Minister of Mines and Petroleum Resources

PROVINCE OF BRITISH COLUMBIA

ANNUAL REPORT

for the Year Ended December 31

1969

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1970

BRITISH COLUMBIA DEPARTMENT OF MINES AND PETROLEUM RESOURCES

VICTORIA, BRITISH COLUMBIA

HON. FRANK RICHTER, *Minister.*

K. B. BLAKEY, *Deputy Minister.*

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

Colonel the Honourable J. R. NICHOLSON,
P.C., O.B.E., Q.C., LL.D.,
Lieutenant-Governor of British Columbia.

MAY IT PLEASE YOUR HONOUR:

The Annual Report of the Mineral Industry of the Province for the year 1969 is herewith respectfully submitted.

FRANK RICHTER,
Minister of Mines and Petroleum Resources.

Minister of Mines and Petroleum Resources Office,
June 1, 1970.

James Dickson, retired Chief Inspector of Mines, died in Vancouver on September 8, 1969, in his eighty-eighth year. He was born in Scotland and studied mining engineering at the Royal Technical College, Glasgow. He came to British Columbia in 1912 and, after holding official positions in several Vancouver Island coal mines, became manager of the Reserve mine of the Western Fuel Company. In 1919 he left this position to join the staff of the Department of Mines as Inspector of Mines and member of the Board of Examiners for coal-mine officials. He became Chief Inspector in 1926, which position he held until his retirement on April 30, 1947. During his long tenure of office he was instrumental in introducing many sound safety provisions in both the Coal and Metalliferous Mines Regulation Acts. He was especially active in promoting mine-rescue work and in the training of mine personnel for this very important and necessary phase of safety work. Mr. Dickson is survived by two daughters and one son.

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ANNUAL REPORT OF THE MINISTER OF MINES AND PETROLEUM RESOURCES, 1969

CHAPTER I

Introduction

A report on the mineral industry in the Province has been published annually since 1874. From 1874 to 1959 it was the Annual Report of the Minister of Mines, and since 1960 it has been the Annual Report of the Minister of Mines and Petroleum Resources.

Starting with 1969, the Annual Report of the Minister of Mines and Petroleum Resources will contain a review of the mineral industry, and chapters dealing with Statistics, Departmental Work, Petroleum and Natural Gas, and Inspection of Mines. Technical reports on geology, mineral exploration, metal mines, placer, industrial minerals and structural materials, and coal which formerly were included in the Annual Report are being published separately in a volume entitled *Geology, Exploration, and Mining in British Columbia*. A new series of annual publications of that name begins with the 1969 volume.

This Annual Report contains a general review of the mineral industry as a whole. The chapter on Statistics records the mineral production of the Province in all its phases and in considerable detail. Current and past practices in arriving at quantities and in calculating the values of products are outlined.

The organization of the Department and the work of its various branches are outlined briefly in the chapter on Departmental Work.

The chapter on Petroleum and Natural Gas contains a general review and records in considerable detail the development and production statistics of that expanding industry.

Information concerning mine safety, fatal accidents, dangerous occurrences, etc., and the activities of the Inspection Branch are contained in the chapter on Inspection of Mines.

Review of the Mineral Industry

By Stuart S. Holland

Production.—The value of the 1969 production of British Columbia's mineral industry amounted to $464,302,695. A new record was established for the eighth successive year and the previous year's total was exceeded by $59,274,207 or 14.6 per cent. The total value to date has now reached $7,160 million.

The values of the four classes of products are as follows:—

	1968	1969	Change (Per Cent)
Metals	$250,912,026	$294,175,536	+17.2
Industrial minerals	26,056,782	21,222,411	−18.6
Structural materials	45,189,476	55,331,584	+22.4
Fuels	82,870,204	93,573,164	+12.9

The increase in metal production by 17.2 per cent was due to the remarkable increases in the production of copper ($24.3 million) and molybdenum ($14 million). The copper increase combined an increased quantity with an increase in average price from 54.22 to 66.66 cents per pound; the molybdenum increase largely was due to increased production at Endako mine.

The decrease in value of industrial minerals was due to a reduction in value of sulphur ($5.8 million). Not only was the production from Jefferson Lake down but there was a large reduction in the arbitrary price used in valuing the sulphur content of the sulphuric acid produced by Cominco Ltd.

Structural materials increased in value (by $10.1 million) mostly due to increased value of cement, sand, and gravel.

The value of fuels increased by 12.9 per cent despite decreased production of coal. Both crude oil and natural gas continue to increase in quantity and value. In 1969, coal contributed 7.3 per cent of the total value but, with the start of bulk shipments of coal to Japan, this percentage should increase considerably in 1970.

During the next few years it is anticipated that the total value of production will continue to increase. New production of copper is expected from several important properties proceeding toward production, and several properties in production in 1970 or shortly thereafter will contribute significantly to the output of molybdenum. Production of coal will increase greatly because of deliveries to Japan starting in April, 1970. Petroleum and natural gas production are expected to maintain a steady growth.

Provincial Revenue.—Direct revenue to the Provincial Government derived from the entire mineral industry in 1969 was as follows:—

Free miners' certificates, recording fees, lease rentals, assessment payments, etc.	$1,779,378.16
Royalties on iron concentrates	252,489.34
Rentals and royalties on industrial minerals and structural materials	239,024.00
Fifteen-per-cent mining tax (received during 1969)	3,725,329.00
Coal licences	78,605.90
Petroleum and natural gas rentals, fees, etc.	10,339,973.73

Sale of Crown reserves	$21,646,451.54
Royalties on oil, gas, and processed products	12,796,833.56
Miscellaneous	19,625.19
Total	$50,877,710.42

Metal Mining.—In 1969, 60 mines produced 31.8 million tons of ore. Eight mines produced more than 1 million tons each and nine open-pit mines produced more than 21 million tons.

In 1969, 29 concentrators were in operation. A new concentrator, capacity 24,000 tons per day, was completed at Brenda mine. Concentrators with total capacity of 10,575 tons per day were under construction at the Granduc, Greyhound, Magnum, Silverquick, Mount Copeland, and True Fissure mines.

Exploration and development work reached a sufficiently advanced stage for production to be expected within the next few years from the following properties: Island Copper (copper-molybdenum) at Rupert Inlet; Lornex and Alwin (copper) in Highland Valley; Newman (copper) on Babine Lake; Ingerbelle and Copper Mountain (copper) at Princeton; Nadina (silver-lead-zinc) at Owen Lake; Invincible (tungsten) at Salmo; Annex (lead-zinc) near Remac; and Ruth Vermont (silver-lead-zinc) near Golden.

During the year mining and concentrating operations were terminated by Zeballos Iron Mines Limited (FL mine).

The Trail smelter treated 7,456 tons of crude ore and 359,937 tons of concentrates from British Columbia as well as a large tonnage of concentrates, ore, and scrap from sources outside the Province. A total of 2,220,867 tons of concentrates was shipped to foreign smelters. Of the total metal production of the Province, concentrates representing 9.0 per cent of the total value were shipped to American smelters and concentrates representing 43.3 per cent of the total value were shipped to Japanese smelters.

DESTINATION OF BRITISH COLUMBIA CONCENTRATES

Smelters	Gold-Silver	Lead	Zinc	Copper	Nickel-Copper	Iron
	Tons	Tons	Tons	Tons	Tons	Tons
Trail	2,707	157,603	199,627	.....	.....	.....
United States	.....	9,542	83,517	24,362	.....	.....
Japan	.....	.....	.....	268,892	16,760	1,817,794

Most molybdenum is sold as molybdenite concentrate, but Endako Mines Ltd. convert about 31 per cent of their output to molybdic oxide. Destinations of British Columbia molybdenum are as follows: Canada and the United States, 10 per cent; Japan, 14 per cent; and the bulk of the remainder sold in Europe, with the United Kingdom taking 27 per cent.

Prospecting for, and exploration and development of, mineral deposits continued at a high level of activity throughout the Province. The chief interest was in copper, copper-molybdenum, and molybdenum deposits in the Omineca, Kamloops, Cariboo, and Atlin Mining Divisions. The number of mineral claims recorded in 1969 was 84,665, a 40-per-cent increase over 1968. Slightly less exploratory diamond drilling but slightly more percussion drilling was done in 1969. The employment statistics for exploration work were slightly less in 1969, 11,466 man-

months, compared with 11,794 man-months in 1968. About 430 geological, geochemical, and geophysical reports were accepted by the Department in 1969. They represent not less than $2,060,000 in work done on claims.

The statistics of exploration and development of mineral deposits and mines are presented as recorded on Dominion Bureau of Statistics forms. Comparable figures for petroleum and natural gas are not available.

EXPLORATION AND DEVELOPMENT EXPENDITURES, 1969

	Physical Work	Land Costs	Head Office Administration, Etc.	Total
Exploration—prospecting and undeclared mines—422 companies	$34,357,000	$2,749,000	$7,272,000	$44,378,000
Exploration on or near declared mines—27 operating companies	$4,545,000	461,000	446,000	5,452,000
Development on declared or operating mines—				
Thirteen development companies	$64,757,000			
Twenty-two operating companies	19,837,000			
	$84,594,000	269,000	5,204,000	90,067,000
Totals	$123,496,000	$3,479,000	$12,922,000	$139,897,000

The foregoing represent minimum amounts, but the response by the industry is sufficiently complete to provide figures that are substantially correct. Exploration includes all work up to the point when a company declares their intention of proceeding to production.

Departmental records indicate that a total of not less than 11,500 man-months of work was done by company and contractor employees in prospecting for and exploring metallic mineral deposits. This figure is not comparable with the one in Table 10 which shows the total company employees reported to the Dominion Bureau of Statistics.

Major operating expenditures in 1969 by companies involved in the exploration and mining of metals, minerals, and coal were as follows:—

Mining operations—metals, minerals, coal	$133,903,585
Structural materials operations	13,488,952
Capital expenditures	70,738,768
Repair expenditures	21,296,769
Exploration and development	139,897,000
Total	$379,325,074

Capital and repair expenditures are listed separately because of difficulties in allocating them consistently. Actually most of the repair expenditures should be applied to mining operations, and most of the capital expenditures to exploration and development.

Coal Mining.—In 1969 the coal-mining industry of British Columbia was in transition from a dormant period which had existed since about 1950 to a period of expansion and greatly increased production resulting from the sustained demand for coking-coal by the Japanese steel industry. The 15-year contracts signed by Kaiser Resources Ltd., and the prospective contracts being negotiated by other companies in the East Kootenay coalfield seem to indicate an immediate increase

in output to about 5 million tons per year, followed by a further increase to 9 million tons and perhaps even higher. In order to carry out this expansion, a tremendous increase in facilities both at the mines and at the shipping points, together with far-reaching changes in railway transportation methods, has been necessary. The new bulk-coal shipping terminals at Roberts Bank and at Neptune Terminal in Vancouver Harbour were substantially completed by the end of the year.

The amount of coal sold and used in 1969 amounted to 852,340 short tons valued at $6,817,155, a decrease of $771,834 or 10.2 per cent. Almost all this production (99 per cent) was from the Michel operations of Kaiser Resources Ltd.

Coal exploration has been stimulated by the more favourable outlook for sales by the industry. Not only has exploration been active in the East Kootenay coalfield, but a number of other coal areas in the Province have been re-examined. Perhaps the most significant discovery was east of Sukunka River, 36 miles south of Chetwynd, where reserves of high-grade coking-coal in relatively flat-lying seams are being explored.

Petroleum and Natural Gas.—The 1969 value of production of the petroleum industry amounted to $86.8 million. For the fifth successive year there was a substantial gain in production. Gains in production compared to 1968 for crude oil were 16.3 per cent in value and 14.2 per cent in quantity, and for natural gas were 13.7 per cent in value and 15.3 per cent in quantity. Crude oil was second only to copper in value. Secondary recovery schemes from the oilfields producing from Triassic formations accounted for the majority of the crude-oil production. Large increases in gas production came from northern fields producing from reservoirs in Devonian formations. Eighty-five per cent of the Province's crude-oil production came from the Boundary Lake, Peejay, Milligan Creek, Inga, and Weasel fields. The major gas fields are Clarke Lake, Yoyo, Laprise, Nig Creek, Jedney, and Rigel.

Exploration activities, as measured by the amount of seismic work and exploration drilling done, were down during the year. Development drilling was only slightly less than in 1968, but the total footage drilled, including exploration, declined by 19 per cent.

The number of wells completed decreased by 9 per cent and no significant discoveries were made.

No major changes were made to pipe-line and marketing installations.

Net cash expenditures by the petroleum industry in 1969 follow:—

Exploration, including land acquisition and drilling	$57,599,000
Development drilling	11,241,000
Capital expenditures	9,702,000
Natural-gas plants operations	3,735,000
Field, well, and pipe-line operations	9,785,000
General (excluding income tax)	17,688,000
Total	$109,750,000

Statistics

CHAPTER II

INTRODUCTION

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

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 collecting 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.

As 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 values of production published by the two organizations arise mainly because 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. This method of pricing with respect to copper results in the Dominion Bureau of Statistic's value of copper production being considerably less than the amount recorded in this report.

Peat, included under the classification of fuel by the Dominion Bureau, is not regarded as a mineral or fuel, and accordingly is not 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 published in earlier reports as additional data became available or errors become known.

Data are obtained from the certified returns made by producers of metals, industrial minerals and structural materials, and coal, and are augmented by data obtained from custom smelters. For placer gold, returns from operators are augmented by data obtained from the Royal Canadian Mint. For petroleum, natural gas, and liquid by-products, production figures supplied by the Petroleum and Natural Gas Branch of the Department of Mines and Petroleum Resources 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 short tons (2,000 lb.), and troy ounces. Barrels are 35 imperial gallons.

METALS

Gross and Net Content

The gross content of a metal in ore, concentrate, or bullion is the amount of that metal calculated from an assay of the material, and the gross metal contents are

the sum of individual metal assay contents. The net contents are the gross contents less smelter and refinery losses.

In past years there have been different methods used in calculating net contents, particularly in the case of one metal contained in the concentrate of another. The present method was established in 1963 and is outlined in the following table. For example, the net content of silver in copper concentrates is 98 per cent of the gross content, of cadmium in zinc concentrates is 70 per cent of the gross content, etc.

	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	....	....	....
Cadmium	....	70	70	....	....
Nickel	....	....	....	88	....

Calculated Value

Prior to 1925 the value of gold and copper produced was calculated by using their true average prices and, in addition, for copper the smelter loss was taken into account.

The value of other metals was calculated from the gross metal content of ores or concentrates by using a metal price which was an arbitrary percentage of the average price, as follows: Silver, 95 per cent; lead, 90 per cent; and zinc, 85 per cent.

It is these percentages of the average price that are listed in the table on page A 26.

For 1925 and subsequent years the value has been calculated by using the true average price (*see* p. A 26) 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.

In the statistical tables, for gold the values are calculated by multiplying the gross contents of gold by the average price for the year; for the other principal metals, by multiplying the net contents of metals as determined by means of the above table by the average price for the year.

Iron concentrate exported to Japan is valued at the price received by the shippers. The value per ton of the iron ore used in making pig iron at Kimberley is an arbitrary figure, being the average of several ores of comparable grade at their points of export from British Columbia. The value of molybdenum is the amount received by the shippers. The metals, bismuth, tin, mercury, and indium, are valued on the basis of the price received by the shippers, and the value of antimony is the net content multiplied by the average price for the year.

Average Prices

The prices used in the valuation of current and past metal production are shown in the table on page A 26.

The price of gold used is the average Canadian Mint buying-price for fine gold. In 1969 this was $37.69 per ounce.

The price used for placer gold was originally established arbitrarily at $17 per ounce, when the price of fine gold was $20.67 per ounce. Between 1931 and

1962 the price was proportionately increased with the continuously changing price of fine gold. Since 1962, Canadian Mint reports giving the fine-gold content have been available for all but a very small part of the placer gold produced, and the average price listed is derived by dividing ounces of placer gold into total amount received.

Prior to 1949 the prices used for silver, copper, lead, and zinc were the average prices of the markets indicated in the table on page A 26, converted into Canadian funds. The abbreviations in the table are Mont.=Montreal; N.Y.=New York; Lond.=London; E. St. L.=East St. Louis; and U.S.=United States.

Latterly the prices of the principal metals, silver, copper, lead, and zinc are average United States prices converted into Canadian funds. Average monthly prices are supplied by the Dominion Bureau of Statistics from figures published in the Metal Markets section of the Engineering and Mining Journal. Specifically, for silver it is the New York price; for lead it is the New York price; for zinc it is the price at East St. Louis of Prime Western; for copper it is the United States export refinery price; and for cadmium the New York producer's price to consumer.

For nickel the price used is the Canadian price as set by the International Nickel Company of Canada Ltd.

Industrial Minerals and Structural Materials

The values for industrial minerals and structural materials approximate the amounts received at the point of origin.

Fuel

The price per ton used in valuing coal (*see* p. A 26) is the weighted average of the f.o.b. prices at the mine for the coal sold.

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

NOTES ON PRODUCTS LISTED IN THE TABLES

Antimony.—Antimony metal was produced at the Trail smelter from 1939 to 1944; since 1944 it has been marketed alloyed with lead. The antimony is a by-product from silver-lead ores. In 1907 the first recorded antimonial ore mined in British Columbia was shipped from the Slocan area to England. Since then other out-of-Province shipments have originated in the Bridge River, North Lardeau, Slocan, Spillimacheen, and Stuart Lake areas. In Table 7c the antimony assigned to individual mining divisions is the reported content of ores exported to foreign smelters; the antimony "not assigned" is that recovered at the Trail smelter from various ores received there. *See* Tables 1, 3, and 7c.

Arsenious Oxide.—Arsenious oxide was recovered at foreign smelters from arsenical gold ores from Hedley between 1917 and 1931, and in 1942 and from the Victoria property on Rocher Déboulé Mountain in 1928. No production has been recorded since 1942. *See* Tables 1 and 7d.

Asbestos.—British Columbia has produced asbestos since 1952 when the Cassiar mine, the sole producer to date, was opened. From 1953 to 1961 the fibre was valued at the shipping point in North Vancouver, but beginning in 1962 it has been valued at the mine, and values for the preceding years have been recalculated on that basis. *See* Tables 1, 3, and 7d.

Barite.—Barite production began in 1940 and has been continuous since then, coming from several operations in the upper Columbia River valley. Some barite is mined from lode deposits and the rest is recovered from the mill-tailings ponds of the former Silver Giant and Mineral King silver-lead-zinc mines. *See* Tables 1, 3, and 7D.

Bentonite.—Small amounts of bentonite were produced between 1926 and 1944 from deposits in the coal measures near Princeton. There has been no production since 1944. *See* Tables 1 and 7D.

Bismuth.—Since 1929 the Trail smelter has produced bismuth. It is a by-product of lead refining and thus the production cannot be assigned to specific properties or mining divisions. *See* Tables 1, 3, and 7C.

Brick.—*See* Clay and Shale products.

Butane.—Butane is recovered as a by-product at the gas-processing plant at Taylor and at oil refineries. *See* Tables 1, 3, and 7A.

Cadmium.—Cadmium has been recovered as a by-product at the Trail zinc refinery since 1928. It occurs in variable amounts in the sphalerite of most British Columbia silver-lead-zinc ores. In Table 7C the cadmium assigned to individual mining divisions is the reported content of custom shipments to the Trail and foreign smelters; that " not assigned " is the remainder of the reported estimated recovery at the Trail smelter from British Columbia concentrates. *See* Tables 1, 3, and 7C.

Cement.—Cement is manufactured from carefully proportioned mixtures of limestone, gypsum, and other mineral materials. It has been produced in British Columbia since 1905. Present producers are Ocean Cement Limited, with a 4.8-million-barrel-per-year plant at Bamberton, and Canada Cement Lafarge Ltd. with a 3.5-million-barrel-per-year plant on Lulu Island and a 1.2-million-barrel-per-year plant at Kamloops. See Tables 1, 3, and 7E.

Clay and Shale Products.—These include brick, blocks, tile, pipe, pottery, light-weight aggregate, and pozzolan manufactured from British Columbia clays and shales. Common red-burning clays and shales are widespread in the Province, but better grade clays are rare. The first recorded production was of bricks at Craigflower in 1853. Since then plants have operated in most towns and cities for short periods, but today clayware production is restricted to plants in Vancouver, Haney, Abbotsford, and Kilgard. On Saturna Island, shale is used to make light-weight aggregate and pozzolan clinker and at Quesnel burnt shale is made into pozzolan. Several hobby and art potteries and a sanitaryware plant are in operation also, but these use mainly imported raw materials and their production is not included in the tables. *See* Tables 1, 3, and 7E.

Chromite.—Two shipments of chromite are on record, 670 tons from Cascade in 1918 and 126 tons from Scottie Creek in 1929. *See* Tables 1 and 7C.

Coal.—Coal was discovered at Suquash on Vancouver Island in 1835, at Nanaimo in 1850, and later at numerous other places in British Columbia. First production, by Mining Divisions: Cariboo, 1942; Fort Steele, 1898; Kamloops, 1893; Liard, 1923; Nanaimo, 1836; Nicola, 1907; Omineca, 1918; Osoyoos, 1926; Similkameen, 1909; and Skeena, 1912. The Nanaimo and Comox fields produced virtually all of the coal until the opening up of the Crowsnest field in 1898. The closing of the last large mine at Tsable River in 1966, and of the last small one, near Wellington in 1968, marked the end of production from the once important Vancouver Island deposits. The enormous requirements for coking-coal in Japan created great activity in coal prospecting in various areas of British Columbia during 1969. The signing of large contracts with the Japanese resulted in preparations for

production at several deposits in the East Kootenays. First shipments to Japan via special port facilities at North Vancouver and Roberts Bank began in 1970.

All the 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. From 1910 the quantity is the amount sold and used, which includes sales to retail and wholesale dealers, industrial users, and company employees; coal used under company boilers, including steam locomotives; and coal used in making coke. *See* Tables 1, 3, 7A, 8A, and 8B.

Cobalt.—In 1928 a recovery of 1,730 pounds of cobalt was made from a shipment of arsenical gold ore from the Victoria mine on Rocher Déboulé Mountain. *See* Tables 1 and 7C.

Coke.—Coke is made from special types of coal. It has been produced in British Columbia since 1895. Being a manufactured product, its value does not contribute to the total mineral production as shown in Table 1. Up to 1966, coke statistics had been included in the Annual Report as Table 9, but this table has been discontinued. The coal used in making coke is still recorded in Table 8B. Coke statistics are available on request from the Economics and Statistics Branch, Department of Industrial Development, Trade, and Commerce, Victoria.

Copper.—Copper production started in 1894. Ore was smelted in British Columbia first in 1896 at Nelson (from Silver King mine) and at Trail (from Rossland mines), and four and five years later at Grand Forks (from Phoenix mine) and Greenwood (from Mother Lode mine). Later, small smelters were built in the Boundary district and on Vancouver and Texada Islands, and in 1914 the Anyox smelter was blown in. Copper smelting ceased in the Boundary district in 1919, at Trail in 1929, and at Anyox in 1935. British Columbia copper ore was then smelted mainly at Tacoma, and since 1961 has gone chiefly to Japan.

Most of the production has come from southern British Columbia—from Britannia, Copper Mountain, Greenwood, Highland Valley, Merritt, Nelson, Rossland, Texada Island, and Vancouver Island, although a sizeable amount came from Anyox and some came from Tulsequah. During recent years exploration for copper has been intense, interest being especially keen in very large, low-grade deposits suitable for open-pit mining. This activity has resulted in the establishment of operating mines at Merritt (Craigmont) in 1961, in Highland Valley (Bethlehem) in 1962, on Babine Lake (Granisle) in 1966, and near Peachland (Brenda) in 1970. Large mines near Port Hardy (Island Copper) and Stewart (Granduc) are nearing the production stage; the Lornex and Valley Copper properties in Highland Valley are in the advanced planning stage; and more prospects are under study in Highland Valley, the Stikine region, and other areas. *See* Tables 1, 3, 6, and 7B.

Crude Oil.—Production of crude oil in British Columbia began in 1955 from the Fort St. John field, but was not significant until late in 1961 (*see* Fig. 34), when the 12-inch oil pipe-line was built to connect the oil-gathering terminal at Taylor to the Trans Mountain Oil Pipe Line Company pipe-line near Kamloops. In 1969 oil was produced from 25 separate fields, of which the Boundary Lake, Peejay, Milligan Creek, Inga, and Weasel fields were most productive.

In Tables 1, 3, and 7A, quantities given prior to 1962 under "petroleum, crude" are total sales, and from 1962 to 1965 include field and plant condensates listed separately. Full details are given in tables in the Petroleum and Natural Gas chapter of this report.

Diatomite.—Small amounts of diatomite have been shipped from Quesnel periodically since 1928. A plant to process the material locally was built in the town in 1969. *See* Tables 1, 3, and 7D.

Field Condensate.—Field condensate is the liquid hydrocarbons separated and recovered from natural gas in the field before gas processing. *See* Tables 1, 3, and 7A.

Fluorite (Fluorspar).—Between 1918 and 1929, fluorite was mined at the Rock Candy mine north of Grand Forks for use in the Trail lead refinery. From 1958 to 1968, small quantities were produced as a by-product at the Oliver silica quarry. *See* Tables 1, 3, and 7D.

Flux.—Silica and limestone are added to smelter furnaces as flux to combine with impurities in the ore and form a slag which separates from the valuable metal. In the past, silica from Grand Forks, Oliver, and the Sheep Creek area was shipped, but today only limestone, chiefly from Texada Island, is produced for flux. Quantities have been recorded since 1911. *See* Tables 1, 3, and 7D.

Gold, Lode.—Gold has played an important part in mining in the Province. The first discovery of lode gold was made on Moresby Island in 1852, and the first stamp mill, to treat gold-bearing quartz, was built in the Cariboo in 1876.

The principal gold-mining camps in order of production have been Bridge River, Rossland, Portland Canal, Hedley, Wells, and Sheep Creek. At the present time the only major producing gold mine is the Bralorne mine in the Bridge River area. Currently more than half the gold is produced as a by-product from copper, copper-zinc-silver, and other base-metal mining. *See* Tables 1, 3, 6, and 7B.

Gold, Placer.—The early explorations and settlement of the Province followed rapidly on the discovery of gold-bearing placer creeks throughout the country. The first placer miners came in 1858 to mine the lower Fraser River bars upstream from Yale.

Important placers were found in the Cariboo, Cassiar, Omineca, and Princeton areas, and at Atlin, Cedar Creek, Fort Steele, Goldstream, Rock Creek, Squaw Creek, and many other places.

Since World War II, placer-mining has been declining steadily.

A substantial part of the production, including much of the gold recovered from the Fraser River upstream from Yale (in the present New Westminster, Kamloops, and Lillooet Mining Divisions) and much of the early Cariboo production, was mined before the original organization of the Department of Mines in 1874. Consequently, the amounts recorded are based on early estimates and cannot be accurately assigned to individual mining divisions.

The first year of production for major placer-producing mining divisions was: Atlin, 1898; Cariboo, 1859; Liard, 1873; Lillooet, 1858; Omineca, 1869.

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, *Placer Gold Production of British Columbia.* *See* Tables 1, 3, 6, and 7A.

Granules.—Rock chips used for bird grits, exposed aggregate, roofing, stucco dash, terrazzo, etc., have been produced in constantly increasing quantities since 1930. Plants operate in Burnaby, near Hope, at Monte Creek, Sirdar, Vananda, and Vernon. *See* Tables 1, 3, and 7D.

Gypsum and Gypsite.—Production of gypsum and gypsite has been recorded since 1911. Between 1925 and 1956 more than 1,000,000 tons was shipped from Falkland and some was quarried near Cranbrook and Windermere. Since 1956 all production has come from Windermere. *See* Tables 1, 3, and 7D.

Hydromagnesite.—Small shipments of hydromagnesite were made from Atlin between 1904 and 1916 and from Clinton in 1921. *See* Tables 1 and 7D.

Indium.—Production of indium as a by-product of zinc-refining at the Trail smelter began in 1942. Production figures have not been disclosed since 1958.

Iron Concentrates.—Iron ore was produced in small quantities as early as 1885. Sustained production began in 1951 with shipments of concentrated magnetite ore to Japan. The ore has been mined mainly from magnetite and copper-bearing magnetite deposits on Vancouver Island, Texada Island, and Morseby Island.

Since 1961, calcined iron sulphide from the tailings of the Sullivan mine has been used for making pig iron at Kimberley. The entire production, credited to the Fort Steele Mining Division in Table 7C, is of calcine. *See* Tables 1, 3, 6, and 7C.

Iron Oxide.—Iron oxide, ochre, and bog iron were mined as early as 1918 from several occurrences, but mainly from limonite deposits north of Squamish. None has been produced since 1950. *See* Tables 1 and 7D.

Jade (Nephrite).—Production of jade (nephrite) has been recorded only since 1959 despite there being several years of significant production prior to that date. The jade is recovered from a few bedrock occurrences and as alluvial boulders from the Fraser River; the Bridge River and its tributaries, Marshall, Hell, and Cadwallader Creeks; O'Ne-ell, Ogden, Kwanika, and Wheaton Creeks; and Dease Lake. *See* Tables 1, 3, and 7D.

Lead.—Lead was first produced in British Columbia in 1887. Almost all has come from the southeastern part of the Province, where the Sullivan mine has produced about 85 per cent of the Provincial total. Other important mines are at Salmo, Pend d'Oreille River, and North Kootenay Lake.

In 1958, revisions were made in some yearly totals for lead to adjust them for recovery of lead from slag treated at the Trail smelter. *See* Tables 1, 3, 6, and 7B.

Limestone.—Besides being used for flux and granules (where it is recorded separately), limestone is used in agriculture, cement manufacture, the pulp and paper industry, and for making lime. It has been produced since 1886. Quarries now operate at Cobble Hill, near Prince George, and on the north end of Texada Island. *See* Tables 1, 3, and 7E.

Magnesium.—In 1941 and 1942, Cominco Ltd. produced magnesium from magnesite mined from a large deposit at Marysville. *See* Tables 1 and 7C.

Magnesium Sulphate.—Magnesium sulphate was recovered in minor amounts at various times between 1915 and 1942 from small alkali lakes near Basque, Clinton, and Osoyoos. *See* Tables 1 and 7D.

Manganese.—In 1918–20 manganese ore was shipped from a bog deposit near Kaslo and from Hill 60 near Cowichan Lake, and in 1956 a test shipment was made from Olalla. *See* Tables 1 and 7C.

Mercury.—Mercury was first produced near Savona in 1895. Since then small amounts have been recovered from the same area and from the Bridge River district. The main production to date was between 1940–44 from the Pinchi Lake and Takla mines near Fort St. James. In 1968 the Pinchi Lake mine reopened and continues in full operation. The Silverquick mine in Bridge River region is expected to recommence production in 1970. *See* Tables 1 and 7C.

Mica.—No sheet mica has been produced commercially in British Columbia. Between 1932–61 small amounts of mica schist for grinding were mined near Albreda, Armstrong, Oliver, Prince Rupert, and Sicamous. *See* Tables 1, 3, and 7D.

Molybdenum.—Molybdenum ore in small amounts was produced from high-grade deposits between 1914 and 1918. More recently, mining of large low-grade molybdenum and copper-molybdenum deposits has increased production to the point that molybdenum now ranks third in importance in annual value of metals produced in British Columbia. The upswing began when Bethlehem Copper mine recovered by-product molybdenum in 1964 to 1966. In 1965, Endako and Boss Mountain mine, followed by the Coxey in 1966, and British Columbia Molybdenum

in 1967, all began operations as straight molybdenum producers. In 1970, Brenda mine, a combination copper-molybdenum producer, started operating. Other large-scale combined metal deposits are in advanced stages of planning. *See* Tables 1, 3, 6, and 7C.

Natro-alunite.—In 1912 and 1913, 400 tons of natro-alunite was mined from a small low-grade deposit at Kyuquot Sound. There has been no subsequent production. *See* Tables 1 and 7D.

Natural Gas.—Commercial production of natural gas began in 1954 to supply the community of Fort St. John. Since the completion in 1957 of the gas plant at Taylor and the 30-inch pipe-line to serve British Columbia and the northwestern United States, the daily average volume of production has increased to more than 800,000,000 cubic feet (*see* Table 26). In 1969 there were 32 producing gas fields (*see* Table 25).

The production shown in Tables 1, 3, and 7A 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).

Full details of gross well output, other production, delivery, and sales are given in tables in the Petroleum and Natural Gas chapter of this report.

Nickel.—One mine, the Pride of Emory near Hope, shipped nickel ore in 1936 and 1937 and began continuous production in 1958. Since 1960, bulk copper-nickel concentrates have been shipped to Japan for smelting. *See* Tables 1, 3, and 7C.

Palladium.—Palladium was recovered in 1928, 1929, and 1930 as a by-product of the Trail refinery and is presumed to have originated in copper concentrates shipped to the smelter from the Copper Mountain mine. *See* Tables 1 and 7C.

Perlite.—In 1953 a test shipment of 1,112 tons was made from a quarry on Francois Lake. There has been no further production. *See* Tables 1 and 7D.

Petroleum, Crude.—*See* Crude Oil.

Phosphate Rock.—Between 1927 and 1933, Cominco Ltd. produced 3,842 tons of phosphate rock for test purposes, but the grade proved to be too low for commercial use. More test shipments were made in 1964 but there has been no commercial production. *See* Tables 1 and 7D.

Plant Condensate.—Plant condensate is the hydrocarbon liquid extracted from natural gas at gas-processing plants. *See* Tables 1, 3, and 7A.

Platinum.—Platinum has been produced intermittently from placer streams in small amounts since 1887, mostly from the Tulameen and Similkameen Rivers. Placer platinum also has been recovered from Pine, Thibert, McConnell, Rainbow, Tranquille, Rock, and Government Creeks; from Quesnel, Fraser, Cottonwood, Peace, and Coquihalla Rivers; and from beach placers on Graham Island. Some platinum recovered between 1928 and 1930 as a by-product of the Trail refinery is presumed to have originated in copper concentrates shipped to the smelter from the Copper Mountain mine. *See* Tables 1, 3, and 7C.

Propane.—Propane is recovered from gas-processing plants at Taylor and Boundary Lake, and at oil refineries. *See* Tables 1, 3, and 7A.

Rock.—Production of rubble, riprap, and crushed rock has been recorded since 1909. *See* Tables 1, 3, and 7E.

Sand and Gravel.—Sand and gravel are used as aggregate in concrete work of all kinds. The output varies from year to year according to the state of activity of the construction industry. *See* Tables 1, 3, and 7E.

Selenium.—The only recorded production of selenium, 731 pounds, was in 1931 from the refining of blister copper from the Anyox smelter. *See* Tables 1 and 7C.

Silver.—Production of silver began in 1887 from silver-copper and silver-lead ores in the Kootenays and has continued in this area to the present. Now, most of the silver is a by-product of lead-zinc ores and nearly all is refined at Trail, although some is exported with concentrates to American and Japanese smelters, or may go to the Mint in gold bullion. Today the greatest single source of silver is the Sullivan mine, which has recorded production since 1900. The only steady producer that is strictly a silver mine is the Highland Bell at Beaverdell, in operation since 1922. A former important mine, the Premier near Stewart, produced more than 41,000,000 ounces of silver between 1918 and 1968. *See* Tables 1, 3, 6, and 7B.

Sodium Carbonate.—Sodium carbonate was recovered between 1921 and 1949 from alkali lakes in the Clinton area and around Kamloops. There has been no further production. *See* Tables 1 and 7D.

Stone.—Cut stone for building purposes is prepared from rock produced at quarries in various parts of the Province when required. Two of the most productive quarries have operated on Haddington and Nelson Islands. *See* Tables 1, 3, and 7E.

Structural Materials.—In Table 7E the value of $5,972,171 for unclassified materials 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 2 that includes unclassified structural materials in that and previous years not assignable to particular years. The figure $3,180,828 in Table 7E 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 1, 2, 3, 7A, and 7E.

Sulphur.—The production of sulphur has been recorded since 1916. From 1916 to 1927 the amounts include the sulphur content of pyrite shipped. From 1928 the amounts include the estimated sulphur content of pyrite shipped, plus the sulphur contained in sulphuric acid made from waste smelter gases. The sulphur content of pyrrhotite roasted at the Kimberley fertilizer plant is included since 1953. Since 1958, elemental sulphur recovered from the Jefferson Lake Petrochemical Co. plant at Taylor has been included. *See* Tables 1, 3, and 7D.

Talc.—Between 1916 and 1936, talc was quarried at Leech River and at Anderson Lake for dusting asphalt roofing. There has been no production since 1936. *See* Tables 1, 3, and 7D.

Tin.—Tin, as cassiterite, is a by-product of the Sullivan mine, where it has been produced since 1941. The tin concentrate is shipped to an American smelter for treatment. *See* Tables 1, 3, and 7C.

Tungsten.—Tungsten, very largely as scheelite concentrates, was produced from 1937 to 1958, first from the Cariboo in 1937 and during World War II from the Red Rose mine near Hazelton and the Emerald mine near Salmo. The Red Rose closed in 1954 and the Emerald in 1958.

A very small amount of wolframite came from Boulder Creek near Atlin. *See* Tables 1, 3, and 7C.

Volcanic Ash.—The only recorded production of volcanic ash is 30 tons from the Cariboo Mining Division in 1954. *See* Tables 1 and 7D.

Zinc.—Zinc was first produced in 1905. Currently the total value of all zinc production is greater than that of any of the other metals, lead being in second place.

By far the greatest amount of zinc has been mined in southeastern British Columbia, at the Sullivan mine, and at mines near Ainsworth, Invermere, Moyie Lake, Riondel, Salmo, Slocan, and Spillimacheen. Other production has come from mines at Portland Canal and Tulsequah and is coming from Britannia and Buttle Lake. The greatest zinc mine is the Sullivan, which has contributed about 75 per cent of the total zinc production of the Province.

Records for the period 1905 to 1908 show shipments totalling 18,845 tons of zinc ore and zinc concentrates of unstated zinc content. In 1958, revisions were made to some yearly totals for zinc to adjust them for recovery of zinc from slag treated at the Trail smelter. *See* Tables 1, 3, 6, and 7B.

PRICES[1] USED IN VALUING PRODUCTION OF GOLD, SILVER, COPPER, LEAD, ZINC, AND COAL

Year	Gold, Placer, 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 ,,	6.04 ,,	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	.....	.....	56.870 ,,	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.	19.978 ,,	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 ,,	15.036 ,,	7.03
1966	29.08	37.71	139.300 ,,	53.344 ,,	16.283 ,,	15.622 ,,	7.28
1967	28.77	37.76	167.111 ,,	50.022 ,,	15.102 ,,	14.933 ,,	7.75
1968	29.21	37.71	231.049 ,,	54.216 ,,	14.546 ,,	14.153 ,,	7.91
1969	29.37	37.69	192.699 ,,	66.656 ,,	16.039 ,,	15.721 ,,	8.00

[1] *See* page A 17 for detailed explanation.

TABLE 1.—MINERAL PRODUCTION: TOTAL TO DATE, PAST YEAR, AND LATEST YEAR

Products[1]		Total Quantity to Date	Total Value to Date	Quantity 1968	Value 1968	Quantity 1969	Value 1969
Metals			$		$		$
Antimony	lb.	51,839,908	15,777,173	1,159,960	614,779	820,122	508,476
Bismuth	lb.	6,614,320	12,921,622	207,783	868,533	62,488	288,070
Cadmium	lb.	38,482,201	68,983,525	1,341,437	3,823,095	1,141,133	4,016,788
Chromite	tons	796	32,295				
Cobalt	lb.	1,730	420				
Copper	lb.	4,047,312,919	987,453,911	160,993,338	87,284,148	167,421,925	111,596,758
Gold—placer	oz.	5,234,917	96,943,212	670	19,571	399	11,720
„ —lode, fine	oz.	16,926,021	500,143,166	123,896	4,672,242	117,830	4,440,659
Iron concentrates	tons	24,426,855	221,376,081	2,094,745	21,437,569	2,074,854	19,787,845
Lead	lb.	15,613,477,321	1,312,844,455	231,627,618	32,782,257	210,072,565	33,693,539
Magnesium	lb.	204,632	88,184				
Manganese	tons	1,724	32,668				
Mercury[2]	lb.	4,171,110	10,447,358				
Molybdenum	lb.	87,272,937	150,374,096	19,799,793	32,552,722	25,512,001	46,533,644
Nickel	lb.	38,273,303	32,769,890	3,317,160	3,372,225	2,979,130	3,396,208
Palladium	oz.	749	30,462				
Platinum	oz.	1,407	135,008				
Selenium	lb.	731	1,389				
Silver	oz.	478,769,477	341,169,358	7,130,866	16,475,795	5,779,108	11,136,283
Tin	lb.	17,921,267	15,777,294	358,191	497,885	288,427	470,136
Tungsten (WO_3)	lb.	16,019,324	38,663,751				
Zinc	lb.	14,149,964,862	1,346,480,629	299,396,264	43,550,181	301,163,774	47,345,957
Others			23,854,691		2,961,024		10,949,453
Totals			5,176,300,638		250,912,026		294,175,536
Industrial Minerals							
Arsenious oxide	lb.	22,019,420	273,201				
Asbestos	tons	837,689	164,185,884	74,667	14,833,891	79,600	15,659,000
Barite	tons	324,659	3,473,857	21,968	164,206	26,949	190,620
Bentonite	tons	791	16,858				
Diatomite	tons	7,442	175,325	856	17,159		
Fluorspar	tons	35,682	795,950	39	1,117		
Fluxes	tons	4,052,705	7,469,371	42,259	157,679	22,342	81,917
Granules	tons	367,269	5,482,634	30,237	436,928	34,746	654,701
Gypsum and gypsite	tons	3,815,025	13,689,269	246,374	689,847	280,894	764,032
Hydromagnesite	tons	2,253	27,536				
Iron oxide and ochre	tons	18,108	155,050				
Jade	lb.	333,792	281,414	49,015	105,670	26,332	42,635
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	6,959,040	91,575,777	320,521	9,650,285	349,122	3,824,593
Talc	tons	1,805	34,871				
Others			5,213				4,913
Totals			288,238,775		26,056,782		21,222,411
Structural Materials							
Cement	tons	12,352,167	200,177,647	656,363	13,634,166	795,591	16,459,571
Clay products			73,012,388		4,388,505		4,585,719
Lime and limestone	tons		50,502,234	2,016,892	3,337,277	1,911,881	3,237,032
Rock	tons		46,893,060	3,385,712	3,524,439	3,756,559	4,456,211
Sand and gravel	tons		231,736,219	22,665,961	20,271,723	29,132,650	26,553,699
Stone	tons	1,161,879	9,204,354	1,654	33,366	2,177	39,352
Not assigned			5,972,171				
Totals			617,498,073		45,189,476		55,331,584
Fuels							
Coal	tons	142,445,046	616,723,876	959,214	7,588,989	852,340	6,817,155
Crude oil	bbl.	133,927,942	290,174,807	22,151,353	50,082,837	25,309,036	58,176,213
Field condensate	bbl.	294,051	658,368	54,163	122,408	78,147	180,520
Plant condensate	bbl.	9,800,559	5,411,033	960,252	247,455	944,111	263,278
Nat'l gas to pipe-line	M s.c.f.	1,619,686,307	162,764,099	224,233,203	24,531,445	256,223,244	27,897,585
Butane	bbl.	4,674,283	1,495,770	527,546	168,814	417,540	133,613
Propane	bbl.	2,955,601	945,789	400,800	128,256	327,501	104,800
Totals			1,078,173,742		82,870,204		93,573,164
Grand totals			7,160,211,228		405,028,488		464,302,695

[1] *See* notes on individual products listed alphabetically on pages A 18 to A 25.
[2] Excludes 1968 and 1969 production, which is confidential.

TABLE 2.—TOTAL VALUE OF MINERAL PRODUCTION, 1836–1969

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 2.—TOTAL VALUE OF MINERAL PRODUCTION, 1836–1969—*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	208,664,003	22,865,324	43,780,272	60,470,406	335,780,005
1967	235,865,318	29,364,065	44,011,488	74,141,627	383,382,498
1968	250,912,026	26,056,782	45,189,476	82,870,204	405,028,488
1969	294,175,536	21,222,411	55,331,584	93,573,164	464,302,695
Totals	5,176,300,638	288,238,775	617,498,073	1,078,173,742	7,160,211,228

TABLE 3.—MINERAL PRODUCTION FOR THE 10 YEARS, 1960 TO 1969

Description	1960		1961		1962		1963		1964	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Metals		$		$		$		$		$
Antimony lb.	1,651,786	538,482	1,331,297	469,948	1,931,397	748,223	1,601,253	624,489	1,591,523	700,270
Bismuth lb.	213,009	419,628	283,363	637,567	228,601	507,494	157,099	348,760	213,428	480,213
Cadmium lb.	1,778,866	2,525,990	907,432	1,451,891	2,086,692	3,839,513	1,981,004	4,754,410	1,864,255	6,040,186
Copper lb.	33,064,429	9,583,724	31,692,412	8,965,149	108,979,144	33,209,215	118,247,104	36,238,007	115,554,700	38,609,136
Gold—placer oz.	3,847	107,418	3,416	99,884	3,315	96,697	4,620	135,411	1,842	55,191
„ —lode, fine oz.	205,580	6,979,441	159,821	5,667,253	158,850	5,942,101	154,979	5,850,458	138,487	5,227,884
Iron concentrates tons	1,160,355	10,292,847	1,335,068	12,082,540	1,793,847	18,326,911	2,060,241	20,746,424	2,002,562	20,419,487
Lead lb.	333,608,699	38,661,912	384,284,524	42,313,569	335,282,537	34,537,454	314,974,310	37,834,714	268,737,503	39,402,293
Mercury lb.	----	----	----	----	----	----	----	----	5,548	22,848
Molybdenum lb.	9,023	9,500	----	----	----	----	----	----	28,245	47,063
Nickel lb.	3,779,878	2,645,915	4,180,677	3,194,037	3,476,467	2,902,850	3,699,402	3,107,498	3,398,560	2,854,790
Platinum oz.	----	----	----	----	5	375	2	150	----	----
Silver oz.	7,446,643	6,600,183	7,373,997	6,909,140	6,189,804	7,181,907	6,422,680	8,861,050	5,269,642	7,348,938
Tin lb.	621,718	522,243	1,119,350	727,578	650,941	442,640	927,062	648,943	352,350	535,572
Zinc lb.	403,399,319	50,656,726	387,951,190	45,370,891	413,430,817	51,356,376	402,863,154	53,069,163	400,796,562	58,648,561
Others	----	760,364	----	676,327	----	535,537	----	633,389	----	533,897
Totals	----	130,304,373	----	128,565,774	----	159,627,293	----	172,852,866	----	180,926,329
Industrial Minerals										
Asbestos tons	40,748	9,482,923	45,113	8,648,503	55,133	10,297,360	63,215	11,681,337	67,460	11,714,494
Barite tons	23,573	279,716	15,478	151,388	6,511	57,062	8,207	69,588	10,588	119,370
Diatomite tons	44	1,430	214	8,817	211	10,228	458	16,030	1,143	64,555
Fluorspar tons	----	----	----	----	----	----	----	----	----	----
Fluxes (quartz, limestone) tons	83,370	294,559	53,335	190,500	62,743	228,477	60,490	223,012	73,021	237,298
Granules (quartz, limestone, granite) tons	19,063	257,067	17,463	253,015	18,251	311,902	19,444	348,543	19,289	397,639
Gypsum and gypsite tons	107,900	337,200	153,300	459,900	147,900	443,700	160,954	482,862	188,303	581,873
Jade lb.	50,300	10,325	69,751	20,876	56,935	20,760	16,000	15,529	11,537	13,804
Mica lb.	122,000	3,186	250,000	8,025	----	----	----	----	----	----
Sulphur tons	264,705	3,095,696	242,377	3,207,284	239,191	2,934,725	254,197	3,673,997	278,385	3,860,436
Totals	----	13,762,102	----	12,948,308	----	14,304,214	----	16,510,898	----	16,989,469
Structural Materials										
Brick	----	954,629	----	926,124	----	1,004,738	----	1,114,042	----	921,992
Clays tons	8,003	22,671	7,980	28,396	8,105	30,027	2,573	33,151	1,853	38,585
Structural and drain tile	----	700,700	----	732,751	----	935,573	----	877,578	----	1,102,341
Pottery and other clay products	----	395,708	----	679,193	----	537,100	----	799,812	----	945,240
Cement tons	384,853	6,432,752	417,336	7,122,046	397,435	7,112,890	476,071	8,546,768	537,396	10,040,776
Lime and limestone tons	565,945	1,602,019	758,882	1,864,315	559,028	1,513,579	907,203	1,723,796	1,211,320	2,055,195
Rubble, riprap, crushed rock tons	1,148,305	1,075,373	1,539,640	1,016,086	1,897,272	1,284,301	1,913,906	1,259,002	1,449,449	1,285,318
Sand and gravel tons	12,355,955	7,597,278	11,424,958	7,439,710	17,757,391	8,862,767	17,387,026	9,514,095	17,708,225	10,013,970
Stone tons	4,328	48,859	5,400	70,300	8,023	85,290	1,827	13,946	846	25,522
Totals	----	18,829,989	----	19,878,921	----	21,366,265	----	23,882,190	----	26,428,939
Fuels										
Coal—sold and used tons	788,658	5,242,223	919,142	6,802,134	825,339	6,133,986	850,541	6,237,997	911,326	6,327,678
Crude oil bbl.	867,873	1,531,049	1,015,568	1,900,104	8,904,938	16,827,118	12,515,137	24,900,381	11,525,476	23,396,716
Field condensate bbl.	----	----	159	297	9,621	18,184	13,671	27,205	26,367	63,436
Plant condensate bbl.	750,848	459,741	813,565	737,761	837,824	674,644	841,740	536,193	922,211	587,685
Natural gas delivered to pipe-line M s.c.f.	80,115,399	7,101,949	95,967,110	8,818,891	108,699,997	10,226,323	105,525,373	10,719,298	118,959,880	12,192,816
Butane bbl.	293,368	93,878	321,706	102,946	387,558	124,019	409,087	130,908	461,759	147,763
Propane bbl.	125,091	40,029	163,079	52,185	216,995	69,438	205,162	65,651	244,804	78,337
Totals	----	14,468,869	----	18,414,318	----	34,073,712	----	42,617,633	----	42,794,431
Grand totals	----	177,365,333	----	179,807,321	----	229,371,484	----	255,863,587	----	267,139,168

Description	1965		1966		1967		1968		1969	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Metals		$		$		$		$		$
Antimony lb.	1,301,787	689,947	1,405,681	745,011	1,267,686	671,874	1,159,960	614,779	820,122	508,476
Bismuth lb.	144,630	446,907	47,435	198,848	142,507	572,878	207,783	868,533	62,488	288,070
Cadmium lb.	466,586	1,297,110	1,169,570	3,017,491	994,365	2,784,222	1,341,437	3,823,095	1,141,133	4,016,788
Copper lb.	85,197,073	32,696,081	105,800,568	56,438,255	172,739,548	88,135,172	160,993,338	87,284,148	167,421,925	111,596,758
Gold—placer oz.	866	25,053	1,535	44,632	891	25,632	670	19,571	399	11,720
„ —lode, fine oz.	117,124	4,419,089	119,508	4,506,646	126,157	4,763,688	123,896	4,672,242	117,830	4,440,659
Iron concentrates tons	2,165,403	21,498,581	2,151,804	20,778,934	2,154,443	20,820,765	2,094,745	21,437,569	2,074,854	19,787,845
Lead lb.	250,183,633	43,149,171	211,490,107	34,436,934	208,131,894	31,432,079	231,627,618	32,782,257	210,072,565	33,693,539
Mercury lb.	1,520	12,301	———	———	380	2,600	———	———	———	———
Molybdenum lb.	7,289,125	12,405,344	17,094,927	27,606,061	17,517,543	31,183,064	19,799,793	32,552,722	25,512,001	46,533,644
Nickel lb.	3,322,000	2,790,480	3,187,712	2,731,869	4,180,842	3,946,715	3,317,160	3,372,225	2,979,130	3,396,208
Platinum oz.	———	———	———	———	———	———	———	———	———	———
Silver oz.	4,972,084	6,929,793	5,549,131	7,729,939	6,180,739	10,328,695	7,130,866	16,475,795	5,779,108	11,136,283
Tin lb.	377,207	735,554	710,752	1,130,096	437,804	621,682	358,191	497,885	288,427	470,136
Zinc lb.	311,249,250	48,666,933	305,124,440	47,666,540	262,830,908	39,248,539	299,396,264	43,550,181	301,163,774	47,345,957
Others	———	1,339,389	———	1,632,747	———	1,327,713	———	2,961,024	———	10,949,453
Totals	———	177,101,733	———	208,664,003	———	235,865,318	———	250,912,026	———	294,175,536
Industrial Minerals										
Asbestos tons	85,851	14,491,195	88,771	15,718,741	92,192	18,273,220	74,667	14,833,891	79,600	15,659,000
Barite tons	17,466	182,931	21,888	176,240	23,466	176,882	21,968	164,206	26,949	190,620
Diatomite tons	82	4,420	70	3,755	2,819	14,096	856	17,159	———	———
Fluorspar tons	70	2,419	152	4,986	80	2,464	39	1,117	———	———
Fluxes (quartz, limestone) tons	59,231	240,076	23,913	112,314	48,052	221,212	42,259	157,679	22,342	81,917
Granules (quartz, limestone, granite) tons	29,033	447,954	23,956	424,667	31,283	305,655	30,237	436,928	34,746	654,701
Gypsum and gypsite tons	207,858	602,788	206,026	576,873	230,044	691,592	246,374	689,847	280,894	764,032
Jade lb.	7,129	9,249	11,633	13,225	20,160	24,341	49,015	105,670	26,332	42,635
Mica lb.	———	———	———	———	———	———	———	———	———	———
Sulphur tons	341,873	4,428,617	342,478	5,834,523	314,490	9,654,603	320,521	9,650,285	349,122	3,824,593
Others	———	———	———	———	———	———	———	———	———	4,913
Totals	———	20,409,649	———	22,865,324	———	29,364,065	———	26,056,782	———	21,222,411
Structural Materials										
Brick	———	1,357,511	———	1,833,801	———	1,819,917	———	2,231,501	———	2,522,916
Clays tons	454	18,234	1,282	34,861	444	18,668	526	23,391	11,887	55,878
Structural and drain tile	———	1,361,227	———	1,063,333	———	892,485	———	828,734	———	1,090,617
Pottery and other clay products	———	1,162,662	———	1,168,197	———	1,214,137	———	1,304,879	———	916,308
Cement tons	601,878	11,199,607	707,519	12,918,301	709,977	13,581,850	656,363	13,634,166	795,591	16,459,571
Lime and limestone tons	1,420,085	2,482,451	1,483,949	2,696,011	1,645,253	2,822,138	2,016,892	3,337,277	1,911,881	3,237,032
Rubble, riprap, crushed rock tons	2,715,411	1,938,088	1,590,189	1,890,992	2,287,407	2,967,195	3,385,712	3,524,439	3,756,559	4,456,211
Sand and gravel tons	20,936,994	12,686,959	24,320,013	21,959,733	23,210,746	20,643,673	22,665,961	20,271,723	29,132,650	26,553,699
Stone tons	2,252	118,975	76,720	215,043	3,577	51,425	1,654	33,366	2,177	39,352
Totals	———	32,325,714	———	43,780,272	———	44,011,488	———	45,189,476	———	55,331,584
Fuels										
Coal—sold and used tons	950,763	6,713,590	850,821	6,196,219	908,790	7,045,341	959,214	7,588,989	852,340	6,817,155
Crude oil bbl.	13,470,757	28,693,662	16,638,181	36,268,683	19,656,799	44,748,477	22,151,353	50,082,837	25,309,036	58,176,213
Field condensate bbl.	31,782	70,874	39,571	86,265	40,570	92,357	54,163	122,408	78,147	180,520
Plant condensate bbl.	947,429	576,107	974,564	312,360	1,016,045	267,941	960,252	247,455	944,111	263,278
Natural gas delivered to pipe-line M s.c.f.	138,814,144	14,493,255	161,264,334	17,339,587	198,626,177	21,667,136	224,233,203	24,531,445	256,223,244	27,897,585
Butane bbl.	477,990	152,956	500,973	160,312	588,118	188,197	527,546	168,814	417,540	133,613
Propane bbl.	358,776	114,808	334,315	106,980	413,058	132,178	400,800	128,256	327,501	104,800
Totals	———	50,815,252	———	60,470,406	———	74,141,627	———	82,870,204	———	93,573,164
Grand totals	———	280,652,348	———	335,780,005	———	383,382,498	———	405,028,488	———	464,302,695

TABLE 4.—MINERAL PRODUCTION, GRAPH OF VALUE, 1887–1969

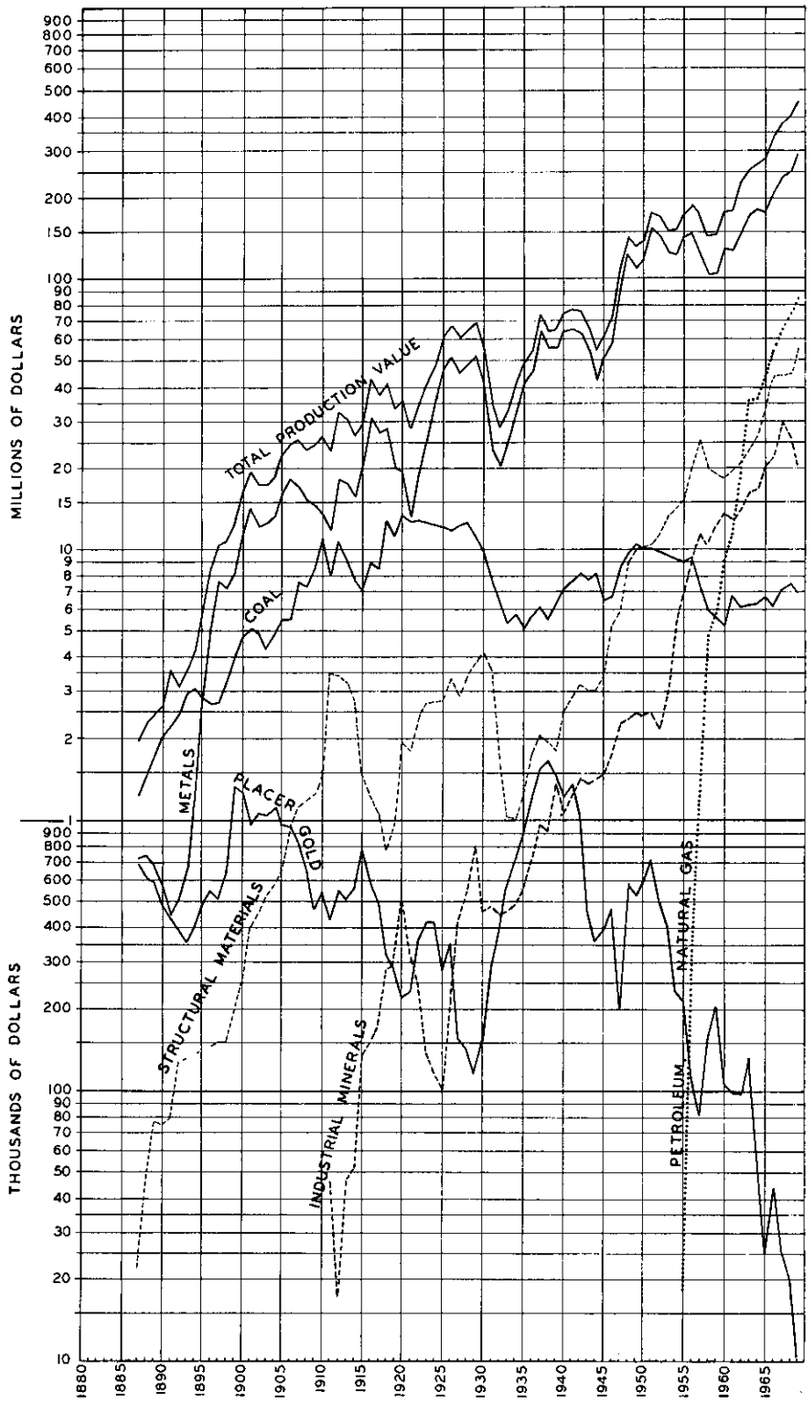


TABLE 5.—PRODUCTION OF GOLD, SILVER, COPPER, LEAD, ZINC, AND MOLYBDENUM, GRAPH OF QUANTITIES, 1893–1967

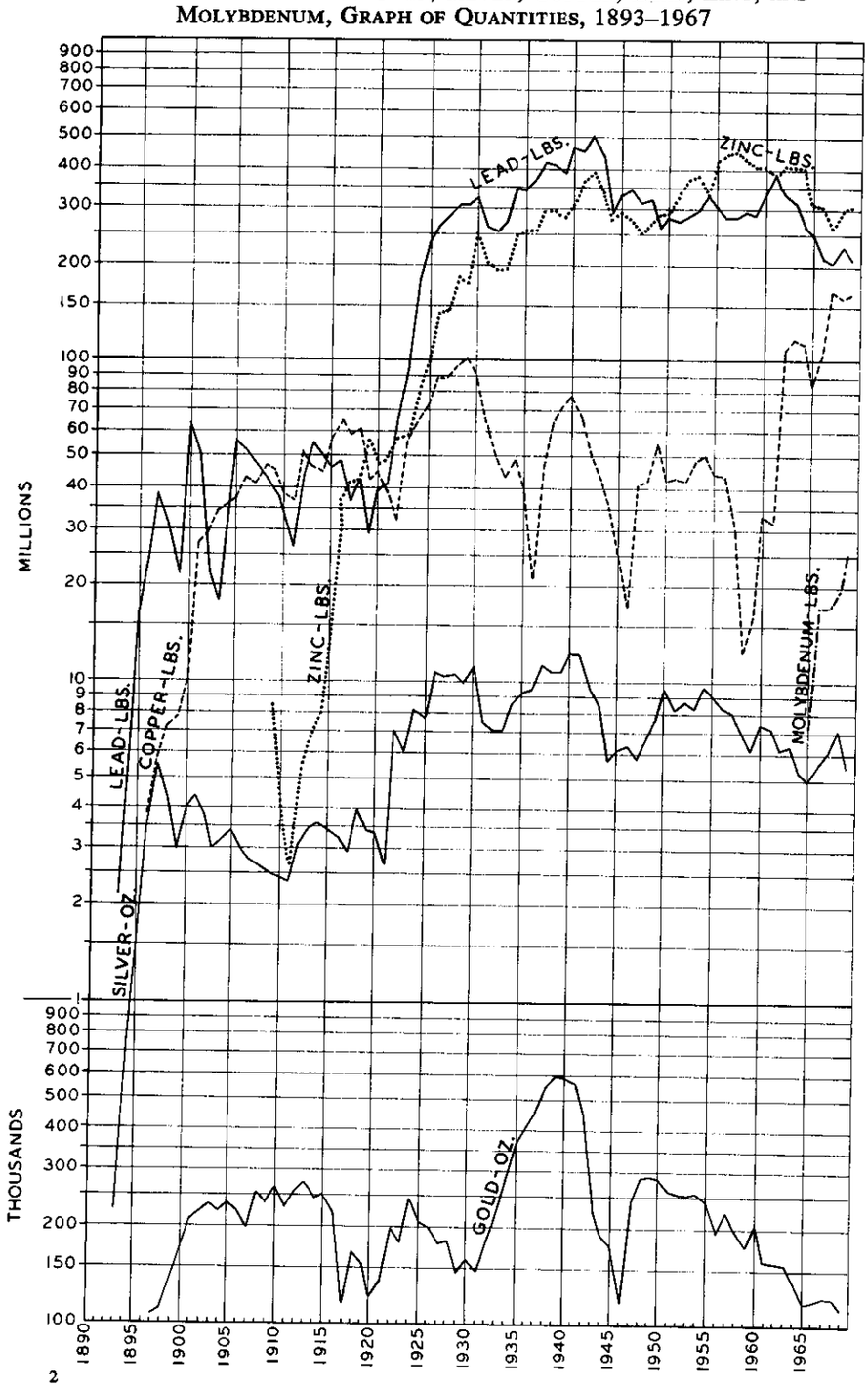


TABLE 6.—PRODUCTION OF GOLD, SILVER, COPPER, LEAD, ZINC, MOLYBDENUM, AND IRON CONCENTRATES, 1858–1969

Year	Gold (Placer)		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
1901–1910	507,580	8,628,660	2,322,118	47,998,179	31,222,548	16,973,507	379,957,091	56,384,783
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	119,508	4,506,646	5,549,131	7,729,939	105,800,568	56,438,255
1967	891	25,632	126,157	4,763,688	6,180,739	10,328,695	172,739,548	88,135,172
1968	670	19,571	123,896	4,672,242	7,130,866	16,475,795	160,993,338	87,284,148
1969	399	11,720	117,830	4,440,659	5,779,108	11,136,283	167,421,925	111,596,758
Totals	5,234,917	96,943,212	16,926,021	500,143,166	478,769,477	341,169,358	4,047,312,919	987,453,911

TABLE 6.—PRODUCTION OF GOLD, SILVER, COPPER, LEAD, ZINC, MOLYBDENUM, AND IRON CONCENTRATES, 1858–1969—*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
1901–1910	407,833,262	17,033,102	12,684,192	894,169			19,553	68,436
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	1,000	5,000
1919	29,475,968	1,526,855	56,737,651	3,540,429			1,230	6,150
1920	39,331,218	2,816,115	47,208,268	3,077,979			1,472	7,360
1921	41,402,288	1,693,354	49,419,372	1,952,065			1,010	5,050
1922	67,447,985	3,480,306	57,146,548	2,777,322			1,200	3,600
1923	96,663,152	6,321,770	58,344,462	3,278,903			243	1,337
1924	170,384,481	12,415,917	79,130,970	4,266,741				
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	2,190,847
1957	281,603,346	39,568,086	449,276,797	50,206,681			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	17,094,927	27,606,061	2,151,804	20,778,934
1967	208,131,894	31,432,079	262,830,908	39,248,539	17,517,543	31,183,064	2,154,443	20,820,765
1968	231,627,618	32,782,257	299,396,264	43,550,181	19,799,793	32,552,722	2,094,745	21,437,569
1969	210,072,565	33,693,539	301,163,774	47,345,957	25,512,001	46,533,644	2,074,854	19,787,845
Totals	15,613,477,321	1,312,844,455	14,149,964,862	1,346,480,629	87,272,937	150,374,096	24,426,855	221,376,081

TABLE 7A.—MINERAL PRODUCTION BY MINING

Division	Period	Placer Gold		Metals	Industrial Minerals	Structural Materials
		Quantity	Value			
		Oz.	$	$	$	$
Alberni	1968	.....	.....	17,836,888	.....	252,147
	1969	.....	.....	**18,405,941**	.....	**720,329**
	To date	1,617	33,253	102,016,297	9,398	3,240,125
Atlin	1968	33	905	39	.....	.....
	1969	**44**	**1,319**	**13**	.....	.....
	To date	735,790	17,388,423	38,047,185	20,325	330,891
Cariboo	1968	564	16,404	4,207,167	17,159	1,641,596
	1969	**279**	**8,253**	**4,175,587**	.....	**3,163,065**
	To date	2,610,007	54,152,737	65,374,111	318,805	14,951,029
Clinton	1968	.....	.....	.....	.....	908,130
	1969	.....	.....	.....	.....	**301,290**
	To date	10,171	243,069	848,377	162,427	1,969,611
Fort Steele	1968	.....	.....	51,913,572	3,125,430	556,966
	1969	.....	.....	**63,604,507**	**622,488**	**464,845**
	To date	20,531	468,450	2,099,657,238	17,506,787	7,319,882
Golden	1968	.....	.....	1,198,872	854,053	191,951
	1969	.....	.....	.....	**954,652**	**242,046**
	To date	469	11,268	61,568,607	10,536,946	2,885,855
Greenwood	1968	.....	.....	6,669,642	.....	172,082
	1969	.....	.....	**8,103,442**	**4,000**	**175,256**
	To date	5,074	115,662	171,686,685	2,327,897	1,668,475
Kamloops	1968	.....	.....	28,771,845	5,257	1,098,440
	1969	.....	.....	**28,590,173**	**6,590**	**1,846,785**
	To date	27,595	604,785	119,358,593	6,540,155	16,834,642
Liard	1968	.....	.....	.....	16,545,342	1,757,941
	1969	.....	.....	.....	**16,571,947**	**1,702,577**
	To date	50,184	1,248,151	6,522	178,999,476	8,057,739
Lillooet	1968	68	2,111	1,994,821	83,899	85,430
	1969	.....	.....	**1,783,316**	**5,237**	**321,635**
	To date	92,938	1,925,432	146,004,796	192,612	2,946,975
Nanaimo	1968	.....	.....	14,469,272	65,175	3,677,117
	1969	.....	.....	**14,697,537**	**143,355**	**3,734,777**
	To date	866	19,300	181,386,409	1,352,887	56,579,509
Nelson	1968	.....	.....	11,393,570	197,831	553,065
	1969	.....	.....	**8,954,030**	**407,141**	**407,632**
	To date	3,586	89,026	331,519,804	1,090,831	5,613,768
New Westminster	1968	.....	.....	4,025,552	60,000	10,069,041
	1969	**76**	**2,148**	**4,433,216**	**77,000**	**12,144,104**
	To date	31,355	595,910	39,589,568	1,414,256	134,587,199
Nicola	1968	.....	.....	16,214,155	.....	108,142
	1969	.....	.....	**24,604,511**	.....	**184,099**
	To date	234	4,764	161,990,174	10,050	1,118,497
Omineca	1968	.....	.....	32,973,465	19,646	1,099,603
	1969	.....	.....	**48,228,491**	**25,438**	**1,066,556**
	To date	56,289	1,499,482	184,299,502	60,944	9,973,692
Osoyoos	1968	.....	.....	2,563,608	267,251	168,656
	1969	.....	.....	**1,149,705**	**98,392**	**221,974**
	To date	240	5,466	55,597,603	6,285,214	2,416,291
Revelstoke	1968	.....	.....	.....	.....	344,454
	1969	.....	.....	.....	.....	**72,647**
	To date	7,582	164,477	11,244,631	.....	2,449,885
Similkameen	1968	.....	.....	.....	.....	264,621
	1969	.....	.....	.....	.....	**393,486**
	To date	45,507	878,204	120,195,258	18,558	8,912,039
Skeena	1968	.....	.....	21,338,011	.....	629,842
	1969	.....	.....	**31,021,577**	.....	**1,698,129**
	To date	4,603	105,569	287,391,422	1,240,215	12,356,844
Slocan	1968	.....	.....	8,082,963	.....	195,400
	1969	.....	.....	**7,966,095**	.....	**203,113**
	To date	366	9,397	253,812,540	.....	1,740,989
Trail Creek	1968	.....	.....	649,615	.....	105,734
	1969	.....	.....	**1,473,803**	.....	**239,263**
	To date	851	24,260	87,824,851	.....	2,984,934
Vancouver	1968	.....	.....	7,706,930	93,829	8,659,515
	1969	.....	.....	**9,406,761**	**168,659**	**9,724,164**
	To date	182	5,306	256,291,050	6,984,826	106,512,476
Vernon	1968	.....	.....	47,271	.....	646,140
	1969	.....	.....	**75,130**	.....	**670,781**
	To date	2,732	72,885	331,631	3,978	5,350,768
Victoria	1968	.....	.....	1,242,611	210	9,059,352
	1969	.....	.....	.....	**140**	**11,561,907**
	To date	628	15,680	16,687,533	189,141	176,828,427
Not assigned	1968	5	151	17,592,586	4,721,700	2,944,111
	1969	.....	.....	**17,489,981**	**2,137,372**	**4,071,124**
	To date	1,525,520	17,262,256	286,627,039	52,973,047	34,867,531
Totals	1968	670	19,571	250,892,455	26,056,782	45,189,476
	1969	**399**	**11,720**	**294,163,816**	**21,222,411**	**55,331,584**
	To date	5,234,917	96,943,212	5,079,357,426	288,238,775	617,498,073

DIVISIONS, 1968 AND 1969, AND TOTAL TO DATE

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.	$	$
								18,089,035
								19,126,270
								105,299,073
								944
								1,332
								55,786,824
								5,882,326
290	1,100							**7,346,905**
								134,797,782
								908,180
								301,290
945,726	7,463,598							3,223,484
842,865	**6,726,731**							63,059,566
59,958,552	280,788,017							**71,418,571**
								2,405,740,374
								2,244,876
								1,196,698
								75,002,676
								6,841,724
								3,252,698
								175,798,719
								29,875,542
								30,443,548
15,087	59,765							143,397,940
		23,165,768	50,452,700	224,233,203	24,531,445	928,346	297,070	93,584,498
		26,331,294	**58,620,011**	**256,223,244**	**27,897,585**	**745,041**	**238,413**	**105,030,533**
99,433	699,521	144,022,552	296,244,208	1,619,686,307	162,764,099	7,629,884	2,441,559	650,461,275
								2,166,261
								2,110,188
								151,069,815
93	1,494							18,213,058
								18,575,669
74,324,471	301,144,744							540,482,849
								12,144,466
								9,768,803
								338,313,429
								14,154,593
								16,656,468
								176,186,933
								16,322,297
								24,788,610
2,929,584	11,080,836							174,204,321
13,395	123,897							34,216,611
9,475	**90,424**							**48,410,909**
499,029	3,391,044							199,224,664
								2,999,515
								1,470,071
1,122	5,008							64,309,582
								344,454
								72,647
								13,858,993
								264,621
								393,488
4,617,442	19,553,725							144,557,784
								21,967,853
								32,719,706
36	116							301,094,166
								8,278,363
								8,169,208
								255,562,926
								755,349
								1,713,066
								90,834,045
								16,460,274
								19,299,584
								369,793,658
								693,411
								745,911
								5,759,262
								10,302,173
								11,562,047
								193,720,781
								25,258,548
								23,688,477
								391,729,878
959,214	7,588,989	23,165,768	50,452,700	224,233,203	24,531,445	928,346	297,070	405,028,488
852,340	**6,817,155**	**26,331,294**	**58,620,011**	**256,223,244**	**27,897,585**	**745,041**	**238,413**	**464,302,695**
142,445,046	616,723,876	144,022,552	296,244,208	1,619,686,307	162,764,099	7,629,884	2,441,559	7,160,211,228

TABLE 7B.—PRODUCTION OF LODE GOLD, SILVER, COPPER, LEAD, AND ZINC BY MINING DIVISIONS, 1968 AND 1969, AND TOTAL TO DATE

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	1968	14,412	543,490	510,881	1,180,385	10,389,624	5,632,839	1,049,235	148,498	43,007,530	6,255,875	13,761,087
	1969	**13,947**	**525,621**	**488,046**	**940,460**	**11,584,059**	**7,721,470**			**47,304,125**	**7,436,682**	**16,624,233**
	To date	343,019	12,845,796	1,563,720	2,871,863	32,386,918	17,842,150	1,966,126	274,061	114,480,630	17,301,708	51,135,578
Atlin	1968			17	39							39
	1969			**7**	**13**							**13**
	To date	344,197	12,126,732	3,377,123	2,895,661	24,777,661	8,160,266	23,765,211	3,437,907	91,067,749	10,864,497	37,485,063
Cariboo	1968			86	199							199
	1969			**41**	**79**							**79**
	To date	1,202,251	43,347,296	146,805	109,070	2,352	920	24,560	3,724	505	19	43,461,029
Clinton	1968											
	1969											
	To date	23,390	827,328	31,586	14,237	57,548	5,905	193	7			847,477
Fort Steele	1968	162	6,109	3,116,675	7,201,047			164,798,502	23,323,932	126,942,614	18,465,073	48,996,161
	1969	**172**	**6,482**	**3,087,692**	**5,949,952**			**185,563,240**	**29,762,488**	**154,683,480**	**24,317,780**	**60,036,712**
	To date	7,359	229,358	233,897,378	161,324,664	28,592	6,193	13,081,157,449	1,058,974,645	9,755,418,205	846,589,393	2,067,124,253
Golden	1968			11,532	26,645			420,437	59,504	7,203,395	1,047,806	1,133,955
	1969											
	To date	170	4,882	4,132,716	3,532,207	1,171,455	367,261	253,871,121	25,261,027	324,599,511	31,283,996	60,449,373
Greenwood	1968	13,061	492,543	640,824	1,480,617	8,414,867	4,562,204	566,395	80,162	342,663	49,844	6,665,370
	1969	**16,319**	**615,014**	**593,331**	**1,143,343**	**9,293,075**	**6,194,392**	**624,713**	**100,198**	**289,891**	**45,574**	**8,098,521**
	To date	1,293,714	30,322,936	40,211,209	30,495,141	526,072,143	106,424,088	22,604,192	2,204,162	22,749,609	2,067,473	171,513,800
Kamloops	1968	2,807	105,855	189,914	438,794	52,064,328	28,227,196					28,771,845
	1969	**2,074**	**78,163**	**155,363**	**299,383**	**42,325,712**	**28,212,627**					**28,590,173**
	To date	62,474	2,159,429	1,200,825	1,729,014	234,080,838	115,155,169	538,097	45,030	438,023	29,826	119,118,468
Liard	1968											
	1969											
	To date	114	4,120	587	507	56	22	10,421	1,776	115	18	6,443
Lillooet	1968	52,324	1,973,190	9,362	21,631							1,994,821
	1969	**46,896**	**1,767,370**	**8,275**	**15,946**							**1,783,316**
	To date	4,126,247	145,214,540	977,647	701,566	400	41	62,513	2,548	15	2	145,918,697
Nanaimo	1968	15,389	580,335	93,901	216,957	11,521,712	6,246,611					7,043,903
	1969	**13,405**	**505,194**	**90,498**	**174,389**	**10,294,439**	**6,861,861**					**7,541,444**
	To date	215,606	6,866,395	1,576,487	1,856,706	129,729,966	52,011,891					60,734,992
Nelson	1968	1,766	66,598	126,260	291,722			18,036,195	2,552,663	52,077,732	7,575,227	10,486,210
	1969	**511**	**19,258**	**60,108**	**115,828**			**12,824,187**	**2,056,871**	**38,099,823**	**5,989,673**	**8,181,630**
	To date	1,339,928	41,950,126	9,224,626	6,523,802	14,915,405	1,689,196	487,069,279	61,583,312	1,291,123,956	169,908,874	281,655,310
New Westminster	1968					1,205,045	653,327					653,327
	1969			**2**	**4**	**1,555,755**	**1,037,004**					**1,037,008**
	To date	4,466	114,164	15,117	7,726	16,662,497	6,696,188	28,425	1,119	12,755	481	6,819,678
Nicola	1968					29,906,587	16,214,155					16,214,155
	1969					**36,912,672**	**24,604,511**					**24,604,511**
	To date	8,548	235,745	276,453	135,632	385,810,370	161,516,538	2,241,499	91,282	323,889	10,977	161,990,174
Omineca	1968	11,906	448,987	142,287	328,753	21,377,460	11,590,004	352,107	49,834	68,248	9,927	12,427,505
	1969	**14,385**	**542,128**	**165,196**	**318,331**	**24,525,650**	**16,347,817**	**83,969**	**13,468**	**34,878**	**5,483**	**17,227,227**
	To date	68,735	2,420,749	10,120,550	8,645,885	78,313,984	42,625,544	29,174,607	3,727,654	32,614,324	4,065,489	61,485,321

		Oz.	$	Oz.	$	Lb.	$	Lb.	$	Lb.	$	$
Osoyoos	1968	2,713	102,310	1,046,612	2,418,187			201,810	28,562	100,019	14,549	2,563,608
	1969	**1,532**	**57,736**	**550,371**	**1,060,559**	**8,719**	**5,812**	**133,262**	**21,374**	**26,868**	**4,224**	**1,149,705**
	To date	1,660,870	50,507,205	2,610,583	4,570,110	2,852,335	423,002	515,446	63,126	228,618	33,140	55,596,583
Revelstoke	1968											
	1969											
	To date	37,300	1,069,260	4,109,297	2,769,163	153,686	51,037	36,077,602	3,858,032	27,127,076	3,311,895	11,059,387
Similkameen	1968											
	1969											
	To date	184,016	6,327,410	4,219,558	2,582,429	601,197,638	111,137,983	382,677	13,376	78,094	4,874	120,066,072
Skeena	1968	3,571	134,666	105,860	244,588	9,572,644	5,189,905	988	140	3,389	493	5,569,792
	1969	**6,000**	**226,122**	**190,449**	**366,993**	**16,516,678**	**11,009,357**					**11,602,472**
	To date	2,436,521	61,818,854	69,355,068	45,095,507	716,388,732	114,834,040	60,001,216	5,438,349	17,198,235	2,541,639	229,728,389
Slocan	1968	174	6,562	547,604	1,265,234			21,373,726	3,025,023	24,235,453	3,525,289	7,822,108
	1969	**217**	**8,178**	**473,781**	**912,971**			**20,150,885**	**3,232,000**	**22,376,022**	**3,517,734**	**7,670,883**
	To date	16,476	481,554	75,777,812	52,281,560	13,662	1,861	1,072,985,163	98,852,517	896,585,670	97,010,403	248,627,895
Trail Creek	1968	340	12,822	242	559			2,366	335	855	124	13,840
	1969											
	To date	2,984,901	63,352,846	3,673,314	2,103,066	122,561,732	18,245,404	148,787	12,628	134,426	16,366	83,730,310
Vancouver	1968	3,688	139,078	50,088	115,728	12,953,884	7,023,078			2,739,246	398,451	7,676,335
	1969	**1,510**	**56,907**	**52,060**	**100,319**	**13,720,681**	**9,145,657**			**607,469**	**95,500**	**9,398,383**
	To date	498,879	16,172,402	5,235,660	3,567,029	1,050,924,186	202,537,144	18,552,603	1,880,670	238,094,203	30,933,686	255,090,931
Vernon	1968	7	264	17,702	40,900			32,734	4,633	10,136	1,474	47,271
	1969	**28**	**1,055**	**30,263**	**58,316**			**97,773**	**15,682**	**490**	**77**	**75,130**
	To date	5,265	177,627	62,856	110,689	654	100	159,186	23,829	66,010	9,354	321,599
Victoria	1968	540	20,364	6,923	15,996	2,224,899	1,206,251					1,242,611
	1969											
	To date	42,120	980,533	923,207	575,564	55,966,545	14,792,228	210,097	19,848	3,568,709	283,923	16,652,096
Not assigned[1]	1968	1,036	39,069	514,096	1,187,814	1,362,288	738,578	24,793,123	3,508,971	42,664,984	6,206,049	11,680,481
	1969	**834**	**31,431**	**—166,375**	**—320,603**	**884,485**	**456,250**	**—9,405,464**	**—1,508,542**	**37,740,728**	**5,933,220**	**4,591,756**
	To date	19,455	585,879	6,049,293	6,670,560	53,243,564	12,929,740	521,930,851	47,073,826	1,334,054,535	130,212,596	197,472,601
Totals	1968	123,896	4,672,242	7,130,866	16,475,795	160,993,338	87,284,148	231,627,618	32,782,257	299,396,264	43,550,181	184,764,623
	1969	**117,830**	**4,440,659**	**5,779,108**	**11,136,283**	**167,421,925**	**111,596,758**	**210,072,565**	**33,693,539**	**301,163,774**	**47,345,957**	**208,213,196**
	To date	16,926,021	500,143,166	478,769,477	341,169,358	4,047,312,919	987,453,911	15,613,477,321	1,312,844,455	14,149,964,862	1,346,480,629	4,488,091,519

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

TABLE 7C.—PRODUCTION OF MISCELLANEOUS METALS BY MINING DIVISIONS, 1968 AND 1969, AND TOTAL TO DATE

Division	Period	Antimony		Bismuth		Cadmium		Chromite		Iron Concentrates		Manganese		Mercury[2]	
		Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
		Lb.	$	Lb.	$	Lb.	$	Tons	$	Tons	$	Tons	$	Lb.	$
Alberni	1968					142,053	404,851			349,672	3,670,950				
	1969					**176,678**	**621,907**			**125,637**	**1,159,801**				
	To date					402,583	1,261,544			4,728,521	49,619,175				
Atlin	1968														
	1969														
	To date					319,212	561,762								
Cariboo	1968														
	1969														
	To date														
Clinton	1968														
	1969														
	To date							126	900						
Fort Steele	1968					239,309	682,031			148,124	1,737,495				
	1969					**329,682**	**1,160,480**			**182,237**	**1,937,179**				
	To date					1,965,376	5,910,758			1,057,406	10,756,749				
Golden	1968					22,778	64,917								
	1969														
	To date	40,062	14,906			544,155	1,104,328								
Greenwood	1968					1,499	4,272								
	1969					**1,398**	**4,821**								
	To date					68,445	141,490	670	31,395						
Kamloops	1968														
	1969														
	To date									21,167	95,851			10,987	5,795
Liard	1968														
	1969														
	To date														
Lillooet	1968														
	1969														
	To date	13,466	4,321											9,231	41,304
Nanaimo	1968									666,404	7,425,369				
	1969									**726,687**	**7,156,093**				
	To date									14,250,519	120,651,417				
Nelson	1968					318,372	907,360								
	1969					**219,432**	**772,400**								
	To date					7,594,541	15,945,805								
New Westminster	1968														
	1969														
	To date														
Omineca	1968					156	445								
	1969					**359**	**1,264**								
	To date	104,489	15,217			269,165	537,846							4,150,892	10,400,259
Osoyoos	1968														
	1969														
	To date											16			

		Lb.	$	Lb.	$	Lb.	$	Tons	$	Tons	$	Tons	$	Lb.	$
Revelstoke	1968														
	1969														
	To date	9,394	3,455			103,612	176,102								
Similkameen	1968														
	1969														
	To date														
Skeena	1968									930,545	8,603,755				
	1969									**1,040,293**	**9,534,772**				
	To date					141,890	316,764			4,368,692	40,250,964				
Slocan	1968					91,528	260,855								
	1969					**83,367**	**295,212**								
	To date	31,865	8,133			2,480,587	5,168,352					541	8,160		
Trail Creek	1968														
	1969														
	To date					115	210			550	1,925				
Vancouver	1968					10,735	30,595								
	1969					**2,380**	**8,378**								
	To date					565,106	1,200,119								
Vernon	1968														
	1969														
	To date					190	532								
Victoria	1968														
	1969														
	To date					7,000	10,929					1,167	24,508		
Not assigned[1]	1968	1,159,960	614,779	207,783	868,533	515,007	1,467,769								
	1969	**820,122**	**508,476**	**62,488**	**288,070**	**327,337**	**1,152,226**								
	To date	51,640,632	15,731,141	6,614,320	12,921,622	24,020,224	36,646,984								
Totals	1968	1,159,960	614,779	207,783	868,533	1,341,437	3,823,095			2,094,745	21,437,569				
	1969	**820,122**	**508,476**	**62,488**	**288,070**	**1,141,133**	**4,016,788**			**2,074,854**	**19,787,845**				
	To date	51,839,908	15,777,173	6,614,320	12,921,622	38,,482,201	68,983,525	796	32,295	24,426,855	221,376,081	1,724	32,668	4,171,110	10,447,358

[1] Metals recovered from operations at the Trail smelter but not assigned to individual mines.
[2] Excludes 1968 and 1969, production, which is confidential.

TABLE 7C.—PRODUCTION OF MISCELLANEOUS METALS BY MINING DIVISIONS, 1968 AND 1969, AND TOTAL TO DATE—*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	1968														4,075,801
	1969														**1,781,708**
	To date														50,880,719
Atlin	1968														
	1969														
	To date											292	360		562,122
Cariboo	1968	2,428,539	4,206,968												4,206,968
	1969	**2,346,883**	**4,175,508**												**4,175,508**
	To date	13,031,998	21,889,352					59	2,299			27,698	21,431		21,913,082
Clinton	1968														
	1969														
	To date														900
Fort Steele	1968									358,191	497,885				2,917,411
	1969									**288,427**	**470,136**				**3,567,795**
	To date									17,921,267	15,777,294			88,1841	32,532,985
Golden	1968														64,917
	1969														
	To date														1,119,234
Greenwood	1968														4,272
	1969														**4,921**
	To date														172,885
Kamloops	1968														
	1969														
	To date	93,995	138,479												240,125
Liard	1968														
	1969														
	To date							2	79						79
Lillooet	1968														
	1969														
	To date	1,469	2,440					3	113			32,353	37,921		86,099
Nanaimo	1968														7,425,369
	1969														**7,156,093**
	To date														120,651,417
Nelson	1968														907,360
	1969														**772,400**
	To date	15,035	18,378									13,739,939	33,900,311		49,864,494
New Westminster	1968			3,317,160	3,372,225										3,372,225
	1969			**2,979,130**	**3,396,208**										**3,396,208**
	To date			38,273,303	32,769,890										32,769,890
Omineca	1968	12,016,709	20,545,515												20,545,960
	1969	**16,600,000**	**31,000,000**												**31,001,264**
	To date	61,185,539	107,162,575					3	154			2,210,892	4,697,710	4202	122,814,181

		Lb.	$	Lb.	$	Oz.	$	Oz.	$	Lb.	$	Lb.	$	$	$
Osoyoos	1968														
	1969														
	To date	612	1,020												
Revelstoke	1968														1,020
	1969														
	To date														
Similkameen	1968											7,784	5,687		185,244
	1969														
	To date														
Skeena	1968	4,989,712	7,164,464					1,287	129,186						129,186
	1969	**5,723,025**	**9,884,333**												15,768,219
	To date	10,736,799	17,093,585												**19,419,105**
Slocan	1968											366	331	1,3893	57,663,033
	1969														260,855
	To date														**295,212**
Trail Creek	1968	364,833	635,775												5,184,645
	1969	**842,093**	**1,473,803**												635,775
	To date	2,202,076	4,058,767			749	30,462	53	3,177						**1,473,803**
Vancouver	1968														4,094,541
	1969														30,595
	To date														**8,378**
Vernon	1968														1,200,119
	1969														
	To date	5,414	9,500												
Victoria	1968														10,032
	1969														
	To date														
Not assigned	1968														35,437
	1969													2,961,024	5,912,105
	To date													**10,949,453**	**12,898,225**
Totals	1968	19,799,793	32,552,722	3,317,160	3,372,225					358,191	497,885			23,854,691	89,154,438
	1969	**25,512,001**	**46,533,644**	**2,979,130**	**3,396,208**					**288,427**	**470,136**			2,961,024	66,127,832
	To date	87,272,937	150,374,096	38,273,303	32,769,890	749	30,462	1,407	135,008	17,921,267	15,777,294	16,019,324	38,663,751	**10,949,453**	**85,950,620**
														23,944,684	591,265,907

[1] Magnesium, page A 22. [2] Cobalt, page A 20. [3] Selenium, page A 24.

TABLE 7D.—PRODUCTION OF INDUSTRIAL MINERALS BY

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	1968										
	1969										
	To date										
Atlin	1968										
	1969										
	To date										
Cariboo	1968					856	17,159				
	1969										
	To date					7,442	175,325			48	168
Clinton	1968										
	1969										
	To date										
Fort Steele	1968										
	1969										
	To date			8	80						
Golden	1968			21,968	164,206						
	1969			**26,949**	**190,620**						
	To date			324,651	3,473,777			3,259	12,612		
Greenwood	1968										
	1969									**200**	**4,000**
	To date							1,790,502	1,540,319	200	4,000
Kamloops	1968									250	5,257
	1969									**357**	**6,590**
	To date									607	11,847
Liard	1986	74,667	14,833,891								
	1969	**79,600**	**15,659,000**								
	To date	837,689	164,185,884								
Lillooet	1968										
	1969										
	To date										
Nanaimo	1968							23,293	59,330	3,500	5,845
	1969							**22,328**	**81,777**	**3,226**	**61,578**
	To date							847,554	1,156,678	13,609	196,209
Nelson	1968									7,090	197,831
	1969									**14,540**	**407,141**
	To date							7,601	8,174	38,298	1,026,756
New Westminster	1968									3,000	60,000
	1969									**3,500**	**77,000**
	To date									99,047	1,414,256
Nicola	1968										
	1969										
	To date										
Omineca	1968										
	1969										
	To date										
Osoyoos	1968							18,945	98,139	16,397	167,995
	1969									**12,923**	**88,392**
	To date							802,611	3,699,031	176,163	2,253,712
Similkameen	1968										
	1969										
	To date										
Skeena	1968										
	1969										
	To date							601,019	1,050,722		
Vancouver	1968										
	1969										
	To date									29,692	418,606
Vernon	1968										
	1969										
	To date										
Victoria	1968							21	210		
	1969							**14**	**140**		
	To date							159	1,835	9,605	157,080
Not assigned	1968										
	1969										
	To date										
Totals	1968	74,667	14,833,891	21,968	164,206	856	17,159	42,259	157,679	30,237	436,928
	1969	**79,600**	**15,659,000**	**26,949**	**190,620**			**22,342**	**81,917**	**34,746**	**654,701**
	To date	837,689	164,185,884	324,659	3,473,857	7,442	175,325	4,052,705	7,469,371	367,269	5,482,634

Other: *See* notes of individual minerals listed alphabetically on pages A 18 to A 25.

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

MINING DIVISIONS, 1968 AND 1969, AND TOTAL TO DATE

Gypsum and Gypsite		Jade		Mica		Sulphur		Other, Value	Division Total
Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value		
Tons	$	Lb.	$	Lb.	$	Tons	$	$	$
								9,3987	9,398
								20,3254	20,325
									17,159
				10,013,800	143,012			30012	318,805
873	6,236							156,1914 6 10	162,427
						104,181	3,125,430		3,125,430
						64,775	**622,488**		**622,488**
112,878	298,824					931,260	17,190,989	16,8949	17,506,787
246,374	689,847								854,053
280,894	**764,032**								**954,852**
2,451,699	7,049,281							1,2765 11	10,536,946
									4,000
								783,5783	2,327,897
									5,257
									6,590
1,246,918	6,323,178			424,700	2,075			203,0556 10	6,540,155
		1,810	2,125			50,450	1,709,326		16,545,342
		5,825	**11,960**			**44,903**	**900,987**		**16,571,947**
		33,048	44,447			648,512	14,769,145		178,999,476
		42,095	83,899						83,899
		6,060	**5,237**						**5,237**
		278,987	187,483					5,12911	192,612
									65,175
									143,355
									1,352,887
									197,831
									407,141
								55,9015	1,090,831
									60,000
									77,000
									1,414,256
2,407	10,050								10,050
		5,110	19,646						19,646
		14,447	**25,438**						**25,438**
		21,757	49,484					11,4601 8	60,944
								1,1173	267,251
									98,392
				1,588,800	25,938			306,5331 3 6	6,285,214
250	1,700							16,8582	18,558
				634,250	10,815	41,624	178,678		1,240,215
						8,500	93,829		93,829
						17,544	**168,659**		**168,659**
						680,943	6,468,831	97,3895	6,984,826
				160,500	3,978				3,978
									210
									140
								30,22611	189,141
						157,390	4,721,700		4,721,700
						221,900	**2,132,459**	**4,913**	**2,137,372**
						4,656,701	52,968,134	4,913	52,973,047
246,374	689,847	49,015	105,670			320,521	9,650,285	1,117	26,056,782
280,894	**764,032**	**26,332**	**42,635**			**349,122**	**3,824,593**	**4,913**	**21,222,411**
3,815,025	13,689,269	333,792	281,414	12,822,050	185,818	6,959,040	91,575,777	1,719,426	288,238,775

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

TABLE 7E.—PRODUCTION OF STRUCTURAL MATERIALS BY

Division	Period	Cement	Lime and Limestone	Building-stone	Rubble, Riprap, and Crushed Rock	Sand and Gravel
		$	$	$	$	$
Alberni	1968				14,880	237,267
	1969				**29,760**	**690,589**
	To date				325,251	2,914,874
Atlin	1968					
	1969					
	To date		1,108		98,478	231,305
Cariboo	1968		109,440		180,259	1,306,897
	1969		**139,485**		**206,882**	**2,810,698**
	To date		301,041		1,762,686	12,731,515
Clinton	1968				458,496	449,634
	1969				**218,772**	**82,518**
	To date				859,092	1,110,519
Fort Steele	1968				216,813	340,153
	1969				**241,000**	**223,845**
	To date		43,873	71,941	2,058,912	5,129,238
Golden	1968					154,951
	1969				**1,800**	**200,801**
	To date		1,000	50,840	127,989	2,570,016
Greenwood	1968			13,122	30,386	128,574
	1969			**38,000**	**1,845**	**135,411**
	To date		42,560	134,136	273,314	1,097,182
Kamloops	1968			1,050	174,157	923,233
	1969		**315**	**750**	**813,185**	**1,032,535**
	To date		12,315	19,800	7,746,907	8,983,241
Liard	1968				219,175	1,538,766
	1969				**392,719**	**1,309,858**
	To date				790,109	7,267,630
Lillooet	1968				50,750	34,680
	1969				**153,640**	**167,995**
	To date		100	2,000	915,154	2,029,721
Nanaimo	1968		2,902,586		246,856	527,675
	1969		**2,824,043**		**379,662**	**531,072**
	To date		43,979,665	3,450,735	1,687,701	6,282,416
Nelson	1968		98,801	2,394	9,852	442,018
	1969		**59,713**	**602**	**615**	**346,702**
	To date		338,259	423,187	520,056	4,310,292
New Westminster	1968		203,772		1,197,593	5,006,682
	1969		**196,728**		**1,521,911**	**6,426,303**
	To date		2,725,077	20,974	13,406,399	59,566,464
Nicola	1968					108,142
	1969					**184,099**
	To date			8,000	156,696	953,801
Omineca	1968				302,334	797,269
	1969		**1,535**		**138,709**	**926,312**
	To date		4,612		1,926,621	8,037,185
Osoyoos	1968		9,990		1,950	156,716
	1969				**11,805**	**210,169**
	To date		43,774	33,018	222,453	2,117,046
Revelstoke	1968				46,022	298,432
	1969				**16,976**	**55,671**
	To date		1,000	5,575	425,798	2,017,512
Similkameen	1968				15,000	249,621
	1969				**5,708**	**387,778**
	To date	10,500	11,571	24,000	638,757	3,213,856
Skeena	1968				258,356	371,486
	1969				**215,639**	**1,482,490**
	To date		1,645,300	144,000	2,925,007	7,629,288
Slocan	1968					195,400
	1969				**7,114**	**195,999**
	To date		1,000	115,143	125,648	1,499,198
Trail Creek	1968				1,442	104,292
	1969				**712**	**238,551**
	To date		32,500	85,520	228,378	2,638,536
Vancouver	1968	6,473,239			17,104	2,169,172
	1969	**7,282,301**			**64,348**	**2,377,515**
	To date	53,483,995	40,885	4,012,560	8,186,761	39,699,683
Vernon	1968			16,800	6,165	623,175
	1969				**3,750**	**667,031**
	To date		46,499	97,852	286,974	4,758,189
Victoria	1968	7,160,927	12,688		8,397	1,231,829
	1969	**9,177,270**	**15,213**		**14,194**	**1,814,118**
	To date	146,683,152	914,597	55	486,824	20,764,591
Not assigned	1968				68,452	2,875,659
	1969				**15,465**	**4,055,659**
	To date		315,498	505,018	711,095	24,182,921
Totals	1968	13,634,166	3,337,277	33,366	3,524,439	20,271,723
	1969	**16,459,571**	**3,237,032**	**39,352**	**4,456,211**	**26,553,699**
	To date	200,177,647	50,502,234	9,204,354	46,893,060	231,736,219

MINING DIVISIONS, 1968 AND 1969, AND TOTAL TO DATE

Brick (Common)	Face, Paving, and Sewer Brick	Firebricks, 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
$	$	$	$	$	$	$	$	$	$
									252,147
									720,329
									3,240,125
									330,891
							45,000		1,641,596
1,193	184	4,651	15,807				**6,000**		**3,163,085**
							133,952		14,951,029
									908,130
									301,290
									1,969,611
									556,966
7,800									**464,845**
							8,118		7,319,882
							37,000		191,951
							39,445		**242,046**
							136,010		2,885,855
									172,082
114,361			6,922						**175,256**
									1,668,475
									1,098,440
72,379									**1,846,785**
									16,834,642
									1,757,941
									1,702,577
									8,057,739
									85,430
									321,635
									2,946,975
									3,677,117
1,104,295	38,939		35,758						**3,734,777**
									56,579,509
									553,065
19,110	2,864								**407,632**
1,734	1,500,230	729,537	23,391	18,972	809,762	27,222	550,146		5,613,768
14,250	**1,744,939**	**763,727**	**55,878**	**8,526**	**1,082,091**	**27,612**	**302,139**		10,069,041
1,844,003	11,337,073	17,486,944	1,103,247	3,056,647	18,698,874	512,556	4,828,941		**12,144,104**
									134,587,199
									108,142
									184,099
									1,118,497
									1,099,603
5,274									**1,066,556**
									9,973,692
									168,656
									221,974
									2,416,291
									344,454
									72,647
									2,449,885
									264,621
			1,363						**393,486**
							11,992		3,912,039
									629,842
			4,925						**1,698,129**
							8,324		12,356,844
									195,400
									203,113
									1,740,989
									105,734
									239,263
									2,984,934
									8,659,515
142,208	241,216	580,778	12,724			23,362	88,304		**9,724,164**
									106,512,476
									646,140
131,467	6,202	1,011	5	18,224	4,325				**670,781**
							20		5,350,768
							645,511		9,059,352
1,814,647	29,552	119,930	1,050	705,821	1,072,346	136,504	**541,112**		**11,561,807**
							4,099,358		176,828,427
									2,944,111
									4,071,124
							3,180,828	5,972,171	34,867,531
1,734	1,500,230	729,537	23,391	18,972	809,762	27,222	1,277,657		45,189,476
14,250	**1,744,939**	**763,727**	**55,878**	**8,526**	**1,082,091**	**27,612**	**888,696**		**55,331,584**
5,256,737	11,656,030	18,193,314	1,181,801	3,780,692	19,775,545	672,422	12,495,847	5,972,171	617,498,073

TABLE 8A.—PRODUCTION OF COAL, 1836–1969

Year	Quantity[1] (Short Tons)	Value	Year	Quantity[1] (Short Tons)	Value
1836–59	41,871	$149,548	1916	2,583,469	$8,900,675
1860	15,956	56,988	1917	2,436,101	8,484,343
1861	15,427	55,096	1918	2,575,275	12,833,994
1862	20,292	72,472	1919	2,433,540	11,975,671
1863	23,906	85,380	1920	2,852,535	13,450,169
1864	32,068	115,528	1921	2,670,314	12,836,013
1865	36,757	131,276	1922	2,726,793	12,880,060
1866	28,129	100,460	1923	2,636,740	12,678,548
1867	34,988	124,956	1924	2,027,843	9,911,935
1868	49,286	176,020	1925	2,541,212	12,168,905
1869	40,098	143,208	1926	2,406,094	11,650,180
1870	33,424	119,372	1927	2,553,416	12,269,135
1871	55,458	164,612	1928	2,680,608	12,633,510
1872	55,458	164,612	1929	2,375,060	11,256,260
1873	55,459	164,612	1930	1,994,493	9,435,650
1874	91,334	244,641	1931	1,765,471	7,684,155
1875	123,362	330,435	1932	1,614,629	6,523,644
1876	155,895	417,576	1933	1,377,177	5,375,171
1877	172,540	462,156	1934	1,430,042	5,725,133
1878	191,348	522,538	1935	1,278,380	5,048,864
1879	270,257	723,903	1936	1,352,301	5,722,502
1880	299,708	802,785	1937	1,446,243	6,139,920
1881	255,760	685,171	1938	1,388,507	5,565,069
1882	315,997	846,417	1939	1,561,084	6,280,956
1883	238,895	639,897	1940	1,662,027	7,088,265
1884	441,358	1,182,210	1941	1,844,745	7,660,000
1885	409,468	1,096,788	1942	1,996,000	8,237,172
1886	365,832	979,908	1943	1,854,749	7,742,030
1887	462,964	1,240,080	1944	1,931,950	8,217,966
1888	548,017	1,467,903	1945	1,523,021	6,454,360
1889	649,411	1,739,490	1946	1,439,092	6,732,470
1890	759,518	2,034,420	1947	1,696,350	8,680,440
1891	1,152,590	3,087,291	1948	1,604,480	9,765,395
1892	925,495	2,479,005	1949	1,621,268	10,549,924
1893	1,095,690	2,934,882	1950	1,574,006	10,119,303
1894	1,134,509	3,038,859	1951	1,573,572	10,169,617
1895	1,052,412	2,824,687	1952	1,402,313	9,729,739
1896	1,002,268	2,693,961	1953	1,384,138	9,528,279
1897	999,372	2,734,522	1954	1,308,284	9,154,544
1898	1,263,272	3,582,595	1955	1,332,874	8,986,501
1899	1,435,314	4,126,803	1956	1,417,209	9,346,518
1900	1,781,000	4,744,530	1957	1,085,657	7,340,339
1901	1,894,544	5,016,398	1958	796,413	5,937,860
1902	1,838,621	4,832,257	1959	690,011	5,472,064
1903	1,624,742	4,332,297	1960	788,658	5,242,223
1904	1,887,981	4,953,024	1961	919,142	6,802,134
1905	2,044,931	5,511,861	1962	825,339	6,133,986
1906	2,126,965	5,548,044	1963	850,541	6,237,997
1907	2,485,961	7,637,713	1964	911,326	6,327,678
1908	2,362,514	7,356,866	1965	950,763	6,713,590
1909	2,688,672	8,574,884	1966	850,821	6,196,219
1910	3,314,749	11,108,335	1967	908,790	7,045,341
1911	2,541,698	8,071,747	1968	959,214	7,588,989
1912	3,211,907	10,786,812	1969	852,340	6,817,155
1913	2,713,535	9,197,460			
1914	2,237,042	7,745,847	Totals	142,445,046	$616,723,876
1915	2,076,601	7,114,178			

[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 8B.—COAL PRODUCTION AND DISTRIBUTION BY COLLIERIES AND BY MINING DIVISIONS, 1969

Mine	Gross Output	Washery Refuse	Output	Coal Used		Sales					Total Coal Sold and Used	
						Canada		United States	Japan	Total Sales		
				Under Companies' Boilers, Etc.	Making Coke	British Columbia	Other Provinces				Amount	Value
Fort Steele Mining Division	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	$
Kaiser Resources Ltd.—Michel Colliery	1,084,940	192,261	892,679	15,344	232,199	83,854	147,703	37,581[1]	326,184	595,322	842,865	6,726,731
Omineca Mining Division												
Forestburg Collieries Ltd.—Bulkley Valley Collieries	9,475	.....	9,475	.....	.....	9,475	.....	.....	.....	9,475	9,475	90,424
Grand totals for Province	1,094,415	192,261	902,154	15,344	232,199	93,329	147,703	37,581[1]	326,184	604,797	852,340	6,817,155

[1] Includes 3,501 tons sold to Peru.

TABLE 9.—PRINCIPAL ITEMS OF EXPENDITURE, REPORTED FOR OPERATIONS OF ALL CLASSES

Class	Salaries and Wages	Fuel and Electricity	Process Supplies
Metal-mining	$71,516,839	$10,051,142	$37,779,749
Exploration and development	29,885,859	.....	.....
Coal	5,334,375	248,354	910,822
Petroleum and natural gas (exploration and production)	3,815,613	.....	.....
Industrial minerals	5,307,033	1,159,018	1,596,253
Structural-materials industry	7,590,608	3,095,609	2,802,735
Totals, 1969	$123,450,327	$14,554,123	$43,089,559
Totals, 1968	113,459,219	13,818,326	38,760,203
1967	94,523,495	13,590,759	34,368,856
1966	93,409,528	12,283,477	28,120,179
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 10.—EMPLOYMENT IN THE MINERAL INDUSTRY, 1901–69

Year	Metals							Coal Mines			Structural Materials		Industrial Materials	Petroleum and Natural-gas Exploration and Development	Total
		Mines													
	Placer	Under	Above	Exploration and Development	Concentrators	Smelters	Total	Under	Above[1]	Total	Quarries and Pits	Plants			
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	4,482	1,641	6,073					9,767
1909		2,184	1,070				3,254	4,718	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	824	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	8,885	3,814	1,520	5,334	412	868	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	843	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	1,385		531	2,486	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	869		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	12,881	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	3,330	9,846	968	398	1,366	1,598	770	854		14,539
1957	67	2,353	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	80	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	1,978	270	949	3,356	8,228	548	228	776	1,523	481	517		11,560
1963	43	1,718	2,012	450	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
1967		1,928	2,582	1,264	992	3,435	10,151	260	197	457	1,309	372	584	507	13,380
1968		1,823	2,369	3,990	1,072	3,283	12,537	195	358	553	1,207	380	582	400	16,212
1969	7	1,794	2,470	4,270	1,099	3,468	13,101	245	455	700	1,097	542	567	416	16,437

[1] Commencing with 1967, does not include employment in by-product plants.

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

TABLE 11.—EMPLOYMENT AT MAJOR METAL MINES AND COAL MINES, 1969

	Tons		Days Operating Mill	Average Number Employed[1]					
	Mined	Milled		Administrative, Etc.	Mine		Mill	Others	Total
					Surface	Underground			
Metal Mines									
Anaconda Britannia Mines Ltd. (Britannia)	604,808	605,273	260	84	60	217	32	—	393
Bethlehem Copper Corporation Ltd. (Bethlehem)	5,703,001	5,386,691	365	26	176	—	152	—	354
Bralorne Can-Fer Resources Ltd. (Bralorne)	94,396	94,396	205	28	25	91	11	—	155
British Columbia Molybdenum Ltd. (B.C. Molybdenum)	2,356,514	2,356,514	362	31	101	—	59	55	246
Brynnor Mines Ltd. (Boss Monutain)	547,500	547,500	365	44	73	74	29	—	220
Canadian Exploration Ltd. (Jersey)	507,641	517,648	365	56	33	118	13	—	220
Coast Copper Co. Ltd. and Cominco Ltd. (Old Sport and Independent)	281,012	281,012	365	37	56	99	11	—	203
Cominco Ltd. (Bluebell)	230,956	230,956	313	38	29	140	15	—	222
Cominco Ltd. (Sullivan)	2,157,522	2,168,280	241	192	82	443	113	—	830
Craigmont Mines Ltd. (Craigmont)	1,810,855	1,810,855	356	106	7	190	186	6	495
Endako Mines Ltd. (Endako)	11,711,800	9,628,000	362	120	262	—	78	—	460
Giant Mascot Mines Ltd. (Pride of Emory)	337,056	337,056	252	42	28	98	23	—	191
The Granby Mining Co. Ltd. (Phoenix)	787,562	759,299	365	25	88	—	55	—	168
Granisle Copper Ltd. (Granisle)	2,367,969	2,329,857	365	32	42	—	48	45	167
Mastodon-Highland Bell Mines Ltd. (Highland-Bell)	41,144	34,105	340	10	7	34	12	—	63
Red Mountain Mines Ltd. (Coxey)	179,800	201,542	260	10	7	—	23	—	40
Reeves MacDonald Mines Ltd. (Reeves MacDonald)	201,215	201,215	251	26	27	45	12	—	110
Texada Mines Ltd. (Texada)	1,309,399	1,330,029	365	21	88	96	35	—	240
Utica Mines Ltd. (Horn Silver)	74,915	74,915	365	18	—	53	18	—	89
Wesfrob Mines Ltd. (Tasu)	2,120,646	2,253,120	365	53	33	—	127	—	213
Western Mines Ltd. (Lynx)	383,931	383,931	363	28	39	56	32	—	155
Zeballos Iron Mines Ltd. (FL)	34,175	47,488	56	2	2	—	1	11	16
Other mines	.....	.....	.....	.....	.....	.....	.....	.....	113
Total	.....	.....	.....	.....	.....	.....	.....	.....	5,363
Coal Mines									
Kaiser Resources Ltd. (Michel Collieries)	1,084,940	.....	—	191	287[2]	217	—	—	695
Forestburg Collieries Ltd. (Bulkley Valley Collieries)	9,475	.....	—	1	4	—	—	—	5
Total	.....	.....	.....	.....	.....	.....	.....	.....	700

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

[2] Does not include employment in by-product plants.

TABLE 12.—METAL PRODUCTION, 1969

Property or Mine	Location of Mine	Owner or Agent	Ore Shipped or Treated	Product Shipped	Gross Metal Contents					
					Gold	Silver	Copper	Lead	Zinc	Cadmium
Alberni Mining Division			Tons		Oz.	Oz.	Lb.	Lb.	Lb.	Lb.
Brynnor mine	Kennedy Lake	Brynnor Mines Ltd., Kennedy Lake Division	41,823	Iron concentrates shipped from stockpile						
FL	Zeballos	Zeballos Iron Mines Ltd.	47,488	Iron concentrates, 83,814 tons						
Lynx mine	Buttle Lake	Western Mines Ltd.	383,931	Copper concentrates, 23,371 tons; zinc concentrates, 49,220 tons	13,947	498,006	12,816,483	6,394,143	57,046,582	252,398
Atlin Mining Division										
Nil										
Cariboo Mining Division										
Boss Mountain mine	Big Timothy Mountain	Brynnor Mines Ltd., Boss Mountain Division	547,500	Molybdenite concentrates, 2,065 tons containing 2,346,883 lb. of molybdenum						
Clinton Mining Division										
Nil										
Fort Steele Mining Division										
Sullivan mine	Kimberley	Cominco Ltd.	2,157,522	Lead concentrates, 140,959 tons; zinc concentrates, 169,300 tons; tin concentrates, 252 tons containing 288,427 lb. of tin; iron sinter, 182,237 tons	172	3,150,706	555,800	200,866,000	177,553,200	470,975
Golden Mining Division										
Nil										
Greenwood Mining Division										
Highland-Bell mine	Beaverdell	Mastodon-Highland Bell Mines Ltd.	34,105	Lead concentrates, 1,925 tons; zinc concentrates, 578 tons; jig concentrates, 201 tons	582	510,149		645,146	691,824	1,997
Midway	Midway	D. Moore, Midway	21	Crude ore	4	303		343	343	
Phoenix mine	Phoenix	The Granby Mining Co. Ltd., Phoenix Copper Division	759,299	Copper concentrates, 18,604 tons	15,730	94,725	9,479,110			
Skomac	Greenwood	J. S. and J. A. Kleman, Greenwood	19	Crude ore	3	264		1,707	493	
Kamloops Mining Division			Tons							
Bethlehem mine	Highland Valley	Bethlehem Copper Corporation Ltd.	5,386,691	Copper concentrates, 57,688 tons	2,074	158,534	42,902,589			

TABLE 12.—METAL PRODUCTION, 1969—*Continued*

Property or Mine	Location of Mine	Owner or Agent	Ore Shipped or Treated	Product Shipped	Gross Metal Contents					
					Gold	Silver	Copper	Lead	Zinc	Cadmium
Liard Mining Division			Tons		Oz.	Oz.	Lb.	Lb.	Lb.	Lb.
Nil										
Lillooet Mining Division										
Bralorne mine	Bralorne	Bralorne Can-Fer Resources Ltd., Bralorne Division	94,396	Bullion	46,896	8,275				
Nanaimo Mining Division										
Independent	Benson Lake	Cominco Ltd.	43,522	Copper concentrates, 4,356 tons	1,627	10,887	1,890,000			
Iron Mike	Sayward	R. I. Bennett	33,000	Iron concentrates shipped from stockpile						
Old Sport mine	Benson Lake	Coast Copper Co. Ltd.	237,490	Copper concentrates, 8,321 tons; iron concentrates, 77,386 tons	10,524	29,238	4,980,000			
Texada mine	Texada Island	Texada Mines Ltd.	1,330,029	Iron concentrates, 616,301 tons; copper concentrates, 8,665 tons	1,254	52,220	3,637,899			
Nelson Mining Division										
Howard	Salmo	J. Stoochnoff, J. Hutton, Salmo; G. Windsor, Spokane	39	Crude ore	4	39		1,466	1,466	
Jersey mine	Salmo, Iron Mountain	Canadian Exploration Ltd.	517,648	Lead concentrates, 5,552 tons; zinc concentrates, 22,129 tons		28,241		9,023,605	25,687,496	207,086
Leadville	Creston	F. J. Brady, Creston	3	Crude ore		16		884	247	
New Arlington	Salmo, Erie Creek	G. D. Fox, Trail	3,339	Crude ore	398	2,219		38,000	46,000	
Puerto Rico	Nelson	D. Pearce, Nelson	6	Mill clean-up	29	91		304	113	
Reeves MacDonald mine	Nelway	Reeves MacDonald Mines Ltd.	201,215	Lead concentrates, 3,990 tons; zinc concentrates, 16,172 tons		28,626	12,680	4,644,134	17,456,975	106,388
Silver Dollar	Salmo, Erie Creek	D. H. Norcross, Nelson	565	Crude ore	80	2,542		6,634	7,441	
New Westminster Mining Division										
Pride of Emory mine	Hope	Giant Mascot Mines Ltd.	337,056	Nickel-copper concentrates, 16,760 tons; nickel content, 3,385,375 lb.			1,830,300			
Nicola Mining Division										
Craigmont Mine	Merritt	Craigmont Mines Ltd.	1,810,855	Copper concentrates, 71,710 tons			37,629,772			
Omineca Mining Division										
Cronin mine	Smithers	Kindrat Mines Ltd.	300	Lead concentrates, 24 tons; zinc concentrates, 28 tons	2	2,485		30,570	34,346	341
Endako mine	Endako	Endako Mines Ltd.	9,628,000*	Molybdenite concentrates, 10,416 tons; molybdenum trioxide, 4,193 tons. Total content, 16,600,000 lb. of molybdenum						

* Production is estimated.

			Tons		Oz.	Oz.	Lb.	Lb.	Lb.	Lb.
Omineca Mining Division—Continued										
Granisle mine	Babine Lake	Granisle Copper Ltd.	2,329,857	Copper concentrates, 36,055 tons	14,339	138,219	24,886,200			
Pinchi Lake mine	Pinchi Lake	Cominco Ltd.	(1)	Mercury						
Silver Standard mine	Hazelton	Northwestern Midland Development Co. Ltd.	884	Lead concentrates, 100 tons; zinc concentrates, 12 tons	44	27,863		60,424	53,031	172
Osoyoos Mining Division										
Dusty Mac	Okanagan Falls	Dusty Mac Mines Ltd.	107	Crude ore	72	1,581		426	533	
Golconda	Olalla	Trent Resources Ltd.	17	Crude ore		79	8,889	279		
Horn Silver mine	Keremeos	Utica Mines Ltd.	74,915	Silver concentrates, 2,697 tons; jib concentrates, 451 tons	1,458	554,979		110,400	135,465	
Revelstoke Mining Division										
Nil										
Similkameen Mining Division										
Silvertip	Princeton	H. J. and L. L. Adams, H. J. Krase, Merritt	35	Crude ore	1	562		9,614	4,207	
Skeena Mining Division										
B.C. Molybdenum mine	Alice Arm	British Columbia Molybdenum Ltd.	2,356,514	Molybdenite concentrates, 4,774 tons containing 5,723,025 lb. of molybdenum						
Tasu mine	Tasu Harbour	Wesfrob Mines Ltd.	2,120,646	Iron concentrates, 1,040,293 tons; copper concentrates, 40,122 tons	6,000	194,336	16,917,900			
Slocan Mining Division										
Alamo	Silverton	W. Pengelly and W. Fulkeo, Silverton	200	Lead concentrates, 6 tons; zinc concentrates, 11 tons	1	1,160		7,669	11,912	84
Arlington	Springer Creek	Arlington Silver Mines Ltd.	1,917	Crude ore		26,805		89,589		
Bluebell mine	Riondel	Cominco Ltd.	230,956	Lead concentrates, 14,134 tons; zinc concentrates, 24,155 tons	69	304,927	288,000	20,649,400	24,157,000	111,788
Colorado	Slocan	Hyperion Silver Mines Ltd.	23	Crude ore		212		135	181	
Dublin Queen	New Denver	Iskut Silver Mines Ltd.	12	Crude ore		611		7,545	3,834	
Enterprise	Slocan	Enterprise Silver Mines Ltd.	61	Crude ore		373		2,536	6,891	
Freddy	Silverton	J. C. Hansen and H. B. Lyon, New Denver	52	Crude ore	4	2,470		919	470	
Homestake	Slocan	Raymond Gold and Silver Ltd., and C. Thickett, Slocan	52	Crude ore	42	4,417		906	1,076	
Little Tim	Slocan	K. G. Marshall and R. B. Savage, Nakusp; Shawn Mines Ltd.	112	Crude ore		6,388		7,168	3,461	
Millie Mack	Slocan	Richwood Silver Mines Ltd.	24	Crude ore	5	222		997	651	

[1] Details confidential.

TABLE 12.—METAL PRODUCTION, 1969—*Continued*

Property or Mine	Location of Mine	Owner or Agent	Ore Shipped or Treated	Product Shipped	Gross Metal Contents					
					Gold	Silver	Copper	Lead	Zinc	Cadmium
Slocan Mining Division—Continued			Tons		Oz.	Oz.	Lb.	Lb.	Lb.	Lb.
Ottawa mine	Springer Creek	Pamicon Developments Ltd.	11	Silver concentrates, 10 tons; crude ore, 115 tons		31,349		624		
Pontiac	Ainsworth	H. A. Lane and V. Matheson, Nelson	11	Crude ore	5	194		4,508	2,656	
Scranton	Kaslo	Silver Star Mines Ltd.	35	Crude ore	49	1,014		47,055	5,845	
Silver Bell	Silverton	J. O. H. Nesbitt and O. A. Lindstein, Silverton	200	Lead concentrates, 17 tons; zinc concentrates, 24 tons		2,284		29,772	24,294	146
Silver Chalice	Kaslo	E. E. Beale, Kaslo	500	Lead concentrates, 6 tons; zinc concentrates, 24 tons		917		6,377	24,845	171
Silver Hoard	Ainsworth	G. McLellan, Ainsworth	200	Crude ore		2,813		7,980	15,561	
Skyline	Ainsworth	W. E. Lane, Ainsworth	400	Crude ore		1,527				
Standard	Silverton	Panoil Canadian Mineral Associates	6,665	Lead concentrates, 229 tons; zinc concentrates, 412 tons	18	67,729		293,673	441,631	3,723
Victor	Sandon	E. H. Petersen and E. Perepolkin, lessees	131	Crude ore	24	16,701		98,443	74,115	401
Washington	Retallack-Three Forks	Red Deer Valley Coal Co.	1,920	Lead concentrates, 2 tons; zinc concentrates, 426 tons		10,552		4,086	438,209	3,495
Westmont	Enterprise Creek	Eastmont Silver Mines Ltd.	10	Crude ore		786		858	1,163	
Trail Creek Mining Division										
Coxey mine	Rossland	Red Mountain Mines Ltd.	201,542	Molybdenite concentrates, 702 tons containing 842,093 lb. of molybdenum						
Vancouver Mining Division										
Britannia mine	Howe Sound	Anaconda Britannia Mines Ltd.	605,273	Copper concentrates, 24,362 tons; zinc concentrates, 653 tons	1,510	53,122	13,964,301		674,966	3,400
Vernon Mining Division										
Chaput	Lumby	F.K. Explorations Ltd.	1,367	Crude ore, 777 tons; lead and iron concentrates, 59 tons	27	29,620		97,233	79,300	
DCK	Vernon	King Graybarr Mines Ltd.	59	Crude ore	1	171		2,536	979	
Skookum	Vernon	T. J. McQuillan, Vancouver	143	Crude ore		1,089				
Victoria Mining Division										
Nil										

Departmental Work

CHAPTER III

ORGANIZATION

The organization of the Department of Mines and Petroleum Resources is displayed in the diagram on page A 58.

ADMINISTRATION BRANCH

The Administration Branch, consisting of three divisions, Mining Titles, Petroleum and Natural Gas Titles, and Accounts, is responsible for the administration of the Provincial laws regarding the acquisition of rights to minerals, coal, petroleum, and natural gas, and deals with other departments of the Provincial service for the Department or for any branch.

MINING TITLES

Staff

R. H. McCrimmon.....Chief Gold Commissioner
E. J. Bowles.....Deputy Chief Gold Commissioner
J. G. B. Egdell.....Gold Commissioner, Vancouver

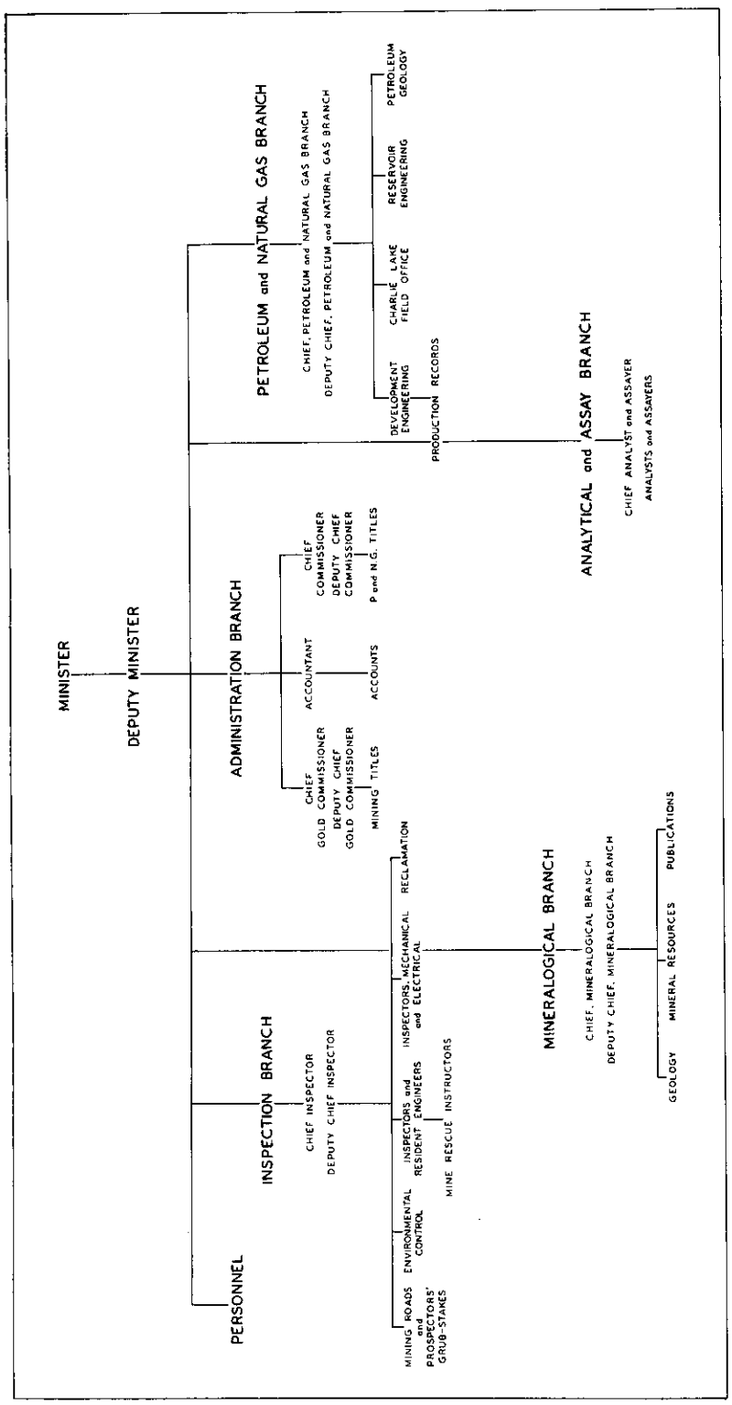
Gold Commissioners, Mining Recorders, and Sub-Mining Recorders, whose duties are laid down in the *Mineral Act* and *Placer-mining Act*, administer these Acts and other Acts relating to mining. Mining Recorders, in addition to their own functions, may also exercise the powers conferred upon Gold Commissioners 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 Mining 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 1. 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 on page A 59.

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 is plotted from details supplied by locators.

During 1969, twenty-one investigations were carried out pursuant to section 80 of the *Mineral Act*. Six investigations with regard to certificates of work being


MINISTER
DEPUTY MINISTER
PERSONNEL
INSPECTION BRANCH
CHIEF INSPECTOR
DEPUTY CHIEF INSPECTOR
MINING ROADS and PROSPECTORS' GRUB-STAKES
ENVIRONMENTAL CONTROL
INSPECTORS and RESIDENT ENGINEERS
MINE RESCUE INSTRUCTORS
INSPECTORS MECHANICAL and ELECTRICAL
RECLAMATION
ADMINISTRATION BRANCH
CHIEF GOLD COMMISSIONER
DEPUTY CHIEF GOLD COMMISSIONER
MINING TITLES
ACCOUNTANT
ACCOUNTS
CHIEF COMMISSIONER
DEPUTY CHIEF COMMISSIONER
P and N.G. TITLES
MINERALOGICAL BRANCH
CHIEF, MINERALOGICAL BRANCH
DEPUTY CHIEF, MINERALOGICAL BRANCH
GEOLOGY
MINERAL RESOURCES
PUBLICATIONS
PETROLEUM and NATURAL GAS BRANCH
CHIEF, PETROLEUM and NATURAL GAS BRANCH
DEPUTY CHIEF, PETROLEUM and NATURAL GAS BRANCH
DEVELOPMENT ENGINEERING
CHARLIE LAKE FIELD OFFICE
RESERVOIR ENGINEERING
PETROLEUM GEOLOGY
PRODUCTION RECORDS
ANALYTICAL and ASSAY BRANCH
CHIEF ANALYST and ASSAYER
ANALYSTS and ASSAYERS

wrongfully or improperly obtained resulted in 49 certificates of work being cancelled. Fifteen investigations with regard to mineral claims having been located or recorded otherwise than in accordance with the *Mineral Act* resulted in 182 mineral claims being cancelled.

List of Gold Commissioners and Mining Recorders

Mining Division	Location of Office	Gold Commissioner	Mining Recorder
Alberni	Port Alberni	T. S. Dobson	T. S. Dobson.
Atlin	Atlin	D. P. Lancaster	D. P. Lancaster.
Cariboo	Quesnel	F. E. P. Hughes	F. E. P. Hughes.
Clinton	Clinton	I. Williams	I. Williams.
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.
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	J. Hoem.
Nicola	Merritt	L. P. Lean	L. P. Lean.
Omineca	Smithers	G. H. Beley	G. H. Beley.
Osoyoos	Penticton	T. S. Dalby	T. S. Dalby.
Revelstoke	Revelstoke	D. G. B. Roberts	D. G. B. Roberts.
Similkameen	Princeton	W. L. Marshall	W. L. Marshall.
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	N. A. Nelson	N. A. Nelson.
Victoria	Victoria	E. J. Bowles	E. A. H. Mitchell.

Maps Showing Mineral Claims, Placer Claims, Placer-mining Leases, and Map Indexes

From the details supplied by the locators, the approximate positions of mineral claims held by record and of placer-mining leases are shown on mineral reference maps which 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 (price, $1.25 per print).

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. Indexes to their published maps, reference maps, and manuscript maps as well as indexes to air photographic cover are available through the Director, Surveys and Mapping Branch, British Columbia Lands Service, Victoria.

Coal

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

Coal Revenue, 1969

Licences—	
Fees	$14,798.00
Rental	63,807.90
Total	$78,605.90

During 1969, 381 coal licences were issued, totalling 226,514 acres. As of December 31, 1969, a total of 760 coal licences, amounting to 422,178 acres, were held in good standing.

Gold Commissioners' and Mining Recorders' Office Statistics, 1969

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	108	1	2,033	3,087	$5,800.00	.....	85	5	1	.....	2	$500.00	.....	$772.00	$36,516.45	$37,288.45
Atlin	218	4	4,070	1,412	20,400.00	.....	107	8	.....	12	23	1,000.00	.....	1,801.00	57,055.25	58,856.25
Cariboo	940	12	7,399	3,487	11,100.00	.....	82	2	2	87	279	1,500.00	91	6,680.00	88,551.50	95,231.50
Clinton	46	.....	2,427	1,621	2,808.00	.....	64	1	.....	4	44	.....	17	610.00	24,236.50	24,846.50
Fort Steele	210	9	1,843	4,111	9,000.00	.....	89	2	1	18	26	1,000.00	2	2,651.00	43,992.50	46,643.50
Golden	81	6	912	1,497	4,200.00	.....	66	1	.....	45	30	.....	32	1,305.00	23,039.55	24,344.55
Greenwood	223	7	2,683	2,728	8,936.00	.....	168	35	.....	2	10	.....	2	2,315.00	51,160.25	53,475.25
Kamloops	534	18	11,059	12,849	54,200.00	82	523	93	.....	10	16	250.00	9	5,415.00	219,871.22	225,286.22
Liard	406	3	6,692	10,158	45,580.00	.....	341	.....	.....	142	57	500.00	242	2,632.00	159,115.75	161,747.75
Lillooet	169	7	3,193	2,073	11,100.00	.....	187	7	.....	19	50	250.00	40	1,846.00	44,441.50	46,287.50
Nanaimo	194	5	3,215	8,368	27,710.00	.....	642	3	1	.....	.....	.....	.....	1,770.00	88,154.25	89,924.25
Nelson	331	5	1,260	1,102	5,704.00	.....	78	18	.....	4	17	.....	.....	2,720.00	29,040.50	31,760.50
New Westminster	490	20	1,876	1,437	7,100.00	.....	96	4	6	61	144	750.00	61	6,227.00	37,084.00	43,311.00
Nicola	129	14	4,941	3,597	24,600.00	.....	516	1	.....	.....	.....	.....	.....	3,446.00	84,932.00	88,378.00
Omineca	572	14	18,301	15,302	35,168.00	.....	483	6	.....	44	119	2,500.00	90	5,040.00	244,776.47	249,816.47
Osoyoos	218	8	1,621	1,826	21,120.00	.....	191	9	.....	.....	.....	.....	.....	2,682.00	44,815.75	47,497.75
Revelstoke	109	1	441	2,148	3,300.00	.....	44	2	.....	1	7	.....	.....	745.00	12,661.75	13,406.75
Similkameen	173	.....	2,676	4,614	14,600.00	.....	188	7	.....	32	134	13,562.00	41	865.00	79,148.20	80,013.20
Skeena	133	2	1,239	3,225	9,388.00	.....	104	16	.....	11	.....	750.00	25	975.00	47,142.25	48,117.25
Slocan	227	11	1,497	1,533	8,436.00	.....	166	40	.....	1	.....	.....	4	2,535.00	32,318.55	34,853.55
Trail Creek	108	6	560	244	612.00	.....	18	14	.....	.....	.....	.....	.....	1,640.00	6,796.15	8,436.15
Vancouver	3,423	820	1,271	610	9,900.00	.....	57	6	.....	3	2	.....	.....	171,360.00	41,962.07	213,322.07
Vernon	406	7	1,905	1,120	1,400.00	.....	76	9	1	3	30	.....	1	3,031.00	20,898.05	23,929.05
Victoria	432	80	1,551	805	2,400.00	.....	40	1	.....	10	9	.....	14	14,361.00	18,243.70	32,604.70
Totals for 1969	9,880	1,060	84,665	88,954	$344,562.00	82	4,411	290	12	509	999	$22,562.00	671	$243,424.00	$1,535,954.16	$1,779,378.16
Totals for 1968	9,305	761	60,384	66,229	$175,884.00	42	3,457	244	11	590	1,041	$19,950.00	662	$185,320.00	$1,047,134.14	$1,232,454.14

Petroleum and Natural-gas Titles

Staff

R. E. Moss ..... Chief Commissioner
W. W. Ross ..... Deputy Chief Commissioner

This Division of the Administration Branch is responsible for the administration of the *Petroleum and Natural Gas Act* and the collecting of revenue from fees, rents, dispositions, and royalties. Information concerning all forms of title issued under the *Petroleum and Natural Gas Act* may be obtained upon application to the office of the Chief Commissioner, Department of Mines and Petroleum Resources, Victoria. Maps showing the locations of all forms of title issued 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. Monthly land reports and 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.

During the year there were four dispositions of Crown reserve petroleum and natural-gas rights resulting in tender bonus bids of $21,646,451.54.

As of December 31, 1969, 41,557,220 acres or approximately 64,933 square miles, a decrease of 1,999,588 acres over the 1968 total, of Crown petroleum and natural-gas rights, issued under the *Petroleum and Natural Gas Act,* were held in good standing by operators ranging 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	525	31,893,990
Natural-gas licences	------	----------
Drilling reservations	31	350,546
Leases (all types)	3,887	9,312,684
Total		41,557,220

Petroleum and Natural-gas Revenue, 1969

Rentals and fees—		
Permits	$1,772,064.01	
Drilling reservations	79,796.10	
Natural-gas licences	----------	
Petroleum, natural-gas, and petroleum and natural-gas leases	8,488,113.62	
Total rentals and fees		$10,339,973.73
Disposal of Crown reserves—		
Permits	$16,516,391.81	
Drilling reservations	1,394,215.34	
Leases	3,735,844.39	
Total Crown reserves disposal		$21,646,451.54

Royalties—		
Gas	$3,730,633.92	
Oil	9,017,352.18	
Processed products	48,847.46	
Total royalties		$12,796,833.56
Miscellaneous fees		19,625.19
Total petroleum and natural-gas revenues		$44,802,884.02

ANALYTICAL AND ASSAY BRANCH

STAFF

S. W. Metcalfe ..... Chief Analyst and Assayer
N. G. Colvin ..... Analyst
R. J. Hibberson ..... Analyst
R. S. Young ..... Analyst
F. F. Karpick ..... Assayer

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 1969 the chemical laboratory in Victoria issued reports on 2,437 samples from prospectors and Departmental engineers. A laboratory examination of a prospector's sample generally consists of the following: (1) A spectrographic analysis to determine if any base metals are present in interesting percentages; (2) assays for precious metals and for base metals shown by the spectrographic analysis to be present in interesting percentages. The degree of radioactivity is measured on all samples submitted by prospectors and Departmental engineers; these radiometric assays are not listed 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 *Prospector's Grub-stake Act,* and Departmental engineers:—

	Samples	Spectrographic Analyses	Assays
Prospectors (not grantees)	2,032	1,974	5,246
Prospectors (grantees)	140	137	387
Departmental engineers	265	92	1,060
Totals	2,437	2,203[1]	5,793

[1] An additional 156 spectrographic analyses were done for prospectors and 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, 65 such samples were examined.

Reports were issued on 25 samples submitted by the Petroleum and Natural Gas Branch. Fifteen of these were samples of formation waters from wells being drilled for gas and oil in the Province, and four were crude-oil samples of the same

origin. In addition, five samples of material from two suspected oil seeps were examined, and oily black particles were examined and found to contain metallic lead.

Reports were issued on 205 samples of a miscellaneous nature.

For the Purchasing Commission, reports were issued on 21 samples of coal submitted for proximate analysis and calorific value. Three samples of detergents were examined for their content of phosphorous pentoxide.

For the Department of Recreation and Conservation, Fish and Wildlife Branch, 11 water samples were examined for their trace metal contents.

For the Department of Agriculture, Field Crops Branch, 22 potato extracts were examined for their trace-metal contents, one gypsum sample was analysed, and the iron content of a water sample was determined.

For the Department of Highways, Materials Testing Branch, nine samples of water were examined.

For the Department of Mines and Petroleum Resources, Inspection Branch, one smoke bomb was identified. For the Petroleum and Natural Gas Branch, one rosin sample was identified.

For the Queen's Printer, one sample of type metal was examined by spectrograph.

For the Department of Lands, Forests, and Water Resources, Forest Protection, two fire-fighting chemicals were analysed for their ammonium sulphate contents, and three others for their diammonium phosphate contents. The pH and hardness of water from 35 lakes were determined. For Engineering Services, the chloride contents of two cement samples was determined. For the Groundwater Division, a drilling slurry and two water samples were examined. For the Water Rights Branch, three water samples were examined, and in addition, another water sample for the Comptroller of Water Rights.

For British Columbia Health Services, Pollution Control Branch, one sediment and one water were examined for their iron contents, and 11 other waters were examined for trace metals.

For the City of Victoria, Smoke Inspection, determination was made of the weights of residue and soluble salts collected in 63 bottles of water placed in various locations in the city. One scale sample was also identified.

For citizens of the Province, four coal samples and three water samples were analysed, and a sample of peat was examined.

X-ray Powder Diffraction Analyses

One hundred and eleven analyses of this type were performed for identification purposes.

Examinations for Assayers

Provincial Government examinations for certificates of efficiency were held in May and December. As a result of the May examination, eight candidates passed and eight failed. In the December examination, one candidate was granted a supplemental and nine failed.

INSPECTION BRANCH

Organization and Staff

Inspectors and Resident Engineers

J. W. Peck, Chief Inspector.....Victoria
J. E. Merrett, Deputy Chief Inspector of Mines.....Victoria
L. Wardman, Senior Inspector, Electrical-Mechanical.....Victoria

D. R. Morgan, Senior Inspector, Mining Roads.....Victoria
V. E. Dawson, Inspector, Mechanical.....Victoria
A. R. C. James, Inspector, Aid to Securities.....Victoria
W. B. Montgomery, Inspector, Reclamation.....Victoria
S. Elias, Senior Inspector, Environmental Control.....Vancouver
B. M. Dudas, Inspector, Environmental Control.....Vancouver
W. C. Robinson, Inspector and Resident Engineer.....Vancouver
J. W. Robinson, Inspector and Resident Engineer.....Vancouver
R. W. Lewis, Inspector and Resident Engineer.....Cranbrook
David Smith, Inspector and Resident Engineer.....Kamloops
E. Sadar, 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
A. D. Tidsbury, Inspector and Resident Engineer.....Prince George
W. H. Childress, Technician, Noise Surveys.....Vancouver

Inspectors are stationed at the places listed above and inspect coal mines, metal mines, and quarries in the districts shown on the accompanying Figure 1. They also may examine prospects, mining properties, roads and trails, and carry out special investigations under the *Mineral Act*. The Environmental Control Inspectors conduct dust, ventilation, and noise surveys at all mines and quarries, and where necessary make recommendations to improve environmental conditions. D. R. Morgan supervises the roads and trails programme and prospectors' grub-stakes. W. B. Montgomery administers the reclamation sections of the Coal Mines and Mines Regulation Acts. A. R. C. James is mining adviser to the Securities Commission.

Instructors, Mine-rescue Stations

A. Littler, Instructor, Mine Rescue and First Aid.....Fernie
T. H. Robertson, Instructor, Mine Rescue and First Aid.....Nanaimo
J. A. Thomson, Instructor, Mine Rescue and First Aid.....Kamloops
G. J. Lee, Instructor, Mine Rescue and First Aid.....Nelson

Staff Changes

In February, 1969, A. R. C. James was transferred from Vancouver to Victoria. His position as Inspector and Resident Engineer at Vancouver was filled by J. W. Robinson, who joined the staff in March. B. M. Dudas joined the staff as Inspector, Environmental Control, Vancouver, in May. In August, W. B. Montgomery joined the staff in Victoria as Inspector, Reclamation. At Prince George a second district was established and A. D. Tidsbury was appointed in September as Inspector and Resident Engineer for that district.

Board of Examiners

Board of Examiners (Coal Mines Regulation Act)

J. W. Peck, Chairman.....Victoria
A. R. C. James, member.....Victoria
D. R. Morgan, member.....Victoria

The Board conducts written and practical examinations for the various certificates of competency under the provisions of sections 25 and 26 of the *Coal Mines Regulation Act,* and advises the Minister on the granting of interchange certificates under this Act. Under the new Act the Board is no longer responsible for issuing

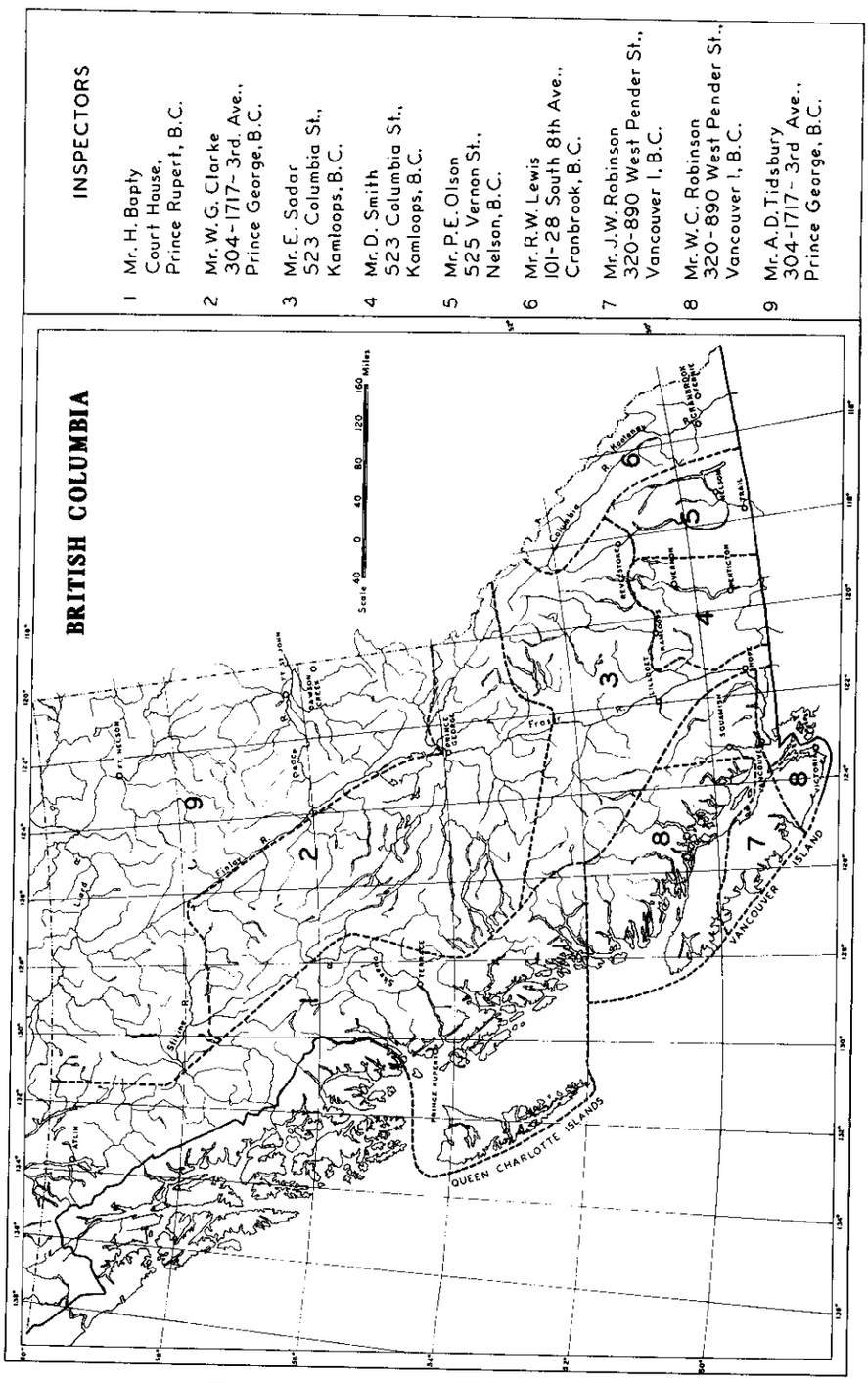


Figure 1. Index map showing inspectoral districts.

coal miners' certificates; these are now issued after examination by the District Inspector.

Board of Examiners (Mines Regulation Act)

J. E. Merrett, Chairman.....Victoria
A. R. C. James, member.....Victoria
W. C. Robinson, 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.

Grub-staking Prospectors

Under the 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. Grub-stakes up to $500 for food, shelter, and clothing, plus a reasonable travelling allowance, are available to a limited number of qualified prospectors who undertake to prospect in British Columbia in areas considered favourable by the Department in accordance with a long-range plan for the development of the Province. Experienced prospectors may be granted a maximum of $300 for travelling expenses if prospecting is to be done in remote areas where air transportation is necessary.

Application forms and terms and conditions under which grub-stakes are granted may be obtained from D. R. Morgan, Senior Inspector, Department of Mines and Petroleum Resources, Victoria.

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

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
1967	29,891	47	148	432
1968	31,224	47	234	402
1969	21,758	27	151	221

In 1969, 46 applications were received and 27 grub-stakes were authorized. One grantee was unable to go out, and his initial payment was returned. Grantees who were unable to complete the terms and conditions of the grant received only partial payment. Seven prospectors were given grants for the first time. Four grantees proved to be unsatisfactory.

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

Alberni Mining Division.—In the Gretchen Creek valley (on the north side of Great Central Lake), spotty copper mineralization with magnetite occurs in volcanic rocks and greenstone. Small rock outcrops containing some chalcopyrite were found on both the north and south sides of View Lake. In the Coleman Creek area (off Alberni Canal), minor mineralization by chalcopyrite and pyrite was investigated. In the Thunder Mountain area, spotty chalcopyrite and pyrite mineralization occurs in greenstone and volcanics.

Cariboo Mining Division.—In the Pinegrove Creek valley, minor chalcopyrite and pyrite mineralization was prospected; in the Heyde Creek area, much overburden was encountered; off the Bowron Lake road, pyritized greenstone was observed; and at the north end of McLeod Lake, deep overburden was reported.

A base camp was established at Le Bourdais Lake, about 50 miles northeast of Williams Lake, and eight weeks were spent prospecting and soil sampling in the area within reach of the lake. During the 1968 season a large piece of high-grade chalcopyrite float was found on the lakeshore, but no further material was found and the source of the float was not located. The area northwest of the lake is underlain by black to grey limestone showing some pyrite and pyrrhotite mineralization. On the west side, back from the lakeshore, exposures of grey limestone and green andesite were found, and along the lakeshore the outcrops were mainly limestone, andesite, and pyritized argillite, with some chert, greenstone, and schist, along with some basic rocks. A short distance back from the lakeshore very few outcrops were found. Nothing of importance was found in the entire area.

Some work was done in the Francis Lake area, southeast of Prince George; on the north side of the lake outcrops of pegmatite were prospected; on the northwest side more outcrops of pegmatite occur, along with monzonite and some small gossans; some inconclusive soil sampling was done in this area. On the southwest side some minor mineralization in the granite intrusive was observed, and a contact zone between granite and altered sediments shows traces of copper mineralization; on the south side of the lake the contact zone shows some barren quartz veins. On Government Creek, quartz-monzonite float shows minor molybdenite mineralization; some work was also done in the Willow River area. In the Nechako valley near Prince George several gossans and minor occurrences of diatomite were investigated. Up Dome Creek, various rock outcrops were examined, but nothing of interest was found. In the Baldy Hughes area very few outcrops were found; 6 miles east of Baldy Hughes road construction had exposed volcanic rocks. Near Tacheeda Lake and in the Tacheeda Creek valley, quartz stringers were found in sedimentary rock; at Teapot Mountain, outcrops of fine-grained andesite were reported. Some granite outcrops were found in the Saxton Lake area. In the Ptarmigan Creek valley, float containing both chalcopyrite and malachite was picked up, but the source of the float was not located. In the Sugarbowl Mountain area, minor mineralization was observed in outcrops of sandstone, and some inconclusive testing of creek water was done. South of Nazul Lake, serpentinized peridotite was found.

Clinton Mining Division.—Some work was done in the Leon Creek area where outcrops of quartzite, dolomite, and marble occur. Near Kelly Lake, malachite stain and narrow pyritized quartz stringers were found associated with two granite contacts. Outcrops of serpentine, basalt, and volcanic ash were also seen.

Fort Steele Mining Division.—In the Ezekiel Creek valley, granite outcrops show some barren-looking quartz veins; pyritized outcrops of slate were examined in a creek bed; and some minor occurrences of chalcopyrite were reported.

Golden Mining Division.—In the Whitetail Lake area some occurrences of gypsum were prospected. Considerable time was spent in the wide Dutch Creek valley checking outcrops and soil sampling. This work covered both the Copper Creek valley and the Rock Creek valley. Up Mineral Creek, widespread but narrow occurrences of barite were investigated. Very little useful information on these areas was submitted.

Kamloops Mining Division.—Some work was done on the east side of Adams Lake, opposite Skwaam Bay, and a group of claims was staked.

Liard Mining Division.—A base camp was established on the west side of Dease Lake, about a mile south of Porter Landing, and considerable work was done in the area west, southwest, and northwest of the camp. Close to the lake there were some rock outcrops, but the overburden was deep and covered a wide area. In the Thibert Creek valley, minor traces of copper and iron sulphides were found; some barren-looking quartz float was picked up, and granitic outcrops were examined. Near Delure Creek, traces of sulphide mineralization were observed and outcrops of slate were examined. On the east side of Delure Creek, exposures of granite, serpentine, and greenstone with quartz stringers were prospected. Nothing of importance was reported in this area. South of the camp, halfway down the lakeshore, numerous rock outcrops were examined and small amounts of pyrrhotite were found. On the east side of Dease Lake, much overburden and heavy undergrowth are present. Outcrops of sedimentary rocks and serpentine were examined. One prospector, Walter Walcow, died of a heart attack in Cassiar hospital after doing some heavy work in preparing to cross Dease Lake to his prospecting area. In spite of this his partner took over and carried on the projected work.

Lillooet Mining Division.—Some work was done on the north side of the Yalakom River where pyritized rock outcrops were sampled. In the Marshall Creek area some minor copper mineralization was reported.

In the Cayoosh Creek valley along a forestry access road considerable pyrite and pyrrhotite were found in silicified schist; some fairly good values in gold were found in this material.

Nanaimo Mining Division.—In the Buttle Lake area close to the edge of Strathcona Park some copper stain was found in a rock cut along the road, and outcrops of basalt show minor amounts of native copper. At the top of the ridge above the rock cut, two fine-grained dykes cut through the underlying basalt; both dykes showed some native copper and copper sulphides but assays of samples taken were very low. At the south end of Quinsam Lake the diorite bluffs show minor magnetite, chalcopyrite, and malachite mineralization. Volcanic rocks are exposed along a fault zone and show narrow stringers of magnetite. Outcrops of basalt in this area also show some chalcopyrite in narrow quartz stringers. Some exposures of crystalline limestone were also examined.

On Mount Arrowsmith, claims were staked to cover an area showing strong copper mineralization.

In the Salmon River area, wide outcrops of limestone were carefully sampled.

In the Holberg Inlet area, a base camp was established on Hushamu Creek on the north side of the inlet, and a considerable amount of line-cutting, soil sampling,

and surface prospecting and geological investigation was done. The underlying rocks are mainly tuff, various other volcanics, and greywacke along with some Bonanza Group rocks. On the south side of the inlet, outcrops of volcanics show minor chalcopyrite and copper carbonates. Some quartz-feldspar outcrops were examined near Coal Harbour. Heavy undergrowth and deep overburden hampered this work very considerably.

Nelson Mining Division.—In the Kloosh Creek valley, slate and shale outcrops were reported along the pyritized argillite showing minor copper mineralization; pyritized quartzite was also examined and some encouraging geochemical anomalies were mapped.

Up Cultus Creek, argillite float showing copper mineralization was picked up, and heavily oxidized limy rocks showing specks of chalcopyrite were investigated by trenching, but nothing of importance was uncovered.

In the Midge Creek area some prospecting on fissure veins in granodiorite was completed, and trenching was done on an oxidized zone showing considerable quartz and manganese dioxide (pyrolusite) and carrying erratic values in gold.

In the Trail Creek area, a small mineralized zone was investigated. Some work was done along Kelly Creek and near Champion Lakes, but nothing was reported. In the Erie Lake area, near Charbonneau Creek and in the Record Creek valley, outcrops of granite and limestone were examined. At Kelly Mountain many outcrops of sedimentary rocks were reported. Sedimentary rocks also underlie much of the Champion Creek area. Nothing was reported from the Marsh Creek valley, although some work was done there. Near Blizzard Mountain a fault zone was prospected. Nothing of interest was seen in the Erie Creek area, but at Dominion Mountain some float containing galena and chalcopyrite was picked up.

South of Boundary Lake, a low-grade, mineralized zone was exposed by surface stripping. Along the Priest River, the underlying rocks are mainly limestone, diorite, and schist, and in this area small pockets of galena and chalcopyrite were prospected. Fairly good assays in silver were reported where tetrahedrite was visible in and near a bed of grey limestone.

On flat terrain near Lister, open-cutting was done on a series of quartz veins showing patches of heavy iron and copper sulphides. Some fairly good assays were obtained from samples taken of this material.

New Westminster Mining Division.—In the Agassiz area, on a high ridge west of the town, limestone bluffs show minor chalcopyrite mineralization in quartz stringers, and rhyolite float picked up here showed specks of molybdenite. On the east side of Bear Mountain a 12-foot width of fine-grained limestone showed some molybdenite and chalcopyrite mineralization.

Some work was done in the Chilliwack River valley where outcrops of limestone, schist, and granite were examined. Some gold colours were found in the gravel beds of two small creeks flowing into this river, and float containing small specks of chalcopyrite was picked up.

In the Coquihalla River valley, at Fifteen Mile Creek, copper stain was found along a granite-serpentine contact.

A base camp was established at Kwoiek Lake, at the head of Kwoiek Creek, which flows easterly into the Fraser River a few miles north of Boston Bar. Access to the area by way of an old trail up the creek valley was very rough and hazardous and the whole area was found to be a rugged one for prospecting. The underlying rocks are mainly various phases of diorite with lesser amounts of sedimentary rocks and some schist. Some barren quartz stringers were found in the schist. Heavy boulders of barren, rusty quartz were found in the creek bottom. A wide belt of

serpentine was examined. It contains some fairly wide quartz veins showing crystals of pyrite and some sericitization. Zones of quartzite and serpentized basic rocks, some fine-grained hornblende diorite, and graphitic phyllite were also reported. Nothing of economic importance was discovered in this area.

In the Hicks Creek and Alouette Lake areas, outcrops of pyritized granite were examined. On the west side of Harrison Lake some lead-zinc mineralization in greenstone was reported and 10 mineral claims were staked. The Cartmell Creek area was found to be underlain mainly by greenstone and schist; at Simms Creek iron pyrite was found in limestone. Disseminated copper mineralization was prospected near Weaver Lake.

Near Greendrop Lake the underlying granite shows some narrow quartz stringers carrying some galena. A short time was spent up the Siwash Creek valley, on the east side of the Fraser River, where outcrops of schist, serpentine, and pyroxenite were examined.

Omineca Mining Division.—Some work was done in the Lorne Creek area.

Northwest of Perow, considerable work was done in the valley adjacent to Byman Creek. Float containing chalcopyrite and pyrite was found in an area underlain by andesite and mixed types of volcanic rocks; minor arsenopyrite and limonite mineralization was reported, but nothing of commercial interest was found. At the head of Byman Creek, reddish-coloured andesite, some conglomerate, odd outcrops of porphyry, rhyolite, and other volcanics showing traces of copper mineralization were prospected. Nothing of real interest was examined.

A logged-off area, well supplied with logging access roads, and located about 10 miles northwest of Wistaria, was fairly well prospected; exposures of volcanic rocks showing minor pyrite and chalcopyrite mineralization were sampled. The assay returns were very low. West of Shelford Hills, narrow quartz stringers in andesitic rocks show some chalcopyrite; outcrops of mixed volcanic rocks and shale were reported, and a large gossan was prospected. Some exposures of basalt were observed. Nothing of economic interest was found in the entire area.

Up Tahtsa Reach, some time was spent searching for an area known to contain some copper showings. Soil and rock samples were taken. The underlying rocks were reported to be granite and basalt with quartz stringers. A contact zone showing some mineralization was prospected, and 10 mineral claims were staked covering an area where good copper float had been found.

Considerable work was done on a group of claims staked late in 1968 on the north side of Tchentlo Lake, a few miles from the west end of the lake. In fractures in diorite near the contact with the Cache Creek series, sufficient chalcopyrite and molybdenite mineralization is present to warrant a programme of stripping, drilling, and blasting. The result of this work warrants more intensive exploration in 1970. The mineralization is spread over a wide area, 2,600 feet by 800 feet, and the geochemical work done by one mining company gave good results. On the north side of Chuchi Lake some work was done on rock exposures showing minor mineralization of copper, lead, and zinc. Near Klawli Lake the area is underlain by volcanics and granite showing traces of copper mineralization.

On the north side of Tchentlo Lake a short distance up the hill from Gidegingla Lake an extensive mineralized zone was located close to the contact between diorite and Takla volcanics. This zone was opened up by drilling and blasting, and the sampling indicated good values in copper across mining widths. Further work is warranted on these claims. North of the east end of Chuchi Lake a narrow shear zone shows minor copper, lead, and zinc mineralization. South of the river connecting Chuchi and Tchentlo Lakes, outcrops of coarse granodiorite contained minor amounts of disseminated pyrite. Some work was also done east of Klawli River,

along a contact between Takla volcanics and diorite, where low assays in copper were obtained.

On Diamond Island in the Nechako River some old open cuts were examined, but nothing was found. The area close to the Kenny Dam was found to be underlain by volcanic rocks. Near Sinkut Mountain, exposures of serpentinized peridotite were investigated.

Some prospecting was done in the McConnell Lakes area. Two mineralized zones showing interesting values in copper were discovered, but no further information is available.

Revelstoke Mining Division.—Considerable work was done from a base camp established alongside a logging-mining road about 6 miles south of Ferguson. South of Nettie Lake Mountain, prospecting was done where outcrops of chlorite schist and quartz veins in argillite occurred; some of these veins showed minor amounts of galena. North of Nettie Lake Mountain, the underlying rocks were mainly phyllite, argillite, and quartzite, with minor amounts of limestone. Near Triune Mountain, outcrops of limestone, schist, and quartzite were examined. In the Index Creek area the underlying rock appeared to be phyllite. On Silvercup Mountain, outcrops of phyllite and sericite schist and quartz veins in quartzite were prospected. Along Ferguson Creek some old properties were examined where the principal rocks were peridotite showing some short-fibre but brittle asbestos. A limestone-slate contact was also checked over. Near the old Molly Mac mine, argillaceous limestone was observed. Up Bunker Hill Creek, phyllite, argillite, and limestone were found, and in the Bunker Hill mine area claims were staked on a phyllite-limestone contact.

Similkameen Mining Division.—In the Treasure Mountain area, basic rock outcrops were examined; a serpentine belt in the Britton Creek area was prospected; outcrops of schist and argillite were examined in the Lawless Creek valley; and some work was done between Jim Kelly and Railroad Creeks, where outcrops of diorite were reported. In the Shawatum Mountain area up Nepopekum Creek, pyritized andesite showing mineralization of pyrite and galena was sampled. Assay returns were very low.

Slocan Mining Division.—In the Duncan River area a mineralized zone in limestone was reported, and sheared diorite showed minor mineralization of galena with specks of tetrahedrite.

Vancouver Mining Division.—In the Squamish area, on the edge of Garibaldi Park, minor copper mineralization was reported in the underlying volcanics.

Vernon Mining Division.—Up Bouleau Creek, a tributary of Whiteman Creek, the rock outcrops were dark-coloured volcanics. At Bouleau Lake, volcanics were reported and a rhyolite-gabbro contact was prospected.

Victoria Mining Division.—Near Francis Lake, close to the Nitinat River, some copper float was picked up, but its source was not found.

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.

The total mileages and expenditures under " Grants in Aid of Mining Roads and Trails " during the 1969/70 fiscal year were as follows:—

	Miles	Cost
Roads—		
Construction	143	$234,906.25
Maintenance	336	97,984.81
Trails—		
Maintenance	1.25	500.00
Bridges—		
Construction		69,389.83
Maintenance		15,500.00
Total		$418,280.89

Work was continued on the Stewart–Cassiar road. Construction of this road was initially financed under the " Roads to Resources " agreement between the Governments of Canada and British Columbia. Total expenditure on the road to date is $20,936,968.38. The Federal Government's contribution of $7,500,000 was expended by the end of September, 1967, and since that time the whole cost of construction has been provided by the Provincial Government.

The construction is done by contract, and is supervised by the Department of Highways on behalf of the Department of Mines and Petroleum Resources. Two major contracts were in progress during 1969—Projects 1391 and 1702. Further road construction was done under Project 1391, covering the 29.08-mile section between Burrage River and Ningunsaw River, contract for which was awarded to Ben Ginter Construction Company in November, 1965, and started the following year. The project was 73 per cent completed by the end of 1969. Project 1702, covering construction of 38.10 miles of road between the south and north Bell-Irving Crossings and clearing and grubbing the North Bell-Irving Crossing and the Ningunsaw River was 60 per cent completed by the end of 1969. There was no major bridge construction in 1969.

MINERALOGICAL BRANCH

The function of the Mineralogical Branch is to assist in the development and use of the Province's mineral resources by making a variety of geological studies, publishing data concerning mineral occurrences and their potential, by collecting and storing geological and statistical data and making it available to the public, and by recording the activities of the industry. The Branch is capable of supplying general geological information as well as specific information regarding mineral deposits and the mineral industry. It provides rock and mineral identification of specimens submitted by prospectors and others, contributes lectures in courses on prospecting, participates in scientific discussions, and arranges educational exhibits.

Field work by officers of the Mineralogical Branch includes areal geological mapping, detailed geological examinations of mineral deposits and mining camps, and examination of properties of current exploration interest. The results of major

mapping projects are published in a series of bulletins, and shorter reports are published annually in a newly instituted series entitled *Geology, Exploration, and Mining in British Columbia.*

Editing of the Annual Report of the Minister of Mines and Petroleum Resources, of Geology, Exploration, and Mining in British Columbia, 1969, and other publications is the responsibility of Stuart S. Holland. Copy for printing is prepared by and under the direction of Mrs. Rosalyn J. Moir.

Staff

On December 31, 1969, the professional staff included the following geologists:—

M. S. Hedley	Chief of the Branch
Stuart S. Holland	Deputy Chief of the Branch
N. C. Carter	Geologist
B. N. Church	Geologist
G. E. P. Eastwood	Geologist
James T. Fyles	Geologist
E. W. Grove	Geologist
E. V. Jackson	Geologist
J. W. McCammon	Geologist
W. J. McMillan	Geologist
K. E. Northcote	Geologist
V. A. G. Preto	Geologist
A. F. Shepherd	Geologist
A. Sutherland Brown	Geologist

All but three are registered professional engineers, and these have applied for registration. Nine hold the Ph.D. degree and one is completing work for that degree.

Staff Changes

D. B. Craig resigned on April 11th to accept a position with the Federal Government, Department of Indian Affairs and Northern Resources.

N. D. McKechnie resigned on April 30th after 20 years of service to undertake consulting work.

R. V. Kirkham resigned on May 23rd to accept a position with the Mineral Deposit section of the Geological Survey of Canada.

J. M. Carr resigned on June 30th after 13 years' service to accept a position with an exploration company.

Three of the resulting vacancies were filled by the following appointments:—

W. J. McMillan, geologist, a graduate of the University of British Columbia and a Ph.D. from Carleton University, joined the staff on May 30, 1969.

E. V. Jackson, geologist, a graduate of the University of New Brunswick, joined the staff on June 9, 1969.

B. Neil Church, geologist, a graduate of the University of British Columbia and a Ph.D. from University of British Columbia, joined the staff on June 18, 1969.

Field Work, 1969 Season

N. C. Carter, with one assistant, completed the remapping of the mineralized area north of Alice Arm. He also made property examinations and checked on current exploration work in the Terrace area and Babine region.

B. N. Church, on joining the Department, started work in the Owen Lake-Goosly Lake area south and southeast of Houston, mapping known deposits and studying the relationship of the mineralization to the Tertiary volcanic rocks.

G. E. P. Eastwood spent a month near McLeese Lake on detailed mapping of an extensive area of copper mineralization.

J. T. Fyles completed mapping the molybdenum-bearing area at Rossland, and made a number of property examinations, principally in the Kootenay region.

E. W. Grove spent the summer in the office, writing up the results of the previous five years' fieldwork in the Portland Canal-Unuk River area.

J. W. McCammon examined deposits of industrial minerals and structural materials in various parts of the Province.

W. J. McMillan, with one assistant, started work in the Highland Valley area preparatory to making an exhaustive study of the mineralization of the entire region. This study will build on and carry forward the work of J. M. Carr.

K. E. Northcote, with one assistant, continued regional mapping of the geology and mineral deposits of the north end of Vancouver Island north and west of Holberg Inlet.

V. A. G. Preto, with one assistant, completed remapping and study of the important copper mineralization on both sides of the Similkameen River in the Copper Mountain area. This area includes the former Granby Company holdings, now the property of Similkameen Mining Company Limited, and others.

A. Sutherland Brown made field studies of mineral deposits of copper and molybdenum in various parts of the Province preparatory to publishing a bulletin on the occurrence of these metals.

Five field assistants were employed on the various projects.

Publications

Technical reports of the Mineralogical Branch were published in *Geology, Exploration, and Mining in British Columbia, 1969*. In addition, the Branch published Bulletin No. 56, *Geology and Geochronology of the Guichon Creek Batholith*, by K. E. Northcote, and also Map 69-1, " Geological Compilation Map of Smithers, Hazelton, and Terrace Areas," by N. C. Carter and R. V. Kirkham.

Six scientific and educational reports and papers resulting directly from their work as staff geologists were also published by officers of the Branch.

Copies of seven mineral inventory maps covering the Queen Charlotte Islands, Vancouver Island, and the Princeton area and Xerox copies of the relevant inventory cards were made available in 1969. Details of this material may be requested from the Chief of the Mineralogical Branch, Department of Mines and Petroleum Resources, Douglas Building, Victoria.

Rock and Mineral Sets

Sets of rocks and minerals are available for sale to prospectors, schools, and residents of British Columbia. Information regarding them may be obtained from the Chief of the Mineralogical Branch, Douglas Building, Victoria.

Airborne Magnetometer Mapping

The project of airborne magnetometer mapping, jointly financed by the Geological Survey of Canada and the British Columbia Department of Mines and Petroleum Resources, continued in 1969. In May, 1969, a three-year contract was signed with Geoterrex Ltd.

Summary of aeromagnetic maps released is as follows:—

Release Date	Number	Scale	Location	When Flown
April 8, 1969	15	1 mile=1 inch	Central British Columbia	1968
April 8, 1969	2	4 miles=1 inch	South central British Columbia	1966
May 6, 1969	18	1 mile=1 inch	Central British Columbia	1968
May 6, 1969	6	4 miles=1 inch	Central and southern British Columbia	1966
February 25, 1970	20	1 mile=1 inch	Central British Columbia	1967
May 28, 1970	10	1 mile=1 inch	Central British Columbia	1967

The maps as well as index maps showing the coverage by aeromagnetic mapping in British Columbia may be obtained from the British Columbia Department of Mines and Petroleum Resources, Room 411, Douglas Building, Victoria, or the Geological Survey of Canada, 100 West Pender Street, Vancouver 3.

The basic data used in compiling the maps are on open file at the Geological Survey of Canada in Ottawa, where interested parties may arrange to obtain them for special processing.

The Department of Energy, Mines and Resources (Observatories Branch) operates a magnetic observatory at Victoria. Services available to geophysical exploration companies and other interested agencies include:—

(*a*) Three-hour range indices of magnetic activity; these provide a measure of the intensity of the magnetic disturbance (on a 0–9 scale) for each three-hour period. The monthly listings of these indices are normally mailed within a few days after the end of each month.

(*b*) Copies of magnetograms are available through a local duplicating firm at a charge of $7.50 for a monthly set. These recordings of the magnetic field can be used to control field surveys, in particular to correct for the diurnal changes and magnetic disturbances. The area over which this control is valid depends on the required accuracy; for ±5 gamma accuracy, it covers an elliptic region reaching roughly as far as longitude 118 degrees to the east and latitude 50.5 degrees to the north.

Further details can be obtained by writing to the Officer-in-charge, Victoria Magnetic Observatory, R.R. 7, Victoria.

PETROLEUM AND NATURAL GAS BRANCH

The Petroleum and Natural Gas Branch is responsible for the administration of the Drilling and Production Regulations made pursuant to the *Petroleum and Natural Gas Act*. These regulations, made by Order in Council 308, dated February 3, 1969, supersede the former 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.

The regulations provide 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.

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 drilling 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 annually, at the end of 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: Development Engineering, W. L. Ingram; Reservoir Engineering, A. J. Dingley; and Geology, S. S. Cosburn.

The field office at Charlie Lake, which includes the core and sample laboratory, is supervised by the District Engineer, D. L. Johnson.

Staff

Headquarters, Victoria

J. D. Lineham	Chief of Branch
W. L. Ingram	Deputy Chief of Branch and Senior Development Engineer
M. B. Hamersley	Development Technician
J. F. Tomczak	Statistician
A. J. Dingley	Senior Reservoir Engineer
B. T. Barber	Reservoir Engineer
P. S. Attariwala	Reservoir Engineer
P. K. Huus	Reservoir Technician
S. S. Cosburn	Senior Petroleum Geologist
D. L. Griffin	Petroleum Geologist
T. B. Ramsay	Petroleum Geologist
J. Y. Smith	Petroleum Geologist
J. E. Hughes (until April 30th)	Petroleum Geologist
A. S. Nemeth (until November 30th)	Petroleum Geologist

Field Office, Charlie Lake

D. L. Johnson	District Engineer
T. B. Smith	Field Engineer
D. A. Selby	Field Technician
G. T. Mohler	Field Technician
W. B. Holland	Field Technician
L. A. Gingras	Field Technician

Staff Changes

J. E. Hughes, petroleum geologist, resigned, effective May 1st.
J. Y. Smith, petroleum geologist, joined the staff on July 3rd.
T. B. Smith, field engineer, joined the staff on November 3rd.
A. S. Nemeth, petroleum geologist, resigned, effective December 1st.

Board of Arbitration

Chairman: A. W. Hobbs, solicitor, Department of the Attorney-General.

Members: S. G. Preston, agrologist, Department of Agriculture; J. D. Lineham, engineer, Department of Mines and Petroleum Resources.

The Board of Arbitration, established under the authority of the *Petroleum and Natural Gas Act,* 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 a company has ceased to use the land.

Three right-of-entry orders were made in 1969. Two of those applications, and one carried over from 1968, were heard at a hearing held at Fort St. John on September 22nd. The three cases were settled by Board awards dated November 3rd.

An application for right-of-entry was received on December 11th. A right-of-entry order was made on December 15th and the application will be heard in 1970.

Conservation Committee

Chairman: K. B. Blakey, Deputy Minister of Mines and Petroleum Resources.

Members: M. H. A. Glover, economist, Department of Industrial Development, Trade, and Commerce; N. D. McKechnie, geologist, Department of Mines and Petroleum Resources, resigned on May 15th and has not been replaced.

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 1969.

PUBLICATIONS

A list of the publications of the Department of Mines and Petroleum Resources is available free on request to the Chief of the Mineralogical Branch or Chief of the Petroleum and Natural Gas Branch, Douglas Building, Victoria.

Publications that are in print may be obtained from the Department of Mines and Petroleum Resources, Douglas Building, Victoria, and from the Geological Survey of Canada, 100 West Pender Street, Vancouver. Current publications may also be obtained from the Gold Commissioner's Office, Room 320, 890 West Pender Street, Vancouver.

Publications are available for reference use in the Departmental library, Room 430, Douglas Building, Victoria, in the reading-room of the Geological Survey of Canada, 100 West Pender Street, Vancouver, in the offices of the Inspectors of Mines in Nelson and Prince Rupert, as well as in some public libraries.

Petroleum and Natural Gas

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PHOTOGRAPHS

DRAWINGS

DRAWINGS—*Continued*

PETROLEUM AND NATURAL GAS TITLES

Petroleum and Natural Gas Titles, 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, including the collection of revenue from fees, rents, dispositions, and royalty. Regulations governing geophysical operations and petroleum-development road regulations are also administered by the Chief Commissioner.

During the year there were four dispositions of Crown reserve petroleum and natural-gas rights resulting in tender bonus bids of $21,646,451.54.

As at December 31, 1969, 41,557,220 acres, or approximately 64,933 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 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	525	31,893,990
Natural-gas licences	------	----------
Drilling reservations	31	350,546
Leases (all types)	3,887	9,312,684
Total		41,557,220

Details of land disposition for the years 1947–1960, inclusive, may be found on page A 61 of the 1960 Annual Report. Details of land disposition for the years 1961–1969, inclusive, are included in this report.

Petroleum and Natural-gas Revenue, 1969

Rentals and fees—		
Permits	$1,772,064.01	
Drilling reservations	79,796.10	
Natural-gas licences	----------	
Petroleum, natural-gas, and petroleum and natural-gas leases	8,488,113.62	
Total rentals and fees		$10,339,973.73
Disposal of Crown reserves—		
Permits	$16,516,391.81	
Drilling reservations	1,394,215.34	
Leases	3,735,844.39	
Total Crown reserve disposal		21,646,451.54
Royalties—		
Gas	$3,730,633.92	
Oil	9,017,352.18	
Processed products	48,847.46	
Total royalties		12,796,833.56
Miscellaneous fees		19,625.19
Total petroleum and natural-gas revenues		$44,802,884.02

Details of yearly revenue, 1947–1960, inclusive, are tabled on page A 61 of the Annual Report for 1960. Details of yearly revenue from 1961–1969, inclusive, are included in this report.

Administration of the *Petroleum and Natural Gas Act* in the Department is divided between Petroleum and Natural Gas Titles and the Petroleum and Natural Gas Branch.

Acreage of Crown Petroleum and Natural-gas Rights Held, 1961–1969

	1961	1962	1963	1964	1965	1966	1967	1968	1969
	Acres	Acres	Acres	Acres	Acres	Acres	Acres	Acres	Acres
Petroleum and natural-gas permits	25,898,913	17,374,307	24,902,690	22,417,836	23,517,709	29,716,610	23,214,363	32,622,739	31,893,990
Petroleum and natural-gas leases	6,900,933	9,226,375	10,753,287	11,289,962	10,642,259	10,439,595	10,596,352	10,029,674	8,837,265
Natural-gas licences	159,027	84,499	74,987	9,669	.....	27,815	.....	.....	.....
Natural-gas leases	416,869	505,982	543,966	555,829	540,088	524,612	549,218	518,826	475,419
Petroleum leases	2,568	2,568	2,568	2,568	2,568	2,568	644	644	.....
Drilling reservations	546,699	471,487	641,919	451,998	534,868	503,603	462,138	384,925	350,546
Totals	33,925,009	27,665,218	36,919,417	34,727,862	35,237,492	41,214,803	34,822,715	43,556,808	41,557,220

Petroleum and Natural-gas Revenue, 1947–1969

	Cumulative, 1947–1961	1962	1963	1964	1965	1966	1967	1968	1969	Cumulative, 1947–1969
Rentals and Fees	$	$	$	$	$	$	$	$	$	$
Permits	32,076,856	2,138,070	1,638,748	1,302,305	1,176,501	1,661,591	1,369,232	1,184,457	1,772,064	44,319,824
Drilling reservations	278,196	126,149	121,632	64,800	114,483	113,496	86,303	87,759	79,796	1,072,614
Natural-gas licences	56,964	2,086	4,738	.....	.....	1,466	.....	.....	.....	65,254
Leases (all)	10,273,218	4,916,971	5,957,533	7,077,488	7,013,187	8,432,386	8,901,196	9,349,480	8,488,114	70,409,573
Total rentals	42,685,234	7,183,276	7,722,651	8,444,593	8,304,171	10,208,939	10,356,731	10,621,696	10,339,974	115,867,265
Crown Reserve Disposition Bonuses										
Permits	14,367,729	1,208,400	79,519	721,193	1,825,322	6,982,439	8,428,409	9,554,004	16,516,392	59,683,407
Drilling reservations	6,296,007	3,067,675	1,585,935	1,541,685	3,278,641	4,657,510	3,013,979	1,785,527	1,394,215	26,621,174
Leases	12,259,049	7,088,659	5,426,555	10,830,994	13,057,470	4,199,528	2,855,428	3,737,489	3,735,845	63,191,017
Crown Reserve disposition total	32,922,785	11,364,734	7,092,009	13,093,872	18,161,433	15,839,477	14,297,816	15,077,020	21,646,452	149,495,598
Crown Royalties										
Gas	3,003,560	1,260,419	1,531,977	1,583,292	1,682,444	2,256,725	2,870,656	3,217,227	3,730,634	21,136,934
Oil	939,891	2,265,167	3,858,985	3,502,222	3,697,668	5,449,663	6,678,245	7,677,405	9,017,352	43,086,598
Processed products	327,567	108,737	115,042	104,990	93,226	61,568	58,536	50,762	48,847	969,275
Crown royalties total	4,271,018	3,634,323	5,506,004	5,190,504	5,473,338	7,767,956	9,607,437	10,945,394	12,796,833	65,192,807
Miscellaneous fees	103,080	31,950	29,376	26,851	17,790	18,073	17,917	17,955	19,025	282,617
Total petroleum and natural-gas revenue	79,982,117	22,214,283	20,350,040	26,755,820	31,956,732	33,834,445	34,279,901	36,662,065	44,802,884	330,838,287

PETROLEUM AND NATURAL GAS BRANCH

The Petroleum and Natural Gas Branch, under the direction of the Chief of the Branch, is responsible for administration of the Drilling and Production Regulations. 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.

GENERAL REVIEW

Production of crude oil and natural gas during 1969 continued their steady increases that have occurred since completion of major pipe-line connections from the northeastern corner of the Province. Gains in production compared to 1968 were 14.2 and 15.3 per cent respectively for oil and natural gas. Secondary recovery schemes from the oilfields producing Triassic oil accounted for the majority of the crude-oil production. Large increases in gas production resulted from further developments in the northern fields producing from reservoirs of Devonian age.

Drilling and exploration activities fell off significantly, with no apparent change expected in the immediate future. The drilling completed during 1969 failed to make any significant discovery that would result in a large-scale development. This decrease in drilling operations provided the Branch with the opportunity to review assigned production allowables and reserve calculations and reoriented the field staff to more emphasis on the inspection of the production facilities.

No major changes were made during 1969 to the pipe-line and marketing installations in the Province.

FIELD OFFICE

The field office of the Department of Mines and Petroleum Resources is located at Charlie Lake, British Columbia, near Mile 52 on the Alaska Highway. A sub-office located in the Provincial Building at Fort Nelson is used periodically by the field staff.

The field office staff is responsible for enforcement at the field level of the Drilling and Production Regulations.

The Provincial standard for bottom-hole pressure-gauge calibration is located at Charlie Lake. The new regulations, effective February 3, 1969, required that any gauge to be used for sub-surface pressure measurement must be calibrated to this standard before it can be lawfully used in British Columbia. During 1969, 465 pressure gauges were calibrated and calculated without charge, and a copy of the results was forwarded to the respective companies.

During 1969, seven vehicles were driven a total of 118,318 miles to conduct inspections and (or) perform surveys pertaining to the drilling and production phase of the oil and gas industry. A specialized bottom-hole unit was employed to conduct surveys on 78 wells. These surveys are used as a check on the pressure data submitted by operating companies or for special studies conducted by Departmental personnel.

Continued fast growth of oil and natural-gas production claimed a large percentage of the inspections made by the field staff. Complete meter calibrations were done on 166 gas meters, and an additional 773 gas meters were fast checked. Twenty-two new gas-measurement sites were inspected, and the meter runs micrometered to ensure that they met with A.G.A. specifications for gas measurement.

Surface production equipment, storage facilities, and production batteries were inspected on 105 occasions.

In compliance with the provisions of the *Petroleum and Natural Gas Act, 1965,* the field office staff supervised lease restoration on two abandoned sites.

Inspections were carried out at 220 drilling-sites and 1,520 producing or abandoned leases. Six hundred and sixty-nine water-storage or disposal sites were inspected during 1969, with the view to strictly enforcing the regulations pertaining to the storage and disposal of produced formation water.

GEOLOGICAL SECTION

During 1969, the Geological Section interpreted, recorded, and filed geologic data from northeastern British Columbia. New data were incorporated into the sub-surface maps for determination of oil and gas reserves, land evaluations, permit and lease work evaluation, and special projects. The main sources of information for the geologic studies were permit and lease reports, submitted drilling and production data, well logs, samples, and core.

Geological data were interpreted in relation to the reservoir geology of the oil and gas fields. Fields receiving the greatest attention were those producing from the Halfway and Charlie Lake Formations in the Fort St. John area, and the Slave Point and Pine Point Formations in the Fort Nelson area. Special projects were undertaken to deal with numerous industry submissions. All approved well locations are classified by the Section according to the Lahee System, as defined by the American Association of Petroleum Geologists. A summary of the wells classified by the Lahee System is shown in Table 13. Six classifications are used that are based upon the geological interpretation, which are described as follows: (1) New field wildcat—drilled in a geological environment where hydrocarbons have not yet been discovered; (2) new pool wildcat—drilled in a geological horizon where other pools have been found but the geological conditions are such that searching for a new pool is very hazardous; (3) outpost—drilled with the intent of extending an already partly developed pool by a considerable distance; (4) and (5) deep-pool and shallow-pool tests—drilled within the known limits of a pool with the intent of searching for hydrocarbons below or above respectively the pool or producible horizon; and (6) development—drilled with the intent of further exploiting the pay horizon or pool within the area which has already been essentially proved for production.

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 1969, 1,236 boxes of core from 90 wells were received at the laboratory. At the end of 1969, 28,428 boxes from 1,684 wells were being 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 Institute of Sedimentary and Petroleum Geology, Geological Survey of Canada, in Calgary. The remainder of the

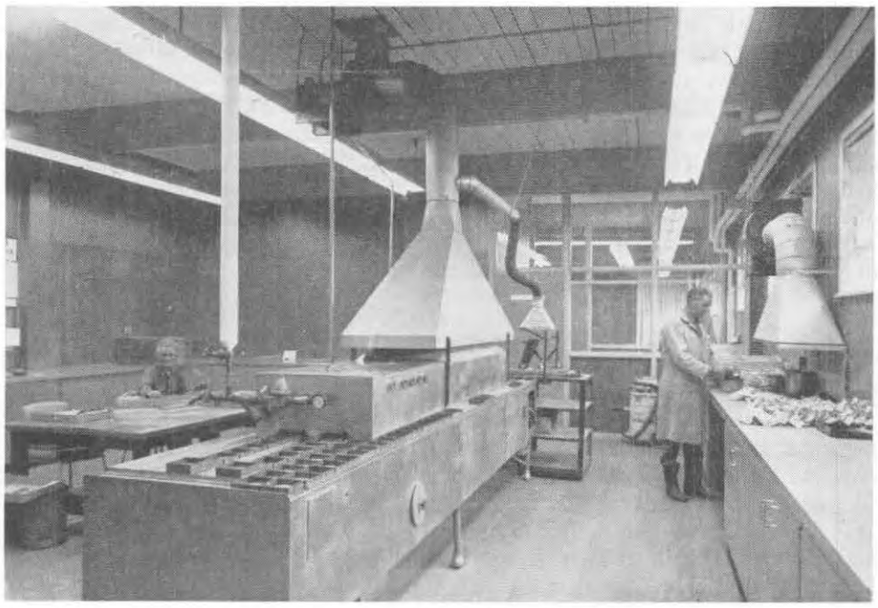


Plate IA.—Sample washing facilities at the Field Office of the Petroleum and Natural Gas Branch, Charlie Lake.

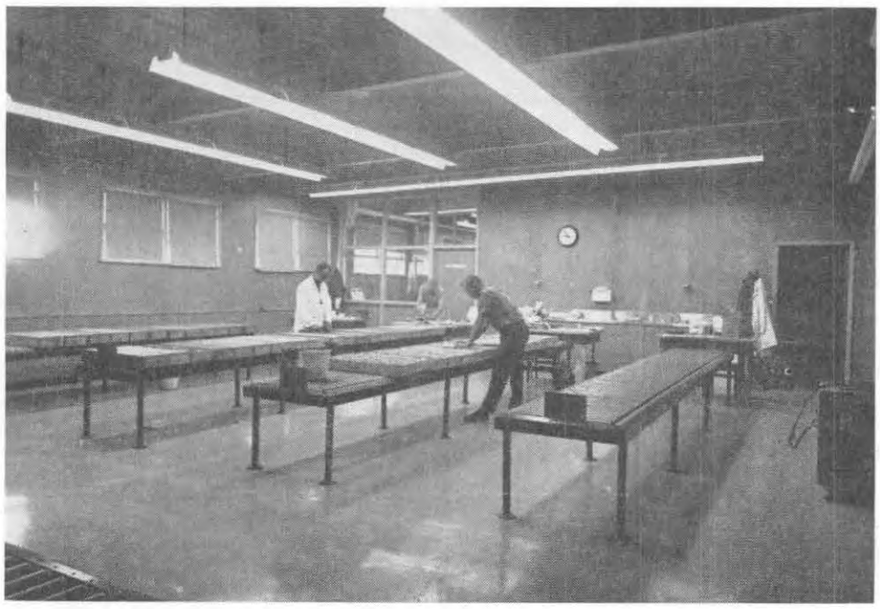


Plate IB.—Core examination facilities at the Field Office of the Petroleum and Natural Gas Branch, Charlie Lake.

10-foot sample from the original sample-bag is retained at the laboratory for a period of one year should further samples be required. The main sample-examination facilities are at Charlie Lake; limited facilities are available at Victoria.

The Charlie Lake sample library and the Geological Survey of Canada 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 1969 the Charlie Lake sample library contained 667,364 samples, while 665,725 samples were retained in the Victoria library.

During 1969, samples were received at the laboratory from 177 wells. A total of 52,062 10-foot samples was washed and bottled in 1969.

Core and Sample Examination

A nominal fee is charged for the use of core- and sample-examination facilities provided by the Department.

In 1969, 8,283 boxes of core from 475 wells were studied by oil company personnel and other interested individuals. Cores from 30 wells were temporarily removed from the laboratory by the operators for further studies. Samples from 21 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, 68,839 boxes of core have been removed from the racks for examination.

EXPLORATION

In northeastern British Columbia during 1969, 23 oil and gas companies employed seismic crews for a total of 182 crew-weeks. During February, the most active month, 12 crews were working. Two companies did gravity work in northeastern British Columbia and one company ran a magnetometer survey in northeastern British Columbia. Surface geological parties worked in northeastern British Columbia and in the Stikine area. These exploration activities are listed in Tables 14 and 15.

Except for one exploratory test in the Bowser Basin, all the drilling for oil and gas was confined to northeastern British Columbia. Of the 35 producing oil wells completed in 1969, 1 was completed in the Mississippian, 2 in the Permian, 31 in the Triassic, and 1 in the Cretaceous. Of the 40 gas wells, 9 were Devonian, 5 Permian, 15 Triassic, and 11 Cretaceous. All these potentially productive wells were located in the plains area of northeastern British Columbia.

Twenty-six wells were drilled to Devonian horizons during 1969. The wells FPC Peggo b-53-I and Pacific Cabin d-57-B discovered gas in the Slave Point Formation, and Sulphur Point gas was discovered in new areas by Apache CPOG IOE Clarke d-24-I and Mobil Sahtaneh c-70-I. Four development gas wells were completed in the Slave Point of the Clarke Lake Field.

One Debolt Formation oil well was completed in the Blueberry area. Two Belloy Formation oil wells and five Belloy gas wells were completed in the Stoddart area. One of these, CDR Eagle 11-29-84-18 discovered a new Belloy oil pool.

Most of the drilling in northeastern British Columbia was to Triassic objectives, and discoveries were made in the Halfway, Charlie Lake, and Baldonnel Formations. The development drilling was mainly aimed at Triassic production in the Boundary Lake field, the non-continuous Halfway trend, and in the Inga field. The numerous Charlie Lake Stray sands are proving an added stimulus to Triassic exploration.

One oil well was completed in the Bluesky-Gething Formation and 11 gas wells were completed in Upper and Lower Cretaceous strata.

Gas Discoveries, 1969

Well Authorization No.	Well Name	Total Depth (Ft.)	Status
	Mesozoic		
444	Pacific et al Siphon 11-27-86-16	4,680	Baldonnel and Halfway gas.
2581	Pacific West Prod Siphon 7-34-86-16	4,740	Baldonnel and Charlie Lake gas.
2446	Dome LaGarde 10-12-87-16	4,420	Baldonnel and Charlie Lake gas.
174	Pacific Ft St John SE 7-3-83-17 (49)	6,688	Charlie Lake gas.
2423	Texcan N Cache 6-28-88-22	5,034	Charlie Lake and Halfway gas.
2533	Amarillo Cabot N Inga d-51-K	5,490	Inga gas.
2496	Placid Banner Sandy d-28-G	3,837	Halfway gas.
2516	Champlin Flatrock 10-9-84-16	4,900	Halfway gas.
2442	Pan Am Redeye d-89-D	3,430	Halfway gas.
	Palæozoic		
2470	Apache CPOG IOE Clarke d-24-I	7,720	Sulphur Point gas.
2436	Mobil Sahtaneh c-70-I	7,767	Sulphur Point gas.
2453	FPC Chevron Peggo b-53-I	7,031	Slave Point gas.
2425	Pacific Cabin d-57-B	6,953	Slave Point gas.

Oil Discoveries, 1969

	Mesozoic		
2548	Chaut Dunbar Stoddart 11-23-85-19	5,990	Charlie Lake oil.
	Palæozoic		
2502	CDR Eagle 11-29-84-18	6,249	Belloy oil.

RESERVOIR ENGINEERING SECTION

The Reservoir Engineering Section is responsible for determination of reservoir and production characteristics of oil and gas pools in the Province. This involves interpretation of reservoir pressure, rock and fluid properties, and production data. The results of these studies are applied in making recommendations concerning the approval of submissions from industry for improved recovery and other production schemes, and also for estimating Provincial hydrocarbon and hydrocarbon-associated sulphur reserves.

The section ensures that requisite reservoir data are obtained, either by industry or Branch personnel, and maintains files of these data. In addition, oil and gas allowable production rates are established by the Section. Other responsibilities of the Section include matters affecting conservation and correlative rights, approval of measurement practices, and approval of produced water-disposal schemes.

Oil Allowables, M.P.R.s, and Improved Recovery Schemes

Maximum permissive rates (M.P.R.s) are assigned to all oil wells in the Province, either as individual wells or for groups of wells in the form of project or unit M.P.R.s. Single-well M.P.R.s are based on well-bore net-pay properties, while project M.P.R.s are derived from mapped pore volume data and the estimated recovery factor for the production scheme in effect. Monthly oil allowables are established from M.P.R. values, and periodic checks are made to ensure that wells and projects are being produced in accordance with regulations governing over-production.

Section 74.03 of the Drilling and Production Regulations provides for the carry-forward of oil allowable underproduction from one production period to the next, provided this circumstance is caused by a situation not controllable by the

operator involved. During the year several requests for such a carry-forward were approved. Under section 71.02 of the regulations, daily oil production cannot exceed 125 per cent of the M.P.R. In connection with applications under section 74.03, requests were also received for waiver of section 71.02 to enable wells in the Inga B pool and Stoddart field to make up underproduction. These requests were not granted, since in the Branch's opinion all wells capable of exceeding their M.P.R. would be able to make up the underproduction during the 1969/70 production period.

A report is issued monthly, in which M.P.R.s are summarized by field and operator. Table 16 presents individual well and project M.P.R.s as of December 31, 1969, while Maps 1, 2, 5, 6, 8, 10, 11, 14, 17, 19, and 20 show the areas included in project or unit M.P.R. approvals.

During 1969 a total of 43 single-well M.P.R.s was issued. This includes revisions to 23 previously approved values due to re-evaluation of pertinent data or changes in well spacing, and four interim M.P.R.s which were revised to permanent status. As discussed in last year's report, during 1968 many project and single-well M.P.R. reapplications were received in response to an attempt to obtain uniformity in parameters included in M.P.R. calculations. By early 1969 these had all been reviewed and, effective March 1, interim M.P.R.s were issued pending final exhaustive evaluation of the submissions. The interim M.P.R.s outstanding at the end of 1969 are identified in Table 16. At the time these interim M.P.R.s were issued, all project approvals were amended to conform with the requirements of the new Drilling and Production Regulations which came into force on February 3, 1969. Annual or semi-annual progress reports are now required for all projects, together with brief monthly status reports detailing withdrawal balances.

In May, an application was received from Tenneco Oil & Minerals Ltd. for an increase in M.P.R. for all wells operated by that Company in the Inga A pool, Inga field. Following extensive review, the application was not approved due to lack of substantiating data and the fact that formation of a unit in this pool was being actively pursued.

At the end of 1968, a waterflood M.P.R. had been approved for Inga Unit No. 1, but was not in effect since water injection had not commenced. Following first water injection in June, 1969, the M.P.R. became 7,064 stock tank barrels per day as of June 1. This was later increased to an interim level of 7,400 stock tank barrels per day following unit enlargement on August 1, 1969. The M.P.R. was finally pegged at 7,246 stock tank barrels per day on October 1, 1969, following completion of an infill drilling programme which provided additional reservoir data leading to some modification of the pool maps.

At the beginning of 1969 an application by Pacific Petroleums Ltd. was under review for increase in the M.P.R. allocated to Weasel Unit No. 2. This application was occasioned by unit enlargement and some infill drilling leading to revised pool maps. At the end of January the M.P.R. was set at 1,143 stock tank barrels per day, to become effective when water injection into the project was commenced. An alternative water-injection pattern was also approved during January. Initial water injection into the project was in March, 1969.

During February, 1969, application was received from Pacific Petroleums Ltd. for approval of three additional water-injection wells to be drilled in Peejay Unit No. 1. Approval was granted immediately for two of the wells and the third was approved following additional clarification of the reasons for the proposal.

In May, an application was received from Union Oil Company of Canada Ltd. for permission to inject, into the well located in d-24-J/94-H-2, gas produced as

a result of oil production from the Halfway Sand in Milligan Creek Unit No. 1. Following review of the relevant data, the scheme was approved at the end of June. The proposal had been advertised in the *Gazette* during the intervening period and had elicited no objections.

An application was received in August from Tenneco Oil & Minerals Ltd. requesting approval for modification of the waterflood pattern in Weasel Unit No. 1. Approval was granted.

At the end of August a request was received from Union Oil Company of Canada Ltd. for an increase in the M.P.R. for the Aitken Creek Gething pool project. It was claimed that pool performance to date was indicative of a higher ultimate recovery factor than was currently being recognized in the M.P.R. calculation. Following extensive review, the M.P.R. was increased to 1,125 stock tank barrels per day, to become effective on January 1, 1970.

One application for removal of oil allowable off-target penalty factor was received during 1969. This was made by Texaco Exploration Company, and related to the well in c-32-A/94-A-14 producing oil from the Dunlevy Sand. No objections were made to the proposal to lift the penalty when it was advertised in the *Gazette*. Consequently, the off-target penalty factor was removed, effective March 1, 1969.

During the year the Reservoir Engineering Section examined two situations involving lease-line problems in adjacent waterflood projects. The first of these related to Weasel Units Nos. 1 and 2, and the allocation between these projects of water injected at their common boundary. A mutually satisfactory solution was obtained to this problem. The second problem arose because of a reservoir voidage imbalance in the vicinity of the boundary between Peejay Unit No. 3 and the Peejay Tenneco project. Reservoir-pressure survey data indicated the presence of a substantial pressure sink in this area which, if not corrected, would allow lease-line drainage from Unit No. 3 and also result in reduced ultimate oil recovery from the common oil pool. Various alternate solutions to the problem were examined by the Branch and by the working-interest owners of the projects involved. The technically superior solution was to combine the projects under one operator, thus allowing for optimum waterflood-pattern selection without regard to artificially imposed lease-line considerations. This was the route adopted by the working-interest owners, and by year-end negotiations which would lead to absorption into Unit No. 3 of the Tenneco project were well advanced.

Associated and Solution Gas-conservation Schemes

Solution gas is always produced as a by-product of oil production. This gas is dissolved in the oil at reservoir pressure and temperature conditions, but due to decreases in these parameters as the oil is brought to the surface much of the dissolved gas is evolved. In many cases the volume of this gas, in excess of lease equipment fuel requirements, is so small that it is not economical to install gathering facilities to market the gas. This excess gas is flared. Many oil pools are discovered in which the oil is originally overlain with gas, known as a gas cap. It is often impossible to produce the oil without also producing some gas-cap gas, in addition to the solution gas. This could be detrimental from the point of view of ultimate oil recovery, since production of the gas cap reduces the reservoir energy available to produce the oil.

Gas produced with oil can be conserved in two ways—either it can be collected and marketed or it can be collected and injected back into the producing reservoir or a storage zone. Conservation is encouraged by incentives. In the case of

schemes with marginal economics, a reduced royalty rate may be applied to gas that is sold. Wells or projects that produce with a gas-oil ratio in excess of 1,000 standard cubic feet stock tank barrels have their allowable reduced by a factor which is dependent on the level of gas-oil ratio (Division 89, Drilling and Production Regulations). This factor may be modified if the gas is conserved, either by reinjection or by marketing. However, in the case that gas-cap gas is to be marketed, the Branch needs to be satisfied that such concurrent production will not be harmful to ultimate oil recovery.

At the beginning of 1969, two conservation schemes were in operation that marketed solution gas, and five projects involving return of gas to the producing reservoir were active. The gas-injection projects are included in Table 16. The schemes involving gas sales were in effect in the Boundary Lake and Blueberry fields. In the latter, solution gas from the Pacific-operated Debolt pool project is collected and compressed along with gas-well gas from other pools in the field. Gas not used as fuel or flared is then either delivered to the sales gas system or used for gas-lifting at individual oil wells. The Boundary Lake system comprises a gas-treating plant (for extraction of liquids) and services oil wells in the four waterflood projects producing from the Boundary Lake Sand in this field.

At the end of 1968, Monsanto Oil Ltd. had been granted approval for relief from gas-oil ratio penalty for Dunlevy Sand oil wells in a section of the Rigel field (located in 19-87-16 W6M, 13 and 23-87-17 W6M). This approval was contingent on implementation of a gas sales-type conservation scheme. By the end of 1969 the scheme had not been put into effect, but firm plans were well advanced.

In December, 1969, two applications were received for approval of gas sales-type conservation schemes. One, made by Canadian Superior Oil Ltd., concerned collection of solution gas being produced from Inga Unit No. 1, the plan being to collect separator and stock-tank-evolved gas, compress it, and market it through the sales gas-line already passing through the north end of the unit carrying gas from gas fields to the northwest of Inga. The proposal was being reviewed by the Reservoir Engineering Section at year-end. The second application was for a scheme to be known as the "Northeast British Columbia Gas Gathering System," and was made by Union Oil Company of Canada Ltd. as operator of the system. The proposal was to build a gas-line from the Westcoast Transmission Co. Ltd. terminal, located in 21-87-15 W6M, generally northwest for some 43 miles. Operators of properties along the route (from Currant in the south to Beatton River in the north, *see* Fig. 3) were to be responsible for necessary collection and compression facilities to deliver gas to the line at any of three injection points. At year-end the proposal was still under review by the Reservoir Engineering Section.

Gas Allowables and Well Tests

The "daily gas allowables" or production rate limits (P.R.L.s) for gas wells in the Province are established from the results of absolute open-flow potential (A.O.F.) tests. These tests are witnessed by Branch field personnel and the data collected are interpreted by the Reservoir Engineering Section to establish P.R.L.s and also for use in reservoir studies.

Restriction of individual well production rates has not been deemed necessary in some gas pools, and in these cases either Project Allowables have been issued, or the pools' operators have approval to produce according to "Good Engineering Practice" (G.E.P.). Table 17 presents A.O.F. test data, individual well P.R.L.s, Project Allowables, and G.E.P. schemes in effect at December 31, 1969. The areas included in the various Project Allowable and G.E.P. schemes are shown in Maps 3, 4, 7, 9, 12, 13, 15, 16, and 18.

When the revised Drilling and Production Regulations came into force on February 3, 1969, major changes in the testing requirements for gas wells became effective. The specific regulations are included in Divisions 79 through 87. Because of this and the desire to update testing procedures, the Reservoir Engineering Section prepared a pamphlet entitled " Procedures for Gas-well Testing and Assignment of Production Rate Limits." This was mailed to all companies operating in the Province under cover of a " Memo to All Operators," dated September 5, 1969. This pamphlet consolidates all gas-well testing requirements, methods, schedules, and P.R.L. calculations. Under these new procedures, the basic A.O.F. test for wells in the Province is now the isochronal or modified isochronal test. Wells have to be tested initially and after one year of production by either of these methods. All wells operating during 1969 whose A.O.F. exceeded 8 million standard cubic feet per day are required to be tested prior to the end of 1970, by one of these methods, if not already so tested. Thereafter, annual static bottom-hole pressure measurements and single-point flow test data are required, with a full multipoint test every fifth year. Wells with an A.O.F. less than 8 million standard cubic feet per day require a single-point flow test every fifth year, together with annual static bottom-hole pressure measurements. Testing schedules have been arranged so that meaningful reservoir pressure data are obtained from the various gas pools in the Province. Daily gas allowables, effective on completion of the initial test or on October 1st, in subsequent years, will be calculated from the results of multipoint or single-point A.O.F. tests. Initially the P.R.L. will be 25 per cent of the A.O.F. Subsequently, however, the P.R.L. will reflect a rate that produces an equivalent wellbore pressure drawdown to that produced at initial reservoir conditions at the original P.R.L.

During 1969, several operator-proposed testing programmes were reviewed and approved with modifications where necessary. Three new wells in the Sunrise field were allowed to produce for a period of one month prior to being A.O.F. tested. This concession was granted to allow clean-up of the wells, which were producing completion fluids that hindered attempts to obtain meaningful A.O.F. test data. Several wells were allowed to flare gas for the purpose of testing or obtaining gas samples for analysis.

The study of the Baldonnel reservoir in the Inga field, incomplete at the end of 1968, was finalized early in 1969. It was concluded that the gas accumulation was separated from the down-dip oil. On this basis, P.R.L.s were issued for the three wells completed as gas producers in the Baldonnel and for which A.O.F. test data had been obtained during 1968.

At the end of 1968, an application was under consideration from Imperial Oil Ltd. for establishment of Good Engineering Practice in the Dunlevy Sand, Rigel field. Some apparent problems concerning equity between operators were successfully resolved and the project became effective on March 1st.

At the beginning of 1969 the Reservoir Engineering Section had under study an application by Amarillo Oil Company (now Pioneer Exploration Ltd.) for approval to produce Inga Sand zone gas wells in the Jeans West field. Additional reservoir-pressure data in the area had been requested toward the end of 1968. It was hoped that these data would assist in resolving whether or not the gas accumulation was connected to the adjacent oil pool in the Inga field. The data were inconclusive, but additional drilling between the two fields indicated that the oil and gas were most probably in communication. This, and the fact that objections to the proposal were received from working-interest owners in Inga Unit No. 1, resulted in further consultation with the applicant to determine the safeguards that would be required before production could be allowed. The application was subsequently withdrawn, and the working-interest owners in the area proceeded to dis-

cuss the practicality of forming a unit for the purpose of concurrently producing the gas in conjunction with oil from Inga Unit No. 1. At year-end a concurrent production system had been modelled for computer solution, and unitization negotiations were well in hand.

In July, an application was received from Pacific Petroleums Ltd. for approval of production by Good Engineering Practice of gas wells in the Baldonnel and Halfway Zones in Beg and Beg West fields. The proposal was advertised in the *Gazette* on July 24th and 31st, and no objections were received. Since there were no technical reservations involved, the scheme was approved, effective September 1, 1969.

In September, an application was received from Amoco Canada Petroleum Company Ltd. requesting approval for a pool allowable for the Nahanni gas pool in the Beaver River area. The submission was advertised in the *Gazette* on October 2nd and 9th. No objections were registered, and studies indicated no technical reasons for withholding approval on a short-term basis, pending actual producing history data. However, the productive area of this Nahanni pool extends into the Yukon. Consequently, before a decision was made with respect to the submission, it was considered advisable to contact the Resource Management Division of the Federal Department of Indian Affairs and Northern Development. This was done in order to arrange for complementary production rates between the " Federal " and " Provincial " portions of the pool, and to collect data on which a decision could be made regarding distribution of royalty from production under a " pool allowable " scheme. As of the end of 1969, consultation was continuing, but no mutually acceptable distribution of reserves had been arrived at.

A request was received from Mobil Oil Canada Ltd. for permission to produce the well located in c-91-D/94-I-14 at rates in excess of its P.R.L., for a period beginning in mid-October and extending until January 15, 1970. The reason for the application was that an adjacent well (c-78-C/94-I-14) had developed a tubing leak, and repair was not expected to be accomplished before mid-January. These two wells are the only wells producing from the Pine Point pool in the Sierra area. Since all productive acreage is leased by Mobil Oil, no equity considerations arose, and total production rate from the pool was to remain stable. The request was therefore granted.

Husky Oil Ltd. applied in May for transfer of the gas allowable for the well in c-100-H/94-J-10 in the Clarke Lake field to another well in the field. The request was not approved. Generally the principle of transferring gas-well allowables is inconsistent with the theory of setting such production limits. Unlike oil well allowables, which are based on reserves, gas well production-rate limits are based on production tests and are assigned at a level designed to minimize well-bore damage. Transfer of allowables, therefore, defeats this object. Specifically with regard to Clarke Lake, two additional factors are pertinent. Most wells in the field are in the Slave Point project, which has an allowable of 400 million standard cubic feet per day. Thus, transfer of allowable to a well in this area is meaningless. The wells that are restricted to individual production-rate limits are those offsetting the well in a-65-G/94-J-10. These wells were excluded from the project at the specific request of the operator of the a-65-G well because it was considered that undue drainage of this tract would occur. Thus, transfer of another well's allowable to one of these wells would defeat the purpose of their rate limitations. Husky was advised to discuss with Pacific Petroleums Ltd., the project operator, the possibility of including the spacing area for c-100-H into the project, and to subsequently apply to the Branch for enlargement of the project for this purpose.

Hydrocarbon and Associated Sulphur Reserves

Table 18 presents estimated reserves, at year-end 1969, of oil, gas, and gas by-products (hydrocarbon liquids and sulphur). The major review and normalization of reserves estimates begun in 1968 was continued during 1969, resulting in modifications to several previous estimates of ultimate recovery. These are shown under the heading " Revisions in 1969 " in Table 18. The current estimates of oil and gas reservoir rock, fluid, and producing characteristics are presented in Tables 19 and 20.

The proved oil reserves in the Province as of December 31, 1969, are estimated at some 253 million stock tank barrels. Drilling during 1969 proved up 2.9 million stock tank barrels of reserves, and revisions to previous estimates added a further 2.3 million stock tank barrels. However, 25.3 million stock tank barrels were produced during the year, resulting in a net decrease in proved reserves of 20.1 million stock tank barrels when compared with reserves at the end of 1968.

Proved reserves represent oil for which it is believed there is a 90 per cent or better chance that the estimated volumes will be recovered. Probable reserves are carried where the probability is estimated to be 50 per cent or more. These include primary reserves on undrilled acreage and reserves attributable to probable increases in ultimate recovery from pools under improved recovery schemes or for which such schemes are planned. Probable oil reserves are estimated at 85 million stock tank barrels, as of December 31, 1969. This is 14.3 million stock tank barrels less than the estimate made for year-end 1968. One reason for this is the transfer of some reserves from the probable to proved category, based on the performance of some improved recovery projects. A fair proportion of the decrease is, however, due to revisions of previous estimates for some pools.

Gas and gas by-products reserves shown in Table 18 are " established " reserves. These comprise the proved reserves plus a percentage (usually 50 per cent) of the estimated probable reserves. As of December 31, 1969, the established raw-gas reserves are estimated at 8.9 trillion standard cubic feet. Adjustment for removal of a percentage of the liquid hydrocarbons and acid gases results in established residue gas reserves of 7.8 trillion standard cubic feet, or 8.1 trillion standard cubic feet when converted to a standard heat content of 1,000 B.T.U. per standard cubic foot. These volumes represent slight increases over the corresponding estimates at the end of 1968. It is readily seen that 75 per cent of the increase is due to drilling in 1969, with major reserves increases in the Rigel, Stoddart, Dahl, Blueberry, and Beavertail areas. Adjustments to previous reserves estimates accounted for the other 25 per cent of the increase, representing 160 billion standard cubic feet; of this, 134 billion standard cubic feet is due to the inclusion of reserves of associated gas in the Crush, Inga, Milligan Creek, part of Peejay, Rigel, and Wildmint fields. These reserves were not previously carried, as gas-conservation schemes were not in effect. However, at year-end 1969, schemes for these fields were well in hand and inclusion in the reserves estimates was considered justified. In the case of Inga field, these reserves include gas in the gas-cap to Inga Unit No. 1 in the Jeans West area. The item in Table 18 identified as " cumulative production adjustment " is to allow for the cumulative gas produced from these proposed conservation schemes up to December 31, 1968.

Natural-gas liquids reserves at year-end 1969 are estimated at 124 million stock tank barrels, some 5.5 million stock tank barrels more than the estimate at December 31, 1968. This increase is entirely due to drilling during 1969 in the area served by the Fort St. John gas plant. No liquids are extracted from gas processed at the Fort Nelson plant, due to the very low liquid content of this gas.

As in the case of gas reserves, the item " cumulative production adjustment " in Table 18 is to adjust the December 31, 1968, cumulative natural-gas liquids production for liquids produced from the proposed conservation schemes.

Estimated sulphur reserves at December 31, 1969, at 3,736 thousand long tons, are 939 thousand long tons more than the 1968 estimate. The reason for this substantial increase is that for the first time sulphur reserves are being carried for gas accumulations serving the Fort Nelson gas plant. Subject to National Energy Board approval, this plant is due to have a sulphur-extraction facility in operation by the fall of 1971 and inclusion of these sulphur reserves is therefore considered justified. The cumulative production adjustment in Table 18 includes cumulative sulphur produced, to December 31, 1968, from the area served by the Fort Nelson plant and also from the proposed gas-conservation schemes previously discussed.

It should be noted that residue gas, natural-gas liquids, and sulphur production and reserves estimates are based on theoretical calculations of the quantities of these materials contained in the raw-gas reserves. Comparisons between actual and theoretical production during 1969 are included in footnotes to Table 18. The apparent low sulphur extraction efficiency is due to the fact that the theoretical values include the sulphur not in fact extracted from the gas in the Fort Nelson plant.

Miscellaneous

During 1969, several proposed schemes for produced-water disposal were examined. In January, Mobil Oil Canada Ltd. drilled a well in d-92-D/94-I-14 for the purpose of disposing of water produced as a result of gas production from the Pine Point Formation in the Sierra area. Approval was granted on an interim basis, pending final evaluation, for disposal into the Debolt Formation in this well. Pacific Petroleums Ltd. applied in March for permission to transport water produced from the Cadomin zone in the well located in 8-15-85-14 W6M to the Boundary Lake injection plant. This plant is operated by Imperial Oil Ltd., and provides water for waterflooding the Boundary Lake zone in this field. Test data indicated that the water could be treated to avoid incompatibility problems, and the request was therefore granted.

At the beginning of November an application was received from Texaco Exploration Co. for approval to dispose of water produced from the Inga Sand in the well located in 16-13-87-24 W6M. The proposal was to truck the water to the Nig Creek field disposal well located in a-31-F/94-H-4 for disposal to the Baldonnel Formation. At the time this well was used solely for the purpose of disposing of water produced with gas from the Baldonnel zone in the Nig Creek field. Laboratory tests indicated that mixing of Inga and Baldonnel waters would cause calcium-carbonate precipitation. This would be detrimental if allowed to occur unchecked in the bore of the disposal well, since " plugging " of the disposal zone would occur. Texaco proposed to control any tendency to such plugging by injection of hydrochloric acid. In mid-November, interim authorization was granted for the proposal, subject to several conditions imposed to ensure that the disposal well's capacity was not impaired, in order that Nig Creek gas production would not be curtailed due to inability to dispose of produced water.

Two applications were dealt with concerning gas metering during 1969. At the end of 1968, Mobil Oil Canada Ltd. requested waiver of the requirement for individual well-gas metering for production from three wells in the Sierra area. The application was not approved as it stood. However, a compromise scheme was authorized whereby individual pool production would be metered and individual well rates within a pool would be estimated by prorating on the basis of monthly

production tests through the dehydration plant. In December 1969, Union Oil Company of Canada Ltd. was informed that the Branch would waive the requirement for chart records on integrating orifice meters for all injection points into, and the custody transfer point from, the proposed Northeast British Columbia Gas Gathering System. This waiver was granted on condition that digital readout orifice-flow computers of approved design would be installed instead of the conventional meters at these locations. It was considered that greater metering accuracy would be obtained with the proposed equipment. One condition of the waiver is that three-monthly reports followed by annual reports are to be filed with the Branch, detailing meter gas balances into and out of the system.

Several comprehensive reservoir studies were made during 1969, in conjunction with the Geological Section. Pools included were the Nahanni in the Beaver River area, the Halfway in the Peejay field, the Bluesky-Gething in Aitken Creek field, and the Baldonnel and Halfway in the Beg and Beg West fields. In addition, preliminary work was started on a study of the potential value in waterflooding the Inga A pool in the Inga field. In addition to the annual reserves estimates, a review was made of potential associated- and solution-gas reserves in the general area of the proposed Northeast British Columbia Gas Gathering System. Some of these, for which firm conservation commitments have been made, are included in the Provincial Reserves estimate as of December 31, 1969.

The revised Drilling and Production Regulations stipulate the frequency with which progress reports are required from operators of improved recovery schemes. During 1969, such reports were reviewed for all the projects listed in Table 16, with the exception of Inga Unit No. 1; water injection into this project had only been taking place for six months by year-end 1969. In addition, a progress report for the Slave Point project in the Clarke Lake field was reviewed. Where necessary, items arising from these reports were discussed with the operator. As a further check on efficacy of the improved recovery schemes in operation during the year, withdrawal balances since initiation were calculated for all projects.

During the year, several proposed testing procedures and test results were reviewed relative to segregation in dual- or triple-zone completion wells. In all cases examined it was concluded that segregation was effective.

Amongst several miscellaneous applications dealt with during 1969 was one from Tenneco Oil & Minerals Ltd. for permission to flare approximately 100 million standard cubic feet of gas from the well located in 16-12-87-24 W6M. This well was completed in the Inga Sand, lower structurally than off-setting oil wells. However, the sand appeared to be gas-bearing. It was contended by the applicant that production of the 100 million standard cubic feet of gas would deplete the interpreted local gas accumulation and permit the well to go on stream as an oil producer. For several reasons, approval to flare this volume of gas was withheld. Normal initial production testing routine was followed when the well was placed on stream in March, and the well came in immediately as an oil producer, although with a gas-oil ratio well above that observed in adjacent wells. At year-end the gas-oil ratio was still about five or six times as high as the nearby wells.

Another application that was considered during the year concerned possible modification of gas-well spacing areas in a projected drilling prospect. It was concluded that modification was not desirable and that sections 13.06 and 13.09 of the regulations adequately covered the situation that might develop if the plans materialized into concrete action. Several proposed M.P.R.s were reviewed for wells in Alberta in spacing units adjacent to the Boundary Lake field, courtesy of the Alberta Oil & Gas Conservation Board. It was ensured that the proposed allowable

rates were consistent with those that would have been applicable in British Columbia, and, therefore, that no lease-line problem existed.

Several requests for general or specific reservoir-fluid analysis data were dealt with during 1969. As in previous years, a map detailing maximum detected concentrations of hydrogen sulphide in produced gases was prepared in September. This map is on file at the Branch field office, for the benefit of personnel about to work in the field. During the year many requests for Branch estimates of Provincial and individual pool reserves were received.

In order to expedite the handling of such things as improved recovery submissions, a set of guidelines was prepared in January detailing the data required in support of various applications to the Branch. These were included in the Drilling and Production Regulations booklet, published by the Branch later in the year. Topics covered were: Water disposal, pressure maintenance or improved recovery, relief from gas-oil ratio penalties, concurrent production of oil and gas, removal of gas-well rate restrictions, and gas processing. In November, guidelines for gas-conservation scheme submissions were issued, in the form of a " Memo to All Operators."

During September, a " Memo to All Operators " was issued on the subject of reservoir-pressure surveys in oil wells. Minimum requirements were detailed and proposals for survey schedules during 1970 were solicited. By year-end several schedules had been received and discussed with the operators where necessary. The finalized Province-wide schedules had not been issued by the end of December, pending review of outstanding submissions.

In previous years the Reservoir Engineering Section has assisted the Chief Commissioner in evaluating acreage posted for disposition of Crown land. Early in 1969 a set of correlations was prepared which enables the selection of a value for such acreage based only on reservoir rock properties and estimated fluid distribution. These are now used generally by the Geological Section, and the Reservoir Engineering Section is only consulted in the case of unusual circumstances. A special evaluation was made for the Provincial Department of Finance. This concerned the value of part of an estate that included an over-riding royalty interest in a large spread of productive and potentially productive acreage in the Fort Nelson area. One or two other miscellaneous tasks were undertaken during the year to supply various Provincial and Federal Government personnel with data and interpretations. These included such things as providing information for Provincial representatives at the National Energy Board hearings in Ottawa in the fall of 1969. The Section assisted the Development Section in the continuing project to improve and modify the computer application, reporting current and historical production data.

Early in 1969 the reorganization of the Reservoir Engineering Section's files, begun in 1968, was completed. Other action to upgrade the Section's utility included the purchase during the year of an electronic calculator, well suited to engineering calculations; and the enrolment of one staff member in a comprehensive reservoir engineering course at the University of Alberta.

DEVELOPMENT SECTION

Drilling

A marked decrease was recorded in drilling operations completed in the Province during 1969. Over-all footage drilled was 19 per cent less than 1968, mainly due to the reduction in exploratory drilling. Exploratory wildcat footage was down 32 per cent from the 1968 level and the footage attained at wells classified as

exploratory outpost decreased 29 per cent. The development footage remained almost constant, relative to the previous year. Footages drilled during 1969 were as follows: Development 433,868 feet, compared to 442,747 feet for 1968; exploratory outpost 189,672 feet, compared to 265,891 feet; and exploratory wildcat 250,245 feet, compared to 366,247 feet. The year 1969 was the first year since 1964 that the total footage drilled did not exceed 1 million feet. Two factors were responsible for this decrease. The general orientation of exploration funds to northern Canada from the Prairie regions and the lack of new discoveries in British Columbia to initiate follow-up development drilling programmes.

All drilling operations, except for one exploratory wildcat venture in the Bowser Basin area, were carried out in the northeastern corner of the Province. In total, 59 operating oil companies employed 51 different drilling rigs to complete the 1969 drilling.

Plate II.—Exploration well, drilled by Dome Petroleum Ltd. on the Ritchie anticline in the Bowser Basin east of Stewart.

Wells completed decreased 9 per cent to 171 wells in 1969 from 194 completions in 1968. Twelve wells were given finished drilling status at the end of the year. Production casing has been set in these wells, indicating that they are expected to be producers but will be evaluated at a later date. Because of the use of this temporary status, a true comparison to the 1968 completions cannot be made. In 1969, there were 40 gas wells completed, compared to 34 in 1968. Thirty-five oil completions were made in 1969, 11 less than in 1968, while 80 abandonments were recorded, compared to 105 during 1968. The number of wells drilling at the end of the year was 24. As in previous compilations, if more than one zone is completed in a well, each productive zone is counted as a well. As two multiple-gas completions were made in 1969, 169 wells were actually drilled. Wells drilled and drilling during 1969 are listed in Table 21. Monthly footages drilled since 1954 are given graphically on Figure 2.

Well classifications were assigned by the Development Section during 1969 to each proposed well location in accordance with the Drilling and Production Regulations. A Lahee classification was also determined, which was described in the Geological Section of this report. The Branch classification system is explained by the following definitions. A development well is located within a spacing area that is contiguous to a spacing area containing a well capable of production from the same objective geological pool. Exploratory wells are divided into two types—wildcat and outpost. An exploratory wildcat well is located more than 4½ miles from any capable well, and an exploratory outpost well is located in the area between development and wildcat wells. Development wells are further classified as deep-pool or shallow-pool tests where undeveloped pools below or above the objective pool is being explored. With the revised Drilling and Production Regulations, which were effective on February 3, 1969, the Branch classification is the basis used for the release of well information. Release of data for exploratory wildcat wells is made one year after the rig release date, while the information from all other wells is available 30 days after the rig release date.

Workover operations were undertaken at many newly completed wells in addition to stimulation treatments performed on some of the declining wells. A workover is considered to be any operation carried out after the rig release date that changes the producing interval, or alters, or intends to alter, the producing characteristics of a well. A producing interval 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 productivity of the well. Changes may include perforating, acidizing, fracturing, installing a pump, or changing a choke, but do not include the replacement of equipment.

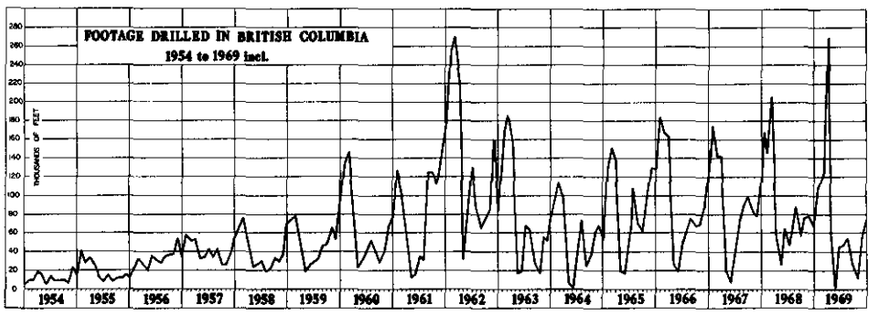


Figure 2. Footage drilled in British Columbia, 1954–69.

FIELDS AND POOLS, DECEMBER 31, 1969

NO.	FIELD	PRODUCING HORIZON OIL	GAS
1	AIRPORT		CADOMIN HALFWAY BALDONNEL
2	AITKEN CREEK	GETHING	
3	BEAR FLAT	CHARLIE LAKE	
4	BEATTON RIVER	HALFWAY	HALFWAY
5	BEATTON RIVER WEST	BLUESKY-GETHING	
6	BEAVERDAM	HALFWAY	HALFWAY
7	BIG		BALDONNEL HALFWAY
8	BIG WEST		BALDONNEL
9	BERNADET		BLUESKY-GETHING
10	BLUEBERRY	DEBOLT	DUNLEVY BALDONNEL CHARLIE LAKE
11	BLUEBERRY EAST		BALDONNEL HALFWAY DEBOLT
12	BLUEBERRY WEST		DUNLEVY BALDONNEL
13	BOUNDARY LAKE	BOUNDARY LAKE HALFWAY CADOMIN	BLUESKY-GETHING GETHING HALFWAY DUNLEVY BALDONNEL
14	BOUNDARY LAKE NORTH		HALFWAY
15	BUBBLES		BALDONNEL
16	BUICK CREEK		DUNLEVY CHARLIE LAKE
17	BUICK CREEK EAST	DUNLEVY	BLUESKY-GETHING DUNLEVY
18	BUICK CREEK NORTH		BLUESKY-GETHING DUNLEVY
19	BUICK CREEK WEST	DUNLEVY	DUNLEVY BALDONNEL HALFWAY GETHING
20	BULMAN	HALFWAY	
21	BULRUSH EAST	HALFWAY	
22	CHARLIE LAKE	GETHING	
23	CLARKE LAKE		SLAVE POINT
24	CLARKE LAKE SOUTH		SLAVE POINT
25	CRUSH	HALFWAY	
26	CURRANT	HALFWAY	HALFWAY
27	DAWSON CREEK		CADOTTE DUNKLEOSC
28	FARRELL CREEK		CHARLIE LAKE HALFWAY
29	FORT ST. JOHN	CHARLIE LAKE BELLOY	CADOMIN HALFWAY CHARLIE LAKE BALDONNEL BELLOY
30	FORT ST. JOHN SOUTHEAST		CADOMIN BALDONNEL HALFWAY BELLOY
31	GUNDY CREEK		BALDONNEL CHARLIE LAKE
32	HALFWAY	CHARLIE LAKE	BALDONNEL CHARLIE LAKE
33	HIGHWAY		DUNLEVY BALDONNEL DEBOLT
34	INGA	BALDONNEL INGA	INGA
35	JEANS WEST		INGA
36	JEDNEY		GETHING BALDONNEL HALFWAY
37	JEDNEY WEST		BALDONNEL HALFWAY
38	KOBES-TOWNSEND		DUNLEVY HALFWAY CHARLIE LAKE DEBOLT
39	KOTCHO LAKE		SLAVE POINT
40	LAPRISE CREEK		BALDONNEL
41	LAPRISE CREEK WEST		BALDONNEL
42	MILLIGAN CREEK	HALFWAY	
43	MORENCY LAKE	CHARLIE LAKE	
44	MONTNEY		BLUESKY-GETHING CHARLIE LAKE HALFWAY
45	NETTLE	BLUESKY-GETHING	BLUESKY-GETHING
46	NIG CREEK	BALDONNEL	BALDONNEL
47	NORTH PINE	CHARLIE LAKE	CHARLIE LAKE
48	OSPREY	HALFWAY	
49	PARKLAND		MARADIN
50	PEEJAY	HALFWAY	HALFWAY
51	PEEJAY WEST	HALFWAY	
52	PETITOT RIVER		SLAVE POINT
53	RED CREEK		CHARLIE LAKE HALFWAY
54	RIGEL	DUNLEVY	DUNLEVY
55	SIERRA		PINE POINT
56	STODDART	CHARLIE LAKE BELLOY	BELLOY
57	STODDART WEST		BELLOY
58	SUNRISE		CADOTTE
59	TWO RIVERS		CHARLIE LAKE BALDONNEL HALFWAY
60	WEASEL	HALFWAY	BALDONNEL HALFWAY
61	WILDMINT	HALFWAY	HALFWAY
62	WILLOW	BLUESKY-GETHING	HALFWAY
63	WOLF	HALFWAY	HALFWAY
64	YOYO		PINE POINT

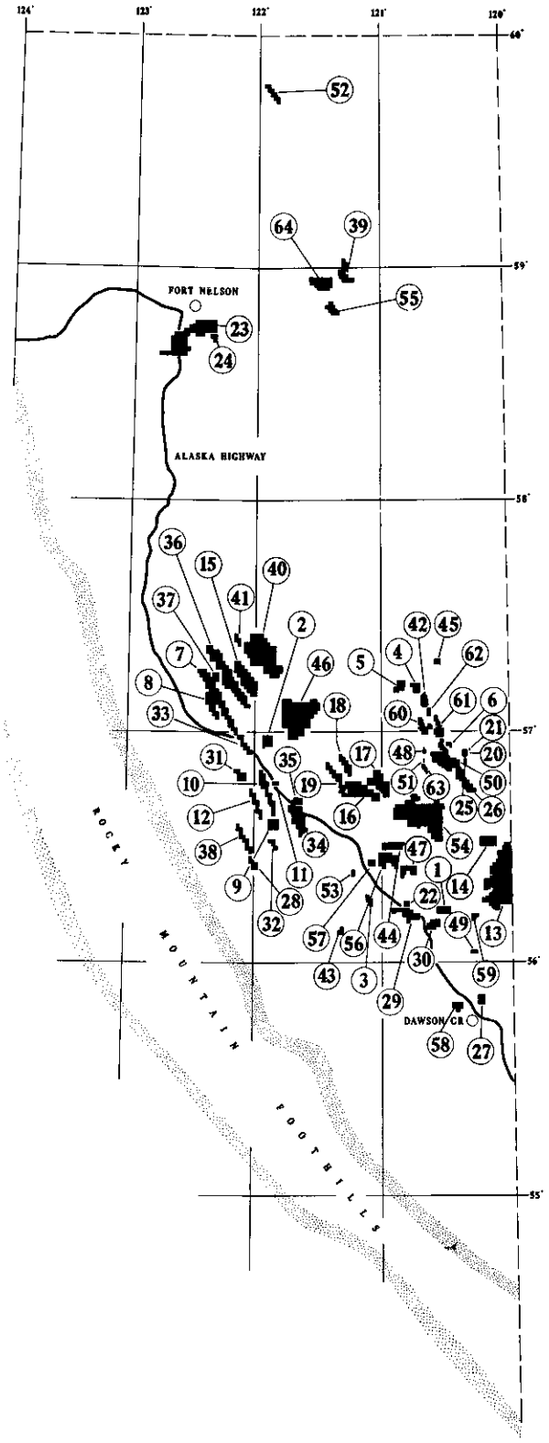


Figure 3. Petroleum and natural-gas fields, 1969.

Five new fields were designated by the Branch during 1969, and field boundaries were amended on 10 occasions. The new fields were at Bear Flat, Moberly Lake, Sierra, Sunrise, and Two Rivers. Boundaries were changed for the Beatton River West, Clarke Lake, Fort St. John, and North Pine fields in one instance and in two cases to the Inga, Rigel, and Stoddart fields. At the end of 1969, there were 64 designated fields which are listed in Table 22 and shown on Figure 3.

All submissions pertaining to drilling operations are studied for approval by the Development Section. Such approvals must be obtained prior to commencement of drilling a well, changing a well name, abandoning a well, or any alteration proposed to change the physical characteristics of a well. When a submission is received by the Development Section, the information, which may include details of the proposed programme, the title under which the petroleum and natural-gas rights are held, and any other relevant requirements of the regulations, is reviewed. With each application to drill a well, a surveyed position must be given which is examined to assure conformation with target and spacing regulations. A spacing area is assigned to the proposed well and, if the location does not meet the target-area requirements, a production penalty is calculated.

Any application that is submitted to alter the equipment in a well or the proposed programme for a well is handled in a similar manner. Details of the application are examined and given approval by the various sections of the Branch. Prior to the abandonment of a well, the operator must transmit an abandonment programme to the field engineer for his approval, but all other types of alterations are studied at Victoria, where official records are retained.

During 1969, 178 well authorizations were issued. Six of these authorizations were cancelled when the operators decided not to drill the proposed locations.

The disposal of salt water produced with petroleum and natural gas was accomplished by evaporation in surface pits or by injection to subsurface formations. Eight disposal wells situated in the producing areas are in operation in the Province. During 1969 there were 3,334,048 barrels injected into the disposal wells and 584,267 barrels delivered to flare pits for evaporation.

Water-flood operations to enhance production from oil fields increased in 1969 by 7 per cent. A total of 47,392,661 barrels, including both fresh and formation water, were injected into nine producing pools in the Province. Fields receiving the largest quantities of water were Boundary Lake, 16,148,469 barrels, and Peejay, 14,128,819 barrels.

Production

Significant gains were made in the production of crude oil and natural gas from British Columbia wells during 1969. Crude-oil production increased 14.2 per cent, compared to 1968, to 25,309,036 barrels and natural gas was up 15.3 per cent to 324,127,117 thousand standard cubic feet.

Five fields each contributed over 1 million barrels and in total over 85 per cent of the Provincial supply. These were Boundary Lake, 8,914,827 barrels; Peejay, 5,838,825 barrels; Milligan Creek, 3,601,026 barrels; Inga, 2,714,618 barrels; and Weasel, 1,182,457 barrels, which are all under active water-flood programmes. Declines in production were reported from several smaller fields, notably Bulrush, Osprey, and Rigel.

Natural-gas production from the largest producing fields remained nearly constant. The sizeable Provincial increase resulted from new production by the Sierra field and large gains from the Kotcho Lake and Yoyo fields. The aforementioned three fields, plus the Clarke Lake field, all located in the Fort Nelson area, produced 49 per cent of the total. The major producing fields in order of volume

were Clarke Lake, 102,176,861 thousand standard cubic feet; Yoyo, 31,915,254 thousand standard cubic feet; Laprise, 26,210,563 thousand standard cubic feet; Nig Creek, 19,039,190 thousand standard cubic feet; Jedney, 18,486,525 thousand standard cubic feet; and Rigel, 15,238,425 thousand standard cubic feet.

Monthly crude-oil and natural-gas production by fields and pools for 1969 are given in Tables 24 and 25.

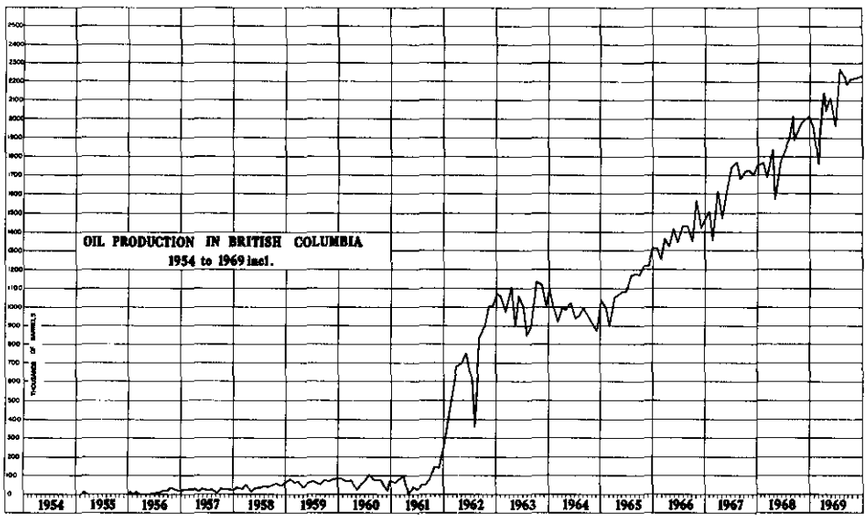


Figure 4. Oil production in British Columbia, 1954–69.

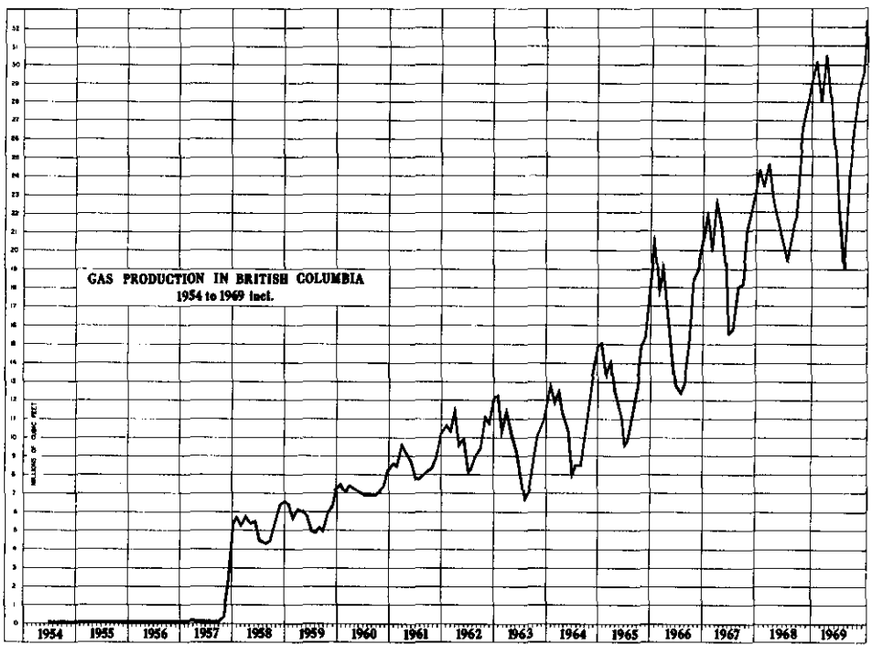


Figure 5. Gas production in British Columbia, 1954–69.

Graphs of monthly production for the years 1954 to 1969 are shown on Figures 4 and 5.

Some changes were noted in the production and sales volumes of butane, propane, and sulphur, compared to 1968. A reduction in the butane sales to the United States was one of the obvious differences.

General statistics showing well operation and production data are given in Table 26. The monthly dispositions of various petroleum products are shown in Tables 27, 28, and 29. Monthly values to the producers are given in Table 30.

PIPE-LINES

Oil-gathering System

The only changes reported for 1969 to the oil-gathering system was the addition of 4 miles to the Trans Prairie Pipelines (B.C.) Ltd. network.

Oil-transmission System

The throughput volume carried by Trans Prairie Pipelines (B.C.) Ltd. was increased from 53,897 barrels per day in 1968 to 60,157 barrels per day in 1969.

Gas-gathering System

During 1969, extensions to the gas-gathering facilities from the Kotcho Lake and Sierra fields were put into operation.

Gas-transmission System

Capacities of the gas-transmission systems in the Province were increased, particularly the Pacific Northern Gas Ltd. line, which was raised from 23,000 million standard cubic feet in 1968 to 44,000 million standard cubic feet in 1969.

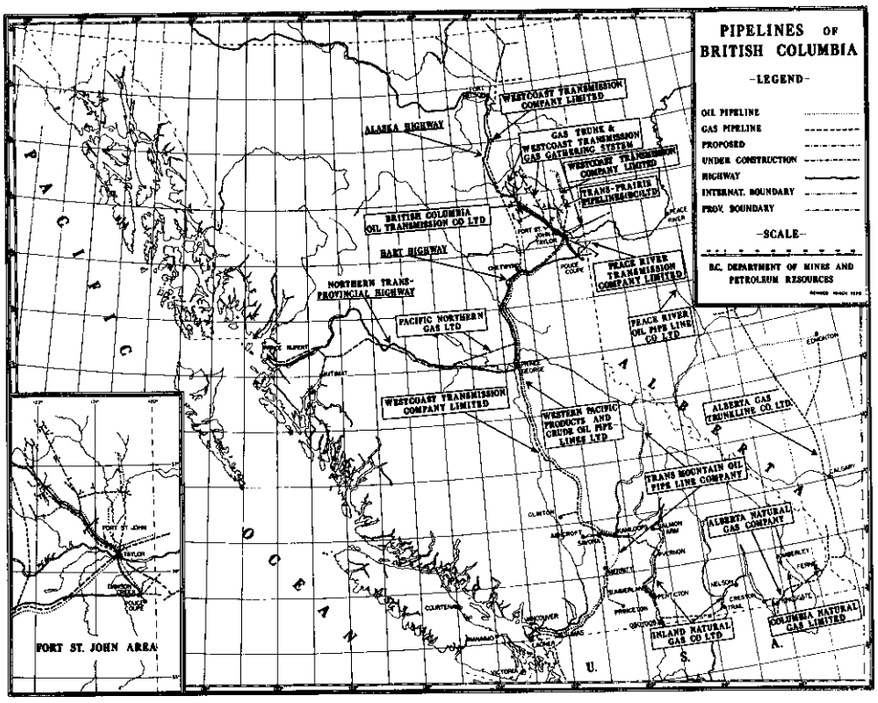


Figure 6. Petroleum and natural-gas pipe-lines.

Gas-distribution System

Expansions and extensions were completed to all Provincial gas-distribution systems during 1969.

Oil Refineries

Imperial Oil Enterprises Ltd. completed alterations at the Ioco refinery to increases the cracking capacity to 11,400 barrels per calendar day.

Gas-processing Plants

No changes were made to the gas-processing plants in British Columbia during 1969.

Sulphur Plants

No changes were reported in the operation of the sulphur plant located at Taylor.

Tables 31, 32, 33, 34, and 35 provide data on the pipe-lines, oil refineries, gas-processing plants, and the sulphur plant. Figure 6 outlines the major pipe-line systems operating in the Province.

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 Division 43 of the Drilling and Production 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 classification assigned by the Branch at the time of approval of the well authorization. Information from any well or portion of a well that is classified as wildcat is available one year after rig-release date. Data from all other classifications of wells are available 30 days after rig-release date. 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 provided by the Branch by publication, examination of Branch records, or reproduction of documents filed. 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 published reports are expanded to meet the requirements of industry and other governmental bodies, the methods 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 of 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 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 early availability of information on all phases of the oil and gas industry.

One meeting of the Statistical Sub-committee was held in 1969, when discussions were held concerning the procedures and reports employed by the Provincial authorities. The Petroleum and Natural Gas Branch has adopted many features of the model forms prepared by this committee 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.—Individual Well.
9A.	Application for M.P.R.—Unit/Project.
10.	Report of Wells Connected to a Battery.
BC S1.	Test Data and Production Report.
BC S2.	Monthly Disposition and Crown Royalty Statement.
15.	Monthly Gas-gathering Operations Report.
16.	Monthly Natural Gas Plant Statement.
17.	Monthly Natural Gas Processing Statement.
18.	Monthly Sulphur Plant Operations Statement.
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 Nominations and Estimated Requirements for British Columbia Crude Oil and Condensate/Pentanes Plus.
31.	New Service Well Report.
32.	Production Allowable Report—Crude Oil.
*33.	Drilling Report.
34.	Application for Test-hole Authorization(s).
*35.	Report of Well Inspection.
*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.

Reports

Schedule of Wells

An annual volume was compiled and published giving all well information released during 1969. It covered the period from 8 a.m. January 1st to 8 a.m. January 1st of the succeeding year.

The data are arranged alphabetically by the well names and provide the following information when applicable: Well authorization number, well name, location, classification, co-ordinates, elevation, total depth, status including geological pool, interval open to production, casing details, spud date, rig-release date, logs, core intervals, sample intervals, drill-stem test data, and geological markers determined by the Branch.

The information is 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 producing wells, pipe-lines, gas plants, oil refineries, and distribution facilities. All production data are compiled and maintained by a computer application. 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.
(3) New oil- and gas-well reports received during the reported month.
(4) The number of producing and producible oil and gas wells by field and pool.
(5) Production of crude oil, condensate, natural gas, and water by individual well, project or unit, field and pool, with gas/oil and water/oil ratios calculated, where applicable. The quantities are given for the current month, the current year to date, and the all-time cumulative.
(6) Estimated oil production for the succeeding month, which is based upon the pipe-line returns reported to the Branch field office.
(7) Crude oil and condensate/pentanes plus disposition, with comparable totals for the same month of the preceding year.
(8) Tabulation of nominations and estimated requirements for British Columbia crude oil and condensate/pentanes plus.
(9) Natural-gas supply and disposition, with comparable volumes for the same month of the preceding year.
(10) Value of natural-gas sales to British Columbia distributors.
(11) Value of crude oil and natural gas to British Columbia producers.
(12) Production and disposition of butane, propane, and sulphur.
(13) Value of butane, propane, and sulphur to British Columbia producers.
(14) Water-flood operations showing the number of injection wells, and volumes of water by current month, current year, with total cumulative figures for each field and pool. The totals are also given for the same month of the preceding year.

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

(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.
  (*k*) Total wells completed.
(3) Well authorizations approved.
(4) Locations cancelled.
(5) Well authorizations 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.
(16) Drilling and production schemes approved by the Branch during the recorded month.

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, British Columbia.

TABLE 13.—EXPLORATORY AND DEVELOPMENT WELLS COMPLETED, JANUARY TO DECEMBER, 1969

	Oil		Gas		Total Producers		Abandonments		Status Undetermined		Service Well		Total	
	No.	Footage	No.	Footage	No.	Footage	No.	Footage	No.	Footage	No.	Footage	No.	Footage
New field wildcats	1	6,249	9	42,597	10	48,846	32	190,398	1	6,932	....	.....	43	246,176
New-pool wildcats	....	.....	2	12,377	2	12,377	1	3,950	....	.....	....	.....	3	16,327
Deep-pool tests	....	.....	....	.....	....	.....	1	9,575	....	.....	....	.....	1	9,575
Outposts	1	4,696	8	34,231	9	38,927	22	120,658	....	.....	....	.....	31	159,585
Total exploratory wells	2	10,945	19	89,205	21	100,150	56	324,581	1	6,932	....	.....	78	431,663
Total development wells	33	153,752	21	102,913	54	256,665	24	113,724	11	45,870	....	.....	89	416,259
Sub-total	35	164,697	40	192,118	75	356,815	80	438,305	12	52,802	....	.....	167	847,922
Other wells drilled (water injection)	....	.....	....	.....	....	.....	....	.....	....	.....	7	25,863	7	25,863
Total	35	164,697	40	192,118	75	356,815	80	438,305	12	52,802	7	25,863	174	873,785

TABLE 14.—GEOPHYSICAL EXPLORATION, 1969

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 Survey	Number of Seismic Crews	Number of Crew-weeks
January			
Amerada Petroleums Ltd.	94-J-8	1	2
	94-P-6	1	2
	94-O-6	1	3
Amoco Canada Petroleum Company	94-O-9; 94-P-12	1	1.4
Canadian Industrial Gas & Oil Ltd.	94-H-3, -4, -5, -6	1	1
	94-I-12, -13	1	1
	Tp. 84, R. 23, W. of 6th M.	1	1
Cankee Gas Company	94-J-15	1	2
Canadian Pacific Oil & Gas Ltd.	94-P-6	1	1
Gulf Oil Canada Ltd.	93-I-10	1	2.4
	93-P-7	1	1.3
French Petroleum Company of Canada	94-P-7	1	1
Hudson's Bay Oil & Gas Co. Ltd.	94-J-10, -11, -14, -15	1	4
Marathon Oil Company	94-I-4; 94-H-13	1	3.3
Sun Oil Company	93-P-9	1	4
Texaco Exploration Company	94-I-8, -9	3	10.5
	94-O-1, -8, -9, -11, -12, -13, -14, -15		
	94-P-3, -4, -5, -6, -12		
Texaco N.F.A.	94-P-3, -4, -5, -6	1	1.0
Union Oil Company of Canada Ltd.	Tp. 83, 84, R. 18, 19, W. of 6th M.	1	0.5
	94-A-13, -14	1	4.0
February			
Amerada Petroleums Ltd.	94-P-11	1	1
	94-O-13	1	3
	94-O-11	1	4
Cankee Gas Company	94-O-5, -6	1	3
Canadian Pacific Oil & Gas Ltd.	94-P-6	1	1
	94-J-9	1	2.5
	94-I-5, -12	1	0.5
Gulf Oil Canada Ltd.	93-P-7, -8, -9, -10	1	2.7
Hudson's Bay Oil & Gas Co. Ltd.	94-J-9, -10, -11, -14, -15, -16	1	4
	94-O-1, -8		
	94-P-9, -10, -15, -16		
French Petroleum Company of Canada	94-P-7	1	1
Marathon Oil Company	94-I-4; 94-H-13	1	4
Placid Oil Company	94-I-3; 94-I-4	1	3
Texaco N.F.A.	94-P-5; 94-O-9	1	1.5
Texaco Exploration Company	94-I-8, -9	3	11.5
	94-O-1, -8, -9, -11, -12, -13, -14, -15		
	94-P-4, -5, -12		
Union Oil Company of Canada Ltd.	94-H-2, -16	1	0.6
	94-I-6	1	2
	94-A-13, -14	1	1

TABLE 14.—GEOPHYSICAL EXPLORATION, 1969—*Continued*

Seismic Surveys—Continued

Company	Location of Survey	Number of Seismic Crews	Number of Crew-weeks
March			
Amerada Petroleum Corporation	94-O-14	1	2
	94-O-11	1	4
Chevron Standard Oil Limited	94-O	1	2
Canadian Pacific Oil & Gas Limited	94-J-8	1	3
Imperial Oil Enterprises	94-J-9	1	1
Pacific Petroleums Ltd.	94-J-9	1	1
Hudson's Bay Oil & Gas Co. Ltd.	94-J-9, -10, -11, -14, -15, -16	1	4
	94-O-1, -8, -9, -10, -15, -16		
Gulf Oil Canada Ltd.	94-P-13	1	2.4
	93-I-10	1	0.9
Marathon Oil Company	94-I-4; 94-H-13	1	0.6
Amoco Canada Petroleum Company	94-O-7, -10	1	1.1
Placid Oil Company	94-I-3	1	1
Texaco Exploration Company	94-O-4, -5, -6, -7, -8, -9, -10, -11, -12, -13, -14	2	5
	94-N-1, -2, -7, -8		
Union Oil Company of Canada Ltd.	94-H-2, -16	1	2
	94-I-14	1	1.7
	94-I-6	1	2
	94-P-5	1	1.3
April			
Central-Del Rio Oils Ltd.	94-A-7	1	1
Midwest Oil Corporation	Tp. 85, 86, R. 22, 23, W. of 6th M.	1	0.7
May			
Tenneco Oil & Minerals Ltd.	94-I-14	1	1
Mesa Petroleum Company	94-G-9	1	1
June			
Canadian Pacific Oil & Gas Ltd.	94-B-1	1	4
Mesa Petroleum Company	94-G-9	1	1
Hudson's Bay Oil & Gas Co. Ltd.	93-P-1, -8	1	2
July			
Canadian Pacific Oil & Gas Ltd.	94-B-8	1	4
	93-P-5	1	1
Hudson's Bay Oil & Gas Co. Ltd.	93-P-1, -2, -7, -8	1	4
Texaco Exploration Company	93-I-16	1	1
Texas Gulf Sulphur Company	93-O-9[1]	1	4
Canadian Industrial Gas & Oil Ltd.	93-I, P	1	3
August			
Central-Del Rio Oils Ltd.	93-P-8	1	2
Canadian Pacific Oil & Gas Ltd.	94-B-8	1	1
	94-A-13	1	1.5
Texaco Exploration Company	93-I-16	1	2
Texas Gulf Sulphur Company	93-O-9	1	4
September			
Texas Gulf Sulphur Company	93-O-9	1	4
October			
Central-Del Rio Oils Ltd.	94-A-7	1	1
Chevron Standard Oil Limited	94-P-7	1	2
Texas Gulf Sulphur Company	93-P-5	1	3
November			
Central-Del Rio Oils Ltd.	94-A-7	1	1
Chevron Standard Oil Limited	94-P-7	1	1
December			
Hudson's Bay Oil & Gas Co. Ltd.	94-G-7	1	0.5
Union Oil Company of Canada Ltd.	94-P-7, -10	1	2

[1] Seismic refraction.

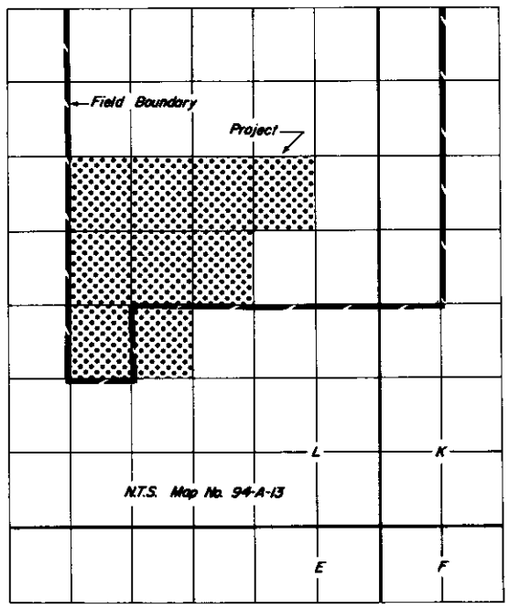
TABLE 14.—GEOPHYSICAL EXPLORATION, 1969—*Continued*

Gravity Surveys

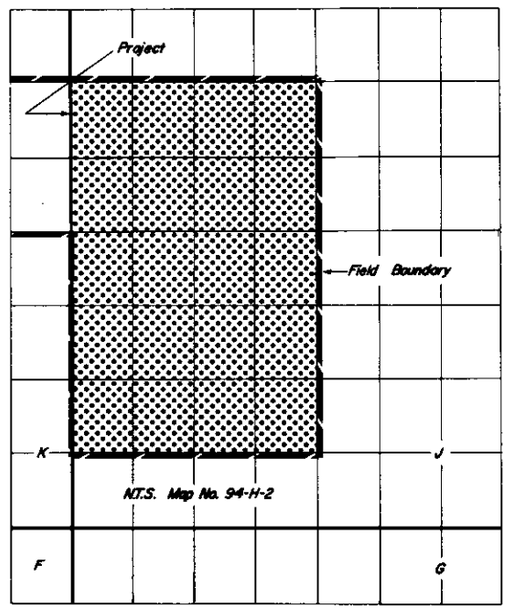
Company	Location of Survey	Number of Crews	Number of Crew-weeks
January			
Tenneco Oil & Minerals Ltd.	94-I, J, P	1	2
February			
Tenneco Oil & Minerals Ltd.	94-I, J, P	1	4
Canadian Delhi Oil Ltd.	94-J-5, -14	1	2
	94-O-1, -2, -3, -8		
	94-P-4, -5		
March			
Tenneco Oil & Minerals Ltd.	94-I, J, P	1	4
Canadian Delhi Oil Ltd.	94-O-1, -2, -3, -8	1	2
	94-P-4, -5		
April			
Tenneco Oil & Minerals Ltd.	94-I, J, P	1	1

Magnetometer Surveys

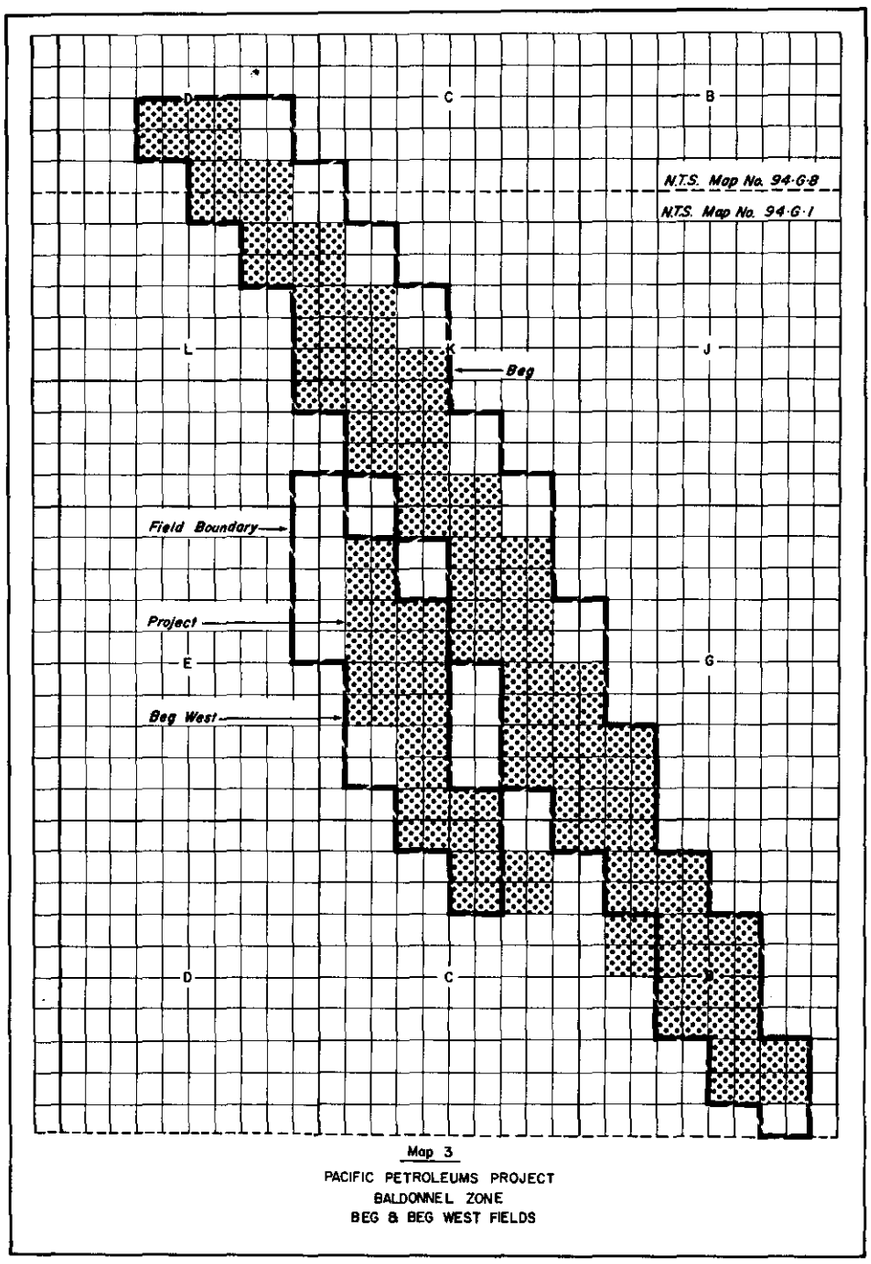
January			
Tenneco Oil & Minerals Ltd.	94-I, J, P	1	2
February			
Tenneco Oil & Minerals Ltd.	94-I, J, P	1	4
March			
Tenneco Oil & Minerals Ltd.	94-I, J, P	1	4
April			
Tenneco Oil & Minerals Ltd.	94-I, J, P	1	1



Map 1
UNION OIL PROJECT
GETHING ZONE
AITKEN CREEK FIELD

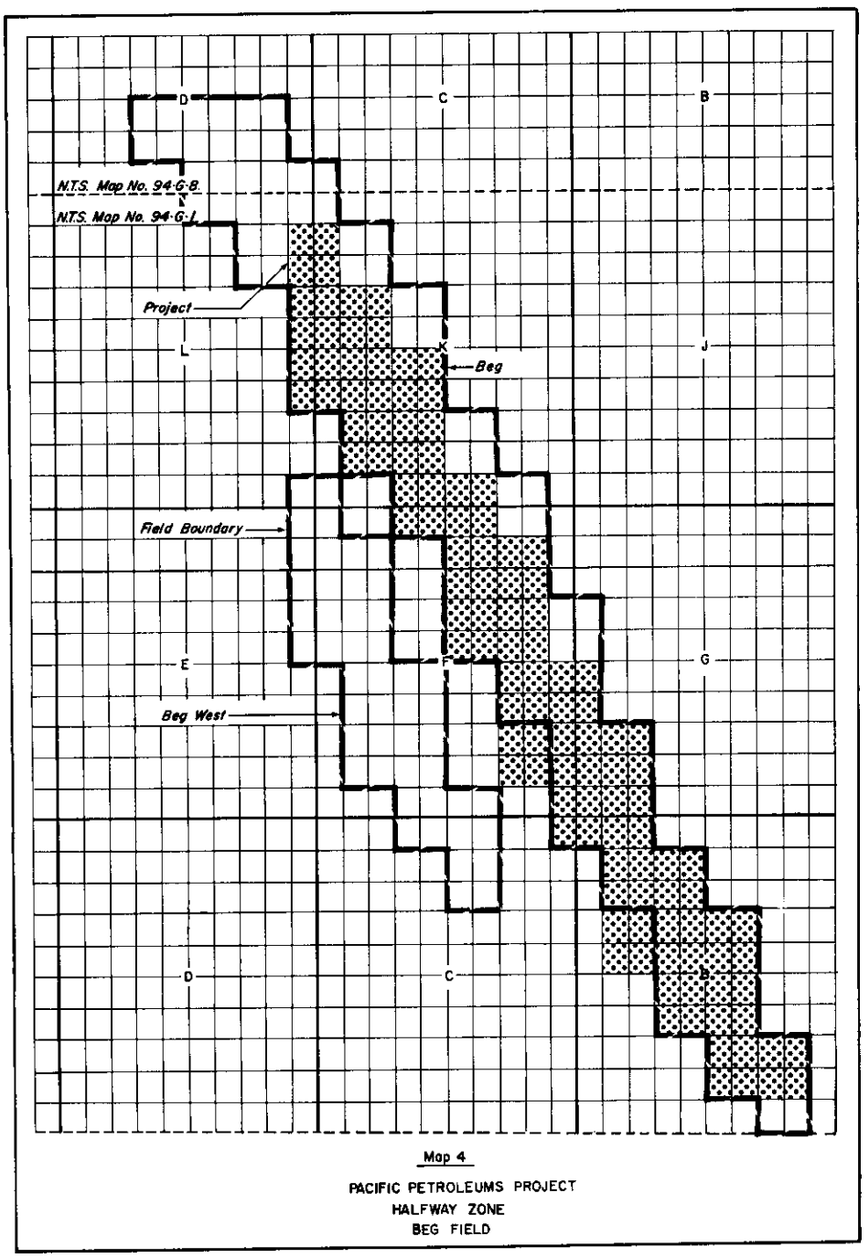


Map 2
TRIAD OIL PROJECT
HALFWAY ZONE
BEATTON RIVER FIELD



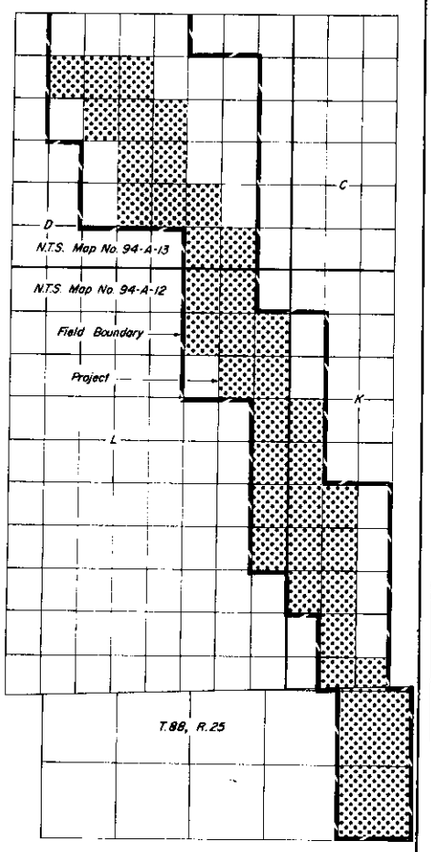
Map 3

PACIFIC PETROLEUMS PROJECT
BALDONNEL ZONE
BEG & BEG WEST FIELDS

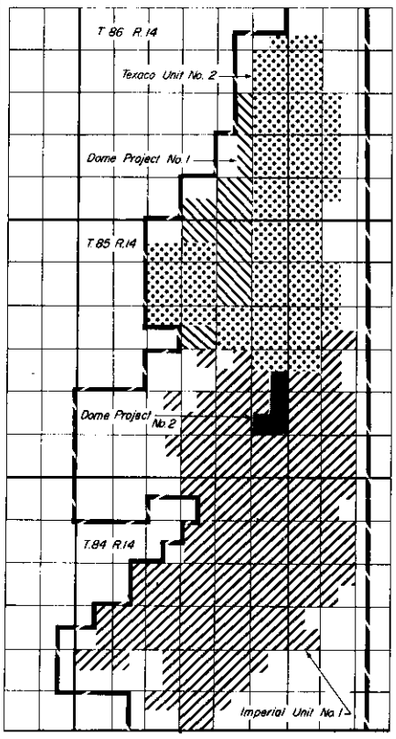


Map 4

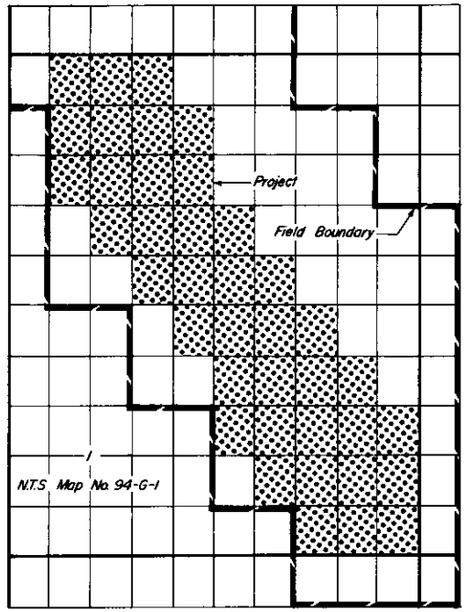
PACIFIC PETROLEUMS PROJECT
HALFWAY ZONE
BEG FIELD



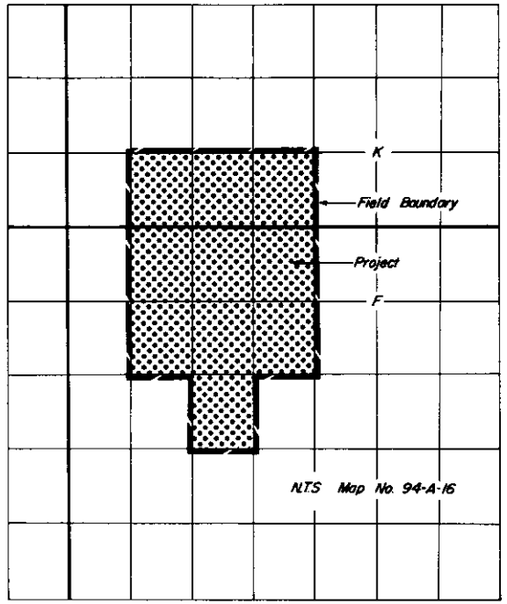
Map 5
PACIFIC PETROLEUMS PROJECT
MISSISSIPPIAN ZONE
BLUEBERRY FIELD



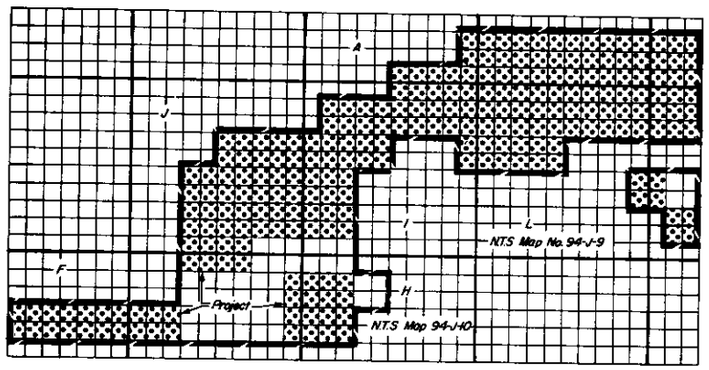
Map 6
BOUNDARY LAKE ZONE PROJECTS
BOUNDARY LAKE FIELD



Map 7
PACIFIC PETROLEUMS PROJECT
BALDONNEL ZONE
BUBBLES FIELD

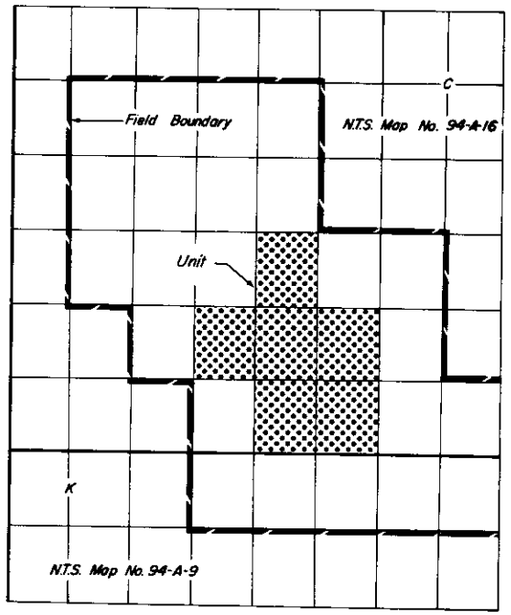


Map 8
UNION OIL PROJECT
HALFWAY ZONE
BULRUSH FIELD



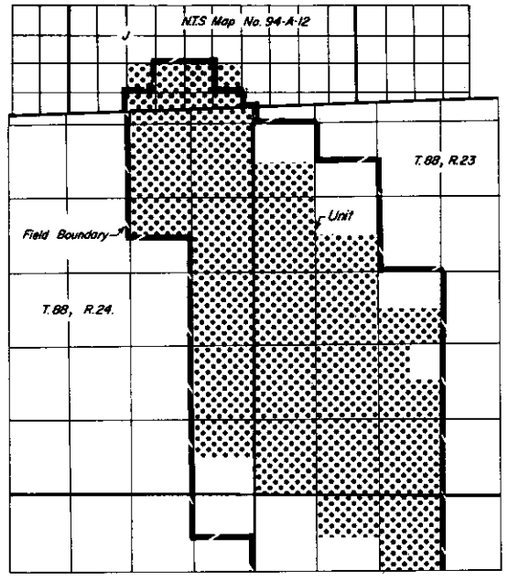
Map 9

PACIFIC PETROLEUMS PROJECT
SLAVE PT. ZONE
CLARKE LAKE AND CLARKE LAKE SOUTH FIELDS

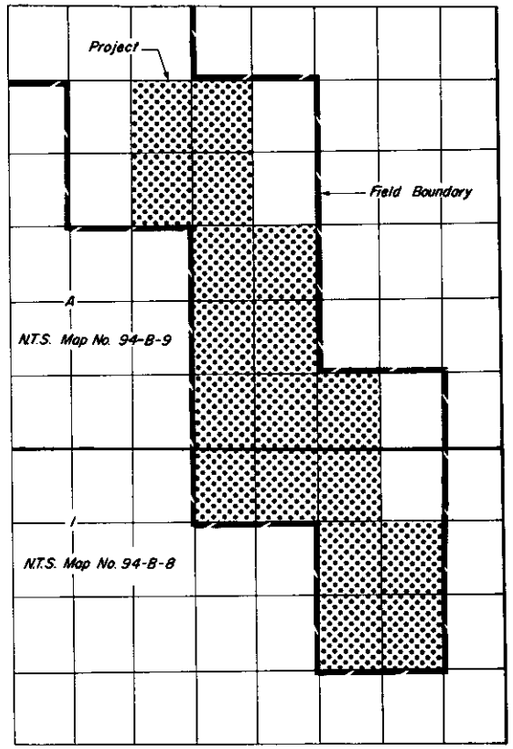


Map 10

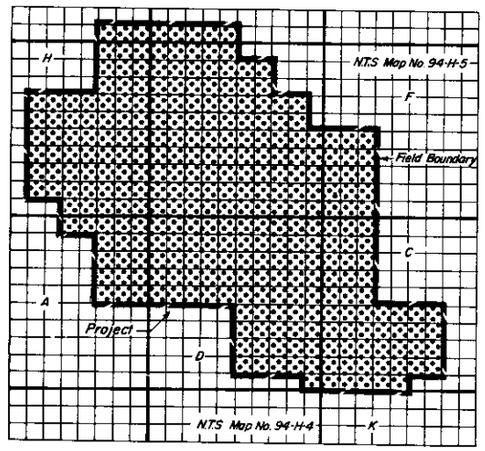
PACIFIC PETROLEUMS UNIT I
HALFWAY ZONE
CURRANT FIELD



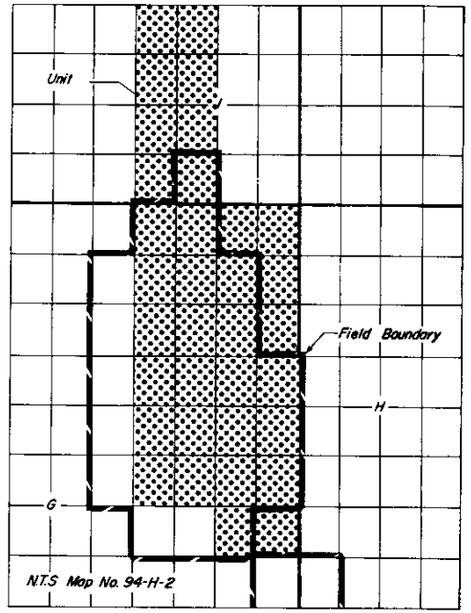
Map 11
CANADIAN SUPERIOR OIL UNIT I
INGA SAND ZONE
INGA FIELD



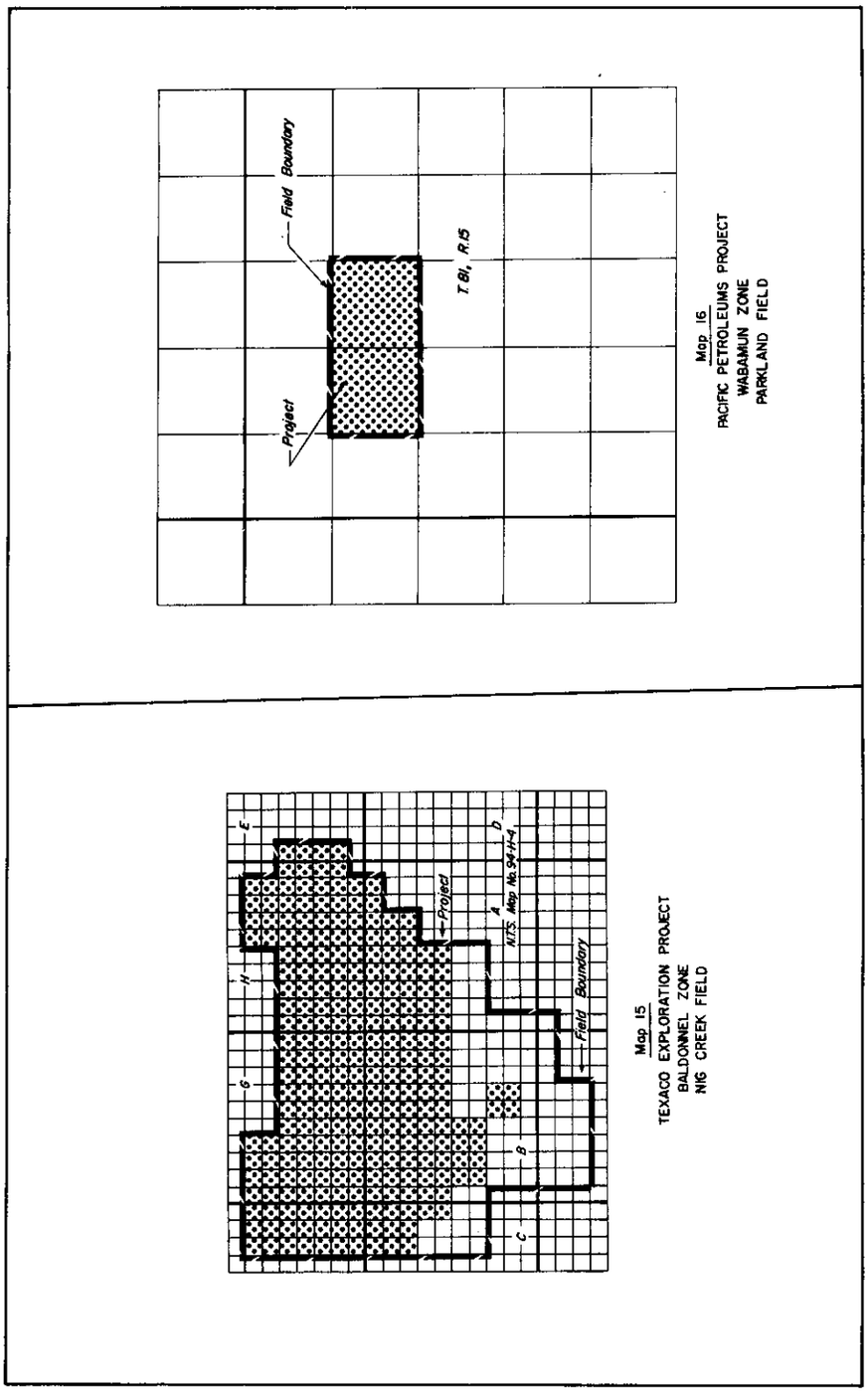
Map 12
PACIFIC PETROLEUMS PROJECT
HALFWAY ZONE
KOBES-TOWNSEND FIELD

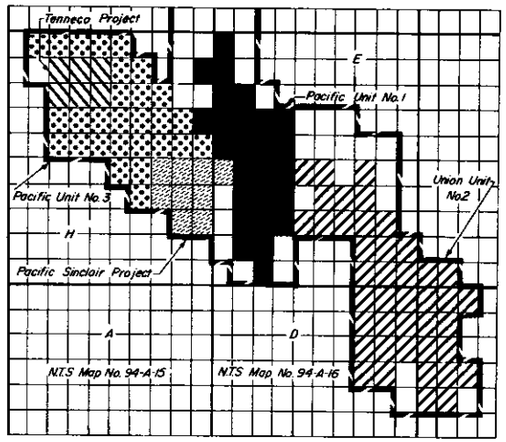


Map 13
BALDONNEL POOL PROJECT
LAPRISE CREEK FIELD

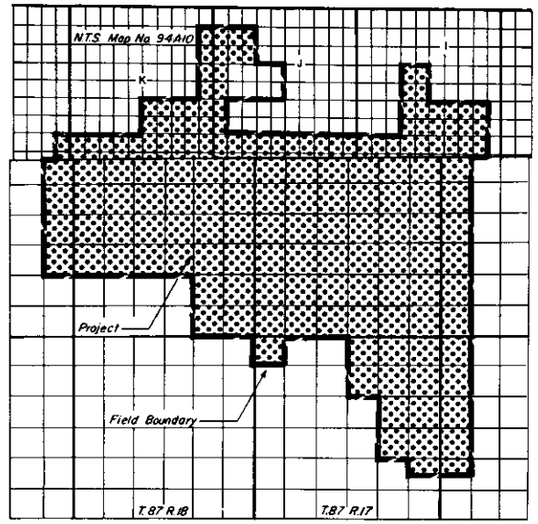


Map 14
UNION OIL UNIT I
HALFWAY ZONE
MILLIGAN CREEK FIELD

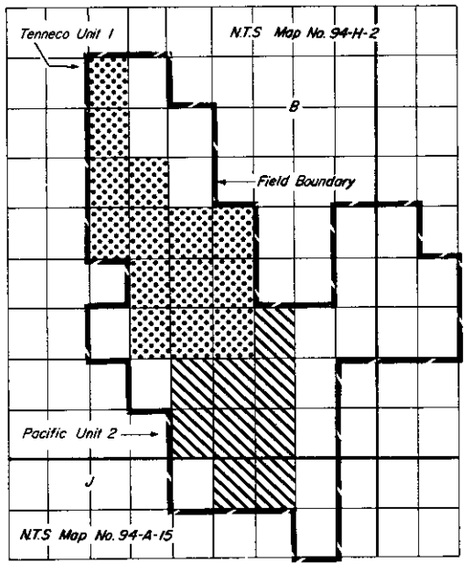

Field Boundary
Project
T 81, R.15
Map 16
PACIFIC PETROLEUMS PROJECT
WABAMUN ZONE
PARKLAND FIELD
E
H
G
Project
A
D
N.T.S. Map No. 94 H-4
Field Boundary
B
C
Map 15
TEXACO EXPLORATION PROJECT
BALDONNEL ZONE
NIG CREEK FIELD



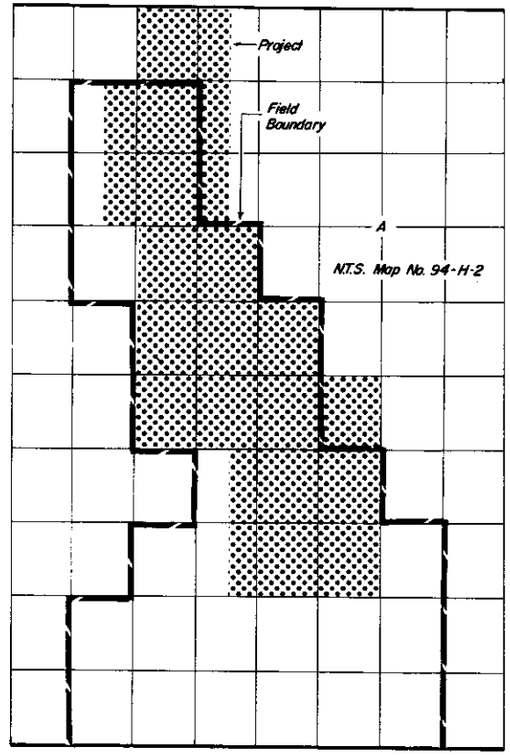
Map 17
HALFWAY ZONE PROJECTS
PEEJAY FIELD



Map 18
DUNLEVY POOL PROJECT
RIGEL FIELD



Map 19
HALFWAY ZONE UNITS
WEASEL FIELD



Map 20
UNION OIL PROJECT
HALFWAY ZONE
WILDMINT FIELD

TABLE 15.—SURFACE GEOLOGICAL EXPLORATION, 1969

Company	Location of Survey	Number of Geologists	Two-man Party-weeks
June			
Amoco Canada Petroleum Company	93-B, C	2	2.4
Gulf Oil Canada Ltd.	93-I-8	6	12
July			
Canadian Pacific Oil & Gas Ltd.	93-I; 93-H-16	10	10
French Petroleum Company of Canada	94-N-6, -11	2	2
Union Oil Company of Canada Ltd.	94-C, D, E; 104-A, H, I	5	8
Amoco Canada Petroleum Company	93-B, C	1	4
August			
Canadian Pacific Oil & Gas Ltd.	93-I; 93-H-16	10	20
Union Oil Company of Canada Ltd.	94-C, D, E; 104-A, H, I	5	8
Amoco Canada Petroleum Company	93-I, H	7	12.2
September			
Canadian Delhi Oil Ltd.	94-J-4; 94-G-13	2	2
Canadian Pacific Oil & Gas Ltd.	93-H-16	8	4
Amoco Canada Petroleum Company	93-I, O, P	5	3

TABLE 16.—PROJECT AND INDIVIDUAL WELL M.P.R. DATA AT DECEMBER 31, 1969

Field	Pool	Well or Project	Well Authorization No.	M.P.R., S.T.B./D.	Project Data							
					Reference Map	Area (Acres)	Cumulative Injection		Number of Wells			
							M.B.W.	MM S.C.F.	Producers		Injectors	
									Oil	Gas	Water	Gas
Aitken Creek	Gething	Union project	.....	874	1	1,212	.....	15,099	5	3	.....	1
Bear Flat	Charlie Lake	Monsanto Bear Flat 6-16-84-20	2411	97	.....	.....	.....	.....	.....	.....	.....	.....
		Monsanto Bear Flat 7-16-84-20	2352	109	.....	.....	.....	.....	.....	.....	.....	.....
		Monsanto Bear Flat 6-21-84-20	2441	75	.....	.....	.....	.....	.....	.....	.....	.....
		Pool total	.....	281	.....	.....	.....	.....	.....	.....	.....	.....
Beatton River	Halfway	Triad et al Beatton d-41-K/94-H-2	869	Suspended	.....	.....	.....	.....	.....	.....	.....	.....
		Triad project	.....	2,270	2	1,201	6,914	.....	10	.....	5	.....
Beatton River West	Bluesky-Gething	Triad West Beatton River d-38-K/94-H-2	538	Suspended	.....	.....	.....	.....	.....	.....	.....	.....
		Triad West Beatton River d-39-K/94-H-2	408	47	.....	.....	.....	.....	.....	.....	.....	.....
		Triad W Beatton a-40-K/94-H-2	1604	116[1]	.....	.....	.....	.....	.....	.....	.....	.....
		Triad West Beatton River d-48-K/94-H-2	441	Suspended	.....	.....	.....	.....	.....	.....	.....	.....
		Triad W Beatton d-49-K/94-H-2	1327	Water injector[1]	.....	.....	.....	.....	.....	.....	.....	.....
		Triad West Beatton River d-57-K/94-H-2	515	78[1]	.....	.....	.....	.....	.....	.....	.....	.....
		Triad W Beatton d-58-K/94-H-2	1398	30[1]	.....	.....	.....	.....	.....	.....	.....	.....
		Triad West Beatton River d-59-K/94-H-2	512	Suspended	.....	.....	.....	.....	.....	.....	.....	.....
		Whitehall Cdn-Sup W Beatton d-12-L/94-H-2	2014	93	.....	.....	.....	.....	.....	.....	.....	.....
		Whitehall Cdn-Sup W Beatton d-13-L/94-H-2	2422	93	.....	.....	.....	.....	.....	.....	.....	.....
		Whitehall et al W Beatton d-21-L/94-H-2	1408	168	.....	.....	.....	.....	.....	.....	.....	.....
		Whitehall Cdn Sup W Beatton d-22-L/94-H-2	2304	66	.....	.....	.....	.....	.....	.....	.....	.....
		Triad et al West Beatton d-23-L/94-H-2	2465	60	.....	.....	.....	.....	.....	.....	.....	.....
		Pool total	.....	751	.....	.....	415	.....	.....	.....	1[2]	.....
Beaverdam	Halfway	Tenn Beaverdam d-38-L/94-A-16	1653	Suspended	.....	.....	.....	.....	.....	.....	.....	.....
Blueberry	Debolt	Mesa et al Blueberry b-18-K/94-A-12	2420	145	.....	.....	.....	.....	.....	.....	.....	.....
		Decalta Blueberry d-57-D/94-A-13	1333	53[1]	.....	.....	.....	.....	.....	.....	.....	.....
		Pacific project	.....	4,600[1]	5	4,005	.....	837	18	.....	1[3]	1[2]
		Pool total	.....	4,798	.....	.....	.....	.....	.....	.....	.....	.....
Boundary Lake	Cadomin	Pacific Boundary 8-15-85-14	270	79[1]	.....	.....	.....	.....	.....	.....	.....	.....
	Boundary Lake	Imp Pac Boundary 8-32-84-13	991	Suspended	.....	.....	.....	.....	.....	.....	.....	.....
		Imp Pac Boundary 8-17-85-13	2568	119	.....	.....	.....	.....	.....	.....	.....	.....
		Decalta Boundary 14-32-85-13	361	Suspended	.....	.....	.....	.....	.....	.....	.....	.....
		Imperial Pac Boundary 11-10-85-14	227	Suspended	.....	.....	.....	.....	.....	.....	.....	.....
		Imp Pac Boundary 6-15-85-14	1368	134[1]	.....	.....	.....	.....	.....	.....	.....	.....

		Texaco NFA Boundary 6-29-86-13	1720	Suspended	—	—	—	—	—	—	—	—
		Texaco NFA Boundary 16-30-86-13	1482	20[1]	—	—	—	—	—	—	—	—
		Dome project 1	—	4,919[1]	6	1,793	6,654	—	25	—	7	—
		Dome project 2	—	1,484[1]	6	652	2,181	—	6	—	2	—
		Imperial unit 1	—	38,657[1]	6	25,754	36,136	—	129	—	32	—
		Texaco unit 2	—	22,723[1]	6	14,833	27,526	—	102	—	22	—
		Pool total	—	68,135	—	—	—	—	—	—	—	—
	Halfway	Texaco NFA Boundary 8-30-85-13	1097	56[1]	—	—	—	—	—	—	—	—
		Pacific Boundary Lake 11-14-85-14	667	101	—	—	—	—	—	—	—	—
		Sun Boundary Lake 6-23-85-14	646	83[1]	—	—	—	—	—	—	—	—
		Amerada Boundary A6-24-85-14	1454	99[1]	—	—	—	—	—	—	—	—
		Amerada Boundary 16-24-85-14	736	96[1]	—	—	—	—	—	—	—	—
		Texaco NFA Boundary 16-25-85-14	1144	Suspended	—	—	—	—	—	—	—	—
		Pool total	—	435	—	—	—	—	—	—	—	—
		Field total	—	68,570	—	—	—	—	—	—	—	—
Buick Creek East	Dunlevy	Texaco NFA E Buick c-32-A/94-A-14	1500	144	—	—	—	—	—	—	—	—
		Decalta et al E Buick c-74-A/94-A-14	1345	—	—	—	—	—	—	—	—	—
Buick Creek West	Dunlevy	Pacific West Buick Creek c-83-K(13A)/94-A-11	271	—	—	—	—	—	—	—	—	—
		Pacific West Buick Creek b-76-C(15)/94-A-14	280	—	—	—	—	—	—	—	—	—
Bulrush	Halfway	Union project	—	389[1]	8	1,106	—	1,370	4	—	—	2
Bulrush East	Halfway	Dome Provo Co-op Bulrush d-5-K/94-A-16	1843	43[1]	—	—	—	—	—	—	—	—
Charlie Lake	Gething	Imp Pac Charlie 13-5-84-18	269	Suspended	—	—	—	—	—	—	—	—
Crush	Halfway	Union et al Crush d-28-F/94-A-16	2096	Suspended	—	—	—	—	—	—	—	—
		Union et al Crush d-29-F/94-A-16	2288	175[1]	—	—	—	—	—	—	—	—
		Union HB Sinclair Crush d-38-F/94-A-16	2253	29[1]	—	—	—	—	—	—	—	—
		Union HB Sinclair Crush d-39-F/94-A-16	2214	199[1]	—	—	—	—	—	—	—	—
		Union HB Crush b-48-F/94-A-16	2532	50	—	—	—	—	—	—	—	—
		Union HB Sinc Crush d-49-F/94-A-16	2220	122[1]	—	—	—	—	—	—	—	—
		Union HB Crush b-58-F/94-A-16	2364	13	—	—	—	—	—	—	—	—
		Union HB Crush d-59-F/94-A-16	2342	201	—	—	—	—	—	—	—	—
		Union HB Crush b-68-F/94-A-16	2355	25	—	—	—	—	—	—	—	—
		Union HB Crush d-69-F/94-A-16	2386	—	—	—	—	—	—	—	—	—
		Pool total	—	814	—	—	—	—	—	—	—	—
Currant	Halfway	Union HB Currant d-28-C/94-A-16	1768	Suspended	—	—	—	—	—	—	—	—
		Pacific unit 1	—	627[1]	10	702	672	—	5	—	1	—
Fort St. John	Charlie Lake	Pacific Ft St John 3-14-83-18	34	48[1]	—	—	—	—	—	—	—	—
		Pacific Ft St John 10-14-83-18	214	13[1]	—	—	—	—	—	—	—	—
		Pacific Ft St John 1-23-83-18	225	24[1]	—	—	—	—	—	—	—	—
		Pacific Ft St John 9-23-83-18	216	65[1]	—	—	—	—	—	—	—	—
		Pool total	—	150	—	—	—	—	—	—	—	—
	Belloy	Imp Pac Ft St John 9-19-83-18	171	Suspended	—	—	—	—	—	—	—	—
		Field total	—	150	—	—	—	—	—	—	—	—

[1] Interim M.P.R. pending final evaluation.
[2] Suspended injector.
[3] Disposal of produced water into Debolt.

TABLE 16.—PROJECT AND INDIVIDUAL WELL M.P.R. DATA AT DECEMBER 31, 1969—*Continued*

Field	Pool	Well or Project	Well Authorization No.	M.P.R., S.T.B./D.	Project Data							
					Reference Map	Area (Acres)	Cumulative Injection		Number of Wells			
							M.B.W.	MM S.C.F.	Producers		Injectors	
									Oil	Gas	Water	Gas
Halfway	Charlie Lake	West Nat et al Halfway 14-11-87-25	1986	Suspended	—	—	—	—	—	—	—	—
Inga	Baldonnel	Hunt Sands Pac Imp Inga 7-16-86-23	933	Suspended	—	—	—	—	—	—	—	—
	Inga Sand	Murphy et al Inga 16-31-85-23	2404	86	—	—	—	—	—	—	—	—
		Pan Am Inga 6-5-86-23	2351	102	—	—	—	—	—	—	—	—
		Murphy et al Inga 6-6-86-23	2416	57	—	—	—	—	—	—	—	—
		Murphy et al Inga 16-6-86-23	2395	59	—	—	—	—	—	—	—	—
		Murphy et al Inga 6-7-86-23	2561	27	—	—	—	—	—	—	—	—
		Murphy et al Inga 16-7-86-23	2299	53	—	—	—	—	—	—	—	—
		Pan Am Inga 6-8-86-23	2340	146	—	—	—	—	—	—	—	—
		Shenandoah et al Coplin 6-17-86-23	2213	77	—	—	—	—	—	—	—	—
		Whitehall et al Inga 6-18-86-23	2407	76	—	—	—	—	—	—	—	—
		Shenandoah et al Coplin 16-18-86-23	2270	37	—	—	—	—	—	—	—	—
		Pan Am Inga 6-19-86-23	2188	54	—	—	—	—	—	—	—	—
		Pan Am Inga 6-20-86-23	2251	94	—	—	—	—	—	—	—	—
		Sun Inga 6-30-86-23	2328	49	—	—	—	—	—	—	—	—
		Decalta Pem Suptst Inga 6-31-86-23	2206	Suspended	—	—	—	—	—	—	—	—
		Murphy et al Inga 16-24-86-24	2298	44	—	—	—	—	—	—	—	—
		Whitehall CTO S Inga 16-25-86-24	2224	83	—	—	—	—	—	—	—	—
		West Nat et al S Inga 16-35-86-24	2166	231	—	—	—	—	—	—	—	—
		Dome Numac Inga 6-36-86-24	2198	102	—	—	—	—	—	—	—	—
		Tenn S Inga 16-36-86-24	2151	541	—	—	—	—	—	—	—	—
		Decalta Pem Suptst S Inga 6-5-87-23	2191	751	—	—	—	—	—	—	—	—
		Tenn S Inga 16-6-87-23	2180	841	—	—	—	—	—	—	—	—
		Tenn S Inga 6-7-87-23	2145	541	—	—	—	—	—	—	—	—
		Tenn S Inga 16-7-87-23	2122	471	—	—	—	—	—	—	—	—
		Pacific S Inga 6-8-87-23	2202	341	—	—	—	—	—	—	—	—
		Dome Numac S Inga 6-18-87-23	2189	631	—	—	—	—	—	—	—	—
		IOE Pac S Inga 6-19-87-23	2169	551	—	—	—	—	—	—	—	—
		IOE Pac Inga 16-19-87-23	2360	49	—	—	—	—	—	—	—	—
		IOE Pac Inga A6-30-87-23	2194	39	—	—	—	—	—	—	—	—
		Tenn Inga 16-12-87-24	2156	37	—	—	—	—	—	—	—	—
		Texaco S Inga 16-13-87-24	2255	112	—	—	—	—	—	—	—	—
		Texaco S Inga 16-24-87-24	2274	109	—	—	—	—	—	—	—	—
		Texaco Inga 6-25-87-24	2294	Suspended	—	—	—	—	—	—	—	—
		Texaco S Inga 16-25-87-24	2209	98	—	—	—	—	—	—	—	—
		Canadian Superior unit 1	—	7,246	11	10,556	1,751	—	26	—	11	—
		Pool total	—	9,325	—	—	—	—	—	—	—	—

Milligan Creek	Halfway	Union HB Milligan b-65-G/94-H-2	1493	157[1]	—	—	—	—	—	—	—	—
		Union unit 1	—	10,000[1]	14	2,588	32,644	3,418	20	—	9	1
		Pool total	—	10,157	—	—	—	—	—	—	—	—
Moberly Lake	Charlie Lake	JBA Moberly 10-15-82-22	2019	61	—	—	—	—	—	—	—	—
		JBA Moberly 4-23-82-22	2463	38	—	—	—	—	—	—	—	—
		Pool total	—	99	—	—	—	—	—	—	—	—
Nettle	Bluesky-Gething	Union KCL ROC Nettle d-67-A/94-H-7	1321	Suspended	—	—	—	—	—	—	—	—
		Union KCL ROC Nettle d-68-A/94-H-7	1879	74[1]	—	—	—	—	—	—	—	—
		Union KCL ARCo Nettle d-69-A/94-H-7	2018	Suspended	—	—	—	—	—	—	—	—
		Pool total	—	74	—	—	—	—	—	—	—	—
Nig	Baldonnel	Texaco NFA Nig d-87-A/94-H-4	2152	165	—	—	—	—	—	—	—	—
North Pine	Charlie Lake	Texaco N Pine 6-15-85-18	2264	50[1]	—	—	—	—	—	—	—	—
Osprey	Halfway	Baysel SR CanDel Osprey d-93-G/94-A-15	1658	Suspended	—	—	—	—	—	—	—	—
		Baysel SR CanDel Osprey d-94-G/94-A-15	2347	19	—	—	—	—	—	—	—	—
		Pacific SR CanDel Osprey d-4-J/94-A-15	1610	42[1]	—	—	—	—	—	—	—	—
		Pool total	—	61	—	—	—	—	—	—	—	—
Peejay	Halfway	Pacific SR CanDel Peejay d-71-H/94-A-15	1851	59	—	—	—	—	—	—	—	—
		Pacific SR West Cdn Peejay d-33-I/94-A-15	725	5[1]	—	—	—	—	—	—	—	—
		Decalta Ranger Peejay d-51-D/94-A-16	2023	25[1]	—	—	—	—	—	—	—	—
		Texcan Texaco Peejay d-61-D/94-A-16	1683	Suspended	—	—	—	—	—	—	—	—
		Pacific unit 1	—	4,430[1]	17	3,800	12,536	—	21	—	12	—
		Union unit 2	—	8,229[1]	17	6,063	14,843	—	32	—	10	—
		Pacific unit 3	—	5,059[1]	17	4,325	9,265	—	20	—	9	—
		Pacific Sinclair project	—	2,717[1]	17	1,430	3,712	—	8	—	3	—
		Tenneco project	—	1,806[1]	17	1,048	2,086	—	5	—	3	—
		Pool total	—	22,330	—	—	—	—	—	—	—	—
Peejay West	Halfway	Pacific SR CanDel W Peejay d-44-G/94-A-15	1008	Suspended	—	—	—	—	—	—	—	—
		Pacific SR West Cdn W Peejay d-54-G/94-A-15	956	Suspended	—	—	—	—	—	—	—	—
Rigel	Dunlevy	Monsanto IOE Fina Rigel 8-18-87-16	1651	Suspended	—	—	—	—	—	—	—	—
		Monsanto IOE Fina Rigel 6-19-87-16	1692	65	—	—	—	—	—	—	—	—
		Monsanto IOE Fina Rigel 11-19-87-16	1616	47	—	—	—	—	—	—	—	—
		Monsanto Rigel 16-19-87-16	1781	66	—	—	—	—	—	—	—	—
		Monsanto Rigel 6-13-87-17	1555	98	—	—	—	—	—	—	—	—
		Monsanto Rigel 6-23-87-17	1942	100	—	—	—	—	—	—	—	—
		Monsanto Rigel 6-31-87-17	1714	46	—	—	—	—	—	—	—	—
		Pool total	—	422	—	—	—	—	—	—	—	—
Stoddart	Charlie Lake	Chaut Dunbar Stoddart 11-23-85-19	2548	69	—	—	—	—	—	—	—	—
	Belloy	Uno-Tex et al Stoddart 6-31-85-19	2218	32	—	—	—	—	—	—	—	—
		Uno-Tex et al Stoddart 10-31-85-19	1519	42	—	—	—	—	—	—	—	—
		Uno-Tex Triad Stoddart A11-5-86-19	1983	Suspended	—	—	—	—	—	—	—	—
		Pool total	—	74	—	—	—	—	—	—	—	—
		Field total	—	143	—	—	—	—	—	—	—	—

[1] Interim M.P.R. pending final evaluation.

TABLE 16.—PROJECT AND INDIVIDUAL WELL M.P.R. DATA AT DECEMBER 31, 1969—*Continued*

Field	Pool	Well or Project	Well Authorization No.	M.P.R., S.T.B./D.	Project Data							
					Reference Map	Area (Acres)	Cumulative Injection		Number of Wells			
							M.B.W.	MM S.C.F.	Producers		Injectors	
									Oil	Gas	Water	Gas
Weasel	Halfway	Pacific SR CanDel Weasel d-82-J/94-A-15	2055	206[1]	---	----	----	----	----	----	----	----
		Pacific Sinclair Weasel d-30-A/94-H-2	1631	Suspended	---	----	----	----	----	----	----	----
		Dome Provo Weasel d-2-B/94-H-2	1734	56[1]	---	----	----	----	----	----	----	----
		Tenneco unit 1	.....	2,551	19	2,128	2,888	1,256	10	.....	6	1
		Pacific unit 2	.....	1,143	19	1,007	510	.....	7	.....	4	.....
		Pool total	.....	3,956	---	----	----	----	----	----	----	----
Wildmint	Halfway	Pacific SR CanDel Wildmint d-84-I/94-A-15	1566	Suspended	---	----	----	----	----	----	----	----
		Tenn Wildmint d-93-I/94-A-15	1947	Suspended	---	----	----	----	----	----	----	----
		Texcan Wildmint d-94-I/94-A-15	1289	167[1]	---	----	----	----	----	----	----	----
		Tenn Wildmint d-95-I/94-A-15	1191	47[1]	---	----	----	----	----	----	----	----
		Tenn Wildmint d-2-A/94-H-2	1211	Suspended	---	----	----	----	----	----	----	----
		Tenn Wildmint d-5-A/94-H-2	1121	Suspended	---	----	----	----	----	----	----	----
		Tenn Wildmint d-6-A/94-H-2	1184	Suspended	---	----	----	----	----	----	----	----
		Tenn Wildmint d-7-A/94-H-2	1750	Suspended	---	----	----	----	----	----	----	----
		CIGOL Wildmint d-13-A/94-H-2	1567	Suspended	---	----	----	----	----	----	----	----
		Union HB Wildmint d-15-A/94-H-2	984	Suspended	---	----	----	----	----	----	----	----
		Husky Colo Wildmint d-16-A/94-H-2	1304	Suspended	---	----	----	----	----	----	----	----
		Husky Colo Wildmint b-23-A/94-H-2	1206	Suspended	---	----	----	----	----	----	----	----
		Union HB Wildmint d-26-A/94-H-2	963	Suspended	---	----	----	----	----	----	----	----
		Union project	.....	3,315[1]	20	1,708	11,549	13,298	13	.....	4	2
		Pool total	.....	3,529[1]	---	----	----	----	----	----	----	----
Willow	Bluesky-Gething	Union HB Willow d-20-H/94-H-2	449	122[1]	---	----	----	----	----	----	----	----
Wolf	Halfway	Pacific Sinclair Wolf d-82-B/94-A-15	1916	118[1]	---	----	----	----	----	----	----	----
		Baysel Sinclair Wolf b-92-B/94-A-15	1972	37[1]	---	----	----	----	----	----	----	----
		Baysel Sinclair Wolf d-93-B/94-A-15	1815	129[1]	---	----	----	----	----	----	----	----
		Frontier Pembina Wolf d-14-G/94-A-15	2062	Suspended	---	----	----	----	----	----	----	----
		Pool total	.....	284[1]	---	----	----	----	----	----	----	----
Other areas	Bluesky-Gething	Union HB BA Ladyfern d-48-H/94-H-1	1433	Suspended	---	----	----	----	----	----	----	----
	Dunlevy	Pacific et al Wargen d-37-C/94-H-6	2324	Suspended	---	----	----	----	----	----	----	----
		IOE et al Rigel b-44-J/94-A-10	2565	34	---	----	----	----	----	----	----	----

	Halfway	Pacific SR CanDel Ptarmigan d-90-I/94-A-15	1531	Suspended	—	—	—	—	—	—	—	—
		Union et al Spruce d-62-E/94-A-16	2323	Suspended	—	—	—	—	—	—	—	—
		Cankee Terrebonne Woodrush d-47-H/94-H-2	1840	Suspended	—	—	—	—	—	—	—	—
	Belloy	CDR Eagle 8-29-84-18	2543	39	—	—	—	—	—	—	—	—
		CDR Eagle 11-29-84-18	2502	285	—	—	—	—	—	—	—	—
		Other areas total	—	358	—	—	—	—	—	—	—	—

[1] Interim M.P.R. pending final evaluation.

TABLE 17.—GAS-WELL TEST AND ALLOWABLE DATA, DECEMBER 31, 1969

Field/Pool/Project	Well Name	Well Authorization No.	Test Date	Shut-in Subsurface Pressure, Psia.	Reciprocal Slope "n"	A.O.F.P. (M S.C.F./D.)	P.R.L. (M S.C.F./D.)
Airport—							
Cadomin	Pacific Airport 8-32-83-17	27	7-68	1,316	0.753	762	2,000
Baldonnel	Pacific Airport 9-32-83-17	287	7-68	1,168	0.500	1,855	Suspended.
Halfway	Pacific Airport 12-34-83-17	35	7-57	1,796	1.000	1,400	Suspended.
Field total							2,000
Beg—							
Baldonnel project	Pacific Imperial Beg c-24-B/94-G-1	1359	5-65	1,505	0.500	1,400	Suspended.
	Pacific Imperial Beg d-35-B/94-G-1	1154	7-68	1,241	0.500	2,239	.....
	Pacific Imperial Beg d-46-B/94-G-1	806	7-68	1,252	0.500	2,033	.....
	Pacific Imperial Beg d-57-B/94-G-1	1095	5-65	1,650	0.860	2,680	Suspended.
	Pacific et al Beg a-21-F/94-G-1	711	7-65	1,632	0.500	658	Suspended.
	Pacific et al Beg b-42-F/94-G-1	748	12-66	1,524	0.925	1,535	Suspended.
	Pacific et al Beg d-64-F/94-G-1	733	7-68	1,294	1.000	4,951	.....
	Pacific et al Beg b-84-F/94-G-1	741	7-68	1,381	1.000	3,961	.....
	Pacific et al Beg b-95-F/94-G-1	747	7-68	1,263	1.000	4,037	.....
	Pacific et al Beg d-10-G/94-G-1	541	8-68	1,220	1.000	2,952	.....
	Pacific et al Beg b-6-K/94-G-1	740	7-68	1,381	1.000	2,197	.....
	Pacific et al Beg b-17-K/94-G-1	539	7-68	1,274	0.661	3,943	.....
	Pacific et al Beg a-28-K/94-G-1	749	7-68	1,408	0.500	3,415	.....
	Pacific et al Beg b-59-K/94-G-1	786	.....	.....	.....	.....	.....
	Pacific et al Beg b-82-L/94-G-1	1132	8-68	1,073	0.577	1,897	.....
	Pacific Pan Am Dome Beg a-4-D/94-G-8	766	8-68	908	0.625	15,600	.....
	Pacific Pan Am Dome Beg d-15-D/94-G-8	855	6-63	1,332	0.600	3,600	Suspended.
Baldonnel project total							G.E.P.
Halfway project	Richfield Sohio Beg d-13-B/94-G-1	1268	9-68	955	0.500	5,400	.....
	Pacific Imperial Beg c-24-B/94-G-1	1359	7-68	1,169	0.500	3,995	.....
	Pacific Imperial Beg d-35-B/94-G-1	1154	7-68	1,096	0.725	6,332	.....
	Pacific Imperial Beg d-46-B/94-G-1	806	7-68	1,126	0.725	8,577	.....
	Pacific Imperial Beg d-57-B/94-G-1	1095	7-68	1,223	0.550	11,800	.....
	Richfield Sohio Beg d-77-B/94-G-1	1233	11-63	1,816	0.537	2,030	Suspended.
	Pacific et al Beg b-88-B/94-G-1	1350	8-68	1,280	0.610	5,224	.....
	Pacific et al Beg b-A99-B/94-G-1	739	7-68	1,031	0.664	3,614	.....
	Pacific et al Beg a-21-F/94-G-1	711	8-68	1,239	0.500	4,088	.....
	Pacific et al Beb b-42-F/94-G-1	748	8-61	1,536	0.842	2,100	Suspended.
	Pacific et al Beg d-64-F/94-G-1	733	7-68	933	1.000	4,208	.....
	Pacific et al Beg b-84-F/94-G-1	741	7-68	1,092	0.508	1,918	.....
	Pacific et al Beg b-95-F/94-G-1	747	7-68	1,107	0.500	2,459	.....
	Pacific et al Beg d-10-G/94-G-1	541	8-68	1,161	0.531	5,929	.....

	Pacific et al Beg b-6-K/94-G-1	740	7-68	1,212	0.500	6,006	———
	Pacific et al Beg b-A17-K/94-G-1	2387	12-69	1,061	0.642	2,425	———
	Pacific et al Beg b-59-K/94-G-1	786	———	———	———	———	———
Halfway project total		———	———	———	———	———	G.E.P.
Field total		———	———	———	———	———	G.E.P.
Beg West—Baldonnel project	Pacific et al W Beg c-84-C/94-G-1	622	7-68	1,145	0.550	1,698	———
	Pacific et al W Beg c-58-F/94-G-1	772	———	———	———	———	———
	Pacific et al W Beg a-79-F/94-G-1	620	7-68	1,155	0.726	1,919	———
Baldonnel and field total		———	———	———	———	———	G.E.P.
Bernadet—Bluesky-Gething	West Nat et al Bernadet 8-1-88-25	1106	7-68	322	0.754	309	2,000
Blueberry—							
Dunlevy	West Nat et al Blueberry 16-24-88-25	279	7-68	1,203	1.000	1,680	2,000
	West Nat et al Blueberry a-29-K/94-A-12	330	11-69	1,357	0.675	539	Suspended.
	West Nat et al Blueberry d-A50-K/94-A-12	357	8-63	1,121	1.000	640	Suspended.
	West Nat et al Blueberry d-38-K/94-A-12	2146	———	———	———	———	———
	West Nat et al Blueberry c-32-D/94-A-13	70	———	———	———	———	2,000[1]
	West Nat et al Blueberry d-A87-D/94-A-13	94	7-68	1,216	0.577	1,747	2,000
	West Nat et al Blueberry d-97-D/94-A-13	581	7-68	887	0.571	2,496	2,000
Dunlevy total		———	———	———	———	———	8,000
Baldonnel	West Nat et al Blueberry c-65-D/94-A-13	71	11-69	1,628	0.577	925	Suspended.
	West Nat et al Blueberry d-87-D/94-A-13	64	7-68	1,405	0.577	877	2,000
	West Nat et al Blueberry d-97-D/94-A-13	581	9-60	1,653	1.000	5,600	Suspended.
Baldonnel total		———	———	———	———	———	2,000
Charlie Lake	West Nat et al Blueberry a-61-L/94-A-12	525	———	———	———	———	———
	West Nat et al Blueberry b-13-D/94-A-13	601	———	———	———	———	———
Halfway	West Nat et al Blueberry b-22-D/94-A-13	1946	———	———	———	———	———
Field total		———	———	———	———	———	10,000
Blueberry East—							
Baldonnel	West Nat et al E Blueberry b-38-C/94-H-13	103	11-69	1,785	0.820	1,909	Suspended.
Debolt	West Nat et al E Blueberry b-36-C/94-A-13	331	10-58	2,697	1.000	3,200	Suspended.
Blueberry West—							
Dunlevy	West Nat et al W Blueberry 2-20-88-25	278	7-68	578	1.000	205	2,000
	West Nat et al W Blueberry d-82-I/94-B-9	165	7-68	883	1.000	793	2,000
Dunlevy total		———	———	———	———	———	4,000
Baldonnel	Guyer et al W Blueberry a-7-L/94-A-12	2435	4-69	1,718	0.980	9,100	2,275
	West Nat et al W Blueberry d-19-L/94-A-12	241	11-69	1,752	0.543	1,488	Suspended.
	Guyer et al W Blueberry d-39-L/94-A-12	2551	———	———	———	———	———
Baldonnel total		———	———	———	———	———	2,275
Field total		———	———	———	———	———	6,275

[1] Lease and camp fuel.

TABLE 17.—GAS-WELL TEST AND ALLOWABLE DATA, DECEMBER 31, 1969—*Continued*

Field/Pool/Project	Well Name	Well Authorization No.	Test Date	Shut-in Subsurface Pressure, Psia.	Reciprocal Slope "n"	A.O.F.P. (M S.C.F./D.)	P.R.L. (M S.C.F./D.)
Boundary Lake—							
Bluesky-Gething	Pacific Boundary 8-15-85-14	270	9-62	1,068	0.687	830	Suspended.
	Texaco NFA Boundary 8-23-86-14	1125	.....	.....	.....	.....	.....
Gething	Pacific Boundary Lake A16-4-85-14	655	11-69	927	0.839	4,223	Suspended.
	Pacific Boundary 12-10-85-14	352	6-68	859	0.839	8,127	2,805
Gething total		.....	.....	.....	.....	.....	2,805
Dunlevy	Amerada Boundary 8-5-85-14	799	10-61	1,468	0.822	11,200	Suspended.
Baldonnel	Texaco NFA Boundary 6-30-85-13	1137	5-68	826	0.605	2,400	2,000
	Pacific Boundary Lake 11-14-85-14	667	11-69	1,176	0.674	1,528	Suspended.
	Pacific Boundary 8-15-85-14	270	11-69	1,254	0.725	3,443	2,000
	Sun Boundary Lake 8-23-85-14	652	6-68	992	0.727	9,900	2,950
	Texaco NFA Boundary Lake 6-25-85-14	687	5-68	1,009	0.850	3,650	2,000
Baldonnel total		.....	.....	.....	.....	.....	8,950
Basal Boundary Lake	Pac et al Boundary 14-4-85-14	1964	6-68	1,145	0.550	2,037	2,000
Halfway	Texaco NFA Boundary 16-31-86-13	836	.....	.....	.....	.....	.....
	Huber et al Boundary 6-4-87-13	1501	11-64	1,569	0.900	360	Suspended.
Field total		.....	.....	.....	.....	.....	13,755
Boundary Lake North—Halfway	Texaco NFA N Boundary 7-3-87-14	1395	.....	.....	.....	.....	.....
	Texaco NFA N Boundary 6-8-87-14	1529	2-69	1,534	0.869	36,000	9,000
	Texaco NFA N Boundary 10-9-87-14	1451	12-64	1,553	0.905	25,000	Suspended.
	Texaco NFA N Boundary 7-15-87-14	1881	3-66	1,556	0.850	2,300	Suspended.
Halfway and field total		.....	.....	.....	.....	.....	9,000
Bubbles—							
Baldonnel	Dome Basco Bubbles b-19-A/94-G-8	464	6-68	927	0.518	2,759	2,000
	Dome Provo Bubbles c-20-A/94-G-8	526	6-68	1,017	0.500	690	Suspended.
	Dome Basco Bubbles b-50-A/94-G-8	506	.....	.....	.....	.....	.....
	McCoy Dome Bubbles d-42-B/94-G-8	791	6-68	1,274	0.500	2,410	Suspended.
	McCoy Dome Bubbles b-A62-B/94-G-8	674	6-68	1,048	0.591	3,390	2,000
Baldonnel project	Pacific Sunray Imp Bubbles b-22-I/94-G-1	467	11-69	1,456	.....	.....	.....
	Pacific Imperial Bubbles b-33-I/94-G-1	451	7-63	932	0.754	13,402	4,417
	Pacific Imperial Bubbles b-44-I/94-G-1	466	7-68	850	0.884	14,700	5,991
	Pacific Sunray Imp Bubbles d-55-I/94-G-1	479	11-69	1,336	.....	.....	.....
	Pacific Imperial Bubbles b-66-I/94-G-1	480	7-68	893	0.686	4,460	2,000
	Pacific Imperial Bubbles d-77-I/94-G-1	478	7-68	916	0.500	3,013	2,000
	Pacific Imperial Bubbles d-88-I/94-G-1	462	7-68	921	0.925	24,250	9,726
	Pacific Dome et al Bubbles d-99-I/94-G-1	615	7-68	927	0.500	1,763	2,000[2]
Baldonnel project P.R.L.		.....	.....	.....	.....	.....	26,134
Baldonnel and field total		.....	.....	.....	.....	.....	30,134

Buick Creek—							
Dunlevy	Texaco NFA Buick a-63-I/94-A-11	1348					
	Decalta et al Buick d-73-I/94-A-11	1344					
	Pacific Buick a-85-I/94-A-11	1323	7-69	890	0.963	8,706	2,985
	Texaco NFA Buick d-96-I/94-A-11	787	6-68	949	0.740	15,600	4,522
	Texaco NFA Buick Creek d-98-I/94-A-11	45	6-68	903	0.980	5,000	2,000
	Texaco NFA Buick Creek c-79-J/94-A-11	110	6-68	609	0.700	2,355	2,000
	Texaco NFA Buick Creek d-83-J/94-A-11	96	9-68	475	0.839	11,600	5,670
	Texaco NFA Buick d-93-J/94-A-11	728	5-68	495	0.965	9,000	5,234
	Texaco NFA Buick Creek c-10-A/94-A-14	65	5-68	932	0.506	187	2,000
	Pacific Buick Creek b-4-B/94-A-14	457	6-68	714	0.931	2,234	2,000
	Texaco NFA Buick b-10-B/94-A-14	1179	6-68	689	0.862	1,475	2,000
	Pacific Buick Creek c-14-B/94-A-14	469	6-68	769	0.869	2,191	2,000
	Sun Buick c-16-B/94-A-14	744	6-68	820	0.767	2,240	2,000
	Sun Buick d-19-B/94-A-14	756	6-68	736	1.000	2,300	2,000
	Texaco NFA Buick c-40-B/94-A-14	1213	6-68	718	0.940	620	2,000
	Sun Buick d-11-C/94-A-14	818	6-68	689	0.900	7,900	3,282
	Sun et al Buick c-32-C/94-A-14	1360	6-68	600	0.966	15,400	7,053
Dunlevy total							46,746
Charlie Lake	Texaco NFA Buick Creek d-83-J/94-A-11	96	6-66	490	0.700	1,500	Suspended.
Field total							46,746
Buick Creek East—							
Bluesky-Gething	Texaco NFA E Buick d-98-L/94-A-10	1088					
	Mic Mac et al E Buick d-17-D/94-A-15	1286	9-68	939	0.870	4,320	2,000
	Texaco NFA E Buick c-80-D/94-A-15	1087	7-66	1,045	0.500	750	Suspended.
Bluesky-Gething total							2,000
Dunlevy	Texaco NFA E Buick c-98-L/94-A-10	1088	8-68	851	0.560	1,375	2,000
	Texaco NFA E Buick a-31-A/94-A-14	295	8-68	929	0.595	16,600	4,420
	Whitehall E Buick c-34-A/94-A-14	1336	7-68	721	0.712	1,540	2,000
	Texaco NFA E Buick b-A46-A/94-A-14	1508	8-68	752	0.630	490	2,000
	Whitehall E Buick b-62-A/94-A-14	1303	7-68	928	1.000	3,900	2,000
	Texaco NFA E Buick c-18-D/94-A-15	1185	8-68	840	0.600	3,450	2,000
	Texaco NFA E Buick c-80-D/94-A-15	1087	8-68	816	0.920	5,400	2,000
Dunlevy total							16,420
Field total							18,420
Buick Creek North—							
Bluesky-Gething	Pacific West Prod N Buick c-22-F/94-A-14	1753	7-69	(2)	(2)	(2)	(2)
	Pacific West Prod N Buick b-44-F/94-A-14	1799					
Dunlevy	Pacific West Prod N Buick a-81-C/94-A-14	2069	7-69	999	0.603	6,800	2,000
	Texaco NFA N Buick d-91-C/94-A-14	2174	5-68	1,123	0.713	10,800	2,783
	Pacific West Prod N Buick b-2-F/94-A-14	2026	8-68	1,094	0.700	3,488	2,000
	Pacific West Prod N Buick c-22-F/94-A-14	1753	7-69[3]	823	0.636	10,453	Suspended.

[2] Restricted to P.R.L.

[3] Comingled production of Bluesky-Gething and Dunlevy not segregated.

TABLE 17.—GAS-WELL TEST AND ALLOWABLE DATA, DECEMBER 31, 1969—*Continued*

Field/Pool/Project	Well Name	Well Authorization No.	Test Date	Shut-in Subsurface Pressure, Psia.	Reciprocal Slope "n"	A.O.F.P. (M S.C.F./D.)	P.R.L. (M S.C.F./D.)
Buick Creek North—*Continued*							
Dunlevy—*Continued*	Pacific West Prod N Buick d-15-J/94-A-15	1799	.....	.....	.....	.....	.....
	Pacific West Prod N Buick b-86-F/94-A-14	1830	6-66	1,261	0.500	1,340	Suspended.
Dunlevy total		.....	.....	.....	.....	.....	6,783
Field total		.....	.....	.....	.....	.....	6,783
Buick Creek West—							
Dunlevy	Pacific West Buick Creek d-95-K/94-A-11	99	6-68	419	0.790	4,800	2,340
	Pacific West Buick Creek c-5-C/94-A-14	264	6-68	416	0.906	3,312	2,119
	Pacific West Buick Creek c-14-C/94-A-14	95	7-69	603	0.975	6,190	Suspended.
	Pacific West Buick Creek d-17-C/94-A-14	384	7-69	397	0.837	16,225	8,778
	Pacific West Buick Creek b-78-C/94-A-14	89	7-69	826	0.712	3,920	2,000
	Pacific West Buick Creek c-80-C/94-A-14	261	7-69	569	.....	.....	.....
	Pacific West Buick Creek d-89-C/94-A-14	268	7-69	759	1.000	1,760	2,000
	Pacific West Buick Creek b-91-D/94-A-14	255	6-68	610	1.000	2,192	2,000
	Pacific West Buick Creek c-2-E/94-A-14	239	6-68	597	0.686	5,046	2,000
Dunlevy total		.....	.....	.....	.....	.....	21,237
Baldonnel	Pacific West Buick Creek d-58-C/94-A-14	249	.....	.....	.....	.....	.....
	Pacific West Buick Creek a-78-C/94-A-14	644	6-68	808	0.699	2,301	2,000
Halfway	Pacific West Buick Creek b-23-E/94-A-14	86	7-62	699	0.712	2,450	Suspended.
Field total		.....	.....	.....	.....	.....	23,237
Clarke Lake—							
Slave Point	Pacific et al Clarke a-65-G/94-J-10	1528	8-68	2,823	0.570	10,400	2,607
	Cankee Cdn-Sup Clarke d-72-G/94-J-10	2176	10-67	2,851	0.649	120,000	30,000
	Pacific Apache Clarke b-76-G/94-J-10	1071	5-69	2,774	0.674	12,616	3,202
	Gulf Shell Clarke c-76-H/94-J-10	2459	3-69	2,877	0.500	8,400	Suspended.
	Husky et al Clarke c-100-H/94-J-10	2506	.....	.....	.....	.....	.....
Slave Point project	Pacific Imp Clarke c-56-L/94-J-9	1833	7-69	2,689	0.552	162,564	.....
	Pacific Imp Clarke b-72-L/94-J-9	2540	.....	.....	.....	.....	.....
	West Nat Imp Clarke Lake d-88-L/94-J-9	344	5-69	2,644	0.748	133,092	.....
	West Nat Imp Clarke Lake d-91-L/94-J-9	585	7-69	2,702	0.543	11,080	.....
	West Nat Imp Clarke Lake c-94-L/94-J-9	397	7-69	2,612	0.593	56,203	.....
	Pacific et al Clarke c-54-F/94-J-10	1932	5-69	2,772	0.575	11,831	.....
	Pacific Apache Clarke a-61-F/94-J-10	1578	5-69	2,717	0.616	133,283	.....
	Pacific et al Clarke d-69-H/94-J-10	1866	3-66	2,906	0.500	40,500	.....
	Pacific et al Clarke b-18-I/94-J-10	2316	9-69	2,772	0.585	24,200	.....
	Pacific et al Clarke c-20-I/94-J-10	2107	5-69	2,732	0.535	41,839	.....
	Pacific et al Clarke b-38-I/94-J-10	1933	5-69	2,691	.....	.....	.....
	Pacific et al Clarke c-69-I/94-J-10	2249	9-69	2,650	0.570	52,000	.....

	West Nat et al Clarke b-70-I/94-J-10	688	5-69	2,653	0.635	45,283	———
	West Nat et al Clarke c-78-I/94-J-10	505	5-69	2,629	0.500	110,175	———
	Pacific Imp Clarke c-85-I/94-J-10	2310	———	———	———	———	———
	Pacific Imperial Clarke c-92-I/94-J-10	1554	5-69	2,637	0.500	205,344	———
	Pacific et al Clarke b-22-J/94-J-10	1796	———	———	———	———	———
	Pacific et al Clarke c-43-J/94-J-10	2239	5-69	2,686	0.588	37,359	———
	Pacific et al Clarke b-46-J/94-J-10	2162	5-69	2,718	0.550	16,937	———
	West Nat et al Clarke c-47-J/94-J-10	211	7-69	2,738	———	———	———
	West Nat et al Clarke a-52-J/94-J-10	856	5-69	2,665	0.582	20,970	———
	Pacific et al Clarke a-55-J/94-J-10	1966	5-69	2,708	0.554	139,356	———
	West Nat Imp Clarke Lake c-8-D/94-J-16	503	7-69	2,650	0.625	48,993	———
	Pacific Imp Clarke b-10-D/94-J-16	2509	———	———	———	———	———
Slave Point project P.R.L.	———	———	———	———	———	———	400,000
Slave Point and field total	———	———	———	———	———	———	435,809
Clarke Lake South—Slave Point	West Nat IOE S Clarke d-29-K/94-J-9	1274	5-69	2,666	0.500	135,164	Suspended.[4]
	Pacific IOE S Clarke c-50-K/94-J-9	1913	5-69	2,700	0.781	14,592	([4])
Dawson Creek—							
Dunvegan	Horizon Dawson B3-22-79-15	2216	———	———	———	———	———
Cadotte	Pacific Sc Dawson Ck 7-11-79-15	302	6-67	540	0.900	805	Suspended.
Farrell Creek—							
Charlie Lake	CanDel et al Farrell a-30-L/94-A-5	2165	1-68	2,427	0.575	975	2,000
	CanDel et al Farrell a-41-I/94-B-8	2089	1-68	2,468	0.646	650	2,000
Charlie Lake total	———	———	———	———	———	———	4,000
Halfway	Ft St John Petroleums Farrell a-9-L/94-A-5	176	11-61	2,341	0.839	5,600	Suspended.
	CanDel et al Farrell a-30-L/94-A-5	2165	———	———	———	———	———
	CanDel et al Farrell a-41-I/94-B-8	2089	12-67	2,034	0.595	1,850	2,000
Halfway total	———	———	———	———	———	———	2,000
Field total	———	———	———	———	———	———	6,000
Fort St. John—							
Cadomin	Pacific Ft St John A3-29-83-18	75	7-53	1,338	1.000	29,000	Suspended.
	Pacific Ft St John A9-19-83-18	190	———	———	———	———	———
Baldonnel	Pacific Ft St John 14-15-83-18	32	11-69	1,059	0.700	3,426	Suspended.
	Pacific Ft St John 16-8-83-18	233	5-67	676	0.820	2,557	Suspended.
	Pacific Ft St John 9-14-83-18	204	———	———	———	———	———
	Pacific Ft St John 13-14-83-18	194	11-69	803	0.993	1,788	Suspended.
	Pacific Ft St John A6-16-83-18	212	6-68	674	0.733	2,118	2,000
	Pacific Ft St John 6-17-83-18	210	6-68	655	0.851	4,940	2,327
	Pacific Ft St John 8-20-83-18	170	6-68	602	0.850	3,420	2,000
	Pacific Ft St John B14-21-83-18	193	6-68	623	0.625	3,262	2,000
	Pacific Ft St John 14-22-83-18	76	6-68	671	0.782	4,600	2,000
	Pacific Ft St John 13-23-83-18	82	6-68	731	0.726	4,522	2,000
	Pacific Ft St John C3-29-83-18	186	6-68	704	0.565	2,942	2,000
	Pacific Ft St John 4-32-83-18	67	6-68	1,014	1.000	631	2,000
Baldonnel total	———	———	———	———	———	———	16,327

[4] Part of Clarke Lake project P.R.L.

TABLE 17.—GAS-WELL TEST AND ALLOWABLE DATA, DECEMBER 31, 1969—*Continued*

Field/Pool/Project	Well Name	Well Authorization No.	Test Date	Shut-in Subsurface Pressure, Psia.	Reciprocal Slope "n"	A.O.F.P. (M S.C.F./D.)	P.R.L. (M S.C.F./D.)
Fort St. John—*Continued*							
Charlie Lake	Pacific Ft St John B3-29-83-18	179	.....	.....	.....	.....	.....
Halfway	Pacific Ft St John 1-20-83-18	74	6-68	525	0.839	2,162	2,000
	Pacific Ft St John 2-21-83-18	172	6-68	524	0.818	2,348	2,000
	Pacific Ft St John A14-21-83-18	178	6-68	510	0.916	2,800	2,209
	Pacific Ft St John A14-22-83-18	192	11-69	607	1.000	97	Suspended.
	Pacific Ft St John B3-29-83-18	179	6-68	565	0.856	2,805	2,000
	Pacific Ft St John 10-30-83-18	181	6-68	560	0.868	860	2,000
	Home W Ft St John 10-27-83-19	2391	.....	.....	.....	.....	.....
	Pacific et al Ft St John 11-34-83-19	2138	7-69	1,772	0.833	4,250	2,000
Halfway total		.....	.....	.....	.....	.....	12,209
Belloy	Pacific Ft St John 14-21-83-18	29	6-68	667	0.624	1,477	2,000
	Pacific Ft St John 3-29-83-17	58	6-68	575	0.542	3,302	2,000
Belloy total		.....	.....	.....	.....	.....	4,900
Field total		.....	.....	.....	.....	.....	32,536
Fort St. John Southeast—							
Cadomin	Pac Ft St John SE 10-31-82-17	220	5-66	960	0.854	897	Suspended.
Baldonnel	Pac Ft St John SE 13-2-83-17	213	6-68	756	0.766	3,101	2,000
	Pac Ft St John SE A4-10-83-17	184	7-68	1,095	0.500	2,316	2,000
Baldonnel total		.....	.....	.....	.....	.....	4,000
Halfway	Pac Ft St John SE 10-33-82-17	60	11-69	1,445	1.000	4,968	Suspended.
	Pacific Ft St John SE 7-3-83-17	174	11-69	818	1.000	1,253	Suspended.
	Pac Ft St John SE 16-3-83-17	197	11-68	563	0.795	7,350	3,647
	Pac Ft St John SE A10-4-83-17	191	6-68	814	0.649	2,129	2,000
	Pac Ft St John SE 7-5-83-17	202	6-57	2,108	1.000	2,050	Suspended.
	Pac Ft St John SE A10-10-83-17	320	5-64	843	0.845	2,675	Suspended.
Halfway total		.....	.....	.....	.....	.....	5,647
Belloy	Pac Ft St John SE 11-32-82-17	201	11-68	492	0.745	5,512	3,019
	Pac Ft St John SE 10-4-83-17	173	6-68	943	0.810	7,689	3,798
	Pacific Ft St John SE 8-5-83-17	52	10-53	2,805	1.000	4,980	Suspended.
	Pacific Ft St John SE 4-9-83-17	166	5-67	1,033	1.000	6,000	4,124
	Pac Ft St John SE 4-10-83-17	42	11-69	1,832	0.500	6,287	Suspended.
	Pac Ft St John SE 10-10-83-17	219	6-68	823	0.726	1,456	2,000
Belloy total		.....	.....	.....	.....	.....	12,941
Field total		.....	.....	.....	.....	.....	22,588

Gundy Creek—							
Baldonnel	West Nat Gundy Creek b-69-A/94-B-16	253	4-59	1,618	1.000	5,000	Suspended.
	West Nat East Gundy Creek a-76-A/94-B-16	291	-----	-----	-----	-----	-----
	West Nat Gundy Creek c-80-A/94-B-16	83	-----	-----	-----	-----	-----
	West Nat Gundy Creek d-2-G/94-B-16	367	8-62	1,707	0.636	2,250	Suspended.
Charlie Lake	West Nat Gundy Creek b-69-A/94-B-16	253	4-59	1,845	1.000	8,300	Suspended.
Halfway—							
Baldonnel	West Nat et al Halfway 11-35-86-25	351	10-58	1,639	0.678	8,200	Suspended.
	West Nat et al Halfway 5-1-87-25	107	7-68	1,222	1.000	1,723	2,000
Baldonnel total		-----	-----	-----	-----	-----	2,000
Charlie Lake	West Nat et al Halfway 8-11-87-25	182	8-63	1,968	0.781	720	Suspended.
Field total		-----	-----	-----	-----	-----	2,000
Highway—							
Dunlevy	West Nat et al Highway b-3-I/94-B-16	168	7-68	1,134	0.869	750	2,000
Baldonnel	Pacific Highway b-25-I/94-B-16	112	8-58	1,653	1.000	6,600	Suspended.
	Pacific Highway a-47-I/94-B-16	180	11-57	1,680	0.754	3,600	Suspended.
	Pacific Highway a-69-I/94-B-16	274	11-57	1,691	0.812	3,150	Suspended.
	Pacific Highway a-90-I/94-B-16	229	11-64	1,388	0.535	920	Suspended.
Debolt	Pacific Highway a-90-I/94-B-16	229	7-66	880	0.553	6,885	Suspended.
Field total		-----	-----	-----	-----	-----	2,000
Inga—Baldonnel	Pacific Inga 6-29-86-23	2327	7-68	1,789	0.864	9,000	2,250
	Pacific Inga 6-32-86-23	2401	12-68	1,778	0.687	3,780	2,000
	Pacific Inga 6-4-87-23	2412	1-69	1,767	0.875	16,300	4,075
Field total		-----	-----	-----	-----	-----	8,325
Jeans West—							
Inga	West Nat et al W Jeans b-10-A/94-A-13	470	1-69	2,278	0.824	2,715	Suspended.
Charlie Lake	Amarillo Cabot W Jeans b-82-J/94-A-12	2241	-----	-----	-----	-----	-----
	Amarillo et al W Jeans a-5-B/94-A-13	2320	-----	-----	-----	-----	-----
	West Nat et al W Jeans a-22-B/94-A-13	412	5-59	2,239	1.000	5,050	Suspended.
Jedney—							
Gething	Pacific Imperial Jedney a-95-C/94-G-8	1366	10-63	1,142	0.531	13,600	Suspended.
Baldonnel	Pacific Imperial Jedney c-78-H/94-G-1	1129	8-69	1,113	0.726	955	2,000
	Pacific Imperial Jedney b-99-H/94-G-1	1054	8-69	1,072	0.535	3,428	2,000
	Pacific Imperial Jedney c-100-H/94-G-1	1082	8-69	1,106	0.500	2,448	2,000
	Pacific Sunray Imp Jedney b-44-J/94-G-1	492	11-69	1,510	-----	-----	-----
	Pacific Imperial Jedney b-66-J/94-G-1	475	8-68	1,155	0.839	7,200	2,244
	Pacific Imperial Jedney d-77-J/94-G-1	484	8-68	963	0.532	1,954	2,000
	Pacific et al Jedney b-88-J/94-G-1	427	8-68	879	0.818	19,500	7,133
	Pacific Imp Jedney d-99-J/94-G-1	382	7-67	1,077	0.531	2,207	2,000
	Pacific Imperial Jedney b-10-B/94-G-8	473	8-68	944	0.766	18,000	5,956
	Pacific Imp Jedney d-19-B/94-G-8	2171	-----	-----	-----	-----	-----
	Pacific Imperial Jedney b-30-B/94-G-8	460	8-68	976	0.588	3,792	2,000
	Pacific Imperial Jedney d-31-C/94-G-8	1178	8-69	1,259	0.931	2,730	2,000
	Pacific Imperial Jedney d-44-C/94-G-8	1375	8-68	1,342	0.685	4,500	2,000

TABLE 17.—GAS-WELL TEST AND ALLOWABLE DATA, DECEMBER 31, 1969—*Continued*

Field/Pool/Project	Well Name	Well Authorization No.	Test Date	Shut-in Subsurface Pressure, Psia.	Reciprocal Slope "n"	A.O.F.P. (M S.C.F./D.)	P.R.L. (M S.C.F./D.)
Jedney—*Continued*							
Baldonnel—*Continued*	Pacific Imperial Jedney d-53-C/94-G-8	820	8-69	1,363	0.880	2,039	2,000
	Pacific Imperial Jedney b-73-C/94-G-8	868	8-69	1,420	0.500	2,792	2,000
	Pacific et al Jedney c-86-C/94-G-8	778	8-69	1,171	0.500	2,061	2,000
	Pacific et al Jedney d-97-C/94-G-8	651	8-68	1,190	0.595	11,470	3,037
	Pacific Pan Am Dome Jedney c-8-F/94-G-8	1152	11-69	1,403	0.594	1,351	Suspended.
	Pacific Pan Am Dome Jedney b-28-F/94-G-8	944	8-69	1,305	0.500	2,096	2,000
	Skelly Jedney a-39-F/94-G-8	1334	12-69	(5)	1.000	(5)	2,000
	Pacific et al Jedney b-50-F/94-G-8	1907	———	———	———	———	———
Baldonnel total		———	———	———	———	———	44,370
Halfway	Pacific Imperial Jedney c-57-H/94-G-1	1183	7-69	1,413	0.500	2,164	2,000
	Pacific Imperial Jedney b-68-H/94-G-1	1256	7-69	1,109	0.500	3,340	2,000
	Pacific Imperial Jedney c-78-H/94-G-1	1129	7-69	1,111	0.853	4,534	2,000
	Pacific Imperial Jedney b-99-H/94-G-1	1054	7-69	1,058	0.726	12,381	3,845
	Pacific Imperial Jedney c-100-H/94-G-1	1082	8-69	1,167	0.738	11,312	3,409
	Pacific Imperial Jedney a-65-J/94-G-1	461	8-68	1,219	0.543	4,599	2,000
	Pacific Imperial Jedney b-66-J/94-G-1	475	8-68	1,106	0.649	9,196	2,608
	Pacific Imperial Jedney d-77-J/94-G-1	484	8-68	1,006	0.869	13,582	5,015
	Pacific Imp Jedney d-99-J/94-G-1	382	8-68	1,025	0.740	7,184	2,293
	Pacific Imp Jedney d-19-B/94-G-8	2171	———	———	———	———	———
	Pacific Imperial Jedney d-31-C/94-G-8	1178	8-69	981	0.500	4,673	2,000
	Pacific Imperial Jedney d-42-C/94-G-8	453	8-68	1,015	0.684	3,443	2,000
	Pacific Imperial Jedney d-44-C/94-G-8	1375	———	———	———	———	———
	Pacific Imperial Jedney d-53-C/94-G-8	820	8-69	806	0.587	2,615	2,000
	Pacific Imperial Jedney b-73-C/94-G-8	868	8-69	1,006	0.588	4,321	2,000
	Pacific Imperial Jedney b-84-C/94-G-8	691	8-69	846	0.500	3,067	2,000
	Pacific et al Jedney c-86-C/94-G-8	778	7-69	911	0.649	2,915	2,000
	Pacific Imperial Jedney a-95-C/94-G-8	1366	8-69	1,396	0.500	2,038	Suspended.
	Pacific et al Jedney d-97-C/94-G-8	651	8-68	885	0.742	3,975	2,000
	Pacific et al Jedney a-17-F/94-G-8	779	8-68	1,145	0.837	5,585	2,000
	Pacific Pan Am Dome b-28-F/94-G-8	944	8-68	913	0.554	3,250	2,000
	Skelly Jedney a-39-F/94-G-8	1334	12-69	1,091	0.926	1,633	2,000
	Pacific et al Jedney b-50-F/94-G-8	1907	———	———	———	———	———
Halfway total		———	———	———	———	———	45,170
Field total		———	———	———	———	———	89,540
Jedney West—							
Baldonnel	Pacific et al W Jedney b-84-K/94-G-1	1081	11-69	1,321	0.500	977	Suspended.
Halfway	Pacific et al W Jedney b-84-K/94-G-1	1081	8-68	1,041	0.500	1,036	Suspended.
	Pacific et al W Jedney b-6-C/94-G-8	1276	6-65	924	0.500	644	Suspended.

Kobes-Townsend—							
Dunlevy	Pacific Kobes b-82-I/94-B-8	496	9-68	979	1.000	687	2,000
	Pacific Kobes a-3-A/94-B-9	372	9-68	998	0.704	1,970	2,000
	Pacific Kobes b-24-A/94-B-9	489	9-68	1,005	1.000	754	2,000
Dunlevy total							6,000
Charlie Lake	Pacific Kobes c-73-I/94-B-8	299	7-67	1,564	0.500	1,663	2,000
	Pacific Kobes d-94-I/94-B-8	141	9-68	1,056	0.824	2,543	2,000
	Pacific Kobes b-35-A/94-B-9	177	9-68	1,339	0.564	1,664	2,000
	Pacific Kobes a-99-A/94-B-9	314	8-68	1,265	0.500	553	2,000
	Pacific Townsend d-21-C/94-B-9	251	9-68	1,187	0.864	1,248	2,000
Charlie Lake total							10,000
Halfway	Pacific Kobes d-94-I/94-B-8	141	8-68	1,952	0.627	9,850	G.E.P.
	Pacific Kobes b-35-A/94-B-9	177	8-68	1,933	0.588	6,141	G.E.P.
Halfway pool P.R.L. total							G.E.P.
Debolt	Pacific Kobes a-99-A/94-B-9	314	9-68	1,583	0.869	8,250	2,000
	Pacific Townsend a-20-H/94-B-9	164	8-65	1,378	0.700	497	Suspended.
Debolt total							2,000
Field total							18,000[6]
Kotcho Lake—Slave Point	West Nat Kotcho Lake d-39-J/94-I-14	532					
	West Nat Kotcho d-54-K/94-I-14	879					
	West Nat Kotcho Lake c-67-K/94-I-14	404	2-60	2,562	0.853	825,000	Suspended.
	Pacific Kotcho b-86-K/94-I-14	2097	3-67	2,553	0.623	100,000	Suspended.
	Pacific Kotcho b-44-C/94-P-3	562	4-60	2,566	0.565	105,000	26,250
	West Nat Kotcho d-12-C/94-P-3	1147	4-69	2,557	0.711	53,646	13,412
Slave Point and field total							39,662
Laprise Creek—Baldonnel project	Dome Basco Laprise Creek a-81-A/94-G-8	490	6-69	1,279	0.500	3,983	
	Dome Provo Laprise Creek d-91-A/94-G-8	653	6-69	1,202	0.500	1,592	
	Dome Provo Laprise Creek b-2-H/94-G-8	483	6-69	1,206	0.720	8,962	
	Dome Provo Laprise d-4-H/94-G-8	1852	6-69	1,133	0.500	3,609	
	Dome Basco Laprise Creek d-13-H/94-G-8	474	6-69	1,211	0.500	5,341	
	Dome Provo Laprise Creek a-25-H/94-G-8	654	6-69	1,225	0.500	1,729	
	Dome Provo Laprise Creek a-33-H/94-G-8	666	6-69	1,230	0.615	5,161	
	Dome Basco Laprise Ck a-35-H/94-G-8	327	6-69	1,226	0.544	7,705	
	Dome Provo Laprise a-46-H/94-G-8	665	6-69	1,259	0.645	3,121	
	Dome Provo Laprise a-52-H/94-G-8	1445	6-69	1,232	0.500	3,418	
	Dome Provo Laprise a-81-H/94-G-8	837	6-69	1,251	0.500	4,546	
	Dome Provo Laprise d-91-H/94-G-8	809	6-69	1,221	0.579	6,964	
	Dome Provo Laprise c-92-H/94-G-8	1056	6-69	1,156	0.578	2,704	
	Tenn Monsanto Laprise b-28-C/94-H-5	1388					
	Dome Laprise d-37-C/94-H-5	1392	6-68	1,376	0.668	390	
	Tenn Monsanto Laprise d-79-C/94-H-5	1371	7-65	1,532	0.720	6,600	
	Pacific Imp Laprise b-90-C/94-H-5	1970	7-68	1,272	0.740	9,800	

[5] Not available.
[6] Excluding Halfway pool G.E.P.

TABLE 17.—GAS-WELL TEST AND ALLOWABLE DATA, DECEMBER 31, 1969—*Continued*

Field/Pool/Project	Well Name	Well Authorization No.	Test Date	Shut-in Subsurface Pressure, Psia.	Reciprocal Slope "n"	A.O.F.P. (M S.C.F./D.)	P.R.L. (M S.C.F./D.)
Laprise Creek—							
Baldonnel project—*Continued*	Pacific Imp Laprise b-100-C/94-H-5	1999	7-68	1,392	0.783	17,200	———
	Amerada Laprise d-33-D/94-H-5	1282	———	———	———	———	———
	Amerada Laprise d-55-D/94-H-5	1468	6-69	1,307	0.662	12,908	———
	Amerada Laprise d-77-D/94-H-5	1378	6-69	1,345	0.521	4,946	———
	Pacific IOE Laprise a-85-D/94-H-5	1948	7-68	1,332	0.500	5,250	———
	Amerada Laprise d-95-D/94-H-5	1477	6-69	1,397	0.500	1,107	———
	Pacific IOE Laprise d-3-E/94-H-5	1979	11-69	1,358	———	———	———
	Amerada Laprise a-7-E/94-H-5	1337	11-63	1,286	0.500	5,300	———
	Pacific IOE Laprise d-11-E/94-H-5	1364	———	———	———	———	———
	Pacific Imperial Laprise a-22-E/94-H-5	715	7-68	1,297	0.554	4,011	———
	Pacific Imperial Laprise c-24-E/94-H-5	1511	11-69	1,226	0.594	2,104	———
	Pacific IOE Laprise a-29-E/94-H-5	1938	11-69	1,448	———	———	———
	Dome Provo Laprise b-30-E/94-H-5	1837	7-68	1,261	0.649	11,750	———
	Pacific Imperial Laprise a-33-E/94-H-5	690	7-68	1,167	0.810	13,000	———
	Dome Provo Laprise c-40-E/94-H-5	1251	7-68	1,229	0.770	14,464	———
	Pacific Imperial Laprise b-44-E/94-H-5	659	7-68	1,152	0.775	12,537	———
	Pacific Imperial Laprise a-46-E/94-H-5	678	7-68	1,229	0.509	6,500	———
	Pacific Imperial Laprise a-49-E/94-H-5	1488	7-68	1,274	0.726	13,800	———
	Pacific Imperial Laprise d-55-E/94-H-5	670	7-68	1,213	0.713	11,400	———
	Pacific Imperial Laprise c-56-E/94-H-5	650	7-68	1,256	0.577	6,000	———
	Pacific Imperial Laprise d-68-E/94-H-5	516	7-68	1,255	0.661	7,000	———
	Dome Provo Laprise c-70-E/94-H-5	1225	7-68	1,227	0.510	6,310	———
	Pacific Imperial Laprise c-78-E/94-H-5	551	7-68	1,257	0.700	6,870	———
	Pacific Imperial Laprise a-99-E/94-H-5	1341	7-68	1,293	0.767	12,500	———
Baldonnel project and field total		———	———	———	———	———	G.E.P.
Laprise Creek West—Baldonnel	Dome CDP C&E W Laprise c-71-G/94-G-8	1015	———	———	———	———	Suspended.
	Dome CDP C&E W Laprise c-82-G/94-G-8	873	6-67	970	0.618	2,695	Suspended.
Milligan Creek—Halfway	Whitehall et al Milligan d-75-G/94-H-2	689	———	———	———	———	———
Montney—							
Bluesky-Gething	Pac Sunray Montney 16-32-86-19	119	9-58	1,123	1.000	814	Suspended.
Charlie Lake	Pac Sunray Montney 14-36-86-19	104	7-58	1,116	1.000	2,200	Suspended.
Halfway	Pac White Rose Sec Montney 6-5-87-18	801	8-69	1,282	0.529	1,587	2,000
	Pac Sunray Montney 14-31-86-19	289	7-61	1,185	0.932	2,250	Suspended.
Halfway total		———	———	———	———	———	2,000
Field total		———	———	———	———	———	2,000

Nettle—Halfway	Union KCL ROC Nettle d-58-A/94-H-7	1411	——	——	——	——	——
Nig Creek—							
Baldonnel	Whitehall ARCo Nig a-87-J/94-A-13	2244	——	——	——	——	——
	West Nat Nig a-3-B/94-H-4	1373	11-69	1,396	0.520	1,514	Suspended.
	Pacific Nig b-4-B/94-H-4	1728	11-69	1,211	0.637	3,033	2,000
	Whitehall Nig b-6-B/94-H-4	1613	7-69	1,369	0.841	7,647	2,087
	Monsanto Nig d-13-B/94-H-4	1004	8-68	1,346	0.591	2,920	2,000
	Monsanto Nig a-21-B/94-H-4	1475	7-69	1,335	0.716	6,183	2,000
	Texaco NFA Nig d-33-B/94-H-4	2157	9-67	1,190	0.662	530	Suspended.
	Dome Provo Nig d-35-B/94-H-4	1139	7-69	1,312	0.595	5,166	2,000
	Tenn Monsanto Nig c-A32-C/94-H-4	1484	10-64	1,589	——	——	——
Baldonnel project	Texaco NFA Nig a-69-A/94-H-4	819	6-69	1,480	1.000	1,512	2,000[7]
	Texaco NFA Nig d-15-B/94-H-4	1180	6-69	1,321	0.787	8,224	2,321[7]
	Texaco NFA Nig c-36-B/94-H-4	729	6-69	1,325	0.660	5,534	2,000[7]
	Texaco NFA Nig Creek b-70-B/94-H-4	383	9-69	1,212	0.500	2,550	2,000[7]
	Texaco NFA Nig d-71-B/94-H-4	790	7-69	1,259	1.000	3,024	——
	Texaco NFA Nig d-75-B/94-H-4	1681	6-69	1,238	0.630	8,374	——
	Texaco NFA Nig a-77-B/94-H-4	1762	6-69	1,197	0.742	13,127	——
	Texaco NFA Nig Creek a-79-B/94-H-4	61	9-69	1,151	0.591	10,128	——
	Texaco NFA Nig c-90-B/94-H-4	1161	6-69	1,173	0.713	9,260	——
	Texaco NFA Nig Creek a-1-G/94-H-4	456	6-69	1,152	0.652	16,513	——
	Texaco NFA Nig Creek b-2-G/94-H-4	447	6-69	1,202	0.693	24,022	——
	Texaco NFA Nig a-6-G/94-H-4	1740	6-69	1,226	0.570	13,027	——
	Texaco NFA Nig a-8-G/94-H-4	967	6-69	1,242	0.800	29,247	——
	Texaco NFA Nig a-12-G/94-H-4	131	6-69	1,165	0.744	11,540	——
	Texaco NFA Nig c-14-G/94-H-4	2178	11-69	1,376	0.670	400	——
	Texaco NFA Nig b-44-G/94-H-4	852	11-69	1,479	0.530	362	——
	Texaco NFA Nig c-6-H/94-H-4	1654	7-69	1,184	0.793	6,071	——
	Texaco NFA Nig c-14-H/94-H-4	1707	9-67	1,169	0.631	3,500	——
	Texaco NFA Nig c-33-H/94-H-4	1742	7-69	1,124	0.709	12,943	——
	Texaco NFA Nig b-41-H/94-H-4	1976	11-69	1,291	1.000	397	——
Baldonnel project P.R.L.		——	——	——	——	——	80,300
Baldonnel and field total		——	——	——	——	——	90,387
North Pine—Charlie Lake	Pacific et al N Pine 6-24-85-18	1994	8-69	1,735	0.583	10,750	2,737
	Pacific et al N Pine 6-27-85-18	1958	9-66	1,959	0.625	28,200	Suspended.
Charlie Lake and field total		——	——	——	——	——	2,737
Parkland—Wabamun project	Pacific Imp Parkland 10-28-81-15	1153	6-68	3,729	0.781	9,450	——
	Pacific Imp Parkland 6-29-81-15	153	6-68	3,152	0.679	26,173	——
Wabamun project and field total		——	——	——	——	——	20,000
Petitot River—Slave Point	West Nat Petitot b-90-K/94-P-12	722	——	——	——	——	——
	West Nat Petitot River b-1-D/94-P-3	533	2-60	2,795	0.802	185,000	Suspended.
	West Nat Petitot River d-24-D/94-P-3	403	——	——	——	——	——
Red Creek—							
Charlie Lake	Pacific Red Creek 5-27-85-21	93	5-65	1,267	1.000	3,308	Suspended.
Halfway	Pacific Red Creek 5-27-85-21	93	7-65	1,437	1.000	2,434	Suspended.

[7] Restricted to individual well P.R.L.

TABLE 17.—GAS-WELL TEST AND ALLOWABLE DATA, DECEMBER 31, 1969—*Continued*

Field/Pool/Project	Well Name	Well Authorization No.	Test Date	Shut-in Subsurface Pressure, Psia.	Reciprocal Slope "n"	A.O.F.P. (M S.C.F./D.)	P.R.L. (M S.C.F./D.)
Rigel—							
Bluesky	Imp et al Rigel 10-35-88-18	2593	———	———	———	———	———
Dunlevy	IOE et al Rigel c-56-J/94-A-10	2537	12-69	1,130	0.684	11,415	2,854
Dunlevy project	Denison Rigel 6-31-87-16	1372	6-69	976	0.765	4,463	Suspended.
	Monsanto Rigel 14-23-87-17	1973	———	———	———	———	———
	IOE Fina Rigel 16-24-87-17	1739	———	———	———	———	———
	Monsanto IOE Fina Rigel 11-26-87-17	1486	6-69	1,031	1.000	2,630	Suspended.
	Wintershall Rigel 10-34-87-17	1365	6-69	974	0.560	8,699	———
	Pacific Rigel 6-35-87-17	1293	6-68	9,985	1.000	4,093	———
	Monsanto Rigel 6-36-87-17	1354	6-69	1,023	0.602	11,047	———
	Whitehall Rigel 11-18-88-16	1234	———	———	———	———	———
	Amarillo Cabot Rigel 7-30-88-16	2258	———	———	———	———	———
	Imp Fina Rigel 8-1-88-17	1312	———	———	———	———	———
	Imp Fina Rigel 6-3-88-17	1187	6-69	883	0.553	10,985	———
	Imp Fina Rigel 6-8-88-17	1208	6-69	1,039	0.675	2,508	———
	Imp Fina Rigel 6-10-88-17	1090	6-69	913	0.582	6,923	———
	Whitehall Rigel 6-14-88-17	1149	———	———	———	———	———
	Whitehall Rigel 6-15-88-17	1148	6-69	927	0.669	30,718	———
	Imp Fina Rigel 6-16-88-17	1168	6-69	1,220	———	———	———
	Imp et al Rigel 7-19-88-17	1107	6-69	1,000	0.500	9,272	———
	IOE Fina Rigel 10-25-88-17	2127	12-69	1,039	0.500	3,600	Suspended.
	Imp Fina Rigel 4-27-88-17	130	6-69	944	0.634	4,425	———
	Imp Fina Rigel 6-28-88-17	1385	———	———	———	———	———
	Imp et al Rigel 6-30-88-17	1032	6-69	1,000	0.738	18,340	———
	Imp Fina Rigel 11-3-88-18	1593	———	———	———	———	———
	IOE Fina Rigel 11-11-88-18	1494	6-69	1,030	0.720	20,051	———
	Pacific Rigel 11-15-88-18	2572	12-69	1,056	1.000	2,420	———
	Imp et al Rigel 7-13-88-18	1978	6-69	1,013	0.688	15,150	———
	Imp Fina Rigel 10-14-88-18	1465	6-69	1,035	0.663	8,049	———
	Richfield et al Rigel 10-19-88-18	1381	———	———	———	———	———
	Imp et al Rigel 6-21-88-18	1118	6-69	1,057	0.924	11,091	———
	Imp et al Rigel 7-23-88-18	1163	6-69	1,045	0.693	4,952	———
	Sun Rigel 10-24-88-18	1324	6-68	1,064	0.675	6,814	———
	Imp et al Rigel 6-27-88-18	828	6-69	969	0.626	9,372	———
	Texaco NFA Rigel 10-29-88-18	1222	2-63	1,166	0.620	4,850	Suspended.
	Texaco NFA Rigel 9-31-88-18	195	9-69	806	0.962	9,392	———
	Imp et al Rigel 10-35-88-18	2593	———	———	———	———	———
	[8]ARCo Rigel a-27-I/94-A-10	1620	3-69	1,062	0.651	3,450	———
	ARCo Rigel d-33-I/94-A-10	1763	———	———	———	———	———

	IOE Fina Rigel d-57-I/94-A-10	1537	6-69	1,057	0.500	9,044	——
	Imp IOE Fina Rigel a-21-J/94-A-10	2054	6-69	875	0.688	11,462	——
	IOE Fina Rigel c-60-J/94-A-10	2400	6-69	1,153	0.644	10,437	——
	IOE Fina Rigel a-89-J/94-A-10	2354	6-69	1,208	0.788	1,910	——
	Imp et al Rigel b-22-K/94-A-10	1003	——	——	——	——	——
	Texaco NFA Rigel a-28-K/94-A-10	1370	9-69	921	0.660	1,609	——
Dunlevy project and field total		——	——	——	——	——	G.E.P.
Sierra—Pine Point	Socony Mobil Sierra c-78-C/94-I-14	1602	2-68	3,450	0.662	610,000	Suspended.
	Socony Mobil Sierra c-91-D/94-I-14	1659	2-67	3,460	0.507	71,700	Suspended.
Stoddart—Belloy	Chaut Dunbar Stoddart 11-23-85-19	2548	10-69	2,384	0.920	3,139	——
	Chaut Dunbar Stoddart 6-26-85-19	2409	7-69	2,261	0.748	15,400	3,850
	Jeff Lake Mesa Stoddart 11-34-85-19	1959	——	——	——	——	——
	Pacific et al Stoddart 10-35-85-19	2182	12-69	1,999	0.718	27,800	7,293
	Pacific Stoddart 11-2-86-19	2155	12-69	1,900	0.621	24,959	6,429
	Dome Provo Stoddart 11-8-86-19	1902	6-69	1,359	0.649	5,563	2,000
	Pacific Stoddart 6-10-86-19	2078	8-69	1,586	0.880	1,393	2,000
	Jeff Lake Altair Stoddart 6-11-86-19	1841	6-68	2,099	0.754	54,000	13,794
	Pacific et al Stoddart 11-16-86-19	1473	6-69	1,585	0.630	2,853	2,000
	Whitehall Stoddart 6-17-86-19	1770	6-69	1,395	1.000	3,341	2,000
	Pacific et al Stoddart 11-18-86-19	2562	10-69	1,531	0.773	7,400	2,000
	Pacific Stoddart 6-19-86-19	2575	——	——	——	——	——
	Pacific et al Stoddart 10-1-86-20	438	——	——	——	——	——
	Pacific Stoddart 2-13-86-20	262	8-69	1,509	0.500	3,250	2,000
	Pacific Stoddart 4-24-86-20	244	8-69	1,501	0.595	7,157	2,000
Belloy and field total		——	——	——	——	——	47,366
Stoddart West—Belloy	Pacific W Stoddart 11-10-86-20	1190	9-69	1,262	0.625	5,815	Suspended.
Sunrise—Cadotte	Pacific Sunrise 11-31-78-16	19	——	——	——	——	——
	Horizon Sunrise 11-4-79-16	2569	——	——	——	——	——
	Horizon Sunrise 11-5-79-16	2559	——	——	——	——	——
	Horizon Sunrise 11-6-79-16	2560	11-69	——	——	——	2,000[9]
	Pacific Sunrise 10-7-79-16	15	——	——	——	——	——
	Horizon Sunrise 10-8-79-16	2538	11-69	——	——	——	2,000[9]
	Pacific Sunrise 10-9-79-16	17	——	——	——	——	——
	Horizon Sunrise 11-9-79-16	2564	11-69	——	——	——	2,000[9]
Cadotte and field total		——	——	——	——	——	6,000[9]
Two Rivers—							
Baldonnel	Champlin et al Two Rivers 6-9-83-16	2139	3-69	——	——	——	2,000[9]
Charlie Lake	Champlin Two Rivers 10-5-83-16	2064	6-68	1,797	1.130	3,800	2,000
Halfway	Champlin et al Two Rivers 6-9-83-16	2139	3-69	2,086	0.797	30,000	7,500
Field total		——	——	——	——	——	11,500
Weasel—							
Baldonnel	Sinclair Pacific Weasel d-93-J/94-A-15	1790	12-65	1,113	0.675	6,050	Suspended.
Halfway	Tenn Ashland Weasel d-27-B/94-H-2	1703	10-65	1,248	0.754	1,070	Suspended.

[8] Bluesky and Dunlevy, without segregation.
[9] Interim.

TABLE 17.—GAS-WELL TEST AND ALLOWABLE DATA, DECEMBER 31, 1969—*Continued*

Field/Pool/Project	Well Name	Well Authorization No.	Test Date	Shut-in Subsurface Pressure, Psia.	Reciprocal Slope "n"	A.O.F.P. (M S.C.F./D.)	P.R.L. (M S.C.F./D.)
Willow—Halfway	Union HB Willow d-11-G/94-H-2	1292	12-69	1,182	0.741	6,522	2,000
	Union HB Willow b-10-H/94-H-2	830	8-69	1,200	0.690	———	5,000[9]
Halfway and field total		———	———	———	———	———	7,000
Yoyo—							
Charlie Lake	Uno-Tex et al Yoyo c-34-I/94-I-13	2229	2-68	2,838	0.640	92,000	Suspended.
Pine Point	Placid Frontier Yoyo d-A15-I/94-I-13	1895	3-67	2,883	0.845	132,000	Suspended.
	West Nat et al Yoyo b-29-I/94-I-13	1230	1-64	2,921	0.577	3,500	Suspended.
	West Nat Yoyo b-98-E/94-I-14	1405	2-67	2,887	0.628	60,000	Suspended.
	Pacific Yoyo a-2-L/94-I-14	2271	3-68	2,904	0.525	65,000	Suspended.
	Pacific Yoyo d-7-L/94-I-14	2035	2-67	2,909	0.660	115,000	28,750
	Placid Frontier Yoyo b-10-L/94-I-14	1569	3-65	3,021	0.643	63,000	Suspended.
	Frontier Yoyo c-18-L/94-I-14	1431	1-68	2,921	0.644	258,000	64,500
	West Nat et al Yoyo b-24-L/94-I-14	1313	1-64	2,908	0.600	146,000	Suspended.
	Tenn Altair Yoyo a-47-L/94-I-14	1831	———	———	———	———	———
	Cankee Uno-Tex Yoyo a-49-L/94-I-14	2068	3-68	2,928	0.662	145,000	Suspended.
Pine Point total		———	———	———	———	———	93,250
Field total		———	———	———	———	———	93,250
Other areas—							
Cadotte	Westcoast Pouce Coupe 8-18-80-13 (6)	———	———	———	———	———	———
	Westcoast Pouce Coupe 6-30-80-13 (1)	———	———	———	———	———	———
Notikewin	Westcoast Kiskatinaw 8-30-80-14 (5)	———	———	———	———	———	———
Bluesky-Gething	Tenn N La Garde 6-23-88-16	1275	———	———	———	———	———
	Pacific Sinclair Beavertail d-71-C/94-A-15	1893	———	———	———	———	———
	Pacific Sinclair Beavertail d-73-C/94-A-15	1915	3-69	1,108	0.758	15,564	3,891
	Texaco NFA Junction b-9-F/94-A-15	300	———	———	———	———	———
	Imp Fina Altares a-83-A/94-B-8	410	1-60	1,237	0.629	22,000	Suspended.
	Union HB Willow d-29-H/94-H-2	1878	———	———	———	———	———
	Union HB Woodrush b-56-H/94-H-2	1889	———	———	———	———	———
	Triad BP Pickell Creek c-88-I/94-H-3	695	———	———	———	———	———
	Triad BP Birley d-17-A/94-H-6	987	———	———	———	———	———
	Imp Pac Sunray Wargen c-58-C/94-H-6	641	10-60	1,132	0.668	14,500	Suspended.
	Texaco NFA Silver c-52-K/94-H-6	571	———	———	———	———	———
	Pan Am Dome Silver d-81-L/94-H-6	2406	———	———	———	———	———
	Pacific et al Dahl d-11-J/94-H-7	2445	———	———	———	———	———
	Tenn Cdn Sup Dahl d-53-J/94-H-7	1849	———	———	———	———	———
	Texaco Dahl a-67-J/94-H-7	2457	2-69	962	0.726	1,250	Suspended.
	Pacific CIGOL Dahl d-91-J/94-H-7	2466	———	———	———	———	———
Bluesky-Gething total		———	———	———	———	———	3,891

Gething	Texcan N Nancy d-46-I/94-A-15	1905	----	----	----	----	----
	Union HB Beaverdam d-64-L/94-A-16	1825	----	----	----	----	----
	Union ROC Firebird d-89-D/94-H-2	707	3-63	1,114	0.825	14,000	Suspended.
Dunlevy	Texaco NFA La Garde 7-21-87-15	145	10-69	1,367	0.859	4,850	2,000
	Texaco NFA N La Garde 10-12-88-16	1192	2-63	1,335	0.660	3,270	Suspended.
	Gray Oil PRP NW Grizzly c-25-A/94-I-15	1396	3-64	2,695	0.675	9,300	Suspended.
	Texaco NFA E Osborn a-45-J/94-A-9	1257	----	----	----	----	----
	Cabot et al Rigel a-87-K/94-A-10	2573	----	----	----	----	----
	Union Fireweed d-53-G/94-A-13	497	----	----	----	----	----
	CDR Union E Fireweed d-55-H/94-A-13	1201	----	----	----	----	----
	Union Birch d-99-E/94-A-14	1630	----	----	----	----	----
	HB-BA-Union Lime c-80-C/94-H-1	122	----	----	----	----	----
Dunlevy total		----	----	----	----	----	2,000
Baldonnel	Westcoast Pingel 13-11-81-17 (8)	4	----	----	----	----	----
	Pacific Ft St John 12-7-84-18 (19)	62	7-53	1,563	0.770	2,100	Suspended.
	Pacific Ft St John 1-15-84-19 (5)	30	----	----	----	----	----
	Apache et al Wilder 7-2-84-20	1940	----	----	----	----	----
	Sinclair Bear Ck 11-18-84-20	243	----	----	----	----	----
	Pacific et al Siphon 11-27-86-16	444	10-69	1,430	----	----	2,000[9]
	White Rose Sec Montney 10-29-86-18	1130	9-62	1,520	0.669	1,640	Suspended.
	Texaco NFA LaGarde 7-21-87-15	145	----	----	----	----	----
	Tenn Osborn 6-35-87-15	1200	11-63	1,665	0.754	1,250	Suspended.
	Dome LaGarde 10-12-87-16	2446	----	----	----	----	----
	Texaco NFA E Osborn 6-33-88-14	1319	1-69	1,309	0.746	1,168	2,000
	TGS Falls c-32-F/93-O-9	2230	----	----	----	----	----
	Hunt Sands Sun Falls c-18-G/93-O-9	1028	----	----	----	----	----
	Triad BP Sukunka a-43-B/93-P-5	1517	9-65	4,601	0.637	120,000	Suspended.
	West Nat et al Alexander d-45-K/94-A-12	2366	----	----	----	----	----
	CDR Fireweed d-31-G/94-A-13	1384	----	----	----	----	----
	FJP Union Birch b-62-I/94-A-13	834	----	----	----	----	----
	Whitehall Numac Nig a-49-J/94-A-13	2012	1-67	1,578	1.000	1,100	Suspended.
	Altair Sarcee C&E Zeke c-34-L/94-A-14	1332	----	----	----	----	----
	Texaco NFA Cameron River b-49-L/94-B-9	120	----	----	----	----	----
	Security Cypress a-92-K/94-B-10	2365	3-69	1,943	0.532	26,000	Suspended.
	Security Cypress a-65-C/94-B-15	1339	8-63	1,960	0.669	11,200	Suspended.
	Security Cypress d-87-C/94-B-15	1326	6-63	1,953	0.625	25,000	Suspended.
	Security Cypress a-28-F/94-B-15	737	11-61	1,990	0.537	30,000	Suspended.
	FPC Richfield Daiber c-56-D/94-B-16	432	----	----	----	----	----
	FPC Richfield Daiber c-76-D/94-B-16	386	1-59	2,017	0.810	6,600	Suspended.
	Sinclair Pac Julienne Creek b-39-D/94-G-1	658	----	----	----	----	----
	Sinclair Julienne Ck a-50-D/94-G-1	304	8-66	2,016	1.000	4,950	Suspended.
	Sinclair et al N Julienne c-54-H/94-G-2	757	----	----	----	----	----
	Pan Am Dome Sikanni b-43-B/94-G-7	1335	9-63	1,726	0.832	5,500	Suspended.
	Union ARCo Firebird d-43-D/94-H-2	2060	----	----	----	----	----
	Union HB Alder c-39-I/94-H-2	721	----	----	----	----	----

[9] Interim.

TABLE 17.—GAS-WELL TEST AND ALLOWABLE DATA, DECEMBER 31, 1969—*Continued*

Field/Pool/Project	Well Name	Well Authorization No.	Test Date	Shut-in Subsurface Pressure, Psia.	Reciprocal Slope "n"	A.O.F.P. (M S.C.F./D.)	P.R.L. (M S.C.F./D.)
Baldonnel—*Continued*	Fargo Nig Creek c-19-C/94-H-4	92	———	———	———	———	———
	Tenn Monsanto Nig d-39-C/94-H-4	1448	———	———	———	———	———
	Pacific Sunray Imp Sojer a-61-L/94-H-4	472	———	———	———	———	———
	Champlin Bass Martin c-91-B/94-H-5	2245	———	———	———	———	———
Baldonnel total		———	———	———	———	———	4,000
Inga	Texcan N Cache 6-28-88-22	2423	1-69	2,293	———	———	———
	Cdn-Sup Whitehall Inga b-44-J/94-A-12	2461	———	———	———	———	———
	Amarillo Cabot N Inga d-51-K/94-A-12	2533	———	———	———	———	———
	Amarillo Cabot N Inga a-81-K/94-A-12	2552	———	———	———	———	———
Charlie Lake	Pacific et al Pingel 13-17-81-17	36	———	———	———	———	———
	Pacific Pingel Creek 5-26-81-18	66	———	———	———	———	———
	CEGO et al Flatrock 10-27-84-16	1954	6-67	1,659	0.837	2,630	Suspended.
	Pacific et al Siphon 11-27-86-16	444	10-69	1,547	———	———	2,000[9]
	Dome LaGarde 10-12-87-16	2446	———	———	———	———	———
	Texcan N Cache 10-20-88-22	2567	12-69	2,239	1.000	2,900	2,000
	West Nat et al Lookout d-42-J/94-A-12	2000	———	———	———	———	———
	Richfield-Prespatou Crk d-59-A/94-H-3	240	———	———	———	———	———
	Ashland Ck Tb Wargen d-19-B/94-H-6	2119	———	———	———	———	———
	Texaco NFA Redeye d-69-I/94-H-6	1549	———	———	———	———	———
Charlie Lake total		———	———	———	———	———	4,000
Boundary Lake	Texaco NFA La Garde 10-29-87-15	1194	3-63	1,693	0.793	23,280	Suspended.
Halfway	Champlin Flatrock 10-9-84-16	2516	6-69	1,952	0.854	15,250	3,813
	Pacific Wilder 13-1-84-20	47	12-53	2,035	0.780	5,500	Suspended.
	Pacific et al Siphon 11-27-86-16	444	10-69	1,660	0.629	7,161	2,000
	Texaco N LaGarde 13-26-88-16	160	1-69	1,532	0.800	3,500	2,000
	Texcan N Cache 6-28-88-22	2423	———	———	———	———	———
	Cankee CIGOL Melanie d-68-K/94-A-9	1859	———	———	———	———	———
	Sinclair Pacific Mink d-8-A/94-A-15	1564	———	———	———	———	———
	Pacific Sinclair Beavertail d-71-C/94-A-15	1893	———	———	———	———	———
	Dome et al W Peejay d-31-G/94-A-15	1927	———	———	———	———	———
	Baysel SR CanDel Osprey d-83-G/94-A-15	2071	———	———	———	———	———
	Pacific SR CanDel Beaverdam d-71-I/94-A-15	2101	4-67	1,323	0.794	4,400	Suspended.
	Pacific SR CanDel W Dede b-45-K/94-A-15	1271	3-63	1,411	0.700	5,600	Suspended.
	Sinclair et al Graham c-53-D/94-B-9	238	———	———	———	———	———
	Texaco NFA Cameron River d-43-H/94-B-10	433	———	———	———	———	———
	Sinclair Pac Julienne Creek b-39-D/94-G-1	658	6-61	2,323	0.911	4,000	Suspended.
	Sinclair Julienne Ck a-50-D/94-G-1	304	9-58	2,237	1.000	7,000	Suspended.

	Pac Imp N Bubbles d-95-B/94-G-8	750	8-61	1,470	0.589	2,500	Suspended.
	Pacific Imperial N Bubbles d-6-G/94-G-8	1055	——	——	——	——	——
	Texaco Tepee d-99-G/94-G-8	1432	——	——	——	——	——
	Mesa et al Prophet d-97-D/94-G-15	2160	——	——	——	——	——
	Fina Tommy Lakes a-29-A/94-G-16	566	3-60	768	0.554	2,850	Suspended.
	Ashland Cankee Tb Snowberry b-57-D/94-H-1	1892	——	——	——	——	——
	Sun Texaco W Willow d-95-B/94-H-2	1775	——	——	——	——	——
	Richfield et al Big Arrow c-71-F/94-H-2	159	——	——	——	——	——
	Placid Bonner Sandy d-28-G/94-H-2	2496	——	——	——	——	——
	Union et al W Milligan c-50-G/94-H-2	1266	3-63	1,256	0.717	14,000	Suspended.
	Union HB Bluebell d-22-H/94-H-2	2296	——	——	——	——	——
	KCL et al Woodrush d-83-H/94-H-2	2115	——	——	——	——	——
	Union et al Evergreen d-24-J/94-H-2	2505	——	——	——	——	——
	CDR Sun Evergreen b-43-J/94-H-2	2056	——	——	——	——	——
	CDR Sun Evergreen d-54-J/94-H-2	1918	——	——	——	——	——
	Triad BP Pickell b-84-I/94-H-3	908	——	——	——	——	——
	Triad BP Birley a-5-A/94-H-6	724	——	——	——	——	——
	Lobitos Black d-57-F/94-H-6	1315	——	——	——	——	——
	Pan Am Redeye d-89-D/94-H-10	2442	1-69	939	0.966	27,385	6,846
Halfway total		——	——	——	——	——	14,659
Permo Carboniferous	Texaco NFA East Osborn a-33-J/94-A-9	322	1-69	1,937	0.624	8,070	2,018
	CSP Town c-69-J/94-B-16	315	——	——	——	——	——
	Mesa et al Moose Lick b-8-K/94-G-2	2185	1-68	2,784	0.625	15,300	Suspended.
	BA HB W Pocketknife d-33-I/94-G-6	1393	8-64	2,054	0.789	121,083	Suspended.
Permo Carboniferous total		——	——	——	——	——	2,018
Belloy	FPC Kilkerran 12-13-78-14	154	8-66	3,473	1.000	1,450	Suspended.
	IOE Pac Parkland 10-26-81-16	1355	9-64	2,945	0.500	3,650	Suspended.
	Pacific Alcon Parkland 7-27-81-16	2250	8-68	2,976	0.825	7,900	Suspended.
	Pacific Two Rivers 2-27-82-16	135	——	——	——	——	——
	Amerada Pac Ft St John W 11-17-83-19	697	——	——	——	——	——
	Pacific et al Stoddart 6-29-85-18	2262	7-69	2,371	0.892	1,430	2,000
	Mesa et al Stoddart 6-31-85-18	2539	8-69	2,326	0.747	6,600	2,000
	Pacific Red Creek 6-7-85-20	102	——	——	——	——	——
	Jeff Lake W Stoddart 11-20-86-20	2553	——	——	——	——	——
	Apache Pac W Stoddart 11-30-86-20	2199	7-68	2,439	0.615	12,423	Suspended.
	Apache et al W Stoddart 7-5-87-20	2338	9-69	2,445	0.550	5,100	2,000
Belloy total		——	——	——	——	——	6,000
Kiskatinaw	Sinclair et al Doe 6-16-81-14	230	——	——	——	——	——
Debolt	West Nat et al Jeans a-57-A/94-A-13	507	9-60	2,472	0.625	2,050	Suspended.
	West Nat et al E Jeans c-A1-H/94-A-13	4455	——	——	——	——	——
	Sinclair et al Lily d-12-K/94-G-2	385	5-59	2,598	1.000	21,800	Suspended.
	HB Pacific Pocketknife c-37-L/94-G-7	468	7-60	1,727	0.642	26,600	Suspended.
	Mesa et al Prophet d-97-D/94-G-15	2160	——	——	——	——	——
	West Nat Bougie Creek a-49-I/94-G-15	138	——	——	——	——	——
	Dome et al Imp Slave c-10-I/94-H-11	2225	3-68	2,684	0.500	1,400	Suspended.

[9] Interim.

TABLE 17.—GAS-WELL TEST AND ALLOWABLE DATA, DECEMBER 31, 1969—*Continued*

Field/Pool/Project	Well Name	Well Authorization No.	Test Date	Shut-in Subsurface Pressure, Psia.	Reciprocal Slope "n"	A.O.F.P. (M S.C.F./D.)	P.R.L. (M S.C.F./D.)
Baldonnel—*Continued*							
Debolt—*Continued*							
	Union IOE Bigfoot d-27-C/94-I-4	508	.....	.....	.....	.....	.....
	ROCK Pan Am Shekilie d-73-K/94-I-9	2110	.....	.....	.....	.....	.....
	Sohio C&E Ekwan a-55-G/94-I-10	897	.....	.....	.....	.....	.....
	Texaco NFA Walrus b-86-L/94-I-16	947	.....	.....	.....	.....	.....
	Pacific S Ft Nelson b-96-B/94-J-10	348	5-58	1,051	0.599	2,350	Suspended.
	Pacific North Kotcho c-93-C/94-P-3	579	.....	.....	.....	.....	.....
	Texaco NFA Judy c-53-D/94-P-6	717	.....	.....	.....	.....	.....
Slave Point	HB Imperial Union Paddy b-49-B/94-H-16	129	8-55	3,114	1.000	8,250	Suspended.
	IOE Junior c-3-C/94-I-11	1249	3-63	2,696	0.500	4,700	Suspended.
	Imp Junior c-98-C/94-I-11	926	3-62	2,714	0.500	90,000	Suspended.
	Mobil Sahtaneh c-70-I/94-I-12	2436	3-69	2,746	0.781	3,610	Suspended.
	Pacific Gunnel c-95-L/94-I-12	1239	.....	.....	.....	.....	Suspended.
	West Nat et al Yoyo a-74-H/94-I-13	887	3-62	2,686	0.791	185,000	Suspended.
	Pacific Sinclair Shekilie b-46-A/94-I-16	2038	.....	.....	.....	.....	.....
	Pacific Shekilie b-24-A/94-I-16	1816	.....	.....	.....	.....	.....
	Atlantic Tees a-16-J/94-I-6	1542	.....	.....	.....	.....	.....
	Triad Sohio Pac Jackfish a-30-K/94-J-8	999	.....	.....	.....	.....	.....
	BA Shell Klua Creek a-50-C/94-J-9	157	.....	.....	.....	.....	.....
	West Nat Imp Clarke Lake b-78-J/94-J-9	700	12-68	3,331	.....	.....	.....
	Pacific et al Milo c-43-E/94-J-10	2260	.....	.....	.....	.....	.....
	IOE E Clarke b-6-A/94-J-16	1576	3-67	3,146	0.685	(5)	Suspended.
	Pan Am A-1 Cam Lake a-31-I/94-O-16	594	.....	.....	.....	.....	.....
	SOBC Helmet b-49-G/94-P-7	1279	.....	.....	.....	.....	.....
	Tenn FPC Tooga d-18-K/94-P-2	2066	.....	.....	.....	.....	.....
	West Nat Kathy b-30-F/94-P-3	677	2-61	2,561	0.573	148,000	Suspended.
	Placid Louise c-80-L/94-P-3	1570	.....	.....	.....	.....	.....
	West Nat Cabin b-40-A/94-P-5	1245	3-63	2,607	0.761	28,900	Suspended.
	Pacific Cabin d-57-B/94-P-5	2425	.....	.....	.....	.....	.....
	West Nat Cabin a-19-G/94-P-5	1406	2-64	2,645	0.554	31,200	Suspended.
	Pacific Cabin a-49-G/94-P-5	2058	.....	.....	.....	.....	.....
	Texaco NFA Tsea b-68-K/94-P-5	704	3-62	2,646	0.628	76,650	Suspended.
	Texaco NFA Tsea b-99-K/94-P-5	1426	3-64	2,734	0.523	12,600	Suspended.
	Midwest Chevron Peggo d-65-A/94-P-7	2276	.....	.....	.....	.....	.....
	FPC Chevron Peggo b-53-I/94-P-7	2453	.....	.....	.....	.....	.....
	FPC Chevron et al Helmet b-11-K/94-P-7	2517	.....	.....	.....	.....	.....
	Pan Am et al Dilly a-30-K/94-P-12	877	3-62	2,766	1.000	14,700	Suspended.
	CanDel Barnwell HB Hoss b-82-G/94-P-14	2234	.....	.....	.....	.....	.....

Slave Point—Sulphur Point	Socony Mobil Swat b-50-F/94-I-5	1835	——	——	——	——	——
	Apache CPOG IOE Clarke d-24-I/94-J-9	2470	——	——	——	——	——
Pine Point	Socony Mobil S Sierra a-98-K/94-I-11	1814	2-67	3,623	1.000	188,000	Suspended.
	Pan Am A-1 Komie a-51-A/94-O-8	527	——	——	——	——	——
	Texaco NFA Missle d-54-A/94-O-9	2232	3-68	3,728	0.550	3,972	Suspended.
	Pan Am IOE Hostli d-48-J/94-P-8	2287	——	——	——	——	——
	Chevron N Helmet a-54-B/94-P-10	2108	——	——	——	——	——
Nahanni	Pan Am Beaver c-27-K/94-N-16	2313	3-69	6,001	0.500	84,000	Suspended.
	Pan Am Beaver c-45-K/94-N-16	2116	12-67	5,824	0.760	86,844	Suspended.
	Pan Am Beaver River d-73-K/94-N-16	682	3-62	5,672	0.653	85,000	Suspended.

[5] Not available.

TABLE 18.—HYDROCARBON AND BY-PRODUCTS RESERVES, DECEMBER 31, 1969

	Crude Oil, M S.T.B.		Raw Gas, B S.C.F.		Established			
	Proved	Probable	Proved	Probable	Residue Gas, B S.C.F.	Residue Gas (Basis 1,000 B.T.U./S.C.F.) B S.C.F.	Natural-gas Liquids, M S.T.B.	Sulphur M L.T.
Original hydrocarbon in place	1,231,354	64,765	11,532.5	2,069.4	(1)	(1)	(1)	(1)
			Established					
Ultimate recovery, current estimate	386,674	85,038	10,872.0		9,534.6	9,939.9	171,188	4,807
Cumulative production to December 31, 1968	108,474	——	1,569.4		1,406.9	1,514.9	41,206	689
Reserves estimated at December 31, 1968	272,950	99,357	8,508.0		7,426.2	7,705.2	118,519	2,797
Revisions in 1969	+2,316	−14,319	+160.1		+139.8	+116.5	−1,137	+1,140
Drilling in 1969	+2,933	——	+491.6		+447.2	+486.1	+12,600	+182
Production in 1969	−25,339	——	−310.1		−271.8	−284.1	−4,908	−85
Cumulative production adjustments[1]	.....	.....	−30.3		−27.3	−30.2	−975	−42
Reserves at December 31, 1969	252,860	85,038	8,962.2		7,828.6	8,110.7	124,099	3,736

NOTES:

M S.T.B.=Thousands of stock tank barrels, where one barrel contains 34.97 Imperial gallons.

B S.C.F.=Billions of standard cubic feet at 14.65 psia. and 60° F.

M L.T.=Thousands of long tons.

Associated and solution gas reserves are included for pools in which a conservation scheme is in operation or for which firm conservation plans have been proposed.

The production data shown above for residue gas, natural-gas liquids, and sulphur are based on theoretical volumes produced with the raw gas and are derived from gas-analysis data. The actual volume of gas delivered to transmission-lines in 1969 was 256.2 B S.C.F. and actually extracted quantities of N.G.L. and sulphur were 1,697,819 barrels and 57,032 long tons respectively.

[1] Not available.

[2] Adjustment for cumulative production at December 31, 1968, for proposed gas-conservation schemes not included in 1968 reserves estimates. This adjustment, in the case of sulphur, also includes the cumulative production to December 31, 1968, from the area served by the Fort Nelson gas plant. Subject to N.E.B. approval, a sulphur-extraction facility at this point is due to go on stream in the fall of 1971.

TABLE 19.—OILFIELD RESERVOIR DATA

Field	Pool	Rock Type	Age	Trapping	Producing Mechanism	Pool Area (Acres)	Net Pay (Feet)	Porosity (%)	Water Saturation (%)	Permeability (Md.)	Shrinkage (S.T.B./R.B.)	Initial Reservoir Pressure (Psig.)	Reservoir Temperature (° F.)	Initial Solution G.O.R. (S.C.F./S.T.B.)	Formation Depth (Feet S.S.)
Aitken Creek	Gething	Sandstone	Lower Cretaceous	Structural-stratigraphic	Depletion and gas cap	1,009	12.60	12.40	30.6	2,835	0.77	1,546	140	518	1,286
Bear Flat	Charlie Lake	Sandstone	Triassic	Stratigraphic	Depletion	633	5.20	14.60	13.2	(1)	0.80	1,972	130	500	2,338
Beatton River	Halfway A	Sandstone	Triassic	Stratigraphic	Waterflood	1,201	12.50	21.55	27.0	288	0.86	1,163	129	285	1,145
	Halfway B	Sandstone	Triassic	Stratigraphic	Depletion	195	4.70	15.60	40.0	(1)	0.86	1,158	129	285	1,225
Beatton River West	Bluesky-Gething	Sandstone	Lower Cretaceous	Stratigraphic	Depletion and gas cap	3,467	7.80	15.10	29.3	65	0.81	1,025	120	398	876
Beaverdam	Halfway	Sandstone	Triassic	Stratigraphic	Depletion	(1)	24.00	12.90	13.0	16	0.83	1,286	127	308	1,350
Blueberry	Dunlevy	Sandstone	Lower Cretaceous	Stratigraphic	Depletion	(1)	10.40	6.70	55.0	(1)	0.75	(1)	130	(1)	1,200
	Debolt	Carbonate	Mississippian	Structural-stratigraphic	Gas cap and partial water	4,343	40.10	10.30	18.5	31	0.76	2,700	165	614	4,030
Boundary Lake	Cadomin	Sandstone	Lower Cretaceous	Structural	Water	489	7.00	20.00	41.0	75	0.80	1,460	116	(1)	1,350
	Boundary Lake	Carbonate	Triassic	Stratigraphic	Waterflood	48,490	11.70	18.30	10.9	45	0.80	1,786	110	485	1,750
	Halfway	Sandstone	Triassic	Structural	Water and partial gas cap	1,141	11.60	13.00	26.0	14	0.82	1,685	125	(1)	2,050
Buick Creek	Dunlevy A	Sandstone	Lower Cretaceous	Stratigraphic	Depletion	629	17.60	10.60	15.4	(1)	0.87	1,290	121	292	1,225
Buick Creek West	Dunlevy D	Sandstone	Lower Cretaceous	Stratigraphic	Depletion	(1)	9.40	14.20	34.0	(1)	0.87	1,302	123	300	1,150
	Dunlevy E	Sandstone	Lower Cretaceous	Stratigraphic	Depletion	(1)	5.40	11.20	46.9	(1)	0.87	1,307	126	300	1,150
Bulrush	Halfway	Sandstone	Triassic	Stratigraphic	Depletion and gas cap	1,483	5.50	16.60	11.0	212	0.83	1,336	130	299	1,350
Bulrush East	Halfway	Sandstone	Triassic	Stratigraphic	Depletion	(1)	6.20	15.00	12.0	(1)	0.83	1,335	130	299	1,290
Charlie Lake	Gething	Sandstone	Lower Cretaceous	Stratigraphic	Depletion	(1)	13.00	19.00	7.0	(1)	0.83	1,097	116	(1)	1,020
Crush	Halfway	Sandstone	Triassic	Stratigraphic	Depletion	2,214	6.90	17.80	10.0	250	0.84	(1)	142	376	1,406
Currant	Halfway	Sandstone	Triassic	Stratigraphic	Waterflood	864	5.90	12.70	18.2	81	0.83	1,398	128	370	1,550
Eagle Area (8-29 and 11-29-84-18)	Belloy	Carbonate	Permian	Stratigraphic	Depletion	116	11.30	11.80	32.9	(1)	0.75	1,876	159	(1)	3,770
Fort St. John	Charlie Lake	Sandstone	Triassic	Stratigraphic	Gas cap	1,319	3.30	14.00	23.0	570	0.77	1,939	125	575	2,325
	Belloy	Carbonate	Permian	Structural-stratigraphic	Depletion	(1)	21.00	10.00	25.0	23	0.75	2,770	155	(1)	4,160
Halfway	Inga	Sandstone	Triassic	Stratigraphic	Depletion	(1)	5.00	10.00	11.0	(1)	0.75	2,112	115	(1)	2,241
Inga	Baldonnel	Carbonate	Triassic	Structural-stratigraphic	Depletion	(1)	23.00	10.00	27.0	(1)	0.80	1,790	120	(1)	1,800
	Inga Main	Sandstone	Triassic	Stratigraphic	Depletion and gas cap	12,036	7.10	12.20	15.2	200	0.75	2,310	140	681	2,465
	Inga South	Sandstone	Triassic	Stratigraphic	Depletion	13,873	5.80	11.40	16.2	(1)	0.77	2,386	140	589	2,540
Milligan Creek	Halfway	Sandstone	Triassic	Stratigraphic	Waterflood	2,955	15.60	23.60	19.3	23	0.86	1,181	134	289	1,170
Moberly Lake	Charlie Lake	Sandstone	Triassic	Stratigraphic	Depletion	170	4.00	14.00	9.0	(1)	0.75	2,290	130	700	2,233

Nettle	Bluesky-Gething	Sandstone	Lower Cretaceous	Stratigraphic	Depletion and gas cap	494	3.60	15.30	40.7	127	0.80	960	127	398	700
Nig Creek	Baldonnel	Carbonate	Triassic	Structural-stratigraphic	Depletion and gas cap	1,624	13.50	9.00	40.0	(1)	0.79	1,533	125	490	1,350
Osprey	Halfway	Sandstone	Triassic	Stratigraphic	Depletion	1,178	4.80	8.10	16.0	67	0.85	1,432	(1)	298	1,535
Parkland area (10-26 and 7-27-81-16)	Belloy	Carbonate	Permian	Structural-stratigraphic	Depletion and gas cap	2,542	19.10	5.80	35.4	(1)	0.75	2,930	153	(1)	4,658
Peejay	Halfway A	Sandstone	Triassic	Stratigraphic	Waterflood	8,801	12.80	13.80	21.2	25	0.84	1,351	133	345	1,489
	Halfway B	Sandstone	Triassic	Stratigraphic	Waterflood	447	6.70	15.70	16.0	35	0.83	1,352	131	370	1,432
	Halfway C	Sandstone	Triassic	Stratigraphic	Waterflood	3,130	10.60	15.00	11.7	30	0.83	(1)	131	370	1,432
	Halfway D	Sandstone	Triassic	Stratigraphic	Waterflood	584	5.70	21.70	43.4	130	0.83	(1)	131	370	1,432
	Halfway E	Sandstone	Triassic	Stratigraphic	Waterflood	1,862	7.50	14.90	17.3	40	0.84	(1)	133	376	1,441
	Halfway F	Sandstone	Triassic	Stratigraphic	Waterflood	5,601	10.70	14.90	26.0	40	0.84	(1)	133	376	1,441
	Halfway G	Sandstone	Triassic	Stratigraphic	Waterflood	129	3.70	11.60	49.5	7	0.84	(1)	133	376	1,441
	Halfway H	Sandstone	Triassic	Stratigraphic	Gas cap and depletion	844	1.10	8.60	40.0	(1)	0.83	(1)	131	370	1,324
Peejay West	Halfway	Sandstone	Triassic	Stratigraphic	Depletion	984	6.00	24.90	34.2	82	0.83	1,425	131	308	1,600
Rigel	Dunlevy A	Sandstone	Lower Cretaceous	Stratigraphic	Depletion	(1)	9.00	13.00	42.0	330	0.87	1,274	120	267	1,295
	Dunlevy B	Sandstone	Lower Cretaceous	Stratigraphic	Depletion	(1)	10.00	11.00	18.0	200	0.86	1,274	120	267	1,295
	Dunlevy C	Sandstone	Lower Cretaceous	Stratigraphic	Depletion and gas cap	713	5.40	11.10	35.0	(1)	0.87	1,274	120	267	1,295
Stoddart	Charlie Lake	Sandstone	Triassic	Stratigraphic	Depletion	(1)	6.00	21.00	10.0	(1)	0.86	1,802	125	500	1,875
	Belloy	Carbonate	Permian	Structural-stratigraphic	Depletion	1,921	8.50	10.30	42.6	8	0.85	2,453	155	300	3,800
Two Rivers	Charlie Lake	Sandstone	Triassic	Stratigraphic	Gas cap and depletion	1,425	9.00	9.80	52.0	(1)	0.80	1,783	126	510	2,138
Weasel	Halfway A	Sandstone	Triassic	Stratigraphic	Waterflood	3,347	11.90	17.40	25.0	400	0.87	1,284	132	298	1,270
	Halfway B	Sandstone	Triassic	Stratigraphic	Depletion	2,907	10.70	15.00	31.0	(1)	0.87	1,284	132	298	1,270
Wildmint	Halfway A	Sandstone	Triassic	Stratigraphic	Waterflood	2,381	9.80	18.10	18.0	202	0.88	1,226	132	260	1,270
	Halfway B	Sandstone	Triassic	Stratigraphic	Depletion	498	6.70	10.70	30.0	(1)	0.87	1,226	132	260	1,270
Willow	Bluesky-Gething	Sandstone	Lower Cretaceous	Stratigraphic	Depletion	218	4.00	34.00	16.0	150	0.89	987	132	216	820
Wolf	Halfway	Sandstone	Triassic	Stratigraphic	Depletion	666	8.00	17.30	37.6	218	0.83	1,446	143	308	1,684

[1] Not available.

TABLE 20.—GASFIELD RESERVOIR DATA

Field	Pool	Rock Type	Age	Trapping	Pool Area (Acres)	Net Pay (Feet)	Porosity (%)	Water Saturation (%)	Permeability (Md.)	Compressibility Factor	Specific Gravity	Reservoir Pressure (Psig.)	
												Original	Current
Airport	Cadomin	Sandstone	Lower Cretaceous	Stratigraphic	(1)	23	18	40	(1)	0.870	0.581	1,432	(1)
	Baldonnel	Carbonate	Triassic	Stratigraphic	(1)	10	10	38	(1)	0.825	0.661	1,614	(1)
	Halfway	Sandstone	Triassic	Stratigraphic	(1)	13	10	25	(1)	0.825	0.623	2,039	(1)
Beaver River area (d-27-K, c-45-K, d-73-K/94-N-16)	Nahanni	Carbonate	Devonian	Structural	(1)	2,173	2	27	(1)	1.095	0.642	5,910	(1)
Beavertail area (d-71-C, d-73-C, c-92-C/94-A-15)	Bluesky-Gething	Sandstone	Lower Cretaceous	Stratigraphic	1,693	25	11	46	(1)	0.843	0.653	1,125	(1)
Beg	Baldonnel A	Carbonate	Triassic	Structural	(1)	80	11	18	65	0.840	0.652	1,666	1,390
	Baldonnel B	Carbonate	Triassic	Structural	(1)	48	12	22	(1)	0.842	0.652	1,636	1,319
	Baldonnel C	Carbonate	Triassic	Structural	(1)	45	11	11	(1)	0.841	0.652	1,651	999
	Halfway	Sandstone	Triassic	Structural	(1)	36	10	35	(1)	0.830	0.673	1,866	1,043
Beg West	Baldonnel A	Carbonate	Triassic	Structural	574	22	7	23	23	0.847	0.653	1,677	(1)
	Baldonnel B	Carbonate	Triassic	Structural	590	41	7	23	(1)	0.847	0.653	1,687	(1)
Bernadet	Bluesky-Gething	Sandstone	Lower Cretaceous	Structural-stratigraphic	(1)	13	8	15	(1)	0.838	0.644	1,193	(1)
Blueberry	Dunlevy	Sandstone	Lower Cretaceous	Structural	(1)	16	11	33	10	0.852	0.659	1,363	(1)
	Baldonnel	Carbonate	Triassic	Structural	(1)	16	10	37	38	0.837	0.673	1,611	(1)
	Charlie Lake	Sandstone	Triassic	Structural-stratigraphic	(1)	31	10	30	(1)	0.658	0.802	2,073	(1)
Blueberry East	Baldonnel	Carbonate	Triassic	Structural	(1)	(1)	(1)	(1)	(1)	0.824	0.675	1,888	(1)
Blueberry West	Dunlevy A	Sandstone	Lower Cretaceous	Structural	(1)	50	8	25	4	0.852	0.659	1,401	(1)
	Dunlevy B	Sandstone	Lower Cretaceous	Structural	(1)	17	9	25	(1)	0.850	0.658	1,424	(1)
	Baldonnel	Carbonate	Triassic	Structural	5,240	27	9	25	84	0.815	0.646	1,813	(1)
Boundary Lake	Bluesky-Gething	Sandstone	Lower Cretaceous	Structural-stratigraphic	(1)	19	13	39	(1)	0.863	0.622	1,141	(1)
	Gething	Sandstone	Lower Cretaceous	Structural-stratigraphic	(1)	57	17	16	(1)	0.847	0.641	1,371	(1)
	Baldonnel	Carbonate	Triassic	Structural	2,506	20	14	34	(1)	0.799	0.677	1,447	(1)
	Boundary Lake Zone	Carbonate	Triassic	Structural	(1)	5	20	6	133	0.810	0.683	1,701	(1)
	Halfway	Sandstone	Triassic	Structural	(1)	23	10	38	(1)	0.838	0.631	1,555	(1)
Boundary Lake North	Halfway	Sandstone	Triassic	Stratigraphic	5,711	46	17	30	57	0.845	0.657	1,566	(1)
Bubbles	Baldonnel	Carbonate	Triassic	Structural	7,399	51	10	17	33	0.842	0.663	1,598	(1)
Bubbles North area (d-95-B, d-6-G/94-G-8)	Halfway	Sandstone	Triassic	Stratigraphic	1,222	37	8	24	(1)	0.860	0.663	1,618	(1)

Buick Creek	Bluesky-Gething A	Sandstone	Lower Cretaceous	Structural-stratigraphic	8,540	7	14	31	(1)	0.862	0.637	1,097	891
	Bluesky-Gething B	Sandstone	Lower Cretaceous	Structural-stratigraphic	3,832	6	11	40	(1)	0.862	0.637	1,092	1,031
	Dunlevy A	Sandstone	Lower Cretaceous	Structural-stratigraphic	(1)	19	12	26	140	0.836	0.659	1,290	856
	Dunlevy B	Sandstone	Lower Cretaceous	Structural-stratigraphic	11,327	15	12	24	(1)	0.853	0.649	1,288	(1)
	Dunlevy C	Sandstone	Lower Cretaceous	Structural-stratigraphic	(1)	22	11	20	(1)	0.836	0.659	1,290	616
	Baldonnel	Carbonate	Triassic	Stratigraphic	(1)	28	8	25	(1)	0.830	(1)	1,400	(1)
	Charlie Lake	Sandstone	Triassic	Structural-stratigraphic	(1)	6	13	33	(1)	0.859	0.613	1,554	(1)
Buick Creek North	Bluesky-Gething	Sandstone	Lower Cretaceous	Structural-stratigraphic	1,280	9	12	36	(1)	0.833	0.685	1,304	(1)
	Dunlevy	Sandstone	Lower Cretaceous	Structural-stratigraphic	6,457	13	11	32	(1)	0.849	0.670	1,248	(1)
Buick Creek West	Dunlevy A	Sandstone	Lower Cretaceous	Structural-stratigraphic	(1)	37	12	32	165	0.849	0.657	1,302	(1)
	Dunlevy B	Sandstone	Lower Cretaceous	Structural-stratigraphic	(1)	16	10	32	(1)	0.853	0.657	1,307	(1)
	Baldonnel	Carbonate	Triassic	Structural-stratigraphic	(1)	18	11	27	45	0.817	0.698	1,467	(1)
	Halfway	Sandstone	Triassic	Structural	(1)	39	11	31	21	0.782	0.748	1,721	(1)
Cabin area (b-40-A, d-57-B, a-19-G, a-49-G/94-P-5)	Slave Point A	Carbonate	Devonian	Stratigraphic	1,202	25	11	15	(1)	0.938	0.651	2,636	(1)
	Slave Point B	Carbonate	Devonian	Stratigraphic	(1)	34	9	15	(1)	0.910	0.651	2,611	2,611
	Slave Point C	Carbonate	Devonian	Stratigraphic	(1)	69	7	20	(1)	0.913	0.684	2,640	2,640
Clarke Lake	Jean Marie	Carbonate	Devonian	Stratigraphic	(1)	78	8	25	(1)	0.909	0.607	1,580	(1)
	Slave Point A	Carbonate	Devonian	Stratigraphic	19,147	144	8	13	(1)	0.929	0.671	2,895	(1)
	Slave Point B	Carbonate	Devonian	Stratigraphic	5,996	56	6	27	(1)	0.929	0.671	2,895	(1)
	Slave Point C	Carbonate	Devonian	Stratigraphic	2,211	157	6	33	(1)	0.929	0.671	2,895	(1)
Clarke Lake South	Slave Point	Carbonate	Devonian	Stratigraphic	4,525	53	3	25	(1)	0.928	0.671	2,845	(1)
Cypress area (a-28-F, d-87-C, a-65-C/94-B-15)	Baldonnel	Carbonate	Triassic	Structural	3,196	36	8	27	(1)	0.850	0.584	1,949	(1)
Dahl area (d-11-J, d-53-J, d-91-J/94-H-7)	Bluesky	Sandstone	Lower Cretaceous	Stratigraphic	1,920	27	16	40	(1)	0.884	0.642	935	935
Dawson Creek	Cadotte	Sandstone	Lower Cretaceous	Structural-stratigraphic	(1)	43	16	25	33	0.922	0.581	679	(1)
Evergreen area (d-24-J, b-43-J, d-54-J/94-H-2)	Halfway	Sandstone	Triassic	Structural	2,100	11	20	16	(1)	0.934	0.630	1,157	1,157
Farrell Creek	Charlie Lake	Sandstone	Triassic	Structural	1,704	3	9	15	13	0.800	0.644	2,568	(1)
	Halfway	Sandstone	Triassic	Structural	1,320	6	9	21	(1)	0.805	0.658	2,322	(1)

1 Not available.

TABLE 20.—GASFIELD RESERVOIR DATA—*Continued*

Field	Pool	Rock Type	Age	Trapping	Pool Area (Acres)	Net Pay (Feet)	Porosity (%)	Water Saturation (%)	Permeability (Md.)	Compressibility Factor	Specific Gravity	Reservoir Pressure (Psig.)	
												Original	Current
Fort St. John	Cadomin	Sandstone	Lower Cretaceous	Structural	2,620	8	12	40	421	0.869	0.581	1,324	(1)
	Baldonnel	Carbonate	Triassic	Structural	(1)	33	12	25	1,212	0.822	0.661	1,603	(1)
	Halfway	Sandstone	Triassic	Structural	(1)	28	11	25	23	0.799	0.680	2,014	(1)
	Belloy	Carbonate	Permian	Structural-stratigraphic	(1)	11	12	25	59	0.830	0.655	2,749	(1)
	Debolt	Carbonate	Mississippian	Stratigraphic	(1)	10	22	25	(1)	0.847	0.671	2,959	(1)
Fort St. John Southeast	Cadomin	Sandstone	Lower Cretaceous	Structural	(1)	32	16	40	64	0.865	0.581	1,389	(1)
	Baldonnel	Carbonate	Triassic	Structural	(1)	12	18	28	30	0.778	0.702	1,634	(1)
	Halfway	Sandstone	Triassic	Structural	(1)	16	10	25	14	0.821	0.693	2,015	(1)
	Belloy	Carbonate	Permian	Structural-stratigraphic	(1)	16	9	25	62	0.842	0.640	2,816	(1)
Gundy Creek	Dunlevy	Sandstone	Lower Cretaceous	Stratigraphic	(1)	8	16	23	(1)	0.820	0.659	1,680	(1)
	Baldonnel A	Carbonate	Triassic	Structural	400	11	11	17	69	0.850	0.630	1,731	(1)
	Baldonnel B	Carbonate	Triassic	Structural	1,992	18	9	24	69	0.850	0.630	1,731	(1)
	Charlie Lake	Sandstone	Triassic	Structural-stratigraphic	(1)	10	7	25	(1)	0.826	0.656	2,339	(1)
Halfway	Baldonnel	Carbonate	Triassic	Structural	2,984	31	8	35	6	0.818	0.639	1,642	(1)
	Charlie Lake	Sandstone	Triassic	Stratigraphic	(1)	8	15	25	(1)	0.784	0.693	2,086	(1)
Highway	Dunlevy	Sandstone	Lower Cretaceous	Structural	(1)	14	9	25	85	0.857	0.669	1,348	(1)
	Baldonnel	Carbonate	Triassic	Structural	3,980	5	10	25	124	0.832	0.675	1,643	(1)
	Debolt	Carbonate	Mississippian	Structural	3,540	13	10	25	105	0.903	0.609	3,122	(1)
Inga	Baldonnel	Carbonate	Triassic	Structural	3,527	16	11	25	(1)	0.785	0.689	1,790	1,790
Jeans West	Inga	Sandstone	Triassic	Structural-stratigraphic	17,878	7	13	15	(1)	0.785	0.687	2,281	2,281
Jedney	Gething	Sandstone	Lower Cretaceous	Structural-stratigraphic	(1)	10	11	24	(1)	0.870	0.663	1,125	(1)
	Baldonnel	Carbonate	Triassic	Structural	(1)	60	10	10	34	0.849	0.693	1,590	(1)
	Halfway	Sandstone	Triassic	Structural	13,661	56	10	20	16	0.842	0.673	1,633	(1)
Jedney West	Baldonnel	Carbonate	Triassic	Structural	(1)	11	9	64	(1)	0.850	0.693	1,622	(1)
	Halfway	Sandstone	Triassic	Structural	2,864	35	8	45	(1)	0.839	0.673	1,768	(1)
Julienne area (b-39-D, a-50-D/94-G-1)	Baldonnel	Carbonate	Triassic	Structural-stratigraphic	1,403	19	12	25	(1)	0.825	0.656	2,024	(1)
	Halfway	Sandstone	Triassic	Structural-stratigraphic	780	8	11	25	(1)	0.875	0.614	2,374	(1)
	Debolt	Carbonate	Mississippian	Structural-stratigraphic	(1)	14	5	38	(1)	0.929	0.558	3,170	3,170
Kobes-Townsend	Dunlevy	Sandstone	Lower Cretaceous	Structural	(1)	26	13	20	18	0.782	0.651	1,488	(1)
	Charlie Lake	Sandstone	Triassic	Structural-stratigraphic	(1)	12	11	29	(1)	0.820	0.629	2,470	(1)

	Halfway	Sandstone	Triassic	Structural-stratigraphic	2,925	24	8	28	5	0.823	0.638	2,641	(1)
	Belloy	Carbonate	Permian	Structural-stratigraphic	224	8	13	19	(1)	0.803	0.695	2,686	(1)
	Debolt	Carbonate	Mississippian	Structural-stratigraphic	(1)	21	5	16	10	0.841	0.647	3,025	(1)
Kotcho Lake	Slave Point	Carbonate	Devonian	Stratigraphic	4,606	19	10	8	46	0.920	0.670	2,548	(1)
Laprise Creek	Baldonnel	Carbonate	Triassic	Structural-stratigraphic	37,613	66	10	19	(1)	0.844	0.676	1,528	(1)
Laprise Creek West	Baldonnel	Carbonate	Triassic	Structural-stratigraphic	(1)	44	10	23	48	0.845	0.694	1,326	(1)
Montney	Bluesky-Gething	Sandstone	Lower Cretaceous	Structural-stratigraphic	(1)	6	17	45	(1)	0.843	0.670	1,250	(1)
	Charlie Lake	Sandstone	Triassic	Structural-stratigraphic	(1)	5	20	30	(1)	0.830	0.664	1,750	(1)
	Halfway	Sandstone	Triassic	Structural	(1)	15	15	33	67	0.807	0.704	1,849	(1)
Nettle	Charlie Lake	Sandstone	Triassic	Stratigraphic	(1)	6	18	15	(1)	0.884	0.663	992	992
	Halfway	Sandstone	Triassic	Structural	(1)	5	17	11	(1)	0.878	0.635	1,036	(1)
Nig Creek	Baldonnel	Carbonate	Triassic	Structural-stratigraphic	44,722	38	11	24	(1)	0.844	0.677	1,642	(1)
	Halfway	Sandstone	Triassic	Stratigraphic	(1)	26	10	26	(1)	0.787	0.748	1,733	(1)
	Slave Point	Carbonate	Devonian	Stratigraphic	(1)	29	7	30	(1)	0.976	0.762	4,500	(1)
Nig Creek West area (c-19-C, d-39-C/94-H-4)	Baldonnel	Carbonate	Triassic	Stratigraphic	1,448	35	11	25	(1)	0.815	0.693	1,639	(1)
North Pine	Charlie Lake	Sandstone	Triassic	Structural-stratigraphic	3,140	5	13	15	(1)	0.790	0.675	1,944	(1)
Parkland	Belloy	Carbonate	Permian	Structural-stratigraphic	2,532	21	7	21	(1)	0.864	0.674	2,933	(1)
	Wabamun	Carbonate	Devonian	Structural-stratigraphic	(1)	(1)	13	16	(1)	1.022	0.623	4,900	(1)
Peejay	Gething	Sandstone	Lower Cretaceous	Structural-stratigraphic	(1)	17	16	28	(1)	0.869	0.642	1,076	(1)
	Baldonnel	Carbonate	Triassic	Structural-stratigraphic	(1)	34	13	41	(1)	0.856	0.638	1,148	1,148
Petitot River	Slave Point	Carbonate	Devonian	Structural-stratigraphic	3,185	84	7	18	(1)	0.936	0.673	2,775	(1)
Red Creek	Charlie Lake	Sandstone	Triassic	Structural-stratigraphic	(1)	6	18	32	(1)	0.838	0.614	1,866	(1)
	Halfway	Sandstone	Triassic	Structural	3,416	19	11	20	18	0.729	0.779	2,021	(1)
Rigel	Bluesky	Sandstone	Lower Cretaceous	Structural-stratigraphic	(1)	15	12	50	(1)	0.844	0.650	1,272	1,272
	Dunlevy	Sandstone	Lower Cretaceous	Structural-stratigraphic	91,088	16	14	26	(1)	0.847	0.654	1,274	(1)
Shekilie area (b-24-A, (b-46-A/94-I-16)	Slave Point	Carbonate	Devonian	Stratigraphic	2,520	50	6	33	(1)	0.896	0.649	2,279	(1)

[1] Not available.

TABLE 20.—GASFIELD RESERVOIR DATA—*Continued*

Field	Pool	Rock Type	Age	Trapping	Pool Area (Acres)	Net Pay (Feet)	Porosity (%)	Water Saturation (%)	Permeability (Md.)	Compressibility Factor	Specific Gravity	Reservoir Pressure (Psig.)	
												Original	Current
Sierra area (c-78-C, c-91-D/94-I-14)	Pine Point	Carbonate	Devonian	Stratigraphic	3,680	186	7	15	(1)	0.938	0.690	3,556	(1)
Stoddart	Belloy A	Carbonate	Permian	Stratigraphic	18,656	14	13	12	(1)	0.805	0.695	2,411	(1)
Stoddart West	Belloy	Carbonate	Permian	Stratigraphic	5,776	15	12	20	24	0.828	0.664	2,489	(1)
Sunrise	Cadotte	Sandstone	Lower Cretaceous	Stratigraphic	4,319	17	22	47	(1)	0.915	0.575	696	(1)
Tsea area (b-68-K, b-99-K/94-P-5)	Slave Point	Carbonate	Devonian	Stratigraphic	2,369	82	8	18	(1)	0.935	0.657	2,704	(1)
Two Rivers	Baldonnel	Carbonate	Triassic	Structural	(1)	12	21	25	(1)	0.790	0.676	1,761	1,761
	Halfway	Sandstone	Triassic	Structural	(1)	27	12	36	(1)	0.795	0.668	2,086	(1)
Weasel	Baldonnel	Carbonate	Triassic	Structural	1,890	8	14	36	(1)	0.848	0.638	1,104	(1)
	Halfway	Sandstone	Triassic	Structural	(1)	6	11	43	(1)	0.842	0.649	1,301	(1)
Willow	Halfway	Sandstone	Triassic	Structural	1,233	12	19	17	(1)	0.854	0.635	1,226	(1)
Wolf (d-14-G/94-A-15)	Halfway	Sandstone	Triassic	Structural	(1)	5	16	43	(1)	0.829	0.645	1,462	(1)
Yoyo	Pine Point	Carbonate	Devonian	Structural-stratigraphic	9,679	136	8	15	(1)	0.928	0.704	2,900	(1)

[1] Not available.

TABLE 21.—WELLS DRILLED AND DRILLING, 1969

Well Authorization No.	Well Name	Date Spudded	Date Rig Released	Total Depth	Status at December 31, 1969
2494	ARCo et al Datcin b-70-H	Feb. 17, 1969	Mar. 24, 1969	6,962	Abandoned—dry.
2443	Amarillo et al Rigel 6-32-88-16	Jan. 11, 1969	Jan. 24, 1969	3,564	Abandoned—dry.
2552	Amarillo Cabot N Inga a-81-K	July 27, 1969	Aug. 11, 1969	5,275	Inga gas well.
2533	Amarillo Cabot N Inga d-51-K	Apr. 8, 1969	Apr. 29, 1969	5,490	Inga gas well.
2547	Amoco Beaver d-A64-K	July 11, 1969	———	———	Drilling.
2563	Amoco Beaver b-19-K	Sept. 10, 1969	———	———	Drilling.
2470	Apache GPOG IOE Clarke d-24-I	Feb. 8, 1969	Mar. 21, 1969	7,720	Sulphur Point gas well.
2601	Apache Cecil 6-8-85-17	Dec. 19, 1969	———	———	Drilling.
2604	Apache Shell E Osborn 6-24-88-14	Dec. 16, 1969	Dec. 30, 1969	4,650	Abandoned—dry.
2598	BVX Pacific et al Black c-38-F	Dec. 15, 1969	Dec. 24, 1969	4,175	Abandoned—dry.
2606	Banff et al Stanislas c-28-H	Dec. 22, 1969	———	———	Drilling.
2543	CDR Eagle 8-29-84-18	July 4, 1969	Aug. 3, 1969	6,107	Belloy oil well.
2502	CDR Eagle 11-29-84-18	Feb. 26, 1969	Mar. 27, 1969	6,249	Belloy oil well.
2614	CDR GN Gulf Eagle 14-26-84-18	Dec. 28, 1969	———	———	Drilling.
2570	CIGOL et al Boundary 6-34-83-14	Oct. 13, 1969	Oct. 25, 1969	4,550	Abandoned—dry.
2524	CIGOL et al Coyote d-82-C	Mar. 13, 1969	Mar. 21, 1969	3,950	Abandoned—dry.
2526	CIGOL et al Muskrat d-78-H	Mar. 18, 1969	Mar. 23, 1969	3,770	Abandoned—dry.
2525	CIGOL Pembina N Nig d-53-I	Mar. 15, 1969	Mar. 28, 1969	4,280	Abandoned—dry.
2501	CPOG et al W Altares a-81-B	Feb. 22, 1969	———	———	Drilling.
2437	CPOG et al Sukunka d-57-B	Jan. 10, 1969	July 8, 1969	9,281	Abandoned—dry.
2460	CPOG Thetlaandoa d-1-G	Jan. 26, 1969	Mar. 12, 1969	7,785	Abandoned—dry.
2573	Cabot et al Rigel a-87-K	Oct. 28, 1969	Nov. 10, 1969	4,250	Dunlevy gas well.
2511	Cankee et al Evie b-33-D	Mar. 8, 1969	Apr. 9, 1969	7,654	Abandoned—dry.
2504	Canso E Buick a-5-D	Feb. 23, 1969	Mar. 7, 1969	3,550	Abandoned—dry.
2558	Canso Pac WP Two Rivers 10-7-83-16	Aug. 6, 1969	Aug. 21, 1969	5,216	Abandoned—dry.
2450	Cdn-Sup et al Donis b-64-F	Jan. 14, 1969	Jan. 29, 1969	3,867	Abandoned—dry.
2534	Cdn-Sup Inga 15-12-88-24	June 2, 1969	June 21, 1969	5,340	Inga oil well.
2535	Cdn-Sup Inga 14-13-88-24	July 8, 1969	July 22, 1969	5,275	Inga oil well.
2536	Cdn-Sup Inga 5-5-88-23	July 24, 1969	Aug. 6, 1969	5,260	Inga oil well.
2419	Cdn-Sup Whitehall Inga 6-28-88-24	Dec. 9, 1968	Jan. 2, 1969	5,415	Abandoned—dry.
2461	Cdn-Sup Whitehall Inga b-44-J	Jan. 26, 1969	Feb. 16, 1969	5,270	Inga gas well.
2518	Cdn-Sup Home Red 16-10-86-21	Mar. 10, 1969	Mar. 26, 1969	5,492	Abandoned—dry.
2444	CanDel SR Beavertail c-32-C	Jan. 6, 1969	Jan. 19, 1969	4,173	Abandoned—dry.
2516	Champlin Flatrock 10-9-84-16	Mar. 8, 1969	Mar. 23, 1969	4,900	Halfway gas well.
2556	Champlin et al Flatrock 10-15-84-16	Aug. 24, 1969	Sept. 11, 1969	4,842	Abandoned—dry.
2409	Chaut Dunbar Stoddart 6-26-85-19	Dec. 21, 1968	Jan. 7, 1969	5,978	Belloy gas well.
2548	Chaut Dunbar Stoddart 11-23-85-19	July 15, 1969	Aug. 1, 1969	5,990	Charlie Lake oil well.
2585	Cox SE et al E Beg d-80-G	Nov. 29, 1969	———	———	Drilling.
2549	Cox SE Murphy Aikman d-44-C	July 22, 1969	Sept. 4, 1969	6,850	Abandoned—dry.
2507	Cox Southeastern Cecil 10-5-85-17	Feb. 28, 1969	Mar. 21, 1969	6,149	Abandoned.
2417	Davis CDR NFA Osborn d-53-K	Jan. 22, 1969	Feb. 9, 1969	4,100	Abandoned—dry.

TABLE 21.—WELLS DRILLED AND DRILLING, 1969—*Continued*

Well Authorization No.	Well Name	Date Spudded	Date Rig Released	Total Depth	Status at December 31, 1969
2418	Davis CDR NFA Osborn d-59-J	Jan. 1, 1969	Jan. 18, 1969	4,075	Abandoned—dry.
2600	DiaSham IOE Kyklo b-43-F	Dec. 14, 1969	.....	.....	Drilling.
2523	Dome Badger 6-1-85-19	Mar. 13, 1969	Mar. 30, 1969	4,910	Abandoned—dry.
2434	Dome et al Boudreau 6-10-83-21	Dec. 31, 1968	Jan. 24, 1969	5,040	Abandoned—dry.
2447	Dome Coplin 6-34-86-23	Jan. 11, 1969	Mar. 25, 1969	5,245	Abandoned—dry.
2497	Dome Bear Flat 16-20-84-20	Feb. 23, 1969	Mar. 10, 1969	4,650	Abandoned—dry.
2446	Dome La Garde 10-12-87-16	Jan. 14, 1969	Feb. 24, 1969	4,420	Multiple Baldonnel-Charlie Lake gas well
2428	Dome et al Monias A7-8-82-21	Dec. 14, 1968	Jan. 18, 1969	4,830	Abandoned—dry.
2529	Dome et al Ritchie a-3-J	Mar. 21, 1969	Nov. 25, 1969	6,932	Finished drilling.
2566	Duncan Milligan d-86-G	Dec. 7, 1969	Dec. 17, 1969	3,810	Finished drilling.
2453	FPC Chevron Peggo b-53-I	Jan. 14, 1969	Mar. 4, 1969	7,031	Slave Point gas well.
2517	FPC Chevron et al Helmet b-11-K	Mar. 8, 1969	Apr. 2, 1969	6,090	Slave Point gas well.
2605	GERC Boundary 16-8-85-14	Dec. 29, 1969	.....	.....	Drilling.
2459	Gulf Shell Clarke c-76-H	Jan. 31, 1969	Mar. 9, 1969	6,650	Slave Point gas well.
2435	Guyer et al W Blueberry a-7-L	Dec. 28, 1968	Feb. 1, 1969	4,610	Baldonnel gas well.
2551	Guyer et al W Blueberry d-39-L	July 28, 1969	Aug. 23, 1969	4,856	Baldonnel gas well.
2440	HB The Most c-58-G	Jan. 4, 1969	Feb. 17, 1969	7,427	Abandoned—dry.
2464	HB IOE Union Paddy b-2-B	Jan. 31, 1969	Mar. 5, 1969	8,317	Abandoned—dry.
2493	Home W Ft St John 10-32-83-19	Feb. 13, 1969	Mar. 5, 1969	5,045	Abandoned—dry.
2510	Home Tenn Redeye a-23-I	Mar. 2, 1969	Mar. 12, 1969	4,135	Abandoned—dry.
2508	Homestead et al W Beatton d-14-L	Mar. 9, 1969	Mar. 22, 1969	3,950	Abandoned—dry.
2531	Homestead et al Inga 14-2-88-23	Mar. 27, 1969	Apr. 14, 1969	5,287	Abandoned—dry.
2468	Homestead Pan Am Kimea b-76-A	Feb. 6, 1969	Mar. 2, 1969	6,450	Abandoned—dry.
2538	Horizon Sunrise 10-8-79-16	June 8, 1969	June 23, 1969	3,174	Cadotte gas well.
2559	Horizon Sunrise 11-5-79-16	Aug. 22, 1969	Sept. 3, 1969	3,298	Cadotte gas well.
2560	Horizon Sunrise 11-6-79-16	Aug. 9, 1969	Aug. 20, 1969	3,341	Cadotte gas well.
2564	Horizon Sunrise 11-9-79-16	Sept. 11, 1969	Sept. 23, 1969	3,230	Cadotte gas well.
2569	Horizon Sunrise 11-4-79-16	Oct. 14, 1969	Oct. 25, 1969	3,205	Cadotte gas well.
2586	Houston et al N Pine 10-11-85-18	Dec. 3, 1969	Dec. 25, 1969	5,917	Abandoned—dry.
2506	Husky et al Clarke c-100-H	Feb. 26, 1969	Apr. 4, 1969	6,540	Slave Point gas well.
2455	Husky et al Hornet a-69-H	Jan. 25, 1969	Mar. 19, 1969	9,083	Abandoned—dry.
2594	IOE Pac Inga 16-18-87-23	Dec. 6, 1969	Dec. 23, 1969	5,450	Finished drilling.
2597	IOE Fina Rigel 11-2-88-18	Dec. 19, 1969	Dec. 28, 1969	3,510	Finished drilling.
2432	IOE Fina Rigel 6-21-88-16	Dec. 23, 1968	Jan. 8, 1969	3,625	Abandoned—dry.
2537	IOE et al Rigel c-56-J	June 3, 1969	June 15, 1969	3,650	Dunlevy gas well.
2557	IOE Fina Rigel c-74-J	Aug. 10, 1969	Aug. 19, 1969	3,600	Abandoned—dry.
2565	IOE et al Rigel b-44-J	Oct. 28, 1969	Nov. 5, 1969	3,650	Finished drilling.
2568	Imp Pac Boundary 8-17-85-13	Oct. 13, 1969	Nov. 1, 1969	4,340	Boundary Lake oil well.
2593	Imp et al Rigel 10-35-88-18	Dec. 2, 1969	Dec. 17, 1969	3,450	Dunlevy gas well.
2463	JBA Moberly 4-23-82-22	Jan. 23, 1969	Feb. 20, 1969	5,100	Charlie Lake oil well.
2503	JBA Moberly 10-22-82-22	Feb. 23, 1969	Mar. 11, 1969	4,547	Abandoned—dry.

2553	Jeff Lake W Stoddart 11-20-86-20	Aug. 3, 1969	Aug. 26, 1969	6,300	Belloy gas well.
2542	Kanata Amerada Boundary 16-20-85-14	July 9, 1969	July 17, 1969	4,270	Abandoned—dry.
2431	Marathon LL&E Bigfoot a-26-C	Dec. 26, 1968	Mar. 7, 1969	9,575	Abandoned—dry.
2608	Marathon LL&E Toob d-33-B	Dec. 25, 1969	———	———	Drilling.
2590	Mesa et al Aikman a-92-F	Dec. 5, 1969	———	———	Drilling.
2408	Mesa et al Altares c-61-G	Oct. 30, 1968	Jan. 19, 1969	8,925	Abandoned—dry.
2420	Mesa et al Blueberry b-18-K	Dec. 30, 1968	Mar. 31, 1969	8,330	Debolt oil well (whipstocked hole).
2413	Mesa et al Mooselick a-29-K	Dec. 2, 1968	Feb. 3, 1969	7,552	Abandoned—dry.
2583	Mesa et al Stoddart 7-29-86-19	Nov. 27, 1969	Dec. 18, 1969	6,220	Abandoned—dry.
2539	Mesa et al Stoddart 6-31-85-18	June 11, 1969	July 1, 1969	6,135	Belloy gas well.
2579	Mesa et al Stoddart 11-20-85-18	Nov. 5, 1969	Nov. 25, 1969	6,028	Abandoned—dry.
2595	Mobil Eskai a-58-E	Dec. 28, 1969	———	———	Drilling.
2436	Mobil Sahtaneh c-70-I	Jan. 6, 1969	Mar. 18, 1969	7,767	Slave Point gas well.
2452	Mobil Sierra d-92-D	Feb. 21, 1969	Mar. 15, 1969	2,260	Water disposal.
2596	Mobil Sierra c-A78-C	Dec. 17, 1969	———	———	Drilling.
2480	Monsanto et al Doig d-79-G	Feb. 7, 1969	Feb. 16, 1969	3,830	Abandoned—dry.
2592	Monsanto Tenneco Donis d-34-F	Dec. 18, 1969	———	———	Drilling.
2441	Monsanto Bear Flat 6-21-84-20	Jan. 7, 1969	Jan. 23, 1969	4,696	Charlie Lake oil well.
2462	Monsanto Bear Flat 16-9-84-20	Jan. 26, 1969	Feb. 12, 1969	4,665	Abandoned—dry.
2495	Monsanto Bear Flat 6-9-84-20	Feb. 14, 1969	Feb. 27, 1969	4,750	Abandoned—dry.
2427	Murphy Pembina Inga 6-31-85-23	Dec. 20, 1968	Jan. 5, 1969	5,483	Abandoned—dry.
2550	Murphy Pembina Inga 6-20-85-23	July 20, 1969	Aug. 6, 1969	4,940	Abandoned—dry.
2561	Murphy et al Inga 6-7-86-23	Aug. 31, 1969	Sept. 18, 1969	5,320	Inga oil well.
2610	Pacific ARCo Beavertail c-92-C	Dec. 21, 1969	———	———	Drilling.
2425	Pacific Cabin d-57-B	Dec. 20, 1968	Feb. 6, 1969	6,953	Slave Point gas well.
2509	Pacific Imp Clarke b-10-D	Mar. 3, 1969	Mar. 31, 1969	6,307	Slave Point gas well.
2540	Pacific Imp Clarke b-72-L	June 22, 1969	July 28, 1969	6,278	Slave Point gas well.
2445	Pacific et al Dahl d-11-J	Jan. 7, 1969	Jan. 16, 1969	4,140	Bluesky-Gething gas well.
2466	Pacific CIGOL Dahl d-91-J	Jan. 27, 1969	Feb. 7, 1969	3,700	Bluesky-Gething gas well.
2433	Pacific et al Elleh d-35-E	Jan. 19, 1969	Feb. 19, 1969	7,155	Abandoned—dry.
2588	Pacific Kobes d-57-A	Dec. 2, 1969	———	———	Drilling.
2609	Pacific Kotcho d-70-C	Dec. 24, 1969	———	———	Drilling.
2430	Pacific et al Peejay b-58-E	Feb. 11, 1969	Feb. 21, 1969	3,945	Water-injection well.
2426	Pacific et al Peejay b-47-E	Dec. 19, 1968	Jan. 1, 1969	3,938	Water-injection well.
2483	Pacific et al Peejay b-38-E	Mar. 7, 1969	Mar. 20, 1969	3,975	Water-injection well.
2482	Pacific et al Peejay b-68-E	Feb. 24, 1969	Mar. 5, 1969	3,950	Halfway oil well.
2577	Pacific et al Peejay b-28-E	Dec. 1, 1969	Dec. 10, 1969	3,950	Finished drilling.
2578	Pacific et al Peejay b-59-E	Nov. 21, 1969	Nov. 29, 1969	3,940	Finished drilling.
2587	Pacific et al Peejay b-63-H	Dec. 11, 1969	Dec. 18, 1969	3,930	Finished drilling.
2589	Pacific et al Peejay b-74-H	Dec. 20, 1969	Dec. 28, 1969	3,921	Finished drilling.
2572	Pacific Rigel 11-15-88-18	Nov. 8, 1969	Nov. 18, 1969	3,529	Finished drilling.
2581	Pacific West Prod Siphon 7-34-86-16	Nov. 12, 1969	Dec. 1, 1969	4,740	Finished drilling.
2575	Pacific Stoddart 6-19-86-19	Oct. 29, 1969	Nov. 12, 1969	6,180	Belloy gas well.
2562	Pacific et al Stoddart 11-18-86-19	Sept. 12, 1969	Sept. 26, 1969	6,280	Belloy gas well.
2582	Pacific et al Stoddart 10-12-86-20	Nov. 5, 1969	Dec. 2, 1969	6,470	Abandoned—dry.
2584	Pacific W Stoddart 7-11-87-21	Dec. 5, 1969	Dec. 27, 1969	6,630	Abandoned—dry.
2456	Pacific Wildboy d-8-H	Feb. 13, 1969	Mar. 13, 1969	6,215	Abandoned.

TABLE 21.—WELLS DRILLED AND DRILLING, 1969—*Continued*

Well Authorization No.	Well Name	Date Spudded	Date Rig Released	Total Depth	Status at December 31, 1969
2602	Pacific Yoyo d-12-I	Dec. 17, 1969	----------	------	Drilling.
2442	Pan Am Redeye d-89-D	Jan. 8, 1969	Jan. 31, 1969	3,430	Halfway gas well.
2512	Pan Am Redeye c-16-D	Mar. 3, 1969	Mar. 13, 1969	3,550	Abandoned—dry.
2473	Pan Am Segar c-45-E	Feb. 6, 1969	Mar. 22, 1969	7,431	Abandoned—dry.
2454	Pan Am Dome Silver d-83-C	Jan. 14, 1969	Feb. 1, 1969	3,590	Abandoned—dry.
2522	Penzl ACT W Boundary 10-23-84-15	June 30, 1969	July 10, 1969	4,863	Abandoned—dry.
2612	Penzl et al Snake b-51-J	Dec. 29, 1969	----------	------	Drilling.
2496	Placid Banner Sandy d-28-G	Feb. 18, 1969	Mar. 1, 1969	3,837	Halfway gas well.
2365	Security Cypress a-92-K	Jan. 16, 1969	Feb. 23, 1969	4,692	Baldonnel gas well.
2415	Security Cypress d-99-C	Nov. 23, 1968	Jan. 4, 1969	4,625	Abandoned—dry.
2491	Sinclair Pacific Romeo d-75-J	Feb. 18, 1969	Mar. 27, 1969	7,388	Abandoned—dry.
2429	Sinclair Pacific S Sierra a-37-K	Jan. 2, 1969	Feb. 11, 1969	6,790	Abandoned—dry.
2492	Sinclair S Wargen d-18-J	Feb. 16, 1969	Feb. 25, 1969	3,975	Abandoned—dry.
2469	Sinclair Wargen d-37-B	Feb. 4, 1969	Feb. 14, 1969	4,067	Abandoned—dry.
2286	Stampede Banff Aquit N Paddy a-63-J	Feb. 20, 1968	Feb. 21, 1969	8,689	Abandoned—dry.
2474	Tenn Cdn-Sup et al Inga d-17-J	Feb. 19, 1969	Mar. 6, 1969	5,335	Inga oil well.
2438	Tenn et al Inga 8-21-88-24	Jan. 5, 1969	Jan. 19, 1969	5,325	Abandoned—dry.
2544	Tenn Cdn-Sup et al Inga d-28-J	Aug. 9, 1969	Aug. 20, 1969	5,455	Abandoned—dry.
2576	Tenn Cdn-Sup et al Inga c-20-J	Nov. 2, 1969	----------	------	Drilling.
2613	Tenn Osprey d-13-J	Dec. 30, 1969	----------	------	Drilling.
2554	Tenn Peejay b-76-H	Oct. 22, 1969	Nov. 1, 1969	3,920	Water-injection well.
2555	Tenn Peejay b-86-H	Aug. 12, 1969	Aug. 19, 1969	3,910	Water-injection well.
2545	Tenn et al Weasel b-34-B	July 14, 1969	July 21, 1969	3,880	Halfway oil well.
2546	Tenn et al Weasel b-35-B	July 21, 1969	July 29, 1969	3,915	Water-injection well.
2467	Texaco et al Boundary 7-7-86-13	Jan. 31, 1969	Feb. 10, 1969	4,336	Boundary Lake oil well.
2475	Texaco et al Boundary 11-36-85-14	Feb. 27, 1969	Mar. 7, 1969	4,466	Boundary Lake oil well.
2476	Texaco et al Boundary 5-8-86-13	Mar. 11, 1969	Mar. 17, 1969	4,300	Boundary Lake oil well.
2477	Texaco et al Boundary 7-31-85-13	Mar. 10, 1969	Mar. 17, 1969	4,346	Boundary Lake oil well.
2478	Texaco et al Boundary 5-7-86-13	Feb. 12, 1969	Feb. 22, 1969	4,330	Boundary Lake oil well.
2479	Texaco et al Boundary 5-29-85-13	Mar. 18, 1969	Mar. 31, 1969	4,330	Boundary Lake oil well.
2484	Texaco et al Boundary 11-20-85-13	June 11, 1969	June 17, 1969	4,349	Boundary Lake oil well.
2485	Texaco et al Boundary 7-19-85-13	Apr. 2, 1969	Apr. 12, 1969	4,309	Boundary Lake oil well.
2486	Texaco et al Boundary 7-24-85-14	Mar. 26, 1969	Apr. 2, 1969	4,269	Boundary Lake oil well.
2487	Texaco et al Boundary 10-23-85-14	Mar. 19, 1969	Mar. 25, 1969	4,275	Boundary Lake oil well.
2488	Texaco et al Boundary 5-17-86-13	June 19, 1969	June 27, 1969	4,275	Abandoned—dry.
2489	Texaco et al Boundary 5-18-86-13	Feb. 23, 1969	Mar. 3, 1969	4,301	Boundary Lake oil well.
2490	Texaco et al Boundary 7-18-86-13	Mar. 4, 1969	Mar. 10, 1969	4,296	Boundary Lake oil well.
2498	Texaco et al Boundary 7-28-85-14	June 3, 1969	June 9, 1969	4,332	Boundary Lake oil well.
2499	Texaco et al Boundary 5-27-85-14	Apr. 5, 1969	Apr. 11, 1969	4,369	Boundary Lake oil well.
2500	Texaco et al Boundary 7-24-86-14	June 9, 1969	June 16, 1969	4,285	Boundary Lake oil well.
2513	Texaco et al Boundary 5-19-86-13	June 1, 1969	June 8, 1969	4,299	Boundary Lake oil well.

2515	Texaco et al Boundary 3-30-86-13	June 17, 1969	June 24, 1969	4,350	Boundary Lake oil well.
2519	Texaco et al Boundary 7-13-86-14	Mar. 19, 1969	Mar. 26, 1969	4,303	Boundary Lake oil well.
2520	Texaco et al Boundary 7-12-86-14	Mar. 28, 1969	Apr. 4, 1969	4,339	Boundary Lake oil well.
2541	Texaco et al Boundary 6-20-86-13	July 10, 1969	July 19, 1969	4,333	Abandoned—dry.
2457	Texaco Dahl a-67-J	Feb. 1, 1969	Feb. 13, 1969	3,703	Bluesky-Gething gas well.
2458	Texaco Dahl a-87-G	Feb. 16, 1969	Feb. 23, 1969	3,800	Abandoned—dry.
2439	Texaco NFA Romeo a-34-E	Jan. 3, 1969	Mar. 7, 1969	7,250	Abandoned—dry.
2449	Texaco NFA Strip b-14-B	Jan. 14, 1969	Feb. 28, 1969	7,640	Abandoned—dry.
2567	Texcan N Cache 10-20-88-22	Oct. 15, 1969	Nov. 2, 1969	5,100	Charlie Lake gas well.
2423	Texcan N Cache 6-28-88-22	Dec. 12, 1968	Jan. 2, 1969	5,034	Multiple Halfway-Inga gas well.
2448	Triad BP CIGOL N Beatton d-1-C	Jan. 13, 1969	Jan. 22, 1969	3,800	Abandoned—dry.
2514	Triad et al W Beatton d-67-K	Mar. 4, 1969	Mar. 12, 1969	3,497	Abandoned—dry.
2465	Triad et al W Beatton d-23-L	Jan. 25, 1969	Feb. 4, 1969	3,470	Bluesky-Gething oil well.
2599	Triad et al Pine 6-21-81-21	Dec. 23, 1969			Drilling.
2293	UOHL et al Cheves b-58-L	Feb. 14, 1968	Jan. 14, 1969	8,280	Abandoned—dry.
2521	Union HB Bluebell d-12-H	Mar. 11, 1969	Mar. 17, 1969	3,726	Abandoned.
2528	Union HB Sinclair Crush b-38-F	Mar. 19, 1969	Mar. 27, 1969	3,875	Abandoned—dry.
2532	Union HB Sinclair Crush b-48-F	Mar. 29, 1969	Apr. 9, 1969	3,871	Halfway oil well.
2505	Union et al Evergreen d-24-J	Feb. 26, 1969	Mar. 6, 1969	3,854	Halfway gas well.
2615	Union HB Gulf Ladyfern d-77-H	Dec. 30, 1969			Drilling.
2591	Union Silverberry 11-8-88-20	Dec. 5, 1969			Drilling.
2580	Uno-Tex et al Stoddart 10-22-85-19	Nov. 7, 1969	Nov. 24, 1969	6,250	Abandoned—dry.
2530	WECo et al Halfway A6-23-87-25	Mar. 27, 1969	Apr. 22, 1969	5,110	Abandoned—dry.
2481	West Nat et al Oriole d-68-L	Mar. 1, 1969	Mar. 28, 1969	6,820	Abandoned—dry.
2571	Westcoast Montney 6-28-86-18	Oct. 25, 1969	Nov. 19, 1969	4,785	Abandoned—dry.
2574	Woods Amerada N Julienne d-33-H	Oct. 30, 1969	Dec. 2, 1969	5,440	Finished drilling.

TABLE 22.—OILFIELDS AND GASFIELDS DESIGNATED AT DECEMBER 31, 1969

Field	Date Designated	Date(s) Revised	Field Location	Pool(s)	Number of Wells Capable of Production	Discovery Well(s)	Pool(s) Discovered
Airport	Oct. 1, 1968		Tp. 83, R. 17, W. of 6th M.	4, 6, 10	3	Pacific Airport 8-32-83-17(3), gas	4
						Pacific Airport 12-34-83-17(10), gas	10
						Pacific Airport 9-32-83-17(97), gas	6
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	3
Bear Flat	Oct. 1, 1969		Tp. 84, R. 20, W. of 6th M.	7	3	Monsanto Bear Flat 7-16-84-20, oil	7
Beatton River	Aug. 7, 1959	Jan. 1, 1962	N.T.S. 94-H-2	10	12	Triad Beatton d-60-J, gas	10
						Triad Beatton River b-38-J, oil	10
Beatton River West	Aug. 7, 1959	Jan. 1, 1962 Oct. 1, 1964 Apr. 1, 1969	N.T.S. 94-H-2	2	12	Triad West Beatton River d-39-K, oil	2
Beaverdam	Apr. 1, 1966		N.T.S. 94-A-16	10	3	Tenn Sun Beaverdam d-37-L, gas	10
						Tenn Beaverdam d-38-L, oil	10
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, 10	34	Pacific et al Beg b-17-K, gas	6
						Pacific et al Beg d-10-G, gas	10
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.	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, 10, 12	33	West Nat et al Blueberry b-22-D, gas	10
						West Nat et al Blueberry c-32-D, gas	5
						West Nat et al Blueberry d-87-D, gas	6
						West Nat et al Blueberry a-61-L, gas	7
						West Nat et al Blueberry d-82-L, oil	12
Blueberry East	Dec. 22, 1958		N.T.S. 94-A-13	6, 10, 12	2	West Nat et al E Blueberry b-38-C, gas	6, 10
						West Nat et al E Blueberry b-36-C, gas	12
Blueberry West	Feb. 7, 1958	July 1, 1961 Oct. 1, 1969	N.T.S. 94-A-12, 94-B-9, 94-B-16, Tp. 88, R. 25, W. of 6th M.	5, 6	5	West Nat et al W Blueberry d-82-I, gas	5
						West Nat et al W Blueberry d-19-L, gas	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, 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, 4, 5, 6, 9, 10	290	Pacific Boundary 8-15-85-14, gas and oil	2, 4, 6
						Pacific Boundary 12-10-85-14, gas	3
						Amerada Boundary 8-5-85-14, gas	5
						Texaco NFA Boundary L 6-6-85-14 (1), oil	9
						Sun Boundary Lake 6-23-85-14, oil	10
						Texaco NFA Boundary 16-31-86-13, gas	10

Boundary Lake North	Jan. 1, 1965	Apr. 1, 1966	Tp. 87, R. 14, W. of 6th M.	10	4	Texaco NFA N Boundary 7-3-87-14, gas — 10
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	18	Texaco NFA Buick Creek d-98-I (1), gas — 5 Texaco NFA Buick Creek d-83-J (4), gas — 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	12	Texaco NFA E Buick c-80-D, gas — 2 Decalta et al E Buick c-74-A, oil — 5 Texaco NFA E Buick a-31-A, gas — 5
Buick Creek North	Apr. 1, 1967		N.T.S. 94-A-14	2, 5	8	Pacific West Prod N Buick c-22-F, gas — 2, 5
Buick Creek West	Feb. 7, 1958	Jan. 6, 1959 Feb. 15, 1960 Jan. 1, 1963	N.T.S. 94-A-11, 94-A-14	3, 5, 6, 10	15	Pacific West Buick Creek c-2-E (6), gas — 3 Pacific W Buick Creek c-83-K (13A), oil — 5 Pacific West Buick Creek b-78-C (2), gas — 5 Pacific West Buick Creek d-58-C (8), gas — 6 Pacific West Buick Creek b-23-E (1), gas — 10
Bulrush	July 1, 1964	Apr. 1, 1967	N.T.S. 94-A-16	10	4	Union HB Sinclair Bulrush d-78-F, oil — 10
Bulrush East	Apr. 1, 1967		N.T.S. 94-A-16	10	1	Dome Provo Co-op E Bulrush d-5-K, oil — 10
Charlie Lake	Jan. 1, 1961		Tp. 84, R. 18, W. of 6th M.	3	1	Imp Pac Charlie 13-5-84-18, oil — 3
Clarke Lake	Feb. 15, 1960	May 27, 1960 Jan. 1, 1961 Apr. 1, 1962 Apr. 1, 1965 Apr. 1, 1966 Jan. 1, 1967 Apr. 1, 1967 July 1, 1967 July 1, 1968 July 1, 1969	N.T.S. 94-J-9, 94-J-10, 94-J-15, 94-J-16	14	29	West Nat et al Clarke Lake c-47-J, gas — 14
Clarke Lake South	Oct. 1, 1968		N.T.S. 94-J-9	14	2	West Nat IOE S Clarke d-29-K, gas — 14
Crush	Apr. 1, 1968	July 1, 1968 Oct. 1, 1968	N.T.S. 94-A-16	10	10	Union et al Crush d-28-F, oil — 10
Currant	Oct. 1, 1965		N.T.S. 94-A-9, 94-A-16	10	10	Union HB Sinc Pac Currant d-37-C, gas — 10 Sinclair et al Currant d-17-C, oil — 10
Dawson Creek	Feb. 7, 1958		Tp. 79, R. 15, W. of 6th M.	1	2	Pac Sc Dawson Ck 1-15-79-15 (1), gas — 1
Farrell Creek	Jan. 1, 1968		N.T.S. 94-A-15, 94-B-8 Tp. 85, R. 26, W. of 6th M. Tp. 86, R. 26, W. of 6thM.	7, 10	5	Ft St John Petroleums Farrel a-9-L, gas — 10 CanDel et al Farrell a-41-I, gas — 7

TABLE 22.—OILFIELDS AND GASFIELDS DESIGNATED AT DECEMBER 31, 1969—*Continued*

Field	Date Designated	Date(s) Revised	Field Location	Pool(s)	Number of Wells Capable of Production	Discovery Well(s)	Pool(s) Discovered
Fort St. John	Aug. 22, 1956	Feb. 7, 1958 Feb. 15, 1960 Jan. 1, 1961 Oct. 1, 1968 Apr. 1, 1969	Tp. 83, R. 18, W. of 6th M.	4, 6, 7, 10, 11	30	Pacific Ft St John A3-29-83-18 (31), gas Pacific Ft St John 14-15-83-18 (7), gas Pacific Ft St John B3-29-83-18 (52), 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 7 10 11 11
Fort St. John Southeast	Feb. 7, 1958		Tp. 82, 83, R. 17, W. of 6th M.	4, 6, 10, 11	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 10 11
Gundy Creek	Feb. 7, 1958	Jan. 6, 1959	N.T.S. 94-B-16	6, 7	5	West Nat Gundy Creek b-69-A, gas West Nat Gundy Creek c-80-A, gas	7 6
Halfway	Dec. 22, 1958		Tp. 86, 87, R. 25, W. of 6th M.	6, 7	4	West Nat et al Halfway 5-1-87-25, gas West Nat et al Halfway 8-11-87-25, gas West Nat et al Halfway 14-11-87-25, oil	6 7 7
Highway	Feb. 7, 1958		N.T.S. 94-B-16	5, 6, 12	6	West Nat el at Highway b-3-I (1), gas Pacific Highway b-25-I (1), gas Pacific Highway a-90-I (4), gas	5 6 12
Inga	Jan. 1, 1967	Apr. 1, 1968 July 1, 1968 Oct. 1, 1968 Jan. 1, 1969 Apr. 1, 1969	Tp. 86, R. 23, 24, W. of 6th M. Tp. 87, R. 23, 24, W. of 6th M. Tp. 88, R. 23, 24, W. of 6th M. N.T.S. 94-A-12 Tp. 85, R. 23, W. of 6th M.	6, 7, 8	64	Cdn-Sup et al Inga 10-25-88-24, oil Hunt Sands Pac Imp Inga 7-16-86-23, oil Texaco Inga 6-25-87-24, oil	8 6 7
Jeans West	July 1, 1968		N.T.S. 94-A-12, 94-A-13	7, 8	4	West Nat et al W Jeans a-22-B, gas West Nat et al W Jeans, b-10-A, gas	8 7
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, 10	45	Pacific Imperial Jedney a-95-C, gas Pacific et al Jedney b-88-J, gas Pacific Imp Jedney d-99-J, gas	3 6 10
Jedney West	July 1, 1964		N.T.S. 94-G-1, 94-G-8	6, 10	3	Pacific et al W Jedney b-84-K, gas	6, 10
Kobes-Townsend	Dec. 22, 1958	Feb. 15, 1960	N.T.S. 94-B-8, 94-B-9	5, 7, 10, 12	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, 10 12
Kotcho Lake	Apr. 1, 1962	Apr. 1, 1967	N.T.S. 94-I-14, 94-P-3	14	6	West Nat Kotcho Lake c-67-K, gas	14
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	10	22	Union HB Milligan Creek d-73-G, oil — 10
Moberly Lake	Jan. 1, 1969	Apr. 1, 1969	Tp. 82, R. 22, W. of 6th M.	7	2	JBA Moberly 10-15-82-22, oil — 7
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, 10	4	Pac Sunray Montney 16-32-86-19 (3), gas — 2 Pac Sunray Montney 14-36-86-19 (2), gas — 7 Pac Sunray Montney 14-31-86-19 (5), gas — 10
Nettle	Apr. 1, 1966		N.T.S. 94-H-7	2	5	Union KCL ROC Nettle d-67-A, oil — 2 Union KCL ROC Nettle d-76-A, gas — 2
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	30	Texaco NFA Nig Creek a-79-B (1), gas — 6 Texaco NFA Nig d-87-A, oil — 6
North Pine	Oct. 1, 1968	Oct. 1, 1969	Tp. 85, R. 18, W. of 6th M.	7	3	Texaco N Pine 6-15-85-18, oil — 7 Pacific et al N Pine 6-27-85-18, gas — 7
Osprey	Apr. 1, 1966		N.T.S. 94-A-15	10	3	Pacific SR CanDel Osprey d-4-J, oil — 10
Parkland	Feb. 7. 1958	July 1, 1963	Tp. 81, R. 15, W. of 6th M.	13	2	Pacific Imp Parkland 6-29-81-15, gas — 13
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 Apr. 1, 1967 July 1, 1967 Jan. 1, 1968	N.T.S. 94-A-15, 94-A-16	10	94	Pacific SR West Cdn Peejay d-52-I, gas — 10 Pacific Sinclair Peejay d-39-E, oil — 10
Peejay West	Jan. 1, 1963		N.T.S. 94-A-15	10	2	Pacific SR West Cdn W Peejay d-54-G, oil — 10
Petitot River	Apr. 1, 1961		N.T.S. 94-P-12, 94-P-13	14	3	West Nat Petitot River d-24-D, gas — 14
Red Creek	Feb. 7, 1958	Aug. 7, 1959 Feb. 15, 1960	Tp. 85, R. 21, W. of 6th M.	7, 10	2	Pacific Red Creek 5-27-85-21 (36), gas — 7, 10
Rigel	Oct. 1, 1962	Jan. 1, 1963 Apr. 1, 1963 Jan. 1, 1964 Oct. 1, 1964 Oct. 1, 1965 Jan. 1, 1967 July 1, 1967 July 1, 1968 Oct. 1, 1968 Jan. 1, 1969 July 1, 1969	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. 87, 88, R. 18, W. of 6th M. Tp. 88, R. 19, W. of 6th M.	5	49	Monsanto Rigel 6-13-87-17, oil — 5 Imp Fina Rigel 4-27-88-17, gas — 5

TABLE 22.—OILFIELDS AND GASFIELDS DESIGNATED AT DECEMBER 31, 1969—*Continued*

Field	Date Designated	Date(s) Revised	Field Location	Pool(s)	Number of Wells Capable of Production	Discovery Well(s)	Pool(s) Discovered
Sierra	Oct. 1, 1969		N.T.S. 94-I-14	15	2	Socony Mobil Sierra c-78-C, gas	15
Stoddart	Jan. 6, 1959	Feb. 15, 1960 Apr. 1, 1965 Jan. 1, 1966 Apr. 1, 1967 Apr. 1, 1969 Oct. 1, 1969	Tp. 86, R. 19, 20, W. of 6th M. Tp. 85, R. 19, W. of 6th M.	7, 11	18	Pacific Stoddart 4-24-86-20 (85), gas Uno-Tex et al Stoddart 10-31-85-19, oil Chaut Dunbar Stoddart 11-23-85-19, oil	11 11 7
Stoddart West	Apr. 1, 1964		Tp. 86, R. 20, W. of 6th M.	11	1	Pacific W Stoddart 11-10-86-20, gas	11
Sunrise	Oct. 1, 1969		Tp. 78, 79, R. 16, W. of 6th M.	1	8	Pacific Sunrise 10-7-79-16 (3), gas	1
Two Rivers	Apr. 1, 1969		Tp. 83, R. 16, W. of 6th M.	6, 7, 10	3	Champlin Two Rivers 10-5-83-16, gas Champlin et al Two Rivers 6-9-83-16, gas	7 6, 10
Weasel	Apr. 1, 1966	Apr. 1, 1967	N.T.S. 94-H-2, 94-A-15	6, 10	23	Tenn Ashland Weasel d-35-B, oil Sinclair Pacific Weasel d-93-J, gas Pacific Sinclair Weasel d-50-A, gas	10 6 10
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	10	28	Union HB Wildmint d-46-A, oil Tenn Wildmint d-4-A, gas	10 10
Willow	July 1, 1963		N.T.S. 94-H-2	2, 10	3	Union HB Willow b-10-H, gas Union HB Willow d-20-H, oil	2, 10
Wolf	Apr. 1, 1967		N.T.S. 94-H-15	10	5	Baysel Sinclair Wolf d-93-B, oil Baysel Sinclair Wolf d-3-G, gas	10 10
Yoyo	Apr. 1, 1965	Jan. 1, 1967 Jan. 1, 1968	N.T.S. 94-I-13, 94-I-14	14, 15	11	West Nat et al Yoyo b-24-L, gas West Nat et al Yoyo b-29-I, gas	15 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 Inga sandstone.
9. Triassic Boundary Lake carbonate.
10. Triassic Halfway sandstone.
11. Permian Belloy carbonate.
12. Debolt carbonate.
13. Upper Devonian Wabamun carbonate.
14. Middle Devonian Slave Point carbonate.
15. Middle Devonian Pine Point carbonate.

TABLE 23.—NUMBER OF PRODUCING AND PRODUCIBLE WELLS AT DECEMBER 31, 1969[1]

Field and Pool	Oil Wells		Natural-gas Wells	
	Producing	Producible	Producing	Producible
Airport field—				
Cadomin	-----	-----	1	1
Baldonnel	-----	-----	-----	1
Halfway	-----	-----	-----	1
Field totals	-----	-----	1	3
Aitken Creek field—Gething	4	5	3	3
Bear Flat field—Charlie Lake	2	3	-----	-----
Beatton River field—Halfway	8	11	-----	1
Beatton River West field—Bluesky-Gething	8	12	-----	-----
Beaverdam field—Halfway	-----	1	-----	2
Beg field—				
Baldonnel	-----	-----	11	17
Halfway	-----	-----	14	17
Field totals	-----	-----	25	34
Beg West field—Baldonnel	-----	-----	2	3
Bernadet field—Bluesky-Gething	-----	-----	1	1
Blueberry field—				
Dunlevy	-----	-----	4	7
Baldonnel	-----	-----	1	3
Charlie Lake	-----	-----	-----	2
Halfway	-----	-----	-----	1
Debolt	19	20	-----	-----
Field totals	19	20	5	13
Blueberry East field—				
Baldonnel	-----	-----	-----	1
Debolt	-----	-----	-----	1
Field totals	-----	-----	-----	2
Blueberry West field—				
Dunlevy	-----	-----	2	2
Baldonnel	-----	-----	-----	3
Field totals	-----	-----	2	5
Boundary Lake field—				
Bluesky-Gething	-----	-----	-----	2
Gething	-----	-----	1	2
Cadomin	-----	1	-----	-----
Dunlevy	-----	-----	-----	1
Baldonnel	-----	-----	3	6
Boundary Lake	256	269	-----	-----
Basal Boundary Lake	-----	-----	1	1
Halfway	4	6	-----	2
Field totals	260	276	5	14
Boundary Lake North field—Halfway	-----	-----	-----	4
Bubbles field—Baldonnel	-----	-----	8	13
Buick Creek field—				
Dunlevy	-----	-----	15	17
Charlie Lake	-----	-----	-----	1
Field totals	-----	-----	15	18
Buick Creek East field—				
Bluesky-Gething	-----	-----	-----	2
Dunlevy	1	2	8	8
Field totals	1	2	8	10
Buick Creek North field—				
Bluesky-Gething	-----	-----	-----	2
Dunlevy	-----	-----	3	6
Field totals	-----	-----	3	8
Buick Creek West field—				
Gething	-----	-----	-----	1
Dunlevy	-----	2	7	9
Baldonnel	-----	-----	1	2
Halfway	-----	-----	-----	1
Field totals	-----	2	8	13
Bulrush field—Halfway	3	4	-----	-----
Bulrush East field—Halfway	1	1	-----	-----
Charlie Lake field—Gething	-----	1	-----	-----
Clarke Lake field—Slave Point	-----	-----	20	29
Clarke Lake South field—Slave Point	-----	-----	-----	2

[1] Each zone of a multiple completion is counted as a well.

TABLE 23.—NUMBER OF PRODUCING AND PRODUCIBLE WELLS AT DECEMBER 31, 1969[1]—*Continued*

Field and Pool	Oil Wells		Natural-gas Wells	
	Producing	Producible	Producing	Producible
Crush field—Halfway	6	10	.....	.....
Currant field—Halfway	2	6	.....	4
Dawson Creek field—				
Dunvegan	.....	.....	.....	1
Cadotte	.....	.....	.....	1
Field totals	.....	.....	.....	2
Farrell Creek field—				
Charlie Lake	.....	.....	2	2
Halfway	.....	.....	1	3
Field totals	.....	.....	3	5
Fort St. John field—				
Cadomin	.....	.....	.....	2
Baldonnel	.....	.....	9	12
Charlie Lake	4	4	.....	1
Halfway	.....	.....	6	8
Belloy	.....	1	2	2
Field totals	4	5	17	25
Fort St. John Southeast field—				
Cadomin	.....	.....	.....	1
Baldonnel	.....	.....	2	2
Halfway	.....	.....	2	6
Belloy	.....	.....	4	6
Field totals	.....	.....	8	15
Gundy Creek field—				
Baldonnel	.....	.....	.....	4
Charlie Lake	.....	.....	.....	1
Field totals	.....	.....	.....	5
Halfway field—				
Baldonnel	.....	.....	1	2
Charlie Lake	.....	1	.....	1
Field totals	.....	1	1	3
Highway field—				
Dunlevy	.....	.....	1	1
Baldonnel	.....	.....	.....	4
Debolt	.....	.....	.....	1
Field totals	.....	.....	1	6
Inga field—				
Inga	54	58	.....	1
Baldonnel	.....	1	3	3
Charlie Lake	.....	1	.....	.....
Field totals	54	60	3	4
Jeans West field—				
Inga	.....	.....	.....	1
Charlie Lake	.....	.....	.....	3
Field totals	.....	.....	.....	4
Jedney field—				
Gething	.....	.....	.....	1
Baldonnel	.....	.....	16	21
Halfway	.....	.....	19	23
Field totals	.....	.....	35	45
Jedney West field—				
Baldonnel	.....	.....	.....	1
Halfway	.....	.....	.....	2
Field totals	.....	.....	.....	3
Kobes-Townsend field—				
Dunlevy	.....	.....	3	3
Charlie Lake	.....	.....	5	5
Halfway	.....	.....	2	2
Debolt	.....	.....	1	2
Field totals	.....	.....	11	12
Kotcho Lake field—Slave Point	.....	.....	3	6
Laprise Creek field—Baldonnel	.....	.....	31	40
Laprise Creek West field—Baldonnel	.....	.....	.....	2
Milligan Creek field—Halfway	16	21	.....	1
Moberly Lake field—Charlie Lake	2	2	.....	.....

[1] Each zone of a multiple completion is counted as a well.

TABLE 23.—NUMBER OF PRODUCING AND PRODUCIBLE WELLS AT DECEMBER 31, 1969[1]—*Continued*

Field and Pool	Oil Wells		Natural-gas Wells	
	Producing	Producible	Producing	Producible
Montney field—				
Bluesky-Gething	-----	-----	-----	1
Charlie Lake	-----	-----	-----	1
Halfway	-----	-----	-----	2
Field totals	-----	-----	-----	4
Nettle field—				
Bluesky-Gething	-----	3	-----	1
Halfway	-----	-----	-----	1
Field totals	-----	3	-----	2
Nig Creek field—Baldonnel	1	1	21	29
North Pine field—Charlie Lake	1	1	1	2
Osprey field—Halfway	1	3	-----	-----
Parkland field—Wabamun	-----	-----	2	2
Peejay field—Halfway	81	92	-----	4
Peejay West field—Halfway	-----	2	-----	-----
Petitot River field—Slave Point	-----	-----	-----	3
Red Creek field—				
Charlie Lake	-----	-----	-----	1
Halfway	-----	-----	-----	1
Field totals	-----	-----	-----	2
Rigel field—Dunlevy	5	7	19	42
Sierra field—Pine Point	-----	-----	1	2
Stoddart field—				
Belloy	3	3	11	14
Charlie Lake	1	1	-----	-----
Field totals	4	4	11	14
Stoddart West field—Belloy	-----	-----	-----	1
Sunrise field—Cadotte	-----	-----	-----	8
Two Rivers field—				
Baldonnel	-----	-----	-----	1
Charlie Lake	-----	-----	1	1
Halfway	-----	-----	1	1
Field totals	-----	-----	2	3
Weasel field—				
Baldonnel	-----	-----	1	1
Halfway	16	20	-----	2
Field totals	16	20	1	3
Wildmint field—Halfway	11	26	-----	2
Willow field—				
Bluesky-Gething	1	1	-----	-----
Halfway	-----	-----	-----	2
Field totals	1	1	-----	2
Wolf field—Halfway	3	4	-----	1
Yoyo field—Pine Point	-----	-----	7	11
Other areas—				
Cadotte	-----	-----	-----	2
Notikewin	-----	-----	-----	1
Bluesky-Gething	-----	2	-----	15
Gething	-----	-----	-----	3
Dunlevy	-----	-----	-----	9
Baldonnel	-----	-----	-----	34
Inga	-----	-----	-----	3
Charlie Lake	-----	-----	-----	10
Boundary Lake	-----	-----	-----	1
Halfway	-----	3	-----	31
Permo Carboniferous	-----	-----	-----	4
Belloy	-----	1	2	11
Debolt	-----	-----	-----	12
Kiskatinaw	-----	-----	-----	1
Banff	-----	-----	-----	2
Sulphur Point	-----	-----	-----	1
Slave Point	-----	-----	-----	27
Slave Point-Sulphur Point	-----	-----	-----	1
Pine Point	-----	-----	-----	5
Nahanni	-----	-----	-----	3
Confidential	1	1	-----	9
Areas totals	1	7	2	185
Totals	515	614	286	682

[1] Each zone of a multiple completion is counted as a well.

TABLE 24.—MONTHLY CRUDE-OIL PRODUCTION BY FIELDS AND POOLS, 1969

(Quantities in barrels.)

Field and Pool	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Aitken Creek—													
Gething	30,162	24,715	26,957	26,985	26,189	18,265	25,545	28,011	27,725	26,914	26,443	28,434	316,345
Gething[1]	2,143	1,594	2,715	3,072	2,995	2,599	2,801	2,612	2,529	2,577	2,350	2,982	30,969
Field totals	32,305	26,309	29,672	30,057	29,184	20,864	28,346	30,623	30,254	29,491	28,793	31,416	347,314
Bear Flat—Charlie Lake	3,743	4,404	5,524		4,560	5,871	6,039	5,971	5,144	4,881	4,952	4,996	56,085
Beatton River—Halfway	52,392	47,238	52,281	51,550	53,772	49,634	62,981	48,109	52,622	28,331	44,890	53,640	597,440
Beatton River West—Bluesky-Gething	8,085	16,050	19,033	16,201	16,463	13,046	15,739	18,550	14,121	17,137	13,419	16,745	184,589
Blueberry—													
Dunlevy[1]	20	24	23	25	24	25	24	24	24	24	25	24	286
Debolt	53,681	48,717	53,535	54,901	54,034	50,748	55,224	54,443	53,655	57,830	46,556	52,785	636,109
Field totals	53,701	48,741	53,558	54,926	54,058	50,773	55,248	54,467	53,679	57,854	46,581	52,809	636,395
Boundary Lake—													
Cadomin						292		239	148	270			949
Boundary	681,601	615,330	710,721	717,352	744,421	744,764	777,675	705,458	780,263	793,404	777,106	787,136	8,835,231
Halfway	5,409	7,331	6,553	7,194	8,334	6,931	6,364	5,420	4,932	7,557	6,215	6,407	78,647
Field totals	687,010	622,661	717,274	724,546	752,755	751,987	784,039	711,117	785,343	801,231	783,321	793,543	8,914,827
Buick Creek—Dunlevy[1]	2,464	2,090	2,151	1,091	978	794	700	1,320	1,600	1,426	1,671	1,708	17,993
Buick Creek East—													
Dunlevy	1,245	1,327	1,504	237	913	571	1,205	1,392	724	1,048	1,078	1,243	12,487
Dunlevy[1]			77	101	65	42							285
Field totals	1,245	1,327	1,581	338	978	613	1,205	1,392	724	1,048	1,078	1,243	12,772
Bulrush—Halfway	8,593	7,299	7,940	8,264	8,417	7,669	7,739	7,935	5,047	7,007	6,662	7,373	89,945
Bulrush East—Halfway					546	416	543	546	63	359	487	517	3,477
Crush—Halfway	21,037	20,537	21,253	22,133	26,969	20,292	28,750	19,276	17,923	23,550	20,487	15,362	257,569
Currant—Halfway	19,886	16,831	17,733	19,812	20,088	15,027	22,547	19,836	19,899	19,949	14,982	20,111	226,701
Fort St. John—Charlie Lake	1,953	2,225	1,949	1,132	1,784	1,607	2,198	2,431	1,862	1,933	1,320	1,580	21,974
Inga—Inga	187,167	129,602	246,924	177,872	203,548	177,048	253,947	277,099	264,880	279,880	271,521	245,130	2,714,618
Milligan—Halfway	284,508	294,145	307,815	284,464	299,700	264,162	302,853	328,539	295,752	296,699	315,413	326,976	3,601,026
Moberly Lake—Charlie Lake	999	1,010	1,064		709	968	2,734	1,885	775	739	1,796	1,503	14,182
Nig Creek—Baldonnel	1,563	1,407	1,594	666	1,115	1,397	1,308	1,401	1,040	1,401	1,196	1,370	15,458
North Pine—Charlie Lake	688	743	775	22	242	705	845	808	720	602	674	625	7,449
Osprey—Halfway	1,704	1,546	1,525	656	943	1,393	1,245	1,283	1,551	1,188	974	1,444	15,452
Peejay—Halfway	490,174	414,005	502,970	503,741	511,829	458,993	550,862	551,000	494,893	473,143	440,015	447,200	5,838,825
Rigel—Dunlevy	4,040	3,732	4,704	880	3,434	3,884	4,008	4,774	2,472	3,531	3,285	2,852	41,596
Stoddart—													
Charlie Lake											1,378	3,051	4,429
Belloy	2,623	2,710	2,774	914	1,018	1,725	3,635	3,312	1,946	2,288	2,879	2,515	28,339
Belloy[1]							95						95
Field totals	2,623	2,710	2,774	914	1,018	1,725	3,730	3,312	1,946	2,288	4,257	5,566	32,863
Two Rivers—													
Charlie Lake[1]	4,895	4,008	3,239	1,626	1,777	1,143	444	2,107	2,008	1,969	2,203	2,182	27,601
Halfway[1]			658										658
Field totals	4,895	4,008	3,897	1,626	1,777	1,143	444	2,107	2,008	1,969	2,203	2,182	28,259

Weasel—Halfway	69,729	78,980	100,262	111,278	87,318	79,318	105,885	103,605	100,920	109,962	112,765	122,435	1,182,457
Wildmint—Halfway	21,301	32,805	28,582	37,788	37,103	34,599	42,112	36,588	37,056	44,297	32,900	66,442	451,573
Willow—Bluesky-Gething	1,979	1,674	1,864	1,585	1,046	1,372	1,552	1,662	1,902	1,953	2,258	2,485	21,332
Wolf—Halfway	3,966	3,323	4,156	3,132	2,988	3,263	2,584	4,169	5,441	4,470	4,915	5,448	47,855
Other areas—													
Belloy									310	474			784
Belloy[1]	260												260
Confidential				180	159	2,040	1,405				1,446	883	6,113
Area totals	260			180	159	2,040	1,405		310	474	1,446	883	7,157
Totals—													
Crude	1,958,228	1,777,686	2,129,992	2,048,939	2,117,642	1,966,000	2,287,524	2,233,742	2,193,786	2,210,797	2,158,012	2,226,688	25,309,036
Field condensate	9,782	7,716	8,863	5,915	5,839	4,603	4,064	6,063	6,161	5,996	6,249	6,896	78,147
Total crude and equivalent	1,968,010	1,785,402	2,138,855	2,054,854	2,123,481	1,970,603	2,291,588	2,239,805	2,199,947	2,216,793	2,164,261	2,233,584	25,387,183

[1] Condensate.

TABLE 25.—MONTHLY NATURAL-GAS PRODUCTION BY FIELDS AND POOLS, 1969

(Quantities in M s.c.f.)

Field and Pool	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Airport—Cadomin	2,282	4,952	13,874	11,953	6,869	.....	11,015	13,179	10,478	11,675	9,096	8,709	104,082
Aitken Creek—Gething	214,136	146,486	288,505	316,843	337,057	317,536	339,118	291,496	304,963	322,086	268,871	335,433	3,482,530
Beg—													
Baldonnel	393,656	384,421	391,663	289,407	231,374	206,658	312,511	412,160	277,112	181,800	361,935	402,473	3,845,170
Halfway	503,289	506,933	532,321	507,231	416,063	458,518	465,238	544,995	324,730	377,765	551,259	494,086	5,682,428
Field totals	896,945	891,354	923,984	796,638	647,437	665,176	777,749	957,155	601,842	559,565	913,194	896,559	9,527,598
Beg West—Baldonnel	11,297	14,442	18,915	17,665	13,926	16,533	11,204	27,039	23,599	18,732	21,237	28,842	223,431
Bernadet—Bluesky-Gething	4,072	5,214	5,201	999	.....	1,422	1,634	4,290	4,408	5,286	4,645	3,468	40,639
Blueberry—													
Dunlevy	90,487	82,250	90,987	87,880	88,550	85,050	83,262	88,750	82,208	87,066	80,712	79,787	1,026,989
Baldonnel	15,538	13,921	15,087	14,639	15,188	14,160	12,666	14,149	13,436	14,238	13,442	13,714	170,178
Field totals	106,025	96,171	106,074	102,519	103,738	99,210	95,928	102,899	95,644	101,304	94,154	93,501	1,197,167
Blueberry West—Dunlevy	9,300	7,989	8,641	8,748	9,125	8,365	8,721	8,602	7,984	8,776	8,250	8,153	102,654
Boundary Lake—													
Gething	1,767	.....	.....	.....	39,770	61,355	64,127	41,490	6,594	38,805	32,496	55,114	341,518
Baldonnel	132,920	125,211	133,831	117,018	131,294	118,790	74,378	134,592	67,007	128,617	129,184	146,949	1,439,791
Basal Boundary	15,188	27,460	22,912	19,438	22,164	17,274	19,437	17,833	5,613	20,678	20,092	21,049	229,138
Field totals	149,875	152,671	156,743	136,456	193,228	197,419	157,942	193,915	79,214	188,100	181,772	223,112	2,010,447
Bubbles—Baldonnel	520,384	536,585	580,431	413,114	207,577	504,773	512,289	554,891	356,581	565,475	538,481	510,223	5,800,804
Buick Creek—Dunlevy	889,516	770,147	817,213	699,837	613,486	532,458	403,581	438,757	722,245	659,044	714,837	742,767	8,003,888
Buick Creek East—Dunlevy	375,400	326,326	352,851	303,430	258,154	218,138	296,085	258,331	315,042	345,456	328,332	334,908	3,712,453
Buick Creek North—													
Bluesky-Gething	59,375	61,446	29,991	.....	.....	51,682	23,525	20,086	22,486	11,898	.....	.....	280,489
Dunlevy	251,338	201,270	211,087	194,315	198,196	102,804	99,023	72,334	183,002	180,818	160,686	157,119	2,011,992
Field totals	310,713	262,716	241,078	194,315	198,196	154,486	122,548	92,420	205,488	192,716	160,686	157,119	2,292,481
Buick Creek West—													
Dunlevy	360,240	308,149	291,276	289,958	205,603	244,599	104,315	122,574	277,429	172,520	302,223	300,144	2,979,030
Baldonnel	20,368	17,967	18,311	18,257	17,643	16,497	11,383	11,684	18,241	14,370	9,828	12,106	186,655
Field totals	380,608	326,116	309,587	308,215	223,246	261,096	115,698	134,258	295,670	186,890	312,051	312,250	3,165,685
Clarke Lake—Slave Point	12,940,877	12,234,887	12,869,700	9,750,573	6,482,036	5,875,305	2,540,764	6,485,188	7,643,484	7,384,440	7,566,315	10,403,292	102,176,861
Clarke Lake South—Slave Point	145,743	217,781	251,604	221,598	.....	.....	.....	.....	.....	.....	.....	.....	836,726
Farrell Creek—													
Charlie Lake	4,885	13,051	5,934	5,586	.....	.....	.....	.....	.....	5,534	59,220	62,372	156,582
Halfway	.....	8,882	4,122	2,334	.....	.....	.....	.....	.....	.....	30,858	35,017	81,213
Field totals	4,885	21,933	10,056	7,920	.....	.....	.....	.....	.....	5,534	90,078	97,389	237,795

Fort St. John—													
Baldonnel	318,618	225,257	297,907	277,850	274,187	67,049	280,710	337,420	278,235	305,649	271,195	283,728	3,217,805
Halfway	236,689	156,238	195,542	193,890	175,032	94,416	147,005	194,065	170,609	176,241	175,500	169,289	2,084,516
Belloy	24,586	22,564	29,779	27,183	21,822	14,259	38,465	37,544	34,878	41,559	35,818	35,202	363,659
Field totals	579,893	404,059	523,228	498,923	471,041	175,724	466,180	569,029	483,722	523,449	482,513	488,219	5,665,980
Fort St. John Southeast—													
Baldonnel	78,019	73,557	77,120	63,337	76,103	69,274	69,978	66,997	66,586	70,630	67,384	72,539	851,524
Halfway	96,246	83,576	84,310	67,885	70,108	59,817	61,465	61,414	68,418	84,518	74,967	70,598	883,322
Belloy	227,091	213,080	220,702	183,443	208,125	211,706	191,332	189,720	152,156	173,548	185,820	208,918	2,365,641
Field totals	401,356	370,213	382,132	314,665	354,336	340,797	322,775	318,131	287,160	328,696	328,171	352,055	4,100,487
Halfway—													
Baldonnel	13,064	12,063	10,546	3,505				10,835	12,404	11,682	8,365	9,851	92,315
Charlie Lake									8,671	10,979			19,650
Field totals	13,064	12,063	10,546	3,505				10,835	21,075	22,661	8,365	9,851	111,965
Highway—Dunlevy	13,962	13,109	14,037	13,753	14,526	13,050	7,277	12,907	12,045	14,364	13,017	12,645	154,692
Inga—Baldonnel								139,434	184,989	214,928	187,463	180,537	907,351
Jedney—													
Baldonnel	1,067,633	978,793	1,011,512	915,057	781,786	630,922	508,814	430,758	829,016	969,971	896,933	901,717	9,922,912
Halfway	895,592	809,998	923,919	743,570	751,102	410,912	326,019	303,556	682,285	954,353	864,796	897,511	8,563,613
Field totals	1,963,225	1,788,791	1,935,431	1,658,627	1,532,888	1,041,834	834,833	734,314	1,511,301	1,924,324	1,761,729	1,799,228	18,486,525
Jedney West—													
Baldonnel									8,147	5,146			13,293
Halfway									3,380	3,762			7,142
Field totals									11,527	8,908			20,435
Kobes-Townsend—													
Dunlevy	50,009	52,335	77,276	50,841	28,638	57,877	35,449	50,864	67,855	80,880	67,829	68,696	688,549
Charlie Lake	96,901	80,327	93,356	70,865	56,340	74,885	48,506	60,973	61,315	90,338	100,688	149,528	984,022
Halfway	333,429	298,538	266,846	247,170	237,492	273,597	187,689	223,706	271,044	337,447	330,125	336,996	3,344,079
Debolt	110,038	92,680	116,848	81,474	55,410	94,202	47,224	87,584	104,890	100,169	80,725	60,238	1,031,482
Field totals	590,377	523,880	554,326	450,350	377,880	500,561	318,868	423,127	505,104	608,834	579,367	615,458	6,048,132
Kotcho Lake—Slave Point	11,942	836	31,116	968,241	907,433	581,799	599,852	641,101	637,840	657,520	800,902	1,193,342	7,031,924
Laprise—Baldonnel	2,519,497	2,263,192	2,494,356	1,980,923	2,144,377	1,479,865	1,765,572	1,949,864	2,165,900	2,383,906	2,510,893	2,552,218	26,210,563
Montney—Halfway	13,196	13,891	12,581	14,181	10,260	20,378	15,532	17,278	7,172				124,469
Nig Creek—Baldonnel	1,937,524	1,777,640	1,803,374	1,723,215	1,687,761	960,669	1,560,108	1,528,926	1,477,060	1,629,132	1,463,174	1,490,607	19,039,190
North Pine—Charlie Lake	96,951	81,297	91,732					44,338	87,660	80,526	77,024	63,157	622,685
Parkland—Wabamun	468,482	475,559	485,961	463,593	92,014	357,158	481,889	348,420	432,574	469,144	440,991	457,541	4,973,326
Rigel—Dunlevy	1,784,023	1,631,458	1,642,993	1,249,913	1,060,459	847,281	770,224	839,321	1,296,038	1,421,698	1,322,095	1,372,922	15,238,425
Sierra—Pine Point				442,473	1,037,186	948,803	718,796	599,513	974,831	1,203,408	1,257,986	293,260	7,476,256
Stoddart—Belloy	892,705	812,522	818,229	690,203	592,809	659,788	560,494	518,959	613,420	726,219	701,044	629,508	8,215,900
Two Rivers—													
Charlie Lake	106,852	99,290	87,764	45,251	49,653	33,485	10,711	56,711	61,367	63,399	59,390	64,747	738,620
Halfway		32,108	124,256	8,599			9,428	62,856	132,560	134,105		14,536	518,448
Field totals	106,852	131,398	212,020	53,850	49,653	33,485	20,139	119,567	193,927	197,504	59,390	79,283	1,257,068

TABLE 25.—MONTHLY NATURAL-GAS PRODUCTION BY FIELDS AND POOLS, 1969—*Continued*

(Quantities in M s.c.f.)

Field and Pool	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Weasel—Baldonnel			1,801	3,424	1,229	211	711	507	1,981	765	2,341	2,642	15,612
Yoyo—Pine Point	3,049	2,398	241,071	2,752,378	4,491,905	3,183,238	3,126,738	3,123,819	2,674,877	3,481,734	4,578,984	4,255,063	31,915,254
Other areas—													
Baldonnel			20,299										20,299
Belloy	24,127	15,945	20,358					1,213	783		63,817	63,934	190,177
Nahanni	49,920		318,340										368,260
Confidential	11,510		31,393	1,162									44,065
Area totals	85,557	15,945	390,390	1,162				1,213	783		63,817	63,934	622,801
Totals, all fields	28,443,713	26,334,021	28,599,781	26,574,202	24,119,832	19,996,558	16,964,264	21,503,023	24,247,628	26,452,799	27,851,265	30,067,195	301,154,281

TABLE 26.—SUMMARY OF DRILLING AND PRODUCTION STATISTICS, 1969

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Well authorizations—													
Issued	38	33	20	1	5	5	10	11	4	8	15	28	178
Cancelled	2			3							1		6
Wells spudded	32	29	28	3		12	13	9	3	10	10	29	178
Rigs operated during month	35	37	11	13	2	10	17	16	9	13	14	29	511
Rigs operating at month's end	27	32	39	2	2	5	8	6	3	10	10	24	
Development footage	23,588	42,735	102,886	27,697		44,189	33,941	43,549	22,970	7,125	40,152	45,036	433,868
Exploratory outpost footage	35,249	53,313	40,437	10,600			9,281	10,215		4,550	3,450	22,577	189,672
Exploratory wildcat footage	47,606	28,311	127,056	19,031			4,863	496	6,850		11,382	4,650	250,245
Total footage drilled	106,443	124,359	270,379	57,328		44,189	48,085	54,260	29,820	11,675	54,984	72,263	873,785
Wells abandoned	15	13	28	3		1	4	4	2	1	3	6	80
Service wells	1	1	2				1	1		1			7
Finished drilling wells											4	8	12
Oil wells completed	1	4	12	5		6	3	2	1		1		35
Producible oil wells	591	596	602	605	605	611	613	612	614	612	612	614	
Producing oil wells	482	486	499	484	483	501	513	509	507	515	514	515	
Production in barrels	1,958,228	1,777,686	2,129,992	2,048,939	2,117,642	1,966,000	2,287,524	2,233,742	2,193,786	2,210,797	2,158,012	2,226,688	25,309,036
Average daily production	63,169	63,489	68,709	68,298	68,311	65,533	73,791	72,056	73,126	71,316	71,934	71,829	69,340
Gas wells completed	6	7	8	3		3	1	4	3	1	3	1	40
Producible gas wells	649	652	660	667	669	669	672	672	675	679	678	682	
Producing gas wells	264	266	274	276	264	258	253	255	274	280	282	286	
Production in M s.c.f.	30,131,789	28,075,469	30,549,394	28,437,524	26,032,943	21,845,985	19,072,063	23,535,326	26,237,580	28,513,655	29,519,406	32,175,983	324,127,117
Average daily production	971,993	1,002,695	985,464	947,917	839,772	728,200	615,228	759,204	874,586	919,795	983,980	1,037,935	888,019

[1] Rig operated during 1969.

NOTE.—Each zone of a multiple completion is counted as one well.

TABLE 27.—MONTHLY SUPPLY AND DISPOSITION OF CRUDE OIL AND CONDENSATE/PENTANES PLUS, 1969

(Quantities in barrels.)

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Available Supply													
British Columbia production—													
Crude	1,958,228	1,777,686	2,129,992	2,048,939	2,117,642	1,966,000	2,287,524	2,233,742	2,193,786	2,210,797	2,158,012	2,226,688	25,309,036
Field condensate	9,782	7,716	8,863	5,915	5,839	4,603	4,064	6,063	6,161	5,996	6,249	6,896	78,147
Plant condensate	82,125	78,341	82,822	72,002	72,903	56,882	54,839	70,397	85,071	99,749	90,758	98,222	944,111
Alberta imports—crude and equivalent	5,993,096	5,774,098	8,123,375	7,458,145	6,740,814	7,427,522	7,792,415	8,035,778	7,700,310	7,135,296	7,635,429	7,944,564	87,760,842
Totals	8,043,231	7,637,841	10,345,052	9,585,001	8,937,198	9,455,007	10,138,842	10,345,980	9,985,328	9,451,838	9,890,448	10,276,370	114,092,136
Disposition													
Inventory change—													
Field	−2,089	−1,135	−4,691	7,282	−6,539	14,729	4,014	−533	−10,704	−976	2,736	−9,032	−6,938
Plant	−6,780	−6,549	−4,249	19,288	12,044	−47,204	7,005	7,754	20,209	−8,273	−19,118	1,191	−24,682
British Columbia transporters	408,153	−577,664	474,117	316,658	−609,196	269,960	134,647	−419,959	−41,365	117,037	116,093	−569,259	−380,778
Miscellaneous—													
Plant fuel													
Pipe-line use	4,410	2,559	5,007	5,400	3,130	7,624	5,991	3,927	5,322	683	6,467	7,493	58,013
Field losses and adjustments	−7,861	−5,165	−8,954	−909	−7,848	−5,632	−6,689				−362	−168	−43,588
Plant losses and adjustments		1,217	−526			−5,159	4,736	2,973	−4,435	7,889	−5,235	−5,186	−3,726
Transporters' losses and adjustments	13,092	15,559	43,143	−9,114	7,385	4,803	9,208	10,393	7,960	31,512	14,618	13,220	161,779
Deliveries—													
British Columbia refineries—													
British Columbia crude	1,646,066	1,328,057	1,812,635	1,424,801	1,942,573	1,356,228	1,819,081	2,070,070	2,022,797	2,275,683	1,669,418	1,940,444	21,307,853
Alberta crude	1,041,144	1,428,813	1,505,402	1,626,675	1,520,090	1,156,078	1,290,581	1,489,805	1,353,689	1,248,856	1,481,137	1,737,271	16,879,541
British Columbia condensate	45,278	31,231	24,030	38,255	30,276	72,267	4,449	27,797	38,061	68,844	43,990	31,752	456,230
Export to United States—													
British Columbia crude	283,338	495,151	477,207	541,804	265,848	450,240	584,477	210,163	183,257	258,486	464,390	418,078	4,632,439
Alberta crude	4,616,540	4,763,668	5,991,901	5,613,097	5,777,521	6,148,121	6,224,587	6,894,041	6,425,129	5,481,110	6,075,742	6,692,363	70,703,820
British Columbia condensate	40,159	43,186	34,116	33,083	34,158	32,751	34,139	27,795	27,412	28,089	67,054	66,393	468,335
Field sales	1,060	1,040	1,407	145	150	340	150	100	65	870	71	600	5,998
Reporting adjustments	−39,279	117,873	−5,493	−31,464	−32,394	−139	22,466	21,654	−42,069	−57,972	−26,553	−48,790	−122,160
Totals	8,043,231	7,637,841	10,345,052	9,585,001	8,937,198	9,455,007	10,138,842	10,345,980	9,985,328	9,451,838	9,890,448	10,276,370	114,092,136
British Columbia Refineries													
Receipts—													
British Columbia crude	1,646,066	1,328,057	1,812,635	1,424,801	1,942,573	1,356,228	1,819,081	2,070,070	2,022,797	2,275,683	1,669,418	1,940,444	21,307,853
Alberta crude	1,041,144	1,428,813	1,505,402	1,626,675	1,520,090	1,156,078	1,290,581	1,489,805	1,353,689	1,248,856	1,481,137	1,737,271	16,879,541
British Columbia condensate	45,278	31,231	24,030	38,255	30,276	72,267	4,449	27,797	38,061	68,844	43,990	31,752	456,230
Alberta condensate	9,691	7,570	5,569	6,487	5,362	8,734	10,533	10,186	9,848	10,537	9,883	9,949	104,349
British Columbia butane	17,020	13,422	9,494	3,759	5,308	7,098	7,626	9,978	11,119	19,961	13,630	21,279	139,694
Alberta butane	10,538	25,943	11,718								14,736	13,900	76,835
Totals	2,769,737	2,835,036	3,368,848	3,099,977	3,503,609	2,600,405	3,132,270	3,607,836	3,435,514	3,623,881	3,232,794	3,754,595	38,964,502

Disposition													
Inventory changes	−100,615	−88,357	15,032	−46,857	362,040	−10,391	−222,750	−78,883	−27,107	82,395	−96,198	142,790	−68,901
Losses and adjustments	−443	−645	−1,669	−561	−1,387	−990	−268	−380	−488	−1,696	−2,881	−5,708	−17,116
Refinery runs—													
British Columbia crude	1,550,468	1,444,073	1,630,444	1,607,239	1,620,514	1,322,535	1,969,514	2,078,131	2,188,071	2,257,080	1,706,608	2,003,409	21,378,086
Alberta crude	1,238,990	1,404,788	1,671,385	1,490,194	1,485,472	1,197,668	1,364,776	1,560,645	1,216,571	1,189,656	1,543,584	1,537,609	16,901,338
British Columbia condensate	45,278	31,231	24,030	38,255	30,276	72,267	4,449	27,797	38,061	68,844	43,990	31,752	456,230
Alberta condensate	8,501	4,581	8,414	7,948	1,386	12,218	8,923	10,548	9,287	7,641	9,325	9,564	98,336
British Columbia butane	17,020	13,422	9,494	3,759	5,308	7,098	7,626	9,978	11,119	19,961	13,630	21,279	139,694
Alberta butane	10,538	25,943	11,718	.....	.....	.....	.....	.....	.....	.....	14,736	13,900	76,835
Total refinery runs	2,870,795	2,924,038	3,355,485	3,147,395	3,142,956	2,611,786	3,355,288	3,687,099	3,463,109	3,543,182	3,331,873	3,617,513	39,050,519

TABLE 28.—MONTHLY SUPPLY AND DISPOSITION OF NATURAL GAS, 1969

(Quantities in M s.c.f.)

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Available Supply													
British Columbia production—													
Wet gas	14,873,620	13,402,560	14,720,329	11,975,346	11,109,258	9,050,255	9,496,225	10,304,982	11,884,022	13,256,553	13,206,087	13,464,697	146,743,934
Dry gas	13,570,093	12,931,461	13,879,452	14,598,856	13,010,574	10,946,303	7,468,039	11,198,041	12,363,606	13,196,246	14,645,178	16,602,498	154,410,347
Associated gas	1,688,076	1,741,448	1,949,613	1,863,322	1,913,111	1,849,427	2,107,799	2,032,303	1,989,952	2,060,856	1,819,815	2,108,788	23,124,510
Less injected	479,964	609,312	629,676	747,009	674,147	698,559	792,773	768,592	724,336	709,986	525,229	741,977	8,101,560
Net British Columbia production	29,651,825	27,466,157	29,919,718	27,690,515	25,358,796	21,147,426	18,279,290	22,766,734	25,513,244	27,803,669	29,145,851	31,434,006	316,177,231
Alberta imports	30,743,421	27,979,834	28,615,824	28,875,079	27,785,434	25,624,159	26,685,416	27,386,497	26,578,435	30,700,500	30,923,547	33,190,074	345,088,220
Totals	60,395,246	55,445,991	58,535,542	56,565,594	53,144,230	46,771,585	44,964,706	50,153,231	52,091,679	58,504,169	60,069,398	64,624,080	661,265,451
Disposition													
Flared—													
Field	969,650	778,920	1,484,375	915,574	982,859	932,967	1,048,836	998,862	1,045,330	1,171,983	1,014,059	1,196,351	12,539,766
Plant—													
Residual gas					400	1,200	2,300	1,800	1,500	456	4,100		11,756
Natural gas	1,446,544	1,332,604	1,408,252	1,764,346	1,710,698	1,393,725	985,019	1,382,743	1,473,052	1,659,846	1,904,738	2,051,112	18,512,679
Gas-gathering systems	37,492	16,703	24,838				5,965	260	315	719	161,411	84,995	332,698
Fuel—													
Lease	180,859	175,522	200,219	185,978	180,418	164,361	159,790	181,636	197,811	206,474	209,812	211,119	2,253,999
Plant	873,839	729,299	813,890	825,796	795,293	655,594	635,936	730,957	741,717	841,400	878,493	951,620	9,473,834
Transporters	2,203,102	1,982,697	2,043,811	1,736,568	1,254,172	924,998	474,506	1,254,528	1,530,628	1,589,135	1,789,089	2,088,394	18,871,628
Gas-gathering systems	33,632	35,174	93,980	278,971	217,262	72,246	167,032		173,917	42,997		181	1,115,392
Line pack changes—													
Gas-gathering systems	−24,403	−174	41,996	102,769	−52,383	205,034						4,124	276,963
Transporters	−43,153	77,766	52,795	96,981	−1,830	79,441	223,372	3,583	301,617	88,726	−105,817	73,978	847,459
Losses and metering difference—													
Field	−22,210	622,872	401,602	1,129,206	431,385	74,478	220,737	417,970	724,303	499,784	899,162	975,025	6,374,314
Gas-gathering systems						3,583	288	122,258	5,367	−2,916	4,205		132,785
Gas plants	544,972	433,202	552,416	449,443	325,767	642,608	335,133	783,974	132,061	614,709	283,559	346,016	5,443,860
Transporters	37,631	−75,882	26,209	−30,479	−33,904	−26,661	142,445	409,521	238,619	18,735	238,984	53,984	999,202
Processing shrinkage	667,364	681,901	648,489	527,087	442,226	383,876	402,500	462,189	576,578	629,231	618,903	626,021	6,666,365
Deliveries—													
British Columbia distributors—													
Northeast	464,812	417,040	612,330	662,910	570,306	503,917	614,991	820,414	759,156	884,435	1,036,427	1,184,561	8,531,299
Interior	2,748,345	2,316,457	2,288,240	1,956,711	1,786,204	1,497,431	1,447,959	1,494,273	1,528,293	2,078,697	2,195,384	2,571,310	23,909,304
Lower Mainland	7,847,573	6,955,387	7,211,860	5,902,084	3,627,172	2,578,249	2,294,625	3,297,519	4,710,465	4,414,123	5,172,755	6,005,942	60,017,754
Export—													
British Columbia natural gas	13,509,022	12,576,098	13,696,993	13,419,706	13,939,259	12,288,774	10,413,164	12,105,015	12,734,342	14,350,812	14,239,483	14,558,697	157,831,365
Alberta natural gas	28,887,451	26,369,343	26,882,625	27,340,807	26,791,035	24,666,508	25,853,896	26,314,147	25,210,027	29,394,859	29,538,170	31,639,487	328,888,355
Reporting adjustments	32,724	21,062	50,622	−698,864	177,891	−270,744	−463,788	−628,418	6,581	19,964	−13,519	1,163	−1,765,326
Totals	60,395,246	55,445,991	58,535,542	56,565,594	53,144,230	46,771,585	44,964,706	50,153,231	52,091,679	58,504,169	60,069,398	64,624,080	661,265,451

British Columbia Distributors													
Receipts—													
Natural gas	11,067,327	9,688,599	10,112,350	8,520,907	5,983,417	4,580,352	4,357,382	5,605,245	7,004,476	7,376,889	8,404,099	9,754,833	92,455,876
L.P.G. gas	124,530	89,806	82,066	68,601	51,006	43,617	45,268	47,962	51,776	68,056	80,422	91,385	844,495
Disposition													
Gas used in operations	12,833	13,655	10,676	9,933	11,409	26,927	14,540	51,746	18,367	17,409	21,243	123,062	331,800
Losses and adjustments	1,104,787	−1,578,138	−266,394	−337,869	−787,906	234,448	22,505	212,410	570,300	1,420,084	1,421,829	1,074,564	3,090,620
Line pack changes	−4,309	153,290	4,627	3,912	478	23,693	−18,043	1,117	40,875	−4,404	2,936	3,678	207,850
Sales—													
Residential	4,542,820	4,512,966	3,094,098	2,476,695	1,648,039	509,553	702,683	694,016	749,553	1,236,625	2,019,278	2,811,189	24,997,515
Commercial	2,637,848	2,717,512	2,043,312	1,652,926	1,149,457	592,491	644,001	639,903	732,222	1,011,269	1,512,713	1,909,598	17,243,252
Industrial	1,861,118	2,396,849	3,178,360	3,186,739	3,290,020	2,970,083	3,016,690	3,239,183	3,120,217	3,491,944	3,409,534	3,487,248	36,647,985
Electric power	1,036,760	1,562,271	2,129,737	1,597,172	722,926	266,774	20,274	814,832	1,824,718	272,018	96,988	436,879	10,781,349
Miscellaneous													
Total sales	10,078,546	11,189,598	10,445,507	8,913,532	6,810,442	4,338,901	4,383,648	5,387,934	6,426,710	6,011,856	7,038,513	8,644,914	89,670,101
Value of sales to distributors	$8,121,478	$7,262,320	$6,888,976	$5,804,304	$4,145,911	$2,983,068	$2,932,224	$3,380,352	$3,938,137	$5,204,385	$6,305,951	$7,092,743	$64,059,849

TABLE 29.—MONTHLY PRODUCTION AND DISPOSITION OF BUTANE, PROPANE, AND SULPHUR, 1969

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Butane													
Production (bbl.)—													
Plant	49,485	48,456	33,972	26,732	26,598	24,280	20,472	28,526	35,415	46,412	40,471	36,721	417,540
Refinery	23,202	15,914	22,306	8,751	22,727	26,440	23,763	29,567	34,584	35,266	33,934	37,592	314,046
Opening inventory	9,037	10,640	9,683	12,939	12,790	16,593	16,762	11,041	13,137	17,395	9,411	14,132	9,037
Plant fuel	.....	6,482	.....	.....	.....	.....	.....	.....	.....	11,602	—753	—753	16,578
Gasoline enrichment	24,020	18,322	15,094	5,759	9,008	14,398	11,473	14,583	16,696	23,050	20,830	23,779	197,012
To refinery	19,138	1,722	9,992	8,426	9,099	2,174	7,391	14,238	10,114	7,145	9,139	9,485	108,063
Losses and adjustments	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sales—													
British Columbia	20,880	35,269	26,820	19,409	24,671	33,026	31,092	25,635	36,381	44,203	35,909	40,797	374,092
Yukon	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Export—United States	7,046	3,532	1,116	2,038	2,744	953	.....	1,541	2,550	3,662	4,559	3,245	32,986
Total sales	27,926	38,801	27,936	21,447	27,415	33,979	31,092	27,176	38,931	47,865	40,468	44,042	407,078
Closing inventory	10,640	9,683	12,939	12,790	16,593	16,762	11,041	13,137	17,395	9,411	14,132	11,892	11,892
Propane													
Production—													
Plant	41,529	43,132	32,139	12,040	14,803	17,008	13,728	18,767	32,836	38,032	33,176	38,978	336,168
Refinery	26,053	27,987	24,623	25,133	22,471	13,095	15,869	23,451	20,801	27,013	27,221	30,126	283,843
Opening inventory	9,263	5,505	8,433	20,841	15,927	12,645	15,752	15,905	7,692	11,890	10,855	9,619	9,263
Plant fuel	.....	.....	.....	.....	.....	.....	.....	.....	.....	4,051	.....	.....	4,051
Gasoline enrichment	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
To refinery	14,034	—14,094	.....	4,173	8,212	.....	1,195	.....	.....	.....	.....	.....	13,520
Losses and adjustments	100	.....	97	100	.....	87	200	—12	—116	—106	196	279	825
Sales—													
British Columbia	56,765	76,982	43,344	37,074	32,344	22,165	27,853	50,247	42,459	41,336	45,593	58,335	534,497
Alberta	.....	.....	.....	.....	.....	1,615	.....	.....	.....	.....	.....	.....	1,615
Export—													
United States	441	3,083	178	.....	.....	3,129	196	196	.....	211	204	.....	7,638
Overseas	.....	2,220	735	740	.....	.....	.....	.....	7,096	20,588	15,640	10,057	57,076
Total sales	57,206	82,285	44,257	37,814	32,344	26,909	28,049	50,443	49,555	62,135	61,437	68,392	600,826
Closing inventory	5,505	8,433	20,841	15,927	12,645	15,752	15,905	7,692	11,890	10,855	9,619	10,052	10,052
Sulphur													
Production (long tons)	5,727	4,964	5,652	4,933	3,732	2,286	2,473	2,056	4,001	4,916	4,520	3,607	48,867
Opening inventory	36,117	40,729	44,678	49,148	53,317	55,735	52,978	50,942	43,962	44,940	47,822	49,136	36,117
Losses and adjustments	.....	—213	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	—213
Sales—													
British Columbia	353	258	419	479	291	357	501	361	497	493	478	1,164	5,651
Export	762	970	763	285	1,023	4,686	4,008	8,675	2,526	1,541	2,728	6,474	34,441
Total sales	1,115	1,228	1,182	764	1,314	5,043	4,509	9,036	3,023	2,034	3,206	7,638	40,092
Closing inventory	40,729	44,678	49,148	53,317	55,735	52,978	50,942	43,962	44,940	47,822	49,136	45,105	45,105

NOTE.—Sales of sulphur are reported in this table in long tons. Sales in short tons, 44,903.

TABLE 30.—MONTHLY GROSS VALUES OF CRUDE OIL, NATURAL GAS, NATURAL-GAS LIQUIDS, AND SULPHUR TO PRODUCERS, 1969

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Crude oil	$4,425,007	$4,046,284	$4,858,354	$4,650,627	$4,846,678	$4,446,604	$5,199,058	$5,135,484	$5,071,017	$5,223,271	$5,131,166	$5,323,183	$58,356,733
Natural gas	2,708,500	2,472,886	2,655,964	2,444,148	2,220,431	1,865,157	1,611,354	2,000,254	2,257,944	2,427,411	2,536,539	2,696,997	27,897,585
Products—													
Natural-gas liquids[1]	$43,318	$38,173	$38,487	$37,277	$42,957	$43,433	$37,360	$41,080	$39,934	$47,235	$46,127	$46,310	$501,691
Sulphur	6,465	6,013	6,336	6,329	4,034	3,279	2,803	2,856	3,352	2,987	2,507	1,861	48,822
Total products	$49,783	$44,186	$44,823	$43,606	$46,991	$46,712	$40,163	$43,936	$43,286	$50,222	$48,634	$48,171	$550,513
Total value	$7,183,290	$6,563,356	$7,559,141	$7,138,381	$7,114,100	$6,358,473	$6,850,575	$7,179,674	$7,372,247	$7,700,904	$7,716,339	$8,068,351	$86,804,831

[1] Includes condensate, pentanes plus, propane, and butane, but does not include petroleum from Boundary Lake Gas Conservation Plant, which is included under "crude oil" sales values.

NOTE.—This statement includes amendments received up to May 22, 1970.

TABLE 31.—CRUDE-OIL PIPE-LINES, 1969

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	12¾	2.2	1	12,000	12,000	37.4	2,880	74,800
		8⅝	62.8						
	Inga	6⅝	1.7	1	8,000	10,000	.....	4,490	1,000
Trans-Prairie Pipelines (B.C.) Ltd.	Beatton River, Beatton River West, Boundary Lake, Bulrush, Currant, Milligan Creek, Osprey, Peejay, Weasel, Wildmint, Willow, Wolf	4½	45.6						
		6⅝	24.3	1	36,000	52,000[1]	79.9	60,668	160,000
		8⅝	103.0	2	45,000	45,000[2]			
		12¾	39.0						
Tenneco Oil & Minerals Ltd.	Inga	4½	8.7	1	2,000	2,000	8.7	1,003	500
Western Pacific Products and Crude Oil Pipelines Ltd.		12	505.0	12	70,000	70,000	.....	54,668	586,000

[1] Boundary Lake.

[2] Terminal to Western Pacific Products and Crude Oil line.

TABLE 32.—CRUDE-OIL REFINERIES, 1969

Name	Location	Type	Year of First Operation	Source of Crude	Crude-oil Capacity (Bbl. per Calendar Day)	Storage Capacity (Bbl.)	Cracking-plant Units	Cracking Capacity (Bbl. per Calendar Day)	Other Units
Chevron Canada Ltd.	North Burnaby	Comp.	1936	B.C. and Alberta	18,000	1,604,400	Catalytic-fluid	8,100	Catalytic polymerization, catalytic reformer, lube-oil blending plant, asphalt.
Gulf Oil Canada Limited	Kamloops	Comp.	1954	B.C.	5,900	585,000	Catalytic-fluid	1,900	Catalytic polymerization, catalytic reformer, distillate desulphurization, naphtha desulphurization, merox.
Gulf Oil Canada Limited	Port Moody	Comp.	1958	B.C. and Alberta	18,000	1,625,000	Catalytic-fluid	8,480	Catalytic reformer, distillate desulphurization, alkylation-sulphuric acid, naphtha desulphurization, merox.
Imperial Oil Enterprises Ltd.	Ioco	S.C.A.	1915	B.C. and Alberta	33,000	2,942,000	Catalytic-fluid	11,400	Catalytic polymerization, powerformer, toluene extraction L.P.G. plant.
Pacific Petroleums Ltd.	Taylor	Comp.	1960	B.C.	9,450	865,735	Catalytic-fluid	3,500	H.F. alkylation, asphalt, pentane, splitter, platformer, unifiner, H.D.S. unit, D.D.S. unit.
Shell Canada Limited	Shellburn	Comp.	1932	B.C. and Alberta	20,000	2,455,300	Catalytic-fluid	6,000	Catalytic polymerization, platformer, vacuum flashing, solvent fractionation, distillate hydrotreater.
Union Oil Company of Canada Limited	Prince George		1967	B.C.	7,500	525,000			Unifiner, reformer, asphalt.

Symbols: S.C.A.—skimming, cracking, and asphalt; Comp.—complete.

TABLE 33.—NATURAL-GAS PIPE-LINES, 1969

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	39.1						
		24	13.3						
		20	44.5						
		18	37.3	---	------	528,000	----	3,395.3	Lower Mainland of British Columbia.
		16	19.6						
		12	78.4						
		8	34.6						
Columbia Natural Gas Ltd.	Alberta Natural Gas Co. Ltd.	6	37.7	---	------	24,800	8	1.7	
		4	20.2	---	------	------	6	2.5	
		3	27.6	---	------	------	4	8.3	Cranbrook, Fernie, Kimberley, Creston, Sparwood.
		2	0.5	---	------	------	3	16.9	
		---	------	---	------	------	2	33.1	
							1¼	39.7	
Gas Trunk Line of British Columbia Ltd.	Beg field	---	------	1	1,000	------	16	27.4	
							6⅝	5.7	
	Boundary Lake field	---	------	---	------	------	16	31.4	
							6⅝	1.8	To Westcoast Transmission Co. Ltd.
	Jedney and Bubbles field	---	------	4	4,960	------	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				8	12.4	
		10	117.5				6	22.9	MacKenzie, Hudson Hope, Chetwynd, Prince George, Cariboo, Okanagan, and West Kootenay areas.
		8	17.1				4	109.5	
		6	89.0	1	1,100	78,600	3	67.4	
		4	116.0				2	437.9	
		3	47.8				1½	20.8	
		2	57.6				1¼	83.1	
		1½	0.3						
Northland Utilities (B.C.) Ltd.	Peace River Transmission	1¼	3.5	---	------	10,900	----	55.9	Dawson Creek, Pouce Coupe, and Rolla.
		....	9.5	---	------	------	...	------	
Pacific Northern Gas Ltd.	Westcoast Transmission Co. Ltd.	10¾	272.0				6	2.6	
		8⅝	86.9				4	8.1	Vanderhoof, Fraser Lake, Burns Lake, Smithers, Terrace, Prince Rupert, Kitimat, Houston, Fort St. James.
		6⅝	36.5	2	3,150	44,000	3	12.4	
		4½	11.0				2	11.3	
		3½	44.0				1¼	10.7	
		2⅞	20.8				¾	1.6	

TABLE 33.—NATURAL-GAS PIPE-LINES, 1969—*Continued*

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	
Plains Western Gas & Electric Co. Ltd.	Westcoast Transmission Co. Ltd.	6	0.3	...	.....	.....	4	13.4	Fort St. John, Aennofield, Taylor, and Grandhaven.
		4	17.0				3	1.9	
		3	5.7				2	31.5	
		2	0.9				1¼	1.4	
Westcoast Transmission Co. Ltd.	Alberta	26	32.5	...	.....	215,000	...	.....	To Plains Western Gas & Electric Co. Ltd., Inland Natural Gas Co., British Columbia Hydro and Power Authority, and export to United States.
	McMahon Plant, Taylor	36	98.5	...	.....	.....	...	.....	
		30	646.6	14	251,140	955,000	...	.....	
	Alaska Highway system	...	.....	...	.....	.....	26	37.5	
							20	18.1	
							18	17.9	
							12¾	9.9	
	Blueberry West field	...	.....	...	.....	.....	8⅝	6.7	
	Boundary Lake field	...	.....	...	.....	.....	16	0.5	
	Bubbles field	...	.....	1	660	.....	...	.....	
	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	...	.....	5	1,980	.....	18	7.8	
							10¾	0.9	
							8⅝	0.7	
	Fort St. John Southeast field	12	7.0	...	.....	.....	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	
	Kotcho Lake field	...	.....	...	.....	.....	12	10.0	
	Laprise Creek field	...	.....	1	2,160	.....	...	.....	
	Montney field	...	.....	...	.....	.....	4½	7.4	
	Parkland field	...	.....	...	.....	.....	8⅝	6.6	
	Red Creek field	...	.....	1	230	.....	4½	2.9	
	Rigel field	...	.....	1	6,565	.....	12¾	9.6	
							10¾	10.3	
	Sierra field	...	.....	...	.....	.....	12	6.8	
	Stoddart field	...	.....	...	.....	.....	8⅝	6.3	

TABLE 34.—GAS-PROCESSING PLANTS, 1969

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.	NW. 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.	SE. 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 British Columbia producing gasfields 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	1967	568	480		Westcoast Transmission Co. Ltd.

TABLE 35.—SULPHUR PLANTS, 1969

Name	Location	Raw Material	Principal Product	Date on Production	Capacity (Long Tons per Day)
Jefferson Lake Petrochemicals Co. of Canada Ltd.	Taylor	Hydrogen sulphide	Sulphur	1957	300

Inspection of Mines

CHAPTER V

By J. W. Peck, Chief Inspector of Mines

CONTENTS

LIST OF DRAWINGS

COAL MINES REGULATION ACT

The *Coal Mines Regulation Act* was completely revised in 1969 in order to keep abreast with new coal-mining methods and equipment. This was the first major revision of this Act since 1948, although amendments were made in 1951, 1954, and 1956. The major additions made to the revised Act were reclamation of surface areas disturbed by mining, the introduction of compulsory chest examinations made regularly on individuals working in a dust-exposure occupation, more comprehensive regulations relating to the use of vehicles and explosives in open-pit or strip-mining operations, and improved control of environmental conditions.

MINES REGULATION ACT

The *Mines Regulation Act* (1967) was amended with introduction of legislation mainly concerning the reclamation of surface areas disturbed by mining, the use of diesel engines underground, and the operation of vehicles in open-pit mining.

FATAL ACCIDENTS

Fifteen fatalities occurred in the mining industry in 1969, eight occurring in metal mining and seven in coal mining. Of the nine surface fatalities, five occurred

in metal mines. The total represents an increase of three over the 12 fatalities which took place in the mining industry in 1968 and exceeds the past 10-year average of 13.7. The 15 fatalities occurred in 11 separate accidents, one of which happened in 1968.

The following table shows the mines at which fatal accidents occurred during 1969, with comparative figures for 1968:—

Company or Place	Location	Number of Fatal Accidents	
		1969	1968
Mines other than coal—			
Anaconda Britannia Mines Ltd.	Britannia Beach	1	...
British Columbia Molybdenum Limited	Kitsault	1	...
Bethlehem Copper Corporation Ltd.	Highland Valley	1	...
Brynnor Mines Ltd. (Boss Mountain)	Big Timothy Mountain	...	1
Churchill Copper Corporation Ltd. (Magnum)	Delano Creek	1	...
Domtar Chemicals Ltd.	Blubber Bay	...	1
Endako Mines Ltd.	Endako	...	1
Giant Mascot Mines Ltd. (Pride of Emory)	Texas Creek	...	3
Granduc Operating Co. (Tide Lake Camp)	Stewart	...	1
Granisle Copper Limited	Granisle	1	...
King Resources Company	Mount Copeland	...	1
Noradco-Shields Joint Venture	Stewart	...	2
Quesnel River placer	Quesnel River	...	1
Texada Mines Ltd.	Omineca	2	...
W. C. Cornish Transport (Churchill Copper Corporation Ltd.)	Racing River	...	1
Wesfrob Mines Ltd.	Tasu	1	...
Coal mines—			
Kaiser Resources Ltd.—			
Balmer South	Michel	3	...
Harmer Ridge	Michel	4	...
Totals		15	12

The following table classifies fatalities as to cause and location:—

Cause	Number	Location	
		Surface	Underground
Buried by muck	1	1	...
Drowned	4	1	3
Fall of ground	1	...	1
Fall of persons	2	1	1
Machinery—			
(*a*) Caught by	1	1	...
(*b*) Crushed by	1	...	1
(*c*) Struck by	1	1	...
Transportation—			
(*a*) Helicopter	2	2	...
(*b*) Motor-vehicle	2	2	...
Totals	15	9	6

A description of each fatal accident follows.

Edward Lloyd Spencer, aged 40 years, married, and employed as an equipment operator by Bethlehem Copper Corporation Ltd. was drowned on January 7, 1969, in Divide Lake in the Highland Valley area, when the tractor he was driving broke through the ice.

A diamond-drill machine drilling-site was being established about 500 to 600 feet from shore and Spencer had driven a Caterpillar D-4 tractor to the site to bulldoze the snow off the lake at that point. After having removed a small area

of snow, Spencer lifted the blade and travelled on the snow again for about 25 feet when the ice broke. Spencer sank with the tractor into about 20 feet of water. As he did not surface, skindivers were obtained and after five days searching they recovered his body in the thick layer of decayed vegetation on the lake bottom.

The inquest disclosed that flooding had been done on the lake ice surface since December 1, 1968, and that at one point approximately 18 inches of ice had been developed, of which 8 to 9 inches was blue ice and the remainder frozen slush ice. On January 6th, a hole 15 inches deep was cut through the ice near the shore and on the day of the accident shallow holes 6 to 8 inches in depth were cut at about 18-foot intervals between the shore and the drillsite. As the thickness of ice near the shore was 15 inches and near the drillsite 18 inches, it was evidently presumed there was an adequate thickness to support the tractor. However, subsequent investigations demonstrated a considerable variance in thickness, the ice being only 6 inches thick where the tractor broke through.

The inquest determined Spencer came to his death as a result of drowning and " that death was caused by negligence due to the lack of necessary safety precautions being carried out." In addition, the jury made the following recommendations:—

"(1) Canopies to be removed from machines on ice:
"(2) Lifejackets be worn at all times:
"(3) Routes on ice surfaces be tested for adequate thickness."

Raymond John Gladstone, aged 54 years, married, and employed as a tractor operator by Fernie Contractors Limited, was killed on January 8, 1969, when buried in a mud slide at the breaker station site of the Kaiser Resources Ltd. new strip mine near Natal.

Two tractors were employed bulldozing on a side hill preparing the site of a coal-breaker station. One machine was cutting the hillside about 40 feet above the bench where Gladstone was standing cleaning the track and rollers of the tractor he operated. The hillside under the upper tractor suddenly slumped and a slide of snow, mud, rocks, and logs travelled out about 80 feet on the bench to knock Gladstone down and pin him against the tractor. The upper tractor dropped about 15 feet vertically but remained in an upright position. The operator of this tractor and the shift foreman went immediately to Gladstone's rescue, but by the time he was removed was found to have been asphyxiated. The Coroner held an inquiry on the accident in place of an inquest.

The District Inspector investigating the accident made the following recommendations:—

"(1) Machines should not be engaged in close proximity with each other on such stepped levels:
"(2) The removal of the earth and the general lowering of the site should be done by using the machines adjacent to each other and on the same working-level."

Wayne Eberle, aged 25, single, and employed as a driller by Granisle Copper Limited, was fatally injured on January 15, 1969, while setting up an air-track drill on a haulage road near the Granisle open pit.

The drilling rig, a Gardner Denver "Airtrac" unit, consists of a main boom pivoted at the rear of the machine and between the two crawler tracks which are used to carry and propel the whole assembly. The boom can be extended, elevated, or sloughed by means of compressed air. At the outer end of this boom, a drill-feed shell (or guide) is attached to the boom by means of a drill-positioning unit. This positioning unit comprises a main pivot to allow the feed shell to rotate in a

vertical plane about the end of the boom. The actual rotation is achieved by means of an air cylinder which is attached between the boom arm and the positioner. Three sets of holes spaced around the outer edge of the positioner allow different points of attachment for the air cylinder so that a much greater range of vertical movement can be achieved.

At the time of the accident, Eberle had the drill at the back end of the feed shell, that is, at the rear of the machine, with a drill steel already in place. The boom was in a partly elevated position and Eberle operated the controls to raise the feed shell to an almost vertical position, with its lower end resting on the ground and the drill at the top. In this position, the shell and drill were inclined backward toward the rear of the machine. In order to obtain further motion, Eberle then decided to change the operating cylinder attachment to one of the alternate drill-positioner holes. He pulled out the pin from the cylinder end and then operated the air controls to extend the air-cylinder piston rod so that it would line up with the next set of holes in the positioner. While doing this, the feed shell swung backward, rotating on the boom end pivot pin, and knocked the victim onto the drawbar between the drill rig and its compressor to which it was still attached. As the drill was at the top end of the shell there would be a very unstable condition.

In falling, Eberle accidentally operated the track controls and the drilling rig reversed and jackknifed with the compressor. The victim was caught between the drawbar and the drilling unit and also had his left leg run over by a track. The helper shut off the compressor and summoned help. Although Eberle was not breathing after the accident, he was temporarily revived by mouth-to-mouth resuscitation. He apparently died, however, while being placed in a helicopter for transport to hospital.

The verdict of the Coroner's jury was " death was caused by a boom . . . of an Airtac falling on the deceased, thereby crushing the chest, ribs, and lungs.

" We do not attach any blame, as the deceased came to his death due to his neglect by not following the safety measures as the piece of equipment calls for."

The jury made two recommendations, as follows:—

" The jury would recommend that at any time the vertical angle of the boom is required to be changed on an Airtac machine the operator be assisted by a helper, and the use of the safety pin be emphasized to all operators."

Patrick Joseph Kenny, aged 42 years, single, and employed as a miner at Magnum mine of Churchill Copper Corporation Ltd. at Delano Creek, died on February 26, 1969, from injuries received when crushed by the derailing of a mucking machine at the face of the 5200-foot level main-haulage adit. The adit has a 10-foot-square cross-section and the face was 1,788 feet from the portal at the time of the accident.

Kenny was working his third shift at this mine adit. It was his first shift on the Eimco 25 mucking-machine. Prior to using the machine, he had advised the mine superintendent he had not operated this particular model before but had used an Eimco 21 and other loaders and was familiar with loader operations. The mine superintendent watched Kenny using the Eimco 25 for about 10 minutes at the beginning of the shift and then again about an hour later. He considered Kenny to be competent to operate it.

At about 10.45 a.m. after eight cars of muck had been loaded, Kenny's two partners were behind the ninth car being loaded when they heard Kenny scream. They hurried toward him as he staggered forward and fell on the muck pile on the opposite side to the loader's platform. The bucket was on the ground and the loader derailed close to the left wall.

The two men realized Kenny was seriously injured, so obtained the first-aid attendant within 15 minutes. Kenny was taken to the surface and delivered to the doctor who arrived in the air ambulance about three hours after the accident. Kenny died in the aeroplane en route to the hospital.

The investigation of the accident scene showed the mucking machine to be in good working order and that the track and ties were properly installed. It is believed that Kenny while raising the bucket caught it against the wall. This action caused the loader to jackknife and derail the back wheels, upset the machine balance, toppling it toward the wall, and derailing the front wheels. It is thought Kenny was crushed against the drift wall as he stood on the operator's platform. When all four wheels were on the floor of the drift, the machine relevelled itself and freed Kenny.

The jury at the Coroner's inquest held in Fort Nelson, May 8, 1969, returned a verdict of accidental death.

Erich Hermann Piehler, aged 37 years, married, and employed as a miner in Britannia mine of Anaconda Britannia Mines Ltd., died of asphyxia at approximately 9.45 p.m. on April 11, 1969, when buried by a fall of rock in 4169 drift.

The face of the drift was being driven 9 feet high and 11 feet wide and had advanced approximately 30 feet from its collar off 4148 south crosscut. The back and sides of the drift had been reinforced with rock bolts, screens, and straps wherever considered necessary. The deceased and his partner had mucked the round that had been blasted, scaled the back, installed some bolts and screens, and were in process of drilling holes for 6-foot rock bolts when a large area of the drift back collapsed. Piehler was knocked down and buried by this fall of ground. Although help was immediately available, it was not possible to free Piehler for several hours because of subsequent caving. On being released it was found he had succumbed from asphyxia.

At the inquest, the jury found that death was accidental, with no blame attached to anyone.

Joseph Lee Gibos, age 45 years, owner and operator of Glacier Drilling Ltd., died on May 15, 1969, two hours after having been severely injured when his clothes caught on the transmission shaft of the drill he was operating for Kaiser Resources Ltd. on the Balmer coal seam, Harmer Ridge, near Natal.

At about 11.45 a.m., an employee near the operating drill, on noticing Gibos suddenly yanked forward, stopped the drill. He removed Gibos from the transmission shaft and saw that Gibos' left arm had been amputated just below the shoulder and that all clothes had been torn off the upper part of his body. Gibos was immediately taken to the hospital about 7 miles distant, where he died about two hours later.

Upon investigation, it was found that the ⅛-inch flexible steel cable used on the drill recorder had broken off the drill kelly. The loose end of the cable had gone over the mast pulley and fell onto the rotating transmission shaft to the double-drum drill hoist. Inasmuch as a loop of this cable was around the thumb of Gibos' severed arm, it is presumed that when he noticed the broken cable he caught it, but not before it had started winding on the rotating shaft.

The opinion of the Coroner, as stated in his Report of Inquiry, was that death occurred as a result of Gibos being " caught in the unguarded power take-off of his drilling rig."

The District Inspector made the following observation and recommendation:—

" This unfortunate accident would not have occurred if the guard had been in position over the rotating drive shaft.

"Machinery guards should be secured in position at all times when the machine is in operation."

Louis Claud Caron, aged 54 years, married, and *Allan James Fergusson,* aged 56 years, single; both employed at Natal by Northern Construction Company and J. W. Stewart Ltd., were fatally injured at approximately 1.50 p.m. on June 1, 1969, when a truck in which they were riding left the road and rolled down a bank at the Harmer Ridge strip-mining project of Kaiser Resources Ltd.

The truck was a 1965 diesel-powered, Chevrolet flat-deck model having a manufacturer's gross vehicle-weight rating of 24,000 pounds and a tare weight of 12,000 pounds. The flat-deck was loaded securely with mine timbers and an Eimco excavator. The total load weight was about 11,000 pounds.

At approximately 1.30 p.m. Fergusson attempted to start the truck but was unable to do so because of a discharged battery. As a down grade began a short distance ahead of the truck, Fergusson had a bulldozer push the truck over the brow of the hill. The truck travelled downhill about 300 feet and stopped, but the engine did not start. The truck was then permitted to roll another 300 feet, during which time the engine could not be started. Caron, the master mechanic, who had followed in a pick-up truck, stopped his vehicle and got into the large truck. It was permitted to roll down the road and was not seen again for about two hours when it was reported overturned below the road at a point approximately one-half mile below where Caron got on it.

Fergusson was thrown out and crushed by the rolling truck, while Caron was trapped within the cab. He became unconscious through suffocation before being removed and died shortly thereafter.

An examination of the truck revealed the battery to have been completely discharged and the emergency brake fully applied, but not in good working adjustment. The position of the gear-shift lever at the time of the accident could not be determined.

The inquiry held after the accident determined only the physiological cause of death. However, it would appear the accident was almost certainly as a result of an excessive braking requirement which resulted in the brakes failing and becoming ineffective in slowing the vehicle sufficiently to negotiate the curve in the road where the truck went over the bank. Because of the steep gradient the truck should not have been started down it in order to start the motor. Futhermore, because of braking limitations when vehicles are operating on steep road grades, it would appear inadvisable to load up to the manufacturer's gross vehicle-weight rating.

Douglas William Bordon Savage, prospector, employed by Texada Mines Ltd. at Marmot group of New Wellington Mines Limited, was instantly killed on June 10, 1969, when the helicopter in which he was riding crashed into a tree, capsized, and burned in the Moose Valley area of the Sustut River in the Omineca District. Dr. Augustus Charles Skerl, also a passenger in the helicopter and employed by Texada Mines Ltd., died on June 26, 1969, as a result of burns received in this accident. The pilot, Ian Wright, was seriously burned.

It was determined that the helicopter appeared to lose power about 12 to 15 seconds after take off and the pilot attempted to land in a small clearing. As the helicopter descended, the rotor struck a tree, and the aircraft bounced heavily on the ground, capsized, and burned. The Department of Transport investigators determined the loss of engine power to be due to a failure of the engine supercharger. At the inquest held in Hazelton on November 26, 1969, the jury determined Savage's death to have been accidental and did not attach blame to anyone.

Robert M. Dancoisne, continuous-miner operator, aged 26 years, married; *Lewis G. Heath,* shuttle-car operator, aged 29 years, single; and *Steve Ktachuk,* faceman, aged 51 years, married, all employed in Balmer No. 1 mine of Michel Colliery of Kaiser Resources Ltd. near Natal died by suffocation at about 11.30 a.m., June 19, 1969, when buried by an inrush of water mixed with mud and coal dust. At the same time John Krall, fireboss; Dan Evans, faceman; and Frank Kutcher, mechanic, were trapped by caving ground until their rescue 84 hours after the incident. Four other men working in the mine escaped without injury.

The six named men, along with one other, Joe Tuza, were working underground approximately 1,700 feet from the portal of the mine adit. They were removing a pillar in room-and-pillar workings in the footwall of a 45-foot-thick coal seam having a dip of 30 degrees. The method of coal extraction was to drive a room a distance of 200 feet in the footwall horizon of the coal seam and then retreat by withdrawing the timber supports, drilling and blasting the roof to induce caving to the hanging wall, with subsequent loading of the coal by a continuous miner and shuttle car to a conveyer-belt system. On June 19, 1969, the coal extraction was about complete for one room, the working face having retreated approximately the full distance of 200 feet. At 11 a.m. the fireboss blasted six holes which had been drilled into the left or down-dip rib and into the coal roof. The conveyer was then started and the coal produced by the blast loaded onto it. At about 11.30 a.m. a severe " bump " occurred, followed by an inrush of coal and water from the face area. The water engulfed the deceased men, while Tuza, who had been at the working-face, managed to run ahead of the inflow and escape into an older section of the mine. Krall, Evans, and Kutcher were also swept along with the water but managed to escape into old workings where the water changed its direction of flow. When the water-level subsided they endeavoured to make their way out of the mine but found all exit routes blocked by caves. Some of these were old caves but some had been caused by the " bump," while others were caused by collapse of the roadways when the water washed out the roadway supports.

Rescue work, commencing immediately after the accident, found the bodies of Dancoisne, Heath, and Ktachuk several hundreds of feet from the working-face. However, the extensive caving prevented re-entry to the working- face to search for Krall, Evans, and Kutcher. A study of the mine plan indicated much of the caved area could be avoided by the driving of a short incline into a possible refuge area. This was commenced by boring a 68-foot drill-hole which was enlarged by hand-mining to make a break-through. The trapped men were located about 225 feet south of the break-through and were brought to the surface without further incident.

The accident investigation determined the existence of an abandoned working-area having an adverse drainage gradient located approximately 52 feet west and up slope from the current working-face. These workings when driven had been dry, but apparently water had subsequently collected in the heading. The pillar removal in the current mining area had possibly overstressed the remaining pillar support and induced a " bump," thus providing an escape route for the stored water.

The inquest was held in Natal on June 27, 1969, and the jury's verdict was " no blame attached to anyone, as from the evidence given at the inquest the conditions at this mine were in good condition." However, in spite of the opinion that an adequate pillar was assumed to exist between the old and new workings, the presence of accumulated water should have been considered and in addition a more alert management might have calculated a " bump " could occur in that area in such a degree as to effect pillar strength.

Howard Wall, aged 45 years, single, and employed by Gremac Construction Ltd., was killed at 5.15 p.m., October 9, 1969, when he fell down the ore-pass raise

at the Tasu mine of Wesfrob Mines Limited, on Moresby Island in the Queen Charlotte Islands.

The deceased was employed on a contract to install a concrete collar on surface at the top of the ore-pass because caving had increased the collar dimensions from an 8 feet by 8 feet square to a circular diameter of 18 feet to 20 feet. A safety bulkhead was established in rock hitches 45 feet below surface, and a working-platform attached with bullhorns to the raise walls was constructed 14 feet above the bulkhead. The first formwork was erected on the north side of the raise and consisted of 3-inch planks resting on 1¼-inch diameter bars 5 feet long, which had been inset 2 feet into the wallrock. Six or seven of these bars were installed at 2½-foot intervals in the north wall, with two east-west crossbars attached at right angles. The front of the formwork comprised 4-inch timbers and ¾-inch plywood, to a total height of 8 feet. The front of the formwork was braced to the working-platform and to the sides of the raise by double 2- by 4-inch timbers.

At the end of the dayshift on October 9th, 2 feet of concrete had been poured. At the beginning of afternoon shift, Wall stationed himself on the ladder to the working-platform in order to operate the vibrator used to compact the concrete being poured into the formwork. He apparently detected some movement in the formwork and shouted to his partner " It is taking weight! " His partner advised Wall to jump onto the water shield above the formwork, but apparently the collapse of the formwork and staging was too sudden for him to do this and so Wall fell down the raise.

Investigation indicated that in addition to the north wall formwork, parts of the safety bulkhead and working-platform had collapsed. Also it was noted that some of the reinforcing-bars had disappeared and the remainder bent down parallel to the raise wall.

The Inspector completing the investigation attributed the accident to an overloading failure of the reinforcing-bars, and made the following recommendations:—

"(1) Load limitations be observed when using reinforcing-bars.

"(2) Safety belts must be worn by all persons working over or in open raises and that the ropes must be attached to an independent anchor.

"(3) No person should be permitted to be in the raise below the top of the framework while concrete is being poured.

"(4) Vibrating operations should be done from above or some point over the top of the framework."

The jury at the inquest held in Queen Charlotte City on October 18, 1969, found that death had been accidental and recommended a continuance in observation of the foregoing recommendations made by the Inspector.

Janos Vidac, aged 38 years, single, employed as a mechanic by British Columbia Molybdenum Limited at Kitsault, died on November 6, 1969, in Victoria, as a result of injuries received in a fall on December 27, 1968, in a bin at the crusher at Kitsault. Vidac sustained severe head injuries when he lost balance and fell 20 feet when the steel frame against which he was leaning and was cutting with a welding torch suddenly released. He was not wearing the safety belt and rope provided at the site. No inquest was held.

FATAL ACCIDENTS AND ACCIDENTS INVOLVING LOSS OF TIME

There were 15 fatalities in 11 accidents and 347 accidents involving a loss of more than three working-days 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, as to occupation, and as to the parts of the body injured. The accidents that occurred in the coal-mining industry are reported separately from those occurring in all other types of mining operations. The fourth table lists all fatal and compensable accidents which occurred in lode and coal mines over a 10-year period and relates these accidents to the number of men employed.

Accidents Causing Death or Injury Classified as to Cause

Cause	Coal Mines		Mines other than Coal	
	Number of Accidents	Percentage of Total	Number of Accidents	Percentage of Total
Atmosphere	1	1.1	2	0.7
Explosives	....	.....	....	.....
Falls of ground	23	26.1	44	15.0
Falls of persons	20	22.7	69	23.5
Lifting and handling material	15	17.1	39	13.2
Machinery and tools	16	18.2	56	19.0
Transportation	10	11.4	37	12.6
Miscellaneous	3	3.4	47	16.0
Totals	88	100.0	294	100.0

Accidents Causing Death or Injury Classified as to the Occupation of Those Injured

Occupation	Coal Mines		Mines other than Coal	
	Number of Accidents	Percentage of Total	Number of Accidents	Percentage of Total
Underground—				
Chutemen	....	.....	5	1.7
Haulagemen	11	12.5	26	8.9
Miners	18	20.4	115	39.1
Helpers	7	8.0	16	5.4
Timbermen	....	.....	6	2.0
Mechanics, electricians, etc.	7	8.0	15	5.1
Miscellaneous	5	5.7	1	0.3
Surface—				
Mechanics, electricians, repairmen	7	8.0	51	17.4
Mill and crusher workers	....	.....	14	4.8
Carpenters	....	.....	3	1.0
Miners and drillers	3	3.4	17	5.8
Vehicle drivers	9	10.2	7	2.4
Coal-preparation and by-product plants	15	17.0	....	.....
Miscellaneous	6	6.8	18	6.1
Totals	88	100.0	294	100.0

Accidents Causing Death or Injury Classified as to the Parts of the Body

Location	Coal Mines		Mines other than Coal	
	Number of Accidents	Percentage of Total	Number of Accidents	Percentage of Total
Eyes	....	.....	5	1.7
Head, face, and neck	8	9.1	16	5.4
Trunk	27	30.7	76	25.9
Upper extremities	18	20.4	74	25.1
Lower extremities	25	28.4	97	33.0
General	10	11.4	26	8.8
Totals	88	100.0	294	100.0

Compensable[1] *and Fatal Accidents Related to Persons Employed in Coal and Metal Mines*

Year	Number of Accidents		Number of Persons Employed		Frequency per 1,000 Persons	
	Coal	Metal	Coal	Metal	Coal	Metal
1960	235	395	1,182	4,389	198	90
1961	219	338	942	3,993	232	85
1962	134	429	776	4,872	173	88
1963	135	521	748	5,025	180	104
1964	134	547	713	5,400	188	101
1965	116	559	649	5,522	179	101
1966	97	739	614	7,210	158	102
1967	92	688	457	6,716	201	102
1968	73	682	553	9,254	132	74
1969	93	725	700	9,633	133	75

[1] Compensable accident means an injury causing a loss of more than three days' work not including the day of the accident.

DANGEROUS OCCURRENCES

Fifty-one dangerous or unusal occurrences were reported as required by sections 9 and 10 respectively of the *Mines Regulation Act* and the *Coal Mines Regulation Act*. These were investigated by the Inspectors of Mines. The total compares with 61 reported in 1968.

Of these occurrences, 5 were at coal mines, 14 involved fires, 10 with vehicles in surface workings, 8 with explosives, 4 each with electric shock and hoisting incidents, 2 with damaged electric power trailing cables, and 1 each involving being struck by falling equipment, being caught in machinery, a large cave of ground, the failure of a clutch of a tugger hoist, a fall, an explosion of a tank being improperly pressurized, a tailings-dam rupture, a submarine slide, and a poisonous-gas release.

On January 14, 1969, at Britannia mine of Anaconda Britannia Mines Ltd., an old compensator-starter for the motor on the 41-057 ventilation fan broke down and caught fire.

On January 18, 1969, in the Tide Tunnel of Granduc Operating Company, Stewart, three men were using propane gas to thaw water pipes. A two-car train of track ballast entered the tunnel and struck the propane-gas cylinder which was on the track. The escaping gas exploded and caught fire, seriously burning one man.

On February 21, 1969, at Craigmont mine of Craigmont Mines Limited, a small fire occurred in 30–842 orepass when hot metal or sparks from an oxy-acetylene torch cut fell down the raise and into an empty Roc-loc can. Traces of the plastic cementing material left in the can ignited and filled the raise with smoke. The fire was extinguished without damage.

On March 3, 1969, at 11.35 p.m. at Reeves MacDonald mine of Reeves MacDonald Mines Limited, the trolley power and lights failed after a large blast was fired. The No. 1 motor-generator set feeding power to the trolley dropped off line, but the No. 2 set did not and the motor driving it burned out. In addition, the 500-horsepower compressor motor burned out. No definite cause for the foregoing event-sequence was determined.

On March 18, 1969, at Highland Bell mine of Mastodon-Highland Bell Mines Limited, a workman's hand was caught between the crusher conveyer belt and a pulley when the operator accidentally started the belt. It was evident that a switch was not locked out.

On March 18, 1969, at the Wolf mine of Dolly Varden Mines Ltd., a workman was seriously injured when he drove a Scoot-Crete muck vehicle over the mine dump.

On April 9, 1969, at Brenda mine of Brenda Mines Ltd., a 100-ton Lectra Haul truck ran away when dynamic braking failed because of a breakdown of the control rheostat. The service brakes were not capable of stopping the truck on the down grade and it was driven into the road bank.

On April 22, 1969, at Bluebell mine of Cominco Ltd., a fire occurred in No. 1 shaft when timber became overheated by an electric heat lamp.

On May 4, 1969, at Boss Mountain mine of Brynnor Mines Limited, the clam of the Cryderman shaft mucking machine suddenly dropped 50 feet to the shaft bottom as it was being lowered. The sudden loss of control was determined to have been caused by the clutch being dirty, loose, and worn.

On May 5, 1969, a fire of unknown origin at the Davis-Keays mine of Davis-Keays Mining Co. Ltd. destroyed the heating-unit for the mine ventilating air.

On May 23, 1969, at the Old Sport mine of Coast Copper Company Limited, the operator of a Wabco Scoopmobile was slightly injured as the vehicle rolled over when one wheel ran up a loading-ramp.

On May 26, 1969, at the Tide Camp of Granduc Operating Company, the operator of a front-end loader was slightly injured when the loader overturned after running off the road edge.

On May 30, 1969, at the Michel Colliery by-product plant of Kaiser Resources Ltd., an electrician working on a service feeder was burned by an electric arc caused when a workman closed the power switch which he had previously opened to allow the electrician to work on the line. If the switch had been properly locked out, the accident would not have occurred.

On June 10, 1969, at Britannia mine of Anaconda Britannia Mines Ltd., a man was injured in the south compartment cage in No. 8 shaft when it struck some object in the shaft. The incident was probably caused by one of the several loose guide-rails in the north compartment, which the workman was about to investigate.

On June 12, 1969, at the Roundy Creek, Alice Arm property of Sileurian Chieftain Mining Company Limited, a diamond driller sustained a fractured skull when struck by a falling snatch block as he was pulling drill rods.

On June 13, 1969, in the concentrator switchroom at British Columbia Molybdenum Limited, an electrician received flash burns when testing a switch-control circuit, because the circuit-breakers had not been completely withdrawn from the live bus bars. The electrician should have realized an unsafe condition existed inasmuch as the switch cubicle door would not open more than 60 degrees.

On June 15, 1969, at the Silver Tip property of Sultana Silver Mines Limited, Rocher Déboulé Mountain, a diamond-drill helper carrying a can of gasoline fell on entering the drill shack. The gasoline spilled over the pump motor and caught fire. The diamond-drill machine and all equipment were destroyed.

On June 21, 1969, at the Bethlehem mine of Bethlehem Copper Corporation Ltd., a Haulpak truck stalled, went out of control, backed over a bench, and landed on its wheels on the bench below. The driver, who was slightly injured, was subsequently prosecuted under section 23, Rule 280 of the *Mines Regulation Act.*

On June 22, 1969, at the Eureka adit, Holy Cross Mountain Mines Ltd. near Hope, an unidentified person or persons placed two cases of explosives in a mine car, pushed the car 60 feet inside the portal, and detonated the explosives.

On June 22, 1969, at the property of Holy Cross Mountain Mines Ltd. near Hope, an unidentified person or persons broke into the explosives magazine, which they destroyed by detonating the 11 cases of explosives stored therein.

On June 23, 1969, at the Lynx mine of Western Mines Limited, a truck-driver was severely injured while endeavouring to escape from an overturning fuel truck.

On June 24, 1969, at the face of the decline of Valley Copper Mines Limited, a miner was found smoking a cigarette while handling explosives. He was subsequently prosecuted under section 23 Rule 39 (*b*) of the *Mines Regulation Act.*

On July 11, 1969, at the Tasu mine of Wesfrob Mines Limited, a 30-ton Haulpak truck backed over the mine dump after climbing part of the dump berm when unloading waste rock. The dump collapsed while the truck was on the berm.

On July 14, 1969, at the Balmer Hydraulic mine of Kaiser Resources Ltd., the trailing cable of a shuttle car was damaged by being crushed against the coal rib when the car was being turned. A flash occurred but no one was injured and the electrical controls automatically isolated the power.

On July 14, 1969, at Reeves MacDonald mine of Reeves MacDonald Mines Limited, a fire occurred in the delivery pipes from the large compressor. A Mercoid heat-sensitive switch in the delivery-line failed to function and allowed the compressor to continue operating while the temperature was increasing in the delivery-line and main receiver.

On July 19, 1969, at the inactive Polaris Taku, Tulsequah mine of Cominco Ltd., a fire destroyed the warehouse containing mine stores.

On July 24, 1969, at Brenda mine of Brenda Mines Ltd., an 100-ton Lectra Haul truck was driven down an embankment and rolled onto its side, causing minor damage. Subsequent investigation revealed the braking system to have been inoperative and, although the warning alarm signalled, the emergency or mechanical braking and auxiliary steering were not applied in time.

On August 23, 1969, at the open-pit mine of British Columbia Molybdenum Limited, an electrician working 1,700 feet away from a blasting operation was injured while endeavouring to escape from flying rock.

On August 25, 1969, at the Harmer No. 1 open pit of Kaiser Resources Ltd., a water truck being used for dust suppression on the mine roads was involved in an accident caused by faulty brakes. A maintenance supervisor released the truck to operations knowing that the truck had a blocked brake. Shortly afterward, the driver lost control of the vehicle and it overturned, causing considerable damage, but fortunately the driver escaped injury. The services of the maintenance supervisor were terminated.

On September 1, 1969, at the Davis-Keays mine of Davis-Keays Mining Co. Ltd., an employee was surveying surface exposures along the mountain top and without using a safety rope ventured too close to a snow scarp. The snow gave way and the workman rolled and fell without injury about 500 feet down the precipitous mountainside.

On September 3, 1969, at the Balmer North mine of Kaiser Resources Ltd., the trailing cable of a shuttle car was crushed against the coal rib. A flash occurred, but no one was injured, and the electrical earth-leakage protection controls isolated the power immediately.

On September 5, 1969, at the Davis-Keays mine of Davis-Keays Mining Co. Ltd., the tank of a fuel truck exploded while being emptied by compressed air. The delivery-line plugged, thus permitting the pressure to build up. The truck was destroyed.

On September 5, 1969, at the Granduc mine of Graduc Operating Company, a blaster failed to properly guard a blasting operation while men were working in the area. Disciplinary action was taken.

On September 12, 1969, at the Twin Creeks tailings-disposal area of The Granby Mining Company Limited (Phoenix Copper Division), a rupture developed in the dam area, causing 90,000,000 gallons of water and tailings to be discharged

in the creek. The flooding caused considerable damage to roads and some buildings in Greenwood.

On September 13, 1969, at the Pitt River quarry of Ocean Cement Limited, a loaded 25-ton Euclid truck failed to negotiate a turn, due to a power-steering failure. The truck rolled on its side and the driver, who was struck by the battery, suffered bruises to the head and acid burns to the face and both eyes.

On September 17, 1969, at the Cassiar mine of Cassiar Asbestos Corporation Limited, a workman received an electric shock while unplugging an electric welding-machine. It was determined the machine grounding was faulty and wet conditions prevailed.

On September 17, 1969, at the Kitsault townsite of British Columbia Molybdenum Limited, a submarine slide engulfed several trailers in a newly prepared residential area.

On October 1, 1969, at the open-pit mine of Endako Mines Ltd., two men reported receiving an electric shock when one of them was closing a switchhouse breaker. The pit grounding and power systems were thoroughly checked, but no reason for the incident could be found.

On October 7, 1969, in the Crown shaft of Bralorne Pioneer Mines Limited, a kink developed in the hoist rope when the safety dogs became engaged. The rope was replaced.

On October 8, 1969, at the Sullivan mine of Cominco Ltd., the main shaft of the 500-horsepower hoist serving No. 2 shaft fractured just as the skip was reaching 3900 level. Fortunately the fracture occurred near the motor end-bearing, and thus did not affect the alignment of the hoist drums and the operation of the braking system. Although the skiptender was on the skip, he was not injured.

On October 8, 1969, at the Jersey mine of Canadian Exploration Limited, a premature blast took place when lightning struck the hillside over the mine. Because of the storm the loading area had been evacuated, but one series of about 50 electrically primed blastholes detonated. No lead wires had been connected.

On October 27, 1969, at the Phoenix mine of The Granby Mining Company Limited (Phoenix Copper Division), the compressor house was destroyed by fire started by an overheated compressor. A new sprinkling system had been installed and the water supply stopped in order to connect into the water main. It was forgotten that the compressor cooling water was obtained from the same supply, hence the compressor overheated and caught fire.

On October 27, 1969, at British Columbia Molybdenum Limited, due to a misunderstanding between two mill operators working on different shifts, a double batch of phosphorous pentasulphide was mixed during the preparation of a milling reagent. This action permitted the release of a large amount of hydrogen sulphide gas. One man was overcome with the gas.

On November 4, 1969, at Granduc mine of Granduc Operating Company, two miners were discharged for having left unused explosives in a drift during a blast and for failing to remove unexploded cartridges from a muck pile.

On November 8, 1969, at the Davis-Keays mine of Davis-Keays Mining Co. Ltd., fire destroyed the mine air-ventilation heating unit at the 7300-level portal. It is believed water in the fuel extinguished the flame and permitted an accumulation of fuel prior to automatic reignition. A subsequent explosion blew flames out of the heater and ignited the housing.

On November 25, 1969, at the Balmer North mine of Kaiser Resources Ltd., water seepage into the roof strata induced an extremely large cave in an entry a short time after it had been driven.

On November 25, 1969, at the Sullivan mine of Cominco Ltd., a slusher miner failed to properly guard a blasting operation in a sub-level, thereby endangering the life of another workman in the vicinity. The miner's blasting certificate was placed in suspension for one month.

On November 28, 1969, at the Magnum mine of Churchill Copper Corporation Ltd., a fire presumably originating from an oil stove destroyed the 5750-level portal lunchroom and first-aid supplies.

On December 16, 1969, at the McDonald Island open pit of Granisle Copper Limited, two diamond drillers were cleaning the sediment bowl of the water pump of a gasoline engine inside a drill shack when the engine burst into flames. The drill and all equipment were destroyed.

On December 18, 1969, at the 17-foot level pump room of the Lynx mine of Western Mines Limited, a fire occurred in an auto-transformer starter for a pump. The fire was caused by inexperienced workmen tampering with the high water-level switches.

On December 20, 1969, at the Annex shaft, of Reeves MacDonald Mines Limited, three teeth broke on the pinion gear on the hoist-motor shaft of the Ottumwa hoist.

PROSECUTIONS

Four prosecutions were instituted under the *Mines Regulation Act* and none under the *Coal Mines Regulation Act.*

The manager of Grouse Creek Mines Ltd., with an underground placer mine near Barkerville, was charged on February 20, 1969, under sections 10 (1), 21 (1), and 22 (1) of the *Mines Regulation Act* for failing to give the Inspector notice of the opening of a mine, for failing to provide a certified shiftboss on the property, and for failing to give the Inspector the name of the manager of the mine. At the hearing held in Quesnel on August 8, 1969, pleas of guilty were made and fines of $125, $200, and $75 were levied for the respective infractions.

The manager of the Donna Mines Ltd.'s property 10 miles northeast of Usilika Lake was charged on April 30, 1969, under sections 21 (1), 23, General Rules 5 (*a*), 5 (*d*), 22, and 90 (*a*) of the *Mines Regulation Act* for failing to provide a certified shiftboss on the property, for installing a diesel engine less than 75 feet from the entrance to a mine, for allowing the exhaust gas from a diesel-engine to enter a mine, for storing detonators in a building other than a magazine, and for failing to provide water for drilling. At the hearing held in Fort St. James on June 4, 1969, pleas of guilty were made and a fine of $50 was levied for each infraction.

The driver of a Haulpak truck involved in an accident on June 21, 1969, at the Bethlehem mine of Bethlehem Copper Corporation Ltd., was charged under section 23, Rule 280, of the *Mines Regulation Act* for being under the influence of or in possession of intoxicating liquor while at a working-place at a mine. At the hearing in Ashcroft on July 3, 1969, a plea of guilty was made and a fine of $75 was levied for the infraction.

A miner employed in the decline adit of Valley Copper Mines Limited was, on June 24, 1969, found smoking a cigarette while handling explosives. He was charged under section 23, Rule 39 (*b*) of the *Mines Regulation Act.* At the hearing in Ashcroft on June 30, 1969, he was found guilty and was fined $10 for the infraction.

BLASTING CERTIFICATE SUSPENSIONS

There were three blasting certificate suspensions made for violations of the explosives and blasting procedure provisions as contained in the *Mines Regulation Act.* The suspensions were each for a period of one month. The offences were for

failing to examine and wash a working-face subsequent to a blast, for drilling holes in the area of the bootleg holes of a former cut, and for failing to properly guard a blasting operation.

ELECTRICAL-MECHANICAL

An Electrical Inspector has directed the inspection of electrical equipment since 1946 in the mining industry and since 1954 in the oil and gas drilling industry. Since 1966 a Mechanical Inspector has assisted in the inspection of all mechanical equipment installed in any type of mine or quarry.

Electrical and Mechanical reports, as presented by L. Wardman, Senior Inspector, Electrical-Mechanical, follow.

ELECTRICAL

In 1969 electric power was used by 48 mining companies in operations at 48 lode mines and two collieries. Twenty-nine metallurgical concentrators were operated. Five concentrators were under construction, of which four should be in operation in 1970. Operations were terminated at one mine and all equipment was removed. Electric power was used at 45 structural-material and industrial-mineral mines. Fifty-one gas and oil well-drilling rigs were in operation.

The following table gives the kilovolt-ampere capacity of mining-company-owned power plants at lode mines and the amount of power generated in 1969:—

Prime Mover	Generator Kva. Capacity	Kilowatt-hours Generated
Diesel engines	31,682	
Hydro	11,410	
Steam	30,000,000	
Totals	30,043,092	114,969,000

The electric power purchased from public utilities and from the generating division of Cominco Ltd. amounted to 694,760,000 kilowatt-hours. This amount, added to that produced by privately owned plants, makes a total of 809,729,000 kilowatt-hours.

A general breakdown of the connected load at the mines which operated during 1969 is as follows:—

Equipment	Horsepower
Hoists and overhead trams	7,762
Hoists (scraper)	4,235
Electric shovels	8,735
Electric rock drills	1,775
Mucking-machines	260
Fans (mine ventilating)	11,623
Pumps (mine)	14,378
Rectifiers and M.G. sets	8,388
Air compressors	25,239
Sink-float	1,585
Crushing plant	24,549
Grinding equipment	76,119
Concentrating	36,147
Magnetic separators	235
Conveyers	15,071
Pumps (mill)	23,997

Pumps (fresh water)	7,652
Workshops	3,995
Miscellaneous	10,407
Total	282,152

On the track haulage systems, there were in use 121 battery, 105 trolley, and 21 diesel locomotives.

In 1969 electric power was used at 45 structural-material and industrial-mineral mines and quarries.

Power is produced at 10 of these operations by company-owned plants, but at the remainder it is purchased. The amount of power produced and purchased is as follows:—

	Kilowatt-hours
Produced by diesel-driven generators, 8,872-kva. capacity	20,612,460
Amount purchased	17,062,980
Total	37,675,440

A general breakdown of the connected load is as follows:—

Equipment	Horsepower
Hoists and aerial trams	273
Hoists (scraper)	205
Fans	80
Pumps	66
Rectifiers and M.G. sets	8
Air compressors	603
Electric shovels	520
Electric rock drills	72
Drying plants	740
Crushing plants	8,069
Conveyers	3,970
Milling	5,050
Screens	1,087
Pumps	2,008
Workshops	629
Miscellaneous	2,081
Total	25,461

One battery locomotive was used for underground haulage.

At coal mines, electric power was used in one open pit, six underground mines, one processing plant, and one screening plant. One of the aforementioned mines, "C" North, was closed. Electric shovels and drills were put into service in the Harmer No. 1 pit. The new Kaiser Resources Ltd. coal-processing plant was nearing completion by the end of the year. The haulage tunnel was also almost ready for service.

The distribution of the connected load at collieries in operation during 1969 was as follows:—

	Horsepower	
Surface—		
Air compressors	1,900	
Electric shovels	3,200	
Electric drills	1,600	
Conveyers	55	
Ventilation	830	
Hoisting	45	
Coal breaker	30	
Coal washing	2,048	
Coal screening	170	
Pumping	120	
Coke production	1,575	
Miscellaneous	2,676	
Total		14,249
Underground—		
Ventilation	290	
Pumping	145	
Air compressors	250	
Continuous miners	2,140	
Shuttle cars	750	
Loaders	175	
Conveyers	3,150	
Hoisting	25	
Miscellaneous	31	
Total		6,956
Total surface and underground		21,205

There was a total consumption of 36,658,450 kilowatt-hours of electrical power used for coal mining and coal processing during the year.

The following table and graph show the power consumption in kilowatt-hours in various mining operations since 1960. It will be noted that since 1961 the total consumption has increased annually.

Annual Consumption of Power (in Kilowatt-hours)

Year	Lode Mines	Industrial Minerals	Total	Coal	Total
1960	273,986,328	15,830,880	.....	.....	289,817,208
1961	255,643,278	13,095,147	.....	.....	268,738,425
1962	324,638,348	23,262,091	.....	.....	347,900,439
1963	345,296,000	23,321,875	.....	.....	368,617,875
1964	373,279,423	26,460,100	399,739,523	31,160,152	430,899,675
1965	467,654,500	32,010,923	499,665,423	40,915,890	540,581,313
1966	573,345,458	35,081,797	608,427,255	22,503,551	630,930,806
1967	660,924,689	31,719,975	692,644,664	22,730,640	715,375,304
1968	730,193,710	37,978,960	768,172,670	26,690,100	794,862,770
1969	809,729,000	37,675,440	847,404,440	36,658,450	884,062,890

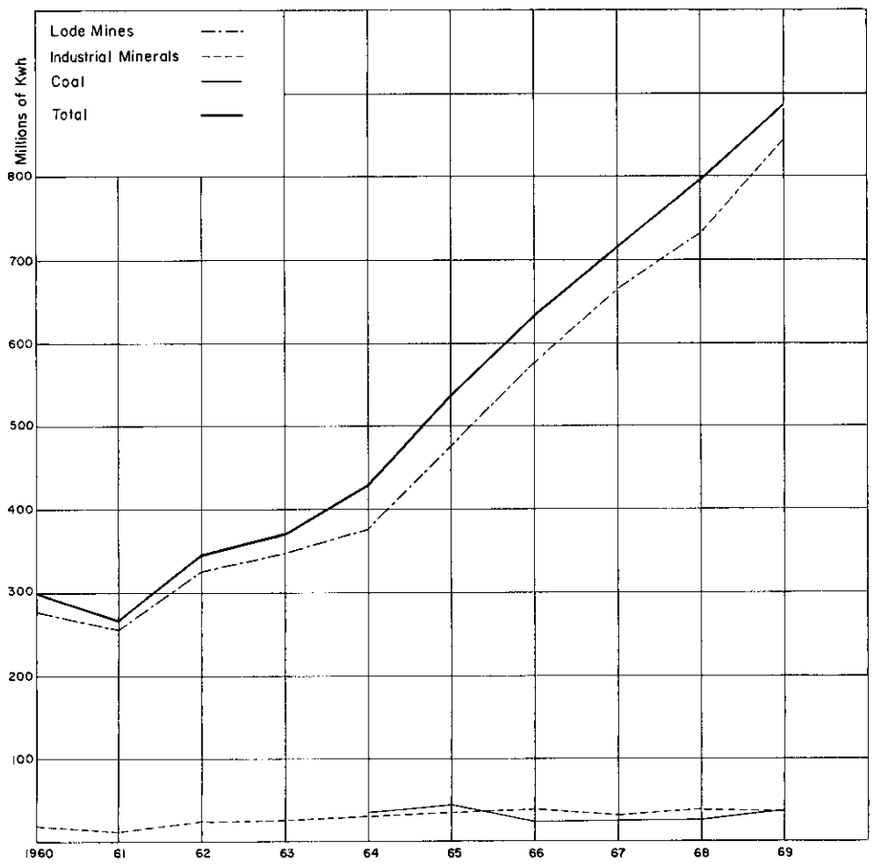


Figure 7. Annual consumption of power in kilowatt-hours, 1960–1969.

MECHANICAL

Diesel-powered Equipment Underground

During the year a further 86 permits were issued to cover the operation of diesel-powered equipment underground. This brought the total number of permits issued to 245 at the end of the year.

A summary of the diesel equipment put into use during 1969 is as follows:—

Equipment	Number of Permits Issued	Total Horsepower
Locomotives	11	362
Load-haul-dump vehicles	26	3,492
Front-end loaders	4	669
Ore carriers	15	760
Tractors	2	117
Drilling jumbos	13	725
Service and personnel vehicles	15	906
Totals	86	7,031

The following eight diesel engines, after being subjected to special dynamometer tests and having their exhaust gases analysed, were in 1969 granted approvals for underground use by the Department of Mines and Petroleum Resources:—

Approval Number	Engine Details	Brake Horsepower Developed	Minimum Ventilation Requirement
			(C.f.m.)
B.C. Dept. of Mines 1969-1	Caterpillar D343, Series A, turbocharged	325	30,000
B.C. Dept. of Mines 1969-2 (*a*)	Mercedes-Benz OM 352	82	5,000
B.C. Dept. of Mines 1969-2 (*b*)	Mercedes-Benz OM 352	88	6,000
B.C. Dept. of Mines 1969-3	Dorman 4 DA	50	10,800
B.C. Dept. of Mines 1969-4	Crossley B.W.L. 5.5	100	10,000
B.C. Dept. of Mines 1969-5	John Deere JD 350	40	4,000
B.C. Dept. of Mines 1969-6	Bedford OB 5-330	93	22,000
B.C. Dept. of Mines 1969-7	J. I. Case 267-D	70	7,200

During the year 1969, a Hunslet, 60-horsepower, diesel-powered man-rider and general-purpose vehicle was put into operation in an underground coal mine at the Michel operations of Kaiser Resources Ltd. This machine carries a full British Ministry of Power approval for use in gassy coal mines.

A Wagner ST-5A(s) Scooptram, approved for use in gassy mines by the United States Bureau of Mines under their Schedule 31, was also used during the year in the driving of a cross-measure tunnel at the Harmer Ridge operation of Kaiser Resources Ltd.

At several mines unacceptable levels of noxious exhaust-gas constituents have been found in the general body of the mine air. These were traced either to ventilating-air flows less than those required on the individual diesel permits issued, or to inadequate maintenance of the diesel engines, which allowed excessively rich fuel/air mixtures to enter the engine cylinders (blocked air filters, exhaust conditioners, etc.).

The following is a summary of all the diesel-powered equipment operated underground during 1969:—

Equipment	Number of Units Operated	Total Horsepower
Locomotives	28	1,284
Load-haul-dump vehicles (Wagner Scooptrams, Eimco loaders, Joy transloaders, Wabco scoopmobiles)	48	6,197
Standard front-end loaders	7	1,270
Ore carriers (trucks, Scootcretes, etc.)	41	3,299
Tractors	6	517
Drilling jumbos	23	1,481
Graders	4	290
Service and personnel vehicles	38	1,941
Scaling towers (2 "Giraffes," 3 pump units)	5	407
Miscellaneous (1 welder, 1 "Flocrete," 3 slushers)	5	329
Totals	205	17,015

The minimum total volume of mine ventilation required for all this equipment was approximately 2,125,000 cubic feet per minute.

Hoisting Equipment

During 1969, the following shaft hoists were put into service:—

Mine	Hoist	Purpose
Anaconda Britannia Mines Ltd. (Hoist leased from Boland Development)	Single-drum, 84-in. diam., 54-in. face width; originally manufactured by Vulcan Iron Works in 1912 but remodelled by Hardie Tynes in 1951; maximum allowable rope pull, 26,500 lb.; maximum rope speed, 1,500 ft./min.	Sinking No. 10 shaft.
Boss Mountain (Brynnor Mines Limited)	Nordberg, double-drum 72-in. diam., 60-in. face width; manufactured, 1940; both drums clutched; maximum allowable rope pull, 22,000 lb.; maximum rope speed, 830 ft./min.	Production (this hoist previously used for sinking the shaft).
Galaxy	Canadian Ingersoll Rand; single drum, 30-in diam., 18-in. face width; manufactured, 1956; maximum allowable rope pull, 5,000 lb.; maximum rope speed, 300 ft./min.	Exploration.

The small compressed-air hoist at the Trojan property was also put back into operation during the year to enable further underground exploration work to be carried out.

The use of electromagnetic rope-testing techniques continued to supplement the routine six-monthly breaking tests required by the *Mines Regulation Act*. Altogether, during 1969, 98 breaking-test reports and 88 electromagnetic-test reports were received. Fifty-five of these non-destructive tests were performed by Wire Rope Industries of Canada, Limited, using their DC Defectograph, and the remaining 33 tests were made by McPhar Manufacturing Limited, of Don Mills, Toronto, using their AC Electromagnetic Rope Tester. At one mine, both methods were used on the same ropes and there was a good degree of correlation between the test results obtained from both instruments.

As a direct result of the increased knowledge gained from the non-destructive test reports, four-month life extensions were granted to enable ropes to remain in service beyond their normal statutory two-year maximum life. During the year, 84 separate life extensions were issued by the Chief Inspector of Mines. It was decided that, for the present time, no rope used for the raising and lowering of persons will be granted life extensions after a total period of service of four years. For counterweight ropes no limit was fixed and two such ropes were still in service at the end of the year, each with close to five years of continuous service.

On several occasions, it was necessary to require the immediate removal of a rope from service because of serious deterioration revealed by the rope-test reports.

A considerable expansion in the use of ultrasonic and magnetic non-destructive test procedures for machinery in general took place during 1969. These methods of testing were used to reveal the presence of serious flaws such as fatigue cracks or weld failures in vital components. Most of the hoisting equipment (drum shafts, brake pins and linkages, draw gear, sheave-wheels, etc.) in use in British Columbia has been checked at least once by this method and regular annual examinations will generally be required in the future.

The value of this work was shown by the following defects which were discovered during the year by the non-destructive tests:—

(*a*) All four brakes and clutch linkages on a "second-hand" hoist were found to be cracked.

(*b*) A bearing pedestal on a small hoist was found to be severely cracked.

(*c*) Six out of twelve new safety catches received by a mine were found to have edge cracks.

(*d*) Several weld cracks were discovered in the main structural members of a man-skip.

(*e*) A main brake pin in an underground hoist was found to have a fatigue crack extending across 75 per cent of its section.

Trucks and Heavy Mobile Equipment

The past year was another busy one for the open-pit mining industry, both for preparation and for operation. The increased tonnage being obtained and planned from the newer pits was reflected in the ever-increasing size of equipment being introduced.

The first 200-ton, two-axle electric trucks in the world were put into service by Kaiser Resources Ltd. at their Harmer Ridge coal operation. This company also used three 25-cubic-yard shovels and was assembling a Page 54-cubic-yard dragline.

Both Brenda Mines Ltd. and Kaiser Resources Ltd. used 100-ton electric dump trucks and had a total of 22 of these large units in operation. The braking system on these vehicles was not considered fully acceptable by either the Department of Mines and Petroleum Resources or the Department of Commercial Transport, primarily because of the absence of a mechanical parking brake. A joint meeting was held between these two Departments and senior representatives of the company manufacturing the trucks. As a result of this meeting, a revised brake arrangement was designed and approved and all new vehicles used in British Columbia are required to have this new, improved braking system incorporated. Vehicles already in use are required to be modified as soon as possible.

Similar joint meetings have been held with other manufacturers of off-highway equipment, and several of these companies are now revising their braking systems to meet the high standards established in British Columbia for mining and industrial roads.

The 1969 revised edition of the *Mines Regulation Act* indicates more clearly the criteria to which braking systems require to be designed. For example, the service brakes on every vehicle must be capable of stopping and holding it on any grade which it can climb under its own power. This in effect, requires the manufacturer to provide a greater braking ability than driving ability for each vehicle. This rule will ensure an adequate standard of design in future and it has been brought to the attention of all manufacturers of off-highway equipment.

The following is a summary of the heavy open-pit and quarry equipment in use during 1969:—

Dump Trucks (off-highway)

Size of Vehicle (Tons)	Number in Use
0–20	150
21–40	163
41–60	22
61–80	10
81–100	23
200	9
Total	377

Pit Shovels

Size of Shovel (Cubic Yards)	Number in Use
0–2	27
2¼–4	22
4¼–6	16
6¼–8	4
10–11	4
16	1
25	3
Total	77

Front-end Loaders

Size of Loader (Cubic Yards)	Number in Use
0–2	94
2¼–4	72
4¼–6	25
10–12	3
15	2
25	1
Total	197

ENVIRONMENTAL CONTROL

Dust and Ventilation

Again owing to difficulties in obtaining an adequately experienced individual to fill a staff vacancy, the 65 surveys completed at 60 mines in 1969 were slightly more than 55 surveys completed in 1968 but still considerably less than the 98 completed in 1967. The surveys were made in underground and open-pit lode and coal mines, rock quarries, sand and gravel pits, and an asbestos open-pit mine.

In June, B. M. Dudas was appointed Inspector and trained to assist in the making of these surveys.

The summary of the report of the Senior Inspector, S. Elias, follows:—

Workmen in a mining environment may be exposed to a variety of harmful substances and (or) conditions that include dusts, gases, fumes, vapours, heat, noise, vibration, and others. It is therefore necessary to establish an exposure level at which the workmen will not be adversely affected. The maximum acceptable operating concentrations of dust in British Columbia is as follows:—

In lode mines, when using the konimeter as the sampling instrument, 300 particles of dust per cubic centimetre of air is used as the maximum.

In the asbestos industry, when using a midget impinger as the sampling instrument, 5 million particles per cubic foot of air is the maximum. A 2-million-particles-per-cubic-foot standard is under study.

For coal dust in non-anthracite coal, 700 particles per cubic centimetre of air between 1 and 5 microns in size is the maximum when using the long-running thermal precipitator as the sampling instrument. A gravimetric standard using the MRE (Mining Research Establishment of the National Coal Board, Great Britain) type 113A sampler is under study.

No known reference gives the exact concentration at which workmen develop silicosis, pneumoconiosis, or asbestosis. The maximum acceptable concentrations are intended as guides and there is reasonable assurance that silicosis, pneumoco-

niosis, or asbestosis will not occur if exposures are kept below these levels. On the other hand, impairment is likely to develop in some workmen if the recommended levels are exceeded consistently. It is the responsibility of both management and the workmen to ensure that the maximum acceptable concentrations are not exceeded.

Drilling operations produce high dust concentrations. No appreciable technical advance has been made in recent years to lower the dust concentration produced by pneumatic rock-drilling equipment. Proper maintenance and adequate auxiliary ventilation together with good mining practices are the control factors. This year 54 per cent of the surveys at drilling locations gave averages of 300 particles per cubic centimetre of air or less.

At " all other " underground locations, the category that includes all operations other than drilling, 76 per cent of the surveys showed averages of less than 300 particles per cubic centimetre of air. The dust-control methods used consist of good mining practices together with adequate ventilation to all areas.

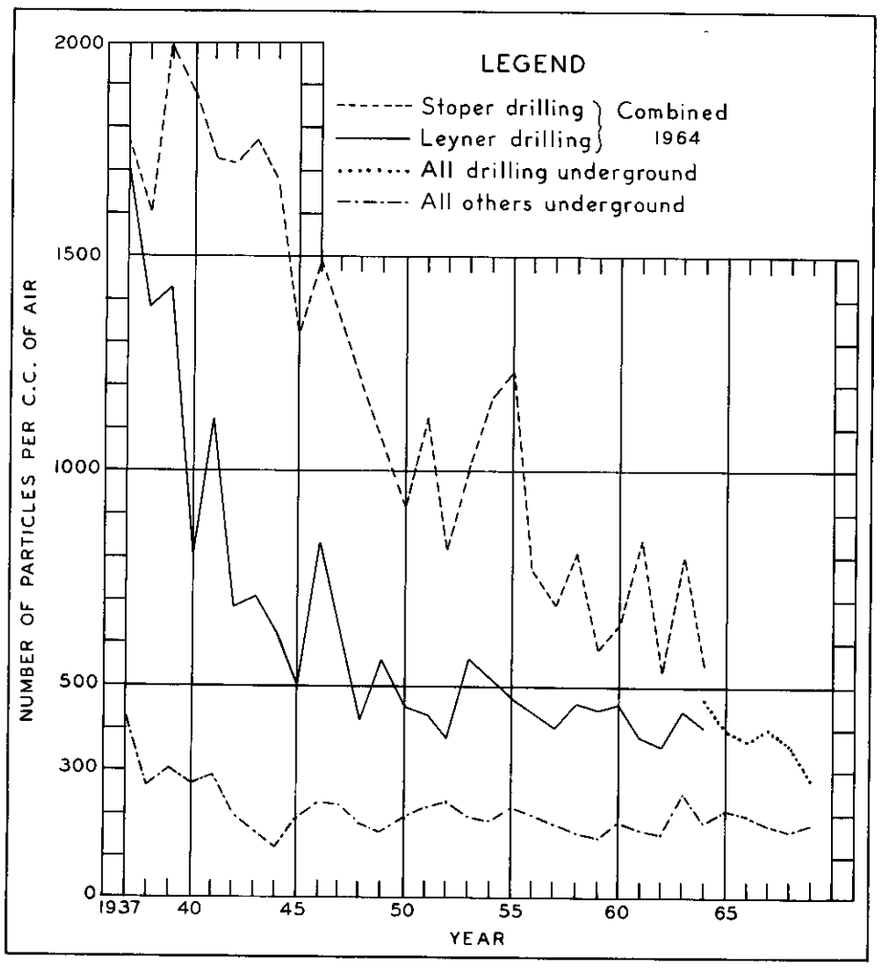


Figure 8. Average underground dust counts.

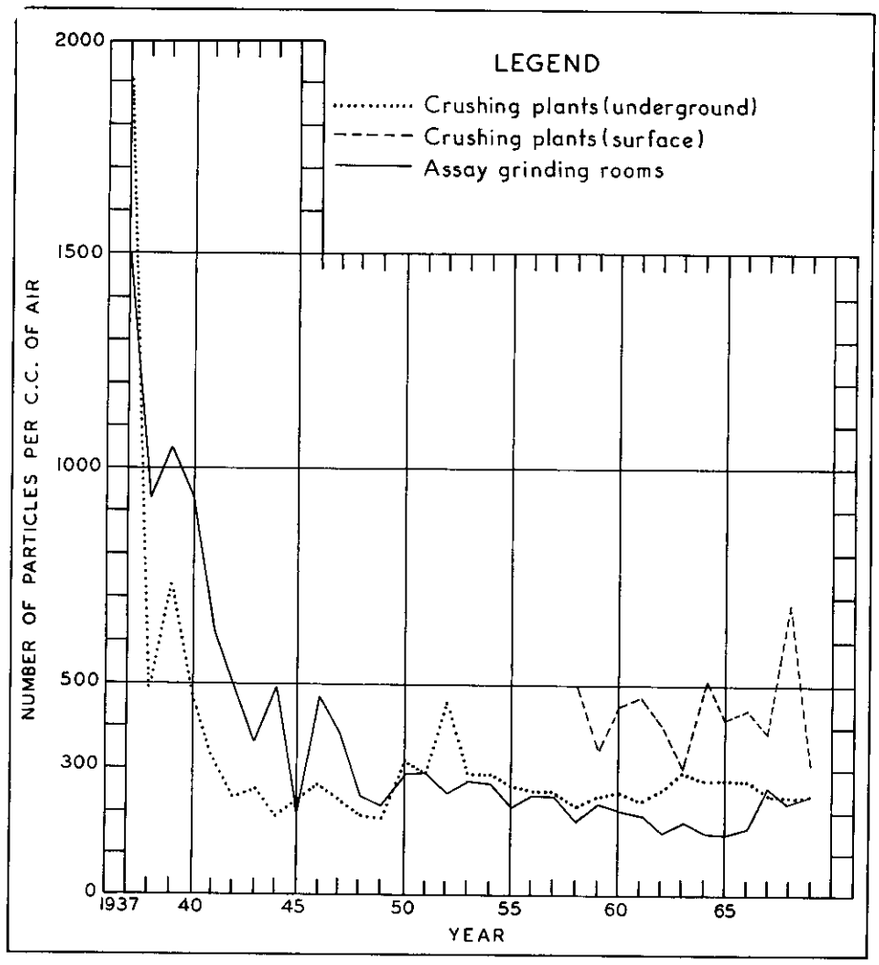


Figure 9. Average crushing and grinding dust counts.

At crushing plants for underground mines the percentage of surveys less than 300 particles per cubic centimetre of air was 68 per cent. There is still a number of plants with under-designed exhaust systems to collect the dust rather than control the dust hazard.

At open-pit operations the results of the dust surveys were as follows: At drilling operations 73 per cent of the surveys were less than 300 particles per cubic centimetre of air. All drilling is done with water and (or) exhaust systems; at all other operations in the pit all of the surveys were less than 300 particles per cubic centimetre of air; at crushing plants 41 per cent of the surveys were less than 300 particles per cubic centimetre of air. A number of companies are modifying their exhaust system to bring dust control within the desired standards.

In the assay grinding rooms, 74 per cent of the surveys gave an average of less than 300 particles per cubic centimetre of air. The use of compressed air for cleaning purposes and inadequate hood face-velocity continue to produce the high dust-concentration areas.

At rock and limestone quarries the results of the dust surveys showed the following: At drilling operations, 50 per cent of the surveys were less than 300 particles per cubic centimetre of air; at " all other " operations, all were below 300 particles per cubic centimetre of air; at crushing operations, 40 per cent were less than 300 particles per cubic centimetre of air; at bagging operations, all were below 300 particles per cubic centimetre of air. There still is a number of gravel pit crushing plants not equipped with adequate dust control. All crushing plants require exhaust systems to give constant dust control.

In the asbestos mining and milling operations, 52 per cent of the samples taken were within the limit of 5 million particles per cubic foot. This is a retrograde step from the previous averages that ranged between 70 to 85 per cent within the standard. New standards for dust concentrations at asbestos mines are under study.

In the coal mines, 50 per cent of the locations were found to be within the set standards. New dust standards for coal dust are presently being studied.

The foregoing graphs show the median of all dust-count averages in various operations in the lode mines. These have been plotted annually since 1937.

Certificates of fitness were checked at the mines and 98 per cent were found to be in good order. New legislation during the year required workmen in a " dust-exposure occupation " in coal mines to obtain a certificate of fitness before entering employment and once every 12 months thereafter. Five hundred and ninety-nine workmen in the coal mine industry were X-rayed for certificates of fitness in 1969.

Noise Control

Noise surveys were made at 33 mining properties. The surveys made showed the following results:—

	Per Cent
Workmen wearing ear protection	75
Workmen wearing ear-plug type defenders	57
Workmen wearing ear-muff type defenders	43
Drills tested that were muffled	73
Drills tested that were not muffled	27
Total drills reported at mining properties that were muffled (not all in use)	67

The hearing-loss criteria are presently under study for revision to be comparable with standards established by the Federal Department of Labour and (or) the United States Walsh-Healey Act, to establish uniformity across Canada.

SHIFTBOSS CERTIFICATES

Section 21 of the *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 application for a shiftboss certificate is required to pass an examination on the *Mines Regulation Act* and general safe working practices. 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 it considers advisable. During 1969, 49 provisional certificates of six months' duration were issued.

Examinations were held at various places throughout the Province, and the following 40 men were successful in qualifying for their permanent certificates:—

SHIFTBOSS CERTIFICATES—1969

Cert. No.	Name	Date	Cert. No.	Name	Date
531	Arthur Theodor Bolch	7/1/69	551	Stephen Henry Elliot Phillips	5/5/69
532	Walter Krestinsky	20/1/69	552	Merlyn Joseph Royea	5/5/69
533	John Margison	20/1/69	553	Richard Allan Majury	5/5/69
534	Wesley Boyd Peters	20/1/69	554	John MacKave	6/6/69
535	Authur Haes	20/1/69	555	John James McConnachie	6/6/69
536	Floyd Irving Flemming	30/1/69	556	William Emil Stark	6/6/69
537	Charles William Skeates	13/2/69	557	Gerd Antpoehler	18/6/69
538	Gunter Grunewald	17/2/69	558	Joseph Roland Foisy	8/7/69
539	Risto N. Peltola	17/2/69	559	Robert Allen Gabrielson	18/7/69
540	Stuart Samuel Taylor	17/3/69	560	Walter Norman Anderson	8/9/69
541	Roland Proulx	17/3/69	561	Theordore Tilby Smith	15/9/69
542	John Moroz	17/3/69	562	Bernard F. Hartinger	15/9/69
543	Warren Embury	21/3/69	563	Pius Simon	7/10/69
544	Umberto Isola	24/3/69	564	Robert Roger Yarjau	7/10/69
545	William Doskoch	24/3/69	565	John Bailey	28/10/69
546	Frank Lawson Walters	24/3/69	566	John Peter Potvin	28/10/69
547	Herbert Edinger	24/3/69	567	Roland Johann Starklauf	3/12/69
548	Dennis Venn	5/5/69	568	Charels Gilbert Pitcher	3/12/69
549	John Carl Bottaro	5/5/69	569	George Edward Casavant	22/12/69
550	Garant Gagnon	5/5/69	570	Walter Glenn Carr	22/12/69

CERTIFICATES OF COMPETENCY

Sections 23 and 24 of the *Coal Mines Regulation Act* require that managers and certain other supervisory officials of underground coal mines shall be the holders of certificates of competency issued under this Act. A Board of Examiners is responsible for setting examinations from time to time for these certificates, for considering applications for interchange certificates, and advising the Minister in accordance with section 26 (3) of the Act. In 1969 no candidates presented themselves for examinations. However, there were nine applicants for interchange certificates, eight of whom were granted certificates. Six applicants held United Kingdom qualifications, one United States (Pennsylvania), and one Alberta. Four first-class certificates of competency were granted, one second class, one third class, and two mine surveyor's certificates.

REGISTERED LIST OF HOLDERS OF CERTIFICATES OF COMPETENCY AS COAL MINE OFFICIALS ISSUED SINCE JANUARY 1, 1964

Cert. No.	Name	Date	Cert. No.	Name	Date
	First-class Certificates of Competency		B335	Gething, Lloyd	Feb. 24, 1969
			B336	Sieling, Ronald E.	June 9, 1969
A216	Aschacher, Martin	Apr. 16, 1964			
A217	Morgan, Irving	May 31, 1965		*Third-class Certificates of Competency*	
A218	Gallagher, John Neil	Sept. 14, 1966			
A219	Russell, William	July 17, 1967	C1039	Ayling, Dennis A.	Mar 2, 1964
A220	Livingstone, Robert D.	Dec. 21, 1967	C1041	Clegg, Robert J. B.	Mar. 21, 1967
A221	Lewis, Richard William	May 27, 1968	C1042	Ellis, Ernest	Feb. 24, 1969
A222	Cameron, Herbert	July 5, 1968	C1043	Komperdo, John	Dec. 31, 1969
A223	Lawrie, James	Aug. 22, 1969	C1044	McAdam, William	Jan. 13, 1970
A224	Chakravatti, Jawahar L.	Sept. 3, 1969			
A225	Hall, Colin David	Dec. 9, 1969		*Mine Surveyors' Certificates of Competency*	
A226	Duncan, Neil James	Dec. 15, 1969			
			108	De Paoli, Dino	Aug. 13, 1964
	Second-class Certificates of Competency		109	Bowen, John D.	June 1, 1966
			110	Quarin, Dennis	June 29, 1967
B332	Walsh, James	Aug. 22, 1966	112	Howat, John	Oct. 1, 1969
B333	Edgar, John Michael	June 21, 1967	129	Errington, Keith	May 30, 1969
B334	Webster, James S.	Dec. 21, 1967			

With the enactment of a new *Coal Mines Regulation Act* in 1969, the Board made considerable revisions in its rules for qualifying for certificates of competency. The new rules are intended to recognize and encourage professional and technical training and to bring up-to-date the examination procedures.

MINE RESCUE, SAFETY, AND FIRST AID

Mine-rescue stations fully supplied with various types of mine-rescue equipment are maintained at Fernie, Kamloops, Nanaimo, and Nelson. At each station is a fully qualified instructor for mine-rescue and first-aid training. With the exception of Fernie, each station is established as a mobile unit to transport equipment anywhere in that area, to be available for either rescue or training services.

Each station is supplied with sufficient self-contained oxygen-supplying equipment to maintain at least two mine-rescue teams of six men each should any emergency arise in nearby mines. In 1969, 12 Aerorlox liquid-oxygen apparatuses were purchased for the Fernie station. The Department now owns 24 of these machines. In addition to the equipment at the stations, some is on loan to supplement that owned by various mining companies. The district instructors periodically check all rescue equipment to insure its serviceability.

During the year the instructors held or assisted in the holding of 15 first-aid classes and 26 mine-rescue classes. At the mine-rescue classes held at various mines throughout the Province, at Hudson Hope, the British Columbia Institute of Technology, and the University of British Columbia, 134 men received their mine-rescue certificates and 17 received their refresher-course stickers. A list of those receiving their certificates follows:—

MINE-RESCUE CERTIFICATES, 1969

Cert. No.	Name	Where Trained
4604	Willard A. Taylor	Reeves MacDonald Mines Limited.
4605	Herbert H. Paeseler	Granduc Mines, Limited.
4606	Jerry Dvorak	Granduc Mines, Limited.
4607	Peter L. Nicholls	Granduc Mines, Limited.
4608	Fritz Knoedler	Granduc Mines, Limited.
4609	James H. Hayes	Granduc Mines, Limited.
4610	Frank Lawson Walters	Ireco of Canada Ltd.
4611	Wess Thomas Campbell	British Columbia Institute of Technology.
4612	Leonard Francis Vaness	British Columbia Institute of Technology.
4613	Leonard J. Werner	British Columbia Institute of Technology.
4614	J. Douglas Peck	British Columbia Institute of Technology.
4615	Brian E. Warner	British Columbia Institute of Technology.
4616	William W. Jarvis	British Columbia Institute of Technology.
4617	D. Morley	British Columbia Institute of Technology.
4618	Walter W. Klassen	British Columbia Institute of Technology.
4619	Leonard Malcolm Smith	Anaconda Britannia Mines Ltd.
4620	John Wallenborn	Anaconda Britannia Mines Ltd.
4621	Neville James Foran	Anaconda Britannia Mines Ltd.
4622	George K. McRae	Boland Development Co.
4623	Eric John Latvala	Boland Development Co.
4624	Robert M. MacKenzie	Boland Development Co.
4625	Roland Johann Starklauf	Anaconda Britannia Mines Ltd.
4626	Richard N. Dickinson	Anaconda Britannia Mines Ltd.
4627	Paul David Crane	Boland Development Co.
4628	John Mervyn MacMillar	Craigmont Mines Limited.
4629	Alan George Ponting	Craigmont Mines Limited.
4630	John Bootle	Craigmont Mines Limited.
4631	Edward John Heppner	Craigmont Mines Limited.
4632	Raymond Douglas Grebliunas	Craigmont Mines Limited.
4633	Larry Edward Gamache	Craigmont Mines Limited.
4634	Harvey Paul Abraham	Craigmont Mines Limited.
4635	John Carl Bottaro	Cominco Ltd. (Sullivan mine).
4636	Garant Gagnon	Cominco Ltd. (Sullivan mine).
4637	Clarence Irwin Pocha	Cominco Ltd. (Sullivan mine).

MINE-RESCUE CERTIFICATES, 1969—*Continued*

Cert. No.	Name	Where Trained
4638	Ronald Edwin St. Eloi	Cominco Ltd. (Sullivan mine).
4639	Albert Leslie Lilley	Cominco Ltd. (Sullivan mine).
4640	Kenneth Sidney Hall	Cominco Ltd. (Sullivan mine).
4641	Arne Olaf Egge	Cominco Ltd. (Sullivan mine).
4642	John Windley Reynolds	Cominco Ltd. (Sullivan mine).
4643	Stephen Henry Elliot Phillips	Cominco Ltd. (Sullivan mine).
4644	Merlyn Joseph Royea	Cominco Ltd. (Sullivan mine).
4645	Kenneth Wayne Dietrich	Cominco Ltd. (Sullivan mine).
4646	Rupert A. Klyne	Giant Mascot Mines Limited (Pride of Emory).
4647	Rheal J. Legault	Giant Mascot Mines Limited (Pride of Emory).
4648	Peter M. Heim	Giant Mascot Mines Limited (Pride of Emory).
4649	William J. Hatton	Giant Mascot Mines Limited (Pride of Emory).
4650	George L. Baker	Giant Mascot Mines Limited (Pride of Emory).
4651	Surinder Singh Hayre	Giant Mascot Mines Limited (Pride of Emory).
4652	Robert R. Adam	Giant Mascot Mines Limited (Pride of Emory).
4653	Partap S. Dhillon	Giant Mascot Mines Limited (Pride of Emory).
4654	William M. Wicks	Giant Mascot Mines Limited (Pride of Emory).
4655	Clayton A. Dake	Giant Mascot Mines Limited (Pride of Emory).
4656	Fredrick E. Kopola	Giant Mascot Mines Limited (Pride of Emory).
4657	Brude Haggerstone	Giant Mascot Mines Limited (Pride of Emory).
4658	Theordore T. Smith	Giant Mascot Mines Limited (Pride of Emory).
4659	Roger William Turner	The Granby Mining Company Limited (Phoenix).
4660	James Douglas Morrison	Granduc Mines, Limited.
4661	William James Robbins	Granduc Mines, Limited.
4662	Charles Murray Coates	Granduc Mines, Limited.
4663	James Milton Jobe	Granduc Mines, Limited.
4664	Hedley James Clayton	Granduc Mines, Limited.
4665	Carl Michael LaLonde	Granduc Mines, Limited.
4666	Peter Albert Jordan	Granduc Mines, Limited.
4667	Stanley Adam Wirth	Granduc Mines, Limited.
4668	Neil Joseph MacPhee	Granduc Mines, Limited.
4669	Brian Harvey Cudmore	Granduc Mines, Limited.
4670	Ronald Frederick Broom	Granduc Mines, Limited.
4671	Richard Allen Majury	Cominco Ltd. (Sullivan mine).
4672	Victor Edward Dawson	Dept. of Mines and Petroleum Resources.
4673	Charles Robert Wilmot	University of British Columbia.
4674	Louis Teglas	Kaiser Resources Ltd.
4675	Bernhard John Birsch	Western Mines Limited (Lynx).
4676	Elmer Ciulka	Valley Copper Mines Limited.
4677	Edward S. Sadar	Dept. of Mines and Petroleum Resources.
4678	Michael L. Shields	McGregor Construction.
4679	Robert R. Yarjau	Gremac Construction Ltd. (Trojan).
4680	Roy M. Hamilton	Brynnor Mines Limited (Boss Mountain).
4681	Bernard J. Pinette	Brynnor Mines Limited (Boss Mountain).
4682	James W. Austin	Brynnor Mines Limited (Boss Mountain).
4683	Mathew Moroz	Brynnor Mines Limited (Boss Mountain).
4684	Eric C. S. Sampson	Brynnor Mines Limited (Boss Mountain).
4685	Edward W. Pryor	Brynnor Mines Limited (Boss Mountain).
4686	Kenneth R. Flannagan	B.C. Hydro & Power Authority (Hudson Hope).
4687	Fredrich C. Wille	B.C. Hydro & Power Authority (Hudson Hope).
4688	Reginald L. McGratten	B.C. Hydro & Power Authority (Hudson Hope).
4689	James J. Novak	B.C. Hydro & Power Authority (Hudson Hope).
4690	David Scorey	B.C. Hydro & Power Authority (Hudson Hope).
4691	Peter Kather	B.C. Hydro & Power Authority (Hudson Hope).
4692	Robert W. Gascoyne	B.C. Hydro & Power Authority (Hudson Hope).
4693	Emil E. Molnar	B.C. Hydro & Power Authority (Hudson Hope).
4694	John Keresman	Granduc Mines, Limited.
4695	Emmanuel Aime Meilleur	Granduc Mines, Limited.
4696	Ted Michael Smulski	Granduc Mines, Limited.
4697	Gordon Salem Cornell	Granduc Mines, Limited.
4698	Peter Paul Spada	Granduc Mines, Limited.
4699	Robert A. Dalton	Granduc Mines, Limited.
4700	Dieter Alfred Grunow	Granduc Mines, Limited.
4701	Orjan Benst Torzny Carlson	Granduc Mines, Limited.
4702	Frank Berenyi	Granduc Mines, Limited.
4703	Edwin Eugene Primrose	Granduc Mines, Limited.
4704	Jack Joseph Retza	Granduc Mines, Limited.
4705	Kenneth Arnold Palmason	Granduc Mines, Limited.
4706	Masaru Nakatsu	Granduc Mines, Limited.
4707	Philip Benedict Ritza	Granduc Mines, Limited.
4708	Charles Henry Walters	Granduc Mines, Limited.
4709	Larry Lloyd Penno	Granduc Mines, Limited.
4710	Robert Earl Primrose	Granduc Mines, Limited.

MINE-RESCUE CERTIFICATES, 1969—*Continued*

Cert. No.	Name	Where Trained
4711	Wayne Bryne Barabas	Granduc Mines, Limited.
4712	Charles Bergstrom	Western Mines Limited (Lynx).
4713	Rudolf Tschach	Western Mines Limited (Lynx).
4714	William Langille	Western Mines Limited (Lynx).
4715	Wilfred Laurier Crout	Western Mines Limited (Lynx).
4716	Ralph Cullen	Western Mines Limited (Lynx).
4717	Edward G. McDonald	Churchill Copper Corporation Ltd. (Magnum).
4718	Josef Barta	Churchill Copper Corporation Ltd. (Magnum).
4719	Kenneth M. Koivula	Churchill Copper Corporation Ltd. (Magnum).
4720	Vaclau Srajer	Churchill Copper Corporation Ltd. (Magnum).
4721	Adorno Bolognini	Churchill Copper Corporation Ltd. (Magnum).
4722	Keith H. Newman	Churchill Copper Corporation Ltd. (Magnum).
4723	Leo J. Langan	Churchill Copper Corporation Ltd. (Magnum).
4724	Leslie M. Vegh	Churchill Copper Corporation Ltd. (Magnum).
4725	Claude J. Meilleur	Churchill Copper Corporation Ltd. (Magnum).
4726	John Malcolm McBlain	Canadian Exploration Limited (Jersey).
4727	Lloyd Lorne Edeburn	Canadian Exploration Limited (Jersey).
4728	Van Russel Ritter	Canadian Exploration Limited (Jersey).
4729	Byron Hoplind	Canadian Exploration Limited (Jersey).
4730	Reginald Harris Hallam	Canadian Exploration Limited (Jersey).
4731	Dirk William Pastoor	Canadian Exploration Limited (Jersey).
4732	Martin John Hannan	Canadian Exploration Limited (Jersey).
4733	William Neil Blayney	Reeves MacDonald Mines Limited.
4734	David Allan Jubinville	Reeves MacDonald Mines Limited.
4735	Donald F. Nichols	Reeves MacDonald Mines Limited.
4736	Edward Dennis McLean	Reeves MacDonald Mines Limited.
4737	Karol Saplywy	Reeves MacDonald Mines Limited.

Considerable time was spent during the year by the instructors in assisting in the preparation of the surface mine-rescue course being presented to persons working in open pits and quarries, particularly those supervisors preparing to qualify for their open-pit shiftboss certification. The first surface mine-rescue course was presented to employees of Endako mine in December, at which 19 persons qualified for their surface mine-rescue certificate. They are as follows:—

SURFACE MINE-RESCUE CERTIFICATES, 1969

Certificate	Name	Where Trained
O-1[1]	William G. Clarke	Endako Mines Ltd.
O-2	Thomas H. Robertson	Endako Mines Ltd.
O-3	Jack A. Thomson	Endako Mines Ltd.
O-4	James M. Gibbs	Endako Mines Ltd.
O-5	Richard J. J. Lampson	Endako Mines Ltd.
O-6	David H. Hunt	Endako Mines Ltd.
O-7	Gustave Manson	Endako Mines Ltd.
O-8	Douglas G. Bailey	Endako Mines Ltd.
O-9	Gordon R. Garayt	Endako Mines Ltd.
O-10	George E. Hatch	Endako Mines Ltd.
O-11	George A. Sutherland	Endako Mines Ltd.
O-12	Olaf A. Mathers	Endako Mines Ltd.
O-13	Leonard J. Krall	Endako Mines Ltd.
O-14	Arnold G. Newton	Endako Mines Ltd.
O-15	John T. McIntosh	Endako Mines Ltd.
O-16	Thomas Craig	Endako Mines Ltd.
O-17	Arthur R. Sharp	Endako Mines Ltd.
O-18	Claude Bourgeois	Endako Mines Ltd.
O-19	Willoughby Trythall	Endako Mines Ltd.

[1] O signifies open-pit training.

Four mine-safety associations operate in different areas of the Province. They are sponsored by the Department of Mines and Petroleum Resources and are aided by company officials, safety supervisors, Inspectors of Mines, and mine-rescue in-

structors. These organizations promote mine-rescue and first-aid training as well as safety education in their various districts.

The Vancouver Island Mine Safety Association held its 55th annual competition in Nanaimo on May 24th. The five teams that competed in the mine-rescue event came from Britannia, Coast Copper, Giant Mascot, Texada, and Lynx mines. The winning team came from Texada Mines Ltd. and was captained by Donald C. Legault.

The West Kootenay Mine Safety Association held its 23rd annual competition at Nelson on May 24, 1969. Six teams participated in the mine-rescue event—two from Bluebell mine and one each from the Highland Bell, Jersey, Phoenix, and Reeves MacDonald mines. The Highland Bell mine team, captained by J. W. Murton, won the district shield.

The Central British Columbia Mine Safety Association held its 21st annual competition at Kamloops on May 31, 1969. Four teams participated in the mine-rescue event, and were from the Craigmont, Boss Mountain, and Bethlehem mines and from Versatile Mining Services Ltd. of Kamloops. The Versatile Mining Services Ltd. team, captained by G. Klein, won the district shield.

The East Kootenay Mine Safety Association held its 48th annual competition on May 31, 1969, at Fernie, with four teams competing in the mine-rescue event. Two teams were from the Sullivan mine of Cominco Ltd. and one team each from Michel and Fernie who represented Kaiser Resources Ltd. The Sullivan No. 3 team, captained by R. McSporran, was successful in winning the competition.

At all four of the preceding meetings, competitions were held in first aid as well as mine-rescue work. In these competitions, events were held for men, women, and juniors. The entries in these events came from other industries and the public at large and were not necessarily connected with mining.

The winners of the four district mine-rescue competitions met in the 14th Provincial mine-rescue competition held in Vancouver on June 7, 1969. The Highland Bell mine team, captained by J. W. Murton, won the Provincial trophy, and the Texada Mines Ltd. team, captained by Donald C. Legault, placed second.

Concurrently with the 14th Provincial mine-rescue competition, the Workmen's Compensation Board sponsored the 13th Provincial first-aid competition in which the competing teams had won the district events at Kamloops, Kimberley, Nanaimo, Nelson, Prince George, Vancouver, and Victoria. The winning team was the Northern Vancouver Island entry of Crown Zellerbach Canada Limited (Ladysmith Division) and was captained by H. Yori.

The 3rd Canadian Mine Rescue Championship was held in Saskatoon on June 14, 1969. Competing teams were from Alberta, British Columbia, Nova Scotia, Saskatchewan, and the Northwest and Yukon Territories. The winning team was from Nova Scotia. The Highland Bell team from British Columbia, captained by J. W. Murton, placed second, the same as they had done following the Alberta team in 1968, but not recorded in the Annual Report for that year.

JOHN T. RYAN TROPHY

The John T. Ryan safety trophies were established in 1941 to promote safety in coal and metal mines. Administration of the awards is by the Canadian Institute of Mining and Metallurgy. The award for metal mines is presented to the mining company or companies having the least number of compensable accidents per million man-hours. In 1969 the regional trophy for metal mines was won by Texada Mines Ltd. with an accident frequency of 8.16.

The coal-mine award is presented to the coal-mining company having worked a minimum of 120,000 man-hours and having the least number of compensable accidents. The coal mines of British Columbia are grouped with those in Alberta to form a Western Region. There was no winner for British Columbia in 1969.

WEST KOOTENAY MINE SAFETY ASSOCIATION TROPHY

In 1951 the West Kootenay Mine Safety Association donated a safety trophy for annual competition in order to encourage and promote safety in small mines. Entrants were originally restricted to the West Kootenay area, but in 1956 this restriction was removed and entries are accepted from any qualifying mine in the Province.

The award is made to the metal mine having the lowest accident rate and having worked a total of from 2,500 to 30,000 shifts per year, at least one-third of which having been worked underground. An accident is considered an incident involving more than three days' time loss by the workman.

In 1969 the award was won by the Annex mine of Reeves MacDonald Mines Limited with an accident frequency of zero.

SAFETY COMPETITION, OPEN-PIT MINES AND QUARRIES

In 1961 the Department of Mines and Petroleum Resources organized a safety competition for the open-pit and quarry industry and instituted awards and donated a trophy for annual competition for operations having the least number of compensable accidents during the year. In 1965, in order to provide a more equitable competition basis, it was decided to donate a second trophy and to divide the entrants having a large number of man-hours into two groups—the A group, for those operations having from 35,000 to 200,000 man-hours per year, and the B group, for those having in excess of 200,000 man-hours per year. A certificate of achievement is awarded to operations amassing 15,000 man-hours without accidents over any continuous time interval.

Because of extremely keen competition of A trophy entrants, it has been necessary to further refine the rules by changing the basis of comparison from " compensable " accidents to " lost-time " accidents. In 1969 the A trophy was won jointly by Domtar Chemicals Ltd. (Lime Division), Ideal Cement Company (Rock Products Division), Canada Cement Lafarge Ltd. (Quarry Division), Ocean Cement Limited (Mary Hill Division), and Red Mountain Mines Limited (Coxey mine). All operators had zero accident frequencies.

The Phoenix Copper Division of The Granby Mining Company Limited won the B trophy for the second consecutive year, and had an accident frequency of 5.97 per million man-hours. This mine has won this trophy four times since the competition was established in 1961.

In addition to the foregoing operations, certificates of achievement were won by the five following operations of Ocean Cement Limited: Cobble Hill quarry of B.C. Cement Division, Cassidy Pit, Kamloops Division, Langley Division, and the Prince George Division.

RECLAMATION

The *Mines Regulation Act* and the *Coal Mines Regulation Act* were amended during the 1969 session of the Provincial Legislature to provide for reclamation of the surface of lands disturbed by surface mines. Identical legislation on reclamation was written into each Act, being section 11 of the *Mines Regulation Act* and section 8 of the *Coal Mines Regulation Act*. This legislation, which was enacted on April 2,

1969, currently applies only to surface mines; provision is made to extend it, by Order in Council, to any mining operation, should this be advisable.

An Advisory Committee on Reclamation, consisting of seven members, three from the Department of Lands, Forests, and Water Resources, one from the Department of Agriculture, one from the Department of Recreation and Conservation, and two from the Department of Mines and Petroleum Resources was established to study and to make recommendations on reports and programmes submitted under the reclamation legislation. The Chief Inspector of Mines is Chairman of the Committee.

W. B. Montgomery, P.Eng., was engaged to administer the Reclamation Branch, responsible to the Chief Inspector of Mines; he joined the Department in the latter part of August.

All the major metal, coal, and industrial mineral mines have submitted reports and programmes, as required by the legislation.

AID TO THE SECURITIES COMMISSION

In February, 1969, A. R. C. James, formerly Inspector of Mines in Vancouver, was transferred to Victoria on special duties as adviser in technical mining matters to the British Columbia Securities Commission. His duties are mainly to advise the Commission in regard to engineering reports submitted in support of prospectuses by mining companies as required by Regulation 17 under the *Securities Act*. Engineering advice is also required from time to time by the Commission on certain other matters, such as in connection with programmes financed by rights offerings to shareholders, on the assessment of reports of work done on mining properties, on prices paid for mining properties, conditions of option agreements, and in approval of company press releases.

During the period from February 7th to the end of the year a total of 222 engineering reports was examined and the Commission advised on their contents. The reports were submitted by 145 companies, mainly in support of prospectuses.

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