040	Halfway gas well.
1899	Dome Provo CEGO IOE Sentinel a-11-L	Mar. 4, 1966	Apr. 30, 1966	6,920	6,920	Abandoned—dry.
1902	Dome-Provo Stoddart 11-8-86-19	Feb. 28, 1966	Mar. 28, 1966	6,285	6,285	Belloy gas well.
1868	Dome Provo Co-op Wolverine d-63-G	Jan. 24, 1966	Feb. 1, 1966	3,869	3,869	Abandoned—dry.
1888	Dome Provo Co-op Woodrush d-36-H	Feb. 11, 1966	Feb. 22, 1966	3,655	3,655	Abandoned—dry.
2008	Empress Wilder 10-31-83-19	Nov. 12, 1966	Dec. 7, 1966	5,055	5,055	Abandoned—dry.
611	Fraser Valley Chilliwack 14-19-26	Nov. 30, 1959	Mar. 7, 1966	6,183		Abandoned—dry.
1992	Frontier et al Evie c-52-I	Oct. 11, 1966	Dec. 1, 1966	7,670	7,670	Abandoned—dry.
1883	Huber Oliph et al N Beatton d-43-E	Feb. 4, 1966	Feb. 20, 1966	4,029	4,029	Abandoned—dry.
1900	Huber Tenneco W Dede d-30-K	Feb. 22, 1966	Mar. 9, 1966	4,080	4,080	Abandoned—dry.
1944	Huber Amarillo Wolf d-81-B	June 20, 1966	July 2, 1966	4,107	4,107	Abandoned—dry.
1860	Imp Pac Boundary 8-28-84-14	Jan. 28, 1966	Feb. 26, 1966	3,903	3,903	Abandoned—junked.
1964	Imp Pac Boundary 14-4-85-14	Aug. 3, 1966	Aug. 20, 1966	4,085	4,085	Boundary Lake gas well.
1978	Imp et al Rigel 7-13-88-18	Sept. 17, 1966	Sept. 27, 1966	3,325	3,325	Dunlevy gas well.
2054	Imp IOE Fina Rigel a-21-J	Dec. 23, 1966			3,217	Drilling.
1847	IOE Beaverskin d-71-G	Jan. 9, 1966	Jan. 23, 1966	2,212	2,212	Abandoned—dry.
1894	IOE Beaverskin c-85-H	Feb. 18, 1966	Feb. 26, 1966	2,276	2,276	Abandoned—dry.
1989	IOE Pac Inga 6-33-87-23	Oct. 5, 1966	Oct. 22, 1966	5,427	5,427	Charlie Lake oil well.
2036	IOE et al Inga 16-33-87-23	Dec. 21, 1966			5,208	Drilling.
2002	IOE Pac Inga 16-26-87-24	Nov. 5, 1966	Nov. 24, 1966	5,185	5,185	Abandoned—dry.
1877	IOE Kathleen c-50-E	Jan. 28, 1966	Feb. 3, 1966	1,722	1,722	Abandoned—dry.
1885	IOE Teklo c-77-D	Feb. 5, 1966	Feb. 16, 1966	1,780	1,780	Abandoned—dry.
1951	Jeff Lake Altair Stoddart 6-6-86-18	July 4, 1966	Aug. 3, 1966	6,057	6,057	Abandoned—dry.

1841	Jeff Lake Altair Stoddart 6-11-86-19	Jan. 21, 1966	Mar. 5, 1966	6,438	6,438	Belloy gas well.
1941	Jeff Lake Altair Stoddart 6-23-86-19	May 25, 1966	June 20, 1966	6,088	6,088	Abandoned—dry.
1859	Kewanee CIGOL Melanie d-68-K	Feb. 1, 1966	Feb. 16, 1966	4,030	4,030	Halfway gas well.
1926	Kewanee Ashland Peppermint d-93-A	Mar. 17, 1966	Mar. 28, 1966	3,650	3,650	Abandoned—dry.
1919	Kewanee et al Woodrush d-38-H	Mar. 13, 1966	Mar. 22, 1966	3,710	3,710	Abandoned—dry.
1840	Kewanee Terrebonne Woodrush d-47-H	Jan. 9, 1966	Jan. 24, 1966	3,660	3,660	Halfway oil well.
2017	Kerr-McGee et al Sierra a-27-F	Dec. 15, 1966			2,930	Drilling.
1998	Mesa et al Beargrass 6-9-86-21	Oct. 21, 1966	Nov. 13, 1966	6,494	6,494	Abandoned—dry.
2034	Mesa et al Carcajou a-47-E	Dec. 13, 1966	Dec. 21, 1966	4,185	4,185	Abandoned—dry.
2033	Mesa et al Snow Worm d-79-E	Dec. 29, 1966			2,561	Drilling.
1985	Monsanto Buick b-70-I	Sept. 29, 1966	Oct. 8, 1966	3,810	3,810	Abandoned—dry.
1950	Monsanto Jedney b-66-C	June 22, 1966	July 7, 1966	5,517	5,517	Abandoned—dry.
1965	Monsanto Rigel 8-13-87-17	Aug. 4, 1966	Aug. 14, 1966	3,725	3,725	Abandoned—dry.
1942	Monsanto Rigel 6-23-87-17	May 25, 1966	June 4, 1966	3,670	3,670	Dunlevy oil well.
1973	Monsanto Rigel 14-23-87-17	Aug. 20, 1966	Aug. 29, 1966	3,655	3,655	Dunlevy gas well.
2049	Mosbacher Cox BA Shell Klua a-37-F	Dec. 23, 1966			3,762	Drilling.
1780	Pacific West Prod Big Beaver c-59-J	Nov. 17, 1965	Jan. 16, 1966	7,992	800	Abandoned—dry.
1850	Pacific et al Bivouac c-68-I	Jan. 24, 1966	Mar. 2, 1966	7,830	7,830	Abandoned—dry.
1901	Pacific Chuatse b-45-H	Feb. 25, 1966	Mar. 26, 1966	7,752	7,752	Abandoned—dry.
2026	Pacific West Prod N Buick b-2-F	Dec. 13, 1966	Dec. 26, 1966	3,765	3,765	Finished drilling.
1830	Pacific West Prod N Buick b-86-F	Jan. 1, 1966	Jan. 18, 1966	4,071	4,071	Dunlevy gas well.
1932	Pacific et al Clarke c-54-F	June 1, 1966	July 9, 1966	6,741	6,741	Slave Point gas well.
1866	Pacific et al Clarke d-69-H	Jan. 28, 1966	Mar. 2, 1966	6,572	6,572	Slave Point gas well.
1933	Pacific et al Clarke c-38-I	May 24, 1966	Sept. 17, 1966	6,722	10,079	Slave Point gas well, whipstocked hole.
1937	Pacific et al Clarke d-83-I	Apr. 3, 1966	Apr. 22, 1966	1,861	1,861	Disposal well.
1796	Pacific et al Clarke b-22-J	Dec. 4, 1965	Jan. 14, 1966	6,576	196	Slave Point gas well.
1966	Pacific et al Clarke a-55-J	July 31, 1966	Sept. 6, 1966	6,124	6,124	Slave Point gas well.
1833	Pacific Imp Clarke c-56-L	Jan. 9, 1966	Feb. 19, 1966	6,558	6,558	Slave Point gas well.
1913	Pacific IOE S Clarke c-50-K	Mar. 9, 1966	May 6, 1966	7,083	7,083	Slave Point gas well.
1921	Pacific et al Currant b-26-C	Mar. 20, 1966	Apr. 1, 1966	4,050	4,050	Halfway oil well.
2025	Pacific et al Currant d-95-K	Dec. 8, 1966	Dec. 23, 1966	4,095	4,095	Abandoned—dry.
1856	Pacific SR CanDel Falcon d-9-C	Jan. 20, 1966	Feb. 4, 1966	3,856	3,856	Abandoned—dry.
1907	Pacific et al Jedney b-50-F	Mar. 3, 1966	Apr. 5, 1966	4,932	4,932	Multiple Baldonnel-Halfway gas well.
1970	Pacific Imp Laprise b-90-C	Aug. 12, 1966	Aug. 31, 1966	4,303	4,303	Baldonnel gas well.
1999	Pacific Imp Laprise b-100-C	Oct. 29, 1966	Nov. 20, 1966	4,081	4,081	Baldonnel gas well.
1948	Pacific IOE Laprise a-85-D	June 27, 1966	July 12, 1966	4,413	4,413	Baldonnel gas well.
1979	Pacific IOE Laprise d-3-E	Sept. 15, 1966	Oct. 2, 1966	4,266	4,266	Baldonnel gas well.
1938	Pacific IOE Laprise a-29-E	June 7, 1966	June 24, 1966	4,471	4,471	Baldonnel gas well.
1957	Pacific et al Lum d-74-B	July 27, 1966	Sept. 29, 1966	9,385	9,385	Abandoned—dry.
1993	Pacific SR CanDel Peejay d-A56-H	Oct. 15, 1966	Oct. 24, 1966	3,945	3,945	Halfway oil well.
1851	Pacific SR CanDel Peejay d-71-H	Jan. 12, 1966	Jan. 25, 1966	3,881	3,881	Halfway oil well.
1912	Pacific SR CanDel Peejay d-73-H	Mar. 4, 1966	Mar. 18, 1966	3,887	3,887	Halfway oil well.
1931	Pacific SR CanDel Peejay d-84-H	Mar. 26, 1966	Apr. 7, 1966	3,880	3,880	Halfway oil well.
1817	Pacific et al Pesh c-72-J	Dec. 25, 1965	Feb. 12, 1966	6,532	5,847	Abandoned—dry.
2005	Pacific et al N Pine 7-11-85-18	Nov. 8, 1966	Nov. 22, 1966	4,360	4,360	Abandoned—dry.
1994	Pacific et al N Pine 6-24-85-18	Oct. 17, 1966	Oct. 30, 1966	4,387	4,387	Charlie Lake gas well.

TABLE 10.—WELLS DRILLED AND DRILLING, 1966—*Continued*

Well Authorization No.	Well Name	Date Spudded	Date Rig Released	Total Depth	1966 Footage	Status at Dec. 31, 1966
1958	Pacific et al N Pine 6-27-85-18	July 17, 1966	Aug. 20, 1966	5,860	5,860	Charlie Lake gas well.
1816	Pacific Shekilie b-24-A	Dec. 27, 1965	Feb. 28, 1966	6,507	6,186	Slave Point gas well, whipstocked hole.
2038	Pacific Sinclair Shekilie b-46-A	Dec. 23, 1966	———	———	3,399	Drilling.
1896	Pacific Sinclair Shekilie b-54-I	Feb. 18, 1966	Mar. 23, 1966	6,402	6,402	Abandoned—dry.
1865	Pacific West Prod E Siphon 6-4-87-15	Jan. 25, 1966	Feb. 16, 1966	4,630	4,630	Baldonnel gas well.
2016	Pac West Prod Stoddart 11-7-86-19	Nov. 28, 1966	———	———	6,445	Drilling.
1977	Pacific Sinclair Weasel b-23-B	Sept. 13, 1966	Sept. 23, 1966	3,810	3,810	Halfway oil well.
2055	Pacific SR CanDel Weasel d-82-J	Dec. 27, 1966	———	———	3,428	Drilling.
1829	Pacific SR CanDel Weasel d-83-J	Dec. 30, 1965	Jan. 14, 1966	3,870	3,362	Abandoned—dry.
1916	Pacific Sinclair Wolf d-82-B	Mar. 5, 1966	Mar. 31, 1966	4,140	4,140	Halfway oil well.
1873	Pacific SR CanDel Wolf a-27-G	Jan. 30, 1966	Feb. 12, 1966	4,022	4,022	Abandoned—dry.
2035	Pacific Yoyo d-7-L	Dec. 22, 1966	———	———	2,015	Drilling.
1867	Pan Am Dome Green d-76-I	Feb. 20, 1966	Apr. 1, 1966	5,241	5,241	Abandoned—dry.
1577	Pan Am Dome Medana c-26-H	Dec. 18, 1965	Feb. 17, 1966	6,701	5,531	Abandoned—dry.
1621	Placid Frontier Gunnel c-98-L	Dec. 6, 1965	Jan. 23, 1966	7,700	1,210	Abandoned—dry.
1634	Placid Frontier Yoyo d-95-H	Mar. 6, 1965	Jan. 20, 1966	7,618	1,598	Abandoned—dry; suspended 9–3–65 to 6–12–65.
1864	Placid Frontier Yoyo d-15-I	Jan. 26, 1966	Feb. 4, 1966	1,894	1,894	Abandoned—junked.
1895	Placid Frontier Yoyo d-A15-I	Feb. 7, 1966	———	———	9,615	Drilling. Whipstocked hole; suspended 25–3–66 to 13–12–66.
1880	Scurry FPC N Beatton d-15-D	Nov. 21, 1966	Dec. 4, 1966	4,000	4,000	Abandoned—dry.
1920	Scurry FPC Cdn Sup Wargen d-57-J	Mar. 15, 1966	Mar. 28, 1966	4,132	4,132	Abandoned—dry.
1845	Shell Hudsons Bay Klingzut b-82-F	Jan. 15, 1966	June 17, 1966	11,462	11,462	Abandoned—dry.
1893	Sinclair Pacific Beavertail d-71-C	Feb. 10, 1966	Feb. 25, 1966	4,097	4,097	Multiple Bluesky-Gething-Halfway gas well.
1915	Sinclair Pacific Beavertail d-73-C	Mar. 4, 1966	Mar. 17, 1966	4,100	4,100	Bluesky-Gething gas well.
1842	Sinclair et al E Currant d-18-B	Jan. 12, 1966	Jan. 24, 1966	4,110	4,110	Abandoned—dry.
1853	Sinclair Pacific Lynx d-66-A	Jan. 16, 1966	Feb. 1, 1966	4,233	4,233	Abandoned—dry.
1882	Sinclair et al Wolverine d-83-F	Feb. 4, 1966	Feb. 18, 1966	3,695	3,695	Abandoned—dry.
1832	Sinclair et al Wolverine a-59-G	Dec. 30, 1965	Jan. 14, 1966	3,850	3,345	Abandoned—dry.
1814	Socony Mobil S Sierra a-98-K	Jan. 7, 1966	———	———	10,086	Drilling. Whipstocked hole; suspended 27–3–66 to 6–12–66.
1835	Socony Mobil Swat b-50-F	Jan. 6, 1966	Mar. 27, 1966	7,600	7,600	Sulphur Point gas well.
2010	Sun E Osborn 6-31-88-13	Nov. 20, 1966	Dec. 8, 1966	4,326	4,326	Abandoned—dry.
1869	Tenn Cdn Sup Bulrush d-65-F	Feb. 9, 1966	Feb. 22, 1966	3,803	3,803	Finished drilling.
1848	Tenn Clear d-6-A	Jan. 31, 1966	Feb. 8, 1966	4,050	4,050	Abandoned—dry.
1929	Tenn Cdn Sup Dahl d-39-J	Mar. 29, 1966	Apr. 4, 1966	3,855	3,855	Abandoned—dry.
1849	Tenn Cdn Sup Dahl d-53-J	Feb. 25, 1966	Mar. 8, 1966	3,911	3,911	Bluesky-Gething gas well.
1991	Tenn Cdn Sup et al Inga 16-7-88-23	Oct. 8, 1966	Oct. 25, 1966	5,395	5,395	Charlie Lake oil well.
1982	Tenn Cdn Sup et al Inga 16-19-88-23	Sept. 24, 1966	Oct. 5, 1966	5,450	5,450	Charlie Lake oil well.
2015	Tenn Cdn-Sup et al Inga 6-30-88-23	Nov. 25, 1966	Dec. 11, 1966	5,477	5,477	Charlie Lake oil well.
2029	Tenn Cdn-Sup et al Inga 16-1-88-24	Dec. 14, 1966	Dec. 27, 1966	5,385	5,385	Charlie Lake oil well.
1997	Tenn Cdn Sup et al Inga 6-12-88-24	Oct. 28, 1966	Nov. 9, 1966	5,440	5,440	Charlie Lake oil well.

1974	Tenn et al Inga 6-13-88-24	Aug. 23, 1966	Sept. 4, 1966	5,360	5,360	Charlie Lake oil well.
2024	Tenn Inga 16-14-88-24	Dec. 8, 1966	Dec. 21, 1966	5,209	5,209	Abandoned—dry.
1968	Tenn Cdn Sup et al Inga 6-24-88-24	Aug. 2, 1966	Aug. 17, 1966	5,320	5,320	Charlie Lake oil well.
1981	Tenn Cdn Sup et al Inga 16-24-88-24	Sept. 7, 1966	Sept. 22, 1966	5,450	5,450	Charlie Lake oil well.
2045	Tenn Cdn-Sup et al Inga 6-25-88-24	Dec. 31, 1966	----	----	108	Drilling.
2004	Tenn Cdn Sup et al Inga 16-26-88-24	Nov. 11, 1966	Nov. 24, 1966	5,338	5,338	Charlie Lake oil well.
2009	Tenn Union W Inga 6-3-88-24	Nov. 12, 1966	Dec. 1, 1966	5,692	5,692	Abandoned—dry.
1952	Tenn et al Lookout d-49-J	July 9, 1966	July 30, 1966	5,425	5,425	Abandoned—dry.
1963	Tenn Peejay d-A88-H	July 24, 1966	Aug. 5, 1966	2,650	2,650	Water source well.
1870	Tenn Amax Rabbit d-66-B	Feb. 5, 1965	Feb. 16, 1966	4,054	4,054	Abandoned—dry.
1943	Tenn Ashland Weasel d-16-B	June 13, 1966	June 21, 1966	3,935	3,935	Abandoned—dry.
1947	Tenn Wildmint d-93-I	June 21, 1966	July 4, 1966	3,750	3,750	Halfway oil well.
1836	Tenn Wolf d-29-G	Jan. 7, 1966	Jan. 25, 1966	4,050	4,050	Abandoned—dry.
1831	Tenn Altair Yoyo a-47-L	Jan. 21, 1966	Dec. 27, 1966	7,248	7,248	Finished drilling; suspended 26-2-66 to 14-3-66 and 30-3-66 to 8-12-66.
1914	Texaco N Beatton d-31-C	Mar. 4, 1966	Mar. 15, 1966	3,810	3,810	Abandoned—dry.
1858	Texaco NFA Boundary 14-21-85-14	Jan. 22, 1966	Feb. 1, 1966	4,235	4,235	Boundary Lake oil well.
1839	Texaco NFA Boundary 16-29-85-14	Jan. 4, 1966	Jan. 19, 1966	4,280	4,280	Abandoned—dry.
1810	Texaco NFA Boundary 4-34-85-14	Dec. 17, 1965	Jan. 1, 1966	4,301	----	Boundary Lake oil well.
1996	Texaco NFA Boundary 6-16-86-14	Oct. 18, 1966	Nov. 16, 1966	4,750	4,750	Abandoned—dry.
1881	Texaco NFA N Boundary 7-15-87-14	Feb. 4, 1966	Feb. 24, 1966	4,807	4,807	Halfway gas well.
2001	Texaco et al Nig a-72-G	Nov. 2, 1966	Nov. 18, 1966	4,325	4,325	Abandoned—dry.
1976	Texaco NFA Nig b-41-H	Sept. 6, 1966	Oct. 2, 1966	4,150	4,150	Baldonnel gas well.
1995	Texaco NFA Osborn 14-25-88-15	Oct. 19, 1966	Nov. 17, 1966	4,199	4,199	Abandoned—dry.
1984	Texaco NFA Wolfe 16-17-88-14	Sept. 24, 1966	Oct. 6, 1966	4,385	4,385	Abandoned—dry.
2042	Texcan Donis d-55-E	Dec. 23, 1966	----	----	3,850	Drilling.
1956	Texcan Fox d-7-D	Aug. 21, 1966	Sept. 1, 1966	4,175	4,175	Abandoned—dry.
2013	Texcan et al Lynx d-70-A	Nov. 24, 1966	Dec. 11, 1966	4,140	4,140	Abandoned—dry.
1905	Texcan N Nancy d-46-I	Mar. 1, 1966	Mar. 20, 1966	3,820	3,820	Gething gas well.
1935	Texcan Texaco Peejay d-60-C	Apr. 15, 1966	Apr. 25, 1966	3,952	3,952	Halfway oil well.
1891	Texcan Texaco Peejay d-70-C	Feb. 9, 1966	Feb. 22, 1966	3,933	3,933	Halfway oil well.
1838	Texcan Texaco Peejay d-62-D	Jan. 10, 1966	Feb. 5, 1966	4,010	4,010	Halfway oil well.
1930	Texaco Peejay d-63-D	Apr. 1, 1966	Apr. 12, 1966	3,962	3,962	Halfway oil well.
1792	TGS Sun Falls a-64-B	Dec. 14, 1965	June 26, 1966	14,350	11,803	Abandoned—dry.
2019	TGS et al Moberly 10-15-82-22	Dec. 5, 1966	----	----	5,092	Drilling.
2031	Trans-Prairie et al Beatton b-51-K	Dec. 14, 1966	Dec. 24, 1966	3,735	3,735	Abandoned—dry.
1807	Triad Dev-Pal Laprise c-38-D	Dec. 19, 1965	Jan. 15, 1966	4,508	214	Abandoned—dry.
1939	Triad BP Sukunka b-10-A	July 30, 1966	----	----	7,952	Drilling. Whipstocked hole.
1928	Triad BP Sukunka c-56-B	Mar. 29, 1966	Nov. 10, 1966	9,642	9,642	Finished drilling.
1823	Union Aspen b-64-K	Jan. 19, 1966	Feb. 7, 1966	4,466	4,466	Abandoned—dry.
1825	Union HB Beaverdam d-64-L	Dec. 28, 1965	Jan. 11, 1966	3,815	1,177	Gething gas well.
2044	Union et al Big Arrow d-72-E	Dec. 26, 1966	----	----	3,324	Drilling.
1934	Union et al Big Nancy d-80-B	Mar. 26, 1966	Apr. 8, 1966	3,985	3,985	Abandoned—dry.
1826	Union HB CDR Chinchaga b-44-A	Dec. 31, 1965	Mar. 17, 1966	10,305	10,058	Abandoned—dry.
1820	Union HB Sinc Pac CIGOL Crush d-98-C	Dec. 18, 1965	Jan. 7, 1966	3,960	352	Abandoned—dry.
1822	Union HB Hazel d-44-I	Jan. 14, 1966	Jan. 26, 1966	3,780	3,780	Abandoned—dry.

TABLE 10.—WELLS DRILLED AND DRILLING, 1966—*Continued*

Well Authorization No.	Well Name	Date Spudded	Date Rig Released	Total Depth	1966 Footage	Status at Dec. 31, 1966
1862	Union HB Highland d-71-H	Feb. 4, 1966	Feb. 13, 1966	3,766	3,766	Abandoned—dry.
1884	Union HB Millrush d-24-H	Feb. 9, 1966	Feb. 17, 1966	3,720	3,720	Abandoned—dry.
1875	Union HB Milo d-79-F	Feb. 23, 1966	Mar. 31, 1966	6,812	6,812	Abandoned—dry.
1898	Union HB Moose d-56-K	Feb. 24, 1966	Mar. 12, 1966	4,633	4,633	Abandoned—dry.
1879	Union KCL Roc Nettle d-68-A	Feb. 15, 1966	Feb. 27, 1966	3,895	3,895	Bluesky-Gething oil well.
2018	Union KCL ARCo Nettle d-69-A	Dec. 6, 1966	Dec. 18, 1966	3,940	3,940	Finished drilling.
1925	Union CIGOL Triad Otter d-29-I	Mar. 18, 1966	Mar. 27, 1966	3,328	3,328	Abandoned—dry.
1961	Union HB Peejay d-59-C	July 31, 1966	Aug. 7, 1966	4,015	4,015	Halfway oil well.
1960	Union HB Peejay d-68-C	Aug. 7, 1966	Aug. 14, 1966	4,015	4,015	Halfway oil well.
1821	Union HB Sinc Pac Peejay d-89-C	Jan. 9, 1966	Jan. 19, 1966	3,975	3,975	Halfway oil well.
2051	Union et al Skwat d-30-B	Dec. 31, 1966	———	———	517	Drilling.
1897	Union et al Weasel d-47-B	Feb. 18, 1966	Feb. 27, 1966	3,970	3,970	Halfway oil well.
1909	Union et al Weasel d-58-B	Mar. 1, 1966	Mar. 13, 1966	4,030	4,030	Abandoned—dry.
1857	Union et al Weasel d-67-B	Jan. 21, 1966	Jan. 31, 1966	3,947	3,947	Halfway oil well.
1834	Union et al Weasel d-68-B	Jan. 4, 1966	Jan. 15, 1966	3,969	3,969	Abandoned—dry.
1906	Union et al Weasel d-77-B	Feb. 28, 1966	Mar. 10, 1966	3,950	3,950	Gas injection well.
1922	Union et al Weasel d-78-B	Mar. 16, 1966	Mar. 25, 1966	3,972	3,972	Abandoned—dry.
1878	Union HB Willow d-29-H	Jan. 31, 1966	Feb. 10, 1966	3,720	3,720	Bluesky-Gething gas well.
1889	Union HB Woodrush b-56-H	Feb. 11, 1966	Feb. 22, 1966	3,726	3,726	Bluesky-Gething gas well.
1959	Uno-Tex Stoddart 11-34-85-19	July 24, 1966	Aug. 27, 1966	6,045	6,045	Belloy gas well.
1980	Uno-Tex Triad Stoddart 11-5-86-19	Sept. 6, 1966	Sept. 9, 1966	619	619	Abandoned—junked.
1983	Uno-Tex Triad Stoddart A11-5-86-19	Sept. 10, 1966	Oct. 3, 1966	6,320	6,320	Belloy oil well.
1946	West Nat et al Blueberry b-22-D	July 17, 1966	Sept. 22, 1966	7,380	7,380	Halfway gas well.
1986	West Nat et al Halfway 14-11-87-25	Sept. 30, 1966	Nov. 5, 1966	5,331	5,331	Finished drilling.
2050	West Nat et al Inga 16-4-88-23	Dec. 26, 1966	———	———	2,145	Drilling.
2037	West Nat et al Inga 16-2-88-24	Dec. 16, 1966	———	———	5,457	Drilling.
2000	West Nat et al Lookout d-42-J	Nov. 1, 1966	Nov. 25, 1966	4,930	4,930	Finished drilling.
2014	Whitehall Cdn Sup W Beatton d-12-L	Dec. 12, 1966	Dec. 20, 1966	3,425	3,425	Finished drilling.
1936	Whitehall Cdn Sup E Buick c-72-D	June 24, 1966	July 13, 1966	4,340	4,340	Abandoned—dry.
2011	Whitehall Cdn Sup Cameron c-76-L	Nov. 19, 1966	———	———	5,277	Drilling. Whipstocked hole.
1908	Whitehall Nig a-25-C	Mar. 12, 1966	Apr. 1, 1966	4,700	4,700	Abandoned—dry.
2012	Whitehall Numac Nig a-49-J	Nov. 17, 1966	Dec. 19, 1966	4,402	4,402	Baldonnel gas well.
1945	Williamson et al Blueberry 11-19-88-24	June 13, 1966	Aug. 24, 1966	7,205	7,205	Abandoned—dry.

TABLE 11.—OILFIELDS AND GASFIELDS DESIGNATED AS AT DECEMBER 31, 1966

Field	Date Designated	Date(s) Revised	Field Location	Pool(s)	Number of Wells Capable of Production	Discovery Well(s)	Pool(s) Discovered
Aitken Creek	Feb. 15, 1960	Jan. 1, 1961 Oct. 1, 1963	N.T.S. 94-A-13	3	8	Union Aitken Creek b-42-L, oil Union Aitken Creek a-53-L, gas	3 3
Beatton River	Aug. 7, 1959	Jan. 1, 1962	N.T.S. 94-H-2	9	12	Triad Beatton River b-38-J, oil Triad Beatton d-60-J, gas	9 9
Beatton River West	Aug. 7, 1959	Jan. 1, 1962 Oct. 1, 1964	N.T.S. 94-H-2	2	9	Triad West Beatton River d-39-K, oil	2
Beaverdam	Apr. 1, 1966	....	N.T.S. 94-A-16	9	3	Tenn Beaverdam d-38-L, oil Tenn Sun Beaverdam d-37-L, gas	9 9
Beg	July 1, 1961	Jan. 1, 1962 Apr. 1, 1962 July 1, 1962 Apr. 1, 1963 Apr. 1, 1964	N.T.S. 94-B-16, 94-G-1, 94-G-8	6, 9	33	Pacific et al Beg b-17-K, gas Pacific et al Beg d-10-G, gas	6 9
Beg West	Apr. 1, 1962	Oct. 1, 1963	N.T.S. 94-G-1	6	3	Pacific et al W Beg a-79-F, gas	6
Bernadet	Oct. 1, 1963	....	Tp. 87, 88, R. 24, 25, W. of 6th M. Tp. 87, 88, R. 24, 25, W. of 6th M.	2	1	West Nat et al Bernadet 8-1-88-25, gas	2
Blueberry	Feb. 7, 1958	Dec. 22, 1958 Feb. 15, 1960 May 27, 1960 Oct. 1, 1961 Jan. 1, 1963	N.T.S. 94-A-12, 94-A-13 Tp. 88, R. 25, W. of 6th M.	5, 6, 7, 11	32	West Nat et al Blueberry c-32-D (2), gas West Nat et al Blueberry d-87-D (1), gas West Nat et al Blueberry a-61-L, gas West Nat et al Blueberry d-82-L (11), oil	5 6 7 11
Blueberry East	Dec. 22, 1958	....	N.T.S. 94-A-13	6, 9, 11	2	West Nat et al E Blueberry b-38-C (7), gas West Nat et al E Blueberry b-36-C (17), gas	6, 9 11
Blueberry West	Feb. 7, 1958	July 1, 1961	N.T.S. 94-A-12, 94-B-9, 94-B-16 Tp. 88, R. 25, W. of 6th M.	5, 6	3	West Nat et al W Blueberry d-82-I (9), gas West Nat et al W Blueberry d-19-L (12), gas	5 6
Boundary Lake	Oct. 30, 1956	Feb. 7, 1958 Aug. 7, 1959 Feb. 15, 1960 Jan. 1, 1961 Apr. 1, 1961 July 1, 1961 Jan. 1, 1962 Apr. 1, 1962 Oct. 1, 1962 Oct. 1, 1963 Oct. 1, 1964 Jan. 1, 1965 Oct. 1, 1965 Jan. 1, 1966 Apr. 1, 1966	Tp. 84, 85, 86, 87, R. 13, W. of 6th M. Tp. 83, 84, 85, 86, R. 14, W. of 6th M. Tp. 84, R. 15, W. of 6th M.	2, 3, 5, 6, 7, 8, 9	265	Pacific Boundary 8-15-85-14, gas Pacific Boundary 12-10-85-14, gas Amerada Boundary 8-5-85-14, gas Texaco N.F.A Boundary L 6-6-86-13 (1), oil Sun Boundary Lake 6-23-85-14, oil Texaco NFA Boundary 16-31-86-13, gas	2, 6 3 5 8 9 9

TABLE 11.—OILFIELDS AND GASFIELDS DESIGNATED AS AT DECEMBER 31, 1966—*Continued*

Field	Date Designated	Date(s) Revised	Field Location	Pool(s)	Number of Wells Capable of Production	Discovery Well(s)	Pool(s) Discovered
Boundary Lake North	Jan. 1, 1965	Apr. 1, 1966	Tp. 87, R. 14, W. of 6th M.	9	4	Texaco NFA N Boundary 7-3-87-14, gas	9
Bubbles	Nov. 24, 1959	Feb. 15, 1960 May 27, 1960 Jan. 1, 1961	N.T.S. 94-G-1, 94-G-8, 94-H-4	6	13	Pacific Imperial Bubbles b-33-I, gas	6
Buick Creek	Feb. 7, 1958	Aug. 7, 1959 Jan. 1, 1961 July 1, 1961 Oct. 1, 1961 Jan. 1, 1963 July 1, 1963 Oct. 1, 1963 Jan. 1, 1965	N.T.S. 94-A-11, 94-A-14	5, 7	20	Texaco NFA Buick Creek d-98-I (1), gas Texaco NFA Buick Creek d-83-J (4), gas	5 7
Buick Creek East	Jan. 1, 1963	Apr. 1, 1963 Oct. 1, 1963 July 1, 1964 Jan. 1, 1965	N.T.S. 94-A-10, 94-A-11, 94-A-14, 94-A-15	2, 5	13	Texaco NFA E Buick c-80-D, gas Decalta et al E Buick c-74-A, oil Texaco NFA E Buick a-31-A, gas	2 5 5
Buick Creek West	Feb. 7, 1958	Jan. 6, 1959 Feb. 11, 1960 Jan. 1, 1963	N.T.S. 94-A-11, 94-A-14	3, 5, 6, 9	15	Pacific West Buick Creek c-2-E (6), gas Pacific W Buick Creek c-83-K (13A), oil Pacific West Buick Creek b-78-C (2), gas Pacific West Buick Creek d-58-C (8), gas Pacific West Buick Creek b-23-E (1), gas	3 5 5 6 9
Bulrush	July 1, 1964	Apr. 1, 1965	N.T.S. 94-A-16	9	5	Union HB Sinclair Bulrush d-78-F, oil Union HB Sinc Pac Bulrush d-9-K, gas	9 9
Charlie Lake	Jan. 1, 1961		Tp. 84, R. 18, W. of 6th M.	3	1	Imp Pac Charlie 13-5-84-14, oil	3
Clarke Lake	Feb. 15, 1960	May 27, 1960 Jan. 1, 1961 Apr. 1, 1962 Apr. 1, 1965 Apr. 1, 1966	N.T.S. 94-J-9, 94-J-10, 94-J-15, 94-J-16	13	17	West Nat et al Clarke Lake c-47-J, gas	13
Currant	Oct. 1, 1965		N.T.S. 94-A-9, 94-A-16	9	11	Sinclair et al Currant d-17-C, oil Union HB Sinc Pac Currant d-37-C, gas	9 9
Dawson Creek	Feb. 7, 1958		Tp. 79, R. 15, W. of 6th M.	1	1	Pacific Sc Dawson Ck 1-15-79-15 (1), gas	1
Fort St. John	Aug. 22, 1955	Feb. 7, 1958 Feb. 15, 1960 Jan. 1, 1961	Tp. 83, R. 18, W. of 6th M.	4, 6, 7, 9, 10	28	Pacific Ft St John A3-29-83-18 (31), gas Pacific Ft St John 14-15-83-18 (7), gas Pacific Ft St John 3-14-83-18 (9), oil Pacific Ft St John 1-20-83-18 (30), gas Imp Pac Ft St John 9-19-83-18 (45), oil Pacific Ft St John 14-21-83-18 (4), gas	4 6 7 9 10 10
Fort St. John Southeast	Feb. 7, 1958		Tp. 82, 83, R. 17, W. of 6th M.	4, 6, 9, 10	15	Pac Ft St John SE 10-31-82-17 (80), gas Pac Ft St John SE A4-10-83-17 (55), gas Pac Ft St John SE 10-33-82-17 (22), gas Pac Ft St John SE 4-10-83-17 (12), gas	4 6 9 10

Gundy Creek	Feb. 7, 1958	Jan. 6, 1959	N.T.S. 94-B-16	6	4	West Nat Gundy Creek c-80-A, gas	6
Halfway	Dec. 22, 1958		Tp. 86, 87, R. 25, W. of 6th M.	6, 9	3	West Nat et al Halfway 5-1-87-25, gas West Nat et al Halfway 8-11-87-25, gas	6 9
Highway	Feb. 7, 1958		N.T.S. 94-B-16	5, 6, 11	4	West Nat et al Highway b-3-I, gas Pacific Highway b-25-I (1), gas Pacific Highway a-90-I (4), gas	5 6 11
Jedney	Aug. 7, 1959	Nov. 24, 1959 Feb. 15, 1960 Jan. 1, 1961 Apr. 1, 1961 Apr. 1, 1963 Oct. 1, 1963	N.T.S. 94-G-1, 94-G-8	3, 6, 9	43	Pacfic Pan Am Dome Jedney c-8-F, gas Pacific et al Jedney b-88-J, gas Pacific Imp Jedney d-99-J, gas	3 6 9
Jedney West	July 1, 1964		N.T. S. 94-G-1, 94-G-8	6, 9	3	Pacific et al W Jedney b-84-K, gas	6, 9
Kobes-Townsend	Dec. 22, 1958	Feb. 15, 1960	N.T.S. 94-B-8, 94-B-9	5, 7, 9, 11	12	Pacific Kobes a-3-A (4), gas Pacific Kobes d-94-I (1), gas Pacific Townsend a-20-H (A-1), gas	5 7, 9 11
Kotcho Lake	Apr. 1, 1962		N.T.S. 94-I-14	13	3	West Nat Kotcho Lake c-67-K, gas	13
Laprise Creek	Feb. 15, 1960	Jan. 1, 1961 Apr. 1, 1961 Apr. 1, 1963 Jan. 1, 1964 Apr. 1, 1964	N.T.S. 94-G-8, 94-H-4, 94-H-5	6	40	Dome Basco Laprise Ck a-35-H, gas	6
Laprise Creek West	July 1, 1962		N.T.S. 94-G-8	6	2	Dome CDP C&E W Laprise c-82-G, gas	6
Milligan Creek	Feb. 7, 1958	Aug. 7, 1959 Feb. 15, 1960 Jan. 1, 1961 Apr. 1, 1962 July 1, 1963	N.T.S. 94-H-2	9	23	Union HB Milligan Creek d-73-G, oil Whitehall et al Milligan d-75-G, gas	9 9
Montney	Feb. 7, 1958	Jan. 6, 1959 Jan. 1, 1962	Tp. 87, R. 18, W. of 6th M. Tp. 86, 87, R. 19, W. of 6th M.	2, 7, 9	4	Pac Sunray Montney 16-32-86-19 (3), gas Pac Sunray Montney 14-36-86-19 (2), gas Pac Sunray Montney 14-31-86-19 (5), gas	2 7 9
Nettle	Apr. 1, 1966		N.T.S. 94-H-7	2, 9	5	Union KCL ROC Nettle d-67-A, oil Union KCL ROC Nettle d-58-A, gas	2 9
Nig Creek	Aug. 7, 1959	Feb. 15, 1960 Jan. 1, 1961 Apr. 1, 1961 Jan. 1, 1962 Apr. 1, 1962 Apr. 1, 1965 July 1, 1965 Apr. 1, 1966	N.T.S. 94-A-13, 94-H-4	6	27	Texaco NFA Nig Creek a-79-B (1), gas	6
Osprey	Apr. 1, 1966		N.T.S. 94-A-15	9	2	Pacific SR CanDel Osprey d-4-J, oil	9
Parkland	Feb. 7, 1958	July 1, 1963	Tp. 81, R. 15, W. of 6th M.	12	2	Pacific Imp Parkland 6-29-81-15, gas	12

TABLE 11.—OILFIELDS AND GASFIELDS DESIGNATED AS AT DECEMBER 31, 1966—*Continued*

Field	Date Designated	Date(s) Revised	Field Location	Pool(s)	Number of Wells Capable of Production	Discovery Well(s)	Pool(s) Discovered
Peejay	Feb. 15, 1960	May 27, 1960 Jan. 1, 1961 Jan. 1, 1962 Apr. 1, 1962 July 1, 1965 Oct. 1, 1965 Jan. 1, 1966 Apr. 1, 1966 July 1, 1966 Oct. 1, 1966	N.T.S. 94-A-15, 94-A-16	9	106	Pacific Sinclair Peejay d-39-E (B8-3), oil Pacific SR West Cdn Peejay d-52-I, gas	9 9
Peejay West	Jan. 1, 1963	—	N.T.S. 94-A-15	9	2	Pacific SR West Cdn W Peejay d-54-G, oil	9
Petitot River	Apr. 1, 1961	—	N.T.S. 94-P-12, 94-P-13	13	3	West Nat Petitot River d-24-D, gas	13
Red Creek	Feb. 7, 1958	Aug. 7, 1959 Feb. 15, 1960	Tp. 85, R. 21, W. of 6th M.	7, 9	2	Pacific Red Creek 5-27-85-21 (36), gas	7, 9
Rigel	Oct. 1, 1962	Jan. 1, 1963 Apr. 1, 1963 Jan. 1, 1964 Oct. 1, 1964 Oct. 1, 1965	N.T.S. 94-A-10 Tp. 87, 88, R. 16, W. of 6th M. Tp. 87, 88, R. 17, W. of 6th M. Tp. 88, R. 18, W. of 6th M. Tp. 88, R. 19, W. of 6th M.	5	39	Monsanto Rigel 6-13-87-17, oil Imp Fina Rigel 4-27-88-17, gas	5 5
Snyder Creek	Apr. 1, 1961	—	N.T.S. 94-A-14	5	1	Union Snyder Creek a-28-K (1), gas	5
Stoddart	Jan. 6, 1959	Feb. 15, 1960 Apr. 1, 1965 Jan. 1, 1966	Tp. 86, R. 19, 20, W. of 6th M.	10	6	Pacific Stoddart 4-24-86-20 (85), gas	10
Stoddart West	Apr. 1, 1964	—	Tp. 86, R. 20, W. of 6th M.	10	1	Pacific W Stoddart 11-10-86-20, gas	10
Weasel	Apr. 1, 1966	—	N.T.S. 94-H-2, 94-A-15	9	26	Tenn Ashland Weasel d-35-B, oil Pacific Sinclair Weasel d-50-A, gas	9 9
Wildmint	Jan. 1, 1962	July 1, 1962 Jan. 1, 1963 Apr. 1, 1964 Jan. 1, 1966	N.T.S. 94-A-15, 94-H-2	9	29	Union HB Wildmint d-46-A, oil Tenn Wildmint d-4-A, gas	9 9
Willow	July 1, 1963	—	N.T.S. 94-H-2	2, 9	3	Union HB Willow d-20-H, oil Union HB Willow b-10-H, gas	2 9
Yoyo	Apr. 1, 1965	—	N.T.S. 94-I-13, 94-I-14	14	4	West Nat et al Yoyo b-24-L, gas	14

Numerical list of pools:—

1. Lower Cretaceous Cadotte sandstone.
2. Lower Cretaceous Bluesky-Gething sandstone.
3. Lower Cretaceous Gething sandstone.
4. Lower Cretaceous Cadomin sandstone.
5. Lower Cretaceous Dunlevy sandstone.
6. Triassic Baldonnel carbonate (includes Baldonnel A and B of Fort St. John area).
7. Triassic Charlie Lake sandstone and carbonate.
8. Triassic Boundary Lake carbonate.
9. Triassic Halfway sandstone.
10. Permian Belloy carbonate.
11. Mississippian Rundle carbonate.
12. Upper Devonian Wabamun carbonate.
13. Middle Devonian Slave Point carbonate.
14. Middle Devonian Pine Point carbonate.

TABLE 12.—NUMBER OF PRODUCING AND PRODUCIBLE WELLS, DECEMBER 31, 1966[1]

Field and Pool	Oil Wells		Natural-gas Wells	
	Producing	Producible	Producing	Producible
Aitken Creek field—Gething	5	5	3	3
Beatton River field—Halfway	9	11	—	1
Beatton River West field—Bluesky-Gething	6	8	—	—
Beaverdam field—Halfway	—	2	—	1
Beg field—				
Baldonnel	—	—	11	17
Halfway	—	—	13	16
Field totals	—	—	24	33
Beg West field—Baldonnel	—	—	2	3
Bernadet field—Bluesky-Gething	—	—	1	1
Blueberry field—				
Dunlevy	—	—	4	6
Baldonnel	—	—	1	4
Charlie Lake	—	—	—	2
Halfway	—	—	—	1
Mississippian	19	19	—	—
Field totals	19	19	5	13
Blueberry East field—				
Baldonnel	—	—	1	1
Halfway	—	—	—	—
Mississippian	—	—	—	1
Field totals	—	—	1	2
Blueberry West field—				
Dunlevy	—	—	2	2
Baldonnel	—	—	—	1
Field totals	—	—	2	3
Boundary Lake field—				
Bluesky-Gething	—	—	—	2
Gething	—	—	—	2
Cadomin	—	1	—	—
Dunlevy	—	—	—	1
Baldonnel	—	—	3	6
Boundary Lake	227	243	—	1
Halfway	5	7	—	2
Field totals	232	251	3	14
Boundary Lake North field—Halfway	—	—	—	4
Bubbles field—Baldonnel	—	—	10	13
Buick Creek—				
Dunlevy	—	—	15	19
Charlie Lake	—	—	—	1
Field totals	—	—	15	20
Buick Creek East field—				
Bluesky-Gething	—	—	—	2
Dunlevy	—	1	8	10
Field totals	—	1	8	12
Buick Creek West field—				
Gething	—	—	—	1
Dunlevy	—	2	7	9
Baldonnel	—	—	1	2
Halfway	—	—	—	1
Field totals	—	2	8	13
Bulrush field—Halfway	4	4	—	1
Charlie Lake field—Gething	—	1	—	—
Clarke Lake field—Slave Point	—	—	11	16
Currant field—Halfway	5	8	—	3
Dawson Creek field—Cadotte	—	—	—	1

[1] Each zone of a multiple completion is counted as a well.

TABLE 12.—NUMBER OF PRODUCING AND PRODUCIBLE WELLS, DECEMBER 31, 1966[1]—*Continued*

Field and Pool	Oil Wells		Natural-gas Wells	
	Producing	Producible	Producing	Producible
Fort St. John field—				
Cadomin	—	—	—	2
Baldonnel A	—	—	4	6
Baldonnel A/B	—	—	5	6
Charlie Lake	4	4	—	1
Halfway	—	—	5	6
Belloy	—	1	2	2
Field totals	4	5	16	23
Fort St. John Southeast field—				
Cadomin	—	—	—	1
Baldonnel A	—	—	1	2
Halfway	—	—	2	6
Belloy	—	—	4	6
Field totals	—	—	7	15
Gundy Creek—Baldonnel	—	—	—	4
Halfway field—				
Baldonnel	—	—	1	2
Halfway	—	—	—	1
Field totals	—	—	1	3
Highway field—				
Dunlevy	—	—	1	1
Baldonnel	—	—	—	4
Mississippian	—	—	—	1
Field totals	—	—	1	6
Jedney field—				
Gething	—	—	—	1
Baldonnel	—	—	16	21
Halfway	—	—	20	21
Field totals	—	—	36	43
Jedney West field—				
Baldonnel	—	—	—	1
Halfway	—	—	—	2
Field totals	—	—	—	3
Kobes-Townsend field—				
Dunlevy	—	—	3	3
Charlie Lake	—	—	5	5
Halfway	—	—	2	2
Mississippian	—	—	1	2
Field totals	—	—	11	12
Kotcho Lake field—Slave Point	—	—	—	3
Laprise Creek field—Baldonnel	—	—	29	40
Laprise Creek West field—Baldonnel	—	—	—	2
Milligan Creek field—Halfway	20	22	—	1
Montney field—				
Bluesky-Gething	—	—	—	1
Charlie Lake	—	—	—	1
Halfway	—	—	—	2
Field totals	—	—	—	4
Nettle field—				
Bluesky-Gething	1	2	—	1
Halfway	—	—	—	1
Field totals	1	2	—	2
Nig Creek field—Baldonnel	—	—	20	27
Osprey field—Halfway	1	2	—	—
Parkland field—Wabamun	—	—	2	2
Peejay field—Halfway	81	102	—	4
Peejay West field—Halfway	—	2	—	—
Petitot River field—Slave Point	—	—	—	3
Red Creek field—				
Charlie Lake	—	—	—	1
Halfway	—	—	—	1
Field totals	—	—	—	2

[1] Each zone of a multiple completion is counted as a well.

TABLE 12.—NUMBER OF PRODUCING AND PRODUCIBLE WELLS, DECEMBER 31, 1966[1]—*Continued*

Field and Pool	Oil Wells		Natural-gas Wells	
	Producing	Producible	Producing	Producible
Rigel field—Dunlevy	5	6	19	32
Snyder Creek field—Dunlevy	----	----	----	1
Stoddart field—Belloy	1	1	5	6
Stoddart West field—Belloy	----	----	1	1
Weasel field—				
Baldonnel	----	----	----	1
Halfway	19	23	----	2
Field totals	19	23	----	3
Wildmint field—Halfway	12	27	----	2
Willow field—				
Bluesky-Gething	1	1	----	----
Halfway	----	----	----	2
Field totals	1	1	----	2
Yoyo field—Pine Point	----	----	----	4
Other areas—				
Cadotte	----	----	----	5
Notikewin	----	----	----	1
Bluesky-Gething	----	1	1	9
Gething	----	----	----	1
Cadomin	----	----	----	1
Dunlevy	----	1	1	13
Jurassic-Triassic	----	----	----	1
Baldonnel	----	1	----	27
Baldonnel A	----	----	1	2
Charlie Lake	----	----	----	7
Boundary Lake	----	----	----	1
Halfway	----	1	----	20
Permo-Carboniferous	----	----	----	3
Belloy	----	----	----	4
Mississippian	----	----	----	11
Kiskatinaw	----	----	----	1
Slave Point	----	----	----	19
Slave Point/Sulphur Point	----	----	----	3
Pine Point	----	----	----	4
Nahanni	----	----	----	1
Confidential	15	20	1	29
Areas totals	15	24	4	163
Totals	440	529	245	570

[1] Each zone of a multiple completion is counted as a well.

TABLE 13.—MONTHLY CRUDE-OIL PRODUCTION BY FIELDS AND POOLS, 1966

(Quantities in barrels.)

Field and Pool	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Aitken Creek field—													
Gething	27,942	23,258	27,541	26,204	26,974	26,556	27,046	27,180	25,855	27,046	26,420	26,892	318,914
Gething[1]	2,279	2,208	2,769	2,660	1,944	2,509	2,506	2,473	1,912	2,167	2,002	2,308	27,737
Field totals	30,221	25,466	30,310	28,864	28,918	29,065	29,552	29,653	27,767	29,213	28,422	29,200	346,651
Beatton River field—Halfway	51,885	49,131	47,543	55,346	54,258	39,489	49,018	43,578	38,827	38,604	36,147	33,949	537,775
Beatton River West field—													
Bluesky-Gething	9,976	9,345	10,099	10,227	10,271	9,445	10,185	10,405	9,679	8,698	9,826	10,993	119,149
Beaverdam field—Halfway	665	606	563	454	423	330	303	315	75	—	—	—	3,734
Blueberry field—													
Dunlevy[1]	24	27	21	24	23	27	25	26	25	26	29	30	307
Mississippian	73,718	68,883	73,444	80,402	81,077	75,031	73,011	70,072	71,844	72,593	69,890	69,794	879,759
Field totals	73,742	68,910	73,465	80,426	81,100	75,058	73,036	70,098	71,869	72,619	69,919	69,824	880,066
Boundary Lake field—													
Cadomin	—	—	—	411	47	—	—	—	—	—	—	—	458
Boundary Lake	418,088	420,947	474,652	422,853	461,085	452,111	482,146	491,252	490,994	515,712	485,205	522,049	5,637,094
Halfway	5,529	5,883	6,038	6,185	6,371	6,297	5,723	7,173	5,834	6,489	6,268	5,496	73,286
Field totals	423,617	426,830	480,790	429,449	467,503	458,408	487,869	498,425	496,828	522,201	491,473	527,545	5,710,838
Buick Creek field—Dunlevy[1]	1,480	1,618	1,696	836	72	443	1,044	557	106	1,074	1,240	1,361	11,527
Bulrush field—Halfway	4,100	3,178	3,756	2,578	5,105	3,730	2,767	3,000	2,975	3,562	3,950	5,761	44,462
Charlie Lake field—Gething	208	—	—	67	—	—	117	131	174	25	—	—	722
Currant field—Halfway	16,809	13,194	11,456	11,392	12,061	8,435	11,072	12,918	8,624	11,318	8,151	7,835	133,265
Fort St. John field—Charlie Lake	2,516	2,303	1,711	1,800	1,858	797	1,481	1,745	1,705	2,246	1,610	1,648	21,420
Milligan Creek field—Halfway	266,642	236,800	276,157	265,979	282,654	275,652	314,656	314,706	292,790	318,425	305,535	325,637	3,475,633
Nettle field—Bluesky-Gething	—	—	1,811	—	—	—	—	—	—	—	—	1,904	3,715
Osprey field—Halfway	1,138	768	833	1,062	1,028	1,032	1,160	1,232	1,097	1,036	996	387	11,769
Peejay field—Halfway	317,239	290,042	289,785	311,436	337,571	314,857	318,335	316,602	282,995	389,365	317,892	310,197	3,796,316
Rigel field—Dunlevy	6,748	7,239	7,762	—	1,951	11,169	9,823	9,034	8,230	9,584	9,715	7,708	88,963
Stoddart field—Belloy	1,890	1,695	1,818	948	1,529	1,739	1,838	1,556	1,802	1,770	1,458	1,566	19,609
Weasel field—Halfway	69,355	71,506	84,698	81,378	79,798	77,568	73,073	73,832	75,229	80,579	68,833	63,558	899,407
Wildmint field—Halfway	42,579	32,315	35,600	34,399	32,920	29,732	32,598	29,522	27,883	34,971	34,533	40,167	407,219
Willow field—Bluesky-Gething	2,420	2,008	2,218	2,059	1,581	1,571	1,442	1,616	826	1,797	2,035	2,144	21,717
Other areas—													
Dunlevy	1,044	857	672	—	989	817	626	556	461	657	730	874	8,283
Confidential	803	441	5,451	972	3,335	7,118	10,349	8,970	12,326	22,641	27,464	35,642	135,512
Area totals	1,843	1,298	6,123	972	4,324	7,935	10,975	9,526	12,787	23,298	28,194	36,516	143,795
Totals—													
Crude oil	1,321,294	1,240,399	1,363,608	1,316,152	1,402,886	1,343,476	1,426,769	1,425,395	1,360,225	1,547,118	1,416,658	1,474,201	16,638,181
Field condensate[1]	3,783	3,853	4,486	3,520	2,039	2,979	3,575	3,056	2,043	3,267	3,271	3,699	39,571
Totals	1,325,077	1,244,252	1,368,094	1,319,672	1,404,925	1,346,455	1,430,344	1,428,451	1,362,268	1,550,385	1,419,929	1,477,900	16,677,752

[1] Field condensate.

TABLE 14.—MONTHLY NATURAL-GAS PRODUCTION BY FIELDS AND POOLS, 1966

(Quantities in M s.c.f.)

Field and Pool	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Aitken Creek field—Gething	12,576	8,253	7,233	11,758	7,897	8,416	8,230	8,183	6,179	9,425	7,591	7,506	103,247
Beg field—													
Baldonnel	503,709	485,448	499,090	345,801	75,786	389,421	442,225	513,978	439,916	538,728	545,308	487,001	5,266,411
Halfway	629,951	579,737	688,653	514,148	69,955	457,390	528,394	654,242	537,875	677,508	601,137	664,162	6,603,152
Field totals	1,133,660	1,065,185	1,187,743	859,949	145,741	846,811	970,619	1,168,220	977,791	1,216,236	1,146,445	1,151,163	11,869,563
Beg West field—Baldonnel	24,995	24,523	26,134	25,476	21,149	27,348	14,426	25,329	24,874	23,906	22,077	24,347	284,584
Bernadet field—Bluesky-Gething	17,452	9,108	5,535		1,867	1,958	5,034	18,999	17,055	15,124	12,493	9,562	114,187
Blueberry field—													
Dunlevy	116,877	94,642	101,808	95,882	103,728	95,210	100,521	102,598	93,275	107,781	103,617	105,971	1,215,910
Baldonnel	18,794	16,686	18,952	18,021	17,651	18,067	14,247	18,347	17,218	17,762	17,143	17,050	209,938
Field totals	129,671	111,328	120,760	113,903	121,379	113,277	114,768	120,945	110,493	125,543	120,760	123,021	1,425,848
Blueberry East field—Baldonnel	30,613	27,561	29,661	25,975	25,273	23,718	22,355	22,252	19,486	21,464	20,922	20,330	289,610
Blueberry West field—Dunlevy	10,766	11,001	8,415	7,651	9,025	14,659	11,610	12,950	12,584	11,898	11,603	11,635	133,797
Boundary Lake field—													
Gething	54,512	40,330	39,912	42,171	25,375	1,032	371			10,300	11,432		225,435
Baldonnel	151,247	143,110	145,539	149,238	154,958	22,423	149,534	158,185	134,888	154,242	144,694	138,235	1,646,293
Field totals	205,759	183,440	185,451	191,409	180,333	23,455	149,905	158,185	134,888	164,542	156,126	138,235	1,871,728
Bubbles field—Baldonnel	597,318	583,667	632,884	666,567	605,972	570,228	472,919	570,433	660,088	432,724	679,709	743,057	7,215,566
Buick Creek field—Dunlevy	1,014,542	920,364	1,026,365	871,000	687,959	861,343	587,676	506,924	716,848	938,934	918,135	869,267	9,919,357
Buick Creek East field—													
Bluesky-Gething					5,652	7,636	3,068			9,229			25,585
Dunlevy	390,315	320,695	395,499	295,174	245,299	360,836	308,055	286,838	86,159	309,027	396,603	356,142	3,750,642
Field totals	390,315	320,695	395,499	295,174	250,951	368,472	311,123	286,838	86,159	318,256	396,603	356,142	3,776,227
Buick Creek West field—													
Dunlevy	378,819	322,604	307,352	326,310	327,248	93,355	234,611	70,516	296,119	341,308	334,673	237,695	3,270,610
Baldonnel	31,796	27,553	31,180	29,501	28,696	15,393	28,815	233	24,608	30,586	28,302	27,757	304,420
Field totals	410,615	350,157	338,532	355,811	355,944	108,748	263,426	70,749	320,727	371,894	362,975	265,452	3,575,030
Clarke Lake field—Slave Point	5,415,922	4,185,872	4,477,032	4,065,046	3,577,812	636,888	994,152	1,495,889	3,372,970	4,200,460	4,648,528	5,552,396	42,622,967
Dawson Creek field—Cadotte		400		7,044	20,534	22,487	25,901	25,947	19,046	14,832	9,569	1,066	146,826
Fort St. John field—													
Baldonnel	380,351	320,922	324,202	342,139	388,867	413,539	285,256	323,513	365,545	329,480	369,669	412,214	4,255,697
Halfway	170,536	146,477	153,724	170,075	255,061	266,142	157,867	194,429	189,351	223,226	223,022	223,123	2,373,003
Belloy	31,130	32,091	33,437	50,176	62,122	59,469	8,872	9,611	34,668	60,819	73,704	59,515	515,614
Field totals	582,017	499,460	511,363	562,390	706,050	739,150	451,995	527,553	589,564	613,525	666,395	694,852	7,144,314
Fort St. John Southeast field—													
Cadomin					104								104
Baldonnel	41,387	27,979	39,419	26,169	27,664	34,137	35,807	35,468	32,466	45,316	37,677	44,793	428,282
Halfway	80,365	56,834	72,509	50,502	52,992	61,443	77,456	49,208	33,753	60,681	63,856	58,730	718,329
Belloy	310,204	233,778	304,823	328,499	250,193	275,925	253,311	212,402	168,843	266,527	261,915	284,966	3,151,386
Field totals	431,956	318,591	416,751	405,170	330,953	371,505	366,574	297,078	235,062	372,524	363,448	388,489	4,298,101

TABLE 14.—MONTHLY NATURAL-GAS PRODUCTION BY FIELDS AND POOLS, 1966—*Continued*

(Quantities in M s.c.f.)

Field and Pool	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Halfway field—Baldonnel	15,625	3,429		7,342		22,567	29,679	30,571	24,048	21,093	23,734	26,811	204,899
Highway field—													
Dunlevy	17,123	13,753	17,448	16,554	16,592	14,899	14,514	17,316	14,160	16,366	14,744	13,773	187,242
Mississippian	37,114	38,745	37,230	35,458	40,361	37,229	30,062	21,224	577				278,000
Field totals	54,237	52,498	54,678	52,012	56,953	52,128	44,576	38,540	14,737	16,366	14,744	13,773	465,242
Jedney field—													
Baldonnel	1,018,569	903,853	1,018,631	800,094	623,677	580,045	738,997	677,969	687,022	672,793	842,041	1,122,964	9,686,655
Halfway	897,237	786,857	826,662	758,256	623,939	594,936	604,894	660,856	555,235	688,283	748,594	930,229	8,675,978
Field totals	1,915,806	1,690,710	1,845,293	1,558,350	1,247,616	1,174,981	1,343,891	1,338,825	1,242,257	1,361,076	1,590,635	2,053,193	18,362,633
Jedney West field—													
Baldonnel	679			2,597	13,497	8,553	11,286	18,694	16,704	14,565			86,575
Halfway	732			2,533	13,130	8,084	13,627	12,016	12,054	13,670			75,846
Field totals	1,411			5,130	26,627	16,637	24,913	30,710	28,758	28,235			162,421
Kobes-Townsend field—													
Dunlevy	92,109	88,938	95,443	86,316	73,256	37,225	63,064	104,932	90,643	99,289	91,030	90,193	1,012,438
Charlie Lake	116,623	100,444	113,400	95,394	195,495	62,253	64,835	116,398	95,733	99,311	100,886	86,501	1,247,273
Halfway	272,831	224,768	226,025	185,696	279,775	311,122	250,201	301,726	353,200	360,456	347,472	349,277	3,462,549
Mississippian	146,423	121,317	135,759	125,759	10,296	138,216	154,800	154,714	145,805	150,629	138,334	131,633	1,553,685
Field totals	627,986	535,467	570,627	493,165	558,822	548,816	532,900	677,770	685,381	709,685	677,722	657,604	7,275,945
Laprise Creek field—Baldonnel	1,513,319	1,416,082	1,629,456	1,599,744	1,857,360	1,467,646	1,658,196	1,884,333	1,682,248	1,636,203	1,457,036	1,692,005	19,493,628
Laprise Creek West field—Baldonnel					10,922				3,506				14,428
Montney field—Halfway	10,569				318		1,558	6,672					19,117
Nig Creek field—Baldonnel	1,860,857	1,507,972	2,038,949	1,070,098	519,875	1,208,188	909,595	1,023,188	901,444	1,693,222	1,712,752	1,473,891	15,920,031
Parkland field—Wabamun	476,504	483,670	531,361	90,745	217,552	146,040	143,465	47,089	260,102	574,157	541,064	498,281	4,010,030
Rigel field—Dunlevy	1,293,525	1,103,256	1,204,548	1,073,043	1,023,098	1,038,834	633,638	639,789	742,507	1,268,983	1,283,720	1,337,209	12,642,150
Snyder Creek field—Dunlevy	9,357	17,482	15,141	12,532	5,052	5,076	13,807	3,967	11,566				93,980
Stoddart field—Belloy	403,152	366,778	397,117	227,552	2,883	374,284	345,998	413,188	387,223	401,551	377,570	473,372	4,170,668
Stoddart West field—Belloy	76,360	63,687	68,214	42,025	605	50,956	53,817	66,907	45,736	45,393	33,496	37,778	584,974
Other areas—													
Bluesky-Gething	129,331	38,535									25,863	29,088	222,817
Cadomin						22,377	41,260		57,580	66,614	58,905		246,736
Baldonnel A						9,705	15,526	10,547			570	2,979	39,327
Halfway						46,666	19,005						65,671
Confidential												28,035	28,035
Areas total	129,331	38,535				78,748	75,791	10,547	57,580	66,614	85,338	60,102	602,586
Totals—													
Dry gas	5,892,426	4,669,942	5,008,393	4,162,835	3,815,898	805,415	1,163,518	1,568,915	3,652,118	4,789,449	5,199,161	6,051,743	46,779,823
Wet gas	12,903,790	11,229,229	12,716,349	10,533,226	8,760,624	10,117,949	9,419,019	9,959,645	9,738,789	11,884,416	12,142,029	12,628,796	132,033,861
Totals	18,796,216	15,899,171	17,724,742	14,696,061	12,576,522	10,923,364	10,582,537	11,528,570	13,390,907	16,673,865	17,341,190	18,680,539	178,813,684

Dry gasfields are Clarke Lake, Dawson Creek, and Parkland.

NOTE.—Table 14 shows gas production from gas wells only and does not include associated gas.

TABLE 15.—SUMMARY OF DRILLING AND PRODUCTION STATISTICS, 1966

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Well authorizations—													
Issued	41	30	26	3	3	10	15	12	9	13	19	39	220
Cancelled		3											3
Wells spudded	39	36	28	3	5	7	16	14	11	12	18	30	219
Rigs operated during month	37	38	35	16	9	13	19	20	16	19	24	30	53[1]
Rigs operating at month's end	32	23	14	6	8	9	15	11	11	11	12	25	
Development footage	52,035	45,007	70,164	14,238	7,969	35,893	25,977	44,605	32,374	16,022	28,075	70,153	442,512
Exploratory outpost footage	71,691	64,974	56,689	5,081	9,313	11,268	20,919	19,290	22,281	36,549	49,745	22,694	390,494
Exploratory wildcat footage	56,687	57,057	36,924	6,657	1,735	227	14,947	11,706	12,367	14,625	7,674	33,088	253,694
Total footage drilled	180,413	167,038	163,777	25,976	19,017	47,388	61,843	75,601	67,022	67,196	85,494	125,935	1,086,700
Wells abandoned	18	24	23	7	1	4	6	5	4	4	9	11	116
Service wells			1	1				1					3
Finished drilling wells		1									4	5	10
Oil wells completed	8	6	2	4		1	1	5	4	5	3	3	42
Producible oil wells	495	498	504	505	506	502	508	515	518	520	525	529	
Producing oil wells	394	422	432	410	423	430	435	436	451	445	445	440	
Production in barrels	1,321,294	1,240,399	1,363,608	1,316,152	1,402,886	1,343,476	1,426,769	1,425,395	1,360,225	1,547,118	1,416,658	1,474,201	16,638,181
Average daily production	42,622	44,300	43,987	43,872	45,254	44,783	46,025	45,980	45,341	49,907	47,222	47,555	45,584
Gas wells completed	3	15	8	3	1	1	3	6	4	3	1	1	49
Producible gas wells	533	538	542	549	552	554	556	557	560	566	569	570	
Producing gas wells	230	230	222	224	223	235	224	219	227	232	240	245	
Production in M s.c.f.	20,810,315	17,773,304	19,431,544	16,404,678	14,426,104	12,764,455	12,286,358	12,989,162	14,933,738	18,380,994	18,889,067	20,330,720	199,420,439
Average daily production	671,300	634,761	626,824	546,823	465,358	425,481	396,334	419,005	497,791	592,935	629,636	655,830	546,357

[1] Rigs operated during 1966.
NOTE.—Each zone of a multiple completion is counted as one well.

TABLE 16.—MONTHLY CRUDE-OIL DISPOSITION, 1966

(Quantities in barrels.)

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Field													
Production—													
Crude oil	1,321,294	1,240,399	1,363,608	1,316,152	1,402,886	1,343,476	1,426,769	1,425,395	1,360,225	1,547,118	1,416,658	1,474,201	16,638,181
Field condensate[1]	3,783	3,853	4,486	3,520	2,039	2,979	3,575	3,056	2,043	3,267	3,271	3,699	39,571
*Plant condensate[1]	4,706	4,756	5,373	6,254	5,723	5,928	6,143	7,071	5,743	6,401	4,805	4,725	67,628
Totals	1,329,783	1,249,008	1,373,467	1,325,926	1,410,648	1,352,383	1,436,487	1,435,522	1,368,011	1,556,786	1,424,734	1,482,625	16,745,380
Opening inventory	45,965	43,097	38,977	42,809	42,133	40,480	35,699	39,647	37,565	41,685	45,642	38,292	45,965
Injection oil recovered													
Other oil receipts	28,841	30,653	31,942	15,010	12,398	14,414	13,130	12,938	13,809	17,977	21,857	22,684	235,653
Losses and adjustments	2,734	−3,098	300	−639	3,630		1,044	1,996	1,763	1,770		7,609	5,857
Transfers and well-head sales	26,149	24,820	29,300	10,491	7,751	9,729	7,339	11,092	10,018	9,662	10,799	12,981	170,131
Field deliveries to transporters	1,325,145	1,258,486	1,367,995	1,324,682	1,413,673	1,354,488	1,431,959	1,436,535	1,360,889	1,553,794	1,439,019	1,481,254	16,747,919
Plant deliveries to transporters	7,464	3,573	3,982	7,078	6,905	7,361	5,327	4,911	5,030	5,580	4,123	4,130	65,464
Closing inventory	43,097	38,977	42,809	42,133	40,480	35,699	39,647	37,565	41,685	45,642	38,292	37,627	37,627
Reporting adjustments	−170	1,964	1,854	2,004	2,292	2,198	5,913	643	2,653	11,634	2,463	16,527	49,975
Transporters													
Receipts—													
B.C. crude	1,332,779	1,260,095	1,370,123	1,329,756	1,418,286	1,359,651	1,431,373	1,440,803	1,363,266	1,547,740	1,440,679	1,468,857	16,763,408
B.C. plant condensate	60,309	52,970	31,170	30,102	31,372	30,156	31,052	58,207	30,026	35,143	61,194		451,701
Opening inventory	1,551,210	1,468,629	1,230,623	1,176,019	1,287,966	1,249,318	1,393,673	1,775,724	1,097,146	1,161,970	1,289,536	1,254,903	1,551,210
Losses and adjustments	869	6,182	20,951	−18,900	−6,154	−14,611	2,494	1,817	−41,888	−14,690	8,499	−19,092	−74,523
Deliveries—													
B.C. refineries	820,244	1,169,668	1,275,595	1,046,029	1,185,413	1,013,823	1,170,065	1,161,449	1,164,144	1,272,431	1,417,545	1,408,894	14,105,300
Export[2]	654,556	375,221	159,351	220,782	308,947	245,572	407,713	514,227	206,177	197,541	110,462	221,686	3,622,235
Other					100	668	102	95	35	35			1,035
Total deliveries	1,474,800	1,544,889	1,434,946	1,266,811	1,494,460	1,260,063	1,577,880	1,675,771	1,370,356	1,470,007	1,528,007	1,630,580	17,728,570
Closing inventory	1,468,629	1,230,623	1,176,019	1,287,966	1,249,318	1,393,673	1,275,724	1,097,146	1,161,970	1,289,536	1,254,903	1,112,272	1,112,272
Reporting adjustments		2	1	−1	55	−1,656	−2,920	2		7			4,510
B.C. Refineries													
Receipts—													
B.C. crude	820,244	1,169,666	1,275,594	1,046,030	1,185,358	1,015,479	1,172,985	1,161,447	1,164,144	1,272,424	1,417,545	1,408,894	14,109,810
Alberta crude	1,642,054	1,505,144	1,705,221	1,781,604	1,534,508	1,333,818	1,654,837	1,779,744	1,814,531	2,001,167	1,678,521	1,558,283	19,989,432
Opening inventory	752,085	764,201	674,401	812,561	656,931	618,110	693,065	550,885	667,525	514,981	587,996	751,465	752,085
Losses and adjustments	−2,278	986	−634	647	−325	−1,461	−311	632	1	−360	−186	−533	−3,822
Refinery runs	2,452,460	1,763,624	2,843,289	2,982,617	2,759,012	2,275,803	2,970,313	2,823,919	3,131,218	3,200,936	2,932,783	3,041,952	34,177,926
Closing inventory	764,201	674,401	812,561	656,931	618,110	693,065	550,885	667,525	514,981	587,996	751,465	677,223	677,223

[1] For complete summary of condensate production and disposition *see* Table 17.
[2] Refers to British Columbia production.
* Refers to condensate collected and produced at a plant in field.

TABLE 17.—MONTHLY NATURAL-GAS DISPOSITION, 1966

(Quantities in M s.c.f.)

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Field													
B.C. production—													
Wet gas	12,903,790	11,229,229	12,716,349	10,533,226	8,760,624	10,117,949	9,419,019	9,959,645	9,738,789	11,884,416	12,142,029	12,628,796	132,033,861
Dry gas	5,892,426	4,669,942	5,008,393	4,162,835	3,815,898	805,415	1,163,518	1,568,925	3,652,118	4,789,449	5,199,161	6,051,743	46,779,823
Associated gas	2,014,099	1,874,133	1,706,802	1,708,617	1,849,582	1,841,091	1,703,821	1,460,592	1,542,831	1,707,129	1,547,877	1,650,181	20,606,755
Totals	20,810,315	17,773,304	19,431,544	16,404,678	14,426,104	12,764,455	12,286,358	12,989,162	14,933,738	18,380,994	18,889,067	20,330,720	199,420,439
Flared	931,559	803,954	1,024,385	922,461	1,062,287	972,029	952,980	900,965	851,765	973,475	917,573	897,875	11,211,308
Lease use	66,757	21,235	53,271	37,038	78,528	80,942	76,596	87,238	67,803	74,078	100,038	96,947	840,471
Gas used for drilling	86,681	80,125	84,028	70,709	37,325	37,325	48,471	33,471	30,557	41,156	40,380	47,669	637,897
Metering difference	1,296	188,791	285,266	405,434	−294,884	117,675	−23,779	8,752	362,099	282,747	48,933	156,029	1,208,797
To gas—injection system	495,982	497,678	233,039	126,430	445,856	134,064	117,429	120,929	96,261	109,123	105,069	113,490	2,595,350
Delivered to gathering system	19,228,040	16,181,521	17,751,555	14,842,606	13,096,992	11,422,420	11,114,661	11,855,311	13,525,253	16,900,415	17,677,074	19,330,768	182,926,616
Reporting adjustment	23,327	11,005	85,436	84,483	17,181	21,043	146,404	30,350	35,584	150,729	141,475	42,533	97,448
Gas-gathering System													
Received from B.C. producers	19,204,713	16,192,526	17,666,119	14,927,089	13,114,173	11,443,463	11,261,065	11,885,661	13,560,837	16,749,686	17,535,601	19,288,235	182,829,168
Line loss and metering difference	578	−50	−107	−331	437		597	−773	2,023	349	6,416	563	9,702
Delivered to—													
Gas plants	18,726,821	15,709,651	17,136,041	14,822,511	12,872,100	11,275,946	11,091,411	11,813,082	13,277,561	16,297,974	17,117,945	18,869,868	179,010,911
Transporters	475,328	482,925	530,185	97,019	238,277	165,184	167,105	71,076	277,909	443,532	397,324	402,329	3,748,193
Distributors	1,986			7,890	3,359	2,333	1,952	2,276	3,344	7,831	13,916	15,475	60,362
Reporting adjustment						49,822							49,822
Gas Plants													
Receipts from gathering system	18,726,821	15,709,651	17,136,041	14,822,511	12,872,100	11,226,124	11,091,411	11,813,082	13,277,561	16,297,974	17,117,945	18,869,868	178,961,089
Plant fuel	614,992	535,900	555,042	462,915	521,141	303,739	362,010	392,345	452,713	458,628	551,021	591,832	5,802,278
Processing shrinkage	597,377	542,586	554,852	499,752	328,509	419,159	460,092	514,251	473,061	555,622	560,642	580,387	6,086,290
Plant waste and metering difference	832,998	472,872	377,182	390,777	554,061	402,895	266,263	336,058	246,063	267,757	440,342	638,903	5,226,171
Flared residual gas	569,638		507,272		13,337	4,286	1,559					81	1,096,173
Flared natural gas	8,579	501,882	41,346	440,218	393,432	69,435	148,638	153,383	360,796	442,112	483,826	537,454	3,581,101
Marketable residual gas	16,103,237	13,656,411	15,100,347	13,028,849	11,061,620	10,026,610	9,852,849	10,417,045	11,744,928	14,573,855	15,082,114	16,521,211	157,169,076
Reporting adjustment		20,451				8,008	7,177		9,402				45,038
Transporters													
Receipts—													
Residual gas from plants	15,660,338	13,237,906	14,617,228	12,551,650	10,574,238	9,538,597	9,379,088	9,940,915	11,312,699	14,130,323	14,684,790	16,118,882	151,746,654
Associated gas from G.G.S.	442,899	398,054	483,119	477,199	487,382	480,005	466,584	476,130	422,827	443,532	397,324	402,329	5,377,384
Dry gas from gathering system	475,328	482,925	530,185	97,019	238,277	165,184	167,105	71,076	277,909	587,697	549,448	498,143	4,140,296
Alberta dry gas	2,705,034	2,498,193	2,886,515	1,679,189	2,480,658	2,115,557	2,124,134	2,428,834	2,019,839	3,973,090	3,229,502	2,984,390	30,224,935
Totals	19,283,599	16,617,078	18,517,047	14,805,057	13,780,555	12,299,343	12,136,911	12,916,955	14,033,274	18,234,642	18,861,064	20,003,744	191,489,269

TABLE 17.—MONTHLY NATURAL-GAS DISPOSITION, 1966—*Continued*

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Reporting adjustments	560,498	1,007,077	586,212	374,460	211,303	93,060	413,128	106,727	354,926	527,171	789,497	569,059	3,578,964
Deliveries to B.C. distributors—													
Northeast	421,191	244,497	249,737	205,073	146,129	145,974	119,924	135,314	154,541	220,113	320,636	347,026	2,710,155
Interior	1,804,279	1,471,245	1,417,692	1,226,558	1,204,301	1,132,711	1,164,114	1,158,194	1,176,304	1,707,203	2,080,273	2,175,936	17,718,810
Lower Mainland	5,969,304	5,264,194	5,994,633	4,237,318	3,649,666	3,047,727	2,345,997	3,815,913	4,679,854	5,787,895	5,434,952	4,778,772	55,006,225
Totals	8,194,774	6,979,936	7,662,062	5,668,949	5,000,096	4,326,412	3,630,035	5,109,421	6,010,699	7,715,211	7,835,861	7,301,734	75,435,190
Deliveries to export—													
B.C. gas	9,126,324	9,296,767	8,713,279	7,803,625	7,093,148	6,566,077	6,707,071	6,282,255	6,595,532	8,357,109	8,545,369	10,401,476	95,488,032
Alberta gas[1]	1,402,003	1,347,452	1,555,494	958,023	1,476,008	1,313,794	1,386,677	1,418,552	1,072,117	1,635,151	1,690,337	1,731,475	16,987,083
Total deliveries	18,723,101	17,624,155	17,930,835	14,430,597	13,569,252	12,206,283	11,723,783	12,810,228	13,678,348	17,707,471	18,071,567	19,434,685	187,910,305
Reporting adjustment	———	162	6	41	40	551	45	43	38	56	14,118	11,285	26,373
B.C. Distributors													
Received from transporters	8,194,774	6,979,774	7,662,068	5,668,908	5,000,056	4,325,861	3,629,990	5,109,378	6,010,661	7,715,155	7,821,743	7,290,449	75,408,817
Received from gathering system	19,439	11,843	10,760	7,890	3,359	2,333	1,952	2,276	3,344	7,831	13,916	15,475	100,418
Propane	———	———	———	———	———	———	———	———	———	———	———	3,514	3,514
Losses and adjustments	278,951	−437,306	−159,880	−363,745	−451,696	−246,697	−185,555	8,548	34,976	402,071	381,873	406,255	−332,205
Deliveries to consumers—													
Residential	3,060,785	2,601,396	2,336,761	1,804,740	1,300,338	906,727	675,268	447,549	562,264	987,318	1,908,147	2,430,091	19,021,384
Commercial	1,078,478	964,898	841,364	1,002,029	754,257	568,568	469,168	373,809	435,762	629,346	1,077,512	1,351,497	9,546,688
Industrial	3,795,999	3,862,629	4,654,583	3,233,774	3,400,516	3,099,596	2,673,061	4,281,748	4,981,003	5,704,251	4,468,127	3,121,595	47,276,882
Total sales	7,935,262	7,428,923	7,832,708	6,040,543	5,455,111	4,574,891	3,817,497	5,103,106	5,979,029	7,320,915	7,453,786	6,903,183	75,844,954

[1] Does not include Alberta natural gas carried by Alberta Natural Gas Co.'s pipe-line and exported at Kingsgate, B.C.

TABLE 18.—MONTHLY NATURAL-GAS LIQUIDS AND SULPHUR DISPOSITION, 1966

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Condensate/Pentanes Plus													
Production (bbl.)—													
Field	3,783	3,853	4,486	3,520	2,039	2,979	3,575	3,056	2,043	3,267	3,271	3,699	39,571
Plant	92,543	77,878	92,875	79,464	59,904	79,761	73,243	81,182	73,827	89,037	88,751	86,099	974,564
Opening inventory	35,655	21,065	17,603	15,104	16,635	20,625	18,404	35,769	26,821	17,185	35,643	20,881	35,655
Losses and adjustments	−2,719	−3,848	−2,548	−1,210	−2,800	−2,155	−3,750	−6,106	−4,073	−4,413	−4,313	−4,525	−42,460
To transporters	7,464	7,940	7,620	7,078	6,905	7,361	7,833	7,384	6,942	8,581	7,934	7,862	90,904
Closing inventory	21,065	17,603	15,104	16,635	20,625	18,404	35,769	26,821	17,185	35,643	20,881	54,183	54,183
Sales—													
British Columbia—													
Northeast B.C. refineries	45,667	27,353	62,442	43,681	21,420	47,896	23,492	32,089	52,256	34,175	41,815	53,159	485,445
Local sales	195	778	1,176	1,802	1,056	1,703	826	1,612	355	360	154	—	10,017
Export	60,309	52,970	31,170	30,102	31,372	30,156	31,052	58,207	30,026	35,143	61,194	—	451,701
Total sales	106,171	81,101	94,788	75,585	53,848	79,755	55,370	91,908	82,637	69,678	103,163	53,159	947,167
Butane													
Production (bbl.)—													
Plant	46,195	39,753	39,644	37,070	34,303	36,837	37,519	46,505	40,099	48,536	47,873	46,639	500,973
Refinery	6,365	7,361	8,268	6,280	6,980	11,812	16,232	17,889	16,358	9,223	9,785	14,704	135,875
Opening inventory	9,913	14,179	13,333	18,283	14,365	10,520	11,620	10,700	17,158	15,011	13,790	9,102	9,913
Plant fuel	3,213	643	170	11,670	8,436	8,467	9,943	4,928	4,770	6,854	2,472	2,065	63,631
Losses and adjustments	10,993	4,235	3,099	2,824	2,740	10,466	4,114	7,450	3,706	8,032	3,623	2,759	68,659
Gas enrichment	12,710	17,322	19,184	16,121	16,385	6,007	14,018	15,500	21,281	25,297	24,988	25,874	214,687
Closing inventory	14,179	13,333	18,283	14,365	10,520	11,620	10,700	17,158	15,011	13,790	9,102	10,538	10,538
Sales—													
British Columbia	21,378	23,275	20,509	10,042	12,944	9,074	13,650	16,718	23,417	11,265	20,875	18,420	201,567
Alberta	—	—	—	—	—	2,031	—	1,203	—	439	—	—	3,673
Saskatchewan	—	—	—	—	—	2,641	—	—	—	—	—	—	2,641
Export	—	2,485	—	6,611	4,623	8,863	12,946	12,137	5,430	7,093	10,388	10,789	81,365
Total sales	21,378	25,760	20,509	16,653	17,567	22,609	26,596	30,058	28,847	18,797	31,263	29,209	289,246
Propane													
Production (bbl.)—													
Plant	34,300	31,717	29,373	19,939	23,718	25,675	21,288	28,909	25,315	28,066	33,144	32,871	334,315
Refinery	27,146	26,660	23,693	22,823	18,268	22,295	27,798	32,415	26,894	30,172	29,450	29,415	317,029
Opening inventory	16,116	15,062	16,606	16,637	16,292	15,749	15,794	17,545	17,903	14,719	18,815	13,306	16,116
Plant fuel	—	—	223	631	1,141	1,162	1,851	86	—	1,924	—	130	7,148
Losses and adjustments	2,443	1,830	−172	−358	968	1,176	3,996	2,830	−74	3,411	959	431	17,440
Closing inventory	15,062	16,606	16,637	16,292	15,749	15,794	17,545	17,903	14,719	18,815	13,306	19,294	19,294

TABLE 18.—MONTHLY NATURAL-GAS LIQUIDS AND SULPHUR DISPOSITION, 1966—*Continued*

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Propane—Continued													
Sales—													
British Columbia	60,057	51,829	52,984	41,218	39,812	38,165	41,248	56,647	45,150	47,111	60,844	53,261	588,326
Alberta		2,783				5,597	240		181	1,519	4,307	2,066	16,693
Saskatchewan						1,439							1,439
Northwest Territories													
Yukon		196									1,993		2,189
Export		195		1,616	608	386		1,403	10,136	177		410	14,931
Total sales	60,057	55,003	52,984	42,834	40,420	45,587	41,488	58,050	55,467	48,807	67,144	55,737	623,578
Sulphur													
Production (short tons)	4,512	4,286	4,605	4,318	2,596	3,790	4,880	5,332	4,710	5,591	5,704	6,270	56,594
Opening inventory	61,638	62,998	61,210	61,121	44,779	43,646	38,350	33,908	34,721	36,960	40,038	41,867	61,638
Losses and adjustments												125	125
Closing inventory	62,998	61,210	61,121	44,779	43,646	38,350	33,908	34,721	36,960	40,038	41,867	40,075	40,075
Sales—													
British Columbia	356	1,864	1,367	1,521	944	1,261	1,523	1,396	165	262	1,434	992	13,085
Export	2,796	4,210	3,327	19,139	2,785	7,825	7,799	3,123	2,306	2,251	2,441	6,945	64,947
Total sales	3,152	6,074	4,694	20,660	3,729	9,086	9,322	4,519	2,471	2,513	3,875	7,937	78,032

Table 18 includes British Columbia production only.

TABLE 19.—MONTHLY GROSS VALUES OF CRUDE OIL, NATURAL GAS, NATURAL-GAS LIQUIDS, AND SULPHUR TO PRODUCERS, 1966

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Crude oil	$2,849,193	$2,683,970	$2,943,710	$2,885,078	$3,082,808	$2,952,050	$3,118,863	$3,128,434	$2,960,308	$3,393,555	$3,133,240	$3,223,739	$36,354,948
Natural gas	1,773,693	1,518,634	1,678,805	1,401,055	1,204,372	1,118,395	1,092,033	1,142,457	1,286,960	1,622,603	1,678,351	1,822,229	17,339,587
Products—													
Natural-gas liquids[1]	$48,655	$45,961	$51,770	$46,446	$50,499	$47,173	$51,013	$53,195	$48,404	$48,382	$47,255	$40,899	$579,652
Sulphur	1,519	1,555	1,642	1,471	1,656	2,423	4,545	4,166	3,488	4,779	4,666	6,458	38,368
Total products	$50,174	$47,516	$53,412	$47,917	$52,155	$49,596	$55,558	$57,361	$51,892	$53,161	$51,921	$47,357	$618,020
Total values	$4,673,060	$4,250,120	$4,675,927	$4,334,050	$4,339,335	$4,120,041	$4,266,454	$4,328,252	$4,299,160	$5,069,319	$4,863,512	$5,093,325	$54,312,555

[1] Includes condensate/pentane plus, propane, and butane, but does not include oil from Boundary Lake Gas Conservation Plant, which is included under crude-oil values.

NOTE.—This statement includes amendments received up to May 12, 1967.

TABLE 20.—CRUDE-OIL PIPE-LINES, 1966

Company	Fields Served	Size and Mileage of Main and Lateral Lines		Pumping-stations		Present Capacity (Bbl./Day)	Gathering Mileage	Throughput (Bbl./Day)	Storage Capacity (Bbl.)
		Size (In.)	Mileage	Number	Capacity (Bbl./Day)				
B.C. Oil Transmission Co. Ltd.	Aitken Creek, Blueberry	8⅝ 12¾	62.8 2.2	1	12,000	12,000	37.4	3,350	74,800
Trans-Prairie Pipelines (B.C.) Ltd.	Beatton River, Beatton River West, Boundary Lake, Bulrush, Currant, Milligan Creek, Osprey, Peejay, Weasel, Wildmint, Willow, Wolf	4½ 6⅝ 8⅝ 12¾	45.6 24.3 103.0 39.0	1 2	36,000 45,000	52,000[1] 45,000[2]	74.3	42,596	160,000
Western Pacific Products and Crude Oil Pipelines Ltd.	——	12	505.0	6	45,000	45,000	——	41,504	586,000

[1] Boundary Lake.
[2] Terminal to Western Pacific Products and Crude Oil line.

TABLE 21.—CRUDE-OIL REFINERIES, 1966

Name	Location of Refinery	Type of Refinery	Year of First Operation	Sources of Crude	Crude-oil Capacity (Bbl. per Calendar Day)	Storage Capacity (Bbl.)	Cracking-plant Units	Cracking Capacity (Bbl. per Calendar Day)	Other Units
The British American Oil Co. Ltd.	Kamloops	Comp.	1954	B.C.	5,900	533,000	Catalytic-fluid	1,900	Catalytic polymerization catalytic reformer, naphtha hydrogen treater, distillate hydrogen treater, merox.
The British American Oil Co. Ltd.	Port Moody	Comp.	1958	B.C. and Alberta	18,000	1,500,000	Catalytic-fluid	8,480	Catalytic reformer, distillate desulphurization, alkylation-sulphuric acid.
Imperial Oil Enterprises Ltd.	Ioco	S.C.A.	1915	B.C. and Alberta	32,000	2,895,000	Catalytic-fluid	9,000	Catalytic polymerization, powerformer, Ioluene extraction.
Shell Canada Limited	Shellburn	Comp.	1932	B.C. and Alberta	20,000	2,455,300	Catalytic-fluid Thermal visbreaking	6,000 3,000	Catalytic polymerization, platformer, vacuum flashing, solvent fractionation distillate hydrotreater.
Standard Oil Co. of British Columbia Ltd.	North Burnaby	Comp.	1936	B.C. and Alberta	18,000	1,451,700	Catalytic-fluid	8,100	Catalytic polymerization, catalytic reformer, lube-oil blending plant, asphalt.
Pacific Petroleums Ltd.	Taylor	Comp.	1957, 1961	B.C.	6,500	450,000	Catalytic-fluid	2,300	Alkylation, asphalt, pentane splitter, platformer, unifiner, H.D.S. unit.

Symbols: S.C.A.—skimming, cracking, and asphalt; Comp.—complete.

TABLE 22.—NATURAL-GAS PIPE-LINES, 1966

Company	Source of Natural Gas	Transmission-lines		Compressor-stations		Present Daily Capacity (M S.C.F.)	Gathering and Distribution Lines		Areas Served by Distributors
		Size (In.)	Mileage	Number	Horse-power		Size (In.)	Mileage	
British Columbia Hydro and Power Authority	Westcoast Transmission Co. Ltd.	30	38.6	...	...	528,000	...	3,027.0	Lower Mainland of British Columbia.
		24	14.1	...	...	...	...	...	
		20	45.1	...	...	...	...	...	
		18	37.2	...	...	...	...	...	
		16	21.2	...	...	...	...	...	
		12	79.1	...	...	...	...	...	
Columbia Natural Gas. Ltd.	Alberta Natural Gas Co. Ltd.	6	37.7	...	...	17,130	8	1.7	Cranbrook, Fernie, Kimberley, Chapman Camp, Creston, Marysville.
		4	11.2	...	...	...	6	2.4	
		3	27.2	...	...	...	4	6.8	
		2	0.5	...	...	...	3	13.4	
							2	25.9	
							1¼	29.4	
Gas Trunk Line of British Columbia Ltd.	Beg field	...	...	...	...	...	16	27.4	To Westcoast Transmission Co. Ltd.
							6⅝	6.9	
	Boundary Lake field	...	...	...	...	...	16	31.4	
							6⅝	1.77	
	Jedney and Bubbles fields	...	...	1	660	...	12¾	31.5	
							10¾	7.0	
	Laprise Creek field	...	...	1	2,160	...	12¾	23.8	
	Nig Creek	...	...	...	...	...	16	28.3	
Inland Natural Gas Co. Ltd.	Westcoast Transmission Co. Ltd.	12	152.8	1	1,100	78,600	8	12.2	MacKenzie, Hudson Hope, Chetwynd, Prince George, Cariboo, Okanagan, and West Kootenay areas.
		10	116.0	...	...	...	6	19.4	
		8	17.1	...	...	...	4	76.0	
		6	70.3	...	...	...	3	42.6	
		4	75.7	...	...	...	2	346.9	
		3	5.4	...	...	...	1½	20.8	
		2	31.3	...	...	...	1¼	67.4	
		1½	0.1	...	...	...	...	...	
Northland Utilities (B.C.) Ltd.	Peace River Transmission	1¼	0.1	...	...	10,900	...	55.0	Dawson Creek, Pouce Coupe, and Rolla.
		...	9.5	...	...	...	...	...	
Plains Western Gas & Electric Co. Ltd.	Westcoast Transmission Co. Ltd.	4	9.9	...	...	...	4	7.1	Fort St. John, Aennofield, Taylor, and Grandhaven.
		3	1.7	...	...	...	3	1.7	
		2	24.1	...	...	...	2	23.8	
		1¼	0.1	...	...	...	1¼	0.1	
Sun Oil Co. Ltd.	Buick Creek field	...	...	1	495	9,000	8	1.5	
							6	1.0	
							4	1.2	
	Rigel field	...	...	...	...	2,000	3½	1.2	To Westcoast Transmission Co. Ltd.

Union Oil Co. of Canada Ltd.	Snyder Creek	....	....	....	....	....	4	3.3	To Westcoast Transmission Co. Ltd.
Westcoast Transmisison Co. Ltd.	McMahon Plant and 26-in. line from Alberta	30	646.6	10	156,690	725,000	....	....	To Plains Western Gas & Electric Co. Ltd., Inland Natural Gas Co. Ltd., British Columbia Hydro and Power Authority, and export to United States.
	Alberta	26	32.5	....	....	215,000	....	....	
	Alaska Highway system	....	....	....	....	....	26	37.5	
							20	19.3	
							18	17.9	
							12¾	9.9	
	Blueberry West field	....	....	....	....	....	8⅝	6.7	
	Boundary Lake field	....	....	....	....	....	16	0.5	
	Buick Creek field	....	....	....	....	....	10¾	5.6	
	Buick Creek East field	....	....	....	....	....	8⅝	6.6	
	Buick Creek West field	....	....	1	1,980	....	20	16.2	
	Clarke Lake field	....	....	....	....	....	16	8.2	
	Dawson Creek field	....	....	....	....	....	8⅝	5.4	
	Fort St. John field	....	....	3	1,980	....	18	7.8	
							10¾	0.9	
							8⅝	0.7	
	Fort St. John Southeast field	....	....	....	....	....	12¾	4.0	
	Fort Nelson plant	30	220.75	....	....	325,000	....	....	
	Gundy Creek field	....	....	....	....	....	10¾	6.1	
	Kobes-Townsend field	....	....	1	6,000	....	12¾	18.9	
							8⅝	5.5	
	Montney field	....	....	....	....	....	4½	7.4	
	Parkland field	....	....	....	....	....	8⅝	6.6	
	Red Creek field	....	....	....	....	....	4½	2.9	
	Rigel field	....	....	1	3,400	....	12¾	9.6	
							10¾	10.3	
	Stoddart field	....	....	....	....	....	8⅝	6.3	
Western Natural Gas Co. (high-pressure system)	Blueberry field	....	....	1	207	3,000	6	2.4	To Westcoast Transmission Co. Ltd.
							4	4.6	
							3	10.7	
							2	6.2	
Western Natural Gas Co. (low-pressure system)	Blueberry field	....	....	1	1,495	15,000	10¾	2.7	To Westcoast Transmission Co. Ltd.
							8⅝	4.9	
							6⅝	2.8	
							4½	0.6	
							3½	1.6	

Table 23.—Gas-processing Plants, 1966

Operator	Location	Fields Served	Plant Type	Date on Stream	Plant Capacity, Thousand M S.C.F./Day		Natural-gas Liquids	Residual Gas to—
					In	Out		
Gas Trunk Line of British Columbia Ltd.	N.W. ¼ Sec. 10, Tp. 85, R. 14, W. of 6th M. (Boundary Lake area)	Boundary Lake	Inlet separator, M.E.A. absorption treating, condensate stabilization	1962	10	9.5	Condensate	Westcoast Transmission Co. Ltd.
Imperial Oil Ltd.	S.E. ¼ Sec. 2, Tp. 85, R. 14, W. of 6th M.	Boundary Lake	Inlet separator, M.E.A. absorption treating, glycol absorption dehydration, combined refrigeration and oil absorption natural-gas liquid recovery, distillation	1964	17	15	Pentanes plus propane, butane	Westcoast Transmission Co. Ltd.
Pacific Petroleums Ltd.	Taylor	All B.C. producing gas-fields except Parkland, Clarke Lake, Dawson Creek, and Boundary Lake	Inlet separator, M.E.A. treating dry dessicant, dehydration oil absorption, distillation	1957	435	400	Condensate/pentanes plus	Westcoast Transmission Co. Ltd. and Plains Western
Westcoast Transmission Co. Ltd.	Lot 2683, P.R.D.	Clarke Lake	Potassium carb. M.E.A. treating absorption.	1965	200	170		Westcoast Transmission Co. Ltd.

Table 24.—Sulphur Plants, 1966

Name	Location	Raw Material	Principal Product	Date on Production	Capacity (Long Tons per Day)
Jefferson Lake Petrochemical Co. of Canada Ltd.	Taylor	Hydrogen sulphide	Sulphur	1957	300

Inspection of Lode Mines, Placer Mines, and Quarries

By J. W. Peck, Chief Inspector of Mines

CONTENTS

FATAL ACCIDENTS

During 1966 there were eight fatal accidents connected with lode mines, placer mines, and quarries. This compares with the average for the past 10 years of 10.0.

The following table shows the mines at which fatal accidents occurred during 1966, with comparative figures for 1965:—

Mine or Place	Location	Number of Fatal Accidents	
		1966	1965
Boss Mountain	100 Mile House	....	1
Bralorne	Bralorne	....	1
Britannia	Britannia Beach	1	....
Brynnor	Ucluelet	....	1
Caledonia	Retallack	1	....
Cariboo Gold Quartz	Wells	....	1
Coast Copper	Port McNeill	....	1
Craigmont	Merritt	1	....
Giant Mascot	Hope	....	1
Glacier Gulch	Smithers	....	1
Granduc	Stewart	1	....
Grouse Creek (placer)	Wells	....	1
H.B.	Salmo	....	1
Hecla	Silverton	1	....
Jersey	Salmo	1	....
Mineral King	Toby Creek	1	....
Mount Washington	Courtenay	1	....
South Gold	Stewart	....	1
Totals		8	10

The following table classifies fatal accidents as to cause and location:—

Cause	Number	Location
Fall of rock	3	Underground.
Haulage	1	Underground.
Vehicles	1	Surface.
Equipment failure	1	Underground.
Bad air	1	Underground.
Loose clothing	1	Underground.
Total	8	

A description of all fatal accidents follows.

Gregg Earl Campbell, aged 19, married, and employed as a sampler at the Britannia mine of The Anaconda Company (Canada) Ltd., was fatally injured on February 23, 1966, when struck by a moving ore train.

The accident took place on the 2900 level of the mine. Campbell and his partner apparently took refuge, one on each side of the track, when they saw a trolley locomotive pulling three 5-ton capacity Granby-type cars approaching them. The motorman slowed to about 2 miles per hour until he saw the men separate and then he increased speed to 4 miles per hour. The motor headlight was on. As he passed Campbell, the motorman turned and saw one arm and one leg outstretched between the motor and the first ore car. He started to slow down but Campbell was spun against a timber by the ore car and when the train was stopped was found lying in the ditch between the second and third ore car. The other men went immediately to the assistance of the injured man. He was conscious but obviously seriously injured. He complained of being unable to breathe. Mouth to mouth resuscitation was given. He was placed on a stretcher and taken to the surface but apparently stopped breathing, being pronounced dead by the doctor when the surface was reached. Cause of the death was given as pressure or bruised lungs due to injury to the chest as well as compound fracture of the pelvis.

The drift where the accident occurred was timbered by 10- by 10-inch timber sets placed at 6-foot centres. The drift here was 7 feet wide inside the timbers and 8 feet 7½ inches between the lagging. There was adequate clearance on the side where Campbell's partner took refuge, in that there was 21 inches from any post to the car and 30 inches from the lagging to a car. However, on the side where Campbell took refuge, the clearance to the lagging was about 12 inches. Even so, he might have escaped if he had not attempted to move. The evidence of the motorman would indicate Campbell tried at the last moment to leave his place of shelter by jumping out into the passing motor, and when this attempt failed he was caught and rolled.

The inquest was held on March 3, 1966. The jury found no individual to blame but recommended: "That safety rules be enforced. That in narrow areas of the shaft [*sic*], one side be designated as a walkway. That new personnel be instructed as to safety procedure before entering the mine alone."

Frank Donald Carlson, aged 38, married, and employed as a shiftboss at the Hecla mine of Johnsby Mines Limited, near Silverton, suffered death in an abandoned working on April 12, 1966.

The accident took place in workings from which the machinery, air-line, and ventilation pipe had been removed by January, 1966. These workings had no through or natural ventilation. The closest ventilated place was about 250 feet from the scene of the accident. It was at this latter point that three miners were engaged in driving a slusher drift and they were the last to see Carlson alive. He reported to them that he was going into the abandoned workings and to look for him if he did not return in 30 minutes. This they did when he did not return, and Carlson was found unconscious 15 feet up a raise lying on his back with one foot caught in a pipe bracket. They could not rescue him because of bad air, and it took another hour before sufficient compressed air was introduced into the area to allow the recovery of the body. Artificial respiration was then applied but without avail.

On April 13th the air was tested where the body had been located. It was found satisfactory, but this was probably due to the compressed air that had been introduced. Thirty feet farther up the raise, however, the safety lamp would not burn, and an air sample gave a later analysis of 3.44 per cent oxygen and 0.55 per cent carbon dioxide.

The inquest was held in Nakusp on May 12th. The jury returned a verdict that death was due to a coronary thrombosis, probably brought on by lack of oxygen. (*See* Prosecutions. A certified shiftboss is required to hold a mine-rescue certificate to ensure a competent knowledge of mine air conditions. The deceased was not so certified.)

Wayne Ake Johannessen, aged 27, married, and employed as a miner at the Jersey mine of Canadian Exploration Limited, was fatally injured on May 27th when a scaling-platform on which he was working collapsed.

The accident occurred in a large open stope where mining is by room-and-pillar method and using trackless diesel-powered equipment. The scaling-platform, a "Trump Giraffe," was mounted on a Dart truck. The essential parts were two booms, about 20 feet long, hinged together and capable of being raised or lowered by hydraulic controls on the platform attached to the end of the upper boom.

On the day of the accident, Johannessen and a partner were using the scaling-platform to bar down a wall of a stope. At about 5.05 p.m. the upper boom knuckles, fitting around the shaft between the upper and lower boom, failed, dropping the upper boom instantly and causing the men to fall onto a pile of broken rock 20 feet below. The noise was heard by men in a nearby stope and rescue got under way shortly after. An ambulance transported the injured men to the Salmo clinic, arriving about 6 p.m. Johannessen's partner was detained there to be treated for bruises and head cuts, while Johannessen was taken to the Kootenay Lake General Hospital at Nelson. He died at 9.45 p.m. Causes of death were internal injuries coupled with severe concussion.

The scaling-platform, designed for a maximum of 1,500 pounds on the platform, was at time of failure carrying a load of about 450 pounds. It was 15 years old and had been in fairly constant use. Investigation disclosed that the failure at the knuckles of the booms was where two of the original welds had parted. There was no evidence that any large pieces of rock had struck the "trump giraffe."

The inquest was held in Nelson on June 1st. The jury returned a verdict of accidental death with no blame attached to anyone, but added a rider recommending that machines of this nature should be dismantled and thoroughly inspected periodically.

Terry Elmer Davis, aged 16, single, and employed as a bulldozer operator and truck spotter by Lamac Construction Ltd., was instantly killed on August 15, 1966, at the Mount Washington (Domineer No. 22) mine of Mount Washington Milling Co. Ltd., when crushed by a bulldozer.

The mine is an open-pit operation, situated about 4 miles from the concentrator. The ore is trucked to the concentrator, where some of it is dumped directly into the coarse-ore bin and some onto a stockpile above the level of the mill. Most of the stockpiled ore is retained to keep the concentrator operating through the winter and spring when snow conditions preclude mining operations. Some of the stockpiled ore, however, is fed to the mill on the night shift during the mining season and at times when the trucks are not running. On the day of the accident, Davis arrived at the dumping point about 6.20 a.m. and was apparently instructed to act as a spotter for the dump trucks and also to keep the top of the dump clear of spillage from the trucks with a small D-2 Caterpillar bulldozer.

At 6.40 a.m. a "Cat" operator for Lamac Construction Ltd., on his way to work at the mine, saw what appeared to be a small "Cat" lying on its side at the bottom of the dump. He went down to investigate, and found Davis lying to the left rear of the overturned machine and apparently dead. He obtained help and the body was transported to Courtenay, where death was confirmed as being due to severe head and internal injuries. There were no witnesses, but it was evident from the track marks that Davis, in attempting to clear the dump with the bulldozer, approached the edge of the dump at an angle of about 35 degrees. In doing this the centre of gravity of the machine was brought down the slope of the dump and rolled over the edge. Davis was thrown out of the machine but was struck by it as it rolled down the slope.

The day of the accident was the first day that Davis was employed by Lamac Construction Ltd. However, it was indicated that Davis had been trained on tractor operations for a period of about two years and thus, although young, had a fair amount of experience in operating tractors. However, it would seem that Davis was not operating safely in pushing the muck at an angle with the edge of the dump. The safe way to push broken material off the edge of the dump is to push at right angles to the edge.

The inquest was held at Courtenay on August 18, 1966. The jury returned a verdict of accidental death, with no blame attached to anyone.

Morley Earl Willmore, aged 27, married, and employed as a miner by Canadian Rock Company Limited, was fatally injured in a stope at the Craigmont mine on August 21, 1966, when his clothing became entangled in a rotating drill-steel.

The accident took place in a subdrift in 719 stope of the mine. Willmore was operating a Gardner Denver D.H. 99 rock drill mounted on a 6-foot aluminum feed slide and supported by a 7-foot vertically positioned machine column. This machine was being used for long-hole drilling. There were no witnesses to the accident. Willmore had been visited by the shiftboss at about 9.30 a.m., but the accident was discovered by a workman at about 12.30 p.m. Help was obtained, but it was apparent from the coldness of the body death had taken place some time previous.

Investigation disclosed that Willmore had encountered difficulties in collaring a hole. Apparently he went to the front end of the machine and, after turning on the drill throttle and feed, had attempted to hold the bit on the proper spot for the hole to be collared by pushing sideways on the steel with his body. His new slicker coat as well as his coveralls and sweatshirt became entangled in the drill-steel. Willmore was then drawn up and killed by strangulation. His position was such that once he became entangled he could not reach the machine throttle to shut the machine off. The drill-steel which had been in the machine was 4 feet in length, in good condition, and free from burrs. The point of entanglement was about 1 foot from the bit and thus about 5 feet from the throttle.

The inquest was held at Merritt on September 13, 1966. The jury returned a verdict of accidental death with no blame attached to anyone, but recommended: "That proper safety equipment such as a steel retainer be used in this type of drilling. That there be closer supervision."

James Haggarty, aged 25, single, and employed as an electrician's helper at the Tide Lake tunnel project of Granduc Mines Limited, was instantly killed by a fall of rock on September 24, 1966, at about 2.30 p.m.

The scene of the accident was approximately 40 feet back from the 14- by 14-foot tunnel face, where a drilling jumbo was being used. Haggarty was a member of a three-man electrical crew engaged approximately 950 feet from the tunnel face placing eyebolts to carry electrical wiring. Haggarty and the other electrician's helper were instructed by the underground electrical boss to fetch additional eyebolts from the steel car, which was situated near the face directly behind the jumbo. When the back of the steel car was reached, Haggarty continued on ahead of the left side of the jumbo to see the rock-drilling in progress, which he had apparently not seen before. When Haggarty's partner had collected sufficient bolts for the job, he went up to Haggarty, who was still standing beside the jumbo, and tapped him on the shoulder and shouted that they had better leave and finish the job. Then, according to Haggarty's partner, "everything caved in." Both men were buried by a fall of rock from the corner of the wall of the tunnel. At the time of the accident the faceboss was on the deck of the jumbo supervising drilling and rock bolting. He heard the rock fall and upon investigating saw a partly buried workman in the muck pile below the left side of the jumbo. The faceboss sent a workman for the first-aid kits and stretchers and made a telephone call to the first-aid attendant. The mining crew uncovered Haggarty's partner, who was conscious, and placed him in a basket stretcher. A large rock, weighing an estimated 300 to 400 pounds, had to be lifted, with the aid of a track jack, off the body of Haggarty. The first-aid attendant, who proceeded underground immediately, stopped briefly to attend the man in the stretcher and then proceeded to Haggarty, who was being uncovered from the muck pile. There was no heart beat and Haggarty, who showed severe multiple crush injuries, appeared dead. The first-aid attendant then devoted his attention to the injured man and remained with him until he was turned over to the Prince Rupert General Hospital three hours later.

The rock type in the tunnel drive had changed the previous week, requiring rock bolting and steel lagging for support. The back and right side of the adit to the face, plus most of the left side, had been rock-bolted and strapped, while the uncompleted section near the back of the jumbo was being rock-bolted when the fall of ground occurred. The rock fall was estimated to be approximately 2 tons. Most of the rock was in small pieces, with some pieces as large as 400 pounds. Haggarty had had 10 days' underground experience, while his partner apparently had three months' underground experience as an electrical helper.

An inquest was held at the Granduc Tide Lake camp on October 11, 1966. Cause of death was given as severe multiple injuries consisting of ruptures of the abdominal and chest walls, and crush injuries to the thoracic contents. A verdict of accidental death by means of a rock fall was returned with no blame attached to anyone. The jury recommended: "That anyone who is not familiar with the tunnel be warned of the dangers, and in future the supervisor in charge be more cautious of falling rock and of rock bolting. Longer rock bolts should be used where required."

Werner Fredricks, aged 32, married, and employed as a miner by Blue Star Mines Limited, was instantly killed at the Caledonia mine when crushed by a falling slab of rock at about 1.30 p.m. on November 8, 1966.

Fredricks and his partner were working in a small sublevel which connected two raises within an ore zone. Stoping was being started from the sublevel, and Fredricks was in the process of drilling off the first lift. Eight holes had been completed and, as Fredricks was collaring the ninth hole, a 2-ton slab of rock fell from the vein zone crushing his head, chest, and one leg. The partner, who had been about 20 feet away, immediately went to aid Fredricks, but there was so sign of life. Help was obtained and the body was removed from the cave-in.

Investigation indicated that the sublevel had been scaled several hours prior to the accident. Two graphite slips had formed a conical-shaped portion of vein which presumably had become loose as a result of drilling. It was this portion of vein, estimated at 2 tons, that fell on Fredricks.

The inquest was held in Kaslo on November 9, 1966. The jury found that the deceased came to his death by an unexpected fall of rock, causing instantaneous death from multiple injuries, with no blame to anyone.

Sergio Antonio Pasin, aged 30, married, and employed as a shiftboss by Aetna Investment Corporation Limited, was fatally injured at the Mineral King mine by a fall of rock at about 8 p.m. on December 14, 1966.

On the day of the accident, Pasin was helping a miner in 34-A stope. A muck raise had been driven in a projecting wall in the stope, and a short time prior to the accident the two men had blasted to widen the raise. Upon returning to the bottom of the raise to scale some loose ground, a large rock, or rocks, fell from the stope above into the raise and struck the two workmen. Pasin's partner was rendered unconscious, but upon recovering he noticed Pasin lying near the wall of the stope below the raise. Help was summoned and artificial respiration was performed on the body prior to the arrival of the doctor, who found that Pasin was dead. The doctor was of the opinion that the deceased had died instantly due to multiple head injuries, fractured neck, and crushing injuries to he chest. The deceased's partner suffered severe facial lacerations and abraisons and was taken to hospital.

Investigation of the accident scene revealed several rocks, stained with blood, which could have caused the accident. During the morning of the accident the working-place had been inspected by the mine foreman and considered safe. Probably the concussion of the previous blast had loosened the rocks in the interim.

The inquest was held at Invermere on December 21, 1966. The jury returned a verdict of accidental death with no blame attached to anyone.

FATAL ACCIDENTS AND ACCIDENTS INVOLVING LOSS OF TIME

Eight fatal accidents and 308 accidents involving a loss of time of over three days 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. The fourth table lists all fatal and compensable accidents which occurred in lode mines over a 10-year period and relates these accidents to the number of persons employed.

Accidents Causing Death or Injury Classified as to Cause

Cause	Number of Accidents	Percentage of Total
Atmosphere	1	0.3
Explosives	3	1.0
Falls of ground	63	20.0
Falls of persons	71	22.4
Lifting and handling material	58	18.4
Machinery and tools	71	22.4
Transportation	27	8.5
Miscellaneous	22	7.0
Totals	316	100.0

Accidents Causing Death or Injury Classified as to the Occupation of Those Injured

Occupation	Number of Accidents	Percentage of Total
Underground—		
Chutemen	3	1.0
Haulagemen	22	7.0
Miners	139	44.0
Helpers	21	6.6
Timbermen	5	1.6
Mechanics, electricians, etc.	15	4.7
Miscellaneous	3	1.0
Surface—		
Mechanics, electricians, repairmen	23	7.4
Mill and crusher workers	20	6.2
Carpenters	9	2.8
Miners and drillers	23	7.4
Vehicle-drivers	13	4.1
Miscellaneous	20	6.2
Totals	316	100.0

Accidents Causing Death or Injury Classified as to the Parts of the Body

Location	Number of Accidents	Percentage of Total
Eyes	9	3.0
Head, face, and neck	14	4.5
Trunk	82	26.0
Upper extremities	82	26.0
Lower extremities	113	36.0
General	14	4.5
Totals	316	100.0

Compensable and Fatal Accidents Related to Persons Employed

Year	Number of Accidents	Number of Persons Employed	Frequency per 1,000 Persons
1957	535	5,678	94
1958	396	4,353	91
1959	310	4,316	72
1960	395	4,389	90
1961	338	3,993	85
1962	429	4,872	88
1963	521	5,025	104
1964	547	5,400	101
1965	559	5,522	101
1966	739	7,722	96

DANGEROUS OCCURRENCES

Thirty-three dangerous occurrences were reported as required by section 9 of the *Metalliferous Mines Regulation Act* and were investigated by the Inspectors of Mines. This compares with 40 reported for 1965.

Of these occurrences, nine involved fires (four of which were of electrical origin), six were connected with hoisting, six with surface vehicles, four with explosives, two with gas conditions, two with cave-ins, two with machinery, and one each with compressed air and electric shock.

On January 6, 1966, at the Sullivan concentrator (Chapman Camp) of Cominco Ltd., a small fire, believed from welding origin, did minor damage to the floor below the copper sulphate mixing-tank.

On January 13, 1966, at the Old Fireclay mine of Clayburn-Harbison Ltd. a cave-in occurred on the Kilgard–Straiton road where it crossed over an abandoned incline. Two people received minor injuries when their truck dropped into a 35-foot-deep hole.

On January 20, 1966, at Reeves MacDonald Mines Limited, a muck skip stuck in the dump position, allowing several feet of hoisting-rope to come off the hoisting-drum and become lodged between the bull and pinion gears.

On January 21, 1966, at the Yreka mine of Minoca Mines Ltd., the bolts holding the crown gear of the transmission assembly of the aerial-tramway drive sheared, and this permitted a runaway of the tram. A friction brake has been installed on the upper sheave to control any further runaways.

On January 25, 1966, the concentrator section of the Empire Development Company Limited mill was destroyed by a fire of unknown origin.

On February 27, 1966, at Texada Mines Ltd., an electrical short circuit in a switch box caused a small fire.

On February 28, 1966, at the Sullivan mine of Cominco Ltd., two men received minor injuries when they delayed at the scene of a blasting operation after having commenced lighting the fuses.

On March 4, 1966, at the asbestos open-pit mine of Cassiar Asbestos Corporation Limited, faulty repairs to the steering mechanism of a Payhauler truck caused it to swerve into a vehicle parked near the dump ramp.

On March 15, 1966, in the Tide Lake tunnel of Granduc Mines Limited, an electrical short circuit caused the mechanical ventilation system to fail, thus permitting blasting gases and smoke to back up in the drift to where men were working.

On April 28, 1966, in the Tide Lake tunnel of Granduc Mines Limited, two men were seriously injured when an 8-inch high-pressure air header was unbolted while under pressure.

On June 15, 1966, at the Old Sport mine of Coast Copper Company Limited, a fire occurred in the battery wiring of an Atlas 3-ton locomotive.

On June 17, 1966, at the Britannia mine of The Anaconda Company (Canada) Ltd., the No. 7 shaft hoist cable became kinked when excess cable was paid out after the cage was chaired.

On July 11, 1966, at the asbestos open-pit mine of Cassiar Asbestos Corporation Limited, a power-shovel ran out of control as it was being moved. The operator jumped clear of the machine when it went over a bank.

On July 25, 1966, a small fire occurred in the compressor building at H.B. mine of Cominco Ltd., when the compressor could not be stopped. The field discharge resistor overheated, igniting oily lint and dust.

On August 5, 1966, at the Old Sport mine of Coast Copper Company Limited, vibrations loosened a splice in the main electrical cable splice box on 4900 level. The cable grounded out to the splice box, causing a small fire.

On August 17, 1966, at the Britannia mine of The Anaconda Company (Canada) Ltd., a man was partially buried for nearly seven hours in the collapse of a hung-up area in a stope as he attempted to cross while using a ladder.

On August 21, 1966, at the mill of Cassiar Asbestos Corporation Limited, a workman reached in under the ram of the bagging-machine. While doing this he activated the ram controls with his other hand. His left forearm received such injuries as to require being amputated.

On August 31, 1966, at the mill-site of British Columbia Molybdenum Limited, a surveyor received a back injury when he jumped off a wall in order to avoid being struck by a crane load. The crane load was swinging due to the breaking of one of its supporting slings.

On September 1, 1966, at the Tide Lake tunnel of Granduc Mines Limited, an underground electrician was rendered unconscious by electrical shock when he attempted to connect two disconnect plugs while the circuit was energized.

On September 10, 1966, at the Jersey mine of Canadian Exploration Limited, a timberman was injured when an explosion occurred while he was picking the floor of a drift with a scaling-bar.

On September 30, 1966, at the open-pit iron mine of Jedway Iron Ore Limited, an unattended grader ran away and suffered considerable damage. The brakes had been set but the blade was uplifted.

On October 9, 1966, at the Alice mine of British Columbia Molybdenum Limited, two first-aid attendants received minor injuries when the ambulance in which they were riding rolled down an embankment after meeting a truck at a blind corner on the mine road.

On October 22, 1966, at the open-pit mine of Cassiar Asbestos Corporation Limited, a loaded Kenworth Dart truck jumped out of gear while being backed down a steep grade. The driver steered the vehicle into the side of the road to prevent a runaway, but the vehicle capsized.

On October 31, 1966, a fire destroyed the underground clothes change-house of the Britannia mine of The Anaconda Company (Canada) Ltd. It is believed the fire was caused by a cigarette setting fire to some clothes.

On November 2, 1966, at the Yreka mine of Minoca Mines Ltd., eight broken wires were found in a 15-inch length of track cable at the upper terminal of the aerial tramway. Repairs were made by removing 16 feet of cable and adding a cable link.

On November 7, 1966, at the Tide Lake tunnel of the Granduc Mines Limited, a pocket of carbon dioxide gas was released after a blast at the face.

On November 17, 1966, on the down-hill road to the crusher at the open-pit iron mine of Jedway Iron Ore Limited, a Euclid truck was damaged when it went out of control as the driver was attempting to change gears.

On November 25, 1966, at the Mineral King mine of Aetna Investment Corporation Limited, the muck skip in the No. 2 shaft was hoisted through the dump position and caused minor damage to the shaft.

On December 6, 1966, at the mill of Granisle Copper Limited, an oil furnace became ignited when the furnace backfired.

On December 13, 1966, at the No. 8 shaft at the Britannia mine of The Anaconda Company (Canada) Ltd., a number of small cracks were observed in the gussets on the underside of the brake paths which are bolted onto each hoist drum. Special precautions were instituted pending replacement of the brake paths.

On December 13, 1966, at Britannia mine of The Anaconda Company (Canada) Ltd., two men were injured as a result of an explosion which occurred as the men were drilling at the face of a drift.

On December 20, 1966, at the Merry Widow mine of Empire Development Company Limited, a welder received superficial burns when the oxygen hose burst as he was lighting an oxy-acetylene torch. The workman's oil-covered clothes caught fire.

On December 30, 1966, at the Sullivan mine of Cominco Ltd., a workman was slightly injured by the concussion of a blast when he returned too soon to the scene of a blasting operation.

PROSECUTIONS

Two prosecutions were instituted under the *Metalliferous Mines Regulation Act*, as follows:—

The manager of Johnsby Mines Limited was charged under section 20 for failing to provide a certified shiftboss at the Hecla mine operated by the company. A hearing was held in New Denver on May 3, 1966, at which time the defendant pleaded guilty and was fined $75.

The manager of Reeves MacDonald Mines Limited was charged under section 21, Rule 55 (*a*), following a blasting accident at the mine where the injured workman was found to have been performing blasting duties but was not the holder of a blasting certificate. A hearing was held in Salmo on May 11, 1966, at which the defendant pleaded guilty and was fined $100.

Two prosecutions were instituted by mine management but not under the *Metalliferous Mines Regulation Act*. Two workmen at Wesfrob Mines Limited were jointly charged with "mischief" and "taking without owner's consent." The first charge arose out of discharging a carbon dioxide type fire-extinguisher in a bunkhouse in which men were sleeping, and the second charge was for taking and driving a company vehicle. Guilty pleas were entered at the hearing on November 21, 1966, and the men were each fined $50 on the first charge and $150 on the second charge.

BLASTING CERTIFICATE SUSPENSIONS

There were violations of the provisions of the *Metalliferous Mines Regulation Act* with respect to the use of explosives and blasting procedure. Blasting certificates of five offenders were suspended for periods varying from two to six months. The offences included drilling in the socket of a hole in which blasting had been done, transporting explosives on a locomotive, and the removal of nitroglycerine-type explosives from drill-holes.

EXPLOSIVES USED IN MINES

The following table records the quantities, in pounds, of explosives and ammonium nitrate used in mines and quarries other than coal in British Columbia in 1962, 1963, 1964, 1965, and 1966:—

	1962	1963	1964	1965	1966
High explosives	4,522,619	4,072,000	5,200,000	6,043,000	5,811,000
Slurries (Hydromex)	2,013,850	1,770,000	2,100,000	2,830,000	3,239,000
AN/FO[1]	2,429,550[2]	2,639,000[2]	4,923,000	5,733,000	6,375,164
Ammonium nitrate	5,921,690	8,900,860	10,100,000	10,544,000	15,073,000
Amite II	———	———	———	———	301,000

[1] Mixture of ammonium nitrate and fuel-oil.

[2] Not inclusive of production by Cominco Ltd., which is included in totals of ammonium nitrate for 1962 and 1963.

With the exception of high explosives, the quantities of the other types of explosives and ammonium nitrate used show continuing large increases. The drop in consumption of high explosives was possibly because of a change in blasting technique wherein AN/FO-loaded holes are being initiated with either high-strength blasting-caps or with anodet delays. The quantity of factory-mixed AN/FO used showed a steady increase, while that produced by local mixing of ammonium nitrate and fuel-oil has increased by almost 50 per cent and is indicative of the large expansion in open-pit mining within the Province. The Amite II was an experimental substitute made to replace certain usages of Hydromex.

Two operations commenced the production of a more sensitive AN/FO during 1966. This is done by impinging the AN/FO against a steel plate in order to pulverize the prills.

The use of AN/FO explosives is contingent on a permit being obtained from the Chief Inspector of Mines, Victoria. For those operators who wish to blend their own ammonium nitrate and fuel-oil or to sensitize it, written permission must be obtained from the Chief Inspector of Explosives, Ottawa.

DUST CONTROL AND VENTILATION

The dust and ventilation conditions at the different operations in the mining industry were surveyed by the Silicosis Control Inspectors of the Department. Excerpts from the report of the Senior Inspector, R. J. Craig, follow:—

(1) A total of 91 surveys of dust conditions was made at 64 operations during 1966. The surveys were made at lode mines, both underground and open pit, rock quarries, gravel pits, and asbestos and coal mines.

(2) The maximum allowable concentrations of dust and threshold limit value have never been clearly defined in Canada. The American Conference of Governmental Industrial Hygienists has adopted a standard based on the midget impinger. In British Columbia the figure of 300 particles per c.c. as determined with the konimeter is used as a level of dust concentration that can be obtained under good conditions of ventilation and dust control. The konimeter is used for sampling rock dust. For asbestos dust, 5 million particles per cubic foot as obtained with the midget impinger is the maximum allowable concentration. For coal dust other than anthracite, 700 particles per c.c. between 1 and 5 microns in size as measured with the thermal precipitator is the accepted standard.

(3) Dust from drilling operations still gives a high percentage of the dust concentrations which are above the general mine average. It was found that only 35 per cent of the surveys at drilling locations underground showed averages of less than 300 particles per c.c. The use of a good supply of water together with auxiliary ventilation are still being recommended as good methods of reducing the dust concentrations.

(4) At all other underground locations, 76 per cent of the surveys showed averages of less than 300 particles per c.c. of air. These samples represent the locations where most of the men work underground.

(5) At crushing plants for underground mines, the percentage of surveys less than 300 particles per c.c. was 56 per cent. A number of the plants have been designed with inadequate exhaust systems. It is difficult to increase the capacity of a system much above its original design, and the companies are loath to scrap the old system.

(6) At open-pit operations the results of the dust surveys were as follows: At drilling operations in pit, 53 per cent of the surveys were less than 300 particles per c.c. of air; at all other operations in pit, 100 per cent of the surveys were less than 300 particles per c.c. of air; at crushing plants, 32 per cent of the surveys were less than 300 particles per c.c. of air. The crushing plants continue to give higher dust concentrations than normal.

(7) In assay grinding-rooms, 77 per cent of the surveys gave averages of less than 300 particles per c.c. of air.

(8) At rock and limestone quarries the results of the dust surveys showed as follows: At drilling operations, 100 per cent of the surveys were less than 300 particles per c.c.; at crushing operations, 83 per cent of the surveys were less than 300 particles per c.c.; and at bagging operations in the warehouse, 75 per cent of the surveys were less than 300 particles per c.c. of air.

(9) At the asbestos-mining operation, 78 per cent of the samples taken were within the limit for asbestos dust of 5 million particles per cubic foot.

(10) In a survey of conditions at a coal-mining operation, only one location was found to be above the limit of 700 particles per c.c. of air between 1.0 and 5.0 microns in size.

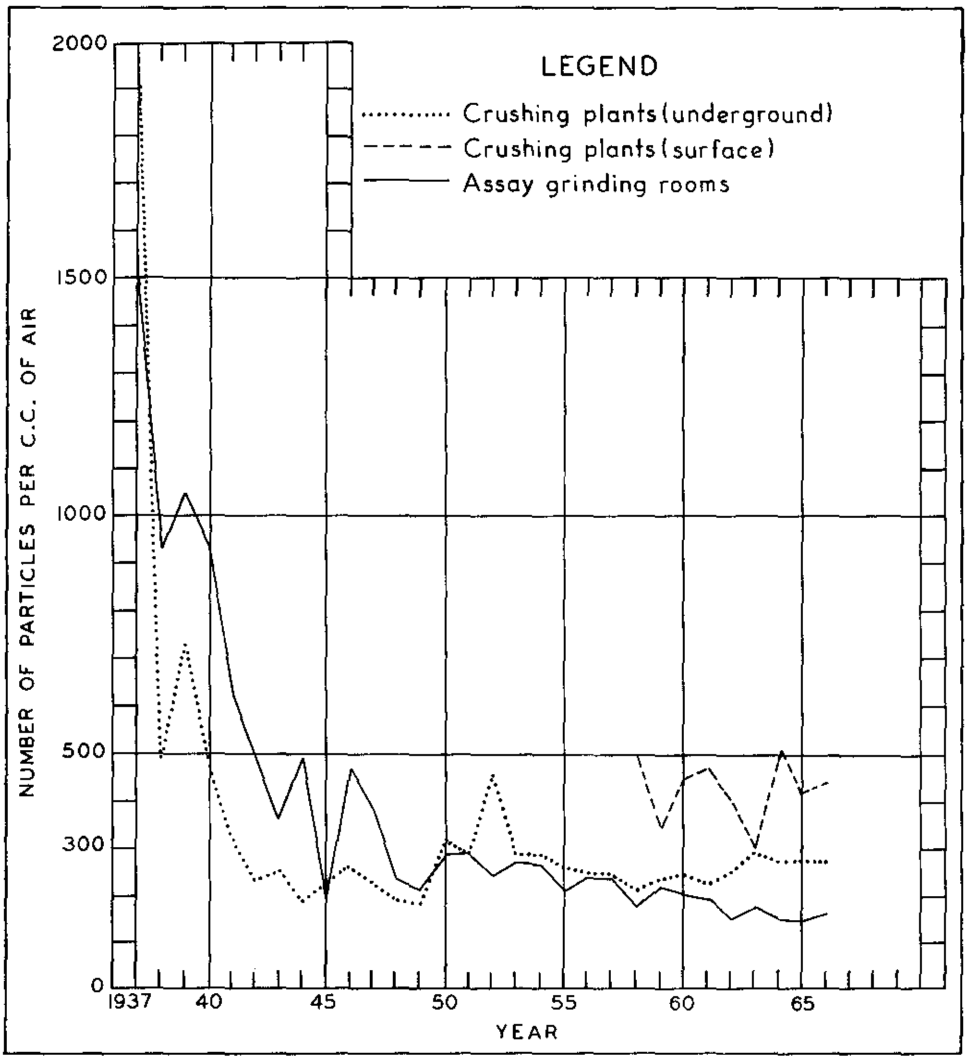


Figure 37. Average underground dust counts.

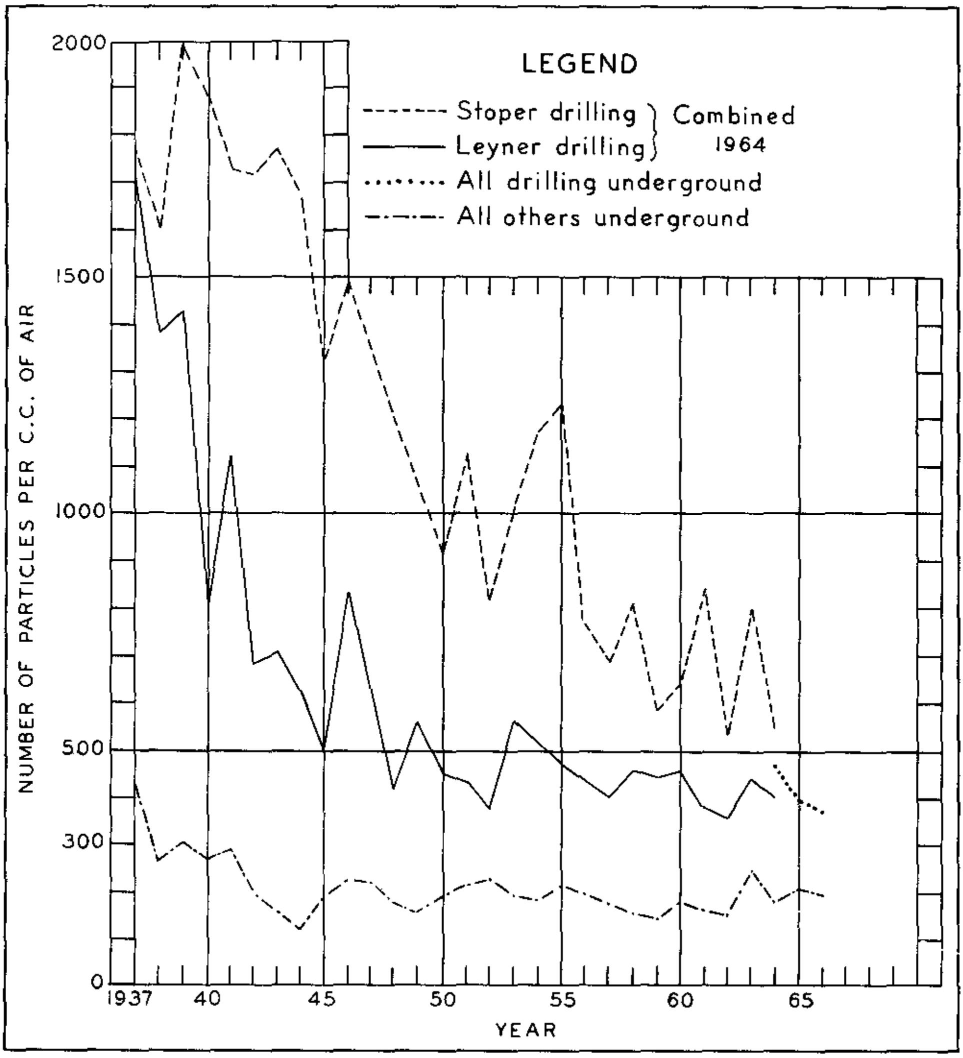


Figure 38. Average crushing and grinding dust counts.

(11) Certificates of fitness were checked at the lode mines and more than 97 per cent were found to be in good order.

(12) Some investigations were made of noise levels. A noise-level meter was purchased, and surveys were made at some of the drill locations and in crushing plants and concentrators.

(13) Figures 37 and 38 are graphs showing the median of all the averages in various operations in the lode mines obtained each year since 1937.

SHIFTBOSS CERTIFICATES

Section 20 of the *Metalliferous Mines Regulation Act* requires that every person employed underground be under the daily supervision of an official who is the holder of a shiftboss certificate issued under this Act. An applicant for a shiftboss certificate is required to pass an examination on the *Metalliferous Mines Regulation Act* and general safe working practices. He must have three years' practical experience or one year plus a degree in mining engineering. He must also be the holder of a mine-rescue certificate and a first-aid certificate. A fee of $5 is charged for the examination.

The Board of Examiners may grant provisional certificates under such conditions as the Board considers advisable. During 1966, 120 provisional certificates of six months' duration were issued.

Examinations were held at various places throughout the Province, and the following 65 men were successful in qualifying for their permanent certificates:—

Cert. No.	Name	Date	Cert. No.	Name	Date
341	John Paul Kingsbury	20–1–66	374	James Martin	20–7–66
342	George L. Dvorak	9–2–66	375	Paul Hoodikoff	20–7–66
343	Leo Patrick Gormley	1–3–66	376	Ambrose B. Kuiack	26–7–66
344	Donald K. Sinclair	2–3–66	377	Lorne Ernest Williams	29–7–66
345	Ronald Bailey	22–3–66	378	Belmont A. Charette	4–8–66
346	Raymond Eric Coke Richards	23–3–66	379	Alois Schneider	12–8–66
347	Jack Heichert	18–4–66	380	Emile M. Roy	12–8–66
348	Edward Sader	28–4–66	381	Frank Edward Young	12–8–66
349	Neville James Foran	28–4–66	382	Dennis Leo Bastien	15–8–66
350	Henry Thomas Smith	28–4–66	383	Ross W. Hunt	22–8–66
351	Ralph Payton Wismer	5–5–66	384	James Markie Craig	2–9–66
352	Adelio Tovani	5–5–66	385	Georges M. Babet	2–9–66
353	Istvan Rovak	5–5–66	386	Martin Swizinski	6–9–66
354	Frederick Henry Wilkinson	12–5–66	387	Walter William Hansen	21–9–66
355	Norman Clarence Knippleberg	12–5–66	388	Frank Albert MacKinnon	21–9–66
356	William Bell McGregor	12–5–66	389	Wolfgang Hermann H. Buddee	21–9–66
357	Harold Camber Shaw	12–5–66	390	Joseph Gerard Gagnon	14–10–66
358	Frederick Lampard Hunt	12–5–66	391	Herbert Heinz	14–10–66
359	John Irvin Scott	12–5–66	392	Frank Kollar	14–10–66
360	Nigel Stonestreet	12–5–66	393	Michael William Dowling Ayre	17–10–66
361	Lloyd E. Johnston	13–5–66	394	Robert Irvine Bennett	18–10–66
362	Konrad Stavem	18–5–66	395	John Elliott Dodge	25–10–66
363	James Richard Billingsley	19–5–66	396	Sergio Antonio Pasin	25–10–66
364	David Wesley Henderson	23–5–66	397	Ivan Jordan Baker	25–10–66
365	Lloyd William Andrews	30–5–66	398	William Andrew Patterson	2–11–66
366	John Lance Walton	30–5–66	399	James Hair McClung	8–11–66
367	Modesto B. Wiwchar	30–5–66	400	Peter Hasselbacher	5–12–66
368	Terry Lowe	30–5–66	401	Frederik Remus	5–12–66
369	Michael Alexander Donahue	8–6–66	402	Helmut Jaeckel	5–12–66
370	Larry J. Marion	20–6–66	403	Paul Richert	8–12–66
371	James Gordon McFadden	20–6–66	404	Frederick A. Pickering	12–12–66
372	Alastair David MacPhail	4–7–66	405	Nick Antoniuk	13–12–66
373	Joel R. Hoff	18–7–66			

MINE RESCUE, SAFETY, AND FIRST AID

The promotion of mine rescue and first aid continued on a high level throughout 1966. Four mine-rescue stations were maintained, with an instructor qualified in mine rescue and first aid available at each station. Each station is equipped with sufficient self-contained oxygen-breathing apparatus to maintain two mine-rescue teams of six men each should any emergency in nearby mines arise. There are also sets of mine-rescue equipment maintained at various mines, either on loan from the Department or owned by the mine. In 1966 Department-owned equipment totalled 60 McCaa two-hour apparatus and 40 Chemox 1-hour apparatus, while that owned by mining companies totalled 75 McCaa's, 80 Chemox's, plus six Draeger BG-174 apparatus. Each station also has auxiliary equipment, such as all-service masks, self-rescuers, gas-detectors, inhalators, and a complete set of first-aid equipment. The district instructor makes a periodic check of mine-rescue and first-aid equipment at mines in his district.

The station at Nanaimo was re-established after the closure of the Cumberland station in 1963. It had been in existence from 1912 to 1951, but in 1963 the building was not found suitable, and a mobile unit was purchased to operate from the Courthouse. Mine-rescue or first-aid classes were held at the Granduc, Britannia, Zeballos Iron, Brynnor, Empire Development, and Coast Copper mines. A course in mine rescue was held at the Institute of Technology at Burnaby for the first enrolled class of mining students. Its acceptance would indicate it could become a voluntary part of the curriculum. A short course in breathing apparatus was also given to employees of Ocean Cement Limited and the British Columbia Forest Service. In the latter part of 1966 the Tsable River coal mine closed and all equipment on loan was moved to Nanaimo.

The Kamloops station is a mobile unit which has operated from Kamloops since 1961. Service is given over a wide area in central British Columbia from the International Boundary to the Yukon Border. Mine-rescue and first-aid training as well as inspection of equipment was given at the Giant Mascot, Cassiar Asbestos, Craigmont, Glacier Gulch, Bulkley Valley, Boss Mountain, Cariboo Gold Quartz, and Horn Silver mines. The instructor travelled over 23,000 miles in the course of his duties.

The Nelson station is also a mobile unit which services the West Kootenay and Boundary areas. Mine-rescue or first-aid classes were held at the Bluebell, Canadian Exploration, Reeves MacDonald, H.B., and Phoenix Copper mines. Assistance was also given to the Nelson, Greenwood, and New Denver fire departments in the use and care of breathing apparatus. Close contact was also maintained with the civil defence organizations.

The mine-rescue station at Fernie is maintained principally to serve the coal mines in the area, but assistance in mine-rescue training is also given to personnel of the Sullivan and Mineral King mines. First-aid classes had a total of 65 persons, while a total of 25 men was trained in mine rescue. There were no emergency calls for the mine-rescue apparatus, but two requests for oxygen by the Fernie fire department received prompt attention.

A certificate of competency in mine-rescue work is granted to each man who takes the training course and passes the examination set by the Department. For those who take a refresher course, a sticker is given for attachment to the certificate. All mine-rescue men are also entitled to a hat emblem. In 1966, in addition to the regular teams in training 235 men took the course and were granted certificates as listed below. This is the highest number granted in one year since the issuing of certificates in 1913.

Certificate No.	Name	Where Trained	Certificate No.	Name	Where Trained
3909	Steve Mikolcevic	Portage Dam.	3927	James B. Standish	Fire Department, North Kamloops.
3910	Andrew Jardine	London Pride Silver.	3928	Jack Heichert	Norex.
3911	Oliver N. McLeod	London Pride Silver.	3929	Kenneth A. Suitor	Norex.
3912	Daniel R. P. O'Connor	London Pride Silver.	3930	James G. Fiske	B.C. Inst. Technol.
3913	James Craig	Zeballos Iron.	3931	Neil J. Sterritt	B.C. Inst. Technol.
3914	Kenneth Kearsley	Zeballos Iron.	3932	Bruce R. Herd	B.C. Inst. Technol.
3915	William T. Anderson	Britannia.	3933	Peter Lawrence Byers	B.C. Inst. Technol.
3916	Ronald Bailey	Britannia.	3934	David Huston	B.C. Inst. Technol.
3917	Carl Blanes	Britannia.	3935	Brian W. Lawrence	B.C. Inst. Technol.
3918	Wolfgang Bechert	Britannia.	3936	John C. Ruelle	B.C. Inst. Technol.
3919	Roy Fogarty	Britannia.	3937	Peter W. Dunsford	B.C. Inst. Technol.
3920	Laurence A. Gagne	Britannia.	3938	Douglas G. Bailey	B.C. Inst. Technol.
3921	Leslie J. Harrop	Britannia.	3939	Paul Kindrat	New Cronin Babine.
3922	J. Bruce Kendrick	Britannia.	3940	Wallace H. Yahnke	Cameron-McMynn.
3923	James Martin	Britannia.	3941	John Smart Broadfoot	Mineral King.
3924	Konrad Stavem	Britannia.	3942	John Filmer Coy	Mineral King.
3925	Larry Krishner	Zeballos Iron.	3943	Frank Stark	Mineral King.
3926	John W. Groeb	Zeballos Iron.			

Certificate No.	Name	Where Trained	Certificate No.	Name	Where Trained
3944	Jure Milanovic	Mineral King.	4018	Frank Berenyi	Empire Developm't.
3945	Robert Jenkins	Mineral King.	4019	Ferdinand Fursthaller	Empire Developm't.
3946	Carl Schwazer	Mineral King.	4020	Emile Roy	Empire Developm't.
3947	Alex Smith	Mineral King.	4021	Martin Laabs	Empire Developm't.
3948	Garry Bryon Elliott	Mineral King.	4022	Istvan Toth	Empire Developm't.
3949	Adelmo Stella	Mineral King.	4023	Earl K. Seaward	Empire Developm't.
3950	John Irvin Scott	Sullivan.	4024	Henry Werner Voss	Empire Developm't.
3951	Gerald Anthony Barre	Sullivan.	4025	Frank Young	Empire Developm't.
3952	Frederick L. Hunt	Sullivan.	4026	Alois Schneider	Empire Developm't.
3953	Rheo L. Joseph Touzin	Sullivan.	4027	Ross Whiteley Hunt	Craigmont.
3954	Albert Leo Frocklage	Sullivan.	4028	Daniel Mervin Kennelly	Craigmont.
3955	Warren Leech	Sullivan.	4029	Robert Montgomery	Craigmont.
3956	Frederick Iner Bidder	Sullivan.	4030	William A. Patterson	Craigmont.
3957	William Russell	Sullivan.	4031	James Michael Rynn	Craigmont.
3958	Wilfred Eric Bisgrove	Sullivan.	4032	Per-Olof Sandstrom	Craigmont.
3959	Nigel Stonestreet	Sullivan.	4033	Paul Henry Schmidt	Craigmont.
3960	Peter Maxim Huppie	Sullivan.	4034	Berwyn Rhys Williams	Craigmont.
3961	Kenneth Williams	Texada.	4035	Herbert Cameron	Jersey.
3962	Daniel Thomas	Texada.	4036	Basil Zakordonski	H.B.
3963	Raymond H. Johnson	Texada.	4037	Melvin Henkel	Reeves MacDonald.
3964	Fred H. Remus	Texada.	4038	Stanley Hatch	Reeves MacDonald.
3965	William J. Francoeur	Texada.	4039	Dieter H. Taube	Cariboo Gold Q'rtz.
3966	Modesto B. Wiwchar	Reeves MacDonald.	4040	William M. Gulka	Granduc.
3967	Clifford Shields	H.B.	4041	Ivan A. Gillis	Granduc.
3968	Robert John Flegel	H.B.	4042	Philip S. Martin	Granduc.
3969	Joseph John Porsmak	H.B.	4043	Bo Wilhelm Wisser	Granduc.
3970	Rowland Edward Klyne	H.B.	4044	Harold M. Hemmerick	Craigmont.
3971	Floyd Flemming	H.B.	4045	William Lawrence Bond	Canadian Explor'n.
3972	John Karl Riehm	Cameron-McMynn.	4046	Edwin William Bussey	Canadian Explor'n.
3973	Harry Sanders	Mineral King.	4047	Murray E. Cryaston	Canadian Explor'n.
3974	Peter Hasselbacher	Texada.	4048	Donald M. Dundas	Canadian Explor'n.
3975	John George Huycke	Giant Mascot.	4049	George James Eftodie	Canadian Explor'n.
3976	Terry Lowe	Giant Mascot.	4050	David John Hamilton	Canadian Explor'n.
3977	Michael W. D. Ayre	Giant Mascot.	4051	Bruce Joseph McNeill	Canadian Explor'n.
3978	Andrew Kovacs	Giant Mascot.	4052	Douglas G. McIntosh	Canadian Explor'n.
3979	Michael A. Donahue	Giant Mascot.	4053	Walter Panagopka	Canadian Explor'n.
3980	Gordon G. Bryant	Fento.	4054	Schuyler G. Peters	Canadian Explor'n.
3981	Robert David Scheer	Phoenix Copper.	4055	Dennis A. Waterstreet	Canadian Explor'n.
3982	Edwin Brandel	Fento.	4056	Thomas P. Gleboff	Canadian Explor'n.
3983	James Fitzpatrick	Fento.	4058	Frederick J. Kannenberg	Zeballos Iron.
3984	Ivan Rudman	Michel Colliery.	4059	Blake F. Kellar	Zeballos Iron.
3985	John David Bowen	Michel Colliery.	4060	Joseph Wilfred Kennedy	Zeballos Iron.
3986	Ivan Jordan Baker	Altamont Explor'n.	4061	William M. Kozak	Zeballos Iron.
3987	Peter Joseph Zeith	Michel Colliery.	4062	Frank A. MacKinnon	Brynnor (Kennedy Lake).
3988	Russell G. Moore	Giant Mascot.			
3989	Yvan De Sereville	Granduc.	4063	Felix A. Reyes	Brynnor (Kennedy Lake).
3990	James Burtam Rannells	Granduc.			
3991	Ronald R. Smith	Granduc.	4064	Wolfgang Buddee	Brynnor (Kennedy Lake).
3992	Clyde A. Myers	Granduc.			
3993	Michael Kardynal	Granduc.	4065	Gary Gregory M. Cain	Brynnor (Kennedy Lake).
3994	John Henry Ashton	Granduc.			
3995	Howard Nelson Geary	Granduc.	4066	William C. Fothergill	Brynnor (Kennedy Lake).
3996	Patrick John Laberge	Granduc.			
3997	Patrick A. J. Kraftchick	Granduc.	4067	John Howat	Brynnor (Kennedy Lake).
3998	Heinz K. Magiera	Granduc.			
3999	Lars M. Ortenbladt	Granduc.	4068	James Ernest Smith	Brynnor (Kennedy Lake).
4000	Lester H. Lubenow	Granduc.			
4001	Merton William Baker	Granduc.	4069	Leo Dottori	Cameron-McMynn.
4002	Edmond Stammet	Granduc.	4070	Richard Leigh Irving	Cameron-McMynn.
4003	Garrick J. Hayes	Granduc.	4071	Raymond Robert Spinks	Hudson Bay Mtn.
4004	Gerald White	Granduc.	4072	Marjan Blazekovic	Cominco (Benson Lake).
4005	John A. McWilliams	Granduc.			
4006	Paul C. Richert	Granduc.	4073	Thomas Q. O'Connor	Cominco (Benson Lake).
4007	George G. Gruelich	Bluebell.			
4008	Raymond I. Raby	Britannia.	4074	Gregory C. Mason	Cominco (Benson Lake).
4009	Jerry J. Krizek	Britannia.			
4010	Herman Baril	Empire Developm't.	4075	Lloyd A. Wood	Cominco (Benson Lake).
4011	Herman Hossl	Empire Developm't.			
4012	Dietrich Mueller	Empire Developm't.	4076	Antonio Benzon	Cominco (Benson Lake).
4013	Peter Antowiak	Empire Developm't.			
4014	Norman Tailleur	Empire Developm't.	4077	Gordon William Wright	Cominco (Benson Lake).
4015	Anthony M. Mulligan	Empire Developm't.			
4016	Joseph Shewin	Empire Developm't.	4078	Edward J. Grabowski	Cameron-McMynn.
4017	Martin Swizinski	Empire Developm't.	4080	Walter W. Hansen	Britannia.

Certificate No.	Name	Where Trained	Certificate No.	Name	Where Trained
4081	Michael Denton	Britannia.	4113	John Margison	Bluebell.
4082	Eric Piehler	Britannia.	4114	Larry Lawson Turner	Bluebell.
4083	Allan McNair	Britannia.	4115	William Eldon Wiley	Bluebell.
4084	Nick Ostojic	Britannia.	4116	Arthur Bert Yarchenko	Bluebell.
4085	Patrick D. Tweed	Britannia.	4117	George Stremel	Bluebell.
4086	Paul Sametz	Britannia.	4118	Lyle Emerson Paulhus	Bluebell.
4087	Jesse Hill	Britannia.	4119	Gordon Wilfred Prest	Bluebell.
4088	Henri La Belle	Britannia.	4120	Richard Sydney Prest	Bluebell.
4089	Grant McFarlane	Britannia.	4121	Babe Gerald Beamer	Bluebell.
4090	Fred Pickering	Britannia.	4122	Paul Chechotko	Bluebell.
4091	Clinton Nicholson	Britannia.	4123	James Albert Fichten	Bluebell.
4092	Jack Scott	Britannia.	4124	David Thomas Fowler	Bluebell.
4093	Joseph Kenneth Hall	Britannia.	4125	Joern Babicht	Bluebell.
4094	Joseph D. Greschuk	Britannia.	4126	Robert Joseph Hepple	Bluebell.
4095	Joseph L. Valliere	Britannia.	4127	Peter Pasiechnyk	Bluebell.
4096	Leonard Skakun	Cassiar.	4128	Peter Richard Schultz	Reeves MacDonald.
4097	Mike Bewcyk	Cassiar.	4129	Edward (Ted) J. Nunn	Reeves MacDonald.
4098	Donald R. Hudgeon	Cassiar.	4130	Thomas L. Brown	Reeves MacDonald.
4099	Michael Lewis Clark	Cassiar.	4131	Walter Bunka	Reeves MacDonald.
4100	Malcolm J. MacLeod	Cassiar.	4132	William Herbert Gray	Reeves MacDonald.
4101	Jack Morin	Cassiar.	4133	Malcolm MacDonald	Granduc.
4102	Norman Kipnis	Cassiar.	4134	Robert D. M. Anderson	Granduc.
4103	Cornelius John Lobbes	Cassiar.	4135	Sandor A. Pap	Granduc.
4104	Donald George Irwin	Cassiar.	4136	Leo List	Granduc.
4106	James Stewart	Granduc.	4137	Fernand Joseph Mathias	Granduc.
4107	Kenneth Walter Gordon	Silmonac.	4138	Egon Franzisz	Granduc.
4108	Anthony White	Silmonac.	4139	Donald E. Moore	Granduc.
4109	John C. Black	Kam-Kotia.	4140	John C. MacDonnell	Granduc.
4110	Peter Donald Stewart	Bluebell.	4141	Ross Craig Roszell	Granduc.
4111	Peter Alexander Scott	Bluebell.	4142	Umberto Isola	Granduc.
4112	Henry Alleyne Hincks	Bluebell.	4143	Roland Proulx	Granduc.

The mine safety associations in different centres of the Province, sponsored by the Department of Mines and Petroleum Resources 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 Bridge River Valley Mine Safety Association held its 24th annual competition at Bralorne on May 14, 1966. This was mainly a first-aid event, but two teams were entered in a mine-rescue elimination event.

The Vancouver Island Mine Safety Association held its 52nd annual competition at Nanaimo on May 28, 1966. Four teams competed in the mine-rescue event—two from the Britannia mine and one each from the Texada Iron and Coast Copper mines. The winning team was from Texada Iron mine and was captained by D. Legault.

The West Kootenay Mine Safety Association held its 20th competition at Nelson on June 4, 1966. Five teams took part in the mine-rescue event—two from the Bluebell mine and one each from the H.B., Canadian Exploration, and Reeves MacDonald mines. A Bluebell team captained by B. Ramage took first place.

The East Kootenay Mine Safety Association held its 45th annual competition at Kimberley on June 11, 1966. Five teams took part in the mine-rescue event—two each from the Sullivan and Michel mines and one from the Mineral King mine. A Michel mine team captained by S. Morgan took first place.

The Central British Columbia Mine Safety Association held its 18th annual competition at Hope on June 18, 1966. Six teams took part in the mine-rescue event—one each from the Bethlehem Copper, Giant Mascot, Craigmont, Bralorne, Glacier Gulch, and Boss Mountain mines. The Craigmont team captained by G. Klein took first place.

At all four of the immediately preceding meets, competitions were held in first-aid as well as mine-rescue work. In these competitions, events were held for women and juniors. There were entries in these competitions from industries and organizations not necessarily connected with mining.

The 11th Provincial mine-rescue competition was held at Cranbrook on June 25, 1966. The winning teams from Nanaimo, Nelson, Hope, and Kimberley competed for a trophy and silver trays. The event was won by the Bluebell mine team captained by B. Ramage. The team also won a silver cup which had been donated by the International Union of Mine, Mill and Smelter Workers for annual competition for mine-rescue teams from metalliferous mines. In conjunction with this competition, the Workmen's Compensation Board sponsored the 10th Provincial men's first-aid competition, and teams competed which had won local events at Victoria, Nanaimo, Hope, Nelson, Vancouver, Kimberley, and Kitimat. The winning team was from the Kitimat fire department captained by M. F. Grogan.

JOHN T. RYAN TROPHY

The John T. Ryan safety trophies were set up in 1941 to promote safety in coal and metal mines. Administration of the awards is by the Canadian Institute of Mining and Metallurgy. In 1963 changes were made in the competition rules which required of the metalliferous mines that sufficient calendar years be submitted by each entering mine to complete 1,000,000 man-hours. In 1966 the definition of an accident was altered to include all injuries which involved a loss of time of more than three working-days not including the day of the accident. In 1966 the regional trophy for metalliferous mines was won by the Bluebell mine of Cominco Ltd., with an accident frequency of 7.9 per 1,000,000 man-hours.

For coal-mining a change was made in 1966 to group the coal mines in British Columbia with those in Alberta to form a Western Region. The trophy for this region was won by the Atlas mine of Charter Coals Ltd., at East Coulee, Alta.

WEST KOOTENAY MINE SAFETY ASSOCIATION TROPHY

The West Kootenay Mine Safety Association in 1951 donated a safety trophy for annual competition in order to encourage and promote safety in small mines. At first the trophy was restricted to mines in the West Kootenay area, but in 1956 this restriction was removed.

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 involved more than three days' loss of time.

In 1966 the award was won by the H.B. mine of Cominco Ltd.

SAFETY COMPETITION, OPEN-PIT MINES AND QUARRIES

In 1961 the Department of Mines and Petroleum Resources instituted a safety competition for the open-pit and quarry industry and put up awards and a trophy for annual competition. In 1965 an additional trophy was put up so that there were two competitions—the "A" group for those pits and quarries having under 200,000 man-hours per year, and the " B " group for those over 200,000 man-hours per year. An accident is taken as one which has been determined as compensable by the Workmen's Compensation Board. For those operations which amass over 15,000 man-hours ending in the competition year, certificates of achievement are given when no compensable accidents occur during this period.

In 1966 the "A" trophy was won by three quarries, each with an accident frequency of zero—the Mary Hill sand and gravel quarry of Ocean Cement Limited, the limestone quarry of Lafarge Cement of North America Ltd., and the sand and gravel quarry of Construction Aggregates Ltd. The "B" trophy was won by the Phoenix open-pit mine of The Granby Mining Company Limited, also with an accident frequency of zero. Twelve quarries received certificates of achievement, four of these being those mentioned for the "A" and "B" trophies above and the other eight as follows: Cobble Hill quarry of the B.C. Cement Division of Ocean Cement Limited, Central Sand and Gravel of Ocean Cement Limited, Coquitlam gravel pit of Deeks-McBride Ltd., Highland Sand and Gravel Division of Ocean Cement Limited, Pitt River quarry of Ocean Cement Limited, Producers Sand and Gravel Division of Ocean Cement Limited, Routledge Gravel Ltd., and Langley gravel pit of Deeks-McBride Ltd.

Coal

By Robert B. Bonar, Deputy Chief Inspector of Mines

CONTENTS

PRODUCTION

The gross output in short tons of the coal mines of the Province for 1966 was 1,088,133 tons, a decrease of 18,539 tons or 1.64 per cent from 1965. A total of 120,362 tons came from strip mines at Michel Colliery and Bulkley Valley Collieries.

The Vancouver Island production was 17,479 tons, a decrease of 24,847 tons or 58.7 per cent from 1965.

There were no operating mines in the Nicola-Princeton District during 1966.

The Northern District production was 11,975 tons, an increase of 6,075 tons or 102.9 per cent over 1965.

The East Kootenay District production was 1,058,679 tons, an increase of 233 tons or 0.02 per cent over 1965.

Output and per Capita Production, 1966

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	16,874	139	39	3.11	433	29	4.59	592
Loudon No. 6 Mine	204	142	1	1.43	204	1	1.43	204
Lewis No. 2 Mine (Timberlands)	161	46	2	1.75	80	2	1.75	80
Undun No. 4 Mine	240	205	1	1.17	240	1	1.17	240
Bulkley Valley Collieries—								
Underground	3,385	117	8	3.62	423	6	4.82	564
Strip	8,590	108	11	7.23	781	.....	.....	.....
Michel Collieries—								
Underground	946,907	241	552	7.11	1,715	308	12.75	3,074
Strip	111,772	224	.....	.....	.....	.....	.....	.....

District Output and per Capita Production, Underground Mines, 1966

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	17,479	43	406	33	530
Northern	3,385	8	423	6	564
East Kootenay	946,907	552	1,715	308	3,074
Whole Province	967,771	603	1,605	347	2,788

Output per Man-shift, Underground Mines, 1957–66

Year	Man-shifts[1]	Tonnage	Average per Man-shift (Tons)
1957	226,536	945,848	4.17
1958	204,148	728,722	3.56
1959	171,608	646,788	3.77
1960	210,254	766,581	3.66
1961	213,962	877,085	4.10
1962	160,418	805,051	5.02
1963	170,287	866,481	5.09
1964	158,638	960,999	6.05
1965	149,695	772,135	5.16
1966	139,828	967,771	6.92

[1] Includes both surface and underground workers.

Collieries of British Columbia, 1966—Production and Distribution, by Collieries and by Districts (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.	Elsewhere	Total Sales	
Vancouver Island District														
Comox Mining Company Ltd.—Tsable River Colliery[2]	16,874	—	16,874	—	—	23,836	25,819	1,983	—	14,891	—	—	14,891	14,891
Loudon No. 6 Mine	204	—	204	—	—	—	—	—	—	204	—	—	204	204
Lewis No. 2 Mine (Timberlands)	161	—	161	—	—	—	—	—	—	161	—	—	161	161
Undun No. 4 Mine	240	—	240	—	—	—	—	—	—	240	—	—	240	240
Totals, Vancouver Island District	17,479	—	17,479	—	—	23,836	25,819	1,983	—	15,496	—	—	15,496	15,496
Northern District														
Bulkley Valley Collieries (underground and strip)	11,975	—	11,975	—	—	—	—	—	—	11,975	—	—	11,975	11,975
East Kootenay District														
Crows Nest Industries Ltd.—Michel Colliery (underground and strip)	1,058,679	221,219	837,460	15,988	227,083	22,477	36,587	14,110	—	202,859	1,171	376,249	580,279	823,350
Coal														
Grand totals for Province	1,088,133	221,219	866,914	15,988	227,083	46,313	62,406	16,093	—	230,330	1,171	376,249	607,750	850,821
Coke														
Crows Nest Industries Ltd.—Michel Collieries	171,543	—	171,543	—	—	6,544	4,751	—	1,793	94,192	79,144	—	173,336	—

[1] Includes coal used in making coke and coal used under stationary and locomotive boilers, etc.
[2] Closed September 23, 1966.

Collieries of British Columbia, 1966—Men Employed, Distribution by Collieries and by Districts

Mine	Supervision and Clerical			Miners			Helpers			Labourers			Mechanics and Skilled Labour			Total Men Employed		
	U.	A.	T.	U.	A.	T.	U.	A.	T.	U.	A.	T.	U.	A.	T.	U.	A.	T.
Vancouver Island District																		
Comox Mining Company Ltd.—Tsable River Colliery	3	3	6	15	—	15	—	—	—	7	4	11	4	3	7	29	10	39
Loudon No. 6 Mine	—	—	—	1	—	1	—	—	—	—	—	—	—	—	—	1	—	1
Lewis No. 2 Mine (Timberlands)	1	—	1	1	—	1	—	—	—	—	—	—	—	—	—	2	—	2
Undun No. 4 Mine	—	—	—	1	—	1	—	—	—	—	—	—	—	—	—	1	—	1
Totals, Vancouver Island District	4	3	7	18	—	18	—	—	—	7	4	11	4	3	7	33	10	43
Northern District																		
Bulkley Valley Collieries—																		
Underground	1	2	3	3	—	3	2	—	2	—	—	—	—	—	—	6	2	8
Strip	—	3	3	—	—	—	—	3	3	—	—	—	—	5	5	—	11	11
Totals, Northern District	1	5	6	3	—	3	2	3	5	—	—	—	—	5	5	6	13	19
East Kootenay District																		
Crows Nest Industries Ltd.—																		
Michel Colliery (underground)	34	48	82	43	—	43[1]	76	—	76[2]	125	103	228	30	93[3]	123	308	244	552
Michel Colliery (strip)[4]	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Totals, East Kootenay District	34	48	82	43	—	43	76	—	76	125	103	228	30	93	123	308	244	552
Grand totals for Province	39	56	95	64	—	64	78	3	81	132	107	239	34	101	135	347	267	614

[1] Continuous miner operators.
[2] Facemen and shuttle-car operators.
[3] Includes 58 " by-product coke oven " personnel.
[4] Removal of overburden and coal by contractor.
NOTE.—U.=underground; A.=above ground; T.=total.

COKE-MAKING

Coke is made at only one plant in the Province, that of the Michel Colliery, Crows Nest Industries Limited, Fernie.

LABOUR AND EMPLOYMENT

In 1966, 614 persons were employed in and about the coal mines of the Province, a decrease of 35 from 1965. Because of the five-day week in force throughout the Province and legal holidays, the maximum number of working-days at the larger mines was 242. In the East Kootenay District the Michel Colliery worked 241 days.

COMPETITION FROM COAL PRODUCED OUTSIDE OF BRITISH COLUMBIA

In 1966 the shipment of Alberta coal, briquettes, and char to British Columbia totalled 197,521, 2,344, and 16,517 tons respectively.

The following table shows the amount of Alberta coal brought into British Columbia during the past 10 years:—

Year	Short Tons	Year	Short Tons
1957	672,527	1962	283,651
1958	532,911	1963	262,433
1959	437,118	1964	261,990
1960	379,668	1965	276,608
1961	321,909	1966	197,521

Of the 580,279 tons of British Columbia coal marketed, 163,235 tons was sold for domestic and industrial use in Alberta, Saskatchewan, Manitoba, and Ontario; 1,171 tons was exported to the United States; and 376,249 tons was exported to Japan.

The amount sold for domestic and industrial use in the Province was 67,095 tons.

ACCIDENTS IN AND AROUND COAL MINES

In 1966 there were three fatal accidents, one more than in 1965. The number of fatal accidents per 1,000 persons (underground and strip-mine personnel) employed was 4.88, compared with 3.08 in 1965, 2.80 in 1964, 1.33 in 1963, 0.00 in 1962, 6.37 in 1961, 0.00 in 1960, 1.89 in 1959, 0.00 in 1958, and 1.45 in 1957.

The number of fatal accidents per 1,000,000 gross tons of coal (underground and strip-mine coal) produced was 2.75, compared with 1.87 in 1965.

The following tables classify the accidents in coal mines in 1966:—

ACCIDENTS CLASSIFIED AS TO OCCUPATION

Occupation	Number of Accidents	Percentage of Accidents
Underground—		
Miners	15	15.47
Drillers and facemen	20	20.63
Haulage and conveyor men	26	26.80
Trackmen and mechanics	5	5.15
Supervisors	2	2.06
Timbermen	----	--------
Coal-cutters	15	15.47
Miscellaneous	3	3.09

Surface—		
Shops	4	4.12
Surface	3	3.09
Preparation and coke-ovens	4	4.12
Miscellaneous	---	--------
Totals	97	100.00

ACCIDENTS CLASSIFIED AS TO CAUSE

Cause	Number of Accidents	Percentage of Accidents
Fall of ground	32	33.00
Fall of material and flying material	7	7.21
Lifting and handling equipment and material	33	34.02
Machinery and tools	15	15.47
Slipped and tripped	6	6.18
Falling off staging and platforms	1	1.03
Miscellaneous	3	3.09
Totals	97	100.00

ACCIDENTS CLASSIFIED AS TO INJURY

Injury	Number of Accidents	Percentage of Accidents
Head and neck	9	9.28
Eyes	---	--------
Trunk	19	19.59
Back	18	18.56
Arms	5	5.15
Hands and fingers	14	14.43
Legs	24	24.74
Feet	8	8.25
Toes	---	--------
Totals	97	100.00

COMPENSABLE[1] ACCIDENTS, INCLUDING FATAL ACCIDENTS RELATED TO TONS MINED AND MEN EMPLOYED IN AND ABOUT COAL MINES

Year	Number of Accidents	Number of Persons Employed	Frequency per 1,000 Persons	Tons Mined (Gross)	Tons Mined per Accident
1957	340	1,380	246	1,221,766	3,593
1958	214	1,086	197	882,962	4,126
1959	189	1,056	179	757,628	4,009
1960	235	1,182	198	844,500	3,593
1961	219	942	232	1,018,832	4,652
1962	134	776	173	912,837	6,812
1963	135	748	180	965,809	7,154
1964	134	713	188	1,121,487	8,369
1965	116	649	179	1,106,672	9,540
1966	97	614	158	1,088,133	11,218

[1] Compensable accident means an injury causing a loss of more than three days' work not including the day of the accident.

In 1966 there were three fatal accidents at the mines in the Province, all of which occurred underground.

James Holland, aged 38, single, and employed as a helper at the No. 4 mine of the Bulkley Valley Collieries Limited, near Telkwa, was fatally injured by a fall of roof at about 8 p.m. on January 20th.

The accident occurred at the intersection of a 15-foot-wide conveyor entry and a 14-foot-wide advance into the coal. Holland, in company with a miner and the mine superintendent, was engaged in installing a shaker-conveyor engine in the entrance to the advance working-place. The superintendent was about 6 feet away from Holland while the miner was on the other side of the shaker-conveyor from him. Holland was moving an extension jack when the superintendent heard the roof crack and yelled a warning, but a slab of cap-rock consisting of 8 inches of rock and 18 inches of coal fell from the roof and struck Holland, pinning him against the jack he was carrying. Rescue operations were carried out immediately, and by 9 p.m. the injured man was in the hospital, but he died at 3.30 a.m. the following morning.

The roof in the vicinity of where the deceased was working was fairly well posted, but due to the lack of a post on the other side of the conveyor the cap-rock apparently bent and finally fractured and knocked out the post holding the roof above the deceased. The roof had been tested 30 minutes prior to the accident and had been found secure.

Victor A. Caldwell, aged 60, married, and employed as a pipe mechanic at the Balmer South mine, Michel Colliery, Crows Nest Industries Limited, was fatally injured when he was run over by a coal train in the main haulage level at about 10.30 a.m. on March 16th.

Caldwell had entered the mine shortly before the accident and was proceeding along the main haulage level when, at about 88 feet from the portal, he was overtaken and run over by an ingoing train of empty 10-ton-capacity cars being pushed by a diesel engine. The first car of the train was equipped with a red warning light, but apparently Caldwell did not hear the train approaching. He apparently was walking in the centre of the track instead of using the travelway at the side. Death was instantaneous.

Joseph John Stachurski, aged 60, married, and employed as a continuous-miner faceman at the Balmer North mine, Michel Colliery, Crows Nest Industries Limited, was fatally injured when he was buried by a fall of coal at about 6 p.m. on September 26th.

The accident occurred at the intersection of a level road and 10-degree dip road. The angle between the two roads was about 30 degrees. A 20-foot bridge-stick on the dip road formed the opening to the level road.

Stachurski and other men were engaged in hauling two 14-foot timbers by the use of a wire rope attached to a shuttle car up the dip road and around the 30-degree corner into the level road. Apparently in hauling the two timbers around the corner, the timbers jammed against the lower leg of the bridge-stick and dislodged it, which allowed the whole intersection to collapse. The deceased, on hearing the apparent collapsing of the roof, attempted to run up the dip roadway past the intersection but was caught by the falling coal and buried. Death was due to asphyxiation.

EXPLOSIVES

The following table shows the quantity of explosives used in underground coal mines in 1966, 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 in coal mines):—

VANCOUVER ISLAND DISTRICT

Colliery	Quantity of Explosives Used (Lb.)	Coal Mined (Tons)	Total Number of Shots	Average Tons per Pound of Explosives Used	Average Pounds of Explosives per Shot Fired
Tsable River Colliery (Comox Mining Company Limited)	9,500	16,874	14,900	1.78	0.63
Loudon No. 6 mine	300	204	310	0.68	0.97
Lewis No. 2 mine (Timberlands)	100	161	100	1.61	1.00
Undun No. 4 mine	100	240	120	2.40	0.83
Totals for district	10,000	17,479	15,430	1.75	0.64

NORTHERN DISTRICT

Bulkley Valley Collieries	2,100	3,385	3,000	1.61	0.70

EAST KOOTENAY DISTRICT

Michel Colliery	46,686	946,907	36,782	20.28	1.21

PROVINCE

Totals for Province	58,786	967,771	55,212	16.47	1.06

QUANTITY OF DIFFERENT EXPLOSIVES USED

	Lb.
Monobel of different grades	56,361
Permissible rock powder	2,425
Total	58,786

MACHINE-MINED COAL

In 1966 mining-machines produced approximately 950,292 tons or 98.2 per cent of the total output from underground mining. A total of 120,362 tons of strip-mined coal was removed by mechanical means.

SAFETY LAMPS

There were 590 safety lamps in use in the mines of the Province. Of this number, 528 were approved electric lamps, mostly of the Wheat and Edison types.

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) under Approval No. 18 of the United States Bureau of Mines, and all Edison lamps up to and including Model M-S, carrying the Approval 6D-34 of the United States Bureau of Mines, and the Department of Energy, Mines and Resources, Canada, Certificate 39-2 Coal Mines.

The Wheat electric lamp and having Approval No. 20, as issued by the United States Bureau of Mines.

The Wheat electric lamp and having Approval No. 6D-30, 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 the 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 three collieries. A total of 14,053 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 Senior 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 Inspector 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

Since August, 1950, diesel locomotives have been permitted in coal mines.

MILLISECOND DELAY DETONATORS

In February, 1951, an amendment to the *Coal Mines Regulation Act* was passed to allow, with permission of the Chief Inspector, more than one shot to be fired at any one time in any coal mine or district of a mine. For further details *see* 1954 Annual Report.

DANGEROUS OCCURRENCES

On April 5th an electrical flash occurred on the No. 3 Incline at "A" North mine, Michel Colliery, when a workman accidentally pierced the insulation of a shuttle-car trailing cable with the point of a metal " timber dog " while guiding timber supplies behind the car. The ground leakage relay operated to isolate the circuit. No one was injured.

On August 8th, in No. 1 North mine, Michel Colliery, a continuous miner was being trammed on planks when the trailing cable caught on a wooden plank and was pinched and damaged. The damaged end was removed and the cable refitted.

On August 10th in No. 1 North mine, Michel Colliery, the trailing cable on a shuttle car, due to being slack, doubled over while being wound on the cable reel winder. When the car moved ahead, the doubled-over cable jammed in the guide fork and broke. No arcing was reported.

On August 30th, in Balmer North mine, Michel Colliery, an electric arc occurred at a continuous miner when continuous flexing in the power cable to the conveyor on the miner caused a short circuit in the cable conductors. The arc ignited leakage of oil from the hydraulic system, but the fire was extinguished without any damage. Subsequent investigation revealed that both the power cable to the conveyor and the hydraulic hose had been damaged by continuous flexing.

On September 3rd, at Michel Colliery, a fire was detected in a portion of the wooden snowsheds leading from the silo bins to the coal-preparation plant. The fire was extinguished one hour after discovery. Over 800 feet of snowshed and fire-resistant conveyor belting was damaged. No one was injured. It was suspected that spillage of coal dust from the conveyors was ignited by incipient heating from a defective portion of insulation on a steam pipe installed below the conveyors.

On November 4th, in No. 2 entry, Balmer North mine, Michel Colliery, a small fire was detected on the floor. The fire was immediately extinguished, and no one was injured. Subsequent investigation disclosed that a short circuit had occurred at the coupling of a shuttle-car trailing cable lying on the floor nearby, and it is suspected that the resulting arc had ignited a small " bleeder " of gas in the coal floor.

On November 15th, on No. 101 slope, Balmer North mine, Michel Colliery, a portion of fire-resistant conveyor belting on the pulley at the drive end of the conveyor was badly damaged owing to frictional heating. The heating was extinguished by the application of limestone dust, and subsequent investigation disclosed that the belt had been jammed at the pulley by spillage of coal dust. No one was injured.

On November 15th, in the main entry, No. 1 South mine, Michel Colliery, an electric flash occurred due to the trailing cable of a shuttle car being jammed and damaged on the cable reel of the car. The power was immediately isolated by the electrical controls, and no one was injured.

BUMPS AND OUTBURSTS

There were no bumps or outbursts reported from any of the coal mines in the Province during 1966.

PROSECUTIONS

There were no prosecutions reported from any of the coal mines in the Province during 1966.

BOARD OF EXAMINERS FOR COAL-MINE OFFICIALS

First-, Second-, and Third-class Certificates and Mine Surveyors' Certificates

The Board of Examiners, formed on July 10, 1919, consists at present of R. B. Bonar, Deputy Chief Inspector of Mines, chairman and secretary; A. R. C.

James, Inspector of Mines, member; and D. R. Morgan, Inspector of Mines, member.

The examinations are held at least once a year and more often if necessary. Examinations were held at the Fernie centre on May 18th, 19th, and 20th. The total number of candidates at these examinations was as follows: Second-class certificate, two (one passed, one failed); mine surveyor's certificate, one (failed). The successful candidate for a second-class certificate was James Walsh.

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 as circumstances warrant 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 1966, 16 candidates were successful in obtaining coal-miners' certificates. In addition to the certificates granted above, substitute certificates were issued to those who had lost their original certificates.

The Board of Examiners desires to thank the different coal-mining companies for use of their premises for the holding of 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 17,479 tons, a decrease of 24,847 tons or 58.7 per cent from the 1965 output. This drop in production was due to the closing of the Tsable River mine, Comox Mining Company Limited, at the end of September.

The annual mine-rescue and first-aid meet organized by the Vancouver Island Mine Safety Association was held at Nanaimo on Saturday, May 28th. Four teams, two from Britannia mine, one from Coast Copper mine, and one from Texada mine, participated in the mine-rescue competition, and a very high standard of performance was maintained. The winning team was the Texada mine team, captained by D. Legault.

Nanaimo (49° 123° S.W.)

Midan Mine This mine did not operate during 1966, being closed at the end of 1965.

Lewis No. 2 Mine (Timberlands) Glyn Lewis, operator and fireboss. The property is described in the 1965 Annual Report. The mine ceased operation at the end of 1966. Total production in 1966 was 161 tons over a working period of 46 days with a crew of two men.

Undun No. 4 Mine J. Unsworth, operator and fireboss. This mine is described in the 1965 Annual Report. The skip, being taken off the inside of the pillar encountered during 1965, was completed early in the year. The pillar is now being mined on the retreat.

Total production in 1966 was 240 tons over a working period of 205 days with a crew of one. Working conditions were found to be satisfactory during the course of inspections, and no accidents were reported.

North Wellington (49° 124° S.E.)

Loudon No. 6 Mine R. B. Carruthers, operator and fireboss. This mine is about 1 mile southeast of Wellington and has been opened 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 being mainly rock is blasted off the solid and stowed. The bottom 20 inches to 2 feet of coal is broken with light shots and hand-loaded into cars which are hauled to the surface by a small gasoline-powered hoist. Production in 1966 amounted to 204 tons over a working period of 142 days with a crew of one man. Working conditions were found to be satisfactory during the course of inspections, and no accidents were reported.

Comox (49° 124° N.W.)

Comox Mining Company Limited
By A. R. C. James

S. J. Lawrence, president; G. Dutfield, vice-president; P. F. Grundy, secretary. Head office address, P.O. Box 8, Union Bay.

Tsable River Mine.—S. J. Lawrence, manager; James Cochrane, overman.

This mine ceased production at the end of September. In the following month, pumps and equipment were withdrawn and the underground workings abandoned.

Production in 1966 was 16,874 tons. The crew decreased from 52 at the beginning of the year to about 12 men at the time of closure.

The Tsable River mine commenced production in 1947 and was operated until April, 1960, by Canadian Collieries (Dunsmuir) Limited. From May, 1960, until this year, the mine was operated by the present company by agreement with the successor company to Canadian Collieries Resources Limited. Total production of coal over the 20 years in which the mine has been in operation is 2,179,067 tons. The best single year was 1955, when 204,369 tons was produced. The closure of Tsable River mine marks the end of any significant coal production on Vancouver Island and thus closes a chapter of British Columbia's mining history.

EAST KOOTENAY INSPECTION DISTRICT

By D. R. Morgan

The gross production of coal from the East Kootenay Inspection District during 1966 was 1,058,679 tons, a decrease of 233 tons or 0.02 per cent less than was produced in 1965. There were two companies in operation, but all of the production was obtained by the Crows Nest Industries Limited, whose activities were confined to the Michel Colliery. The colliery produced 1,058,679 tons, an increase of 135,423 tons or 14.67 per cent more than was produced in 1965. Two other companies, the Pacific Coal Limited and Fernie Coal Mines Limited, conducted an exploration programme on Crown lands in the Morrissey, Lodgepole, and Corbin areas, but did not produce any coal.

The accident statistics at Michel Colliery during 1966 showed an increase in both frequency and severity rates despite a strong effort by the safety department to improve the accident record. Two workmen were fatally injured, both underground, one being killed by a fall of coal and timbers, and the other by transportation. Seven other accidents, also classified as serious, were reported and investigated, six of which occurred underground and one on the surface. Three of these accidents were caused by involvement with machinery, two by falls of rock and coal, and the other two by transportation. This was an increase of one on the total number of serious accidents reported in 1965. Minor accidents resulting in the loss of one or more working-days totalled 118, of which 97 occurred underground and 21 on the surface, an increase of 11 accidents. Eight dangerous occurrences were reported at Michel Colliery, and are reported more fully in another part of this report under the heading of " Dangerous Occurrences." No accidents or dangerous occurrences were reported from the British Columbia side of the coal-stripping operation on Tent Mountain or by the two exploration companies.

The East Kootenay Mine Safety Association held its 45th annual mine-rescue and first-aid competitions at Kimberley on June 11th, and the various contests were well attended. Five six-man teams from Fernie, Michel, Kimberley, and Toby Creek entered the mine-rescue competition, and the Department of Mines and Petroleum Resources trophy was won by the Michel Colliery team, captained by Spencer Morgan. The men's open competition in the first-aid events was won by the Sullivan Mine team from Kimberley, captained by Warren Leach. Both teams represented the East Kootenay District at the Provincial competitions held in Cranbrook on June 25th and were successful in winning second place in their respective competitions.

Crows Nest Industries Limited Thomas F. Gleed, president, 2000 Washington Building, Seattle, Wash.; J. E. Morris, vice-president, Mines, Fernie; W. R. Prentice, vice-president, Sales and Executive, Fernie; J. L. Cleeve, vice-president, Finance, and secretary-treasurer, Fernie. This company, formerly known as The Crow's Nest Pass Coal Company Limited, has conducted large-scale coal-mining operations in the East Kootenay District since 1897, and its present operations are confined to the Michel Colliery. The coal is sold on the industrial market, and a large quantity is exported to Japan. A large amount of fines is also utilized in the making of coke, and the coke is sold in various parts of Western Canada and the United States. The operations are directed from a head office in Fernie.

Michel Colliery.—(49° 114° N.W.) J. E. Morris, manager; James Anderson, general mine overman; Paul Kusnir, safety supervisor; Harry Corrigan, afternoon-shift overman.

The colliery is at Michel, 24 miles northeast of Fernie, and is situated on the Crowsnest Pass branch of the Canadian Pacific Railway. It is a large colliery, and has been in operation since 1899. Present workings include four underground mines, three stripping operations, and a modern by-product plant that is located on the colliery-site. The mines are on both sides of the valley and are located at various elevations, having been opened mainly from the outcrops of the seams. With one exception they are named according to the seam that is worked and the direction of development. Those in the No. 10 seam are known as Balmer mines. All the mines are operated by the room-and-pillar system. They are highly mechanized, and a very high percentage of coal is mined by continuous miners. The equipment is chiefly operated by electricity. It is of the flame-proof type and has been approved for use in coal mines. The present transportation of coal at most of the mines is via shuttle cars and fast-moving belts which convey the coal to the surface, from where it is trucked to the preparation plant for cleaning and treatment. Diesel and battery locomotives are used at one of the mines.

The colliery employs on an average 550 men, of whom 400 are employed underground. The underground operations are under the direct supervision of five overmen and 35 firebosses. A brief description of the underground operations follows.

Balmer North Mine.—Irving Morgan, overman; James Walsh, Sidney Hughes, Thomas Taylor, Frank McVeigh, Roger Girou, William Verkerk, Henry Parsons, Spencer Morgan, Kenneth Kniert, and Harry Sanders, firebosses.

This mine, in No. 10 seam, is a new operation and is being worked to develop a large area of virgin coal on the north side of the Michel Valley. The mine is entered by two rock tunnels, each 1,150 feet long, which were started in September, 1965, and reached the seam in February, 1966. The present intentions are to develop a limited amount of workings on the west side of the McKay fault, extend the rock tunnels at a later date, and develop extensive workings on the east side of the fault. The portals of the rock tunnels are at an elevation of 3,850 feet. They are approximately 1 mile south of the preparation plant, and are accessible by a private road leading to the Baldy strip mine. The seam is 40 feet thick, dips at an angle of 15 to 20 degrees in a southwesterly direction, and is overlain by a fairly strong shale roof.

The mine averaged a daily production after reaching the seam of 750 tons of coal with a crew of 70 men. Six development levels were opened to the west of the rock tunnels, and four slopes are in the process of being driven to the dip of the levels. The roadways are in contact with the hangingwall of the seam, and the coal is mined by continuous miners, of which there were four in operation at the end of 1966. Following mining, the coal from all the continuous miners is loaded via loaders and shuttle cars, and the entire production from the mine is transferred to the surface by a series of fast-moving belt conveyors. At the surface the coal is trucked to the preparation plant. Total development in 1966 was 20,050 feet.

The mine is ventilated by a 100-horsepower electrically driven axivane fan which delivers 145,000 cubic feet of air per minute to the mine workings at a 2.86-inch water gauge. Small auxiliary fans and synthetic tubing are also used for directing the ventilation to the face of each continuous-miner working-place to contend with the rapid advancement of the roadways. The conditions in general were found to be satisfactory during the course of inspections, with exception to three instances which are reported more fully in another part of this report under the heading of "Dangerous Occurrences." Some difficulty was also experienced when the six main development levels encountered a large gravel washout in the seam, which has resulted in a temporary suspension of development work in that area.

Balmer No. 1 (South) Mine.—Arnold Webster, overman; Robert Doratty, Robert Taylor, Roger Pasiaud, Michael Tymchuk, Joseph Serek, and Stanley Menduk, firebosses.

This mine, operating in No. 10 seam, was opened in 1960 to develop a large area of virgin coal on the south side of the Michel Valley. The portals are 1 mile west of the preparation plant, and the workings are entered by three levels which have been driven from the outcrop of the seam, near creek level. The seam is 40 feet thick, dips at an angle of 30 degrees in an easterly direction, and is overlain by a moderately hard shale roof. The mine is one of the major operations at the colliery, and a description of the workings has been given in past Annual Reports.

The mine averaged a daily production of 1,200 tons of coal during 1966 with a crew of 90 men. There were two continuous miners in operation, and most of the activities were directed to the development and extraction of pillars in the No. 1 Incline and No. 1 slope districts. Pillars in the No. 1 Incline workings were extracted by the caving system, and those in the slope workings, where only the top section of the seam was worked, were extracted by the angling system. The whole operations in both workings were carried out by continuous miners, and a very rapid rate of extraction was made. Extraction of pillars in the slope area was completed toward the end of 1966. The production from the incline area was transported via shuttle cars and fast-moving belts to loading points on the main haulage level, from where it was loaded into 10-ton-capacity bottom-dumping cars and taken from the mine by diesel and battery locomotives. Production from the slope workings was transported directly to the surface by belt conveyors. At the surface the whole production from the mine was dumped into a large storage bin and later trucked to the preparation plant. Total development work at the mine during 1966 was 4,800 feet.

The mine is ventilated by a 100-horsepower electrically driven axivane fan which delivers 41,625 cubic feet of air per minute to the mine workings at a 1.5-inch water gauge. Auxiliary fans and tubing were also used with each of the continuous miners during the development of the workings. The conditions in general were found to be satisfactory during the course of inspections, with exception to the occurrences of two fatal accidents, which are reported more fully in another part of this report under the heading of "Fatal Accidents."

Balmer No. 2 (Prospect No. 22) Mine.—This mine, which was opened in June, 1965, to develop an area of coal in the No. 10 seam at a high elevation on Baldy Mountain, was abandoned during the early part of 1966 owing to the main levels encountering a large fault. There was no development in 1966, and a description of the workings has been given in the 1965 Annual Report.

No. 1 South Mine.—Henry Eberts, overman; Thomas Krall, John Krall, and Benjamin Volpatti, firebosses.

This mine was opened in September, 1966, and is being worked to develop an area of No. 1 seam coal between the abandoned workings of the old No. 1 mine and the outcrop of the seam, on the south side of the Michel Valley. The portals are at an elevation of 4,400 feet, and the workings are entered by three slopes which have been driven from the outcrop of the seam by a continuous miner. The seam is 9 feet thick, dips at an angle of 15 degrees in a southerly direction, and is overlain by a fairly strong shale roof.

The mine has averaged a daily production of 345 tons of coal with a crew of 29 men since its commencement, and most of the activities have been centred on the development of the slopes and connecting crosscuts with a continuous miner. The roof at most of the roadways is supported by rock bolts, and wooden bolts are used for reinforcing the coal ribs where necessary. The entire production is loaded via shuttle car and is transported from the mine by belt conveyors. At the surface the coal is dumped on the floor at present, then loaded into trucks by front-end loader, and trucked to the preparation plant along a 2-mile private roadway.

The mine at present is ventilated by a 25-horsepower electrically driven centrifugal fan which delivers 35,000 cubic feet of air per minute to the mine workings with a 2.1-inch water gauge. An auxiliary fan is also used for directing the air to the face of the working-places where the continuous miner operates. Conditions in general were found to be satisfactory during the course of inspections, but some difficulty was encountered at the faces of two of the main slopes at the year-end owing to a large fault. Total development during 1966 was 4,600 feet.

No. 1 North Mine.—Henry Eberts, overman. This mine, which was opened in October, 1965, to develop an area of coal in the No. 1 seam on the north side of the Michel Valley, was abandoned in September, 1966, owing to geological disturbances in the seam. The mine during its operation averaged a daily production of 450 tons with a crew of 36 men. The whole production was mined by a continuous miner and was transported to the surface by a series of fast-moving belt conveyors. Total development completed during 1966 was 8,300 feet.

"A" North Mine.—J. Whittaker, overman. This mine is operated in the "A" seam on the north side of the Michel Valley, and the portals are approximately half a mile east of the preparation plant. The mine was opened in 1951 and is entered by two pairs of levels which have been driven on level course from various elevations along the outcrop and follow the strike of the seam. The coal is 12 feet thick where normal but is very irregular and faulty. It dips at an angle of 15 to 20 degrees in a southwesterly direction and is overlain by a moderately strong shale roof. The mine has been one of the major operations at the colliery for many years, and a description of the workings has been given in past Annual Reports.

The mine averaged a daily production of 910 tons of coal during 1966 with a crew of 73 men. There were two continuous miners in operation for the greater part of the year, and most of the production was obtained from the extraction of pillars in the No. 1 Incline district. The remainder was obtained by the development and extraction of pillars from a small panel of workings below the No. 1 level. Both operations were carried out by continuous miners, and a very rapid rate of extraction was made. Some difficulties were experienced at times owing to faults and other geological disturbances, but these were generally overcome and a fairly high percentage of pillar extraction was made. The coal from both continuous miners was loaded via shuttle cars and fast-moving belt conveyors and transferred to loading points on the main haulage level, where it was loaded into 10-ton-capacity bottom-dumping cars and transported from the mine by diesel and battery locomotives. The operations were temporarily suspended in November, 1966, owing to economic reasons, and work was concentrated on the other mines. The total development work completed at the mine during 1966 was 16,400 feet.

The mine is ventilated by a 100-horsepower electrically driven axivane fan which delivers 83,000 cubic feet of air to the mine workings at a 2.5-inch water gauge. Auxiliary fans and synthetic tubing were also used for directing the air to the working-places. These quantities were found to be sufficient for the requirements of the mine. Other conditions were found to be satisfactory during the course of inspections, with exception to one incident which is reported more fully in another part of this report under the heading of "Dangerous Occurrences."

"C" North Mine.—Henry Eberts, overman; Michael Mihalynuk, Albert Littler, and Henry Travis, firebosses.

This mine is a new operation and was opened in November, 1966, to develop an area of workings in the top section of the "C" seam on the north side of the Michel Valley. The portals are at an elevation of 5,200 feet and can be reached by a 3½-mile private road leading from the preparation plant. The mine is entered by two levels which have been driven from the outcrop by a continuous miner and follow the strike of the seam. The coal is 7 feet thick, dips at an angle of 12 degrees in a southwesterly direction, and is overlain by a strong shale roof.

The mine averaged a daily production of 540 tons of coal during the short period it operated in 1966 with a crew of 25 men. Most of the activities were directed to the development of the two levels, and the whole operation was carried out by a continuous miner. The roof at all the roadways is supported by rock bolts, and the whole production of coal is transported from the mine by fast-moving belts. Total development completed was 3,080 feet.

The mine at present is ventilated by a 25-horsepower electrically driven centrifugal fan which delivers 25,000 cubic feet of air per minute to the mine workings at a 1-inch water gauge. The conditions were found to be satisfactory during the course of inspections.

No. 2 South Mine.—William Davey, overman. This was a small operation that was opened in January, 1966, to develop a small area of coal in the No. 2 seam in the old rock tunnels on the south side of the valley, and to test a new type of continuous miner known as a "Demag," which has been designed for thin seams. The mine averaged a daily production of 35 tons with a crew of seven men and was abandoned in June, 1966.

Prospect Tunnels and Exploration.—Louis Sclippa, fireboss. This work is part of an extensive exploration programme being conducted by the company to prospect and develop a number of known seams on the mountainside in the vicinity of the colliery. Six prospect tunnels were driven during 1966 for a total length of 665 feet, including crosscuts. One of the tunnels was on the Natal Ridge in the No. 8 seam, one on Baldy Mountain in No. 8 seam, and four on Sparwood Ridge in seams Nos. 1, 2, Upper 3, and 4. A total of 60,000 feet of trenching was completed, 40,000 feet of which was on the company's property, and 20,000 feet on Crown land. Over 20,000 feet of road was built to provide access to the drill-sites and as permanent hauling-roads. In addition to the above, approximately 120 holes were drilled to an average depth of 70 feet to prove coal-stripping possibilities along the outcrops of the No. 3 and No. 7 seams on Baldy Mountain and Natal Ridge. The work was under the direction of J. J. Crabb, exploration manager.

During 1966, 44,400 pounds of Monobel No. 4, 307 pounds of Monobel No. 14, 26,500 pounds of CXL-ite, and 35,543 electric detonators were used at the colliery for coal and rock blasting. No misfired shots were reported.

Five hundred and thirty-one tons of limestone dust was used for the application of inert dust over the roadways at the various mines to minimize the coal-dust hazard and for tamping shots. Monthly dust samples were taken at all the mines and analyzed. The samples were found to be above the minimum requirements needed for incombustible content.

Monthly examinations of workings were made at all the mines by the miners' inspection committees, and regular safety meetings were held each month at the colliery office. The various reports kept at the mines in compliance with the *Coal Mines Regulation Act* were examined periodically and found to be in order.

Baldy Strip Mine.—George Lancaster, foreman. This mine is on Baldy Mountain, 4 miles northwest of Michel. It is at an elevation of 5,000 feet and can be reached by means of a private road leading from the preparation plant. The coal is 40 to 60 feet thick and dips at an angle of 25 to 30 degrees in an easterly direction. The seam is believed to be the No. 10 seam. It can be traced for miles, and the company has operated several pits along the outcrop since 1948. The present activities in this seam are confined to No. 4B pit. It was opened in 1960 and is being worked on a contract basis. Removal of overburden was completed in 1961.

The mine produced 13,747 tons of coal during 1966 with a crew of one shovel operator for loading the coal and three truck-drivers for transporting the coal to the preparation plant. The operation was very restricted owing to the present state of the coal market. It was confined to a single-shift basis, and the mine was idle for several long periods. The whole operation was directed to the loading of coal with a power-shovel, and it is estimated there was approximately 50,000 tons of coal left exposed in the pit at the end of 1966.

" C " Seam Strip Mine.—George Lancaster, foreman. This mine is on the Natal Ridge, 2 miles northeast of Michel, and was opened in November, 1965, to operate an area of Upper and Lower " C " seam coal outcropping on the mountainside. The mine is at an elevation of 5,600 feet. It can be reached by a good gravel private road leading from the preparation plant. The seams pitch at an angle of 15 to 20 degrees in a southwesterly direction. The upper seam is 7 feet thick and the lower 11 feet. The coal is mined by bulldozer, and blasting restricted to rock work. An area of the overburden is first removed, then the top coal is pushed into the pit prior to removal of the rock parting between the two seams. The coal is then loaded by power-shovel and trucked to the preparation plant. Total production during 1966 was 58,152 tons of coal with a crew of 11 men. The work was carried out on a contract basis. Operations were temporarily suspended in December owing to a high moisture content in the coal due to climatic conditions.

No. 7 Seam Strip Mine.—J. Whittaker, foreman. This mine is on Natal Ridge, approximately 2 miles southwest of Michel, and was opened in September, 1966, to develop an area of No. 7 seam coal outcropping on the mountainside. The mine is at an elevation of 4,800 feet and can be reached by private road from the preparation plant. The seam is 31 feet thick and contains a 6-foot rock parting approximately 6 feet above the footwall. The coal pitches at an angle of 15 to 20 degrees in a southwesterly direction.

The mine produced 24,164 tons of coal during 1966 with a crew of 14 men. It was operated in a similar manner to that described at the " C " North strip mine.

" A " South Strip Mine.—George Lancaster, foreman. This mine, operating in the "A" seam on the Sparwood Ridge, south of Michel, was abandoned at the commencement of 1966 owing to depletion of coal reserves. The equipment was removed to the other strip mine. It had operated since 1961, and a description of the workings has been given in past Annual Reports.

Preparation Plant.—George Lancaster, superintendent. This plant is on the colliery-site and is located near the entrances to the old rock tunnels on the south side of the valley. It was built in 1936 but has been considerably modernized since that date. A description of the plant has been given in past Annual Reports. There were no major changes in 1966.

By-product Plant.—Ian Dufour, superintendent. This plant is adjacent to the preparation plant and employs 60 men. Present operations are confined to the Curran-Knowles ovens, and a description has been given in past Annual Reports. The plant produced 154,991 tons of coke, 16,544 tons of breeze (coke fines), and 1,188,499 gallons of tar during 1966. There were no major changes.

Coleman Collieries Limited (49° 114° N.W.) William Goodwin, mine superintendent. The coal-mining activities of this company in the East Kootenay District are confined to a large stripping operation on the interprovincial boundary on Tent Mountain, near Corbin. Most of the activities are on the Alberta side, but large quantities of coal have been produced from the British Columbia side during the past 15 years, where the seams extend into the Province. The present operations are confined to the No. 4 pit, which is at an elevation of 7,000 feet, and can be reached by means of private road leading from the No. 3 highway at the Crowsnest Lakes. The road is on the Alberta side, and all the production is taken to the company's preparation plant at Coleman. The pit has been in operation since 1954, and a detailed description has been given in past Annual Reports.

Most of the activities in 1966 were directed to rock work, and there was no production of coal from the British Columbia side. The rock work is part of an extensive programme that currently is being carried out to widen the No. 4 pit to expose a greater area of coal and enable the seam to be worked to a greater depth. Operations were suspended in December owing to climatic conditions and are not expected to be resumed until next spring.

Pacific Coal Limited (49° 114° S.W.) Registered office, 540, 1070 Douglas Street, Victoria. This company has conducted an exploration programme on Crown land in the Morrissey area, southeast of Fernie, since 1964. Most of the activities in 1966 were confined to the latter part of the year and were directed mainly to an area on the mountainside at an elevation of 6,000 feet on the Flathead Ridge. A crew of five men drove three prospect tunnels, totalling 291 feet (drifting and crosscutting), from the outcrops of two of the seams, and another crew of five men drilled two surface diamond-drill holes, totalling 1,400 feet, in the same vicinity. A limited amount of trenching was done along the outcrops, and several access roads were built on the drill-site and prospect tunnels. A number of bulk samples of coal were shipped from the prospect tunnels for testing. The work started in September and was suspended on December 2nd for the winter months.

Fernie Coal Mines Limited (49° 114° N.W.) Registered office, 510 West Hastings Street, Vancouver 2. This company, formed in 1966, conducted an exploration programme on Crown land in the vicinity of Mount Taylor, near Corbin, for a period of two months during the summer of 1966. A 4-mile access road was built to the property, and a bulldozer trenched several of the seams. One prospect tunnel, totalling 130 feet (drifting and crosscutting), was driven in one of the seams. The seam was over 50 feet thick but appeared to be in the vicinity of a fault. Several bulk samples of coal were shipped from the tunnel for testing. There were seven men employed.

NICOLA-PRINCETON INSPECTION DISTRICT

By David Smith

There was no coal production in 1966 in the Nicola-Princeton District. Imperial Metals and Power Ltd. continued testing, using local coal in conjunction with magnetite ore from the Lodestone Mountain deposits near Princeton, studying the feasibility of producing sponge iron locally.

NORTHERN INSPECTION DISTRICT

By David Smith

The coal mines of the Northern District produced a total of 11,975 tons of coal in 1966. The output is sold entirely on the domestic market, which limits all operations to seasonal work.

One fatal accident due to a roof fall was investigated. No other accidents and no dangerous occurrences were reported in this district in 1966. There were no prosecutions.

Peace River (56° 122° S.E.)

King Gething Mine This property is on Lot 1039, 12 miles west of Hudson Hope. In 1966, due to lack of markets, the mine remained closed.

Telkwa (54° 127° N.E.)

Bulkley Valley Collieries Limited Company office, Telkwa. T. D. Carnahan, general manager; L. Gething, superintendent; P. Baker and E. Ellis, firebosses. This property is on Goat Creek, a tributary of Telkwa River, about 7 miles southeast of Telkwa. Underground production in 1966 was 3,385 tons. The mine closed in March, and this terminated all underground operations. A small crew carried out a stripping operation, removal of overburden, during the summer months. The exposed coal seam lies to the north, downstream, from the portal of the old workings. Operations on surface were resumed in September, and production from this source totalled 8,590 tons. An average crew of nine men was employed.

Bowron River (53° 121° N.W.)

Northern Coal Mines Ltd. Registered office, 285—17th Street, West Vancouver. A. J. Garraway, manager. This company holds Coal Licence No. 148, covering Lot 9592 and parts of Lots 9591 and 9593, which lie in the vicinity of the Bowron River, about 30 miles due east of Prince George. In 1966 a new slope was started and has been driven down 300 feet at 120 degrees to intersect two known coal seams. A tipple for dumping cars and bins for storage and loading coal into trucks has been built. These workings are known as the Garraway mine and were flooded during inspection. The workings that were driven in 1964 and 1965 have not been abandoned to date but have been permitted to flood.

Surface exploration using a diamond drill continued. The company is considering the recovery of resin which occurs within the coal seam.

An average crew of seven men was employed. Permitted explosives and short-period delay detonators were used for blasting rock and coal. General working conditions were found to be satisfactory in the course of inspections. No accidents or unusual occurrences were reported. No coal was produced in 1966.

Inspection of Electrical Equipment and Installations at Mines, Quarries, and Well Drilling Rigs

By L. Wardman, Senior Electrical Inspector

ELECTRICAL POWER

In 1966 electric power was used by 43 mining companies in operations at 49 lode mines and three collieries. Thirty-eight metallurgical concentrators were operated during the year. Electric power was also used at 22 structural-material and industrial-mineral mines and quarries. Forty-nine drilling rigs were operated in the Province during the year.

Lode-metal Mines

Electrical equipment was installed at nine properties during the year and put into service. Of these nine installations, five were for use during development work, one was a pilot mill, and three were concentrators. Details of these installations are given under " Electrical Installations." At two properties, buildings to house crushing and concentrating equipment were built. Operations at six properties were suspended either temporarily or permanently.

Power Plants

The kilovolt-ampere capacity of mining-company-owned power plants that operated in 1966 was as follows:—

Prime Mover	Generator Kva. Capacity
Diesel engines	37,773
Hydro	15,770
Total	53,543

The electric power generated by these plants amounted to 469,014,458 kilowatt-hours. The power purchased from public utilities and from the generating division of Cominco Ltd. amounted to 104,331,000 kilowatt-hours. The total amount of power consumed at lode mines was 573,345,458 kilowatt-hours.

A general breakdown of the connected load at the operating mines was as follows:—

Equipment	Horsepower
Hoists (incline and shaft)	8,119
Hoists (scraper)	9,035
Fans (mine ventilating)	7,435
Pumps (mine)	8,825
Rectifiers and M.G. sets	8,673
Air compressors	23,488
Crushing	22,585
Sink float	2,105
Grinding	43,730
Concentrating	28,472

Equipment	Horsepower
Conveyors	2,834
Pumps (mill and fresh water)	16,312
Shovels and rotary drills	4,000
Workshops	3,265
Miscellaneous	7,252
Total	196,130

In addition to electrically powered equipment, there was in use approximately 19,065 horsepower of prime movers driving direct-connected or belt-connected equipment as follows:—

Prime Mover	Horsepower
Diesel engines	17,765
Hydro	1,300
Total	19,065

On the haulage systems there were in use 146 battery locomotives, 105 trolley locomotives, and 22 diesel locomotives.

Structural-material and Industrial-mineral Mines and Quarries

As in 1965, electric power was used at 22 structural-material and industrial-mineral mines and quarries. Power is purchased from public utilities for all except three of these operations. At the three operations, company-owned plants of 5,668 kilovolt-amperes produced 19,715,695 kilowatt-hours of power, and this added to 15,366,102 kilowatt-hours of purchased power makes a total of 35,081,-797 kilowatt-hours consumed during the year.

A general breakdown of the connected load was as follows:—

Equipment	Horsepower
Hoists and aerial tram	292
Hoists (scraper)	530
Fans	105
Pumps	974
Rectifiers and M.G. sets	38
Air compressors	747
Electric drills and shovels	584
Crushing, rock reject, and drying	6,040
Conveyors	3,541
Screens	747
Milling	3,978
Workshops	409
Miscellaneous	2,045
Total	20,030

At these properties there was in addition direct-driven equipment totalling 3,978 horsepower.

One battery locomotive was in use for underground haulage.

Coal Mines

Three collieries, the same number as in 1965, were in operation. The distribution of the connected load was as follows:—

	Horsepower
Surface—	
Air compressors	2,800
Ventilating	345
Hoisting	552
Haulage	2,143
Coal washing and screening	46
Pumping	65
Coke production	1,573
Miscellaneous	1,121
Total	8,645
Underground—	
Ventilation	303
Pumping	265
Air compressors	700
Coal-cutters	100
Continuous miners	1,950
Shuttle cars	735
Loading	220
Conveying	915
Hoisting	125
Total	5,313
Total for surface and underground	14,053

Six battery locomotives and two diesel locomotives were in use for surface and underground haulage.

A total of 2,503,551 kilowatt-hours of electric power was used for mining and coal-processing during the year.

ELECTRICAL INSTALLATIONS

LODE MINES

Tide Lake Flats (56° 130° S.E.)

Granduc Mine
Granduc Mines Limited

The 225-horsepower M.G. set installed in 1965 was replaced with a rectifier capable of supplying 250 horsepower of direct current to the trolley system. A tandem ventilating fan, each fan driven by a 50-horsepower motor, was installed to ventilate the tunnel. An overhead line was built to the new camp and a 75-kilowatt generator was installed for the trailer camp. These additions were made at the Tide Lake camp. No changes or alterations were made at the Leduc camp.

Alice Arm (55° 129° S.E.)

Alice
British Columbia Molybdenum Limited

A temporary electric-power system was installed to provide power for camp and mill area during the building of a concentrator. The diesel-driven power units consist of one 75-kw., one 125-kw., one 500-kw., and two 150-kw. generators.

By the end of the year the crusher and concentrator buildings were completed but most of the electrical work was yet to be done.

Power will be supplied by British Columbia Hydro and Power Authority at 64 kv. Three 10/13.3 M.V.A. 64–4.16-kv. transformers will step the power down for distribution to the plant and mine.

The crushing plant will contain primary, secondary, and tertiary crushers driven by two 300- and one 450-horsepower 4,160-volt motors respectively.

The grinding circuit will consist of three mills, each driven by a 1,250-horsepower 4,160-volt synchronous motor. There are also two regrind mills driven by 40- and 75-horsepower motors respectively.

The flotation circuit will consist of 40 flotation cells driven by twenty 25-horsepower motors, 18 flotation cells driven by nine 10-horsepower motors, 12 flotation cells driven by six 5-horsepower motors, and 8 flotation cells driven by four 3-horsepower motors.

Other equipment will consist of ore feeders, pumps, and filtering equipment.

The open-pit equipment will be supplied at 4,160 volts through a 1,200-ampere service.

MORESBY ISAND (52° 132° N.E.)

Tasu
Wesfrob Mines Limited
The underground crushing chamber, the cobbing-plant building, the concentrator building, and the power-house were completed, but most of the wiring was yet to be done.

The power plant will contain five 2,760-kva. 4,160-volt diesel-driven generators.

The primary crusher will be installed underground and will be driven by a 350-horsepower 600-volt motor. Two conveyors will transfer the ore to the coarse-ore stockpile near the cobbing plant.

The cobbing plant will contain a secondary crusher and two tertiary crushers driven by three 200-horsepower 600-volt motors. In the cobbing plant there will be also two screens driven by two 25-horsepower motors, four cobbers driven by four 5-horsepower motors, elevators, and conveyors.

The concentrator will contain three rod mills driven by three 400-horsepower 4,160-volt motors, two pebble mills driven by two 1,700-horsepower 4,160-volt motors, 143 flotation cells driven by seventy-three 15-horsepower motors, and 24 magnetic separators driven by twenty-four 3-horsepower motors. Other equipment will consist of air compressors; vacuum pumps; sand, sump, and water pumps; thickeners; filters; and conveyors.

Jessie, Adonis, Rose
Jedway Iron Ore Limited
A 200-kva. transformer-station was built at the 475-foot level adit to supply power for an air compressor, ventilation fan, and mine pumps. At the power plant a new water-cooling plant was built for a 100-horsepower diesel-electric generator.

BABINE LAKE (54° 126° N.E.)

Granisle Mine
Granisle Copper Limited
A 5,000-tons-per-day concentrator was built and put into operation. At the present time eleven 500-kw. diesel-driven generators supply power for the concentrator and mine. When a power-line has been completed to the property, power will be purchased from the British Columbia Hydro and Power Authority.

The primary crushing plant consists of one cone crusher driven by a 350-horsepower 4,160-volt induction motor. The secondary crushing plant consists of a secondary crusher and a tertiary crusher, driven by two 350-horsepower 4,160-volt induction motors. Other equipment consists of three screens, conveyors, feeders, and dust-collecting equipment.

In the concentrator there are three mills driven by three 1,100-horsepower 4,160-volt synchronous motors, a regrind mill driven by a 125-horsepower 550-volt motor, 80 flotation cells driven by forty 15-horsepower 550-volt motors, and 14 flotation cells driven by seven 10-horsepower motors. Other equipment consists of pumps, thickeners, and filters.

SMITHERS (54° 127° N.E.)

Glacier Gulch
Climax Molybdenum (B.C.) Ltd.

Two diesel-driven generators, one of 125 kva. and the other of 95 kva., were installed to supply power and lighting during exploration and development work. Dual fans driven by two 40-horsepower motors are used to ventilate the mine.

HOUSTON (54° 126° S.W., 54° 127° S.E.)

Silver Queen
Nadina Explorations Limited

The following equipment was installed: Two 50-kw. 440-volt generators driven by a Caterpillar diesel and a Bolinger diesel respectively, a panelboard and transformers to control and supply camp lighting, two rectifiers for charging locomotive batteries, and a 7-horsepower fan for mine ventilation. The camp buildings were wired for lighting. Three battery locomotives are in use underground.

B
Phelps Dodge Corporation of Canada, Limited

A camp to accommodate 40 men was built at Haven Lake and wired for lighting. A 43-kw. diesel-driven generator was installed to supply power.

TAHTSA LAKE (53° 127° N.E.)

Emerald
Emerald Glacier Mines Ltd.

A concentrator building was built and the milling equipment from the Silver Standard mill was installed. Power is supplied by two diesel-driven generators at 440-volts 3-phase. One generator is 125 kva. and the other is 100 kva. A 9-kva. single-phase plant was installed for lighting when the main plant is shut down.

A general description of the equipment in the mill may be obtained from the 1948 Annual Report, page 249 (Silver Standard Mines Limited).

ENDAKO (54° 125° S.E.)

Endako Mine
Endako Mines Limited

The following equipment was installed: A primary grinding mill driven by a 700-horsepower synchronous motor with a 15-horsepower M.G. set for direct-current excitation, four 100-horsepower discharge-pump motors to replace four 75-horsepower motors, one new reclaim pump driven by a 125-horsepower motor, one 100-horsepower motor to replace 75-horsepower motor on secondary-crusher dust fan, one 100-horsepower motor to replace 75-horsepower motor on tailings pump, a semi-automatic oxide canning system driven by 20 fractional horsepower motors, a dust-collecting system for conveyor transfer houses Nos. 6 and 7 equipped with motors of a total load of 65-horsepower, a new 125-foot thickener equipped with motors of a total load of 10 horsepower, screw conveyors for roasting plant with motors of a total load of 30 horsepower, pumps with motors of a total load of 315 horsepower, and four welders of 60 horsepower each.

Four 250-foot branch lines and one 10-yard 350-horsepower shovel were installed in the pit.

BRIDGE RIVER (50° 122° N.W.)

Bralorne Mine
Bralorne Pioneer Mines Limited

Electrical work done during the year consisted of installing three 50-kva. transformers on 4100 level at the Queen shaft, installing new power and signal cable from 4100 level to 4300 level in the Queen shaft, installing a new pumping-station on 4300 level, and completing the wiring at 4200 and 4300 levels.

HIGHLAND VALLEY (50° 120° S.W.)

Bethlehem Mine
Bethlehem Copper Corporation Ltd.

The remaining equipment required to raise the mill tonnage to 10,000 tons per day was installed. This consisted of two mills driven by two 1,250-horsepower synchronous motors; one main 2,500-kva. 4,160–600-volt 3-phase transformer; three 5,000-kva., 138-kva., and 60–4.16-kv. single-phase main transformers; and one main switchgear section.

MERRITT (50° 120° S.W.)

Craigmont Mine
Craigmont Mines Limited

The No. 34 substation on 2852 level was removed and the No. 19 substation at 3000 level portal was relocated, and the transformers were replaced with three 25-kva. 4,160–600-volt transformers connected delta-delta. The installation of a 125-horsepower service hoist on 3500 level was commenced. Electric lighting in the main office extension was completed.

BRENDA LAKE (49° 120° N.E.)

Brenda Mine
Brenda Mines Ltd.

A pilot plant was installed for a test run of the ore. The crushing plant is driven by a diesel engine. For the mill, power is supplied by a 200-kw. 480-volt 3-phase diesel-driven generator. The mill equipment consists of a ball mill driven by a 100-horsepower motor, a rod mill driven by a 60-horsepower motor, six flotation cells driven by three 5-horsepower motors, six flotation cells driven by three 1½-horsepower motors, 18 flotation cells driven by nine ½-horsepower motors, two regrind mills driven by two 3-horsepower motors, two conveyors driven by a 5- and a 3-horsepower motor respectively, a classifier driven by a ¼-horsepower motor, a vacuum pump and filter each driven by 5-horsepower motors, and a thickener driven by a ½-horsepower motor.

ROSSLAND (49° 117° S.W.)

Coxey
Red Mountain Mines Limited

A 500-tons-per-day mill was built and put into operation. Power is supplied from the 60,000-volt West Kootenay Power and Light Company power-line stepped down to 2,400 volts. The 600-horsepower ball-mill motor is supplied at 2,400 volts, while the remainder of the motors are supplied at 600 volts through three 150-kva. step-down transformers.

The crushing plant consists of a jaw crusher driven by a 125-horsepower motor, a cone crusher driven by a 150-horsepower motor, feeders, and conveyors.

In addition to the ball mill mentioned previously, the mill equipment consists of a regrind mill driven by a 75-horsepower motor, 12 flotation cells driven by six 10-horsepower motors, six cleaner flotation cells driven by three 5-horsepower motors, 10 recleaner cells driven by five 2-horsepower motors, pumps, and storage tanks.

Phoenix (49° 118° S.W.)

Phoenix Mine
The Granby Mining Company Limited
Phoenix Copper Division

Six thousand feet of power-line was built to a new pumping area and a 200-horsepower ball-mill motor was replaced with a 250-horsepower motor.

Aspen Creek (49° 117° S.E.)

H.B.
Cominco Ltd.

A scraper hoist driven by a 30-horsepower motor was installed underground and an electric fan driven by an 11-horsepower motor was installed on 3300 level. A 600-c.f.m. diesel-driven compressor was installed on the surface to supplement the stationary compressors.

Operations were suspended on October 31st for an indefinite period. A small fire occurred in the compressor building on July 25, 1966, at 6.45 p.m. At the end of the day shift an attempt was made to shut down the air compressor but the circuit-breaker would not trip out, so the unit was left running, apparently with the field circuit de-energized, causing the field discharge resistor to overheat and ignite an accumulation of oily lint and dust. The fire was extinguished with little damage being done.

Iron Mountain (49° 117° S.E.)

Jersey
Canadian Exploration Limited

In the Jersey mine on 4800 level a ventilating fan driven by a 60-horsepower motor was installed. To supply this fan 1,200 feet of 2,300-volt power-line, three 25-kva. 2,300–460-volt transformers, 500 feet of three-conductor armoured cable and switchgear were installed.

In the underground crushing chamber a full-wave rectifier was installed to replace an M.G. set.

A 1,100-kva. capacitor was installed at the Tungsten mill substation for power-factor improvement. It is automatically switched in an out of circuit.

At the lead-zinc mill a platform to hold six 25-kva. transformers was built and three 25-kva. transformers were installed.

Nelway (49° 117° S.E.)

Reeves MacDonald Mine
Reeves MacDonald Mines Limited

Three thousand feet of 1/0 A.W.G. ACSR power-line was built to the Annex mine, and two 50-kva. transformers for power and 25-kva. for lighting were installed at the portal. Two new Woods fans were installed for mine ventilation. A Cameron pump driven by a 30-horsepower motor was installed at the river.

RIONDEL (49° 116° N.W.)

Bluebell
Cominco Ltd.
The 6,900-volt transmission-line was extended from the Comfort area to North Bay, where three 150-kva. 6,900–550-volt transformers were installed. The 24-inch dual ventilating fans at No. 2 winze were replaced with 30-inch dual fans driven by two motors totalling 106 horsepower.

RETALLACK-THREE FORKS (50° 117° S.E.)

Caledonia
Blue Star Mines Limited
No additions or alterations were made at the mill. At the mine a diesel-driven 2-kva. plant was installed for lights in the dry and for charging cap-lamp batteries. A 50-volt 50-ampere generator was installed for charging the locomotive battery.

KIMBERLEY (49° 115° N.W.)

Sullivan Mine
Cominco Ltd.
At the mine the electrical work outlined in the 1965 Annual Report was completed. At the concentrator, remote-control equipment was installed for controlling the locomotives while unloading ore and loading float.

A plant for crushing Pine Point ore was built adjacent to the railroad above the mill. It consists of a jaw crusher and a cone crusher driven by two 100-horsepower motors; a set of rolls driven by two 75-horsepower motors; a screen driven by a 20-horsepower motor; six conveyors driven by one 15-, one 20-, and four 5-horsepower motors respectively; and a pump driven by a 50-horsepower motor.

Other work consisted of installing switchgear for 14 motor installations.

WASA (49° 115° N.W.)

Estella
Giant Soo Mines Limited
A 150-tons-per-day concentrator was built, and the following equipment was installed: A jaw crusher driven by a 20-horsepower motor; a gyratory crusher driven by a 50-horsepower motor; a feeder, screen, and two conveyors driven by four 5-horsepower motors; a dust fan driven by a 10-horsepower motor; an 8- by 6-foot ball mill driven by a 125-horsepower motor; 10 flotation cells driven by five 7½-horsepower motors; eight flotation cells driven by four 5-horsepower motors; a classifier, filter, and five pumps driven by seven 5-horsepower motors.

REVELSTOKE (51° 118° S.E.)

J and L
Westairs Mines Limited
A Curtis Wright 30-kva. 120/208-volt 3-phase 60-cycle diesel-driven generator was installed to supply power for lighting and locomotive-battery charging. Three 15-kva. transformers connected star-delta step the voltage up for the battery-charger. One thousand feet of overhead line was built to the camp-site.

HOWE SOUND (49° 123° N.E.)

Britannia Mine
The Anaconda Company (Canada) Ltd.
In the Victoria mine a 200-kva. 6,600–440-volt transformer was moved from 2800 level to 3500 level. A 200-kva. diesel-driven generator and a 50-ton-per-hour crushing plant was installed at Jane Basin.

TEXADA ISLAND (49° 124° N.W.)

Texada Mine
Texada Mines Ltd.
Five hundred kvar. of capacitors were installed throughout the mine and plant, which raised the power factor to 94 per cent. The underground electrical system was extended to supply equipment in new headings. On the surface a 525-kva. transformer-station was installed to supply the Lake pit operations.

QUATSINO-PORT HARDY (50° 127° S.W.)

Yreka
Minoca Mines Ltd.
A concentrate-loading system was installed, which increased the connected motor load to 100 horsepower.

Merry Widow, Kingfisher
Empire Development Company Limited
A magnetic scalper was installed at the mine consisting of a 48-inch conveyor with a magnetic head pulley and driven by a 10-horsepower motor. A 7.5-kva. rectifier supplies direct current for the pulley. In January the concentrator was burned down but was later rebuilt.

Old Sport
Coast Copper Company Limited
Two 40-horsepower ventilation fans were installed for mine ventilation and one 6-ton Atlas locomotive was installed for mine haulage.

A locomotive battery caught fire while being moved into the charging-station north of the No. 2 winze on 5100 level. Considerable smoke was produced, but most of it went out through the ventilation raise. The cause of the fire was not determined.

ZEBALLOS (50° 126° S.W.)

F.L.
Zeballos Iron Mines Limited
A new 440-volt overhead line was built to B level to replace the old line, and additional mine ventilation fans were installed at this level. A new blasting-line to underground was installed.

BUTTLE LAKE (49° 125° N.W.)

Lynx, Paramount, Price
Western Mines Limited
A hydro-electric plant, a crushing plant, and concentrator were built and tested. The hydro-electric plant consists of one 3,600-kva. unit. The equipment in the crushing plant consists of a jaw crusher and two cone crushers driven by three 150-horsepower motors, a feeder driven by a 40-horsepower motor, a Dillon screen driven by a 10-horsepower motor, a conveyor driven by a 25-horsepower motor, and two dust fans driven by a 20- and a 7½-horsepower motor respectively.

The equipment in the concentrator consists of a rod mill driven by a 350-horsepower motor, a ball mill driven by a 400-horsepower motor, and 66 flotation cells driven by thirty-three 10-horsepower motors. Other equipment consists of conveyors, pumps, and filters. The two grinding-mill motors operate at 4,160 volts. All the others operate at 550 volts.

On No. 8 level a 75-horsepower ventilation fan was installed and on No. 12 level a 25-horsepower pump. Two rectifiers and one motor generator set was installed for charging locomotive batteries.

An assay office and a general service building were built and wired.

KENNEDY LAKE (49° 125° S.E.)

Brynnor Mine
Brynnor Mines Limited
(Kennedy Lake Division)

A new Magna-Blast air circuit-breaker was installed for No. 1 hoist. A 500 M.C.M. cable was installed from the surface to the first level. A power-line was installed for the new camp-site at the mine-site.

STRUCTURAL-MATERIAL AND INDUSTRIAL-MINERAL MINES AND QUARRIES

McDAME (59° 129° S.W.)

Cassiar Asbestos Corporation Limited A 400-kva. diesel-driven generator was installed in the power-house, increasing the generating capacity to 5,466 kva.

WINDERMERE (50° 115° S.W.)

Western Gypsum Products Limited A transportable primary crushing plant was installed at the quarry. The power unit is a DT-817 International diesel which drives by belts the crusher and a 100-kw. generator. The generator supplies power to an apron feeder driven by a 10-horsepower motor and eight conveyors driven by two 20-, one 10-, four 7½-, and one 5-horsepower motors.

VANANDA (49° 124° N.W.)

Ideal Cement Company Limited A transportable crusher plant consisting of two crushers, screens, and conveyors was installed on the property. It is powered by a D-333 Caterpillar driving a 120-kva. generator. In the main plant three 30-kva. capacitors were installed to improve power factor.

Imperial Limestone Company Limited The installation of electrical equipment to operate on British Columbia Hydo and Power Authority power was completed. Motors and controls for four crushers were installed. These are respectively 40, 60, 75, and 125 horsepower.

COAL MINES

TELKWA (54° 127° N.E.)

Bulkley Valley Collieries Limited All underground work was discontinued at the end of June, and an open-pit operation was started later in the year. A bin was built in which the trucks could dump, and a pan feeder driven by a 5-horsepower motor and a belt conveyor driven by a 7-horsepower motor were installed to move the coal to the primary crusher.

COMOX (49° 124° N.W.)

Comox Mining Company Limited The mine was closed on September 23, 1966, and all equipment has since been removed.

EAST KOOTENAY (49° 114° N.W.)

Michel Colliery
Crows Nest Industries Limited

Three new mines were put into production. They are No. 1 Seam South, " C " Seam North, and Balmer North.

In No. 1 Seam South mine, three 200-kva. 3-phase permissible transformers were installed to supply a continuous miner, a shuttle car, conveyors, pump, fans, and compressor.

In "C" Seam North mine, three 200-kva. 3-phase permissible transformers were installed to supply a continuous miner, shuttle car, loader, conveyor, pump, and compressor.

In Balmer North mine, thirteen 200-kva. 3-phase permissible transformers were installed to supply four continuous miners, loader, two shuttle cars, conveyors, fans, and pumps.

There were six incidents of damaged cable and one of a failure, due to moisture, of the fibre insulation in a plug connector. One cable damage caused arcing which ignited combustible dust, and the failure of the fibre insulation in the plug connector also caused arcing which was assumed to have ignited a bleeder of methane. In all these incidents the protective devices functioned to isolate the circuits. There was also a case of conveyor-belt heating due to a jammed tail pulley. About 1½ feet of belting melted where it passed over the drive pulley. Further details of these incidents are given under "Dangerous Occurrences."

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