Minister of Mines and Petroleum Resources

PROVINCE OF BRITISH COLUMBIA

ANNUAL REPORT

for the Year Ended December 31

1971

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1972

BRITISH COLUMBIA DEPARTMENT OF MINES AND PETROLEUM RESOURCES

VICTORIA, BRITISH COLUMBIA

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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 1971 is herewith respectfully submitted.

FRANK RICHTER
Minister of Mines and Petroleum Resources

Minister of Mines and Petroleum Resources Office,
June 1, 1972

CONTENTS

ANNUAL REPORT OF THE MINISTER OF MINES AND PETROLEUM RESOURCES, 1971

CHAPTER 1

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 contains 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 published separately in a volume entitled *Geology, Exploration, and Mining in British Columbia.* A new series of annual publications of that name began with the 1969 volume.

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

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 1971 production of British Columbia's mineral industry amounted to $526,811,839. A new record was established for the 10th successive year, for the first time the annual production exceeded half a billion dollars, the previous year's total was exceeded by $38,206,214 or 7.8 per cent, and the cumulative value to date has now reached $8,175,714,746.

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

	1970	1971	Change (Per Cent)
Metals	$309,981,470	$299,908,645	−3.2
Industrial minerals	22,020,359	21,909,767	−0.5
Structural materials	46,069,660	59,940,333	+30.1
Fuels	110,534,136	145,053,094	+31.2

The outstanding features of the year were the enormous gains in production of copper and coal, a significant gain in quantity of cement, and important gains in production of zinc and tungsten. On the other hand there was a very large decline in production of molybdenum, as well as declines in production of mercury and several other minor metals.

The decrease in value of metal production of $10 million or 3.2 per cent was due to decreased production of all metals except copper, zinc, tungsten, and iron and a significant decrease in the price of copper. The main decline in production was of molybdenum from $52.56 million to $36.95 million. The impact of the enormous increase in copper production (66.1 million pounds) was diminished by the continuing fall in price of copper from an average of 58.698 cents per pound in 1970 to 46.696 cents per pound in 1971.

The slight decrease in value of industrial minerals of $111,000 resulted because the decline in value of sulphur produced was somewhat greater than the gain of $1.8 million for asbestos.

The value of structural materials increased by $13.87 million or 30.1 per cent, almost entirely due to increased activity of the construction industry and consequent increased use of cement, sand, and gravel.

The considerable increase in the value of fuels produced, $34.52 million or 31.2 per cent, was very largely due to increased coal production (a gain in value of $26.24 million) and to a lesser extent increased production of crude oil and natural gas.

During the next several years it is anticipated that the total value of production will continue to increase despite current uncertainties about metal prices and cutbacks in sales contracts for molybdenum and possibly for those of copper concentrates. In 1972, production is expected from six new copper mines, in addition to which there will be a full year's production from the Island Copper mine operating at 33,000 tons per day. Production of coal should also continue to increase sharply and petroleum and natural gas production are expected to maintain a steady growth. However, the production of molybdenum is expected to continue to decline in 1972 as a result of a further cutback in production at the Endako mine, to the closure of the Boss Mountain mine by Noranda Mines, Limited (Boss Mountain Division) late in 1971, and to the closure early in 1972 of the Coxey mine by Consolidated Canadian Faraday Ltd. (Red Mountain Mines Division), and of the British Columbia Molybdenum mine.

Provincial revenue—Direct revenue to the Provincial Government derived from the entire mineral industry in 1971 was as follows:

Free miners' certificates, recording fees, lease rentals, assessment payments, etc.	$1,655,858.61
Royalties on iron concentrates	253,048.59
Rentals and royalties on industrial minerals and structural materials	403,687.00
Fifteen-per-cent mining tax (received during 1971)	4,978,917.00
Coal licences	264,423.82
Petroleum and natural gas rentals, fees, etc.	9,428,322.51
Sale of Crown reserves	22,186,250.58
Royalties on oil, gas, and processed products	14,667,966.44
Miscellaneous petroleum and natural gas fees	35,604.37
Total	$53,874,078.92

Expenditure by the industry—Expenditures in 1971 by companies involved in the exploration, development, and production of metals, minerals, and coal were $652,201,332.

Equivalent expenditures by companies involved in the exploration and production of petroleum and natural gas were $149,064,000.

The resulting total expenditures in 1971 by the mineral industry for exploration, development, and production therefore were $801,265,732.

Metal mining—In 1971, 52 mines produced more than 42.57 million tons of ore. Eleven produced more than 1 million tons each and all but four of these were open-pit mines. In total, 11 open-pit mines produced about 32.84 million tons of ore. Twelve mines produced between 100,000 and 1 million tons each.

In 1971, 31 concentrators were in operation, two of which were new. At the Island Copper mine near Port Hardy, a new mill with a daily capacity of 33,000 tons was completed and at the Pride of Emory mine near Hope a new mill of 1,500 tons per day capacity was completed to replace one destroyed by fire. Concentrators having a total daily capacity of 96,250 tons were under construction at the following eight mines: Alwin, Bell (Newman), Bull River, Gibraltar, Lornex, Silver Queen (Nadina), Similkameen (Ingerbelle), and Sunro.

During the year, mining operations were terminated at the following mines: Bralorne (Bralorne Can-Fer Resources Limited), Bluebell (Cominco Ltd.), Boss Mountain (Noranda Mines, Limited), Golconda (Trent Resources Ltd.), Magnum (Churchill Copper Corporation Ltd.), Ruth Vermont (Copperline Mines Ltd.), and True Fissure (Columbia Metals Corporation, Limited). Of these, the Boss Mountain, Magnum, and Ruth Vermont are being maintained in condition to recommence operation.

The Trail smelter treated 6,589 tons of crude ore and 388,222 tons of concentrates from British Columbia mines as well as a large tonnage of concentrates, crude ore, and scrap from sources outside the Province. A total of 2,469,595 tons of concentrates was shipped to foreign smelters. Of the total metal production of the Province, concentrates representing 50.4 per cent of the total value were shipped to Japanese smelters and 6.5 per cent of the total value were shipped to smelters in the United States.

DESTINATION OF BRITISH COLUMBIA CONCENTRATES IN 1971

Smelters	Lead	Zinc	Copper	Nickel-Copper	Iron	Tungsten
	Tons	Tons	Tons	Tons	Tons	Tons
Trail	167,151	221,071	———	———	———	———
Other Canadian	———	———	4,923	———	22,810	14
United States	7,044	67,487	19,023	———	———	———
Japan	———	8,884	507,393	14,487	1,844,196	———
Other foreign	———	———	———	———	———	1,081
Totals	174,195	297,442	531,339	14,487	1,867,006	1,095

Destinations of molybdenum as molybdenite concentrate, molybdic oxide, and ferromolybdenum are largely in Europe and Japan.

Prospecting for and exploration and development of mineral deposits throughout the Province continued at a slightly lower level of activity than in 1970. Although the total funds expended were markedly less, the number of properties on which exploratory work was done and the number of certificates of work recorded were about the same.

Recording of claims was most active in the Kamloops, Liard, Omineca, and Similkameen Mining Divisions. The discovery of zinc-lead mineralization at Robb Lake in the Liard division and of copper in the vicinity of the Afton property in the Kamloops division accounted for large recordings of claims. The number of mineral claims recorded in 1971 was 57,778, a 16.4-per-cent decrease from 1970. Footage of surface and underground exploratory diamond drilling was 461,791 feet, a decrease of 211,330 feet or 31.3 per cent, and percussion drilling was 81,934 feet, a decrease of 153,949 feet or 65 per cent.

About 652 geological, geochemical, and geophysical reports were accepted in 1971 by the Department for assessment-work credit. They represent not less than $3,827,000 in work done on claims.

The following statistics of expenditures on exploration and development of coal, mineral, and metallic deposits, and mines are summarized from data recorded on Statistics Canada forms. They represent minimum amounts, but the response of the industry is sufficiently complete to provide figures that are substantially correct. Comparable figures for petroleum and natural gas operations are not available.

Exploration includes all work done up to the time when a company declares its intention of proceeding to production, after that date the work is classed as development.

Major expenditures in 1971 by companies involved in the exploration, development, and mining of metals, minerals, and coal were as follows:

Mining operations (metals, minerals, coal)		$203,935,369
Mining operations (structural materials)		18,878,901
Repairs expenditures		55,063,940
Capital expenditures	$294,562,094	
Exploration and development	79,761,028	
		374,323,122
Total		$652,201,332

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.

EXPLORATION AND DEVELOPMENT EXPENDITURES, 1971

	Number of Mines Reporting	Physical Work and Surveys	Administration, Overhead, Land Costs, Etc.	Total
A. Prospecting and exploration on undeclared mines—				
1. Metal mines	407	$29,081,729	$9,972,415	$39,054,144
2. Coal mines	6	929,424	521,090	1,450,514
3. Others	6	335,847	37,240	373,087
Totals	419	$30,347,000	$10,530,745	$40,877,745
B. Exploration on declared or operating mines—				
1. Metal mines	21	$2,642,706	$552,358	$3,195,064
2. Coal mines	2	912,511	21,362	933,873
3. Others	3	31,748	9,000	40,748
Totals	26	$3,586,965	$582,720	$4,169,685
C. Development on declared mines—				
1. Metal mines	11	$230,650,849	$1,496,677	$232,147,526
2. Coal mines	1	26,638,553	639,507	27,278,060
3. Others	—	101,374	250	101,624
Totals	12	$257,390,776	$2,136,434	$259,527,210
D. Development on operating mines—				
1. Metal mines	19	$33,618,309	$5,616,590	$39,234,899
2. Coal mines	1	26,229,444	375	26,229,819
3. Others	4	4,269,164	14,600	4,283,764
Totals	24	$64,116,917	$5,631,565	$69,748,482
E. Total expenditures on exploration and development—				
1. Metal mines—A(1) + B(1) + C(1) + D(1)	—	$295,993,593	$17,638,040	$313,631,633
2. Coal mines—A(2) + B(2) + C(2) + D(2)	—	54,709,932	1,182,334	55,892,266
3. Others—A(3) + B(3) + C(3) + D(3)	—	4,738,133	61,090	4,799,223
Grand totals	—	$355,441,658	$18,881,464	$374,323,122

Structural materials and industrial minerals—Exploration for industrial minerals extended from the newly discovered fluorite deposit near Liard Hot Springs in the north to the Mount Brussilof magnesite deposit in the south. In regard to operations, the following should be noted: The Cassiar Asbestos mine mill expansion was completed to a capacity of 110,000 tons of fibre annually, trial runs continued at the Crownite diatomite-pozzolan mill at Quesnel, barite recovery plants in the Columbia Valley continued to operate, but sales declined, and rock chips for granules and aggregates were produced at a variety of plants in southern British Columbia.

Coal mining—The total amount of coal mined (net production) in 1971 was 4,637,012 short tons, of this 3,912,154 tons was from open-pit mines and 724,858 tons was from underground mines. The total net production was a 46.6-per-cent increase over that of 1970 and is the largest amount of coal ever produced in any year in British Columbia. All came from Kaiser Resources Ltd. mines at Michel and Sparwood.

Kaiser Resources Ltd. were successful in renegotiating their sales contract with Mitsubishi Metal Mining Co., Ltd. to an annual delivery to 1985 of 4.4 million long tons of clean coal.

Work continued in preparing the property of Fording Coal Limited to deliver 3 million long tons of metallurgical coking coal annually to Japanese consumers.

Exploration continued in the East Kootenay coalfield and also in the northeastern coalfield which extends along the eastern foothills of the Rocky Mountains from the Alberta boundary south of Narraway River northwestward for more than 200 miles.

Development work is well advanced at the Sukunka property of Brameda Resources Ltd., where a reserve of more than 65 million tons of high-grade coking-coal has been established by drilling of the Chamberlain seam.

Several other companies have been exploring coal licences both north and south of the Peace River.

In 1971, 840 new coal licences were issued and 192 old licences were forfeited. At year end, 2,090 coal licences, totalling 1,188,749 acres, were in good standing.

Petroleum and natural gas—The value of production of the petroleum industry in 1971 amounted to $99,251,158, up 9.1 per cent from 1970. Crude-oil production was 25,154,122 barrels, only slightly less than the 1970 total, but increased to a value of $66,471,856, a gain of 10 per cent. The major producing fields, all under water-flood programmes, were Boundary Lake, Peejay, Milligan Creek, Inga, and Weasel.

Natural gas delivered to pipe-lines was 291,188,481 MSCF, an increase of 6.8 per cent and increased to a value of $31,946,372, a 7.2-per-cent gain. The major gas-producing fields were Clarke Lake, Yoyo, Laprise Creek, Rigel, Nig Creek, and Jedney.

For the third successive year the footage drilled increased over the previous year and in 1971 was 989,650 feet, an increase of 10 per cent over 1970.

All drilling was in the northeastern corner of the Province, except for one wildcat venture on the west coast of the Queen Charlotte Islands. Despite the search for significant new petroleum or natural gas finds, the last major success was the discovery of the Inga field in 1966.

The gas transmission-line delivering gas from the Beaver River field to Westcoast Transmission Company Limited at Fort Nelson was put into operation. Westcoast Transmission Company increased capacities of their gas transmission-lines between Fort Nelson and Taylor, and also between Taylor and the Lower Mainland.

The dehydration plant at the Beaver River field was completed during the year.

Expenditures in 1971 by companies involved in the exploration and production of petroleum and natural gas were:

Exploration, land acquisition, and drilling	$60,749,000
Development drilling	8,923,000
Capital expenditures	41,384,000
Natural gas plant operations	4,310,000
Field, well, and pipe-line operations	13,315,000
General (excluding income tax)	20,383,000
Total	$149,064,000

Statistics

CHAPTER 2

CONTENTS

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, Statistics Canada and the Provincial departments have co-operated in collecting and processing 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 Statistics Canada.

As far as possible, both organizations follow the same practice in processing the data. The final compilation by Statistics Canada is usually published considerably later than the Annual 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 Statistics Canada uses average prices considered applicable to the total Canadian production, whereas the British Columbia mining statistician uses prices considered applicable to British Columbia production.

Peat, classified as a fuel by Statistics Canada, is not included in the British Columbia statistics of mineral production being regarded as neither a fuel nor a mineral.

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 pounds), and troy ounces. Barrels are 35 imperial gallons.

METALS

Average Prices

The prices used in the valuation of current and past production of gold, silver, copper, lead, and zinc 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 1971 this was $35.34 per ounce.

The price used for placer gold originally was 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 silver, copper, lead, and zinc are average United States prices converted into Canadian funds. Average monthly prices are supplied by Statistics Canada from figures published in the Metal Markets section of *Metals Week*. 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. However, commencing in 1970 the copper price is the average of prices received by the various British Columbia shippers.

For antimony the average price for the year and for cadmium, the New York producers' price to consumers are used. For nickel the price used is the Canadian price set by the International Nickel Company of Canada Ltd. 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.

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
Zinc	50	90	—	—	—
Cadmium	—	70	—	—	—
Nickel	—	—	—	88	—

Value of Production

For indium, iron concentrate shipped to Japan, mercury, molybdenum, and tin the value of production is the amount received by the shippers.

For gold, silver, copper, lead, zinc, antimony, bismuth, cadmium, some iron concentrate, and nickel the value of production is calculated from the assay content

of the ore, concentrate, or bullion less appropriate smelter losses, and an average price per unit of weight.

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 Statistics Canada 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 metals, by multiplying the net contents of metals as determined by means of the above table by the average price for the year.

Industrial Minerals and Structural Materials

The values of production of industrial minerals and structural materials are approximately the amounts received at the point of origin.

Fuel

The value of production of coal is calculated using a price per ton (*see* p. A 26) which is the weighted average of the f.o.b. prices at the mine for the coal sold.

The values of production of natural gas, natural gas liquid by-products, and 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 of 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 ore 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 was opened. All British Columbia production consists of chrysotile from the Cassiar mine near the Yukon border. This deposit is noted for its high percen-

tage of valuable long fibre and for the low iron content of the fibre. The original claims were located at Cassiar in 1950, and the first fibre was shipped two years later. The fibre is milled from the ore at Cassiar, shipped by truck to Whitehorse, and then moved by rail to tidewater at Skagway. 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.

Building-stone — Dimensional stone for building purposes is quarried when required from a granite deposit on Nelson Island and an andesite deposit on Haddington Island. Other stone close to local markets is quarried periodically or as needed for special building projects. *See* Table 7E.

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.

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.

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 and since then plants have operated in most towns and cities for short periods. Local surface clay is used at Haney to make common red brick, tile, and flower pots. Shale and fireclay from Abbotsford Mountain are used to make firebrick, facebrick, sewer pipe, flue lining, and special fireclay shapes in plants at Kilgard, Abbotsford, and South Vancouver. A plant on Saturna Island makes light-weight expanded shale aggregate and pozzolan clinker from a local shale

deposit. A plant at Quesnel makes pozzolan from burnt shale quarried south of Quesnel. Common clays and shales are abundant in British Columbia, but fireclay and other high-grade clays are rare. Several hobby and art potteries and a sanitary-ware plant are in operation, but these use mainly imported raw materials and their production is not included in the tables. *See* Tables 1, 3, and 7E.

Coal—Coal is almost as closely associated with British Columbia's earliest history as is placer gold. Coal was discovered at Suquash on Vancouver Island in 1835 and at Nanaimo in 1850. The yearly value of coal production passed that of placer gold in 1883 and contributed a major part of the total mineral wealth for the next 30 years.

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 production started from the Crowsnest field in 1898. The Crowsnest field contains coking-coal and prospered in the early years of smelting and railroad-building. Mining started in the Nicola-Princeton coalfield in 1907, at Telkwa in 1918, and on the Peace River in 1923. The Nanaimo field was exhausted in 1953 when the last large mines closed, and only small operations on remnants were left. The colliery at Merritt closed in 1945 and at Coalmont in 1940. 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.

Undeveloped fields include basins in the foothills of the Rocky Mountains north and south of the Peace River, the Groundhog basin in north central British Columbia, the Hat Creek basin west of Ashcroft, and basins on Graham Island.

The enormous requirements for coking-coal in Japan created great activity in coal prospecting in various areas of British Columbia since 1968. 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. In 1971, 113,545 pounds of cobalt were shipped from the Pride of Emory mine at Hope.

Copper—Copper concentrates are shipped to Japanese and American smelters because no copper smelter has operated in British Columbia since 1935. Small amounts of gold and silver are commonly present and add value to the ore, but some

ores contain important amounts of gold (as at Rossland), silver (Silver King mine), lead and zinc (Tulsequah), or zinc (Britannia mine). Most of the smelting in British Columbia in early years was done on ore shipped direct from the mines without concentration, but modern practice is to concentrate the ore first.

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 concentrates were then smelted mainly at Tacoma, and since 1961 have 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 from Tulsequah. During resent years exploration for copper has been intense, interest being especially directed toward finding 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, near Peachland (Brenda) in 1970, Stewart (Granduc) and near Port Hardy (Island Copper) in 1971. Large mines near Babine Lake (Bell), McLeese Lake (Gibraltar), Highland Valley (Lornex), and Princeton (Ingerbelle) are nearing production. Others are in an advanced planning stage or under exploration.

After a lapse of many years, copper has been produced comparatively recently on Vancouver Island at Jordan River, Courtenay, Benson Lake, Quatsino, and also at Buttle Lake, together with zinc and silver. At Tasu Harbour on Moresby Island and at Texada Island copper is produced as a by-product of iron-mining.

Copper is now the most valuable single commodity of the industry. Production in 1971 was 278.5 million pounds. *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, 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 1971, oil was produced from 28 separate fields, of which the Boundary Lake, Peejay, Milligan Creek, Inga, and Weasel fields were the 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 condensate listed separately. Full details are given in tables in the Petroleum and Natural Gas chapter of this Report.

Diatomite—Relatively large deposits of diatomite are found near the Fraser River in the Quesnel area, and small deposits are widespread throughout the Province. Small amounts of diatomite have been shipped from Quesnel periodically since 1928. One plant to process the material locally was built in Quesnel in 1969 and a new one to replace it was completed in 1970. *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 was shipped from Grand Forks, Oliver, and the Sheep Creek area. Today silica from Sheep Creek and limestone, chiefly from Texada Island, are 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 on Moresby Island in 1852, when some gold was recovered from a small quartz vein. The first stamp mill was built in the Cariboo in 1876, and it seems certain that some arrastras—primitive grinding-mills—were built even earlier. These and other early attempts were short lived, and the successful milling of gold ores began about 1890 in the southern part of the Province. The value of production was second only to that of coal by 1900 and continued to be very important. At the start of World War II, gold-mining attained a peak yearly value of more than $22 million, but since the war it dwindled, owing to the fact that the price for gold was fixed and the cost of mining rose and continues to rise.

In the early years, lode gold came mostly from the camps of Rossland, Nelson, McKinney, Fairview, Hedley, and also from the copper and other ores of the Boundary district. A somewhat later major producer was the Premier mine at Stewart. In the 1930's the price of gold increased and the value of production soared, new discoveries were made and old mines were revived. The principal gold camps, in order of output of gold, have been Bridge River, Rossland, Portland Canal, Hedley, Wells, and Sheep Creek. In 1971 the Bralorne mine in Bridge River closed; it was the last gold mine in the Province to operate. To date the gold mines have paid a total of about $82 million in dividends.

As long as the price of gold remains fixed and costs continue to rise, there can be no increase in the mining of lode gold except as a by-product. With the closing of the Bralorne mine, all is produced as a by-product of 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.

The year of greatest placer-gold production was 1863, shortly after the discovery of placer in the Cariboo. Another peak year in 1875 marked the discovery of placer on creeks in the Cassiar. A minor peak year was occasioned by the discovery of placer gold on Granite Creek in the Tulameen in 1886. A high level of production ensued after 1899, when the Atlin placers reached their peak output. Other important placer-gold camps were established at Goldstream, Fort Steele, Rock Creek, Omineca River, and Quesnel River. The last important strike was made on Cedar Creek in 1921, and coarse gold was found on Squaw Creek in 1927 and on Wheaton Creek in 1932.

Mining in the old placer camps revived during the 1930's under the stimulus of an increase in the price of fine gold from $20.67 per ounce to $35 per ounce in United States funds. Since World War II, placer-mining has declined under conditions of steadily rising costs and a fixed price for gold. Since 1858, more than 5.2 million ounces valued at almost $97 million has been recovered.

A substantial part of the production, including much of the gold recovered from the Fraser River upstream from Yale (in the present New Westminster, Kam-

loops, 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 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 Rock Creek, Grand Forks, Sirdar, Vananda, and Armstrong. *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—Iron ore was produced in small quantities as early as 1885, commonly under special circumstances or as test shipments. Steady production started in 1951 with shipments of magnetite concentrates to Japan from Vancouver and Texada Islands.

Most of the known iron-ore deposits are magnetite, and occur in the coastal area. On the average they are low in grade and need to be concentrated. Producing mines have operated on Texada Island, at Benson Lake and Zeballos on Vancouver Island, and at Tasu and Jedway on Moresby Island. At Texada Island copper is a by-product of iron-mining, and at the Coast Copper mine at Benson Lake iron was a by-product of copper-mining. The latest operation, and to date the largest, is that of Wesfrob Mines Limited at Tasu, begun at the end of 1967; copper is produced as a by-product.

Since January 1961, calcined iron sulphide from the tailings of the Sullivan mine has been used for making pig iron at Kimberley. This is the first manufacture of pig iron in British Columbia. The iron occurs as pyrrhotite and pyrite in the lead-zinc ore of the Sullivan mine. In the process of milling, the lead and zinc minerals are separated for shipment to the Trail smelter, and the iron sulphides are separated from the waste rock. Over the years a stockpile had been built containing a reserve of about 20 million tons of iron ore.

The sulphur is removed in making pig iron and is converted to sulphuric acid, which is used in making fertilizer. A plant built at Kimberley converts the pig iron to steel, and a fabricating plant has been acquired in Vancouver. 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 bedrock occurrences on Mount Ogden and near Dease Lake 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. *See* Tables 1, 3, and 7D.

Lead—Lead was the most valuable single commodity for many years, but it was surpassed in value of annual production by zinc in 1950, by copper in 1966, and in total production by zinc in 1966. Lead and zinc usually occur together in nature although not necessarily in equal amounts in a single deposit. Zinc is the more abundant metal, but lead ore usually is more valuable than zinc ore because it contains more silver as a by-product. For a long time British Columbia produced almost all of Canada's lead, but now produces only about one-quarter of it. Most of the concentrated ore is smelted and the metal refined at Trail, but some concentrate is shipped to American and Japanese smelters.

Almost all of British Columbia's lead comes from the southeastern part of the Province. The Sullivan mine at Kimberley is now producing about three-quarters of the Province's lead and has produced about 85 per cent of the grand total. This is one of the largest mines in the world and supports the great metallurgical works at Trail. Other mines are at the Pend d'Oreille River, North Kootenay Lake, Slocan, and southwest of Golden. In northwestern British Columbia less important parts of the total output have come from Tulsequah, the Premier mine, and several small mines in the general region of Hazelton.

A small amount of high-grade lead ore is shipped directly to the smelter, but most of the ore is concentrated by flotation and the zinc content is separated from the lead. All output from the Sullivan and other mines owned by Cominco Ltd. goes to the Trail smelter, but part of the output of other mines goes to American smelters. Lead was first produced in 1887, and the total production amounts to approximately 8 million tons.

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, at Kamloops, 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—From 1918 to 1920 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 and 1944 from the Pinchi Lake and Takla mines near Fort St. James. In 1968 the Pinchi Lake mine reopened and continues in operation. *See* Tables 1 and 7C.

Mica—No sheet mica has been produced commercially in British Columbia. Between 1932 and 1961 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. 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 the Bethlehem mine recovered by-product molybdenum from 1964 to 1966. In 1965, the Endako and Boss Mountain mines, followed by the Coxey in 1966, and British Columbia Molybdenum mine in 1967, all began operations as straight molybdenum producers. In 1970, the Brenda mine, a combined copper-molybdenum producer, started operating, and Island Copper in 1971. Large-scale combined metal deposits at Lornex and Gibralter mines are being prepared for production in 1972. *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 950,000,000 cubic feet. In 1971 there were 43 producing gas fields, of which the Yoyo, Laprise Creek, Clarke Lake, Jedney, Nig Creek, Beaver River, and Rigel were the most productive.

The production shown in Tables 1, 3, and 7A is the total amount sold of residential 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 at 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—Silver is recovered from silver ores or as a by-product of other ores. Most of it is refined in Trail, some goes to the Mint in gold bullion, and some is exported in concentrated ores of copper, lead, and zinc to American and Japanese smelters. Silver bullion was produced by the Torbrit mine from 1949 to 1959.

Invariably some silver is associated with galena, so that even low-grade lead ores, if mined in quantity, produce a significant amount of silver. Some silver is recovered from gold ores and some from copper ores, and although the silver in such ores is usually no more than a fraction of an ounce per ton, even that amount is important in a large-tonnage operation.

Silver-bearing ores were intensively sought in the early days. A metal of high unit value was the only one worth finding in regions remote from market, and in the 1880's and 1890's there was little point in prospecting for ores that did not contain values in silver or gold. Prospecting for silver ores started in southeastern British Columbia in about 1883, and from 1894 to 1905 British Columbia produced most of Canada's silver, many of the early ores being mined primarily for their silver content.

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 been in production since 1900. By 1971 the Sullivan mine has accounted for 47 per cent of the total silver production of the Province. A significant total amount is contributed by the Lynx, Phoenix, Bethlehem, Granisle, Brenda, and Tasu mines. The only steady producer that is strictly a silver mine is the Highland Bell mine at Beaverdell, in operation since 1922. A former important mine, the Premier near Stewart, produced more than 41 million 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 Canadian Occidental Petroleum Ltd. 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 to make dust for 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 Columbia Tungstens (Hardscrabble) mine in 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. Small amounts of scheelite have been produced from the Bridge River, Revelstoke, and other areas when demand was high. In 1970 production began from the Invincible mine near Salmo.

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. For many years lead was the most valuable single metal, but in 1950 the annual value of production of zinc surpassed that of lead and in 1966 the total value of zinc production exceeded that of lead. In 1971 the annual production of zinc is exceeded by that of copper and crude oil. Zinc is invariably associated with lead, and most ores are mined for their combined values in zinc, lead, and silver, and rarely for their zinc content alone. Some zinc ores contain a valuable amount of gold, and zinc is associated with copper at the Lynx mine. Modern practice is to concentrate and separate the zinc mineral (sphalerite) from the lead mineral (galena). Most of the zinc concentrates go to the zinc-recovery plant at Trail, are roasted, and are converted electrolytically to refined metal. Some concentrates are shipped to American or Japanese smelters.

More than 87 per cent of the 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 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.	———	2.65
1902	———	———	49.55 „	11.70 „	3.66 „	———	2.63
1903	———	———	50.78 „	13.24 „	3.81 „	———	2.67
1904	———	———	53.36 „	12.82 „	3.88 „	———	2.62
1905	———	———	51.33 „	15.59 „	4.24 „	———	2.70
1906	———	———	63.46 „	19.28 „	4.81 „	———	2.61
1907	———	———	62.06 „	20.00 „	4.80 „	———	3.07
1908	———	———	50.22 „	13.20 „	3.78 „	———	3.11
1909	———	———	48.93 „	12.98 „	3.85 „	———	3.19
1910	———	———	50.812 „	12.738 „	4.00 „	4.60E. St.L.	3.35
1911	———	———	50.64 „	12.38 „	3.98 „	4.90 „	3.18
1912	———	———	57.79 „	16.341 „	4.024 „	5.90 „	3.36
1913	———	———	56.80 „	15.27 „	3.93 „	4.80 „	3.39
1914	———	———	52.10 „	13.60 „	3.50 „	4.40 „	3.46
1915	———	———	47.20 „	17.28 „	4.17 „	11.25 „	3.43
1916	———	———	62.38 „	27.202 „	6.172 „	10.88 „	3.45
1917	———	———	77.35 „	27.18 „	7.91 „	7.566 „	3.48
1918	———	———	91.93 „	24.63 „	6.67 „	6.94 „	4.99
1919	———	———	105.57 „	18.70 „	5.19 „	6.24 „	4.92
1920	———	———	95.80 „	17.45 „	7.16 „	6.52 „	4.72
1921	———	———	59.52 „	12.50 „	4.09 „	3.95 „	4.81
1922	———	———	64.14 „	13.38 „	5.16 „	4.86 „	4.72
1923	———	———	61.63 „	14.42 „	6.54 „	5.62 „	4.81
1924	———	———	63.442 „	13.02 „	7.287 „	5.39 „	4.89
1925	———	———	69.065 „	14.042 „	7.848 Lond.	7.892 Lond.	4.79
1926	———	———	62.107 „	13.795 „	6.751 „	7.409 „	4.84
1927	———	———	56.370 „	12.920 „	5.256 „	6.194 „	4.81
1928	———	———	58.176 „	14.570 „	4.575 „	5.493 „	4.71
1929	———	———	52.993 „	18.107 „	5.050 „	5.385 „	4.74
1930	———	———	38.154 „	12.982 „	3.927 „	3.599 „	4.73
1931	———	———	28.700 „	8.116 „	2.710 „	2.554 „	4.35
1932	19.30	23.47	31.671 „	6.380 Lond.	2.113 „	2.405 „	4.04
1933	23.02	28.60	37.832 „	7.454 „	2.391 „	3.210 „	3.90
1934	28.37	34.50	47.461 „	7.419 „	2.436 „	3.044 „	4.00
1935	28.94	35.19	64.790 „	7.795 „	3.133 „	3.099 „	3.95
1936	28.81	35.03	45.127 „	9.477 „	3.913 „	3.315 „	4.23
1937	28.77	34.99	44.881 „	13.078 „	5.110 „	4.902 „	4.25
1938	28.93	35.18	43.477 „	9.972 „	3.344 „	3.073 „	4.01
1939	29.72	36.14	40.488 „	10.092 „	3.169 „	3.069 „	4.02
1940	31.66	38.50	38.249 „	10.086 „	3.362 „	3.411 „	4.26
1941	31.66	38.50	38.261 „	10.086 „	3.362 „	3.411 „	4.15
1942	31.66	38.50	41.166 „	10.086 „	3.362 „	3.411 „	4.13
1943	31.66	38.50	45.254 „	11.750 „	3.754 „	4.000 „	4.17
1944	31.66	38.50	43.000 „	12.000 „	4.500 „	4.300 „	4.25
1945	31.66	38.50	47.000 „	12.550 „	5.000 „	6.440 „	4.24
1946	30.22	36.75	83.650 „	12.800 „	6.750 „	7.810 „	4.68
1947	28.78	35.00	72.000 „	20.390 „	13.670 „	11.230 „	5.12
1948	28.78	35.00	75.000 Mont.	22.350 U.S.	18.040 „	13.930 „	6.09
1949	29.60	36.00	74.250 U.S.	19.973 „	15.800 U.S.	13.247 U.S.	6.51
1950	31.29	38.05	80.635 „	23.428 „	14.454 „	15.075 „	6.43
1951	30.30	36.85	94.550 „	27.700 „	18.400 „	19.900 „	6.46
1952	28.18	34.27	83.157 „	31.079 „	16.121 „	15.874 „	6.94
1953	28.31	34.42	83.774 „	30.333 „	13.265 „	10.675 „	6.88
1954	27.52	34.07	82.982 „	29.112 „	13.680 „	10.417 „	7.00
1955	28.39	34.52	87.851 „	38.276 „	14.926 „	12.127 „	6.74
1956	28.32	34.44	89.373 „	39.787 „	15.756 „	13.278 „	6.59
1957	27.59	33.55	87.057 „	26.031 „	14.051 „	11.175 „	6.76
1958	27.94	33.98	86.448 „	23.419 „	11.755 „	10.009. „	7.45
1959	27.61	33.57	87.469 „	27.708 „	11.670 „	10.978 „	7.93
1960	27.92	33.95	88.633 „	28.985 „	11.589 „	12.557 „	6.64
1961	29.24	35.46	93.696 „	28.288 „	11.011 „	11.695 „	7.40
1962	29.25	37.41	116.029 „	30.473 „	10.301 „	12.422 „	7.43
1963	29.31	37.75	137.965 „	30.646 „	12.012 „	13.173 „	7.33
1964	29.96	37.75	139.458 „	33.412 „	14.662 „	14.633 „	6.94
1965	28.93	37.73	139.374 „	38.377 „	17.247 „	15.636 „	7.03
1966	29.08	37.71	139.300 „	53.344 „	16.283 „	15.622 „	7.28
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
1970	28.89	36.56	184.927 „	58.6982	16.336 „	16.006 „	7.40
1971	26.25	35.34	155.965 „	46.6962	13.950 „	16.286 „	10.03

[1] *See* page A 13 for detailed explanation.
[2] *See* page A 14 for explanation.

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

Products[1]	Total Quantity to Date	Total Value to Date	Quantity, 1970	Value, 1970	Quantity, 1971	Value, 1971
Metals		$		$		$
Antimony lb.	52,889,907	17,124,827	726,474	1,104,040	323,525	243,614
Bismuth lb.	6,828,976	14,138,782	132,135	828,486	82,521	388,674
Cadmium lb.	40,458,224	74,338,692	939,310	3,343,944	1,036,713	2,011,223
Chromite tons	796	32,295				
Cobalt lb.	115,275	103,519			113,545	103,099
Copper lb.	4,538,186,651	1,242,159,863	212,371,731	124,657,958	278,508,515	130,052,336
Gold—placer oz.	5,235,585	96,962,044	491	14,185	177	4,647
„ —lode, fine oz.	17,111,968	506,836,942	100,809	3,685,476	85,487	3,021,453
Iron concentrates tons	28,235,788	256,921,576	1,879,065	17,391,883	1,929,868	18,153,612
Lead lb.	16,076,243,537	1,382,526,389	214,838,525	35,096,021	247,927,691	34,585,913
Magnesium lb.	204,632	88,184				
Manganese tons	1,724	32,668				
Mercury[2] lb.	4,171,110	10,447,358				
Molybdenum lb.	141,519,639	241,356,536	31,276,497	52,561,796	21,884,729	36,954,846
Nickel lb.	44,225,084	40,970,630	3,408,203	4,703,320	2,543,578	3,497,420
Palladium oz.	749	30,462				
Platinum oz.	1,407	135,008				
Selenium lb.	731	1,389				
Silver oz.	492,916,634	365,112,955	6,511,316	12,041,181	7,654,415	11,938,208
Tin lb.	18,503,982	16,620,319	263,716	421,946	318,999	421,079
Tungsten (WO_3) lb.	17,355,132	41,676,291			1,335,808	3,012,540
Zinc lb.	14,726,510,113	1,439,630,540	275,590,749	44,111,055	305,451,243	49,745,789
Others		39,649,062		10,020,179		5,774,192
Totals		5,786,896,331		309,981,470		299,908,645
Industrial Minerals						
Arsenious oxide lb.	22,019,420	273,201				
Asbestos tons	1,012,325	197,232,451	86,730	16,033,827	87,118	17,800,406
Barite tons	394,921	4,094,018	45,320	382,508	21,267	179,455
Bentonite tons	791	16,858				
Diatomite tons	10,268	239,772	1,276	26,567	1,550	37,830
Fluorspar tons	35,682	795,950				
Fluxes tons	4,111,071	7,674,330	31,626	106,533	26,740	98,426
Granules tons	418,856	6,528,317	22,349	526,491	29,238	519,192
Gypsum and gypsite tons	4,430,086	15,356,252	270,266	736,635	344,795	930,348
Hydromagnesite tons	2,253	27,536				
Iron oxide and ochre tons	18,108	155,050				
Jade lb.	764,154	728,002	262,602	250,256	167,760	196,332
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	7,583,927	97,681,097	336,420	3,957,542	288,467	2,147,778
Talc tons	1,805	34,871				
Others		5,213				
Totals		331,439,433		22,020,359		21,909,767
Structural Materials						
Cement tons	13,860,527	235,437,698	601,893	13,485,549	906,467	21,629,385
Clay products		83,673,368		4,714,368		5,981,785
Lime and limestone tons		56,709,121	1,867,586	3,169,665	1,819,549	3,037,222
Rock tons		53,581,885	2,692,282	3,018,242	3,668,244	3,670,583
Sand and gravel tons		279,028,002	23,155,989	21,679,387	29,320,104	25,612,396
Stone tons	1,164,321	9,215,765	175	2,449	2,267	8,962
Not assigned		5,972,171				
Totals		723,618,010		46,069,660		59,940,333
Fuels						
Coal tons	149,654,344	682,085,481	2,644,056	19,559,669	4,565,242	45,801,936
Crude oil bbl.	184,415,614	417,052,604	25,333,550	60,405,941	25,154,122	66,471,856
Field condensate bbl.	510,313	1,223,978	107,254	277,829	109,008	287,781
Plant condensate bbl.	11,917,836	5,957,329	1,003,138	253,009	1,114,139	293,287
Nat'l gas to pipe-line MSCF	2,183,429,009	224,514,882	272,554,221	29,804,411	291,188,481	31,946,372
Butane bbl.	5,301,142	1,696,364	308,664	98,772	318,195	101,822
Propane bbl.	3,844,804	1,230,334	420,327	134,505	468,876	150,040
Totals		1,333,760,972		110,534,136		145,053,094
Grand Totals		8,175,714,746		488,605,625		526,811,839

[1] *See* notes on individual products listed alphabetically on pages A 15 to A 25.
[2] From 1968, excludes production which is confidential.

TABLE 2—TOTAL VALUE OF MINERAL PRODUCTION, 1836–1971

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, 1836–1971—*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	294,881,114	20,492,943	55,441,528	93,573,164	464,388,749
1970	309,981,470	22,020,359	46,069,660	110,534,136	488,605,625
1971	299,908,645	21,909,767	59,940,333	145,053,094	526,811,839
Totals	5,786,896,331	331,439,433	723,618,010	1,333,760,972	8,175,714,746

TABLE 3—MINERAL PRODUCTION FOR THE 10 YEARS, 1962 TO 1971

Description	1962		1963		1964		1965		1966	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Metals		$		$		$		$		$
Antimony ..... lb.	1,931,397	748,223	1,601,253	624,489	1,591,523	700,270	1,301,787	689,947	1,405,681	745,011
Bismuth ..... lb.	228,601	507,494	157,099	348,760	213,428	480,213	144,630	446,907	47,435	198,848
Cadmium ..... lb.	2,086,692	3,839,513	1,981,004	4,754,410	1,864,255	6,040,186	466,586	1,297,110	1,169,570	3,017,491
Copper ..... lb.	108,979,144	33,209,215	118,247,104	36,238,007	115,554,700	38,609,136	85,197,073	32,696,081	105,800,568	56,438,255
Gold—placer ..... oz.	3,315	96,697	4,620	135,411	1,842	55,191	866	25,053	1,535	44,632
„ —lode, fine ..... oz.	158,850	5,942,101	154,979	5,850,458	138,487	5,227,884	117,124	4,419,089	119,508	4,506,646
Iron concentrates ..... tons	1,793,847	18,326,911	2,060,241	20,746,424	2,002,562	20,419,487	2,165,403	21,498,581	2,151,804	20,778,934
Lead ..... lb.	335,282,537	34,537,454	314,974,310	37,834,714	268,737,503	39,402,293	250,183,633	43,149,171	211,490,107	34,436,934
Mercury ..... lb.	.....	.....	.....	.....	5,548	22,848	1,520	12,301	.....	.....
Molybdenum ..... lb.	.....	.....	.....	.....	28,245	47,063	7,289,125	12,405,344	17,094,927	27,606,061
Nickel ..... lb.	3,476,467	2,902,850	3,699,402	3,107,498	3,398,560	2,854,790	3,322,000	2,790,480	3,187,712	2,731,869
Platinum ..... oz.	5	375	2	150	.....	.....	.....	.....	.....	.....
Silver ..... oz.	6,189,804	7,181,907	6,422,680	8,861,050	5,269,642	7,348,938	4,972,084	6,929,793	5,549,131	7,729,939
Tin ..... lb.	650,941	442,640	927,062	648,943	352,350	535,572	377,207	735,554	710,752	1,130,096
Zinc ..... lb.	413,430,817	51,356,376	402,863,154	53,069,163	400,796,562	58,648,561	311,249,250	48,666,933	305,124,440	47,666,540
Others	.....	535,537	.....	633,389	.....	533,897	.....	1,339,389	.....	1,632,747
Totals	.....	159,627,293	.....	172,852,866	.....	180,926,329	.....	177,101,733	.....	208,664,003
Industrial Minerals										
Asbestos ..... tons	55,133	10,297,360	63,215	11,681,337	67,460	11,714,494	85,851	14,491,195	88,771	15,718,741
Barite ..... tons	6,511	57,062	8,207	69,588	10,588	119,370	17,466	182,931	21,888	176,240
Diatomite ..... tons	211	10,228	458	16,030	1,143	64,555	82	4,420	70	3,755
Fluorspar ..... tons	.....	.....	.....	.....	.....	.....	70	2,419	152	4,986
Fluxes (quartz, limestone) ..... tons	62,743	228,477	60,490	223,012	73,021	237,298	59,231	240,076	23,913	112,314
Granules (quartz, limestone, granite) ..... tons	18,251	311,902	19,444	348,543	19,289	397,639	29,033	447,954	23,956	424,667
Gypsum and gypsite ..... tons	147,900	443,700	160,954	482,862	188,303	581,873	207,858	602,788	206,026	576,873
Jade ..... lb.	56,935	20,760	16,000	15,529	11,537	13,804	7,129	9,249	11,633	13,225
Sulphur ..... tons	239,191	2,934,725	254,197	3,673,997	278,385	3,860,436	341,873	4,428,617	342,478	5,834,523
Others	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Totals	.....	14,304,214	.....	16,510,898	.....	16,989,469	.....	20,409,649	.....	22,865,324
Structural Materials										
Cement ..... tons	397,435	7,112,890	476,071	8,546,768	537,396	10,040,776	601,878	11,199,607	707,519	12,918,301
Clay products	.....	2,507,438	.....	2,824,583	.....	3,008,158	.....	3,899,634	.....	4,100,192
Lime and limestone ..... tons	559,028	1,513,579	907,203	1,723,796	1,211,320	2,055,195	1,420,085	2,482,451	1,483,949	2,696,011
Rubble, riprap, crushed rock ..... tons	1,897,272	1,284,301	1,913,906	1,259,002	1,449,449	1,285,318	2,715,411	1,938,088	1,590,189	1,890,992
Sand and gravel ..... tons	17,757,391	8,862,767	17,387,026	9,514,095	17,708,225	10,013,970	20,936,994	12,686,959	24,320,013	21,959,733
Stone ..... tons	8,023	85,290	1,827	13,946	846	25,522	2,252	118,975	76,720	215,043
Totals	.....	21,366,265	.....	23,882,190	.....	26,428,939	.....	32,325,714	.....	43,780,272
Fuels										
Coal—sold and used ..... tons	825,339	6,133,986	850,541	6,237,997	911,326	6,327,678	950,763	6,713,590	850,821	6,196,219
Crude oil ..... bbl.	8,904,938	16,827,118	12,515,137	24,900,381	11,525,476	23,396,716	13,470,757	28,693,662	16,638,181	36,268,683
Field condensate ..... bbl.	9,621	18,184	13,671	27,205	26,367	63,436	31,782	70,874	39,571	86,265
Plant condensate ..... bbl.	837,824	674,644	841,740	536,193	922,211	587,685	947,429	576,107	974,564	312,360
Natural gas delivered to pipe-line ..... MSCF	108,699,997	10,226,323	105,525,373	10,719,298	118,959,880	12,192,816	138,814,144	14,493,255	161,264,334	17,339,587
Butane ..... bbl.	387,558	124,019	409,087	130,908	461,759	147,763	477,990	152,956	500,973	160,312
Propane ..... bbl.	216,995	69,438	205,162	65,651	244,804	78,337	358,776	114,808	334,315	106,980
Totals	.....	34,073,712	.....	42,617,633	.....	42,794,431	.....	50,815,252	.....	60,470,406
Grand totals	.....	229,371,484	.....	255,863,587	.....	267,139,168	.....	280,652,348	.....	335,780,005

Description	1967		1968		1969		1970		1971	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Metals										
Antimony lb.	1,267,686	$ 671,874	1,159,960	$ 614,779	820,122	$ 508,476	726,474	$ 1,104,040	323,525	$ 243,614
Bismuth lb.	142,507	572,878	207,783	868,533	62,488	288,070	132,135	828,486	82,521	388,674
Cadmium lb.	994,365	2,784,222	1,341,437	3,823,095	1,141,133	4,016,788	939,310	3,343,944	1,036,713	2,011,223
Cobalt lb.									113,545	103,099
Copper lb.	172,739,548	88,135,172	160,993,338	87,284,148	167,415,411	111,592,416	212,371,731	124,657,958	278,508,515	130,052,336
Gold—placer oz.	891	25,632	670	19,571	399	11,720	491	14,185	177	4,647
„ —lode, fine oz.	126,157	4,763,688	123,896	4,672,242	117,481	4,427,506	100,809	3,685,476	85,487	3,021,453
Iron concentrates tons	2,154,443	20,820,765	2,094,749	21,437,569	2,074,854	19,787,845	1,879,065	17,391,883	1,929,868	18,153,612
Lead lb.	208,131,894	31,432,079	231,627,618	32,782,257	210,072,565	33,693,539	214,838,525	35,096,021	247,927,691	34,585,913
Mercury lb.	380	2,600								
Molybdenum lb.	17,517,543	31,183,064	19,799,793	32,552,722	26,597,477	47,999,442	31,276,497	52,561,796	21,884,729	36,954,846
Nickel lb.	4,180,842	3,946,715	3,317,160	3,372,225	2,979,130	3,396,208	3,408,203	4,703,320	2,543,578	3,497,420
Silver oz.	6,180,739	10,328,695	7,130,866	16,475,795	5,760,534	11,100,491	6,511,316	12,041,181	7,654,415	11,938,208
Tin lb.	437,804	621,682	358,191	497,885	288,427	470,136	263,716	421,946	318,999	421,079
Tungsten (WO_3) lb.									1,335,808	3,012,540
Zinc lb.	262,830,908	39,248,539	299,396,264	43,550,181	296,667,033	46,639,024	275,590,749	44,111,055	305,451,243	49,745,789
Others		1,327,713		2,961,024		10,949,453		10,020,179		5,774,192
Totals		235,865,318		250,912,026		294,881,114		309,981,470		299,908,645
Industrial Minerals										
Asbestos tons	92,192	18,273,220	74,667	14,833,891	80,388	14,871,334	86,730	16,033,827	87,118	17,800,406
Barite tons	23,466	176,882	21,968	164,206	30,624	248,818	45,320	382,508	21,267	179,455
Diatomite tons	2,819	14,096	856	17,159			1,276	26,567	1,550	37,830
Fluorspar tons	80	2,464	39	1,117						
Fluxes (quartz, limestone) tons	48,052	221,212	42,259	157,679	22,342	81,917	31,626	106,533	26,740	98,426
Granules (quartz, limestone, granite) tons	31,283	305,655	30,237	436,928	34,746	654,701	22,349	526,491	29,238	519,192
Gypsum and gypsite tons	230,044	691,592	246,374	689,847	280,894	764,032	270,266	736,635	344,795	930,348
Jade lb.	20,160	24,341	49,015	105,670	26,332	42,635	262,602	250,256	167,760	196,332
Sulphur tons	314,490	9,654,603	320,521	9,650,285	349,122	3,824,593	336,420	3,957,542	288,467	2,147,778
Others						4,913				
Totals		29,364,065		26,056,782		20,492,943		22,020,359		21,909,767
Structural Materials										
Cement tons	709,977	13,581,850	656,363	13,634,166	795,591	16,604,688	601,893	13,485,549	906,467	21,629,385
Clay products		3,945,207		4,388,505		4,550,546		4,714,368		5,981,785
Lime and limestone tons	1,645,253	2,822,138	2,016,692	3,337,277	1,911,881	3,237,032	1,867,586	3,169,665	1,819,549	3,037,222
Rubble, riprap, crushed rock tons	2,287,407	2,967,195	3,385,712	3,524,439	3,756,559	4,456,211	2,692,282	3,018,242	3,668,244	3,670,583
Sand and gravel tons	23,210,746	20,643,673	22,665,961	20,271,723	29,132,650	26,553,699	23,155,989	21,679,387	29,320,104	25,612,396
Stone tons	3,577	51,425	1,654	33,366	2,177	39,352	175	2,449	2,267	8,962
Totals		44,011,488		45,189,476		55,441,528		46,069,660		59,940,333
Fuels										
Coal—sold and used tons	908,790	7,045,341	959,214	7,588,989	852,340	6,817,155	2,644,056	19,559,669	4,565,242	45,801,936
Crude oil bbl.	19,656,799	44,748,477	22,151,353	50,082,837	25,309,036	58,176,213	25,333,550	60,405,941	25,154,122	66,471,856
Field condensate bbl.	40,570	92,357	54,163	122,408	78,147	180,520	107,254	277,829	109,008	287,781
Plant condensate bbl.	1,016,045	267,941	960,252	247,455	944,111	263,278	1,003,138	253,009	1,114,139	293,287
Natural gas delivered to pipe-line MSCF	198,626,177	21,667,136	224,233,203	24,531,445	256,223,244	27,897,585	272,554,221	29,804,411	291,188,481	31,946,372
Butane bbl.	588,118	188,197	527,546	168,814	417,540	133,613	308,664	98,772	318,195	101,822
Propane bbl.	413,058	132,178	400,800	128,256	327,501	104,800	420,327	134,505	468,876	150,040
Totals		74,141,627		82,870,204		93,573,164		110,534,136		145,053,094
Grand totals		383,382,498		405,028,488		464,388,749		488,605,625		526,811,839

TABLE 4—MINERAL PRODUCTION, GRAPH OF VALUE, 1887–1971

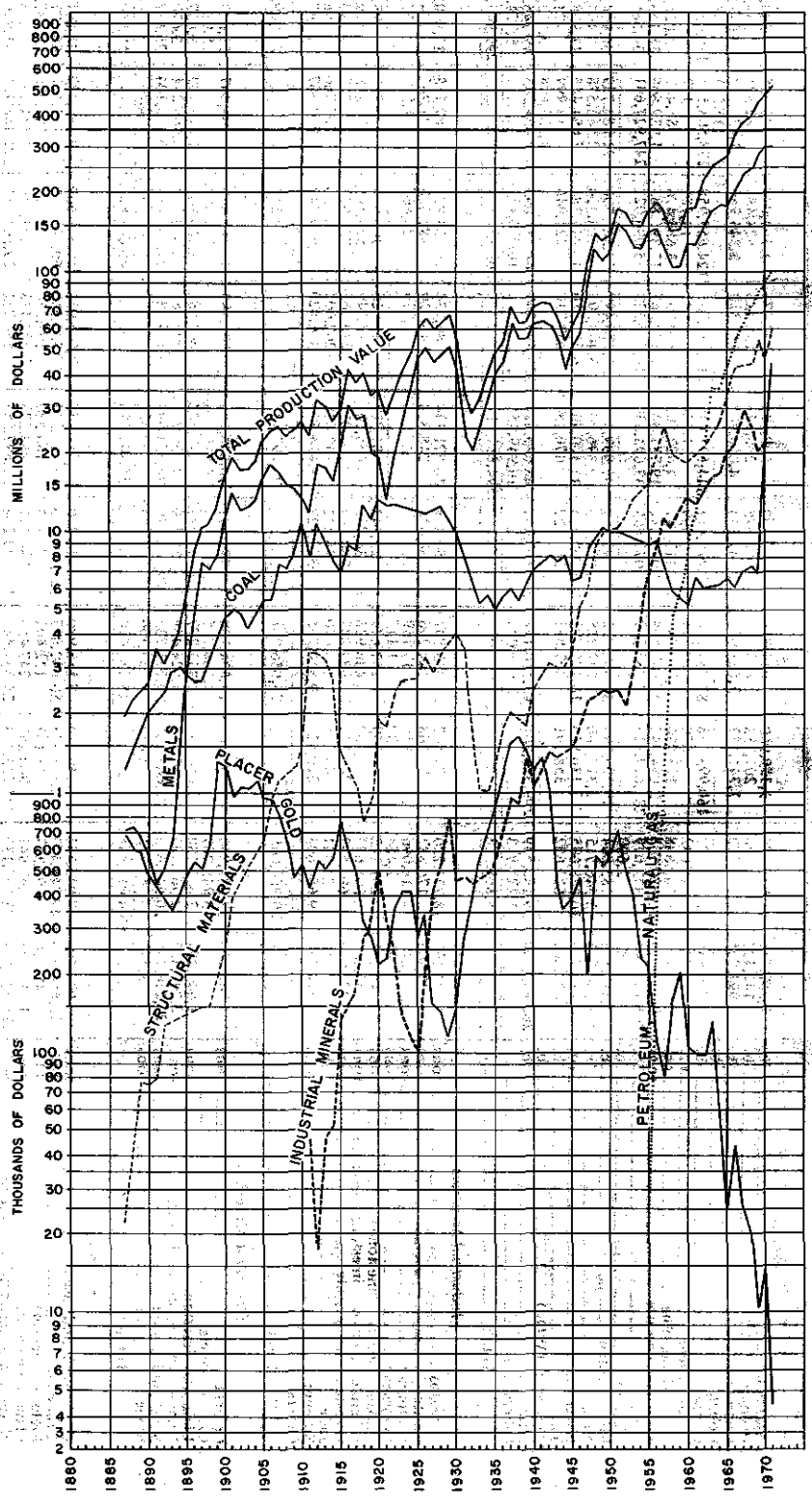


TABLE 5—PRODUCTION OF GOLD, SILVER, COPPER, LEAD, ZINC, AND MOLYBDENUM, GRAPH OF QUANTITIES, 1893–1971

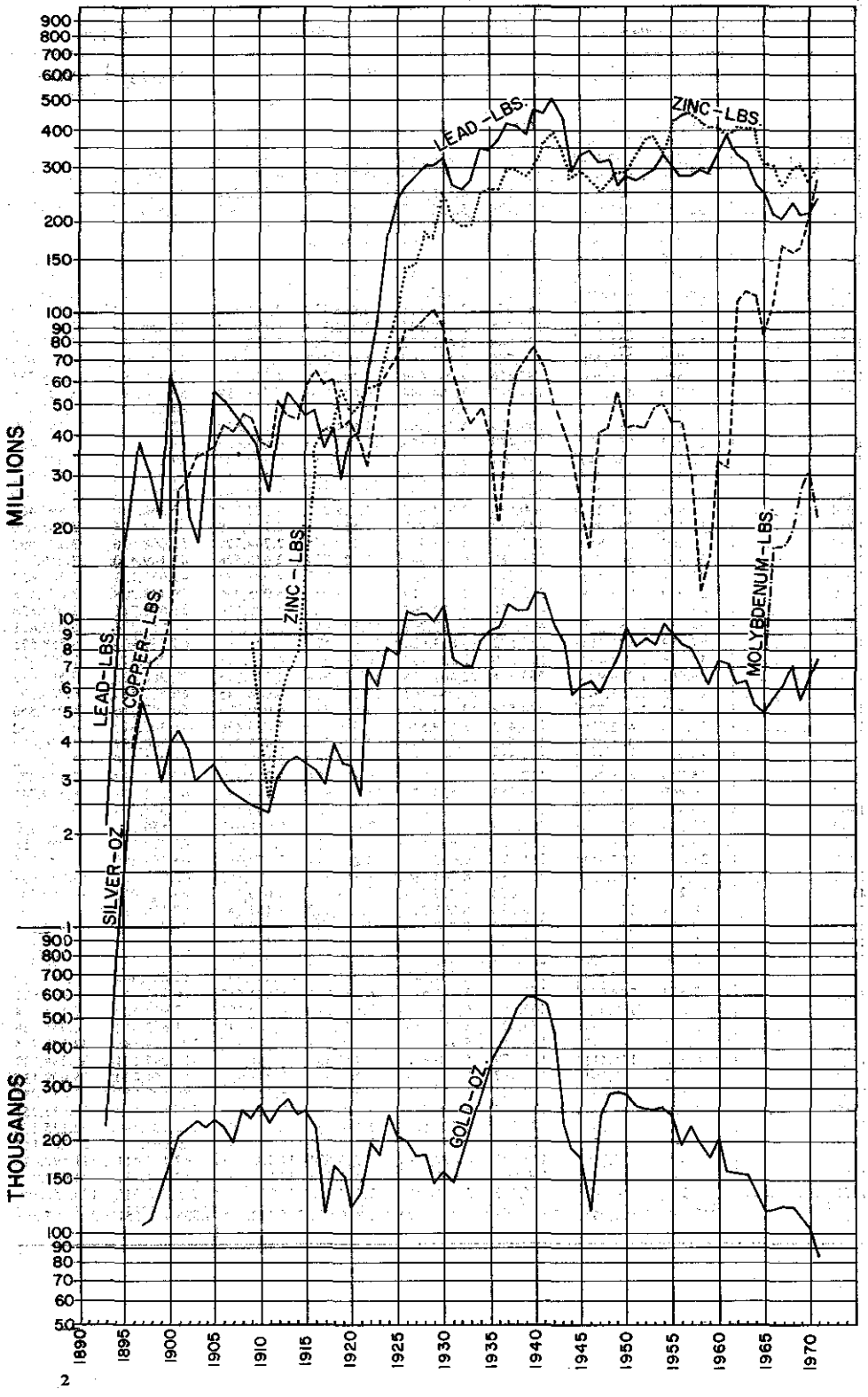


TABLE 6—PRODUCTION OF GOLD, SILVER, COPPER, LEAD, ZINC, MOLYBDENUM, AND IRON CONCENTRATES, 1858–1971

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	3,498,172	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	362,787	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	7,637,262	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	117,481	4,427,506	5,760,534	11,100,491	167,415,411	111,592,416
1970	491	14,185	100,809	3,685,476	6,511,316	12,041,181	212,371,731	124,657,958
1971	177	4,647	85,487	3,021,453	7,654,415	11,938,208	278,508,515	130,052,336
Totals	5,235,585	96,962,044	17,111,968	506,836,942	492,916,634	365,112,955	4,538,186,651	1,242,159,863

TABLE 6—PRODUCTION OF GOLD, SILVER, COPPER, LEAD, ZINC, MOLYBDENUM, AND IRON CONCENTRATES, 1858–1971—*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	296,667,033	46,639,024	26,597,477	47,999,442	2,074,854	19,787,845
1970	214,838,529	35,096,021	275,590,749	44,111,055	31,276,497	52,561,796	1,879,065	17,391,883
1971	247,927,691	34,585,913	305,451,243	49,745,789	21,884,729	36,954,846	1,929,868	18,153,612
Totals	16,076,243,537	1,382,526,389	14,726,510,113	1,439,630,540	141,519,639	241,356,536	28,235,788	256,921,576

TABLE 7A—MINERAL PRODUCTION BY MINING

Division	Period	Placer Gold		Metals	Industrial Minerals	Structural Materials
		Quantity	Value			
		Oz.	$	$	$	$
Alberni	1970			15,555,220		363,088
	1971			13,592,004		432,472
	To date	1,617	33,253	131,159,179	9,398	4,035,680
Atlin	1970	20	548	7		3,975
	1971	4	141			3,375
	To date	735,814	17,389,112	38,047,192	20,325	338,241
Cariboo	1970	346	9,908	3,910,401	26,567	2,098,224
	1971	148	3,781	2,734,101	37,830	3,150,193
	To date	2,610,501	54,166,426	72,018,613	383,202	20,199,446
Clinton	1970					561,979
	1971					270,282
	To date	10,171	243,069	848,377	162,427	2,801,872
Fort Steele	1970			61,290,422	685,894	654,771
	1971			64,064,434	609,564	581,641
	To date	20,531	468,450	2,225,012,094	18,802,245	8,556,294
Golden	1970			886,130	1,119,143	303,785
	1971			1,017,942	1,109,803	246,678
	To date	469	11,268	63,472,679	12,824,090	3,401,145
Greenwood	1970			8,855,865		92,154
	1971			7,765,475		175,325
	To date	5,074	115,662	188,308,025	2,327,897	1,935,954
Kamloops	1970			30,254,999	383	2,096,988
	1971			25,096,722		4,476,797
	To date	27,595	604,785	174,710,314	6,540,538	23,408,427
Liard	1970			5,046,177	16,435,902	1,040,983
	1971			6,183,725	18,224,832	1,375,835
	To date	50,184	1,248,151	11,236,424	212,872,544	10,474,507
Lillooet	1970	8	256	1,449,370	27,583	75,585
	1971			713,090	102,900	164,244
	To date	92,946	1,925,688	148,167,256	323,095	3,186,804
Nanaimo	1970			14,050,288	152,938	3,567,021
	1971			16,997,484	168,196	4,109,496
	To date	866	19,300	212,434,181	1,674,016	64,256,026
Nelson	1970			7,054,155	339,289	635,123
	1971			8,685,162	281,843	550,212
	To date	3,586	89,026	347,259,121	1,711,963	6,799,103
New Westminster	1970			5,802,046	65,039	11,395,323
	1971			4,312,143	52,330	14,107,989
	To date	31,355	595,910	49,703,757	1,531,625	160,090,511
Nicola	1970			22,904,573		236,443
	1971			18,768,216		293,023
	To date	234	4,764	203,662,963	10,050	1,647,963
Omineca	1970	117	3,473	40,475,648	213,574	592,819
	1971	25	725	27,441,963	85,660	1,158,738
	To date	56,431	1,503,680	253,715,195	860,178	11,725,249
Osoyoos	1970			26,451,165	65,590	235,445
	1971			24,199,868	73,019	447,910
	To date	240	5,466	106,248,636	6,423,823	3,099,646
Revelstoke	1970			1,071,796		109,910
	1971			1,615,109		194,563
	To date	7,582	164,477	13,931,536		2,754,378
Similkameen	1970					116,559
	1971					121,785
	To late	45,507	878,204	120,198,200	18,558	4,150,383
Skeena	1970			30,725,783		1,038,925
	1971			42,949,113		1,733,301
	To date	4,603	105,569	361,066,323	1,240,215	15,134,070
Slocan	1970			9,126,061		91,384
	1971			10,054,179		106,916
	To date	366	9,397	272,992,780		1,939,289
Trail Creek	1970			1,018,844		200,994
	1971			950,904		139,259
	To date	851	24,260	89,762,315		3,325,187
Vancouver	1970			3,283,012	82,138	6,981,639
	1971			8,042,080		10,132,873
	To date	182	5,206	267,616,142	7,066,964	123,772,105
Vernon	1970				9,500	563,811
	1971			3,482	42,000	805,641
	To date	2,732	72,885	335,113	55,478	6,720,220
Victoria	1970				290	9,787,083
	1971				230	13,492,425
	To date	628	15,680	16,687,533	189,661	200,107,935
Not Assigned	1970			20,755,323	2,796,534	3,225,704
	1971			14,716,797	1,121,560	1,664,340
	To date	1,525,520	17,262,256	321,340,339	56,891,141	39,757,575
Totals	1970	491	14,185	309,967,285	22,020,359	46,069,660
	1971	177	4,647	299,903,998	21,909,767	59,940,333
	To date	5,285,585	96,962,044	5,689,934,287	331,439,433	723,618,010

DIVISIONS, 1970 AND 1971, 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.	$	MSCF	$	Bbl.	$	$
								15,918,303
								14,024,476
								135,237,510
								4,530
								3,516
								55,794,870
								6,045,100
								5,925,905
290	1,100							146,768,787
								561,979
								270,282
2,641,625	19,538,505							4,055,745
4,565,242	45,801,836							82,169,592
67,165,419	346,128,458							**111,057,575**
								2,598,967,541
								2,309,058
								2,374,423
								79,709,182
								8,948,019
								7,940,800
								192,687,538
								32,352,370
								29,573,519
15,087	59,765							205,323,829
		26,443,942	60,936,779	272,554,221	29,804,411	728,991	233,277	113,497,479
		26,377,269	67,052,924	291,188,481	31,946,372	787,071	251,362	**125,035,550**
99,433	699,521	196,843,763	424,233,911	2,183,429,009	224,514,882	9,145,946	2,926,698	888,206,638
								1,552,794
								980,234
								153,602,843
								17,770,242
								21,275,176
74,324,471	301,144,744							579,528,267
								8,028,567
								9,517,217
								355,859,213
								17,262,408
								18,472,462
								211,921,803
								23,141,016
								19,061,239
2,929,584	11,080,836							216,406,576
2,431	21,164							41,306,678
								28,687,086
501,460	3,412,208							270,716,510
								26,752,200
								24,720,797
1,122	5,008							115,782,579
								1,181,706
								1,809,692
								16,850,391
								116,559
								121,785
4,617,442	19,553,725							144,799,070
								31,764,708
								44,687,419
36	116							377,546,293
								9,217,445
								10,161,095
								274,941,466
								1,219,838
								1,090,163
								93,111,762
								10,346,780
								18,174,953
								398,460,517
								573,311
								851,123
								7,183,696
								9,787,373
								13,492,655
								217,000,809
								26,777,561
								17,502,697
								435,251,311
2,644,056	19,559,669	26,443,942	60,936,779	272,554,221	29,804,411	728,991	233,277	488,605,625
4,565,242	45,801,836	26,377,269	67,052,924	291,188,481	31,946,372	787,071	251,362	**526,811,839**
149,654,344	682,085,481	196,843,763	424,233,911	2,183,429,009	224,514,882	9,145,946	2,926,698	8,175,714,746

TABLE 7B—PRODUCTION OF LODE GOLD, SILVER, COPPER, LEAD, AND ZINC BY MINING DIVISIONS, 1970 AND 1971, 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	1970	11,795	431,214	383,885	709,815	13,112,057	7,696,515	1,777,201	290,324	36,966,171	5,916,805	15,044,673
	1971	**12,422**	**439,044**	**488,130**	**761,312**	**12,161,571**	**5,692,976**	**2,270,943**	**316,797**	**37,539,227**	**6,113,639**	**13,323,768**
	To date	367,286	13,716,054	2,485,685	4,342,990	57,684,032	31,227,299	6,014,270	881,182	188,986,028	29,832,152	79,499,677
Atlin	1970			4	7							7
	1971											
	To date	344,197	12,126,782	3,377,127	2,895,668	24,777,661	8,160,266	23,765,211	3,437,907	91,067,749	10,864,497	37,485,070
Cariboo	1970			94	174			295	48			222
	1971			**14**	**22**							**22**
	To date	1,202,251	43,347,296	146,913	109,266	2,352	920	24,855	3,772	505	19	43,461,273
Clinton	1970											
	1971											
	To date	28,390	827,328	31,586	14,237	57,548	5,905	193	7			847,477
Fort Steele	1970	161	5,886	2,829,793	5,233,051			179,232,240	29,279,379	145,496,100	23,288,106	57,806,422
	1971	**181**	**6,397**	**3,476,343**	**5,421,879**			**198,524,560**	**27,694,176**	**178,171,400**	**29,016,995**	**62,139,447**
	To date	7,701	241,641	240,203,514	171,979,594	28,592	6,193	13,458,914,249	1,115,948,200	10,079,085,705	898,894,494	2,187,070,122
Golden	1970	49	1,791	122,417	226,382			1,723,642	281,574	2,091,727	334,802	844,549
	1971	**92**	**3,252**	**69,576**	**108,514**			**506,431**	**70,647**	**5,130,354**	**885,529**	**1,017,942**
	To date	311	9,925	4,324,709	3,867,103	1,171,455	367,261	256,101,194	25,613,248	331,821,592	32,454,327	62,311,864
Greenwood	1970	13,171	481,520	577,750	1,068,416	12,208,427	7,166,102	570,801	93,246	245,272	39,258	8,848,542
	1971	**15,005**	**530,337**	**758,898**	**1,183,615**	**12,661,387**	**5,912,361**	**500,986**	**69,888**	**400,976**	**65,303**	**7,761,504**
	To date	1,321,890	31,334,793	41,547,857	32,747,172	550,941,957	119,502,551	23,675,979	2,367,296	23,395,857	2,172,084	188,123,846
Kamloops	1970	2,251	82,294	179,620	332,177	50,837,884	29,840,528					30,254,999
	1971			**150,820**	**235,382**	**53,240,834**	**24,861,340**					**25,096,722**
	To date	64,725	2,241,723	1,581,371	2,296,573	338,159,056	169,857,037	538,097	45,030	488,023	29,826	174,470,189
Liard	1970			441	816	8,593,790	5,044,888	5,456	891	544	87	5,046,177
	1971			**50**	**78**	**13,241,813**	**6,183,397**	**498**	**69**	**1,114**	**181**	**6,183,725**
	To date	114	4,120	1,078	1,401	21,885,659	11,227,802	16,375	2,736	1,773	286	11,236,345
Lillooet	1970	39,300	1,436,769	6,814	12,601							1,449,370
	1971	**20,021**	**707,622**	**3,506**	**5,468**							**713,090**
	To date	4,185,568	147,353,931	987,967	719,635	400	41	62,513	2,548	15	2	148,081,157
Nanaimo	1970	8,748	319,635	101,911	188,461	13,592,842	7,978,726					8,486,822
	1971	**9,825**	**347,255**	**110,270**	**171,983**	**21,279,304**	**9,936,584**					**10,455,822**
	To date	234,174	7,533,285	1,788,668	2,217,150	164,602,112	69,927,201					79,677,636
Nelson	1970	943	34,475	236,806	437,918			8,823,373	1,359,706	28,121,867	4,501,106	6,333,205
	1971	**411**	**14,526**	**359,163**	**560,169**			**2,932,613**	**409,100**	**25,930,218**	**4,231,138**	**5,214,933**
	To date	1,341,282	41,999,127	9,820,595	7,521,889	14,915,405	1,689,196	498,325,265	63,352,118	1,345,225,541	178,641,118	293,203,448
New Westminster	1970					1,871,829	1,098,726					1,098,726
	1971	**6**	**212**	**2**	**3**	**1,523,490**	**711,409**					**711,624**
	To date	4,472	114,376	15,119	7,729	20,057,816	8,506,323	28,425	1,119	12,755	481	8,630,028
Nicola	1970	630	23,032			38,552,826	22,629,738					22,652,770
	1971	**753**	**26,614**			**39,389,382**	**18,369,918**					**18,396,532**
	To date	9,981	285,391	276,453	135,632	463,702,578	202,516,194	2,241,499	91,282	328,889	10,977	203,089,476
Omineca	1970	11,157	407,889	123,547	228,472	28,180,930	13,606,742	120,427	19,678	119,621	19,147	14,281,928
	1971	**10,542**	**372,597**	**123,690**	**192,913**	**22,973,282**	**10,727,604**	**130,278**	**18,174**	**148,298**	**24,152**	**11,335,440**
	To date	90,434	3,201,235	10,867,787	9,067,270	124,468,196	66,959,890	29,425,312	3,765,501	32,882,243	4,108,788	87,102,684

		Oz.	$	Oz.	$	Lb.	$	Lb.	$	Lb.	$	$
Osoyoos	1970	3,251	113,853	325,148	601,286	25,285,455	14,842,056	24,365	3,980	10,352	1,657	15,567,832
	1971	4,690	165,763	309,555	482,797	34,096,660	15,921,776					16,570,336
	To date	1,668,811	50,791,821	3,245,286	5,654,193	62,284,450	31,186,834	539,811	67,106	238,970	84,797	87,734,751
Revelstoke	1970											
	1971											
	To date	37,800	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	1970											
	1971											
	To date	184,017	6,327,448	4,220,109	2,583,491	601,197,638	111,137,983	392,099	14,887	80,198	5,205	120,069,014
Skeena	1970	7,172	262,201	244,960	452,997	18,564,753	10,897,139					11,612,337
	1971	10,732	379,312	573,434	894,356	49,837,022	23,271,896	32	4	85	14	24,545,582
	To date	2,454,425	62,460,367	70,178,462	46,442,860	784,790,507	149,008,075	60,001,248	5,438,853	17,198,320	2,541,653	265,886,308
Slocan	1970	601	21,972	661,472	1,223,240			22,358,453	3,652,477	24,443,296	3,912,394	8,810,083
	1971	100	3,534	997,305	1,555,447			28,537,886	3,981,035	26,503,103	4,316,295	9,856,311
	To date	17,177	507,060	77,486,589	55,060,247	13,662	1,861	1,128,881,502	106,486,029	947,532,069	105,239,092	267,294,289
Trail Creek	1970	42	1,535	3	6							1,541
	1971											
	To date	2,984,943	65,354,881	3,673,317	2,103,072	122,561,732	18,245,404	148,787	12,628	134,426	16,366	83,731,851
Vancouver	1970	553	20,217	21,546	39,844	5,413,303	3,177,501	17,424	2,846	246,157	39,400	3,279,808
	1971			91,615	142,887	16,916,210	7,899,193					8,042,080
	To date	499,432	16,192,619	5,348,821	3,749,760	1,078,253,699	213,613,838	18,570,027	1,883,516	238,340,360	30,973,086	266,412,819
Vernon	1970											
	1971	18	636	1,482	2,311			3,696	516	118	19	3,482
	To date	5,283	178,263	64,338	113,000	654	100	162,882	24,345	66,128	9,373	325,081
Victoria	1970											
	1971											
	To date	42,120	980,538	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]	1970	990	36,198	695,149	1,285,518	1,158,135	679,802	684,848	111,877	37,850,142	6,058,203	8,171,683
	1971	689	24,352	140,462	219,072	1,207,560	563,882	14,519,765	2,025,507	31,576,350	5,142,524	7,975,337
	To date	20,784	633,233	6,865,779	8,138,296	55,609,259	14,173,424	537,126,045	49,209,699	1,398,982,182	140,706,149	212,860,801
Totals	1970	100,809	3,685,476	6,511,816	12,041,181	212,371,731	124,657,958	214,888,525	35,096,021	275,590,749	44,111,055	219,591,691
	1971	85,487	3,021,453	7,654,415	11,938,208	278,508,515	130,052,336	247,927,991	34,585,913	305,451,243	49,745,789	229,343,699
	To date	17,111,968	506,836,942	492,916,634	365,112,955	4,538,186,651	1,242,159,863	16,076,243,537	1,382,526,389	14,726,510,113	1,439,630,540	4,936,266,689

[1] Metals recovered from operations at the Trail smelter but not assigned to individual mines.

TABLE 7c—PRODUCTION OF MISCELLANEOUS METALS BY MINING DIVISIONS, 1970 AND 1971, AND TOTAL TO DATE

Division	Period	Antimony		Bismuth		Cadmium		Chromite		Iron Concentrates		Manganese		Mercury[1]	
		Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
		Lb.	$	Lb.	$	Lb.	$	Tons	$	Tons	$	Tons	$	Lb.	$
Alberni	1970					139,048	495,011			4,296	15,536				
	1971					138,266	268,236								
	To date					679,897	2,024,791			4,732,817	49,634,711				
Atlin	1970														
	1971														
	To date					819,212	561,762								
Cariboo	1970														
	1971														
	To date														
Clinton	1970														
	1971														
	To date							126	900						
Fort Steele	1970					314,060	1,118,058			186,207	1,944,001				
	1971					384,429	745,792			62,562	758,116				
	To date					2,668,865	7,774,603			1,306,475	13,458,866				
Golden	1970					11,680	41,581								
	1971														
	To date	40,062	14,906			555,835	1,145,909								
Greenwood	1970					2,057	7,328								
	1971					2,047	3,971								
	To date					72,549	152,784	670	81,395						
Kamloops	1970														
	1971														
	To date									21,167	95,851			10,987	5,795
Liard	1970														
	1971														
	To date														
Lillooet	1970														
	1971														
	To date	13,466	4,821											9,231	41,304
Nanaimo	1970									576,104	5,563,466				
	1971									542,479	6,541,662				
	To date									15,369,102	132,756,545				
Nelson	1970					202,514	720,950								
	1971					235,922	457,669								
	To date					8,032,977	17,124,444								
New Westminster	1970														
	1971														
	To date														
Nicola	1970									18,565	251,803				
	1971									22,810	371,684				
	To date									41,375	623,487				
Omineca	1970	18,898	6,665			1,192	4,244								
	1971					1,385	2,687								
	To date	118,882	21,882			271,742	544,777							4,150,892	10,400,259

		Lb.	$	Lb.	$	Lb.	$	Tons	$	Tons	$	Tons	$	Lb.	$
Osoyoos	1970														
	1971														
	To date											16			
Revelstoke	1970														
	1971														
	To date	9,894	3,455			103,612	176,102								
Similkameen	1970														
	1971														
	To date														
Skeena	1970									1,093,898	9,617,077				
	1971									1,301,717	10,482,150				
	To date					141,890	316,764			6,764,302	60,350,191				
Slocan	1970					88,758	315,978								
	1971					101,994	197,868								
	To date	31,865	8,188			2,671,839	5,682,198					541	8,160		
Trail Creek	1970														
	1971														
	To date					115	210			550	1,925				
Vancouver	1970					900	3,204								
	1971														
	To date					566,006	1,208,828								
Vernon	1970														
	1971														
	To date					190	582								
Victoria	1970														
	1971														
	To date					7,000	10,929					1,167	24,508		
Not assigned[2]	1970	712,581	1,097,875	132,135	828,486	179,101	687,600								
	1971	323,525	243,614	82,521	388,674	172,670	334,980								
	To date	52,676,738	17,072,180	6,828,976	14,138,782	24,871,995	37,619,564								
Totals	1970	726,474	1,104,040	132,135	828,486	939,310	3,343,944			1,879,065	17,391,888				
	1971	323,525	243,614	82,521	388,674	1,036,713	2,011,223			1,929,868	18,153,612				
	To date	52,889,907	17,124,827	6,828,976	14,138,782	40,458,224	74,388,692	796	82,295	28,235,788	256,921,576	1,724	82,668	4,171,110	10,447,358

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

TABLE 7C—PRODUCTION OF MISCELLANEOUS METALS BY MINING DIVISIONS, 1970 AND 1971, 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	1970														510,547
	1971														268,238
	To date														51,659,502
Atlin	1970														
	1971														
	To date														562,122
Cariboo	1970	2,247,185	3,910,179									292	360		3,910,179
	1971	1,583,507	2,734,079												2,734,079
	To date	16,867,640	28,533,610					59	2,299			27,698	21,431		28,557,340
Clinton	1970														
	1971														
	To date														900
Fort Steele	1970									263,716	421,946				3,484,000
	1971									315,999	421,079				1,824,987
	To date									18,503,982	16,620,319			88.1841	37,941,972
Golden	1970														41,581
	1971														
	To date														1,160,315
Greenwood	1970														7,823
	1971														3,971
	To date														184,179
Kamloops	1970														
	1971														
	To date	93,995	138,479												240,125
Liard	1970														
	1971														
	To date							2	79						79
Lillooet	1970														
	1971														
	To date	1,469	2,440					3	113			32,353	37,921		86,099
Nanaimo	1970														5,563,486
	1971														6,541,662
	To date														132,756,545
Nelson	1970														720,950
	1971											1,335,808	3,012,540		3,470,229
	To date	15,035	18,878									15,075,747	36,912,851		54,055,673
New Westminster	1970			3,408,208	4,703,820										4,703,820
	1971			2,543,578	3,497,420									103.0992	3,600,519
	To date			44,225,084	40,970,630									103,099	41,073,729
Nicola	1970														251,803
	1971														371,684
	To date														623,487
Omineca	1970	15,565,807	26,182,816												26,193,725
	1971	9,126,026	16,103,836												16,106,523
	To date	86,962,848	150,947,309					3	154			2,210,892	4,697,710	4202	166,612,511

		Lb.	$	Lb.	$	Oz.	$	Oz.	$	Lb.	$	Lb.	$	$	$
Osoyoos	1970	6,894,520	10,888,888												10,888,888
	1971	4,806,600	7,629,532												7,629,532
	To date	11,201,732	18,518,885												18,518,885
Revelstoke	1970	637,104	1,071,796												1,071,796
	1971	988,245	1,615,109												1,615,109
	To date	1,625,349	2,686,905									7,784	5,687		2,872,149
Similkameen	1970														
	1971														
	To date							1,287	129,186						129,186
Skeena	1970	5,867,877	9,496,869												19,113,446
	1971	4,800,880	7,921,386												18,408,536
	To date	21,404,556	34,511,340									366	331	1,3898	95,180,015
Slocan	1970														315,978
	1971														197,868
	To date														5,698,491
Trail Creek	1970	564,554	1,017,303												1,017,303
	1971	574,971	950,904												950,904
	To date	8,341,601	5,994,690			749	30,462	53	3,177						6,030,464
Vancouver	1970														3,204
	1971														
	To date														1,203,823
Vernon	1970														
	1971														
	To date	5,414	9,500												10,032
Victoria	1970														
	1971														
	To date														35,437
Not assigned[2]	1970													10,020,179	12,583,640
	1971													5,774,192	6,741,460
	To date													39,649,062	109,479,538
Totals	1970	31,276,497	52,561,796	3,408,203	4,703,320					263,716	421,946			10,020,179	90,375,594
	1971	21,884,729	36,954,846	2,543,573	3,497,420					313,999	421,079	1,335,808	3,012,540	5,877,291	70,560,299
	To date	141,519,689	241,856,536	44,225,084	40,970,630	749	30,462	1,407	135,008	18,503,982	16,620,819	17,355,182	41,676,291	39,842,154	753,667,598

[1] Magnesium, page A 21.
[2] Cobalt, page A 17.
[3] Selenium, page 23.

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	1970										
	1971										
	To date										
Atlin	1970										
	1971										
	To date										
Cariboo	1970					1,276	26,567				
	1971					1,550	37,330				
	To date					10,268	239,722			48	168
Clinton	1970										
	1971										
	To date										
Fort Steele	1970										
	1971										
	To date			8	80						
Golden	1970			45,820	382,508						
	1971			21,267	179,455						
	To date			394,913	4,093,938			3,259	12,612		
Greenwood	1970										
	1971										
	To date							1,790,502	1,540,319	200	4,000
Kamloops	1970									18	383
	1971										
	To date									625	12,230
Liard	1970	86,730	16,033,827								
	1971	87,118	17,800,406								
	To date	1,012,325	197,232,451								
Lillooet	1970										
	1971										
	To date										
Nanaimo	1970							31,598	106,243	2,400	46,690
	1971							26,719	98,196	3,000	70,000
	To date							905,871	1,361,117	19,009	312,899
Nelson	1970									12,151	339,289
	1971									13,440	281,843
	To date							7,601	8,174	63,889	1,647,888
New Westminster	1970									3,706	65,089
	1971									3,210	52,330
	To date									105,963	1,531,625
Nicola	1970										
	1971										
	To date										
Omineca	1970										
	1971										
	To date										
Osoyoos	1970									3,574	65,590
	1971									3,456	73,019
	To date							802,611	3,699,031	188,193	2,392,321
Similkameen	1970										
	1971										
	To date										
Skeena	1970										
	1971										
	To date							601,019	1,050,722		
Vancouver	1970										
	1971										
	To date									29,692	418,606
Vernon	1970									500	9,500
	1971									1,132	42,000
	To date									1,632	51,500
Victoria	1970							28	290		
	1971							21	230		
	To date							208	2,355	9,605	157,080
Not assigned	1970										
	1971										
	To date										
Totals	1970	86,730	16,033,827	45,820	382,508	1,276	26,567	31,626	106,533	22,349	526,491
	1971	87,118	17,800,406	21,267	179,455	1,550	37,330	26,740	98,426	29,238	519,192
	To date	1,012,325	197,232,451	394,921	4,094,018	10,268	239,722	4,111,071	7,674,330	418,856	6,528,317

Other: *See* notes of individual minerals listed alphabetically on pages A 15 to A 25.

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

MINING DIVISIONS, 1970 AND 1971, 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
									26,567
									37,830
				10,013,800	143,012			30012	383,202
873	6,236							156,1914 6 10	162,427
						55,538	685,894		685,894
						80,737	609,564		609,564
112,878	298,824					1,067,535	18,486,447	16,8949	18,802,245
270,266	736,635								1,119,143
344,795	930,343								1,109,803
3,066,760	8,716,264							1,2765 11	12,824,090
								783,5783	2,327,897
									383
1,246,918	6,323,178			424,700	2,075			203,0556 10	6,540,538
		5,322	9,099			47,789	392,976		16,435,902
		3,993	7,772			59,179	416,654		18,224,832
		42,368	61,318			755,480	15,578,775		212,872,544
		14,280	27,583						27,583
		44,867	102,900						102,900
		338,134	317,966					5,12911	323,095
									152,933
									163,196
									1,674,016
									339,289
									281,843
								55,9015	1,711,963
									65,089
									52,330
									1,531,625
2,407	10,050								10,050
		248,000	213,574						213,574
		118,900	85,660						85,660
		383,657	348,718					11,4601 8	360,178
									65,590
									73,019
				1,588,800	25,938			306,5331 3 6	6,423,823
250	1,700							16,8582	18,558
				634,250	10,815	41,624	178,678		1,240,215
						6,653	82,138		82,138
						687,596	6,550,969	97,3895	7,066,964
									9,500
									42,000
				160,500	3,978				55,478
									290
									230
								30,22611	189,661
						226,440	2,796,534		2,796,534
						148,551	1,121,560		1,121,560
						5,031,692	56,886,228	4,913	56,891,141
270,266	736,635	262,602	250,256			336,420	3,957,542		22,020,359
344,795	930,346	167,760	196,332			233,467	2,147,778		21,909,767
4,430,086	15,356,252	764,154	728,002	12,822,050	185,818	7,583,927	97,681,097	1,719,426	331,439,433

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

TABLE 7E—PRODUCTION OF STRUCTURAL MATERIALS BY MINING DIVISIONS, 1970 AND 1971, AND TOTAL TO DATE

Division	Period	Cement	Lime and Limestone	Building-stone	Rubble, Riprap, and Crushed Rock	Sand and Gravel	Clay Products	Unclassified Material	Division Total
		$	$	$	$	$	$	$	$
Alberni	1970				4,078	359,005			363,083
	1971				5,013	427,459			432,472
	To date				334,342	3,701,338			4,035,680
Atlin	1970				3,975				3,975
	1971					3,375			3,375
	To date		1,108		102,453	234,680			338,241
Cariboo	1970		194,500		420,042	1,449,182	34,500		2,098,224
	1971		293,400		391,518	2,391,205	74,070		3,150,193
	To date		788,941		2,574,246	16,571,902	264,357		20,199,446
Clinton	1970				393,091	168,888			561,979
	1971				988	269,294			270,282
	To date				1,253,171	1,548,701			2,801,872
Fort Steele	1970				244,720	410,051			654,771
	1971				170,867	410,774			581,641
	To date		43,873	71,941	2,474,499	5,950,063	15,918		8,556,294
Golden	1970				69,000	228,435	6,350		303,785
	1971				5,498	230,680	10,500		246,678
	To date		1,000	50,840	202,487	3,029,131	117,687		3,401,145
Greenwood	1970					92,154			92,154
	1971				4,000	166,165			175,325
	To date		42,560	138,136	278,474	1,355,501	121,283		1,935,954
Kamloops	1970	585,653	12,752		377,915	1,120,668			2,096,988
	1971	2,795,009			392,255	1,289,533			4,476,797
	To date	3,380,662	25,067	19,800	8,517,077	11,393,442	72,379		23,408,427
Liard	1970				52,442	988,491			1,040,933
	1971				460,573	915,262			1,375,835
	To date				1,303,124	9,171,383			10,474,507
Lillooet	1970				28,293	47,292			75,585
	1971				93,903	70,341			164,244
	To date		100	2,000	1,037,350	2,147,354			3,186,804
Nanaimo	1970		2,630,587		123,679	812,755			3,567,021
	1971		2,496,269		587,301	1,025,926			4,109,496
	To date		49,106,521	3,450,735	2,398,681	8,121,097	1,178,992		64,256,026
Nelson	1970		61,600	2,449		571,074			635,123
	1971		90,018	4,962	24,645	430,587			550,212
	To date		489,877	430,598	544,701	5,311,953	21,974		6,799,103
New Westminster	1970		250,190		971,659	6,011,305	4,162,169		11,395,323
	1971		138,945		1,099,716	7,751,450	5,117,878		14,107,989
	To date		3,114,212	20,974	15,477,774	73,329,219	68,148,332		160,090,511
Nicola	1970				10,950	225,493			236,443
	1971				20,108	272,915			293,023
	To date			8,000	187,754	1,452,209			1,647,963
Omineca	1970		2,236		60,701	529,882			592,819
	1971		2,500		149,249	1,006,989			1,158,738
	To date		9,348		2,136,571	9,574,056	5,274		11,725,249
Osoyoos	1970				9,075	226,370			235,445
	1971				21,046	426,864			447,910
	To date		43,774	33,018	252,574	2,770,280			3,099,646
Revelstoke	1970				31,050	78,860			109,910
	1971				27,035	167,548			194,583
	To date		1,000	5,575	483,883	2,263,920			2,754,378
Similkameen	1970				12,840	103,719			116,559
	1971					121,785			121,785
	To date	10,500	11,571	24,000	651,597	3,439,360	13,355		4,150,383
Skeena	1970				63,876	975,049			1,038,925
	1971				143,280	1,595,021			1,738,301
	To date		1,645,300	144,000	3,132,163	10,199,358	13,249		15,134,070
Slocan	1970				4,335	87,049			91,384
	1971				810	106,106			106,916
	To date		1,000	115,143	130,793	1,692,353			1,939,289
Trail Creek	1970				525	200,469			200,994
	1971				90	139,169			139,259
	To date		32,500	85,520	228,993	2,978,174			3,325,187
Vancouver	1970	5,100,289				1,881,350			6,981,639
	1971	7,614,263				2,518,610			10,132,873
	To date	66,343,664	40,885	4,012,560	8,186,761	44,099,643	1,088,592		123,772,105
Vernon	1970					563,811			563,811
	1971				48,000	757,641			805,641
	To date		46,499	97,852	334,974	6,079,641	161,254		6,720,220
Victoria	1970	7,799,607	17,800		10,983	1,447,344	511,349		9,787,083
	1971	11,220,113	16,090		4,710	1,472,175	779,337		13,492,425
	To date	165,702,872	948,487	55	502,517	23,684,110	9,269,894		200,107,935
Not assigned	1970				125,013	3,100,691			3,225,704
	1971				18,813	1,645,522			1,664,340
	To date		315,498	505,018	854,926	28,929,134	3,180,828	5,972,171	39,757,575
Totals	1970	13,485,549	3,169,665	2,449	3,018,242	21,679,387	4,714,368		46,069,660
	1971	21,629,385	3,037,222	8,962	3,670,553	25,612,396	5,981,785		59,940,333
	To date	235,437,698	56,709,121	9,215,765	53,581,885	279,028,002	83,673,368	5,972,171	723,618,010

TABLE 8A—PRODUCTION OF COAL, 1836–1971

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	1970	2,644,056	19,559,669
1914	2,237,042	7,745,847	1971	4,565,242	45,801,936
1915	2,076,601	7,114,178			
			Totals	149,654,344	682,085,481

[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, 1971

Mine	Gross Production	Net Production	Coal Used		Sales						Total Coal Sold and Used	
			Under Companies' Boilers, Etc.	Making Coke	Canada		United States	Japan	Others	Total Sales	Amount	Value
					British Columbia	Other Provinces						
Fort Steele Mining Division	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	$
Kaiser Resources Ltd.—Michel Colliery	5,602,000	4,637,012	7,207	212,035	74,230	137	754	4,063,778	207,101	4,346,000	4,565,242	45,801,936

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

Class	Salaries and Wages	Fuel and Electricity	Process Supplies
	$	$	$
Metal-mining	98,161,050	14,636,565	58,173,812
Exploration and development	42,538,468		
Coal	16,259,000	2,171,000	3,353,000
Petroleum and natural gas (exploration and production)	5,304,802		
Industrial minerals	7,432,128	1,448,558	2,300,256
Structural-materials industry	9,480,244	4,910,781	4,487,876
Totals, 1971	179,175,692	23,166,904	68,314,944
Totals, 1970	172,958,282	19,116,672	59,846,370
1969	123,450,327	14,554,123	43,089,559
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, 1901–71

Year	Metals							Coal Mines			Structural Materials				
		Mines													
	Placer	Under	Above	Exploration and Development	Concentrators	Smelters	Total	Under	Above[1]	Total	Quarries and Pits	Plants	Industrial Materials	Petroleum and Natural-gas Exploration and Development	Total
1901	.....	2,736	1,212	.....	.....	.....	3,948	3,041	933	3,974	.....	.....	.....	.....	7,922
1902	.....	2,219	1,126	.....	.....	.....	3,345	3,101	910	4,011	.....	.....	.....	.....	7,356
1903	.....	1,662	1,088	.....	.....	.....	2,750	3,137	1,127	4,264	.....	.....	.....	.....	7,014
1904	.....	2,143	1,163	.....	.....	.....	3,306	3,278	1,175	4,453	.....	.....	.....	.....	7,759
1905	.....	2,470	1,240	.....	.....	.....	3,710	3,127	1,280	4,407	.....	.....	.....	.....	8,117
1906	.....	2,680	1,303	.....	.....	.....	3,983	3,415	1,390	4,805	.....	.....	.....	.....	8,788
1907	.....	2,704	1,239	.....	.....	.....	3,943	2,862	907	3,769	.....	.....	.....	.....	7,712
1908	.....	2,567	1,127	.....	.....	.....	3,694	4,432	1,641	6,073	.....	.....	.....	.....	9,767
1909	.....	2,184	1,070	.....	.....	.....	3,254	4,718	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	.....	.....	.....	.....	9,817
1919	.....	2,513	1,746	.....	.....	.....	4,259	4,145	1,821	5,966	.....	.....	.....	.....	10,225
1920	.....	2,074	1,605	.....	.....	.....	3,679	4,191	2,158	6,349	.....	.....	.....	.....	10,028
1921	.....	1,355	975	.....	.....	.....	2,330	4,722	2,163	6,885	.....	.....	.....	.....	9,215
1922	.....	1,510	1,239	.....	.....	.....	2,749	4,712	1,932	6,644	.....	.....	.....	.....	9,393
1923	.....	2,102	1,516	.....	.....	.....	3,618	4,342	1,807	6,149	.....	.....	.....	.....	9,767
1924	.....	2,353	1,680	.....	.....	.....	4,033	3,894	1,524	5,418	.....	.....	.....	.....	9,451
1925	.....	2,298	2,840	.....	.....	.....	5,138	3,828	1,615	5,443	.....	.....	.....	.....	10,581
1926	299	2,606	1,735	.....	808	2,461	7,610	3,757	1,565	5,322	493	324	124	.....	14,172
1927	415	2,671	1,916	.....	854	2,842	8,283	3,646	1,579	5,225	647	138	122	.....	14,880
1928	355	2,707	2,469	.....	911	2,748	8,335	3,814	1,520	5,334	412	368	120	.....	15,424
1929	841	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	1,335	.....	531	2,436	6,088	2,241	853	3,094	376	269	408	.....	11,369
1934	1,122	2,796	1,729	.....	631	2,890	8,046	2,050	843	2,893	377	187	360	.....	12,985
1935	1,291	2,740	1,497	.....	907	2,771	7,915	2,145	826	2,971	536	270	754	.....	13,737
1936	1,124	2,959	1,840	.....	720	2,678	8,197	2,015	799	2,814	931	288	825	.....	14,179
1937	1,371	3,603	1,818	.....	1,168	3,027	9,616	2,286	867	3,153	724	327	938	.....	16,129
1938	1,303	3,849	2,266	.....	919	3,158	10,192	2,088	874	2,962	900	295	369	.....	16,021
1939	1,252	3,905	2,050	.....	996	3,187	10,138	2,167	809	2,976	652	311	561	.....	15,890
1940	1,004	3,923	2,104	.....	1,048	2,944	10,019	2,175	699	2,874	827	334	647	.....	15,705
1941	939	3,901	1,823	.....	1,025	3,072	9,821	2,229	494	2,723	766	413	422	.....	15,084
1942	489	2,920	1,504	.....	960	3,555	8,939	1,892	468	2,360	842	378	262	.....	13,270
1943	212	2,394	1,699	.....	891	2,835	7,819	2,240	611	2,851	673	326	567	.....	12,448
1944	255	1,896	1,825	.....	849	2,981	7,551	2,150	689	2,839	690	351	628	.....	12,314
1945	209	1,933	1,750	.....	822	2,834	7,339	1,927	503	2,430	921	335	586	.....	11,820
1946	347	1,918	1,817	.....	672	2,813	7,220	1,773	532	2,305	827	555	679	.....	11,933
1947	360	2,024	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	.....	16,897
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	10,852	1,745	516	2,261	1,916	616	660	.....	16,612
1951	205	3,785	3,695	.....	1,307	4,044	12,831	1,462	463	1,925	1,783	628	491	.....	17,863
1952	230	4,171	3,923	.....	1,516	4,120	13,730	1,280	401	1,681	1,580	557	529	.....	18,257
1953	132	3,145	2,589	.....	1,371	3,901	11,006	1,154	396	1,550	1,909	559	634	.....	15,790
1954	199	2,644	2,520	.....	1,129	3,119	9,412	1,076	358	1,434	1,861	638	584	.....	14,128
1955	103	2,564	2,553	.....	1,091	3,304	9,512	1,100	378	1,478	1,646	641	722	.....	14,102
1956	105	2,637	2,827	.....	1,043	3,339	9,846	968	398	1,366	1,598	770	854	.....	14,539
1957	67	2,393	2,447	.....	838	3,328	9,006	1,020	360	1,380	1,705	625	474	.....	13,257
1958	75	1,919	1,809	.....	625	3,081	7,484	826	260	1,086	1,483	677	446	.....	11,201
1959	99	1,937	1,761	.....	618	3,008	7,524	765	291	1,056	1,357	484	459	.....	10,779
1960	86	1,782	1,959	.....	648	3,034	7,423	894	288	1,182	1,704	557	589	.....	11,541
1961	74	1,785	1,582	.....	626	3,118	7,111	705	237	942	1,828	508	571	.....	11,034
1962	35	1,677	1,976	270	949	3,356	8,223	548	228	776	1,523	481	517	.....	11,560
1963	43	1,713	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	2,532	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	15,659
1969	7	1,794	2,470	4,270	1,099	3,468	13,101	245	455	700	1,097	549	567	416	16,487
1970	.....	2,160	3,167	4,964	1,331	3,738	15,360	242	1,033	1,275	740	647	627	437	19,086
1971	.....	2,073	3,058	4,040	1,513	3,481	14,165	444	1,013	1,457	846	794	666	495	18,423

[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 AND COAL MINES, 1971

	Tons		Days Operating Mill	Average Number Employed[1]					
	Mined	Milled		Administrative, Etc.	Mine		Mill	Others	Total
					Surface	Underground			
Metal Mines									
Anaconda American Brass Ltd. (Britannia)	698,061	720,964	265	77	58	182	27	—	344
Bethlehem Copper Corporation Ltd. ((Bethlehem)	6,065,209	5,625,999	365	28	185	—	144	—	357
Bralorne Can-Fer Resources Ltd. (Bralorne)	36,282	36,282	270	12[2]	10[2]	38[2]	5[2]	—	65[2]
Brenda Mines Ltd. (Brenda)	8,860,500	8,987,210	365	84	129	—	181	—	394
British Columbia Molybdenum Ltd. (B.C. Molybdenum)	2,476,175	2,476,175	273	27	115	—	65	47	254
Canadian Exploration Ltd. (Invincible)	173,288	172,512	365	50	23	57	31	11	172
Churchill Copper Corporation Ltd. (Magnum)	184,012	177,069	275	30	31	68	12	—	141
Coast Copper Co. Ltd. (Old Sport)	324,828	295,684	365	32	51	84	10	—	177
Cominco Ltd. (Bluebell)	256,797	256,797	322	35	—	130	16	21	202
Cominco Ltd. (Sullivan)	2,005,301	2,005,301	235	190	72	431	101	—	794
Copperline Mines Ltd. (Ruth Vermont)	35,469[2]	38,352[2]	121[2]	—	—	17[2]	5[2]	—	22[2]
Craigmont Mines Ltd. (Craigmont)	1,828,260	1,833,461	364	121	15	291	119	25	571
Endako Mines Ltd. (Endako)	8,982,500	9,051,000	358	128	80	—	250	—	458
Giant Mascot Mines Ltd. (Pride of Emory)	260,241	260,241	230	53	28	79	11	—	171
Granduc Operating Co. (Granduc)	1,498,854	1,498,854	365	208	143	302	53	—	706
The Grandby Mining Co. Ltd. (Phoenix)	854,389	887,133	365	23	93	—	52	—	168
Granisle Copper Ltd. (Granisle)	2,307,733	2,314,682	365	39	50	—	98	—	187
Kam-Kotia and Burkam Joint Venture (Silmonac)	39,154	39,154	365	10	6	34	16	—	66
King Resources Co. (Mount Copeland)	57,618	60,314	276	17	18	18	10	—	63
Noranda Mines Ltd. (Boss Mountain Division) (Boss Mountain)	534,522	534,522	326	43	63	70	24	—	200
Red Mountain Mines Ltd. and Consolidated Canadian Faraday Ltd. (Red Mountain Division) (Coxey)	188,601	191,715	318	9	10	—	19	—	38
Reeves MacDonald Mines Ltd. (Annex)	166,089	166,089	230	23	21	55	9	—	108
Reeves MacDonald Mines Ltd. (Reeves MacDonald)	25,296	25,296	36	4	2	5	2	—	13
Teck Corporation Ltd. (Highland-Bell)	38,318	36,404	355	7	5	16	10	—	38
Texada Mines Ltd. (Texada)	1,169,496	1,200,292	365	23	78	88	38	—	227
Utah Mines Ltd. (Island Copper)	1,327,241	1,040,608	87	29	141	—	44	—	214
Wesfrob Mines Ltd. (Tasu)	2,004,744	2,004,744	329	56	34	—	116	—	206
Western Mines Ltd. (Lynx)	347,403	386,541	363	40	47	79	34	—	200
Other mines	—	—	—	28	20	29	11	—	88
Total	—	—	—	—	—	—	—	—	6,644
Coal Mines									
Kaiser Resources Ltd. (Michel Collieries)	5,602,000	—	356	132	881	444	—	—	1,457

[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] Estimated.

TABLE 12—METAL PRODUCTION, 1971

Property or Mine	Location of Mine	*See* Page	Owner or Agent	Ore Shipped or Treated	Product Shipped	Gross Metal Content					
						Gold	Silver	Copper	Lead	Zinc	Cadmium
				Tons		Oz.	Oz.	Lb.	Lb.	Lb.	Lb.
Alberni Mining Division											
Lynx mine	Buttle Lake		Western Mines Ltd.	386,541	Copper concentrates, 25,655 tons; lead concentrates, 2,170 tons; zinc concentrates, 38,848 tons	12,422	498,091	13,889,779	4,758,596	46,772,351	197,523
Atlin Mining Division											
Nil											
Cariboo Mining Division											
Boss Mountain mine	Big Timothy Mountain		Noranda Mines Ltd. (Boss Mountain Division)	534,522	Molybdenite concentrates, 1,402 tons containing 1,588,507 lb. of molybdenum						
Clinton Mining Division											
Nil											
Fort Steele Mining Division											
Sullivan mine	Kimberley		Cominco Ltd.	2,005,301	Lead concentrates, 148,276 tons; zinc concentrates, 195,687 tons; tin concentrates, 201 tons containing 318,999 lb. of tin; iron sinter, 62,862 tons	181	3,547,289	552,400	213,860,000	203,834,000	549,184
Golden Mining Division											
Ruth Vermont	Parson		Copperline Mines Ltd.	38,352	Lead concentrates, 340 tons; zinc concentrates, 5,567 tons	92	70,999	46,360	650,337	5,713,081	
Greenwood Mining Division											
Greyhound, Mother Lode	Greenwood		Greyhound Mines Ltd.	(1)	Copper concentrates, 499 tons	90	1,890	208,113			
Highland Bell mine	Beaverdell		Teck Corporation Ltd.	36,404	Lead concentrates, 1,947 tons; zinc concentrates, 306 tons; jig concentrates, 110 tons	332	637,797		512,816	580,323	2,592
Phoenix mine	Phoenix		The Granby Mining Co. Ltd., Phoenix Copper Division	887,133	Copper concentrates, 23,269 tons	14,306	134,298	12,690,954			
Marshall	Phoenix		San Jacinto Explorations Ltd.	177	Crude ore	277	402	1,041	4,364	466	
Kamloops Mining Division											
Bethlehem mine	Highland Valley		Bethlehem Copper Corp. Ltd.	5,625,999	Copper concentrates, 86,059 tons		154,000	54,101,424			

Liard Mining Division											
Magnum mine	Delano Creek		Churchill Copper Corp. Ltd.	177,069	Copper concentrates, 21,970 tons			13,461,513			
Silver Queen (Magno)	Cassiar		Coast Silver Mines Ltd.	13	Crude ore		51		996	1,238	
Lillooet Mining Division											
Bralorne mine	Bralorne		Bralorne Can-Fer Resources Ltd.	36,282	Bullion	20,021	3,506				
Nanaimo Mining Division											
Bob (Bonanza)	Bonanza Lake		M.B.H. Developments Ltd	2,384	Crude ore			97,186			
Island Copper mine	Port Hardy		Utah Mines Ltd.	1,040,608	Copper concentrates, 16,187 tons	2,733	13,503	7,200,000			
Old Sport mine	Benson Lake		Coast Copper Co. Ltd.	295,684	Copper concentrates, 21,860 tons	5,523	42,101	10,413,928			
Texada mine	Texada Island		Texada Mines Ltd.	1,200,292	Iron concentrates, 542,479 tons; copper concentrates, 9,626 tons	1,569	56,916	4,067,764			
Nelson Mining Division											
Annex	Nelway		Reeves MacDonald Mines Ltd.	166,089	Lead concentrates, 2,537 tons; zinc concentrates, 25,962 tons		358,429	18,482	2,667,777	27,080.068	323,740
Burlington (Sheep Creek Camp)	Salmo		J. A. C. Ross, Vancouver	409	Siliceous ore	20	82		2,453	2,453	
Invincible, East Dodger	Salmo, Iron Mountain		Canadian Exploration Ltd.	172,512	Tungsten concentrates, 1,095 tons containing 1,335,808 lb. of tungsten (WO_8)						
Maple Leaf	Salmo		A. Matovich and W. Potapoff, Trail	76	Crude ore	1	190		1,062	1,973	
Reeves MacDonald mine	Nelway		Reeves MacDonald Mines Ltd.	25,296	Lead concentrates, 515 tons; zinc concentrates, 1,996 tons		7,206	1,527	550,823	2,124,142	13,291
Reno (Sheep Creek Camp)	Salmo		R. G. Tjader, D. E. Tjader, and D. J. Endersby, Montrose	2,079	Crude ore	390	587		6,973	5,273	
New Westminster Mining Division											
Pride of Emory mine	Hope		Giant Mascot Mines Ltd.	260,241	Nickel-copper concentrates, 14,487 tons containing 2,890,430 lb. of nickel and 113,545 lb. of cobalt			1,792,341			
Nicola Mining Division											
Craigmont mine	Merritt		Craigmont Mines Ltd.	1,833,461	Copper concentrates, 75,441 tons; iron concentrates, 22,810 tons	753		40,093,792			

[1] Mine closed January 8, 1971.

TABLE 12—METAL PRODUCTION, 1971—*Continued*

Property or Mine	Location of Mine	See Page	Owner or Agent	Ore Shipped or Treated	Product Shipped	Gross Metal Content					
						Gold	Silver	Copper	Lead	Zinc	Cadmium
Omineca Mining Division				Tons		Oz.	Oz.	Lb.	Lb.	Lb.	Lb.
Cronin mine	Smithers		Kindrat Mines Ltd.	216	Lead concentrates, 91 tons; zinc concentrates, 125 tons	14	11,731		108,431	159,441	1,885
Endako mine	Endako		Endako Mines Ltd.	9,051,000	Molybdenite concentrates, 3,021 tons; molybdenum trioxide, 5,009 tons; ferromolybdenum, 138 tons, total content, 9,126,026 lb. of molybdenum						
Granisle mine	Babine Lake		Granisle Copper Ltd.	2,314,682	Copper concentrates, 35,399 tons	10,509	102,020	23,327,272			
Pinchi Lake mine	Pinchi Lake		Cominco Ltd.	(2)	Mercury						
Silver Standard mine	Hazelton		Northwestern Midland Development Co. Ltd.	260	Lead concentrates, 32 tons; zinc concentrates, 9 tons; crude ore, 24 tons	19	12,460	457	26,190	21,865	92
Osoyoos Mining Division											
Brenda mine	Brenda Lake		Brenda Mines Ltd.	8,987,210	Copper concentrates, 86,142 tons; molybdenite concentrates, 4,258 tons containing 4,806,600 lb. of molybdenum	4,984	335,393	37,068,715			
Revelstoke Mining Division											
Mount Copeland mine	Revelstoke		King Resources Co.	60,314	Molybdenite concentrates, 890 tons containing 988,245 lb. of molybdenum						
Similkameen Mining Division											
Nil											
Skeena Mining Division											
British Columbia Molybdenum mine	Alice Arm		British Columbia Molybdenum Ltd.	2,476,175	Molybdenite concentrates, 4,004 tons containing 4,800,380 lb. of molybdenum						
Granduc mine	Stewart		Granduc Operating Co.	1,498,854	Copper concentrates, 69,439 tons	6,043	417,441	38,509,705			
Kay	Stewart		Stikine Silver Ltd.	1.68	Crude ore	0.3	239		64	94	
Tasu mine	Tasu Harbour		Wesfrob Mines Ltd.	2,004,744	Iron concentrates, 1,301,717 tons; copper concentrates, 30,051 tons	4,689	167,457	12,322,220			

Slocan Mining Division											
Lucky Thought	Silverton	Surfside Explorations Ltd.	127	Lead concentrates, 53 tons; tailings, 36 tons; crude ore, 38 tons	1	16,337		87,383	19,549	
Arlington	Slocan	Arlington Silver Mines Ltd.	920	Crude ore		10,854		49,670	44,152	
Best	Slocan	Thomas Eccles, Rossland	9	Crude ore		204		730	360	
Bluebell mine	Riondel	Cominco Ltd.	260,343	Lead concentrates, 14,472 tons; zinc concentrates, 24,944 tons	75	281,759	298,600	29,328,800	25,364,400	111,984
Crown	Ainsworth	Dave Norcross, Nelson	58	Crude ore		1,195		2,099	3,381	
Dublin Queen	New Denver	Iskut Silver Mines Ltd.	17	Crude ore		147		3,492	10,202	
Enterprise	Slocan City	W. Wingert and L. M. Fried, New Denver	97	Crude ore	1	5,509		25,687	43,581	
Freddy	Silverton	Van Hansen, New Denver	25	Crude ore	2	1,470		199	349	
Homestake	Slocan City	Clarence Thickett, Slocan	8	Crude ore	2	311		64	32	
Joyce	Slocan	Clarence Thickett, Slocan	10	Crude ore	18	2,105		265	245	
Ottawa	Springer Creek	Pamicon Developments Ltd.	105	Crude ore		15,153		951	426	
Republic	Slocan	Denu Mines & Development Ltd.	33	Crude ore	1	149		133	133	
Silmonac (Minnehaha)	Sandon	Kam-Kotia and Burkham Joint Venture	39,154	Lead concentrates, 3,652 tons; zinc concentrates, 3,998 tons		681,407		4,754,805	4,875,873	33,721
Washington	Retallack–Three Forks	Larch Mining Ltd., W. H. McLeod, Silverton	1	Crude ore		167		1,965	65	
Westmont	Silverton	Eastmont Silver Mines Ltd.	72	Crude ore		889		5,349	9,976	
Trail Creek Mining Division										
Coxey mine	Rossland	Consolidated Canadian Faraday Ltd. (Red Mountain Mines Division)	191,715	Molybdenite concentrates, 959,244 tons containing 574,971 lb. of molybdenum						
Vancouver Mining Division										
Britannia mine	Howe Sound	Anaconda Britannia Mines, Division of Anaconda American Brass Ltd.	720,964	Copper concentrates, 29,742 tons		93,485	17,213,630			
Vernon Mining Division										
St. Paul	Monashee Mountain	W. Miller, Vernon	33	Crude ore	18	1,512		3,771	235	
Victoria Mining Division										
Nil										

2 Details confidential.

Departmental Work

CHAPTER 3

CONTENTS

ORGANIZATION

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

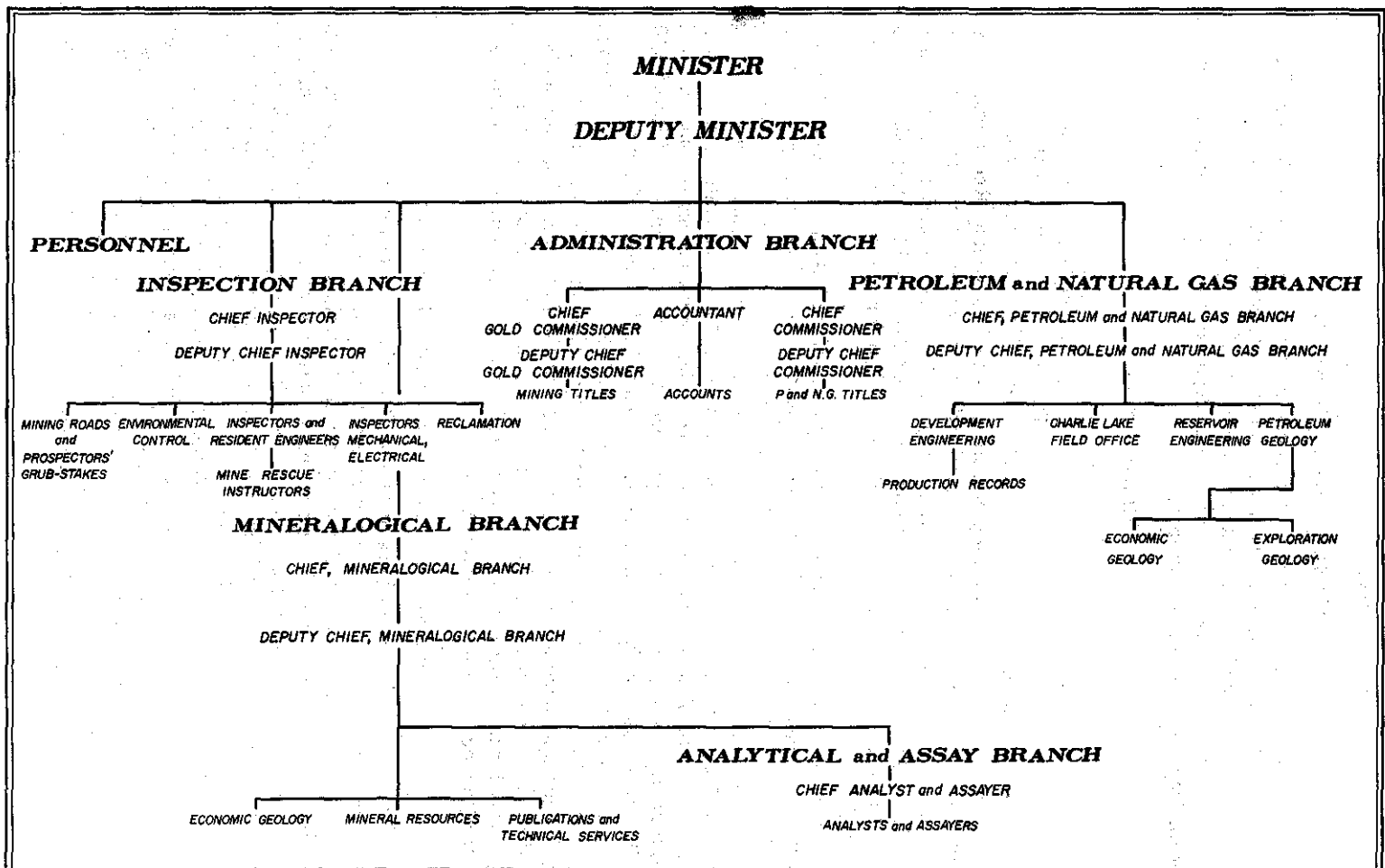
Gold Commissioners, Mining Recorders, and Sub-Mining Recorders, whose duties are laid down in the *Mineral Act* and *Placer-mining Act,* administer these Acts and other Acts relating to mining. Mining Recorders, in addition to their own functions, may also exercise the powers conferred upon Gold Commissioners with regard to mineral claims within the mining division for which they have been appointed.

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, and also the names of lessees of reverted surveyed mineral claims, are sent to the office of the Chief Gold Commissioner in Victoria twice each month. The 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 1971, 12 investigations were carried out pursuant to section 80 of the *Mineral Act.* Nine investigations with regard to certificates of work being wrongfully or improperly obtained resulted in 156 certificates of work being cancelled. Four 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.


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

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	D. V. Drew	D. V. Drew.
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	G. A. Broomfield	G. A. Broomfield.
Kamloops	Kamloops	N. R. Blake	N. R. Blake.
Liard	Victoria	E. J. Bowles	E. A. H. Mitchell.
Lillooet	Lillooet	K. J. Weir	K. J. Weir.
Nanaimo	Nanaimo	E. B. Offin	E. B. Offin.
Nelson	Nelson	G. L. Brodie	G. L. Brodie.
New Westminster	New Westminster	F. E. Hughes	J. Hoem.
Nicola	Merritt	L. P. Lean	L. P. Lean.
Omineca	Smithers	A. W. Milton	A. W. Milton.
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 and Placer Leases

Maps showing the approximate locations of placer-mining leases, mineral leases, and mineral claims held by record may be seen at the Central Records Offices at Victoria and at Room 320, 890 West Pender Street, Vancouver. Prints are obtainable on request made to the Chief Gold Commissioner at Victoria, and accompanied by the proper sum. The charges are $1.25 per sheet. The maps conform to the reference maps issued by the Legal Surveys Branch, Department of Lands, Forests, and Water Resources, in size and geographical detail.

The Department of Mines and Petroleum Resources is now engaged in replacing the above-mentioned maps with maps based on the National Topographic System of mapping. The new sheets cover 15 minutes of longitude and 15 minutes of latitude, and are available from this Department at 50 cents per sheet at a scale approximately 1¼ inches to 1 mile, or $1 per sheet at a scale of 2 inches to 1 mile (including tax).

It is advisable to order claim maps from an index, which will be supplied on request.

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, 1971

Licences—	
Fees	$46,904.00
Rental	217,519.82
Total	$264,423.82

During 1971, 840 coal licences were issued, totalling 467,869 acres. As of December 31, 1971 a total of 2,090 coal licences, amounting to 1,188,749 acres, was held in good standing.

Gold Commissioners' and Mining Recorders' Office Statistics, 1971

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	101	3	1,273	4,787	$4,600.00	*Nil*	124	10	1	*Nil*	*Nil*	$250.00	*Nil*	$1,000.00	$34,559.00	$35,559.00
Atlin	175	2	1,546	1,854	26,100.00	*Nil*	127	8	*Nil*	29	32	*Nil*	23	1,175.00	55,852.50	57,027.50
Cariboo	894	11	4,229	5,807	14,900.00	86	271	2	*Nil*	91	211	3,750.00	82	6,066.00	113,154.75	119,220.75
Clinton	64	2	2,369	3,643	1,800.00	*Nil*	98	6	*Nil*	30	14	*Nil*	27	520.00	36,492.75	37,012.75
Fort Steele	199	6	1,023	4,603	7,100.00	36	67	9	1	10	36	500,00	1	2,165.00	41,115.00	43,280.00
Golden	96	8	550	1,626	5,000.00	*Nil*	53	7	*Nil*	7	1	*Nil*	2	1,540.00	14,934.75	16,474.75
Greenwood	155	5	1,022	3,917	12,272.00	*Nil*	149	20	*Nil*	4	13	250.00	7	1,800.00	49,395.75	51,195.75
Kamloops	589	13	8,494	16,129	22,900.00	*Nil*	390	3	*Nil*	4	11	*Nil*	3	4,745.00	172,427.50	177,172.50
Liard	285	*Nil*	7,739	13,454	49,700.00	*Nil*	517	*Nil*	*Nil*	64	193	1,750.00	56	1,426.00	174,190.25	175,616.25
Lillooet	150	7	849	3,183	12,793.00	*Nil*	91	9	*Nil*	16	23	250.00	11	1,950.00	41,714.50	43,664.50
Nanaimo	225	5	1,189	6,803	13,200.00	*Nil*	283	2	2	3	2	*Nil*	*Nil*	1,725.00	50,787.15	52,512.15
Nelson	276	7	457	666	4,000.00	*Nil*	19	6	*Nil*	2	20	*Nil*	2	2,615.00	10,921.78	13,536.78
New Westminster	546	20	2,189	3,439	8,900.00	2	122	1	*Nil*	11	138	1,250.00	8	6,236.00	50,772.25	57,008.25
Nicola	115	5	3,126	3,615	13,900.00	*Nil*	312	3	*Nil*	*Nil*	*Nil*	*Nil*	*Nil*	1,471.00	53,630.25	55,101.25
Omineca	510	8	9,864	20,061	59,100.00	*Nil*	464	13	*Nil*	30	76	1,250.00	42	3,950.00	237,219.00	241,169.00
Osoyoos	198	11	1,343	1,431	24,920.00	*Nil*	48	2	*Nil*	*Nil*	*Nil*	*Nil*	*Nil*	2,801.00	42,838.75	45,639.75
Revelstoke	83	2	787	441	3,700.00	*Nil*	48	8	*Nil*	3	7	250.00	*Nil*	815.00	12,170.25	12,985.25
Similkameen	216	3	5,041	3,513	23,400.00	5	322	9	*Nil*	152	114	5,562.50	180	1,680.00	91,879.50	93,559.50
Skeena	148	1	819	1,463	15,416.00	*Nil*	94	25	*Nil*	4	8	*Nil*	*Nil*	941.00	44,066.50	45,007.50
Slocan	217	5	771	2,371	14,428.00	*Nil*	197	19	*Nil*	1	3	*Nil*	*Nil*	2,085.00	37,432.00	39,517.00
Trail Creek	82	4	276	439	1,296.00	*Nil*	12	11	*Nil*	*Nil*	*Nil*	*Nil*	*Nil*	1,215.00	6,677.50	7,892.50
Vancouver	3,158	732	1,300	1,886	9,203.00	*Nil*	92	2	*Nil*	2	4	*Nil*	*Nil*	151,100.00	46,185.93	197,285.93
Vernon	429	2	1,138	861	1,300.00	*Nil*	72	*Nil*	1	*Nil*	22	*Nil*	1	2,415.00	9,239.00	11,654.00
Victoria	440	68	384	712	800.00	*Nil*	43	2	1	4	6	*Nil*	6	15,515.00	11,251.00	26,766.00
Totals for 1971	9,351	930	57,778	106,704	$350,728.00	129	4,015	177	6	467	934	$15,062.50	451	$216,951.00	$1,438,907.61	$1,655,858.61
Totals for 1970	10,034	911	69,546	118,633	$428,739.00	150	4,732	354	5	655	886	$16,562.50	669	$215,650.00	$1,749,308.07	$1,964,958.07

PETROLEUM AND NATURAL GAS TITLES

Staff

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

Petroleum and Natural Gas Titles, under the direction of the Chief Commissioner, is responsible for the administration of the *Petroleum and Natural Gas Act, 1965,* which includes all matters related to and affecting title to Crown petroleum and natural gas rights and includes the collection of revenue from fees, rents, dispositions, and royalties. Regulations governing geophysical operations and petroleum-development roads are also administered by the Chief Commissioner.

Information concerning all forms of title issued under the *Petroleum and Natural Gas Act, 1965,* 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, 1965* 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 amounting to $22,186,250.58, an increase of $5,846,449.39 from the previous year. This sum was higher than any previous yearly total by $539,799.04. A total of 415 parcels was offered and bids were accepted on 259 parcels covering 2,367,731 acres. The average price per acre was $9.37, which is an increase of $1.16 per acre over the previous year. Average bonus price per acre was respectively—permits, $7.23; leases, $36.95; and drilling reservations, $16.48.

During the year, 23 geophysical licences were renewed or issued.

During the year, two petroleum-development road applications were received and processed for approval.

A total of 135 notices of commencement of exploratory work was recorded during the year. These notices are required prior to the commencement of any geological or geophysical exploration for petroleum or natural gas.

During the year, two unit agreements and two royalty agreements were approved.

As of December 31, 1971, 26,763,316 acres or approximately 41,818 square miles, a decrease of 3,147,179 acres over the 1970 total, of Crown petroleum and natural gas rights, issued under the *Petroleum and Natural Gas Act, 1965,* 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	430	18,726,137
Natural gas licences	———	———
Drilling reservations	33	337,656
Leases (all types)	3,693	7,699,523
Total		26,763,316

Title Transaction Statistics, 1971

	Permits		Leases		Drilling Reservations		Natural Gas Licences	
	No.	Acres	No.	Acres	No.	Acres	No.	Acres
Issued	82	2,502,458	256	260,240	27	242,679	—	—
Cancelled or surrendered	87	4,892,326	243	664,469	20	197,425	—	—
Renewed or extended	305	—	3,340	—	4	—	—	—
Assigned	128	—	986	—	7	—	—	—
Acreage amendments	6	262,456	73	134,878	—	—	—	—
Crown reserve dispositions	62	2,030,354	170	94,698	27	242,679	—	—

Petroleum and Natural Gas Revenue, 1971

Rentals and fees—		
Permits	$1,615,619.07	
Drilling reservations	79,119.60	
Natural gas licences	—	
Petroleum, natural gas, and petroleum and natural gas leases	7,733,583.84	
Total rentals and fees		$9,428,322.51
Disposal of Crown reserves—		
Permits	$14,688,570.48	
Drilling reservations	2,486,762.52	
Leases	5,010,917.58	
Total Crown reserves disposal		22,186,250.58
Royalties—		
Gas	$4,209,793.04	
Oil	10,415,656.54	
Processed products	42,516.86	
Total royalties		14,667,966.44
Miscellaneous fees		35,604.37
Total petroleum and natural gas revenues		$46,318,143.90

ANALYTICAL AND ASSAY BRANCH

Staff

S. W. Metcalfe — Chief Analyst and Assayer
N. G. Colvin — Laboratory Scientist
R. J. Hibberson — Laboratory Scientist
R. S. Young — Laboratory Scientist
Mrs. E. A. Juhasz — Laboratory Scientist
F. F. Karpick — Assayer
L. E. Shepard — Crusherman

Analytical and Assay Work

During 1971 the chemical laboratory in Victoria issued reports on 573 samples from prospectors and Departmental engineers. Between May 1 and September 30

only, five samples will be assayed without charge for a prospector who makes application for free assays and 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. 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 *Prospectors' Grub-stake Act,* and Departmental engineers:

	Samples	Spectrographic Analyses	Assays
Prospectors (not grantees)	267	262	575
Prospectors (grantees)	19	19	40
Departmental Engineers	287	113	1,672
Totals	573	394[1]	2,287

[1] An additional 98 spectrographic analyses were done for Departmental engineers, but the results were not reported.

Petroleum and Natural Gas Samples

Reports were issued on 10 samples, 7 of which were formation waters and the remainder crude oils.

Miscellaneous Samples

Reports were issued on 117 samples of a miscellaneous nature:

For the Purchasing Commission, reports were issued on 20 samples of coal submitted for proximate analysis and calorific value.

For the Department of Lands, Forests, and Water Services, Pollution Control Branch, four ore samples were assayed for nine elements each. For Forest Research, a sample of quartz was analysed for potassium and phosphorus pentoxide.

For the Department of Highways, Geotechnical and Materials Branch, two soil samples were analysed for their sulphate content, one clay sample was analysed for its chloride content, and a sample of sand was spectrographed.

For a citizen of the Province, one water sample was tested for oil and a limestone sample was analysed for calcium oxide content.

For the City of Victoria, Smoke Inspection, the weights of residue and soluble salts collected in 85 bottles of water placed in various locations in the city were determined, and a sample of siliceous material was examined.

Mineralogical Branch Samples

Forty-three rock samples were analysed for their major oxide content, and trace elements were determined on some of the samples.

Twenty-two bead samples obtained by arc fusion were analysed for both ferrous and ferric oxides.

Six complete limestone analyses were performed.
Sixty-two samples of sediments were analysed for certain trace elements.
Ten samples were analysed for both acid soluble and total nickel.
The balance of the samples was analysed for a variety of elements and oxides.

X-RAY POWDER DIFFRACTION ANALYSES

One hundred and seventy-two analyses of this type were performed for identification purposes.

EXAMINATIONS FOR ASSAYERS

Examinations for assayers were held in May and December. In the May examination, 12 candidates were examined, of whom eight passed, three failed, and one was granted a supplemental. In the December examination, 12 candidates were examined, of whom two passed, nine failed, and one was granted a supplemental.

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
A. R. C. James, Senior Inspector, Coal; Aid to Securities	Victoria
Harry Bapty, Senior Inspector, Mining Roads	Victoria
V. E. Dawson, Inspector, Mechanical	Victoria
J. Cartwright, Inspector, Electrical	Victoria
W. B. Montgomery, Inspector, Reclamation	Victoria
S. Elias, Senior Inspector, Environmental Control	Vancouver
D. I. R. Henderson, Inspector, Environmental Control	Vancouver
J. W. Robinson, Inspector and Resident Engineer	Vancouver
W. C. Robinson, Inspector and Resident Engineer	Nanaimo
R. W. Lewis, Inspector and Resident Engineer	Fernie
David Smith, Inspector and Resident Engineer	Kamloops
E. Sadar, Inspector and Resident Engineer	Kamloops
B. M. Dudas, 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 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. H. Bapty supervises the roads and trails programme and prospectors' grub-stakes. W. B. Montgomery administers the reclamation sections of the *Coal Mines Regulation Act* and *Mines Regulation Act*. A. R. C. James is Senior Inspector, Coal, and has additional duties as mining adviser to the Securities Commission.

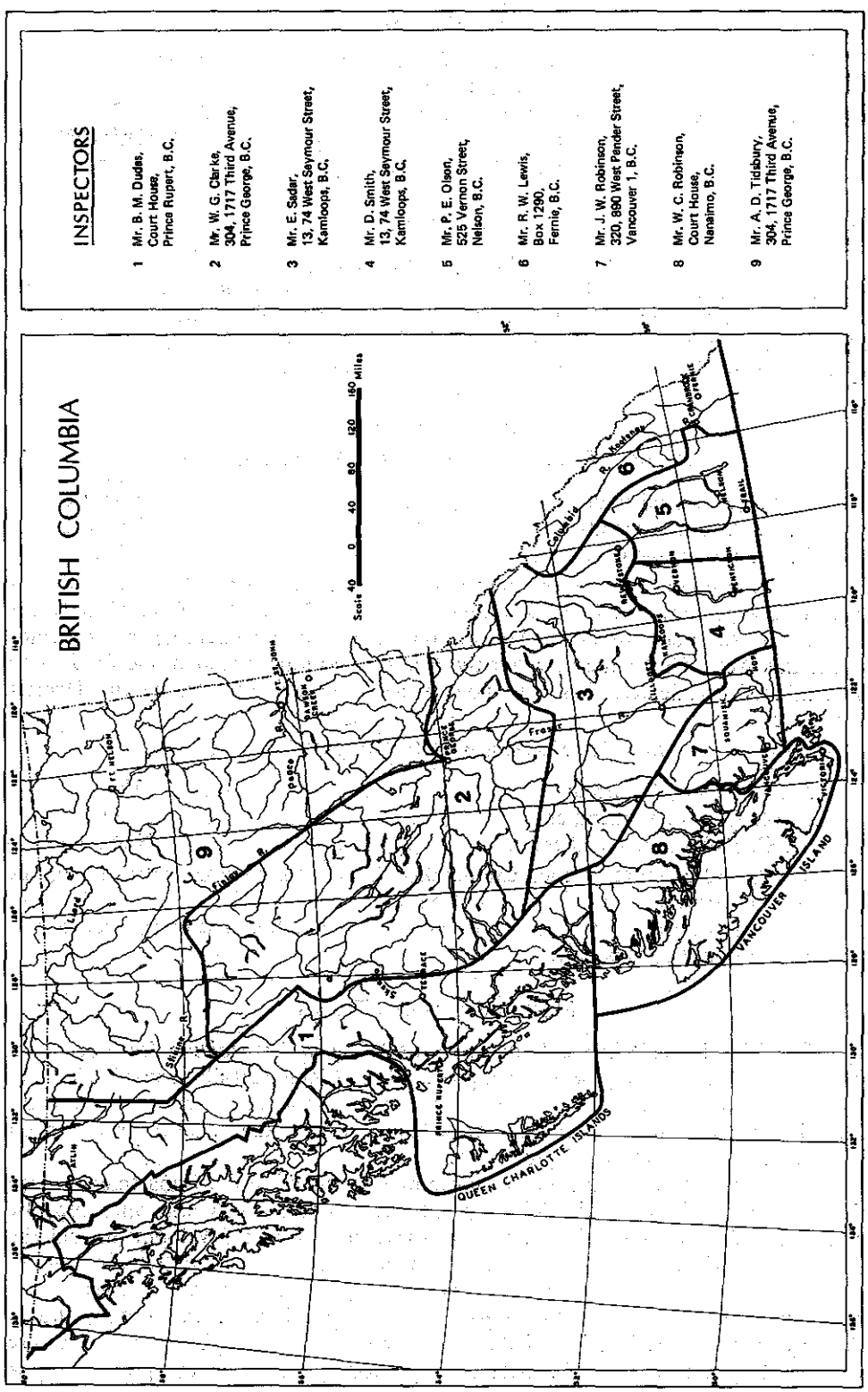


Figure 1. Index map showing inspectoral districts.

Co-ordinators, Mine-rescue Stations

E. C. Ingham, Co-ordinator, Rescue Training ..... Prince George
G. J. Lee, Co-ordinator, Rescue Training ..... Nelson
A. Littler, Co-ordinator, Rescue Training ..... Fernie
T. H. Robertson, Co-ordinator, Rescue Training ..... Nanaimo
J. A. Thomson, Co-ordinator, Rescue Training ..... Kamloops

Staff Changes

On July 13, J. Cartwright, P.Eng., joined the staff in Victoria as Inspector, Electrical. On August 2, D. I. R. Henderson joined the Vancouver office staff as Inspector, Environmental Control, and E. C. Ingham joined the Prince George office as Co-ordinator, Rescue Training. On December 15, W. C. Robinson, Inspector and Resident Engineer, was transferred from Vancouver to Nanaimo.

Board of Examiners

Board of Examiners (Coal Mines Regulation Act)

J. W. Peck, Chairman ..... Victoria
A. R. C. James, member ..... Victoria
R. W. Lewis, member ..... Fernie

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 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 ..... Nanaimo

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

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 1971/72 fiscal year were as follows:

	Miles	Cost
Roads—		
Construction	53.8	$176,714.14
Maintenance	279.0	77,677.59
Trails—Construction	5.0	1,000.00
Bridges—		
Construction		25,748.02
Maintenance		14,675.86
Total		$295,815.61

In addition to the above, work continued on the Cassiar–Stewart road being built under the "Roads to Resources" agreement between the Governments of Canada and British Columbia. The construction is done by contract, and is supervised by the Department of Highways on behalf of the Department of Mines and Petroleum Resources.

Road construction was done under Projects 2233, 2234, and 763. Project 2233 covers 16.33 miles between the north crossing of the Bell-Irving River and Beaverpond Creek. The contract was awarded to Peter Kiewit Sons Co. of Canada Ltd. in May 1971 and 5.5 miles of new road was completed at year-end. Project 2234 covers 11.48 miles of road between Bob Quinn Lake and Beaverpond Creek. This contract was awarded to Keen Industries Ltd. in March 1971 and 7.5 miles of new road was completed at year-end. The remaining gap of 14.81 miles is expected to be completed in 1972 to allow vehicular traffic to flow from Stewart, British Columbia, to the Alaska highway. Project 763 was awarded to Barnett-McQueen Ltd. to construct the Stikine River bridge, which will be opened for traffic late in 1972. Work on the north Bell-Irving River and Devil Creek bridges progressed favourably.

Total expenditure on the road to date is $27,179,481.89. The Federal Government's commitment of $7,500,000 was expended by the end of September 1967, and since that time the whole cost of construction has been borne by the Provincial Government.

The Omineca road, now completed for 175 miles northwest from Fort St. James, was extended an additional 20 miles past Aiken Lake toward Johanson Lake. Further construction will be undertaken.

During the past winter, heavy freight was moved over the road between Fort St. James and Takla Landing to assist in the British Columbia railway construction. The road has withstood the increased weight, but some of the bridges show signs of having been overloaded.

To encourage the development of petroleum and natural gas resources in the northeastern part of the Province, it was decided, in conjunction with the Department of Highways, to build vehicle access approaches to the new British Columbia railway bridge over Fort Nelson River. One approach extends from the Alaska Highway at Mile 293.7 to the Clarke Lake Oilfield. The cost of this new work totalled $171,643.18. The former access bridge was destroyed by flooding on June 16, 1971.

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 H. Bapty, Senior Inspector, Department of Mines and Petroleum Resources, Victoria.

Samples received from grub-staked prospectors are assayed free of charge and mineralogical identifications may be 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
1970	30,614	39	84	423
1971	21,081	23	29	348

Forty-three applications were received, and 23 grub-stakes were authorized. Grantees unable to complete the terms and conditions of the grant received only partial payment. Five prospectors were given grants for the first time. Three grantees proved to be unsatisfactory.

E. R. Hughes interviewed applicants in Vancouver and contacted 16 grantees in the field, giving advice and direction to those requiring additional guidance. Personnel in offices of Government Agents and local Mine Inspectors throughout the Province assisted in administering the programme. The following notes comprise

summaries by Mr. Hughes of the prospecting activities and results. They are based on observations made by him in the field and from information contained in diaries of the grantees.

Alberni Mining Division—West of Strathcona Park, in the Donner Lake area, bornite, chalcopyrite, and magnetite were found. Some good copper assays were obtained, with small fractions of 1 per cent of zinc, nickel, and cobalt, and traces of molybdenum. Work here was continued until late in the season. Mineral claims were located and drilling was contemplated.

Chalcopyrite, silver, and galena mineralization was reported on Canoe Creek, and some chalcopyrite was encountered in an area southeast of Kennedy Lake.

Cariboo Mining Division—Between Willow River and Bowron River, and south of Purden Lake it was reported that pyrite, chalcopyrite, pyrrhotite, and arsenopyrite had been found. Traces of nickel were reported in the Tumuch Lake area.

Clinton Mining Division—A few exposures of andesitic and basaltic volcanic rocks are exposed on a hill west of the road between Hanceville and Fletcher Lake, but the area is mostly veneered with glacial overburden. East of the road similar rocks were seen along a bluff that extends into the Chilcotin Valley. The area examined on the south flank of Piltz Peak is underlain by coarse-grained granodiorites and quartz diorites which are exposed on hilltops and steep slopes. No sulphides were seen on the south flank, but fractures and alteration were observed in southernmost exposures near Hungry Valley. The west flank was observed to be largely unmineralized, although minor pyrite occurs with quartz in shear zones as much as 50 feet but more commonly 2 to 3 feet wide and great distances apart. Geochemical samples collected for about 3.5 miles along the base of the north slope of Vedan Mountain gave negative tests for copper by the rubeanic acid method. Examination of the south and west flanks of the mountain also gave negative results.

Northeast of Choelquoit Lake some interesting fractured and locally highly altered and mineralized dioritic rocks were found, but because of the limited amount of exposure the mineralized area was reported to be too small to be of economic significance. Trace amounts of chalcopyrite were found in vesicular olivine basalt outcropping south of Scum Lake, west of the Taseko Lakes road.

North of McKay Creek, on the west Pavilion road, it was reported that chalcopyrite, bornite, and molybdenite were found. Gold and platinum were reported in pan sampling.

Kamloops Mining Division—In an area north of Lac des Roches, from Wavey Lake to north of Mount Heger, near the western boundary of the mining division, two base camps were established. The regional geology of the area is shown on Geological Survey of Canada Map 3-1966 (Campbell and Tipper). There is extensive, generally shallow overburden and outcrops are scarce. Creek beds and road rock-cuts were examined. Exposures of andesite breccia and syenite were found. A minor amount of bornite was found and a few specks of chalcopyrite were seen in float. Twelve mineral claims were located south of Mount Heger.

Between Thuya Lakes and Patrick Lake, fault zones were traced and some trenching was done, but nothing of interest was found.

In the Whitewood Creek-Fishtrap Lake area some reconnaissance work was done. Greenstones, phyllites, and argillites of the Cache Creek Group were found cut by granitic dykes. Quartz veining was found to be well developed in many areas. Pyrite and pyrrhotite appeared to be associated with the granitic rocks. Sulphides in both Poison and Fishtrap Creeks appear to warrant further investigation upstream. In the Wentworth Creek area some quartz veins and fractures were encountered but no significant mineralization was seen. Silt-sampling was done in

creeks flowing into the east end of Bonaparte Lake and bedrock exposures were examined. Several types of granitic rocks, ranging from coarse-grained pink granite to granodiorite, were found, but no mineralization was seen in either bedrock or float.

Water and silt-sampling was done in the Maiden Creek area and 12 mineral claims were located.

Mapping and sampling were done in an area about 8 miles north of the south end of Adams Lake, on the east side, where a zone of lead and zinc mineralization had been found.

Liard Mining Division—Soil-sampling by a three-member team gave negative results near the north end of Dease Lake. Shattered jade boulders were seen on Seywerd Creek. Traces of molybdenite were found in granitic rocks north of Cry Lake. Minor amounts of chalcopyrite and malachite were reported to have been encountered on the north side of Thibert Creek. An assay of a sample from this area showed 0.15 per cent nickel, with traces of copper and cobalt. A sample taken from the south side of the creek showed 0.10 per cent nickel, with traces of copper and cobalt.

Minor amounts of bornite and chalcopyrite, finely disseminated in granodiorite, were found near the contact of intrusive and volcanic rocks south of Lingwell Creek on Yehiniko Creek. Minor chalcopyrite was found on a ridge near Coffee Crater. Three small boulders of solid arsenopyrite were found in a creek bottom below Edziza Peak, and some chalcopyrite was found in an adjacent area; the source of the arsenopyrite was not determined. Minor chalcopyrite was found in quartz and quartzite near the head of a small creek draining into Allan Lake, about 12 miles east of Cassiar townsite.

Lillooet Mining Division—In the Donelly Creek area, southwest of Bralorne, volcanic and sedimentary rocks were found cut by fine-grained quartz porphyry dykes. Pyrite occurs along fractures within and adjacent to the dykes and also within bleached and highly altered portions of them and the wallrocks. Bedrock and float were examined north of the junction with Hurley River and some geochemical testing was done; sulphides were reported to be generally sparse.

Nanaimo Mining Division—In the Bigtree Creek area, about 30 miles northwest of Campbell River, Karmutsen rocks are intruded by granites. Chalcopyrite mineralization was found along fractures and disseminated over a wide area, although in some parts the mineralization is slight. At the south end of Mohun Lake the rocks contain much iron stain and minor amounts of copper. Native copper was found alongside of a logging-road in the same area. Pyrite and chalcopyrite were found disseminated in the rock at the south end of Brewster Lake. Much mineralization was seen in the Boot Lake area, about 13 miles west of Campbell River. Here, chalcopyrite and chalcocite were found disseminated and in amygdales. Magnetometer surveying, mapping, and geochemical sampling were done. Surveying was done on the east side of Mount Menzies where chalcocite mineralization was reported.

Native copper was reported in an X-ray-drill hole in the Buttle Lake area.

Nelson Mining Division—East of Trail and south of Nelson numerous outcrops and areas of stain were investigated contiguous to Porcupine, Archibald, Erie, and Tillicum Creeks, and at Blizzard Mountain. The results were inconclusive. On Stewart Creek, sampling indicated the presence of zinc and gold, and four mineral claims were located.

New Westminster Mining Division—Silt sampling in the drainage area between the main forks of Stoyama Creek was negative. Quartz-feldspar porphyry was

encountered south of Stoyama Creek; some of this rock was lightly pyritized but gave no geochemical response for valuable metals.

Omineca Mining Division—Very good work was done by a two-member team using a floatplane in areas adjacent to Albert, Chuchi, Ahdatay, and Witch Lakes, and 82 mineral claims were located. Coarse diorite, with micaceous dykes, syenodiorite, syenite, small fractures with malachite and chalcopyrite, and some disseminated chalcopyrite, was found north of Chuchi Lake. Numerous outcrops of coarse andesite and pyrite were found near the north shore of Witch Lake. Chalcopyrite and pyrite in greenstone, and some green nickel silicate were found near the east shore of Albert Lake. An old burned-off area west of Ahdatay Lake was traversed and several streams were sampled. In this area some coarse to medium-grained diorite was found, as were several areas of fractures filled with epidote, some large quartz veins, and minor amounts of chalcopyrite and bornite.

A quartz porphyry showing was investigated in the Sibola Range area, east of Twinkle Lake, where sparse pyrite was found disseminated and in fractures. The rocks appear to be lithologically similar to those associated with copper-molybdenite mineralization at other nearby properties. Geochemical tests indicated generally low copper and molybdenite concentrations and no further work was done.

Some geochemical work was done near Grizzly Lake, southwest of Houston. Rusty weathered conglomerate, red shales, and siltstones were found in a creek draining into the lake, and exposures of epidote-veined volcanic rocks were seen on a ridge east of the lake. A small stock of heavily pyritized quartz porphyry with minor molybdenite was found in this area. Three pyritized quartz porphyry dykes (15 to 30 feet wide) associated with minor chalcopyrite mineralization in volcanic wallrocks were found north of the east end of Poplar Lake, and minor stibnite was found in a quartz-sericite vein in fractured quartz porphyry dyke material. Many exposures of basic volcanic and pyroclastic rocks were found and several small, quarter-inch wide veins with chalcopyrite-quartz mineralization were seen in this area. Some massive sulphide float, mainly pyrite, was found north of Hazelton; the local source may be glacial overburden. Bedrock exposures along the lower slope include sedimentary and volcanic rocks which are fractured and sheared, but not altered nor mineralized.

In the Fredrickson Lake area, a long season of conventional prospecting resulted in the finding of minor galena in float about 2 miles north of the lake, and minor chalcopyrite about 3 miles west of the lake. Some chalcopyrite float was also found near Snowslide Creek.

A three-man team did soil and silt sampling on a grid in an area north and south of Tetachuk Lake. Rock outcrops were few and those seen were chiefly andesite and intrusive rock. No mineralization was found. Soil sampling in one area on the north side of the lake indicated interesting quantities of molybdenum.

Slocan Mining Division—In the area drained by the Wilson, Keene, Monitor, and Burkitt Creeks, east of Slocan Lake, some work was done in an effort to find nickel in the serpentines. Minor chalcopyrite and molybdenite mineralization was found on Wilson Creek, but nothing significant was reported.

Vancouver Mining Division—In the Ashlu Creek area, north of Squamish, some copper mineralization was reported. Copper and molybdenum mineralization was reported northeast of Sechelt, and 14 short plugger-drill holes were drilled and blasted. Pyrite, molybdenite, and chalcopyrite mineralization was reported in an area north of Sechelt, and some short plugger-drill holes were drilled and blasted.

Vernon Mining Division—In the Bouleau Lake area, near the headwaters of Salmon River, some soil, silt, and water-sampling was done, but the results were

negative. Galena float was found in a logged-off area southeast of Cherryville, and fine-grained disseminated sulphides were seen in bands and veinlets. Soil-sampling indicated the presence of zinc.

On the east side of Mabel Lake, in the vicinity of Latewhos Creek, recent logging-road construction work exposed outcrops of limestone, quartz, and granitoid gneiss. No significant mineralization was found.

MINERALOGICAL BRANCH

The principal function of the Mineralogical Branch is to assist in the orderly exploration, development, and use of the Province's coal and mineral resources, and to provide information to Government and industry on the quantity and distribution of the coal and mineral resources of the Province. The Branch makes a variety of geological studies; publishes data concerning mineral deposits; makes mineral potential appraisals of land; collects, stores, and disseminates geological and statistical data; and records the activities of the industry. The Branch is capable of making mineral assessments and of supplying general geological information as well as specific information regarding mineral deposits, mineral resources, and the mineral industry. It provides rock and mineral identifications, contributes lectures in courses on prospecting, participates in scientific meetings, and arranges educational exhibits.

The Branch consists of three sections—an Economic Geology Section, a Mineral Resources Section, and a Publications and Technical Services Section. In effect the Laboratory and Assay Branch functions as a fourth section of the Mineralogical Branch, for they report to the Deputy Minister through the Chief of the Mineralogical Branch.

The Economic Geology Section, under the direction of Dr. A. Sutherland Brown, is responsible for scientific investigations related to mineral deposits. The work commonly involves detailed geological mapping and study of mineral deposits principally in areas of recognized mineral potential or in mining districts.

The Mineral Resource Section, under the direction of Dr. James T. Fyles, is concerned with the documentation of current exploration and mining activity, compilation of an inventory of mineral deposits of all sorts, and appraisal of the economic mineral potential of areas for various purposes.

The Publications and Technical Services Section, under the direction of J. W. McCammon, is responsible for production and editing of manuscripts and maps. The library, lapidary, photographic, transport, and equipment services are part of the function of this section and these services extend to the other branches of the Department.

STAFF

On December 31, 1971, the professional and technical staff included the following:

Stuart S. Holland, Ph.D., P.Eng.	Chief
A. Sutherland Brown, Ph.D., P.Eng.	Deputy Chief
James T. Fyles, Ph.D., P.Eng.	Senior Geologist
J. W. McCammon, P.Eng.	Geologist
N. C. Carter, P.Eng.	Geologist
B. N. Church, Ph.D., P.Eng.	Geologist
G. E. P. Eastwood, Ph.D., P.Eng.	Geologist
J. A. Garnett, P.Eng.	Geologist
E. W. Grove, P.Eng.	Geologist
E. V. Jackson, B.Sc.	Geologist

W. J. McMillan, Ph.D., P.Eng.	Geologist
K. E. Northcote, Ph.D., P.Eng.	Geologist
V. A. Preto, Ph.D., P.Eng.	Geologist
A. F. Shepherd, P.Eng.	Geologist
R. I. Thompson, Ph.D.	Geologist
Miss E. M. Balicki, B.Sc.	Research Officer (Geology)
Mrs. Rosalyn J. Moir	Manuscript Supervisor
K. S. Crabtree	Draughting Supervisor
R. E. Player	Lapidary and Photographer

Staff Changes

R. I. Thompson, geologist, a graduate of Queens University, joined the staff on December 23, 1971.

Miss E. M. Balicki, research officer (geology), a graduate of Acadia University, joined the staff on September 15, 1971.

Field Work, 1971 Season

A. Sutherland Brown visited copper and molybdenum properties in various parts of the Province.

J. T. Fyles made park-appraisal studies of the Okanagan Mountain, Chilliwack Lake, Conkle Lake, and Nancy Greene Lake areas.

J. W. McCammon examined industrial mineral properties and quarries in southern British Columbia.

N. C. Carter examined mining properties in the Nass River, Terrace, Smithers, and Toodoggone River areas.

B. N. Church made detailed examinations of mines in the Greenwood, Smithers, and Tahtsa Lake areas.

J. A. Garnett began a detailed study of the geology and mineral deposits in the Hogem batholith in the Omineca.

E. W. Grove completed reconnaissance geological mapping in the Stewart area and virtually completed a geochemical sampling of the Guichon Creek batholith as part of Dr. McMillan's project described below.

W. J. McMillan continued his detailed study of the Guichon Creek batholith; 90 per cent of the mapping is complete. C. A. Ager carried out a gravity survey of the batholith as part of the project.

K. E. Northcote examined and mapped mining properties on Vancouver Island.

V. A. Preto examined copper properties in the Racing River-Gataga River area of the northern Rocky Mountains.

Three senior geological field assistants and 10 junior assistants were employed on the various projects.

Publications and Reports

Technical reports of the Mineralogical Branch were published in *Geology, Exploration, and Mining in British Columbia, 1971*. Bulletin 58, *Geology and Mineral Deposits of the Stewart Area,* by Edward W. Grove, was also published, although its release was delayed because of technical problems. *Index No. 5, Numerical List of Geological, Geophysical & Geochemical Reports,* accepted for assessment from 1947 to the end of 1970, was also published.

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

Three preliminary geological maps were released in 1971. Preliminary mineral inventory maps covering 41 NTS sheets were also released during the year, bringing the total to 66 and completing the preliminary programme. Details of this material may be obtained from the Chief of the Mineralogical Branch, Department of Mines and Petroleum Resources, Douglas Building, Victoria.

In addition, during the year, mineral potential appraisals were made of two large areas of the Province for land-use and planning purposes, and the mineral potential of about 45 large and small areas proposed for parks and ecological reserves were assessed.

Aeromagnetic Surveys and Magnetic Surveillance

The programme of airborne magnetometer mapping, jointly financed by the Geological Survey of Canada and the British Columbia Department of Mines and Petroleum Resources, continued in 1971, but without any new maps released during the year.

Maps released in former years 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 (Earth Physics 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, RR 7, 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.

PETROLEUM AND NATURAL GAS BRANCH

The Petroleum and Natural Gas Branch, under the direction of the Chief of the Branch, is responsible for the administration of Part XII of the *Petroleum and Natural Gas Act, 1965* and the Drilling and Production Regulations made thereunder.

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 provisions 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 are available for study. 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 four sections. These sections and their supervisors are as follows: Development Engineering, W. L. Ingram; Reservoir Engineering, A. J. Dingley; Exploration Geology, S. S. Cosburn; and Economic Geology, W. M. Young.

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 (Engineering)
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 (Engineering)
W. M. Young	Senior Economic Geologist
K. A. McAdam (until June 30)	Economic Geologist
T. B. Ramsay	Economic Geologist
J. Y. Smith	Economic Geologist
R. Stewart	Economic Geologist
S. S. Cosburn	Senior Exploration Geologist

Field Office, Charlie Lake

D. L. Johnson ..... District Engineer
T. B. Smith ..... Field Engineer
D. A. Selby ..... Field Technician (Engineering)
G. T. Mohler ..... Field Technician (Engineering)
W. B. Holland ..... Field Technician (Engineering)
L. A. Gingras ..... Field Technician (Engineering)
(until December 15)

Staff Changes

K. A. McAdam, Economic Geologist, resigned, effective June 30.
R. Stewart, Economic Geologist, joined the staff on November 15.
L. A. Gingras, Technician (Engineering), resigned, effective December 15.

Board of Arbitration

Chairman: A. W. Hobbs, Q.C.

Members: S. G. Preston, Agrologist; 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, 1965,* grants right of entry to 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.

In 1971, four applications for right of entry were submitted to the Board and three were carried over from 1970. One application was withdrawn.

One right of entry order was issued, one was terminated, and 14 were withdrawn.

Three right of entry orders and four applications were outstanding at the end of the year.

A hearing was held on April 27 at Fort St. John. Of the 12 cases scheduled to be heard, five resulted in compensation awards, six were adjourned, and one was settled by agreement.

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, and one to be named.

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, 1965.* 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 1971.

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

CHAPTER 4

CONTENTS

PETROLEUM AND NATURAL GAS—*Continued*

LIST OF ILLUSTRATIONS

DRAWINGS

PETROLEUM AND NATURAL GAS—*Continued*

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, 1965* which includes all matters related to and affecting title to Crown petroleum and natural gas rights and includes the collection of revenue from fees, rents, disposition, and royalties. Regulations governing geophysical operations and petroleum-development roads are also administered by the Chief Commissioner.

Information concerning all forms of title issued under the *Petroleum and Natural Gas Act, 1965,* 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, 1965* 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 amounting to $22,186,250.58, an increase of $5,846,449.39 from the previous year. This sum was higher than any previous yearly total by $539,799.04. A total of 415 parcels were offered and bids were accepted on 259 parcels covering 2,367,731 acres. The average price per acre was $9.37 which is an increase of $1.16 per acre over the previous year. Average bonus price per acre was respectively—permits, $7.23; leases, $36.95; and drilling reservations, $16.48.

During the year, 23 geophysical licences were renewed or issued.

During the year, two petroleum-development road applications were received and processed for approval.

A total of 135 notices of commencement of exploratory work were recorded during the year. These notices are required prior to the commencement of any geological or geophysical exploration for petroleum or natural gas.

During the year, two unit agreements and two royalty agreements were approved.

As of December 31, 1971, 26,763,316 acres or approximately 41,818 square miles, a decrease of 3,147,179 acres over the 1970 total, of Crown petroleum and natural gas rights, issued under the *Petroleum and Natural Gas Act, 1965,* 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	430	18,726,137
Natural gas licences	-------	----------
Drilling reservations	33	337,656
Leases (all types)	3,693	7,699,523
Total		26,763,316

Title Transaction Statistics, 1971

	Permits		Leases		Drilling Reservations		Natural Gas Licences	
	No.	Acres	No.	Acres	No.	Acres	No.	Acres
Issued	82	2,502,458	256	260,240	27	242,679	—	—
Cancelled or surrendered	87	4,892,326	243	664,469	20	197,425	—	—
Renewed or extended	305	—	3,340	—	4	—	—	—
Assigned	128	—	986	—	7	—	—	—
Acreage amendments	6	262,456	73	134,878	—	—	—	—
Crown reserve dispositions	62	2,030,354	170	94,698	27	242,679	—	—

Petroleum and Natural Gas Revenue, 1971

Rentals and fees—		
Permits	$1,615,619.07	
Drilling reservations	79,119.60	
Natural gas licences	—	
Petroleum, natural gas, and petroleum and natural gas leases	7,733,583.84	
Total rentals and fees		$9,428,322.51
Disposal of Crown reserves—		
Permits	$14,688,570.48	
Drilling reservations	2,486,762.52	
Leases	5,010,917.58	
Total Crown reserves disposal		22,186,250.58
Royalties—		
Gas	$4,209,793.04	
Oil	10,415,656.54	
Processed products	42,516.86	
Total royalties		14,667,966.44
Miscellaneous fees		35,604.37
Total petroleum and natural gas revenues		$46,318,143.90

Acreage of Crown Petroleum and Natural Gas Rights Held, 1962–71

	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971
	Acres	Acres	Acres	Acres	Acres	Acres	Acres	Acres	Acres	Acres
Petroleum and natural gas permits	17,374,307	24,902,690	22,417,836	23,517,709	29,716,610	23,214,363	32,622,739	31,893,990	21,379,461	18,726,137
Petroleum and natural gas leases	9,226,375	10,753,287	11,289,962	10,642,259	10,439,595	10,596,352	10,029,674	8,837,265	7,765,668	7,226,320
Natural gas licences	84,499	74,987	9,669	.....	27,815	.....	.....	.....	.....	.....
Natural gas leases	505,982	543,966	555,829	540,088	524,612	549,218	518,826	475,419	472,964	471,919
Petroleum leases	2,568	2,568	2,568	2,568	2,568	644	644	.....	.....	1,284
Drilling reservations	471,487	641,919	451,998	534,868	503,603	462,138	384,925	350,546	292,402	337,656
Totals	27,665,218	36,919,417	34,727,862	35,237,492	41,214,803	34,822,715	43,556,808	41,557,220	29,910,495	26,763,316

Petroleum and Natural Gas Revenue, 1947–71

	Cumulative, 1947–62	1963	1964	1965	1966	1967	1968	1969	1970	1971	Cumulative, 1947–71
Rentals and Fees	$	$	$	$	$	$	$	$	$	$	$
Permits	34,214,926	1,638,748	1,302,305	1,176,501	1,661,591	1,369,232	1,184,457	1,772,064	1,426,448	1,615,619	47,361,891
Drilling reservations	404,345	121,632	64,800	114,483	113,496	86,303	87,759	79,796	48,156	79,120	1,199,890
Natural gas licences	59,050	4,738	.....	.....	1,466	.....	.....	.....	.....	.....	65,254
Leases (all)	15,190,189	5,957,533	7,077,488	7,013,187	8,432,386	8,901,196	9,349,480	8,488,114	7,699,844	7,733,584	85,843,001
Total rentals	49,868,510	7,722,651	8,444,593	8,304,171	10,208,939	10,356,731	10,621,696	10,339,974	9,174,448	9,428,323	134,470,036
Crown Reserve Disposition Bonuses											
Permits	15,576,129	79,519	721,193	1,825,322	6,982,439	8,428,409	9,554,004	16,516,392	9,506,074	14,688,570	83,878,051
Drilling reservations	9,363,682	1,585,935	1,541,685	3,278,641	4,657,510	3,013,979	1,785,527	1,394,215	1,825,404	2,486,763	30,933,341
Leases	19,347,708	5,426,555	10,830,994	13,057,470	4,199,528	2,855,428	3,737,489	3,735,845	5,008,323	5,010,918	73,210,258
Crown reserve disposition total	44,287,519	7,092,009	13,093,872	18,161,433	15,839,477	14,297,816	15,077,020	21,646,452	16,339,801	22,186,251	188,021,650
Crown Royalties											
Gas	4,263,979	1,531,977	1,583,292	1,682,444	2,256,725	2,870,656	3,217,227	3,730,634	3,948,356	4,209,793	29,295,083
Oil	3,205,058	3,858,985	3,502,222	3,697,668	5,449,663	6,678,245	7,677,405	9,017,352	9,483,937	10,415,656	62,986,191
Processed products	436,304	115,042	104,990	93,226	61,568	58,536	50,762	48,847	42,314	42,517	1,054,106
Crown royalties total	7,905,341	5,506,004	5,190,504	5,473,338	7,767,956	9,607,437	10,945,394	12,796,833	13,474,607	14,667,966	93,335,380
Miscellaneous fees	135,030	29,376	26,851	17,790	18,073	17,917	17,955	19,025	21,843	35,604	340,064
Total petroleum and natural gas revenue	102,196,400	20,350,040	26,755,820	31,956,732	33,834,445	34,279,901	36,662,065	44,802,884	39,010,699	46,318,144	416,167,130

PETROLEUM AND NATURAL GAS BRANCH

The Petroleum and Natural Gas Branch, under the direction of the Chief of the Branch, is responsible for the administration of Part XII of the *Petroleum and Natural Gas Act, 1965* and the Drilling and Production Regulations made thereunder.

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 provisions 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 at Charlie Lake, where they are available for study. Charlie Lake is adjacent to the Alaska highway, about 5 miles northwest of Fort St. John.

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GENERAL REVIEW

Except for a slight decline in the oil production, all aspects of the exploration, drilling, and production operations were increased during 1971. Geophysical and drilling activities gained 25 and 10 per cent respectively over the 1970 accomplishments. Production of natural gas retained its consistent annual rise of 7 per cent, while the annual oil production was down by less than 1 per cent.

Development and outpost drilling, both undertaken to extend existing fields, increased 12 and 36 per cent respectively, but wildcat drilling in areas far from proven production recorded a 14-per-cent decrease. The over-all footage drilled, 989,650 feet, and the number of wells drilled, 197, each increased by 9.5 per cent. Successful drilling ventures resulted in 40 gas wells and 46 oil wells with 103 locations abandoned and six other wells drilled for the purpose of water injection to aid production or as a means to dispose of unwanted produced water. Two wells awaited evaluation at year-end.

No discoveries were made that could be considered major finds, but several wells indicated interesting and potential anomalies that warrant further exploration. Declined petroleum production resultant from the lack of new discoveries and gradual depletion of the producing fields were reported during 1971. Additional pipe-line facilities to potential gas-producing areas, which included the major extension to the Beaver River area, were responsible for the increased gas production.

During 1971 there were 25,154,122 barrels of crude oil and 336,765,259 MSCF of natural gas produced.

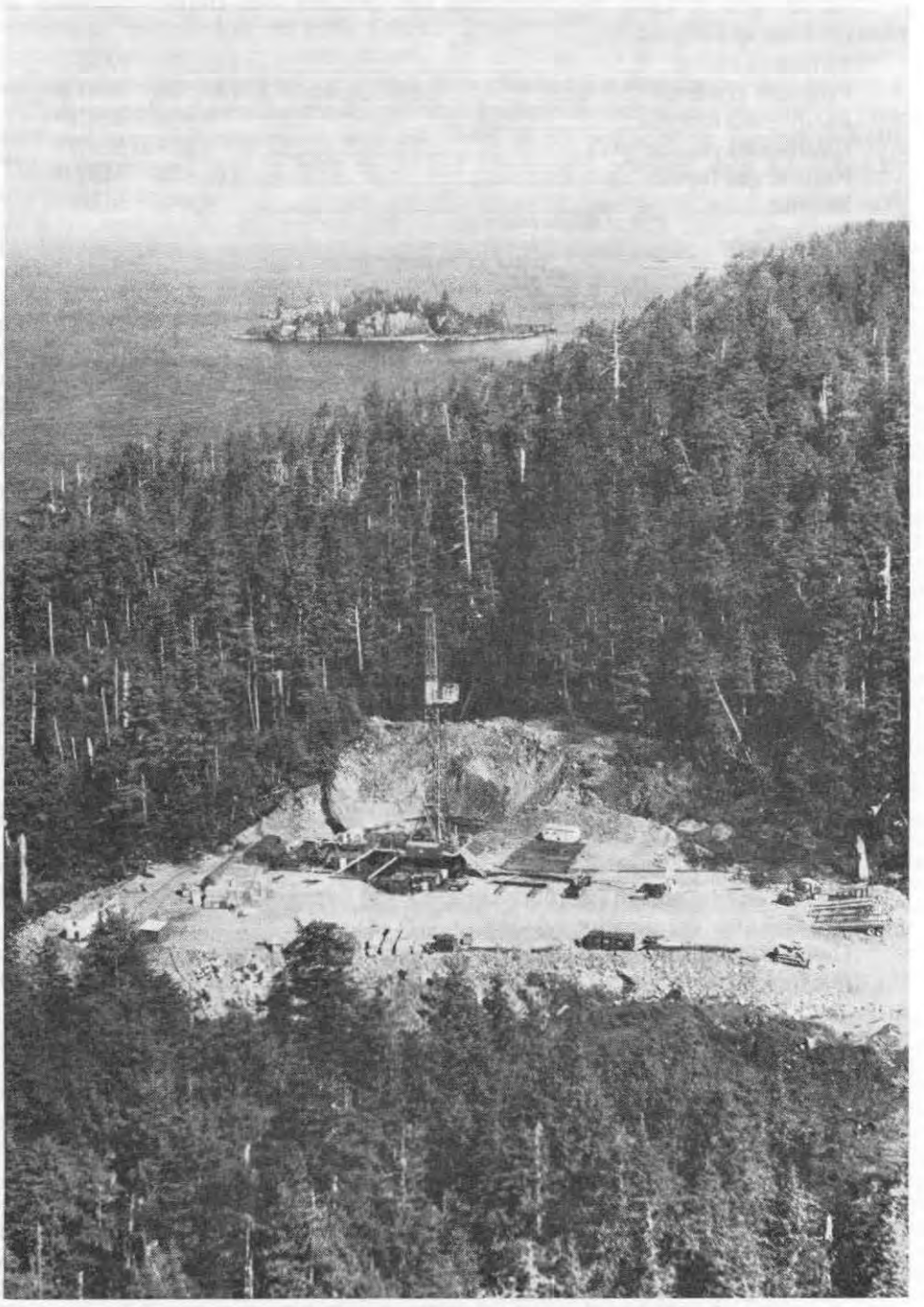


Plate I. Exploratory wildcat well, Union Port Louis c-28-L, drilled on Queen Charlotte Islands by Union Oil Company of Canada.

At the end of 1971 the Petroleum and Natural Gas Branch estimates of reserves were as follows:

Proved crude oil	183,176	MSTB
Probable crude oil	147,584	MSTB
Established raw gas	9,908.7	BSCF
Established residue gas	8,604.0	BSCF
Natural gas liquids	111,838	MSTB
Sulphur	4,046	MLT

FIELD OFFICE

A. General

The Field Office is responsible for enforcement of all sections of the Drilling and Production Regulations which pertain to field operations throughout the entire Province. The staff are headquartered at Charlie Lake, near Mile 52 on the Alaska Highway. Offices, core and sample storage facilities, technical laboratories, and residences comprise the Branch establishment. During periods of increased winter drilling activity, a suboffice at Fort Nelson is periodically used.

During 1971, eight vehicles were driven 163,681 miles to conduct various inspections, perform surveys, or witness industry operations pertaining to the drilling and production phases of the oil and gas industry. Numerous geophysical and pipeline operations were observed and reported to Departmental personnel in Victoria.

B. Laboratories

Core and sample storage and examination facilities are located at the Field Office. All cores from British Columbia wells must be placed in labelled boxes and delivered by the operator to the Geological Laboratory for permanent storage. Core received during 1971 numbered 825 boxes from 70 wells, bringing the total stored at the end of the year to 30,459 core boxes from 1,833 wells. In 1971, 5,242 boxes of core from 287 wells were studied by oil company personnel and other interested individuals. Cores from 19 wells were temporarily removed from the laboratory by operators for more detailed study. Since the core-examination equipment at Charlie Lake was made available in February 1961, 81,726 boxes of core have been removed from the racks for examination.

Unless otherwise directed, any operator who drills a well is required to sample the drilled rock (bit cuttings) at least every 10 feet of depth. Each sample is placed in a small bag at the well, identified, 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 in the sample library at the Field Office, one is sent to headquarters in Victoria, and the other is forwarded to the Institute of Sedimentary and Petroleum Geology, Geological Survey of Canada in Calgary. The remainder of the 10-foot sample is retained for a period of one year should further samples be required.

The main sample-examination equipment made available by the Branch is at the Field Office with limited facilities at Victoria. Complete sample libraries of all samples from British Columbia wells drilled since 1948 are retained at the Charlie Lake and Calgary locations. The Victoria library has samples from wells drilled since September 1957. At the end of 1971, the Charlie Lake storage contained 763,285 samples, while 757,308 samples were retained in the Victoria library. During 1971, samples from 198 wells were delivered to the Field Office and a total of 43,028 10-foot samples were washed and bottled. Industry and personnel from other government agencies studied samples from 105 wells during the year.

The Provincial calibration standard for selective oil field pressure measurement equipment is located at the Field Office. During 1971, 884 calibrations were performed on subsurface pressure gauges. In addition, 20 dead-weight gauges were calibrated and numerous spring gauges were checked for accuracy.

A specialized wireline truck, operated by Branch technicians to conduct pressure and temperature surveys, was employed at 85 potential or producing wells. These surveys are used to both check and supplement pressure data submitted by operating companies.

C. Inspections

Inspections of gas production, oil production, and sales meters to ensure that proper production practices are employed, increased substantially in 1971. Complete meter calibrations were performed on 828 gas meters, an increase of nearly 100 per cent over 1970. Fast meter checks were conducted on an additional 726 meters. Complete meter calibrations were witnessed on 105 positive displacement meters which include test oil meters, test water meters, and oil-sales meters at custody transfer points.

Crude oil production facilities were inspected on 377 occasions during 1971 while 2,347 inspections were made at producing or abandoned wells, and 379 drilling operations were viewed. Field Office personnel witnessed 72 tests on natural gas wells and conducted three tests on producing oil wells. These tests were performed to verify production characteristics of the wells and ensure accuracy of data submitted to the Branch.

Increased awareness of oil and gas as pollutants resulted in the Field Office staff being involved in the direct supervision of clean-up operations at two major pipe-line spills and two other spills of a minor nature. In total, 20 oil spillages of varying magnitudes were reported to the Branch. Six spills occurred from wellhead installations, four from flowlines, seven from batteries, and three from pipe-lines. The reasons for the spillages were principally related to equipment failures, although soil and weather conditions were responsible in three instances. In each of these instances, as well as when spills were discovered by the Field Office staff, the companies responsible were required to take immediate remedial measures.

The Branch participated in the organization of an Oil Spill Contingency Plan for British Columbia. This provides for the formation of producing companies into co-operatives to ensure containment and rapid clean-up of any spilled oil.

Three minor fires were reported. Two resulted in loss of production equipment at gas installations while the other was a small fire at an oil battery caused by lightning.

GEOLOGICAL SECTION

A. General

The Geological Section is responsible for the preservation and evaluation of certain well data, the geological mapping of oil and gas accumulations, and the preparation of regional subsurface mapping. These responsibilities have been resolved in the assignment to the geological staff of specific reservoir areas and regional districts. The primary function of the Section is the application of geological and subsurface engineering data to assist in the interpretation of oil and gas reserves. The second important involvement concerns the undertaking of regional studies resulting in subsurface mapping of key economic horizons to assist in development of the Province's undiscovered reserves.

Another responsibility of the Section is to evaluate the geological and economical situations of Crown reserve land posted for competition by industry for the

right to explore and develop Crown petroleum and natural gas resources. The Section personnel are also available to industry and other Government agencies for discussion of specific and general geologic matters concerning the exploration for and development of the Province's hydrocarbon potential.

For each well location approved, the Section stipulates sampling and coring requirements and assigns a classification to the well based on 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.

All geological and geophysical reports submitted to the Chief Petroleum and Natural Gas Commissioner in support of work requirements are assessed to ensure that the Department receives full value for credits or other benefits granted.

Investigations are carried out of any reported occurances of oil or gas seepage.

B. Reservoir and Regional Mapping

Reservoir mapping standards have been evolved for the geological engineering interpretation of the Province's existing and potential productive reservoirs. These standards are applied to assignments within two areas of responsibility for the compilation of geologic and engineering subsurface data required in the construction of accurate net-pay maps.

Economic geological work is continued during the productive period of the reservoir. Production data supplement and complete, the previously accumulated subsurface information, and the geological interpretation of reservoirs are revised accordingly during the production stage of oil and gas pools. Results provide the proper basis in reservoir studies, evaluation of reserves and the control of remedial work, cycling, repressuring, and secondary recovery projects. Accuracy in the geological engineering interpretation of the oil and gas pools are the result of coordination in the assemblage and evaluation of data of both Geological and Reservoir Engineering Sections.

A primary aim in carrying forth regional studies is to assist industry and the Department in affecting the continuing geologic evaluation of rock-stratigraphic units which have attained a position of economic importance in the recovery of the Province's hydrocarbon resources. Regional study responsibilities have been assigned under the Northern and Southern Districts with the geographic boundary placed at 58 degrees north latitude. Project assignments are primarily directed to mapping key economic horizons and to keeping current with all methods of exploration activity undertaken within each district.

The principal producing units of the Southern District have been developed within rocks of the Mesozoic Era. These rock units are defined according to structure and areal distribution with a limited amount of facies-type work at this time. In addition to the latter work, future studies are scheduled for the mapping and economic appraisal of Paleozoic sediments within the district.

Reefal carbonates of Middle Devonian age constitute the units of economic importance in the Northern District. Mapping of the facies fronts and reefal distribution have been compiled integrating the new with previous work and incorporating available seismic data when applicable. In addition to the Devonian, other units within the stratigraphic section are under consideration for evaluation as to their economic worth.

C. Drilling Highlights

Exploratory drilling in the Province for 1971 resulted in 19 new pool discoveries from a total of 92 wells classified as exploratory in accordance with the Lahee System. This drilling activity was highlighted by a success ratio of approximately one successful completion for every four wells drilled. With the possible exception of the Home et al Attachie multiple-zone gas well, the listed oil and gas discoveries fall within the new pool discovery classification and are of limited areal extent. The Attachie well located in 7-20-84-22 W6 recovered gas from the Triassic Baldonnel Formation and the Mississippian Kiskatinaw Section. This latter gas indication may lead the way to a significant gas play to the south of the Triassic Inga oil field. Over 80 per cent of the discovery completions were drilled within the proximity of Fort St. John. This area offers the prospects of multiple-zone objectives with a limited deferment on return of investment from successful completions.

The search for new reserves within the disturbed foothills belt was disappointing after last year's successful gas discovery at the LRI Grassy d-52-A/94-G-6 location. The objective Mississippian and Devonian horizons are complicated by facies changes and structural deformation of en-echelon folds by thrust faulting.

Winter drilling results for Middle Devonian gas in the Fort Nelson area resulted in the addition of four minor new pool discoveries. Two of these completions were drilled as outpost wells to previous gas discoveries and thus resulted in the addition of a minimal amount of new reserve.

The results of development drilling for the extension or addition to proven reserves were minimal for the lack of significant discoveries. The limit of the Laprise gas field was extended to the northwest with three successful completions. Other established fields which received limited development drilling include Rigel, Aitken Creek, Clarke Lake, and Siphon.

The major portion of development drilling centred within the limits of the Boundary Lake oil field for the purpose of enhanced recovery by means of a secondary-pressure maintenance scheme.

The following tables summarize the discoveries made during 1971:

Oil Discoveries, 1971

Well Authorization No.	Well Name	Location	Total Depth (Ft.)	Productive Horizon
2856	Bralorne et al Elm b-62-C	b-62-C/94-H-7	3,840	Halfway.
2915	CIGOL et al Beatton d-11-K	d-11-K/94-H-2	3,810	Halfway.
2909	POR Ashland Beatton d-9-J	d-9-J/94-H-2	3,800	Halfway.
2834	Tenn et al W Weasel d-71-C	d-71-C/94-H-2	3,890	Halfway.
2848	Union HB Drake b-82-E	b-82-E/94-H-1	3,560	Halfway.

Gas Discoveries, 1971

2863	Anadarko Cdn-Sup Buick c-32-I	c-32-I/94-A-11	3,585	Bluesky-Gething.
2869	GraMic Forest Buttes Velma d-15-E	d-15-E/94-H-8	3,480	Bluesky-Gething.
2995	Pacific Westcoast Pouce 7-30-80-13	7-30-80-13 W6M	4,786	Bluesky-Gething.
2971	Scurry ML Cecil 6-31-84-17	6-31-84-17 W6M	6,242	Charlie Lake-Baldonnel.
2989	Westcoast et al Goose 6-5-85-21	6-5-85-21 W6M	5,510	Inga.
2999	Pacific Stoddart 6-22-86-20	6-22-86-20 W6M	6,410	Halfway.
2861	Union HB Balsam d-77-H	d-77-H/94-H-2	3,715	Halfway.
2992	Wainoco Francana Pluto 10-27-85-17	10-27-85-17 W6M	6,029	Belloy.
2961	Home et al Attachie 7-20-84-22	7-20-84-22 W6M	9,364	Baldonnel-Kiskatinaw.
2993	SOC et al Jeans d-75-A	d-75-A/94-A-13	6,950	Dunlevy-Debolt.
2881	Dome et al Peggo d-79-A	d-79-A/94-P-7	6,428	Slave Point.
2902	Huber Quintana et al Shekilie a-74-G	a-74-G/94P-8	6,322	Slave Point.
2839	GAOL GERC Helmet c-40-K	c-40-K/94-P-7	6,131	Slave Point.
2884	Pacific Sextet c-22-K	c-22-K/94-I-12	6,850	Slave Point.

D. Exploration

In northeastern British Columbia during 1971, 28 oil and gas companies employed seismic crews for a total of 220 crew weeks. During February, the most active month, 20 crews were working. Seven companies ran gravity surveys in northeastern British Columbia—one of these companies also completed a ground-magnetometer survey.

In the Fernie area, one company did seismic work. One company employed a seismic crew on northwestern Vancouver Island during part of October.

Surface geological parties worked in northeastern British Columbia and Fernie areas. These exploration activities are listed in Tables 14 and 15.

During 1971, 97 work-requirement reports on oil and gas permits or leases were submitted to the Department by operating companies. These reports represent exploration expenditures of over eight million dollars for work done by the companies in sedimentary basins of British Columbia and they contain comprehensive geophysical and geologic coverage. Most of the reports were on seismic-reflection work done in northeastern British Columbia during 1970 and 1971. Other types of exploration reported for northeastern British Columbia and other basins in the Province included marine seismic, surface geology, photogeology, magnetometer, and gravity.

RESERVOIR ENGINEERING SECTION

A. General

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. These parameters are used in studies to forecast the oil and gas recoverable from hydrocarbon accumulations in the Province. The results from such 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.

B. Oil Allowables, MPRs, and Improved Recovery Schemes

Maximum permissive rates (MPRs) are assigned to all oil wells in the Province, either as individual wells or as groups of wells in the form of project or unit

MPRs. Single well MPRs are based on well-bore net-pay properties, while project MPRs are derived from mapped pore volume data and the estimated recovery factor for the production scheme in effect.

Monthly oil allowables are established from MPR values, and periodic checks are made to ensure that wells and projects are being produced in accordance with regulations governing overproduction. Division 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 is due to forces outside the control of the operator involved. During the year three requests for such a carry-forward were approved, and one was rejected. One application was approved which sought permission to produce three wells in the Inga field at rates in excess of their daily production limits. Basis for the application was the fact that the production limits were so low that production could not be maintained due to the wells waxing-off. Consequently permission was granted to produce the wells at the lowest rate at which wax build-up did not occur, provided that the wells were shut-in each month following production of the monthly allowable.

Table 16 presents the individual well and project MPRs in effect as of December 31, 1971. The areas included into projects or units are shown on the maps following Table 15.

During 1971, in addition to the individual well MPRs assigned or revised, modifications were made to the MPRs or operating schemes for a number of projects. The water injection plant in Inga Unit 1 was enlarged during the early part of the year, in order to handle increased rates to offset concurrent production of the main gas cap. This proposal was discussed in the 1970 Annual Report. On April 10, 1971, concurrent production commenced, with gas being produced from Inga Unit 3.

The rejection of an application for concurrent production of oil and gas in Milligan Creek Unit 1 was noted in the 1970 Annual Report. In the first half of 1971, considerable further discussion took place with the operator of the unit, Union Oil Company of Canada. It was proposed that the well, previously designated as a gas producer under the concurrent production scheme, be produced as a stand-by source of gas for the oil-well gas-lift system. A scheme under which the well was to be used alternatively for gas storage and then as a gas-lift source was also discussed. All schemes foundered on the fact that the operator did not control the full spacing area of the well.

Also noted in the 1970 Annual Report was a submission with respect to production from the Charlie Lake oil pool in the Fort St. John field, together with a counter-proposal by the Branch. This was accepted by the applicant, Pacific Petroleums Ltd. A unit was formed on May 1, 1971, and the gas-gathering scheme became operative on August 9, 1971. Consequently an MPR of 334 BOPD was granted the unit, effective August 1, 1971, and at the same time approval was given for the unit-wide gas-oil ratio adjustment factor to be determined from Table 2000 in the schedule included in the Drilling and Production Regulations. The use of this schedule was approved for an initial period of three years.

The installation of a waterflood scheme in Inga Unit 2 was approved on April 23, 1971. This proposal also was discussed in the 1970 Annual Report, at which time a suitable water source had not been developed and plans for disposition of associated gas production had not been finalized. By the time the scheme was approved a dam was nearing completion, across Coplin Creek, which would provide ample water for the scheme. Gas conservation aspects of the scheme are discussed in Section C following. Actual water injection commenced in July, at which time

an MPR of 6,705 BOPD was granted. In December an application for an increase in MPR was received, on the strength of an enlargement of the unit scheduled for January 1, 1972, at which time seven additional tracts were to be included. An MPR of 7,489 BOPD was granted, to become effective at the time of enlargement.

Approval of a waterflood scheme in Crush Unit 1 was noted in the 1970 Annual Report. After source-water equipment problems have been overcome injection will start early in 1972, with the previously approved MPR of 1,383 BOPD in effect.

A gas-cap drive project, the Peejay North Project, was established in June (Map 22). This followed consultation with, and application by, Pacific Petroleums Ltd., the operator. The project was formed in order to optimise hydrocarbon recovery from the pool, and was granted an MPR of 42 BOPD. Also in the Peejay field, an additional injection well in Unit 3 was approved in March.

At the end of June, Canadian Superior Oil Ltd., as operator, applied for permission to concurrently produce the central gas cap in Inga Unit 1. It was claimed that this was necessary in order to minimize adverse effects on oil recovery from the waterflood project due to migration of the gas cap. Review of the situation indicated that oil recovery could probably be enhanced by controlled production of the gas cap. Consequently, the proposal was approved in September, subject to certain conditions, including a maximum average offtake rate of 1.5 MMSCF/D and the requirement that gas production be replaced on a reservoir volume basis by additional water injection into wells in the vicinity of the gas cap.

Also in the Inga field, adjustments were made to the MPRs previously granted to three wells operated by Texaco Exploration Canada Ltd. These wells were not included into Unit 2, and consequently the net oil pay thickness values were re-evaluated on the basis of data developed in connection with the Inga Unit 2 waterflood proposals. These modifications were made in July. However, an application was rejected which sought to increase the recovery factor, used in the MPR formula, for all wells on the Texaco leases outside the Unit 2 area. Later, in October, the daily production limits for three wells on the leases were waived temporarily, so that productivity index data could be obtained in order to assist in the design of a waterflood scheme for the acreage.

In July, Imperial Oil Limited applied for enlargement of Boundary Lake Unit 1. An unusual aspect of this proposal was the intention to unitize across the British Columbia/Alberta border, and to enlarge the waterflood presently operating in British Columbia into the Alberta portion of the pool. After consultations on the proposal it was abandoned in September, since the Alberta authorities could not approve the scheme. The Unit was subsequently enlarged (October 1, 1971) by inclusion of six tracts within British Columbia. No modification was made to the MPR.

In May, approval was granted for Pacific Petroleums Ltd. to conduct a 30-day production test of the well in d-30-A/94-H-2. The purpose of this test was to establish the well's productive characteristics. Union Oil Company of Canada Limited applied in July for permission to exceed the daily production limit on the well in b-65-G/94-H-2. Purpose of this request was to perform a stabilized two-rate flow test on the well. After consultation it was agreed that the requisite data could in fact be obtained without exceeding the daily production limit.

An application was received in August, from Tenneco Oil and Minerals Ltd., seeking approval for an annual allowable for the well in d-71-C/94-H-2. It was claimed that muskeg conditions in the area limited the well to winter operation only, and that the reserves in the producing Halfway pool were not sufficient to support a pipe-line. The Branch's interpretation of the situation confirmed the applicant's

views, with one exception. It appeared that there was a good possibility the oil reservoir was more extensive than was considered in the application. Consequently, although an annual allowable was granted, its term was limited to two years. The approval stipulated that sufficient data were to be collected, during this period, to enable a realistic estimate to be made of the size of the reservoir. The annual allowable was based on the MPR of 56 BOPD, with a maximum daily limitation of 100 BOPD.

C. 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. In addition, many oil pools are discovered in which the oil is originally overlain with a gas cap. In these it is often impossible to produce the oil without also producing some gas-cap gas, together with the solution gas. This could adversely affect 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. Such 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, or the gas-oil ratio adjustment factor may be modified if gas is conserved. However, in the case that gas-cap gas is to be marketed, the Branch needs to be satisfied that such concurrent production will optimise hydrocarbon recovery.

At the beginning of 1971, 10 conservation schemes were in operation that marketed gas, and five projects, involving return of gas to the producing reservoir, were active. During the year, five additional gas-sales conservation projects were placed on stream, so that, by year-end, pools accounting for 95 per cent of associated gas production were subject to conservation.

The split gas injection-gas sales conservation project in Weasel Unit 1, discussed in the 1970 Annual Report, started delivering gas to market in February 1971 following compressor overhaul. Prior to this time all compressed gas was injected into the gas cap. By the end of 1971, plans were being made to cease gas injection entirely and to replace all reservoir withdrawals by water, after increasing the capacity of the water-injection plant.

Details were presented in the 1970 Annual Report of the discussions between the Branch and the working interest owners in Peejay Unit 3 (Map 22) concerning the feasibility of gas conservation in this project. These were continued during the first quarter of 1971. In March the proposal by the unit operator, Pacific Petroleums Ltd., was accepted. Under this scheme, solution gas in excess of fuel requirements would be collected from Peejay Units 1 and 3 and the Pacific/Arco project, compressed at a central location, and delivered to the Northeast British Columbia Gas Gathering System. The plan was to collect from Unit 3 only 26.08 per cent of the excess gas, this being the share owned by the working-interest owners willing to participate in the collection and compression costs. Simultaneously with the acceptance of this plan, the other working-interest owners in Unit 3 were ordered to conserve their excess solution gas. This order stipulated that a plan and schedule for effecting this conservation were to be filed with the Branch by April 30, 1971.

On April 15, 1971, a proposal was received from Tenneco Oil & Minerals Ltd., on behalf of the other working-interest owners in Peejay Unit 3. This was formalized on April 26 in the form of an application. The proposed scheme involved collecting and compressing 73.92 per cent of the excess gas. It was then planned to inject the gas into one of the water-injection wells, the actual location of which would depend on the results of a computer simulation study then in progress. Alternatively, if the study indicated gas injection would be detrimental to waterflood performance, the gas would be delivered to the Northeast British Columbia Gas Gathering System. This alternate plan was finally adopted, and the plant was in operation by year-end. Meanwhile the Pacific-operated compressor station began operating in May 1971. In addition to the planned-for 26.08 per cent of the gas from Unit 3, some additional gas from this unit was also processed up to compressor capacity, the volumes of this additional gas being dependent on the volumes available from other sources.

In June, an application was received from Monsanto Oils Ltd. for approval of a gas-sales conservation scheme involving production from the Rigel field well in 6-31-87-17 W6M (Map 24). The application also requested credit for all gas so conserved in computation of gas-oil ratio adjustment factors. This submission was based on the contention that operation of the well would not be economical otherwise. In addition, removal of the MPR from the well was requested. The scheme was approved in July, together with the provision that gas credits would be granted for all gas gathered and sold or used to fuel the compression and dehydration facilities. The MPR, however, was not removed.

Some discussions took place early in the year, between the Branch and Monsanto Oils Ltd., with respect to the first gas-conservation scheme in Rigel (Map 24), which was placed on stream during 1970. Some clarification was required concerning the gas credits to be applied in determination of the gas-oil ratio adjustment factors. Effective February 1, 1971, approval was granted for such credit to be obtained for all gas collected and sold together with the gas used to fuel the compression and dehydration facilities.

The installation of a waterflood in Inga Unit 2 was discussed in Section A. It is the policy of the Branch to require from the operator of a proposed improved recovery project a statement concerning disposition of associated gas production. If it is not considered economic to conserve the gas, then justification for this contention is required. Otherwise, a submission for a gas-conservation scheme is required, following the guidelines included in the Drilling and Production Regulations booklet. In January, Amoco Canada Petroleum Company Ltd. applied, as operator of Inga Unit 2, to flare all produced gas in excess of fuel requirements. Following discussions on the topic, this application was withdrawn in favour of a submission seeking approval of a gas-conservation scheme. It was proposed that all gas in excess of fuel requirements would be collected, compressed, and delivered to Westcoast Transmission Company Ltd.'s line on the western boundary of Inga Unit 1. The application was received in October and the scheme was approved on October 14, 1971. It was placed on stream on November 24, 1971. Gas credits were allowed for all gas collected and sold, together with the gas required to process the sales gas.

As noted earlier, by the end of 1971 the majority of the associated gas produced in the Province was subject to a conservation scheme. Of the gas available to these schemes during 1971 (or from the date of plant start-up in the case of schemes coming on stream during 1971), an average of 78 per cent was conserved or used as fuel.

D. Gas Allowables and Well Tests

The "daily gas allowables," or production rate limits (PRLs), for gas wells in the Province are established from the results of absolute open flow potential (AOF) tests. These tests are witnessed by Branch field personnel and the data collected are interpreted by the Reservoir Engineering Section to establish PRLs and also for use in reservoir engineering studies.

Restriction of individual well production rates is not considered 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 Practices" (GEP). Table 17 presents AOF test data, individual well PRLs, Project Allowables, and GEP schemes in effect at year-end 1971. The areas included in the various Project Allowable and GEP schemes are shown on the maps following Table 15.

During 1971, well-testing schedules were reviewed for a majority of the gas pools in the Province. Where necessary, for evaluation test purposes, flaring of the test-gas production was allowed (seven wells). The computer programme (mentioned in the 1970 Annual Report) was finalized early in the year, and is now used routinely to calculate AOF and PRL data from field-read temperature and pressure data.

Evaluation of the wells completed in the Sunrise field continued to present problems in 1971, as in 1970. However, three AOF tests were performed during the year, and the reservoir pressure was obtained in a fourth well.

In January, Texaco Exploration Canada Ltd. applied to produce the well in d-76-A/94-H-4 as a Baldonnel gas well. This well, located in the Nig Creek field, was drilled in August 1970, and as discussed in the 1970 Annual Report, was considered to be completed in a gas cap to the oil accumulation in d-87-A/94-H-4. Texaco's application claimed the wells were completed in separate reservoirs. In order to resolve the situation, the well was granted a temporary PRL of 2 MMSCF/D so that representative fluid-production rates could be obtained, together with fluid samples from both wells. Analysis of these samples confirmed that the wells were in fact producing from separate reservoirs, and the well in d-76-A/94-H-4 was therefore included into the Nig Creek Baldonnel Project (Map 20).

Woods Petroleum of Canada Ltd. applied in February for enlargement of the Rigel Dunlevy Project to include sections 8 and 9-88-18 W6M. Following review of relevant data, the project was enlarged as requested on February 17, 1971 (Map 23).

At the beginning of April, Atlantic Richfield Canada Ltd. applied for removal of production rate restrictions from Baldonnel and Halfway zone gas wells in the Julienne field. Following advertisement of the application in the *Gazette* and detailed review of the reservoir performance by the Branch, the application was approved effective May 15, 1971. Under this approval, Baldonnel and Halfway Projects were formed in the Julienne field (Map 16). Consequently, all wells presently producing or subsequently completed in either of these pools in the project area are to be produced according to good engineering practices.

The Wilder Unit 1 was formed in October 1971 (Map 26). Prior to this, an application was received from the proposed unit operator, Wainoco Oil and Chemicals Limited, requesting a Pool Allowable of 9 MMSCF/D for wells completed in the Halfway pool of the field. After review by the Branch, and advertisement in the *Gazette*, a pool allowable of 10 MMSCF/D was approved on September 8, to become effective upon formation of the unit. Subsequently, this rate was increased

to 12.5 MMSCF/D, following application from Wainoco, in order to provide operating flexibility within the maximum daily-take contract rate.

During 1971, considerable discussion and correspondence took place between the Branch and the operators of several gas wells concerning the interpretation of AOF test readings. All problems were resolved satisfactorily. In addition, testing procedures employed in the Beaver River field were reviewed, and as a result several modifications were sanctioned in March. It was expected that these would simplify the testing procedures and reduce their cost, without reducing the accuracy of the results.

Further discussions took place during 1971 between the Branch, the Resource Management Division of the Canadian Department of Indian Affairs and Northern Development, and Amoco Canada Petroleum Company Ltd., concerning the operation of the Nahanni pool, Beaver River field. During the year, lease consolidation was accomplished in that portion of the field underlying the Yukon Territory, and by year-end a draft agreement had been formulated. It was mutually agreed that operation of the field on a unitized basis would provide optimum technical, economic, and conservation advantages. The draft agreement, to be signed in final form by the Federal Minister of Indian Affairs and Northern Development and the Provincial Minister of Mines and Petroleum Resources, set out the terms under which this was to be accomplished. These included provision for total field production to be allocated between the British Columbia and Yukon portions of the field in proportion to the initial gas in place underlying each. As of December 31, 1971, the draft agreement was being reviewed by officials of the Federal Government.

Meanwhile, the field was placed on steady production in October 1971, gradually increasing the throughput of the dehydration plant until it was up to capacity with all wells producing by mid-November. In order to provide sufficient operating flexibility during this stage, individual well PRLs were lifted on a temporary basis during October and November. This time limit was subsequently extended, so that contract-rates could be met in spite of a variety of operational problems encountered in handling the hot, high-rate, gas streams. In addition, approval was granted to flare 800–1,000 MSCF/D regeneration gas from the molecular sieve fuel-gas treaters, until a water-contamination problem in the sieves had been cured.

E. Hydrocarbon and Associated Sulphur Reserves

The Provincial reserves of oil, gas, and gas by-products, as of December 31, 1971, are summarized in Table 18. Details of pool-by-pool estimates are published in the Departmental report *Hydrocarbon and By-products Reserves in British Columbia, December 31, 1971.* This report includes individual pool rock and fluid property data. Complementary reservoir fluid data are presented here in Tables 19 and 20, for oil and gas reservoirs respectively.

The proved oil reserves in the Province as of December 31, 1971, are estimated at some 183 MMSTB. Drilling during 1971 proved-up only 0.7 MMSTB of reserves, while revisions to previous estimates reduced these by 23.6 MMSTB. In addition, 25 MMSTB were produced during the year, resulting in a net decrease in proved reserves of 48 MMSTB when compared with reserves at the end of 1970.

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 147.6 MMSTB, as of December 31, 1971, which is 53 MMSTB more than the estimate made for year-end 1970.

The substantial decrease in proved reserves is the result of a complete geological/reservoir engineering re-evaluation of the Boundary Lake zone, Boundary Lake field, undertaken during 1971. This study indicated that the reservoir volume was considerably less than previously mapped, so that the proved reserves were reduced by a total of 33 MMSTB. Revisions to other reservoirs resulted in a net increase of 9.4 MMSTB. The bulk of this increase was due to an upward revision in the Milligan Creek Halfway waterflood recovery factor (based on performance review) and an increase in the recovery factor assigned to Inga Unit 2 following implementation of waterflooding.

The increase in probable reserves also results from the Boundary Lake re-evaluation. Detailed waterflood performance calculations indicated that a substantial upward revision in recovery factor was justified. In spite of the reduced reservoir volume this resulted in an increase of 51.8 MMSTB of probable reserves. Other increases allocated, for example, to the Inga field as a result of waterflooding going into operation, were largely offset by a transfer of the probable reserves into the proved category in the Milligan Creek Halfway pool. Drilling during 1971 resulted in an addition of 0.9 MMSTB to the probable undrilled reserves.

The 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, 1971, the established raw gas reserves are estimated at 9.9 TSCF. Adjustment for removal of a percentage of the liquid hydrocarbons and acid gases results in established residue gas reserves of 8.6 TSCF, or 8.8 TSCF when converted to a standard heat content of 1,000 Btu/SCF. These volumes are virtually the same as the corresponding estimates at the end of 1970, due to the fact that gas production during the year was slightly in excess of any increases in reserves attributable to drilling or revisions of previous reserves estimates. These latter were, for the most part, very minor, with the result that they accounted for a net raw-gas reserve increase of only 0.03 TSCF. The reserves additions due to 1971 drilling were estimated at 0.3 TSCF, the bulk of which (80 per cent) were in the general Fort St. John area. Major additions were attributed to four wildcat wells, the data from which are still confidential, while development drilling in the Laprise, Siphon, and Stoddart West fields accounted for some 80 BSCF of the additions.

The estimates shown in Table 18 include associated gas reserves where a gas-sales type conservation scheme was in effect. As discussed in Section C, additional schemes were placed on stream during 1971 in the Fort St. John Charlie Lake pool, Inga Unit 2, Peejay Units 1 and 3 and Pacific/Arco Project, and the Dunlevy B pool in the Rigel field.

Natural gas liquids reserves at year-end 1971 are estimated at 112 MMSTB, down only 12 MSTB from the 1970 estimate. Although 1971 drilling resulted in additions of 5.4 MMSTB, these were just offset by cumulative production adjustments and negative revisions to previous estimates of 1.2 MMSTB, together with production of 4.2 MMSTB during the year. A major revision was made to the reserves in the Boundary Lake zone, Boundary Lake field, partly as a result of the study referred to earlier, but mainly as a result of re-evaluation of the analysis of the produced gas.

Estimated sulphur reserves, at 4,046 thousand long tons, were also marginally down at December 31, 1971, when compared with year-end 1970. The decrease

of 18 thousand long tons was due to cumulative production adjustments and negative revisions to previous estimates of 10 thousand long tons, which, together with production during 1971 of 95 thousand long tons, also just offset the additions due to 1971 drilling of 87 thousand long tons. Sulphur reserves have again been included for pools serviced by the Fort Nelson gas plant, on the strength of National Energy Board approval for installation there of sulphur extraction facilities.

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 1971 are included in footnotes to Table 18. The low apparent 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.

F. Miscellaneous

Applications for permission to dispose of produced salt water into a subsurface formation are reviewed by the Reservoir Engineering Section, although the actual mechanical completion of the disposal well is approved by the Development Engineering Section. In reviewing applications several factors are considered, such as the compatibility between injected water and receiving-zone water, the water quality in the disposal zone and the effect on this of the injected water, and whether the planned water disposal will be prejudicial to hydrocarbon reserves either in the planned disposal zone or in other zones penetrated by the disposal well. In addition, when disposition of water into a hydrocarbon productive zone is planned, consideration is given to the probable effect on reservoir performance, and the flood-out pattern and time of breakthrough of injected water into adjacent producing wells. Equity considerations of adjacent lessees are also taken into account.

During 1971, two new water disposal schemes were approved, and modifications were also approved to an existing scheme. In the Beaver River field, permission was granted Amoco Canada Petroleum Company Ltd. to dispose of water, produced from the Nahanni gas reservoir, into the Mattson sand through the well located in d-64-K/94-N-16. This approval was contingent on there being no significant produced volumes of Nahanni formation water (as opposed to water of condensation). A water-disposal scheme was also approved in the Wilder field. Wainoco Oil & Chemicals Limited applied to dispose of water, produced from the Halfway zone in this field, into the Dunlevy zone in the well in 7-30-83-19 W6M. Permission was granted in early September 1971. In the Nig Creek field, the water-disposal system at a-31-F/94-H-4 was modified twice during 1971. Under terms of a previous approval (1969 Annual Report) water produced from the Inga field has been disposed of through this facility on an interim basis, together with Baldonnel water produced from various wells in the Nig Creek field. In January 1971, the terms of this approval were widened to allow disposal under pressure, where previously disposal under gravity-feed had been in effect. In June 1971, a further modification was made, following a request from Tenneco Oil & Minerals Ltd. Under this, approval was granted for produced Baldonnel water from the well in d-39-C/94-H-4 to be disposed of through the system in a-31-F/94-H-4.

At the end of March, an application was received from Pacific Petroleums Ltd. requesting temporary waiver of the requirement that gas rates be measured on an individual well basis for four wells in the Kotcho Lake field and two wells in the Yoyo field. Basis for the request was the fact that delays were being experienced in delivery of special electronic equipment necessary for telemetry of pressure and

temperature data from the remote wellhead metering facilities to the central dehydration plants. Approval was granted to meter the two sets of wells through group facilities, until June 30, 1971, or earlier if the electronic equipment came into service prior to that date. In fact, this approval was not utilized. Other problems necessitated frequent visits to the wells in question, so that normal meter-run strip-charts of the required data were collected on a regular basis until the telemetry system was completed.

The 1969 Annual Report contained details of the installation of integrating orifice meters with digital readout on the Northeast British Columbia Gas Gathering System. During 1971 the first report was received on the efficacy of the installation at the point of custody transfer to Westcoast Transmission Company Limited, from which it was apparent that following some initial problems, the equipment appeared to be operating satisfactorily. Data concerning the meters at injection points into the system have not yet been received by the Branch.

The use of vortex-velocity type meters was approved, during 1970 (*see* Annual Report), for use on the oil-water emulsion lines at the Peejay-Crush battery. In use, these meters were less than satisfactory, and were withdrawn from service in 1971.

Two gas-metering facilities operated by Canadian Superior Oil Ltd. were approved in the Inga field during 1971. Permission was granted, in April, to locate the metering facility for Inga Unit 3 production at the delivery point to the Westcoast Transmission Company Limited's line, rather than at the wellhead. This approval was given in the interests of operating efficiency, since total unit production is taken from only one well. Also in Inga, permission was granted in November to produce gas from the central gas cap (*see* Section B) through the associated gas-metering facility at the central battery.

Several reservoir studies were carried out during 1971, some being of a comprehensive nature while others were more cursory reviews. The comprehensive studies usually involved a joint Economic Geology-Reservoir Engineering effort. Many of the studies were carried out in connection with review of submissions pertaining to planned producing schemes.

The waterflood performance prediction for Inga Unit 2, mentioned in the 1970 Annual Report, was completed early in 1971, together with a forecast of associated gas-production rates. This forecast was used to evaluate the economic feasibility of gas conservation in this unit, and a similar analysis was made for projects in the Peejay field in connection with the discussions pertaining to Peejay Unit 3 detailed in Section C. By the end of 1971, detailed waterflood performance predictions had been made for all oil reservoirs currently subject to this improved recovery mechanism. This includes the four projects in the Boundary Lake field, which due to its large size and consequent large volume of data, occupied a considerable part of the engineering-geological effort during the year. The waterflood potential of the Bluesky-Gething pool, Beatton River West field, was also evaluated during the year. This work was not completely finalized by year-end. Studies were also made during the year to evaluate the gas cap drive recovery factor in the Peejay North Project (Map 22) and to evaluate the effect, on oil recovery in Inga Unit 1, of blowdown of the central gas cap. During the year, rate-time forecasts of production were made for oil pools in the Province.

Detailed material balance calculations were made during 1971 for four gas fields in order to better evaluate the ultimate gas recovery. The pools examined were the Slave Point A and B pools in Clarke Lake field, the Halfway pool in Kobes-Townsend field, the Baldonnel A pool in Nig Creek field, and the Halfway pool in Willow field. Material balance calculations were also attempted in the Charlie Lake

pool, North Pine field, but results were inconclusive. A detailed evaluation of the Baldonnel and Halfway pools in the Julienne Creek field was made during the year. A similar study of the Cadotte pool in the Sunrise field was incomplete at year-end. The Charlie Lake oil pool, discovered in the Boundary Lake field during the year, was evaluated, and pressure build-up data were employed to assist in evaluation of the Boundary Lake zone oil discovery in the Flatrock field. Re-evaluations were made of four minor hydrocarbon accumulations which had been considered primarily to contain oil reserves. As a result of these studies it was concluded that exploitation as oil reservoirs was not feasible and consequently these pools were assigned established gas reserves for the 1971 reserves review. At the request of the Department of Agriculture, a preliminary review was made of developed gas supplies in the Rolla area, from the viewpoint of supplying a drying plant. An evaluation of potential gas supplies in the Mississippian formation in the general Beaver River area was also made.

During the course of the year meetings were held with many of the operators of oil- and gas-producing facilities in the Province, at which current operations were reviewed and planned improved recovery schemes were discussed. In addition, meetings were held with representatives of the National Energy Board and the Canadian Petroleum Association, at which the gas reserves situation in the Province was discussed. Progress reports pertaining to the projects listed in Table 16 were reviewed during the year, together with a progress report for the Slave Point Project in Clarke Lake.

Reservoir pressure survey proposals for a large number of oil and gas pools were reviewed during the year. By year-end, drafting of a "Memo to All Operators" was under way dealing with the subject of reservoir pressure surveys. The intent of this memo was to assign to each oil or gas pool a "co-ordinating operator," this operator to be responsible for organizing the annual reservoir pressure surveys. The results from several wellbore segregation tests were reviewed, and one application for nonsegregated completion in two zones was considered. This involved completion of the well in a-74-H/94-I-13 in both the Slave Point and Pine Point formations. The application was approved, on the basis that the Slave Point reservoir appeared to be of very limited extent; the approval is, however, subject to modification if further drilling in the area indicates a sizeable Slave Point reservoir.

The Reservoir Engineering Section continued to provide assistance and information to other government and industry personnel. The annual publication of pool-by-pool hydrocarbon and associated sulphur reserves was prepared during 1971, with details of the year-end 1970 estimates. Unfortunately, due to printing delays, the volume was not available prior to the end of 1971. The Section advised the Titles Branch with respect to the evaluation of 29 lease renewal applications during 1971, and also provided advice concerning the reservoir engineering aspects of unitization plans in Wilder Unit 1 and the enlargement of Boundary Lake Unit 1. A submission from Pacific Petroleums Ltd. was also reviewed at the request of the Titles Branch. The submission requested an increase in the gas transportation and processing deduction, allowed against royalty charged on associated gas-sales revenue, from the Debolt pool, Blueberry field.

Many requests for miscellaneous information were dealt with during the year. As in previous years, a map was prepared to show maximum detected hydrogen sulphide concentrations in produced gases. This map is on file in the Charlie Lake field office for the benefit of anyone working in the field. Several revisions were made to the Drilling and Production Regulations during 1971, the Reservoir Engi-

neering Section assisting in this where appropriate. Two staff members attended the annual technical meeting of the Petroleum Society of the Canadian Institute of Mining and Metallurgy.

DEVELOPMENT ENGINEERING SECTION

A. General

The Development Engineering Section is responsible for all matters related to the location, drilling, completion, and abandonment of wells. This involves the assurance that operators of all wells drilled in the Province conform to the requirements of the regulations and that the prescribed information is submitted to the Branch.

Well classifications are assigned by the Section to each proposed drilling location according to the definitions outlined in the Drilling and Production Regulations. 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 further than 4½ miles from any capable well and an exploratory outpost well is located in the area between development and wildcat wells. Development wells, and in certain instances exploratory outpost wells, are further classified as deep-pool or shallow-pool tests where undeveloped pools below or above the objective zone are being explored. The assigned classification is the basis used for the release of well information. Release of data for wildcat wells is made one year after the rig release date, while the information from all other classifications is available 30 days after the rig release date.

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 is 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.

In addition the Development Section collects and retains for use of Branch personnel and industry, all drilling and production records, as well as statistics on refineries, gas plants, and the various pipe-line networks located in the Province. Two monthly reports are prepared for distribution to interested parties and a Weekly Drilling Report is compiled to advise Departmental personnel of current activities.

The Section is also responsible for co-ordinating the updating of the Drilling and Production Regulations, as deemed necessary due to changes in techniques and procedures.

B. Drilling

Continued recovery in the drilling activity in British Columbia was noted during 1971. For the third successive year the annual footage increased over the previous year and for the first time in five years a moderate increase in the number of completed wells was recorded. The search for a significant petroleum or natural gas find continued. The last major success was the discovery of the Inga field in 1966. The 1971 drilling favoured locations within or near known pools rather than areas far afield. Total footage drilled increased by 10 per cent over 1970 to 989,650 feet. Development and outpost footages were up 12 and 36 per cent respectively while wildcat footage decreased 14 per cent.

All the drilling operations were conducted in the northeastern corner of the Province except one wildcat venture on the Queen Charlotte Islands which was abandoned. Several tests were drilled along the eastern foothills belt of the Rocky Mountains, providing some encouragement for future drilling. During 1971, a total of 66 operating companies employed 57 individual drilling rigs, which were owned by 18 contractor companies, to complete the drilling operations.

Wells completed increased 9 per cent to 197. Slightly less than half of the drilled locations were successful as 46 resulted in oil completions, 40 in gas wells, while 103 locations were abandoned.

As in previous compilations, if more than one zone is completed in a well, each productive zone is counted as one well. As four multiple gas completions were made in 1971, 193 wells were actually drilled. At the end of the year, two locations were awaiting evaluation to determine a final status and 29 wells were actively drilling. Six other locations were drilled and completed either to aid production schemes or to dispose of undesirable water, a frequent by-product of oil or gas production. Wells drilled and drilling are listed in Table 21 and monthly footages drilled since 1954 are shown graphically in Figure 2.

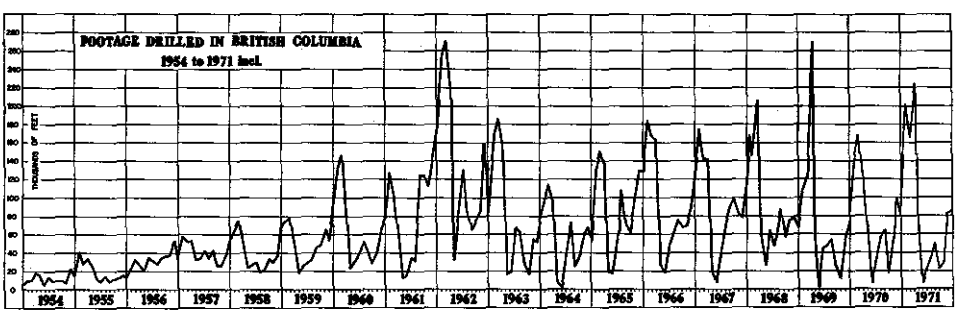


Figure 2. Footage drilled in British Columbia, 1954–1971.

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. During 1971, 229 workovers were performed on potential or producing wells in British Columbia.

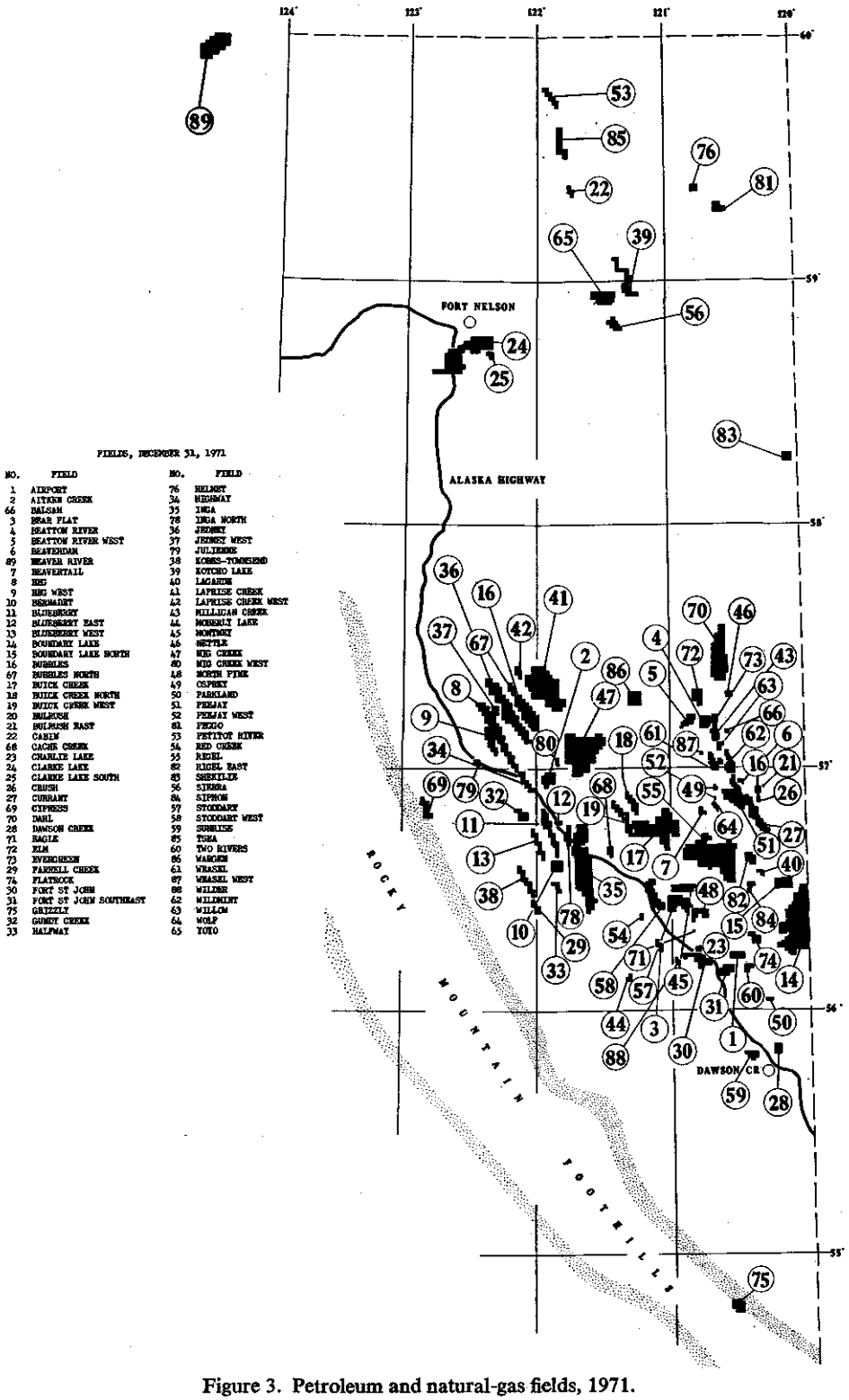


Figure 3. Petroleum and natural-gas fields, 1971.

Twenty-three new fields were designated by the Branch in 1971 and field boundaries were amended on four occasions. The new fields were at Balsam, Beaver River, Bubbles North, Cache Creek, Cypress, Dahl, Eagle, Elm, Evergreen, Flatrock, Grizzly, Helmet, Inga North, Julienne Creek, Nig Creek West, Peggo, Rigel East, Shekilie, Siphon, Tsea, Wargen, Weasel West, and Wilder. Field boundaries were changed for Beaver River, Flatrock, and twice for Siphon. The new policy to designate fields in areas where the Branch recognizes reserves is responsible for the large increase in the present number of fields. At the end of 1971, there were 88 designated fields which are listed in Table 22 and shown in Figure 3.

During 1971, 204 well authorizations were issued by the Development Section and four were cancelled where the operators decided not to drill the wells.

Disposal of salt water produced with petroleum or natural gas was accomplished by evaporation in surface pits or injection into subsurface formations. As only limited amounts are permitted to be stored at the surface, disposal facilities were installed at three additional wells during 1971. There were 4,264,111 barrels injected into the 21 disposal wells and 210,765 barrels put into evaporation pits during the year.

Water-flood operations to aid the efficiency of oil recovery continued in 10 producing pools in the Province. A total of 47,367,006 barrels, including both fresh and formation water, were injected into 145 individual injection wells. Fields receiving the largest volumes were Boundary Lake, 16,071,135 barrels; Peejay, 10,077,407 barrels; and Inga, 7,523,564 barrels.

C. Production

Production of crude oil from British Columbia oilfields during 1971 was 25,154,122 barrels, slightly less than the 1970 Provincial total. The major producing fields, all under active water-flood programmes, were Boundary Lake, 9,703,100 barrels; Peejay, 4,425,895 barrels; Milligan Creek, 3,152,309 barrels; Inga, 3,269,469 barrels; and Weasel, 1,262,756 barrels. Production from Peejay and Milligan Creek was reduced significantly from the 1970 volumes, recording decreases of 13 and 19 per cent respectively. A notable gain of 30 per cent was obtained from the Inga field while the Wildmint field increased 21 per cent to 821,213 barrels.

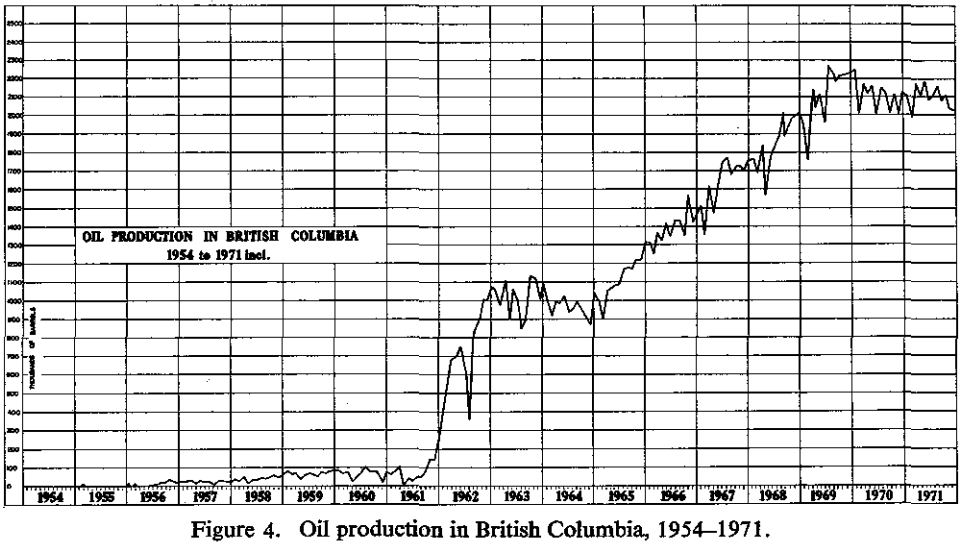


Figure 4. Oil production in British Columbia, 1954–1971.

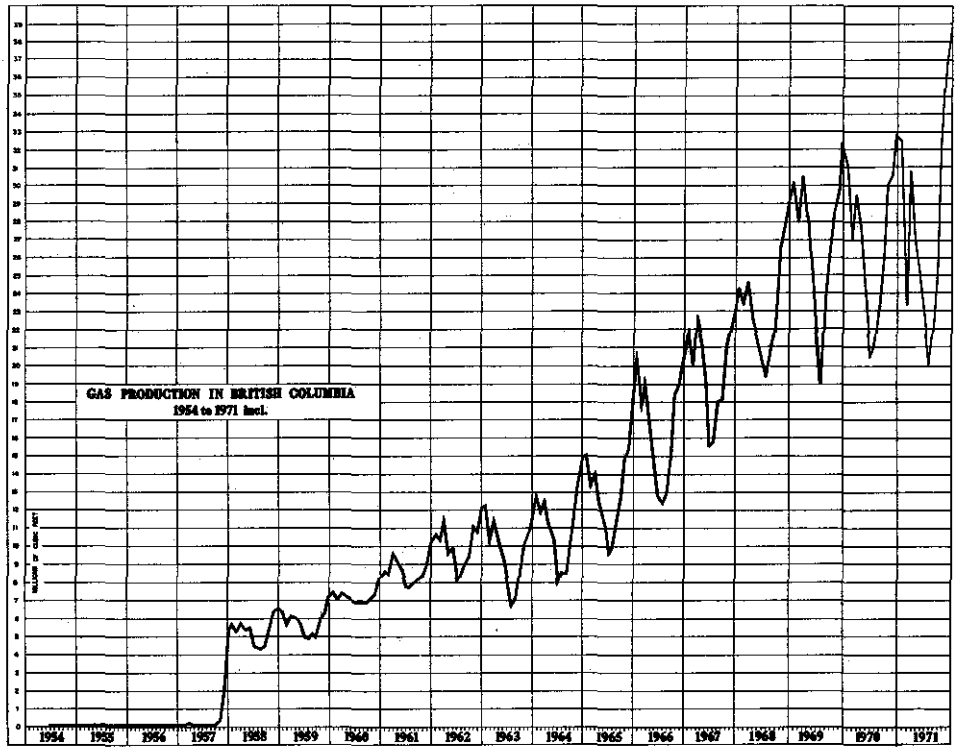


Figure 5. Gas production in British Columbia, 1954–1971.

Clarke Lake, although 10 per cent less than 1970, continued to lead the gas-producing fields in volume. The net production was 94,112,768 MSCF followed by Yoyo, 37,462,939 MSCF; Laprise Creek, 24,175,857 MSCF; Rigel, 22,805,490 MSCF; Nig Creek, 17,756,522 MSCF; and Jedney, 16,764,879 MSCF. The overall 4-per-cent increase in gas production from British Columbia was the result of additional pipe-line connections, particularly the line to the Beaver River field. Rigel and Stoddart reported increases of 39 and 23 per cent respectively but production from the major fields in the Fort Nelson area was down significantly. The Yoyo field production was 22 per cent less than in 1970, while Kotcho was decreased by 24 per cent.

Monthly crude oil and natural gas production by fields and pools for 1971 are given in Tables 24 and 25. Graphs of monthly production since 1954 are shown in Figures 4 and 5.

Butane sales were down appreciably because of decreased sales within the Province, while sales of propane recorded a marked gain principally due to an increase in internal distribution. Sulphur sales remained at the same level as during 1970.

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.

D. Pipe-lines, Refineries, and Gas Plants

Oil Pipe-line Systems

During 1971, throughput of the Tenneco Oil and Minerals line which serves part of the Inga field was increased from 2,300 to 3,000 barrels per day.

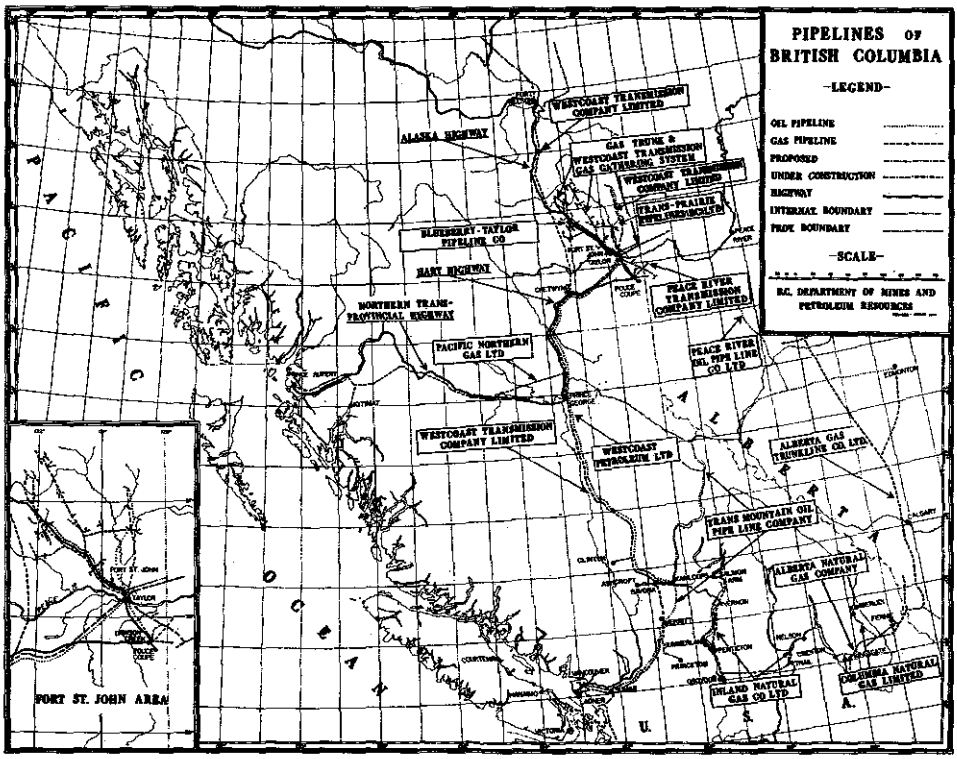


Figure 6. Petroleum and natural gas pipe-lines.

Gas Pipe-line Systems

A revision to the company name of the oil transmission-line between Taylor and Kamloops was reported to the Branch. The company is now known as Westcoast Petroleum Ltd.

No changes were made to the gas-gathering systems during the year. The gas transmission-line delivering gas from the Beaver River field to Westcoast Transmission at Fort Nelson was put into operation. Westcoast Transmission Company increased capacities of their transmission-lines between the Fort Nelson area and the Taylor plant and between the Taylor plant and the Lower Mainland area to 740,000 MSCFD and 999,290 MSCFD respectively. Significant increases were completed to the Columbia Natural Gas distribution system bringing the capacity to 85,500 MSCFD.

Oil Refineries

No basic changes were made to the equipment or capacity of the refineries, although a moderate increase of 80,371 barrels was reported in the Provincial storage capacity.

Gas Plants

Completion of the dehydration plant in the Beaver River field was accomplished during 1971. Its initial output capacity is rated at 260 thousand MSCFD.

Sulphur Plants

A change of company name to Canadian Occidental Petroleum Ltd. was made for the sulphur plant 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.

E. 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 Subcommittee 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.

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 MPR—Individual Well.
9A.	Application for MPR—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.
36.	Confidential D.S.T. Report.
*7C.	Meter Inspection Report.
*7D.	Battery Inspection Report.
	†Monthly Natural Gas Distributor's Statement.
	†Monthly Report on Oil Pipe-line Gathering Operations.

* For departmental use only.
† Used in conjunction with the Dominion Bureau of Statistics.

F. Reports and Publications

Schedule of Wells

An annual volume was compiled and published giving all well information released during 1971. The data are arranged by geographical locations 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 three 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 reported 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 dispositions 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 1971

	Oil		Gas		Total Producers		Abandonments		Status Undetermined		Service Wells		Total	
	No.	Footage	No.	Footage	No.	Footage	No.	Footage	No.	Footage	No.	Footage	No.	Footage
New field wildcats	1	3,560	3	15,254	4	18,814	15	103,866	—	—	—	—	19	122,680
New pool wildcats	1	3,890	5	32,258	6	36,148	31	170,769	—	—	—	—	37	206,917
Deep-pool tests	3	12,370	17*	96,797	1*	2,566	—	—	—	—	—	—	1*	2,566
Outposts	1	4,920	9	46,719	10	51,639	26	139,615	—	—	—	—	36	191,254
Total exploratory wells	3	12,370	13*	96,797	20*	109,167	72	414,250	—	—	—	—	92	523,417
Total development wells	43	194,243	19	96,929	62	291,172	31	134,373	2	10,092	—	—	95	435,637
Subtotal	46	206,613	36	193,726	82	400,339	103	548,623	2	10,092	—	—	187	959,054
Other wells drilled (service wells)	—	—	—	—	—	—	—	—	—	—	6	30,596	6	30,596
Total	46	206,613	36	193,726	82	400,339	103	548,623	2	10,092	6	30,596	193	989,650

* One deep-pool test is not included in the well total as it is counted under Development.
There were four multiple gas completions which are counted as single wells.

TABLE 14—GEOPHYSICAL EXPLORATION, 1971

Seismic Surveys

NOTE—Unless otherwise shown, the exploration method used is the reflection seimic 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 Hess Corporation	94-N-8	1	2
Amoco Canada Petroleum Company	93-P-7, -10	1	0.3
Aquitaine Company of Canada Ltd.	94-O-1, -8, -9, -15	1	3.3
Atlantic Richfield Company	94-I-6, -10, -11, -14, -15	1	4
Canadian Reserve Oil and Gas Ltd.	94-J-S.E.	1	3
Canadian Superior Oil Ltd.	94-A-N.E.	1	0.9
Dome Petroleum Limited	94-P-7	1	1
Home Oil Company Limited	93-P-16	1	0.8
Hudson's Bay Oil & Gas Co. Ltd.	94-G-11, -14, -15	1	2.8
	94-H-3	1	3.8
	94-G-7		
	94-P-11, -14, -16	1	5.6
Leonard Refineries Inc.	94-G-7	1	2
Mobil Oil Canada Ltd.	94-J-13, -14	1	4.5
	94-O-3		
	94-O-5, -6	1	4
	94-N-1, -2, -7, -8		
Northern Oil Explorers Ltd.	94-I-5	1	1
	94-I-8		
Pacific Petroleums Ltd.	93-P-S.W.	1	2
	94-P-S.W.	1	2
	94-J-N.E.	1	1
	93-P- S.E.	1	3
Tenneco Oil and Minerals Ltd.	94-I-N.W.	1	3
Texaco Exploration Canada Ltd.	94-J-12, -13	1	3
	94-K-9, -16		
Union Oil Company of Canada Ltd.	93-I	1	5.7
	93-P	1	2.8
	94-B	1	0.3
February			
Amerada Hess Corporation	94-N-8	1	1
	94-O-6	1	1
	94-O-11	1	1
Amoco Canada Petroleum Company	93-P-7, -10	1	4
Aquitaine Company of Canada Ltd.	94-O-1, -8, -9, -15	1	3.3
Atkinson Petroleums Ltd.	94-P-1, -8	1	1
Canadian Industrial Gas & Oil Ltd.	94-A-12, -13	1	1.3
	94-B-9, -16		
	94-H-3, -4	1	0.6
Canadian Superior Oil Ltd.	94-A-N.E.	1	0.3
Cankee Gas Company	94-O-5, -6	1	0.5
Dome Petroleum Limited	93-P-1	1	3
Home Oil Company Limited	93-P-6	1	0.4
	93-P-11, -12	1	4
	93-P-13	1	0.3
	93-P-16	1	0.6
Hudson's Bay Oil & Gas Co. Ltd.	94-P-11, -14, -16	1	5.5
	94-G-15		
	94-G-10, -11	2	2.1
Leonard Refineries Inc.	94-G-2	1	3
	94-G-7	1	3
	94-P-7	1	1
Mobil Oil Canada Ltd.	94 I-12; 94-P-8	1	4
	94-K-9, -16; 94-N-1	1	4
Northern Oil Explorers Ltd.	94-I-5, 94-J-8	1	1
Pacific Petroleums Ltd.	93-P S.E.	1	3
	93-P-S.W.	1	2
	94-J-N.E.	1	1
	94-P-S.W.	1	2
Shell Canada Limited	94-A-1, -8	1	2
Texaco Exploration Canada Ltd.	94-B-9, -16	1	2
	94-J-12, -13; 94-K-9, -16	1	3
Union Oil Company of Canada Ltd.	93-P	2	7.1
	94-A	1	1
	94-B	1	1.3
	94-G	1	3
Westcoast Production Co. Ltd.	94-J-2	1	1
	94-P-11	1	1

TABLE 14—GEOPHYSICAL EXPLORATION, 1971—*Continued*

Seismic Surveys—Continued

Company	Location of Survey	Number of Crews	Number of Crew-weeks
March			
Amerada Hess Corporation	94-P-6	1	1
	94-P-11	1	2
Amoco Canada Petroleum Company	93-P-7, -10	1	1
Aquitaine Company of Canada Ltd.	94-K-15	1	0.6
	94-N-16	1	0.5
BP Oil and Gas Ltd.	94-P-2, -3, -7	1	1
Canadian Superior Oil Ltd.	94-J-12, -13	1	2.3
Central Del Rio Oils Ltd.	94-J-N.E.	1	2
Elf Oil Exploration & Production Canada Ltd.	94-H-5	1	1
Gulf Oil Canada Limited	93-P-S.W.	1	2.5
Home Oil Company Limited	93-P-6	1	1.6
	94-A-3, -6	1	2
	94-B-10, -15	1	1.4
	94-G-10, -11	1	0.8
Hudson's Bay Oil & Gas Co. Ltd.	93-P-11	1	1.8
	94-G-15 94-P-3, -4	1	5.6
Leonard Refineries Inc.	94-G-2	1	1
	94-G-14 94-J-3, -4	1	3
Mesa Petroleum Co.	94-J-9	1	1.5
Mobil Oil Canada Ltd.	94-B-15, -16; 94-G-13, -14 94-J-3, -4, -12; 94-K-9	1	4
	94-I-1, -2	1	1.5
	94-O-6, -10, -11, -14	1	1.5
Pacific Petroleums Ltd.	94-J-N.W. 94-K-N.E.	1	1
Union Oil Company of Canada Ltd.	93-P	1	2.2
	94-A	1	1.2
Westcoast Production Co. Ltd.	94-P-11	1	1
April			
Home Oil Company Limited	93-P-6	1	0.4
	94-G-10, -11	1	1.2
	94-A-3, -6	1	1
BP Oil and Gas Ltd.	94-P-2, -3, -7	1	1
Aquitaine Company of Canada Ltd.	94-O-9	1	0.5
June			
Pacific Petroleums Ltd.	94-A-S.E.	1	0.6
July			
Amoco Canada Petroleum Company	93-O-7, -10	1	1.8
Placid Oil Company	94-P-5	1	2
August			
Canadian Industrial Gas & Oil Ltd.	94-A-S.E.	1	1
Mobil Oil Canada Ltd.	94-J-6	1	1
September			
Central Del Rio Oils Ltd.	82-G-S.E.	1	2
October			
Chevron Standard Limited	102-I	1	1
Hudson's Bay Oil & Gas Co. Ltd.	94-J-15	1	1.5
Shell Canada Limited	94-A-S.E.	1	2.5
Canadian Superior Oil Ltd.	94-J-12, -13	2	3.6
November			
Shell Canada Limited	94-A-S.E.	1	1.5
Canadian Superior Oil Ltd.	94-J-3, -5, -6, -12	2	3
Northern Oil Explorers Ltd.	94-B-8	1	2
December			
Amoco Canada Petroleum Company	94-P-3	1	1
Hudson's Bay Oil & Gas Co. Ltd.	94-J-15	1	1
Mobil Oil Canada Ltd.	93-P-2	1	2
Shell Canada Limited	94-A-S.E.	1	1
BP Oil & Gas Ltd.	94-P-12	1	1
	94-O-15, -16	1	2
Canadian Superior Oil Ltd.	94-J-3, -5, -6	1	2.7
Aquitaine Company of Canada Ltd.	94-O-15	1	0.5
General American Oils Ltd.	94-P-N.W.	1	2

TABLE 14—GEOPHYSICAL EXPLORATION, 1971—*Continued*

Gravity Surveys

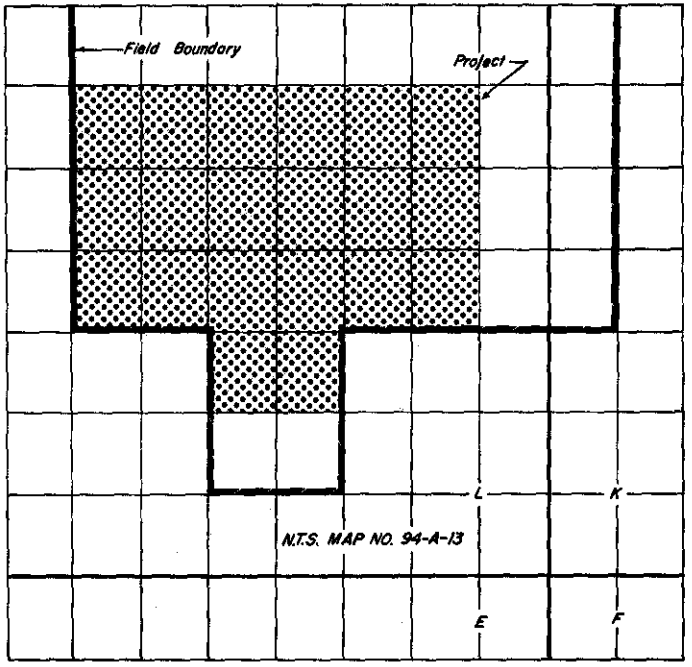
Company	Location of Survey	Number of Crews	Number of Crew-weeks
January			
Hudson's Bay Oil & Gas Co. Ltd.	94-J	1	0.8
Leonard Refineries Inc.	94-G-7	1	4
Texaco Exploration Canada Ltd.	93-P-1, -8, -9, -16	1	4
February			
Hudson's Bay Oil & Gas Co. Ltd.	94-J	1	0.8
Leonard Refineries Inc.	94-G-14	1	2
	94-J-3, -4		
Texaco Exploration Canada Ltd.	93-P-1, -8, -9, -16	1	4
March			
Hudson's Bay Oil & Gas Co. Ltd.	94-J	1	0.8
	94-J-15	1	0.5
Leonard Refineries Inc.	94-G-2	1	1
	94-G-14	1	2
	94-J-3, -4		
Texaco Exploration Canada Ltd.	94-B-9, -16	1	3
	93-P-1, -8, -9, -16	1	4
July			
Home Oil Company Limited	93-O-16	1	2.8
August			
Atlantic Richfield Company	94-B-9, -15	1	1
Home Oil Company Limited	93-O-16	1	4.1
September			
Getty Oil (Canadian Operations) Ltd.	94-J, K	1	2
Atlantic Richfield Company	94-B-15	1	4.3
Home Oil Company Limited	93-O-16	1	5.1
Westcoast Production Co. Ltd.	94-N-N.W.	1	2
October			
Atlantic Richfield Company	94-G-2	1	4.3
Home Oil Company Limited	93-O-16	1	4.8
Getty Oil (Canadian Operations) Ltd.	94-J, K	1	2
November			
Atlantic Richfield Company	94-B-15, -16	1	4.3
Home Oil Company Limited	93-O-16	1	2
Westcoast Petroleum Ltd.	94-N-N.W.	1	2
December			
Atlantic Richfield Company	94-B-15, -16; 94-G-2	1	2

Magnetometer Surveys

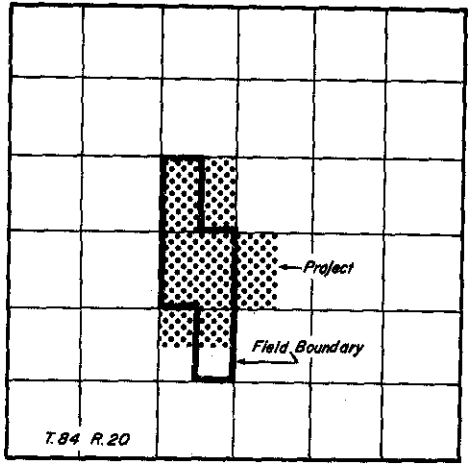
July			
Home Oil Company Limited	93-O-16	1	2.8
August			
Home Oil Company Limited	93-O-16	1	4.1
September			
Home Oil Company Limited	93-O-16	1	5.1
October			
Home Oil Company Limited	93-O-16	1	4.8
November			
Home Oil Company Limited	93-O-16	1	2

TABLE 15—SURFACE GEOLOGICAL EXPLORATION, 1971

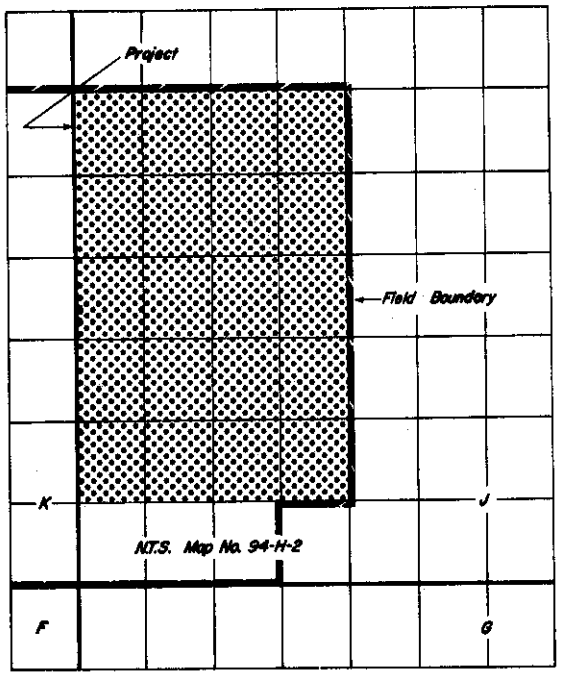
Company	Location of Survey	Number of Geologists	Two-man-party Weeks
January			
Leonard Refineries Inc.	94-G, J	1	0.2
February			
Leonard Refineries Inc.	94-J, N, O	2	1.6
June			
Amoco Canada Petroleum Company	93-P-4	2	4.3
	93-O-1, -7, -8		
	93-I-11, -12, -13, -14	3	5.1
	82-G-7	2	1
Mobil Oil Canada Ltd.	94-N-10, -14; 94-O-15	2	1
July			
Amoco Canada Petroleum Company	82-G-7, -10	5	9.2
	83-E, 93-H, I, O, P	6	11.4
August			
Amoco Canada Petroleum Company	82-G-7, -10	4	4.4
	83-E, 93-H, I, O, P	6	9.6



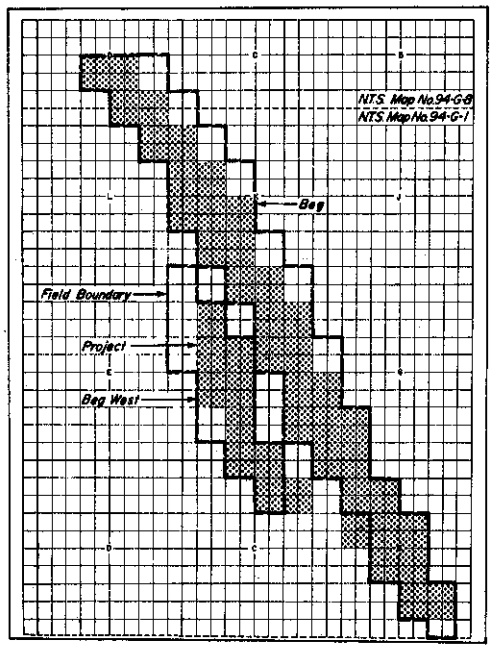
Map 1
UNION OIL PROJECT
GETHING ZONE
AITKEN CREEK FIELD



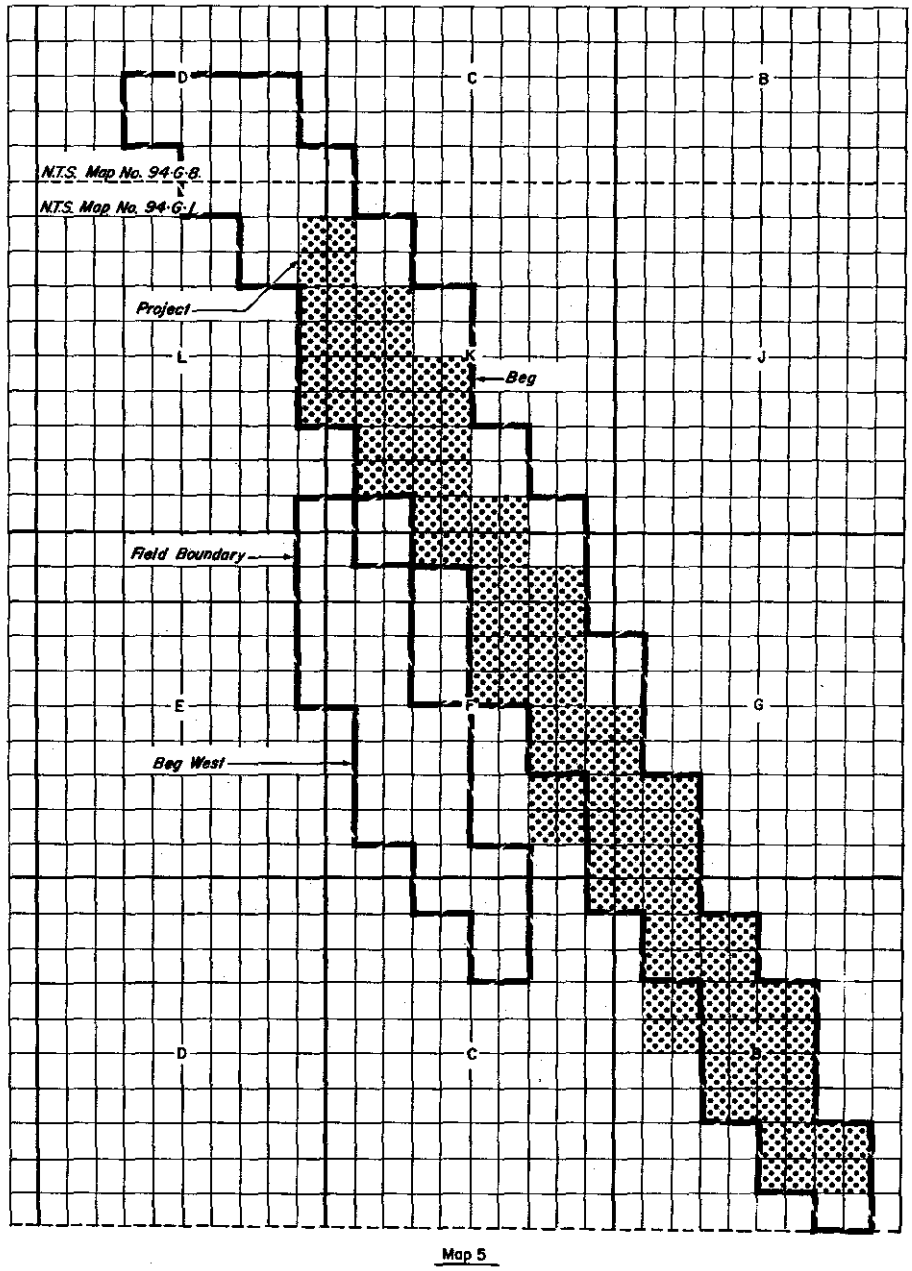
Map 2
MONSANTO PROJECT
CHARLIE LAKE ZONE
BEAR FLAT FIELD



Map 3
TRIAD OIL PROJECT
HALFWAY ZONE
BEATTON RIVER FIELD

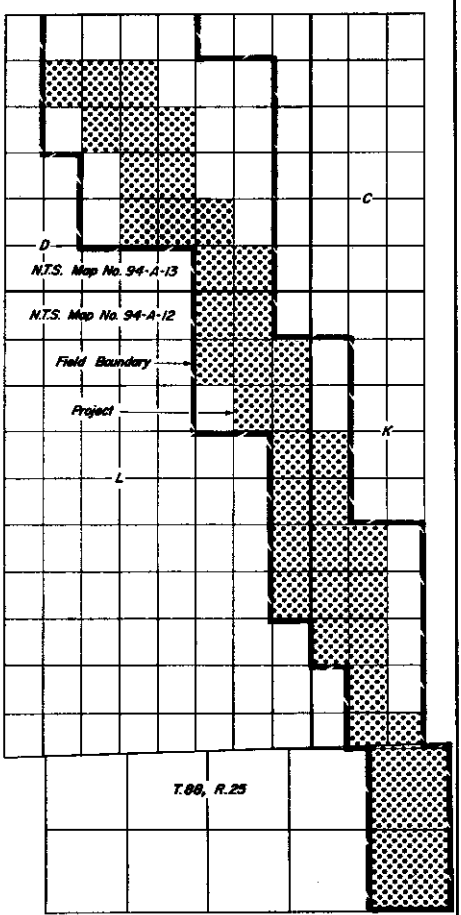


Map 4
PACIFIC PETROLEUMS PROJECT
BALDONNEL ZONE
BEG & BEG WEST FIELDS

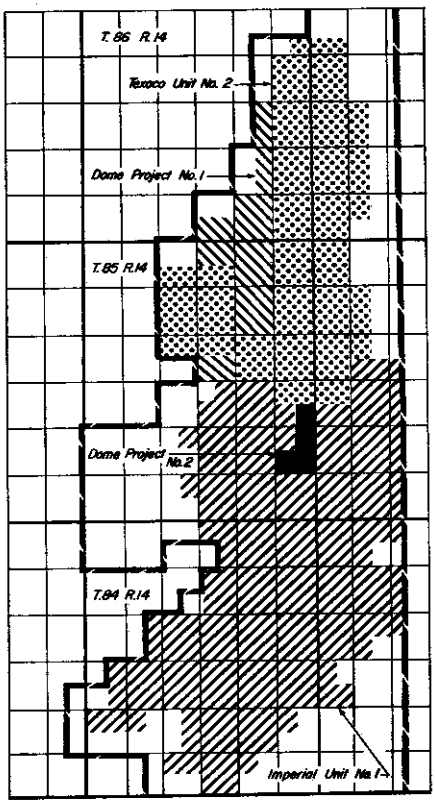


Map 5

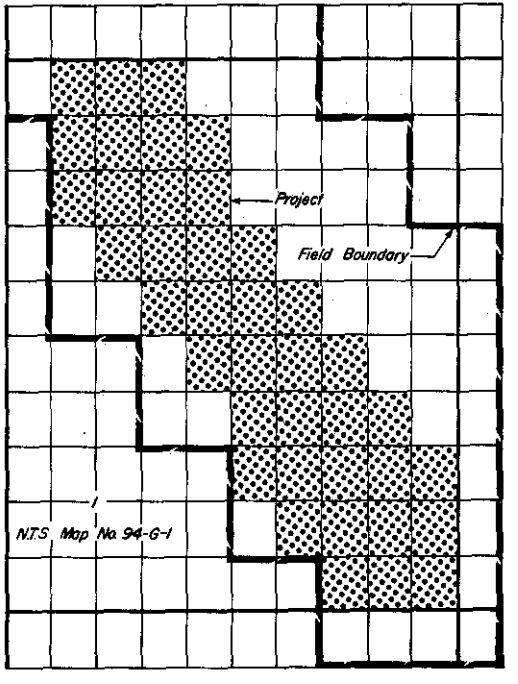
PACIFIC PETROLEUMS PROJECT
HALFWAY ZONE
BEG FIELD



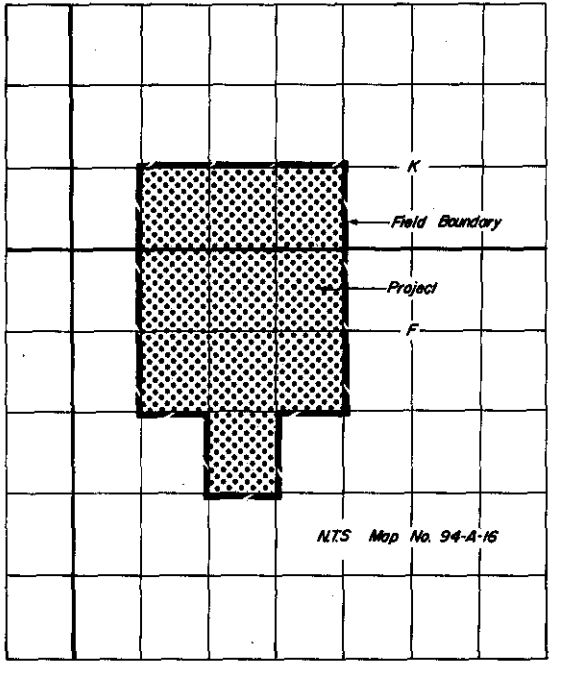
Map 6
PACIFIC PETROLEUMS PROJECT
DEBOLT ZONE
BLUEBERRY FIELD



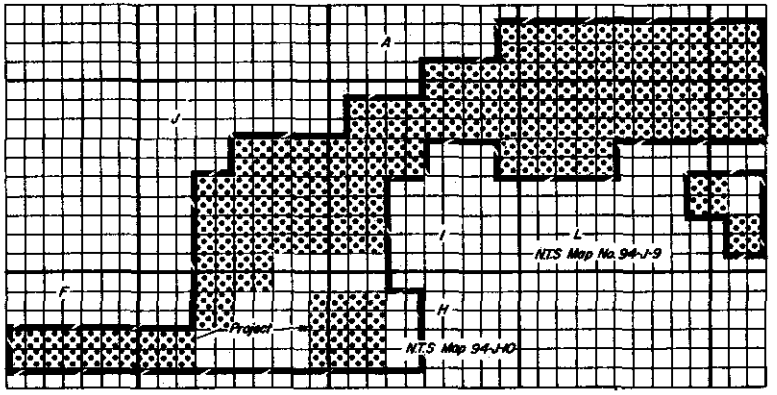
Map 7
BOUNDARY LAKE ZONE PROJECTS
BOUNDARY LAKE FIELD



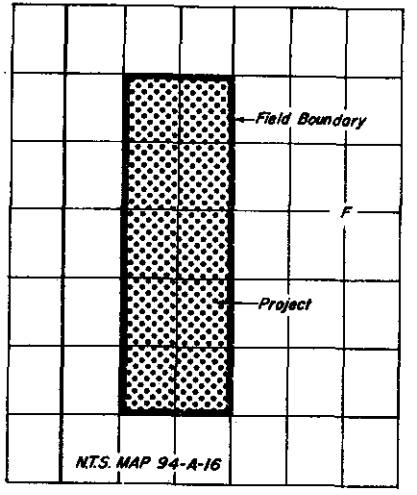
Map 8
PACIFIC PETROLEUMS PROJECT
BALDONNEL ZONE
BUBBLES FIELD



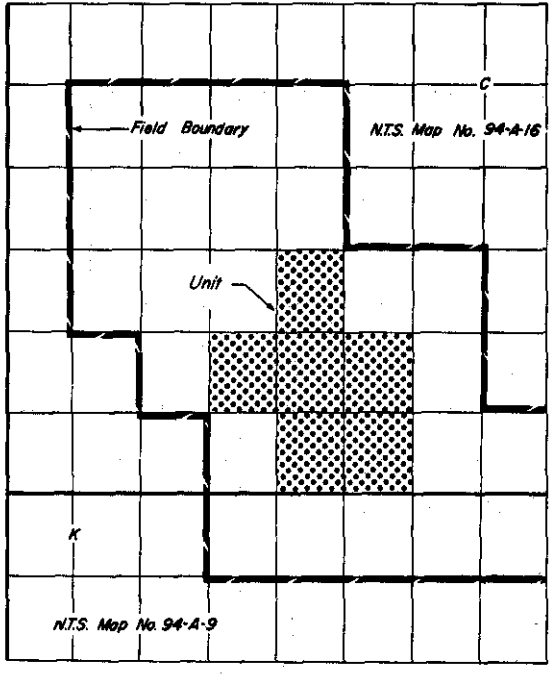
Map 9
UNION OIL PROJECT
HALFWAY ZONE
BULRUSH FIELD



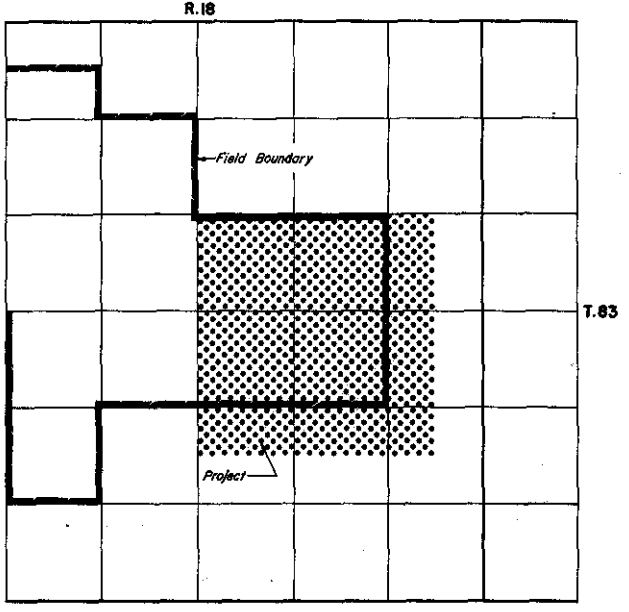
Map 10
PACIFIC PETROLEUMS PROJECT
SLAVE, PT. ZONE
CLARKE LAKE AND CLARKE LAKE SOUTH FIELDS



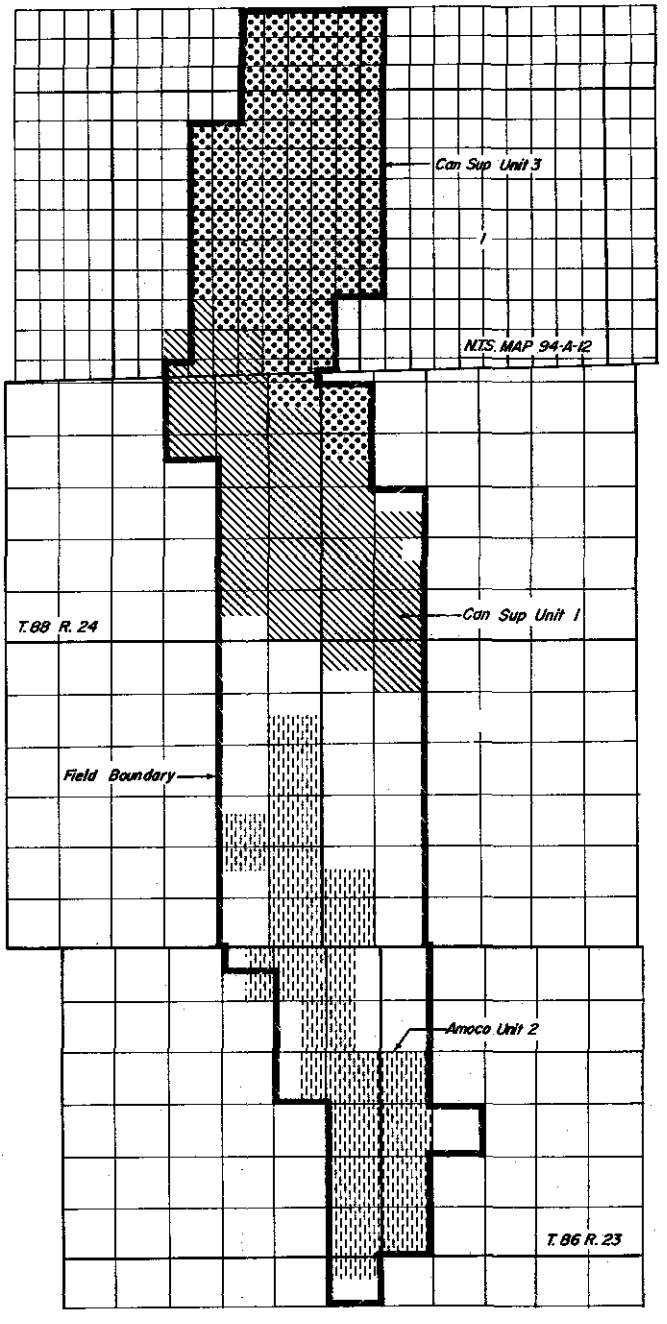
Map 11
UNION OIL UNIT I
HALFWAY ZONE
CRUSH FIELD



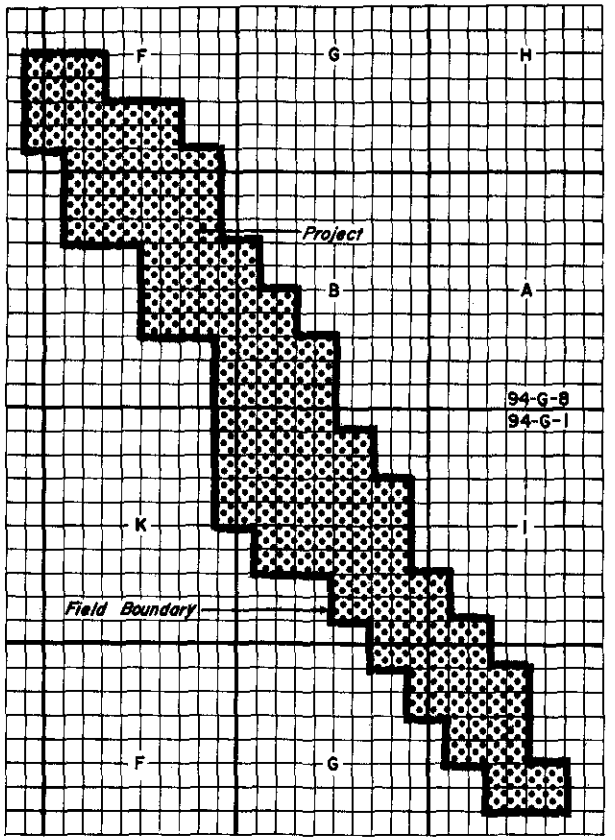
Map 12
PACIFIC PETROLEUMS UNIT I
HALFWAY ZONE
CURRANT FIELD



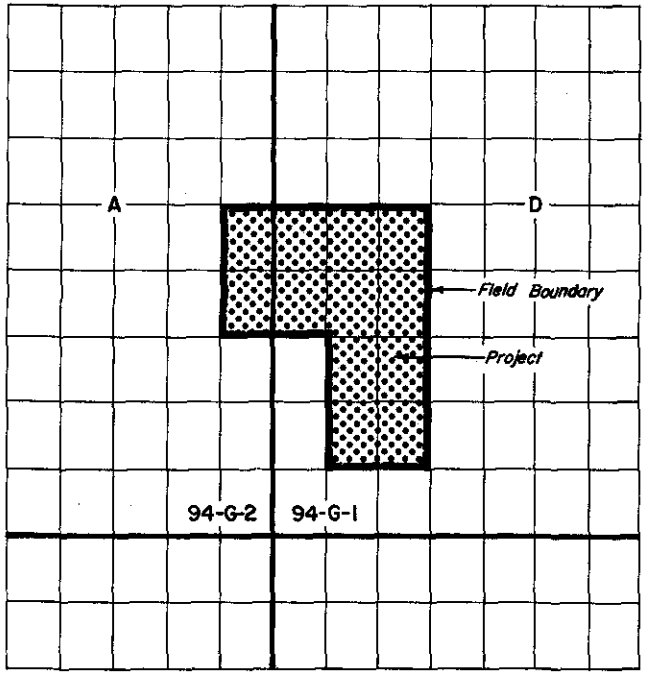
MAP 13
PACIFIC PETROLEUMS UNIT I
CHARLIE LAKE ZONE
FORT ST. JOHN FIELD



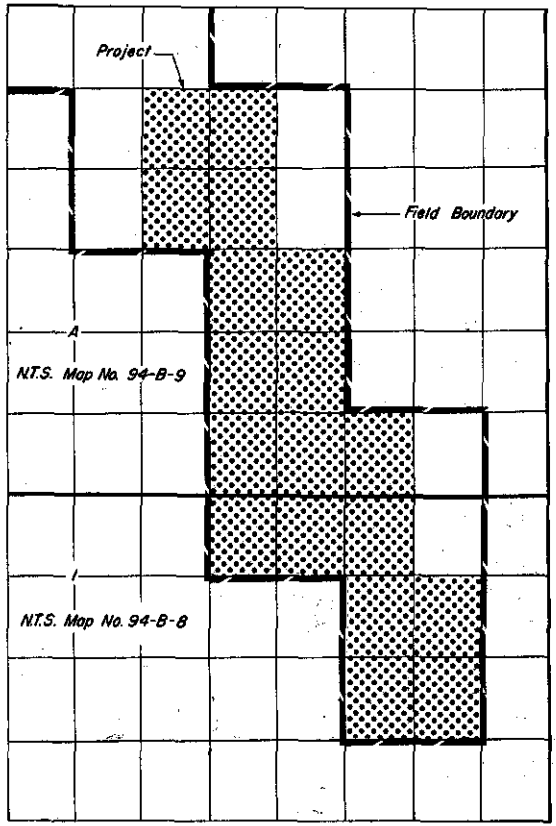
Map 14
INGA ZONE UNITS
INGA FIELD



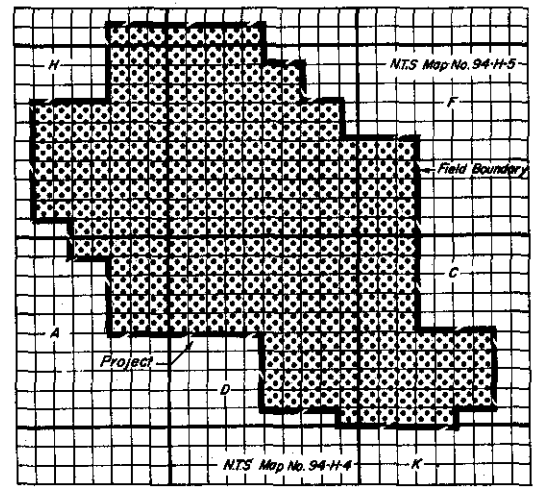
Map 15
PACIFIC PROJECTS
BALDONNEL & HALFWAY ZONES
JEDNEY FIELD



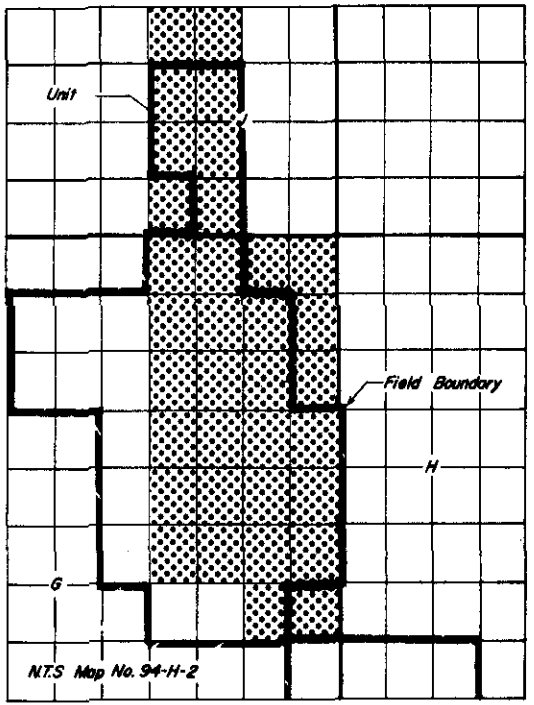
Map 16
ARCO PROJECTS
HALFWAY & BALDONNEL ZONES
JULIENNE FIELD



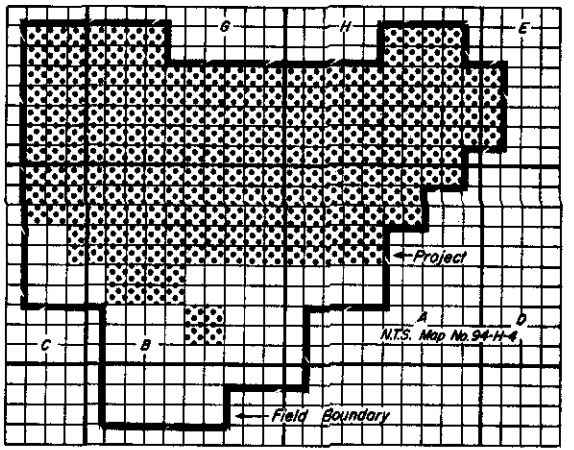
Map 17
PACIFIC PETROLEUMS PROJECT
HALFWAY ZONE
KOBES-TOWNSEND FIELD



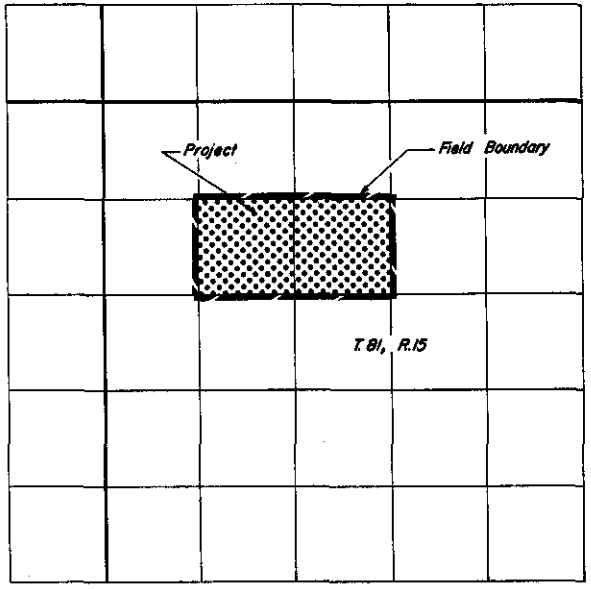
Map 18
BALDONNEL POOL PROJECT
LAPRISE CREEK FIELD



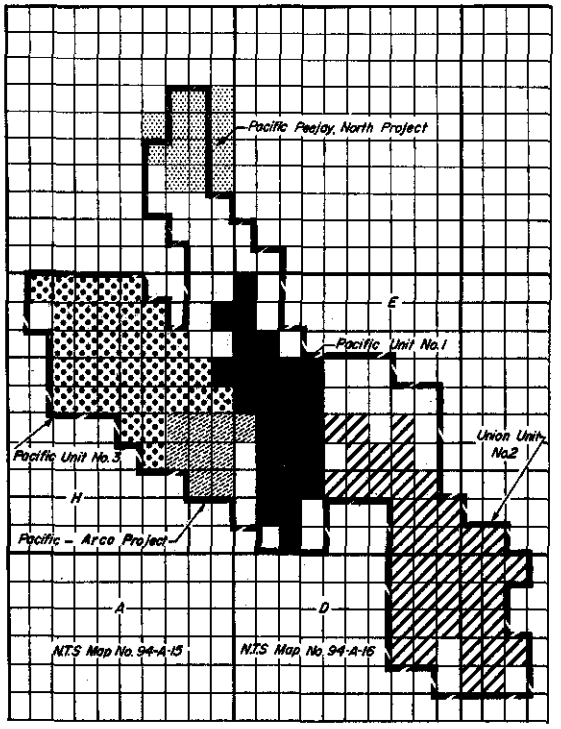
Map 19
UNION OIL UNIT I
HALFWAY ZONE
MILLIGAN CREEK FIELD



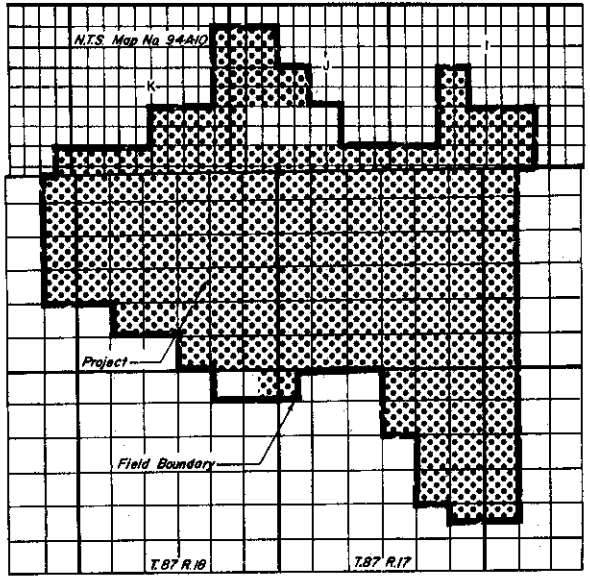
Map 20
TEXACO EXPLORATION PROJECT
BALDONNEL ZONE
NIG CREEK FIELD



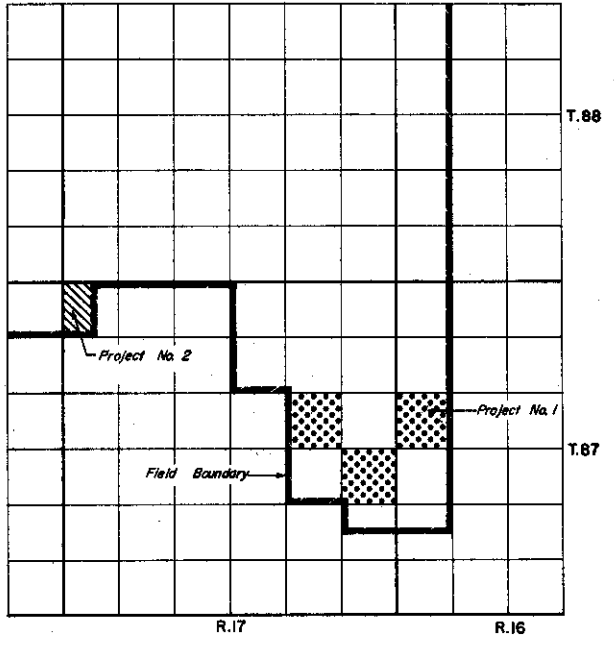
Map 21
PACIFIC PETROLEUMS PROJECT
WABAMUN ZONE
PARKLAND FIELD



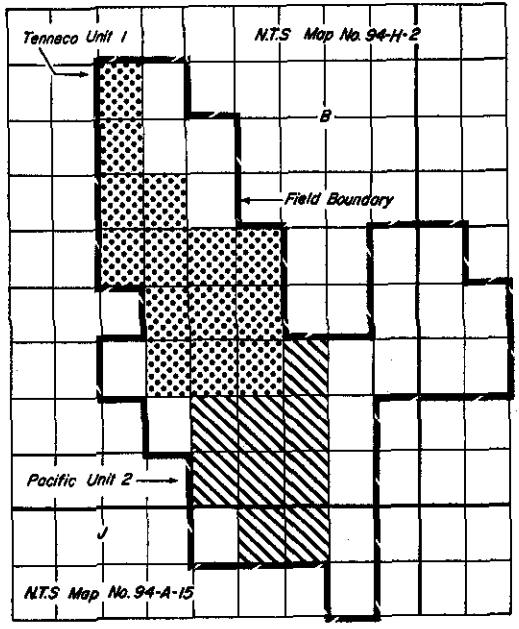
Map 22
HALFWAY ZONE PROJECTS
PEEJAY FIELD



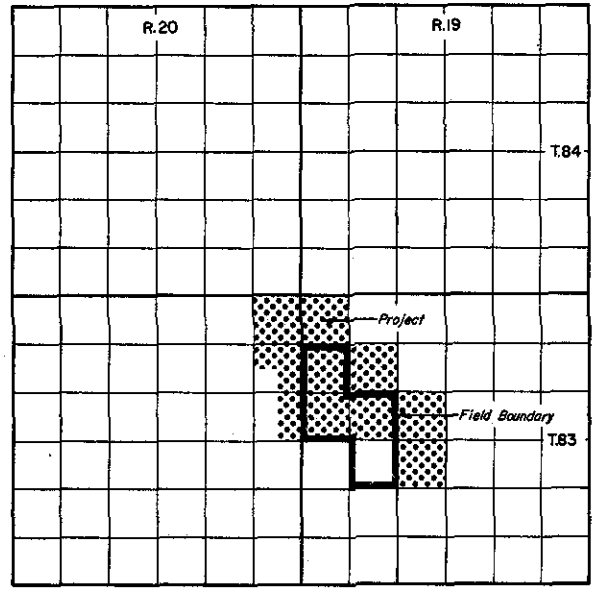
Map 23
DUNLEVY POOL PROJECT
RIGEL FIELD



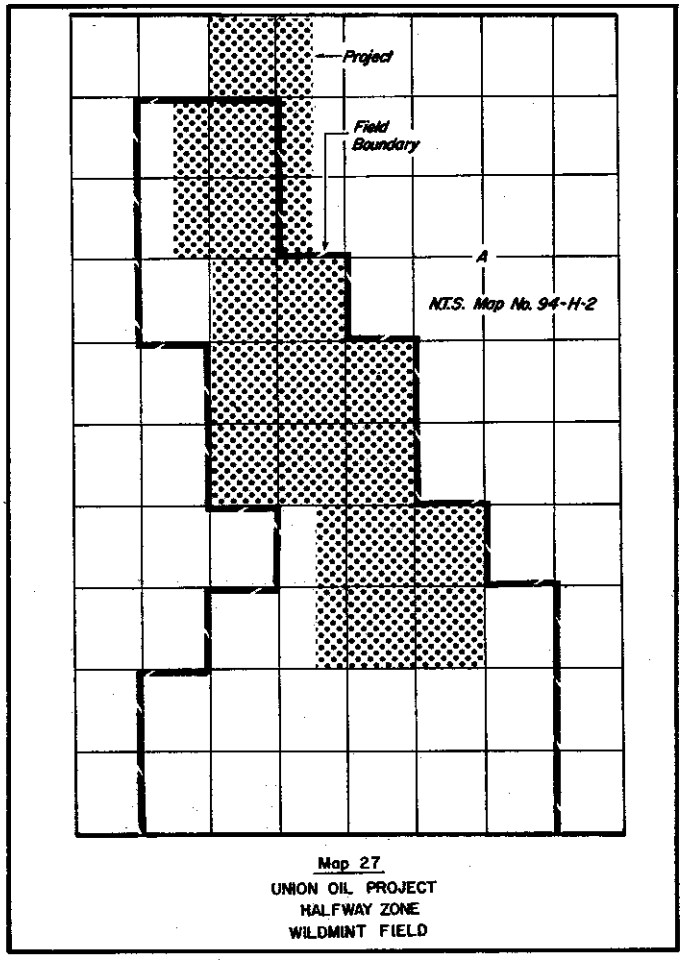
Map 24
MONSANTO CONSERVATION PROJECTS
DUNLEVY ZONE
RIGEL FIELD



Map 25
HALFWAY ZONE UNITS
WEASEL FIELD



MAP 26
WAINOCO UNIT 1
HALFWAY & BELLOY POOLS
WILDER FIELD



Map 27
UNION OIL PROJECT
HALFWAY ZONE
WILDMINT FIELD

TABLE 16—PROJECT AND INDIVIDUAL WELL MPR DATA AT DECEMBER 31, 1971

Field	Pool	Well or Project	Well Authorization No.	MPR, STB/D	Project Data							
					Reference Map	Area (Acres)	Cumulative Injection		Number of Wells			
							MBW	MMSCF	Producers		Injectors	
									Oil	Gas	Water	Gas
Aitken Creek	Gething	Union Project	----	1,125	1	1,009	----	22,017	6	4	----	1
Bear Flat	Charlie Lake	Monsanto Project	----	286	2	1,362	----	205	2	----	----	1
Beatton River	Halfway	POR Ashland Beatton d-9-J/94-H-2	2909	184	----	----	----	----	----	----	----	----
		CIGOL et al Beatton d-1-K/94-H-2	2948	----	----	----	----	----	----	----	----	----
		CIGOL et al Beatton d-11-K/94-H-2	2915	184	----	----	----	----	----	----	----	----
		CIGOL et al Beatton d-21-K/94-H-2	3002	78	----	----	----	----	----	----	----	----
		Triad et al Beatton d-41-K/94-H-2	869	Suspended	----	----	----	----	----	----	----	----
		Triad Project	----	2,270	3	1,821	----	10,544	10	1	5	----
		Pool total	----	2,716	----	----	----	----	----	----	----	----
Beatton River West	Bluesky-Gething	Triad West Beatton River d-38-K/94-H-2	538	59	----	----	----	----	----	----	----	----
		Triad West Beatton River d-39-K/94-H-2	408	47	----	----	----	----	----	----	----	----
		Triad W Beatton a-49-K/94-H-2	1604	116	----	----	----	----	----	----	----	----
		Triad West Beatton River d-48-K/94-H-2	441	Suspended	----	----	----	----	----	----	----	----
		Triad W Beatton d-49-K/94-H-2	1327	Water Inj.*	----	----	----	----	----	----	----	----
		Triad West Beatton River d-57-K/94-H-2	515	78	----	----	----	----	----	----	----	----
		Triad W Beatton d-58-K/94-H-2	1398	30	----	----	----	----	----	----	----	----
		Triad West Beatton River d-59-K/94-H-2	512	Suspended	----	----	----	----	----	----	----	----
		Ashland Cdn-Sup W Beatton d-3-L/94-H-2	2669	59	----	----	----	----	----	----	----	----
		Sierra Patrick W Beatton d-4-L/94-H-2	2802	74	----	----	----	----	----	----	----	----
		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 W Beatton d-23-L/94-H-2	2465	60	----	----	----	----	----	----	----	----
		Whitehall Cdn-Sup W Beatton d-31-L/94-H-2	2645	Suspended	----	----	----	----	----	----	----	----
		Pool total	----	943	----	----	----	----	----	----	----	----
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	----	----	----	----	----	----	----	----
		Pacific Project	----	4,600	6	4,343	----	837	18	----	----	1
		Pool total	----	4,798	----	----	----	----	----	----	----	----
Boundary Lake	Cadomin	Pacific Boundary 8-15-85-14	270	79	----	----	----	----	----	----	----	----

	Charlie Lake	Texaco et al Boundary A8-30-85-13	2931	86	—	—	—	—	—	—	—	—
	Boundary Lake	Imp Pac Boundary 8-32-84-13	991	Suspended	—	—	—	—	—	—	—	—
		Texaco et al Boundary 6-32-85-13	2930	155	—	—	—	—	—	—	—	—
		Texaco NFA Boundary 6-29-86-13	1720	Suspended	—	—	—	—	—	—	—	—
		Texaco NFA Boundary 16-30-86-13	1482	20	—	—	—	—	—	—	—	—
		Dome Project 1	—	4,919	7	3,352	—	9,608	25	—	7	—
		Dome Project 2	—	1,484	7	650	—	3,306	6	—	2	—
		Imperial Unit 1	—	38,657	7	25,919	—	51,506	145	—	32	—
		Texaco Unit 2	—	22,723	7	14,103	—	41,478	111	1	22	—
		Pool total	—	68,338	—	—	—	—	—	—	—	—
	Halfway	Texaco NFA Boundary 8-30-85-13	1097	83	—	—	—	—	—	—	—	—
		Pacific Boundary Lake 11-14-85-14	667	101	—	—	—	—	—	—	—	—
		Sun Boundary Lake 6-23-85-14	646	83	—	—	—	—	—	—	—	—
		Amerada Boundary A6-24-85-14	1454	99	—	—	—	—	—	—	—	—
		Texaco NFA Boundary 16-25-85-14	1144	Suspended	—	—	—	—	—	—	—	—
		Pool total	—	366	—	—	—	—	—	—	—	—
		Field total	—	68,869	—	—	—	—	—	—	—	—
Buick Creek	Dunlevy	Texaco NFA Buick c-32-A/94-A-14	1500	144	—	—	—	—	—	—	—	—
		Decalta et al 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	9	1,173	—	2,564	4	—	—	2
Bulrush East	Halfway	Dome Provo Co-op E Bulrush d-5-K/94-A-16	1843	43	—	—	—	—	—	—	—	—
Charlie Lake	Gething	Imp Pac Charlie 13-5-84-18	269	Suspended	—	—	—	—	—	—	—	—
Crush	Halfway	Union Unit 1	—	1,383	11	1,474	1,020	—	8	1	1	—
Currant	Halfway	Pacific et al Currant d-7-C/94-A-16	2937	13	—	—	—	—	—	—	—	—
		Union HB Currant d-28-C/94-A-16	1768	Suspended	—	—	—	—	—	—	—	—
		Pacific Unit 1	—	627	12	696	1,554	—	4	—	2	—
		Pool total	—	640	—	—	—	—	—	—	—	—
Eagle	Belloy	Raines Eagle 8-29-84-18	2543	39	—	—	—	—	—	—	—	—
		Raines Eagle 11-29-84-18	2502	285	—	—	—	—	—	—	—	—
		Pool total	—	324	—	—	—	—	—	—	—	—
Elm	Halfway	Bralorne et al Elm b-62-C/94-H-7	2856	Suspended	—	—	—	—	—	—	—	—
Flatrock	Boundary Lake	Ballinderry Flatrock 10-19-84-16	2852	153	—	—	—	—	—	—	—	—
Fort St. John	Charlie Lake	Pacific Unit 1	—	334	13	1,230	—	—	4	—	—	—
	Belloy	Imp Pac Ft St John 9-19-83-18(45)	171	Suspended	—	—	—	—	—	—	—	—
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	Pacific Inga 16-4-87-23	2944	28	—	—	—	—	—	—	—	—
		Pacific Inga 6-9-87-23	2938	113	—	—	—	—	—	—	—	—
		IOE et al Inga 16-9-87-23	2918	28	—	—	—	—	—	—	—	—
		IOE et al Inga 6-16-87-23	2806	75	—	—	—	—	—	—	—	—
		IOE Pac Inga 16-16-87-23	2859	Suspended	—	—	—	—	—	—	—	—

* Suspended.

TABLE 16—PROJECT AND INDIVIDUAL WELL MPR DATA AT DECEMBER 31, 1971—*Continued*

Field	Pool	Well or Project	Well Authorization No.	MPR, STB/D	Project Data							
					Reference Map	Area (Acres)	Cumulative Injection		Number of Wells			
							MBW	MMSCF	Producers		Injectors	
									Oil	Gas	Water	Gas
Inga—*Continued*	Inga—*Continued*	IOE Pac Inga 6-20-87-23	2798	27	—	—	—	—	—	—	—	—
		IOE Pac Inga 6-21-87-23	2778	119	—	—	—	—	—	—	—	—
		IOE Pac Inga 16-21-87-23	2896	29	—	—	—	—	—	—	—	—
		IOE Pac Inga 6-28-87-23	2743	111	—	—	—	—	—	—	—	—
		IOE Pac Inga 14-28-87-23	2950	38	—	—	—	—	—	—	—	—
		IOE Pac Inga 6-29-87-23	2770	8	—	—	—	—	—	—	—	—
		IOE Pac Inga 16-30-87-23	2658	63	—	—	—	—	—	—	—	—
		IOE Pac Inga 6-31-87-23	2755	58	—	—	—	—	—	—	—	—
		Tenn et al Inga 12-31-87-23	2953	14	—	—	—	—	—	—	—	—
		Texaco Inga 16-13-87-24	2255	135	—	—	—	—	—	—	—	—
		Texaco Inga 16-24-87-24	2274	116	—	—	—	—	—	—	—	—
		Texaco Inga 16-25-87-24	2209	109	—	—	—	—	—	—	—	—
		Texaco Texcan Inga 8-36-87-24	2766	58	—	—	—	—	—	—	—	—
		IOE Pac Inga 16-36-87-24	2720	77	—	—	—	—	—	—	—	—
		West Nat et al Inga 8-1-88-24	2764	57	—	—	—	—	—	—	—	—
		Canadian Superior Unit 1	—	7,246	14	11,057	12,979	—	24	1	14	—
		Amoco Unit 2	—	6,705	14	12,703	803	—	28	—	8	—
		Pool total	—	15,200	—	—	—	—	—	—	—	—
Milligan Creek	Halfway	Union HB Milligan b-65-G/94-H-2	1493	157	—	—	—	—	—	—	—	—
		Union HB Milligan d-65-G/94-H-2	1518	107	—	—	—	—	—	—	—	—
		Ipex Milligan b-75-G/94-H-2	2721	148	—	—	—	—	—	—	—	—
		Baysel SR Milligan d-76-G/94-H-2	2659	—	—	—	—	—	—	—	—	—
		Ipex Milligan b-85-G/94-H-2	2765	110	—	—	—	—	—	—	—	—
		Duncan Milligan d-86-G/94-H-2	2566	52	—	—	—	—	—	—	—	—
		Union Unit 1	—	10,000	18	2,922	42,622	3,418	20	—	13	1
		Pool total	—	10,574	—	—	—	—	—	—	—	—
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	—	—	—	—	—	—	—	—
		Union KCL ARCo Nettle d-69-A/94-H-7	2018	Suspended	—	—	—	—	—	—	—	—

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	—	—	—	—	—	—	—	—
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	—	—	—	—	—	—	—	—
		Pool total	—	61	—	—	—	—	—	—	—	—
Peejay	Halfway	Pacific SR CanDel Peejay d-71-H/94-A-15	1851	59	—	—	—	—	—	—	—	—
		Decalta Ranger Peejay d-51-D/94-A-16	2023	25	—	—	—	—	—	—	—	—
		Texcan Texaco Peejay d-61-D/94-A-16	1683	Suspended	—	—	—	—	—	—	—	—
		Pacific Unit 1	—	4,430	21	3,734	16,960	—	23	—	12	—
		Union Unit 2	—	8,229	21	6,627	22,858	—	37	—	11	—
		Pacific Unit 3	—	6,865	21	5,423	17,633	—	26	—	13	—
		Peejay North Project	—	42	21	632	—	—	1	2	—	—
		Pacific ARCO Project	—	2,717	21	1,338	5,455	—	8	—	3	—
		Pool total	—	22,367	—	—	—	—	—	—	—	—
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	Suspended	—	—	—	—	—	—	—	—
		Monsanto Rigel 6-13-87-17	1555	98	—	—	—	—	—	—	—	—
		Monsanto Rigel 6-23-87-17	1942	100	—	—	—	—	—	—	—	—
		Monsanto Rigel 6-31-87-17	1714	46	—	—	—	—	—	—	—	—
		IOE et al Rigel b-44-J/94-A-10	2565	34	—	—	—	—	—	—	—	—
		Pool total	—	390	—	—	—	—	—	—	—	—
Stoddart	Charlie Lake	Apache 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	—	—	—	—	—	—	—	—
		Apache et al Stoddart 6-36-85-20	2757	61	—	—	—	—	—	—	—	—
		Uno-Tex Triad Stoddart A11-5-86-19	1983	Suspended	—	—	—	—	—	—	—	—
		Pool total	—	135	—	—	—	—	—	—	—	—
		Field total	—	204	—	—	—	—	—	—	—	—
Wargen	Bluesky-Gething	Pacific et al Wargen d-37-C/94-H-6	2324	—	—	—	—	—	—	—	—	—
Weasel	Halfway	Pacific SR CanDel Weasel d-82-J/94-A-15	2055	206	—	—	—	—	—	—	—	—
		Pacific Sinclair Weasel d-30-A/94-H-2	1631	Suspended	—	—	—	—	—	—	—	—
		Dome Provo Weasel d-2-B/94-H-2	1734	56	—	—	—	—	—	—	—	—
		Tenneco Unit 1	—	2,551	24	1,847	6,002	1,568	10	—	6	1
		Pacific Unit 2	—	1,143	24	1,081	1,974	—	7	—	4	—
		Pool total	—	3,956	—	—	—	—	—	—	—	—
Weasel West	Halfway	Tenn et al W Weasel d-71-C/94-H-2	2834	56	—	—	—	—	—	—	—	—
Wildmint	Halfway	Pacific SR Can Del Wildmint d-84-I/94-A-15	1566	Suspended	—	—	—	—	—	—	—	—
		Tenn Wildmint d-93-I/94-A-15	1947	Suspended	—	—	—	—	—	—	—	—

TABLE 16—PROJECT AND INDIVIDUAL WELL MPR DATA AT DECEMBER 31, 1971—*Continued*

Field	Pool	Well or Project	Well Authorization No.	MPR, STB/D	Project Data							
					Reference Map	Area (Acres)	Cumulative Injection		Number of Wells			
							MBW	MMSCF	Producers		Injectors	
									Oil	Gas	Water	Gas
Wildmint—*Continued*	Halfway—*Continued*	Texcan Wildmint d-94-I/94-A-15	1289	167	—	—	—	—	—	—	—	—
		Tenn Wildmint d-95-I/94-A-15	1191	47	—	—	—	—	—	—	—	—
		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	26	1,869	17,972	15,870	12	—	5	2
		Pool total	—	3,529	—	—	—	—	—	—	—	—
Willow	Bluesky-Gething	Union HB Willow d-20-H/94-H-2	449	122	—	—	—	—	—	—	—	—
Wolf	Halfway	Pacific Sinclair Wolf d-82-B/94-A-15	1916	118	—	—	—	—	—	—	—	—
		Baysel Sinclair Wolf b-92-B/94-A-15	1972	37	—	—	—	—	—	—	—	—
		Baysel Sinclair Wolf d-93-B/94-A-15	1815	129	—	—	—	—	—	—	—	—
		Frontier Pembina Wolf d-14-G/94-A-15	2062	Suspended	—	—	—	—	—	—	—	—
		Pool total	—	284	—	—	—	—	—	—	—	—
Other Areas	Bluesky-Gething	Union HB Gulf Canuck d-39-G/94-H-1	2616	Suspended	—	—	—	—	—	—	—	—
		Union HB BA Ladyfern d-48-H/94-H-1	1433	—	—	—	—	—	—	—	—	—
	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	—	—	—	—	—	—	—	—
		Union HB Drake b-82-E/94-H-1	2848	—	—	—	—	—	—	—	—	—
		Cankee Terrebonne Woodrush d-47-H/94-H-2	1840	Suspended	—	—	—	—	—	—	—	—

TABLE 17—GAS-WELL TEST AND ALLOWABLE DATA, DECEMBER 31, 1971

Field/Pool/Project	Well Name	Well Authorization No.	Date	Pws (Psia)	"n"	AOFP (MSCF/D)	PRL (MSCF/D)
Airport—							
Cadomin	Pacific Airport 8-32-83-17 (3)	27	5-71	1,387	0.753	825	Zone ab'd.
Baldonnel	Pacific Airport 9-32-83-17 (97)	287	5-71	1,573	0.500	2,498	Zone ab'd.
Halfway	Pacific Airport 12-34-83-17 (10)	35	5-71	1,960	1.000	1,667	Zone ab'd.
Beaver River—							
Nahanni	Amoco Beaver b-19-K/94-N-16	2563	9-70	5,869	-----	-----	26.250
	Pan Am Beaver d-27-K/94-N-16	2313	3-69	6,001	0.500	84,000	21,000
	Pan Am Beaver c-45-K/94-N-16	2,116	12-67	5,824	0.760	86,844	21,711
	Amoco Beaver d-A64-K/94-N-16	2547	-----	-----	-----	-----	13,925
	Pan Am Beaver River d-73-K/94-N-16	682	3-62	5,672	0.653	85,000	55,250
Nahanni total		-----	-----	-----	-----	-----	138,136
Beavertail—							
Bluesky-Gething	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
	Pacific ARCo Beavertail c-92-C/94-A-15	2610	-----	-----	-----	-----	-----
Halfway	Pacific Sinclair Beavertail d-71-C/94-A-15	1893	-----	-----	-----	-----	-----
Beg—							
Baldonnel project	Pacific Imperial Beg c-24-B/94-G-1	1359	8-70	1,567	0.500	1,458	Disposal.
	Pacific Imperial Beg d-35-B/94-G-1	1154	9-71	1,152	0.500	2,078	-----
	Pacific Imperial Beg d-46-B/94-G-1	806	9-71	1,228	0.500	1,994	-----
	Pacific Imperial Beg d-57-B/94-G-1	1095	9-71	1,439	0.860	2,118	Suspended.
	Pacific et al Beg a-21-F/94-G-1	711	7-70	1,611	0.500	650	Suspended.
	Pacific et al Beg b-42-F/94-G-1	748	12-66	1,524	0.925	1,535	Zone ab'd.
	Pacific et al Beg d-64-F/94-G-1	733	5-71	1,017	1.000	3,058	-----
	Pacific et al Beg b-84-F/94-G-1	741	5-71	1,217	1.000	3,076	-----
	Pacific et al Beg b-95-F/94-G-1	747	5-71	1,051	1.000	2,796	-----
	Pacific et al Beg d-10-G/94-G-1	541	5-71	863	1.000	1,477	-----
	Pacific et al Beg b-6-K/94-G-1	740	5-71	1,237	1.000	1,762	-----
	Pacific et al Beg b-17-K/94-G-1	539	5-71	1,111	0.661	3,290	-----
	Pacific et al Beg a-28-K/94-G-1	749	5-71	1,261	0.500	3,058	Suspended.
	Pacific et al Beg b-59-K/94-G-1	786	-----	-----	-----	-----	-----
	Pacific et al Beg b-82-L/94-G-1	1132	8-70	1,221	0.577	2,202	-----
	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	Disposal.
Baldonnel project total		-----	-----	-----	-----	-----	GEP.
Halfway project	Richfield Sohio Beg d-13-B/94-G-1	1268	8-71	834	0.500	4,716	-----
	Pacific Imperial Beg c-24-B/94-G-1	1359	9-71	1,125	0.500	3,844	-----
	Pacific Imperial Beg d-35-B/94-G-1	1154	9-71	882	0.725	4,621	-----

TABLE 17—GAS-WELL TEST AND ALLOWABLE DATA, DECEMBER 31, 1971—*Continued*

Field/Pool/Project	Well Name	Well Authorization No.	Date	Pws (Psia)	"n"	AOFP (MSCF/D)	PRL (MSCF/D)
Beg—*Continued*							
Halfway project—*Continued*	Pacific Imperial Beg d-46-B/94-G-1	806	9-71	877	0.725	5,970	———
	Pacific Imperial Beg d-57-B/94-G-1	1095	9-71	987	0.550	9,321	———
	Richfield Sohio Beg d-77-B/94-G-1	1233	8-71	1,251	0.537	1,360	Suspended.
	Pacific et al Beg b-88-B/94-G-1	1350	5-71	1,096	0.610	4,322	———
	Pacific et al Beg b-A99-B/94-G-1	739	5-71	971	0.664	3,337	———
	Pacific et al Beg a-21-F/94-G-1	711	5-71	1,396	0.500	4,606	———
	Pacific et al Beg b-42-F/94-G-1	748	8-61	1,536	0.842	2,100	Disposal.
	Pacific et al Beg d-64-F/94-G-1	733	5-71	715	1.000	2,472	———
	Pacific et al Beg b-84-F/94-G-1	741	5-71	1,088	0.508	1,910	———
	Pacific et al Beg b-95-F/94-G-1	747	5-71	927	0.500	2,060	———
	Pacific et al Beg d-10-G/94-G-1	541	5-71	839	0.531	4,199	———
	Pacific et al Beg b-6-K/94-G-1	740	5-71	904	0.500	4,479	———
	Pacific et al Beg b-A17-K/94-G-1	2387	5-71	1,127	0.642	2,620	———
	Pacific et al Beg b-59-K/94-G-1	786	———	———	———	———	———
Halfway project total	———	———	———	———	———	———	GEP.
Field total	———	———	———	———	———	———	GEP.
Beg West—							
Baldonnel project (2)	Pacific et al W Beg c-84-C/94-G-1	622	5-71	1,448	0.550	2,198	Suspended.
	Pacific et al W Beg c-58-F/94-G-1	772	5-71	1,610	———	———	Suspended.
	Pacific et al W Beg a-79-F/94-G-1	620	5-71	1,431	0.726	2,618	Suspended.
Baldonnel total	———	———	———	———	———	———	GEP.
Bernadet—							
Bluesky-Gething	West Nat et al Bernadet 8-1-88-25	1106	8-71	298	0.754	275	Suspended.
Blueberry—							
Dunlevy	West Nat et al Blueberry 16-24-88-25	279	7-71	1,179	1.000	1,613	2,000
	West Nat et al Blueberry a-29-K/94-A-12	330	7-71	1,342	0.675	531	Suspended.
	West Nat et al Blueberry d-A50-K/94-A-12	357	7-71	1,312	1.000	876	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	7-71	1,215	0.577	1,745	2,000
	West Nat et al Blueberry d-97-D/94-A-13	581	8-70	739	0.571	2,026	2,000
Dunlevy total	———	———	———	———	———	———	8,000
Baldonnel	West Nat et al Blueberry c-65-D/94-A-13	71	7-71	1,637	0.577	931	Suspended.
	West Nat et al Blueberry d-87-D/94-A-13	64	8-70	1,340	0.577	830	2,000
	West Nat et al Blueberry d-97-D/94-A-13	581	9-60	1,653	1.000	5,600	Suspended.
Charlie Lake	West Nat et al Blueberry a-61-L/94-A-12	525	10-60	2,089	———	———	———
	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-A-13	103	7-71	1,775	0.820	1,892	Suspended.
Debolt	West Nat et al E Blueberry b-36-C/94-A-13	331	8-59	1,380	1.000	838	Suspended.
Blueberry West—							
Dunlevy	West Nat et al W Blueberry 2-20-88-25	278	7-68	578	1.000	205	Suspended.
	West Nat et al W Blueberry d-82-I/94-B-9	165	7-68	883	1.000	793	2,000
Baldonnel	G Basins et al W Blueberry a-7-L/94-A-12	2435	3-71	1,727	1.000	10,389	2,597
	West Nat et al W Blueberry d-19-L/94-A-12	241	10-71	1,703	0.543	1,443	Suspended.
	G Basins et al W Blueberry d-39-L/94-A-12	2551	3-70	1,786	1.000	4,714	2,000
Baldonnel total							4,597
Field total							6,597
Boundary Lake—							
Bluesky-Gething	Pacific Boundary 8-15-85-14	270	7-71	957	0.687	713	Suspended.
	Texaco NFA Boundary 8-23-86-14	1125					
Gething	Pacific Boundary Lake A16-4-85-14	655	7-71	788	0.839	3,215	Suspended.
	Pacific Boundary 12-10-85-14	352	7-71	695	0.839	5,697	2,430
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	5-71	729	0.605	2,308	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	7-71	1,302	0.725	3,260	Suspended.
	Sun Boundary Lake 8-23-85-14	652	9-71	851	0.767	7,153	2,454
	Amerada Boundary A6-24-85-14	1454					
	Texaco NFA Boundary Lake 6-25-85-14	687	5-71	839	0.850	3,725	2,000
Baldonnel total							6,454
Basal Boundary	Pacific et al Boundary 14-4-85-14	1964	7-71	1,114	0.550	1,976	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							10,884
Boundary Lake North—							
Halfway	Texaco NFA N Boundary 7-3-87-14	1395					
	Texaco NFA N Boundary 6-8-87-14	1529	5-71	996	1.000	46,975	17,851
	Texaco NFA N Boundary 10-9-87-14	1451	5-71	1,030	0.804	18,478	6,354
	Texaco NFA N Boundary 7-15-87-14	1881	3-66	1,556	0.850	2,300	Suspended.
Halfway total							24,205
Bubbles—							
Baldonnel	Dome Basco Bubbles b-19-A/94-G-8	464	7-71	787	0.518	2,329	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					
	Dome Bubbles d-42-B/94-G-8	791	8-70	1,400			Disposal.
	McCoy Dome Bubbles b-A62-B/94-G-8	674	7-71	845	0.591	2,628	2,000

[1] Lease and camp fuel.

TABLE 17—GAS-WELL TEST AND ALLOWABLE DATA, DECEMBER 31, 1971—*Continued*

Field/Pool/Project	Well Name	Well Authorization No.	Date	Pws (Psia)	"n"	AOFP (MSCF/D)	PRL (MSCF/D)
Bubbles—*Continued*							
Baldonnel project	Pacific Sunray Imp Bubbles b-22-I/94-G-1	467	10-71	1,445	———	———	———
	Pacific Imperial Bubbles b-33-I/94-G-1	451	6-70	781	0.754	10,266	4,283
	Pacific Imperial Bubbles b-44-I/94-G-1	466	6-70	704	0.884	10,534	4,445
	Pacific Sunray Imp Bubbles d-55-I/94-G-1	479	11-69	1,336	———	———	Disposal.
	Pacific Imperial Bubbles b-66-I/94-G-1	480	10-71	754	0.686	3,637	2,000
	Pacific Imperial Bubbles d-77-I/94-G-1	478	10-71	933	0.500	3,069	Suspended.
	Pacific Imperial Bubbles d-88-I/94-G-1	462	6-70	826	0.925	19,826	8,003
	Pacific Dome et al Bubbles d-99-I/94-G-1	615	10-71	711	0.500	1,352	2,000[2]
Baldonnel project total		———	———	———	———	———	20,731
Baldonnel total		———	———	———	———	———	24,731
Bubbles North—							
Halfway	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	———	———	———	———	———
Buick Creek—							
Bluesky-Gething	Anadarko Cdn-Sup Buick c-32-I/94-A-11	2863	3-71	1,107	0.924	4,948	2,000
Project Pool A	Texaco NFA Buick c-98-L/94-A-10	1088	———	———	———	———	———
	Mic Mac et al Buick d-17-D/94-A-15	1286	3-70	891	0.870	3,943	2,000
Project Pool B	Texaco NFA Buick c-80-D/94-A-15	1087	7-70	767	0.541	550	Suspended.
Dunlevy—							
Project Pool A	Anadarko Cdn-Sup Buick b-22-I/94-A-11	2794	2-71	1,160	0.793	2,955	2,000
	Woods Buick a-65-I/94-A-11	2785	8-71	978	0.660	7,546	2,000
	Decalta et al Buick d-73-I/94-A-11	1344	———	———	———	———	———
	Pacific Buick a-85-I/94-A-11	1323	8-71	755	0.963	6,342	2,027
	Texaco et al Buick c-94-I/94-A-11	2693	7-71	760	0.867	37,784	14,538
	Texaco NFA Buick d-96-I/94-A-11	787	7-71	734	0.700	11,767	4,625
	Texaco NFA Buick Creek d-98-I(1)/94-A-11	45	7-71	773	0.980	2,904	2,000
	Texaco NFA Buick Creek c-10-A(2)/94-A-14	65	6-71	915	0.506	183	2,000
	Whitehall Buick c-34-A/94-A-14	1336	8-69	714	0.712	1,519	2,000
	Texaco NFA Buick b-A46-A/94-A-14	1508	7-71	751	0.630	624	Abandoned.
Project Pool A total		———	———	———	———	———	31,190
Project Pool B	Texaco NFA Buick c-98-L/94-A-10	1088	7-71	782	0.566	714	2,000
	Texaco NFA Buick a-31-A/94-A-14	295	7-71	761	0.661	19,115	5,775
	Whitehall Buick b-62-A/94-A-14	1303	8-69	907	1.000	3,725	2,000
	Texaco NFA Buick d-93-A/94-A-14	1346	8-71	1,190	0.694	———	Observation.
	Texaco NFA Buick c-18-D/94-A-15	1185	7-71	707	0.748	3,154	2,000
	Texaco NFA Buick c-80-D/94-A-15	1087	7-71	646	0.682	3,224	2,000
Project Pool B total		———	———	———	———	———	13,775

Project Pool C	Texaco NFA Buick Creek c-79-J(6)/94-A-11	110	7-71	549	0.700	1,520	2,000
	Texaco NFA Buick Creek d-83-J(4)/94-A-11	96	7-71	437	0.898	11,527	5,859
	Texaco NFA Buick d-93-J/94-A-11	728	9-71	444	0.938	8,293	3,848
	Pacific Buick Creek b-4-B/94-A-14	457	8-71	586	0.931	1,546	2,000
	Texaco NFA Buick b-10-B/94-A-14	1179	6-71	587	0.862	632	2,000
	Pacific Buick Creek c-14-B/94-A-14	469	8-71	631	0.869	1,554	2,000
	Sun Buick c-16-B/94-A-14	744	9-71	664	0.767	1,621	2,000
	Sun Buick d-19-B/94-A-14	756	9-71	572	1.000	1,389	2,000
	Texaco NFA Buick c-40-B/94-A-14	1213	8-71	604	0.940	807	2,000
	Sun Buick d-11-C/94-A-14	818	9-71	562	0.900	5,475	2,694
	Sun et al Buick c-32-C/94-A-14	1360	9-71	568	0.996	7,409	3,708
Project Pool C total							30,109
Charlie Lake	Texaco NFA Buick Creek d-83-J(4)/94-A-11	96	6-66	490	0.583	1,500	Suspended.
Field total							43,884
Buick Creek North—							
Bluesky-Gething	Pacific West Prod N Buick c-22-F/94-A-14	1753	7-71[2]	614[2]	0.636[2]	7,200[2]	2,867[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	8-71	853	0.603	5,620	2,000
	Texaco NFA N Buick d-91-C/94-A-14	2174	7-71	837	0.736	9,344	3,971
	Pacific West Prod N Buick b-2-F/94-A-14	2026	7-71	854	0.700	2,466	2,000
	Pacific West Prod N Buick c-22-F/94-A-14	1753	7-71	([3])	([3])	([3])	Suspended[3].
	Pacific West Prod N Buick b-44-F/94-A-14	1799					
	Pacific West Prod N Buick b-86-F/94-A-14	1830	7-71	1,278	0.500	1,358	Suspended.
Dunlevy total							7,971
Field total							10,838
Buick Creek West—							
Dunlevy—							
Project Pool A	Pacific West Buick Creek d-95-K(4)/94-A-11	99	8-71	390	0.790	4,286	Suspended.
	Pacific West Buick Creek c-5-C(11)/94-A-14	264	7-71	394	0.906	3,002	Suspended.
	Pacific West Buick Creek c-14-C(3)/94-A-14	95	7-71	630	0.975	6,742	Suspended.
	Pacific West Buick Creek d-17-C(17)/94-A-14	384	7-71	401	0.837	16,499	7,701
Project Pool B	Pacific West Buick Creek b-78-C(2)/94-A-14	89	8-71	769	0.712	3,540	2,000
	Pacific West Buick Creek c-80-C(10)/94-A-14	261	8-71	519			
	Pacific West Buick Creek d-89-C(12)/94-A-14	268	7-71	705	1.000	1,518	2,000
	Pacific West Buick Creek b-91-D(9)/94-A-14	255	7-71	559	1.000	1,840	2,000
	Pacific West Buick Creek c-2-E(6)/94-A-14	239	8-71	543	0.686	4,431	2,000
Project Pool B total							8,000
Dunlevy total							15,701
Baldonnel	Pacific West Buick Creek d-58-C(8)/94-A-14	249	7-71	1,367			
	Pacific West Buick Creek a-78-C/94-A-14	644	8-71	787	0.699	2,218	2,000
Halfway	Pacific West Buick Creek b-23-E(1)/94-A-14	86	7-62	699	0.712	2,450	Suspended.
Field total							17,701

[2] Leaseline well restricted to 2 MMSCF/D.
[3] Comingled production. Bluesky-Gething and Dunlevy not segregated.

TABLE 17—GAS-WELL TEST AND ALLOWABLE DATA, DECEMBER 31, 1971—*Continued*

Field/Pool/Project	Well Name	Well Authorization No.	Date	Pws (Psia)	"n"	AOFP (MSCF/D)	PRL (MSCF/D)
Cabin—							
Slave Point	General American Cabin a-61-F/94-P-5	2665	-----	-----	-----	-----	-----
	West Nat Cabin a-19-G/94-P-5	1406	2-64	2,645	0.554	32,100	Suspended.
	Pacific Cabin a-49-G/94-P-5	2058	-----	-----	-----	-----	-----
Cache Creek—							
Charlie Lake	Texcan Cache 10-20-88-22	2567	12-69	2,239	1.000	2,900	2,000
	Texcan Cache 6-28-88-22	2423	1-69	2,293	-----	-----	-----
Halfway	Texcan Cache 6-28-88-22	2423	8-70	1,916	1.000	934	Suspended.
Clarke Lake—							
Slave Point	Pacific et al Clarke a-65-G/94-J-10	1528	8-68	2,823	0.570	10,400	Disposal.
	Cankee Cdn-Sup Clarke d-72-G/94-J-10	2176	12-70	2,734	0.786	78,098	20,451
	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	2-70	2,762	-----	-----	2,000
Slave Point Project (2)	Pacific Imp Clarke c-56-L/94-J-9	1833	8-71	2,550	0.552	58,598	-----
	Pacific Imp Clarke b-69-L/94-J-9	2240	-----	-----	-----	-----	Disposal.
	Pacific Imp Clarke b-72-L/94-J-9	2540	8-71	2,562	0.637	101,134	-----
	West Nat Imp Clarke Lake d-88-L/94-J-9	344	8-71	2,488	0.620	108,852	-----
	West Nat Imp Clarke Lake d-91-L/94-J-9	585	8-71	2,500	0.854	15,872	-----
	West Nat Imp Clarke Lake c-94-L/94-J-9	397	8-71	2,467	1.000	53,776	-----
	Pacific et al Clarke c-54-F/94-J-10	1932	8-71	2,738	0.575	11,664	-----
	Pacific Apache Clarke a-61-F/94-J-10	1578	8-71	2,724	0.695	36,893	-----
	Pacific Apache Clarke b-76-G/94-J-10	1071	8-71	2,726	0.674	10,608	-----
	Pacific et al Clarke d-69-H/94-J-10	1866	3-70	2,802	0.500	39,051	-----
	Pacific et al Clarke b-18-I/94-J-10	2316	8-71	2,705	0.567	22,812	-----
	Pacific et al Clarke c-20-I/94-J-10	2107	8-71	2,679	0.535	40,971	-----
	Pacific et al Clarke b-38-I/94-J-10	1933	4-70	2,703	-----	-----	-----
	Pacific et al Clarke c-69-I/94-J-10	2249	8-71	2,574	0.587	53,343	-----
	West Nat et al Clarke b-70-I/94-J-10	688	8-71	2,590	0.655	42,990	-----
	West Nat et al Clarke c-78-I/94-J-10	505	8-71	2,592	1.000	134,747	-----
	Pacific Imp Clarke c-85-I/94-J-10	2310	-----	-----	-----	-----	-----
	Pacific Imperial Clarke c-92-I/94-J-10	1554	8-71	2,531	0.500	96,585	-----
	Pacific et al Clarke b-22-J/94-J-10	1796	4-70	2,759	-----	-----	-----
	Pacific et al Clarke b-26-J/94-J-10	2776	-----	-----	-----	-----	-----
	Pacific et al Clarke c-43-J/94-J-10	2239	8-71	2,549	0.649	34,583	-----
	Pacific et al Clarke b-46-J/94-J-10	2162	8-71	2,678	0.550	16,663	Suspended.
Slave Point project (2)	West Nat et al Clarke c-47-J/94-J-10	211	-----	-----	-----	-----	-----
	West Nat et al Clarke a-52-J/94-J-10	856	8-71	2,619	0.733	23,862	-----
	Pacific et al Clarke a-55-J/94-J-10	1966	8-71	2,651	0.715	94,135	-----
	Pacific Imp Clarke b-6-D/94-J-16	2820	8-71	2,495	-----	-----	-----

	West Nat Imp Clarke Lake c-8-D/94-J-16	503	8-71	2,528	1.000	136,714	———
	Pacific Imp Clarke b-10-D/94-J-16	2509	8-71	2,496	0.591	80,320	———
Slave Point project (2)	PRL	———	———	———	———	———	400,000
Slave Point total		———	———	———	———	———	422,451
Clarke Lake South—							
Slave Point	West Nat IOE S Clarke d-29-K/94-J-9	1274	8-71	2,674	0.500	135,570	Suspended[4].
	Pacific IOE S Clarke c-50-K/94-J-9	1913	8-71	2,654	0.781	14,205	Suspended[4].
Currant—							
Halfway	Texaco NFA Currant a-3-C/94-A-16	1607	———	———	———	———	———
Cypress—							
Baldonnel	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	3-71	1,948	0.676	50,586	Suspended.
Dahl—							
Bluesky-Gething	Sierra Dahl b-62-G/94-H-7	2628	———	———	———	———	———
	Joe Phillips Dahl d-93-G/94-H-7	2622	———	———	———	———	———
	Pacific et al Dahl d-11-J/94-H-7	2445	———	———	———	———	Suspended.
	Tenn Cdn Sup Dahl d-53-J/94-H-7	1849	———	———	———	———	———
	Texaco Dahl a-67-J/94-H-7	2457	———	———	———	———	Suspended.
	Pacific CIGOL Dahl d-91-J/94-H-7	2466	———	———	———	———	Suspended.
	IOE Scurry Dahl d-51-B/94-H-10	2642	———	———	———	———	———
Dawson Creek—							
Dunvegan	Horizon Dawson B3-22-79-15	2216	———	———	———	———	———
Cadotte	Pacific Sc Dawson Ck 3-22-79-15 (2)	302	6-67	540	0.900	805	Suspended.
Elm—							
Halfway	BO&G et al Elm d-83-C/94-H-7	2712	4-71	1,141	0.902	4,819	2,000
Evergreen—							
Halfway	CDR Sun Evergreen b-43-J/94-H-2	2056	———	———	———	———	———
	CDR Sun Evergreen d-54-J/94-H-2	1918	———	———	———	———	———
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	10-69	1,941	0.595	1,750	2,000
Field total		———	———	———	———	———	6,000
Flatrock—							
Halfway	Champlin Flatrock 10-9-84-16	2516	6-71	1,659	0.945	17,279	4,320
	Champlin et al Flatrock 11-17-84-16	2827	10-71	1,913	0.697	9,474	2,368
Halfway total		———	———	———	———	———	6,688

TABLE 17—GAS-WELL TEST AND ALLOWABLE DATA, DECEMBER 31, 1971—*Continued*

Field/Pool/Project	Well Name	Well Authorization No.	Date	Pws (Psia)	"n"	AOFP (MSCF/D)	PRL (MSCF/D)
Fort St. John—							
Cadomin	Pacific Ft St John A3-29-83-18 (31)	75	6-71	1,330	1.000	28,827	Suspended.
	Pacific Ft St John A9-19-83-18 (58)	190	———	———	———	———	———
Baldonnel	Pacific Ft St John 14-15-83-18 (7)	32	5-71	1,019	0.700	3,247	Suspended.
	Pacific Ft St John 16-8-83-18 (83)	233	5-67	676	0.820	2,557	2,000
	Pacific Ft St John 9-14-83-18 (71)	204	———	———	———	———	———
	Pacific Ft St John 13-14-83-18 (54)	194	5-71	789	0.993	1,726	Suspended.
	Pacific Ft St John A6-16-83-18 (73)	212	5-71	551	0.733	1,577	2,000
	Pacific Ft St John 6-17-83-18 (72)	210	6-68	655	0.851	4,940	2,327
	Pacific Ft St John 8-20-83-18 (43)	170	5-71	480	0.850	2,529	2,000
	Pacific Ft St John B14-21-83-18 (62)	193	6-71	442	0.625	2,132	2,000
	Pacific Ft St John 14-22-83-18 (32)	76	5-71	551	0.782	3,004	2,000
	Pacific Ft St John 13-23-83-18 (34)	82	5-71	475	0.726	2,418	2,000
	Pacific Ft St John C3-29-83-18 (56)	186	6-71	548	0.565	2,216	2,000
	Pacific Ft St John 4-32-83-18 (26)	67	5-71	925	1.000	525	Suspended.
Baldonnel total		———	———	———	———	———	16,327
Charlie Lake	Pacific Ft St John B3-29-83-18 (52)	179	———	———	———	———	———
Halfway	Pacific Ft St John 1-20-83-18 (30)	74	5-71	389	0.839	1,308	2,000
	Pacific Ft St John 2-21-83-18 (46)	172	5-71	381	0.818	1,394	2,000
	Pacific Ft St John A14-21-83-18 (51)	178	5-71	471	0.916	2,420	2,000
	Pacific Ft St John A14-22-83-18 (61)	192	5-71	556	1.000	81	Suspended.
	Pacific Ft St John B3-29-83-18 (52)	179	6-71	522	0.856	2,450	2,000
	Pacific Ft St John 10-30-83-18 (53)	181	5-71	495	0.868	695	Suspended.
	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		———	———	———	———	———	10,000
Belloy	Pacific Ft St John 14-21-83-18 (4)	29	6-71	509	0.624	1,054	2,000
	Pacific Ft St John 3-29-83-18 (23)	58	5-71	507	0.542	2,881	2,000
	Pacific Ft St John 3-30-83-18 (6)	31	———	———	———	———	Disposal.
Belloy total		———	———	———	———	———	4,000
Field total		———	———	———	———	———	30,327
Fort St. John Southeast—							
Cadomin	Pac Ft St John SE 10-31-82-17 (80)	220	5-70	1,219	0.854	1,349	Suspended.
Baldonnel	Pac Ft St John SE 13-2-83-17 (74)	213	6-68	756	0.766	3,101	2,000
	Pac Ft St John SE A4-10-83-17 (55)	184	5-70	1,053	0.500	2,227	2,000
Baldonnel total		———	———	———	———	———	4,000
Charlie Lake	Pacific Ft St John SE 7-3-83-17 (49)	174	5-70	1,339	———	———	———

	Pacific Ft St John SE 8-5-83-17 (20)	52	———	———	———	———	———
Halfway	Pac Ft St John SE 10-33-82-17 (22)	60	5-70	1,451	1.000	5,009	Suspended.
	Pacific Ft St John SE 7-3-83-17 (49)	174	11-69	818	1.000	1,253	Zone ab'd.
	Pac Ft St John SE 16-3-83-17 (66)	197	6-70	505	0.795	6,183	3,612
	Pac Ft St John SE A10-4-83-17 (60)	191	5-70	864	0.649	2,300	2,000
	Pac Ft St John SE 7-5-83-17 (69)	202	5-70	1,797	1.000	1,490	Suspended.
	Pac Ft St John SE A10-10-83-17 (98)	320	5-70	735	0.845	2,122	Suspended.
Halfway total		———	———	———	———	———	5,612
Belloy	Pac Ft St John SE 11-32-82-17 (68)	201	5-70	497	0.745	5,597	4,303
	Pac Ft St John SE 10-4-83-17 (47)	173	6-70	799	0.810	5,879	3,467
	Pacific Ft St John SE 8-5-83-17 (20)	52	10-53	2,805	1.000	4,980	Zone ab'd.
	Pacific Ft St John SE 4-9-83-17 (44)	166	5-70	866	1.000	4,217	Suspended.
	Pac Ft St John SE 4-10-83-17 (12)	42	5-70	1,825	0.500	6,263	Suspended.
	Pac Ft St John SE 10-10-83-17 (79)	219	5-70	733	0.726	1,231	2,000
Belloy total		———	———	———	———	———	9,770
Field total		———	———	———	———	———	19,382
Grizzly—							
Dunlevy	Gray Oil PRP NW Grizzly c-25-A/93-I-15	1396	3-64	2,682	0.565	7,428	Suspended.
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	———	———	———	———	Suspended.
	West Nat Gundy Creek c-80-A/94-B-16	83	———	———	———	———	Suspended.
	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	9-71	1,448	1.000	2,419	2,000
Charlie Lake	West Nat et al Halfway 8-11-87-25	182	6-70	2,035	0.781	759	Suspended.
Helmet—							
Slave Point	Atkinson Sunlite Helmet b-2-K/94-P-7	2617	———	———	———	———	———
	FPC Chevron et al Helmet b-11-K/94-P-7	2517	1-70	2,346	0.500	191,823	47,956
Highway—							
Dunlevy	West Nat et al Highway b-31-I/94-B-16	168	7-71	1,171	0.869	793	2,000
Baldonnel	Pacific Highway b-25-I(1)/94-B-16	112	8-58	1,653	1.000	6,600	Suspended.
	Pacific Highway a-47-I(2)/94-B-16	180	11-57	1,680	0.754	3,600	Suspended.
	Pacific Highway a-69-I(3)/94-B-16	274	11-57	1,691	0.812	3,150	Suspended.
	Pacific Highway a-90-I(4)/94-B-16	229	11-64	1,388	0.535	920	Suspended.
Debolt	Pacific Highway a-90-I(4)/94-B-16	229	7-66	880	0.553	6,885	Suspended.
Inga—							
Baldonnel	Pacific Inga 6-29-86-23	2327	7-71	1,155	0.864	4,225	2,000
	Pacific Inga 6-32-86-23	2401	7-71	1,332	0.687	2,542	Suspended.
	Pacific Inga 6-4-87-23	2412	7-71	667	0.875	2,963	2,000
Baldonnel total		———	———	———	———	———	4,000

TABLE 17—GAS-WELL TEST AND ALLOWABLE DATA, DECEMBER 31, 1971—*Continued*

Field/Pool/Project	Well Name	Well Authorization No.	Date	Pws (Psia)	"n"	AOFP (MSCF/D)	PRL (MSCF/D)
Inga—							
Inga Unit 3	West Nat et al Inga d-42-J/94-A-12	2000	———	———	———	———	Observation.
	Cdn-Sup Whitehall Inga b-44-J/94-A-12	2461	———	———	———	———	Observation.
	Pioneer Cabot Inga b-82-J/94-A-12	2241	9-70	2,293	0.981	23,184	———
	West Nat et al Inga b-10-A/94-A-13	470	1-69	2,278	0.824	2,715	———
	Pioneer et al Inga a-5-B/94-A-13	2320	9-70	2,285	0.851	4,722	———
	West Nat et al Inga a-22-B/94-A-13	412	11-70	2,264	1.000	3,220	———
Unit total		———	———	———	———	———	10,000[5]
Field total		———	———	———	———	———	14,000
Inga North—							
Inga	Pioneer Cabot N Inga d-51-K/94-A-12	2533	———	———	———	———	———
	Pioneer Cabot N Inga a-81-K/94-A-12	2552	10-70	2,344	0.755	10,146	2,536
	Wincan et al N Inga b-20-B/94-A-13	2684	———	———	———	———	———
Jedney—							
Gething	Pacific Imperial Jedney a-95-C/94-G-8	1366	10-63	1,142	0.531	13,600	Suspended.
Baldonnel project	Pacific Imperial Jedney c-78-H/94-G-1	1129	8-69	1,113	0.726	955	———
	Pacific Imperial Jedney b-99-H/94-G-1	1054	4-71	894	0.535	3,121	———
	Pacific Imperial Jedney c-100-H/94-G-1	1082	4-71	1,078	0.500	2,386	———
	Pacific Sunray Imp Jedney b-44-J/94-G-1	492	7-71	1,525	———	———	———
	Pacific Imperial Jedney b-66-J/94-G-1	475	8-70	1,006	0.839	5,711	———
	Pacific et al Jedney b-68-J/94-G-1	498	6-66	1,358	0.685	———	Disposal.
	Pacific Imperial Jedney d-77-J/94-G-1	484	8-70	911	0.532	1,842	———
	Pacific et al Jedney b-88-J/94-G-1	427	8-68	879	0.818	19,500	———
	Pacific Imp Jedney d-99-J/94-G-1	382	9-71	869	0.531	1,757	———
	Pacific Imperial Jedney b-10-B/94-G-8	473	8-70	839	0.766	15,025	———
	Pacific Imperial Jedney b-30-B/94-G-8	460	9-71	920	0.588	3,537	———
	Pacific Imperial Jedney d-31-C/94-G-8	1178	7-71	1,210	0.931	2,535	———
	Pacific Imperial Jedney d-44-C/94-G-8	1375	7-71	1,250	0.685	4,083	Suspended.
	Pacific Imperial Jedney d-53-C/94-G-8	820	7-71	721	0.880	665	———
	Pacific Imperial Jedney b-73-C/94-G-8	868	7-71	1,255	0.500	2,468	———
	Pacific et al Jedney c-86-C/94-G-8	778	7-71	1,218	0.500	2,143	———
	Pacific et al Jedney d-97-C/94-G-8	651	7-71	1,086	0.595	10,287	———
	Pacific Pan Am Dome Jedney c-8-F/94-G-8	1152	7-71	1,314	0.594	1,250	———
	Pacific Pan Am Dome Jedney b-28-F/94-G-8	944	7-71	1,237	0.500	1,987	———
	Skelly Jedney a-39-F/94-G-8	1334	3-71	1,137	1.000	3,779	———
	Pacific et al Jedney b-50-F/94-G-8	1907	———	———	———	———	———
Baldonnel project total		———	———	———	———	———	GEP.
Halfway project	Pacific Imperial Jedney c-57-H/94-G-1	1183	4-71	1,016	0.500	1,556	———
	Pacific Imperial Jedney d-68-H/94-G-1	1256	4-71	1,020	0.500	3,072	———

	Pacific Imperial Jedney c-78-H/94-G-1	1129	4-71	996	0.853	3,942	———
	Pacific Imperial Jedney b-99-H/94-G-1	1054	4-71	894	0.726	6,856	———
	Pacific Imperial Jedney c-100-H/94-G-1	1082	4-71	1,033	0.921	10,101	———
	Pacific Imperial Jedney a-65-J/94-G-1	461	10-71	987	0.543	3,657	———
	Pacific Imperial Jedney b-66-J/94-G-1	475	8-70	963	0.649	7,683	———
	Pacific Imperial Jedney d-77-J/94-G-1	484	8-70	872	0.869	10,594	———
	Pacific Imp Jedney d-99-J/94-G-1	382	9-71	877	0.740	5,703	———
	Pacific Imp Jedney d-19-B/94-G-8	2171	———	———	———	———	———
	Pacific Imperial Jedney d-31-C/94-G-8	1178	7-71	843	0.500	4,016	———
	Pacific Imperial Jedney d-42-C/94-G-8	453	7-71	905	0.684	2,943	———
	Pacific Imperial Jedney d-44-C/94-G-8	1375	———	———	———	———	———
	Pacific Imperial Jedney d-53-C/94-G-8	820	7-71	736	0.587	2,350	———
	Pacific Imperial Jedney b-73-C/94-G-8	868	7-71	776	0.588	3,184	———
	Pacific Imperial Jedney b-84-C/94-G-8	691	7-71	701	0.500	2,541	———
	Pacific et al Jedney c-86-C/94-G-8	778	7-71	831	0.649	2,588	———
	Pacific Imperial Jedney a-95-C/94-G-8	1366	8-70	1,444	0.500	———	Disposal.
	Pacific et al Jedney d-97-C/94-G-8	651	7-71	823	0.742	3,569	———
	Pacific Pan Am Dome Jedney c-8-F/94-G-8	1152	12-69	1,536	0.677	1,576	———
	Pacific et al Jedney a-17-F/94-G-8	779	9-71	1,113	0.837	5,325	———
	Pacific Pan Am Dome Jedney b-28-F/94-G-8	944	7-71	737	0.554	2,563	———
	Skelly Jedney a-39-F/94-G-8	1334	3-71	1,072	0.926	2,588	———
	Pacific et al Jedney b-50-F/94-G-8	1907	———	———	———	———	———
Halfway project total		———	———	———	———	———	GEP.
Field total		———	———	———	———	———	GEP.
Jedney West—							
Baldonnel	Pacific et al W Jedney b-84-K/94-G-1	1081	9-71	1,597	0.500	1,181	2,000
Halfway	Pacific et al W Jedney b-84-K/94-G-1	1081	9-71	1,502	0.500	1,495	2,000
	Pacific et al W Jedney b-6-C/94-G-8	1276	9-71	1,244	0.500	867	Suspended.
Field total		———	———	———	———	———	4,000
Julienne Creek—							
Baldonnel	ARCo Pac Julienne b-39-D/94-G-1	658	1-67	2,099	———	———	———
	Sinclair Julienne Ck a-50-D(B13-2)/94-G-1	304	2-71	2,035	0.912	3,927	———
Baldonnel total		———	———	———	———	———	GEP.
Halfway	ARCo Pac Julienne b-39-D/94-G-1	658	2-71	2,264	0.674	2,372	———
	Sinclair Julienne Ck a-50-D(B13-2)/94-G-1	304	2-71	2,262	0.988	6,970	———
Halfway total		———	———	———	———	———	GEP.
Field total		———	———	———	———	———	GEP.
Kobes-Townsend—							
Dunlevy	Pacific Kobes b-82-I/94-B-8	496	8-71	1,002	1.000	720	2,000
	Pacific Kobes a-3-A(4)/94-B-9	372	8-71	1,074	0.704	2,184	2,000
	Pacific Kobes b-24-A/94-B-9	489	8-71	830	1.000	514	2,000
Dunlevy total		———	———	———	———	———	6,000

[5] Concurrent production scheme: Annual allowable, 3,650 MMSCF.

TABLE 17—GAS-WELL TEST AND ALLOWABLE DATA, DECEMBER 31, 1971—*Continued*

Field/Pool/Project	Well Name	Well Authorization No.	Date	Pws (Psia)	"n"	AOFP (MSCF/D)	PRL (MSCF/D)
Kobes-Townsend—*Continued*							
Charlie Lake	Pacific Kobes c-73-I(2)/94-B-8	299	8-71	1,352	0.500	1,438	2,000
	Pacific Kobes d-94-I(1)/94-B-8	141	9-68	1,056	0.824	2,543	2,000
	Pacific Kobes b-35-A(A-1)/94-B-9	177	8-71	1,217	0.564	1,494	2,000
	Pacific Kobes d-57-A/94-B-9	2588	———	———	———	———	———
	Pacific Kobes a-99-A(B-1)/94-B-9	314	8-68	1,265	0.500	553	2,000
	Pacific Townsend d-21-G(A-2)/94-B-9	251	8-71	1,213	0.864	1,296	2,000
Charlie Lake total		———	———	———	———	———	10,000
Halfway project	Pacific Kobes d-94-I(1)/94-B-8	141	8-68	1,952	0.627	9,850	GEP.
	Pacific Kobes b-35-A(A-1)/94-B-9	177	8-71	1,673	0.588	5,181	GEP.
Halfway project total		———	———	———	———	———	GEP.
Debolt	Pacific Kobes a-99-A(B-1)/94-B-9	314	9-68	1,583	0.869	8,250	3,385
	Pacific Townsend a-20-H(A-1)/94-B-9	164	8-71	2,093	0.700	892	Suspended.
Field total		———	———	———	———	GEP plus	19,385
Kotcho Lake—							
Slave Point	West Nat Kotcho Lake d-39-J/94-I-14	532	———	———	———	———	———
	West Nat Kotcho b-54-K/94-I-14	879	2-71	2,523	———	———	———
	West Nat Kotcho Lake c-67-K/94-I-14	404	2-60	2,562	0.853	825,000	206,250
	Pacific Kotcho b-86-K/94-I-14	2097	3-70	2,366	0.623	90,957	Suspended.
	West Nat Kotcho d-12-C/94-P-3	1147	3-70	2,495	0.605	57,000	14,511
	Pacific Kotcho b-44-C/94-P-3	562	4-60	2,566	0.565	105,000	Suspended.
	Pacific Kotcho d-70-C/94-P-3	2609	3-70	2,531	0.589	16,594	4,149
	Pacific Kotcho d-100-C/94-P-3	2823	3-71	2,537	0.500	10,845	2,711
	Pacific Kotcho c-31-E/94-P-3	2877	3-71	2,537	0.551	33,869	8,467
	Pacific Kotcho b-30-F/94-P-3	677	2-70	2,526	0.573	145,684	Suspended.
Slave Point total		———	———	———	———	———	236,088
LaGarde—							
Dunlevy	Texaco NFA LaGarde 7-21-87-15	145	8-71	980	0.859	2,737	2,000
Boundary Lake	Texaco NFA LaGarde 10-29-87-15	1194	8-71	1,004	0.964	9,324	3,706
Field total		———	———	———	———	———	5,706
Laprise Creek—							
Baldonnel project	Dome Basco Laprise Creek a-81-A/94-G-8	490	8-71	1,207	0.500	3,759	———
	Dome Provo Laprise Creek d-91-A/94-G-8	653	8-71	1,118	0.500	1,563	———
	Dome Provo Laprise Creek b-2-H/94-G-8	483	8-71	1,109	0.720	7,943	———
	Dome Provo Laprise d-4-H/94-G-8	1852	8-71	1,065	0.500	3,393	———
	Dome Basco Laprise Creek d-13-H/94-G-8	474	8-71	1,115	0.500	4,918	———

	Dome Provo Laprise Creek a-25-H/94-G-8	654	8-71	1,130	0.500	1,595	———
	Dome Provo Laprise Creek a-33-H/94-G-8	666	8-71	1,137	0.615	4,685	———
	Dome Basco Laprise Ck a-35-H/94-G-8	327	8-71	1,138	0.544	7,105	———
	Dome Provo Laprise a-46-H/94-G-8	665	8-71	1,184	0.645	2,883	———
	Dome Provo Laprise a-52-H/94-G-8	1445	8-71	1,124	0.500	3,119	———
	Dome Provo Laprise a-81-H/94-G-8	837	8-71	1,159	0.500	4,212	———
	Dome Provo Laprise d-91-H/94-G-8	809	8-71	1,144	0.579	6,458	———
	Dome Provo Laprise c-92-H/94-G-8	1056	8-71	1,066	0.578	2,462	———
	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	8-71	1,231	0.684	4,845	———
	Pacific Imp Laprise b-90-C/94-H-5	1970	8-71	1,194	0.740	8,924	———
	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	7-71	1,250	0.500	4,927	———
	Amerada Laprise d-95-D/94-H-5	1477	6-69	1,397	0.500	1,142	———
	Pacific IOE Laprise d-3-E/94-H-5	1979	7-71	1,347	———	———	———
	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	6-70	1,213	0.554	3,724	———
	Pacific Imperial Laprise c-24-E/94-H-5	1511	6-70	1,166	0.594	1,982	———
	Pacific IOE Laprise a-29-E/94-H-5	1938	6-70	1,442	———	———	———
	Dome Provo Laprise b-30-E/94-H-5	1837	7-71	1,107	0.649	9,922	———
	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	7-71	1,140	0.770	12,883	———
	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	8-71	1,104	0.509	5,825	Suspended.
	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	7-70	1,132	0.713	10,330	———
	Pacific Imperial Laprise c-56-E/94-H-5	650	6-70	1,137	0.577	5,349	———
	Pacific Imperial Laprise d-68-E/94-H-5	516	7-68	1,132	0.661	6,108	———
	Dome Provo Laprise c-70-E/94-H-5	1225	7-71	1,141	0.510	5,860	———
	Pacific Imperial Laprise c-78-E/94-H-5	551	7-71	1,159	0.700	6,132	———
	Pacific Imperial Laprise a-99-E/94-H-5	1341	7-68	1,293	0.767	12,500	———
Baldonnel total		———	———	———	———	———	GEP.
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—							
Bluesky-Gething	Union HB Milligan d-62-G/94-H-2	1001	———	———	———	———	2,000[6]
	Baysel SR Milligan d-76-G/94-H-2	2659	———	———	———	———	———
	Ashland Homestead Milligan d-85-G/94-H-2	2644	4-70	1,024	0.880	3,535	2,000
Bluesky-Gething total		———	———	———	———	———	4,000
Halfway	Whitehall et al Milligan d-75-G/94-H-2	689	———	———	———	———	———
Field total		———	———	———	———	———	4,000

[6] Lease fuel.

TABLE 17—GAS-WELL TEST AND ALLOWABLE DATA, DECEMBER 31, 1971—*Continued*

Field/Pool/Project	Well Name	Well Authorization No.	Date	Pws (Psia)	"n"	AOFP (MSCF/D)	PRL (MSCF/D)
Montney—							
Bluesky-Gething	Pac Sunray Montney 16-32-86-19 (3)	119	9-58	1,123	1.000	814	Suspended.
Charlie Lake	Pac Sunray Montney 14-36-86-19 (2)	104	7-58	1,116	1.000	2,200	Suspended.
Halfway	Pac White Rose Sec Montney 6-5-87-18	801	9-71	1,302	0.529	1,613	2,000
	Pac Sunray Montney 14-31-86-19 (5)	289	7-61	1,185	0.932	2,250	Suspended.
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	7-71	1,376	0.520	1,491	Suspended.
	Pacific Nig b-4-B/94-H-4	1728	10-71	1,085	0.637	2,636	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	1104	7-70	1,217	0.500	1,950	2,000
	Monsanto Nig a-21-B/94-H-4	1475	7-70	1,175	0.677	3,669	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	7-71	1,177	0.595	4,540	2,000
	Tenn Monsanto Nig c-A32-C/94-H-4	1484	10-64	1,589	.....	.....	Abandoned.
Baldonnel project	Texaco NFA Nig a-69-A/94-H-4	819	7-71	1,369	0.500	1,103	2,000
	Texaco Gulf Nig d-76-A/94-H-4	2761	8-71	1,441	0.665	2,777	.....
	Texaco NFA Nig d-15-B/94-H-4	1180	5-71	1,224	0.621	7,584	2,568
	Texaco NFA Nig c-36-B/94-H-4	729	5-71	1,206	0.572	5,194	2,000
	Texaco et al Nig b-68-B/94-H-4	2784	8-71	1,171	0.665	3,720	2,000
	Texaco NFA Nig Creek b-70-B(9)/94-H-4	383	7-71	1,256	0.500	2,642	2,000
	Texaco NFA Nig d-71-B/94-H-4	790	7-71	1,021	1.000	1,485	.....
	Texaco NFA Nig d-75-B/94-H-4	1681	8-71	1,002	0.587	5,611	.....
	Texaco NFA Nig a-77-B/94-H-4	1762	8-71	925	0.663	5,896	.....
	Texaco NFA Nig Creek a-79-B(1)/94-H-4	61	8-71	1,034	0.591	11,742	.....
	Texaco NFA Nig c-90-L/94-H-4	1161	8-71	1,049	0.594	2,744	.....
	Texaco NFA Nig Creek a-31-F(7)/94-H-4	294	.....	.....	.....	.....	Disposal.
	Texaco NFA Nig Creek a-1-G/94-H-4	456	8-71	884	0.898	6,281	.....
	Texaco NFA Nig Creek b-2-G/94-H-4	447	8-71	966	0.564	14,477	.....
	Texaco NFA Nig a-6-G/94-H-4	1740	8-71	963	0.571	7,439	.....
Baldonnel project	Texaco NFA Nig a-8-G/94-H-4	967	8-71	1,040	0.806	20,516	.....
	Texaco NFA Nig Creek a-12-G(6)/94-H-4	131	8-71	914	1.000	9,946	.....
	Texaco NFA Nig c-14-G/94-H-4	2178	3-70	1,357	0.670	393	.....
	Texacco NFA Nig b-44-G/94-H-4	852	3-70	1,470	0.530	360	.....
	Texaco NFA Nig c-6-H/94-H-4	1654	8-71	1,031	0.764	3,807	.....
	Texaco NFA Nig c-14-H/94-H-4	1707	8-71	1,168	0.631	3,497	.....
	Texaco NFA Nig c-33-H/94-H-4	1742	8-71	1,080	0.654	3,610	.....

	Texaco NFA Nig b-41-H/94-H-4	1976	7-71	1,255	1.000	375	———
Baldonnel project	PRL	———	———	———	———	———	80,300
Baldonnel total		———	———	———	———	———	90,387
Nig Creek West—							
Baldonnel	Pacific W Nig c-19-C/94-H-4	92	———	———	———	———	———
	Tenn Monsanto W Nig d-39-C/94-H-4	1448	7-70	1,651	0.796	7,634	2,000
North Pine—							
Charlie Lake	Pacific et al N Pine 6-24-85-18	1994	9-71	1,326	0.583	7,772	2,422
	Pacific et al N Pine 6-27-85-18	1958	9-71	1,777	0.625	24,826	Suspended.
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 PRL		———	———	———	———	———	20,000
Peggo—							
Slave Point	Midwest Chevron Peggo d-65-A/94-P-7	2276	———	———	———	———	———
	Dome et al Peggo d-79-A/94-P-7	2881	———	———	———	———	———
Petitot River—							
Slave Point	West Nat Petitot b-90-K/94-P-12	722	———	———	———	———	———
	West Nat Petitot River b-1-D/94-P-13	533	2-60	2,795	0.802	185,000	Suspended.
	West Nat Petitot River d-24-D/94-P-13	403	———	———	———	———	———
Red Creek—							
Charlie Lake	Pacific Red Creek 5-27-85-21 (36)	93	5-65	1,267	1.000	3,308	Suspended.
Halfway	Pacific Red Creek 5-27-85-21 (36)	93	7-65	1,437	1.000	2,434	Suspended.
Rigel—							
Bluesky-Gething	Imp et al Rigel 10-35-88-18	2593	(7)	(7)	(7)	(7)	(7)
	ARCo Rigel d-33-I/94-A-10	1763	11-70	981	———	———	———
	IOE et al Rigel d-39-J/94-A-10	2686	10-70	1,118	0.509	55	2,000
Dunlevy	IOE Fina Rigel 7-35-87-18	2707	6-71	935	0.500	10,271	2,568
	IOE et al Rigel d-39-J/94-A-10	2686	6-71	1,041	0.826	8,844	2,211
Dunlevy project	Denison Rigel 6-31-87-16	1372	7-71	996	0.765	4,604	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	11-71	985	1.000	2,400	Suspended.
	Wintershall Rigel 10-34-87-17	1365	7-70	965	0.560	8,609	———
	Pacific Rigel 6-35-87-17	1293	5-71	932	1.000	3,664	———
	Monsanto Rigel 6-36-87-17	1354	6-71	938	0.565	8,420	———
	Whitehall Rigel 11-18-88-16	1234	———	———	———	———	———
	IOE Fina Rigel 7-30-88-16	2258	———	———	———	———	———
	Imp Fina Rigel 8-1-88-17	1312	12-71	927	———	———	———
	Imp Fina Rigel 6-3-88-17	1187	6-71	819	0.553	7,318	———
	Imp Fina Rigel 6-8-88-17	1208	6-71	1,026	0.675	2,465	———
	Imp Fina Rigel 6-10-88-17	1090	6-71	842	0.582	6,301	———
	Whitehall Rigel 6-14-88-17	1149	———	———	———	———	———
	Whitehall Rigel 6-15-88-17	1148	6-71	843	0.720	25,224	———
	Imp Fina Rigel 6-16-88-17	1168	6-71	1,253	———	———	———

[7] Bluesky and Dunlevy without segregation.

TABLE 17—GAS-WELL TEST AND ALLOWABLE DATA, DECEMBER 31, 1971—*Continued*

Field/Pool/Project	Well Name	Well Authorization No.	Date	Pws (Psia)	"n"	AOFP (MSCF/D)	PRL (MSCF/D)
Rigel—*Continued*							
Dunlevy project—*Continued*	Imp et al Rigel 7-19-88-17	1107	6-71	838	0.500	14,772	———
	IOE Fina Rigel 10-25-88-17	2127	12-71	963	0.500	3,337	Suspended.
	Imp Fina Rigel 4-27-88-17	130	6-71	852	0.634	3,885	———
	Imp Fina Rigel 6-28-88-17	1385	12-71	1,281	———	———	———
	Imp et al Rigel 6-30-88-17	1032	6-71	850	0.793	17,009	———
	Gulf et al Rigel 7-1-88-18	2974	———	———	———	———	———
	IOE Fina Rigel 11-2-88-18	2597	6-71	924	0.837	19,728	———
	Imp Fina Rigel 11-3-88-18	1593	12-71	945	———	———	———
	Woods Rigel 10-8-88-18	2795	8-71	1,022	0.626	5,557	———
	IOE Fina Rigel 11-11-88-18	1494	6-71	911	0.663	17,277	———
	Imp et al Rigel 7-13-88-18	1978	6-71	885	0.669	14,128	———
	Imp Fina Rigel 10-14-88-18	1465	6-71	913	0.663	6,083	———
	Pacific Rigel 11-15-88-18	2572	4-71	986	0.837	2,246	———
	Sierra Rigel 10-17-88-18	2725	9-71	992	0.700	1,198	———
	Tenn Rigel 6-18-88-18	2987	———	———	———	———	Suspended.
	Richfield et al Rigel 10-19-88-18	1381	———	———	———	———	———
	Imp et al Rigel 6-21-88-18	1118	6-71	935	0.952	6,391	———
	Imp et al Rigel 7-23-88-18	1163	6-71	938	0.693	4,263	———
	Sun Rigel 10-24-88-18	1324	9-70	1,000	0.675	6,267	———
	Imp et al Rigel 6-27-88-18	828	6-71	871	0.699	5,256	———
	Texaco NFA Rigel 10-29-88-18	1222	2-63	1,166	0.620	4,850	Suspended.
	Texaco NFA Rigel 9-31-88-18(10)	195	7-71	743	0.685	7,041	———
	Imp et al Rigel 10-35-88-18	2593[7]	6-71	1,023	0.781	5,230	———
	ARCo Rigel a-27-I/94-A-10	1620[7]	6-71	931	0.777	9,786	———
	ARCo Rigel d-33-I/94-A-10	1763	6-71	1,079	———	———	———
	IOE Fina Rigel d-57-I/94-A-10	1537	6-71	936	0.676	3,443	———
	Imp IOE Fina Rigel a-21-J/94-A-10	2054	6-71	758	0.760	12,201	———
	IOE et al Rigel c-56-J/94-A-10	2537	6-71	1,013	0.594	10,173	———
	IOE Fina Rigel c-60-J/94-A-10	2400	6-71	1,018	0.622	11,991	———
	IOE Fina Rigel a-89-J/94-A-10	2354	6-71	1,135	0.788	1,731	———
	Imp et al Rigel b-22-K/94-A-10	1003	———	———	———	———	———
	Texaco NFA Rigel a-28-K/94-A-10	1370	6-71	834	0.660	1,284	———
	IOE Fina Rigel d-71-K/94-A-10	2726	6-71	1,127	0.740	12,539	———
Dunlevy project (2) total		———	———	———	———	———	GEP.
Field total		———	———	———	———	GEP plus	6,779
Rigel East—							
Dunlevy	Texaco NFA E Rigel 10-12-88-16	1192	2-63	1,335	0.660	3,270	Suspended.
	Tenn E Rigel 6-23-88-16	1275	12-71	1,330	———	———	———
Halfway	Texaco NFA E Rigel 13-26-88-16 (4)	160	1-69	1,532	0.800	3,500	2,000

Shekilie—							
Slave Point	Pacific Shekilie b-24-A/94-I-16	1816	——	——	——	——	——
	Pacific Sinclair Shekilie b-46-A/94-I-16	2038	——	——	——	——	——
Sierra—							
Pine Point	Socony Mobil Sierra c-78-C/94-I-14	1602	2-68	3,450	0.662	610,000	Abandoned.
	Mobil Sierra c-A78-C/94-I-14	2596	3-71	3,425	0.995	565,804	142,162
	Socony Mobil Sierra c-91-D/94-I-14	1659	3-71	3,428	0.500	58,420	14,681
Pine Point total		——	——	——	——	——	156,843
Siphon—							
Baldonnel	Pacific et al Siphon 11-27-86-16	444	10-69	1,430	——	——	2,000
	Pacific West Prod Siphon 7-34-86-16	2581	——	——	——	——	——
	Kissinger Vaughey Siphon 6-2-87-16	2952	——	——	——	——	——
	Dome Siphon 10-12-87-16	2446	1-70	1,381	0.966	1,550	2,000
Baldonnel total		——	——	——	——	——	4,000
Charlie Lake	Pacific et al Siphon 11-27-86-16	444	10-69	1,547	——	——	2,000
	Pacific West Prod Siphon 7-34-86-16	2581	——	——	——	——	——
	Dome Siphon 10-12-87-16	2446	——	——	——	——	——
Halfway	Pacific et al Siphon 11-27-86-16	444	10-69	1,660	0.629	7,161	2,000
	Kissinger Vaughey Siphon 7-33-86-16	2972	——	——	——	——	——
	Pacific West Prod Siphon 7-34-86-16	2581	——	——	——	——	——
	Kissinger Vaughey Siphon 6-2-87-16	2952	——	——	——	——	——
Field total		——	——	——	——	——	8,000
Stoddart—							
Belloy	Pacific et al Stoddart 6-29-85-18	2262	9-71	2,208	0.892	1,259	2,000
	Mesa et al Stoddart 6-31-85-18	2539	8-69	2,326	0.747	6,600	2,000
	Apache Dunbar Stoddart 11-23-85-19	2548	10-69	2,384	0.920	3,140	Zone ab'd.
	Apache Dunbar Stoddart 6-26-85-19	2409	12-70	2,119	0.751	14,689	4,021
	Jeff Lake Mesa Stoddart 11-34-85-19	1959	——	——	——	——	——
	Pacific et al Stoddart 10-35-85-19	2182	9-71	1,706	0.718	22,141	7,021
	Pacific Stoddart 11-2-86-19	2155	9-71	1,672	0.621	21,295	6,660
	Dome Provo Stoddart 11-8-86-19	1902	7-71	1,173	0.649	4,595	2,000
	Pacific Stoddart 6-10-86-19	2078	9-71	1,426	0.880	1,156	2,000
	Jeff Lake Altair Stoddart 6-11-86-19	1841	7-70	1,845	0.754	44,455	13,461
	Pacific et al Stoddart 11-16-86-19	1473	9-71	1,405	0.630	2,451	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	3-71	1,349	0.729	17,399	7,291
	Pacific Stoddart 6-19-86-19	2575	3-71	1,400	0.654	12,148	4,536
	Pacific et al Stoddart 10-1-86-20	438	——	——	——	——	Suspended.
	Pacific Stoddart 2-13-86-20 (90)	262	9-71	1,239	0.756	14,961	6,013
	Pacific Stoddart 4-24-86-20 (85)	244	9-71	1,284	0.927	30,631	13,085
Belloy total		——	——	——	——	——	74,088
Stoddart West—							
Belloy	Woods W Stoddart 11-7-86-20	2814	9-71	1,639	0.784	19,344	4,836
	Pacific W Stoddart 11-10-86-20	1190	9-71	1,310	0.625	6,093	Suspended.
	Woods W Stoddart 10-18-86-20	2786	2-71	2,438	0.779	5,631	2,000

TABLE 17—GAS-WELL TEST AND ALLOWABLE DATA, DECEMBER 31, 1971—*Continued*

Field/Pool/Project	Well Name	Well Authorization No.	Date	Pws (Psia)	"n"	AOFP (MSCF/D)	PRL (MSCF/D)
Stoddart West—*Continued*							
Belloy—*Continued*	Woods W Stoddart 11-19-86-20	2737	8-71	2,324	0.784	2,079	2,000
	Jeff Lake W Stoddart 11-20-86-20	2553	----	----	----	----	----
	Pacific et al W Stoddart 11-30-86-20	2199	3-71	2,166	0.692	14,635	3,372
	Pacific et al W Stoddart 7-5-87-20	2338	3-71	2,119	1.000	7,920	2,000
	Trend et al W Stoddart 6-16-87-20	2780	3-71	2,132	0.869	2,633	2,000
Belloy total		----	----	----	----	----	16,208
Sunrise—							
Paddy	Horizon Sunrise 11-6-79-16	2560	----	----	----	----	----
	Pacific Sunrise 10-7-79-16 (3)	15	5-71	734	----	----	----
Upper Cadotte	Great Northern Sunrise A11-6-79-16	2878	3-71	632	0.724	707	Zone ab'd.
Cadotte	Pacific Sunrise 11-31-78-16 (6A)	19	----	----	----	----	----
	Horizon Sunrise 11-4-79-16	2569	8-70	770	----	----	----
	Horizon Sunrise 11-5-79-16	2559	8-70	683	----	----	----
	Great Northern Sunrise A11-6-79-16	2878	2-71	721	0.625	2,398	2,000
	Horizon Sunrise 10-8-79-16	2538	12-69	714	----	----	----
	Pacific Sunrise 10-9-79-16 (4)	17	----	----	----	----	----
	Horizon Sunrise 11-9-79-16	2564	8-70	730	----	----	----
	GNPM Sunrise 7-12-79-17	2772	----	----	----	----	----
Tsea—							
Slave Point	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.
Two Rivers—							
Baldonnel	Champlin et al Two Rivers 6-9-83-16	2139	3-69	----	----	----	2,000
Charlie Lake	Champlin Two Rivers 10-5-83-16	2064	5-71	1,533	0.924	6,635	2,000
Halfway	Champlin et al Two Rivers 6-9-83-16	2139	5-70	1,985	0.912	43,327	11,373
Field total		----	----	----	----	----	15,373
Weasel—							
Baldonnel	Sinclair Pacific Weael d-93-J/94-A-15	1790	12-65	1,113	0.675	6,050	2,000
Charlie Lake	Tenn Ashland Weasel d-27-B/94-H-2	1703	10-65	1,248	0.754	1,070	Suspended.
Wilder—							
Halfway project	Wainoco Woods Wilder 10-19-83-19	2793	2-71	2,003	0.800	32,920	----
	Wainoco Woods Wilder 7-30-83-19	2773	1-71	2,016	0.786	16,019	----
Halfway project	PRL	----	----	----	----	----	12,500
Belloy	Amerada Pac Wilder 11-17-83-19	697	----	----	----	----	----
	Wainoco Woods Wilder 11-20-83-19	2708	8-70	2,602	1.000	1,132	2,000
Unit total		----	----	----	----	----	14,500

Willow—							
Bluesky-Gething	Union HB Willow d-29-H/94-H-2	1878	-----	-----	-----	-----	-----
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	8-71	871	0.510	20,744	8,271
Halfway total		-----	-----	-----	-----	-----	10,271
Yoyo—							
Slave Point	West Nat et al Yoyo a-74-H/94-I-13	887	3-62	2,686	0.791	185,000	-----
Pine Point	West Nat et al Yoyo a-74-H/94-I-13	887	3-71	2,761	0.536	15,012	3,753
	BVX Mesa Redwater Yoyo b-86-H/94-I-13	2907	-----	-----	-----	-----	-----
	Pacific Placid Yoyo d-95-H/94-I-13	1634	-----	-----	-----	-----	Disposal.
	Pacific Yoyo d-12-I/94-I-13	2602	12-70	2,772	0.581	251,505	62,876
	Placid Frontier Yoyo b-24-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.
	Uno-Tex et al Yoyo c-34-I/94-I-13	2229	2-68	2,838	0.640	92,000	Suspended.
	West Nat Yoyo b-98-E/94-I-14	1405	3-70	2,832	0.533	112,753	28,781
	Pacific Yoyo a-2-L/94-I-14	2271	3-70	2,829	0.684	91,016	23,375
	Pacific Yoyo d-7-L/94-I-14	2035	3-70	2,815	0.600	116,154	29,601
	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	3-70	2,845	0.596	250,722	63,815
	West Nat et al Yoyo b-24-L/94-I-14	1313	3-70	2,797	0.524	106,920	27,381
	Tenn Altair Yoyo a-47-L/94-I-14	1831	3-71	2,752	0.693	219,839	54,960
	Cankee Uno-Tex Yoyo a-49-L/94-I-14	2068	3-71	2,761	1.000	288,903	72,226
Pine Point total		-----	-----	-----	-----	-----	366,768
Other areas—							
Cadotte	Westcoast Pouce Coupe 8-18-80-13(6)	-----	7-60	595	-----	-----	-----
	Westcoast Pouce Coupe 6-30-80-13 (1)	-----	-----	-----	-----	-----	-----
Notikewin	Westcoast Kiskatinaw 8-30-80-14 (5)	-----	-----	-----	-----	-----	-----
Bluesky-Gething	Texaco NFA Junction b-9-F(12)/94-A-15	300	8-71	1,083	0.539	10,504	2,626
	Imp Fina Altares a-83-A/94-B-8	410	3-71	1,238	-----	-----	Suspended.
	Union HB Gulf Ladyfern d-77-H/94-H-1	2615	3-70	1,047	0.729	6,016	2,000
	Union HB Woodrush b-56-H/94-H-2	1889	3-70	1,030	-----	-----	-----
	Triad BP Pickell Creek c-88-I/94-H-3	695	-----	-----	-----	-----	-----
	Triad BP Birley d-17-A/94-H-6	987	-----	-----	-----	-----	-----
	Texaco NFA Silver c-52-K/94-H-6	571	-----	-----	-----	-----	-----
	Pan Am Dome Silver d-81-L/94-H-6	2406	-----	-----	-----	-----	-----
	GraMic Forest Buttes Velma d-15-E/94-H-8	2869	-----	-----	-----	-----	-----
Bluesky-Gething total		-----	-----	-----	-----	-----	4,626
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	3-71	1,091	0.811	6,713	Suspended.
Dunlevy	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	-----	-----	-----	-----	-----

TABLE 17—GAS-WELL TEST AND ALLOWABLE DATA, DECEMBER 31, 1971—*Continued*

Field/Pool/Project	Well Name	Well Authorization No.	Date	Pws (Psia)	"n"	AOFP (MSCF/D)	PRL (MSCF/D)
Other areas—*Continued*							
Baldonnel	Westcoast Pingel 13-11-81-17(8)	4	———	———	———	———	———
	Pacific Ft St John 12-7-84-18(19)	62	8-70	1,503	0.770	1,977	Suspended.
	Pacific Ft St John 1-15-84-19 (5)	30	9-52	1,594	———	———	———
	Apache et al Wilder 7-2-84-20	1940	———	———	———	———	———
	Sinclair Bear Ck 11-18-84-20 (B2-3)	243	———	———	———	———	———
	White Rose Sec Montney 10-29-86-18	1130	9-62	1,520	0.669	1,640	Suspended.
	Tenn LaGarde 6-35-87-15	1200	11-63	1,665	0.754	1,250	Suspended.
	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.
	CDR Fireweed d-31-G/94-A-13	1384	———	———	———	———	———
	PJP 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(1) /94-B-9	120	———	———	———	———	———
	Security Cypress a-92-K/94-B-10	2365	3-71	1,960	0.630	53,208	Suspended.
	FPC Richfield Daiber c-56-D/94-B-16	432	9-71	2,008	0.573	1,166	2,000
	FPC Richfield Daiber c-76-D(1) /94-B-16	386	9-71	2,011	0.726	11,289	Suspended.
	Woods Amerada N Julienne d-33-H/94-G-2	2574	2-70	1,961	1.000	540	2,000
	Sinclair et al N Julienne c-54-H/94-G-2	757	8-71	1,944	———	———	———
	Pan Am Dome Sikanni b-43-B/94-G-7	1335	9-63	1,726	0.832	5,500	Suspended.
	Pacific et al Laprise c-12-I/94-G-8	2984	———	———	———	———	———
	Pacific et al Laprise d-33-I/94-G-8	2994	———	———	———	———	———
	Union ARCo Firebird d-43-D/94-H-2	2060	———	———	———	———	———
	Pacific Sunray Imp Sojer a-61-L/94-H-4	472	———	———	———	———	———
	Champlin Bass Martin c-91-B/94-H-5	2245	———	———	———	———	———
	Pacific CIGOL Laprise c-20-L/94-H-5	2945	10-71	1,369	0.927	6,854	2,000
Baldonnel total		———	———	———	———	———	8,000
Charlie Lake	Pacific et al Pingel 13-17-81-17(1)	36	———	———	———	———	Suspended.
	Pacific Pingel Creek 5-26-81-18(2)	66	———	———	———	———	———
	CEGO et al Flatrock 10-27-84-16	1954	6-67	1,659	0.837	2,630	Suspended.
	Union HB Alder c-39-I/94-H-2	721	3-70	907	———	———	———
	Richfield-Prespatou Crk d-59-A(1) /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	———	———	———	———	———
Halfway	Ballinderry Flatrock 10-33-84-16	2760	9-70	1,940	0.659	3,462	2,000
	Pacific Wilder 13-1-84-20(14)	47	12-53	2,035	0.780	5,500	Suspended.

	Cankee CIGOL Melanie d-68-K/94-A-9	1859	----	----	----	----	----
	Sinclair Pacific Mink d-88-A/94-A-15	1564	----	----	----	----	----
	Dome et al W Peejay d-31-G/94-A-15	1927	----	----	----	----	----
	Baysel SR CanDel Osprey d-83-G/94-A-15	2071	----	----	----	----	----
	GraMic Scurry et al N Nancy d-30-I/94-A-15	2713	----	----	----	----	----
	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.
	Union HB Spruce d-74-E/94-A-16	2664	----	----	----	----	----
	ARCo et al E Bulrush d-93-F/94-A-16	2603	----	----	----	----	----
	Sinclair et al Graham c-53-D(B5-1)/94-B-9	238	----	----	----	----	----
	Texaco NFA Cameron River d-43-H/94-B-10	433	2-60	3,861	----	----	----
	Pacific S Julienne b-80-K/94-B-16	2779	----	----	----	----	----
	Texaco Tepee d-99-G/94-G-8	1432	----	----	----	----	----
	Mesa et al Prophet c-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	----	----	----	----	----
	Apache DiaSham et al Harrier d-18-B/94-H-2	2789	12-70	1,278	----	----	----
	Sun Texaco W Willow d-95-B/94-H-2	1775	----	----	----	----	----
	Richfield et al Big Arrow c-71-F(1)/94-H-2	159	----	----	----	----	----
	Placid Banner 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	----	----	----	----	----
Halfway	KCL et al Woodrush d-83-H/94-H-2	2115	----	----	----	----	----
	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		----	----	----	----	----	8,846
Permo-Carboniferous	Texaco NFA East Osborn a-33-J(7)/94-A-9	322	1-69	1,937	0.624	8,070	2,018
	CSP Town c-69-J/94-B-16	315	8-61	1,992	----	----	----
	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.
Belloy	FPC Kilkerran 12-31-78-14	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	0.835	7,900	Suspended.
	Pacific Two Rivers 2-27-82-16(37)	135	----	----	----	----	----
	Pacific Red Creek 6-7-85-20(39)	102	----	----	----	----	----
	Apache Woods W Stoddart 10-14-87-21	2777	9-71	2,291	0.721	996	2,000
Kiskatinaw	Sinclair et al Doe 6-16-81-14 (B6-1)	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	455	----	----	----	----	----
	Sinclair et al Lily d-12-K(XB 18-1)/94-G-2	385	8-71	2,917	----	----	Suspended.
	ARCo Pacific FPC Grassy a-A75-D/94-G-7	2687	6-70	2,132	1.000	181,349	45,349
	HB Pacific Pocketknife c-37-L/94-G-7	468	7-60	1,727	0.642	26,600	Suspended.
	Mesa et al Prophet c-97-D/94-G-15	2160	----	----	----	----	----
	West Nat Bougie Creek a-49-I/94-G-15	138	----	----	----	----	----
	Union IOE Bigfoot d-27-C/94-I-4	508	----	----	----	----	----

TABLE 17—GAS-WELL TEST AND ALLOWABLE DATA, DECEMBER 31, 1971—*Continued*

Field/Pool/Project	Well Name	Well Authorization No.	Date	Pws (Psia)	"n"	AOFP (MSCF/D)	PRL (MSCF/D)
Other areas—*Continued*							
Debolt—*Continued*	Texaco NFA Walrus b-86-L/94-I-16	947	———	———	———	———	———
	Pacific S Ft Nelson b-96-B(1)/94-J-10	348	5-58	1,051	0.599	2,350	Suspended.
	Texaco NFA July c-53-D/94-P-6	717	———	———	———	———	———
Banff	Dome et al Imp Slave d-10-I/94-H-11	2225	3-68	2,684	0.500	1,400	Suspended.
	Sohio C&E Ekwan a-55-G/94-I-10	897	———	———	———	———	———
Jean Marie	Placid Hunt Amoco Niteal a-58-E/94-I-3	2611	———	———	———	———	———
Slave Point	HB Imperial Union Paddy a-49-B(1)/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 Sextet c-22-K/94-I-12	2884	3-71	2,690	0.692	4,373	2,000
	Pacific Gunnel c-95-L/94-I-12	1239	2-63	2,648	———	———	———
	Atlantic Tees a-16-J/94-I-6	1542	———	———	———	———	———
	Triad Sohio Pac Jackfish a-30-K/94-J-8	999	1-63	1,955	———	———	———
	BA Shell Klua Creek a-50-C(1)/94-J-9	157	———	———	———	———	———
	Mesa Pubco S Clarke a-75-F/94-J-9	2817	11-71	2,820	0.577	57,237	14,309
	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	(8)	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	———	———	———	———	———
	Pacific Louise c-40-L/94-P-3	2472	———	———	———	———	———
	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	———	———	———	———	———
	FPC Chevron Peggo b-53-I/94-P-7	2453	2-70	2,322	0.724	751	2,000
	GAOL GERC Helmet c-40-K/94-P-7	2839	3-71	2,349	———	———	———
	Huber Quintana et al Shekilie a-74-G/94-P-8	2902	———	———	———	———	———
	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 total		———	———	———	———	———	18,309
Sulphur Point	Socony Mobil Swat b-50-F/94-I-5	1835	———	———	———	———	———
	Apache CPOG IOE Clarke d-24-I/94-J-9	2470	2-70	2,823	———	———	———
	Pacific IOE Clarke a-23-I/94-J-10	2870	———	———	———	———	———
	Socony Mobil S Sierra a-98-K/94-I-11	1814	2-67	3,623	1.000	188,000	Suspended.
Pine Point	Pan Am A-1 Komie a-51-A/94-O-8	527	3-70	3,713	———	———	———
	Texaco NFA Missle d-54-A/94-O-9	2232	3-68	3,728	0.550	3,972	Suspended.
	Pan Am IOE Union Hostil d-48-J/94-P-8	2287	———	———	———	———	———
	Chevron N Helmet a-54-B/94-P-10	2108	———	———	———	———	———
Other areas total		———	———	———	———	———	89,148

[8] Not available.

TABLE 18—HYDROCARBON AND BY-PRODUCTS RESERVES, DECEMBER 31, 1971

	Crude Oil, MSTB		Raw Gas, BSCF		Established			
	Proved	Probable	Proved	Probable	Residue Gas, BSCF	Residue Gas (Basis 1,000 Btu/SCF)	Natural Gas Liquids, MSTB	Sulphur MLT
Original hydrocarbon in place	1,993,278	14,214	12,531.3	4,108.6	(2)	(2)	(2)	(2)
			Established					
Ultimate recovery, current estimate	367,643	147,584	12,511.3		10,917.8	11,290.7	168,795	5,071
Cumulative production to December 31, 1970	159,322	———	2,243.9		1,997.5	2,132.4	52,253	929
Reserves estimated at December 31, 1970	231,159	94,623	9,972.7		8,652.2	8,880.6	111,850	4,064
Revisions in 1971	−23,559	+52,019	+26.5		+26.8	+21.1	−748	−9
Drilling in 1971	+716	+942	+168.2		+241.3	+256.6	+5,440	+87
Production in 1971	−25,159	———	−351.2		−309.3	−315.0	−4,237	−95
Cumulative production adjustments[1]	+19	———	−7.5		−7.0	−8.1	−467	−1
Reserves at December 31, 1971	183,176	147,584	9,908.7		8,604.0	8,835.2	111,838	4,046

NOTES:

MSTB=Thousands of stock tank barrels, where one barrel contains 34.97 imperial gallons.

BSCF=Billions of standard cubic feet at 14.65 psia and 60°F.

MLT=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 1971 was 291.2 BSCF, and actually extracted quantities of NGL and sulphur were 1,901,180 barrels and 66,468 long tons respectively.

[1] Adjustment to cumulative production carried in 1970 reserves report. The gas data reflect the implementation of gas sales from Fort St. John Unit 1, Inga Unit 2, Peejay Unit 3, and Pacific-Arco project, and Rigel project 2 during 1971. In previous years no gas reserve was carried; consequently the cumulative production data shown in the 1970 reserves report did not include gas flared from these projects.

[2] Not available.

TABLE 19—OILFIELD RESERVOIR FLUID DATA

Field	Pool/Project	Rock Type and Age	Trapping	Producing Mechanism	Fluid Contacts (G/O, O/W) (Feet SS)	Datum Depth (Feet SS)	Initial Reservoir		Saturation Pressure at Reservoir Temp. (°F)	Initial Formation Volume Factor (RB/STB)	Initial Solution Gas-Oil Ratio (SCF/STB)	Initial Oil Viscosity (Cp)
							Pressure (Psig)	Temp. (°F)				
Aitken Creek	Gething	Sandstone/Lower Cretaceous	Structural/ Stratigraphic	Depletion/ Gas-cap	G/O 1,270	1,270	1,546	140	1,546	1.296	518	0.476
Bear Flat	Charlie Lake	Sandstone/Triassic	Stratigraphic	Depletion/ Gas-cap	G/O 2,285	2,238	1,971	130	1,971	1.270	545	----
Beatton River	Halfway A—B.P. project	Sandstone/Triassic	Structural/ Stratigraphic	Waterflood	G/O 1,110, O/W 1,158	1,134	1,172	129	1,164	1.176	277	1.149
	Halfway B	Sandstone/Triassic	Structural/ Stratigraphic	Depletion/ Gas-cap	G/O 1,125, O/W 1,134	1,125	[1]	129	1,164	1.176	277	1.149
	Halfway C	Sandstone/Triassic	Structural/ Stratigraphic	Depletion	O/W 1,192	1,170	1,172	129	1,164	1.176	277	1.149
	Halfway D	Sandstone/Triassic	Structural/ Stratigraphic	Depletion/ Gas-cap	G/O 1,154, O/W 1,160	1,157	[1]	129	1,164	1.176	277	1.149
	Halfway E	Sandstone/Triassic	Structural/ Stratigraphic	Depletion	O/W 1,188	1,177	1,172	129	1,164	1.176	277	1.149
Beatton River West	Bluesky-Gething A	Sandstone/Lower Cretaceous	Structural/ Stratigraphic	Depletion/ Gas-cap	G/O 875, O/W 893	884	1,024	118	1,021	1.209	377	0.565
	Bluesky-Gething B	Sandstone/Lower Cretaceous	Structural/ Stratigraphic	Depletion/ Gas-cap	G/O 868, O/W 922	896	1,024	118	1,021	1.209	377	0.565
Beaverdam	Halfway	Sandstone/Triassic	Stratigraphic	Depletion/ Gas-cap	G/O 1,380	1,380	1,358	127	1,358	1.202	370	----
Buick Creek	Dunlevy A	Sandstone/Lower Cretaceous	Stratigraphic	Gas cap/ Depletion	G/O 1,260, O/W 1,280	1,260	1,291	122	1,291	1.148[2]	305[2]	----
	Dunlevy B	Sandstone/Lower Cretaceous	Stratigraphic	Gas cap/ Depletion	G/O 1,223, O/W none	1,225	1,290	122	1,290	1.148[2]	305[2]	----
	Dunlevy C	Sandstone/Lower Cretaceous	Stratigraphic	Gas cap/ Depletion	G/O 1,251, O/W 1,282	1,251	1,291	122	1,291	1.148[2]	305[2]	----
Buick Creek West	Dunlevy A	Sandstone/Lower Cretaceous	Stratigraphic	Gas cap/ Depletion	G/O 1,252, O/W 1,282	1,252	1,318	123	1,318	1.150[2]	300[2]	----
	Dunlevy B	Sandstone/Lower Cretaceous	Stratigraphic	Gas cap/ Depletion	G/O 1,246, O/W 1,250	1,246	1,317	123	1,317	1.150[2]	300[2]	----
Bulrush	Halfway	Sandstone/Triassic	Stratigraphic	Depletion/ Gas cap	G/O 1,320	1,320	1,318	132	1,318	1.192	368	0.950
Bulrush East	Halfway	Sandstone/Triassic	Stratigraphic	Depletion	None	1,285	1,314	131	1,314	1.192	366	0.951
Charlie Lake	Gething	Sandstone/Lower Cretaceous	Stratigraphic	Depletion	----	1,020	1,096	116	[1]	1.200[3]	[1]	----
Crush	Halfway—Unit 1	Sandstone/Triassic	Structural/ Stratigraphic	Waterflood	G/O 1,366	1,402	1,341	132	1,345	1.200	359	1.030
Currant	Halfway—Unit 1	Sandstone/Triassic	Stratigraphic	Waterflood	G/O 1,555	1,555	1,399	134	1,399	1.203	390	0.800
Blueberry	Dunlevy	Sandstone/Lower Cretaceous	Stratigraphic	Depletion	----	1,200	1,350	130	[1]	1.339	[1]	----

	Debolt	Carbonate/Mississippian	Structural/Stratigraphic	Gas cap/Partial water	G/O 4,030, O/W 4,158	4,030	2,705	165	2,705	1.349	650	0.652
Boundary Lake	Dunlevy B	Sandstone/Lower Cretaceous	Structural	Water	G/O 1,340, O/W 1,345	1,340	1,454	110	1,454	1.120[2]	265	——
	Charlie Lake	Sandstone/Triassic	Stratigraphic	Depletion	None	1,673	1	1	(1)	1.290[3]	(1)	(1)
	Boundary Lake	Carbonate/Triassic	Structural/Stratigraphic	——	(main) G/O 1,700	1,750	1,835	118	1,818	1.278	530	0.960
	Unit 1	Carbonate/Triassic	Structural/Stratigraphic	Waterflood								
	Unit 2	Carbonate/Triassic	Structural/Stratigraphic	Waterflood								
	Dome Project 1	Carbonate/Triassic	Structural/Stratigraphic	Waterflood								
	Dome Project 2	Carbonate/Triassic	Structural/Stratigraphic	Waterflood								
	Halfway	Sandstone/Triassic	Structural/Stratigraphic	Depletion/Gas cap	G/O 2,071, O/W 2,092	2,071	1,700	125	1,700	1.218[2]	450[2]	——
Eagle Area	Belloy	Carbonate/Permian	Stratigraphic	Depletion	O/W 3,806	3,788	2,441	155	——	1.334[4]	650[3]	——
Elm	Halfway A	Sandstone/Triassic	Stratigraphic	Depletion/Gas cap	G/O 1,061, O/W 1,076	1,061	1,142	128	1,142	1.170[3]	298[3]	——
Flatrock	Boundary Lake	Carbonate/Triassic	Stratigraphic	Depletion	——	2,015	1,693	133	1,693	1.268[3]	500[3]	——
Fort St. John	Charlie Lake	Sandstone/Triassic	Stratigraphic	Gas cap	G/O 2,290, O/W 2,343	2,332	1,921	125	1,921	1.290	534	0.600
	Belloy	Carbonate/Permian	Structural/Stratigraphic	Depletion	——	4,160	2,769	155	——	1.330[4]	——	——
Halfway	Inga	Sandstone/Triassic	Stratigraphic	Depletion	——	2,157	2,112	130	2,112[3]	1.314[3]	630[3]	——
Inga	Baldonnel	Carbonate/Triassic	Structural	Depletion	G/O 1,796	1,796	1,788	126	1,788	1.240[2]	470[2]	——
	Inga	Sandstone/Triassic	Structural/Stratigraphic	——	——	——	——	——	——	——	——	——
	Unit 1	Sandstone/Triassic	Structural/Stratigraphic	Waterflood	G/O 2,405, G/O 2,432	2,519	2,342	140	2,310	1.335	681	0.440
	Unit 2	Sandstone/Triassic	Structural/Stratigraphic	Waterflood	G/O 2,432	2,519	2,342	140	2,310	1.335	681	0.440
Milligan Creek	Halfway—Unit 1	Sandstone/Triassic	Structural/Stratigraphic	Waterflood	G/O 1,127, O/W 1,200	1,170	1,167	132	1,152	1.163	289	0.832
Moberly Lake	Charlie Lake	Sandstone/Triassic	Structural/Stratigraphic	Depletion	——	2,233	2,290	130	2,290	1.340[2]	700[2]	——
Nettle	Bluesky-Gething	Sandstone/Lower Cretaceous	Stratigraphic	Depletion/Gas cap	G/O 711, O/W 715	711	960	118	960	1.240	396	0.580
Nig Creek	Baldonnel	Carbonate/Triassic	Stratigraphic	Depletion	None	1,399	1,535	140	1,535	1.213[2]	400[2]	——
North Pine	Charlie Lake	Sandstone/Triassic	Stratigraphic	Depletion	——	1,854	1,511	130	1,511	1.302	575	0.730
Osprey	Halfway	Sandstone/Triassic	Stratigraphic	Depletion	G/O 1,517	1,517	1,415	134	1,415	1.175[2]	340[2]	——
Parkland Area	Belloy B	Carbonate/Permian	Structural/Stratigraphic	Depletion/Gas cap	G/O 4,664, O/W 4,668	4,665	2,930	153	2,930	1.333[4]	880[2]	——

[1] Not available.
[2] Standing's correlation.
[3] Estimated.
[4] Nominal.

TABLE 19—OIL FIELD RESERVOIR FLUID DATA—*Continued*

Field	Pool/Project	Rock Type and Age	Trapping	Producing Mechanism	Fluid Contacts (G/O, O/W) (Feet SS)	Datum Depth (Feet SS)	Initial Reservoir		Saturation Pressure at Reservoir Temp. (°F)	Initial Formation Volume Factor (RB/STB)	Initial Solution Gas-Oil Ratio (SCF/STB)	Initial Oil Viscosity (Cp)
							Pressure (Psig)	Temp. (°F)				
Peejay	Halfway—											
	Unit 1	Sandstone/Triassic	Stratigraphic	Waterflood	G/O 1,427, G/O 1,438, O/W 1,504	1,465	1,359	132	1,352	1.202	370	0.850
	Unit 2	Sandstone/Triassic	Stratigraphic	Waterflood	G/O 1,435, O/W 1,547	1,490	1,367	134	1,330	1.196	376	0.840
	Unit 3	Sandstone/Triassic	Stratigraphic	Waterflood	G/O 1,450, O/W 1,543	1,500	1,363	133	1,323	1.183	345	0.892
Wargen	Gething	Sandstone/Lower Cretaceous	Stratigraphic	Gas cap	G/W 1,095	1,095	1,100	120	1,100	1.256[3]	436[3]	.....
Weasel	Halfway—											
	Unit 1	Sandstone/Triassic	Stratigraphic	Waterflood	G/O 1,345, G/O 1,375	1,377	1,300	132	1,293	1.181	339	0.898
	Unit 2	Sandstone/Triassic	Stratigraphic	Waterflood	O/W 1,410	1,377	1,300	132	1,293	1.181	339	0.898
Weasel	Halfway A	Sandstone/Triassic	Stratigraphic	Depletion	O/W 1,389	1,375	1,300	132	1,293	1.181	339	0.898
	Halfway B	Sandstone/Triassic	Stratigraphic	Depletion/ Gas cap	G/O 1,312	1,312	1,284	132	1,284	1.180	340	0.895
Weasel West	Halfway	Sandstone/Triassic	Stratigraphic	Depletion	O/W 1,364	1,359	1,278	133	1,278[3]	1.179[3]	335[3]	.....
Wildmint	Halfway—											
	Union-HB Project	Sandstone/Triassic	Structural/ Stratigraphic	Waterflood	G/O 1,252	1,272	1,230	132	1,210	1.142	260	1.05
	Union-HB B	Sandstone/Triassic	Structural/ Stratigraphic	Depletion/ Gas cap	G/O 1,294	1,294	1,238	132	1,238	1.143	265	1.05
	Union-HB C	Sandstone/Triassic	Structural/ Stratigraphic	Depletion	None	1,327	1,264	132	1,210	1.142	260	1.05
	Union-HB D	Sandstone/Triassic	Structural/ Stratigraphic	Depletion	None	1,303	1,256	132	1,210	1.142	260	1.05
	Union-HB E	Sandstone/Triassic	Structural/ Stratigraphic	Depletion	None	1,272	1,230	132	1,210	1.142	260	1.05
	Union-HB F	Sandstone/Triassic	Structural/ Stratigraphic	Depletion/ Gas cap	G/O 1,344	1,344	1,271	132	1,271	1.160[2]	315[2]	.....
Willow	Bluesky-Gething	Sandstone/Lower Cretaceous	Stratigraphic	Depletion/ Gas cap	G/O 820	820	1,019	118	1,019	1.115	235	.....
Wolf	Halfway	Sandstone/Triassic	Structural/ Stratigraphic	Depletion/ Gas cap	G/O 1,680, O/W 1,690	1,684	1,445	143	1,445	[3]1.1925	372[3]	0.832[3]

[2] Standing's correlation.
[3] Estimated.

TABLE 20—GASFIELD RESERVOIR FLUID DATA—*Continued*

Field/Area	Pool/Project	Rock Type and Age	Trapping	Fluid Contacts G/W (Feet SS)	Datum Depth (Feet SS)	Specific Gravity of Gas	Critical Value	
							Pressure (Psia)	Temperature (°R)
Bubbles	Baldonnel	Carbonate/Triassic	Structural	None	1,350	0.663	682	373
Bubbles North area	Halfway	Sandstone/Triassic	Stratigraphic	———	1,825	0.663	678	375
Buick Creek	Bluesky A	Sandstone/Lower Cretaceous	Structural/Stratigraphic	———	1,150	0.637	670	372
	Bluesky B	Sandstone/Lower Cretaceous	Structural/Stratigraphic	———	1,132	0.637	670	372
	Bluesky C	Sandstone/Lower Cretaceous	Stratigraphic	———	1,127	0.662	673	377
	Dunlevy A	Sandstone/Lower Cretaceous	Structural/Stratigraphic	1,287	1,260	0.659	670	378
	Dunlevy B	Sandstone/Lower Cretaceous	Structural/Stratigraphic	1,260	1,225	0.649	674	374
	Dunlevy C	Sandstone/Lower Cretaceous	Structural/Stratigraphic	1,260	1,225	0.659	670	378
	Baldonnel	Carbonate/Triassic	Stratigraphic	———	1,412	0.692	681	383
	Charlie Lake	Sandstone/Triassic	Structural/Stratigraphic	———	1,626	0.613	671	362
Buick Creek North	Bluesky-Gething	Sandstone/Lower Cretaceous	Structural/Stratigraphic	———	1,100	0.685	672	386
	Dunlevy	Sandstone/Lower Cretaceous	Structural/Stratigraphic	1,238	1,225	0.670	677	380
Buick Creek West	Dunlevy A	Sandstone/Lower Cretaceous	Structural/Stratigraphic	1,252	1,150	0.657	678	375
	Dunlevy B	Sandstone/Lower Cretaceous	Structural/Stratigraphic	None	1,150	0.657	678	375
	Baldonnel	Carbonate/Triassic	Structural/Stratigraphic	———	1,375	0.698	680	387
	Halfway	Sandstone/Triassic	Structural	———	2,200	0.748	679	403
Cabin	Slave Point A	Carbonate/Devonian	Stratigraphic	4,808	4,800	0.651	706	353
	Slave Point B	Carbonate/Devonian	Stratigraphic	4,857	4,800	0.686	727	371
Cache Creek	Charlie Lake	Sandstone/Triassic	Stratigraphic	None	2,134	0.631	671	369
	Halfway	Sandstone/Triassic	Structural/Stratigraphic	2,607	2,560	0.805	805	441
Clarke Lake	Jean Marie	Carbonate/Devonian	Stratigraphic	———	3,000	0.607	670	345
	Slave Point A	Carbonate/Devonian	Stratigraphic	5,231	5,000	0.671	712	354
	Slave Point B	Carbonate/Devonian	Stratigraphic	5,256	5,000	0.671	712	354
	Slave Point C	Carbonate/Devonian	Stratigraphic	5,255	5,000	0.671	712	354
Clarke Lake South	Slave Point	Carbonate/Devonian	Stratigraphic	5,242	5,000	0.671	712	354
Currant	Halfway B	Sandstone/Triassic	Stratigraphic	None	1,555	0.637	672	370
Cypress	Baldonnel	Carbonate/Triassic	Structural	1,210	1,095	0.584	672	354
Dahl	Bluesky	Sandstone/Lower Cretaceous	Stratigraphic	729	700	0.642	678	372
Dawson Creek	Cadotte	Sandstone/Lower Cretaceous	Structural/Stratigraphic	———	363	0.581	671	347
Eagle	Halfway	Sandstone/Triassic	Stratigraphic	2,548	2,536	0.680	677	382
Elm area	Halfway A	Sandstone/Triassic	Stratigraphic	———	1,061	0.645	674	374
	Halfway B	Sandstone/Triassic	Stratigraphic	1,076	1,074	0.645	674	374
Evergreen	Halfway	Sandstone/Triassic	Structural	———	1,057	0.630	679	363.4
Farrell Creek	Charlie Lake	Sandstone/Triassic	Structural	———	2,624	0.644	675	372
	Halfway	Sandstone/Triassic	Structural	———	3,325	0.658	678	375
Flatrock	Halfway	Sandstone/Triassic	Stratigraphic	———	2,511	0.650	681	375
Fort St. John	Dunlevy	Sandstone/Lower Cretaceous	Structural	1,045	980	0.581	680	347
	Baldonnel	Carbonate/Triassic	Structural	1,765	1,050	0.661	682	373
	Halfway A	Sandstone/Triassic	Structural	2,731	2,660	0.680	677	382

	Halfway B	Sandstone/Triassic	Structural	2,700	2,677	0.623	700	368
	Belloy	Carbonate/Permian	Structural/Stratigraphic	———	4,105	0.655	670	378
	Debolt	Carbonate/Mississippian	Stratigraphic	———	4,739	0.671	666	376
Fort St. John Southeast	Dunlevy	Sandstone/Lower Cretaceous	Structural	———	1,101	0.581	680	347
	Baldonnel	Carbonate/Triassic	Structural	———	1,800	0.702	668	392
	Charlie Lake	Sandstone/Triassic	Structural	———	2,335	0.648	665	366
	Halfway	Sandstone/Triassic	Structural	2,875	2,836	0.693	678	369
	Belloy	Carbonate/Permian	Structural/Stratigraphic	4,290	4,255	0.640	674	371
Grizzly	Dunlevy	Sandstone/Lower Cretaceous	Structural/Stratigraphic	———	4,150	0.620	696	354
Gundy Creek	Dunlevy	Sandstone/Lower Cretaceous	Stratigraphic	———	1,276	0.659	675	369
	Baldonnel A	Carbonate/Triassic	Structural	1,750	1,730	0.630	674	367
	Baldonnel B	Carbonate/Triassic	Structural	1,778	1,730	0.630	674	367
	Charlie Lake	Sandstone/Triassic	Structural/Stratigraphic	———	2,256	0.655	670	378
Halfway	Baldonnel	Carbonate/Triassic	Structural	1,400±	1,361	0.639	670	372
	Charlie Lake	Sandstone/Triassic	Structural	———	1,880	0.693	667	385
Helmet	Slave Point	Carbonate/Devonian	Stratigraphic	4,162	4,124	0.661	719	368
Highway	Dunlevy	Sandstone/Lower Cretaceous	Structural	———	1,127	0.669	686	375
	Baldonnel	Carbonate/Triassic	Structural	———	1,472	0.675	677	382
	Debolt	Carbonate/Mississippian	Structural	———	3,900	0.609	671	362
Inga	Gething	Sandstone/Lower Cretaceous	Structural/Stratigraphic	———	1,140	0.670	668	379
	Baldonnel B	Carbonate/Triassic	Structural	1,823	1,803	0.689	693	388
	Baldonnel D	Carbonate/Triassic	Stratigraphic	———	1,866	0.689	693	388
Inga North	Inga	Sandstone/Triassic	Stratigraphic	2,545	2,299	0.825	923	482
Jedney	Gething	Sandstone/Lower Cretaceous	Structural/Stratigraphic	———	1,125	0.663	678	375
	Baldonnel	Carbonate/Triassic	Structural	———	1,300	0.693	699	376
	Halfway	Sandstone/Triassic	Structural	2,054±	1,905	0.673	673	381
Jedney West	Baldonnel	Carbonate/Triassic	Structural	———	1,500	0.693	499	376
	Halfway	Sandstone/Triassic	Structural	———	2,100	0.673	673	381
Julienne Creek	Baldonnel	Carbonate/Triassic	Structural/Stratigraphic	None	1,769	0.656	678	375
	Halfway	Sandstone/Triassic	Structural/Stratigraphic	None	2,833	0.614	671	362
	Debolt	Carbonate/Mississippian	Structural/Stratigraphic	———	4,457	0.560	673	341
	Shunda	Carbonate/Mississippian	Structural/Stratigraphic	———	5,575	0.560	673	341
Kobes-Townsend	Dunlevy	Sandstone/Lower Cretaceous	Structural	———	714	0.651	674	374
	Charlie Lake A	Sandstone/Triassic	Structural/Stratigraphic	———	2,578	0.652	670	376
	Charlie Lake B	Sandstone/Triassic	Structural/Stratigraphic	———	2,424	0.638	673	369
	Charlie Lake C	Sandstone/Triassic	Structural/Stratigraphic	———	2,348	0.629	670	368
	Halfway	Sandstone/Triassic	Structural/Stratigraphic	———	2,820	0.638	670	372
	Belloy	Carbonate/Permian	Structural/Stratigraphic	———	4,540	0.695	668	392
	Debolt	Carbonate/Mississippian	Structural/Stratigraphic	———	4,600	0.647	678	372
Kotcho Lake	Slave Point A	Carbonate/Devonian	Stratigraphic	4,667	4,577	0.670	722	361
	Slave Point B	Carbonate/Devonian	Stratigraphic	4,600	4,560	0.670	722	361
	Slave Point C	Carbonate/Devonian	Stratigraphic	None	4,410	0.670	722	361
Lagarde	Dunlevy	Sandstone/Lower Cretaceous	Structural/Stratigraphic	———	1,160	0.636	683.4	369.5
	Baldonnel	Carbonate/Triassic	Structural/Stratigraphic	———	1,361	0.628	671	361
	Boundary Lake	Carbonate/Triassic	Stratigraphic	———	1,579	0.706	667	392

TABLE 20—GASFIELD RESERVOIR FLUID DATA—*Continued*

Field/Area	Pool/Project	Rock Type and Age	Trapping	Fluid Contacts G/W (Feet SS)	Datum Depth (Feet SS)	Specific Gravity of Gas	Critical Value	
							Pressure (Psia)	Temperature (°R)
Laprise Creek	Baldonnel	Carbonate/Triassic	Structural/Stratigraphic	1,426	1,250	0.676	681	380
Laprise Creek West	Baldonnel	Carbonate/Triassic	Structural/Stratigraphic	.....	1,375	0.694	669	388
Louise area	Slave Point	Carbonate/Devonian	Stratigraphic	4,950	4,790	0.657	715	365
Milligan Creek	Gething A	Sandstone/Lower Cretaceous	Stratigraphic	.....	800	0.669	676.6	380
	Gething B	Sandstone/Lower Cretaceous	Stratigraphic	.....	762	0.669	676.6	380
	Halfway B	Sandstone/Triassic	Stratigraphic	.....	1,170	0.714	675	389
Montney	Bluesky-Gething	Sandstone/Lower Cretaceous	Structural/Stratigraphic	.....	1,065	0.670	668	379
	Charlie Lake	Sandstone/Triassic	Structural/Stratigraphic	.....	1,784	0.664	657	372
	Halfway A	Sandstone/Triassic	Structural	.....	2,400	0.704	685	385
	Halfway B	Sandstone/Triassic	Structural	.....	2,350	0.701	680	387
Nettle	Bluesky-Gething	Sandstone/Lower Cretaceous	Stratigraphic	.....	701	0.641	678	369
	Charlie Lake	Sandstone/Triassic	Stratigraphic	.....	773	0.663	676	378
	Halfway	Sandstone/Triassic	Structural	.....	925	0.635	681	367
Nig Creek	Baldonnel A	Carbonate/Triassic	Structural/Stratigraphic	.....	1,399	0.681	693	384
	Baldonnel B	Carbonate/Triassic	Structural/Stratigraphic	None	1,508	0.677	681	380
	Baldonnel C	Carbonate/Triassic	Structural/Stratigraphic	None	1,399	0.671	687	380
	Halfway	Sandstone/Triassic	Stratigraphic	.....	1,970	0.748	679	403
	Slave Point	Carbonate/Devonian	Stratigraphic	.....	8,050	0.762	749	376
Nig Creek West	Baldonnel	Carbonate/Triassic	Stratigraphic	.....	1,550	0.693	686	381
North Pine	Charlie Lake	Sandstone/Triassic	Structural/Stratigraphic	None	2,096	0.677	668	383
Parkland	Belloy A	Carbonate/Permian	Structural/Stratigraphic	4,608	4,588	0.674	655	360
	Belloy B	Carbonate/Permian	Structural/Stratigraphic	4,668	4,642	0.674	655	360
	Wabamun	Carbonate/Devonian	Structural/Stratigraphic	.....	8,500	0.623	693	348
Peejay	Gething	Sandstone/Lower Cretaceous	Structural/Stratigraphic	.....	933	0.642	677	371
	Baldonnel	Carbonate/Triassic	Structural/Stratigraphic	.....	1,019	0.638	676	371
Pegco	Slave Point A	Carbonate/Devonian	Stratigraphic	3,982	3,965	0.642	703	358
	Slave Point B	Carbonate/Devonian	Stratigraphic	4,032	4,012	0.642	703	358
Petitot River	Slave Point	Carbonate/Devonian	Structural/Stratigraphic	5,157	5,100	0.673	714	357
Red Creek	Charlie Lake	Sandstone/Triassic	Structural/Stratigraphic	.....	2,300	0.614	675	361
	Halfway	Sandstone/Triassic	Structural	.....	2,686	0.779	674	415
Rigel	Bluesky	Sandstone/Lower Cretaceous	Structural/Stratigraphic	1,180	1,170	0.650	676	375
	Dunlevy	Sandstone/Lower Cretaceous	Structural/Stratigraphic	1,242	1,195	0.654	674	374
Rigel East	Dunlevy	Sandstone/Lower Cretaceous	Stratigraphic	.....	1,177	0.647	674	372
	Halfway	Sandstone/Triassic	Stratigraphic	1,842	1,827	0.649	677	372.5
Shekilie	Slave Point	Carbonate/Devonian	Stratigraphic	4,110	4,055	0.649	698.3	357.1
Sierra	Pine Point	Carbonate/Devonian	Stratigraphic	5,457	5,250	0.690	730	373
Siphon	Dunlevy	Sandstone/Lower Cretaceous	Stratigraphic	.....	1,220	0.652	675	375
	Baldonnel	Carbonate/Triassic	Structural/Stratigraphic	1,469	1,459	0.690	717	395

	Charlie Lake	Sandstone/Triassic	Stratigraphic	None	1,615	0.693	668	385
	Halfway	Sandstone/Triassic	Structural/Stratigraphic	2,169	2,120	0.678	680.4	385
Stoddart	Belloy A	Sandstone/Permian	Stratigraphic	None	3,726	0.695	668	392
	Belloy B	Sandstone/Permian	Stratigraphic	None	3,726	0.695	668	392
Stoddart West	Halfway	Sandstone/Triassic	Stratigraphic	.....	2,572	0.693	705.7	389
	Belloy A	Sandstone/Permian	Stratigraphic	None	3,830	0.664	677	379.5
	Belloy B	Sandstone/Permian	Stratigraphic	3,792	3,786	0.664	677	379.5
Sunrise	Cadotte	Sandstone/Lower Cretaceous	Stratigraphic	.....	349	0.575	674.5	350
Tsea area	Slave Point	Carbonate/Devonian	Stratigraphic	.....	5,000	0.657	713	358
Two Rivers	Baldonnel	Carbonate/Triassic	Structural	.....	1,941	0.676	710	385
	Halfway	Sandstone/Triassic	Structural	.....	2,839	0.668	693	382
Weasel	Baldonnel	Carbonate/Triassic	Structural	.....	975	0.638	676	371
	Charlie Lake	Sandstone/Triassic	Structural	.....	1,389	0.660	680	377
	Halfway B	Sandstone/Triassic	Stratigraphic	.....	1,312	0.649	678	372
	Halfway E	Sandstone/Triassic	Stratigraphic	.....	1,435	0.649	678	372
Wilder	Halfway	Sandstone/Triassic	Structural/Stratigraphic	2,698	2,670	0.630	704	369
	Belloy A	Carbonate/Permian	Stratigraphic	.....	4,255	0.668	670.5	379.3
	Belloy B	Carbonate/Permian	Stratigraphic	.....	4,115	0.673	671.6	383.2
Willow	Halfway	Sandstone/Triassic	Structural	1,238	1,225	0.635	678	379
Wolf	Halfway	Sandstone/Triassic	Structural	.....	1,660	0.645	681.7	369.8
Yoyo	Slave Point	Carbonate/Devonian	Stratigraphic	None	4,800	0.613	696	351
	Pine Point	Carbonate/Devonian	Structural/Stratigraphic	5,420	5,322	0.704	729	368

TABLE 21—WELLS DRILLED AND DRILLING, 1971

Well Authorization No.	Well Name	Date Spudded	Date Rig Released	Total Depth	Status at December 31, 1971
2822	ARCo Pac LRI Grassy d-44-D	Dec. 14, 1970	Apr. 1, 1971	6,462	Water disposal.
2903	ARCo Pacific Lichen b-18-A	Feb. 19, 1971	Mar. 21, 1971	6,725	Abandoned—dry.
2875	ARCo Pink c-71-D	Feb. 6, 1971	Mar. 22, 1971	1,666	Abandoned—junked.
2959	ARCo Pink d-71-D	Aug. 8, 1971	———	———	Drilling.
3012	ARCo Pacific Robertson b-71-K	Dec. 18, 1971	———	———	Drilling.
2812	ARCo Pac S Sierra a-25-K	Dec. 15, 1970	Jan. 17, 1971	6,800	Abandoned—dry.
2547	Amoco Beaver d-A64-K	July 11, 1969	Jan. 13, 1971	14,000	Nahanni gas.
2858	Amoco Chevron Crow d-36-H	Feb. 2, 1971	Aug. 11, 1971	12,383	Permo Carboniferous gas.
2940	Amoco Inga 14-18-87-23	July 16, 1971	July 29, 1971	5,425	Water injection.
2941	Amoco Inga 15-8-86-23	June 11, 1971	June 25, 1971	5,339	Water injection.
2942	Amoco Inga 8-36-86-24	July 1, 1971	July 13, 1971	5,533	Water injection.
2943	Amoco Inga 14-7-86-23	May 22, 1971	June 6, 1971	5,565	Water injection.
2811	Amoco Stewart 14-35-79-23	Dec. 21, 1970	Mar. 13, 1971	8,500	Abandoned—dry.
2840	Anadarko Cdn-Sup Buick 11-29-88-19	Dec. 31, 1970	Jan. 9, 1971	3,770	Abandoned—dry.
2863	Anadarko Cdn-Sup Buick c-32-I	Jan. 19, 1971	Jan. 28, 1971	3,585	Bluesky-Gething gas.
3033	Andex Flatrock 6-11-84-16	Dec. 21, 1971	———	———	Drilling.
2849	Apache Penzl Buckinghorse d-A95-H	Jan. 6, 1971	Jan. 26, 1971	4,550	Abandoned—dry.
2988	Apache Gopher 10-29-85-16	Oct. 22, 1971	Nov. 11, 1971	5,980	Abandoned—dry.
3013	Aquit Elf Julia b-14-A	Dec. 10, 1971	———	———	Drilling.
2842	Ashland Cdn-Sup Junction b-2-E	Jan. 6, 1971	Jan. 17, 1971	3,750	Abandoned—dry.
3037	Atkinson Phillips Pesh c-76-I	Dec. 30, 1971	———	———	Drilling.
3052	BP W Beatton d-47-K	Dec. 31, 1971	———	———	Drilling.
2845	BP Phillips W Stoddart 7-8-86-20	Jan. 1, 1971	Jan. 18, 1971	6,480	Abandoned—dry.
2907	BVX Mesa Redwater Yoyo b-86-H	Mar. 10, 1971	Apr. 9, 1971	7,287	Pine Point gas.
2852	Ballinderry Flatrock 10-19-84-16	Jan. 12, 1971	Jan. 24, 1971	4,920	Boundary Lake oil.
2912	Ballinderry Flatrock 16-13-84-17	Feb. 26, 1971	Mar. 14, 1971	4,795	Abandoned—dry.
2913	Ballinderry Flatrock 6-30-84-16	Feb. 27, 1971	Mar. 14, 1971	4,970	Abandoned—dry.
2933	Ballinderry Flatrock 6-25-84-17	Mar. 17, 1971	Mar. 27, 1971	5,020	Abandoned—dry.
2926	Bralorne et al Currant d-56-C	Mar. 27, 1971	Apr. 3, 1971	4,010	Abandoned—dry.
2925	Bralorne et al S Currant b-82-K	Mar. 16, 1971	Mar. 25, 1971	4,110	Abandoned—dry.
2932	Bralorne et al S Currant d-79-J	Mar. 17, 1971	Mar. 27, 1971	4,100	Abandoned—dry.
2856	Bralorne et al Elm b-62-C	Jan. 18, 1971	Jan. 28, 1971	3,840	Halfway oil.
2921	CAEL Union HB Moose d-39-J	Mar. 7, 1971	Mar. 15, 1971	3,820	Abandoned—dry.
2882	CDR Helmet c-80-B	Feb. 2, 1971	Mar. 9, 1971	7,970	Abandoned—dry.
2826	CDR et al Junior d-47-E	Dec. 26, 1970	Feb. 1, 1971	6,732	Abandoned—dry.
2915	CIGOL et al Beatton d-11-K	Mar. 9, 1971	Mar. 23, 1971	3,810	Halfway oil.
2936	CIGOL et al Beatton a-12-K	Mar. 24, 1971	Apr. 3, 1971	3,810	Abandoned.
2948	CIGOL et al Beatton d-1-K	July 22, 1971	July 31, 1971	3,835	Halfway oil.
3002	CIGOL et al Beatton d-21-K	Nov. 16, 1971	Nov. 27, 1971	3,750	Halfway oil.
2871	CIGOL Crush d-30-F	Jan. 21, 1971	Jan. 31, 1971	3,850	Abandoned—dry.
2935	Cabot et al Flatrock 6-8-85-16	Mar. 19, 1971	Apr. 9, 1971	6,160	Abandoned—dry.

2883	CanDel et al Peejay d-23-I	Feb. 7, 1971	Feb. 17, 1971	3,805	Abandoned—dry.
2809	Cankee et al Patry a-67-D	Jan. 3, 1971	Mar. 8, 1971	8,315	Abandoned—dry.
3032	Cdn Res Quintana Adsett a-36-G	Dec. 23, 1971	———	———	Drilling.
2824	Cdn-Sup Dahl b-6-J	Dec. 23, 1970	Jan. 4, 1971	3,750	Abandoned.
2947	Cdn-Sup Inga 10-26-88-24	May 26, 1971	June 8, 1971	5,327	Abandoned—dry.
2827	Champlin et al Flatrock 11-17-84-16	Jan. 1, 1971	Jan. 25, 1971	4,870	Halfway gas.
2976	Champlin Two Rivers 10-18-83-16	Oct. 15, 1971	Oct. 31, 1971	5,352	Water disposal.
2767	Clark Can Elcan TGS Pine c-29-B	Sept. 12, 1970	Jan. 11, 1971	7,740	Abandoned—dry.
3022	Clark Can et al Trutch c-34-A	Dec. 25, 1971	———	———	Drilling.
3007	Cockrell Corp Cheves d-92-G	Dec. 19, 1971	———	———	Drilling.
2991	Decalta POC Stoddart 8-35-85-20	Nov. 3, 1971	Nov. 26, 1971	6,442	Belloy oil.
2934	Decalta et al Yoyo d-33-L	Mar. 19, 1971	Apr. 7, 1971	7,390	Abandoned—dry.
2808	DiaSham IOE Junior c-56-C	Dec. 11, 1970	Jan. 15, 1971	6,600	Abandoned—dry.
2851	DiaSham Mobil Sahtaneh c-36-I	Jan. 20, 1971	Feb. 27, 1971	6,764	Abandoned—dry.
2881	Dome et al Peggo d-79-A	Mar. 2, 1971	Mar. 31, 1971	6,428	Slave Point gas.
2876	Dome et al Wargen c-72-D	Jan. 21, 1971	Feb. 3, 1971	4,410	Abandoned—dry.
2880	Fina et al August d-67-K	Feb. 10, 1971	Mar. 12, 1971	6,550	Abandoned—dry.
2843	Fina Mana HB Calendar d-20-I	Jan. 3, 1971	Feb. 6, 1971	7,200	Abandoned—dry.
2905	Fina et al Earth d-71-E	Feb. 19, 1971	Mar. 1, 1971	3,700	Abandoned—dry.
2879	Fina et al Jupiter d-19-F	Feb. 3, 1971	Feb. 16, 1971	3,780	Abandoned—dry.
2900	Fina Amoco Mars d-19-G	Feb. 13, 1971	Feb. 23, 1971	3,710	Abandoned—dry.
2846	Fina Amoco Mercury d-44-B	Jan. 17, 1971	Jan. 30, 1971	3,883	Abandoned—dry.
2838	Fina Amoco Venus d-44-G	Dec. 30, 1970	Jan. 13, 1971	3,490	Abandoned—dry.
2957	Frio Et Can CAEL Cecil 7-20-84-17	July 16, 1971	Aug. 1, 1971	6,050	Abandoned—dry.
2885	GAO Union Gunnel a-67-K	Feb. 8, 1971	Mar. 9, 1971	7,730	Abandoned—dry.
3039	GAO GEOG Helmet c-94-L	Dec. 29, 1971	———	———	Drilling.
2830	GAOL S Clarke b-2-L	Jan. 1, 1971	Feb. 1, 1971	6,700	Abandoned—dry.
2839	GAOL GERC Helmet c-40-K	Dec. 29, 1970	Jan. 31, 1971	6,131	Slave Point gas.
2983	GNPM Sunrise 6-7-79-16	Oct. 20, 1971	Nov. 6, 1971	3,271	Cadotte gas.
2998	GNPM Horizon Sunrise 10-5-79-16	Nov. 11, 1971	Nov. 24, 1971	3,280	Finished drilling.
2970	GraMic IOE Inga 6-15-87-23	Sept. 14, 1971	Sept. 30, 1971	5,260	Abandoned—dry.
2869	GraMic Forest Buttes Velma d-15-E	Jan. 23, 1971	Jan. 31, 1971	3,480	Bluesky-Gething gas.
2878	Great Northern Sunrise A11-6-79-16	Jan. 31, 1971	Feb. 13, 1971	3,250	Cadotte gas.
2974	Gulf et al Rigel 7-1-88-18	Oct. 1, 1971	Oct. 8, 1971	3,065	Dunlevy gas.
2897	HB IOE Union Gutah d-57-I	Mar. 13, 1971	Mar. 19, 1971	3,102	Abandoned—dry.
2898	HB Quintana et al Paddy d-35-F	Feb. 14, 1971	Mar. 18, 1971	8,000	Abandoned—dry.
3026	HB et al Pocketknife a-7-L	Dec. 29, 1971	———	———	Drilling.
3031	Heritage Yoyo b-4-I	Dec. 22, 1971	———	———	Drilling.
2961	Home et al Attachie 7-20-84-22	Aug. 5, 1971	Oct. 29, 1971	9,364	Multiple Kiskatinaw and Baldonnel gas.
2951	Home Pembina Farmington 6-18-80-15	July 20, 1971	Dec. 5, 1971	12,585	Abandoned—dry.
2902	Huber Quintana et al Shekilie a-74-G	Feb. 18, 1971	Apr. 4, 1971	6,322	Slave Point gas.
2819	IOE Amoco Clayhurst 14-26-82-15	Dec. 16, 1970	Jan. 7, 1971	5,260	Abandoned—dry.
2833	IOE Inga 16-34-87-23	Dec. 30, 1970	Jan. 14, 1971	5,420	Abandoned—dry.
2837	IOE Pac Inga 16-20-87-23	Dec. 28, 1970	Jan. 14, 1971	5,070	Abandoned—dry.
2859	IOE Pac Inga 16-16-87-23	Jan. 15, 1971	Jan. 31, 1971	5,315	Inga oil.
2896	IOE Pac Inga 16-21-87-23	Feb. 10, 1971	Feb. 23, 1971	5,450	Inga oil.

TABLE 21—WELLS DRILLED AND DRILLING, 1971—*Continued*

Well Authorization No.	Well Name	Date Spudded	Date Rig Released	Total Depth	Status at December 31, 1971
2918	IOE et al Inga 16-9-87-23	Feb. 27, 1971	Mar. 15, 1971	5,270	Inga oil.
2950	IOE Pac Inga 14-28-87-23	June 22, 1971	July 9, 1971	5,455	Inga oil.
2733	Imp et al Boundary 5-31-84-13	Feb. 10, 1971	Feb. 19, 1971	4,333	Boundary Lake oil.
2734	Imp et al Boundary 7-31-84-13	Feb. 20, 1971	Feb. 28, 1971	4,360	Boundary Lake oil.
2736	Imp et al Boundary 3-1-85-14	Feb. 4, 1971	Feb. 19, 1971	4,529	Boundary Lake oil.
2738	Imp et al Boundary 3-18-85-13	Dec. 17, 1971	Dec. 29, 1971	4,652	Boundary Lake oil.
2740	Imp et al Boundary 11-1-85-14	Feb. 20, 1971	Mar. 7, 1971	4,541	Boundary Lake oil.
2744	Imp et al Boundary 3-6-85-13	Oct. 24, 1971	Nov. 6, 1971	4,610	Boundary Lake oil.
2864	Imp et al Boundary 5-5-85-13	Jan. 17, 1971	Jan. 29, 1971	4,310	Boundary Lake oil.
2865	Imp et al Boundary 7-2-85-14	Jan. 24, 1971	Feb. 2, 1971	4,189	Boundary Lake oil.
2866	Imp et al Boundary 11-25-84-14	Mar. 1, 1971	Mar. 10, 1971	4,395	Boundary Lake oil.
2867	Imp et al Boundary 11-30-84-13	Jan. 31, 1971	Feb. 8, 1971	4,430	Boundary Lake oil.
2868	Imp et al Boundary 7-26-84-14	Mar. 12, 1971	Mar. 19, 1971	4,310	Boundary Lake oil.
2911	Imp et al Boundary 5-2-85-14	Mar. 8, 1971	Mar. 20, 1971	4,410	Boundary Lake oil.
2978	Imp et al Boundary 5-32-84-13	Nov. 18, 1971	Nov. 27, 1971	4,355	Boundary Lake oil.
2979	Imp et al Boundary 3-7-85-13	Nov. 20, 1971	Dec. 1, 1971	4,579	Boundary Lake oil.
2980	Imp et al Boundary 11-7-85-13	Dec. 1, 1971	Dec. 13, 1971	4,554	Boundary Lake oil.
2981	Imp et al Boundary 11-6-85-13	Nov. 7, 1971	Nov. 18, 1971	4,562	Boundary Lake oil.
2982	Imp et al Boundary 7-3-85-14	Oct. 24, 1971	Nov. 16, 1971	4,143	Abandoned—junked.
2939	Ipex et al Crush d-20-F	May 19, 1971	May 27, 1971	3,900	Abandoned—dry.
2952	Kissinger Vaughey Siphon 6-8-87-16	July 18, 1971	July 29, 1971	4,560	Multiple Baldonnel and Halfway gas.
2960	Kissinger Vaughey Siphon 7-9-87-16	Aug. 6, 1971	Aug. 15, 1971	4,527	Abandoned—dry.
2972	Kissinger Vaughey Siphon 7-33-86-16	Sept. 22, 1971	Oct. 3, 1971	4,648	Halfway gas.
2975	LRI Grassy d-52-A	Oct. 12, 1971	———	———	Drilling.
2841	LRI Dome Homestead Helmet d-41-F	Jan. 6, 1971	Feb. 26, 1971	6,355	Abandoned—dry.
2816	Mesa et al E Clarke c-2-A	Dec. 16, 1970	Jan. 21, 1971	7,132	Abandoned—dry.
2817	Mesa Pubco S Clarke b-75-F	Dec. 18, 1970	Mar. 8, 1971	6,625	Slave Point gas.
2955	Mesa Pubco S Clarke a-35-F	July 24, 1971	Aug. 17, 1971	7,030	Abandoned—dry.
2956	Mesa Pubco Klua b-30-C	July 21, 1971	Aug. 12, 1971	7,226	Abandoned—dry.
3000	Mobil et al W Evie d-99-G	Nov. 18, 1971	———	———	Drilling.
2973	Monkman Pass PRP Grizzly c-36-A	Oct. 9, 1971	———	———	Drilling.
2996	Monsanto Dome Bear Flat 6-30-84-20	Nov. 8, 1971	Nov. 24, 1971	5,535	Abandoned—dry.
2909	POR Ashland Beatton d-9-J	Feb. 24, 1971	Mar. 8, 1971	3,800	Halfway oil.
2949	POR Ashland Beatton d-10-J	Aug. 3, 1971	Aug. 14, 1971	3,810	Abandoned—dry.
2828	POR BP Milligan d-98-G	Dec. 27, 1970	Jan. 6, 1971	3,831	Abandoned—dry.
2920	Pacific et al Bulrush d-63-F	Mar. 9, 1971	Mar. 16, 1971	3,825	Abandoned—dry.
2927	Pacific et al Bulrush d-35-F	Mar. 18, 1971	Mar. 25, 1971	3,850	Abandoned—dry.
2820	Pacific Imp Clarke b-6-D	Dec. 16, 1970	Jan. 15, 1971	6,404	Slave Point gas.
2870	Pacific IOE Clarke a-23-I	Jan. 20, 1971	Feb. 14, 1971	6,791	Sulphur Point gas.
3011	Pacific Imp Clarke c-92-L	Dec. 13, 1971	———	———	Drilling.
2937	Pacific et al Currant d-7-C	Mar. 29, 1971	Apr. 5, 1971	4,016	Halfway oil.

2938	Pacific Inga 6-9-87-23	Mar. 29, 1971	Apr. 11, 1971	5,050	Inga oil.
2944	Pacific Inga 16-4-87-23	May 27, 1971	June 10, 1971	5,130	Inga oil.
621[1]	Pacific Ft St John 12-7-84-18 (19)	July 18, 1971	July 30, 1971	310	Baldonnel gas (deepened well).
2877	Pacific Kotcho c-31-E	Feb. 5, 1971	Mar. 2, 1971	6,834	Slave Point gas.
2823	Pacific Kotcho d-100-C	Dec. 19, 1970	Jan. 28, 1971	6,830	Slave Point gas.
2945	Pacific CIGOL Laprise c-20-L	Aug. 26, 1971	Sept. 4, 1971	3,980	Baldonnel gas.
2984	Pacific et al Laprise c-12-I	Oct. 24, 1971	Nov. 6, 1971	4,070	Baldonnel gas.
2994	Pacific et al Laprise d-33-I	Nov. 12, 1971	Nov. 25, 1971	4,099	Baldonnel gas.
3038	Pacific et al Laprise a-69-C	Dec. 27, 1971	.....	.....	Drilling.
2946	Pacific et al Peejay d-8-I	July 6, 1971	July 14, 1971	3,860	Halfway gas.
2995	Pacific Westcoast Pouce 7-30-80-13	Nov. 7, 1971	Nov. 21, 1971	4,786	Multiple Baldonnel and Bluesky-Gething gas.
2924	Pacific et al Rabbit b-48-B	Mar. 11, 1971	Mar. 19, 1971	4,040	Abandoned—dry.
2928	Pacific et al Rabbit d-94-B	Mar. 17, 1971	Mar. 27, 1971	3,950	Abandoned—dry.
2831	Pacific Sahdoanah c-86-L	Jan. 2, 1971	Jan. 20, 1971	6,038	Abandoned—dry.
2884	Pacific Sextet c-22-K	Feb. 14, 1971	Mar. 28, 1971	6,850	Slave Point gas.
3030	Pacific Spangler a-67-I	Dec. 17, 1971	.....	.....	Drilling.
2999	Pacific Stoddart 6-22-86-20	Nov. 16, 1971	Dec. 3, 1971	6,410	Halfway gas.
3009	Pacific Apache W Stoddart 10-8-87-20	Dec. 7, 1971	Dec. 24, 1971	6,450	Belloy gas.
2929	Pacific et al Wolverine d-100-B	Mar. 23, 1971	Mar. 30, 1971	3,950	Abandoned—dry.
2804	Pacific S Yoyo b-42-E	Dec. 12, 1970	Jan. 28, 1971	7,785	Abandoned—dry.
2818	Pembina et al W Stoddart 11-10-87-20	Dec. 20, 1970	Jan. 11, 1971	6,370	Abandoned—dry.
2862	Pembina et al W Stoddart 6-20-87-20	Jan. 16, 1971	Feb. 6, 1971	6,485	Abandoned—dry.
2829	Penzl BP N Beatton b-56-B	Jan. 6, 1971	Jan. 15, 1971	3,790	Abandoned—dry.
2853	Provident Andex LaGarde 7-13-87-15	Jan. 14, 1971	Jan. 28, 1971	4,545	Abandoned—dry.
2990	Quasar AM Hess W Boundary 6-17-86-14	Oct. 29, 1971	Nov. 14, 1971	4,625	Abandoned—dry.
2966	Quasar Grizzly a-74-G	Sept. 18, 1971	.....	.....	Drilling.
2993	SOC et al Jeans d-75-A	Nov. 1, 1971	Dec. 4, 1971	6,950	Multiple Debolt and Dunlevy gas.
2971	Scurry ML Cecil 6-31-84-17	Sept. 15, 1971	Oct. 4, 1971	6,242	Charlie Lake gas.
3005	Sierra Red 7-1-86-22	Dec. 10, 1971	Dec. 28, 1971	5,442	Abandoned—dry.
2825	Sun Coplin 8-17-85-23	Jan. 16, 1971	Feb. 4, 1971	4,850	Abandoned—dry.
3015	TLI Amoco Varrick c-71-L	Dec. 17, 1971	.....	.....	Drilling.
2914	Tenn Ashland Alder d-59-I	Mar. 3, 1971	Mar. 11, 1971	3,803	Abandoned—dry.
2910	Tenn et al Harrier d-97-J	Feb. 22, 1971	Feb. 28, 1971	4,020	Abandoned—dry.
2953	Tenn et al Inga 12-31-87-23	July 1, 1971	July 17, 1971	5,450	Inga oil.
2832	Tenn et al Middleton d-69-J	Jan. 9, 1971	Jan. 20, 1971	4,060	Abandoned—dry.
2987	Tenn Rigel 6-18-88-18	Nov. 3, 1971	Nov. 14, 1971	3,646	Dunlevy gas.
2834	Tenn et al W Weasel d-71-C	Dec. 28, 1970	Jan. 7, 1971	3,890	Halfway oil.
2899	Tenn Monsanto W Weasel d-61-C	Feb. 12, 1971	Feb. 20, 1971	3,910	Abandoned—dry.
2835	Texaco Texcan Beavertail a-25-F	Jan. 8, 1971	Jan. 22, 1971	3,990	Abandoned—dry.
2892	Texaco et al Boundary 11-30-85-13	Feb. 22, 1971	Feb. 28, 1971	4,303	Boundary Lake oil.
2891	Texaco et al Boundary 11-31-85-13	Feb. 15, 1971	Feb. 21, 1971	4,375	Boundary Lake oil.
2890	Texaco et al Boundary 3-13-86-14	Feb. 23, 1971	Feb. 28, 1971	4,305	Boundary Lake oil.
2888	Texaco et al Boundary 11-18-86-13	Feb. 7, 1971	Feb. 14, 1971	4,290	Boundary Lake oil.
2887	Texaco et al Boundary 3-19-86-13	Feb. 14, 1971	Feb. 22, 1971	4,293	Boundary Lake oil.
2886	Texaco et al Boundary 3-31-85-13	Feb. 7, 1971	Feb. 14, 1971	4,358	Boundary Lake oil.

[1] Not total depth—deepened, but status not changed in 1971.

TABLE 21—WELLS DRILLED AND DRILLING, 1971—*Continued*

Well Authorization No.	Well Name	Date Spudded	Date Rig Released	Total Depth	Status at December 31, 1971
2895	Texaco et al Boundary 11-1-86-14	Mar. 1, 1971	Mar. 7, 1971	4,432	Boundary Lake oil.
2889	Texaco et al Boundary 11-27-85-14	Mar. 8, 1971	Mar. 16, 1971	4,350	Boundary Lake oil.
2893	Texaco et al Boundary 3-30-85-13	Mar. 1, 1971	Mar. 7, 1971	4,300	Boundary Lake oil.
2894	Texaco et al Boundary 3-1-86-14	Mar. 8, 1971	Mar. 15, 1971	4,450	Boundary Lake oil.
2930	Texaco et al Boundary 6-32-85-13	Mar. 15, 1971	Mar. 22, 1971	4,275	Boundary Lake oil.
2931	Texaco et al Boundary A8-30-85-13	Mar. 18, 1971	Mar. 25, 1971	4,300	Charlie Lake oil.
3016	Texaco et al Boundary 3-18-86-13	Dec. 17, 1971	———	———	Drilling.
3017	Texaco et al Boundary 3-27-85-14	Dec. 29, 1971	———	———	Drilling.
3008	Texaco et al S Tsea d-95-F	Dec. 17, 1971	———	———	Drilling.
2901	Texcan Cheves a-90-L	Feb. 16, 1971	Mar. 14, 1971	2,960	Abandoned—junked.
3020	Texcan Cheves a-A90-L	Dec. 28, 1971	———	———	Drilling.
2986	Tidel N Pine 6-33-85-18	Oct. 21, 1971	Nov. 6, 1971	5,990	Abandoned—dry.
2958	UniGas et al Siphon 11-8-86-16	July 24, 1971	Aug. 4, 1971	4,610	Abandoned—dry.
2873	Union HB Aitken d-57-L	Jan. 23, 1971	Feb. 13, 1971	4,780	Gething gas.
2919	Union HB Pine Pass Aitken d-71-I	Feb. 27, 1971	Mar. 14, 1971	4,935	Abandoned—dry.
2985	Union Aitken b-43-L	Oct. 26, 1971	Nov. 6, 1971	4,480	Gething oil.
3001	Union Aitken b-70-L	Nov. 17, 1971	Dec. 6, 1971	4,980	Abandoned—dry.
2844	Union Aspen d-11-K	Jan. 4, 1971	Jan. 18, 1971	4,480	Abandoned—dry.
2861	Union HB Balsam d-77-H	Feb. 13, 1971	Feb. 21, 1971	3,715	Halfway gas.
2860	Union et al Bluejay b-86-E	Feb. 20, 1971	Feb. 28, 1971	3,972	Abandoned—dry.
2848	Union HB Drake b-82-E	Feb. 4, 1971	Feb. 12, 1971	3,560	Halfway oil.
2916	Union HB Drake d-81-E	Feb. 27, 1971	Mar. 5, 1971	3,540	Abandoned—dry.
2923	Union et al Drake d-83-E	Mar. 9, 1971	Mar. 15, 1971	3,508	Abandoned—dry.
2874	Union HB Ladyfern c-100-H	Jan. 22, 1971	Feb. 2, 1971	3,467	Abandoned—dry.
2847	Union HB Larch d-69-E	Jan. 10, 1971	Jan. 19, 1971	3,585	Abandoned—dry.
2954	Union Port Louis c-28-L	July 9, 1971	Aug. 23, 1971	5,152	Abandoned—dry.
2967	Union et al Milligan b-61-G	Aug. 27, 1971	Sept. 3, 1971	3,725	Abandoned—dry.
2969	Union et al Milligan c-32-G	Sept. 15, 1971	Sept. 22, 1971	3,760	Abandoned—dry.
2836	Union et al Moose d-34-K	Dec. 29, 1970	Jan. 7, 1971	3,810	Abandoned—dry.
3004	Union W Nig d-17-F	Nov. 30, 1971	Dec. 15, 1971	4,574	Abandoned—dry.
2906	Union et al Scot Point a-81-I	Feb. 20, 1971	Feb. 27, 1971	3,695	Abandoned—dry.
2917	Union et al Yew d-37-H	Mar. 1, 1971	Mar. 7, 1971	3,896	Abandoned—dry.
3010	Wainoco Ft St John 11-12-84-19	Dec. 6, 1971	Dec. 24, 1971	4,954	Halfway gas.
3023	Wainoco Pennzoil Kyklo d-68-G	Dec. 16, 1971	———	———	Drilling.
2997	Wainoco Moberly 10-23-82-22	Nov. 15, 1971	Dec. 5, 1971	5,090	Abandoned—dry.
3027	Wainoco E Osborn d-37-I	Dec. 21, 1971	———	———	Drilling.
2992	Wainoco Francana Pluto 10-27-85-17	Nov. 5, 1971	Nov. 21, 1971	6,029	Belloy gas.
3047	Wainoco Francana Pluto 11-35-85-17	Dec. 30, 1971	———	———	Drilling.
2989	Westcoast et al Goose 6-5-85-21	Oct. 28, 1971	Dec. 1, 1971	5,510	Inga gas.
3040	Westcoast et al Goose 11-27-84-21	Dec. 31, 1971	———	———	Drilling.
2850	Westcoast Amoco Dome Green d-85-I	Jan. 10, 1971	Feb. 12, 1971	4,790	Abandoned—dry.

2904	Westcoast Amoco Dome Medana b-55-D	Feb. 18, 1971	Apr. 10, 1971	5,070	Abandoned—dry.
2854	Wincan et al Woodrush d-37-H	Feb. 3, 1971	Feb. 11, 1971	3,670	Abandoned—dry.
2968	Woods Dome Boudreau 11-16-83-20	Aug. 31, 1971	Sept. 17, 1971	5,100	Abandoned—dry.
3003	Woods WOL Boudreau 6-6-83-20	Dec. 12, 1971	Dec. 30, 1971	4,942	Abandoned—dry.
2872	Woods ARCo Buick d-57-I	Jan. 18, 1971	Jan. 25, 1971	3,600	Abandoned—dry.
3021	Woods Anadarko Oak 11-20-86-17	Dec. 14, 1971	Dec. 29, 1971	5,850	Abandoned—dry.
3055	Woods Anadarko Siphon 7-31-86-16	Dec. 31, 1971			Drilling.
2908	Woods W Stoddart 11-6-86-20	Mar. 1, 1971	Mar. 22, 1971	6,812	Finished drilling.
2922	Woods W Stoddart 10-12-86-21	Mar. 12, 1971	Apr. 16, 1971	6,694	Abandoned—dry.

		Oct. 1, 1964 Jan. 1, 1965 Oct. 1, 1965 Jan. 1, 1966 Apr. 1, 1966					
Boundary Lake North	Jan. 1, 1965	Apr. 1, 1966	Tp. 87, R. 14, W6M	9	4	Texaco NFA N Boundary 7-3-87-14, gas	9
Bubbles	Nov. 24, 1959	Feb. 15, 1960 May 27, 1960 Jan. 1, 1961	N.T.S. 94-G-1, 94-G-8, 94-H-4	5	11	Pacific Imperial Bubbles b-33-I, gas	5
Bubbles North	Dec. 31, 1971		N.T.S. 94-G-8	9	2	Pac Imp N Bubbles d-95-B, gas	9
		Aug. 7, 1959 Jan. 1, 1961 July 1, 1961				MicMac et al Buick d-17-D, gas	2
		Oct. 1, 1961	N.T.S. 94-A-11, 94-A-14	2, 4, 6	32	Texaco NFA Buick Creek d-98-I(1), gas	4
Buick Creek	Feb. 7, 1958	Jan. 1, 1963 July 1, 1963 Oct. 1, 1963 Jan. 1, 1965 Apr. 1, 1970	N.T.S. 94-A-10, 94-A-15			Texaco NFA Buick Creek d-83-J(4), gas	6
Buick Creek North	Apr. 1, 1967		N.T.S. 94-A-14	2, 4	8	Pacific West Prod N Buick c-22-F, gas	2, 4
						Pacific West Buick Creek c-2-E(6), gas	3
		Jan. 6, 1959				Pacific W Buick Creek c-83-K(13A), oil	4
Buick Creek West	Feb. 7, 1958	Feb. 15, 1960 Jan. 1, 1963	N.T.S. 94-A-11, 94-A-14	3, 4, 5, 9	14	Pacific West Buick Creek b-78-C(2), gas	4
						Pacific West Buick Creek d-58-C(8), gas	5
						Pacific West Buick Creek b-23-E(1), gas	9
Bulrush	July 1, 1964	Apr. 1, 1967	N.T.S. 94-A-16	9	4	Union HB Sinclair Bulrush d-78-F, oil	9
Bulrush East	Apr. 1, 1967		N.T.S. 94-A-16	9	1	Dame Provo Co-op E Bulrush d-5-K, oil	9
Cabin	Apr. 1, 1970		N.T.S. 94-P-5		3		
Cache Creek	Dec. 31, 1971		Tp. 88, R. 22, W6M	6, 9	3	Texcan N Cache 6-28-88-22, gas	6, 9
Charlie Lake	Jan. 1, 1961	May 27, 1960	Tp. 84, R. 18, W6M	3	1	Imp Pac Charlie 13-5-84-18, oil	3
		Jan. 1, 1961 Apr. 1, 1962 Apr. 1, 1965 Apr. 1, 1966					
Clarke Lake	Feb. 15, 1960	Jan. 1, 1967 Apr. 1, 1967 July 1, 1967 July 1, 1968 July 1, 1969 July 1, 1970	N.T.S. 94-J-9, 94-J-10, 94-J-15, 94-J-16	13	30	West Nat et al Clarke Lake c-47-J, gas	13
Clarke Lake South	Oct. 1, 1968		N.T.S. 94-J-9	13	2	West Nat IOE S Clarke d-29-K, gas	13
Crush	Apr. 11, 1968	July 1, 1968 Oct. 1, 1968	N.T.S. 94-A-16	9	9	Union et al Crush d-28-F, oil	9
Currant	Oct. 1, 1965		N.T.S. 94-A-9, 94-A-16	9	10	Union HB Sinc Pac Currant d-37-C, gas	9
						Sinclair et al Currant d-17-C, oil	9
Cypress	Dec. 31, 1971		N.T.S. 94-B-15	5	3	Security Cypress a-28-F, gas	5
Dahl	Dec. 31, 1971		N.T.S. 94-H-7	2	7	Tenn Cdn-Sup Dahl d-53-J, gas	2

TABLE 22—OILFIELDS AND GASFIELDS DESIGNATED AT DECEMBER 31, 1971—*Continued*

Field	Date Designated	Date(s) Revised	Field Location	Pool(s)	Number of Wells Capable of Production	Discovery Well(s)	Pool(s) Discovered
Dawson Creek	Feb. 7, 1958		Tp. 79, R. 15, W6M	1	2	Pac Sc Dawson Ck 1-15-79-15(1), gas	1
Eagle	Dec. 31, 1971		Tp. 84, R. 18, W6M	10	2	Raines Eagle 11-29-84-18, oil	10
Elm	Dec. 31, 1971		N.T.S. 94-H-7	9	2	BO&G et al Elm d-83-C, gas	9
						Bralorne et al Elm b-62-C, oil	9
Evergreen	Dec. 31, 1971		N.T.S. 94-H-2 N.T.S. 94-A-15, 94-B-8	9	2	CDR Sun Evergreen d-54-J, gas	9
Farrell Creek	Jan. 1, 1968		Tp. 85, R. 26, W6M Tp. 86, R. 26, W6M	6, 9	5	Ft St John Petroleums Farrell a-9-L, gas	9
						CanDel et al Farrell a-41-I, gas	6
Flatrock	July 1, 1971	Oct. 1, 1971	Tp. 84, R. 16, W6M	9	3	Champlin Flatrock 10-9-84-16, gas	9
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, W6M	4, 5, 6, 9, 10	30	Pacific Ft St John A3-29-83-18(31), gas	4
						Pacific Ft St John 14-15-83-18(7), gas	5
						Pacific Ft St John B3-29-83-18(52), gas	6
						Pacific Ft St John 3-14-83-18(9), oil	6
						Pacific Ft St John 1-20-83-18(30), gas	9
						Imp Pac Ft St John 9-19-83-18(45), oil	10
						Pacific Ft St John 14-21-83-18(4), gas	10
Fort St. John Southeast	Feb. 7, 1958		Tp. 82, 83, R. 17, W6M	4, 5, 9, 10	15	Pac Ft St John SE 10-31-82-17(80), gas	4
						Pac Ft St John SE A4-10-83-17(55), gas	5
						Pac Ft St John SE 10-33-82-17(22), gas	9
						Pac Ft St John SE 4-10-83-17(12), gas	10
Grizzly	Dec. 31, 1971		N.T.S. 93-I-15	4	1	Gray Oil PRP NW Grizzly c-25-A, gas	4
Gundy Creek	Feb. 7, 1958	Jan. 6, 1959	N.T.S. 94-B-16	5, 6	5	West Nat Gundy Creek b-69-A, gas	6
						West Nat Gundy Creek c-80-A, gas	5
Halfway	Dec. 22, 1958		Tp. 86, 87, R. 25, W6M	5, 6	4	West Nat et al Halfway 5-1-87-25, gas	5
						West Nat et al Halfway 8-11-87-25, gas	6
						West Nat et al Halfway 14-11-87-25, oil	6
Helmet	Dec. 31, 1971		N.T.S. 94-P-7	13	2	FPC Chevron et al Helmet b-11-K, gas	13
Highway	Feb. 7, 1958		N.T.S. 94-B-16	4, 5, 11	6	West Nat et al Highway b-3-I(1), gas	4
						Pacific Highway b-25-I(1), gas	5
						Pacific Highway a-90-I(4), gas	11
Inga	Jan. 1, 1967	Apr. 1, 1968 July 1, 1968 Oct. 1, 1968 Jan. 1, 1969 Apr. 1, 1969 July 1, 1970 Oct. 1, 1970	Tp. 86, R. 23, 24, W6M Tp. 87, R. 23, 24, W6M Tp. 88, R. 23, 24, W6M N.T.S. 94-A-12 Tp. 85, R. 23, W6M N.T.S. 94-A-13	5, 6, 7	81	Cdn Sup et al Inga 10-25-88-24, oil	7
						Hunt Sands Pac Imp Inga 7-16-86-23, oil	5
						Texaco Inga 6-25-87-24, oil	6
Inga North	Dec. 31, 1971		N.T.S. 94-A-12, 94-A-13	7	3	Pioneer Cabot N Inga d-51-K, gas	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, 5, 9	44	Pacific Imperial Jedney a-95-C, gas 3 Pacific et al Jedney b-88-J, gas 5 Pacific Imp Jedney d-99-J, gas 9
Jedney West	July 1, 1964		N.T.S. 94-G-1, 94-G-8	5, 9	3	Pacific et al W Jedney b-84-K, gas 5, 9
Julienne Creek	Apr. 1, 1971		N.T.S. 94-G-1, 94-G-2	9, 5	4	Sinclair Julienne Ck a-50-D, gas 9, 5
Kobes-Townsend	Dec. 22, 1958	Feb. 15, 1960	N.T.S. 94-B-8, 94-B-9	4, 6, 9, 11	13	Pacific Kobes a-3-A(4), gas 4 Pacific Kobes d-94-I(1), gas 6, 9 Pacific Townsend a-20-H(A-1), gas 11
Kotcho Lake	Apr. 1, 1962	Apr. 1, 1967	N.T.S. 94-I-14, 94-P-3	13	10	West Nat Kotcho Lake c-67-K, gas 13
LaGarde	July 1, 1970		Tp. 87, R. 15, W6M	4, 8	2	Texaco NFA LaGarde 7-21-87-15, gas 4 Texaco NFA LaGarde 10-29-87-15, gas 8
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	5	40	Dome Basco Laprise Ck a-35-H, gas 5
Laprise Creek West	July 1, 1962		N.T.S. 94-G-8	5	2	Dome CDP C&E W Laprise c-82-G, gas 5
Milligan Creek	Feb. 7, 1958	Aug. 7, 1959 Feb. 15, 1960 Jan. 1, 1961 Apr. 1, 1962 July 1, 1963 Jan. 1, 1970 Apr. 1, 1970	N.T.S. 94-H-2	2, 9	30	Union HB Milligan Creek d-73-G, oil 9 Union HB Milligan d-62-G, gas 2 Whitehall et al Milligan d-75-G, gas 9
Moberly Lake	Jan. 1, 1969	Apr. 1, 1969	Tp. 82, R. 22, W6M	6	2	JBA Moberly 10-15-82-22, oil 6
Montney	Feb. 7, 1958	Jan. 6, 1959 Jan. 1, 1962	Tp. 87, R. 18, W6M Tp. 86, 87, R. 19, W6M	2, 6, 9	4	Pac Sunray Montney 16-32-86-19(3), gas 2 Pac Sunray Montney 14-36-86-19(2), gas 6 Pac Sunray Montney 14-31-86-19(5), gas 9
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	5	31	Texaco NFA Nig Creek a-79-B(1), gas 5 Texaco NFA Nig d-87-A, oil 5
Nig Creek West	Oct. 1, 1971		N.T.S. 94-H-4	5	2	Fargo Nig Creek c-19-C, gas 5
North Pine	Oct. 1, 1968	Oct. 1, 1969	Tp. 85, R. 18, W6M	6	3	Texaco N Pine 6-15-85-18, oil 6 Pacific et al N Pine 6-27-85-18, gas 6
Osprey	Apr. 1, 1966		N.T.S. 94-A-15	9	4	Pacific SR CanDel Osprey d-4-J, oil 9
Parkland	Feb. 7, 1958	July 1, 1963	Tp. 81, R. 15, W6M	12	2	Pacific Imp Parkland 6-29-81-15, gas 12

TABLE 22—OILFIELDS AND GASFIELDS DESIGNATED AT DECEMBER 31, 1971—*Continued*

Field	Date Designated	Date(s) Revised	Field Location	Pool(s)	Number of Wells Capable of Production	Discovery Well(s)	Pool(s) Discovered
Peejay	Feb. 15, 1960	May 27, 1960 Jan. 1, 1961 Jan. 1, 1962 Apr. 1, 1962 July 1, 1965 Oct. 1, 1965 Jan. 1, 1966 Apr. 1, 1966 July 1, 1966 Oct. 1, 1966 Apr. 1, 1967 July 1, 1967 Jan. 1, 1968	N.T.S. 94-A-15, 94-A-16	9	102	Pacific SR West Cdn Peejay d-52-I, gas Pacific Sinclair Peejay d-39-E, oil	9 9
Peejay West	Jan. 1, 1963		N.T.S. 94-A-15	9	2	Pacific SR West Cdn W Peejay d-54-G, oil	9
Peggo	Dec. 31, 1971		N.T.S. 94-P-7	13	2	Midwest Chevron Peggo d-65-A, gas	13
Petitot River	Apr. 1, 1961		N.T.S. 94-P-12, 94-P-13	13	3	West Nat Petitot River d-24-D, gas	13
Red Creek	Feb. 7, 1958	Aug. 7, 1959 Feb. 15, 1960 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 Apr. 1, 1970	Tp. 85, R. 21, W6M	6, 9	2	Pacific Red Creek 5-27-85-21(36), gas	6,9
Rigel	Oct. 1, 1962		N.T.S. 94-A-10 Tp. 87, 88, R. 16, W6M Tp. 87, 88, R. 17, W6M Tp. 87, 88, R. 18, W6M Tp. 88, R. 19, W6M	4	62	Monsanto Rigel 6-13-87-17, oil Imp Fina Rigel 4-27-88-17, gas	4 4
Rigel East	Dec. 31, 1971		Tp. 88, R. 16, W6M	9, 4	3	Texaco NFA E Rigel 13-26-88-16, gas Texaco NFA E Rigel 10-12-88-16, gas	9, 4
Shekilie	Dec. 31, 1971		N.T.S. 94-I-16	13	2	Pacific Shekilie b-24-A, gas	13
Sierra	Oct. 1, 1969		N.T.S. 94-I-14	14	2	Socony Mobil Sierra c-78-C, gas	14
Siphon	Apr. 1, 1971	Oct. 1, 1971 Dec. 31, 1971 Feb. 15, 1960 Apr. 1, 1965 Jan. 1, 1966 Apr. 1, 1967 Apr. 1, 1969 Oct. 1, 1969 July 1, 1970	Tp. 86, 87, R. 16, W6M	5, 6, 9	11	Pacific et al Siphon 11-27-86-16, gas	5, 6, 9
Stoddart	Jan. 6, 1959		Tp. 86, R. 19, 20, W6M Tp. 85, R. 19, W6M Tp. 85, R. 18, 19, W6M	6, 10	21	Pacific Stoddard 4-24-86-20(85), gas Uno-Tex et al Stoddart 10-31-85-19, oil Chaut Dunbar Stoddart 11-23-85-19, oil	10 10 6

Stoddart West	Apr. 1, 1964		Tp. 86, R. 20, W6M	10	8	Pacific W Stoddart 11-10-86-20, gas — 10
Sunrise	Oct. 1, 1969		Tp. 78, 79, R. 16, W6M	1	10	Pacific Sunrise 10-7-79-16(3), gas — 1
Tsea	Dec. 31, 1971		N.T.S. 94-P-5, 94-P-12	13	2	Texaco NFA Tsea b-68-K, gas — 13
Two Rivers	Apr. 1, 1969		Tp. 83, R. 16, W6M	5, 6, 9	3	Champlin Two Rivers 10-5-83-16, gas — 6 Champlin et al Two Rivers 6-9-83-16, gas — 5, 9
Wargen	Dec. 31, 1971		N.T.S. 94-H-6	2	2	Imp Pac Sunray Wargen c-58-C, gas — 2 Pacific et al Wargen d-37-C, oil — 3
Weasel	Apr. 1, 1966	Apr. 1, 1967	N.T.S. 94-H-2, 94-A-15	5, 9	23	Tenn Ashland Weasel d-35-B, oil — 9 Sinclair Pacific Weasel d-93-J, gas — 5 Pacific Sinclair Weasel d-50-A, gas — 9
Weasel West	Apr. 1, 1971		N.T.S. 94-H-2	9	1	Tenn et al W Weasel d-71-C, oil — 9
Wilder	Jan. 1, 1971		Tp. 83, R. 19, W6M	9, 10	4	Amerada Pac Wilder 11-17-83-19, gas — 9, 10 Wainoco Woods Wilder 7-30-83-19, gas — 4, 9
Wildmint	Jan. 1, 1962	July 1, 1962 Jan. 1, 1963 Apr. 1, 1964 Jan. 1, 1966	N.T.S. 94-A-15, 94-H-2	9	27	Union HB Wildmint d-46-A, oil — 9 Tenn Wildmint d-4-A, gas — 9
Willow	July 1, 1963	Apr. 1, 1970	N.T.S. 94-H-2	2, 9	4	Union HB Willow b-10-H, gas — 9 Union HB Willow d-20-H, oil — 2
Wolf	Apr. 1, 1967		N.T.S. 94-H-15	9	5	Baysel Sinclair Wolf d-93-B, oil — 9 Baysel Sinclair Wolf d-3-G, gas — 9
Yoyo	Apr. 1, 1965	Jan. 1, 1967 Jan. 1, 1968 Oct. 1, 1970	N.T.S. 94-I-13, 94-I-14	13, 14	15	West Nat et al Yoyo b-24-L, gas — 14 West Nat et al Yoyo b-29-I, gas — 13

Numerical list of pools:

1. Lower Cretaceous Cadotte sandstone.
2. Lower Cretaceous Bluesky-Gething sandstone.
3. Lower Cretaceous Gething sandstone.
4. Lower Cretaceous Dunlevy sandstone.
5. Triassic Baldonnel carbonate (includes Baldonnel A and B of Fort St. John area).
6. Triassic Charlie Lake sandstone and carbonate.
7. Triassic Inga sandstone.
8. Triassic Boundary Lake carbonate.
9. Triassic Halfway sandstone.
10. Permian Belloy carbonate.
11. Debolt carbonate.
12. Upper Devonian Wabamun carbonate.
13. Middle Devonian Slave Point carbonate.
14. Middle Devonian Pine Point carbonate.

TABLE 23—NUMBER OF CAPABLE AND OPERATING WELLS AT DECEMBER 31, 1971[1]

Field and Pool	Oil Wells		Gas Wells	
	Capable	Operating	Capable	Operating
Aitken Creek field—Gething	6	5	4	3
Balsam field—Halfway	—	—	1	—
Bear Flat field—Charlie Lake	2	2	—	—
Beatton River field—Halfway	15	12	1	—
Beatton River West field—Bluesky-Gething	15	11	—	—
Beaverdam field—Halfway	1	—	2	—
Beaver River field—Nahanni	—	—	5	5
Beavertail field—				
Bluesky-Gething	—	—	3	2
Halfway	—	—	1	—
Field totals	—	—	4	2
Beg field—				
Baldonnel	—	—	14	11
Halfway	—	—	16	13
Field totals	—	—	30	24
Beg West field—Baldonnel	—	—	3	—
Bernadet field—Bluesky-Gething	—	—	1	—
Blueberry field—				
Dunlevy	—	—	7	4
Baldonnel	—	—	3	—
Charlie Lake	—	—	2	—
Halfway	—	—	1	—
Debolt	20	19	—	—
Field totals	20	19	13	4
Blueberry East field—				
Baldonnel	—	—	1	—
Debolt	—	—	1	—
Field totals	—	—	2	—
Blueberry West field—				
Dunlevy	—	—	2	—
Baldonnel	—	—	3	2
Field totals	—	—	5	2
Boundary Lake field—				
Bluesky-Gething	—	—	2	—
Gething	—	—	2	1
Cadomin	1	—	—	—
Dunlevy	—	—	1	—
Baldonnel	—	—	6	3
Charlie Lake	1	1	—	—
Boundary Lake	298	279	—	—
Basal Boundary	—	—	1	1
Halfway	5	3	2	—
Field totals	305	283	14	5
Boundary Lake North field—Halfway	—	—	4	2
Bubbles field—Baldonnel	—	—	11	7
Bubbles North field—Halfway	—	—	2	—
Buick Creek field—				
Bluesky-Gething	—	—	4	1
Dunlevy	2	1	25	19
Charlie Lake	—	—	1	—
Field totals	2	1	30	20
Buick Creek North field—				
Bluesky-Gething	—	—	2	1
Dunlevy	—	—	6	3
Field totals	—	—	8	4
Buick Creek West field—				
Dunlevy	2	—	9	6
Baldonnel	—	—	2	1
Halfway	—	—	1	—
Field totals	2	—	12	7
Bulrush field—Halfway	4	3	—	—
Bulrush East field—Halfway	1	—	—	—

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

TABLE 23—NUMBER OF CAPABLE AND OPERATING WELLS AT DECEMBER 31, 1971[1]—*Continued*

Field and Pool	Oil Wells		Gas Wells	
	Capable	Operating	Capable	Operating
Cabin field—Slave Point	—	—	3	—
Cache Creek field—				
Charlie Lake	—	—	2	—
Halfway	—	—	1	—
Field totals	—	—	3	—
Charlie Lake field—Gething	1	—	—	—
Clarke Lake field—Slave Point	—	—	30	19
Clarke Lake South field—Slave Point	—	—	2	—
Crush field—Halfway	8	6	1	—
Currant field—Halfway	6	4	4	—
Cypress field—Baldonnel	—	—	3	—
Dahl field—Bluesky-Gething	—	—	7	—
Dawson Creek field—				
Dunvegan	—	—	1	—
Cadotte	—	—	1	—
Field totals	—	—	2	—
Eagle field—Belloy	2	—	—	—
Elm field—Halfway	1	—	1	—
Evergreen field—Halfway	—	—	2	—
Farrell Creek field—				
Charlie Lake	—	—	2	2
Halfway	—	—	3	1
Field totals	—	—	5	3
Flatrock field—				
Boundary Lake	1	1	—	—
Halfway	—	—	2	2
Field totals	1	1	2	2
Fort St. John field—				
Cadomin	—	—	2	—
Baldonnel	—	—	12	9
Charlie Lake	4	3	1	—
Halfway	—	—	8	5
Belloy	1	—	2	2
Field totals	5	3	25	16
Fort St. John Southeast field—				
Cadomin	—	—	1	—
Baldonnel	—	—	2	2
Charlie Lake	—	—	2	—
Halfway	—	—	5	2
Belloy	—	—	5	3
Field totals	—	—	15	7
Grizzly field—Dunlevy	—	—	1	—
Gundy Creek field—				
Baldonnel	—	—	4	—
Charlie Lake	—	—	1	—
Field totals	—	—	5	—
Halfway field—				
Baldonnel	—	—	2	1
Charlie Lake	1	—	1	—
Field totals	1	—	3	1
Helmet field—Slave Point	—	—	2	—
Highway field—				
Dunlevy	—	—	1	—
Baldonnel	—	—	4	—
Debolt	—	—	1	—
Field totals	—	—	6	—
Inga field—				
Baldonnel	1	—	3	—
Inga	72	60	5	2
Field totals	73	60	8	2
Inga North field—Inga	—	—	3	—

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

TABLE 23—NUMBER OF CAPABLE AND OPERATING WELLS AT DECEMBER 31, 1971[1]—*Continued*

Field and Pool	Oil Wells		Gas Wells	
	Capable	Operating	Capable	Operating
Jedney field—				
Gething	—	—	1	—
Baldonnel	—	—	20	16
Halfway	—	—	23	18
Field totals	—	—	44	34
Jedney West field—				
Baldonnel	—	—	1	—
Halfway	—	—	2	—
Field totals	—	—	3	—
Julienne Creek field—				
Baldonnel	—	—	2	2
Halfway	—	—	2	2
Field totals	—	—	4	4
Kobes-Townsend field—				
Dunlevy	—	—	3	3
Charlie Lake	—	—	6	3
Halfway	—	—	2	2
Debolt	—	—	2	1
Field totals	—	—	13	9
Kotcho Lake field—Slave Point	—	—	10	4
LaGarde field—				
Dunlevy	—	—	1	—
Boundary	—	—	1	—
Field totals	—	—	2	—
Laprise Creek field—Baldonnel	—	—	40	31
Laprise Creek West field—Baldonnel	—	—	2	—
Milligan field—				
Bluesky-Gething	—	—	3	1
Halfway	26	21	1	—
Field totals	26	21	4	1
Moberly Lake field—Charlie Lake	2	—	—	—
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	30	22
Nig Creek West field—Baldonnel	—	—	2	1
North Pine field—Charlie Lake	1	1	2	1
Osprey field—Halfway	3	1	1	—
Parkland field—Wabamun	—	—	2	2
Peejay field—Halfway	98	82	4	—
Peejay West field—Halfway	2	—	—	—
Peggo field—Slave Point	—	—	2	—
Petitot River field—Slave Point	—	—	3	—
Red Creek field—				
Charlie Lake	—	—	1	—
Halfway	—	—	1	—
Field totals	—	—	2	—
Rigel field—				
Bluesky-Gething	—	—	3	1
Dunlevy	8	3	51	27
Field totals	8	3	54	28
Rigel East field—				
Dunlevy	—	—	2	—
Halfway	—	—	1	—
Field totals	—	—	3	—

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

TABLE 23—NUMBER OF CAPABLE AND OPERATING WELLS AT DECEMBER 31, 1971[1]—*Continued*

Field and Pool	Oil Wells		Gas Wells	
	Capable	Operating	Capable	Operating
Shekilie field—Slave Point	—	—	2	—
Sierra field—Pine Point	—	—	2	2
Siphon field—				
Baldonnel	—	—	4	—
Charlie Lake	—	—	3	1
Halfway	—	—	4	1
Field totals	—	—	11	2
Stoddart field—				
Charlie Lake	1	—	—	—
Belloy	4	4	16	14
Field totals	5	4	16	14
Stoddart West field—Belloy	—	—	8	2
Sunrise field—				
Paddy	—	—	2	—
Cadotte	—	—	8	—
Field totals	—	—	10	—
Tsea field—Slave Point	—	—	2	—
Two Rivers field—				
Baldonnel	—	—	1	—
Charlie Lake	—	—	1	1
Halfway	—	—	1	1
Field totals	—	—	3	2
Wargen field—Bluesky-Gething	1	—	1	—
Weasel field—				
Baldonnel	—	—	1	1
Charlie Lake	—	—	1	—
Halfway	20	16	1	—
Field totals	20	16	3	1
Weasel West field—Halfway	1	1	—	—
Wilder field—				
Halfway	—	—	2	2
Belloy	—	—	2	—
Field totals	—	—	4	2
Wildmint field—Halfway	24	12	3	—
Willow field—				
Bluesky-Gething	1	1	1	—
Halfway	—	—	2	1
Field totals	1	1	3	1
Wolf field—Halfway	4	3	1	—
Yoyo field—				
Slave Point	—	—	1	—
Pine Point	—	—	14	7
Field totals	—	—	15	7
Other areas—				
Cadotte	—	—	2	—
Notikewin	—	—	1	—
Bluesky-Gething	2	—	8	—
Gething	—	—	3	—
Dunlevy	—	—	6	—
Baldonnel	—	—	28	—
Charlie Lake	—	—	7	—
Halfway	3	—	30	—
Permo-Carboniferous	—	—	4	—
Belloy	—	—	6	—
Kiskatinaw	—	—	1	—
Debolt	—	—	11	—
Baniff	—	—	2	—
Jean Marie	—	—	1	—
Slave Point	—	—	23	—
Sulphur Point	—	—	3	—
Pine Point	—	—	5	—
Confidential	1	—	11	—
Area totals	6	—	152	—
Totals	677	556	754	305

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

TABLE 24—MONTHLY CRUDE-OIL PRODUCTION BY FIELDS AND POOLS, 1971

(Quantities in barrels.)

Field and Pool	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Aitken Creek—													
Gething	32,311	30,447	38,153	35,919	36,980	35,573	31,836	30,530	31,900	20,082	28,956	32,174	384,861
Gething[1]	2,626	2,596	3,059	2,762	3,027	2,103	2,259	2,439	2,266	1,076	2,060	2,175	28,448
Field totals	34,937	33,043	41,212	38,681	40,007	37,676	34,095	32,969	34,166	21,158	31,016	34,349	413,309
Bear Flat—Charlie Lake	5,021	4,119	4,731	2,353	3,939	4,493	4,343	4,115	3,939	4,014	3,911	4,003	48,981
Beatton River—Halfway	47,029	41,529	44,152	45,480	45,886	37,326	39,122	42,453	37,264	38,642	35,517	42,160	496,560
Beatton River West—Bluesky-Gething	16,369	16,030	18,392	17,536	20,816	18,070	10,510	17,835	13,555	14,880	14,841	13,074	191,908
Blueberry—													
Dunlevy[1]	24	25	22	24	23	31	18	19	24	23	24	24	281
Debolt	46,143	41,957	61,029	46,933	45,475	40,926	54,231	45,053	49,208	46,389	46,031	37,102	560,477
Field totals	46,167	41,982	61,051	46,957	45,498	40,957	54,249	45,072	49,232	46,412	46,055	37,126	560,758
Boundary Lake—													
Baldonnel[1]	75	67	84	76	55	84	93	82	72	102	10	89	889
Charlie Lake				1,249	1,244	1,142	1,396	902	1,253	499	1,217	923	9,825
Boundary Lake	752,462	695,287	831,459	834,448	850,797	812,995	836,009	841,287	792,400	803,122	774,449	794,870	9,619,585
Halfway	4,774	5,896	4,601	5,824	7,469	6,300	6,431	6,887	6,563	5,061	7,264	6,620	73,690
Field totals	757,311	701,250	836,144	841,597	859,565	820,521	843,929	849,158	800,288	808,784	782,940	802,502	9,703,989
Boundary Lake North—Halfway[1]	1,105	652	672	567	417	388	532	680	624	369	419	586	7,011
Buick Creek—													
Dunlevy	847	755	807	243	496	803	704	783	771	788	539	687	8,223
Dunlevy[1]	1,601	1,520	1,527	1,117	1,224	1,500	1,125	1,311	1,194	1,538	1,464	1,295	16,416
Field totals	2,448	2,275	2,334	1,360	1,720	2,303	1,829	2,094	1,965	2,326	2,003	1,982	24,639
Bulrush—Halfway	6,362	5,186	5,711	4,979	5,531	4,604	4,613	4,206	4,321	4,249	4,570	4,829	59,161
Crush—Halfway	15,476	15,660	27,075	24,355	28,599	21,845	19,824	24,860	18,685	29,503	28,428	28,985	283,295
Currant—													
Halfway	22,155	19,657	17,605	18,954	19,903	19,006	18,716	20,098	14,168	15,916	15,387	14,924	216,489
Halfway[1]		795	283										1,078
Field totals	22,155	20,452	17,888	18,954	19,903	19,006	18,716	20,098	14,168	15,916	15,387	14,924	217,567
Elm—Halfway		400											400
Flatrock—Boundary Lake			2,146	864		810	1,549	2,582	1,533	1,524	1,397	286	12,691
Fort St. John—Charlie Lake	1,958	1,605	2,696	1,802	1,183	1,254		6,488	10,344	8,710	11,505	11,839	59,384
Inga—													
Inga	273,420	249,177	219,901	226,040	288,239	271,570	271,663	288,513	293,521	310,471	290,307	286,647	3,269,469
Inga[1]	240										179	52	471
Field totals	273,660	249,177	219,901	226,040	288,239	271,570	271,663	288,513	293,521	310,471	290,486	286,699	3,269,940

Jedney—													
Baldonnel[1]											48	104	152
Halfway[1]											45	100	145
Field totals											93	204	297
Milligan—Halfway	308,364	277,501	277,505	256,713	258,643	260,774	261,092	259,376	253,264	255,047	237,755	246,275	3,152,309
Moberly Lake—Charlie Lake	808	498	592										1,898
Nig Creek—													
Baldonnel	642	1,045	1,137	605	962	1,123	585	1,098	1,035	1,001	939	943	11,115
Baldonnel[1]			65										65
Field totals	642	1,045	1,202	605	962	1,123	585	1,098	1,035	1,001	939	943	11,180
Nig Creek West—Baldonnel[1]			225	135	136							216	712
North Pine—Charlie Lake	469	493	518	372	453	438	348	498	430	430	375	396	5,220
Osprey—Halfway	1,588	1,151	1,390	1,123	1,476	1,178	1,282	1,217	1,422	1,272	1,645	748	15,492
Peejay—Halfway	410,702	389,551	403,119	390,021	363,260	351,536	359,888	373,339	356,143	351,276	343,231	333,829	4,425,895
Rigel—Dunlevy	3,491	3,088	3,016	574	2,759	3,217	2,804	2,559	2,478	4,561	3,939	2,103	34,589
Siphon—													
Charlie Lake[1]					262	506	342	1,083	803	838	491	575	4,900
Halfway[1]					349	664	446						1,459
Field totals					611	1,170	788	1,083	803	838	491	575	6,359
Stoddart—													
Charlie Lake	838	1,193	2,053	316	362		103	880	753	646	1,020		8,164
Belloy	3,787	3,822	4,166	1,544	3,482	4,430	3,088	4,638	4,274	4,156	3,739	2,997	44,123
Field totals	4,625	5,015	6,219	1,860	3,844	4,430	3,191	5,518	5,027	4,802	4,759	2,997	52,287
Stoddart West—Belloy[1]	3,711	3,573	3,744	2,819	3,314	3,425	3,576	3,788	3,285	3,700	3,322	3,417	41,674
Two Rivers—Charlie Lake[1]	1,313	1,024	1,111	987	41						300	531	5,307
Weasel—Halfway	94,491	104,346	122,578	115,816	112,049	101,959	96,664	97,756	102,583	110,427	104,339	99,748	1,262,756
Weasel West—Halfway	995	2,468	3,512	440								1,745	9,160
Wildmint—Halfway	49,751	62,967	67,189	69,440	76,166	75,843	71,198	79,426	74,400	72,108	67,123	55,602	821,213
Willow—Bluesky-Gething	2,462	2,322	2,335	2,232	2,245	1,950	2,224	1,995	2,047	2,834	1,345	2,034	26,025
Wolf—Halfway	3,476	3,068	3,609	3,573	3,670	3,426	3,428	3,826	3,363	3,086	2,927	3,712	41,164
Totals—													
Crude	2,106,191	1,981,218	2,171,177	2,109,748	2,182,084	2,082,591	2,103,651	2,163,200	2,081,617	2,110,694	2,032,696	2,029,255	25,154,122
Field condensate	10,695	10,252	10,792	8,487	8,848	8,701	8,391	9,402	8,268	7,646	8,362	9,164	109,008
Total crude and equivalent	2,116,886	1,991,470	2,181,969	2,118,235	2,190,932	2,091,292	2,112,042	2,172,602	2,089,885	2,118,340	2,041,058	2,038,419	25,263,130

[1] Condensate

TABLE 25—MONTHLY NATURAL GAS PRODUCTION BY FIELDS AND POOLS, 1971

Field and Pool	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Aitken Creek—Gething	330,013	282,843	319,674	335,459	347,408	315,440	337,991	342,502	340,657	164,076	291,112	371,241	3,778,416
Beaver River—Nahanni	71,440	238,470	291,750							1,098,470	5,675,566	5,145,134	12,520,830
Beavertail—Bluesky-Gething	144,867	120,595	61,773	99,850	265,670	262,971	305,149	282,960	253,141	309,830	286,662	326,908	2,720,376
Beg—													
Baldonnel	270,954	332,990	351,773	347,296	248,588	216,127	373,069	323,310	336,266	343,515	330,586	329,818	3,804,292
Halfway	445,253	411,916	420,701	378,299	299,804	322,367	405,381	403,181	383,099	427,156	419,057	419,876	4,736,090
Field totals	716,207	744,906	772,474	725,595	548,392	538,494	778,450	726,491	719,365	770,671	749,643	749,694	8,540,382
Blueberry—													
Dunlevy	84,717	73,332	78,507	69,165	78,845	73,517	66,855	70,661	80,397	79,737	78,484	77,147	911,364
Baldonnel	12,205	11,186	12,589	10,069	45	429							46,523
Field totals	96,922	84,518	91,096	79,234	78,890	73,946	66,855	70,661	80,397	79,737	78,484	77,147	957,887
Blueberry West—													
Dunlevy	9,813	9,125	9,942	10,688	9,797	9,121	10,535	9,605	10,012	8,066			96,704
Baldonnel										51,646	120,486	129,417	301,549
Field totals	9,813	9,125	9,942	10,688	9,797	9,121	10,535	9,605	10,012	59,712	120,486	129,417	398,253
Boundary Lake—													
Gething	31,102	24,211	31,909	25,257	14,047	16,786	21,036	26,799	25,410	26,528	22,506	26,623	292,214
Baldonnel	118,391	106,532	116,219	105,228	44,788	93,229	99,229	92,355	88,766	90,828	90,010	81,426	1,127,001
Basal Boundary	19,035	15,891	17,682	16,609	9,036	15,715	13,296	16,006	16,533	16,261	16,245	17,418	189,727
Field totals	168,528	146,634	165,810	147,094	67,871	125,730	133,561	135,160	130,709	133,617	128,761	125,467	1,608,942
Boundary Lake North—Halfway	362,759	291,260	321,590	291,316	255,075	228,154	226,278	283,413	277,397	211,645	175,590	195,325	3,119,802
Bubbles—Baldonnel	414,279	360,309	413,842	415,548	403,781	402,639	373,918	383,523	347,777	314,820	400,743	386,349	4,617,528
Buick Creek—													
Bluesky-Gething	7,476	7,273	6,351	3,669	4,219	8,385	13,589	12,098	12,075	5,808	7,268	11,493	99,704
Dunlevy	1,023,435	968,081	1,039,213	1,005,849	921,502	899,685	856,743	889,089	779,998	828,914	916,751	966,990	11,096,250
Field totals	1,030,911	975,354	1,045,564	1,009,518	925,721	908,070	870,332	901,187	792,073	834,722	924,019	978,483	11,195,954
Buick Creek North—													
Bluesky-Gething	62,433	77,017	86,037	80,415	70,648	63,278	55,716	60,891	52,275	45,736		47,840	702,286
Dunlevy	218,438	162,308	216,591	202,021	226,307	226,343	211,220	205,938	229,950	214,911	268,124	229,121	2,611,272
Field totals	280,871	239,325	302,628	282,436	296,955	289,621	266,936	266,829	282,225	260,647	268,124	276,961	3,313,558
Buick Creek West—													
Dunlevy	144,062	127,724	104,527	106,877	94,943	93,778	130,367	47,876	140,374	162,831	167,660	192,688	1,513,707
Baldonnel	4,891	2,280					11,274		19,013	20,191	10,836	6,102	74,587
Field totals	148,953	130,004	104,527	106,877	94,943	93,778	141,641	47,876	159,387	183,022	178,496	198,790	1,588,294
Clarke Lake—Slave Point	11,227,022	5,577,065	10,206,589	7,235,807	5,850,398	5,540,556	5,188,504	6,413,258	8,380,655	9,874,615	8,640,080	9,978,219	94,112,768
Currant—Halfway		9,406	7,396										16,802

Farrell Creek—													
Charlie Lake	15,471	38,125	45,506	41,578	45,481	21,657			17,486	60,599	44,779	4,881	335,563
Halfway	26,059	55,472	58,654	56,314	55,137	27,657			17,607	43,982	53,808	3,298	397,988
Field totals	41,530	93,597	104,160	97,892	100,618	49,314			35,093	104,581	98,587	8,179	733,551
Flatrock—Halfway	112,056	101,272	107,988	21,478		4,011			75,649	31,744	176,870	81,943	713,011
Fort St. John—													
Cadomin									29,859	25,382			55,241
Baldonnel	235,841	212,699	279,093	258,317	159,429	230,906	176,300	203,463	218,430	238,273	229,141	225,278	2,667,170
Halfway	106,742	112,070	158,519	156,219	128,918	140,077	124,955	140,881	138,430	129,275	122,252	137,248	1,595,586
Belloy	29,097	21,052	21,201	16,721	19,863	35,452	25,518	32,467	35,232	20,093	29,294	32,547	318,537
Field totals	371,680	345,821	458,813	431,257	308,210	406,435	326,773	376,811	421,951	413,023	380,687	395,073	4,636,534
Fort St. John Southeast—													
Baldonnel	60,829	56,190	61,409	62,360	63,673	59,637	48,056	35,869	42,666	61,140	58,482	61,727	672,038
Halfway	81,549	68,642	68,742	65,407	63,069	61,267	53,571	26,852	50,501	63,407	64,054	60,330	727,391
Belloy	146,296	138,251	142,883	139,953	146,304	129,278	105,709	59,164	94,907	132,817	139,449	135,936	1,510,947
Field totals	288,674	263,083	273,034	267,720	273,046	250,182	207,336	121,885	188,074	257,364	261,985	257,993	2,910,376
Halfway—Baldonnel						8,313	9,810	4,925	4,498	10,045	9,397	679	47,667
Highway—Dunlevy						9,694	9,251	4,094	9,910	7,770			40,719
Inga—													
Baldonnel	62,550	60,665	55,716	53,896	49,162	52,853	37,234	44,231	37,728	28,673	34,912		517,620
Inga				159,377	442,444	397,408	276,365	201,608	307,050	400,457	395,305	328,781	2,908,795
Field totals	62,550	60,665	55,716	213,273	491,606	450,261	313,599	245,839	344,778	429,130	430,217	328,781	3,426,415
Jedney—													
Baldonnel	888,300	762,972	758,920	758,128	895,239	765,645	617,452	576,990	498,037	845,931	825,439	834,148	9,027,201
Halfway	758,845	637,409	524,979	455,680	779,245	730,977	608,961	562,470	361,422	767,293	788,418	761,979	7,737,678
Field totals	1,647,145	1,400,381	1,283,899	1,213,808	1,674,484	1,496,622	1,226,413	1,139,460	859,459	1,613,224	1,613,857	1,596,127	16,764,879
Julienne Creek—													
Baldonnel	41,890	67,933	62,524	59,302	63,720	59,256	51,627	51,378	16,747	42,613	45,532	50,383	612,905
Halfway	62,427	127,453	138,907	130,148	142,196	133,710	95,527	95,161	79,654	86,212	103,447	105,125	1,299,967
Field totals	104,317	195,386	201,431	189,450	205,916	192,966	147,154	146,539	96,401	128,825	148,979	155,508	1,912,872
Kobes-Townsend—													
Dunlevy	18,480	34,397	60,586	63,395	68,402	53,026	39,494	33,983	38,209	51,112	56,090	59,129	576,303
Charlie Lake	73,218	88,794	105,632	90,391	87,018	91,076	100,442	70,958	117,261	237,228	54,671	46,933	1,163,622
Halfway	294,937	253,277	301,263	266,930	300,583	233,150	301,656	224,050	269,554	157,295	292,416	298,009	3,193,120
Debolt	86,076	41,945	60,599	55,133	49,549	56,100	46,703	33,177	48,097	20,470	13,669	12,005	523,523
Field totals	472,711	418,413	528,080	475,849	505,552	433,352	488,295	362,168	473,121	466,105	416,846	416,076	5,456,568
Kotcho Lake—Slave Point	346,037	233,195	183,241	134,366	171,674	203,670	382,899	376,657	337,957	367,626	356,346	467,657	3,561,325
Laprise Creek—Baldonnel	2,396,786	1,929,830	2,335,074	2,210,339	2,110,774	1,963,424	1,440,514	1,566,432	1,769,914	2,049,969	2,067,372	2,335,429	24,175,857
Milligan—Bluesky-Gething		3,502	3,378	4,897	6,407	6,341	6,181	5,714	8,173	9,005	7,781	9,028	70,407
Montney—Halfway		1,792	16,390	13,859	14,247	12,377	13,230	13,588	8,936	3,131			97,550
Nig Creek—Baldonnel	1,554,232	1,291,139	1,656,960	1,589,806	1,678,193	1,566,060	1,524,840	1,464,257	1,137,912	1,199,124	1,586,612	1,487,092	17,736,227
Nig Creek West—Baldonnel		43,378	52,284	38,306	53,019	55,686	55,689	34,613	40,130	59,352	64,985	65,638	563,080
North Pine—Charlie Lake	63,459	43,717	69,383	63,718	49,248	31,512	66,778	59,387	56,717	45,192	55,498	51,599	656,208
Parkland—Wabamun	491,207	355,708	475,290	453,097	456,060	430,504	430,470	433,637	311,229	369,072	464,244	419,965	5,090,483

TABLE 25—MONTHLY NATURAL GAS PRODUCTION BY FIELDS AND POOLS, 1971—*Continued*

Field and Pool	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Rigel—													
Bluesky-Gething						5,667	17,884	15,970	13,909	16,764	16,706	17,471	104,371
Dunlevy	2,127,445	1,737,285	2,071,580	2,029,032	2,091,773	1,487,679	1,416,477	1,772,165	1,572,822	1,842,635	1,977,483	2,168,319	22,294,695
Field totals	2,127,445	1,737,285	2,071,580	2,029,032	2,091,773	1,493,346	1,434,361	1,788,135	1,586,731	1,859,399	1,994,189	2,185,790	22,399,066
Sierra—Pine Point	1,332,504	1,151,525	1,400,928	1,258,939	1,070,343	1,211,436	845,191	1,362,329	1,116,451	1,917,136	1,681,998	1,620,395	15,969,175
Siphon—													
Charlie Lake					27,755	52,494	54,117	54,829	47,383	46,884	45,804	41,003	370,269
Halfway	14,842				18,035	66,929	44,770	58,016	55,373	59,933	53,324	56,878	428,100
Field totals	14,842				45,790	119,423	98,887	112,845	102,756	106,817	99,128	97,881	798,369
Stoddart—Belloy	1,281,865	1,150,768	1,438,904	1,354,651	1,372,536	1,334,738	1,374,991	1,318,909	966,551	1,202,588	1,181,917	1,300,433	15,278,851
Stoddart West—Belloy	171,154	139,146	130,363	112,971	161,978	150,483	168,316	161,779	155,170	166,277	165,836	175,789	1,859,262
Sunrise—Cadotte	13,825	16,700	19,277	42,064	29,860	12,703							134,429
Two Rivers—													
Baldonnel									3,795	12,091	8,201		24,087
Charlie Lake	63,214	53,494	55,186	53,711	8,644	18,332	7,561				29,742	47,055	336,939
Halfway	106,866	94,594	87,895	100,703	115,411	95,743	108,670	83,727	57,753	161,109	149,029	168,124	1,329,624
Field totals	170,080	148,088	143,081	154,414	124,055	114,075	116,231	83,727	61,548	173,200	186,972	215,179	1,690,650
Weasel—Baldonnel	2,422	1,474	1,261	1,289	1,296	1,254	963	826	1,053	1,075	1,239	1,512	15,664
Wilder—Halfway										97,062	272,624	341,911	711,597
Willow—Halfway	246,945	263,839	339,237	279,667	247,421	250,458	229,034	156,689	242,483	262,434	205,164	183,413	2,906,784
Yoyo—Pine Point	4,243,767	2,778,867	3,321,656	3,487,918	2,555,167	1,719,306	560,600	754,132	2,683,324	4,834,851	4,831,363	5,691,988	37,462,939
Other areas—													
Bluesky-Gething			67,385					9,499	28,980				105,864
Gething			19,207	64,481									83,688
Baldonnel								139,169	12,922				152,091
Debolt	250							113,059					113,309
Field totals	250		86,592	64,481				261,727	41,902				454,952
Totals	32,560,068	23,378,385	30,872,655	26,943,963	24,944,174	22,766,466	20,177,956	22,220,569	24,911,666	32,480,705	36,678,459	38,830,193	336,765,259

TABLE 26—SUMMARY OF DRILLING AND PRODUCTION STATISTICS, 1971

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Well authorizations—													
Issued	31	39	19	5	4	8	3	10	7	16	13	44	204
Cancelled	Nil	Nil	1	Nil	1	Nil	2	Nil	Nil	Nil	Nil	Nil	4
Wells spudded	35	40	33	Nil	4	2	12	7	5	13	17	30	198
Rigs operated during month	39	36	35	12	5	4	14	14	10	18	22	34	571
Rigs operating at month's end	19	24	11	1	4	2	7	6	6	14	13	29	[1]
Development footage	75,914	79,645	73,527	25,387	3,900	21,361	34,118	11,036	16,725	7,713	54,819	25,325	429,470
Exploratory outpost footage	74,054	48,529	76,240	28,727	Nil	Nil	310	22,217	Nil	11,594	14,259	27,556	303,486
Exploratory wildcat footage	51,036	38,317	76,004	11,392	Nil	Nil	Nil	17,535	5,100	9,364	14,575	33,371	256,694
Total footage drilled	201,004	166,491	225,771	65,506	3,900	21,361	34,428	50,788	21,825	28,671	83,653	86,252	989,650
Wells abandoned	27	18	27	7	1	1	Nil	7	3	Nil	5	7	103
Service wells	Nil	Nil	Nil	1	Nil	2	2	Nil	Nil	1	Nil	Nil	6
Finished drilling wells	Nil	Nil	1	Nil	Nil	Nil	Nil	Nil	Nil	Nil	1	Nil	2
Oil wells completed	5	13	13	2	Nil	1	3	Nil	Nil	Nil	6	3	46
Producible oil wells	644	657	671	672	671	667	670	671	670	671	672	677	----
Producing oil wells	524	536	546	555	544	541	543	548	545	548	558	556	----
Production in barrels	2,106,191	1,981,218	2,171,177	2,109,748	2,182,084	2,082,591	2,103,651	2,163,200	2,081,617	2,110,694	2,032,696	2,029,255	25,154,122
Average daily production	69,942	70,758	70,038	70,325	70,390	69,420	67,860	69,781	69,387	68,087	67,757	65,460	69,100
Gas wells completed	7	4	4	2	Nil	Nil	3	1	1	5	7	6	40
Producible gas wells	729	732	735	737	743	743	742	745	746	743	744	754	----
Producing gas wells	295	296	295	294	292	298	291	283	302	309	307	305	----
Production in M scf	32,560,068	23,378,385	30,872,655	26,943,963	24,944,174	22,766,466	20,177,956	22,220,569	24,911,666	32,480,705	36,678,459	38,830,193	336,765,259
Average daily production	1,050,325	834,942	995,892	898,132	804,651	758,882	650,902	716,793	830,389	1,047,765	1,222,615	1,252,586	921,990

[1] Rigs operated during 1971.

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, 1971

(Quantities in barrels.)

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Available Supply													
British Columbia production—													
Crude	2,106,191	1,981,218	2,171,177	2,109,748	2,182,084	2,082,591	2,103,651	2,163,200	2,081,617	2,110,694	2,032,696	2,029,255	25,154,122
Field condensate	10,695	10,252	10,792	8,487	8,848	8,701	8,391	9,402	8,268	7,646	8,362	9,164	109,008
Plant condensate	92,933	75,727	100,601	95,647	105,102	98,578	94,689	87,350	84,323	94,311	91,007	93,871	1,114,139
Alberta imports—crude and equivalent	9,047,072	7,682,671	9,061,299	7,459,124	7,210,807	7,496,082	8,693,836	7,563,096	8,084,917	7,847,155	7,344,982	9,082,878	96,573,919
Totals	11,256,891	9,749,868	11,343,869	9,673,006	9,506,841	9,685,952	10,900,567	9,823,048	10,259,125	10,059,806	9,477,047	11,215,168	122,951,188
Disposition													
Inventory change—													
Field	12,731	5,541	—1,301	867	—6,796	5,636	—1,040	—3,277	5,939	—2,834	—2,190	5,156	18,432
Plant	—9,631	5,616	—12,660	33,054	—25,432	12,582	—2,686	—7,562	—10,929	23,008	12,856	—1,548	16,668
British Columbia transporters	228,070	—223,783	—156,107	156,699	—82,770	—90,340	209,712	—232,976	464,011	—394,049	—92,722	189,630	—24,625
Miscellaneous—													
Plant fuel													
Pipe-line use	16,786	6,464	12,025	9,612	6,230	9,449	6,418	2,946	11,544	8,348	8,623	18,287	116,732
Field losses and adjustments	—188	—4,641	2,598	108	2,097	—1,213	1,033	—478	—8,468	434	620	—2,805	—10,903
Plant losses and adjustments	—126	—9,143		120		2,479	7,671	1,235	—106	71	—2,402	—7,495	—7,696
Transporters' losses and adjustments	—32,018	11,125	23,513	1,951	18,061	7,091	12,647	15,901	22,734	29,466	39,294	15,085	164,850
Deliveries—													
British Columbia refineries—													
British Columbia crude	1,943,078	2,075,188	2,130,407	1,763,630	1,997,132	1,616,419	2,185,445	2,246,236	2,010,446	1,988,730	1,949,807	2,044,889	23,951,407
Alberta crude	2,073,814	1,704,517	1,653,596	1,136,348	1,568,055	1,460,136	1,736,111	1,899,922	1,889,714	2,100,468	2,104,005	1,999,071	21,325,757
British Columbia condensate	54,628	36,563	66,664	32,093	93,798	54,917	47,768	48,648	42,220	41,928	50,366	50,112	619,453
Export to United States—													
British Columbia crude	58,305	86,690	145,699	341,953	245,544	289,702	113,968	99,529	111,118	133,293	85,374	147,240	1,858,415
Alberta crude	6,863,819	6,051,128	7,396,611	6,204,095	5,665,533	6,297,358	6,539,203	5,736,560	5,674,974	6,147,743	5,338,673	6,737,602	74,653,299
British Columbia condensate	44,814	42,147	46,457	24,413	30,995	29,905	46,432	46,596	45,070	22,508	23,648	46,550	449,535
Field sales	600	2,425	175	395	31		378		67	127	932	3,066	8,196
Reporting adjustments	2,209	—39,969	36,192	—32,332	—5,637	—8,169	—2,493	—30,232	791	—39,435	—39,837	—29,672	—188,584
Totals	11,256,891	9,749,868	11,343,869	9,673,006	9,506,841	9,685,952	10,900,567	9,823,048	10,259,125	10,059,806	9,477,047	11,215,168	122,951,188
British Columbia Refineries													
Receipts—													
British Columbia crude	1,943,078	2,075,188	2,130,407	1,763,630	1,997,132	1,616,419	2,185,445	2,246,236	2,010,446	1,988,730	1,949,807	2,044,889	23,951,407
Alberta crude	2,073,814	1,704,517	1,653,596	1,136,348	1,568,055	1,460,136	1,736,111	1,899,922	1,889,714	2,100,468	2,104,005	1,999,071	21,325,757
British Columbia condensate	54,376	36,563	66,664	32,093	93,798	54,917	47,768	48,648	42,220	41,928	50,366	50,112	619,453

Alberta condensate	4,510	6,335	10,430	6,878	5,351	5,351	9,360	10,135	9,767	.....	10,910	4,559	83,586
Alberta butane	5,029	6,107	2,022	2,022	1,009	.....	.....	.....	.....	5,047	12,178	8,798	42,212
Totals	4,080,807	3,828,710	3,863,119	2,940,971	3,665,345	3,136,823	3,978,684	4,204,941	3,952,147	4,136,173	4,127,266	4,107,429	46,022,415
Disposition													
Inventory changes	53,021	132,295	5,375	—124,617	49,754	—196,534	—115,796	—35,181	—86,876	—9,649	22,830	32,154	—273,224
Losses and adjustments	—2,819	—653	—676	110,780	61,463	750	746	724	—32,048	816	276	3,587	142,946
Refinery runs—													
British Columbia crude	1,842,247	1,865,767	2,177,456	1,599,889	2,059,412	1,706,319	2,374,501	2,772,202	2,015,742	1,978,573	1,991,293	2,136,496	24,519,897
Alberta crude	2,123,296	1,779,574	1,599,346	1,316,960	1,392,046	1,563,508	1,663,724	1,410,883	2,003,859	2,119,458	2,037,937	1,869,714	20,880,305
British Columbia condensate	54,376	36,563	66,664	32,093	93,798	54,917	47,768	48,648	42,220	41,928	50,366	50,112	619,453
Alberta condensate	5,657	9,057	12,932	3,844	7,863	7,863	7,741	7,665	9,250	.....	12,386	6,568	90,826
Alberta butane	5,029	6,107	2,022	2,022	1,009	.....	.....	.....	.....	5,047	12,178	8,798	42,212
Total refinery runs	4,030,605	3,697,068	3,858,420	2,954,808	3,554,128	3,332,607	4,093,734	4,239,398	4,071,071	4,145,006	4,104,160	4,071,688	46,152,693

TABLE 28—MONTHLY SUPPLY AND DISPOSITION OF NATURAL GAS, 1971

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Available Supply													
British Columbia production—													
Wet gas	16,165,753	14,195,080	16,394,129	15,632,775	15,865,085	14,753,007	13,516,596	14,130,040	13,095,745	15,829,254	16,611,732	17,029,349	183,218,545
Dry gas	16,394,315	9,183,305	14,478,526	11,311,188	9,079,089	8,013,459	6,661,360	8,090,529	11,815,921	16,651,451	20,066,727	21,800,844	153,546,714
Associated gas	1,803,547	1,786,243	1,954,639	1,802,488	1,958,262	1,805,941	1,890,479	1,896,731	1,916,721	1,943,276	1,834,527	1,718,869	22,311,723
Less injected	414,527	437,579	469,535	481,290	583,136	546,281	479,504	476,206	482,345	299,078	410,949	464,995	5,545,425
Net British Columbia production	33,949,088	24,727,049	32,357,759	28,265,161	26,319,300	24,026,126	21,588,931	23,641,094	26,346,042	34,124,903	38,102,037	40,084,067	353,531,557
Alberta imports	37,122,496	34,975,168	39,861,631	37,344,963	36,233,322	32,799,093	34,699,007	33,757,007	34,784,947	37,438,002	37,357,726	39,953,715	436,327,077
Yukon imports											469,688	455,107	924,795
Totals	71,071,584	59,702,217	72,219,390	65,610,124	62,552,622	56,825,219	56,287,938	57,398,101	61,130,989	71,562,905	75,929,451	80,492,889	790,783,429
Disposition													
Flared—													
Field	990,511	1,046,011	1,102,341	783,362	531,053	433,507	583,835	816,315	641,064	554,239	700,972	628,729	8,811,939
Plant—													
Residual gas	32,274		1,347				10,082	278,107	67,315				389,125
Natural gas	2,035,192	1,258,991	1,938,708	1,565,732	1,262,446	1,131,813	925,829	1,156,673	1,641,739	80,443	13,664	55,501	13,066,731
Gas gathering systems	1,454	1,408	1,551	1,436	1,751	991	980	495	596	432	41,911	1,483	54,488
Fuel—													
Lease	248,053	228,770	239,764	243,913	251,701	217,661	210,060	234,020	222,735	262,988	257,369	275,964	2,892,998
Plant	1,145,815	915,090	890,635	798,564	749,599	680,665	692,698	746,785	897,544	1,159,895	1,278,013	1,420,893	11,376,196
Transporters	2,405,390	1,427,461	2,327,404	1,844,291	1,501,047	1,255,407	1,115,285	1,265,477	1,572,269	1,940,066	2,649,959	3,020,990	22,325,046
Gas gathering systems													
Line pack changes—													
Gas gathering systems			1,040	—920								—8,390	—8,270
Transporters	138,245	—192,335	47,953	44,590	13,208	—12,135	—291,120	487,471	—155,343	595,011	—212,535	54,306	517,316
Losses and metering difference—													
Field	1,966,220	795,897	651,276	949,570	763,087	341,045	—31,645	257,281	148,027	114,387	280,898	547,330	6,783,373
Gas gathering systems	—5,131	—2,399			489		283	1,623	4,056	129,445	5,024		133,390
Gas plants	101,148	593,243	617,231	568,339	832,871	652,796	313,965	452,664	386,145	793,859	320,323	125,838	5,758,422
Transporters	20,677	182,696	417,356	80,213	86,167	84,728	460,467	120,330	289,131	—21,480	69,691	239,675	2,029,651
Processing shrinkage	588,428	521,518	606,239	576,130	587,587	626,526	595,959	593,573	574,386	3,087,157	3,277,520	3,617,544	15,252,567
Deliveries—													
British Columbia distributors—													
North	1,631,312	1,362,234	1,479,576	964,343	1,196,358	1,013,028	995,626	1,066,172	969,804	1,254,855	996,421	1,480,160	14,409,889
Interior	3,123,404	2,679,928	2,824,858	1,972,723	1,706,430	1,561,369	1,327,720	1,446,692	1,732,556	2,327,997	2,723,074	3,398,651	26,825,402
Lower Mainland	7,411,178	6,329,564	6,734,819	5,016,703	3,672,373	3,518,658	2,751,186	2,632,834	4,735,122	7,121,887	6,527,631	7,301,790	63,753,745
Export—													
British Columbia natural gas	14,038,812	9,300,679	14,135,921	14,356,098	14,520,813	13,633,460	12,794,574	13,189,951	13,870,652	16,546,083	20,916,663	21,121,537	178,425,243
Alberta natural gas	35,319,967	33,237,715	38,011,812	35,827,684	34,907,243	31,684,024	33,747,003	32,666,434	33,558,530	35,988,074	36,037,151	38,212,004	419,197,641
Reporting adjustments	—121,365	15,746	189,559	17,353	—31,601	1,676	85,151	—14,796	—25,339	—372,433	45,702	—1,001,116	—1,211,463
Totals	71,071,584	59,702,217	72,219,390	65,610,124	62,552,622	56,825,219	56,287,938	57,398,101	61,130,989	71,562,905	75,929,451	80,492,889	790,783,429

British Columbia Distributors													
Receipts—													
Natural gas	12,160,363	10,375,419	11,038,657	7,953,359	6,575,381	6,093,499	5,074,303	5,145,473	7,437,985	10,693,531	10,244,243	11,569,459	104,361,672
L.P. gas	106,099	89,445	101,272	77,251	59,627	56,080	50,416	47,980	56,212	73,624	94,061	116,763	928,830
Gas from storage											6,369	148,323	154,692
Disposition													
Gas used in operations	27,080	29,680	25,147	29,144	21,509	20,723	10,916	14,131	15,590	17,323	8,056	25,060	244,359
Losses and adjustments	481,414	—765,353	224,551	—1,290,754	—1,239,048	—251,269	—555,522	—166,824	922,018	1,787,518	1,414,762	1,930,076	2,491,569
Line pack changes	23,645	—7,494	27,257	—11,984	14,533	—5,726	—13,786	3,537	29,751	62,262	—26,723	—14,552	80,720
Gas to storage				92,702	89,995	62,575	79,585	69,665	42,520	49,081			486,123
Sales—													
Residential	4,356,173	4,272,476	3,746,515	3,391,669	2,335,397	1,560,329	1,181,558	802,906	803,866	1,453,435	2,622,074	3,682,662	30,209,060
Commercial	3,076,600	2,781,035	2,625,672	2,294,869	1,709,773	1,123,955	1,031,506	744,310	844,362	1,310,239	2,058,829	2,640,378	22,241,528
Industrial	3,745,090	3,877,811	4,431,060	3,420,404	3,658,352	3,602,551	3,360,893	3,533,239	3,588,980	4,261,078	4,023,208	3,520,195	45,022,861
Electric power generation	556,460	276,709	59,727	104,560	44,497	36,441	29,569	192,489	1,247,110	1,826,219	244,467	50,726	4,668,974
Miscellaneous													
Total sales	11,734,323	11,208,031	10,862,974	9,211,502	7,748,019	6,323,276	5,603,526	5,272,944	6,484,318	8,850,971	8,948,578	9,893,961	102,142,423
Value of sales to distributors	9,298,936	8,309,298	8,043,226	6,429,956	5,312,823	4,482,004	3,445,634	3,688,759	4,600,072	6,826,100	7,330,611	9,724,468	77,491,887

TABLE 29—MONTHLY PRODUCTION AND DISPOSITION OF BUTANE, PROPANE, AND SULPHUR, 1971

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Butane													
Production (bbl.)—													
Plant	37,155	38,386	16,638	7,264	10,879	12,444	10,354	23,141	33,847	45,569	43,886	38,632	318,195
Refinery	47,155	44,003	43,501	25,501	27,663	41,452	48,607	36,001	36,761	32,153	45,828	35,043	463,668
Opening inventory	10,166	14,191	13,209	14,332	10,868	12,891	10,385	13,335	12,139	13,531	16,317	8,184	10,166
Gasoline enrichment	27,992	23,239	25,011	13,686	11,826	16,303	16,971	24,484	30,523	37,696	37,230	32,168	297,129
Losses and adjustments	—4,551	2,545	.....	.....	.....	.....	.....	.....	.....	.....	—1,948	—4,833	—8,787
Sales—													
British Columbia	53,741	54,510	30,262	19,710	17,920	20,102	25,317	22,971	33,629	34,187	59,342	46,856	418,547
Yukon	.....	.....	.....	.....	.....	.....	.....	12,883	2,110	.....	.....	.....	14,993
Export—U.S.A.	3,103	3,077	3,743	2,833	6,773	19,997	13,723	.....	2,954	3,053	3,223	2,414	64,893
Total sales	56,844	57,587	34,005	22,543	24,693	40,099	39,040	35,854	38,693	37,240	62,565	49,270	498,433
Closing inventory	14,191	13,209	14,332	10,868	12,891	10,385	13,335	12,139	13,531	16,317	8,184	5,254	5,254
Propane													
Production (bbl.)—													
Plant	36,476	35,092	37,686	39,418	39,339	32,785	39,398	41,221	43,155	35,933	42,683	45,690	468,876
Refinery	44,140	40,366	43,860	34,103	38,349	47,999	37,960	37,860	43,771	43,000	47,650	42,094	501,152
Opening inventory	9,920	10,351	14,509	8,148	16,781	15,514	14,385	12,463	14,890	8,198	15,288	16,345	9,920
Losses and adjustments	.....	200	300	300	100	100	.....	—100	100	.....	—29	.....	971
Sales—													
British Columbia	80,185	71,100	87,607	64,588	78,855	68,304	62,343	51,468	73,029	61,837	86,440	92,775	878,531
Export—	.....	.....	.....	.....	.....	13,509	16,937	25,286	20,489	10,006	2,865	1,434	90,526
Northwest Territories	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
U.S.A.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Offshore	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total sales	80,185	71,100	87,607	64,588	78,855	81,813	79,280	76,754	93,518	71,843	89,305	94,209	969,057
Closing inventory	10,351	14,509	8,148	16,781	15,514	14,385	12,463	14,890	8,198	15,288	16,345	9,920	9,920
Sulphur													
Production (long tons)	5,095	4,682	5,135	4,857	5,468	6,269	5,859	5,181	5,108	6,347	6,354	6,113	66,468
Opening inventory	65,628	70,723	66,607	65,062	64,449	63,686	64,862	65,980	65,442	65,385	70,015	73,995	65,628
Losses and adjustments	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sales—													
British Columbia	.....	2,506	1,601	1,095	1,406	1,170	1,766	1,437	196	.....	.....	.....	11,177
Export	.....	6,292	5,079	4,375	4,825	3,923	2,975	4,282	4,969	1,717	2,374	844	41,655
Total sales	.....	8,798	6,680	5,470	6,231	5,093	4,741	5,719	5,165	1,717	2,374	844	52,832
Closing inventory	70,723	66,607	65,062	64,449	63,686	64,862	65,980	65,442	65,385	70,015	73,995	79,264	79,264

TABLE 30—MONTHLY GROSS VALUES TO PRODUCERS OF CRUDE OIL, NATURAL GAS, NATURAL GAS LIQUIDS, AND SULPHUR, 1971

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
	$	$	$	$	$	$	$	$	$	$	$	$	$
Crude oil	5,556,631	5,254,044	5,761,265	5,576,309	5,822,147	5,531,409	5,580,468	5,756,082	5,558,186	5,629,251	5,381,415	5,352,430	66,759,637
Natural gas	2,899,642	2,169,085	2,863,461	2,520,547	2,419,498	2,259,363	2,072,374	2,174,366	2,382,283	3,087,114	3,425,355	3,673,284	31,946,372
Products—													
Natural gas liquids[1]	34,482	34,038	46,369	41,468	46,610	47,935	49,095	48,682	51,934	45,540	47,841	51,155	545,149
Sulphur	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total products	34,482	34,038	46,369	41,468	46,610	47,935	49,095	48,682	51,934	45,540	47,841	51,155	545,149
Total value	8,490,755	7,457,167	8,671,095	8,138,324	8,288,255	7,838,707	7,701,937	7,979,130	7,992,403	8,761,905	8,854,611	9,076,869	99,251,158

[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 February 17, 1972.

TABLE 31—CRUDE-OIL PIPE-LINES, 1971

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)				
Blueberry-Taylor Pipeline Co.	Aitken Creek, Blueberry	12¾	2.2	—	.....	.....	.....	.....	.....
		8⅝	62.8	1	5,000	12,000	37.4	2,739	74,800
	Inga	6⅝	1.7	1	12,500	12,500	.....	7,124	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	1	36,000	52,000[1]	84.1	58,999	160,000
		6⅝	24.3	2	45,000	45,000[2]	.....	.....	.....
		8⅝	103.0	—	.....	.....	.....	.....	.....
		12¾	39.0	—	.....	.....	.....	.....	.....
Tenneco Oil & Minerals Ltd.	Inga	6⅝	3.2	—	.....	.....	.....	.....	.....
		4½	8.7	1	7,500	7,500	11.9	3,000	.....
Westcoast PetroleumLtd.	.....	12	505.0	12	70,000	70,000	.....	61,637	586,000

[1] Boundary Lake.

[2] Terminal to Westcoast Petroleum Ltd.

TABLE 32—CRUDE-OIL REFINERIES, 1971

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	1,611,700	Catalytic-fluid	8,100	Catalytic polymerization, catalytic reformer, lub-oil blending plant, asphalt.
Gulf Oil Canada Limited	Kamloops	Comp.	1954	B.C.	5,900	650,000	Catalytic-fluid	1,900	Catalytic polymerization, catalytic reformer, distillate desulphurization, merox.
Gulf Oil Canada Limited	Port Moody	Comp.	1958	B.C. and Alberta	30,000	1,625,000	Catalytic-fluid	8,480	Catalytic reformer, distillate, desulphurization, alkylation-sulphuric acid, naphtha, merox.
Imperial Oil Enterprises Ltd.	Ioco	SCA	1915	B.C. and Alberta	33,000	2,950,000	Catalytic-fluid	11,700	Catalytic polymerization, powerformer, Toluene extraction, LPG plant.
Pacific Petroleums Ltd.	Taylor	Comp.	1960	B.C.	10,500	895,335	FCCU	3,500	H.F. alkylation, asphalt, pentane splitter, platformer, unifiner, HDS unit, DDS unit.
Shell Canada Limited	Shellburn	Comp.	1932	B.C. and Alberta	20,500	2,455,300	Catalytic-fluid	6,000	Catalytic polymerization, platformer, vacuum flashing, solvent fractionation, distillate hydrotreater, sulphur recovery.
Union Oil Company of Canada Limited	Prince George	SA	1967	B.C.	8,000	630,500		—	Unifiner, reformer, asphalt.

Symbols: SCA—skimming, cracking, asphalt; Comp.—complete.

TABLE 33—NATURAL GAS PIPE-LINES, 1971

Company	Source of Natural Gas	Transmission-lines		Compressor Stations		Present Daily Capacity (MSCF)	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	—	—	528,000	—	3,587.0	
		24	12.2	—	—	—	—	—	
		20	44.5	—	—	—	—	—	Lower Mainland of British Columbia.
		18	37.3	—	—	—	—	—	
		16	18.2	—	—	—	—	—	
		12	77.3	—	—	—	—	—	
Columbia Natural Gas Ltd.	Alberta Natural Gas Co. Ltd.	8	56.1	—	—	85,550	8	1.7	
		6	66.9	—	—	—	6	2.6	Cranbrook, Fernie, Kimberley, Creston, Sparwood, Elk Valley, Skookumchuck, Elko, and Elkford.
		4	22.8	—	—	—	4	8.8	
		3	27.6	—	—	—	3	18.9	
		2	0.5	—	—	—	2	34.1	
							1¼	42.9	
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 field	—	—	1	1,800	—	16	28.3	
Inland Natural Gas Co. Ltd.	Westcoast Transmission Co. Ltd.	12	254.4	1	1,100	78,600	8	12.4	
		10	119.1	—	—	—	6	23.1	
		8	21.4	—	—	—	4	128.9	Mackenzie, Hudson Hope, Chetwynd, Prince George, Cariboo, North Okanagan, Okanagan, and West Kootenay areas.
		6	105.8	—	—	—	3	77.3	
		4	152.9	—	—	—	2	485.8	
		3	67.4	—	—	—	1½	20.8	
		2	69.3	—	—	—	1¼	126.8	
		1¼	3.4	—	—	—	—	—	
Northland Utilities (B.C.) Ltd.	Peace River Transmission Co. Ltd.	3	2.0	—	—	10,900	10	0.4	
		2	0.4	—	—	—	8	1.6	
		1¼	3.2	—	—	—	6	2.7	
							4	12.2	Dawson Creek, Pouce Coupe, and Rolla.
							3	5.0	
							2	24.6	
							1¼	14.8	
							¾	0.4	
Pacific Northern Gas Ltd.	Westcoast Transmission Co. Ltd.	10¾	272.0	2	3,150	54,000	6	2.5	
		8⅝	86.9	—	—	—	4	10.6	
		6⅝	36.5	—	—	—	3	16.1	Vanderhoof, Fraser Lake, Burns Lake, Smithers, Terrace, Prince Rupert, Kitimat, Houston, Fort St. James.
		4½	13.7	—	—	—	2	29.1	
		3½	44.0	—	—	—	1¼	22.5	
		2⅜	39.0	—	—	—	¾	14.4	
		1⅜	3.2	—	—	—	—	—	

TABLE 33—NATURAL GAS PIPE-LINES, 1971—*Continued*

Company	Source of Natural Gas	Transmission-lines		Compressor Stations		Present Daily Capacity (MSCF)	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	13.7	
		4	17.0	—	—	—	2½	1.5	
		3	5.7	—	—	—	2	35.5	Fort St. John, Taylor, Grandhaven, Charlie Lake.
		2	0.9	—	—	—	1½	0.7	
							1	2.7	
							¾	0.9	
Union Oil Company of Canada	Milligan-Peejay system	—	—	—	—	17,350	10¾	22.1	To Westcoast Transmission Co. Ltd.
							8⅝	13.6	
							6⅝	7.1	
Westcoast Transmission Co. Ltd.	Alberta	26	32.5	—	—	215,000	—	—	
	McMahon Plant	36	334.5	13	263,640	999,290	—	—	
	Taylor	30	646.6	—	—	—	—	—	
	Alaska Highway system	—	—	—	—	—	26	37.5	
							20	18.1	
							18	17.9	
							12¾	9.9	
	Beaver River	24	112.0	—	—	350,000	—	—	
	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	To Plains Western Gas & Electric Co. Ltd., Inland Natural Gas Co., British Columbia Hydro and Power Authority, and export to the United States.
	Fort St. John field	—	—	1	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	220.8	3	55,900	740,000	—	—	
	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	—	—	—	
	Milligan-Peejay system	—	—	—	—	—	12	32.2	
	Montney field	—	—	—	—	—	4½	7.4	
	Parkland field	—	—	—	—	—	8⅝	6.6	
	Red Creek field	—	—	1	230	—	4½	2.9	
	Rigel field	—	—	1	6,800	—	12¾	9.6	
		—	—	1	1,400	—	10¾	10.3	
	Sierra field	—	—	—	—	—	12	6.8	
	Stoddart field	—	—	1	1,400	—	8⅝	6.3	

TABLE 34—GAS-PROCESSING PLANTS, 1971

Operator	Location	Fields Served	Plant Type	Year of First Operation	Plant Capacity, Thousand MSCF/Day		Natural Gas Liquids	Residual Gas to—
					In	Out		
Gas Trunk Line of British Columbia Ltd.	NW. ¼ Sec. 10, Tp. 85, R. 14, W6M	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, W6M	Boundary Lake	Inlet separator, M.E.A. absorption treating, glycol absorption dehydration, combined refrigeration and oil absorption natural gas liquid recovery, distillation	1964	19	17	Pentanes plus, propane, butane	Westcoast Transmission Co. Ltd.
Mobil Oil of Canada Ltd.	Unit 91, Block D, NTS map 94-I-14	Sierra	Inlet separator, dry dessicant dehydration	1969	63.5	63		Westcoast Transmission Co. Ltd.
Pacific Petroleums Ltd.	Sec. 36, Tp. 82, R. 18, W6M	All British Columbia producing gasfields except Parkland, Dawson Creek, Boundary Lake, Sierra, Clarke Lake, Yoyo, and Beaver River	Inlet separator, M.E.A. treating dry dessicant, dehydration oil absorption, distillation	1957	435	400	Condensate, pentanes plus	Westcoast Transmission Co. Ltd.
Westcoast Transmission Co. Ltd.	Unit 85, Block G, NTS map 94-J-10	Clarke Lake, Yoyo	Potassium carb. M.E.A. treating absorption	1967	568	480		Westcoast Transmission Co. Ltd.
Westcoast Transmission Co. Ltd.	Units 68, 69, Block J, NTS map 94-N-16	Beaver River	D.T.A. treating absorption	1971	301	260		Westcoast Transmission Co. Ltd.

TABLE 35—SULPHUR PLANTS, 1971

Name	Location	Raw Material	Principal Product	Year of First Operation	Capacity (Long Tons per Day)
Canadian Occidental Petroleum Ltd.	Taylor	Hydrogen sulphide	Sulphur	1957	300

Inspection of Mines

CHAPTER 5

By J. W. Peck, Chief Inspector of Mines

CONTENTS

LIST OF DRAWINGS

COAL MINES REGULATION ACT

No amendments were made to the *Coal Mines Regulation Act,* however, Order in Council 1390, dated April 23, 1971, invoked the provisions of section 8 (Reclamation) at all coal mines in the exploration stage.

MINES REGULATION ACT

The *Mines Regulation Act* was amended by the introduction of legislation to

(1) extend the scope of the Act to prevent interference with public communications systems where mining operations are in progress (section 7 (3));

(2) renumber the subsections of section 8 (Reclamation) and to make certain application changes;

(3) provide for the microfilm storage of mine plans (section 13);

(4) revise and update certain general rules in section 23, particularly with respect to blasting practices, audiometric tests, fire protection, mechanical haulage, quarry practice, and supervisors' responsibilities.

FATAL ACCIDENTS

Eleven fatalities occurred to persons employed at mining operations in 1971. In addition, a 12-year-old boy was electrocuted when he came into contact with an energized high-voltage line where power service to an inactive mine was supposed to have been cut off. Of the 11 fatalities, only one occurred underground, and, of the total, one occurred at a gravel pit, three at surface coal-mining operations, and the remainder at metal-mining operations. The total represents a decrease of five from the 16 fatalities which took place in the mining industry in 1970 and is less than the past 10-year average of 14.5.

The following table shows the mines at which fatal accidents occurred in 1971, with comparative figures for 1970:

Company or Place	Location	Number of Fatal Accidents	
		1971	1970
Mines other than coal—			
Anaconda American Brass Limited	Britannia Beach	—	1
Bethlehem Copper Corporation Ltd.	Highland Valley	1	—
Butler-Lafarge Ltd.	Duncan	1	—
Churchill Copper Corporation Ltd.	Delano Creek	1	1
Craig gravel pit	Langley	—	1
Craigmont Mines Limited	Merritt	—	1
Gibraltar Mines Ltd.	McLeese Lake	1	—
Granduc Operating Co.	Stewart	1	2
Greyhound Mines Ltd.	Greenwood	—	1
Lornex Mining Corporation Ltd.	Highland Valley	2	—
Phelps Dodge Corporation of Canada, Limited	Rupert Inlet	—	1
Phoenix Copper Division, The Granby Mining Company Limited	Greenwood	—	1
Union Carbide Exploration Corporation	Lillooet	—	1
Utah Mines Ltd.	Rupert Inlet	1	—
Wesfrob Mines Limited	Tasu	—	1
Western Mines Limited	Myra Falls	—	1
Coal mines—			
Crows Nest Industries Limited	Horseshoe Ridge (Elk River)	—	1
Fording Coal Limited	Fording River	1	—
Kaiser Resources Ltd.—			
"A" North No. 2	Michel	—	1
Elkview preparation plant	Michel	2	—
Harmer Ridge	Michel	—	1
Sparwood breaker station	Michel	—	1
Totals		11	16

The following table classifies fatalities as to cause and location:

Cause	Number	Location	
		Surface	Underground
Falls of person	3	3	—
Struck by flying object	1	1	—
Suffocation	1	1	—
Transportation—			
(*a*) Capsizing vehicles	4	4	—
(*b*) Locomotive derailment	1	—	1
(*c*) Run over	1	1	—
Totals	11	10	1

A description of each fatal accident follows.

Peter Jacob Seida, aged 34, a structural ironworker employed by Surrey Ironworks Ltd., North Surrey, British Columbia, was fatally injured by a fall at the

Elkview plant of Kaiser Resources Ltd. on February 10, 1971, when the boom of a P & H, Model 9125-TC, 140-ton truck crane collapsed.

A steel conveyor-gallery tube, 194 feet long, 9 feet in diameter, and weighing 77,750 pounds, manufactured by Surrey Ironworks Ltd., was being lifted into position between a 53-foot-high steel tower and a head house, approximately 175 feet high, on top of the raw-coal silos.

The ground slopes down from the base of the steel tower toward the base of the raw-coal silos, the difference in elevation between the bases being approximately 120 feet.

The contract for the erection of the conveyor tube was being supervised by Surrey Ironworks' personnel, using three rented cranes for the lift; a P & H Model 9125-TC, 140-ton truck crane, a Link-Belt 82-ton mobile crane, and a Bucyrus-Erie 32-ton hydraulic mobile crane.

At the time of the accident, the P & H crane was at the base of the raw-coal silos and was operating with a 220-foot boom. A D-6 Caterpillar tractor had been fastened to the cab end of the truck. One end of the conveyor tube was suspended from this crane with the slings positioned 7 to 9 feet from the end. The height of the conveyor tube at this time was approximately 150 feet above the base of the raw-coal silos. There is conflicting evidence as to the operating radius of the P & H boom during this stage of the lift; the Surrey Ironworks' personnel and the crane operator claim that the radius was approximately 50 feet, but survey plans made after the accident indicate a greater radius than this.

The other end of the conveyor tube was being handled by the Link-Belt and the Bucyrus-Erie cranes. A short time before the accident occurred, the slings from the Link-Belt crane, which had been attached to the conveyor tube approximately 85 feet from the silo end, were loosened and moved toward the steel-tower end of the tube, which was being supported by the Bucyrus-Erie crane.

Again, there is conflicting evidence regarding the position of the slings for the Bucyrus-Erie crane. A photograph taken about 20 minutes before the accident shows the slings to be approximately 22 feet from the tower end of the conveyor tube, and this was confirmed by the Bucyrus-Erie crane operator in a statement made shortly after the accident. P. Zeeman, the president of Surrey Ironworks Ltd., who was in charge of the operation, stated, however, that the sling position had been moved to a point 38 feet from the end of the tube after the photograph had been taken. At the inquest, the Bucyrus-Erie crane operator changed his original statement and agreed with Zeeman.

For approximately 10 minutes prior to the accident, the conveyor tube had been hanging stationary, its weight being carried by the P & H crane at the raw-coal silo end and the Bucyrus-Erie crane at the tower end. Peter Seida and another structural ironworker, Rodney Haines, were standing on the tube, repositioning the slings for the Link-Belt crane, when the P & H boom collapsed and they were thrown to the ground. Haines suffered a fractured leg and Seida received fatal head injuries. The boom and mast of the Link-Belt crane also collapsed when the conveyor tube dropped, and the Bucyrus-Erie crane was pulled over onto its side.

The P & H boom, which was manufactured from tubular constructional alloy steel (U.S.S.T.1) having a minimum yield strength of 100,000 psi., buckled at a point approximately 56 feet from the heel, at the beginning of a 30-foot section of boom.

This buckled 30-foot section was sent to Non-Destructive Testing Ltd., of Calgary, for a complete metallurgical examination. A preliminary report has been issued stating that no flaws or defects were found that could account for the failure.

A history of the P & H crane, received from the owners, Con-Force Ltd., Calgary, states that this 30-foot-boom section had not previously suffered any known damage.

According to eyewitness reports, there was a sudden gust of wind at the time of the accident, and the P & H boom was actually seen to flex downward, recover, and then buckle. (Two earlier attempts at making this lift had been cancelled due to wind conditions.)

From conflicting evidence presented, it was not possible to determine if the P & H crane was being operated within the safe load and radius conditions fixed by the manufacturer and posted in the cab. However, in the absence of any evidence of metallurgical defects in the buckled section of boom, it must be assumed that an overload did occur.

The normal loading may have been augmented by an impact load caused by a strong gust of wind acting on the large exposed surface area of the conveyor tube.

At the inquest held in Sparwood on March 16, 1971, the jury returned a verdict that "Peter Jacob Seida, the afternoon of the 10th day of February, 1971, at approximately 4 p.m., met his death on the project of Kaiser Resources, Elkview Plant, while working upon a tube suspended by 1—30 ton crane and 1—140 ton crane when mechanical failure occurred in a boom section of the 140 ton crane, causing load to fall to the ground."

The following recommendations for mobile construction cranes were made by the Department of Mines Inspectors as a result of their investigation of the accident:

1. Before any object is lifted by more than one mobile crane, the person in charge shall draw up a plan showing the calculated loads that each crane will handle.

2. A log-book shall be maintained for each crane in which shall be recorded the time spent at each location, a record of any defect found or damage caused, and a record of all maintenance and repairs.

3. A nondestructive test report of all major components shall be obtained before the crane is first used on any new job unless such a report has been obtained within the previous six months.

4. A minimum safety factor of five in all components shall be required for any mobile crane when operating on a mining-site. An amended load chart shall be obtained from the crane manufacturer to show the maximum load that can be handled at different radii to achieve this safety factor.

5. No repairs involving welding shall be made to any load-bearing member of a crane without prior consultation with the manufacturer.

6. Whenever gusts of wind are expected or develop during the lifting of a bulky object, additional independent anchor-lines should be used to secure and steady the load.

David Watson Ross, aged 40 years, single, and employed as a batchman by Butler-Lafarge Ltd., Duncan, was suffocated at about 3.15 p.m., March 18, 1971, when buried by gravel in a bin at the company's Cowichan Lake road gravel pit.

Gravel at this pit is excavated by a front-end loader and trucked a short distance to a hopper or bin. A conveyor beneath the bin supplies gravel to a washing and screening plant. The plan dimensions of the hopper are approximately 17 by 19 feet, and it is capable of storing about 80 cubic yards of gravel.

Ross had advised other workmen he intended to clean down the hopper and, at about 3.15 p.m., was seen going toward it. About five minutes later the washerman noted the conveyor belt to the washing plant was empty. On investigation he saw a pair of boots extending down through the bin discharge opening. Rescue work began immediately by digging in the hopper to uncover the head of the trapped man. As the exposing of Ross by this method was unsuccessful, one side of the hopper

was pulled off to get rid of the loose sand. A period of one and one-half hours elapsed before Ross was released, at which time the doctor arrived and after an examination pronounced him dead.

The investigation indicated Ross had entered the bin without using a safety rope and belt and without having a second person in attendance. It is presumed he stood at or slipped into the drawdown point and was trapped by a slump of gravel. The pressure of the slumping gravel is believed to have prevented Ross from breathing.

At the inquest held in Duncan on March 23, 1971, the following verdict was made by the jury:

"We, the Jury, having been duly empanelled, find that David Watson Ross of Glenora, aged 40 years, died on the 8th of March, 1971 as a result of Traumatic Asphyxiation as a result of being buried by gravel. We find that this death was unnatural and that it was accidental. We attach no blame to any person in connection with the death. We recommend that safer procedures and regulations be devised for protecting workmen who are occupied in sluffing hoppers containing gravel or similar material. We feel that this operation should not be performed by only one workman."

The recommendations of the jury are concurred with, inasmuch as the deceased failed to take the necessary precautions of using a lifeline and belt and to have a second person in attendance as required by section 23, Rule 306, of the *Mines Regulation Act.*

The District Inspector further recommends that entry to the hoppers be avoided and that when attempts are made to bring down material hung up on the sides of a bin it be done from the outside, if at all possible.

Darryl Richard Lindquist, aged 26 years, married, and employed as a heavy-equipment operator by View Construction Company Limited, a subcontractor to Stearns-Roger Canada Ltd., the principal contractor at the Highland Valley project of Lornex Mining Corporation Ltd., died from injuries received on May 21, 1971, approximately an hour after having been thrown out of and crushed by the Caterpillar 631B scraper he was operating.

Lindquist was hired on May 19 as a fully qualified equipment operator and was assigned a belly-scraper to excavate earth at the thickener site of the new mine plant. On being checked out by the foreman, Lindquist was found not to be experienced with this equipment to the extent desired. He was instructed to keep the full bucket as close to the ground as possible in order to dampen bouncing, particularly if the machine was moving too fast.

An eyewitness to the accident advised that the loader scraper was making a sharp left turn when it bounced. As the operator's seat belt was not fastened, he was thrown out of the cab, fell head first under the machine, and landed on his back. The bucket cutting edge of the moving scraper pushed his head and body down into the soft dirt. The machine continued pushing him along until it stopped, the engine being in neutral gear. Lindquist was removed immediately and taken to hospital at Ashcroft. The damaged bumper hat, lacking a chin strap, was found on the ground near the scraper. This is not an approved type of headgear for use around any mining operation in British Columbia.

The accident investigation indicated Lindquist had either put the motor in neutral to slow down and minimize bouncing rather than drag the bucket as instructed or had accidentally knocked it into neutral as he was ejected.

At the inquest held in Ashcroft on June 24, 1971, the jury returned the following verdict and recommendations:

"We, the jury, having been duly empanelled, find that Darryl Richard Lindquist of Ashcroft, B.C., aged 26 years, died on May 21, 1971, as a result of being crushed under the machine.

"We find that the death was unnatural and that it was accidental.

"We attach no blame to any person in connection with the death.

"We recommend that proper hard hats be worn at all times on duty.

"We also recommend that all operators of such equipment be compelled to use the seat belts.

"We also recommend that an instructor accompany a new operator for a reasonable amount of time for new operator to become familiar with machine.

"We also recommend that the company check safety equipment and enforce safety rules."

Andrew Schlakoff, aged 47 years and employed as a carpenter by Stearns-Roger Canada Ltd., died on July 3, 1971, as a result of injuries received when he fell from a scaffold at the Lornex concentrator-site on May 12, 1971.

Schlakoff and three other men were erecting scaffolding and had reached a height of 20 feet when a plank being raised to the top platform dislodged a scaffold plank. Schlakoff attempted to catch the falling plank, lost his balance, and fell to the ground, landing on his head and right shoulder.

He was taken to Ashcroft hospital and subsequently transferred to the Kamloops Hospital, where he died July 3 from gross head injuries received when he struck the ground.

The accident investigation revealed that the final platform on the safeway scaffold from which Schlakoff fell was not completely planked in, as is required, before the bridging planks were placed. Had the required four planks been installed instead of three, the platform would have been tight and there would have been less likelihood of any planks being dislodged.

It was also revealed Schlakoff was not wearing a chin strap, and his hat fell off before he struck the ground.

At the inquiry the coroner determined the death to be accidental. No recommendations were made.

Thomas Joseph Mrnka, aged 34 years, married, and employed as a lead-hand locomotive operator by Granduc Operating Company at Granduc mine, was instantly killed on July 7, 1971, while endeavouring to get off a moving locomotive on the main ore-dump tail track.

Shortly after 8.30 a.m., July 7, Mrnka, the motorman of the 35-ton Mitsubishi locomotive 1660, arrived at Leduc mine-station and was presumed to be connecting the air hoses between cars, as he was seen standing at the side of the train. The air had been released on some of the cars, as they had been loaded and shunted by a locomotive not equipped to use the air brakes on them. Mrnka left the mine area about 9 a.m. on the locomotive, pulling 17 loaded 20-ton-capacity ore cars to the concentrator ore dump, a distance of approximately 10 miles. He was next seen at the locomotive controls passing through the ore dump travelling at a speed estimated to be from 25 to 35 miles per hour, when his speed should have been from 5 to 7 miles per hour, as the end of the tail track beyond the dump is about 1,000 feet distant. The motorman did not appear to exhibit any concern as he passed through the dump point. The train did not show any indication of slowing down until the last car was well past the ore dump at about the time the locomotive hit three flat cars at the drift end. Mrnka's body was found on the side of the track opposite to the motorman's operating position, and about 40 feet from the final position of the cab.

At the inquest held in Stewart on September 16, 1971, it could not be determined why Mrnka had not slowed the train to a safe operating speed while passing through the dump and the following verdict was returned:

"We the jury, having been duly empanelled find that Thomas J. Mrnka of Stewart, B.C., age 34 years, died on the 7th day of July 1971 at about 9.30 a.m. in the underground tunnel at the Granduc Operating Company's mine at Tide Lake. The cause of death was multiple injuries suffered in an accident while he was operating an ore train. We find that death was accidental and from the evidence presented under oath, can attach no blame either to the deceased or anyone else."

The Department has recommended that some form of operating control be adopted to automatically slow and stop trains before they reach the drift end.

Richard Wayne Harwood, aged 25 years, married, and employed as an ore-truck driver by Dix Construction Company, died at the scene of the accident on July 14, 1971, from injuries received on being ejected from a loaded ore truck when it ran off the Delano Creek road between Magnum mine and concentrator operated by Churchill Copper Corporation Ltd. The accident occurred on Harwood's third trip to the concentrator and on his first day of employment.

Harwood had been hired as an experienced truck-driver, but in line with safe operating procedure had been accompanied by the senior operator on his two previous trips to get the "feel" of the vehicle and to learn road conditions and such driving instructions as recommended gearing and braking for the various grades on the road. He was unaccompanied on his third trip, and at a point approximately 9 miles from the mine he drove off the right shoulder of the road after having completed a turn at the foot of a hill. At this point the truck should have been in second auxiliary of first gear or second auxiliary of second gear, but after the accident it was found to be in second auxiliary of fifth main gear, in which case the truck could easily have gone out of control and have been travelling too fast to make the turn.

The driver who used the same truck on the previous shift considered it to be in a safe operating condition. The investigation after the accident did not reveal any steering or braking defects.

The coroner conducting the inquiry came to the following conclusion: "My verdict based on the information and statements I have received, and which I believe to be true, is that Richard Wayne Harwood lost his life by misadventure, and that no blame should be attached to any person or persons."

Garry Wayne Morrison, aged 33 years, married, and employed as a journeyman pipefitter by Commonwealth Construction Company at the McLeese Lake property of Gibraltar Mines Ltd., died on September 1, 1971, from head injuries received on August 25, when struck by a flying water-line pressure-test cap.

Morrison and four other workmen were testing sections of the 36-inch-diameter steel return water-line from the tailings pond to the concentrator with the aid of compressed air. Normal test procedure was to weld together several lengths of pipe to form a section which was capped on either end and pressurized to 50 psi. This pressure was maintained for one hour, during which time each section was carefully checked for leaks. The cap designed for this purpose was to be made from a Dresser coupling having a reinforced half-inch-steel bulkhead. The bulkhead coupling connection was to be a gland assembly which could be closed or sealed by tightening 16 high-tensile strength bolts, equally spaced, and peripherally located between two flanges. Eight equally spaced L-shaped lugs were to be welded at their toes to the cylindrical surface of the coupling and their backs extended forward to lap against and be bolted to lugs welded to the cylindrical surface of the pipe. The installation that failed had only four radial braces attached to the bulkhead

instead of eight, the lug bolts were of standard tensile strength only, and four lugs were attached to the pipe instead of eight. During the pressurizing, Morrison had tightened the flange bolts twice to stop air-leaking; when the pressure was close to 40 psi. he leaned over the cap for some undetermined reason and the cap blew off, striking him in the head, causing massive skull fractures and brain damage.

The investigation showed that two of the four lugs attached to the pipe had pulled off and two of the four bolts holding the four sets of lugs together had sheared. In addition, it was also noted that there were only six pipe-line lugs at the other end of the test section to which the cap was bolted.

The inquest was held in Williams Lake on October 27, 1971, and the jury returned the following verdict:

"We the jury having been duly empanelled find that Garry Wayne Morrison of Vancouver, B.C., aged 33 years, died on the 1st of September, 1971, as a result of extensive skull injuries. We find that the death was unnatural and that it was accidental. We find no blame to any person. We recommend that proper procedures be carried out on all construction projects."

The Inspector recommends that no pneumatic testing of any vessel, including pipe, be done unless the test procedure has been approved by a recognized authority such as the Boiler Inspection Branch of the Department of Public Works.

Frederick Van-Heddigan, aged 35 years, and employed as a journeyman ironworker by Brittain Steel Company, of Vancouver, at the Fording Coal mine construction-site, died almost instantly on October 1, 1971, from extensive injuries received when he fell and was struck by members of an 81-foot-high steel support tower when it capsized.

A conveyor gallery 140 feet long and weighing 447 tons was being placed between the top of the support tower and the adjacent clean-coal storage building. The tower end of the conveyor was being raised with an 82.5-ton Link-Belt mobile crane while the other end was being lifted with a 150-ton Manitowoc crane. Cables were attached loosely from the Manitowoc counterweight to a D-7 Caterpillar tractor so that any tendency for the crane to tilt would be arrested by the additional weight of the tractor. Similarly, the Link-Belt crane was being counterbalanced with the blade of a D-6 Caterpillar resting on the counterweight of the Link-Belt truck carrier.

The gallery was raised to about a foot above its final position. At the storage building end, four or five men stepped onto the gallery to commence connecting it to the building. At the same time, Van-Heddigan and two other men were on the support tower to which they had secured the other end of the gallery with a chain block in order to prevent drifting. After about 10 minutes in this position the operator of the Manitowoc crane noticed his vehicle starting to tip. He immediately started to boom-in, during which time the men working on the gallery were able to get back onto the storage building. The crane continued to tip until the D-8 tractor was being raised off the ground and the boom had swung out about 30 feet. Realizing the crane was about to capsize, the Manitowoc operator cut his load loose. As that end of the gallery fell, the load on the Link-Belt crane increased until the crane boom failed and the weight of the gallery was conveyed to the top of the support tower to which the gallery was secured with a chain block. The unbalanced load capsized the tower and upset the three men on it, who were at that time endeavouring to escape down the ladder-way. Fortunately two of the men escaped with minor injuries when Van-Heddigan was killed.

The accident investigation disclosed that the manufacturer's rated loading for the Link-Belt crane for the boom length in use at its operating radius is 35,000 pounds. Calculation indicated the actual loading to have been 35,400 pounds. The

manufacturer's rated loading for the boom length in use at its operating radius for the Manitowoc crane is 42,500 pounds and its tipping load is 56,250 pounds. The actual load on the Manitowoc crane was calculated to have been in excess of that amount. In other words, it would appear that this crane was obviously overloaded at the time of the accident.

The inquest was held in Sparwood on October 13, 1971, and the jury's verdict was that death was accidental with no blame attached to anyone.

The jury added the following recommendations, "(1) That the Department of Mines Directive 'Re Cranes' be enforced to the letter, and (2) That all weights, degrees, and measurements be calculated by a Certified Structural Engineer re the Department of Mines Directive 'Re Cranes'."

The jury's recommendations refer to a directive issued by the Department of Mines and Petroleum Resources on July 16, 1971, subsequent to the fatal accident at the Sparwood plant of Kaiser Resources on February 10, 1971, when a crane failed. Specifically the recommendations refer to items (1) and (4) of the directive and read as follows:

"(1) Before any object is lifted by more than one mobile crane, the person in charge shall draw up a plan showing the calculated loads that each crane will handle.

"(4) A minimum safety factor of five in all components shall be required for any mobile crane when operating on a mining site. An amended load chart shall be obtained from the crane manufacturer to show the maximum load that can be handled at different radii to achieve their safety factor."

Steve Marchuk, aged 44 years, and employed as a welder at the Elkview coal-preparation plant of Kaiser Resources Ltd., died on October 15, 1971, approximately four hours after being injured when the Caterpillar 996B front-end loader he was driving went off the road between the preparation plant and settling lagoon B.

Marchuk and three mechanics had taken the lagoon pump apart and were taking the pump barrel across a plank when Marchuk and two others fell into the water. On retrieving the pump barrel it was taken up to the railroad track. It was intended to load the pump barrel in the crew-cab truck which was on the road about 300 yards from the pump barrel. The crew-cab truck started down the tracks but high centred in such a position that the four-wheel drive would not work. Shortly before 4 p.m. Marchuk was taken to the preparation plant to obtain a front-end loader to pick up the pump barrel. Marchuk found the loader near the electrical shop and started down the road to the lagoon. There were no witnesses to the accident, but the investigation shows that about 700 feet above the junction of the plant road with the camp, the old farm and main gate roads, the loader swung from the middle of the road to the right side and then back left across the road and over the edge at a point 140 feet from the junction. It would appear that the loader had rolled over a complete revolution after leaving the road as it was found in the upright position with its cab torn off. Marchuk was found farther down the bank at the edge of the road to the main gate. The time of the accident is believed to be about 4 p.m. because just after that time a supervisor, on coming down the road, noted the tracks leading over the bank and then saw the damaged vehicle and Marchuk. Marchuk was taken immediately to the Michel hospital and then on to Calgary, but died en route.

The investigation of the vehicle found the brakes and steering to be in good working order. The left front tire was deflated and its outer retaining ring unseated. It is believed the tire deflated and the ring became unseated because of the very heavy side thrust exerted on the tire when the vehicle went over the bank. It was deter-

mined the road surface was in satisfactory condition and that Marchuk, although employed as a welder, had had considerable previous experience in the handling of this model of front-end loader.

The inquest was held in Sparwood on November 12 and the verdict of the jury was:

"He came to his death accidentally as a result of injuries received when the 966B Loader he was operating overturned in transit between the Elk Valley and the main camp of Kaiser Resources property; and that no person or persons were to blame. We the jury recommend the following:

"1. Persons operating equipment should be fully qualified.

"2. Road surfaces should be maintained in a better condition—i.e., wash board conditions.

"3. Steel roll bars for the cab should be installed in vehicles of this type."

It was the opinion of the investigating Inspector that had this machine been provided with roll-over protection and a seat belt used by the operator the possibility of injury or a fatality would have been greatly reduced.

Gerald Paul Paulson, aged 24 years, married, and employed as a Haulpak operator by Bethlehem Copper Corporation Ltd., died on November 4, 1971, at Bethlehem mine as a result of an accident, when the truck which he was driving went over the south waste dump of the Huestis zone pit.

The accident occurred at 6.15 p.m., when Paulson brought a load of waste rock to the dump. The normal dumping procedure is for the loaded truck to approach the berm at an acute angle with the driver's side adjacent to the berm, turn sharply away from the berm to come into a position roughly at right angles to it, back up to the berm ridge, and then dump.

The only witness to the accident was a man working at a mining operation across the valley, a considerable distance away. He advised he had seen the truck approach the dump, but had turned his head away briefly, and, on reobserving the Huestis dump, had seen the truck cartwheeling down the hillside. Examination of the accident area showed a set of tire tracks approaching the berm at an angle of about 65 degrees and the berm edge broken where the tracks met it. The truck was subsequently located at the bottom of the dump some distance along from the point below where it went over. This would indicate possible forward motion. In addition, the truck gear shift was found to be between second and third gear rather than in reverse as it would have been if the vehicle had backed over.

At the time of the accident neither the shovel loader nor the driver of another truck hauling waste considered the possibility of a truck going over the bank, but thought Paulson had gone to the garage for repairs. The driver of the other truck had noted that the berm appeared to be broken, but did not think it damaged enough to warrant further investigation. At about 6.45 p.m. the driver of a rubber-tired dozer came to the dump to carry out normal clean-up and maintenance. He noticed the broken berm, and by two-way radio advised the shiftboss and asked for a light to investigate the area below the broken berm. On locating the truck, he and the shiftboss immediately climbed down to it and found Paulson pinned inside the crushed cab. No sign of life was evident, and considerable difficulty was experienced in removing him as fuel leakage prohibited the use of a cutting torch.

The person who had driven the same truck on the shift before the accident was interviewed and the truck repair log was examined. Both investigations indicated the vehicle to be in good working order. From the condition of the vehicle after the accident it was not possible to determine its degree of fitness immediately prior to the accident. It was observed, though, that the left front tire had become deflated.

It could not be determined if this condition prevailed immediately prior to the accident or was caused by it. Nor could it be determined if Paulson had misjudged his position relative to the berm and had driven over it, or if he had lost steering control due to a flat tire and allowed the truck to climb the berm.

The inquest was held at Logan Lake on November 25, 1971, and the verdict and recommendations of the jury were as follows:

"We, the Jury, having been duly empanelled, find that Gerald Paulson, of Ashcroft, B.C., aged 24 years, died of multiple injuries suffered in an occupational accident. We find that it was accidental. We find that there is insufficient concrete evidence to attach the blame to the driver, or to the vehicle's mechanical condition or to the ambient conditions of the accident scene.

"Recommendations

1. Artificial lighting to be at all dump areas.
2. Dump man to be in all dump areas in accordance with Workmen's Compensation Board standards.
3. In future cases such as this when there are no eyewitnesses, the investigating authorities should provide more detailed photographs of the scene and a complete written mechanical report."

In comment, the purport of the first two recommendations is already contained in the *Mines Regulation Act,* section 23, Rules 271 and 272.

Gordon James Bishop, aged 36 years, married, and employed as a bulldozer operator by Utah Mines Ltd. at Island Copper mine on Rupert Inlet, was fatally injured on November 10, 1971, when the forklift he was operating overturned on him.

With the forklift, Bishop was unloading 4 by 4-foot pallets of bagged ammonium nitrate prills from a railway boxcar onto the deck of an 8-foot-wide flatbed trailer. The forklift was approximately 3 feet wide and 6 feet long. As the design of the pallets was such that they could be lifted by the forklift from only two opposing sides, the pallets had to be positioned on the edge of the trailer so that it was possible to pick up a pallet with a forklift working on the ground at the side of the trailer. This necessitated a considerable amount of manœuvring by the forklift on the confined area of the flatbed trailer. Two pallets for the second trailer load had been properly positioned at the left front corner of the trailer and Bishop, who had backed out of the boxcar with a pallet, positioned it on the right side of the trailer to counterbalance the tilt caused by the other two pallet loads. As the forklift was backing away from the loaded pallet, its tires were observed by a nearby witness to skid and slide over the side of the trailer. Bishop jumped out but fell to the ground. At the same time the forklift fell and then rolled on top of him. Bishop was quickly removed but died three hours later from internal crushing injuries he had received.

The forklift was examined by a mechanic who found it was in good working order except for some superficial damage received when it fell. It was determined that although Bishop had previously operated the forklift he was not fully experienced in handling it in a restricted area.

At the inquest held at Island Copper mine on December 8, 1971, the jury returned the following verdict and recommendations:

"Who: Gordon James Bishop.

"When: Approx. 3:00 p.m., November 10/71.

"Where: Island Copper job site (dock area).

"How: Lower portion of body crushed under falling forklift.

"Why: Unsafe procedure by using trailers as un-loading ramp; trailers do not have sufficient room for maneuverability of forklifts, deck of

trailer slippery due to rain and solid rubber tires on forklift—insufficient traction. Lack of supervision. No known supervisor on this operation.

"Recommendations:

No further use of trailers of any type used as a ramp.

Proper un-loading ramps be used and the above use of trailers not be used again under any circumstances.

Mine Safety Inspector have more control of safety procedures on job site and should inspect more frequently.

Any loading ramps being or to be constructed, meet the specifications set down by the Workmen's Compensation Board or equivalent.

Safety Committee be made up of a man from each crew at the operation regardless of the shift to be in direct relation to Safety Supervisor. Recommendations from meeting to be posted on proper bulletin board available to all employees."

All fatalities but the following occurred to persons employed at mining properties.

Leslie Fryters, aged 12 years, of Silverton, was electrocuted on October 24, 1971, when he came in contact with a 2,300-volt transmission-line extending from Western Exploration powerhouse to the Hecla mine.

Western Exploration Company Limited formerly operated a concentrator in Silverton and Hecla mine on Idaho Mountain about 3 miles to the east. The mine closed in 1969 and subsequently the Silverton plant was leased to Panoil Canadian Minerals Associates. This company subsequently leased the concentrator to Semiahmoo Enterprises.

Many years ago this operation generated its own power from water taken from Silverton Creek, but, when British Columbia Hydro power was available, the generating plant was closed and the powerhouse was used as a power-control station. It contains the control switches for the 2,300-volt transmission-line and for the concentrating plant. About 100 yards east of the powerhouse and on the lines to the mine are pole-top, fused, oil circuit-breakers.

The last time the line to the mine was energized was for a brief period in October 1970, after which time the power was cut off and the service checked to see that it was discontinued. Between that date and the date of the accident the line had fallen into a state of disrepair and three fir trees had fallen across it below the second tower. The largest tree had taken two of the lines to the ground and the third line about 3 feet above it.

On October 24, Leslie Fryters, playing around the foot of the second tower with another boy, reached up to hold onto the wire in order to look down over a bluff. The other boy, who said they had swung on these wires on other occasions, noted something was wrong and tried to pull Fryters off by grasping the victim's rubber boot. He received such a severe shock that he released the boot and went for help after throwing a rock at the line to dislodge Fryters.

A key to the powerhouse was obtained from the wife of the unpaid caretaker and the power cut off at the switch and subsequently at the pole-top fuse disconnects where it was noted one of the two 30-ampere fuses had melted though the 50-ampere fuse was intact.

An attempt was made to find out who had access to the powerhouse besides the caretaker. It was determined that an additional key was available at the mill office and that boys playing around that area had broken into the building on more than

one occasion. However, it could not be determined when or by whom the line was re-energized.

At the inquest held at Silverton on November 23, 1971, the jury's verdict was as follows:

"Leslie Fryters met his death by accidental electrocution while playing on Sunday morning, October 24, 1971, at a location approximately 1000 yards east of the Western Exploration Mill at Silverton.

"We recommend that the power be shut off at the B.C. Hydro bank so that there is no power at the powerhouse and that the lines be brought up to the required standards before the power is restored."

It is the recommendation of this Department that immediately upon the de-energization of any high-tension transmission-line the main switchgear supplying the transmission-line shall be locked out and tagged and, in addition, all pole disconnect switches be opened.

It is further recommended that strict security measures shall be adopted in all areas of high potential hazard to prevent unauthorized access.

FATAL ACCIDENTS AND ACCIDENTS INVOLVING LOSS OF TIME

There were 11 fatal accidents and 784 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, occupation, and 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	12	5.1	2	0.4
Explosives	—	0.0	1	0.2
Falls of ground	25	10.7	67	11.9
Falls of persons	72	30.8	169	30.1
Lifting and handling material	38	16.2	72	12.8
Machinery and tools	45	19.2	114	20.3
Transportation	29	12.4	39	7.0
Miscellaneous	13	5.6	97	17.3
Totals	234	100.0	561	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	—	—	9	1.6
Haulagemen	15	6.4	41	7.3
Miners	13	5.5	163	29.1
Helpers	2	0.9	21	3.8
Timbermen and facemen	24	10.2	11	1.9
Mechanics, electricians, etc.	6	2.5	44	7.8
Supplymen, welders, pipefitters, etc.	40	17.1	4	0.7
Surface—				
Mechanics, electricians, repairmen, etc.	27	11.5	101	18.0
Mill and crusher workers	1	0.4	32	5.7
Carpenters	8	3.4	25	4.5
Miners and drillers	3	1.3	36	6.4
Vehicle drivers	34	14.5	25	4.5
Surveyors, labourers, construction, etc.	61	26.3	49	8.7
Totals	234	100.0	561	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	10	4.3	25	4.4
Head, face, and neck	12	5.1	30	5.3
Trunk	64	27.3	171	30.5
Upper extremities	50	21.4	126	22.5
Lower extremities	80	34.2	171	30.5
General	18	7.7	38	6.8
Totals	234	100.0	561	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
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
1970	172	860	1,275	11,622	135	74
1971	196	737	1,457	10,684	135	69

[1] Compensable accident means an injury causing a loss of more than three days' work including the day of the accident.

DANGEROUS OCCURRENCES

Ninety-four dangerous occurrences were reported as required by sections 9 and 10 respectively of the *Mines Regulation Act* and the *Coal Mines Regulation Act*. Eighty-four were reported from metal-mining operations and 10 from coal mines. Sixty-five occurred on the surface and 29 underground. These were investigated by the Inspector of Mines.

In summary, 35 of these incidents involved the use of vehicles of which 27 occurred on the surface. Of the 35, 23 involved the use of trucks, five the use of scrapers and scooptrams, three the use of front-end loaders, and one each involved a bus, a grader, a shovel, and a backhoe. There were 11 fires reported, eight being on the surface. There were 10 instances of slides of rock or snow and eight incidents involving the use of explosives or blasting procedures. Seven incidents were reported involving the use of electricity, five involving crane boom failures, and four involving underground hoisting. Two each were reported involving a man being caught in machinery while wearing loose clothing, leakage of tailings dams, and runs of muck. In addition, there were eight miscellaneous dangerous occurrences reported.

On January 6 at Britannia mine of Anaconda American Brass Limited, two of three miners working on the same ramp heading drilled in the sockets of holes in which blasting had been done. The third miner had drilled two holes within 4 inches of such sockets. Disciplinary action was taken.

On January 8 at the Michel operations of Kaiser Resources Ltd., an electrician, while working on a live circuit in an electric cabinet, permitted his wrench to slip. The wrench contacted live conductors, causing an arc flash from which he received first-degree burns.

On January 9 at the Britannia mine of Anaconda American Brass Limited, a scooptram ran out of control down 4950 ramp because of unserviceable brakes and steering mechanism. The driver was slightly injured.

On January 12 at the Dry Creek pit of Kaiser Resources Ltd., the driver of a 35-ton truck owned by Natal Enterprises Ltd., backed the truck over the dump berm. The driver escaped serious injury but the truck was completely wrecked after rolling down about 200 feet.

On January 17 at Texada iron mine of Texada Mines Ltd., a power failure and an unusually high inflow of surface water from melting snow resulted in the flooding of the shaft up to 1455 station at the crusher room at the foot of the conveyor way below 1455 level.

On January 19 at Granduc mine of Granduc Operating Company, a workman was injured by a Unimog truck which capsized after running out of control backwards down a steep grade.

On January 23 on the Davis-Keays mine road, a workman was injured by the explosion of an improvised steel-barrel steam generator he was using to produce steam to thaw a frozen culvert.

On January 25 at the Quatse Lake property of North Island Mines Ltd., a workman received burn injuries and a trailer was destroyed by fire when the Coleman lamp he was filling exploded.

On January 25 at Britannia mine of Anaconda American Brass Limited, three men were riding in a shaft cage, into which five 20-foot lengths of 6-inch diameter pipe had been loaded, when the shaft inspection bonnet above the cage struck a shaft guide. The bonnet was then flipped back and forth by the violently whipping hoist rope.

On January 29 at Granduc mine of Granduc Operating Company, an unauthorized driver permitted an Unimog truck to get out of control and run backward down a ramp.

On January 30 at the Eagle mine of Davis-Keays Mining Co. Ltd., a diamond-drill operator was injured when the loose clothing he was wearing caught in the drill screw. A nearby miner observed the accident, shut off the drill, and freed the injured man.

On February 1 a carpenter was injured by a fall of ground at the lower end of mill feed tunnel 3 at Ingerbelle mine of Similkameen Mining Company Limited. The rock was released by the melting of ice on the rock face above the portal.

On February 2 at Craigmont mine of Craigmont Mines Limited, a shiftboss was caught in a run of wet muck issuing from a stope in which surface water had accumulated.

On February 3 at Bralorne mine of Bralorne Can-Fer Resources Limited, the Queen shaft south hoist cable was badly kinked for 750 feet when the cage hung up while descending after a successful drop test had been made. The cause of the incident was the failure of the rear safety dogs to completely open because of corrosion on the top pin of the linkage between the dog shaft and the assisting spring.

On February 6 at Granduc mine of Granduc Operating Company, a small fire occurred in the steam-cleaning room of the service building at Tide Lake when a workman attempted to refuel the burner of an oil-fired steam-cleaning jenny while it was in operation.

On February 17 at the Highland Valley Jersey pit of Bethlehem Copper Corporation Ltd., a Haulpak truck ran off the road and turned over on its side. No equipment defects could be determined which may have caused the incident.

On February 20 at Granduc mine a scooptram in use by Haste Mine Development Company Ltd. stalled while ascending a steep grade. The foot brake failed to operate and the vehicle rolled backward for a distance of 840 feet, tearing out air and water pipe-lines and hangers. The driver received minor injuries.

On February 25 at Granduc mine of Granduc Operating Company, an untrained and unauthorized workman drove a scooptram into an ore pass where there was no dump block. The driver escaped uninjured.

On March 1 at the Britannia concentrator of Anaconda American Brass Limited, an arc flash occurred when two electricians removed the insulating tape from two unused and supposedly de-energized electric feeder-lines they were checking.

On March 2 on the Britannia townsite–4100 level road of Anaconda American Brass Limited, the operator of a Caterpillar loader received severe bruise injuries when the vehicle he was operating slid backward on snow, went off the road, and rolled on its side.

On March 3 on the Stewart–Granduc road of Granduc Operating Company, an attempt was being made to induce an avalanche with the assistance of a truck-mounted avalauncher. This device, using a high-pressure nitrogen-activated piston, hurls a bundle of fuse-ignited explosives into the area where it is desired to induce a controlled avalanche. At the time of the incident, an ignited charge had been loaded into the avalauncher barrel and the firing initiated. For some unexplained reason the charge did not clear the barrel and the operator, realizing the malfunction and danger, quickly left the site to seek safety. The ensuing explosion destroyed the avalauncher and severely damaged the truck on which it was mounted.

On March 5 in Granduc mine of Granduc Operating Company, a miner received superficial injuries as a result of a minor explosion when he accidentally drilled into an unexposed socket of a hole in which blasting had been done.

On March 8 on the Stewart–Granduc road of Granduc Operating Company, a passenger-bus carrying men to the mine collided with a concentrate truck during bad visibility on a narrow section of the road. Both vehicles were proceeding with caution at the time and, although some damage was done to both vehicles, only one person was slightly injured.

On March 9 in Granduc mine of Granduc Operating Company, a miner received superficial injuries from an explosion caused by drilling into some explosives remaining in the socket of a hole in which blasting had been done. Disciplinary action was taken with respect to the injured miner and his cross-shift partner for not having adequately washed the drift face.

On March 18, a Caterpillar scraper owned by Pooley Construction Company Limited overturned on the east pit haul road of Gibraltar Mines Ltd. The overturned scraper pinned the operator to the ground. It was determined the cause of the accident was due to operator inexperience.

On March 18 at the Britannia Beach machine shop of Anaconda American Brass Limited, two roof beams were ignited by the backfiring of an overheated infrared heater.

On March 20 in the Old Sport mine of Coast Copper Company Limited, a miner received serious injuries when he was partly buried on being drawn down in the muck above a draw-point in a stope while broken ore was being removed.

On March 20 at the Tofino prospect of Catface Copper Mines Limited, a small explosion followed by a fire caused the destruction of the cookhouse and cook's bunkhouse. It is conjectured the arcing of a faulty electrical circuit ignited an accumulation of propane gas leaking from a refrigerator in the same room.

On March 22 a logger clearing timber at the Gibraltar Mines Ltd. tailings dam-site was seriously injured when struck by a falling tree. The injured man had undercut several trees and left them standing. He was struck by one of these as he was about to fall another tree.

On March 26 on the Cassiar 6100 open-pit haul road of Cassiar Asbestos Corporation Limited, a shovel operator escaped injury when the P & H 1400 shovel he was operating swerved off the road and rolled 150 feet down the road embankment. The shovel was being moved under its own power down the road when it swerved because the newly repaired left track was tighter and stiffer than the right track. This condition caused the vehicle to crab to the left.

On April 1 at the Granduc mine of Granduc Operating Company, a fire occurred in the main wiring harness between the engine and the operator's panel of a scooptram. The fire was quickly extinguished, but the vehicle required rewiring.

On April 2 in the Pinchi Lake mercury mine of Cominco Ltd., a miner was seriously injured by crushing when he walked between a truck and a load-haul-dump unit as it was backing up to the truck.

On April 6 at the Pinchi Lake mercury mine of Cominco Ltd., a truck-driver suffered minor injuries when he backed a Euclid truck over a stop block and into the coarse-ore bin.

On April 6 at the Eagle mine of Davis-Keays Mining Co. Ltd., an avalanche destroyed or damaged the buildings and equipment at the 5900-level portal facilities by burying them under 30 feet of snow. The avalanche was caused by large sections of snow cornice that broke off a mountain ridge above the portal. No persons were in the area at the time of the incident because the afternoon shift had not reported for work due to adverse weather conditions.

On April 8 at the south dam of No. 2 tailings pond of Endako Mines Ltd., a piece of timber left in the dam during fall construction caused a rupture of the dam.

During a period of less than an hour more than 100,000 gallons of tailings escaped, but most of the spillage was caught by the safety dam.

On April 27 at the Bell Copper Division project of Noranda Mines, Limited, a man was seriously injured at the north side of the pit when a slide of wet glacial till struck him and the bulldozer he was operating. The man was removing overburden to uncover the orebody and had dislodged a large boulder which undercut the 25-foot-high face. The ground was thawing at the time and considerable water was present. This developed an unstable condition resulting in a slide.

On April 30 at the Mamquam River gravel pit of Coast Aggregates Ltd., the manager was injured when his sweater caught in an unguarded grease nipple of the processing plant drive shaft. The injured man had his sweater and shirt torn off him and he was thrown over the shaft.

On May 3 at the Highland Valley operation of Lornex Mining Corporation Ltd., a loaded 120-ton Haulpak truck ran out of control and halted only as a result of the shearing off of the right front wheel suspension. The accident investigation failed to indicate any equipment failure, and it was concluded that the loaded vehicle was travelling on a down grade too fast for effective braking.

On May 5 at Adit 29 dump of the Harmer Ridge operations of Kaiser Resources Ltd., the thawing of frozen material at the edge of the dump caused it to collapse while a bulldozer was pushing overburden over the edge. The bulldozer slid approximately 600 feet down slope, but the driver esaped injury.

On May 12 a power outage of 12 hours' duration occurred at Granduc mine of Granduc Operating Company. The outage caused an interruption of the mechanical ventilation system for a like period of time. All underground personnel were evacuated by way of the main adit in which the ventilation direction reversed and became incast.

Between May 13 and June 10 a succession of mud slides occurred in the valley of Six Mile Creek below the Harmer Knob pit of Kaiser Resources Ltd. The slides, attributed to a very heavy spring run-off, commenced with the slumping of a portion of the 6600 dump on May 13. Several muck flows occurred subsequently in the creek and blocked the road and culvert, thus necessitating frequent reopening. On June 4 after a particularly heavy mud flow, the creek was examined to its source. Considerable gouging of the banks was evident and it was noted that the end of the 6600 dump had dropped about 200 feet. In so doing it had exposed a coal outcrop.

On May 17 at the Ingerbelle property of Similkameen Mining Company Limited, a Letourneau 15-cubic-yard front-end loader was being driven down a 10-percent grade when the dynamic braking failed. Later examination showed several sections of the resistance grids had burned off and the service and emergency brake linings were severely worn. The investigation indicated the operator had permitted the vehicle to reach a speed beyond the control of both the dynamic and the service brakes.

On May 20 at the McDonald Island open-pit operation of Granisle Copper Limited, a blaster sounded the "all-clear" signal before all holes being fired had time to detonate. Disciplinary action was taken.

On May 27 at the Britannia concentrator of Anaconda American Brass Limited, a blaster failed to properly clear all persons from the danger zone before initiating a blast. Disciplinary action was taken.

On May 31 at the Ingerbelle property of Similkameen Mining Company Limited, as a grader was being backed over the crest of a hill, the operator had difficulty in engaging third gear and the grader started to gain speed down the slope. When

the operator finally managed to engage first gear the engine stalled and the vehicle plunged off the road.

On June 17 at the Elkview coal-preparation plant of Kaiser Resources Ltd., a workman was seriously injured in a runaway scraper which he had taken without authority and contrary to instructions given him by his supervisor.

On June 23 at the Smelter Lake tailings impoundment project being made by Pooley Construction Co., Ltd., for Similkameen Mining Company Limited, a Caterpillar scraper slid into the lake when a 50-foot-wide section, 500 feet long, of the on-shore side of the east starter dam sloughed into the lake. It was believed the fill being dumped was over an area of unstable base which suddenly failed because of the loading and possible shock disturbance by the movements of the scraper and other vehicles nearby.

On July 2 at the Harmer Ridge open pit of Kaiser Resources Ltd., a truck-driver received serious injuries on being thrown out of the cab of a 100-ton truck when it capsized in a ditch subsequent to running out of control on the downhill road to the breaker station. The investigation indicated the cause of the accident attributable to a poorly designed braking system, or unsatisfactory equipment maintenance, or abusive treatment of the braking systems.

On July 8 an employee of Stearns-Rogers Canada Limited was injured at Lornex mine of Lornex Mining Corporation Ltd. when a crane operator dropped a crane load of steel reinforcing-bars too rapidly and struck a workman on the back and foot. The cause of the accident was attributed to too sensitive brake control and operator inexperience.

On July 9 the driver of a truck on the open-pit haulage road of Granisle Copper Limited drove a 50-ton truck over the road edge and capsized the truck.

On July 12 at the Island Copper mine of Utah Construction & Mining Co., one of two men employed on a crane-supported work-platform was injured by a fall when the cable supporting the platform broke because the crane operator neglected to extend the cable at the same time as the telescoping boom was being extended.

On July 12 on the Granduc mine road of Granduc Operating Company, the driver of a semitrailer concentrate truck escaped injury when the truck overturned at the bottom of a steep hill. No mechancial defects were found in the truck, but the driver reported the truck had jumped out of gear, and he was unable to re-engage the motor or stop the vehicle.

On July 12 at the tailings area of the old Union mine about 40 miles north of Grand Forks, about 3,000 gallons of cyanide solution escaped when a leaching pond retaining-wall collapsed due to pressue from stacked tailings saturated with the cyanide solution. Sufficient hypochlorate neutralizing solution was added to the slurry to prevent poisoning of the nearby streams, but this was possible only because failure was observed when it occurred, and the operator had taken the precaution of having an adequate supply of neutralizing agent on hand.

On July 14 at the Gibraltar mine of Gibraltar Mines Ltd., the boom of a 45-ton Northwest crane collapsed while lifting a 35-ton ring gear. The investigation indicated that due to additional side loading caused when attempting to position the ring gear the crane loading exceeded the maximum allowable lift for a 53-foot boom having a working radius of 23 feet.

On July 16 in Granduc mine of Granduc Operating Company, a fire occurred in a Mitsubishi locomotive while en route underground. An investigation indicated that due to excessive torque developed in the main traction motor the resistor bank overheated and ignited nearby insulation.

On July 19 at the Pinchi Lake mercury mine of Cominco Ltd., part of a large cable-anchored rock outcrop at the south edge of main open pit and above the plant broke loose along a slip plane subsequent to a blast and rolled down the hillside. A portion of it struck and damaged the water tank.

On July 20 at the No. 6 fine-ore bin in the Britannia mill of Anaconda American Brass Limited, a workman was buried to his waist in ore when he lost his footing subsequent to a sloughing of the muck he was attempting to release.

On July 21 at the Phoenix open pit of the Phoenix Copper Division of The Granby Mining Company Limited, the driver of an old and known unserviceable dump truck was slightly injured when the vehicle capsized after rolling backward down a road because the brakes were faulty and could not stop the truck.

On July 23 at Kitsault, the operator of a boat under charter to British Columbia Molybdenum Limited was severely burned when an explosion occurred in the motor-well in the forward compartment of the boat. The injured man was repairing a leaking gasoline line when a spark caused by an uninsulated and poor electrical connection to the pump ignited the gasoline vapour.

On July 27 in the Boss Mountain mine of Brynnor Mines Limited, a workman was injured when a large slab slid out of a partly empty drawpoint and pinned him to the mucking machine he was operating.

On August 3 at the west pit of Endako Mines Limited, the right front rim and tire fell off a loaded 85-ton Lectra Haul truck as it was travelling along a level road. It was determined the cause of the incident was that the rim and tire had been improperly positioned (not centred) when mounted, which permitted the loosening of the rim lugs and nuts.

On August 4 in Granduc mine of Granduc Operating Company, the operator of a scooptram was seriously injured when he drove the vehicle into an ore pass. The scooptram slid down the ore pass for 100 feet and the driver continued down a further 60 feet. The investigation indicated the operator was an inexperienced trainee and that there was no stop-block in front of the ore pass.

On August 4 at the Ingerbelle mine project of Similkameen Mining Company Limited, the contractor operator of a backhoe escaped injury by jumping off the machine prior to its sliding off a bridge-pier site and falling 600 feet into Similkameen River.

On August 10 at the Fireclay mine of Canadian Refractories Limited, a subsidence occurred at the side of the Straiton road which runs over the mine workings. The hole was filled with waste rock.

On August 12 at the McDonald Island surface maintenance shop oil room of Granisle Copper Limited, a welder was seriously burned by an explosion and fire caused when sparks from the welding operation he was performing ignited fumes from a barrel of methanol stored in the oil room.

On August 13 in Britannia mine of Anaconda American Brass Limited, the swinging of the two sides of the tail-rope loop of the Koepe hoist in No. 10 shaft displaced the bottom shaft-divider, thus permitting the tail rope to tangle and kink.

On August 16 in Granduc mine of Granduc Operating Company, because of an electric wiring short circuit, a small fire occurred in the battery box of a locomotive.

On August 17 at the Bell Copper project of Noranda Mines, Limited, the 110-foot boom of a new Bucyrus-Erie 45-ton crane failed while lifting a 5-ton load. The cause of the failure was not determined.

On August 20 in the Balmer North mine of Kaiser Resources Ltd., because of a failure in its cable-reeling mechanism, a shuttle car ran over its trailing cable, badly

damaging a 10-inch length of it. A small arc flash occurred before the earth leakage protection system isolated the power.

On August 23 at the Lornex mine of Lornex Mining Corporation Ltd., a Haulpak 120-ton truck lost its right front wheel when the 12 bolts fastening the wheel suspension plate to the chassis mounting plate sheared. The cause of the incident appeared to be an improperly installed plate-positioning key.

On August 27 at the Craigmont mine of Craigmont Mines Limited, three men were slightly injured when a Unimog truck and a scooptram collided on an underground ramp. The accident was attributed to the entering of a block signal zone against a red light by one of the vehicles and the stalling of the scooptram, with a fluid leak in the hydraulic braking system, when a compressed air-line connected to the fuel-supply system broke.

On August 30 at the Pride of Emory mine tailings pond of Giant Mascot Mines Limited, an overflow water culvert separated and permitted an escape of tailings, which washed out a road and ran down into a creek.

On August 31 at the Endako mine of Endako Mines Limited, the right front tire and rim of an 85-ton truck came off while the truck was travelling at 7 miles per hour. The investigation indicated that the rim, when mounted, had not been centred and thus allowed the retaining lugs and nuts to come loose.

On September 12 in Granduc mine of Granduc Operating Company, one scooptram ran into the back of another while proceding down an underground ramp. Both drivers received minor injuries. The cause of the accident was determined to be the inability of the rear vehicle to stop because of wet brakes.

On September 23 in Magnum mine of Churchill Copper Corporation Ltd., two men were descending a raise in an Alimak raise climber when the automatic brake engaged at a point 200 feet above the raise bottom. The flywheel bar broke when the two men were endeavouring to move the climber. A mechanic using raise climbers released the safety brake and permitted the equipment to descend.

On September 28 at Granduc mine of Granduc Operating Company, it was necessary to evacuate all mine personnel when the mine mechanical ventilation system was interrupted for seven and one-half hours due to a power failure. The power outage was caused by the failure of a fuse and a relay coil in the mine feeder system.

On September 28 in the Jersey pit of Bethlehem Copper Corporation Ltd., a truck-driver overturned a tandem truck on a switchback bend while sanding a road. It was concluded that the truck was travelling too fast on a curve with the partly filled dump box elevated.

On September 28 at the Bell Copper project of Noranda Mines, Limited, a 2-pound piece of fly rock destroyed a wash basin in a bunkhouse 700 feet from the blasting-site in the mill foundation excavation.

On October 5 at the Brenda open pit of Brenda Mines Limited, the right rear electric wheel and two tires fell off a moving 100-ton truck when the axle-box housing of the electric wheel fractured. An investigation indicated an attempt had been made eight months earlier to weld a crack in the housing.

On October 9 at the Cassiar powerhouse main switchboard of Cassiar Asbestos Corporation Limited, an arcing between the mine and mill panels caused a power outage. The current transformers and the 600-ampere mine-panel air-breaker switch were damaged. The investigation indicated the switchgear was carrying too heavy a load.

On October 18 at the Lornex plant-site of Lornex Mining Corporation Ltd., a workman was injured when struck by a crane load when the crane boom collapsed.

A contracting company's P & H Model 210 crane with a boom length of 50 feet and at an operating radius of 30 feet was being used to lift a portable welding machine weighing 3,240 pounds. It was determined that the load at the operating radius indicated approached maximum allowable, and the operation was aggravated by the settling of the inner track in soft ground.

On October 19 at the Sukunka project of Coalition Mining Limited, a man was severely injured when he lost control of the front-end loader he was driving. The vehicle rolled backward striking another, and the operator was injured when he was thrown out between the two machines.

On October 22 at the McLeese Lake operations of Gibraltar Mines Ltd., the driver of a pick-up truck narrowly escaped injury when his vehicle was run into by an empty 100-ton truck. The pick-up truck had been parked in front of the large truck and was below the line of sight of its driver.

On October 22 at the Tasu open pit of Wesfrob Mines Limited, a truck was extensively damaged after backing over a road edge and rolling down the hillside. The investigation revealed the truck-driver had, without authorization, used the brake air system to boost water into a 40-R drill and had thus depleted the air in brake reservoirs. On subsequently moving the truck there was insufficient air pressure to operate the brakes.

On November 1 at the Fording operations of Cominco Ltd., a truck-driver received minor injuries when a 120-ton truck ran out of control on a steep down-grade and capsized. The cause of the accident was determined to have been a failure in the electrical circuitry of the dynamic braking system.

On November 1 at the Island Copper mine of Utah Construction & Mining Co., a drill hole loaded with AN/FO explosive and primacord was partly redrilled. Due to severe water and mud conditions the primacord lead became detached from the yellow "loaded-hole" stake or the stake was removed. Subsequently surveyors established new hole-sites and marked them with yellow stakes also. Drilling then commenced in the mud-filled loaded hole. As a corrective measure all loaded holes will be indicated with a red marking stake.

On November 10 at Britannia mine of Anaconda American Brass Limited, a muck car was inadvertently bumped into the north side of No. 10 shaft where it broke the shaft lining and protruded very slightly into the shaft. Minor damage was done in the shaft when the skip struck the corner of the muck-car chassis.

On November 15 at the Cassiar open pit of Cassiar Asbestos Corporation Limited, extensive damage was done to a 40-R drill when it capsized due to the collapse of a section of the bench on which it had commenced drilling. The operator endeavoured to move the drill back to stable ground but was forced to jump before it rolled.

On November 21 in the Jersey pit of Bethlehem Copper Corporation Ltd., a small slide occurred in the pit wall. Rocks from this slide rolled over the bench berm and damaged two Haulpak trucks parked too close to the bench wall.

On December 4 at the Elkview coal-preparation plant of Kaiser Resources Ltd., a fire starting in the scrubber plant spread to the scrubber decks, the roof of the building, and onto the conveyor gantry which it destroyed along with the conveyor belt. The fire was caused by a failure of the 3,500-horsepower hot-air exhaust fan. Coincident with this failure was the failure of water supply to the scrubber sprays. On restarting the fan, a small smouldering fire, which had started within the fine dust in the scrubber decks, was fanned to an intense heat and caused a major fire.

On December 5 in the Jersey pit of Bethlehem Copper Corporation Ltd., the negligence of one driver caused a collision between two Haulpak 50-ton trucks. Both drivers escaped injury, but the cab of one vehicle was demolished.

On December 17 at the Cassiar powerhouse main switchboard of Cassiar Asbestos Corporation Limited, arcing in the townsite panel destroyed the air-break switch and current transformers. The investigation indicated the switchgear was overloaded.

On December 18 at the Ingerbelle operation of Similkameen Mining Company Limited, three employees of Bechtel (Canada) Limited were slightly injured when a 42-man bunkhouse trailer exploded. The incident occurred as a result of a bulldozer operator having unknowingly broken a propane fuel-line to a heater in the trailer. Gas accumulated and was ignited by one of the propane heaters in the bunkhouse.

On December 20 at the loading wharf of Island Copper mine of Utah Construction & Mining Co., a concentrate-conveyor boom dropped onto the deck of a ship due to an overload caused by the blocking of the conveyor discharge chute by concentrates.

PROSECUTIONS

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

On June 3, six charges relating to the supervision of the Duncan operations of Butler-Lafarge Ltd. were dismissed when the Crown failed to prove in Court that the Inspector of Mines was one and the same person who signed the information as informant.

On June 3, the manager of the Duncan operations of Butler-Lafarge Ltd. was charged under the *Mines Regulation Act,* section 23, General Rules 306 (*a*), (*b*), and (*c*) for failing to ensure adequate supervision and the safety protection of persons entering a hopper while materials were stored therein. The defendant was found guilty on all counts and was sentenced to one day in gaol for each offence, with the sentences to run concurrently. The Court ruled that the day spent by the defendant in the courtroom was acceptable compliance with the sentence.

On October 15 at Cassiar, prosecution proceedings were instituted by the laying of information against the manager of an inactive mine in the Liard Mining Division concerning the abandonment of a large quantity of explosives at the mine-site. A preliminary hearing was scheduled for December 8 but was postponed pending contacting the defendant.

BLASTING CERTIFICATE SUSPENSIONS

There were seven blasting certificate suspensions made for violations of the explosives and blasting procedure provisions as contained in the *Mines Regulation Act.*

On January 6 at the Britannia mine of Anaconda American Brass Limited, two miners were found drilling in the sockets of holes in which blasting had been done and a third man was found to have collared holes too close to similar bootleg sockets. The blasting certificates of the first two miners were suspended for 30 days each and that of the third was suspended for three days.

On March 9 at Granduc mine of Granduc Operating Company, the blasting certificates of two miners were suspended for two months each when, as a result of a minor blast, it was found that the two men had drilled in the same bootleg socket.

On May 20 at the McDonald Island open pit of Granisle Copper Limited, the blasting certificate of a miner was suspended for a year because he sounded the "all clear" whistle before all the charges initiated had detonated.

On May 27 at the Britannia mine of Anaconda American Brass Limited, the blasting certificate of a miner was suspended for a period of 30 days because he failed to clear an area adequately before blasting a concrete foundation in the mill area.

ELECTRICAL-MECHANICAL

An Electrical Inspector has directed the inspection of electrical equipment since 1946 in the mining industry and since 1954 in the oil industry. Since 1966, a Mechanical Inspector has assisted in the inspection of all mechanical equipment installed in any type of mine or quarry. J. Cartwright was appointed Electrical Inspector on July 1, 1971, to replace the Senior Inspector, Electrical-Mechanical, on his retirement.

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

ELECTRICAL

In 1971, electrical power was used by 40 companies in operations at 43 metal mines. Concentrators were completed at the Pride of Emory, Island Copper, and Bull River mines. Operations at Bralorne, Bluebell, and Greyhound mines were terminated and at Boss Mountain, Copperline, Churchill Copper, Golconda, Cinola, and True Fissure mines they were suspended indefinitely.

Fifty-eight gas and oil well-drilling rigs completed 198 wells in northeastern British Columbia.

The following table gives the kilovolt-ampere capacity of mining-company owned plants at metalliferous mines and the approximate amount of power generated in 1971.

Prime Mover	Generator Kva. Capacity	Kilowatt-hours Generated
Diesel engines	44,266	73,926,514
Hydro	11,410	71,475,640
Steam turbine	30,000	41,675,860
Total	85,676	187,078,014

The electric power purchased from public utilities and from the generating division of Cominco amounted to 850,291,386 kilowatt-hours. This amount, added to that produced by privately owned plants, totalled 1,037,369,400 kilowatt-hours.

A general breakdown of the connected load at operating mines during 1971 was as follows:

Equipment	Horsepower
Hoists and overhead trams	9,073
Scraper hoists	7,215
Electric shovels	17,075
Electric rock drills	4,510
Electric mucking-machines	
Mine fans	13,802
Mine pumps	7,153
Rectifiers and M.G. sets	7,684
Air compressors	28,229

Sink-float plant	1,816
Crushing plant	26,384
Grinding equipment	82,658
Concentrating equipment	35,817
Magnetic separators	665
Conveyors	15,007
Mill pumps	24,013
Fresh-water pumps	12,151
Reclaim-water pumps	6,100
Workshops	4,045
Miscellaneous	12,291
Total	315,688

Track haulage systems used 110 battery, 97 trolley, and 17 diesel locomotives.

In 1971 electric power was used at 55 structural material and industrial mineral mines and quarries. Power was produced by company-owned plants at 11 of these operations. The kva. capacity of company-owned plants and the amount of power purchased and generated was as follows:

	Kilowatt-hours
Diesel-driven generators, kva. capacity, 13,015—	
Generated	28,322,760
Purchased	21,135,974
Total	49,458,734

A general breakdown of the connected is as follows:

Equipment	Horsepower
Hoists and aerial trams	288
Scraper hoists	140
Fans	615
Pumps	296
Rectifiers and M.G. sets	7
Air compressors	258
Electric shovels	520
Electric rock drills	140
Drying plant	1,553
Crushing plant	9,470
Conveyors	6,034
Milling	8,581
Screens	1,467
Pumps	2,237
Workshops	25
Miscellaneous	3,371
Total	35,002

One battery locomotive was used for underground haulage at an industrial mineral operation.

At coal-mining properties, electric power was used in two open pits, two underground mines, and two coal-processing plants. A third processing plant at Fording Coal was under construction.

There were 12 incidents of damaged trailing cable which have not been recorded as dangerous occurrences. Seven of these incidents caused ground faults which tripped the circuit-breakers, four incidents resulted in torn jackets, and one resulted in a torn jacket and shielding.

Reported under dangerous occurrences is a flash-burn incident to a man working in an enclosure without locking out the electrical supply to the cubicle. His wrench slipped, contacted a live part, and caused an arc. If at all possible, electrical circuits must be de-energized and locked out while being worked on; if not, all live parts must be protected with insulating material.

The distribution of the connected load at collieries in 1971 was as follows:

Equipment	Horsepower	
Surface—		
Air compressors	2,700	
Electric shovels	18,280	
Electric drills	3,625	
Conveyors	3,903	
Hoists	315	
Haulage	----	
Coal breakers	145	
Coal washing	1,300	
Coal screening	3,250	
Pumping	14,415	
Coke production	1,575	
Ventilation	700	
Miscellaneous	7,686	
Total		57,894
Underground—		
Ventilation	276	
Pumping	195	
Air compressors	200	
Continuous miners	2,140	
Shuttle cars	750	
Loaders	270	
Conveyors	1,490	
Hoists	50	
Miscellaneous	31	
Total		5,402
Total surface and underground		63,296

The following table and graph show the power consumption in kilowatt-hours in mining operations since 1962.

Annual Consumption of Power (in Kilowatt-hours)

Year	Lode Mines	Industrial Minerals	Total	Coal	Grand Total
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
1970	1,010,755,603	47,274,704	1,058,030,307	96,430,894	1,154,461,201
1971	1,037,369,400	49,458,734	1,086,828,134	132,404,380	1,219,232,514

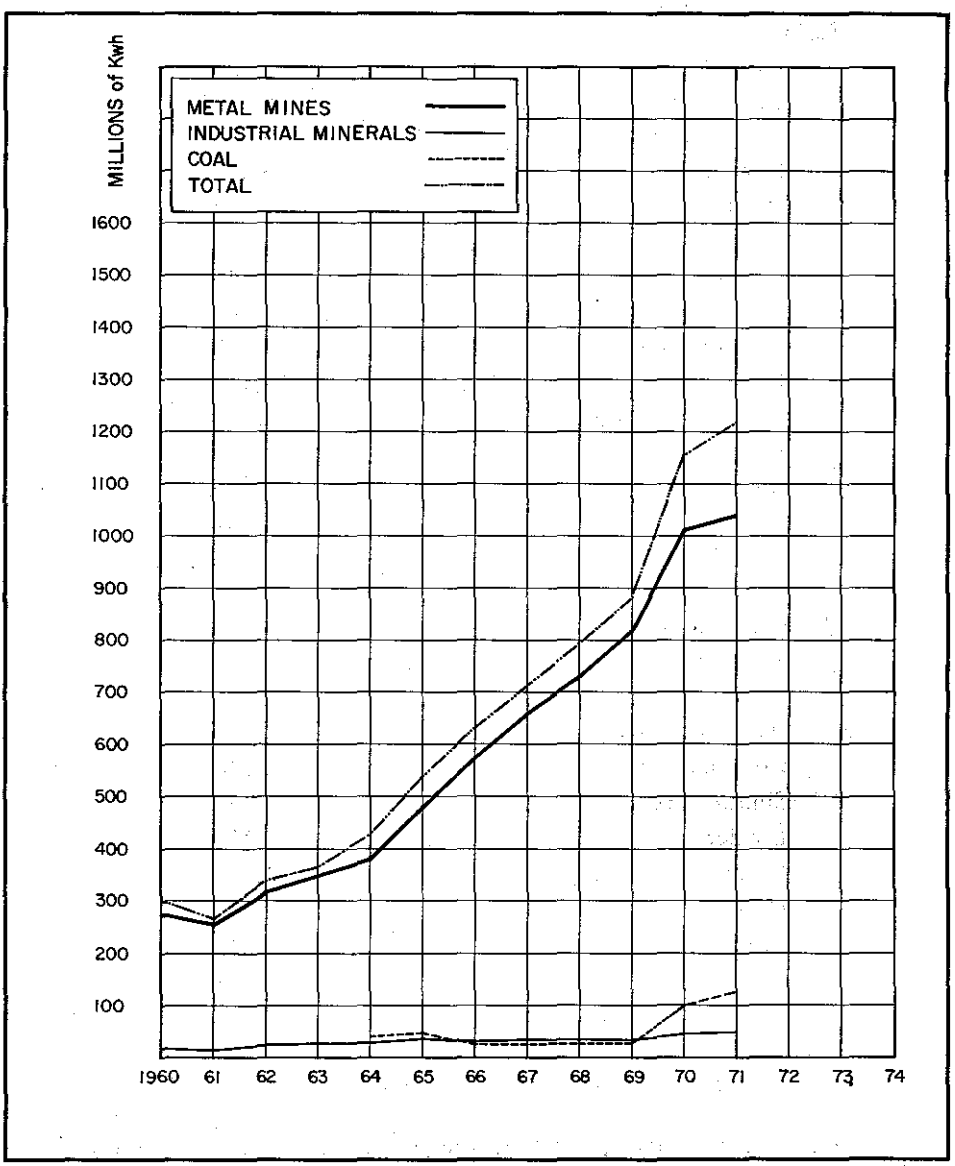


Figure 7. Annual consumption of power in kilowatt-hours, 1960–71.

MECHANICAL

Underground Diesel Equipment

During 1971, 93 new diesel permits were issued to cover the underground operation of diesel-powered equipment. At the end of the year, a total of 438 permits had been issued since the introduction of individual permits in 1968.

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

Diesel Equipment	Number of Permits Issued	Total Horsepower
Locomotives	3	100
Load-haul-dump vehicles	29	3,259
Front-end loaders	6	1,229
Ore carriers	10	276
Tractors	4	832
Drilling jumbos	11	559
Service and personnel vehicles	22	1,362
Graders	2	210
Mobile crane	1	75
Fork-lift truck	1	56
Scaling platform	1	109
Diamond drills	1	33
Compressors	2	528
Totals	93	8,628

Eight approvals were issued by the Department of Mines and Petroleum Resources during the year for diesel engines not previously approved for underground use by any other recognized authority.

These approvals are based on the chemical analyses of exhaust-gas samples collected while the engine is being operated under varying conditions of load and speed on a dynamometer.

Approval Number	Date Approved	Engine Identification	Brake Horsepower	Minimum Ventilation Requirement
				(Cfm)
B.C. Dept. of Mines 1971-1	Mar. 5, 1971	Ford 2713 (E)	90	13,500
B.C. Dept. of Mines 1971-2	Mar. 15, 1971	Mag 1057 DRT	11.5	2,500
B.C. Dept. of Mines 1971-3	Mar. 30, 1971	Perkins 4-203	56	9,000
B.C. Dept. of Mines 1971-4	June 7, 1971	Farymann 24-P	20	2,000
B.C. Dept. of Mines 1971-5	July 14, 1971	Ford 2711 (E)	64	8,000
B.C. Dept. of Mines 1971-6	Aug. 12, 1971	Ford 172 DD	38	4,400
B.C. Dept. of Mines 1971-7	Sept. 14, 1971	Caterpillar D 330 (C) N.A.	70	9,800
B.C. Dept. of Mines 1971-8	Nov. 18, 1971	Allis Chalmers D 262	60	6,700

Several manufacturers have shown an interest in the design or adaptation of diesel-powered rubber-tired loaders for use in underground coal mines, especially for driving headings and general clean-up purposes.

One of the conditions established by the Department of Mines and Petroleum Resources for such equipment is that the maximum temperature of any part of the external engine surface shall not exceed 300°F and, for air-cooled engines, this will require the installation of an automatic excess temperature shut-down switch. Two years ago, a loader powered by an air-cooled engine fitted with this type of temperature control was subjected to final testing on the surface of a coal mine, prior to its being used underground. It proved to be impractical to operate the machine under load without the safety controls shutting down the engine because

of excessive surface temperature. All equipment now being considered for underground coal-mining application is powered by water-cooled engines. It would appear that the present type of air-cooled diesel engine is no longer considered suitable for such use.

A loader, known as the "Minesmobile Diesel Loader," manufactured in Australia, was tested in Vancouver during December 1971 and found to be satisfactory in every way. This unit, which has been granted approval for use in gassy atmospheres by both the New South Wales Mines Department and by the South African Bureau of Standards, is powered by a water-cooled Perkins four-cylinder diesel engine and is fitted with a 2-cubic yard bucket. It is planned to subject the machine to further full-load testing on the surface of a coal mine early in 1972 before any final decision is reached regarding its use underground in a coal mine.

Several diesel-powered, hydrostatically driven vehicles were introduced underground during 1971. One of these, known as the "King Nipper Personnel Carrier," was designed and built in Vancouver by Canadian Mine Services Limited. It is powered by a Deutz six-cylinder diesel engine and can carry 18 persons at speeds up to 10 m.p.h. The main feature of this vehicle is the closed-circuit, hydrostatic-drive system comprising a Sunstrand, series 24, positive displacement hydraulic pump, driving four Staffa, B 45, hydraulic wheel motors. This arrangement provides stepless speed control of the vehicle and eliminates such conventional transmission features as clutch and gear box. The operation of this unit underground has apparently been very satisfactory.

The following is a summary of all diesel-powered equipment operated underground during 1971:

Equipment	Number of Units Operated	Total Horsepower
Locomotives	34	1,493
Load-haul-dump vehicles (Wagner scoop-trams, Eimco loaders, Joy transloaders, etc.)	81	8,930
Standard front-end loaders	8	1,423
Ore and waste carriers (Scootcretes, dump trucks, etc.)	36	3,164
Tractors	7	990
Drilling jumbos	31	1,792
Graders	10	883
Service and personnel vehicles	49	2,621
Air compressors	2	528
Diamond drills	3	153
Scaling equipment	1	109
Concrete placing equipment	2	60
Welder	1	49
Mobile crane	1	75
Forklift	1	56
Totals	267	22,326

The minimum total volume of mine ventilation required for all the above equipment was almost 2¾ million cubic feet per minute.

Hoisting

No new shaft hoists were put into service during the past year and the following hoists ceased operation for the reasons shown:

Bralorne Can-Fer Resources Limited (mining operations ceased)—
Crown Shaft—Canadian Ingersoll Rand, 300-horsepower 72 by 54-inch double-drum hoist.
Empire Shaft—Canadian Ingersoll Rand, 350-horsepower 72 by 60-inch double-drum hoist.
Queen Shaft—Canadian Ingersoll Rand, 300-horsepower 72 by 58-inch double-drum hoist.

Cominco Ltd., Bluebell Operation (mining operations ceased)—
No. 1 Shaft—Canadian Ingersoll Rand, 200-horsepower 60 by 48-inch double-drum hoist.
No. 2 Winze—Canadian Ingersoll Rand, 75-horsepower 36 by 24-inch double-drum hoist.

Cominco Ltd., Benson Lake Operation (shaft hoisting ceased)—
No. 2 Winze—Canadian Ingersoll Rand, 225-horsepower 72 by 48-inch double-drum hoist.

Granduc Operating Company (shaft hoisting ceased)—
No. 1 Shaft—Coeur D'Alenes, two 200-horsepower 62-inch diameter tandem double-drum hoists.

Brynnor Mines Limited, Boss Mountain Division (mining operations suspended)—
No. 1 Shaft—Bertram Nordberg, 250-horsepower 60 by 72-inch double-drum hoist.

During October 1971, final adjustments and tests were carried out on the 80-inch friction hoist of Britannia mine by representatives of the manufacturer, the Canadian General Electric Company. The maximum speed of the hoist was raised to the design figure of 2,200 feet per minute with a hoisting capacity of between 280 and 300 tons per hour. At the time of this inspection, although more than 1,000,000 tons had been hoisted since the hoist was first put into service in September 1970, there was virtually no wear on the plastic rope treads. The hoist is being operated semiautomatically by a skip-tender who watches the dumping action of the skips by means of a television monitor. The only accident of any consequence occurred during August 1971, when the two tail ropes swung excessively at the loop and knocked out a shaft divider which, in turn, caused the two ropes to become entangled and necessitated their replacement.

During 1971, 69 breaking-test reports were received for samples of rope tested to destruction in accordance with Rule 164 of the *Mines Regulation Act* and 125 nondestructive test reports were also received during the same period. It is interesting to note that for the first time the number of nondestructive test reports received exceeded the number of routine breaking-test reports.

During the year, 54 four-month rope-life extensions were granted, enabling hoisting ropes to remain in service after the expiration of the normal two-year statutory limit. Most hoisting equipment such as drive shafts, brake linkages, conveyance suspension components, etc., is now being checked at regular intervals by nondestructive techniques.

A new cage was installed at Giant Mascot Mines during May 1971, and a full-load free-fall drop test was carried out to test the effectiveness of the cage safety catches. The cage, carrying a load of 2,000 pounds, was allowed to reach a speed of more than 1,000 feet per minute in the 50-degree inclined shaft before the safety catches were released and engaged the guides. After engagement, the cage travelled a distance of 4.3 feet before being stopped. This test indicated the cage and its safety catches were correctly designed for that installation.

Trucks and Heavy Mobile Equipment

The quantity and size of heavy, off-highway equipment being used by the mining industry continued to increase during the past year. Altogether 546 dump trucks were operated and, of this total, 161, or almost 30 per cent, carried pay loads in excess of 60 tons. Front-end loaders also continued to play a larger role in mining operations and of the 248 machines operated in 1971, 23, or 9.5 per cent, were fitted with buckets having a capacity greater than 6 cubic yards.

In spite of repeated reassurances from manufacturers as to the reliability of dynamic braking systems on large, electric-wheel trucks and loaders, there were several serious accidents during the year directly attributable to an unexpected loss of dynamic braking. In each case, the reason for the failure of the dynamic brakes could be traced to a relatively simple component such as a faulty transistor or rheostat in a control circuit. In several instances, however, the consequence of these simple component failures was extremely serious as shown by the following examples.

A fully loaded 120-ton truck was descending a 10-per-cent grade when the driver lost dynamic braking because of a faulty transistor in a printed-circuit board forming part of the speed-sensing circuit of the controls. The speed of the vehicle increased rapidly up to a point where the driver lost all control and the unit then overturned. The service brakes on these trucks have been tested under full load conditions on a 10-per-cent grade and found to be quite capable of producing a safe stop in less than 200 feet from an initial speed of 20 m.p.h. It appears, therefore, that the accident resulted from an excessive delay between the time the driver first noticed that the dynamic brakes had failed and when he made a full application of the service brakes. The speed reached by the vehicle would increase rapidly on such a grade during this period up to a point where the service brakes would no longer be effective.

A similar accident at another mine resulted in a seriously injured driver. On this occasion, the actual cause of the dynamic braking failure was not completely established, but intermittent trouble had been reported for some time previously. Eyewitnesses state that the truck was travelling at an excessive speed down an 8-per-cent grade before it finally left the road and rolled over. The driver said that he applied the service brakes when he first noticed the dynamic braking had failed, but released them again when he noticed, through his rearview mirror, that smoke was coming from the back wheels. He apparently intended to reapply the brakes later when he reached a more favourable gradient.

Yet another similar accident occurred to a large 15-cubic-yard front-end loader which was being driven empty down a 10-per-cent grade at a speed of 15 m.p.h. when dynamic braking failed. The resistance grids in this case failed due to overheating. Once again the service brakes failed to stop the loader, presumably because of the excessive speed reached by the vehicle by the time the operator realized what had happened. The driver finally dropped the bucket and this stopped the machine, but only after it caused extensive damage to the bucket arms and operating linkage.

These accidents show that dynamic braking systems can and will fail from time to time, and all users of heavy off-highway equipment have therefore been directed to carry out full-load braking tests on their equipment on the maximum grade encountered during normal operations, using only the service brakes. All of the test results so far received have been satisfactory and show that the service brakes alone, without any dynamic braking, are quite capable of safely stopping and holding the vehicle at normal operating speeds.

As mentioned above, all open-pit mines where heavy, off-highway dump trucks are in use, special brake tests have been carried out at the request of the Department of Mines and Petroleum Resources. These tests are conducted by loading the truck to its maximum rated capacity and measuring the stopping distance on an 8 or 10-per-cent downgrade from initial speeds of 5, 10, 15, and 20 m.p.h. The service brakes alone are used with no assistance from dynamic braking or other retarding devices. Initial tests are required for all new vehicles and repeat tests are subsequently required at periodic intervals. It is only by obtaining such actual test information that the effectiveness of the service brakes can be accurately assessed and, by conducting similar tests at intervals throughout the life of the equipment, that any changes in brake efficiency can be detected. When the measured stopping distances are plotted against the speed of the truck, a curve can be drawn and used to predict stopping distances from other speeds greater than those actually used during the tests. In all cases these curves will show that the stopping distance increases alarmingly as speeds increase beyond the normal operating limits, and it is very doubtful that any existing fully loaded 100-, 120-, or 200-ton truck operating on an 8 or 10-per-cent grade could be safely stopped by the service brakes from an initial speed in excess of 35 m.p.h.

As a result of these tests and because of the accidents that have occurred, it is realized that heavy trucks and loaders will continue to get out of control from time to time, hence consideration must be given to lessening the consequences of these runaways. All operators of open pits where vehicles are in use have been directed to provide run-off protection at strategic locations on downgrade roads. The most effective protection, where topography permits, is the steeply inclined run-off lane or ramp, with an easy well-marked access. These have now been constructed at some mines and have already proved their worth. At one mine it is reported that a fully loaded 100-ton truck got out of control on an 8-per-cent grade and the driver entered an emergency run-off lane at an estimated speed of 50 m.p.h. The truck stopped safely and the driver was uninjured.

Where an emergency run-off lane cannot be provided, it has been recommended that emergency impact barriers be considered. One suggestion is to have large wedge-shaped masses of sand or fine gravel arranged at suitable locations so that runaway vehicles can "plough" into them in an emergency. Plastic containers holding calculated quantities of sand and arranged in definite patterns have been successfully used on highways for emergency crash barriers and have safely arrested automobiles travelling at speeds of over 60 m.p.h. The company that developed this, "International Barrier System," is currently trying to design a barrier to stop a large open-pit truck safely in an emergency. This may be feasible by stacking one or more rows of the containers vertically to provide a sufficient mass of sand to decelerate the vehicle.

Emergency steering has now been provided for most of the larger trucks and loaders in accordance with Rule 266 (*b*) of the *Mines Regulation Act*. The most commonly used method is to install a battery-driven auxiliary hydraulic pump, designed to provide five to ten minutes of emergency steering, to be started by the driver in the event of a failure of the vehicle engine. Better methods are slowly emerging, however, and at least two manufacturers have either used or are planning to use wheel-driven auxiliary hydraulic pumps. This means that whenever the vehicle is in motion there will be emergency steering. Another device being used successfully by some manufacturers is the hydraulic accumulator. These accumulators allow sufficient emergency steering for a vehicle to be brought to a safe stop without requiring activation by the driver or operator of the equipment.

Mobile Cranes

During 1971 there were two fatal and several serious accidents involving boom failures of mobile construction-type cranes.

The two fatalities occurred under very similar circumstances. In both cases a long conveyor gallery was being lifted into position by two or more cranes during construction phases of open-pit coal-mining operations. In one of the accidents, a 220-foot boom collapsed due to buckling and in the other, a crane fitted with a 140-foot boom went into tip, forcing the operator to release the load. From an investigation of each of these instances it appears almost certain that one of the cranes involved was being operated beyond the manufacturer's rated safe load for the boom radius in use. Several other crane accidents involving either the collapse of a boom or the complete overturning of the crane were caused by careless handling or inexperience on the part of the operator. For example, a telescopic hydraulic crane was being used to raise two iron-workers in a cage when the operator extended the boom without simultaneously letting out the rope. The result was a broken rope and two injured iron-workers. Another crane operator apparently failed to take into account the weight of a 15-foot jib when determining the maximum safe load for a given radius of operation. This resulted in the crane overturning and a workman being injured by the falling load.

It is essential that all persons connected with crane operation realize the many factors involved in accident prevention. These include

(*a*) adequate operator training and experience;
(*b*) competent supervision and planning for heavy lifts;
(*c*) equipment in first-class operating condition;
(*d*) equipment properly set up and levelled, with fully extended well-placed outriggers;
(*e*) carefully checked and correctly reeved rigging;
(*f*) clearly marked weight on all articles being lifted; and
(*g*) correctly identified load charts for the boom and crane in use.

Another aspect of crane usage discussed during 1971 was the question of repairs to damaged boom sections. Many of the newer mobile cranes have long slender booms constructed of quenched and tempered, high-strength, tubular structural steel, having a tensile strength of 100,000 psi. These boom members are extremely vulnerable to damage during transportation and storage. If a chord member should become bent and go undetected, the boom would be considerably weakened and could fail under certain extreme operating conditions.

Repairs to damaged boom should normally only be made under the direct supervision of the crane manufacturer or his authorized agent. If this is not possible, however, the services of a recognized independent engineer, specializing in this type of repair, should be obtained. Needless to say, great care should always be exercised in handling boom sections, and no unauthorized welding or other physical alteration should be attempted on a high-strength boom section without the express permission from the manufacturer.

In general, 1971 showed that the construction phase of a large mining operation is fraught with hazards not normally encountered in the field of mining, and the number of accidents occurring can only be reduced by better communication and understanding between all contractors and mining company officials.

The following is a summary of the heavy open-pit and quarry equipment in use during 1971:

Dump Trucks (Mostly Off-highway)

Size of Vehicle (Tons)	Number in Use
0–20	196
21–40	157
41–60	32
61–80	11
81–100	76
120	56
150	1
200	17
Total	546

Pit Shovels

Size of Shovel (Cubic Yards)	Number in Use
0–2	23
2¼–4	23
4¼–6	20
6¼–8	3
10–11	8
13–14	4
15–16	11
25	4
54–64 (draglines)	2
Total	98

Front-end Loaders

Size of Bucket (Cubic Yards)	Number in Use
0–2	89
2¼–4	90
4¼–6	49
8¼–10	9
10¼–12	3
15	7
20–25	4
Total	251

ENVIRONMENTAL CONTROL

A summary of the report submitted by S. Elias, Senior Inspector, Environmental Control, follows:

In August, D. I. R. Henderson joined the staff as Inspector, Environmental Control, to assist the Senior Inspector and a Technician, Noise Surveys, perform surveys of the noise, dust, and ventilation conditions in underground and open-pit lode and coal mines, rock quarries, sand and gravel pits, and an asbestos open-pit mine.

Dust and Ventilation

The threshold-limit values (TLV's) or maximum allowable dust concentrations are periodically adjusted as more technical and medical evidence becomes available. The standards in use in British Columbia are as follows:

For silica dust, a maximum allowable concentration of 300 particles of dust per cubic centimetre of air, sampled with a Gathercole konimeter, the sample being processed and counted by a standard technique.

For asbestos dust, the following air sampling method was used: An M.S.A. Monitaire portable pump, designed and calibrated to give a sampling rate of 0.1 cfm (plus or minus 3 per cent) at 12 inches water gauge when connected to a midget impinger, was used to take 10-minute samples in desired areas. The sample was collected in a solution of one part isopropyl alcohol to three parts of distilled water. A standard counting cell with an accurate depth of 1 millimetre and a settling period of 30 minutes was used to make the count. Two cells of each sample were counted and averaged. Counting was done with a microscope having a substage Abbe NA 1.25 condenser with an iris diaphragm, using 100-diameter magnification. Illumination was by means of light field with a 10-watt substage lamp using a daylight filter. Five fields in each cell were counted and averaged, and the dust concentration calculated accordingly. With each set of samples a blank was made of the collecting liquid and the blank count recorded and used in the final calculation. In all samples, counts were made of both asbestos-dust fibres and particles. A fibre is a particle having a length of not less than three times its diameter and the diameter must be less than 5 microns. The percentage of fibres was reported for each location.

The present standard used to assess the asbestos-dust conditions is a maximum allowable concentration of 5 million particles per cubic foot. In recent years new standards have been recommended by various organizations to assess the airborne asbestos-dust risk to health.

For coal-dust sampling, British Columbia has adopted the gravimetric sampling method now in use in Great Britain and the United States. Monitaire-approved personal respirable-dust samplers are used to evaluate the dust hazard. These samplers are approved for use in an explosive atmosphere of methane gas and consist of a model "G" pump powered by rechargeable nickel-cadmium battery operated at a flow rate of 2 litres of air per minute. The sampling head consists of a 10-millimetre nylon cyclone and filter assembly. The concentration of respirable dust is reported in milligrams per cubic metre of air. To convert the concentration obtained by the Monitaire personal sampler unit to an equivalent British Mining Research Establishment (MRE) criterion, the result is multiplied by a factor of 1.6. The samplers are worn for a full shift by various workmen to determine the amount of dust exposure to which they were subjected and, to comply with the newly adopted standards, must not exceed 3 milligrams of dust per cubic metre of air.

In 1971, 67 surveys of dust and ventilation conditions were made at 66 operations. These were completed at all types of mining operations.

Fifty per cent of the surveys at underground drilling-sites gave averages of less than 300 particles of dust per cubic centimetre of air. Horizontal heading ventilation has improved, but the ventilation of raise headings required to be improved. The lack of ventilation to the face of raises is the major item maintaining the low percentage of drilling operations with dust concentrations below 300 particles per cubic centimetre. Small-diameter plastic-type ducting could be used to establish ventilation at these locations and thus reduce the concentration of dust.

At "all other underground locations," 79 per cent of the surveys made showed dust concentrations less than 300 particles per cubic centimetre. Most of the men employed underground work in areas listed in this category. In some mines computer assistance is now being used to control intricate ventilation circuits.

Underground crushing plants have shown some improvement inasmuch as 65 per cent of the surveys completed indicated less than 300 particles per cubic centimetre. New plant design could eliminate many of the inadequacies in dust control existing in the older plants. Bag-type filters and water air-scrubbers are being used to keep stack emissions to a minimum at many plants.

In assay grinding-rooms, 75 per cent of the surveys showed under 300 particles of dust per cubic centimetre of air. Several pertinent considerations should be observed when designing dust control systems for assay grinding-rooms. These are:

(1) Equipment hoods should be sufficiently large to perform their function, but sufficiently small to avoid unnecessary burden on the exhaust fan:
(2) To be effective, the ventilating velocity at the hood face must be between 250 to 500 feet per minute, depending on the method being used to clean the equipment; and
(3) All sample preparation operations must be performed under the hood provided.

At open-pit drilling operations, 85 per cent of the surveys showed less than 300 particles of dust per cubic centimetre of air. With proper maintenance and utilization of the dust-control system, 100 per cent below 300 particles per cubic centimetre could be readily achieved. Operator abuse and (or) non use of dust control are the main reasons for unsatisfactory conditions. At all other operations in open-pit mining, 100 per cent of the surveys completed showed below 300 particles per cubic centimetre of air.

Crushing plants at open-pit mining operations are subject to handling drier ore than usual at underground operations, hence open-pit plant design to control dust assumes greater importance. Most plants are equipped with dust collectors of the bag type to prevent excessive stack emissions. Fifty-three per cent of the crushing plants had averages less than 300 particles of dust per cubic centimetre of air.

At structural-material and industrial-mineral operations the results of sampling were as follows: At drilling operations, 71 per cent of the surveys showed an average particle count per cubic centimetre of air less than 300; at crushing operations, 46 per cent showed below 300; and at bagging and warehouse locations, 50 per cent showed below 300.

Portable crushing plants used at many of the structural-material and industrial-mineral operations are not usually designed with dust-control facilities incorporated and each unit must be custom equipped. Management resist such dust-control devices because of high installation and operating costs.

At asbestos mining and milling operations, 60 per cent of the samples taken had average counts below 5 million particles per cubic foot of air. A bag-type filter to control stack emissions was being installed at the drying plant.

At coal mines, 73 per cent of the locations sampled had coal-dust concentrations below the new maximum of 3 milligrams of dust per cubic metre. Rock work in open pits was sampled by standard konimeter methods and all areas sampled were below the maximum of 300 particles of dust per cubic centimetre of air.

Certificates of fitness were checked at the mines. In the lode-mining industry, 97 per cent of dust-exposure category employees had the required certificates of fit-

ness, in the coal-mining industry 84 per cent of like employees had certificates of fitness, and in the asbestos-mining industry, 100 per cent of employees in the same category had certificates of fitness. During the year, certificates of fitness issued in coal and metal mines were made interchangeable between industries.

The accompanying graphs show the median of all dust-count averages in various operations in the lode mines obtained each year since 1937.

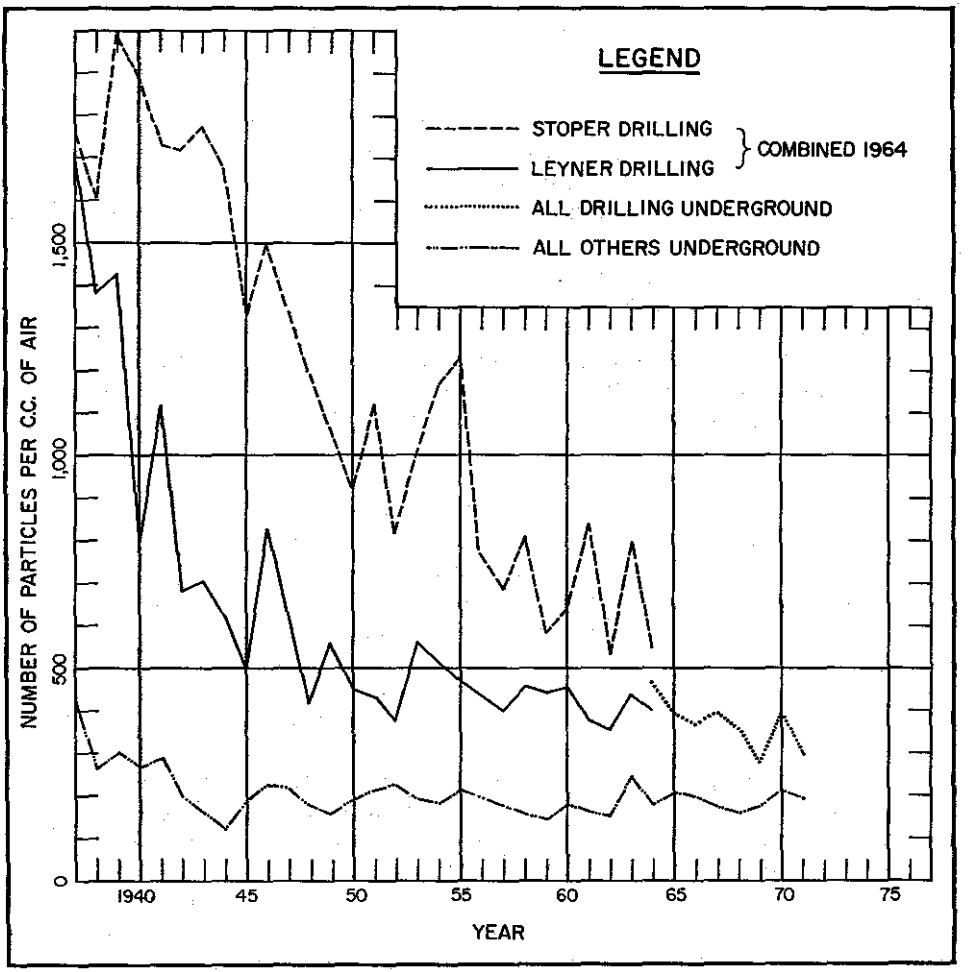


Figure 8. Average underground dust counts.

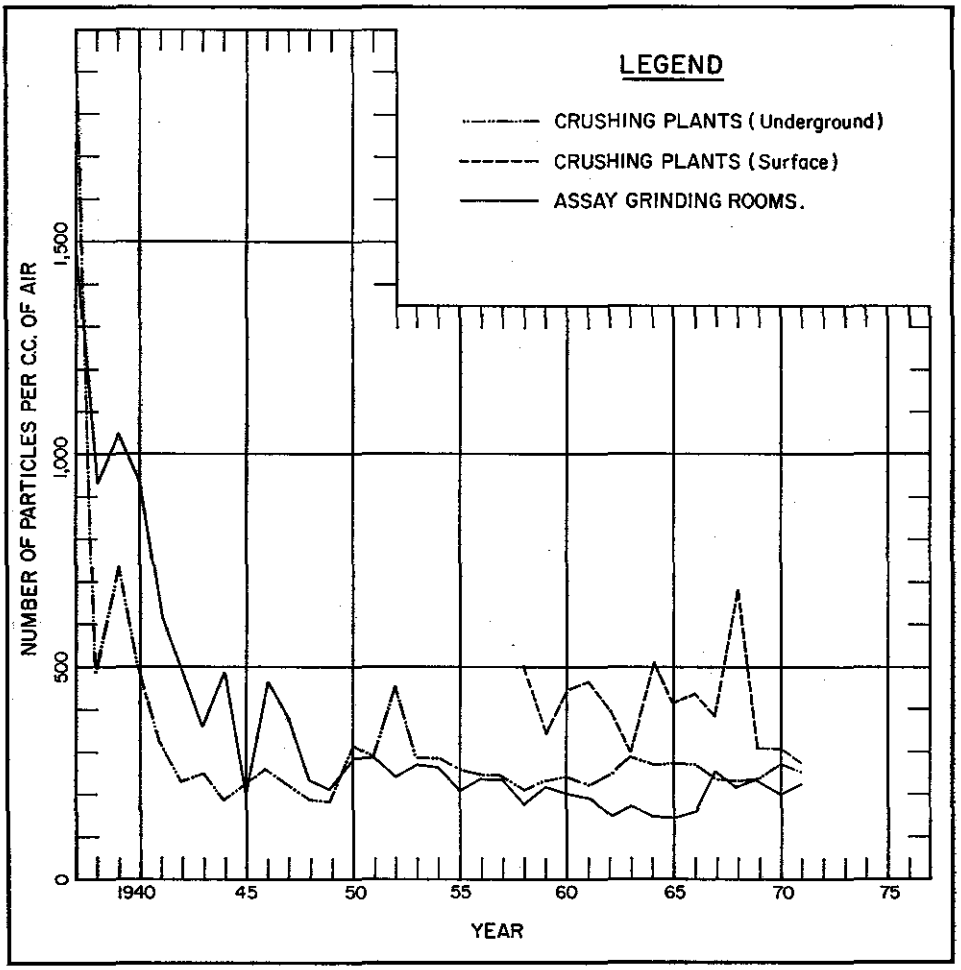


Figure 9. Average crushing and grinding dust counts.

Noise Control

British Columbia has adopted the noise-control standards set by the Canada Department of Labour Safety Code.

Noise surveys were made at 45 mining operations during the year. Eighty-five per cent of the workmen were wearing ear protection and 99 per cent of the drills in use underground at metal-mining operations were muffled. At structural material and industrial mineral operations 33 per cent of the operators wore ear protection.

SHIFTBOSS CERTIFICATES

Section 21 of the *Mines Regulation Act* requires that every person employed underground or in open-pit workings must be under the daily supervision of an official who is the holder of a shiftboss certificate issued under the Act. In addition, section 23 of the *Coal Mines Regulation Act* requires that every person employed

Open Pit Shiftboss Certificates, 1971

Cert. No.	Name	Date	Cert. No.	Name	Date
OP-49	Robert Frederick Cuthbertson	4/1/71	OP-79	William David Webster	6/5/71
OP-50	Alexander Fielkowich	4/1/71	OP-80	William John Beck	11/5/71
OP-51	Joseph Graham Murray	4/1/71	OP-81	Bill Papove	11/5/71
OP-52	Royce James Stevenson	4/1/71	OP-82	Donald G. Miller	14/5/71
OP-53	Peter Marlatt Stiles	4/1/71	OP-83	William A. Zelisney	14/5/71
OP-54	Thomas Craig	2/2/71	OP-84	John Campbell Ross	20/5/71
OP-55	Gerald Alfred Allcott	8/2/71	OP-85	Thomas Stefanac	3/6/71
OP-56	Harry Bapty	10/2/71	OP-86	Albrecht John Kutsche	28/6/71
OP-57	Willoughby Agar Trythall	1/3/71	OP-87	John Edward Lane	30/6/71
OP-58	Grant McFarlane	5/3/71	OP-88	John Phillip Oleshko	30/6/71
OP-59	Norman George Aasen	9/3/71	OP-89	William Roy Woodey	28/7/71
OP-60	Lawrence Cheveldieff	9/3/71	OP-90	William Hubert Hingley	28/7/71
OP-61	Lloyd Evan Iverson	9/3/71	OP-91	Norman Varabioff	28/7/71
OP-62	William Gwyn Jones	9/3/71	OP-92	Dwight Ovila St. Germain	30/7/71
OP-63	Noel James Kirby	9/3/71	OP-93	George Melville Leask	6/8/71
OP-64	Kay Osachoff	9/3/71	OP-94	Richard L. Bouck	10/8/71
OP-65	Paul Papove	9/3/71	OP-95	Glen Gordon Walters	10/8/71
OP-66	Edwin Alfred Shannon	9/3/71	OP-96	Leo F. Piwek	17/8/71
OP-67	Nick Samuel Strukoff	9/3/71	OP-97	Earl Arnold Hargrove	15/9/71
OP-68	Roger Philip Taylor	9/3/71	OP-98	Edward Eftodie	15/9/71
OP-69	Roger William Turner	9/3/71	OP-99	James Adrien Bertrand	20/9/71
OP-70	James A. Wallace	9/3/71	OP-100	William David Scribner	20/9/71
OP-71	Arthur Wilkinson	9/3/71	OP-101	Andrew Arthur Corden	25/11/71
OP-72	Gustave Manson	15/3/71	OP-102	Erik A. James	29/11/71
OP-73	Arnold George Newton	15/3/71	OP-103	John Fredrick Barker	8/12/71
OP-74	Alan J. Merritt	29/3/71	OP-104	Nicholas Atamanick	15/12/71
OP-75	John Albert Littler	15/4/71	OP-105	Leonard Skakun	17/12/71
OP-76	Glen Vernon Downing	22/4/71	OP-106	Steven Arthur Wulf	20/12/71
OP-77	Grant Waldorf	22/4/71	OP-107	William Bryan Johnson	23/12/71
OP-78	Harold Melvin Diggon	30/4/71	OP-108	Richard Edward Wilson	23/12/71

Underground Shiftboss Certificates, 1971

Cert. No.	Name	Date	Cert. No.	Name	Date
613	Lawrence George Seeland	21/1/71	641	Denis Guy Bouillet	28/4/71
614	William Windsor Jarvis	8/2/71	642	David Leo Wolf	28/4/71
615	Joseph Wilfred Kennedy	8/2/71	643	David Morley	28/4/71
616	Rudolph Karl Tschach	8/2/71	644	Harold Melvin Diggon	30/4/71
617	Leo Joseph Bourassa	22/2/71	645	Alfred Lucyk	3/5/71
618	James Graydon Powers	22/2/71	646	Hans H. Baule	19/5/71
619	Alan Whitaker	23/2/71	647	Thomas Stefanac	20/5/71
620	Paul Kindrat	25/2/71	648	Etienne Antoine Ciana	20/5/71
621	Gerhard Krausnig	25/2/71	649	Fritz Knoedler	20/5/71
622	Cecil Edwin Donovan	26/2/71	650	Paul Vigneault	20/5/71
623	Aldin Gordon Ratzloff	26/2/71	651	Robert Leslie Bjarnason	1/6/71
624	W. J. Francoeur	5/3/71	652	William Barry Abbott	15/6/71
625	Emmanuel Meilleur	5/3/71	653	Walter Greavison	15/6/71
626	Christopher Ronald Coleman	8/3/71	654	Bradley Glenn Thiele	15/6/71
627	Frederick Gordon Gibbons	8/3/71	655	William Edwin Tambling	26/7/71
628	Peter Rhys Jones	8/3/71	656	John Davidson Allison Gray	6/8/71
629	Ralph Stewart Jones	8/3/71	657	Louis Emile Pommier	6/8/71
630	John Douglas Peck	8/3/71	658	John Bootle	26/8/71
631	Paul Fredrick Saxton	12/3/71	659	Bert Varkonyi	27/8/71
632	Michael Kalman Csaba	12/3/71	660	Donald A. Davidson	29/9/71
633	James Joseph Doyle	12/3/71	661	Robert J. Ramsey	30/9/71
634	Brian Edward Warner	15/3/71	662	Thomas Quinton O'Connor	18/10/71
635	Leonard O'Neill	22/3/71	663	Raymond Leslie Frederick	21/10/71
636	Lorne Harman Primrose	23/3/71	664	Eugene N. Larabie	21/10/71
637	Donald Alexander Riva	14/4/71	665	Albert A. Parrent	21/10/71
638	Joseph Frederick Flynn	20/4/71	666	Michael Alexander Bryson	30/12/71
639	Thomas Patrick Miller	20/4/71	667	Redmond Webster Heine	30/12/71
640	George W. Claxton	22/4/71			

in open-pit workings at a coal mine shall be under the daily supervision of a shiftboss or other official who is the holder of an open-pit shiftboss certificate issued under the Act.

An applicant for a shiftboss certificate must hold a mine-rescue certificate (surface or underground as requisite), a currently valid first aid certificate, and is required to pass an examination on the regulations and rules as contained in the respective Acts. Three different certificates are issued; one for underground metal-mining operations; one that is valid in both coal- and metal-mining open-pit operations; and a third for sand-, gravel-, and clay-removal operations. A fee of $5 is charged for the examination. There were 233 applications for examinations filed during 1971.

The Board of Examiners may grant provisional certificates under such conditions as it considers advisable. During 1971, 99 provisional certificates were issued.

Examinations were held at various places throughout the Province, and, of the 206 examinations written, 156 candidates passed. There were 115 shiftboss certificates issued, 55 to underground shiftbosses and 60 to those employed in open-pit mining. The recipients are listed in the preceding tables.

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 for advising the Minister in accordance with section 26 (3) of the Act. In 1971 two candidates presented themselves for examination, one for a first-class certificate who was successful in passing the examination, and one for a third-class certificate who was unsuccessful. Eight other candidates applied for interchange certificates, all of whom were granted certificates by the Minister, on the Board's recommendation. These included five applicants for first-class certificates, two for third-class certificates, and one for a mine surveyor's certificate. Five of the applicants for interchange certificates held equivalent qualifications from the United Kingdom, two from Alberta, and one from Nova Scotia. All candidates were interviewed by the Board, either in Victoria or at Fernie.

The following certificates were issued in 1971:

First-class Certificates of Competency

Certificate Number	Name	Date
A229	H. S. Haslam	January 25.
A230	D. M. Parkes	March 9.
A231	J. E. Powell	July 13.
A232	K. S. Khunkhun	July 13.
A233	J. E. Anderson	October 19.
A234	D. I. R. Henderson	November 29.

Third-class Certificates of Competency

C1047	Alan Menzies	August 18.
C1048	Kenneth Charlton	October 5.

Surveyor's Certificate

113	Wilfred Lynk	February 10.

MINE RESCUE, SAFETY, AND FIRST AID

Mine-rescue stations fully supplied with mine-rescue equipment are maintained at Fernie, Kamloops, Nanaimo, and Nelson. A fifth station was established at Prince George and is being equipped to the same standard as the others. Mine-rescue co-ordinators are at each station and are fully qualified instructors in first aid and mine-rescue training. With the exception of Fernie, each station is established as a mobile unit to transport equipment anywhere in that area and to be available for either rescue or training purposes. Each station is equipped with sufficient self-contained, oxygen-supplying breathing equipment to maintain at least two mine-rescue teams of six men each should an emergency arise in the nearby mines. In addition to this equipment some is on loan by the Department to supplement that owned by various mining companies. The co-ordinators periodically check all mine-rescue equipment to ensure its serviceability.

First aid classes were held by the co-ordinators at various mines and centres throughout the Province. From the classes, 222 candidates received St. John Ambulance certificates and 25 received Industrial First Aid certificates. In addition, 420 men were trained in mine-rescue work. Of this total, 118 men received underground mine-rescue certificates, 230 received surface mine-rescue certificates, and 72 received gravel-pit rescue certificates. Lists of the recipients follow:

UNDERGROUND MINE-RESCUE CERTIFICATES, 1971

Cert. No.	Name	Where Trained
4898	Wilbert R. Cote	Vancouver.
4899	Larry G. Seeland	Vancouver.
4900	Ian R. Pringle	Vancouver.
4901	Arthur Peters	Fernie.
4902	Normand Paradis	Remac.
4903	Fernand Labelle	Remac.
4904	Walter W. Bagnall	Britannia Beach.
4905	William MacPherson	Invermere.
4906	Willy H. Peters	Invermere.
4907	Norman E. Boyce	Britannia Beach.
4908	Ronald W. Evans	Britannia Beach.
4909	Milton Holowka	Britannia Beach.
4910	Roy A. Houston	Britannia Beach.
4911	Howard J. Last	Britannia Beach.
4912	Timothy P. Riordon	Britannia Beach.
4913	Harvey A. Craig	Hendrix Lake.
4914	Leslie J. Halsall (supervision only)	Hendrix Lake.
4915	David J. Fair	Hendrix Lake.
4916	Edward G. McArdle	Hendrix Lake.
4917	Ronald C. Benson	Hendrix Lake.
4918	T. Desmond Wilson	Hendrix Lake.
4919	Billy Chernoff	Hendrix Lake.
4920	Ilmo I. Ika-Heimonen	Hendrix Lake.
4921	Michael Toews	Hendrix Lake.
4922	Theodore P. Mandryk	Hendrix Lake.
4923	Donald L. Tremblay	Hendrix Lake.
4924	Kenneth L. Saje	Hendrix Lake.
4925	Leonard J. Anderson	Vancouver.
4926	Paul G. Brown	Vancouver.
4927	Garry W. Davies	Vancouver.
4928	Russell L. Davis	Vancouver.
4929	George Delisle	Vancouver.
4930	Maurice H. Duperreault	Vancouver.
4931	Brendan Gordon	Vancouver.
4932	Robert A. Hamaguchi	Vancouver.
4933	Charles W. Larsen	Vancouver.
4934	Andre G. Miller	Vancouver.
4935	Samuel W. Moseanko	Vancouver.
4936	William L. Ogden	Vancouver.
4937	Thomas E. Ostrow	Vancouver.
4938	Joseph E. Price	Vancouver.
4939	Lawrie C. Reinertson	Vancouver.

UNDERGROUND MINE-RESCUE CERTIFICATES, 1971—*Continued*

Cert. No.	Name	Where Trained
4940	Claus Richter	Vancouver.
4941	Douglas Scheving	Vancouver.
4942	William S. Strutt	Vancouver.
4943	Michael H. Theodore	Vancouver.
4944	Jack C. S. Moore (supervision only)	Vancouver.
4945	Leonard O'Neill	Vancouver.
4946	Alfred Lucyk	Craigmont mine.
4947	John T. Susak	Craigmont mine.
4948	Larry W. McClelland	Craigmont mine.
4949	Bradley G. Thiele	Craigmont mine.
4950	Jack Brennan	Craigmont mine.
4951	Hans Geertsema	Craigmont mine.
4952	Jack F. Fitzer	Craigmont mine.
4953	Terry L. Day	Craigmont mine.
4954	Hew G. Richards	Sullivan mine.
4955	John N. S. Sibson	Sullivan mine.
4956	Roger M. Williams	Sullivan mine.
4957	Walter F. Bottcher	Sullivan mine.
4958	John D. A. Gray	Sullivan mine.
4959	Lorne Fulton	Sullivan mine.
4960	Dan Edwards	Sullivan mine.
4961	Larry D. Donaldson	Sullivan mine.
4962	David Morley	Sullivan mine.
4963	Ian R. B. Patterson	Sullivan mine.
4964	Douglas W. Flynn	Sullivan mine.
4965	John E. Hunt	Sullivan mine.
4966	John R. Lucke	Craigmont mine.
4967	Thomas Stefanac	Nelson.
4968	Colin D. Welling	Granduc mine.
4969	Bert Varkonyi	Granduc mine.
4970	Paul R. Vigneault	Granduc mine.
4971	Lawrence G. Turner	Granduc mine.
4972	Gary J. Stevenson	Granduc mine.
4973	Albert E. Sellar	Granduc mine.
4974	Tellfrank Segler	Granduc mine.
4975	Luis A. Quezada	Granduc mine.
4976	Ross Pallett	Granduc mine.
4977	John O'Brien	Granduc mine.
4978	Henning A. Nielsen	Granduc mine.
4979	Leonel J. Morin	Granduc mine.
4980	Donald E. Moore	Granduc mine.
4981	William H. LaCroix	Granduc mine.
4982	Redmond W. Heine	Granduc mine.
4983	Brian M. Fisher	Granduc mine.
4984	Johann P. Essers	Granduc mine.
4985	James E. Dawson	Granduc mine.
4986	Etienne A. Ciana	Granduc mine.
4987	Dennis R. Brown	Granduc mine.
4988	Neal F. Bassett	Granduc mine.
4989	Gordon W. Brown	Granduc mine.
4990	John F. Findlay	Fernie.
4991	Wilfred Lynk	Fernie.
4992	Edward A. Taje	Fernie.
4993	Ronald E. Sieling	Fernie.
4994	John R. Willox	Invermere.
4995	Avard W. Nelson	Invermere.
4996	Nicholas Atamanick	Granduc mine.
4997	William M. Nelson	Benson Lake.
4998	Patrick D. Moore	Benson Lake.
4999	Lionel Comeau	Benson Lake.
5000	Stan Locniskar	Benson Lake.
5001	Robert G. Riddle	Benson Lake.
5002	Heinz D. Scholz	Benson Lake.
5003	Frederic L. Westgate	Benson Lake.
5004	Brian J. Murray	Benson Lake.
5005	James L. Moldenhauer	Benson Lake.
5006	Peter J. Sabo	Benson Lake.
5007	Ronald W. Linkert	Fernie.
5008	Chester S. Taje	Fernie.
5009	Keith Bracewell	Fernie.
5010	Harold R. Legge	Fernie.
5011	John Kelly	Fernie.
5012	Bela Poncsak	Fernie.
5013	Florent J. A. Laforest	Britannia Beach.
5014	Bruce C. Knack	Britannia Beach.
5015	Jean Pierre Bacon	Britannia Beach.

SURFACE MINE-RESCUE CERTIFICATES, 1971

Cert. No.	Name	Where Trained
O-212	James A. Hirsche	Fernie.
O-213	Don I. Slavens	Fernie.
O-214	Jackie Peters	Fernie.
O-215	Bruce W. Rusnell	Fernie.
O-216	Arthur Peters	Fernie.
O-217	Glen G. Ecklund	Ashcroft.
O-218	William N. Baddeley	Fernie.
O-219	Laurence B. Smith	Fernie.
O-220	George H. Walker	Fernie.
O-221	Robert V. Uphill	Fernie.
O-222	John Albert Littler	Fernie.
O-223	Rupert McKenzie	Cassiar.
O-224	Albrecht J. Kutsche	Cassiar.
O-225	George B. Bremert	Cassiar.
O-226	William L. Dobie	Cassiar.
O-227	Aldo Borsato	Cassiar.
O-228	Richard Weigandt	Cassiar.
O-229	Dezso Csete	Cassiar.
O-230	Dale Carin	Cassiar.
O-231	Paul M. Ripco	Cassiar.
O-232	Charles J. S. Gander	Cassiar.
O-233	Robert J. Bisson	Cassiar.
O-234	Reg. W. Ash	Cassiar.
O-235	William B. Akey	Cassiar.
O-236	Michael F. Lane	Cassiar.
O-237	Charan Salh	Cassiar.
O-238	Wayne L. Aadland	Cassiar.
O-239	Alan Ponting	Cassiar.
O-240	Thomas J. Lobbes	Cassiar.
O-241	Dewis C. Spicer	Cassiar.
O-242	Roger M. Borsato	Cassiar.
O-243	Fred H. Venzi	Cassiar.
O-244	Joseph Mezes	Cassiar.
O-245	Steve Tarasuk	Cassiar.
O-246	Henry K. Hawkins	Cassiar.
O-247	Danny Demitri	Cassiar.
O-248	William Gantert	Cassiar.
O-249	Glen E. L. Smith	Cassiar.
O-250	Ross L. Rowland	Cassiar.
O-251	John F. Barker	Cassiar.
O-252	Stanley Oven	Cassiar.
O-253	Victor K. Maxson	Cassiar.
O-254	Livio Fregonese	Cassiar.
O-255	Max Ruckstuhl	Cassiar.
O-256	Leonard J. Werner	Cassiar.
O-257	Cesar L. Isidoro	Cassiar.
O-258	Gilles Joseph Prince	Cassiar.
O-259	Robert W. Zeindler	Fernie.
O-260	Francis H. Webster	Fernie.
O-261	James A. Ferguson	Fernie.
O-262	William Krats	Fernie.
O-263	William MacPherson	Invermere.
O-264	Willy H. Peters	Invermere.
O-265	David W. Stewart	Invermere.
O-266	Roy E. Bowlby	Invermere.
O-267	Walter E. Wikman	Invermere.
O-268	Larry Campanas	Tasu.
O-269	Peter T. Fahlgren	Tasu.
O-270	Bruce A. Graney	Tasu.
O-271	Harry R. Kean	Tasu.
O-272	George M. Leask	Tasu.
O-273	Robert G. McCarthy	Tasu.
O-274	Peter L. Ngai	Tasu.
O-275	Glenn A. Mallory (supervision only)	Tasu.
O-276	Edward A. Mark	Fernie.
O-277	George J. Kalmakav	Fernie.
O-278	Duane S. Howard	Fernie.
O-279	Harold A. Peyto	Fernie.
O-280	Leo F. Piwek	Fernie.
O-281	Lin A. Schafer	Fernie.
O-282	Lawrence B. Samuelson	Fernie.
O-283	Henry A. Podrasky	Fernie.
O-284	Randolph T. Aubie	Kitsault.

SURFACE MINE-RESCUE CERTIFICATES, 1971—*Continued*

Cert. No.	Name	Where Trained
O-285	Bela M. Dudas	Kitsault.
O-286	James D. Gordon	Kitsault.
O-287	Philip M. Janzen	Kitsault.
O-288	Kenneth A. Kallberg	Kitsault.
O-289	Fred F. Kiedrowski	Kitsault.
O-290	Joseph E. Labossiere	Kitsault.
O-291	G. Richard Lunman	Kitsault.
O-292	Wallace M. Manley	Kitsault.
O-293	John H. Marfell	Kitsault.
O-294	Fred Moreiko	Kitsault.
O-295	Glen G. McInnes	Kitsault.
O-296	Robert A. Naismyth	Kitsault.
O-297	Bruce L. Turner	Kitsault.
O-298	Frank K. Wanka	Kitsault.
O-299	William R. Woodey	Kitsault.
O-300	Louis Yaffe	Kitsault.
O-301	Avard W. Nelson	Fernie.
O-302	John R. Willox	Fernie.
O-303	Louis Sclippa	Fernie.
O-304	Patrick J. McNamee	Fernie.
O-305	Alexander E. Johnson	Fernie.
O-306	Thomas B. Keegan	Fernie.
O-307	John A. Hill	Fernie.
O-308	Nicholas Atamanick	Fernie.
O-309	Donald Aaltonen	Rossland.
O-310	Larry J. Brown	Rossland.
O-311	Harold F. Bryant	Rossland.
O-312	James B. Cervo	Rossland.
O-313	Raymond A. Civitarese	Rossland.
O-314	Robert Edger Cunningham	Rossland.
O-315	Deane E. L. Desireau	Rossland.
O-316	James A. Fichten	Rossland.
O-317	David T. Fowler	Rossland.
O-318	Lorne G. Herrett	Rossland.
O-319	Dennis Le Duc	Rossland.
O-320	Robert M. MacKenzie	Rossland.
O-321	Ronald Rector (Jr.)	Rossland.
O-322	Terry Robitaille	Rossland.
O-323	Ronald G. Roberts	Rossland.
O-324	Norman D. Robertson	Rossland.
O-325	Alfred R. Salvail	Rossland.
O-326	Peter D. Stewart	Rossland.
O-327	Joe A. Wilkins	Rossland.
O-328	Thomas J. Salmon (supervision only)	Port Hardy.
O-329	Jack B. Morin	Port Hardy.
O-330	Robert W. Bishop	Port Hardy.
O-331	Don C. Ingham (Jr.)	Port Hardy.
O-332	Gerald O. Henriksen	Port Hardy.
O-333	William B. Johnson	Port Hardy.
O-334	Richard E. Wilson	Port Hardy.
O-335	Robert L. T. Renaud	Granisle.
O-336	Edward G. Desormeau	Granisle.
O-337	Valentine F. McDonald	Granisle.
O-338	William L. Miller	Granisle.
O-339	Albert E. Lowe	Granisle.
O-340	Richard N. Olson	Granisle.
O-341	Lloyd H. Bussineau	Granisle.
O-342	Allan R. McCluskey	Granisle.
O-343	Donald E. Ralph	Granisle.
O-344	Leonard S. Rempel	Granisle.
O-345	Peter Solodiuk	Granisle.
O-346	Ronald R. Montigny	Granisle.
O-347	William R. J. Forshaw	Granisle.
O-348	Douglas G. McIntosh	Granisle.
O-349	Julius G. Grof	Granisle.
O-350	Richard E. Ashe	Granisle.
O-351	Erik A. James (supervision only)	Granisle.
O-352	Edward C. Ingham	Granisle.
O-353	Douglas D. Valin	Fernie.
O-354	Chester S. Taje	Fernie.
O-355	Verne R. Olsen	Fernie.
O-356	Keith Bracewell	Fernie.

SURFACE MINE-RESCUE CERTIFICATES, 1971—*Continued*

Cert. No.	Name	Where Trained
O-357	Karsten L. Hansen	Fernie.
O-358	John Kelly	Fernie.
O-359	Donald B. Reimer	Fernie.
O-360	Ronald W. Linkert	Fernie.
O-361	Harold R. Legge	Fernie.
O-362	Edmond Plessis	Fernie.
O-363	Leslie H. Weitzell	Rossland.
O-364	Gerald A. Tarasoff	Rossland.
O-365	Fred Rowe	Rossland.
O-366	Rodney T. Newton	Rossland.
O-367	Victor L. Neff	Rossland.
O-368	Michael J. Mitchell	Rossland.
O-369	Alan J. Mills	Rossland.
O-370	Christian Bertram Lyck	Rossland.
O-371	Gerald D. Jordan	Rossland.
O-372	Michael Hojw	Rossland.
O-373	Joseph O. F. Gauthier	Rossland.
O-374	Ronald G. Fazakas	Rossland.
O-375	Bart D. Eacrett	Rossland.
O-376	Mervyn G. Biles	Rossland.
O-377	James W. Burgess	Rossland.
O-378	Luigi Collazzo	Rossland.
O-379	Luis Campo	Rossland.
O-380	Blaine H. Carlson	Rossland.
O-381	Dennis R. Dawson	Rossland.
O-382	Howard A. Woody	Ingerbelle mine.
O-383	Barclay M. Draper	Ingerbelle mine.
O-384	John T. Corcoran	Ingerbelle mine.
O-385	Paul Gabor	Ingerbelle mine.
O-386	Bill J. McDonnell	Ingerbelle mine.
O-387	Norman A. Ross	Ingerbelle mine.
O-388	Griffiths C. Taynton	Ingerbelle mine.
O-389	Wayne W. Birch	Ingerbelle mine.
O-390	C. Wayne Inglis	Ingerbelle mine.
O-391	Bruce A. Lambert	Ingerbelle mine.
O-392	William A. Buchan	Ingerbelle mine.
O-393	Robert M. Davis	Ingerbelle mine.
O-394	Albert W. Rowbottom	Ingerbelle mine.
O-395	John Bey	Ingerbelle mine.
O-396	Marcel A. Morin	Ingerbelle mine.
O-397	John Tegart	Fernie.
O-398	George Onofrychuk	Fernie.
O-399	Martin P. Johnson	Fernie.
O-400	Robert J. Wilson	Fernie.
O-401	Bela Poncsak	Fernie.
O-402	Harold O. Johnson	Fraser Lake.
O-403	Gerhard Wolfgang Kurz	Fraser Lake.
O-404	Glenn G. Galloway	Fraser Lake.
O-405	Carl Vidor Johnson	Fraser Lake.
O-406	Dale R. Duperreault	Fraser Lake.
O-407	Kenneth Ahlm	Fraser Lake.
O-408	Lewis W. Rutledge	Fraser Lake.
O-409	Arthur L. Walsh	Fraser Lake.
O-410	Henry T. John	Fraser Lake.
O-411	Ross Glanville	Fraser Lake.
O-412	David E. Matatall	Fraser Lake.
O-413	Robert Giesbrecht	Fraser Lake.
O-414	John A. Chapman	Fraser Lake.
O-415	Richard Fitch	Fraser Lake.
O-416	Ronald G. Epp	Fraser Lake.
O-417	Matthew W. Waldner	Fraser Lake.
O-418	Eugene Winiarski	Logan Lake.
O-419	Joel H. Beaman	Logan Lake.
O-420	Brian R. Cuthill	Logan Lake.
O-421	Lloyd H. Davies	Logan Lake.
O-422	George W. Popoff	Logan Lake.
O-423	Gordon M. Denham	Logan Lake.
O-424	James J. Dugan	Logan Lake.
O-425	Floyd W. Prouse	Logan Lake.
O-426	John S. Kristofferson	Logan Lake.
O-427	Jerry J. Ofukany	Logan Lake.
O-428	Douglas E. Guild	Logan Lake.

SURFACE MINE-RESCUE CERTIFICATES, 1971—*Continued*

Cert. No.	Name	Where Trained
O-429	Robert B. Johnson	Logan Lake.
O-430	Willis J. McBride	Logan Lake.
O-431	Allan J. Smith	Logan Lake.
O-432	Harold K. Mosley	Logan Lake.
O-433	Peter W. Cisowski	Logan Lake.
O-434	John R. Mayoh	Logan Lake.
O-435	Frank G. Richards	Logan Lake.
O-436	Roger J. Saindon	Logan Lake.
O-437	Mathias M. Holst	Logan Lake.
O-438	Robert J. Pittman	Logan Lake.
O-439	Robert L. Blake	Logan Lake.
O-440	Leonard Skakum	Logan Lake.
O-441	Kenneth Munro	Logan Lake.

GRAVEL PIT MINE-RESCUE CERTIFICATES, 1971

Cert. No.	Name	Where Trained
G-1	Lloyd V. Smith	Saturna Island.
G-2	Kenneth Johnson	Saturna Island.
G-3	Earl T. Melvile	Mission.
G-4	John W. Robinson	Mission.
G-5	Douglas P. Cripps	Britannia Beach.
G-6	Jack Nestman	Britannia Beach.
G-7	Robert B. Blinston	Britannia Beach.
G-8	Don Gunn	Britannia Beach.
G-9	Roland D. Harrison	Britannia Beach.
G-10	Steve Kwasnycia	Britannia Beach.
G-11	Roy F. Fogarty	Britannia Beach.
G-12	Thomas H. Robertson	Britannia Beach.
G-13	William M. Adamson	Britannia Beach.
G-14	Heinz Heidenreneich	Britannia Beach.
G-15	John R. Allan	Britannia Beach.
G-16	Andrew Dzuris	Britannia Beach.
G-17	Lloyd Born	Britannia Beach.
G-18	Melvin L. Buckmaster	Britannia Beach.
G-19	Wilson H. MacKenzie	Haney.
G-20	Leslie G. Kirkpatrick	Haney.
G-21	Sam A. Berto	Haney.
G-22	Tony H. Meter	Haney.
G-23	Leonard A. Landgraff	Haney.
G-24	Frederick Davidson	Haney.
G-25	Ernest A. Gareau	Haney.
G-26	James W. Watt	Haney.
G-27	Clement Hertslet	Haney.
G-28	Joseph T. O'Neill	Port Coquitlam.
G-29	Wallace H. Evans	Port Coquitlam.
G-30	Ralph L. Brett	Port Coquitlam.
G-31	Dan A. Chapman	Port Coquitlam.
G-32	Wayne A. Leys	Port Coquitlam.
G-33	Howard V. Richardson	Port Coquitlam.
G-34	Edmond H. Freund	Port Coquitlam.
G-35	Frank E. Harris	Port Coquitlam.
G-36	James A. Wingrove	Port Coquitlam.
G-37	Ken A. Jorgenson	Port Coquitlam.
G-38	Bernard C. Stewart	Port Coquitlam.
G-39	S. Omelaniec	Abbotsford.
G-40	Peter J. Enns	Abbotsford.
G-41	Murray A. Blackham	Abbotsford.
G-42	Andrew Rees	Langley.
G-43	Lloyd G. Knibbs	Langley.
G-44	William Duke	Langley.
G-45	Marvin A. Parker	Colwood.
G-46	Howard C. Eames	Colwood.
G-47	Dennis Ridley	Colwood.
G-48	Frederick H. Smith	Colwood.
G-49	Metro Ostapovich	Colwood.

GRAVEL PIT MINE-RESCUE CERTIFICATES, 1971—*Continued*

Cert. No.	Name	Where Trained
G-50	Bernard V. Delamere	Colwood.
G-51	Albert E. Basley	Colwood.
G-52	Robin MacDowell	Colwood.
G-53	Richard G. Ball	Campbell River.
G-54	Frank J. Bencze	Campbell River.
G-55	Bruce H. Luoma	Campbell River.
G-56	Frank D. Gingerich	Campbell River.
G-57	Nicholas K. Antonelli	Campbell River.
G-58	Maxwell P. Hood	Campbell River.
G-59	F. Barry Lindsay	Campbell River.
G-60	Anthony R. Woodsman	Campbell River.
G-61	Otto M. Tiemer	Duncan.
G-62	Donald J. Robertson	Duncan.
G-63	George Duncan	Duncan.
G-64	Kenneth Paskin	Duncan.
G-65	Ernest A. Piper	Duncan.
G-66	Herbert F. McNulty	Duncan.
G-67	Gerald J. Hudson	Nanaimo.
G-68	Harry K. Griffith	Nanaimo.
G-69	Ronald E. Oberg	Nanaimo.
G-70	Patrick J. Dolan	Nanaimo.
G-71	Terrence H. Howson	Nanaimo.
G-72	William J. Symington	Nanaimo.

Four mine-safety associations operate in different areas of the Province. They are sponsored by the Department of Mines and Petroleum Resources and the Workmen's Compensation Board and are aided by mining company officials, safety supervisors, Inspectors of Mines, mine-rescue co-ordinators, and, in some areas, local industry. These organizations promote mine-rescue and first aid training as well as safety education in their various districts.

The West Kootenay Mine Safety Association held its 25th annual competition in Nelson on May 29. The three teams that competed in the mine-rescue event came from Bluebell, Jersey, and Reeves MacDonald mines. The Cominco Ltd. team from Bluebell mine, captained by E. Ingham, won the district shield.

The Central British Columbia Mine Safety Association held its 23rd annual competition at Kamloops on May 29. The five teams participating in the mine-rescue event were from Boss Mountain, Craigmont, Granduc, Pinchi Lake mines, and Versatile Mining Services Ltd., Kamloops. The Granduc Operating Company team from Granduc mine, captained by P. R. Jones, won the district shield.

The Vancouver Island Mine Safety Association held its 57th annual competition in Nanaimo on June 5. The four teams that competed in the mine-rescue event came from Britannia, Coast Copper, Texada, and Western Lynx mines. The winning team was that of Texada Mines Ltd., captained by J. MacKave.

The East Kootenay Mine Safety Association held its 50th annual competition on June 5, 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, representing Kaiser Resources Ltd. The Fernie team, captained by J. Peters, won the district trophy.

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 not only from the mining industry but also from other industries and from the public at large.

The winners of the four district mine-rescue competitions met in the 16th Provincial mine-rescue competition held in Kelowna on June 12. The Kaiser Resources

Mine-rescue team from Britannia mine erecting a fire seal underground.

Ltd. team, captained by J. Peters, won the Provincial trophy, and the Cominco Ltd. team from Bluebell mine, captained by E. Ingham, placed second.

The 5th Canadian Mine Rescue Championship was held in Edmonton, Alta., on June 19. Competing teams were from Alberta, British Columbia, Nova Scotia, Saskatchewan, and the Northwest and Yukon Territories. The winning team was that of Coleman Colliers Limited of Coleman, Alta. The team from the Northwest Territories placed second.

On October 3, a surface mine-rescue meeting was held at Brenda mine where five rescue problems based on hazard potentials in the surface-mining industry were demonstrated. These involved the rescue of persons in a capsized motor-vehicle, in the collision of vehicles, in a burning building, buried by an avalanche, and having broken through ice.

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 1971 the regional trophy for metal mines was won by Brynnor Mines Limited, Boss Mountain Division, with an accident frequency of 6.58.

Texada Mines Ltd. had an accident frequency of 4.52 but was not eligible to compete for the regional trophy because their statistical period for the frequency calculation included a portion of the period in which it won the regional trophy in 1969. However, this low accident-frequency record enabled Texada Mines Ltd. to win the Canadian Trophy because it had the least accident frequency per million man-hours of any metal mine in Canada.

The coal-mine award is presented to the coal-mining company having worked a minimum of 120,000 man-hours with the least number of compensable accidents. The coal mines of British Columbia are grouped with those in Alberta to form a Western Region. In 1971 the regional trophy for coal mines was won by Kaiser Resources Ltd., Michel Colliery, with an accident frequency of 101.4.

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 1971 the award was won by the Pinchi Lake operation of Cominco Ltd. with an accident frequency of 0.144 per thousand man-shifts.

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 among 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 1971 the A trophy was won jointly by seven operations each having no lost time or compensable accidents. The number of accident-free man-hours worked is indicated in parentheses after the names of the following list of companies winning this award: The Cobble Hill quarry of Ocean Cement Limited, B.C. Cement Division (46,636); the Vananda quarry of Canada Cement Lafarge Ltd. (56,116); the Blubber Bay quarry of Domtar Chemicals Limited (Lime Division) (74,971); the Myra Falls open pit of Western Mines Limited, under work contract to Gretsinger and Macdonald Construction Company (73,920); the Mary Hill Division of Ocean Cement Limited (113,321); the Coxey open-pit mine of the Red Mountain Mines Division of Consolidated Canadian Faraday Ltd. (90,561); and the Invermere operation of Western Gypsum Limited (47,169).

Wesfrob Mines Limited at their Tasu mine won the B trophy with an accident frequency of 5.98 per million man-hours.

RECLAMATION

Section 11 of the *Mines Regulation Act* was amended by limiting the time in which a representation may be made in subsection (5), by the renumbering of all subsections from (5*a*) to (15), and the addition of subsection (17) as follows:

"(17) Notwithstanding the provisions of this section, where a substance is not a mineral as defined in the *Mineral Act,* the Chief Inspector has and may exercise power and authority under this section, and may

(*a*) approve programmes for reclamation and conservation of land comprising a mine and issue permits required under this section, subject to such terms and conditions as he may prescribe; or

(*b*) if he is satisfied that the protection and reclamation of the land is adequately secured and controlled under any Act, regulation, or municipal by-law, by order, exempt that mine from the provisions of this section."

Under the authority of subsection (15) of section 8 of the *Coal Mines Regulation Act,* Order in Council 1390 was approved on April 23, 1971, thereby making coal mines in the exploration stage subject to section 8 of the *Coal Mines Regulation Act.*

Under the authority of subsection (16) of section 11 of the *Mines Regulation Act,* Order in Council 1667 was approved on May 27, 1971, thereby making the surface operations of underground metal mines subject to section 11 of the *Mines Regulation Act.*

During the calendar year 1971, 17 temporary permits authorizing surface work (reclamation permits) were issued by the Minister of Mines and Petroleum Resources under the authority of section 8 of the *Coal Mines Regulation Act* or section 11 of the *Mines Regulation Act.* Since the reclamation legislation was enacted on April 2, 1969, 49 temporary permits have been issued.

Temporary permits were issued in 1971 for the following mining operations:

Permit Number	Company Name	Location of Operation
34	Pacific Silica Ltd.	Oliver.
36	International Marble & Stone Co. Ltd.	Sirdar.
37	Valley Copper Mines Ltd.	Highland Valley.
38	Premier Sand & Gravel Co. Ltd.	Sechelt.
39	Construction Aggregates Ltd.	Metchosin.
40	Gibraltar Mines Ltd.	McLeese Lake.
43	Columbia Metals Corp.	Ferguson.
C 45	Utah Construction & Mining Co. (Utah Mines Ltd.)	Carbon Creek.
C 46	Nickel Hill Mines Ltd.	Pink Mountain.
C 47	Brameda Resources Ltd.	Sukunka River.
C 48	Teck Corporation Ltd.	Sukunka River.
C 49	Elk River Explorations Ltd.	Upper Elk River.
50	Alwin Mining Co. Ltd.	Highland Valley.
C 51	Alberta Coal Ltd.	Sukunka River.
C 52	Hogan Mines Ltd.	W. A. C. Bennett Dam.
C 53	Rio Tinto Canadian Exploration Ltd.	Upper Elk River.
C 54	Crows Nest Industries Ltd.	Tornado Mountain.

C—*Coal Mines Regulation Act.*

In addition to the foregoing, 24 permits had been approved and were in process of being issued as of December 31, 1971. Five surface metal mines, five coal-exploration properties, and 14 underground metal mines are included in this group.

As of December 31, 1971, 56 reclamation programmes and reports had been received from sand and gravel operations and will be processed in the coming year.

Permit 13 was issued to Forestburg Collieries Ltd. on January 27, 1970, authorizing surface work at the coal mine near Telkwa. This operation terminated in late March 1970. Reclamation of the surface of the land disturbed by the surface mining was carried out during 1970 and 1971. The reclamation work was approved in November 1971, and the security deposit refunded.

AID TO THE SECURITIES COMMISSION

A. R. C. James, Senior Inspector of Mines, continued to act as mining engineer adviser 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 changes in programmes or property holdings after a prospectus has been issued, on prices paid for mining properties, conditions of option agreements, and in approval of company press releases.

In 1971, a total of 227 engineering reports was examined and the Commission advised on their contents. The reports were submitted by 168 companies, mainly in support of prospectuses. Two full days of each working week are normally spent at the Commission offices.

INDEX

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