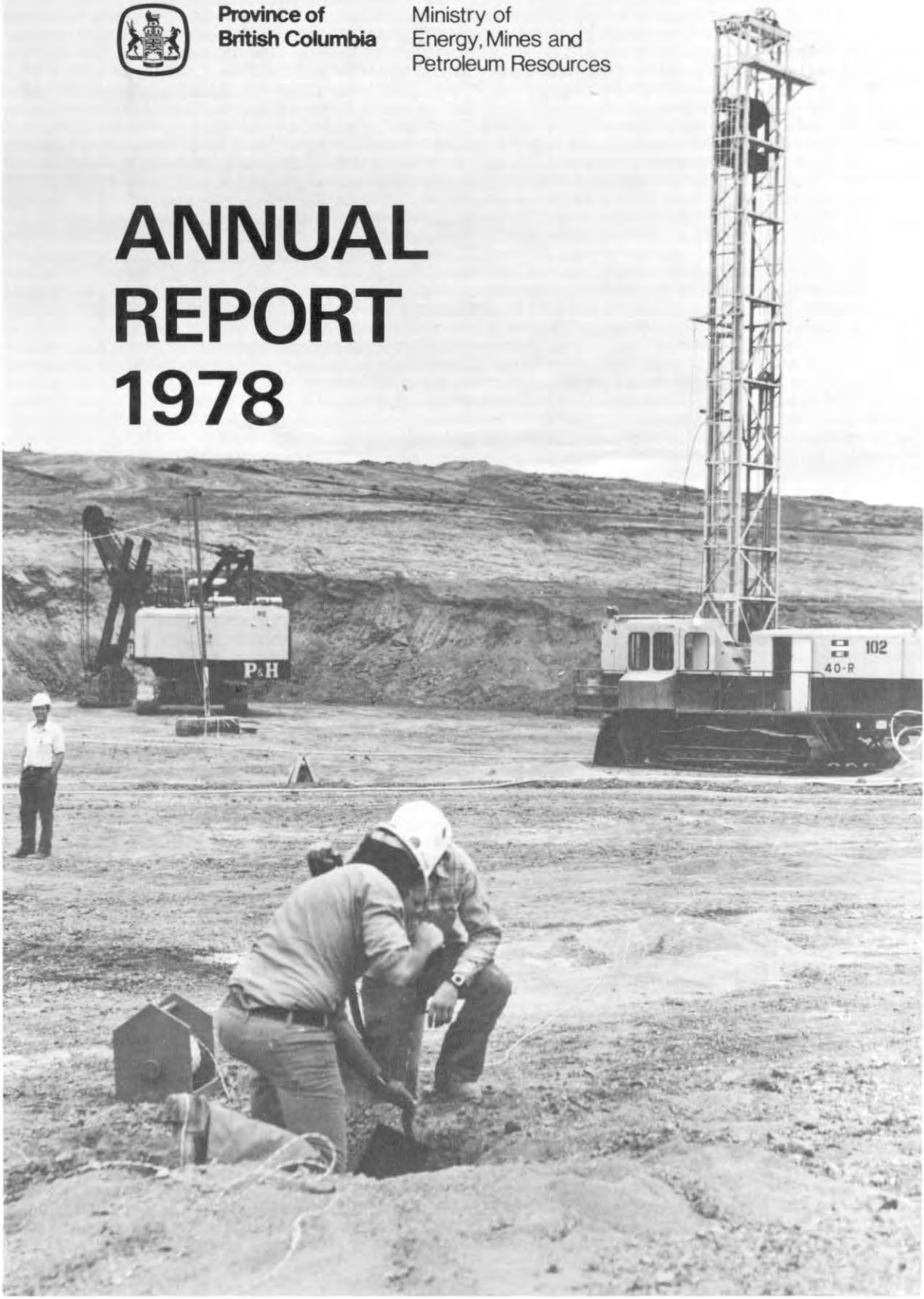
Province of
British Columbia

Ministry of
Energy, Mines and
Petroleum Resources

ANNUAL REPORT 1978



To the Honourable HENRY P. BELL-IRVING, D.S.O., O.B.E., E.D.,
Lieutenant-Governor of the Province of British Columbia.

MAY IT PLEASE YOUR HONOUR:

The Annual Report of the Ministry of Energy, Mines and Petroleum Resources is herewith respectfully submitted.

JAMES J. HEWITT
Minister of Energy, Mines and Petroleum Resources

Office of the Minister of Energy, Mines and Petroleum Resources
November 1979

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PLATES

All photographs by R E. Player except plate on page 36 by G. Nordin.

FOREWORD

The Annual Report of the Ministry for 1978 follows the format of the 1976 Report. Annual Reports have been published since 1874, from that date to 1959 as the Annual Report of the Minister of Mines, and subsequently as the Annual Report of the Minister of Mines and Petroleum Resources until this report. In December 1978 the Ministry was enlarged and a reorganization started so that the report is now that of the Minister of Energy, Mines and Petroleum Resources.

In 1969 geological and technical reports previously published as part of the Annual Report were published separately as *Geology, Exploration and Mining in British Columbia.* Starting in 1975, this technical volume has been divided into separate reports that are issued as they are prepared, and eventually bound together. Detailed information on mine safety, fatal accidents, dangerous occurrences, etc., was included in the Annual Report until 1973, for 1974 was issued separately, and subsequently forms part of the separate volume *Mining in British Columbia.*

The Annual Report for 1978 contains four chapters—a general review of the mineral and petroleum industries, a chapter on the activities of the Ministry, one on the statistics of the mineral industry, and one on the performance of the petroleum industry.

The change in mandate of the Ministry occurred so late in the year that no substantial changes occurred within the calendar year, hence energy aspects except those traditionally part of the Ministry are not reflected in the report.


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INTRODUCTION

By A. SUTHERLAND BROWN

The value of mineral production in British Columbia nearly reached $2 billion, continuing a real growth above the inflation rate. Production was $1.986 billion or an increase of 11.1 per cent over 1977. However, much of the growth was the result of better commodity prices and exchange rates rather than increased production.

The top 10 commodities in 1978 in order of value were copper, natural gas, coal, molybdenum, crude oil, sand and gravel, cement, zinc, lead, and lode gold. Changes in relative position among these commodities are minor. Copper again assumed the top place that it generally has occupied since displacing zinc in 1966. Asbestos dropped out of the top 10 because of the long strike at Cassiar. Structural material commodities—sand and gravel, and cement—each moved two places forward, relegating zinc to eighth place. Gold occupied tenth place, the first time for many years. British Columbia is Canada's leading producer of copper, molybdenum, and coal, and a major contributor to Canada's production of natural gas, lead, zinc, asbestos, cement, gold, and silver. The mineral production of 1978 is shown in detail in Table 1-1 compared to 1977, and the production in 1978 is diagrammed on Figure 1-1.

All major sectors of the mining and petroleum industries experienced growth except industrial minerals. The latter showed a significant decrease because of the drop in asbestos production. Structural materials showed the greatest growth. The total value and percentage change for the various sectors are as follows:

	1978 Value $	Change per cent
Metals	891 778 518	+14.8
Petroleum and natural gas	582 969 834	+5.9
Coal	381 895 241	+16.1
Structural materials	142 341 826	+23.1
Industrial minerals	59 471 361	—24.9

Actually 15 of the listed commodities were subject to some decrease in the quantity of material produced but only eight showed a decrease in value. In major commodities, copper, molybdenum, zinc, sand and gravel, asbestos, crude oil, and natural gas all showed some decrease in quantity produced, while gold, iron concentrate, gypsum, jade, sulphur, cement, and coal showed significant increases.

The growth of mineral industry and the changing proportion contributed by the various sectors is illustrated by two diagrams. Figure 1-2 shows the growth in total value in actual dollars and in deflated dollars. Figure 1-3 shows the relative proportion contributed by the various sectors. In both diagrams these trends are shown in five-year increments to 1970 and yearly thereafter. Figure 1-2 shows that growth has been fairly steady, with an average increase of about $80 million per year since 1965. Comparison of the figures reveals major shifts in trends and allows growth comparisons of specific commodity sectors. The important changes illustrated are as follows:

(1) A dominance of metals throughout the whole period, but a fairly constant decrease in importance since 1935.

(2) The collapse of the coal industry between 1945 and 1970, related significantly to the conversion of railways to oil.

(3) Compensating rapid growth of petroleum and natural gas between 1955 and 1965.

Table 1-1—Mineral Production of British Columbia, 1977 and 1978

	1977		1978	
	Quantity	Value	Quantity	Value
Metals				
Units		$		$
Antimony kg	596 207	2 519 739	459 521	2 083 895
Bismuth kg	18 540	187 612	28 172	166 452
Cadmium kg	320 711	1 720 051	253 803	1 186 320
Copper kg	275 224 115	384 736 661	273 692 676	431 694 395
Gold—				
placer g	46 170	289 075	36 515	295 001
lode, fine g	5 906 336	31 301 931	6 542 332	47 951 880
Iron concentrates t	445 317	7 362 345	615 569	11 597 462
Lead kg	78 172 646	42 316 293	81 064 539	51 640 564
Molybdenum kg	15 521 970	142 057 947	13 055 203	167 714 272
Silver g	241 503 007	37 934 098	227 271 890	45 071 509
Tin kg	187 478	1 912 300	261 863	3 675 508
Zinc kg	103 780 228	61 301 001	95 618 111	52 048 701
Others	.....	397 654	.....	4 652 559
Subtotals	.....	714 036 707	.....	819 778 518
Industrial Minerals				
Asbestos t	97 033	69 729 205	68 766	47 066 170
Diatomite t	1 239	49 595	2 184	59 346
Fluxes t	28 624	95 461	22 475	56 894
Granules t	29 551	1 238 485	26 849	1 186 160
Gypsum and gypsite t	653 126	2 357 488	733 080	3 110 695
Jade kg	266 621	825 523	488 759	1 422 018
Sulphur t	248 892	3 871 660	322 181	5 647 993
Others	.....	1 017 682	.....	922 085
Subtotals	.....	79 185 099	.....	59 471 361
Structural Materials				
Cement t	909 522	42 705 320	1 020 065	56 140 564
Clay products	.....	4 909 799	.....	6 282 560
Lime and limestone t	2 231 166	5 861 614	2 512 867	7 263 312
Rubble, riprap, and crushed rock t	2 464 503	7 309 536	2 841 920	8 410 065
Sand and gravel t	52 994 528	54 809 121	38 315 952	64 227 295
Building-stone t	4 535	55 602	405	18 030
Subtotals	.....	115 650 992	.....	142 341 826
Coal				
Coal—sold and used t	8 424 181	328 846 883	9 463 920	381 895 241
Total solid minerals	.....	1 237 719 681	.....	1 403 486 946
Petroleum and Natural Gas				
Crude oil m^3	2 200 303	132 859 085	2 004 699	145 005 524
Field condensate m^3	24 465	1 477 248	25 386	1 836 217
Plant condensate m^3	180 267	9 751 058	155 503	10 269 861
Subtotals	.....	144 087 391	.....	157 111 602
Natural gas to pipeline 10^3m^3	8 895 663	396 601 354	8 003 029	401 373 236
Butane m^3	111 357	5 358 167	106 580	13 360 454
Propane m^3	91 297	4 392 944	85 732	11 124 542
Subtotals	.....	406 352 465	.....	425 858 232
Total petroleum and natural gas	.....	550 439 856	.....	582 969 834
Grand totals	.....	1 788 159 537	.....	1 986 456 780

CONVERSION TABLE

Metric	Symbol	
Tonnes	t	÷ .90718=short tons.
Kilograms	kg	÷ .45359=pounds.
Grams	g	÷ 31.103=troy ounces.
Cubic metres	m^3	× 6.29=barrels.
Thousand cubic metres	10^3m^3	× 35.49373=thousand standard cubic feet.

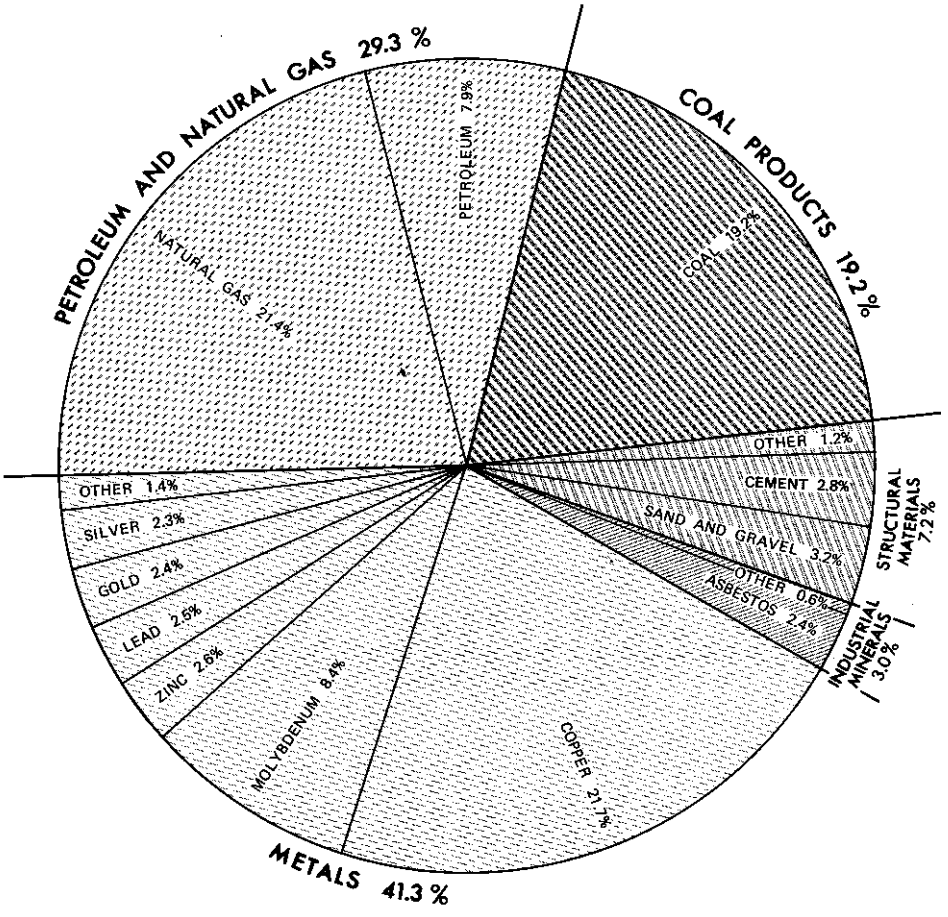


Figure 1-1—Major mineral commodities produced in 1978 by value.

(4) Regeneration of significant coal production related to growth of export markets from metallurgical coals in the early 1970's.

(5) Surge in value of metals related to copper and molybdenum production in 1972 and 1973 when the major porphyry-deposit open-pit mines came on stream.

(6) The increase in value of natural gas in 1975 and 1976.

(7) The relative decrease in importance of metals, dropping below 50 per cent of the total for the first time in 1975.

(8) The major changes in proportion starting in 1973 levelled out in 1976 and the proportions have remained stable through 1978.

The value of the production of the various sectors is shown throughout their history of production on a log graph, Figure 3-1.

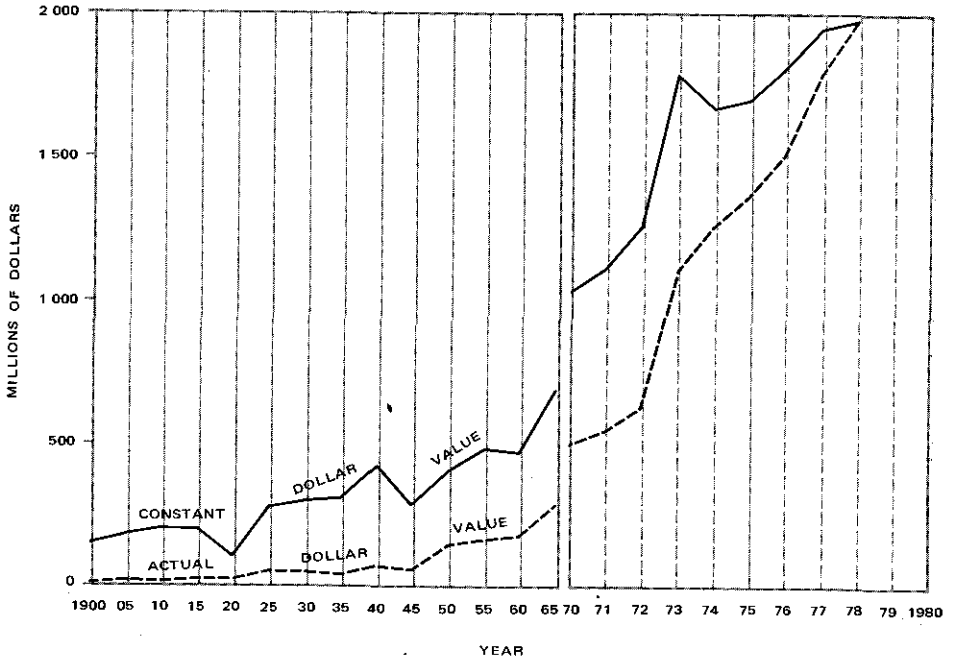


Figure 1-2—Growth of the mineral industry in total value in actual dollars and deflated dollars.

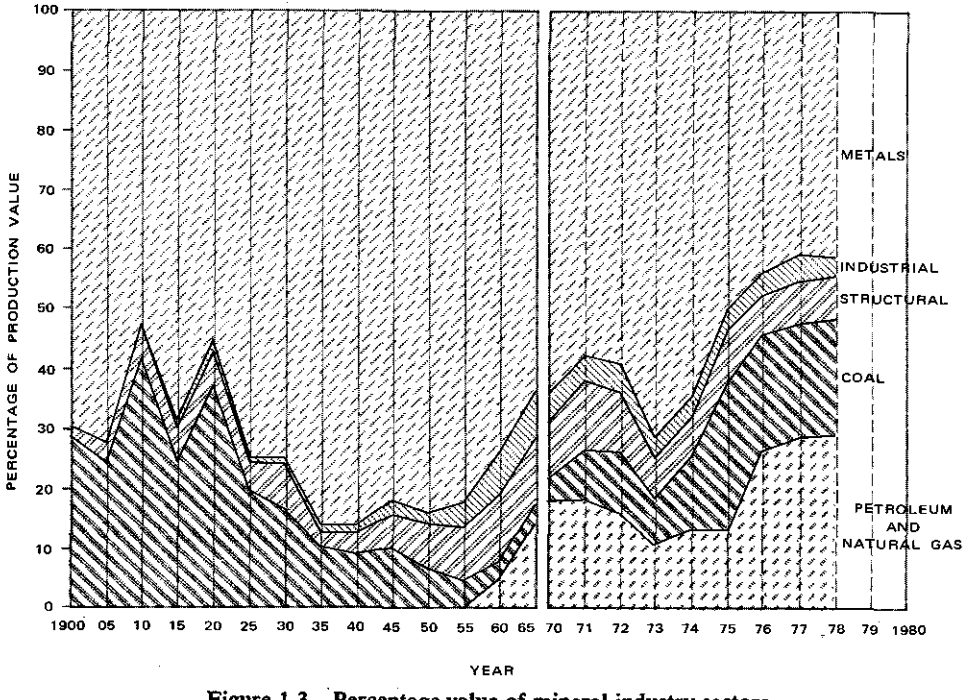


Figure 1-3—Percentage value of mineral industry sectors.

REVENUE TO THE CROWN

Direct revenue to the Provincial Government in 1978 from the mining and petroleum industries is as shown on Figure 1-4.

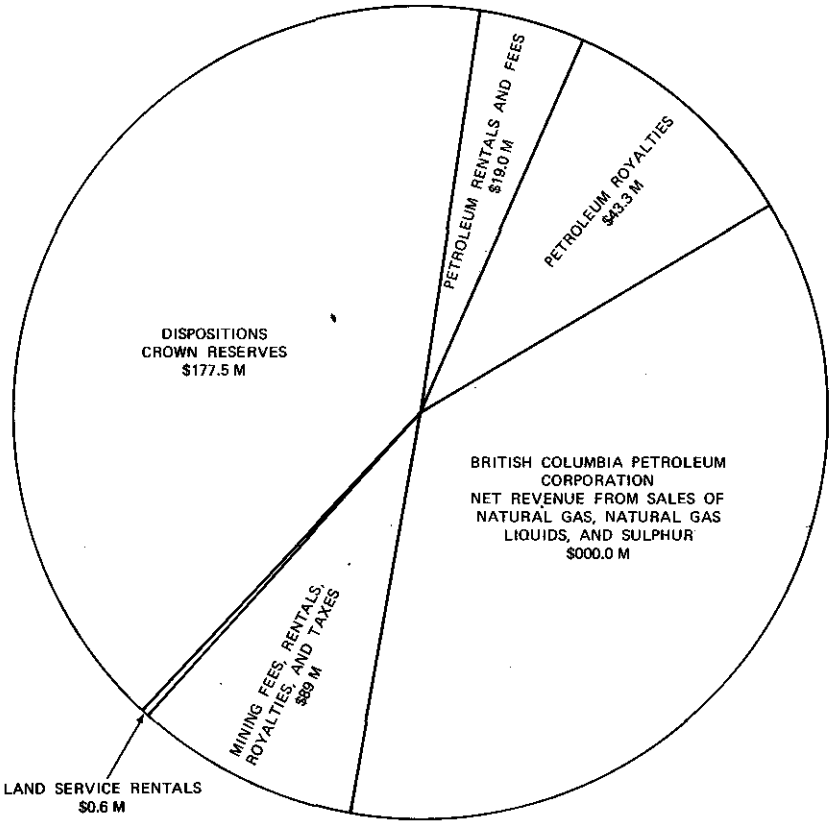


Figure 1-4—Direct revenue to the Provincial Government from the mineral and petroleum industries, 1978.

Table 1-2—Direct Revenue to the Provincial Government From the Mineral and Petroleum Industries, 1978

	$
Petroleum Industry—	
Crown reserves—disposition	177 459 648
Rentals and fees	19 048 999
Crown royalties	43 339 456
British Columbia Petroleum Corporation—	
Net revenue from sales	159 400 000
Mining Industry—	
Claims, fees, and rentals	2 842 497
Royalties	5 851 562
Mineral taxes	30 391 018
Land Service—	
Rentals and royalties on structural materials	636 360
Total	438 969 540

THE MINING INDUSTRY IN 1978

By A. SUTHERLAND BROWN AND W. P. WILSON

The total value of solid minerals set another new record, $1.4 billion, up 13.4 per cent from 1977. This was achieved in the face of slight declines in output of most major metals, industrial minerals, and structural materials. Increased commodity prices, favourable currency exchange rates, and a 12.3-per-cent increase in coal production more than made up the difference.

Table 1-1 and Figure 1-1 show the quantity and value of solid minerals produced in 1978 and the table compares these with production in 1977. The ratios of the various sectors of the mining industry are as follows: Metals, 58.5 per cent; coal, 27.2 per cent; structural materials, 10.1 per cent; and industrial minerals, 4.2 per cent. The only significant change from 1977 was a nearly 2-per-cent drop in the proportion shared by industrial minerals caused by the drop in asbestos production.

METALS

The growth and long-term trends of the quantities of major base metals produced are shown on Figure 1-5 on a linear graph. These, plus gold and silver, are shown on a log graph on Figure 3-2.

Lead and zinc production advanced sharply in the period 1920 to 1943, thereafter starting a slow decline, a feature dependent principally on the production history of the Sullivan mine. In contrast, copper production remained at a modest level until the onset of major porphyry copper production in the late sixties. Molybdenum production also started its growth in this period, related principally to mining of porphyry deposits. Precious metals are not shown on Figure 1-5 but are on Figure 3-2. Their history since the decline in the forties increasingly has been related to by-product origin related to production of base metals at massive sulphide and porphyry deposits. The graphs of these principal metals show all are down slightly in quantity except lead and gold.

In 1978 conditions for copper producers improved significantly for the first time for many years. Copper price, having been low since the sharp peak of 1974, advanced significantly during the year. Favourable currency exchange rates and a lowering of world copper stocks also added to the improved market and the increased value of production. Copper, at $431.7 million, contributed 52.7 per cent of the value of metals produced and 30.8 per cent of the value of all minerals. The quantity of production was down because of the closure of the Granduc mine in mid-year and a prolonged strike at the Gibraltar mine that started May 26 and continued beyond the year-end. However the Afton, which started up late in 1977, had a full year's production and the smelter started producing blister copper early in 1978.

Molybdenum markets continued to be very strong, and the value of production in British Columbia rose 18.1 per cent to $167.7 million, more than three times the value of zinc, the third most valuable metal. The quantity produced, however, was down 2.5 million kilograms or 15.9 per cent.

Zinc production was also down 7.9 per cent, and the value at $52 million was down 15.1 per cent due to continuing difficult market conditions and the lowest prices since the beginning of 1975.

Lead remained in fourth position, with a value of $51.6 million, nearly equal to zinc. Unlike the other major metals, production quantity was up 3.7 per cent

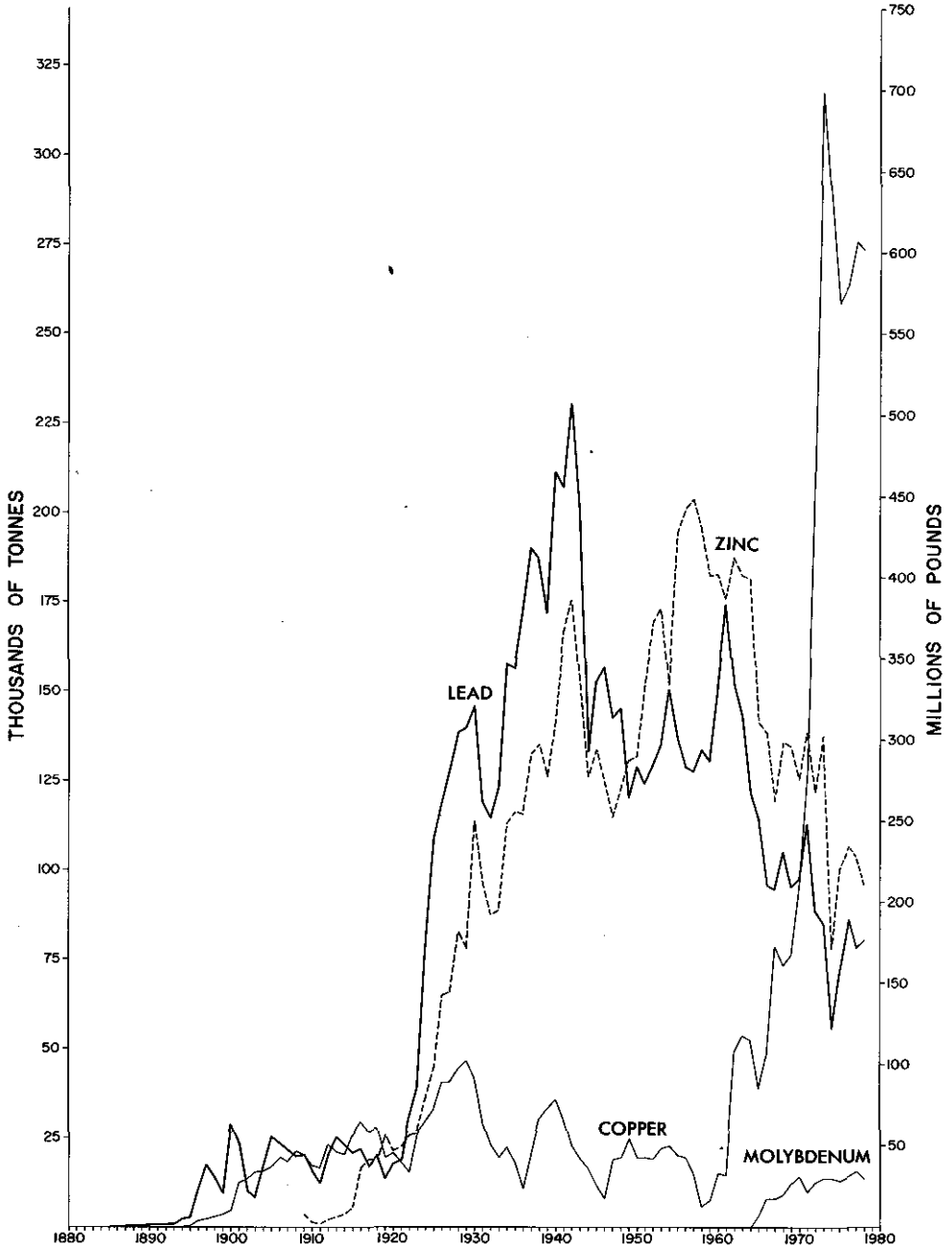


Figure 1-5—Quantities of major metals produced, 1885–1978.

and, with markets continuing fairly strong from the preceding year and with the price rising, the value was up 22 per cent.

Gold (lode) surpassed silver in value for the first time since 1960, to become the fifth most valuable metal. Production was up 10.6 per cent to 6 542 332 grams with a value of $47.9 million. This resulted largely from the sizeable new production from Afton mine. In addition the price of gold advanced from $173.18 (U.S.) per ounce in January to $207.85 (U.S.) in December with the result that the value of production was up 53.3 per cent to $47.9 million.

Silver value was up 19.0 per cent to $45.1 million although production was down 6 per cent. This resulted from the significant price increases during the year from $4.39 (U.S.) per ounce in January to $5.92 (U.S.) in December.

Iron concentrate production was up 38.2 per cent over 1977. This was a significant portion of the production of former years, although now almost entirely the product of one mine, Tasu (Wesfrob). The value of production was $11.6 million.

Of the minor metals, tin was up significantly for the second straight year (39.7 per cent above 1977) to 261 863 kilograms with a value of $3.7 million; bismuth production was up but both antimony and cadmium were down.

Coal

Coal ranked third in value after copper and natural gas. Production was up 12.3 per cent to 9.5 million tonnes and value was up 16.1 per cent to $381.9 million.

Industrial Minerals

Production value of industrial minerals dropped 24.9 per cent to $59.5 million because the most valuable commodity, asbestos, produced in British Columbia only at the Cassiar mine, was subject to a strike from September 15 to beyond the end of 1978. Only 68 760 tonnes of asbestos was produced, compared to 79 033 tonnes in 1977.

Other important industrial minerals had increased production and value in 1978 but in aggregate were only a small part of the drop in value of the values of the asbestos production. Gypsum, jade, and sulphur production quantities were all up with an aggregate value of more than $10 million in 1978.

Structural Materials

Production and value of all structural materials were up significantly for the tenth year in a row, and the value of $142.3 million was up 23.1 per cent over 1977. All commodities were up except building stone. Sand and gravel at $64.2 million and cement at $56.1 million, the two most important structural materials, were both up significantly. They advanced to become respectively sixth and seventh most valuable commodities in the Province, following crude oil and leading zinc for the first time.

PROVINCIAL REVENUE FROM MINING COMPANIES

Direct revenue to the Provincial Government in 1978, derived from the mining sector of the mineral industry, is shown in Table 1-3. The amount for mineral royalties shown is the amount collected after adjustments for 1977. For coal licences and rentals, the amount shown includes cash paid in lieu of work, some of which may be refundable. The rentals and royalties on industrial minerals and structural materials were collected by the Lands Service of the Ministry of Environment. The total revenue is about $40 million, approximately the same as 1977.

Table 1-3—Revenue From Mineral Resources, 1978

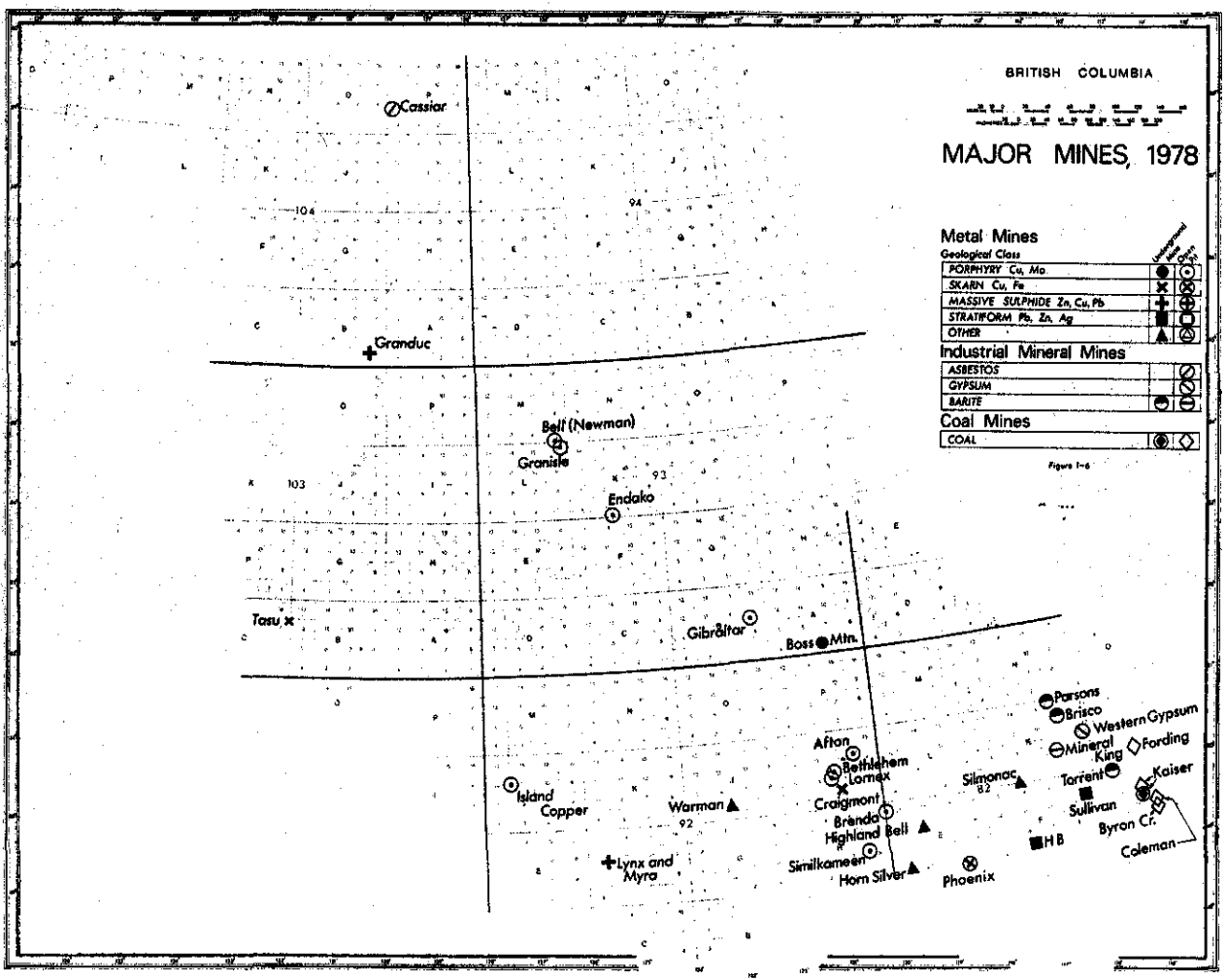
	$
Claims	1 705 924.52
Coal licence fees and rentals collected	1 136 572.00
Coal royalties	5 030 739.19
Iron ore royalties	121 506.53
Mineral land taxes	8 162 797.44
Mineral resource taxes	8 922 897.92
Mineral royalties	699 316.19
Mining taxes	13 305 323.01
Rental and royalties on industrial minerals and structural materials (Lands Service)	636 360.07
Total	39 721 436.87

EXPENDITURES BY MINING COMPANIES

Major expenditures in 1978 by companies involved in exploration, development, and mining of metals, minerals, and coal are shown in Table 1-4. No major new plants were in process of major expenditure in 1978 so that the expenditures represent ongoing projects or early stages of new projects.

Table 1-4—Expenditures (Mining Companies), 1978

	$	$
Capital expenditures	36 122 284	
Exploration and development	104 721 116	
		140 843 400
Mining operations (metals, minerals, coal)		453 928 938
Mining operations (structural materials)		63 079 924
Repair expenditures		123 818 077
Total		781 670 339



Mines in British Columbia Which Produced More Than 1 000 Tonnes of Ore in 1978

Name of Mine	Products	NTS Location	Rated Capacity of Mill/Cleaning Plant (Tonnes, Day)	Mine[1] Type	Name of Company	Company Address	Mine Address
Metal Mines							
Phoenix	Cu, Au, Ag	82E 2E	2 500	O	Granby Mining Corp.	15th Floor, 1066 W. Hastings St., Box 12524, Vancouver V6E 3X1	Box 490, Grand Forks (Mining ended in 1976).
Horn Silver	Ag, Pb, Zn, Cu	82E/4E	140	U	Dankoe Mines Limited	2002, 1177 W. Hastings St., Vancouver V6E 2K3	Box 190, Keremeos.
Highland Bell	Ag, Zn, Pb, Au, Cd	82E 6E	110	U	Teck Corp. Ltd.	1199 W. Hastings St., Vancouver V6E 2K3	Beaverdell V0H 1A0.
HB	Zn, Pb, Ag, Cd	82F/3E	1 090	U	Cominco Ltd. (HB mine)	200 Granville Square, Vancouver V6C 2R2	Salmo.
Silmonac	Zn, Pb, Ag, Cd	82F 14	140	U	Kam-Kotia Mines Ltd. and Silmonac Mines Ltd.	420, 475 Howe St., Vancouver V6C 2B3	Box 189, New Denver.
Sullivan	Zn, Pb, Ag, Cd	82G 12W	9 500	U	Cominco Ltd. (Sullivan mine)	200 Granville Square, Vancouver V6C 2R2	Box 2000, Kimberley V1A 2G3.
Lynx, Myra	Zn, Cu, Ag, Pb, Au, Cd	92F 12E	900	O	Western Mines Ltd.	Room 1103, Box 49066, 595 Burrard St., Vancouver V7X 1C4	Box 3000, Campbell River.
Similkameen	Cu, Ag, Au	92H 7E	13 600	O	Similkameen Mining Co. Ltd.	14th Floor, 750 W. Pender St., Vancouver V6C 1K3	Box 520, Princeton V0X 1W0.
Brenda	Cu, Mo, Ag	92H 16E	22 000	O	Brenda Mines Ltd.	Box 420, Peachland V0H 1X0	Box 420, Peachland V0H 1X0.
Craigmont	Cu	92I 2W	4 860	U	Craigmont Mines Ltd.	700, 1030 W. Georgia St., Vancouver V6E 3A4	Box 3000, Merritt.
Lornex	Cu, Mo, Ag, Au	92I 6E	40 900	O	Lornex Mining Corp. Ltd.	510, 580 Granville St., Vancouver V6C 1W8	Box 1500, Logan Lake V0K 1W0.
Bethlehem	Cu, Ag, Au	92I 7W	16 800	O	Bethlehem Copper Corp.	2100, 1055 W. Hastings St., Vancouver V6E 2H8	Box 520, Ashcroft.
Afton	Cu	92I 10E	6 350	O	Afton Mines Ltd.	1199 W. Hastings St., Vancouver V6E 2K3	Box 937, Kamloops.
Warman	Au, Ag	92J/3E	426	U	Northair Mines Ltd.	333, 885 Dunsmuir St., Vancouver V6C 1N5	Squamish.
Island Copper	Cu, Mo, Ag, Au	92L/11W	34 500	O	Utah Mines Ltd.	1600, 1050 W. Pender St., Vancouver V6E 2S7	Box 370, Port Hardy V0N 2P0.
Boss Mountain	Mo	93A 2W	1 590	U	Noranda Mines Ltd. (Boss Mt. Div.)	1050 Davie St., Vancouver V6B 3W7	Hendrix Lake.
Gibraltar	Cu, Mo, Ag	93B 9W	36 330	O	Gibraltar Mines Ltd.	700, 1030 W. Georgia St., Vancouver V6E 3A4	Box 130, McLeese Lake V0L 1P0.
Endako	Mo	93K/3E	24 500	O	Placer Development Ltd. (Endako Div.)	700, 1030 W. Georgia St., Vancouver V6E 3A4	Endako.
Granisle	Cu, Ag, Au	93L/16E	12 260	O	Granisle Copper Ltd.	17th Floor, 1050 W. Pender St., Vancouver V6E 2H7	Box 1000, Granisle.
Bell (Newman)	Cu, Au	93M 1E	11 800	O	Noranda Mines Ltd. (Bell Copper Div.)	1050 Davie St., Vancouver V6B 3W7	Box 2000, Granisle.
Tasu	Fe, Cu	103C 16E	7 300	O	Westfrob Mines Ltd. (Tasu)	500, 1112 W. Pender St., Vancouver V6E 2S5	Tasu.
Granduc	Cu, Ag, Au	104B 1W	7 270	U	Granduc Operating Co.	520, 800 W. Pender St., Vancouver V6C 1K3	Box 69, Stewart.
Industrial Mineral Open Pits and Quarry							
Torrent	Barite	82G/13W	.....	U	Mountain Minerals Ltd.	Box 700, Lethbridge, Alta.	Box 603, Invermere.
Western Gypsum	Gypsum	82J 5W	2 450	O	Westroc Industries Ltd.	Box 5638, Postal Station A, Calgary, Alta. T2H 1Y1	Box 217, Invermere V0A 1K0.
Mineral King	Barite	82K/8W	Small	O	Mountain Minerals Ltd.	Box 700, Lethbridge, Alta.	Box 603, Invermere.
Brisco	Barite	82K/16W	.....	U	Mountain Minerals Ltd.	Box 700, Lethbridge, Alta.	Box 603, Invermere.
Parsons	Barite	82N/2E	.....	U	Mountain Minerals Ltd.	Box 700, Lythbridge, Alta.	Box 603, Invermere.
Cassiar	Asbestos	104P 5W	3 630	O	Cassiar Asbestos Corp. Ltd.	2000, 1055 W. Hastings St., Vancouver V6E 3V3	Cassiar V0C 1E0.
Coal Mines							
Byron Creek (Corbin)	Coal	82G 10E	1 700	O	Byron Creek Collieries Ltd.	Box 270, Blairmore, Alta.	Box 270, Blairmore, Alta.
Kaiser (Harmer Ridge, Balmer North and Hydraulic)	Coal	82G 10, 15	28 000	O, U	Kaiser Resources Ltd.	2600, 1177 W. Hastings St., Vancouver V6E 2L1	Box 2000, Sparwood.
Fording (Clode Creek and Greenhill)	Coal	82J 2W	17 000	O	Fording Coal Ltd.	200, 205 Ninth Ave. S.E., Calgary, Alta. T2G 0R4	Box 100, Elkford V0B 1H0.
Coleman (Tent Mountain)	Coal	82G 10W	.....	O	Coleman Collieries Ltd.	Box 640, Coleman, Alta.	Tent Mountain V0K 0M0.

[1] O—Open pit, U—Underground.

MINING AND TREATMENT

METAL MINES

Metal mining prospered more in 1978 than for a considerable period previously because world stockpiles were reduced, over capacity was largely eliminated so that prices rose as a result. In addition, Canada's relative position was enhanced by favourable currency exchange with our metal trading partners. Almost all metals except zinc participated in the strengthening of markets. However, a number of factors held production of many metals to about what they were in 1977. Nevertheless, the dollar value of metals produced rose 14.8 per cent during the year to a new record of $819.8 million.

In 1978, 42 mines produced an aggregate of 87 724 973 tonnes of ore which was concentrated or shipped directly to a smelter (*see* Tables 3-12 and 3-13). This contrasts with 41 mines in 1977 which produced 90 287 570 tonnes of ore. Thus aggregate tonnage was reduced by 2.8 per cent in 1978. Of the 42 mines, 22 produced more than 1 000 tonnes and these are shown on Figure 1-6 classified as to product, geological type, and whether open pit or underground.

In 1978, 12 mines produced more than 1 million tonnes. These large mines produced an aggregate of 84 668 967 tonnes or 96.5 per cent of the ore mined. Ten of the large mines are open-pit operations, including in order of output, Lornex, Island Copper, Endako, Brenda, Similkameen, Bethlehem, Gibraltar, Bell, Granisle, and Afton. The two others, Sullivan and Craigmont, are underground mines. In aggregate these produced about 4 million tonnes or 4.6 per cent of the total tonnage. In regard to geological type, all 10 large open-pit mines are porphyry deposits of copper and/or molybdenum. Of the large underground mines, the Sullivan is a silver-lead-zinc mine of stratiform type whereas Craigmont is a copper-iron skarn deposit.

Some changes occurred in the list of large mines since 1977. Afton appeared on the list for the first time as it reached rated capacity. Production at Tasu and Granduc dropped just below 1 million tonnes in 1978 so are not included. Granduc produced only until June when it was closed and later sold.

Six intermediate mines operated in 1978, each of which produced between 100 000 and 1 000 000 tonnes. Besides Granduc and Tasu, these include the Lynx and Myra, Boss Mountain, Phoenix, and HB. Strictly speaking, Phoenix closed as a mine but continued producing from the low-grade stockpile. All operating medium mines are underground mines. Granduc and Lynx and Myra are massive sulphide deposits, Tasu and Phoenix skarn deposits, Boss Mountain a porphyry molybdenum deposit, and HB a stratiform lead-zinc deposit. The aggregate tonnage of medium mines was 2 881 231 tonnes or 3.3 per cent of the total.

There were four small mines with production between 1 000 and 100 000 tonnes a year. These are all underground mines producing from vein deposits whose principal values are in silver or gold and silver with by-product base metals. The mines in order of production tonnage are the Warman (Northair), Highland Bell, Horn Silver, and Silmonac.

Changes during 1978 did not include opening of any new major mines but two mines closed, one it appears temporarily. The HB mine near Salmo exhausted its reserves and closed in August after mining about 6.7 million tonnes mainly between 1955 and 1966 and again from 1973 to 1978. The Granduc mine near Stewart ceased operations in June but was under investigation with regard to purchase by Esso Minerals before the end of the year. Among small mines the Astra (Van

Silver) closed but the Scranton, Bluebird, and Ottawa, all of which produced more than 1 000 tonnes in 1977, produced less in 1978.

Concentrating

In 1978, 29 concentrators operated (*see* Table 3-12). Six treated copper ore, five copper-molybdenum, 13 lead-zinc-(silver-gold), two molybdenum, two copper-iron, and one copper-lead-zinc ores. Bethlehem started operating a new molybdenum circuit during the year reflecting the increased price of this metal. The old circuit operated in 1964–66. Many of the lead-zinc-silver concentrators are old ones in the Slocan with a small throughput. The Phoenix mill continued producing from low-grade stockpile but closed finally in October 1978. The HB concentrator was closed and moth-balled for possible custom work in the future.

Smelting, Refining, and Destination of Concentrates

Most of the lead-zinc concentrates produced in the Province are smelted and refined here as well as some from outside the Province, but, for the first time since the closure of the Anyox smelter in 1933, copper was smelted within British Columbia. The Afton rotary top-blown converter started continuous operations in March 1978, producing 5 995 tonnes of blister copper. This unique smelter near Kamloops is operated by Teck Corporation in conjunction with the Afton porphyry copper mine which produces low sulphur concentrates. The Trail lead-zinc smelter and refinery of Cominco Ltd. was continued with its modernization to improve environmental aspects and productivity. Molybdenum concentrates are also processed at Endako where both molybdic trioxide and ferromolybdenum are both produced.

The smelter at Trail received concentrates and scrap from a number of sources—principally company mines within the Province (Sullivan and HB), the Pine Point in the Northwest Territories, and custom sources both inside and outside the Province. The smelter received 138 170 tonnes of lead concentrates and 134 980 tonnes of zinc concentrates from the Sullivan and HB mines, and 10 760 tonnes of lead concentrates and 5 210 tonnes of zinc concentrates from other British Columbia mines. The total value of concentrates, including by-product metal from British Columbia treated at Trail, was $130 177 040 or 15.9 per cent of metal production of the Province in 1978.

Endako shipped products containing 6 030 967 kilograms of molybdenum. Of this, 10 176 tonnes was molybdic trioxide, and 200 tonnes was ferromolybdenum.

The proportions of the total value of metal production going to the various destinations are not known accurately but are approximately as follows: Smelted or treated in British Columbia, $134.2 million (16.4 per cent); shipped to other parts of Canada, $58.0 million (7.1 per cent); exported to Japan, $420.1 million (51.2 per cent); exported to the United States, $68.0 million (8.3 per cent); exported to Europe, $128.4 million (15.7 per cent); other or unattributed, $11.1 million (1.3 per cent).

The destination of concentrates of the major metals is as discussed following and shown in Table 3-13.

Copper concentrates produced in British Columbia were shipped to the following destinations: Eastern Canada, 80 622 tonnes; the United States, 26 972 tonnes; Japan, 770 684 tonnes; Germany, 36 733 tonnes; elsewhere, 59 916 tonnes.

Details of the disposition of molybdenum (13 055 203 kilograms valued at $167 714 272) are not precisely ascertainable but from known sales, almost 44 per

cent of the total was shipped to Europe and about 28 per cent to Japan. The balance was disposed of to many other countries and eastern Canada.

Zinc concentrates, produced but not smelted in British Columbia, totalled 30 918 tonnes, of which 27 551 tonnes were shipped to the United States and 3 367 tonnes shipped to Japan.

Iron concentrates produced in British Columbia were sold to the following markets: Japan, 371 711 tonnes; the United States, 152 602 tonnes; Australia, 30 668 tonnes; Canada, 61 088 tonnes.

Lead concentrates, produced but not smelted in British Columbia, totalled 598 tonnes and were shipped to the United States.

Non-metallic Mines

Industrial minerals in British Columbia with production value greater than $1 million include asbestos, sulphur, gypsum, jade, and granules (*see* Table 1-1). Asbestos is by far the most important, its production value of $47.1 million representing 79 per cent of the total for all industrial mineral production. Asbestos production is entirely from the Cassiar mine which was on strike from September 15, 1978, until January 15, 1979. Sulphur is produced entirely as a by-product, chiefly from Cominco Ltd.'s roasting operations, but also from sour gas production in the Peace River. Gypsum is produced chiefly at the Windermere quarry at Westroc Industries Limited (733 080 tonnes). Granules are produced in many small quantities but production was dominated by the International Marble & Stone Company Ltd. with a plant at Sirdar near Creston. In 1978 production of jade again exceeded $1 million. Production came from many sources but the main mines are working *in situ* nephrite at Mount Ogden (Continental Jade Ltd.), east of Dease Lake (Cry Lake Minerals Ltd. and Nephro-Jade Canada Ltd.), and at the Cassiar asbestos mine.

Barite, an important industrial mineral, not specifically listed in Table 1-1, was produced by Mountain Minerals Limited from three small underground mines near Brisco, Parson, and Torrent and tailings from the Mineral King mine at Toby Creek, all in the East Kootenays.

The dominant structural materials produced are sand and gravel, cement, limestone, clay products, and riprap, crushed rock, and building stone. Individual mines and quarries are not shown on Figure 1-6. Many of these products are produced at a large number of small quarries, some of which have very intermittent production. Limestone production is dominated by four mines (Ideal, Imperial, Vananda, and Domtar) on Texada Island. The Cobble Hill quarry (British Columbia Cement Company Limited) on Vancouver Island is being phased out. Significant operations are also located at Harper Ranch near Kamloops (Canada Cement Lafarge Ltd.), Ptarmigan Creek near Quesnel (Quesnel Redi-Mix Cement Co. Ltd.), and Pavilion Lake (Steel Brothers Canada Limited).

Clay and shale production in British Columbia is dominated by Clayburn Industries Ltd.'s pit and plant near Abbotsford, with lesser production by Haney Brick and Tile Limited, east of Haney.

Coal

Coal is the third most valuable mineral commodity to British Columbia, following copper and natural gas, and improved its position *vis-à-vis* these products in 1978. Although coal is widely distributed in the Province, the major producing mines are at present concentrated in the Crowsnest Coalfield of southeast British

Columbia. They are represented by five symbols on Figure 1-6 for (1) Fording Coal Limited's two open pits, (2) Kaiser Resources Ltd.'s open-pit complex (Harmer Ridge), (3) Kaiser's two underground mines (Balmer North and Hydraulic), (4) Coleman Collieries Limited's Tent Mountain open-pit mine, and (5) Byron Creek Collieries Limited's open pit. The only other producing coal mine is Bulkley Valley Collieries Limited's mine at Telkwa which was a very minor producer of thermal coal. The Sukunka colliery of BP Minerals Limited near Chetwynd operated to test mining methods during part of the year. Production for Kaiser's and Fording's mines are consolidated in Table 3-8B so that only five operations are shown. Kaiser Resources Ltd. and Fording Coal Limited produced 94 per cent of the coal mined in the Province in 1978.

Some salient facts about coal production in 1978 are as follows:

(1) Coal production was up significantly to 9 463 920 tonnes, a new record, 6 per cent above the previous record in 1975.
(2) Clean coal output was up 6 per cent to 9 093 048 tonnes.
(3) The value of coal sold and used was $381 895 241, up 16.1 per cent to a new record.
(4) About 93.4 per cent of raw coal produced in 1978 comes from surface mining operations, virtually unchanged since 1977.
(5) About 89 per cent of raw coal produced was metallurgical coal.
(6) The percentage of clean to raw coal remained at 74 per cent.

The diversification of markets started in 1977 continued in 1978. Although coal sales to Japan increased to over 7 million tonnes, up 2.2 per cent, they now represent only 74.2 per cent of total production. Shipments to many countries were up and Spain, Italy, Sweden, and Taiwan were new recipients. Major shipments were as follows:

	Tonnes
Korea	471 368
Denmark	284 408
Romania	241 706
Brazil	190 792
Belgium	132 351
Spain	123 886
Italy	93 304
Sweden	52 159
Mexico	41 822
Taiwan	26 756
Argentina	18 389
United States	3 791

Shipments in Canada were up 61.6 per cent, with 344 722 tonnes to Ontario Hydro, 56 956 tonnes to Manitoba, and 120 tonnes to Nova Scotia. Use in British Columbia was up also with 292 005 tonnes used for coke, an increase of 93.4 per cent but other uses dropped about 3 per cent to 62 437 tonnes.

EXPLORATION

Exploration during 1978 showed a significant increase over the previous year, the third year in sequence this has occurred. All the indices used by the Ministry to measure exploration effort were up in 1978, except total geophysics. Programs were generally at more mature stages than in 1977 so expenditures, especially in metals exploration, increased significantly. Exploration for uranium in particular

progressed to the stage where extensive drilling occurred. In contrast coal exploration was only up slightly and that for industrial minerals and structural materials was down from the very high figure of 1977.

Table 1-5—Indices of Metal Exploration

	1975	1976	1977	1978
	$	$	$	$
Exploration expenditure	22 100 000	27 183 927	26 177 389	29 475 341
Claims recorded	11 751*	28 970*	37 151*	37 242*
Certificates of work	39 403	36 729	39 711	65 705
Free miners certificates—				
Individual	8 484	7 826	7 566	9 444
Companies	562	555	520	531
Number of properties	409	433	564	647
Total drilling (metres)	92 802	97 277	110 303.6	154 177
Total geophysical surveys (kilometres)	4 835	4 267	14 623.5	9 135.5

* Unit modified grid system.

METALLIC MINERALS

The indices of metal exploration are indicated in Table 1-5 compared to the three previous years. All indices are up except kilometres of geophysical surveys. Total expenditure was up 12.6 per cent; claims recorded, +0.2 per cent; certificates of work, +65 per cent; individual free miners certificates, +25 per cent; and companies, +2 per cent; number of properties receiving work, +18 per cent; total drilling, +40 per cent; and total geophysical surveys, −37.5 per cent. The last index although down from 1977 was more than double the previous two years. This slight decrease plus the large increase in drilling indicates maturing of exploration programs and principally those related to uranium. The number of free miners' certificates extant has been decreasing steadily for the last five years until the significant reversal of this trend in 1978.

The metals most sought in 1978 appeared to be molybdenum, uranium, tungsten, and tin. A notable feature of the 1978 exploration scene was the relatively low level of porphyry copper investigations, a reflection of depressed world copper prices over the past three years. However, exploration and development of massive sulphide deposits containing copper, zinc, gold, and silver increased over 1977.

The most active metal exploration areas in the Province included, from north to south: The Surprise Lake–Atlin area (uranium, tungsten/tin), Kechika–Gataga Rivers of the northern Rocky Mountains (stratiform lead/zinc), Fraser Lake–Vanderhoof and Central Interior (uranium), Barkerville area (placer gold), North Thompson River area (stratiform copper), Highland Valley–Aspen Grove area (porphyry molybdenum/copper), and the southeast Okanagan–Boundary area (uranium).

Massive sulphide prospects explored in 1978 included two in the Coast Range: the Nifty near Bella Coola, drilled by Pan Ocean, and Maggie Mines' property near Howe Sound north of Vancouver, drilled by Canex Placer. Regional exploration was conducted in the Omineca area northwest of Prince George and near Barrière Lakes north of Kamloops where several prospects in Paleozoic rocks were drilled. One of these programs disclosed interesting copper mineralization in acid volcanic rocks on the Chu Chua property, owned by the Vestor group of companies and under option to Craigmont.

Lead/zinc deposits explored in southeast British Columbia included the Vine deposit at Moyie Lake, drilled by Cominco, and the Cottonbelt Shuswap-type deposit, drilled by Metallgesellschaft.

Significant lead/zinc/barite deposits in Upper Devonian/Mississippian black shale sequences in the Kechika River area of northeast British Columbia attracted considerable attention. Gataga Joint Venture conducted a major drilling program at Driftpile Creek and Cyprus Anvil drilled a similar deposit to the southeast. Also in northern British Columbia, exploration drilling continued on the Suzie property where galena and sphalerite occur in dolomitized limestone.

One of the most active exploration areas in the Province was in the Atlin–Jennings River–Cassiar area where considerable effort was directed to the search for tungsten and tin. Three types of tin occurrences are known in the part of northwest British Columbia and adjacent Yukon. Cassiterite occurs in the gold placer creeks east of Atlin which drain the Surprise Lake batholith which hosts quartz/wolframite veins with tin as a minor constituent. Minor tin is associated with scheelite at the Adanac molybdenum property, and in skarns in the general area.

At Trout Lake, 56 kilometres southeast of Revelstoke, drilling of a significant molybdenum discovery by Newmont and Esso Minerals is continuing to further define a reported 275-metre intersection of 0.40 per cent MoS_2. An underground exploration program is under consideration for 1979.

Exploration programs for gold and silver included Tournigan Mining's drilling and underground work at Big Missouri north of Stewart, and projects by several companies on gold mineralization on Porcher and Banks Islands south of Prince Rupert and on the Queen Charlotte Islands.

Government Programs to Encourage Exploration

Ongoing geological programs include regional mapping in areas of mineral potential and studies directed to the better understanding of ore deposits. Related programs include reconnaissance geochemical surveys in selected areas, principally through the three-year Federal/Provincial Uranium Reconnaissance Program (URP) which was completed in 1978. This program involved the collection of stream sediments and waters at a sample site density of one per 13 square kilometres. Waters are analysed for fluorine and uranium and sediments for uranium and up to 11 other elements. To the end of 1978, six 1:250 000 map sheets have been published, including five in southeastern British Columbia and the Atlin sheet in the northwestern part of the Province. The 1978 sampling program included the Jennings River–McDame map-area east of Atlin, and survey results were made available in the spring of 1979 (*see* Fig. 2-2).

The 1978 Accelerated Mineral Development Program, funded by $5 million made available through Bill 5, *Revenue Surplus of 1976–77 Appropriation Act, 1978,* included an Accelerated Geochemical Survey of two map-areas in west-central British Columbia. This program is modelled after the Uranium Reconnaissance Program except that sample site density was one per 8 square kilometres. Data from this program were to be released in the late spring of 1979.

The Accelerated Mineral Development Program also expanded existing Ministry programs including Prospectors' Assistance, funds for mineral roads, and mine sites reclamation. In addition, funds were made available to assist with labour costs for underground mine development and property exploration, and for the Mineral Exploration Incentive Program which reimbursed junior mining companies

and prospectors for one third of field expenditures up to a maximum of $50 000. Details of the Accelerated Mineral Development Program are given in Chapter 2 (pp. 43–45).

Major Exploration Activity

Nine properties were reported as completing programs exceeding more than 3 000 metres of drilling or 300 metres of underground development. These non-producing properties, defined as conducting major exploration by the above criteria, are listed below.

BANK, WALLER (Hecate Gold Corporation), 103G/8E—a replacement gold deposit in shear zones on the west coast of Banks Island, a 427-metre decline.

JEFF (Imperial Oil Limited), 104I/1W—a bedded, massive copper/zinc sulphide deposit at the head of Kutcho Creek, 130 kilometres east of Dease Lake, 8 933 metres of diamond drilling.

NU, ELK (Placer Development Limited), 93K/3E—west end of Endako molybdenum porphyry deposit, 10 797 metres of percussion drilling and 5 053 metres of diamond drilling.

IDAHO (Carolin Mines Ltd.), 92H/11W—a disseminated gold deposit near Hope, 6 155 metres of underground diamond drilling.

SULLIVAN MINE AREA (Cominco Ltd.), 82F/9E; 82G/12W—stratabound iron/lead/zinc sulphide lens at Kimberley, 4 865.9 metres of surface diamond drilling and 1 000 metres of underground diamond drilling.

BLIZZARD (Norcen Energy Resources Limited), 82E/10W—uranium in loosely consolidated sediments underlying Tertiary plateau basalt at Lassie Lake, Beaverdell area, 294 diamond-drill holes, 15 000 metres and 47 rotary holes, 2 000 metres.

TROUT LAKE (Newmont Exploration of Canada Limited), 82K/12E—molybdenum porphyry deposit 4 kilometres west of Trout Lake village, five diamond-drill holes, 4 298 metres.

PR (Gold Fields Mining Corporation), 39A/12W—copper porphyry, 8 kilometres west of Quesnel Forks, percussion drilling, 4 063 metres and diamond drilling, 1 596 metres.

NED (Granges Exploration Aktiebolag), 93F/6—a zinc/lead/silver/gold deposit in rhyolite at the east end of Capoose Lake, 63 percussion drill holes, 3 688.1 metres.

Development and Feasibility Studies

Development of previously explored deposits increased significantly in 1978.

The Sam Goosly copper/silver deposit south of Smithers was optioned from Equity Mining/Kennco by Canex Placer in mid-year. Additional development drilling and metallurgical studies are under way pending a production decision. Esso Minerals continued drilling the significant Kutcho massive sulphide deposit in northwest British Columbia, part of which is held by Sumitomo who have reported at least 9 million tonnes of good grade copper/zinc mineralization.

Underground development and mill construction went on at the Nu-Energy gold deposit near Cassiar where production and mill tune-up started in December 1978. Feasibility studies continued at the Carolin gold property near Hope. A major drilling program was continued by Amax on Logtung, a significant stockwork tungsten/molybdenum property on the British Columbia/Yukon border.

Two potentially economic types of uranium deposit have been identified in British Columbia. Rexspar is a volcanogenic deposit in which uranium minerals and fluorite occur in Paleozoic trachytic volcanic rocks. The Blizzard, southeast of Kelowna, is a basal or paleo-stream channel deposit in which secondary uranium minerals are contained in poorly consolidated Tertiary sediments preserved beneath a Pliocene basalt cap. Continued drilling of this deposit, owned by Lacana and under option to Norcen, has indicated the presence of 1.9 million tonnes of 0.17 per cent U_3O_8.

Non-metallic Minerals

Costs of exploration and development for industrial minerals, structural materials, and placer in 1978 decreased from $559 065 to $459 280. However, the 1977 figure was abnormally high due to major capital costs that year, and the 1978 figure still represents a dramatic increase over expenditures of previous years.

The following major projects took place in 1978. Barite exploration was concentrated in the northeastern Rockies and the East Kootenays. The Letain asbestos prospect near Kutcho Creek was explored by 4 500 metres of diamond drilling. Exploration for gypsum near Canal Flats, limestone near Terrace and at Holberg Inlet, talc near Hope, and phosphate near Fernie continued on a small scale. Laboratory testing, feasibility studies, and development work on a mica property near Valemount, perlite prospects near the Empire Valley and at Uncha Lake, and on a silica property near Golden were indicative of renewed interest in these commodities.

Coal

Distribution of Coalfields

The principal coal resources of the Province occur in comparatively narrow linear belts within the Intermontane basins of the East Kootenay area (the Crowsnest Coalfield) and the Inner Foothills region of northeastern British Columbia (the Peace River Coalfield). These deposits of Late Jurassic to Early Cretaceous age contain major reserves of medium to low-volatile bituminous coal, generally suitable for the production of metallurgical coke.

In addition to the above-described mountain coals, local deposits of lignite, sub-bituminous, high-volatile bituminous, and semi-anthracite coals, of Late Cretaceous and Tertiary age, occur in widely scattered areas of British Columbia. Size and economic potential of most of these, including reserves in the former coal-mining areas of Vancouver Island, are comparatively small, although they are of potential value for power development as energy costs continue to increase. An exception of the foregoing is the Hat Creek property, which is a Tertiary lignite of limited areal extent but of remarkable thickness, and possibly the coals of the Groundhog Coalfield of north-central British Columbia.

Coal Exploration

On February 10, 1978, the moritorium on the issuance of coal licences ended, resulting in the granting of 1 036 coal licences, totalling 257 960 hectares in the Province, bringing the total to 501 076 hectares comprising 2 103 coal licences, thus doubling the area of coal lands held. In addition, there were a further 525 coal licence applications, totalling 95 510 hectares, being considered at the end of the year. There were no coal licences surrendered. Unfortunately most of the coal licences were issued well on in the field season, thus allowing little time for exploration generated from acquisition in 1978. Nevertheless, coal exploration was up marginally in 1978 with a total of $19 800 923.

Activity in the Peace River again was very intensive and greater than in the Crowsnest. Other significant activity occurred at Hat Creek, Comox, Similkameen, and Telkwa Coalfields.

Programs with greater than 3 000 metres of total drilling took place at the following properties, from south to north:

Crowsnest Coalfield

MICHEL (Kaiser Resources Ltd.)—71 rotary drill holes, 9 550 metres; seven adits.

LINE CREEK (Shell Canada Resources Limited)—19 diamond-drill holes, 4 747 metres; 12 rotary drill holes, 3 079 metres; four adits.

GREENHILLS (Kaiser Resources Ltd.)—two diamond-drill holes, 560 metres; 19 rotary drill holes, 2 850 metres; two adits.

Hat Creek Coalfield

HAT CREEK (British Columbia Hydro and Power Authority)—28 diamond-drill holes, 7 323 metres; seven rotary drill holes, 882 metres.

Peace River Coalfield

SAXON (Denison Coal Limited)—nine diamond-drill holes, 3 474 metres; 14 rotary drill holes, 929 metres.

BELCOURT (Denison Coal Limited)—16 diamond-drill holes, 5 332 metres.

MONKMAN-BELCOURT (Pacific Petroleum Ltd.)—30 diamond-drill holes, 9 647 metres: 22 rotary drill holes, 2 292 metres.

MOUNT SPIEKER [Ranger Oil (Canada) Ltd.]—18 diamond-drill holes, 12 988 metres.

SUKUNKA [BP Exploration (Canada) Ltd.]—10 diamond-drill holes, 2 551 metres; 20 rotary drill holes, 5 050 metres.

THE PETROLEUM INDUSTRY IN 1978

By the Staff of the Petroleum Resources Branch

Drilling activity continued to increase during 1978 with the number of wells up 30 per cent over 1977 and up 390 per cent over 1975. Production of oil and gas, however, was down 9 and 10 per cent respectively due mainly to reasons other than decreased productivity, as described below. Industry's interest in Crown land acquisition remained high during the year with proceeds from sales amounting to $177.5 million compared to $125.5 million in 1977. The following are tabulations of the petroleum industry fiscal data for 1978:

Table 1-6—Value of Production of Petroleum Industry, 1978

	$
Crude oil	145 005 524
Field condensate	1 836 217
Marketable natural gas	401 373 236
Gas plant liquids	34 754 856
Total	582 969 834

Table 1-7—Provincial Revenue From Petroleum Industry, 1978

	$
Rentals and fees	19 048 999
Crown reserve dispositions	177 459 648
Royalties (oil, gas, and products)	43 339 456
Gas revenue from B.C. Petroleum Corporation	159 400 000
Total	399 248 103

DRILLING

Growth in annual drilling operations and the length of the drilling season significantly increased for the third successive year. The total wells drilled was 30 per cent greater than in 1977. The footage of wells drilled as step-outs to established production was 71 per cent higher than in 1977. Wildcat footage, at locations far removed from the established pools, was up 31 per cent while development drilling within producing fields gained 6 per cent. Again, an increase in the amount of drilling during the summer months was evident as operations increased rapidly in June and continued at a high level until year-end. A shortage of available drilling rigs, especially during the winter months, imposed a constraint on the level of activity.

The total number of wells drilled was 393. Footage drilled was 2 110 948 (643 428.1 metres), an increase of over 30 per cent from the previous year. All categories of wells recorded increases over 1977. There were 202 gas wells, 71 oil wells, and 129 abandonments—up 22, 84, and 9 per cent. In addition four wells were completed as service wells and two were assigned standing status. As in previous compilations, if more than one zone is completed in a well, each productive zone is counted as one well. Fifteen multiple zone completions were made in 1978 making the total number of wells recorded as 408. Included in the count are five wells that had been drilled in previous years which were re-entered and deepened.

All of the activity, limited to the northeastern corner of the Province, was accomplished by 71 individual drilling rigs that were owned by 34 drilling contractor firms and employed by 87 different oil companies.

On July 1, 1978, all drilling operations were converted to SI. This caused considerable confusion in field operations which continued until acceptance and experience of the system improved. At year-end only minor problems could be attributed to the conversion.

PRODUCTION

Oil production for 1978 was 12 609 176 barrels, down 9 per cent from 1977. Several incidents contributed to this decrease. A major fire in the Boundary Lake field caused a significant disruption to production as did an oil pipeline break. Another factor that adversely affected the oil production was a decrease in demand for asphaltic-type crude from Boundary Lake during the first part of the year. However, after August 1978, oil production was slightly higher than for the same period in 1977 at nearly 40 000 barrels per day.

The concentrated developments in the Eagle area moved the field into prominence and to fourth largest-producing oil field in the Province. The largest-producing oil fields during the year were Boundary Lake, 5 618 791 barrels; Inga, 1 349 943 barrels; Peejay, 1 123 542 barrels; and Eagle, 1 014 944 barrels.

Gas production for 1978 also decreased compared to 1977. The nonassociated raw gas production was 341 051 255 MCF compared to 379 599 825 MCF in 1977. Although additional gas was available from the newly connected areas of Grizzly, Velma, and Dahl, the over-all production was down 10 per cent. The use of natural gas by the domestic market was a slight 2 per cent higher while the volume delivered to export was 11 per cent down. The demand by the export market continually decreased since May and presented a problem in the marketing of the gas supply producible in the Province.

Yoyo was again the largest gas-producing field reporting 65 162 982 MCF. It was followed by Clarke Lake, 49 684 731 MCF, Sierra, 28 650 148 MCF, and Laprise Creek, 28 811 243 MCF.

In order to maintain or improve production, applications by industry to convert wells to salt-water disposal service were approved in the Dahl, Grizzly, Siphon, Velma, and Yoyo fields and in the Klua (2) and South Julienne areas.

Two applications by Union Oil Company for approval of modifications to the waterflood schemes in the Crush and Wildmint fields were approved. In addition, it was agreed that additional oil recovered as a result of the modifications would only be subject to new oil royalty rates.

Applications for Good Engineering Practice and the concurrent production of oil and gas were approved for the Altares Bluesky pool, Fort St. John Nancy pool, South Grizzly Unit Dunlevy pool, Pocketknife Debolt pool, Sierra Pine Point A pool, Weasel Halfway F pool, Boundary Lake North Halfway C and D pools, Buick Creek Doig pool, Fireweed b-26-D/94-A-14 Doig pool, Flatrock Halfway C pool, North Pine 6-13-85-18 North Pine pool, Nettle Gething pool, and Nig Creek d-53-A/94-H-4 Baldonnel pool. All approvals were conditional on conservation of gas production.

Following the issuance of an order by the Minister requiring conservation of solution gas produced from wells in the Eagle Belloy oil pools, a number of oil wells in the Belloy F pool were shut-in to await installation of recovery facilities.

OPERATION PROBLEMS IN THE FIELD

During 1978, no major oil spills occurred at field production facilities; however, one pipeline incident and one wellhead mishap are worthy of mention.

The only major pipeline spill which this section monitored occurred when the 8-inch Norcen pipeline in the Wildmint field ruptured due to stress that had been imposed on the pipe during road construction in the fall of 1977. The rupture point was approximately 20 metres from the north side of the East Milligan Creek. Oil spill equipment was installed at a control point on the main Milligan Creek, and by using booms, skimmers, and associated equipment, the majority of the estimated 2 100 barrels spilled was recovered.

The second incident of note occurred at the well GPD Eagle 6-22-84-18, in the newly developed Eagle oil field. It appeared that the 100-barrel oil spill was due to the fact that both the master valve and the wing valve on the wellhead had been opened to about four turns of the valve wheel. The reason for these valves being opened is not known, but appeared to be a deliberate act of vandalism. Due to quick actions taken by both the landowner and by Norcen Energy Resources Limited, a major oil spill was averted. Cleanup operations took place immediately and minimal damage was incurred.

During 1978 no major incidents occurred at drilling sites. One near accident took place at Nuggett Drilling Rig No. 3 during September 1978 when, due to instability of the lease surface, anchor lines were pulled out and the derrick toppled. No damage was done to the blowout preventor system, and the well was safely shut in. After removal of old rig debris, another rig was moved on and drilling operations were concluded.

A fire occurred during August 1978 at Texaco Boundary Lake A battery. The cause of the fire, which totally destroyed the header house and separator building, was attributed to sparks igniting the flow of oil and gas when the cast top blew off a check valve on one of the group oil separators. Oil production at this battery, which normally runs at 6 000 barrels of oil per day, was regained to about 90 per cent by the use of temporary field headers and by tieing in the field satellites directly to the treaters.

EXPLORATION AND DEVELOPMENT

Exploratory and development drilling activity for the 1978 calendar year set a new record high with a total of 393 wells drilled and re-entered compared to 310 wells drilled and re-entered in the previous corresponding period (Fig. 4-20). The over-all drilling program was slightly weighted in favour of exploratory over development activity with 203 and 190 assigned to each classification respectively. Approximately 75 per cent of this total activity took place within the general Fort St. John area.

Exploratory drilling (wildcats and outsteps) carried out in all areas of the northeastern sector of the Province, with exception of the Liard Plateau, resulted in 21 oil completions and 97 gas completions, for an over-all success ratio of 58 per cent. A further breakdown of this activity shows that 65 wells resulted in extensions to established reserves, 5 in New Pool oil discoveries and 48 in New Pool gas discoveries.

All of the oil and 28 of the New Pool gas discoveries were made in the Mesozoic rock sequences of the Fort St. John area. The remaining 20 gas discoveries were completed in the Mesozoic and Paleozoic sedimentary rocks of the general Fort Nelson and Foothills Belt areas. For the most part the Cretaceous and Triassic horizons were the favoured objectives in the southern areas with the Middle Devonian reefs the primary horizon of interest in the northern area.

None of the successful exploratory wells completed in 1978 can be given major gas discovery status. However, several of the Middle Devonian reef wells drilled in the Sierra South area encountered substantial gas reserves. New Pool discoveries in the Fort St. John area resulted in minimal additions to reserves while those wells completed to the south along the Grizzly–Sukunka gas trend could offer a greater volume of reserve with subsequent successful development drilling. In the area drilling is expected to maintain the current rate of high activity as a result of the completion in 1978 of the Grizzly–Chetwynd gas transmission facility.

Development drilling activity resulted in 142 completions out of a total 190 wells drilled, for a success ratio of 75 per cent. Most of the development drilling took place within the general Fort St. John area with successful oil and gas infill and extension wells to a number of established pools. The most active areas included oil development in the Eagle and Stoddart West pools. Gas reserve development was carried out in all areas although the greater part of this activity centred in the Fort St. John area within close proximity of existing gas transmission facilities.

Geophysical activity set a new record for the year with a slight increase in crew weeks over the previous corresponding period (Fig. 4-21). This increase in geophysical effort would indicate a continuation of the current high drilling activity for the coming year. Geophysical crews were active over most of the prospective northeast sector of the Province, with the areas northeast of Fort Nelson and south of the Peace River receiving most of the activity. Within the Foothills Belt area the conventional type of geophysical survey was supplemented by portable crew and helicopter support programs with encouraging results. A total of 243 projects was approved during the year.

Table 1-8—Oil Discoveries, 1978

Well Authorization No.	Well Name	Location	Total Depth (Metres)	Productive Horizon
4506	CZAR et al Squirrel	7-26-87-19	1 525.0	Confidential.
4508	OIL Wolf	d-80-A/94-A-15	1 265.0	Confidential.
4509	Orbit et al Montney	11-2-87-19	1 555.0	Confidential.
4585	Joffre et al Two Rivers	7-2-83-16	1 587.0	Confidential.
4616	Zephyr et al Birch	b-50-1/94-A-13	1 305.0	Confidential.

Table 1-9—Gas Discoveries, 1978

Well Authorization No.	Well Name	Location	Total Depth (Metres)	Productive Horizon
3915	Skelly Getty CS Commotion	a-23-D/93-P-12	4 572.0	Confidential.
3924	Chevron N Helmet	a-81-A/94-P-10	2 045.2	Jean Marie.
3976	Cdn-Sup Fina Ojay	b-57-G/93-I-9	3 998.7	Dunlevy.
4029	BP et al Murray	d-48-I/93-14	2 865.1	Baldonnel.
4043	Pacific Burch	c-31-K/93-P-5	2 723.7	Dunlevy.
4138	Sundance Nig	b-84-C/94-H-4	1 588.0	Gething.
4182	Mobil Sierra	d-64-K/94-I-11	2 209.8	Pine Point.
4198	Mobil Sahtaneh	d-29-L/94-I-11	2 329.9	Pine Point.
4202	Mobil S Sierra	a-51-L/94-I-11	2 325.6	Pine Point.
4217	Highfield Hidrogas Prespatou	c-100-A/94-H-3	883.9	Notikewin.
4227	Cdn Res Dome Cons Suhm	b-5-A/94-P-4	1 882.2	Slave Point.
4230	Chevron Amoco Ekwan	d-65-E/94-I-10	1 780.0	Slave Point.
4232	Canhunter et al Bluebell	d-59-I/94-B-9	2 374.4	Debolt.
4249	Pacific HBOG Boucher	8-26-82-23	1 591.4	Halfway.
4252	Pacific Union Kelly	b-28-I/93-P-1	2 452.1	Cadotte.

Well Authorization No.	Well Name	Location	Total Depth (Metres)	Productive Horizon
4263	Exalta Conuco Ring	b-22-A/94-H-6	1 025.7	Gething.
4275	Imp Union Uno-Tex Noel	c-34-F/93-P-8	2 675.5	Dunlevy.
4276	ATAPCO PCP Klua	d-90-B/94-J-9	2 331.7	Pine Point.
4288	CZAR et al Aspen	d-17-J/94-A-13	1 623.1	Coplin.
4309	GEOG et al Martin	d-39-E/94-H-6	1 306.0	Confidential.
4316	Cdn Res et al Dahl	a-67-C/94-H-9	952.5	Bluesky.
4317	Cdn Res et al Dahl	a-9-C/94-H-9	1 082.0	Bluesky.
4325	Pacific Buffalo	c-94-J/94-I-1	571.5	Confidential.
4328	CZAR et al Goldenrod	b-88-C/94-A-13	1 770.9	Baldonnel.
4331	Mobil et al Sierra	d-98-B/94-I-14	2 347.0	Bluesky.
4343	Quintana et al Elleh	b-8-K/94-I-12	2 046.6	Slave Point.
4345	Pacific et al Tooga	a-71-B/94-P-2	716.3	Bluesky.
4347	Canhunter et al Beargrass	10-4-88-25	1 578.9	Halfway.
4348	Murphy Osprey	c-92-K/94-A-15	1 204.9	Bluesky.
4367	Chevron Amoco Ekwan	b-56-E/94-I-10	517.6	Debolt.
4372	Gulf Trutch	a-49-B/94-G-15	1 691.0	Confidential.
4393	Westcoast et al Velma	d-59-L/94-H-8	1 219.2	Bluesky.
4400	Imp Union-Tex Windsor	b-82-A/93-P-1	2 926.1	Confidential.
4402	Turbo Ranger Pluto	10-14-86-17	1 402.1	Halfway.
4404	Ashland Numac Jeans	d-71-B/94-A-13	1 362.5	Confidential.
4430	BP et al W Doe	11-1-81-15	3 327.5	Confidential.
4436	Pacific et al Laprise	d-39-E/94-H-5	1 267.0	Confidential.
4480	Home Wainoco Sundown	c-34-B/93-P-10	3 100.0	Confidential.
4488	Sabine Wainoco Red	10-12-86-22	2 119.1	Confidential.
4492	Home et al Farmington	10-11-80-15	869.0	Confidential.
4493	Home et al Farmington	11-9-80-15	850.8	Confidential.
4514	Cdn Res Bougie	d-11-F/94-G-15	3 258.0	Confidential.
4526	Wainoco et al Tea	6-34-84-20	2 140.0	Confidential.
4565	Wainoco BCRIC Sojer	d-47-K/94-H-4	1 329.2	Confidential.
4571	Canhunter Wapistan	c-A56-E/94-G-1	2 305.8	Confidential.
4582	Westcoast GAO N Red	10-27-86-21	2 059.7	Confidential.
4586	Highfield et al Aspen	a-81-F/94-A-13	1 705.0	Confidential.
4604	Northstar et al N Sunrise	10-33-79-16	785.0	Confidential.

LAND DISPOSITION

There were seven dispositions of Crown reserve petroleum and natural gas rights held during 1978. These resulted in tender bonus bids amounting to a record total of $177 458 367.82, an increase of $51 990 642.32 from the previous year. The total bonus figure of $67 293 219.34 for the January sale was a record high for any such land sale in Canada. A total of 906 parcels was offered, an increase of 120 over 1977, with bids acceptable on 739 parcels, an increase of 132 over 1977, covering 1 727 588 acres (699 155 hectares), a decrease of 608 606 acres (246 303 hectares). It is of interest while the total parcels purchased increased substantially, the acreage purchased decreased substantially. This is a direct result of fewer permit parcels being offered for purchase and more lease parcels being offered and purchased.


NAHANNI

Activity of the Ministry

CHAPTER 2

CONTENTS

FIGURES

TABLES

HISTORY AND DEVELOPMENT

The Department of Mines was created in 1874. Before that time, mining laws were administered by the Provincial Secretary's Department, to a great extent through Gold Commissioners, the first of whom was appointed in 1858. As the Province grew and mining increased in importance and diversity, the Bureau of Mines was formed as a technical division within the Department. Composed of professional men under the direction of a Provincial Mineralogist, the Bureau lasted from 1896 to 1934, when it was succeeded by the Mineralogical Branch, now the Geological Division of the Mineral Resources Branch. The Department took over administration of the *Petroleum and Natural Gas Act* and the *Coal Act* from the Department of Lands in 1953 and became the Department of Mines and Petroleum Resources in 1960. In a general name change in 1976 it became the Ministry of Mines and Petroleum Resources. On December 4, 1978, the mandate of the Ministry was enlarged to include responsibility for energy matters and it became the Ministry of Energy, Mines and Petroleum Resources. This change occurred so late in the year little action to implement it was possible, and it is scarcely reflected in the remainder of this report.

Prior to December the Ministry's mandate was to administer the laws and regulations governing the entire mineral and petroleum industries, second only to the forest industry in terms of gross value. The Ministry provided major technical services that aid in the orderly development of the Province's natural resources contained in its crustal rocks: metals, minerals, coal, petroleum, and natural gas.

Technical services include geological mapping and related research; guidance, stimulation, and monitoring of exploration; training and aid for prospectors; financial aid in the construction of mining roads; advice to small operators; information to the public; identification of rocks and minerals; promotion of safety in all operations; general betterment of working conditions; encouragement of orderly development and conservation; and maintenance and analyses of resource data. These services are provided in order that new deposits and fields may be found to maintain the industry in order that the known deposits and fields may be worked to the best advantage of the Province.

NEW MANDATE

On December the 4th, Premier Bennett announced major changes in cabinet responsibilities and extensive reorganizational changes within Ministries. The new mandate for the enlarged Ministry of Energy, Mines and Petroleum Resources was announced to be the development and management of an energy policy for the Province of British Columbia and the management of the mineral resources of the Province and conservation of the landscape associated with mining operations. The new Ministry and its mandate meant that for the first time all energy-related responsibilities will be placed under one roof. The new Minister appointed was the Honourable James J. Hewitt, the former Minister of Agriculture. The former minister, the Honourable James Chabot became Minister of Lands, Parks and Housing at the same time.

LEGISLATION

During 1978, four Acts were passed at the Session of the Legislature that directly affect the mining and petroleum industries.

Bill 5, *Revenue Surplus of 1976–77 Appropriation Act, 1978,* was designed to create new employment. Five million dollars of the total appropriation was

allocated to mineral resources. The Accelerated Mineral Development Program resulting from the appropriation is described on pages 43 to 45.

Bill 25, *Mineral Act Clarification Act,* amended sections 51 and 52 of the *Mineral Act* (R.S.B.C. 1960) to make it clear that rent was payable for mineral claims each year since January 1, 1974. This Act was made necessary by a decision of the Justice Richard Anderson in the case of Morris versus the Queen who found that there was no forfeiture for nonpayment of rentals on the plaintiff's mineral claims. The precedent-setting verdict, unfavourable to the Crown, created an extremely serious title problem for both the administration and the industry, requiring clarification of the original intent of the Act. The provision for payment of rent was discontinued by amendment to the *Mineral Act* proclaimed January 1, 1978.

Bill 27 amended the *Coal Act.* In addition to a number of amendments of a housekeeping nature, this Bill

(*a*) increases the amount of the work requirements to extend the term of a licence,
(*b*) allows for unlimited grouping of contiguous licences during first three terms of a licence and grouping of not more than 15 contiguous licences thereafter,
(*c*) changes the royalty to 3.5 per cent of the net minehead value of coal sold,
(*d*) clarifies royalty collection procedures,
(*e*) increases rentals on licences and leases,
(*f*) clarifies the issuance of leases and the issuance and renewal of holding leases, and
(*g*) converts measurements to metric.

Bill 29 amended the *Petroleum and Natural Gas Act.* In addition to a variety of minor amendments of a housekeeping nature, this Bill

(*a*) converts all units of measure to the metric system (SI),
(*b*) implements policy changes respecting new conditions on the length of time leases can be held and continued, and
(*c*) establishes new procedures respecting and pooling of locations for drilling, and unit agreements for production.

Some details of the recommendations are described under Activity of the Petroleum Resources Branch (pages 67 and 68).

ORGANIZATION

The organization of the Ministry operational in 1978 was the same as in 1977 and as shown in the accompanying chart (Fig. 2-1). The only minor change was that the Publications Section, which had operated as part of the Geological Division, Mineral Resources Branch, became functional as part of the Finance and Administration Division during the year.

APPOINTMENTS AND RETIREMENTS

The Honourable James J. Hewitt was appointed Minister of the enlarged Ministry on December 4, 1978. He announced on December 14 that Mr. Roy Illing would be Deputy Minister of the new Ministry and Dr. James T. Fyles would be Senior Assistant Deputy Minister.

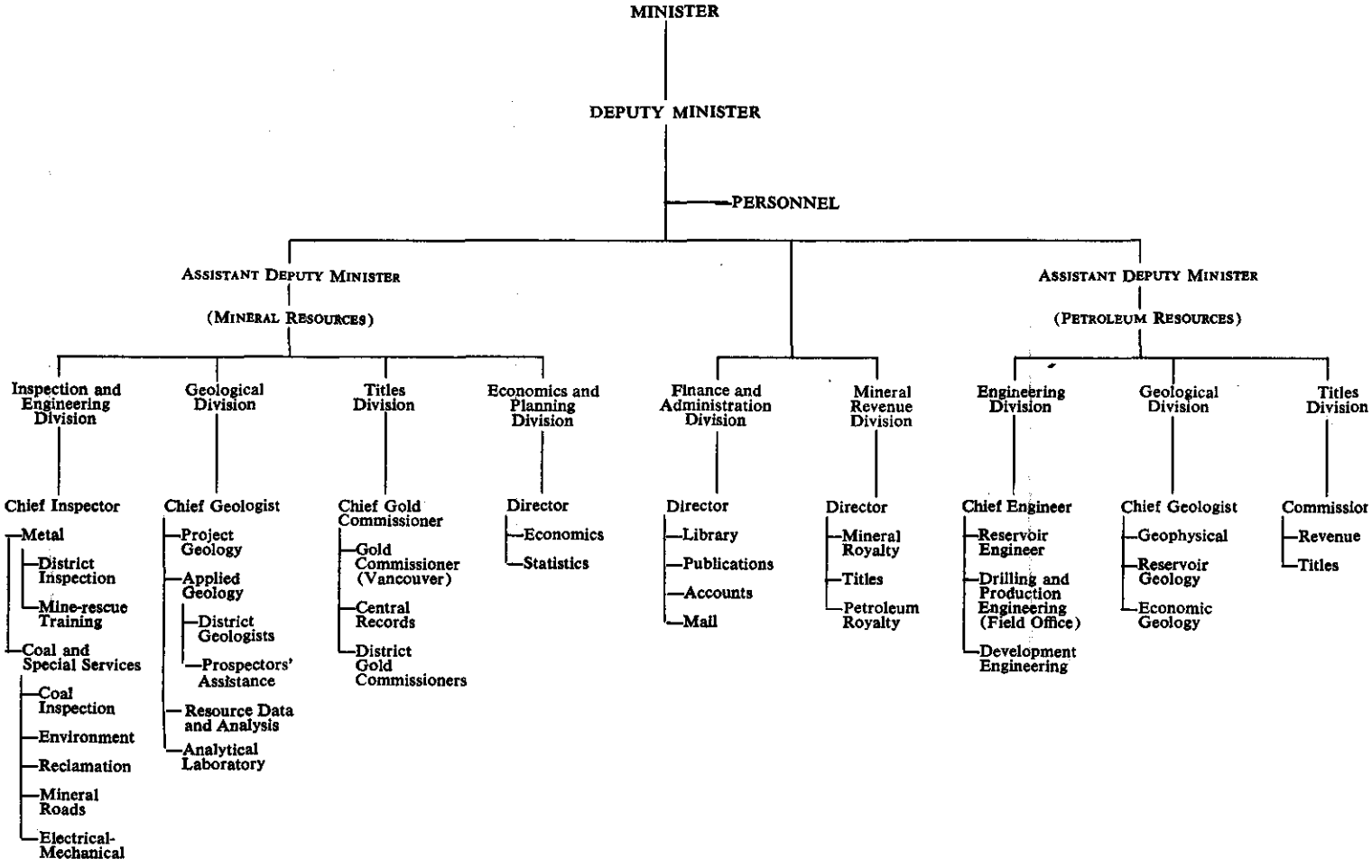


Figure 2-1—Organization Chart, Ministry of Energy, Mines and Petroleum Resources, November 1978

A number of changes in staffing occurred in the Inspection and Engineering Division of the Mineral Resources Branch, as described in the section denoted to that Division. The principal change was that A. J. Richardson was appointed Deputy Chief Inspector of Mines, Metals. He had been 30 years with Cominco Ltd. in various engineering capacities previous to accepting this appointment.

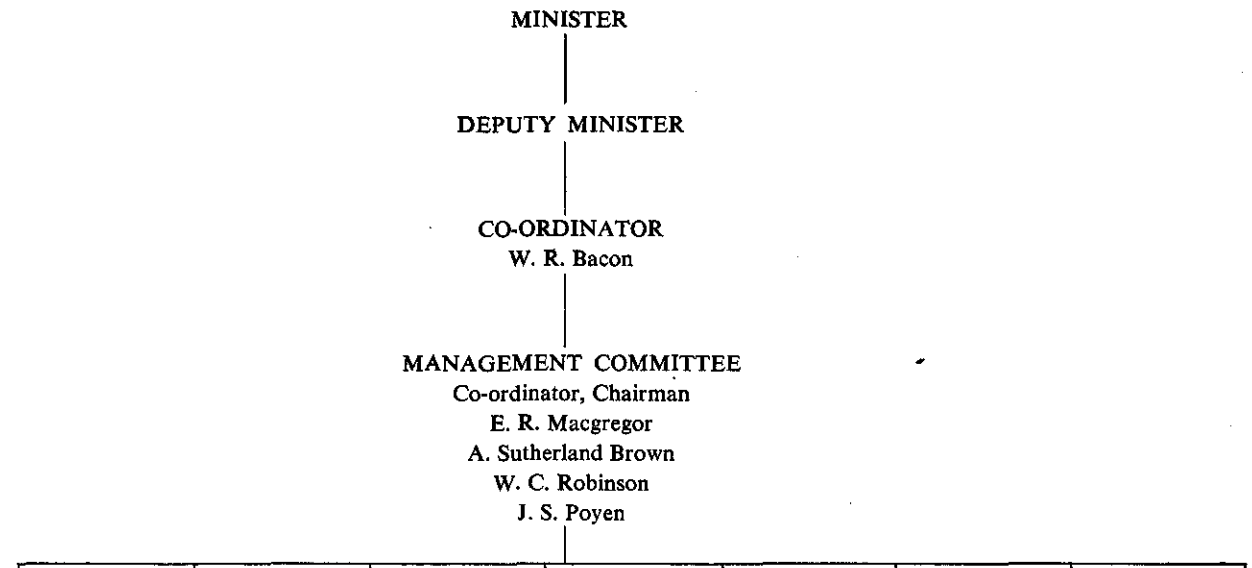
In addition, R. R. Davy, previously with the Ministry of Finance, was appointed Director, Finance and Administration, on May 1, 1978.

ACCELERATED MINERAL DEVELOPMENT PROGRAM

On May 11 the Honourable James Chabot announced an Accelerated Mineral Development Program under Bill 5, *Revenue Surplus of 1976–77 Appropriation Act, 1978*. The objective was to create new employment which will be of lasting benefit during and beyond the period of appropriation. Dr. W. R. Bacon, a well-known consulting mining geologist, was appointed Co-ordinator of the program on May 24, 1978, and the details were quickly formulated. In essence, the Accelerated Mineral Development Program consisted of eight sub-programs of which six had relatively modest budgets but two were more than $1 000 000 each. The total budget was $5 000 000. The programs, their administration, and the original budgets are shown on Figure 2-2. Most programs either paid only labour costs of projects created to avail themselves of the funding or were aimed at direct stimulation of exploration and development. The termination of the programs was to be on March 31, 1979, so many were not completed in the calendar year.

The largest programs were the Accelerated Mine Development and Mineral Exploration Programs, and the Mineral Road Assistance Program. It became expedient to combine the first two. The following list of grants was made to pay labour costs of new projects initiated under the Accelerated Mineral Development Program:

	Locality	$
Producers		
Cassiar Asbestos Corporation Limited	Cassiar	200 000
Wesfrob Mines Limited	Tasu	51 946
Western Mines Limited	Buttle Lake	182 500
Northair Mines Ltd.	Squamish	275 000
Dankoe Mines Ltd.	Keremeos	140 000
Teck Corporation Ltd.	Beaverdell	300 000
Silvana Mines Inc.	Sandon	300 000
Fording Coal Limited	Elkford	50 000
		1 499 446
Developers		
Erickson Gold Mining Corp.	McDame Lake	175 000
Table Mountain Mines Limited	McDame Lake	75 000
Mosquito Creek Gold Mining Company Limited	Wells	75 000
Dungannon Explorations Ltd.	Slocan	56 000
Syber Mines Ltd.	Slocan	20 000
Robert Mines Ltd.	Greenwood	51 000
Gold Belt Mines Inc.	Salmo	175 000
		627 000
Explorers		
Silver Standard Mines Limited	East Kootenays	50 000
St. Eugene Mining Corporation Ltd.	East Kootenays	31 562
Barrier Reef Resources Ltd.	Black Dome Mtn.	25 250
JMT Services Corp.	Queen Charlotte Islands	16 000
DuPont of Canada Exploration Limited	Queen Charlotte Islands	8 505
		131 317
Total		2 257 763
Miscellaneous		
British Columbia Museum of Mining		10 000



Program	Mineral Road Assistance	Accelerated Mine Development	Accelerated Mineral Exploration	Expanded Prospectors' Assistance	Mineral Exploration Incentive	Accelerated Geochemical Survey	Enhanced Mine Site Reclamation	Neutron Activation Analysis Facility
Administration	P. E. Olson	W. R. Bacon		E. W. Grove	E. W. Grove	N. C. Carter	J. D. McDonald	W. M. Johnson
Budget	$1 780 000	$1 200 000	$600 000	$150 000	$500 000	$350 000	$200 000	$170 000
Expenditure	$1 570 000	$2 270 000		$163 000	$367 803	$356 605	$ 94 427	$170 000

Figure 2-2. Organization, Administration, and Budget and Expenditure of the Accelerated Mineral Development Program.

In total, these amounted to 45 per cent of the Accelerated Mineral Development Program.

The other large program was Mineral Road Assistance. This was the only program with a major component directed toward the petroleum industry. Design and site testing of a bridge across the Pine River was completed but the project was not proceeded with because of escalating costs. The funds thus released were applied to preparation of the Sierra–Yoyo access road east of Fort Nelson into the Sierra gas field. The project was continuing at the calendar year-end. In addition, the normal mining road program was augmented.

Three programs represent expansion of ones run by the Geological Division, Mineral Resources Branch. These were an expanded grant program for Prospectors' Assistance, the Accelerated Geochemical Survey, and the Mineral Exploration Incentive Program. These are described on pages 55 to 57.

The Enhanced Mine Site Reclamation Program was designed to revegetate selected old mine tailings areas and clean up abandoned mine sites. Localities at Princeton, Salmo, Phoenix, Hedley, and Jordan River were involved.

Finally, funds were provided to purchase equipment for a neutron activation facility at TRIUMF. Other funding for this development came from the National Research Council. The purpose was to create a viable commercial analysis facility at the accelerator site to service needs of industry, university, and government in western Canada. Positions for five full-time employees were created by the grant and expansion is likely. Analysis of some of the samples from the Accelerated Geochemical Survey was carried out at the facility.

BRANCH ACTIVITY

MINERAL RESOURCES BRANCH

The Mineral Resources Branch, under the direction of Assistant Deputy Minister, Edwin R. Macgregor, consists of four divisions: Inspection and Engineering, Geological, Titles, and Economics and Planning.

INSPECTION AND ENGINEERING DIVISION

Coal mines, metal mines, and quarries were inspected during the year by inspectors stationed at the following listed locations. The inspectors also examined prospects, mining properties, roads and trails, and carried out special investigations under the *Mineral Act*. Dust, ventilation, and noise surveys were carried out by Environmental Control Inspectors under the supervision of S. Elias and, where necessary, recommendations were made regarding improvement to the environmental conditions. The roads and trails program was supervised by P. E. Olson. J. D. McDonald administered the reclamation sections of the *Coal Mines Regulation Act* and the *Mines Regulation Act*. Mine-rescue training was completed under the direction of the Co-ordinators, Mine-rescue Training, for the areas in which their stations were located.

Staff

Inspectors and Resident Engineers

W. C. Robinson, Chief Inspector of Mines ..... Victoria
V. E. Dawson, Deputy Chief Inspector of Mines, Coal and Special Services ..... Victoria
A. J. Richardson, Deputy Chief Inspector of Mines, Metals ..... Victoria
H. Dennis, Senior Inspector of Coal Mines ..... Victoria
T. G. Carter, Senior Inspector of Mines, Mechanical/Electrical ..... Victoria
J. Cartwright, Inspector of Mines, Electrical ..... Victoria
P. E. Olson, Senior Inspector of Mines, Mining Roads ..... Victoria
J. D. McDonald, Senior Inspector of Mines, Reclamation ..... Victoria
D. M. Galbraith, Inspector of Mines, Reclamation ..... Victoria
J. E. Errington, Inspector of Mines, Reclamation (Agrologist) ..... Victoria
S. Elias, Senior Inspector of Mines, Environmental Control ..... Vancouver
D. J. Murray, Inspector of Mines, Environmental Control ..... Vancouver
S. J. L. Miller, Inspector of Mines, Environmental Control ..... Vancouver
J. C. Ferguson, Inspector of Mines, Technician, Environmental Control ..... Vancouver
B. M. Dudas, Inspector of Mines and Resident Engineer ..... Vancouver
W. H. Childress, Inspector of Mines, Technician ..... Vancouver
J. W. Robinson, Inspector of Mines and Resident Engineer ..... Nanaimo
H. A. Armour, Inspector of Mines, Technician ..... Nanaimo
S. J. Hunter, Inspector of Mines and Resident Engineer ..... Prince Rupert
B. Varkonyi, Inspector of Mines, Technician ..... Prince Rupert
J. F. Hutter, Inspector of Mines and Resident Engineer ..... Smithers
S. J. North, Inspector of Mines, Technician ..... Smithers
A. D. Tidsbury, Inspector of Mines and Resident Engineer ..... Prince George
T. Vaughan-Thomas, Inspector of Mines and Resident Engineer ..... Prince George
J. J. Sutherland, Inspector of Mines, Technician ..... Prince George
B. E. Warner, Inspector of Mines, Technician, Reclamation ..... Prince George
K. G. Hughes, Inspector of Mines, Technician, Mechanical ..... Prince George
D. I. R. Henderson, Inspector of Mines and Resident Engineer ..... Fernie
D. Smith, Inspector of Mines and Resident Engineer ..... Kamloops

Inspectors and Resident Engineers—Continued

E. S. Sadar, Inspector of Mines and Resident Engineer ..... Kamloops
J. P. MacCulloch, Inspector of Mines and Resident Engineer ..... Kamloops
J. A. Thomson, Inspector of Mines, Technician ..... Kamloops
R. H. Heistad, Inspector of Mines, Technician, Mechanical ..... Kamloops
J. B. C. Lang, Inspector of Mines and Resident Engineer ..... Nelson
A. L. O'Bryan, Inspector of Mines, Technician, Reclamation ..... Nelson
E. J. Hall, Inspector of Mines, Technician, Reclamation ..... Fort St. John

Co-ordinators, Mine-rescue Training

G. J. Lee, Senior Co-ordinator ..... Victoria
R. F. Brow ..... Nanaimo
J. E. A. Lovestrom ..... Smithers
R. J. Stevenson ..... Prince George
B. A. McConachie ..... Kamloops
E. C. Ingham ..... Nelson
P. J. Switzer ..... Fernie

Staff Changes

In March, E. J. Hall joined the Ministry as Inspector-Technician, Reclamation, in the Charlie Lake office.

S. J. L. Miller joined the Ministry as Inspector, Environmental Control, in the Vancouver office in April. In the same month B. M. Dudas transferred from Kamloops office to the Vancouver office, to replace J. W. Robinson, who moved from there to the Nanaimo office. The vacancy created in Kamloops was filled by J. P. MacCulloch who joined the Ministry as Inspector of Mines and Resident Engineer in July.

A. J. Richardson was appointed Deputy Chief Inspector of Mines, Metals, in May.

S. J. Hunter joined the Ministry in June as Inspector of Mines in Prince Rupert.

A. Littler, Co-ordinator, Mine-rescue Training, in Fernie retired in July and was replaced in August by P. J. Switzer.

In August, H. Dennis was appointed Senior Inspector of Coal Mines in the Victoria office and T. Vaughan-Thomas joined the Ministry as Inspector of Mines and Resident Engineer in the Prince George office.

T. Carter joined the Ministry in September as Senior Inspector of Mines, Mechanical/Electrical, in the Victoria office.

In December, J. C. Ferguson joined the Ministry as Inspector-Technician, Environmental Control, in the Vancouver office.

Mine Safety

The Inspection and Engineering Division has the responsibility of enforcing the observance of the *Mines Regulation Act* and the *Coal Mines Regulation Act* by all persons working at mines in British Columbia. Additional staff were recruited to fill the posts vacated the previous year and some new posts were created and filled. A good standard of co-operation existed at the mines and active safety programs were in effect at the mines throughout 1978.

Certain supervisory grades at the mines are required to hold statutory certificates and for this purpose Boards of Examiners have been appointed from the Inspection and Engineering Division. It is the responsibility of these Boards to

conduct examinations of applicants for various certificates. These are first, second, and third class certificates of competency and open-pit shiftboss certificates under the *Coal Mines Regulation Act* and underground and open-pit shiftboss certificates under the *Mines Regulation Act*. District Inspectors continued to examine for and issue permanent miners', coal miners', and blasting certificates.

Investigations into environmental conditions at mines were continued, with particular attention being paid to the monitoring of the conditions in respect of ventilation, dust, and noise. Further efforts have been made in the industry to reduce dust and noise produced at the mines and preparation plants.

Mine Rescue

Mine-rescue stations, under the supervision of co-ordinators who were qualified instructors in first aid and rescue, were maintained at Fernie, Kamloops, Nanaimo, Nelson, Prince George, and Smithers. Each station was fully equipped with sufficient self-contained, oxygen-supplying, breathing apparatus to maintain at least two rescue teams of six men each and other suitable rescue apparatus was also held at the stations. Some of the equipment owned by the Ministry was loaned to various mining companies to supplement their own equipment.

In 1978, the Ministry owned 59 Aerorlox three-hour liquid oxygen-breathing machines, 43 Draeger BG-174 and 60 McCaa two-hour high-pressure gaseous oxygen-breathing machines, and 64 Chemox one-hour chemical oxygen-producing machines. The equipment owned by industry was 24 Aerorlox, 55 Draeger BG-174, 30 McCaa, and 92 Chemox machines. In addition, each station and most mines had other auxiliary equipment, such as Type N gas masks, self-rescuers, gas detectors, oxygen therapy units, and first-aid equipment.

Periodic visits to mines were made by the district co-ordinators of rescue training. During these visits they gave rescue and first-aid training to open-pit and underground employees and checked the rescue equipment in order to ensure that it was being maintained satisfactorily. In addition, training courses were given in underground, surface, and gravel-pit rescue work and first aid at other centres throughout the Province.

Instructors at the mines, trained by the Ministry co-ordinators, trained or assisted in the training of 318 persons for St. John Ambulance first-aid certificates, and 385 safety-oriented first-aid certificates. Training was also given to 98 men in underground mine-rescue work, 337 men in surface mine rescue, 20 men in gravel-pit rescue, 382 men in mine-rescue survival, and 21 in industrial first aid. Fifteen men received Surface Mine Rescue Instructors' certificates. One hundred and sixty men received advanced Mine Rescue certificates.

The four mine safety associations, sponsored by the Ministry of Energy, Mines and Petroleum Resources and the Workers' Compensation Board, continued to operate in different areas in the Province. They were aided by mining company officials, safety supervisors, inspectors of mines, mine-rescue co-ordinators, and, in some areas, local industry. The association promoted mine-rescue and first-aid training, in addition to safety education in their various districts.

The Vancouver Island Mine Safety Association held their 64th annual mine-rescue and first-aid competition in Nanaimo on May 27. The Western Mines' team, captained by H. Uhrig, won the trophy in the underground mine-rescue event. The Noranda Mines' Boss Mountain team, captained by B. Buys, was placed second and represented the Central British Columbia Mine Safety Association area at the Provincial meet.

The West Kootenay Mine Safety Association held their 32nd annual competition in Nelson on June 3. The Cominco's Sullivan mine team from Kimberley, captained by A. Bruemmer, won the underground mine-rescue event.

The East Kootenay Mine Safety Association held their 57th mine-rescue and first-aid competition in Kimberley on June 10. The Kaiser Resources' team from Fernie, captained by J. Peters, won the trophy.

On May 26, and June 3 and 10, the Central British Columbia Mine Safety Association held their 30th annual mine-rescue and first-aid competition in Smithers, Ashcroft, and Princeton. The Gibraltar Mines' team, captained by P. Beaudoin, won the surface mine-rescue trophy in Ashcroft; the Kaiser Resources' team, captained by A. Gallacher, won the trophy at Princeton; and the Cassiar Asbestos' team, captained by G. Smith, placed first at Smithers.

On June 17, the Provincial Underground and Surface Mine Rescue Competition was held in Nanaimo. The trophy winners were: In the surface mine-rescue event, Kaiser Resources' team from Sparwood, captained by A. Gallacher; and in the underground mine-rescue event, Kaiser Resources' team from Fernie, captained by J. Peters. The underground team represented British Columbia in the Canadian meet, held in Glace Bay, Nova Scotia on June 24, 1978, where six provinces, namely British Columbia, Yukon, Northwest Territories, Alberta, Saskatchewan, and Nova Scotia, competed. The team from Alberta, captained by W. Kinnear, placed first.

The first Provincial Three-Persons' First-Aid event was held in Nanaimo on June 17. This event was won by the Cominco's HB mine team, captained by R. Lofstrom.

Another milestone for 1978 was the Provincial Bench Competition, in which the teams competing had to demonstrate their proficiency in the examination and testing of their apparatus prior to use. This event was in memory of the late B. Abbott, captain of the Cominco's HB mine-rescue team of 1976, and the winner of the Canadian Mine Rescue Competition of the same year. The team from Noranda Mines' Boss Mountain team, Hendrix Lake, captained by B. Buys, won the trophy.

Safety of Mechanical/Electrical Equipment

An upward trend, albeit a slow one, was experienced in the total number of underground pieces of equipment using fire-resistant hydraulic fluids. The legislation requiring the use of these fluids has now been in effect since January 1, 1975, and it is felt that both manufacturers and users of equipment have had a liberal amount of time allocated to them to comply with the regulation requiring their use. It is therefore envisaged that in future it will only be under the most exceptional circumstances that an exemption to the use of such fluids will be granted by the Chief Inspector.

During the year, 831 trucks were reported to be in operation at open pits and quarries. All trucks with a gross vehicular mass greater than 50 tonnes are required by the Ministry to be tested annually for braking performance. Where deficiencies exist, a program designed to improve braking capability is instituted. New trucks being introduced into the Province have all shown excellent braking capability during actual tests. The world's largest haulage truck, the Terex Titan, with a load-carrying capacity well in excess of 300 tonnes, was tested during the year. This truck, having a gross vehicular mass approaching 600 tonnes, was brought to a complete stop in 102 metres from an initial speed of approximately 58 kilometres per hour on a downgrade of 8.6 per cent. Evaluation of the truck's dependability

in relation to other trucks and compatability to existing truck and shovel capacities will probably determine future requirements for trucks of this size.

Meetings of the British Columbia Mobile Equipment Committee were attended at monthly or bi-monthly intervals in an effort to evaluate the safety-related features of new and existing mobile equipment in use in the Province. In addition, the annual meeting of the Canadian Council Committee for Electrical Mechanical Mine Safety at Sudbury, Ontario, was attended by a member of the staff.

Kaiser Resources Ltd. completed construction of the surface and underground electrical installations for their new Panel 6 Hydraulic coal mine located at Michel. Systematic electrical checks were performed in readiness for the anticipated production start-up of early 1979.

The Canadian Electrical Code, Part V, "Use of Electricity in Mines," is currently being revised and will be restructured to comprise four sections as follows: General Requirements; Surface Mining; Underground Metal Mines; and Underground Coal Mines.

Reclamation

Reclamation is administered by the Inspection and Engineering Division, under the authority of section 11 of the *Mines Regulation Act,* and section 8 of the *Coal Mines Regulation Act.* Its objective is to restore lands used in mining, waste disposal, and exploration to useful purpose, compatible with the surrounding countryside.

During 1978, surface work permits were altered from a three or five-year period and are now issued on a permanent basis. An annual reclamation report is still required so that the permit can be revised at any time. A total of 47 new surface work permits (4 metal, 6 coal, 2 mineral exploration, 13 placer, 18 sand and gravel, and 4 quarries) was issued during 1978.

Reclamation progressed satisfactorily during 1978, with most of the disturbance and revegetation activity occurring in the coal-mining industry. The 34 active metal mines reported a total disturbance of 9 612 hectares, of which 315 hectares were revegetated during 1978. The three active coal operations reported a total disturbance of 2 205.9 hectares, of which 193 hectares were revegetated during 1978. The total amount revegetated since 1969 now stands at 1 072 hectares for metal mines and 775 hectares for coal mines.

The second annual Mine Reclamation Symposium was held in March 1978, sponsored by the Ministry of Energy, Mines and Petroleum Resources and the Mining Association of British Columbia. One hundred and sixty-two participants attended the three-day session and heard talks concerning the Ministry's reclamation policy and activities, reclamation planning, site preparation, and other resource problems and solutions.

During the symposium, the reclamation award for 1977 was presented to the Reclamation Research Department of Cominco Ltd. for its outstanding contribution to mine reclamation research in British Columbia. Citations were presented to Elco Mining Ltd. and Kaiser Resources Ltd.

Under the Accelerated Mineral Development Program, funded under Bill 5, the *Revenue Surplus of 1976–77 Appropriation Act, 1978,* the Reclamation Section of the Ministry of Energy, Mines and Petroleum Resources revegetated some of the old mine-waste disposal areas formed prior to mine reclamation legislation. Four areas were treated in the 1978/79 fiscal year: Princeton tailings, Salmo tailings, Phoenix Copper tailings, and the Hedley tailings.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PETROLEUM
RESOURCES
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PETROLOGY

The reclamation section has conducted or commissioned several research studies and during 1978, the following reports were published:

Revegetation of Disturbances in the Northeast Coal Block, Current Activities and State-of-the-Art, 1977. Inspection and Engineering Division, Paper 1978-7.

Reclamation of Lands Disturbed by Mining. Proceedings of the Second Annual British Columbia Mine Reclamation Symposium.

Handbook of Environmental Protection and Reclamation in Coal Exploration (Draft).

Mining and Petroleum Roads

The Ministry of Energy, Mines and Petroleum Resources' road program was continued during 1978 under authority of the *Ministry of Mines and Petroleum Resources Act.* The purpose of the program is to encourage and assist in the development of mineral and petroleum resources in the Province.

During 1978, an expenditure of around $600 000 was made under Bill 5 to provide all-weather access to gas exploration and production areas east of Fort Nelson. This program is expected to continue for several years. Also under Bill 5, about $300 000 was spent on engineering studies and designs to provide access to a gas field between the Pine and Moberly Rivers.

In the order of $230 000 was spent during the year for the purpose of upgrading an airfield at Kutcho Creek and to build a new one in the Sturdee River area. These airstrips greatly facilitate exploration and will become even more important as mining in those areas progresses.

During the year, around $500 000 was spent to upgrade the Omineca road, build new bridges, and improve the Takla Lake spur road. This expenditure included the cost of roadside reclamation, environmental studies, and engineering design related to the Omineca road.

About $200 000 was spent on approximately 25 smaller projects throughout the Province in improving mineral exploration access roads.

Geological Division

Objectives and Organization

Metals, non-metallic minerals, and coal are non-renewable judged by the scale of man's lifetime. The Province's needs for these commodities for our own use and for export are fulfilled only by continuous exploration and discovery. The fundamental role of the Geological Division is to facilitate the renewal process. To do this the detailed objectives of the Geological Division are to provide accurate and current information on the quantity and distribution of mineral and coal deposits of the Province for Government and industry, to provide geological, geochemical, and geophysical maps and other data, ideas, and interpretations useful in the search for these deposits, and to assist in the orderly exploration, development, and use of these resources. To carry out these objectives, the Division is organized into four sections: Project Geology, Applied Geology, Resource Data and Analysis, and Analytical Laboratory.

Staff

The permanent staff on December 31, 1978, included 26 professional geoscientists, 6 chemists, 9 clerks, and 12 technicians.

A. Sutherland Brown, Ph.D., P.Eng. ..... Chief Geologist

Project Geology

N. C. Carter, Ph.D., P.Eng. ..... Senior Geologist
P. A. Christopher, Ph.D., P.Eng. ..... Geologist
B. N. Church, Ph.D., P.Eng. ..... Geologist
G. E. P. Eastwood, Ph.D., P.Eng. ..... Geologist
R. D. Gilchrist, B.Sc. ..... Geologist
T. Höy, Ph.D., P.Eng. ..... Geologist
W. J. McMillan, Ph.D., P.Eng. ..... Geologist
A. Panteleyev, Ph.D., P.Eng. ..... Geologist
D. E. Pearson, Ph.D., P.Eng. ..... Geologist
V. A. Preto, Ph.D., P.Eng. ..... Geologist
J. L. Armitage ..... Chief Draughtsman
R. E. Player ..... Lapidary and Photographer

Applied Geology

E. W. Grove, Ph.D., P.Eng. ..... Senior Geologist
A. F. Shepherd, B.A.Sc., P.Eng. ..... Geologist
G. G. Addie, M.Sc., P.Eng. ..... District Geologist
G. H. Klein, B.A.Sc., P.Eng. ..... District Geologist
T. G. Schroeter, M.Sc., P.Eng. ..... District Geologist
G. P. E. White, B.Sc., P.Eng. ..... District Geologist
R. H. Karst, B.Sc. ..... District Geologist
D. A. Grieve, M.Sc. ..... District Geologist

Resource Data and Analysis

J. A. Garnett, Ph.D., P.Eng. ..... Senior Geologist
K. E. Northcote, Ph.D., P.Eng. ..... Geologist
Z. D. Hora, M.Sc. ..... Geologist
E. V. Jackson, B.Sc., P.Eng. ..... Geologist
G. L. James ..... Systems Analyst
J. E. Forester, M.A. ..... Research Officer
A. Matheson, B.Sc. ..... Research Officer

Analytical Laboratory

W. M. Johnson, Ph.D. ..... Chief Analyst
R. F. Ralph, L.R.I.C. ..... Deputy Chief Analyst
B. Bhagwanani, B.Sc. ..... Laboratory Scientist
R. J. Hibberson, B.Sc. ..... Laboratory Scientist
Y. T. J. Kwong, M.Sc. ..... Laboratory Scientist
V. V. B. Vilkos, Ph.D. ..... Laboratory Scientist
M. A. Chaudhry ..... Laboratory Technician
F. F. Karpick ..... Assayer
L. E. Sheppard ..... Laboratory Technician

Staff Changes

During 1978, district coal geologists were appointed: In Charlie Lake, R. H. Karst filled this new position and supervised the coal core storage facility there; in Fernie, D. A. Grieve was appointed to a similar position.

The Work of the Division

The distribution in 1978 of major projects and of district offices is shown on Figure 2-3.

Project Geology

The work of this section is devoted to geological mapping of areas important for mineral resources and regional geochemical reconnaissance surveys useful for both exploration and environmental base line studies. The section mounted 12 main field projects at a total field cost of about $250 000 and two main geochemical reconnaissance surveys at a cost of $470 000. One of the latter was a Federal/Provincial cost-shared project, the other costing $350 000 was supported entirely by Bill 5, the *Revenue Surplus of 1976–77 Appropriation Act, 1978.* Salaries and other costs of the section totalled about $400 000.

The geochemical projects are done by a series of separate contracts with only planning, supervision, and control provided by the Division.

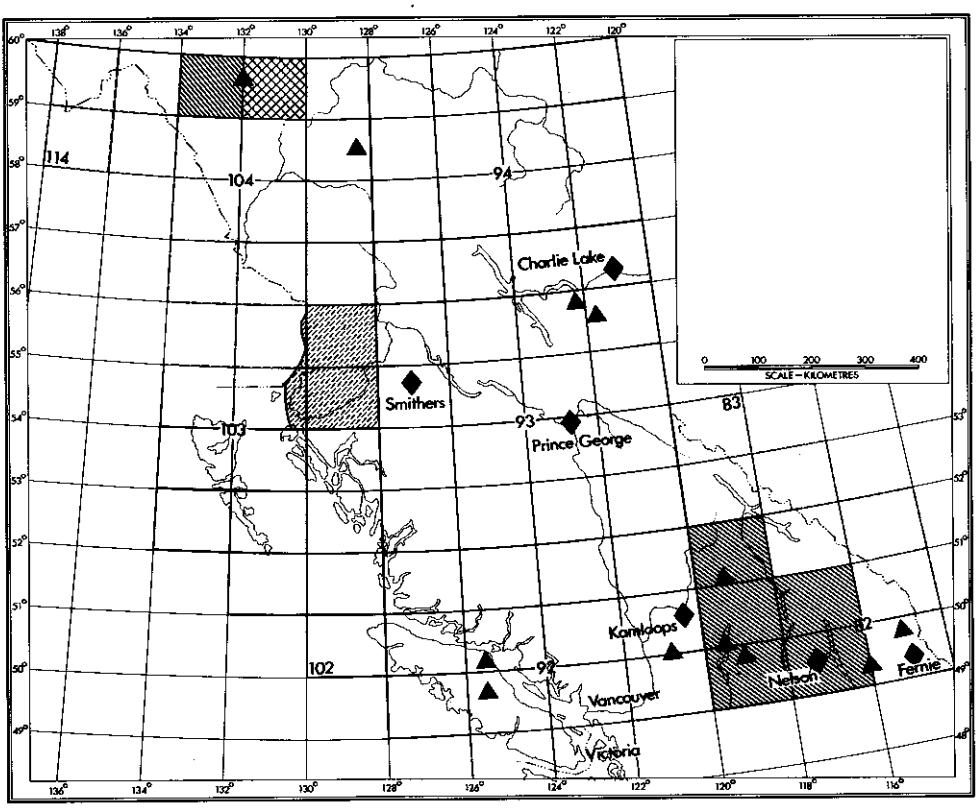

Figure 2-3—Geological and Geochemical Project Areas, District Geologist Offices, 1978.

A considerable part of the effort of the section is devoted to prospectors and small developers, and these programs were augmented in 1978 by funds from Bill 5. Over 400 students in 22 centres were enrolled in basic prospecting courses in 1978 and 34 prospectors graduated from the two-week-long advanced field school held at Selkirk College, Castlegar. Two hundred and twenty-two prospectors received grants under the *Prospectors Assistance Act*. In addition, a new program (Mineral Exploration Incentive Program) with a budget of $500 000 was started under Bill 5 to act as a fiscal bridge between prospecting and preliminary development. The Mineral Exploration Incentive Program provided grants up to one-third of the receipted cost of approved programs to a maximum of $50 000. Forty contracts were let in 1978.

The costs of these programs were approximately as follows: Core repository and recovery, $99 000; prospector training, $20 000; Prospectors' Assistance grants, $365 000 ($163 000 from Bill 5); field programs of district geologists, $110 000; salaries and overhead, $260 000. The field studies of this section are also reported in the publication *Geological Fieldwork* and elsewhere but much of their work is service oriented.

Resource Data and Analysis Section

This section is responsible for the collection, compilation, interpretation, and distribution of exploration and development data gathered from various sources. Most of the information is readily available after requisite confidential periods, normally one to three years. The major files are: MINFILE, a shallow computer file of over 8 000 mineral occurrences; assessment report file, over 7 000 microfilmed reports available at reader/printers in Vancouver or Victoria; property files of historic maps and data from producers and prospects recovered from many sources and filed by NTS system; and industrial minerals reference files. In addition, a computerized coal data file is being constructed under contract jointly with the Geological Survey of Canada, and a computer file of statistics on producing mines and major prospects is underway. The annual volume, *Exploration in British Columbia,* is produced by the section coincident with its update of MINFILE.

In addition, the section administers the Portable Assessment Credit account, produces map compilations and mineral potential evaluation studies related to land-use conflicts, and advises on regulations. Field-oriented studies related to industrial minerals and structural materials are also handled by this section.

The costs of this section were approximately as follows: Field studies, $25 000; MINFILE and analyses, $65 000; coal file construction, $100 000; salaries and overhead, $200 000.

Analytical Laboratory—The laboratory, under Dr. W. M. Johnson, is responsible for a complete range of analytical services for the Division geologists and prospector grantees as well as some services to other government agencies. The laboratory also runs control samples and handles the chemical data for the British Columbia geochemical surveys. The Chief Analyst is also responsible for assayer examinations for the Province. In 1978, the Chief Analyst was largely responsible for the Ministry's funding under Bill 5 of a $170 000 grant to Novatrack Ltd. to help create a neutron activation facility at the TRIUMF cyclotron at the University of British Columbia.

The facilities include X-ray fluorescence, atomic absorption and emission spectrography, X-ray diffraction, gamma ray spectrometry, and mineral separation. Capability in traditional wet analytical chemistry still exists. Instrument output is fully computerized.

The Analytical Laboratory had a productive year in 1978 in terms of both output and method development.

Method Development—The hydride generation method for arsenic, tin, selenium, tellurium, antimony, and other metals was investigated and used for arsenic very successfully. Work was done on a standard reference uranium ore. The Laboratory reported value was 7.07 per cent uranium as compared with the consensus value of 7.09 per cent. Further work was done on the use of a mercury amalgam as a means of concentrating gold for subsequent measurement by atomic absorption spectrometry.

Output—Wet Chemical and X-ray Fluorescence Laboratory: There are 539 results on 179 samples submitted by prospectors, 3 348 results on 993 samples from prospector grantees, and 12 276 results on 2 440 samples submitted by Ministry personnel. This represents a total of 16 728 results on 3 605 samples.

Emission Spectrographic Laboratory: There were 43 770 semi-quantitative determinations on 1 459 samples of which 7 200 were reported. In addition, there were 565 quantitative determinations.

X-ray Diffraction Laboratory: There were 533 mineral identifications made, clay mineralogy studies were done on 311 samples, 100 quartz and R.I., and 116 semi-quantitative zeolite determinations were made. In addition, work was done with both Dr. Pearson and Dr. McMillan on co-operative projects in coal and zeolite metamorphism respectively.

Sample Comminution: There was a total of 3 370 samples received and prepared for analytical work, 2 200 from geologists and 1 170 from prospectors and prospector grantees.

Mineral Separation: There were 46 mineral separations made, one of which required a separation into 20 fractions.

Two assayer examinations were held with a total of 13 examinees writing. Three certificates of efficiency were awarded for the May examination and, at the date of this writing, no decision has been made for the examinees for the December examination.

Costs of the laboratory were: Materials and supplies, $62 000; salaries and overhead, $200 000.

Publications

During 1978 supervision of the Ministry Publications Section was handed over to Finance and Administration Division. Publications prepared by the Division include the following:

Prepared yearly:

Geological Fieldwork—a preliminary account of work of the Division published as soon as possible after completion. Now published as part of the paper series of the Ministry.

Geology in British Columbia—a fuller treatment augmented by laboratory and office studies and usually a year or so after completion.

Exploration in British Columbia—a report that summarizes and collates all known exploration in the Province based on reports filled out jointly by the Division and industry personnel.

At irregular intervals:

Bulletins—these are generally the result of three or four years' work and commonly of areas of significant mineral potential. In 1978 two were published:

Bulletin 68—*An Analysis of Distribution of Mineral Occurrences in British Columbia* by A. J. Sinclair, H. R. Wynne-Edwards, and A. Sutherland Brown.

Bulletin 70—*Geology and Mineral Occurrences of the Southern Hogem Batholith,* by J. A. Garnett.

Preliminary Maps, usually white prints issued as soon as compilations are complete with brief accompanying notes. In 1978, the following four were issued:

Map 27—*Geology Map of the Crowsnest Coalfield, West Part,* by D. E. Pearson and D. A. Grieve (part of NTS 82G; scale—1:10 000).

Map 28—*Geology Map of the Estella–Kootenay King Area,* by Trygve Höy (NTS 82G/12 and 13; scale—1:25 000; approximately 240 square kilometres).

Map 29—*Geology of the East Okanagan Uranium Area (Kelowna to Beaverdell), South-Central British Columbia,* by P. A. Christopher (NTS 82F/10W, 11E, 14E, and 15W; scale—1:50 000).

Map 30—*Geology of the Guichon Creek Batholith,* by W. J. McMillan, (NTS 92I/2W, 6E, 7W, 10W, 11E, and small areas of 14E and 15W; scales—1:100 000 and 1:25 000).

Other map series issued included:

Joint Federal/Provincial geochemical reconnaissance maps from the Uranium Reconnaissance Program of 82 F and K in the Kootenays and 104N Atlin.

Mineral Deposit/Land Use maps were issued of southeast British Columbia, that is, Victoria (92B/C), Vancouver (92G), Pemberton (92J), and Bute Inlet (92K).

In addition, regularly updated maps in the following series are available:

Mineral Inventory Maps, issued as ozalid prints, show location and commodities of all known mineral deposits.

Assessment Report Index Maps show the location and number of reports accepted for assessment credit by the Ministry.

No open file reports nor aeromagnetic maps were issued during 1978.

The Division was involved in the publication of a booklet *Minerals in British Columbia,* by Angus M. Gunn of the University of British Columbia. This was intended to inform the public about the metal and energy minerals industries.

Titles Division

The Titles Division of the Mineral Resources Branch is under the direction of the Chief Gold Commissioner and is responsible for the administration of the Provincial laws relating to the acquisition of minerals and coal.

Staff

E. J. Bowles ——— Chief Gold Commissioner
R. Rutherford ——— Deputy Chief Gold Commissioner
D. Doyle ——— Gold Commissioner, Vancouver

Gold Commissioners and Sub-recorders are appointed for the 24 Mining Divisions throughout the Province and their duties are specified in writing by the Chief Gold Commissioner.

Table 2-1—Gold Commissioners and Claim Inspectors

Mining Division	Phone	Location of Office	Name
Alberni	723-3501	4515 Elizabeth Street, Port Alberni V9Y 6L5	W. G. Mundell
Atlin	651-7577	Box 100, Atlin V0W 1A0	E. J. Johnstone
Cariboo	992-5591	102, 350 Barlow Avenue, Quesnel V2J 2C1	R. Campbell
Clinton	459-2268/69	Box 70, Clinton V0K 1K0	W. R. Anderson
Fort Steele	489-2311	102—11th Avenue South, Cranbrook V1C 2P2	W. L. Draper
Golden	344-5221/22	Box 39, Golden V0A 1H0	J. Olson
Greenwood	442-8642	Box 850, Grand Forks V0H 1H0	S. Matsuo
Kamloops	372-5233	Court House, Kamloops V2C 1E5	N. R. Blake
Liard	387-6246/55	411 Douglas Building, Parliament Buildings, Victoria V8V 1X4	E. A. H. Mitchell
Lillooet	256-7548	Box 70, Lillooet V0K 1V0	M. Sakakibara
Nanaimo	754-2111	Courthouse, Nanaimo V9R 5J1	R. H. Archibald
Nelson	352-2211	Box 730, Nelson V1L 5R4	H. S. Tatchell
New Westminster	525-0375	100, 403 Sixth Street, New Westminster V3L 3B1	T. P. McKinnon
Nicola	378-9944	Box 339, Merritt V0K 2B0	L. P. Lean
Omineca	847-4411	Box 340, Smithers V0J 2N0	A. W. Milton
Osoyoos	493-1719	Courthouse, Penticton V2A 5A5	L. D. Sands
Revelstoke	837-3222	Box 380, Revelstoke V0E 2S0	D. G. B. Roberts
Similkameen	295-6957	Box 9, Princeton V0X 1W0	W. L. Marshall
Skeena	624-2121	Courthouse, Prince Rupert V8J 1B7	I. Williams
Slocan	353-2338	Box 850, Kaslo V0G 1M0	Mrs. J. James
Trail Creek	362-7324	Box 910, Rossland V0G 1Y0	A. D. Sherwood
Vancouver	688-2208	800 Hornby Street, Vancouver V6Z 2C5	D. Doyle
Vernon	545-2387	Courthouse, Vernon V1T 4W5	N. A. Nelson
Victoria	387-6246/55	411 Douglas Building, Parliament Buildings, Victoria V8V 1X4	E. A. H. Mitchell

Claim Inspectors

D. Lieutard, 401, 350 Barlow Avenue, Quesnel V2J 2C1.
R. T. Morgan, Box 877, Smithers V0J 2N0.
F. A. Reyes, 800 Hornby Street, Vancouver V6Z 2C5.
H. S. Turner, 212, 2985 Airport Drive, Kamloops V2B 7W8.

The recording of locations and of work on mineral claims as required pursuant to the provisions of the *Mineral Act,* and the recording of work on placer leases as required under the *Placer Mining Act,* must be made at the office of the Gold Commissioner for the Mining Division in which the claim or lease is located. The statistics for the Gold Commissioner's office are shown on Table 2-2.

Central Records Office (Victoria and Vancouver)

Copies of records of mineral claims and 2-post claims recorded in the offices of Gold Commissioners are forwarded to the office of the Chief Gold Commissioner daily, while transcripts of all other recording in the offices of the Gold Commissioners are sent twice monthly.

Information concerning claims and leases and the ownership and standing of claims and leases in any Mining Division may be obtained from the Gold Commissioner for the Mining Division in which the property is situated or from the Ministry's offices, Room 411, Douglas Building, Victoria, and 800 Hornby Street, Vancouver, the office of the Gold Commissioner.

The records and maps, showing the approximate positions of mineral claims held by record and of placer leases, may be viewed by the public during regular office hours in Victoria and at the office of the Gold Commissioner in Vancouver. The position of mineral claims held by record and of placer leases is plotted from details supplied by the locators. Prints of mineral and placer titles reference maps at a scale of 1:50 000 may be obtained from the Victoria and Vancouver offices.

Appointed officials in the office of the Gold Commissioner at Victoria and the Gold Commissioner at Vancouver act as Sub-recorders for all Mining Divisions.

Table 2-2—Gold Commissioner's Office Statistics

Mining Division	Free Miners' Certificate		Lode Mining						Placer Mining				Revenue			
	Individual	Company	Mineral Claims Units	Work Numbers	Cash in Lieu	Bills of Sale, Etc.	Mining Leases Issued	Lease Rentals	Lease Issued	Work Numbers	Cash in Lieu	Bills of Sale, Etc.	Extensions	Free Miners Certificate	Mining Receipts	Total
					$			$			$			$	$	$
Alberni	90	3	276	574	4 950	23	.....	1 990	2	.....	.....	.....	.....	1 180	13 605.50	14 785.50
Atlin	158	2	2 358	2 529	23 760	32	.....	366	17	134	3 900	29	1	1 335	63 242.50	64 577.50
Cariboo	1 289	5	2 093	4 021	32 780	71	.....	9 544	201	478	4 900	84	7	7 450	121 306.84	128 756.84
Clinton	56	.....	1 351	421	49 500	24	.....	104	8	34	.....	3	.....	255	16 165.63	16 420.63
Fort Steele	272	4	1 369	5 950	18 370	62	.....	2 488	11	49	.....	.....	1	2 445	67 715.00	70 160.00
Golden	133	8	358	1 099	17 600	27	.....	1 028	9	1	300	1	.....	3 005	30 180.20	33 185.20
Greenwood	163	4	4 315	3 976	31 680	86	.....	6 108	3	15	100	4	.....	2 050	90 620.50	92 670.50
Kamloops	575	13	4 546	9 246	35 310	141	.....	16 082	8	16	300	1	.....	6 380	132 523.00	138 903.00
Liard	233	1	1 553	5 886	74 910	89	.....	3 664	43	109	.....	12	.....	1 440	145 637.50	147 077.50
Lillooet	111	5	487	1 093	12 430	25	.....	2 118	7	26	300	18	1	1 855	29 719.00	31 574.00
Nanaimo	261	2	490	1 317	8 030	21	.....	824	.....	.....	.....	1	.....	1 720	34 899.90	36 619.90
Nelson	328	5	1 067	795	3 190	51	.....	896	3	4	.....	1	.....	2 570	21 318.00	23 888.00
New Westminster	803	10	632	1 587	13 200	38	.....	2 162	17	42	600	4	.....	6 420	37 777.50	44 197.50
Nicola	74	1	779	3 645	4 180	64	.....	1 488	.....	.....	.....	.....	.....	730	34 119.00	34 849.00
Omineca	413	4	6 124	9 633	63 910	214	.....	21 336	15	50	1 500	13	1	4 166	198 559.50	202 725.50
Osoyoos	268	4	1 584	2 053	33 880	29	.....	7 870	.....	.....	.....	.....	.....	2 415	61 083.00	63 498.00
Revelstoke	125	3	778	2 018	40 480	41	.....	998	2	9	50	.....	.....	1 160	64 081.00	65 241.00
Similkameen	158	3	762	1 521	19 030	31	.....	6 346	32	82	.....	16	.....	1 730	45 679.00	47 409.00
Skeena	240	2	1 105	2 713	51 480	35	.....	4 128	.....	8	.....	1	.....	1 440	90 074.84	91 514.84
Slocan	197	8	1 990	973	17 380	71	.....	5 234	.....	2	.....	.....	.....	3 675	43 607.00	47 282.00
Trail Creek	61	4	941	485	1 980	14	.....	698	.....	.....	.....	.....	.....	1 820	11 621.50	13 441.50
Vancouver	2 371	331	501	902	11 670	35	.....	1 972	.....	.....	.....	.....	.....	133 145	43 715.45	176 860.45
Vernon	462	4	1 308	2 554	11 770	59	.....	654	5	12	.....	.....	.....	3 145	33 760.65	36 905.65
Victoria	603	105	475	714	1 980	16	.....	80	14	10	200	6	.....	41 995	41 386.51	83 381.51
Total, 1978	9 444	531	37 242	65 705	583 450	1 299	.....	98 178	397	1 081	12 200	205	11	233 526	1 472 398.52	1 705 924.52
Total, 1977	7 566	520	37 151	39 711	384 500	782	1	105 412	146	928	31 325	102	50	221 546	2 013 668.39	2 234 051.14

Mineral and Placer Title Maps

The initial program of redrawing mineral titles reference maps which are produced for the public on a scale of 1:50 000 was completed in 1977 and the entire Province is now available at this scale. A new mapping program on the same scale using superior Ottawa base maps has been commenced. These maps will show contours and should be of great assistance to the prospector.

During 1978, 15 new mineral titles reference maps were drawn.

Five hundred and four applications were received for placer leases under a new system, established in 1975 with the proclamation of a new *Placer Mining Act,* of only accepting applications for leases in designated placer areas.

Mineral Claims Inspectors are based at Kamloops, Smithers, Vancouver, and Quesnel. Their duties include checking the locations of mineral claims to correlate them with the plotted position of the claims, determining the validity of the staking under the *Mineral Act* and the *Placer Mining Act* and regulations, investigation of possible misuse of mineral claims, and investigations of disputes. In order to fulfill the objectives of providing claim-holders with firm title and maintaining accurate and up-to-date records, the activities of the inspectors have increased with the use of the modified grid system.

During 1978 as a result of seven complaints under section 50 (formerly section 80) of the *Mineral Act,* seven mineral claims were cancelled. Two complaints were dismissed.

The Gold Commissioner's office in Vancouver is now equipped with a microfilm reader which will allow the general public to view technical reports. The Xerox machine will print these reports at a nominal cost. The Vancouver office should now become a greater source of information for the mining community.

Coal

The Coal Administrator is responsible to the Chief Gold Commissioner for the daily administration of the *Coal Act.* This involves reviewing applications for coal licences and leases and maintenance of records of title.

The statistics related to coal licences for 1978 are shown in Table 2-3.

Table 2-3—Statistics for Coal Licences, 1978

Number of coal licences issued	793
Approximate area of coal licences issued	205 000 hectares
Annual rental	$1 046 517.00
Application fees	6 190.00
Cash in lieu of work	77 460.00
Miscellaneous fees	6 405.00

ECONOMICS AND PLANNING DIVISION

Objectives

The Division provides economic and financial analyses pertaining to Provincial mineral sector policy, legislation, and planning and also collects, maintains, and disseminates comprehensive statistical data in support of Ministry resource management responsibilities.

Staff

The professional staff of the Division as at December 31, 1978, was as follows:

J. S. Poyen	Director
F. C. Basham	Assistant Director
J. F. Clancy	Senior Research Officer
W. P. Wilson	Mining Statistician
D. R. Ramage	Financial Analyst

Review of Activities

The Division's mineral statistics service, in addition to its normal activities of collection, analysis, and reporting of mineral statistical information, continued with a project which will result in the computerization of most data now assembled on a manual basis. A monthly metal mine data input program was mounted, and the introduction of reporting and tabular output computer reports is scheduled for late 1979. Economic and financial analyses projects in 1978 included the initiation of a project to develop a financial/economic analysis model (MINSIM) for metal mining projects in the Province. This analytical tool will contribute to Government benefit-cost evaluations of new mining projects.

Staff in the group also participated in a major analysis of mineral taxation impacts on mining in the Province. This work led to the publication of a joint Federal/Provincial report on mineral taxation which was endorsed by Mines and Finance Ministers in November 1978.

The Division's responsibility for coal project economic appraisals was applied to a number of potential developments in the northeast and southeast areas of the Province. Such appraisals are required under the *Guidelines for Coal Development* in order to assist the Government in identifying the economic effects of such projects and in the evaluation of public sector infrastructure investments made in support of mining projects. Staff in the group also proceeded on enhancements to the computer model (COALMOD) used to conduct these evaluations.

Other major Division contributions included participation in a resource management study for sand and gravel, development of a computerized metal price data base, and research and analysis of compensation/mitigation policy pertinent to the mining sector.

The responsibility of the statistical section is, on a monthly and annual basis, to mail out, collect, edit, compile, and organize mineral statistics as required for the Annual Report and other intergovernmental uses. In order to reduce the reporting burden on the industry, these surveys are done on behalf of Statistics Canada and the Department of Energy, Mines and Resources, Ottawa. The section is currently involved in a number of committees relevant to mineral statistics, including Mines Ministers' Subcommittee on Mineral Statistics, Consultative Council for Mineral Statistics, Coal Statistics, and represents the Government of British Columbia on such committees. The Task Force on Mineral Valuation has made a thorough review of all major mineral surveys in use throughout Canada in a continuing effort to obtain the most meaningful statistics available and at the same time avoid duplication. An internal project is underway which ultimately will computerize most of the data received from the Monthly and Annual Survey of Mines.

PETROLEUM RESOURCES BRANCH

ORGANIZATION

The Petroleum Resources Branch, under the general direction of Assistant Deputy Minister J. D. Lineham, Chief of the Branch, administers the *Petroleum and Natural Gas Act* and the regulations made thereunder, including the Drilling and Production Regulations, the Geophysical Regulations, the Drilling Reservation Regulations, and the Development Road Regulations. It also administers the *Underground Storage Act, 1964*. Therefore, the Branch is responsible for all matters related to the disposition of Crown-owned petroleum and natural gas rights as well as the regulation of the exploration, development, and production phases of the oil and gas industry.

The Branch is divided into three Divisions, namely, the Engineering Division, the Geological Division, and the Titles Division.

Engineering Division

The Engineering Division, under the direction of Chief Engineer A. G. T. Weaver, is responsible for all engineering activities of the Petroleum Resources Branch.

There are three main functions:

(1) Enforcement of the Drilling and Production Regulations under the *Petroleum and Natural Gas Act,* together with provision of advice to the Minister with respect to applications made by industry under the Act.

(2) Collection, filing for Branch and public use, and publication of drilling and production statistics, production and disposition data, reservoir and pool performance data.

(3) Reservoir analysis of all oil and gas pools in the Province, including maintenance of current production rate forecasts together with data concerning reserves discovered to date and estimates of potential reserves growth.

The Development Engineering Section, under the supervision of Senior Development Engineer W. L. Ingram, licenses drilling and service rigs, issues well authorizations, and maintains detailed records pertaining to all drilling and production operations.

The Reservoir Engineering Section, under the Senior Reservoir Engineer B. T. Barber, is concerned with all reservoir engineering aspects of the Division's activities. The 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 to forecast ultimate recoveries obtainable from oil and gas accumulations in the Province, and the rates at which these volumes will be produced. Oil and gas allowable rates are set by the section, and recommendations concerning proposed improved recovery and produced fluid disposition schemes are made.

The Drilling and Production Engineering Section, under the supervision of District Engineer D. L. Johnson, is located at the field office at Charlie Lake and is primarily responsible for enforcement of the Drilling and Production Regulations in the field. It also collects reservoir and other data as required, acts in a liaison capacity with industry at the field level, and maintains core and drill sample storage and examination facilities.

Geological Division

The Geological Division consists of two sections, under the direction of Chief Geologist W. M. Young, and is responsible for all geological activities of the Petroleum Resources Branch. The Division is accountable for the collection, compilation, and assessment of geological and related information concerned with the exploration for and development of petroleum resources within producing and nonproducing areas of the Province; assisting in the framing of development procedures to ensure conservation and the best returns from these resources; estimating the remaining undiscovered petroleum resources used for the prediction in forecasts of oil and gas production; and providing data and opinions to attract, assist, and encourage industry in the development of the Province's petroleum resources.

The Economic Geology Section, under the supervision of Senior Economic Geologist J. A. Hudson, is responsible for the co-ordination and direction of projects concerned with regional mapping and the assessment of undiscovered petroleum resources.

The Reservoir Geology Section, under the supervision of Senior Reservoir Geologist R. Stewart, is responsible for the co-ordination and direction of projects concerned with the detailed mapping and assessment of discovered petroleum resources.

Titles Division

The Titles Division consists of two sections, under the direction of Commissioner R. E. Moss, and is responsible for administering those parts of the *Petroleum and Natural Gas Act* relating to and affecting title to Crown petroleum and natural gas rights. The Division administers the disposition of Crown petroleum and natural gas rights and, in consultation with the Engineering and Geological Divisions, approves and selects parcels for posting, and accepts or rejects the tenders received.

The Titles Section is responsible for all transactions involving petroleum and natural gas permits, all leases, natural gas licences, drilling reservations, geophysical licences, notices of commencement of exploratory work, affidavits of work, unit agreements, and miscellaneous recordings.

The Revenue Section, under W. J. Quinn, is responsible for the collection of all petroleum and natural gas revenue, except royalty, payable to the Crown under the provisions of the Act.

Staff

On December 31, 1978, the professional and senior staff included the following:

Assistant Deputy Minister, J. D. Lineham, P.Eng. ..... Chief of Branch

Engineering Division

A. G. T. Weaver, P.Eng. ..... Chief Engineer
W. L. Ingram, P.Eng. ..... Senior Development Engineer
M. B. Hamersley, C.E.T. ..... Development Technician
W. Duncan ..... Administrative Supervisor
B. T. Barber, P.Eng. ..... Senior Reservoir Engineer
P. S. Attariwala, P.Eng. ..... Reservoir Engineer
L. Pepperdine, P.Eng. ..... Reservoir Engineer
P. K. Huus ..... Reservoir Technician

J. H. Burt	Reservoir Technician
D. L. Johnson, P.Eng.	District Engineer
D. E. Krezanoski, P.Eng.	Field Engineer
D. A. Selby	Field Technician
G. T. Mohler	Field Technician
J. L. Withers	Field Technician
B. Baraniski	Field Technician
G. L. Holland	Field Technician
R. W. Nyffeler	Field Technician
G. German	Geophysical Technician

Geological Division

W. M. Young, P. Eng.	Chief Geologist
R. Stewart, P.Eng.	Senior Reservoir Geologist
T. B. Ramsay, P.Eng.	Reservoir Geologist
J. J. English	Reservoir Geologist
J. A. Hudson, P.Eng.	Senior Economic Geologist
K. A. McAdam	Economic Geologist

Titles Division

R. E. Moss	Commissioner
W. J. Quinn	Assistant Commissioner

Staff Changes

In the Engineering Division, D. Krezanoski and R. Nyffeler joined the District staff at Charlie Lake as Field Engineer and Field Technician respectively. W. Duncan joined the Victoria staff as Administrative Supervisor.

In the Geological Division, D. Dewar, Economic Geologist, resigned to join industry and J. J. English joined the Branch as a Reservoir Geologist.

HIGHLIGHTS OF THE PETROLEUM RESOURCES BRANCH ACTIVITIES

This section describes the highlights of both the technical and administrative work carried out by the various parts of the Branch during 1978.

Legislation

The *Petroleum and Natural Gas Act* was amended, in part, to make minor housekeeping changes, to convert all units of measure to the metric system (SI), and to provide for the following:

(*a*) entry of land for the purposes of the *Underground Storage Act, 1964* to be obtained by application to the Mediation and Arbitration Board established under the *Petroleum and Natural Gas Act;*

(*b*) greater flexibility in the approval for locations for drilling wells on permits and subsequent leasing of locations;

(*c*) reduction of the term of leases from 10 to 5 years for designated areas considered workable for most of the year;

(*d*) reversion to the Crown of rights to oil and gas in a lease below the base of the deepest known commercial production. This stratigraphic reversion is effective at the end of the initial term of a lease or January 1, 1985;

(*e*) a lease, at the end of its initial term, may be continued only for the spacing area on which a commercial well is located and for such

other spacing areas as may be drained by the well. The remainder of the original lease converts to the Crown;

(*f*) for continuation of a lease beyond its initial term when drilling is being performed to the satisfaction of the Minister;

(*g*) continuation of a lease term under penalty reduced from four years to five years with increased penalties;

(*h*) in the event of a dispute concerning pooling, the Branch may invite submissions from interested parties rather than hold a hearing;

(*i*) the spacing, pooling, and licensing of all wells in the Province, including any wells located on freehold lands, must comply with the provisions of the Act and regulations;

(*j*) the disposal of Crown reserve oil sand, oil sand products, oil shale, and oil shale products under such terms and conditions as determined by the Minister;

(*k*) to prevent waste and for the approval of schemes to maximize production of oil and gas;

(*l*) the Minister may order the unitization of an area provided that at least two-thirds of the working interest owners in the area, who have agreed in writing to a proposed plan of unit operations, have made application for a unitization order.

In addition to the above, the Drilling and Production Regulations issued under the Act were amended to convert all measurements and numerical data into SI (metric) units. For many months before this conversion, meetings had been held with representatives from other oil-producing provinces in an attempt to develop common petroleum industry operating standards for all jurisdictions. Uniformity was achieved except when special circumstances made this impractical.

Mediation and Arbitration Board

CHAIRMAN: Glen B. Pomeroy
VICE-CHAIRMAN: Cecil Ruddell
MEMBER: John Martin

The Mediation and Arbitration Board, established under the authority of the *Petroleum and Natural Gas Act,* grants rights of entry to oil and gas companies over alienated lands, and determines conditions of entry and compensation therefore. The Act provides for a process of mediation by a member of the Board appointed by the Chairman. Failing satisfactory agreement between the parties upon mediation, the Act provides for final disposition by the Board of entry conditions and compensation. The Board is also charged with the responsibility to review and set compensation on leases and previous Board orders of more than five years' duration, and to terminate rights of entry when an operator has ceased to use occupied lands.

In 1978, 68 field inspections were carried out by the Board. The Board made 36 entry orders, and held eight arbitration hearings to set compensation. The Board met 94 times during the year to deal with general Board matters and specific concerns of the public.

Engineering Division

The high level of petroleum activity in 1978 imposed a heavy regulatory and administrative work load on the Division. In addition to these more routine duties, the Division also had many dealings with other Crown agencies and presented

submissions to the British Columbia Energy Commission Hearings and to two hearings held by the National Energy Board.

Important projects completed by the Division during the year included the complete conversion of appropriate legislation to SI (metric) standards, the design of engineering requirements for Government approval of underground gas storage projects, participation with other jurisdictions and industry in the standardization of reserves terminology, and the introduction of a procedure for Ministry participation in petroleum road maintenance and construction. These items are described more fully in the following summaries of work carried out by the three sections of the Engineering Division.

Development Engineering—The Development Engineering Section is responsible for the administration of all matters related to the location, drilling, completion, and abandonment of wells in the Province. This involves the assurance that operators of all wells located, drilled, and produced conform with the Drilling and Production Regulations and submit the required applications, reports, and information to the Branch.

Approval of well authorizations to drill proposed well locations is granted by the section after review and reference to the Titles and Geological Divisions. In 1978 there were 466 well authorizations issued, an increase of 24 per cent over 1977. Throughout the life of a well, the status, well name, and classification may be changed as circumstances require. During the year statuses were changed on 121 occasions, well names on 117, and well classifications on 35.

In addition to comprehensive well data records, all geological and geophysical reports submitted for work credits as well as the Branch correspondence files of the three Divisions are maintained by the section. The program to microfilm all significant full-sized documents for security purposes and to establish a library in microfiche format was continued. At the end of 1978 the first 3 500 well data files were in this library with plans to have some of the technical staff use this format on a trial basis. This scheme will be employed for records a few years old but the later documents will be used in the full size until entered into the system. Two items not included in this plan are the Daily Drilling Reports and the full-scale logs.

The changeover of measurements to SI for drilling operations was put into effect on July 1, 1978 and at the beginning of 1979 all measurements related to production and transportation will be converted. All Government-issued forms were reprinted and distributed to the industry to meet these deadlines while conversion of the relevant computer programs was near completion at year-end.

Each drilling and service rig operating in the Province must have a valid Rig Licence. During 1978, 88 licences were renewed while 34 new ones were issued.

Drilling and Production Engineering—This section is located in the district office at Charlie Lake in northeast British Columbia. During 1978, approximately 162,710 miles were driven by the field staff of this section to enforce at the field level requirements of the Drilling and Production Regulations and the Geophysical Regulations, both made pursuant to the *Petroleum and Natural Gas Act.*

The year began with six regular field technicians on staff but, due to the heavy work load imposed by unusually high drilling and subsequent production operations, the staff complement was increased by the addition of a field engineer and another field technician. During the year increased emphasis was placed on inspections at oil and gas production facilities to ensure compliance with gas conservation orders and to attend to reduce needless flaring of oil and gas. Such inspections were carried out on 609 different occasions at oil and gas battery facilities.

To check the accuracy and reliability of gas measurement equipment, gas production was monitored closely with fast meter checks being done on 631 occasions and complete meter checks being made on another 431 occasions.

To ensure the reliability and to augment data received by our Victoria Reservoir Engineering Section, 145 static pressure gradients were run, 18 gas well flow tests were witnessed, and six oil well production tests were witnessed. Further in keeping with Branch policy that all surface pressure elements be calibrated to the Provincial standard, which is maintained at the Charlie Lake office, 1 492 such calibrations were performed during 1978.

Geophysical field activity increased greatly during 1978, with 176 seismic field inspections being made compared to 64 during 1977.

The high level of drilling activity which had started in 1977 carried forward throughout 1978, and as an indication of the activity there were, after a short spring breakup during April and May, an average 33 active wells each month from June to the end of October 1978.

During 1978, 403 wells were spudded and in the course of 781 inspections on active drilling sites emphasis was placed on ensuring that the drilling rigs, both those that had been previously working in the Province and those ones newly in, were mechanically acceptable to Branch standards.

This section continued its involvement with the Northeastern British Columbia Oil Spill Co-operative, taking an active part in all meetings and training exercises. This involvement was recognized during 1978, when the Branch was asked to become an associate member of the PROSCARAC (Prairie Regional Oil Spill Containment and Recovery Advisory Committee) established under the auspices of the Canadian Petroleum Association.

Reservoir Engineering—An important responsibility of the Reservoir Engineering Section is to estimate on a continuing basis the oil and gas reserves in British Columbia. Estimates as of December 31, 1978 are shown in Table 4-3 and are summarized below.

Oil, established	185 930 MSTB	29 546 10^3m^3
Natural gas, established—		
Raw	8 719 BSCF	245 635 10^6m^3
Marketable	7 105 BSCF	200 173 10^6m^3
Natural gas liquids—		
Propane	8 289 MSTB	1 316 10^3m^3
Butane	12 535 MSTB	1 991 10^3m^3
Pentanes plus	24 258 MSTB	3 855 10^3m^3
Sulphur	7 558 MLT	7 679 10^3t

It may be observed from Table 4-3 that the oil reserves have increased 19.1 MMSTB (3.0 10^6m^3) from last year. Additions due to drilling and revisions were 16.7 MMSTB (2.6 10^6m^3) and 15.0 MMSTB (2.4 10^6m^3) respectively. Production reduced the reserves by 12.6 MMSTB (2.0 10^6m^3).

Raw gas reserves at the end of 1978 were 0.45 TSCF (12 600 10^6m^3) higher than last year. Additions due to drilling and revisions were 0.75 TSCF (21 100 10^6m^3) and 0.05 TSCF (1 400 10^6m^3) respectively. Production reduced the reserves by 0.35 TSCF (9 900 10^6m^3).

The Branch has adopted a revised method for the determination of established marketable gas reserves. This method consists of accumulating initial established reserves of raw gas, cumulative production, and remaining established reserves by plants (operating, planned, or anticipated) and applying to these volumes actual shrinkage values from field production to marketable gas volumes at the tailgate

of the plant. These shrinkage values were derived by averaging data for the four years, 1974 to 1977. In previous years volumes of raw gas were converted to volumes of "residue" gas by allowing for theoretical volume reductions due to removal of acid gases in processing plants and, also, removal of certain percentages of liquid hydrocarbons in the Fort St. John plant. It should be noted, therefore, that volumes of "residue" gas published in past years should not be directly compared to volume of marketable gas shown in Table 4-3.

British Columbia took part during the year in a task force on Uniform Reserve Terminology consisting of representatives from the western producing provinces, the National Energy Board, and industry. This task force was set up by the Interprovincial Advisory Committee on Energy (IPACE) to develop a set of terms which could be acceptable to all sections of the petroleum business in Canada for the reporting of reserve estimates. After a series of meetings unanimity was reached by the task force on terms to be proposed for general application. These were subsequently accepted by the Ministry and will be adopted by all British Columbia Government agencies involved in the estimation of oil and gas reserves.

An estimate of established remaining reserves and producibility by years for the period 1978 to 2002 of raw and residue natural gas and natural gas liquids, together with estimates of future discoveries, was included in the Ministry's submission to the British Columbia Energy Commission's Oil and Gas Price Inquiry in June 1978. Also included were estimates of established remaining reserves and producibility by years for the period 1978 to 1995 of crude oil together with estimates of future discoveries, modifications to existing waterfloods, and tertiary recovery.

An estimate of established remaining reserves and producibility by years for the period 1978 to 1995 of crude oil and pentanes plus together with estimates of future discoveries, modifications to existing waterfloods, and tertiary recovery was prepared for inclusion in the Province's submission to the National Energy Board at a hearing into "Canadian Oil Supply and Requirements" during May to June 1978. An estimate of established remaining reserves and producibility by years for the period 1978 to 2000 of raw and marketable natural gas together with estimates of future discoveries was prepared for inclusion in the Province's submission to the National Energy Board at a hearing into "Natural Gas Supply and Demand" during October to November 1978.

The estimates presented to the National Energy Board indicate that daily oil producibility from established reserves and future discoveries may decline from 37.3 MSTB in 1978 to 11.9 MSTB in 1995; daily producibility of pentanes plus is expected to remain constant at about 3.3 MSTB through 1980 and then decline to about 1.3 MSTB in 1995. Annual producibility of raw natural gas is predicted to increase from 391 BSCF in 1978 to 496 BSCF in 1983 and remain essentially constant in the 475- to 500-BSCF range through 2000.

A review of the literature dealing with underground storage was undertaken for the purpose of establishing a procedural guide for industry when making application for approval of a scheme of underground hydrocarbon storage in an aquifer under the *Underground Storage Act, 1964*. The information needed by the Branch to enable it to evaluate an application and make recommendations to the Minister has now been determined and these requirements will be published in the next update of the Procedural Handbook.

Geological Division

Economic Geology—The published subsurface mapping series of the northeastern sedimentary basin area was updated and revised to include released information as of April 30, 1978. This subsurface coverage, which includes most of the major producing horizons, is available on both a 1:100 000 and 1:250 000 mapping scale. The latter scale is a composite of eight map sheets and therefore provides a broad regional perspective of the mapped horizon.

A new 1:100 000-scale drillstem test and penetration compilation map series started in 1977 was completed during the year with released information posted as of April 30, 1978. These maps show for all wells outside designated field boundaries the deepest geological formation penetrated, all formation drillstem tests, and the zone(s) in which gas and oil wells are completed. In addition to the latter information and within the designated field limit the penetration map will show drillstem tests in horizons other than that productive in the field as well as the formation at total depth for wells which have penetrated below the lowest productive horizon within the field.

The section was very active in assisting other Divisions, Ministries, Crown agencies, and the public in matters concerning regional geology and estimates of the remaining undiscovered petroleum resources. Frequent meetings were held with various industry representatives to discuss aspects of geology, geophysics, and the petroleum resource potential of the northeastern producing area.

Reservoir Geology—As a result of a record year in drilling activity, the Reservoir Geology Section carried out a demanding program of assessment and mapping in detail all oil and gas accumulations encountered by the drill. Structural, stratigraphic, and reservoir geologic data made available through drilling were used as the basis for new and revision-type map work, reservoir studies, evaluation of reserves, and the control of remedial work, cycling, repressuring, and secondary recovery projects.

During the year substantial changes resulted from new drilling and studies in the following pools and corresponding hydrocarbon-bearing rock unit(s): Boundary Lake North—Halfway, Buick Creek—Dunlevy and Doig, Buick Creek North—Bluesky, Cabin—Slave Point, Cache Creek—Coplin and Halfway, Dahl—Bluesky, Eagle West—Belloy, Fireweed—Dunlevy, Fort St. John—Charlie Lake, Kotcho Lake East—Slave Point, Pocketknife—Debolt, Sierra—Pine Point, Silver—Bluesky, Stoddart—Cecil, Stoddard West—Belloy, and Wilder—Halfway.

The most significant change as a result of development drilling took place in the Stoddart West-Belloy oil pool which was extended to include approximately 1 457 hectares of productive area. Other noteworthy extensive successes included the Halfway and Baldonnel gas in the Sundown and Ojay areas respectively.

Several new fields encompassing previous single and double well pools were designated as Altares, Birch, Goose, Gundy Creek West, and Klua as a replacement of Clarke Lake South, Thetlaandoa North, and Wolverine. The outlines of all designated fields and pools are revised on a quarterly basis.

A considerable amount of time was employed in assessing the volumetric oil and gas reserves of wells as a basis in determining production allowables. Controversy with industry over assigned reservoir parameters was frequent with noteworthy examples in the Devonian carbonates where the operator was reluctant to penetrate the complete gas-bearing interval. Other problem areas were encountered at Eagle West and Stoddart West as a result of questionable rock lithology in wells which did not have a complete core recovery over the whole of the productive zone.

As a result of the above problems, the section conducted special studies on the Devonian reef distribution in the Yoyo, Sierra, Junior and Ekwan area, and the Belloy rock lithology in the Eagle West and Stoddart West oil pools. The inter-relationship of tight Devonian reef, porous reef, and shale deposits was determined from structure, isopach, and cross-sectional displays. This mapping was then used in conjunction with reservoir pressure depth plots as a means of estimating the over-all gas-bearing interval in wells which did not penetrate the gas/water interface. Belloy cored data from the Eagle West and Stoddart West oil pools were used in constructing density plots, core porosity-log porosity cross-plots, and porosity-permeability cross-plots for the purpose of assigning net oil pays within sections containing variable rock lithologies.

Routine assistance was provided in advising other Divisions with geological evaluations and assessments of Crown lands posted for disposal of petroleum and natural gas rights; petroleum and natural gas lease extension renewals; the reclassification of wells for the purpose of confidentiality of information and new pool discovery status; geological appraisal concerning industry production schemes; and the disposal of water production.

Titles Division

One of the basic responsibilities of the Titles Division is to issue licences permitting a company to carry out geophysical exploration. During the year 34 geophysical licences were issued or renewed, an increase of 12 from 1977. One Unit Agreement was approved. A total of 258 notices of commencement of exploratory work was recorded, an increase of 94 from the previous year. These notices are required prior to the commencement of any geological and geophysical exploration for petroleum and natural gas. With the exception of one program done in the Queen Charlotte Islands and one in the Fraser Valley, all geophysical activity was undertaken in the northeast corner of the Province. During the year 378 geophysical crew weeks were worked and approximately 13 744 kilometres of line recorded resulting in an increase of 99 crew weeks and 5 389 kilometres of line over that of 1977.

During the year the mapping section continued with the ongoing program of updating and converting base maps to 1:50 000 scale. Of particular interest were the seismic road and trail maps which are updated on a daily basis using a base with the topography screened so these maps become very useful in the field when determining the location of lines for new seismic programs.

In addition to its normal activities, the Division spent considerable time assisting in special projects with other Ministries in matters relating to petroleum tenure rights and lands. Very frequent meetings were held with various industry representatives concerning tenure to petroleum and natural gas rights, Crown sales, and their administration under the terms of the *Petroleum and Natural Gas Act* and regulations.

One of the major projects of the Division was the selection, description, terms of the licence agreement, and evaluation of the petroleum and natural gas rights transferred to the British Columbia Resources Investment Corporation. By the end of the year three permits had been issued to British Columbia Resources Investment Corporation and one well had been drilled. In addition, several seismic programs were in progress over licensed lands.

During the year two permits were issued for oil sand and oil shale exploration in Graham Island. By the end of the year drilling was in progress on these permits.

The Division was involved in discussions and preparation of amendments to the *Petroleum and Natural Gas Act* which became effective on July 1, 1978. Many changes were of a housekeeping nature but substantial amendments were made involving the tenure and continuation of a lease term.

By the end of the year, approval was given to add two clerical positions to the staff of the Division to assist in processing the very heavy volume of work created as a result of 1978 being the year of record-breaking interest in land acquisition, exploration, and drilling. As of December 31, 1978, 21,873,776 acres (8 852 317 hectares) or approximately 34,178 square miles, an increase of 862,642 acres (349 111 hectares) over the 1977 total of Crown petroleum and natural gas rights issued under the *Petroleum and Natural Gas Act* were held in good standing by operators ranging from small independent companies to major international ones. The form of title held, total number issued, and acreage of each case were as follows:

Form of Title	Number	Acreage	Hectares
Permits	421	12,496,271	5 057 241
Natural gas licences	2	18,678	7 559
Drilling reservations	107	1,052,921	426 117
Lease (all types)	5 056	8,305,906	3 361 400
Totals		21,873,776	8 852 317

During 1978 the following transactions were completed:

1. PERMITS—	
Issued*	40
Renewed	304
Converted to lease	43
Cancelled	45
Transferred (assigned)	34
2. DRILLING RESERVATIONS—	
Issued	52
Renewed	50
Converted to lease	34
Cancelled	34
Transferred (assigned)	12
3. LEASES—	
Issued	939
Annual rental paid	3 260
Renewed for 10-year term†	39
Extended under penalty†	86
Extended NOT under penalty†	219
Cancelled	37
Transferred (assigned)	659
4. NATURAL GAS LICENCES‡—	
Issued	3
Renewed	*Nil*
Converted to lease	1
Cancelled	2
Transferred (assigned)	*Nil*

* Includes three BCRIC permits.
† From January 1, 1978 to June 30, 1978 only.
‡ From July 1, 1978 to December 31, 1978: Leases continued, 110; leases continued with penalty, 83.

	Number Advertised	Number Sold
5. CROWN SALES—		
Permits	35	35
Drilling reservations	59	52
Leases	812	652
Totals	906	739
6. GEOPHYSICAL LICENCES—Issued		34
7. NOTICE OF COMMENCEMENT OF EXPLORATORY WORK—Approved		258
8. AFFIDAVITS OF WORK—Approved		
Permits		86
Leases		18
9. MISCELLANEOUS RECORDINGS (mergers, grouping notices, etc.)—Approved§		2 400
10. UNIT AGREEMENTS—Approved		1

§ Estimated.

MINERAL REVENUE DIVISION

The Mineral Revenue Division is responsible for the assessment and collection of royalties and resource taxes imposed on metallic and non-metallic minerals, the development of which is subject to the administrative jurisdiction of the Ministry of Energy, Mines and Petroleum Resources. To execute its assigned responsibilities, the Division has a staff of 21 permanent employees and one temporary employee. Under the direction of W. W. Ross, it is organized into five functional areas as follows: The Mineral and Petroleum Accounting sections, under B. A. Garrison, Assistant Director; the Mineral Titles Section, under N. D. Smith, Chief Titles Officer, who reports directly to Mr. Garrison; the External Audit Section, under A. R. Lockwood; and the staff stenographic services, under Mrs. J. Skrypnick, both of whom report to Mr. Ross. Primary responsibilities of the Division which have not changed during the year are outlined in the 1977 Annual Report. This report is confined to summarizing 1978 performance.

COAL ROYALTY REGULATIONS UNDER THE COAL ACT

On June 29, 1978, the *Coal Amendment Act, 1978,* was given royal assent. Under the Act, section 29 was amended to provide a royalty based on 3.5 per cent of the minehead value of coal produced and sold, rather than the flat rate royalties of $1.50 per ton for metallurgical coal, and 75 cents per ton for thermal coal. B.C. Regulation 290/78 was approved and ordered on July 13, 1978, to initiate the new provisions of section 29 of the Act.

During 1978, 2 805 225 tonnes of coal was reported as shipped and sold which yielded royalty payments of $4 222 054.58; however, an audit of production for the period 1974–1977 resulted in increased tonnages subject to the payment of royalty, and accounted for an additional collection of $808 682.61 for total receipts from Crown coal during the year of $5 030 737.19.

IRON ORE ROYALTY AGREEMENTS UNDER THE MINERAL ACT

Two producers were subject to the payment of a royalty of $1.00 per long dry ton of contained iron in iron concentrates produced and sold during 1978. The royalty provisions deem a concentrate to have an iron content of 50 per cent, and

allows a credit against royalty payments of 50 per cent of the royalty payable where exploration work has been performed. During 1978, 486,026.057 long dry tons of iron concentrates with a deemed iron content of 243,013.029 long dry tons was reported as shipped and sold which yielded royalty payments of $121 506.53.

MINERAL LAND TAX ACT

The *Mineral Land Tax Act,* which imposes a tax on the ownership of freehold mineral rights, was converted to metric standards during the year. The basic tax under the Act ranges from 62 cents per hectare to $2.47 per hectare with a minimum assessment of $10.00 depending upon total area held by an owner. Where land is designated as a "Production Area," the basic assessment becomes $4.94 per hectare, and if the land is designated as a "Production Tract," a mill rate assessment, not exceeding 25 mills is applied to the assessed value of the production tract in addition to the basic charge of $4.94 per hectare. During 1978, the only designated production tracts subject to a mill rate assessment of 12.5 mills were those tracts which produced coal, petroleum, or natural gas during the year.

Mineral land tax assessment notices for 1978 were issued by May 1 on a total of 521 647.42 hectares under 6 124 folios. This represents increases of 1 182 folios or 24 per cent and 23 929.68 hectares or 5 per cent over the 1977 mineral land tax assessment roll. A summary of the 1978 mineral land tax assessment roll and the related taxes assessed and collected are reflected in the following table:

Table 2-4—Mineral Land Tax Assessment Roll

Classification of Mineral Land	Number of Folios	Hectares	Tax Assessed	Taxes Forgiven on Agricultural Land	Tax Collected
			$	$	$
Non-designated	6 060	503 465.73	330 623.42	82 763.04	288 841.45
Production areas	53	14 156.41	69 932.67	.....	59 850.91
Production tracts	11	4 025.28	7 966 148.91	.....	7 814 105.08
Interest	.....	.....	3 270.27	.....	(1)
Delinquent taxes	.....	.....	46 957.65	.....	(1)
Totals	6 124	521 647.42	8 416 932.92	82 763.04	8 162 797.44

[1] Interest and delinquent tax collections included in tax collected for each classification.

During 1978, the Mineral Titles Section carried out 27 767 title searches including 2 694 special search requests for the Water Resources Branch of the former Ministry of the Environment. As a result of the searching activities, 2 024 parcels covering 93 024.04 hectares were added to the roll, and five surrenders covering 124.71 hectares were processed. Preliminary searches were also completed to facilitate the surrender of mineral rights in the "lieu lands" of the Esquimalt and Nanaimo Railway Belt located north of title 7434A. It is anticipated that this surrender will be completed in 1979. The Division also processed forfeitures on 97 folios covering 167 lots for a total of 3 471.83 hectares.

Audits were completed on nine mines which resulted in a reduction of $9 331 600 in assessed values, and a tax adjustment of $116 645.00.

Professor John Bedford Evans resigned as Chairman of the Mineral Land Tax Review Board in December to take up a position in Australia. Fortunately, actions before the Board have been adjourned *sine die* pending the final disposition of an appeal on the Honourable Mr. Justice Berger's findings on specific questions of law put to the Supreme Court of British Columbia by the Mineral Land Tax Review Board. The rulings were sought as the result of an appeal before the Board, and a consolidated action before the Supreme Court. On December 5, 1978, the Honourable Mr. Justice Berger pronounced his judgment finding that:

> The effect of these reasons is to uphold the validity of the regulations under which assessments have been made. The administrator has the power now under the Act and regulations to make assessments on production tracts, and these assessments may be retro-active. But the assessment made against production tracts before the coming into force of the Amending Act—I refer to the assessments in issue in these proceedings—have no legal force and effect, and no tax can be levied under them. All moneys paid by the companies under these assessments must be returned.

An appeal has been initiated on the Honourable Mr. Justice Berger's decision, but it is not likely that this will be dealt with until late 1979.

Mineral Royalties Act

This Act was repealed as of January 1, 1977; however, six audits remained at the close of 1977, and these have now been completed with additional assessments of $372 641. Also, the Crown was successful in its claim against Consolidated Churchill Copper Corporation Ltd. for delinquent royalties, and collected $336 637.78 on that account. Total net revenue received during the year under this Act was $699 316.19.

Mineral Resource Tax Act

The *Mineral Resource Tax Act* imposes a 17.5-per-cent tax on the profits earned from the operation of a mine, within the Province, which produces minerals as defined under the *Mineral Act*. A review of annual returns indicated that 38 returns were filed for fiscal years ending in 1977, and that net aggregate income was $53 367 407.33 which resulted in a gross tax payable of $11 112 995.52 which, after deduction of allowed royalty credits of $2 847 218.46, paid for the 1976 calendar year, yielded a net tax payable of $8 265 777.06. Actual revenue collections for the year under the Act were $8 922 987.92. The Audit section reviewed 25 of the annual returns submitted and issued 19 assessment notices for a net credit adjustment of $114 826.26.

Petroleum and Natural Gas Royalties

Petroleum and natural gas production from Crown lands is subject to the payment of a royalty under the Petroleum and Natural Gas Royalty Regulations, with the proviso that any gas sold under contract to the British Columbia Petroleum Corporation is exempt from the payment of royalty. The revenue collections for the year are as follows:

Table 2-6—Petroleum and Natural Gas Revenue Collection, 1978

	$
Natural gas royalties	72 729.14
Crude petroleum royalties	42 191 349.49
Natural gas by-product royalties	1 074 867.41
Penalties	510.00
Total	43 339 456.04

The petroleum exploration incentive program was terminated in 1978; however, any established credits may be redeemed in accordance with the provisions as previously specified. The transactions completed during the year for oil credits are reflected in the following statement.

Table 2-5—Mineral Revenue Collections, 1978

Month	Petroleum and Natural Gas Royalties					Mineral Resource Royalties and Taxes							
	Gas	Oil	Products	Penalties	Total	Iron Ore Royalty Agreement	Coal Act Royalties	Mineral Royalties Act	Total Royalties	Mineral Land Tax Act	Mineral Resource Tax Act	Total Mineral Royalties and Taxes	Total Divisional Revenue
	$	$	$	$	$	$	$	$	$	$	$	$	$
January	10 324.41	3 854 224.48	95 960.92		3 960 509.81	67.68	230 764.00		230 831.68	231.26	735 549.19	966 612.13	4 927 121.94
February	3 812.57	4 870 515.67	176 961.13	430.00	5 051 719.37	286.69	325 580.00		325 866.69	2 048.72	504 000.00	831 915.41	5 883 634.78
March	11 245.43	3 462 645.69	72 735.10		3 546 626.22	12 133.69	256 024.50	7 152.49	275 310.68	2 313.39	501 500.00	779 124.07	4 325 750.29
April	5 808.45	2 767 740.17	67 332.52		2 840 881.14	15 345.97	305 940.00		321 285.97	173.45	792 089.64	1 113 549.06	3 954 430.20
May	4 961.48	3 453 670.26	82 036.66	80.00	3 540 748.40	12 213.17	262 200.00		274 413.17	30 069.21	53 000.00	357 482.38	3 898 230.78
June	4 896.96	2 586 197.05	65 839.85		2 656 933.86	6 913.63	503 537.00		510 450.63	42 771.12	3 284 884.76	3 838 106.51	6 495 040.37
July	4 114.63	3 412 663.41	60 575.71		3 477 353.75	17 125.62	247 584.00		264 709.62	7 782 561.88	518 573.87	8 565 845.37	12 043 199.12
August	3 588.80	2 126 159.13	5 207.85		2 134 955.78	8 405.41	341 058.00		349 463.41	247 215.09	514 828.00	1 081 506.50	3 216 462.28
September	3 148.77	4 061 040.76	140 137.47		4 204 327.00	19 684.84	341 518.00	(9 962.37)	351 240.47	12 333.11	514 828.00	878 401.58	5 082 728.58
October	4 319.82	3 896 498.35	100 050.31		4 000 868.48	17 252.42	371 337.08	336 637.78	725 227.28	308.23	466 500.00	1 192 035.51	5 192 903.99
November	9 695.59	4 036 215.92	109 629.14		4 155 540.65	7 181.06	1 507 642.61		1 514 823.67	70 025.22	570 644.46	2 155 493.35	6 311 034.00
December	6 812.23	3 663 778.60	98 400.75		3 768 991.58	4 896.35	337 552.00	365 488.29	707 936.64	2 746.76	466 500.00	1 177 183.40	4 946 174.98
1978 totals	72 729.14	42 191 349.49	1 074 867.41	510.00	43 339 456.04	121 506.53	5 030 737.19	699 316.19	5 851 559.91	8 162 797.44	8 922 897.92	22 937 255.27	66 276 711.31
1977 totals	180 951.50	41 015 470.45	887 907.66	890.00	42 085 219.61	126 653.28	3 347 551.80	2 507 896.90	5 982 101.98	8 307 272.87	9 655 342.29	23 944 717.14	66 029 936.75
1976 totals	323 750.43	43 732 456.11	716 447.65	550.00	44 773 204.19	182 314.48	2 502 201.78	11 409 767.74	14 094 284.00	22 428 217.32		36 522 501.32	81 295 705.51
1975 totals	2 848 929.60	44 782 489.47	569 521.01	800.00	48 201 740.08	185 283.60	3 644 267.91	5 016 838.24	8 846 389.75	15 416 461.09		24 262 850.84	72 464 590.92
1974 totals	3 288 296.85	45 300 184.21	51 181.21	649.20	48 640 311.47	155 925.04	1 361 081.25	12 979 098.52	14 496 104.81	2 640 022.84		17 136 127.65	65 776 439.12
Cumulative totals	6 714 657.52	217 021 949.73	3 299 924.94	3 399.20	227 039 931.39	771 682.93	15 885 839.93	32 612 917.59	49 270 440.45	56 954 771.56	18 578 240.21	124 803 452.22	351 843 383.61

Table 2-7—Oil Credits Transactions, 1978

	Credits	Value
		$
Balance brought forward from 1977	9 699 092	7 274 319.00
Credits established during the year	1 800 261	1 350 195.75
Credits redeemed during the year	9 909 087	7 431 815.25
Credit expired during the year	----------	----------
	1 590 266	1 192 699.50

MINES ASSESSORS' CONFERENCE

On January 25 to 27, 1978, the Province hosted a conference of Provincial mines assessors in Victoria. The meeting afforded the assessors an opportunity to discuss administrative problems, and to compare the administrative procedures employed within different Provincial jurisdictions. A transcript of the proceedings was prepared, and copy was provided for each delegate. The assessors felt that the conference was very successful, and should be held on a regular basis so that they can be made fully aware of the implication for changes made in other jurisdictions.

FINANCE AND ADMINISTRATIVE DIVISION

The Director of Finance and Administration, Robert R. Davy, was appointed May 1, 1978. Reporting to the Director are the Accounts Section, Publications, Library, and Mailing Services. The Director reports directly to the Deputy Minister.

ACCOUNTS SECTION

This section is under control of the Director. Mrs. Maureen Lundquist, who had assumed temporary responsibility of the section until the Director was appointed, won a competition with the Ministry of Finance and left in November. During the year Mary-Ellen Tonge was appointed to head Accounts Payable. The several functions of the section are the preparation of Ministry estimates, payroll administration, administering payment of suppliers' accounts and travel claims, costing and facilitating of purchases of the Ministry through the Purchasing Commission, and other administrative accounting responsibilities.

LIBRARY

The Ministry Library, located at Room 430, Douglas Building, Victoria, is administered by the Director and supervised by Sharon Ferris. The Library provides geological and technical information for the staff, other Ministries, industry, and the public.

The Library is the depository for all publications of the Ministry. Other holdings include reports of the geological surveys and mines' branches of Canada, the United States, and other foreign nations. Government reports and maps total approximately 16 000 in number. There are approximately 1 850 texts and reference books. Audio visual equipment is also stored in the Library for staff use. Special collections comprising of proceedings and guidebooks from international geological congresses, and annual reports of the mining and petroleum companies are also held by the Library.

An estimated 2 100 requests for information were dealt with in 1978 and 115 inter-library loan requests were made for staff members. Indexing of government serial publications was continued.

PUBLICATIONS

The Publications section is administered by the Director and supervised by Mrs. Rosalyn J. Moir. Responsibilities include publication preparation for the Ministry, maintaining indexes and publication lists, disseminating press releases, and dispatch of the ever-increasing requests for information from other governmental agencies, universities, industry, and the public. Approximately 8 000 communiques were handled during the year.

The Publication Committee, composed of a representative from each Division, is chaired by Dr. A. Sutherland Brown who administered the section until the appointment of the Director on May 1. This Committee met at irregular intervals throughout the year.

Publications that are in print may be obtained from the Ministry, Room 414, 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, 800 Hornby Street, Vancouver.

Publications are available for reference use in the Ministry Library, in the Reading Room of the Geological Survey of Canada, in the offices of the Inspector of Mines in Nelson and Prince Rupert, as well as in certain libraries.

Separate lists of publications are available for the Mineral Resources Branch and the Petroleum Resources Branch on request to the Publications Section, Ministry of Energy, Mines and Petroleum Resources, Room 414, Douglas Building, Victoria V8V 1X4. Mailing lists are maintained for all those interested in receiving notification of the release of new publications.

PERSONNEL

There were no staff changes in the Personnel office during 1978.

The Management Classification and Compensation Plan was completed, and Personnel continued input to an over-all Licensed Professional Officer Plan as well as representing the Ministry on management negotiations. Throughout 1978 more than 26 staff were enrolled in training courses.

The Ministry Personnel statistics for 1978 are as follows:

Number of permanent employees	261
Number of appointments	30
Number of resignations	4
Number of retirements	3
Number of in-service transfers	3
Number of promotions and reclassifications	17
Number of temporary employees	43
Number of temporary employees under WIG 1978	15
Number of temporary employees under summer program	47

Mineral Resource Statistics

CHAPTER 3

CONTENTS

INTRODUCTION

The statistics of the mineral industry are collected, compiled, and tabulated for this Report by the Economics and Planning Division of the Mineral Resources Branch.

In the interests of uniformity and to avoid duplication of effort, beginning with the statistics for 1925, Statistics Canada and the Provincial Ministries 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 Energy, 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.

The statistics of the petroleum industry are collected, compiled, and tabulated for this Report by the Petroleum Resources Branch.

METHODS 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 became known.

Data are obtained from the certified returns made by the producers of metals, industrial minerals and structural materials, and coal, and are augmented by data obtained from custom smelters. For petroleum, natural gas, and liquid by-products, production figures supplied by the Petroleum Resources Branch of the Ministry of Energy, Mines and Petroleum Resources are compiled from the monthly disposition reports and the Crown royalty statement filed with the Ministry by the producers.

Values are in Canadian funds. Metric weights are used throughout.

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 100.

Prior to 1974 the price of gold used was the average Canadian Mint buying-price for fine gold.

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 until 1973 the average price listed is derived by dividing ounces of placer gold into total amount received. Starting in 1974 the price used for the valuation of gold, lode and placer, is the amount received by the producer.

Prior to 1949 the prices used for silver, copper, lead, and zinc were the average prices at the markets indicated in the table on page 102, converted into Canadian funds. The abbreviations in the table are Mont.=Montreal; N.Y.=New York; Lon.=London; E. St. L.=East St. Louis; and U.S.=United States.

Starting in 1949 the price of silver, copper, lead, and zinc were average United States prices converted into Canadian funds. Average monthly prices were supplied by Statistics Canada from figures published in the Metal Markets section of *Metals Week*. Specifically, for silver it was the New York price; for lead it was the New York price; for zinc it was the price at East St. Louis of Prime Western; for copper it was the United States export refinery price. Commencing in 1970 the copper price is the average of prices received by the various British Columbia shippers and since 1974 this applies also to gold, silver, lead, zinc, and cadmium.

For antimony and bismuth the average producers' price to consumers is used. For nickel the price used is the Canadian price set by Inco Limited. The value per tonne of the iron ore used in making pig iron at Kimberley was 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 the 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 method established in 1963 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. Commencing in 1974 the quantities represent the actual net quantities or metals paid for.

	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, mercury, molybdenum, rhenium, 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 was calculated from the assay content of the ore, concentrate, or bullion less appropriate smelter losses, and an average price per unit of weight. Since 1974 the values represent the settlement values received by the producers for the respective metals.

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 100.

For 1925 to 1973 the values had been calculated by using the true average price (*see* page 100) and the net metal contents in accordance with the procedures adopted by Statistics Canada and the Ministry of Energy, Mines and Petroleum Resources.

Since 1974 the total quantity and value of metal production include the quantities paid for to the mines, and the smelter and refinery production that can be attributed to the mines but is not paid for. The quantity and value paid for to the mines, excluding outward transportation costs, smelting and refining costs, penalties and deductions, are shown separately for comparative purposes.

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.

COAL

The value of production of coal is calculated using a price per tonne which is the weighted average of the f.o.b. prices at the mine for the coal sold.

PETROLEUM AND NATURAL GAS

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.

MINERAL AND PETROLEUM PRODUCTS IN BRITISH COLUMBIA

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 3-7C 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 3-1, 3-3, and 3-7C.

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 3-1 and 3-7D.

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 boundary. This deposit is noted for its high percentage 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 and now most is shipped by truck to Stewart. 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 3-1, 3-3, and 3-7D.

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

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 3-1 and 3-7D.

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 3-1, 3-3, and 3-7C.

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* Tables 3-1, 3-3, and 3-7E.

Butane—Butane is recovered as a by-product at the gas-processing plant at Taylor and at oil refineries. *See* Tables 3-1, 3-3, 3-7A, and 4-16.

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 3-7C 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 3-1, 3-3, and 3-7C.

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 Inland Cement Industries Ltd., with a 907 180 tonnes-per-year plant on Tilbury Island, and a 490 000 tonnes-per-year plant at Bamberton, and Canada Cement Lafarge Ltd., with a 476 000 tonnes-per-year plant on Lulu Island and a 191 000 tonnes-per-year plant at Kamloops. *See* Tables 3-1, 3-3, and 3-7E.

Chromite—Two shipments of chromite are on record, 608 tonnes from Cascade in 1918 and 114 tonnes from Scottie Creek in 1929. *See* Tables 3-1 and 3-7C.

Clay and shale products—These include brick, blocks, tile, pipe, pottery, lightweight 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 at Quesnel makes pozzolan from burnt shale quarried south of Quesnel. 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 3-1, 3-3, and 3-7E.

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 large mine at Tsable River in 1966, and the last small one, near Wellington in 1968, marked the end of continuous production from the important Vancouver Island deposits. Recent exploration indicates the possibility of renewed coal mining on the island.

Undeveloped fields include basins in the foothills of the Rocky Mountains south of the Peace River, the Groundhog basin in north-central British Columbia, the Hat Creek basin west of Ashcroft, and Sage Creek basin southeast of Fernie.

The enormous requirements for coking-coal in Japan created intense exploration 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 3-1, 3-3, 3-7A, 3-8A, and 3-8B.

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. From 1971 to 1973, cobalt was shipped from the Pride of Emory mine at Hope. *See* Tables 3-1 and 3-7C.

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 3-1. Up to 1966, coke statistics had been included in the Annual Report at Table 3-9, but this table has been discontinued. The coal used in making coke is still recorded in Table 3-8B.

Condensate—(*a*) *Field*—Field condensate is the liquid hydrocarbons separated and recovered from natural gas in the field before gas processing. (*b*) *Plant*—Plant condensate is the hydrocarbon liquid extracted from natural gas at gas-processing plants. *See* Tables 3-1, 3-3, 3-7A, and 4-16.

Copper—From 1935 to 1978 no copper smelter operated in British Columbia and most of the copper concentrates were shipped to Japanese, eastern Canadian, and American smelters. In 1978, Afton Mines Ltd. started producing blister copper from its own concentrates. Most of the smelting in British Columbia in early years was done on ore shipped directly from the mines without concentration, but modern practice is to concentrate the ore first. Small amounts of gold and silver are commonly present and add value to the ore.

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 sizable amount came from Anyox and some from Tulsequah. During the 1960's, exploration for copper became intense, interest being especially directed toward finding very large, low-grade deposits suitable for open-pit mining. This activity has resulted in the establish-

ment 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)—closed mid-1978, near Port Hardy (Island Copper) in 1971, near Babine Lake (Bell), McLeese Lake (Gibraltar), Highland Valley (Lornex), Princeton (Ingerbelle) in 1972, and near Kamloops (Afton) in 1977. *See* Table 3-12 for a complete list of copper producers.

Some of these mines produce molybdenum as a by-product, for example, Bethlehem, Brenda, Lornex, Gibraltar, and Island Copper. Copper is also produced as a by-product of iron mining at Tasu Sound, Queen Charlotte Islands (Wesfrob), and with ores containing zinc, gold, silver, and lead at Buttle Lake (Lynx and Myra, Western Mines).

Copper has been the most valuable single commodity of the industry since 1966 except in 1977 when it was surpassed marginally by natural gas. *See* Tables 3-1, 3-3, 3-6, and 3-7B.

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 oil pipeline was built to connect the oil-gathering terminal at Taylor to the Trans Mountain Oil Pipe Line Company pipeline near Kamloops. In 1978, oil was produced from 36 separate fields, of which the Boundary Lake, Inga, Peejay, and Eagle were the most productive.

In Tables 3-1, 3-3, and 3-7A, quantities given prior to 1962 under "petroleum, crude" are total sales, but since 1962 the field and plant condensates are listed separately. Table 4-16 incorporates all revisions since the commencement of production.

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. A plant to process the material is located in Quesnel. *See* Table 3-7D.

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* Table 3-7D.

Flux—Silica and limestone are added to smelter furnaces as flux to combine with impurities in the ore and from 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 near Kamloops and limestone, chiefly from Texada Island, are produced for flux. Quantities have been recorded since 1911. *See* Tables 3-1, 3-3, and 3-7D.

Gold, lode—Gold has played an important part in mining in the Province. The first discovery of lode gold was on Morseby 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. By 1900 the value of gold production was second only to that of coal. At the start of World War II, gold-mining attained a peak yearly value of more than $22 million, but since the war it has dwindled until developments in the 1970's.

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 at Bridge River closed.

With the closing of the Bralorne mine, most of the lode gold is produced as a by-product of copper, copper-zinc-silver, and other base metal mining. Because of the volume of this production the amount of gold produced is still at a fairly high level, and with the significant rise in the price of gold in the 1970's the value of production has exceeded the peaks reached during the era of gold mines in the 1930's. *See* Tables 3-1, 3-3, 3-6, and 3-7B. *See* Table 3-12 for a complete list of current producers.

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 the 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 in the Granite Creek in the Tulameen in 1885. 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 declined under conditions of steadily rising costs and a fixed price for gold but is showing signs of revival in response to a freely floating gold price since 1972. Since 1858, more than 161 181 000 grams valued at $98.5 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, Kamloops, and Lillooet Mining Divisions) and much of the early Cariboo production, was mined before the original organization of the Department of Mines in 1874. Consequently, the amounts recorded are based on early estimates and cannot be accurately assigned to individual mining divisions.

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

In 1965, changes were made in the allocation of placer gold in 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 3-1, 3-3, 3-6, and 3-7A.

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 and near Grand Forks, Sirdar, Vananda, and Armstrong. *See* Tables 3-1, 3-3, and 3-7D.

Gypsum and gypsite—Production of gypsum and gypsite has been recorded since 1911. Between 1925 and 1956, more than 907 000 tonnes were shipped from Falkland and some was quarried near Cranbrook and Windermere. Since 1956, nearly all production has come from Windermere. *See* Tables 3-1, 3-3, and 3-7D.

Hydromagnesite—Small shipments of hydromagnesite were made from Atlin between 1904 and 1916 and from Clinton in 1921. *See* Tables 3-1 and 3-7D.

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 shipment. 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 Morseby Island. At Texada Island copper was a by-product of iron-mining, and in 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.

From January 1961 to August 1972, calcined iron sulphide from the tailings of the Sullivan mine was used for making pig iron at Kimberley. This was 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 has been built containing a reserve of about 18 million tonnes of iron ore.

The sulphur was removed in making pig iron and was converted to sulphuric acid, which was used in making fertilizer. A plant built at Kimberley converted the pig iron to steel, and a fabricating plant was acquired in Vancouver. The iron smelter at Kimberley closed in August 1972. The entire production, credited to the Fort Steele Mining Division in Table 3-7C, is of calcine. *See* Tables 3-1, 3-3, 3-6, and 3-7C.

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 3-1 and 3-7D.

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 3-1, 3-3, and 3-7D.

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, by molybdenum in 1969, 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 about 26 per cent of the total. Most of the concentrated ore is smelted and the metal refined at Trail, but some concentrate is shipped to American 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 99.9 per cent of the Province's lead and has produced about 85.4 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 Pend-d'Oreille River, North Kootenay Lake, Slocan, southwestern British Columbia, and Vancouver Island. 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. *See* Table 3-12 for the current lead producers.

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 in British Columbia 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 7.8 million tonnes.

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 3-1, 3-3, 3-6, and 3-7B.

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 3-1, 3-3, and 3-7E.

Magnesium—In 1941 and 1942, Cominco Ltd. produced magnesium from magnesite mined from a large deposit at Marysville. *See* Tables 3-1 and 3-7C.

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 3-1 and 3-7D.

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 3-1 and 3-7C.

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 continued in operation until 1975 when it closed because of market situations. *See* Tables 3-1 and 3-7C.

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 3-1 and 3-7D.

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 second 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, commencing again in 1978. 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. The Boss Mountain mine closed in 1971 and reopened late in 1973. The Coxey and British Columbia Molybdenum mines closed in 1971 and 1972 respectively. In 1970 the Brenda mine, a combined copper-molybdenum producer, started operating, and Island Copper in 1971, and Lornex in 1972, while Gibraltar ceased molybdenum production in 1975 but re-commenced in 1977. *See* Tables 3-1, 3-3, 3-6, and 3-7C.

Natro-alunite—In 1912 and 1913, 363 tonnes of natro-alunite were mined from a small low-grade deposit at Kyuquot Sound. There has been no subsequent production. *See* Tables 3-1 and 3-7D.

Natural gas—Commercial production of natural gas began in 1954 to supply the community of Fort St. John. In 1957 the gas plant at Taylor and the pipeline to serve British Columbia and the northwestern United States was completed. The daily average volume of production in 1975 was 1.14 billion cubic feet. In 1978 there were 83 gas-fields producing both associated and non-associated gas, of which the Yoyo, Clarke Lake, Sierra, and La Prise Creek, were the most productive.

The production shown in Tables 3-1, 3-3, 3-7A, and 4-16, 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 millions of cubic metres at standard conditions [99.2 kPa (kilopascals) pressure, 15°C temperature, up to and including the year 1960, and thereafter 101.3 kPa pressure, 15°C temperature].

Full details of gross well output, other production, delivery, and sales are given in the tables in chapter 4.

Nickel—One mine, the Pride of Emory near Hope, shipped nickel ore in 1936 and 1937 and began continuous production in 1958. From 1960 to 1974, bulk copper and nickel concentrates have been shipped to Japan and Alberta respectively for smelting. The mine closed in August 1974. *See* Tables 3-1, 3-3, and 3-7C.

Niobium—Niobium was produced from placer deposits on Vowell and Malloy Creeks in the Bugaboo area in 1956. A test shipment of 8 187 tonnes of gravel was shipped by St. Eugene Mining Corporation Limited to Quebec Metallurgical Industries. The placer contained a variety of minerals, including pyrochlore and uraninite. Recovery from the test shipment was as follows: 104.39 kilograms of niobium and 146.29 kilograms of uranium and thorium.

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 3-1 and 3-7C.

Perlite—In 1953 a test shipment of 1 009 tonnes was made from a quarry on François Lake. There has been no further production. *See* Tables 3-1 and 3-7D.

Petroleum, crude—*See* Crude oil.

Phosphate Rock—Between 1927 and 1933, Cominco Ltd. produced 3 485 tonnes 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 3-1 and 3-7D.

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 3-1, 3-3, and 3-7C.

Propane—Propane is recovered from gas-processing plants at Taylor and Boundary Lake, and at oil refineries. *See* Tables 3-1, 3-3, 3-7A, and 4-16.

Rhenium—Rhenium occurs in significant quantities only with molybdenite associated with porphyry copper deposits. It was first produced in 1972 by the Island Copper mine and is extracted as rhenium oxide from fumes produced during roasting of the molybdenite concentrate.

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

Sand and gravel—Sand and gravel is used as aggregate in concrete work. The output varies from year to year according to the level of activity in the construction industry. *See* Tables 3-1, 3-3, and 3-7E.

Selenium—The only recorded production of selenium, 332 kilograms, was in 1931 from the refining of blister copper from the Anyox smelter. *See* Tables 3-1 and 3-7C.

Silver—Silver is recovered from silver ores or as a by-product of other ores. Most of it is refined in Trail, 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.

Some silver is associated with galena, while other is recovered from gold and 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.

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. Today the greatest single source of silver is the Sullivan mine, which has been in production since 1900. By 1978 the Sullivan mine has accounted for 46 per cent of the total silver production of the Province. A significant total amount is contributed by the Lynx, Lornex, Warman, Island Copper, Horn Silver, Silmonac, and Granduc mines. Table 3-12 details the current silver production. 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 1.3 million kilograms of silver between 1918 and 1968. *See* Tables 3-1, 3-3, 3-6, and 3-7B.

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 3-1 and 3-7D.

Stone (*see* Building-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 3-1, 3-3, and 3-7E.

Structural materials—In Table 3-7E 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 3-2 that includes unclassified structural materials in that and previous years not assignable to particular years. The figure $3,180,828 in Table 3-7E 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 3-1, 3-2, 3-3, 3-7A, and 3-7E.

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. Elemental sulphur has been recovered from the Westcoast Transmission Co. Ltd. plant at Taylor since 1958 and the Fort Nelson plant of Petrosul International Ltd. since 1978. *See* Tables 3-1, 3-3, and 3-7D.

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 3-1 and 3-7G.

Thorium—*See* Niobium.

Tin—Tin, as cassiterite, is a by-product of the Sullivan mine, where it has been produced since 1941. Tin is also produced in a lead-tin alloy at the Trail smelter. *See* Tables 3-1, 3-3, and 3-7C.

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 where demand was high. In 1970, production began from the Invincible mine near Salmo, which closed in 1973.

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

Uranium—*See* Niobium.

Volcanic ash—The only recorded production of volcanic ash is 27 tonnes from the Cariboo Mining Division in 1954. *See* Table 3-7D.

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 copper production exceeded that of zinc. In 1977 the production of zinc was exceeded by that of copper, molybdenum, asbestos, coal, crude oil, and natural gas. 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 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 electronically to refined metal. Usually some concentrates are shipped to American or Japanese smelters.

About 85 per cent of the zinc that has been mined in British Columbia has originated 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 and Callaghan Creek. The greatest zinc mine is the Sullivan, which has contributed about 73 per cent of the total zinc production of the Province. *See* Table 3-12 for details of current zinc producers.

Records for the period 1905 to 1908 show shipments totalling 17 096 tonnes of zinc ore and zinc concentrates of unstated zinc content. In 1918, 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 3-1, 3-3, 3-6, and 3-7B.

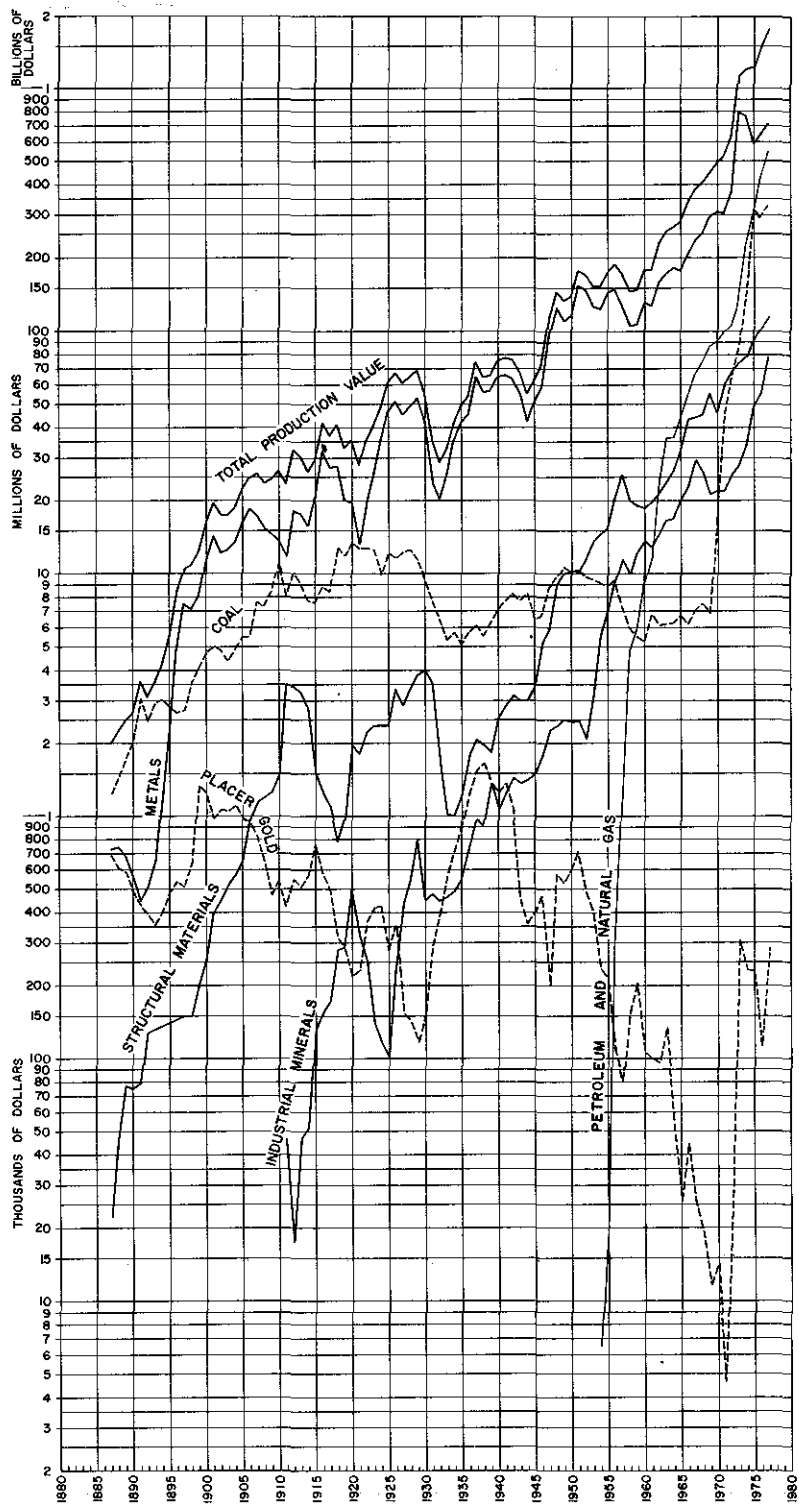

Figure 3-1—Value of mineral production, 1887–1978.

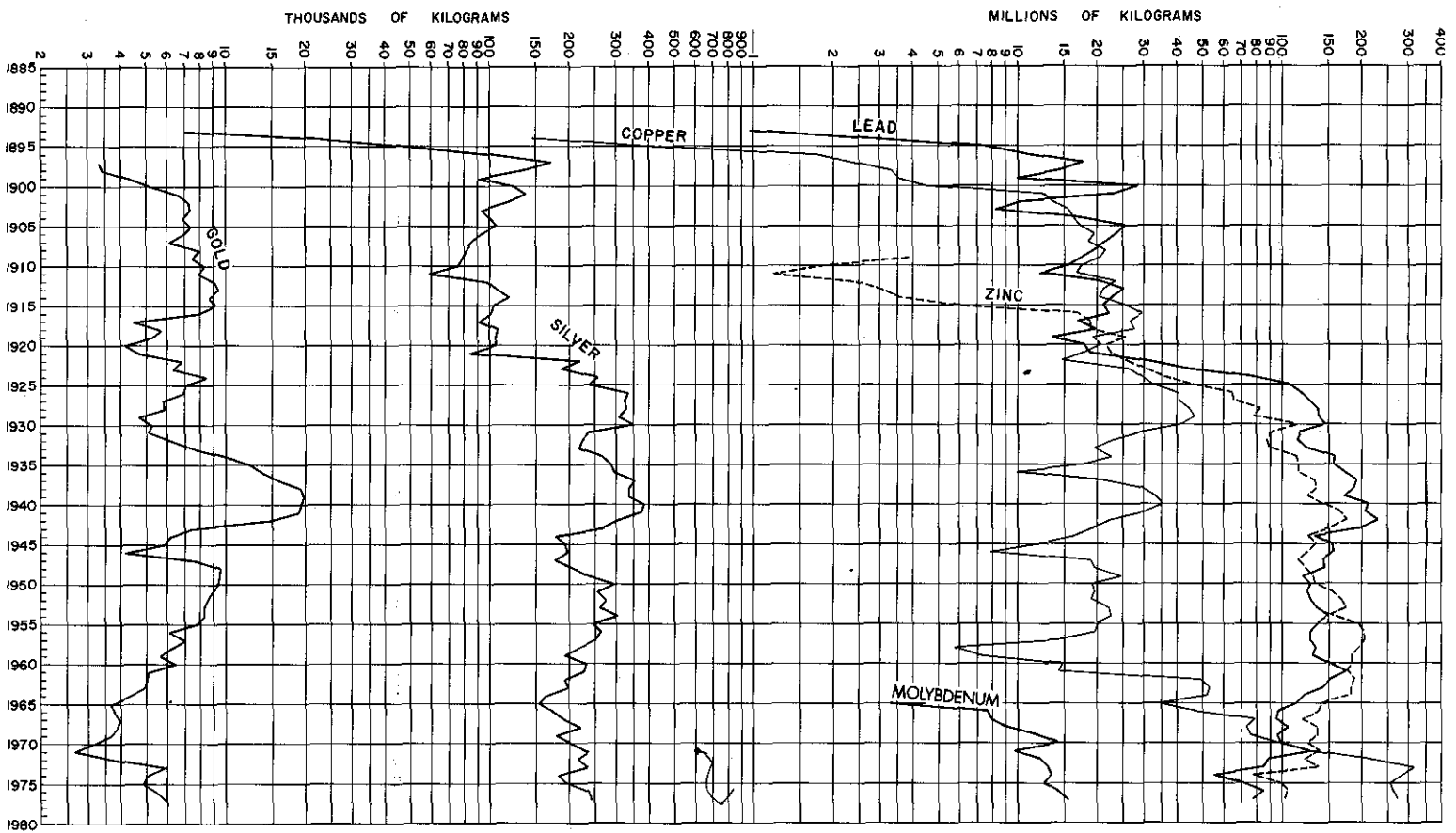

Figure 3-2—Production quantities of gold, silver, copper, lead, zinc, and molybdenum, 1893–1978.

Prices[1] *Used in Valuing Production of Gold, Silver, Copper, Lead, Zinc, and Coal*

Year	Gold, Fine	Silver, Fine	Copper	Lead	Zinc	Coal
	$/g	$/g	$/kg	$/kg	$/kg	$/t
1901	0.66457	0.01801 N.Y.	0.355 N.Y.	0.057 N.Y.	.....	2.92
1902	,,	.01593 ,,	.258 ,,	.081 ,,	.....	2.90
1903	,,	.01633 ,,	.292 ,,	.084 ,,	.....	2.94
1904	,,	.01716 ,,	.283 ,,	.086 ,,	.....	2.89
1905	,,	.01650 ,,	.344 ,,	.094 ,,	.....	2.98
1906	,,	.02040 ,,	.425 ,,	.106 ,,	.....	2.88
1907	,,	.01995 ,,	.441 ,,	.106 ,,	.....	3.38
1908	,,	.01615 ,,	.291 ,,	.083 ,,	.....	3.43
1909	,,	.01573 ,,	.286 ,,	.085 ,,	.....	3.52
1910	,,	.01634 ,,	.281 ,,	.088 ,,	0.101 E. St. L.	3.69
1911	,,	.01628 ,,	.273 ,,	.088 ,,	.108 ,,	3.51
1912	,,	.01858 ,,	.360 ,,	.089 ,,	.130 ,,	3.70
1913	,,	.01826 ,,	.337 ,,	.087 ,,	.106 ,,	3.74
1914	,,	.01675 ,,	.300 ,,	.077 ,,	.097 ,,	3.69
1915	,,	.01518 ,,	.381 ,,	.092 ,,	.248 ,,	3.78
1916	,,	.02006 ,,	.600 ,,	.136 ,,	.240 ,,	3.80
1917	,,	.02487 ,,	.599 ,,	.174 ,,	.167 ,,	3.84
1918	,,	.02956 ,,	.543 ,,	.147 ,,	.153 ,,	5.50
1919	,,	.03394 ,,	.412 ,,	.114 ,,	.138 ,,	5.42
1920	,,	.03080 ,,	.385 ,,	.158 ,,	.144 ,,	5.20
1921	,,	.01914 ,,	.276 ,,	.090 ,,	.087 ,,	5.30
1922	,,	.02062 ,,	.295 ,,	.114 ,,	.107 ,,	5.20
1923	,,	.01981 ,,	.318 ,,	.144 ,,	.124 ,,	5.30
1924	,,	.02040 ,,	.287 ,,	.161 ,,	.119 ,,	5.39
1925	,,	.02221 ,,	.310 ,,	.173 Lond.	.174 Lond.	5.28
1926	,,	.01997 ,,	.304 ,,	.149 ,,	.163 ,,	5.34
1927	,,	.01812 ,,	.285 ,,	.116 ,,	.137 ,,	5.30
1928	,,	.01870 ,,	.321 ,,	.101 ,,	.121 ,,	5.19
1929	,,	.01704 ,,	.399 ,,	.111 ,,	.119 ,,	5.22
1930	,,	.01227 ,,	.286 ,,	.087 ,,	.079 ,,	5.21
1931	,,	.00923 ,,	.179 ,,	.060 ,,	.056 ,,	4.80
1932	.75459	.01018 ,,	.141 Lond.	.047 ,,	.053 ,,	4.45
1933	.91953	.01216 ,,	.164 ,,	.053 ,,	.071 ,,	4.30
1934	1.10922	.01526 ,,	.164 ,,	.054 ,,	.067 ,,	4.41
1935	1.13140	.02083 ,,	.172 ,,	.069 ,,	.068 ,,	4.35
1936	1.12626	.01451 ,,	.209 ,,	.086 ,,	.073 ,,	4.66
1937	1.12497	.01443 ,,	.288 ,,	.113 ,,	.108 ,,	4.68
1938	1.13108	.01398 ,,	.220 ,,	.074 ,,	.068 ,,	4.42
1939	1.16195	.01302 ,,	.223 ,,	.070 ,,	.068 ,,	4.43
1940	1.23782	.01230 ,,	.222 ,,	.074 ,,	.075 ,,	4.70
1941	1.23782	.01230 ,,	.222 ,,	.074 ,,	.075 ,,	4.57
1942	1.23782	.01324 ,,	.222 ,,	.074 ,,	.075 ,,	4.55
1943	1.23782	.01455 ,,	.259 ,,	.083 ,,	.088 ,,	4.60
1944	1.23782	.01383 ,,	.265 ,,	.099 ,,	.095 ,,	4.68
1945	1.23782	.01511 ,,	.277 ,,	.110 ,,	.142 ,,	4.67
1946	1.18156	.02689 ,,	.282 ,,	.149 ,,	.172 ,,	5.16
1947	1.12529	.02315 ,,	.450 ,,	.301 ,,	.248 ,,	5.64
1948	1.12529	.02411 Mont.	.493 U.S.	.398 ,,	.307 ,,	6.71
1949	1.15744	.02387 U.S.	.440 ,,	.348 U.S.	.292 U.S.	7.18
1950	1.22335	.02593 ,,	.517 ,,	.319 ,,	.332 ,,	7.09
1951	1.18477	.03040 ,,	.611 ,,	.406 ,,	.439 ,,	7.12
1952	1.10182	.02674 ,,	.685 ,,	.355 ,,	.350 ,,	7.65
1953	1.10665	.02693 ,,	.669 ,,	.292 ,,	.235 ,,	7.58
1954	1.09539	.02668 ,,	.642 ,,	.302 ,,	.230 ,,	7.72
1955	1.10986	.02825 ,,	.844 ,,	.329 ,,	.267 ,,	7.43
1956	1.10729	.02873 ,,	.877 ,,	.347 ,,	.293 ,,	7.26
1957	1.07867	.02799 ,,	.574 ,,	.310 ,,	.246 ,,	7.45
1958	1.09250	.02779 ,,	.516 ,,	.259 ,,	.221 ,,	8.21
1959	1.07932	.02812 ,,	.611 ,,	.257 ,,	.242 ,,	8.74
1960	1.09153	.02850 ,,	.639 ,,	.256 ,,	.277 ,,	7.32
1961	1.14008	.03012 ,,	.620 ,,	.243 ,,	.258 ,,	8.16
1962	1.20278	.03730 ,,	.672 ,,	.227 ,,	.274 ,,	8.19
1963	1.21371	.04436 ,,	.676 ,,	.265 ,,	.290 ,,	8.08
1964	1.21371	.04484 ,,	.737 ,,	.323 ,,	.323 ,,	7.65
1965	1.21307	.04481 ,,	.846 ,,	.380 ,,	.345 ,,	7.75
1966	1.21242	.04479 ,,	1.176 ,,	.359 ,,	.344 ,,	8.02
1967	1.21403	.05373 ,,	1.125 ,,	.333 ,,	.329 ,,	8.54
1968	1.21242	.07429 ,,	1.195 ,,	.321 ,,	.312 ,,	8.72
1969	1.21178	.06196 ,,	1.470 ,,	.354 ,,	.347 ,,	8.82
1970	1.17545	.05946 ,,	1.294[2]	.360 ,,	.353 ,,	8.16
1971	1.13622	.05014 ,,	1.030[2]	.308 ,,	.359 ,,	11.06
1972	1.84934	.05348 ,,	.989[2]	.328 ,,	.388 ,,	12.08
1973	3.13185	.08251 ,,	1.835[2]	.359 ,,	.455 ,,	12.71
1974	5.348682	.156532	1.884[2]	.422[2]	.767[2]	19.93
1975	5.204662	.155602	1.283[2]	.346[2]	.808[2]	35.53
1976	4.035142	.135712	1.438[2]	.384[2]	.615[2]	39.63
1977	5.299722	.157072	1.398[2]	.541[2]	.591[2]	39.04
1978	*7.329482*	*.198322*	*1.5772*	*.6372*	*.5442*	*40.35*

[1] *See* page 84 for detailed explanation.
[2] *See* page 85 for explanation.

Table 3-1—Mineral Production: Total to Date, Past Year, and Latest Year

Products[1]	Total Quantity to Date[2]	Total Value to Date	Quantity, 1977	Value, 1977	Quantity, 1978	Value, 1978
Metals		$		$		$
Antimony kg	27 139 714	27,324,317	596 207	2,519,739	459 521	2,083,895
Bismuth kg	3 261 251	15,999,685	18 540	187,612	28 172	166,452
Cadmium kg	20 482 585	86,990,225	320 711	1,720,051	253 803	1,186,320
Chromite t	722	32,295				
Cobalt kg	114 484	376,661				
Copper kg	3 947 448 423	4,104,107,278	275 224 115	384,736,661	273 692 676	431,694,395
Gold—						
placer g	163 180 703	98,464,878	46 170	289,075	36 515	295,001
lode, fine g	569 472 747	684,806,939	5 906 336	31,301,931	6 542 332	47,951,880
Iron concentrates t	33 103 733	343,206,456	445 317	7,362,345	615 569	11,597,462
Lead kg	7 835 932 889	1,616,562,950	78 172 646	42,316,293	81 064 539	51,640,564
Magnesium kg	92 819	88,184				
Manganese t	1 564	32,668				
Mercury kg	6 094 387	49,218,263				
Molybdenum kg	160 179 063	872,342,694	15 521 970	142,057,947	13 055 203	167,714,272
Nickel kg	23 337 783	51,698,754				
Palladium g	23 296	30,462				
Platinum g	43 762	135,008				
Selenium kg	332	1,389				
Silver g	16 870 686 529	570,740,205	241 503 007	37,934,098	227 271 890	45,071,509
Tin kg	9 418 602	25,343,603	187 478	1,912,300	261 863	3,675,508
Tungsten (WO_3) kg	9 090 002	48,068,016				
Zinc kg	7 422 197 745	1,868,372,620	103 780 228	61,301,001	95 618 111	52,048,701
Others		23,569,876		397,654		4,652,559
Totals		10,487,513,426		714,036,707		819,778,518
Industrial Minerals						
Arsenious oxide kg	9 987 789	273,201				
Asbestos t	1 509 114	461,976,898	97 033	69,729,205	68 266	47,066,170
Bentonite t	718	16,858				
Fluxes t	3 932 927	8,406,438	28 624	95,461	22 475	56,894
Granules t	597 560	13,958,996	29 551	1,238,485	26 849	1,186,160
Gypsum and gypsite t	7 519 568	30,624,067	653 126	2,357,488	733 080	3,110,695
Hydromagnesite t	2 044	27,536				
Iron oxide and ochre t	16 427	155,050				
Jade kg	1 880 253	5,485,335	266 621	825,523	488 759	1,422,018
Magnesium sulphate t	12 604	254,352				
Mica kg	5 815 954	185,818				
Natro-alunite t	474	9,398				
Perlite t	1 009	11,120				
Phosphate rock t	3 485	16,894				
Sodium carbonate t	9 518	118,983				
Sulphur t	8 692 263	126,797,900	248 892	3,871,660	322 181	5,647,993
Talc t	984	34,871				
Others		10,736,920		1,067,277		981,431
Totals		659,090,635		79,185,099		59,471,361
Structural Materials						
Cement t	18 826 544	472,717,609	909 522	42,705,320	1 020 065	56,140,564
Clay products		125,924,000		4,909,799		6,282,560
Lime and limestone t		91,117,665	2 231 166	5,861,614	2 512 867	7,263,312
Rubble, riprap, crushed rock t		97,138,683	2 464 503	7,309,536	2 841 920	8,410,065
Sand and gravel t		589,845,642	53 994 528	54,809,121	38 315 952	64,227,295
Building-stone t	1 058 177	9,351,050	4 535	55,602	405	18,030
Not assigned		5,972,171				
Totals		1,392,066,820		115,650,992		142,341,826
Coal						
Coal—sold and used t	190 263 059	2,317,222,986	8 424 181	328,846,883	9 463 920	381,895,241
Petroleum and Natural Gas						
Crude oil m^3	48 336 755	1,140,550,066	2 200 303	132,859,085	2 004 699	145,005,524
Field condensate m^3	218 682	7,360,197	24 465	1,477,248	25 386	1,836,217
Plant condensate m^3	3 103 913	41,177,874	180 267	9,751,058	155 503	10,269,861
Natural gas to pipeline 10^3m^3	125 677 472	1,749,617,714	8 895 663	396,601,354	8 003 029	401,373,236
Butane m^3	1 545 659	28,135,279	111 357	5,358,167	106 580	13,360,454
Propane m^3	1 223 368	22,962,017	91 297	4,392,944	85 732	11,124,542
Totals		2,989,803,147		550,439,856		582,969,834
Grand totals		17,845,697,014		1,788,159,537		1,986,456,780

[1] *See* notes on individual products listed alphabetically on pages 87 to 97.
[2] *See* page 12 for conversion table to old system.

Table 3-2—Total Value of Mineral Production, 1836–1978

Year	Metals	Industrial Minerals	Structural Materials	Coal	Petroleum and Natural Gas	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 3-2—Total Value of Mineral Production, 1836–1978—Continued

Year	Metals	Industrial Minerals	Structural Materials	Coal	Petroleum and Natural Gas	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	9,154,544	6,545	152,894,663
1955	142,609,505	6,939,490	15,299,254	8,986,501	18,610	173,853,360
1956	149,441,246	9,172,792	20,573,631	9,346,518	319,465	188,853,652
1957	125,353,920	11,474,050	25,626,939	7,340,339	1,197,581	170,992,829
1958	104,251,112	9,958,768	19,999,576	5,937,860	4,806,233	144,953,549
1959	105,076,530	12,110,286	19,025,209	5,472,064	5,967,128	147,651,217
1960	130,304,373	13,762,102	18,829,989	5,242,223	9,226,646	177,365,333
1961	128,565,774	12,948,308	19,878,921	6,802,134	11,612,184	179,807,321
1962	159,627,293	14,304,214	21,366,265	6,133,986	27,939,726	229,371,484
1963	172,852,866	16,510,898	23,882,190	6,237,997	36,379,636	255,863,587
1964	180,926,329	16,989,469	26,428,939	6,327,678	36,466,753	267,139,168
1965	177,101,733	20,409,649	32,325,714	6,713,590	44,101,662	280,652,348
1966	208,664,003	22,865,324	43,780,272	6,196,219	54,274,187	335,780,005
1967	235,865,318	29,364,065	44,011,488	7,045,341	67,096,286	383,382,498
1968	250,912,026	26,056,782	45,189,476	7,588,989	75,281,215	405,028,488
1969	294,881,114	20,492,943	55,441,528	6,817,155	86,756,009	464,388,749
1970	309,981,470	22,020,359	46,104,071	19,559,669	90,974,467	488,640,036
1971	301,059,951	21,909,767	59,940,333	45,801,936	99,251,158	527,963,145
1972	372,032,770	25,764,120	66,745,698	66,030,210	105,644,978	636,217,776
1973	795,617,596	27,969,664	73,720,831	87,976,105	124,104,445	1,109,388,641
1974	764,599,451	33,676,214	78,088,393	154,593,643	233,275,505	1,264,233,206
1975	586,650,344	48,667,602	90,928,011	317,111,744	320,719,474	1,364,077,175
1976	646,750,403	52,917,142	100,938,648	298,683,679	420,973,564	1,520,263,436
1977	714,036,707	79,185,099	115,650,992	328,846,883	550,439,856	1,788,159,537
1978	819,778,518	59,471,361	142,341,826	381,895,241	582,969,834	1,986,456,780
Totals	10,487,513,426	659,090,635	1,392,066,820	2,317,222,986	2,989,803,147	17,845,697,014

Table 3-3—Mineral Production for the 10 Years, 1969–1978

Description	1969		1970		1971		1972		1973	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Metals		$		$		$		$		$
Antimony kg	371 999	508,476	329 521	1,104,040	146 748	243,614	308 260	419,042	753 110	1,192,118
Bismuth kg	28 344	288,070	59 935	828,486	37 431	388,674	42 556	324,617	1 293	13,058
Cadmium kg	517 607	4,016,788	426 062	3,343,944	470 243	2,011,223	315 540	1,759,995	367 761	2,951,236
Cobalt kg	.....	.....	.....	.....	51 503	103,099	70 642	155,739	18 555	117,403
Copper kg	75 937 956	111,592,416	96 329 694	124,657,958	127 286 040	131,037,918	211 832 288	209,403,822	317 603 055	582,803,251
Gold—placer g	12 410	11,720	15 272	14,185	5 505	4,647	21 492	26,905	119 156	311,524
lode, fine g	3 654 012	4,427,506	3 135 462	3,685,476	2 668 046	3,031,844	3 782 871	6,995,448	5 784 723	18,117,268
Iron concentrates t	1 882 266	19,787,845	1 704 650	17,391,883	1 750 798	18,153,612	1 139 698	11,642,379	1 420 160	12,906,063
Lead kg	95 286 815	33,693,539	97 448 607	35,096,021	112 865 575	34,711,408	88 109 663	28,896,566	84 890 924	30 477,936
Molybdenum kg	12 064 350	47,999,442	14 186 706	52,561,796	9 926 694	36,954,846	12 719 391	43,260,349	13 785 264	51,851,509
Nickel kg	1 351 304	3,396,208	1 545 927	4,703,320	1 153 742	3,497,420	1 469 851	4,601,486	1 119 221	3,775,232
Silver g	179 169 889	11,100,491	202 521 462	12,041,181	238 670 301	11,968,046	215 420 498	11,519,660	236 987 318	19,552,997
Tin kg	130 828	470,136	119 619	421,946	144 695	421,079	159 230	473,908	138 221	397,265
Tungsten (WO_3) kg	.....	.....	.....	.....	605 909	3,012,540	577 509	2,167,663	640 378	4,224,062
Zinc kg	134 565 200	46,639,024	125 005 208	44,111,055	138 549 629	49,745,789	121 719 968	47,172,894	137 380 768	62,564,751
Others	.....	10,949,453	.....	10,020,179	.....	5,774,192	.....	3,212,297	.....	4,161,923
Subtotals	.....	294,881,114	.....	309,981,470	.....	301,059,951	.....	372,032,770	.....	795,617,596
Industrial Minerals										
Asbestos t	72 926	14,871,334	78 680	16,033,827	79 032	17,800,406	95 986	20,870,241	98 852	21,102,892
Diatomite t	319	4,913	1 158	26,567	1 406	37,830	1 338	52,073	513	9,526
Fluxes (quartz, limestone) t	20 268	81,917	28 690	106,533	24 258	98,426	28 667	59,246	41 937	106,371
Granules (quartz, limestone, granite) t	31 521	654,701	20 275	526,491	26 524	519,192	33 709	757,924	31 135	857,643
Gypsum and gypsite t	254 821	764,032	245 180	736,635	312 791	930,348	352 272	1,087,196	331 347	1,114,009
Jade kg	11 944	42,635	119 114	250,256	76 094	196,332	110 551	235,218	69 967	306,808
Sulphur t	316 717	3,824,593	305 194	3,957,542	261 691	2,147,778	270 074	2,306,933	286 701	4,187,387
Others	.....	248,818	.....	382,508	.....	179,455	.....	395,289	.....	285,028
Subtotals	.....	20,492,943	.....	22,020,359	.....	21,909,767	.....	25,764,120	.....	27,969,664
Structural Materials										
Cement t	721 744	16,604,688	546 025	13,485,549	822 329	21,629,385	808 230	21,014,112	862 521	24,935,624
Clay products	.....	4,550,546	.....	4,714,368	.....	5,981,785	.....	5,263,749	.....	5,590,290
Lime and limestone t	1 734 420	3,237,032	1 694 237	3,204,076	1 650 658	3,037,222	1 838 227	3,357,927	1 954 008	3,633,870
Rubble, riprap, and crushed rock t	3 407 875	4,456,211	2 442 384	3,018,242	3 327 758	3,670,583	3 013 438	4,032,548	2 579 122	4,160,009
Sand and gravel t	26 428 476	26,553,699	21 006 650	21,679,387	26 598 612	25,612,396	31 593 921	33,076,196	30 811 402	35,379,590
Building-stone t	1 975	39,352	159	2,449	2 057	8,962	176	1,166	729	21,448
Subtotals	.....	55,441,528	.....	46,104,071	.....	59,940,333	.....	66,745,698	.....	73,720,831
Coal										
Sold and used t	773 226	6,817,155	2 398 635	19,559,669	4 141 496	45,801,936	5 466 846	66,030,210	6 924 733	87,976,105
Total solid minerals	.....	377,632,740	.....	397,665,569	.....	428,711,987	.....	530,572,798	.....	985,284,196
Petroleum and Natural Gas										
Crude oil m^3	4 023 815	58,176,213	4 032 130	60,405,941	3 999 185	66,471,856	3 788 849	63,166,717	3 368 902	68,306,032
Field condensate m^3	12 425	180,520	17 052	277,829	17 331	287,781	16 619	277,069	20 114	407,807
Plant condensate m^3	150 104	263,278	159 489	253,009	177 137	293,287	161 854	327,820	180 088	222,463
Natural gas delivered to pipeline 10^3m^3	7 218 831	27,897,585	7 678 940	29,804,411	7 685 055	31,946,372	9 939 498	41,616,824	10 789 269	54,762,105
Butane m^3	66 385	133,613	49 074	98,772	50 590	101,822	54 200	106,533	109 057	212,640
Propane m^3	52 069	104,800	66 828	134,505	74 547	150,040	76 323	150,015	99 188	193,398
Total petroleum and natural gas	.....	86,756,009	.....	90,974,467	.....	99,251,158	.....	105,644,978	.....	124,104,445
Grand totals	.....	464,388,749	.....	488,640,036	.....	527,963,145	.....	636,217,776	.....	1,109,388,641

Table 3-3—Mineral Production for the 10 Years, 1969–1978—Continued

Description	1974		1975		1976		1977		1978	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Metals		$		$		$		$		$
Antimony kg	221 238	879,897	364 045	1,467,928	447 001	1,636,871	596 207	2,519,739	459 521	2,083,895
Bismuth kg	33 711	680,771	19 163	261,931	20 261	226,462	18 540	187,612	28 172	166,452
Cadmium kg	195 979	1,532,096	320 923	1,971,035	356 422	1,530,800	320 711	1,720,051	253 803	1,186,320
Cobalt kg										
Copper kg	287 547 048	541,644,913	258 497 599	331,693,850	263 618 197	378,984,941	275 224 115	384,736,661	273 692 676	431,694,395
Gold—placer g	45 162	232,512	43 744	232,204	26 064	115,613	46 170	289,075	36 515	295,001
lode, fine g	5 001 082	26,749,083	4 819 241	25,082,494	5 393 477	21,761,502	5 906 336	31,301,931	6 542 332	47,951,880
Iron concentrates t	1 306 930	12,742,227	1 305 840	15,273,878	1 255 277	14,760,526	445 317	7,362,345	615 569	11,597,462
Lead kg	55 252 692	23,333,016	70 603 483	24,450,158	85 407 582	32,796,533	78 172 646	42,316,293	81 064 539	51,640,564
Molybdenum kg	13 789 825	60,791,552	13 026 627	71,201,391	14 088 686	94,109,138	15 521 970	142,057,947	13 055 203	167,714,272
Nickel kg	688 656	2,351,406								
Silver g	181 695 950	28,440,365	196 305 885	30,545,947	239 720 882	32,532,836	241 503 007	37,934,098	227 271 890	45,071,509
Tin kg	143 816	1,150,722	32 511	200,669	102 262	712,912	187 478	1,912,300	261 863	3,675,508
Tungsten (WO_3) kg										
Zinc kg	77 733 732	59,582,753	99 668 230	80,572,872	106 498 987	65,499,108	103 780 228	61,301,001	95 618 111	52,048,701
Others		4,488,138		3,695,987		2,083,161		397,654		4,652,559
Subtotals		764,599,451		586,650,344		646,750,403		714,036,707		819,778,518
Industrial Minerals										
Asbestos t	83 403	27,398,900	76 771	37,849,743	90 443	40,727,296	97 033	69,729,205	68 266	47,066,170
Diatomite t	1 593	32,600	5 847	229,483	2 737	182,159	1 239	49,595	2 184	59,346
Fluxes (quartz, limestone) t	34 451	206,049	35 914	174,824	11 378	33,263	28 624	95,461	22 475	56,894
Granules (quartz, limestone, granite) t	31 546	1,025,615	33 316	1,144,968	31 476	1,219,884	29 551	1,238,485	26 849	1,186,160
Gypsum and gypsite t	400 338	1,412,157	474 387	1,751,799	556 134	4,434,471	653 126	2,357,488	733 080	3,110,695
Jade kg	3 510	18,613	110 437	414,123	483 796	1,535,030	266 621	825,523	488 759	1,422,018
Sulphur t	206 646	3,068,507	246 079	5,738,134	231 704	4,296,189	248 892	3,871,660	322 181	5,647,993
Others		513,773		1,364,528		488,850		1,017,682		922,085
Subtotals		33,676,214		48,667,602		52,917,142		79,185,099		59,471,361
Structural Materials										
Cement t	890 372	25,828,823	915 293	31,681,722	846 548	34,973,746	909 522	42,705,320	1 020 065	56,140,564
Clay products		6,615,128		6,593,189		6,995,917		4,909,799		6,282,560
Lime and limestone t	2 097 909	4,297,547	1 976 415	4,349,800	2 173 831	5,610,063	2 231 166	5,861,614	2 512 867	7,263,312
Rubble, riprap, and crushed rock t	2 691 473	5,715,219	4 103 452	8,723,448	2 485 215	5,205,973	2 464 503	7,309,536	2 841 920	8,410,065
Sand and gravel t	31 440 908	35,611,346	28 945 523	39,575,457	36 073 618	48,138,635	53 994 528	54,809,121	38 315 952	64,227,295
Building-stone t	452	20,330	53	4,395	657	14,314	4 535	55,602	405	18,030
Subtotals		78,088,393		90,928,011		100,938,648		115,650,992		142,341,826
Coal										
Sold and used t	7 757 440	154,593,643	8 924 816	317,111,744	7 537 695	298,683,679	8 424 181	328,846,883	9 463 920	381,895,241
Total solid minerals		1,030,957,701		1,043,357,701		1,099,289,872		1,237,719,681		1,403,486,946
Petroleum and Natural Gas										
Crude oil m^3	3 012 501	103,335,328	2 269 898	94,229,725	2 367 450	116,595,050	2 200 303	132,859,085	2 004 699	145,005,524
Field condensate m^3	16 561	568,075	16 094	668,092	18 309	901,711	24 465	1,477,248	25 386	1,836,217
Plant condensate m^3	178,534	924,549	185 272	6,525,837	167 576	7,198,957	180 267	9,751,058	155 503	10,269,861
Natural gas delivered to pipeline $10^3 m^3$	9 016 996	128,018,726	9 236 489	214,733,528	8 799 508	287,997,059	8 895 663	396,601,354	8 003 029	401,373,236
Butane m^3	105 426	232,085	106 427	2,577,205	109 781	4,591,832	111 357	5,358,167	106 580	13,360,454
Propane m^3	89 373	196,742	81 975	1,985,087	88 195	3,688,955	91 297	4,392,944	85 732	11,124,542
Total petroleum and natural gas		233,275,505		320,719,474		420,973,564		550,439,856		425,858,232
Grand totals		1,264,233,206		1,364,077,175		1,520,263,436		1,788,159,537		1,986,456,780

Table 3-4—Comparison of Total Quantity and Value of Production, and Quantity and Value of Production Paid for to Mines

Metals	1978 Total Production		1978 Production Paid for to Mines	
	Quantity	Value	Quantity	Value
		$		$
Antimony kg	459 521	2,083,895	.....	.....
Bismuth kg	28 172	166,452	.....	.....
Cadmium kg	253 803	1,186,320	56 370	146,582
Copper kg	273 692 676	431,694,395	273 632 023	301,119,740
Gold—placer g	36 515	295,001	36 515	295,001
lode, fine g	6 542 332	47,951,880	6 542 332	36,287,607
Iron concentrates t	615 569	11,597,462	615 569	11,597,462
Lead kg	81 064 539	51,640,564	81 064 539	46,547,809
Molybdenum kg	13 055 203	167,714,272	13 055 203	166,617,307
Silver g	227 271 890	45,071,509	227 000 410	36,409,036
Tin kg	261 863	3,675,508	227 957	3,135,822
Zinc kg	95 618 111	52,048,701	75 998 700	26,257,729
Others	.....	4,652,559	.....	968,911
Totals	.....	819,778,518	.....	629,383,006

NOTE—For metals, the total quantity and value of production include the quantities paid for to the mines, and the smelter and refining production that can be attributed to the mines but is not paid for. The quantity and value paid for to the mines, excluding outward transportation costs, smelting and refining costs, penalties and deductions, are shown separately for comparative purposes.

Table 3-5—Exploration and Development Expenditures, 1974–1978

	Physical Work and Surveys	Administration, Overhead, Land Costs, Etc.	Construction, Machinery and Equipment, Other Capital Costs	Totals
A. Exploration on Undeclared Mines	$	$	$	$
Metal mines—				
1974	18,773,326	6,525,878	128,144	25,427,348
1975	16,366,152	5,298,367	442,327	22,106,846
1976	20,437,180	6,365,331	381,416	27,183,927
1977	19,097,099	6,974,231	106,059	26,177,389
1978	22,724,774	5,715,214	1,035,353	29,475,341
Coal mines—				
1974	3,450,746	884,849	18,958	4,354,553
1975	9,955,507	3,057,843	.....	13,013,350
1976	9,234,269	3,678,893	.....	12,913,162
1977	14,741,425	4,797,788	.....	19,539,213
1978	15,289,351	4,511,572	.....	19,800,923
Others—				
1974	42,706	11,134	.....	53,840
1975	90,025	35,679	.....	125,704
1976	73,453	47,760	.....	121,213
1977	327,113	9,860	222,092	559,065
1978	342,100	117,180	.....	459,280
Totals—				
1974	22,266,778	7,421,861	147,102	29,835,741
1975	26,411,684	8,391,889	442,327	35,245,900
1976	29,744,902	10,091,984	318,416	40,218,302
1977	34,165,637	11,781,879	328,151	46,275,667
1978	38,356,225	10,343,966	1,035,353	49,735,544
B. Exploration on Declared or Operating Mines				
Metal mines—				
1974	2,652,243	762,224	278,500	3,692,967
1975	2,792,378	3,090,135	.....	5,882,513
1976	8,359,413	83,304	.....	8,442,717
1977	2,988,366	2,020,259	.....	5,008,625
1978	6,562,912	1,729,402	.....	8,292,314
Coal mines—				
1974	488,308	104,259	.....	592,567
1975	1,000,000	.....	.....	1,000,000
1976	665,000	28,000	.....	693,000
1977	5,978,043	25,115,000	.....	31,093,043
1978	4,052,774	510,612	.....	4,563,386

Table 3-5—Exploration and Development Expenditures, 1974–1978—Continued

	Physical Work and Surveys	Administration, Overhead, Land Costs, Etc.	Construction, Machinery and Equipment, Other Capital Costs	Totals
B. Exploration on Declared or Operating Mines —Continued	$	$	$	$
Others—				
1974	4,236	———	———	4,236
1975	36,242	2,700	———	38,942
1976	214,081	30,000	———	244,081
1977	106,896	403,300	———	510,196
1978	12,025	———	36,604	48,629
Totals—				
1974	3,144,787	866,483	278,500	4,289,770
1975	3,828,620	3,092,835	———	6,921,455
1976	9,238,494	141,304	———	9,379,798
1977	9,073,305	27,538,559	———	36,611,864
1978	10,693,030	2,240,014	———	12,867,725
C. Development on Declared Mines				
Metal mines—				
1974	1,280,513	1,028,199	1,985,000	4,293,712
1975	———	57,166	840,344	897,510
1976	512,197	974,985	12,447,569	13,934,751
1977	380,419	1,132,316	33,672,153	35,184,888
1978	133,335	895,892	———	1,029,227
Coal mines—				
1974	320,098	256,055	111,500	687,653
1975	———	———	———	———
1976	1,425,312	583,304	———	2,008,616
1977	1,725,484	247,313	———	1,972,797
1978	30,957	38,910	———	69,867
Others—				
1974	23,242	37,988	2,883,584	2,944,814
1975	———	———	———	———
1976	———	3,155	18,001,500	18,004,655
1977	64,689	708	40,000	105,397
1978	7,045	2,159	10,000	19,204
Totals—				
1974	1,623,853	1,322,242	4,980,084	7,926,179
1975	———	57,166	840,344	897,510
1976	1,937,509	1,561,444	30,449,069	33,948,022
1977	2,170,592	1,380,337	33,712,153	37,263,082
1978	171,337	936,961	10,000	1,118,298
D. Development of Operating Mines				
Metal mines—				
1974	20,933,501	1,722,680	46,732,326	69,388,507
1975	9,013,375	5,804,924	24,548,602	39,366,901
1976	6,937,229	404,226	41,881,126	49,222,581
1977	14,491,378	1,722,479	45,859,006	62,072,863
1978	10,424,872	575,164	17,908,816	28,908,852
Coal mines—				
1974	9,027,818	———	16,607,506	25,635,324
1975	3,300,000	———	59,000,000	62,300,000
1976	16,043,383	55,377	20,767,397	36,866,157
1977	30,466,894	———	25,943,377	56,410,271
1978	31,222,528	———	15,621,757	46,844,285
Others—				
1974	6,198,552	146,182	16,606,229	22,950,963
1975	17,350,175	124,860	18,077,384	35,552,419
1976	58,980	79,300	1,389,956	1,528,236
1977	432,731	108,500	931,521	1,472,752
1978	102,248	9,579	1,220,265	1,332,092
Totals—				
1974	36,159,871	1,868,862	79,946,061	117,974,794
1975	29,663,550	5,929,784	101,625,986	137,219,320
1976	23,039,592	538,903	64,038,479	87,616,974
1977	45,391,003	1,830,979	72,733,904	119,955,886
1978	41,749,648	584,743	35,076,931	77,121,833

Table 3-6—Production of Gold, Silver, Copper, Lead, Zinc, Molybdenum, and Iron Concentrates, 1858–1978

Year	Gold (Placer)		Gold (Fine)		Silver		Copper	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
	g	$	g	$	g	$	kg	$
1858–90	100 978 533	55,192,163			6 876 531	214,152		
1891–1900	11 703 748	6,397,183	19 682 165	12,858,353	700 977 829	13,561,194	16 064 375	4,365,210
1901–1910	15 787 261	8,628,660	72 224 836	47,998,179	971 114 910	16,973,507	172 344 737	56,384,783
1911	779 441	426,000	7 110 675	4,725,512	58 858 198	958,293	16 750 016	4,571,644
1912	1 016 446	555,500	8 008 898	5,322,442	97 417 955	1,810,045	23 340 171	8,408,513
1913	933 090	510,000	8 467 916	5,627,595	107 798 519	1,968,606	21 073 930	7,094,489
1914	1 033 864	565,000	7 687 729	5,109,008	112 038 605	1,876,736	20 415 949	6,121,319
1915	1 408 655	770,000	7 776 403	5,167,934	104 708 436	1,588,991	25 817 619	9,835,500
1916	1 062 167	580,500	6 902 751	4,587,333	102 699 711	2,059,739	29 655 426	17,784,494
1917	907 585	496,000	3 562 009	2,367,191	91 107 405	2,265,749	26 765 241	16,038,256
1918	585 358	320,000	5 121 855	3,403,811	108 803 644	3,215,870	27 888 416	15,143,449
1919	524 086	286,500	4 740 906	3,150,644	105 847 210	3,592,673	19 259 132	7,939,896
1920	405 583	221,600	3 733 853	2,481,392	105 061 237	3,235,980	20 360 601	7,832,899
1921	426 733	233,200	4 222 699	2,804,197	83 150 418	1,591,201	17 706 790	4,879,624
1922	674 624	368,800	6 153 915	4,089,684	220 872 076	4,554,781	14 678 125	4,329,754
1923	768 555	420,000	5 575 057	3,704,994	187 643 964	3,718,129	26 181 346	8,323,266
1924	769 799	420,750	7 704 711	5,120,535	259 454 010	5,292,184	29 413 222	8,442,870
1925	512 453	280,092	6 522 890	4,335,069	238 088 613	5,286,818	32 797 475	10,153,269
1926	650 426	355,503	6 264 984	4,163,859	334 312 337	6,675,606	40 523 625	12,324,421
1927	285 868	156,247	5 536 365	3,679,601	325 654 164	5,902,043	40 461 530	11,525,011
1928	262 012	143,208	5 619 130	3,734,609	330 536 775	6,182,461	44 410 233	14,265,242
1929	217 192	118,711	4 516 871	3,002,020	309 791 230	5,278,194	46 626 180	18,612,850
1930	278 527	152,235	5 002 482	3,324,975	352 342 964	4,322,185	41 894 588	11,990,466
1931	534 225	291,992	4 545 175	3,020,837	234 837 945	2,254,979	29 090 879	5,365,690
1932	634 501	395,542	5 649 891	4,263,389	222 406 822	2,264,729	22 955 299	3,228,892
1933	744 233	562,787	6 954 289	6,394,645	218 397 615	2,656,526	19 572 164	3,216,701
1934	783 205	714,431	9 244 309	10,253,952	267 920 527	4,088,280	22 521 530	3,683,662
1935	961 985	895,058	11 363 263	12,856,419	288 323 068	6,005,996	17 884 241	3,073,428
1936	1 349 528	1,249,940	12 583 590	14,172,367	296 944 198	4,308,330	9 830 071	2,053,828
1937	1 684 321	1,558,245	14 331 671	16,122,767	351 630 830	5,073,962	20 891 260	6,023,411
1938	1 796 478	1,671,015	17 340 607	19,613,624	337 827 661	4,722,288	29 832 572	6,558,575
1939	1 547 250	1,478,492	18 267 912	21,226,957	336 577 786	4,381,365	33 227 590	7,392,862
1940	1 215 101	1,236,928	18 149 347	22,461,516	383 436 042	4,715,315	35 371 049	7,865,085
1941	1 361 534	1,385,962	17 760 622	21,984,501	378 700 797	4,658,545	30 134 516	6,700,693
1942	1 023 413	1,041,772	13 825 843	17,113,943	301 011 133	4,080,775	22 723 823	5,052,856
1943	454 104	462,270	6 979 607	8,639,516	265 193 820	3,858,496	19 190 263	4,971,132
1944	355 601	361,977	5 804 815	7,185,332	177 453 003	2,453,293	16 465 584	4,356,070
1945	391 556	398,591	5 454 626	6,751,860	191 510 720	2,893,934	11 726 375	3,244,472
1946	489 219	475,361	3 658 086	4,322,241	197 994 264	5,324,959	7 938 069	2,240,070
1947	216 757	200,585	7 566 800	8,514,870	177 550 262	4,110,092	18 952 769	8,519,741
1948	632 386	585,200	8 902 612	10,018,050	209 016 328	5,040,101	19 515 886	9,616,174
1949	556 308	529,524	8 969 981	10,382,256	237 559 178	5,671,082	24 882 500	10,956,550
1950	595 125	598,717	8 832 723	10,805,553	295 772 610	7,667,950	19 147 001	9,889,458
1951	736 861	717,911	8 126 405	9,627,947	255 632 882	7,770,983	19 617 612	11,980,155
1952	545 982	494,756	7 955 805	8,765,889	274 042 530	7,326,803	19 053 280	13,054,893
1953	443 062	403,230	7 886 228	8,727,294	260 606 407	7,019,272	22 235 441	14,869,544
1954	270 098	238,967	8 036 642	8,803,279	305 630 613	8,154,145	22 747 578	14,599,693
1955	238 436	217,614	7 541 762	8,370,306	245 811 643	6,942,995	20 065 928	16,932,549
1956	120 213	109,450	5 963 782	6,603,628	261 423 017	7,511,866	19 667 923	17,251,872
1957	91 318	80,990	6 948 504	7,495,170	252 847 111	7,077,166	14 237 029	8,170,465
1958	175 732	157,871	6 044 992	6,604,149	218 998 027	6,086,854	5 741 837	2,964,529
1959	235 450	208,973	5 385 360	5,812,511	192 779 535	5,421,417	7 363 374	4,497,991
1960	119 653	107,418	6 394 155	6,979,441	231 612 937	6,600,183	14 997 694	9,583,724
1961	106 248	99,884	4 970 913	5,667,253	229 353 429	6,909,140	14 375 361	8,965,149
1962	103 106	96,697	4 940 712	5,942,101	192 521 474	7,181,907	49 431 850	33,209,215
1963	143 696	135,411	4 820 312	5,850,458	199 764 616	8,861,050	53 635 704	36,238,007
1964	57 292	55,191	4 307 361	5,227,884	163 901 675	7,348,938	52 414 456	38,609,136
1965	26 935	25,053	3 642 908	4,419,089	154 646 729	6,929,793	38 644 540	32,696,081
1966	47 743	44,632	3 717 057	4,506,646	172 594 622	7,729,939	47 990 080	56,438,255
1967	27 713	25,632	3 923 861	4,763,688	192 239 525	10,328,695	78 352 932	88,135,172
1968	20 839	19,571	3 853 537	4,672,242	221 791 325	16,475,795	73 024 968	87,284,148
1969	12 410	11,720	3 654 012	4,427,506	179 169 889	11,100,491	75 937 956	111,592,416
1970	15 272	14,185	3 135 462	3,685,476	202 521 462	12,041,181	96 329 694	124,657,958
1971	5 505	4,647	2 668 046	3,031,844	238 670 301	11,968,046	127 286 040	131,037,918
1972	21 492	26,905	3 782 871	6,995,448	215 420 498	11,519,660	211 832 288	209,403,822
1973	119 156	311,524	5 784 723	18,117,268	236 987 318	19,552,997	317 603 055	582,803,251
1974	45 162	232,512	5 001 082	26,749,083	181 695 950	28,440,365	287 547 048	541,644,913
1975	43 744	232,204	4 819 241	25,082,494	196 305 885	30,545,947	258,497 599	331,693,850
1976	26 064	115,613	5 393 477	21,761,502	239 720 882	32,532,836	263 618 197	378,984,941
1977	46 170	289,075	5 906 336	31,301,931	241 503 007	37,934,098	275 224 115	384,736,661
1978	36 515	295,001	6 542 332	47,951,880	227 271 890	45,071,509	273 692 676	431,694,395
Totals	163 180 703	98,464,878	569 472 747	684,806,939	16 870 686 529	570,740,205	3 947 448 423	4,104,107,278

Table 3-6—Production of Gold, Silver, Copper, Lead, Zinc, Molybdenum, and Iron Concentrates, 1858–1978—Continued

Year	Lead		Zinc		Molybdenum		Iron Concentrates	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
	kg	$	kg	$	kg	$	t	$
1858–90	473 729	45,527					27 097	70,879
1891–1900	93 002 804	7,581,619					11 820	45,602
1901–1910	184 989 089	17,033,102	5 753 423	894,169			17 738	68,436
1911	12 189 051	1,069,521	1 195 003	129,092				
1912	20 353 243	1,805,627	2 430 462	316,139				
1913	25 112 864	2,175,832	3 065 710	324,421				
1914	22 963 016	1,771,877	3 568 151	346,125	901	662		
1915	21 093 563	1,939,200	5 888 705	1,460,524	1 641	2,000		
1916	22 102 314	3,007,462	16 859 478	4,043,985	5 598	20,560		
1917	16 922 293	2,951,020	18 982 067	3,166,259	3 371	11,636		
1918	19 912 447	2,928,107	18 947 777	2,899,040	435	1,840	907	5,000
1919	13 370 004	1,526,855	25 735 631	3,540,429			1 116	6,150
1920	17 840 247	2,816,115	21 413 198	3,077,979			1 335	7,360
1921	18 779 664	1,693,354	22 416 133	1,952,065			916	5,050
1922	30 593 731	3,480,306	25 921 103	2,777,322			1 089	3,600
1923	43 845 439	6,321,770	26 464 465	3,278,903			220	1,337
1924	77 284 697	12,415,917	35 893 017	4,266,741				
1925	107 908 698	18,670,329	44 568 438	7,754,450				
1926	119 305 027	17,757,535	64 807 554	10,586,610				
1927	128 364 347	14,874,292	65 872 809	8,996,135				
1928	138 408 812	13,961,412	82 445 946	9,984,613			18	
1929	139 705 336	15,555,189	78 061 406	9,268,792				
1930	145 966 952	12,638,198	113 614 910	9,017,005				
1931	118 796 232	7,097,812	91 657 703	5,160,911				
1932	114 308 115	5,326,432	87 143 752	4,621,641				
1933	123 235 512	6,497,719	88 887 198	6,291,416				
1934	157 562 183	8,461,859	113 013 038	7,584,199				
1935	156 156 723	10,785,930	116 227 650	7,940,860				
1936	171 444 146	14,790,028	115 475 574	8,439,373				
1937	190 107 902	21,417,049	132 081 905	14,274,245				
1938	187 323 227	13,810,024	135 395 388	9,172,822				
1939	171 794 338	12,002,390	126 283 585	8,544,375				
1940	211 758 089	15,695,467	141 529 456	10,643,026				
1941	207 218 262	15,358,976	166 861 962	12,548,031				
1942	230 060 714	17,052,054	175 646 590	13,208,636				
1943	199 196 604	16,485,902	152 474 485	13,446,018				
1944	132 866 893	13,181,530	126 126 765	11,956,725				
1945	152 849 156	16,848,823	133 714 538	18,984,581				
1946	156 879 853	23,345,731	124 406 109	21,420,484				
1947	142 306 192	42,887,313	114 761 068	28,412,593				
1948	145 165 821	57,734,770	122 610 001	37,654,211			616	3,735
1949	120 373 215	41 929,866	130 736 145	38,181,214			4 964	27,579
1950	128 830 683	41,052,905	131 697 238	43,769,392				
1951	124 037 181	50,316,015	153 091 761	67,164,754			102 997	790,000
1952	129 250 197	45,936,692	169 130 882	59,189,656			816 898	5,474,924
1953	135 004 129	39,481,244	173 407 848	40,810,618			899 240	6,763,105
1954	150 807 088	45,482,505	151 555 559	34,805,755			486 018	3,733,891
1955	137 241 656	45,161,245	194 680 177	52,048,909			554 223	3,228,756
1956	128 691 681	44,702,619	201 327 284	58,934,801			335 616	2,190,847
1957	127 732 462	39,568,086	203 787 462	50,206,681			324 174	2,200,637
1958	133 615 439	34,627,075	195 952 146	43,234,839			571 769	4,193,442
1959	130 372 360	33,542,306	182 498 693	44,169,198			770 421	6,363,848
1960	151 321 570	38,661,912	182 977 897	50,656,726	2 456	9,500	1 052 651	10,292,847
1961	174 307 617	42,313,569	175 970 780	45,370,891			1 211 147	12,082,540
1962	152 080 806	34,537,454	187 528 084	51,356,376			1 627 342	18,326,911
1963	142 869 197	37,834,714	182 734 698	53,069,163			1 869 009	20,746,424
1964	121 896 644	39,402,293	181 797 313	58,648,561	12 812	47,063	1 816 684	20,419,487
1965	113 480 794	43,149,171	141 179 547	48,666,933	3 306 274	12,405,344	1 964 410	21,498,581
1966	95 929 798	34,436,934	138 401 395	47,666,540	7 754 088	27,606,061	1 952 074	20,778,934
1967	94 406 546	31,432,079	119 217 472	39,248,539	7 945 782	31,183,064	1 954 468	20,820,765
1968	105 063 971	32,782,257	135 803 151	43,550,181	8 980 988	32,552,722	1 900 311	21,437,569
1969	95 286 815	33,693,539	134 565 199	46,639,024	12 064 350	47,999,442	1 882 266	19,787,845
1970	97 448 607	35,096,021	125 005 208	44,111,055	14 186 706	52,561,796	1 704 650	17,391,883
1971	112 865 575	34,711,408	138 549 629	49,745,789	9 926 694	36,954,846	1 750 738	18,153,612
1972	88 109 663	28,896,566	121 719 968	47,172,894	12 719 391	43,260,349	1 139 698	11,642,379
1973	84 890 924	30,477,936	137 380 768	62,564,751	13 785 264	51,851,509	1 420 160	12,906,063
1974	55 252 692	23,333,016	77 733 732	59,582,753	13 789 825	60,791,552	1 306 930	12,742,227
1975	70 603 483	24,450,158	99 668 230	80,572,872	13 026 627	71,201,391	1 305 840	15,273,878
1976	85 407 582	32,796,533	106 498 987	65,499,108	14 088 686	94,109,138	1 255 277	14,760,526
1977	78 172 646	42,316,293	103 780 228	61,301,001	15 521 970	142,057,947	445 317	7,362,345
1978	81 064 539	51,640,564	95 618 111	52,048,701	13 055 203	167,714,272	615 569	11,597,462
Totals	7 835 932 889	1,616,562,950	7 422 197 745	1,868,372,620	160 179 063	872,342,694	33 103 733	343,206,456

Table 3-7A—Mineral Production by Mining

Division	Period	Placer Gold		Metals	Industrial Minerals	Structural Materials
		Quantity	Value			
		g	$	$	$	$
Alberni	1977			22,364,704		528,778
	1978			**24,988,615**		**1,016,069**
	To date	50 294	33,253	282,795,867	9,398	7,847,614
Atlin	1977	28,039	189,278			22,281
	1978	**3 328**	**26,880**			**17,542**
	To date	22 983 970	17,938,866	38,171,207	20,325	385,503
Cariboo	1977	10 775	66,818	66,680,425	49,595	7,608,803
	1978	**9 611**	**78,621**	**41,934,799**	**59,346**	**4,665,784**
	To date	81 264 411	54,501,242	491,998,646	997,984	51,378,450
Clinton	1977					1,322,916
	1978					**1,775,423**
	To date	316 349	243,069	848,377	162,427	7,881,498
Fort Steele	1977			86,408,253	1,113,986	1,431,994
	1978			**102,876,534**	**1,531,236**	**854,961**
	To date	639 241	472,087	2,787,635,070	27,426,114	14,372,379
Golden	1977				2,357,488	235,703
	1978			**36,541**	**3,110,695**	**99,744**
	To date	14 587	11,268	66,284,632	28,487,194	4,781,623
Greenwood	1977			7,433,120	900	433,332
	1978			**3,621,966**	**23,339**	**249,802**
	To date	157 817	115,662	245,281,228	2,352,136	3,765,702
Kamloops	1977			135,399,441		12,195,844
	1978			**179,822,359**		**13,310,737**
	To date	858 287	604,785	1,046,590,757	6,540,538	86,053,466
Liard	1977				71,131,574	2,025,368
	1978	**591**	**4,750**		**50,028,356**	**4,541,797**
	To date	1 565 303	1,258,153	19,156,498	486,488,833	25,405,736
Lillooet	1977	1 884	9,407			258,442
	1978			**106,590**		**310,803**
	To date	2 893 348	1,937,853	148,273,846	473,095	4,406,310
Nanaimo	1977			81,969,046	206,109	7,901,541
	1978			**102,917,596**	**56,894**	**10,592,097**
	To date	26 935	19,300	800,873,941	2,838,984	111,864,674
Nelson	1977			7,020,924	1,099,488	1,344,182
	1978			**4,195,459**	**1,139,304**	**1,694,028**
	To date	111 535	89,026	409,187,135	8,066,921	13,933,331
New Westminster	1977					18,932,498
	1978	**31**	**250**			**22,012,397**
	To date	975 418	597,152	63,751,805	1,611,625	293,004,976
Nicola	1977			25,566,841		340,793
	1978			**41,065,672**		**163,101**
	To date	7 278	4,764	419,470,394	10,050	3,102,780
Omineca	1977			124,587,817	116,095	1,228,568
	1978	**342**	**2,750**	**139,006,311**	**48,689**	**1,027,152**
	To date	1 756 007	1,509,150	953,887,088	1,560,820	18,989,856
Osoyoos	1977			62,327,867	25,577	836,846
	1978			**74,146,136**	**22,100**	**501,870**
	To date	7 465	5,466	465,033,625	6,782,114	7,353,017
Revelstoke	1977					396,364
	1978					**269,539**
	To date	235 823	164,477	15,500,414		4,623,591
Similkameen	1977			32,553,805		850,292
	1978			**40,878,260**		**347,514**
	To date	1 415 404	878,204	340,066,486	18,558	6,016,679
Skeena	1977			29,939,818		2,597,402
	1978			**37,248,519**		**1,725,272**
	To date	143 167	105,569	679,807,250	1,240,215	28,926,454
Slocan	1977			3,216,040		260,557
	1978			**2,604,889**		**93,820**
	To date	11 384	9,397	286,912,804		3,290,142
Trail Creek	1977			132,717		299,452
	1978			**82,734**		**1,735,319**
	To date	26 469	24,260	90,987,375		5,953,413
Vancouver	1977			8,860,795		20,828,514
	1978			**8,815,561**		**28,366,072**
	To date	5 661	5,306	318,722,490	7,066,964	239,638,251
Vernon	1977					2,683,196
	1978			**9,360**		**1,788,720**
	To date	85 058	73,349	371,414	225,341	19,274,682
Victoria	1977					27,602,612
	1978			**2,943**		**32,120,435**
	To date	19 533	15,680	24,812,286	190,651	354,783,984
Not assigned	1977	5 472	23,572	19,286,019	3,084,287	3,484,714
	1978	**22 612**	**181,750**	**15,122,173**	**3,451,402**	**13,061,818**
	To date	47 609 959	17,847,540	392,627,913	76,520,348	75,032,709
Totals	1977	46 170	289,075	713,747,632	79,185,099	115,650,992
	1978	**36 515**	**295,001**	**819,483,517**	**59,471,361**	**142,341,826**
	To date	163 180 703	98,464,878	10,389,048,548	659,090,635	1,392,066,820

Divisions, 1977 and 1978, and Total to Date

Coal		Petroleum and Natural Gas						Division Total
		Crude Oil and Condensates		Natural Gas Delivered to Pipeline		Butane and Propane		
Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	
t	$	m³	$	10³m³	$	m³	$	$
								22,893,482
								26,004,684
								290,686,132
								211,559
								44,422
								56,515,901
								74,405,641
								48,738,560
263	1,100							598,877,422
								1,322,916
								1,775,423
								9,135,371
8 423 950	328,841,783							417,796,016
9 463 648	**381,888,469**							**487,151,200**
115 386 984	1,980,416,332							4,810,321,982
								2,593,191
								3,246,980
								99,564,717
								7,867,352
								3,895,107
								251,514,728
								147,595,285
								193,133,596
13 687	59,765							1,139,849,311
		2 405 035	144,087,391	8 895 663	396,601,354	202 654	9,751,111	623,596,798
		2 185 588	**157,111,602**	**8 003 029**	**401,373,236**	**192 312**	**24,484,996**	**637,544,737**
131 923	1,515,507	51 659 350	1,189,088,137	125 677 472	1,749,617,714	2 769 027	51,097,296	3,523,627,874
								267,849
								417,393
								155,091,104
								90,076,696
								113,566,587
67 425 673	301,144,744							1,216,741,643
								9,464,594
								7,028,791
								431,276,413
								18,932,498
								22,012,647
								358,965,558
								25,907,634
								41,228,773
2 657 660	11,080,836							433,668,824
231	5,100							125,937,580
272	**6,772**							**140,091,674**
456 967	3,445,853							979,392,767
								63,190,290
								74,670,106
1 018	5,008							479,179,230
								396,364
								269,539
								20,288,482
								33,404,097
								41,225,774
4 188 851	19,553,725							366,533,652
								32,537,220
								38,973,791
33	116							710,079,604
								3,476,597
								2,698,709
								290,212,343
								432,169
								1,818,053
								96,965,048
								29,689,309
								37,181,633
								565,433,011
								2,683,196
								1,798,080
								19,944,786
								27,602,612
								32,123,378
								379,802,601
								25,878,592
								31,817,143
								562,028,510
8 424 181	328,846,883	2 405 035	144,087,391	8 895 663	396,601,354	202 654	9,751,111	1,788,159,537
9 463 920	**381,895,241**	**2 185 588**	**157,111,602**	**8 003 029**	**401,373,236**	**192 312**	**24,484,996**	**1,986,456,780**
190 263 059	2,317,222,986	51 659 350	1,189,088,137	125 677 472	1,749,617,714	2 769 027	51,097,296	17,845,697,014

Table 3–7B—Production of Lode Gold, Silver, Copper, Lead, and Zinc by Mining Divisions, 1977 and 1978, and Total to Date

Division	Period	Lode Gold		Silver		Copper		Lead		Zinc		Division Total
		Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	
		g	$	g	$	kg	$	kg	$	kg	$	$
Alberni	1977	527 351	2,579,181	28 421 579	4,372,906	2 402 259	2,874,364	2 519 178	1,293,494	14 759 757	11,081,341	22,201,286
	1978	**605 420**	**4,121,668**	**29 431 680**	**5,435,156**	**3 000 193**	**3,802,301**	**2 364 683**	**1,387,099**	**14 872 224**	**10,111,375**	**24,857,599**
	To date	15 173 816	30,669,530	276 073 960	30,326,952	46 854 699	58,527,128	18 989 722	8,118,304	195 022 894	101,877,397	229,519,311
Atlin	1977											
	1978											
	To date	10 706 647	12,131,576	105 785 004	2,997,652	11 239 012	8,160,361	10 818 897	3,453,882	41 309 830	10,865,614	37,609,085
Cariboo	1977			2 979 170	526,163	38 595 779	55,837,221					56,363,384
	1978			**2 867 758**	**612,970**	**18 835 185**	**29,339,407**					**29,952,377**
	To date	37 393 613	43,347,296	22 290 027	3,070,934	246 445 497	374,101,406	11 890	3,998	230	20	420,523,649
Clinton	1977											
	1978											
	To date	727 499	827,328	982 419	14,237	26 103	5,905	88	7			847,477
Fort Steele	1977			79 114 182	12,145,695			68 300 790	36,866,630	62 812 003	35,298,445	84,310,770
	1978			**102 608 113**	**19,987,927**			**80 961 213**	**51,795,162**	**52 286 179**	**27,509,538**	**99,292,627**
	To date	390 707	749,363	8 041 225 618	246,725,956	7 163 855	12,534,149	6 597 706 869	1,328,997,390	5 016 150 175	1,149,565,740	2,738,572,598
Golden	1977											
	1978			**66 031**	**14,242**			**12 083**	**9,057**	**20 446**	**13,013**	**36,312**
	To date	13 965	25,415	143 530 143	4,931,031	532 092	367,849	117 953 505	26,293,855	152 337 820	33,466,050	65,084,200
Greenwood	1977	261 359	1,489,066	12 836 551	2,016,898	2 576 877	3,865,152	110 765	61,128	99 888	49,446	7,431,690
	1978	**64 352**	**430,899**	**10 888 321**	**2,172,005**	**581 146**	**906,571**	**93 926**	**60,529**	**102 993**	**50,751**	**3,620,755**
	To date	43 562 914	40,637,424	1 397 222 466	45,349,285	273 352 547	153,550,378	11 822 190	2,808,512	11 625 178	2,727,060	245,072,609
Kamloops	1977	106 807	581,202	24 614 634	3,996,954	87 318 138	118,518,238	59 386	32,731	33 349	16,174	123,145,299
	1978	**1 109 879**	**8,595,976**	**27 414 961**	**5,787,702**	**94 121 838**	**146,155,242**					**160,538,920**
	To date	3 445 726	12,254,169	177 218 233	22,020,193	676 731 726	956,732,155	387 375	107,382	242,240	51,507	991,165,406
Liard	1977											
	1978											
	To date	3 546	4,120	33 809	1,416	13 570 392	19,147,861	7 428	2,736	804	286	19,156,419
Lillooet	1977											
	1978	**13 934**	**106,240**	**1 742**	**350**							**106,590**
	To date	130 197 655	147,465,171	30 730 480	719,985	181	41	28 355	2,548	7	2	148,187,747
Nanaimo	1977	1 443 988	7,558,331	8 729 275	1,541,477	44 722 108	64,889,992					73,989,800
	1978	**1 298 208**	**9,968,963**	**9 362 470**	**2,110,717**	**48 466 230**	**81,382,719**					**93,462,399**
	To date	17 413 543	54,818,061	119 218 919	11,291,843	385 866 308	554,332,229					620,442,133
Nelson	1977	809	4,204	391 120	62,028			1 580 379	847,685	10 500 285	5,900,189	6,814,106
	1978			**249 415**	**39,771**			**1 202 688**	**700,689**	**6 962 555**	**3,329,215**	**4,069,675**
	To date	41 733 010	42,064,473	324 078 549	9,121,798	6 765 479	1,689,196	240 828 610	69,411,098	686 782 248	223,718,582	346,005,147
New Westminster	1977											
	1978											
	To date	139 093	114,376	470 246	7,729	11 333 143	11,553,105	12 893	1,119	5 786	481	11,676,810
Nicola	1977					16 933 541	24,624,499					24,624,499
	1978					**25 173 621**	**40,126,034**					**40,126,034**
	To date	343 221	396,312	8 598 518	135,632	353 721 100	412,670,581	1 016 721	91,282	146 913	10,977	413,304,734
Omineca	1977	1 171 650	6,347,079	5 461 967	894,927	32 160 141	42,993,226	9 579	5,280	9 409	4,563	50,245,075
	1978	**1 113 056**	**8,413,612**	**3 937 235**	**815,374**	**30 794 089**	**50,550,297**	**2 378**	**1,784**	**3 891**	**2,402**	**59,783,469**
	To date	10 261 163	39,185,787	369 951 336	14,540,623	258 436 935	372,030,165	13 816 624	3,934,634	19 617 976	6,187,725	435,878,934

Osoyoos	1977	107 899	550,029	15 253 595	2,429,781	15 490 255	22,170,354	11 602	6,489	15 990	6,168	25,162,821
	1978	**122 639**	**924,324**	**13 541 437**	**2,787,539**	**13 545 457**	**22,652,512**	**9 918**	**6,366**	**16 165**	**5,523**	**26,376,264**
	To date	53 328 333	57,389,598	196 141 861	19,432,214	130 080 511	182,208,369	296 303	91,713	177 982	65,225	259,187,119
Revelstoke	1977	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	1978	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	To date	1 163 532	1,081,981	128 317 043	2,821,365	69 710	51,037	16 406 534	3,876,057	12 314 288	3,817,157	11,147,597
Similkameen	1977	847 246	4,660,448	3 456 476	532,814	19 730 380	27,360,548	.....	.....	.....	.....	32,553,805
	1978	**1 012 496**	**7,040,384**	**3 083 303**	**586,077**	**23 746 609**	**33,251,799**	.....	.....	.....	.....	**40,878,260**
	To date	11 260 811	33,130,894	152 279 883	5,597,010	397 744 177	301,189,001	178 550	15,137	36 494	5,258	339,937,300
Skeena	1977	154 085	983,100	10 147 136	1,689,657	14 960 957	21,133,979	6 866	3,780	3 046	1,342	23,811,858
	1978	**159 403**	**1,521,659**	**9 566 928**	**2,067,748**	**15 325 225**	**23,369,465**	**14 029**	**10,511**	**9 602**	**5,875**	**26,975,258**
	To date	78 070 188	70,058,522	2 283 403 638	58,772,828	508 775 980	385,473,229	27 243 451	5,456,050	7 822 718	2,552,726	522,313,355
Slocan	1977	28 334	164,045	10 519 812	1,656,306	136	111	1 234 959	810,664	866 458	571,516	3,202,042
	1978	**3 173**	**23,035**	**8 344 064**	**1,654,119**	**87**	**100**	**881 852**	**560,023**	**576 913**	**357,945**	**2 595,222**
	To date	594 007	807,585	2 468 132 034	62,579,113	6 491	2,133	516 050 916	109,396,054	434 871 195	108,278,719	281,063,604
Trail Creek	1977	2 831	15,951	528 285	85,989	.....	.....	26 814	16,127	29 865	14,650	132,717
	1978	**1 897**	**13,616**	**261 390**	**50,277**	.....	.....	**12 216**	**7,363**	**23 342**	**11,478**	**82,734**
	To date	92 877 400	63,513,572	117 180 523	2,528,926	55 592 776	18,245,404	175 629	61,660	198 043	87,750	84,437,312
Vancouver	1977	1 185 864	6,070,222	9 648 057	1,433,890	53 251	80,043	1 171 697	673,842	1 096 020	602,798	8,860,795
	1978	**1 039 182**	**6,799,359**	**5 333 052**	**883,589**	**40 365**	**36,704**	**1 005 903**	**603,925**	**1 124 390**	**486,984**	**8,815,561**
	To date	18 395 424	31,606,622	193 295 876	7,376,224	506 993 281	242,954,209	10 903 591	3,306,607	110 676 505	32,272,752	317,516,414
Vernon	1977	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	1978	**156**	**1,125**	**37 106**	**8,235**	.....	.....	.....	.....	.....	.....	**9,360**
	To date	165 250	181,914	2 246 726	148,293	297	100	86 363	29,276	33 511	11,299	370,882
Victoria	1977	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	1978	**31**	**225**	**404**	**81**	**1 994**	**2,637**	.....	.....	.....	.....	**2,943**
	To date	1 375 157	1,236,720	29 478 396	654,567	29 775 654	22,581,791	95 298	19,848	1 618 731	283,923	24,776,849
Not assigned	1977	68 613	349,078	29 401 168	4,548,613	280 293	388,934	8 140 631	1,698,443	13 554 158	7,754,369	14,739,437
	1978	**—1 494**	**—9,205**	**271 480**	**52,630**	**60 653**	**118,607**	**—5 496 355**	**—3,501,944**	**19 619 411**	**10,164,602**	**6,824,690**
	To date	736 527	1,109,130	282 800 822	19,574,449	26 370 527	15,999,546	251 095 087	51,083,806	731 206 177	193,026,370	280,793,301
Totals	1977	5 906 336	31,301,931	241 503 007	37,934,098	275 224 115	384,736,661	78 172 646	42,316,293	103 780 228	61,301,001	557,589,984
	1978	**6 542 332**	**47,951,880**	**227 271 890**	**45,071,509**	**273 692 676**	**431,694,395**	**81 064 539**	**51,640,564**	**95 618 111**	**52,048,701**	**628,407,049**
	To date	569 472 747	684,806,939	16 870 686 529	570,740,205	3 947 448 423	4,104,107,278	7 835 932 889	1,616,562,950	7 422 197 745	1,868,372,620	8,844,589,992

Table 3-7C—Production of Miscellaneous Metals by Mining Divisions, 1977 and 1978, 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
		kg	$	kg	$	kg	$	t	$	t	$	t	$	kg	$
Alberni	1977					28 781	163,418								
	1978					**26 872**	**131,016**								
	To date					560 001	3,641,845			4 293 517	49,634,711				
Atlin	1977														
	1978														
	To date					144 791	561,762								
Cariboo	1977														
	1978														
	To date														
Clinton	1977														
	1978														
	To date							114	900						
Fort Steele	1977									21 763	292,043				
	1978									**25 459**	**384,563**				
	To date					1 542 022	10,064,486			1 327 992	15,281,785				
Golden	1977														
	1978					**66**	**229**								
	To date	18 172	14,906			259 162	1,185,526								
Greenwood	1977					259	1,430								
	1978					**350**	**1,211**								
	To date					36 883	177,224	608	31,395						
Kamloops	1977					45	270								
	1978														
	To date					99	641			19 202	95,851			4 984	5,795
Liard	1977														
	1978														
	To date														
Lillooet	1977														
	1978														
	To date	6 108	4,321											4 187	41,804
Nanaimo	1977														
	1978														
	To date									15 872 977	152,633,401				
Nelson	1977					36 949	206,818								
	1978					**26 568**	**125,784**								
	To date					4 059 962	19,859,034								
New Westminster	1977														
	1978														
	To date														
Nicola	1977									39 245	942,342				
	1978									**35 696**	**939,638**				
	To date									299 041	6,165,660				
Omineca	1977														
	1978														
	To date	53 697	21,882			135 245	628,342							6 085 216	49,171,164

Osoyoos	1977														
	1978														
	To date											15			
Revelstoke	1977														
	1978														
	To date	4 261	3,455			46 997	176,102								
Similkameen	1977														
	1978														
	To date														
Skeena	1977									384 309	6,127,960				
	1978									**554 414**	**10,273,261**				
	To date					64 360	316,764			11 290 505	119,443,123				
Slocan	1977					4 506	13,398								
	1978					**2 514**	**9,667**								
	To date	14 453	8,133			1 238 891	5,832,907					491	8,160		
Trail Creek	1977														
	1978														
	To date					52	210			499	1,925				
Vancouver	1977														
	1978														
	To date					257 261	1,206,076								
Vernon	1977														
	1978														
	To date					86	532								
Victoria	1977														
	1978														
	To date					3 175	10,929					1 058	24,508		
Not assigned	1977	596 207	2,519,739	18 540	187,612	250 171	1,334,717								
	1978	**459 521**	**2,083,895**	**28 172**	**166,452**	**197 433**	**918,413**								
	To date	27 043 023	27,271,620	3 261 251	15,999,685	12 133 598	43,327,845								
Totals	1977	596 207	2,519,739	18 540	187,612	320 711	1,720,051			445 317	7,362,345				
	1978	**459 521**	**2,083,895**	**28 172**	**166,452**	**253 803**	**1,186,320**			**615 569**	**11,597,462**				
	To date	27 139 714	27,824,317	3 261 251	15,999,685	20 482 585	86,990,225	722	32,295	33 103 733	343,206,456	1 564	32,668	6 094 387	49,218,263

Table 3-7C—Production of Miscellaneous Metals by Mining Divisions, 1977 and 1978, 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		
		kg	$	kg	$	kg	$	g	$	kg	$	kg	$	$	$
Alberni	1977														163,418
	1978														**131,016**
	To date														53,276,556
Atlin	1977														
	1978														
	To date											132	360		562,122
Cariboo	1977	1 129 768	10,317,041												10,317,041
	1978	**883 690**	**11,982,422**												**11,982,422**
	To date	13 524 177	71,451,267					1 835	2,299			12 564	21,431		71,474,997
Clinton	1977														
	1978														
	To date														900
Fort Steele	1977									177 009	1,805,440				2,097,483
	1978									**227 957**	**3,199,344**				**3,583,907**
	To date									9 205 576	23,678,017			88,1841	49,062,472
Golden	1977														
	1978														**229**
	To date														1,200,432
Greenwood	1977														1,480
	1978														**1,211**
	To date														208,619
Kamloops	1977	1 846 837	12,253,872												12,254,142
	1978	**1 998 132**	**19,283,939**												**19,283,939**
	To date	10 352 178	55,323,064												55,425,351
Liard	1977														
	1978														
	To date							62	79						79
Lillooet	1977														
	1978														
	To date	666	2,440					93	113			14 675	37,921		86,099
Nanaimo	1977	987 627	7,979,246												7,979,246
	1978	**859 104**	**9,455,197**												**9,455,197**
	To date	4 511 890	27,798,407												180,481,808
Nelson	1977														206,818
	1978														**125,784**
	To date	6 819	18,378									8 056 095	43,304,576		63,181,988
New Westminster	1977														
	1978														
	To date			23 337 783	51,698,754									376,2412	52,074,995
Nicola	1977														942,342
	1978														**939,638**
	To date														6,165,660
Omineca	1977	7 691 235	74,342,742												74,342,742
	1978	**6 030 967**	**79,222,842**												**79,222,842**
	To date	84 125 229	463,488,482					93	154			1 002 839	4,697,710	4202	518,008,154

Osoyoos	1977	3 866 503	37,165,046												37,165,046
	1978	3 283 310	47,769,872												47,769,872
	To date	34 343 485	205,846,506												205,846,506
Revelstoke	1977														
	1978														
	To date	1 190 713	4,167,573									3 531	5,687		4,352,817
Similkameen	1977														
	1978														
	To date							40 030	129,186						129,186
Skeena	1977														6,127,960
	1978														10,273,261
	To date	10 470 935	37,782,288									166	331	1,8893	157,493,895
Slocan	1977														13,398
	1978														9,667
	To date														5,849,200
Trail Creek	1977														
	1978														
	To date	1 652 970	6,514,289			23 296	30,462	1 649	3,177						6,550,068
Vancouver	1977														
	1978														
	To date														1,206,076
Vernon	1977														
	1978														
	To date														532
Victoria	1977														
	1978														
	To date														35,437
Not assigned	1977									10 469	106,860			397,654	4,546,582
	1978									33 906	476,164			4,652,559	8,297,483
	To date									213 026	1,665,586			23,569,876	111,834,612
Totals	1977	15 521 970	142,057,947							187 478	1,912,300			397,654	156,157,648
	1978	13 055 203	167,714,272							261 863	3,675,505			4,652,559	191,076,468
	To date	160 179 062	872,342,694	23 337 783	51,698,754	23 296	30,462	43 762	135,008	9 418 602	25,343,603	9 090 002	48,068,016	24,036,110	1,544,458,556

[1] Magnesium, page 93. [2] Cobalt, page 89. [3] Selenium, page 95.

Table 3-7D—Production of Industrial Minerals by

Division	Period	Asbestos		Barite[1]		Diatomite		Fluxes (Quartz and Limestone)		Granules (Quartz, Limestone, and Granite)	
		Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
		t	$	t	$	t	$	t	$	t	$
Alberni	1977										
	1978										
	To date										
Atlin	1977										
	1978										
	To date										
Cariboo	1977					1 239	49,595				
	1978					**2 184**	**59,346**				
	To date					24 766	854,504			44	168
Clinton	1977										
	1978										
	To date										
Fort Steele	1977										
	1978										
	To date			7	80						
Golden	1977										
	1978										
	To date			398 388	4,489,227			2 956	12,612		
Greenwood	1977									41	900
	1978									**711**	**23,339**
	To date							1 624 308	1,540,319	933	28,239
Kamloops	1977										
	1978										
	To date									567	12,230
Liard	1977	97 033	69,729,205								
	1978	**68 266**	**47,066,170**								
	To date	1 509 114	461,976,898								
Lillooet	1977										
	1978										
	To date										
Nanaimo	1977							28 624	95,461	2 733	110,648
	1978							**22 475**	**56,894**		
	To date							1 022 258	2,061,835	31 506	777,149
Nelson	1977									25 836	1,099,488
	1978									**25 327**	**1,139,304**
	To date							6 895	8,174	227 825	8,002,846
New Westminster	1977										
	1978										
	To date									99 490	1,611,625
Nicola	1977										
	1978										
	To date										
Omineca	1977									24	1,872
	1978									**20**	**1,417**
	To date									123	9,478
Osoyoos	1977									917	25,577
	1978									**791**	**22,100**
	To date							728 113	3,699,031	194 213	2,750,612
Similkameen	1977										
	1978										
	To date										
Skeena	1977										
	1978										
	To date							545 232	1,050,722		
Vancouver	1977										
	1978										
	To date									26 936	418,606
Vernon	1977										
	1978										
	To date							2 903	30,400	7 210	190,963
Victoria	1977										
	1978										
	To date							262	3,345	8 713	157,080
Not assigned	1977										
	1978										
	To date										
Totals	1977	97 033	69,729,205			1 239	49,595	28 624	95,461	29 551	1,238,485
	1978	**68 266**	**47,066,170**			**2 184**	**59,346**	**22 475**	**56,894**	**26 849**	**1,186,160**
	To date	1 509 114	461,976,898	398 395	4,489,307	24 766	854,504	3 932 927	8,406,438	597 560	13,958,996

[1] From 1972, excludes production which is confidential.
Other: *See* notes on individual materials listed alphabetically on pages 87 to 97.

[2] Natro-alunite.
[3] Hydromagnesite.
[4] Volcanic ash.
[5] Magnesium sulphate.
[6] Sodium carbonate.
[7] Phosphate rock.

Mining Divisions, 1977 and 1978, and Total to Date

Gypsum and Gypsite		Jade		Mica		Sulphur		Other, Value	Division Total
Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value		
t	$	kg	$	t	$	t	$	$	$
								9,3982	9,398
								20,3253	20,325
									49,595
									59,340
				4 542 160	143,012			3004	997,984
792	6,236							156,1913 5 6	162,427
						74,582	1,113,986		1,113,986
						87 752	**1,531,236**		**1,531,236**
102 400	298,824					1 493 828	27,110,316	16,8947	27,426,114
653 126	2,357,488								2,357,488
733 080	**3,110,695**								**3,110,695**
6 282 786	23,984,079							1,2768 9	28,487,194
									900
									23,339
								783,57810	2,352,136
1 131 179	6,323,178			192 640	2,075			203,0555 6	6,540,538
		228 337	711,300			35 950	691,069		71,131,574
		451 908	**1,374,746**			**89 480**	**1,587,440**		**50,028,356**
		1 068 923	3,477,487			1 039 770	21,034,448		486,488,833
		253 391	467,966					5,1299	473,095
									206,109
									56,894
									2,838,984
									1,099,488
									1,139,304
								55,9018	8,066,921
									1,611,625
2 184	10,050								10,050
		38 284	114,223						116,095
		36 851	**47,272**						**48,689**
		557 939	1,539,882					11,46011 12	1,560,820
									25,577
									22,100
				720 664	25,938			306,5335 10 11	6,782,114
227	1,700							16,85813	18,558
				287 689	10,815	37 761	178,678		1,240,215
						623,773	6,550,969	97,3898	7,066,964
				72 801	3,978				225,341
								30,2269	190,651
						138 360	2,066,605	1,017,682	3,084,287
						144 949	**2,529,317**	**922,085**	**3,451,402**
						5 497 131	71,923,489	4,596,859	76,520,348
653 126	2,357,488	266 621	825,523			248 892	3,871,660	1,017,682	79,185,099
733 080	**3,110,695**	**488 759**	**1,422,018**			**322 181**	**5,647,993**	**922,085**	**59,471,361**
7 519 568	30,624,067	1 880 253	5,485,335	5 815 954	185,818	8 692 263	126,797,900	6,311,372	659,090,635

8 Iron oxide and ochre.
9 Talc.
10 Fluorspar.
11 Arsenious oxide.
12 Perlite.
13 Bentonite.

Table 3-7E—Production of Structural Materials by Mining Divisions, 1977 and 1978, 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	1977					528,778			528,778
	1978					**1,016,069**			**1,016,069**
	To date				346,659	7,500,955			7,847,614
Atlin	1977					22,281			22,281
	1978					**17,542**			**17,542**
	To date		1,108		102,453	281,942			385,503
Cariboo	1977		557,035		1,733,660	5,318,108			7,608,803
	1978		**469,780**		**2,004,453**	**2,191,581**			**4,665,794**
	To date		3,675,091		11,476,746	35,894,156	332,457		51,378,450
Clinton	1977				3,906	1,319,010			1,322,916
	1978				**1,323,000**	**452,423**			**1,775,423**
	To date				3,199,130	4,682,368			7,881,498
Fort Steele	1977					1,431,994			1,431,994
	1978				**20,000**	**834,981**			**854,981**
	To date		43,873	71,941	2,975,311	11,265,336	15,918		14,372,379
Golden	1977					235,703			235,703
	1978					**99,744**			**99,744**
	To date		1,000	50,840	255,923	4,345,701	128,159		4,781,623
Greenwood	1977					433,332			433,332
	1978		**8,261**			**241,541**			**249,802**
	To date		50,821	161,020	278,474	3,154,104	121,283		3,765,702
Kamloops	1977	8,136,745			2,167,475	1,891,624			12,195,844
	1978	**9,067,294**			**1,544,504**	**2,698,939**			**13,310,737**
	To date	45,198,985	25,067	19,800	17,220,400	23,516,835	72,379		86,053,466
Liard	1977				36,000	1,989,368			2,025,368
	1978				**459,000**	**4,082,797**			**4,541,797**
	To date				2,622,808	22,782,928			25,405,736
Lillooet	1977		246,672			11,770			258,442
	1978		**303,150**			**7,653**			**310,803**
	To date		927,080	2,000	1,122,818	2,354,412			4,406,310
Nanaimo	1977		4,282,416		595,568	3,023,557			7,901,541
	1978		**5,419,687**		**1,679,297**	**3,493,113**			**10,592,097**
	To date		75,113,819	3,450,735	7,581,205	24,539,923	1,178,992		111,864,674
Nelson	1977		670,922			673,260			1,344,182
	1978		**929,653**		**1,455**	**762,920**			**1,694,028**
	To date		3,977,470	437,138	591,026	8,905,723	21,974		13,933,331
New Westminster	1977		69,800		1,259,367	12,693,532	4,909,799		18,932,498
	1978		**86,172**		**345,288**	**14,795,377**	**6,282,560**		**22,012,397**
	To date		3,680,882	20,974	25,816,947	154,751,023	108,735,150		293,004,976
Nicola	1977					340,793			340,793
	1978					**163,101**			**163,101**
	To date			8,000	187,994	2,906,786			3,102,780
Omineca	1977		3,091	60	42,285	1,183,132			1,228,568
	1978		**4,278**	**105**	**6,420**	**1,016,349**			**1,027,152**
	To date		37,229	576	2,951,483	15,995,294	5,274		18,989,856
Osoyoos	1977					836,846			836,846
	1978					**501,870**			**501,870**
	To date		43,774	33,018	355,349	6,920,876			7,353,017
Revelstoke	1977			14,250	10,000	372,114			396,364
	1978			**17,925**	**600**	**251,014**			**269,539**
	To date		1,000	67,345	773,753	3,781,493			4,623,591
Similkameen	1977					850,292			850,292
	1978					**347,514**			**347,514**
	To date	10,500	11,571	24,000	712,341	5,244,912	13,355		6,016,679
Skeena	1977				722,001	1,875,401			2,597,402
	1978				**526,048**	**1,199,224**			**1,725,272**
	To date		1,645,300	144,000	5,531,295	21,592,610	13,249		28,926,454
Slocan	1977					260,557			260,557
	1978					**93,820**			**93,820**
	To date		1,000	115,143	157,323	3,016,676			3,290,142
Trail Creek	1977					299,452			299,452
	1978					**1,735,319**			**1,735,319**
	To date		32,500	85,520	381,393	5,454,000			5,953,413
Vancouver	1977	14,585,523				6,242,991			20,828,514
	1978	**21,947,739**				**6,418,333**			**28,366,072**
	To date	143,220,736	40,885	4,012,560	8,681,796	82,593,682	1,088,592		239,638,251
Vernon	1977			41,292		2,641,904			2,683,196
	1978					**1,788,720**			**1,788,720**
	To date		351,416	141,367	403,649	18,216,996	161,254		19,274,682
Victoria	1977	19,983,052	31,678			7,587,882			27,602,612
	1978	**25,125,581**	**42,331**			**6,952,573**			**32,120,435**
	To date	284,287,388	1,141,281	55	532,563	57,967,561	10,855,136		354,783,984
Not assigned	1977				739,274	2,745,440			3,484,714
	1978					**13,061,818**			**13,061,818**
	To date		315,498	505,018	2,879,844	62,179,350	3,180,828	5,972,171	75,032,709
Totals	1977	42,705,320	5,861,614	55,602	7,309,536	54,809,121	4,909,799		115,650,992
	1978	**56,140,564**	**7,263,312**	**18,030**	**8,410,065**	**64,227,295**	**6,282,560**		**142,341,826**
	To date	472,717,609	91,117,665	9,351,050	97,138,683	589,845,642	125,924,000	5,972,171	1,392,066,820

Table 3-8A—Production of Coal, 1836–1978

Year	Quantity[1]	Value	Year	Quantity[1]	Value
	tonnes	$		tonnes	$
1836–59	37 985	149,548	1919	2 207 659	11,975,671
1860	14 475	56,988	1920	2 587 763	13,450,169
1861	13 995	55,096	1921	2 422 455	12,836,013
1862	18 409	72,472	1922	2 473 692	12,880,060
1863	21 687	85,380	1923	2 391 998	12,678,548
1864	29 091	115,528	1924	1 839 619	9,911,935
1865	33 345	131,276	1925	2 305 337	12,168,905
1866	25 518	100,460	1926	2 182 760	11,650,180
1867	31 740	124,956	1927	2 316 408	12,269,135
1868	44 711	176,020	1928	2 431 794	12,633,510
1869	36 376	143,208	1929	2 154 607	11,256,260
1870	30 322	119,372	1930	1 809 364	9,435,650
1871	50 310	164,612	1931	1 601 600	7,684,155
1872	50 310	164,612	1932	1 464 759	6,523,644
1873	50 311	164,612	1933	1 249 347	5,375,171
1874	82 856	244,641	1934	1 297 306	5,725,133
1875	111 912	330,435	1935	1 159 721	5,048,864
1876	141 425	417,576	1936	1 226 780	5,722,502
1877	156 525	462,156	1937	1 312 003	6,139,920
1878	173 587	522,538	1938	1 259 626	5,565,069
1879	245 172	723,903	1939	1 416 184	6,280,956
1880	271 889	802,785	1940	1 507 758	7,088,265
1881	232 020	685,171	1941	1 673 516	7,660,000
1882	286 666	846,417	1942	1 810 731	8,237,172
1883	216 721	639,897	1943	1 682 591	7,742,030
1884	400 391	1,182,210	1944	1 752 626	8,217,966
1885	371 461	1,096,788	1945	1 381 654	6,454,360
1886	331 875	979,908	1946	1 305 516	6,732,470
1887	419 992	1,240,080	1947	1 538 895	8,680,440
1888	497 150	1,467,903	1948	1 455 552	9,765,395
1889	589 133	1,739,490	1949	1 470 782	10,549,924
1890	689 020	2,034,420	1950	1 427 907	10,119,303
1891	1 045 607	3,087,291	1951	1 427 513	10,169,617
1892	839 591	2,479,005	1952	1 272 150	9,729,739
1893	993 988	2,934,882	1953	1 255 662	9,528,279
1894	1 029 204	3,038,859	1954	1 186 849	9,154,544
1895	954 727	2,824,687	1955	1 209 157	8,986,501
1896	909 237	2,693,961	1956	1 285 664	9,346,518
1897	906 610	2,734,522	1957	984 886	7,340,339
1898	1 146 015	3,582,595	1958	722 490	5,937,860
1899	1 302 088	4,126,803	1959	625 964	5,472,064
1900	1 615 688	4,744,530	1960	715 455	5,242,223
1901	1 718 692	5,016,398	1961	833 827	6,802,134
1902	1 667 960	4,832,257	1962	748 731	6,133,986
1903	1 473 933	4,332,297	1963	771 594	6,237,997
1904	1 712 739	4,953,024	1964	826 737	6,327,678
1905	1 855 121	5,511,861	1965	862 513	6,713,590
1906	1 929 540	5,548,044	1966	771 848	6,196,219
1907	2 255 214	7,637,713	1967	824 436	7,045,341
1908	2 143 225	7,356,866	1968	870 180	7,588,989
1909	2 439 109	8,574,884	1969	773 226	6,817,155
1910	3 007 074	11,108,335	1970	2 398 635	19,559,669
1911	2 305 778	8,071,747	1971	4 141 496	45,801,936
1912	2 913 778	10,786,812	1972	5 466 846	66,030,210
1913	2 461 665	9,197,460	1973	6 924 733	87,976,105
1914	2 029 400	7,745,847	1974	7 757 440	154,593,643
1915	1 883 851	7,114,178	1975	8 924 816	317,111,744
1916	2 343 671	8,900,675	1976	7 537 695	298,683,679
1917	2 209 982	8,484,343	1977	8 424 181	328,846,883
1918	2 336 238	12,833,994	1978	9 463 920	381,895,241
			Totals	190 263 059	2,317,222,986

[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 3-8B—Coal Production and Distribution by Collieries and by Mining Divisions, 1978

Mine	Raw Coal Production	Clean Coal 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						
	t	t	t	t	t	t	t	t	t	t	t	$
Fort Steele Mining Division												
Byron Creek Collieries Ltd.	540 657	519 171	.....	.....	13 071	401 678	.....	108 531	.....	523 280	523 280	12,654,559
Coleman Collieries Ltd.	247 152	120 787	.....	.....	.....	.....	.....	120 787	.....	120 787	120 787	5,167,578
Fording Coal Ltd.	4 223 002	2 790 011	.....	.....	.....	.....	.....	2 669 692	140 510	2 810 202	2 810 202	121,540,688
Kaiser Resources Ltd.	7 368 096	5 662 807	7 666	292 005	49 101	120	3 791	4 120 265	1 536 431	5 709 708	6 009 379	242,525,644
Omineca Mining Division												
Bulkley Valley Coal Ltd.	308	272	7	.....	265	.....	.....	.....	.....	265	272	6,772
Totals	11 379 215	9 093 048	7 673	292 005	62 437	401 798	3 791	7 019 275	1 676 941	9 164 242	9 463 920	381,895,241

Table 3-9—Principal Items of Expenditure, Reported for Operations of All Classes

Class	Salaries and Wages	Fuel and Electricity	Process Supplies
	$	$	$
Metal-mining	135,853,137	47,060,849	159,461,138
Exploration and development	82,099,007		
Coal	65,643,694	14,644,287	14,083,909
Petroleum and natural gas (exploration and production)	9,946,457		
Industrial minerals	11,611,228	3,750,361	1,820,335
Structural-materials industry	29,982,587	19,329,629	13,767,708
Totals, 1978	335,136,110	84,785,126	189,133,090
1977	337,382,149	71,149,313	192,025,357
1976	277,736,828	59,220,204	170,075,616
1975	246,953,568	49,104,838	154,476,238
1974	272,945,078	42,381,258	140,002,685
1973	221,877,595	36,750,711	103,840,649
1972	199,351,449	31,115,621	77,092,955
1971	179,175,692	23,166,904	68,314,944
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 3–10—Employment in the Mineral Industry, 1901–1978

Year	Metals						Coal Mines			Structural Materials					
	Placer	Mines		Concentrates	Smelters	Total	Under	Above[1]	Total	Quarries and Pits	Plants	Industrial Materials	Exploration and Development	Petroleum and Natural Gas Exploration and Development	Total
		Under	Above												
1901	.....	2,736	1,212	.....	.....	3,948	3,041	933	3,974	.....	.....	.....	.....	.....	7,922
1902	.....	2,219	1,126	.....	.....	3,345	3,101	910	4,011	.....	.....	.....	.....	.....	7,356
1903	.....	1,662	1,088	.....	.....	2,750	3,137	1,127	4,264	.....	.....	.....	.....	.....	7,014
1904	.....	2,143	1,163	.....	.....	3,306	3,278	1,175	4,453	.....	.....	.....	.....	.....	7,759
1905	.....	2,470	1,240	.....	.....	3,710	3,127	1,280	4,407	.....	.....	.....	.....	.....	8,117
1906	.....	2,680	1,303	.....	.....	3,983	3,415	1,390	4,805	.....	.....	.....	.....	.....	8,788
1907	.....	2,704	1,239	.....	.....	3,943	2,862	907	3,769	.....	.....	.....	.....	.....	7,712
1908	.....	2,567	1,127	.....	.....	3,694	4,432	1,641	6,073	.....	.....	.....	.....	.....	9,767
1909	.....	2,184	1,070	.....	.....	3,254	4,713	1,705	6,418	.....	.....	.....	.....	.....	9,672
1910	.....	2,472	1,237	.....	.....	3,709	5,903	1,855	7,758	.....	.....	.....	.....	.....	11,467
1911	.....	2,435	1,159	.....	.....	3594	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	8,288	3,646	1,579	5,225	647	138	122	.....	.....	14,830
1928	355	2,707	2,469	911	2,748	8,835	3,814	1,520	5,334	412	368	120	.....	.....	15,424
1929	341	2,926	2,052	966	2,948	8,892	3,675	1,353	5,028	492	544	268	.....	.....	15,565
1930	425	2,316	1,260	832	3,197	7,605	3,389	1,256	4,645	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	681	2,890	8,046	2,050	843	2,893	377	187	360	.....	.....	12,985
1935	1,291	2,740	1,497	907	2,771	7,915	2,145	826	2,971	536	270	754	.....	.....	13,737
1936	1,124	2,959	1,840	720	2,678	8,197	2,015	799	2,814	931	288	825	.....	.....	14,179
1937	1,371	3,603	1,818	1,168	3,027	9,616	2,286	867	3,153	724	327	938	.....	.....	16,129
1938	1,303	3,849	2,266	919	3,158	10,192	2,088	874	2,962	900	295	369	.....	.....	16,021
1939	1,252	3,905	2,050	996	3,187	10,138	2,167	809	2,976	652	311	561	.....	.....	15,890
1940	1,004	3,923	2,104	1,048	2,944	10,019	2,175	699	2,874	827	334	647	.....	.....	15,705
1941	939	3,901	1,823	1,025	3,072	9,821	2,229	494	2,723	766	413	422	.....	.....	15,084
1942	489	2,920	1,504	960	3,555	8,939	1,892	468	2,360	842	378	262	.....	.....	13,270
1943	212	2,394	1,699	891	2,835	7,819	2,240	611	2,851	673	326	567	.....	.....	12,448
1944	255	1,896	1,825	849	2,981	7,551	2,150	689	2,839	690	351	628	.....	.....	12,314
1945	209	1,933	1,750	822	2,834	7,339	1,927	503	2,430	921	335	586	.....	.....	11,820
1946	347	1,918	1,817	672	2,813	7,220	1,773	532	2,305	827	555	679	.....	.....	11,933
1947	360	3,024	2,238	960	3,461	9,683	1,694	731	2,425	977	585	869	.....	.....	14,899
1948	348	3,143	2,429	1,126	3,884	10,582	1,594	872	2,466	1,591	656	754	.....	.....	16,397
1949	303	3,034	2,724	1,203	3,763	10,724	1,761	545	2,306	2,120	542	626	.....	.....	16,621
1950	327	3,399	2,415	1,259	3,759	10,832	1,745	516	2,261	1,916	616	660	.....	.....	16,612
1951	205	3,785	3,695	1,307	4,044	12,831	1,462	463	1,925	1,783	628	491	.....	.....	17,863
1952	230	4,171	3,923	1,516	4,120	13,730	1,280	401	1,681	1,580	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	2,558	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	1,609	625	3,081	7,434	826	260	1,086	1,483	677	446	.....	.....	11,201
1959	99	1,937	1,761	618	3,008	7,324	765	291	1,056	1,357	484	459	.....	.....	10,779
1960	86	1,782	1,959	648	3,034	7,423	894	288	1,182	1,704	557	589	.....	.....	11,541
1961	74	1,785	1,582	626	3,118	7,111	705	237	942	1,828	508	571	.....	.....	11,034
1962	85	1,677	1,976	949	3,356	7,958	548	228	776	1,523	481	517	270	.....	11,560
1963	43	1,713	2,012	850	3,239	7,814	501	247	748	909	460	528	450	.....	10,952
1964	5	1,839	1,967	822	3,281	7,909	446	267	713	1,293	444	509	772	.....	11,645
1965	2	1,752	2,019	965	3,529	8,265	405	244	649	1,079	422	639	786	441	12,283
1966	2	2,006	2,296	1,014	3,654	8,970	347	267	614	1,269	393	582	1,894	478	14,202
1967	.....	1,928	2,532	992	3,435	8,887	260	197	457	1,309	372	584	1,264	507	13,380
1968	.....	1,823	2,369	1,072	3,283	8,547	195	358	553	1,207	380	582	3,990	400	15,659
1969	7	1,794	2,470	1,099	3,468	8,831	245	455	700	1,097	549	567	4,270	416	16,437
1970	.....	2,160	3,167	1,331	3,738	10,396	242	1,033	1,275	740	647	627	4,964	437	19,086
1971	.....	2,073	3,058	1,513	3,481	10,125	444	1,013	1,457	846	794	666	4,040	495	18,423
1972	.....	1,833	3,463	1,734	3,353	10,383	214	1,771	1,985	1,116	800	527	4,201	458	19,470
1973	.....	1,704	4,005	2,394	3,390	11,493	265	1,951	2,216	898	802	667	3,392	454	19,922
1974	.....	1,509	4,239	2,352	2,767	10,867	267	2,255	2,522	895	782	646	2,848	509	19,069
1975	.....	1,100	3,619	1,983	3,733	10,435	299	2,464	2,763	826	725	705	2,931	518	18,903
1976	.....	1,268	3,733	2,048	3,542	10,591	327	2,300	2,627	931	680	670	3,101	495	19,095
1977	.....	1,208	3,768	2,224	3,590	10,790	312	2,556	2,868	1,380	626	766	3,537	490	20,457
1978	.....	**1,009**	**3,874**	**2,029**	**3,838**	**10,750**	**377**	**2,606**	**2,983**	**1,645**	**491**	**618**	**3,232**	**496**	**20,215**

[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 3-11—Employment at Major Metal and Coal Mines, 1978

	Tonnes		Days Operating Mill	Average Number Employed[1]					
	Mined	Milled		Administrative, Etc.	Mine		Mill	Others	Total
					Surface	Underground			
Metal Mines									
Afton Mines Ltd. (Afton)	3 484 846	2 456 757	365	92	76	.....	21	89	278
Bethlehem Copper Corp. (Bethlehem)	6 572 018	6 490 726	343	27	145	.....	129	20	321
Brenda Mines Ltd. (Brenda)	10 002 567	9 995 736	364	121	173	.....	177	4	475
Cominco Ltd. (HB)[2]	200 888	200 888	202	16	14	28	8	.....	66
Cominco Ltd. (Sullivan)	2 058 304	2 107 869	346	196	.....	482	203	85	966
Craigmont Mines Ltd. (Craigmont)	1 885 916	1 899 934	361	65	110	95	38	.....	308
Dankoe Mines Ltd. (Horn Silver)	28 677	28 677	247	8	5	25	3	.....	41
Gibraltar Mines Ltd. (Gibraltar)	7 363 580	5 135 655	145	119	53	.....	114	.....	286
Granby Mining Corp. (Phoenix)[3]	.....	237 801	207	2	6	.....	11	.....	19
Granisle Copper Ltd. (Granisle)	4 621 464	4 549 265	365	85	136	.....	128	.....	349
Lornex Mining Corp. Ltd. (Lornex)	15 865 501	15 927 064	365	95	382	.....	278	.....	755
Newmont Mines Ltd. (Granduc Operating Division)[4]	722 782	741 648	129	54	41	59	30	.....	184
Newmont Mines Ltd. (Similkameen Division)	6 906 996	6 779 045	365	70	162	.....	77	.....	309
Noranda Mines Ltd. (Bell)	4 080 296	4 470 070	365	82	52	.....	143	.....	277
Noranda Mines Ltd. (Boss Mountain)	541 928	541 928	354	60	49	58	32	.....	199
Northair Mines Ltd. (Warman)	89 486	93 397	356	24	.....	53	17	22	116
Placer Development Ltd. (Endako Mining Division)	10 603 873	10 656 643	347	150	137	.....	337	.....	624
Silvana Mines Ltd. (Silmonac)	15 967	15 967	365	8	8	19	9	2	46
Teck Corp. Ltd. (Highland Bell)	35 280	35 280	355	9	.....	23	9	7	48
Utah Mines Ltd. (Island Copper)	13 209 595	14 200 203	364	163	524	.....	171	.....	858
Wesfrob Mines Ltd. (Tasu)	889 933	889 933	329	45	.....	30	75	.....	150
Western Mines Ltd. (Lynx and Myra)	269 033	269 033	313	46	.....	137	19	35	237
Total metal mines	.....	.....	.....	1,537	2,073	1,009	2,069	264	6,912
Coal Mines									
Byron Creek Collieries Ltd.	595 975	.....	365	24	45	.....	9	.....	78
Coleman Collieries Ltd.	247 152	.....	365	.....	30[4]	.....	.....	.....	30
Fording Coal Ltd.	4 223 002	.....	365	231	639	.....	191	.....	1,061
Kaiser Resources Ltd.	7 368 096	.....	365	465	790	377	182	.....	1,814
Total coal mines	.....	.....	.....	720	1,504	377	382	.....	2,983

[1] The average number of 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] Production ceased August 17, 1978.

[3] Production ceased June 30, 1978.

[4] Estimated.

Table 3-12—Metal Production, 1978

Property or Mine	Location of Mine	Owner or Agent	Ore Shipped or Treated	Product Shipped	Gross Metal Content					
					Gold	Silver	Copper	Lead	Zinc	Cadmium
			t		g	g	kg	kg	kg	kg
Alberni Mining Division										
Lynx and Myra	Buttle Lake	Western Mines Ltd.	269 033	Copper concentrates, 11 485 t; lead concentrates, 6 463 t; zinc concentrates, 32 400 t	628 094	36 150 053	3 294 888	2 768 914	18 003 921	71 704
Atlin Mining Division										
Nil										
Cariboo Mining Division										
Boss Mountain	Big Timothy Mountain	Noranda Mines Ltd. (Boss Mountain Div.)	541 928	Molybdenite concentrates, 1 384 t containing 764 516 kg of molybdenum						
Gibraltar	McLeese Lake	Gibraltar Mines Ltd.	5 135 655	Copper concentrates, 74 705 t; molybdenite concentrates, 238 t containing 119 174 kg of molybdenum		3 265 628	19 713 622			
Clinton Mining Division										
Nil										
Fort Steele Mining Division										
Sullivan	Kimberley	Cominco Ltd.	2 107 869	Lead concentrates, 134 270 t; zinc concentrates, 119 716 t; tin concentrates, 561 t containing 236 339 kg of tin		114 039 181		88 863 212	64 417 720	
Golden Mining Division										
Ruth Vermont	Spillimacheen	Ruth Vermont Mines Ltd.	62	Clean-up; lead concentrates, 20 t; zinc concentrates, 42 t		75 083	384	13 600	21 901	166
Greenwood Mining Division										
Highland Bell	Beaverdell	Teck Corporation Ltd.	35 280	Lead concentrates, 439 t; zinc concentrates, 403 t; jig concentrates, 121 t	4 012	11 333 062	865	105 933	139 279	977
Phoenix	Greenwood	Granby Mining Corp. (Phoenix Copper Div.)	237 801	Copper concentrates, 2 645 t	120 555	924 599	912 728			
Kamloops Mining Division										
Afton	Kamloops	Afton Mines Ltd.	2 456 757	Copper concentrates, 18 176 t; blister copper, 5 995 t	1 022 791	5 524 701	15 429 468			
Bethlehem	Highland Valley	Bethlehem Copper Corp.	6 490 726	Copper concentrates, 41 580 t; molybdenite concentrates, 269 t containing 133 777 kg of molybdenum	124 661	7 299 470	18 312 007			
Lornex	Highland Valley	Lornex Mining Corp. Ltd.	15 927 064	Copper concentrates, 208 799 t; molybdenite concentrates, 3 459 t containing 1 864 355 kg of molybdenum		17 486 200	63 114 028			

Liard Mining Division										
Nil										
Lillooet Mining Division										
Bralorne	Bridge River	Nelson Machinery Co. Ltd.	149	Clean-up	14 992	4 976		150	150	
Nanaimo Mining Division										
Island Copper	Rupert Inlet	Utah Mines Ltd.	14 200 203	Copper concentrates, 218 515 t; molybdenite concentrates, 2 087 t containing 859 104 kg of molybdenum; rhenium shipments are confidential	1 345 360	10 402 740	50 653 152			
Nelson Mining Division										
HB	Salmo	Cominco Ltd.	200 888	Lead concentrates, 3 900 t; zinc concentrates, 15 264 t		827 713		1 451 180	8 381 566	67 298
New Westminster Mining Division										
Nil										
Nicola Mining Division										
Craigmont	Merritt	Craigmont Mines Ltd.	1 899 934	Copper concentrates, 93 082 t; iron concentrates, 33 183 t; coarse iron, 2 513 t			26 290 618			
Omineca Mining Division										
Bell (Newman)	Babine Lake	Noranda Mines Ltd. (Bell Copper Div.)	4 470 070	Copper concentrates, 64 464 t	763 299	2 210 148	17 144 917			
Endako	Endako	Placer Development Ltd. (Endako Mines Div.)	10 656 643	Molybdic tri-oxide, 10 176 t; ferro-molybdenum, 200 t; total content, 6 030 967 kg of molybdenum						
Golden Eagle	Topley	V. G. Finch and R. Williams, Smithers	3	Crude ore	9	10 404		317	140	
Granisle	Babine Lake	Granisle Copper Ltd.	4 549 265	Copper concentrates, 47 366 t	467 571	4 819 410	14 851 373			
Silver Standard	Hazelton	George Braun, Hazelton	57	Crude ore	187	78 286	138	2 811	4 016	
Sunrise Silver	Hazelton	M. Kryger, Smithers	26	Crude ore		19 377		1 642	2 356	
Osoyoos Mining Division										
Brenda	Brenda Lake	Brenda Mines Ltd.	9 995 736	Copper concentrates, 46 880 t; molybdenite concentrates, 5 820 t containing 3 310 663 kg of molybdenum	111 629	7 140 191	14 072 630			
Horn Silver	Keremeos	Dankoe Mines Ltd.	28 677	Bulk concentrates, 979 t; jig concentrates, 97 t	23 949	7 569 195	5 518	21 091	27 927	
Revelstoke Mining Division										
Nil										
Similkameen Mining Division										
Similkameen (Ingerbelle)	Princeton	Newmont Mines Ltd. (Similkameen Div.)	6 779 045	Copper concentrates, 88 964 t	1 152 926	4 347 297	24 725 222			
Skeena Mining Division										
Granduc	Stewart	Newmont Mines Ltd. (Granduc Operating Div.)	741 648	Copper concentrates, 52 268 t	160 460	9 056 914	14 780 100			

Table 3-12—Metal Production, 1978—Continued

Property or Mine	Location of Mine	Owner or Agent	Ore Shipped or Treated	Product Shipped	Gross Metal Content					
					Gold	Silver	Copper	Lead	Zinc	Cadmium
			t		g	g	kg	kg	kg	kg
Premier	Stewart	Spring Investments Ltd.	245	Clean-up; lead concentrates, 58 t; ore, 187 t	9 144	312 212	98	17 915	15 035	
Tasu	Tasu Sound	Wesfrob Mines Ltd.	889 933	Iron concentrates, 554 414 t; copper concentrates, 5 989 t	28 397	1 198 647	1 175 609			
Troy	Stewart	Nick Benkovich, Stewart	22	Crude ore	370	5 038		420	641	
Slocan Mining Division										
Arlington	Slocan	R. S. Reilly and D. P. Bialkoski, Slocan, and Selmon Resources Ltd.	17	Lead concentrates, 17 t; dump clean-up		84 569		5 946	3 647	
Colonial	Sandon	N. Sibilleau, North Surrey	2	Crude ore		8 802		1 895	82	
Corinth	Sandon	Corinthian Mines Ltd.	7	Crude ore		1 680		443	1 350	
Grey Copper (Blue Bird)	Cody	G. Sipos, Kaslo	19	Crude ore		6 096		671	4 993	
Little Tim	Slocan City	D. Nebor, Slocan	54	Lead concentrates, 2 t		54 710		646	386	
Mammoth	Silverton	D. Pengelly, Silverton	15	Lead concentrates, 5 t; zinc concentrates, 10 t		16 982		3 784	5 279	
Ottawa	Springer Creek	C. Thickett, Slocan	496	Silver concentrates, 7 t; crude ore, 42 t		1 372 047	234	647	335	
Pilot Bay	Pilot Bay	D. Pearce, Nelson	8	Smelter clean-up; lead concentrates, 2 t; zinc concentrates, 6 t		1 275		527	3 746	
Queen Bess (Idaho)	Sandon	I. T. Steenhoff, New Denver	8	Crude ore	10	43 389		6 284	135	
Scranton	Kaslo	Hem Mines Ltd.	114	Lead concentrates, 56 t; zinc concentrates, 58 t	5 381	109 669		41 112	32 651	681
Silmonac (Minnehaha)	Slocan Lake	Silvana Mines Ltd.	15 967	Lead concentrates, 1 460 t; zinc concentrates, 972 t		7 579 024		883 758	638 881	3 724
Trail Creek Mining Division										
Bluebird	Rossland	Standonray Mines Ltd.	130	Lead concentrates, 54 t; zinc concentrates, 76 t	560	280 860		13 755	29 385	
Golden Drip	Rossland	J. A. Ruelle and L. G. McLellan, Rossland	16	Crude ore	1 711	1 213		34	17	
Vancouver Mining Division										
Warman (Northair)	Callaghan Creek	Northair Mines Ltd.	93 397	Lead concentrates, 2 782 t; zinc concentrates, 2 161 t; dore bars	1 069 386	5 708 023	100 930	1 140 032	1 464 364	
Vernon Mining Division										
Silver Bell	Cherry Creek	Cheyenne Mines Ltd.	14	Crude ore	311	43 171		700	252	
Victoria Mining Division										
Sunro	Jordan River	Dison International Ltd.	(1)	Copper concentrates, 9 t	31	435	2 143			

1 Disposal of stockpile.

Table 3-13—Destination of British Columbia Concentrates in 1978

	Lead	Zinc	Copper	Iron
	t	t	t	t
Trail	148 930	140 190	.....	.....
Other Canadian	.....	.....	80 622	61 088
United States	598	27 551	26 972	152 602
Japan	.....	3 367	770 684	371 211
Other foreign	.....	.....	96 649	30 668
Totals	149 528	171 108	974 927	615 569

Petroleum and Natural Gas Statistics

CHAPTER 4

CONTENTS

Chapter 4 is a series of tables and figures providing important information on the petroleum industry operations in 1978. It complements the review of the industry in Chapter 1 and the work of the Ministry reported in Chapter 2.

Table 4-1—Acreage of Crown Petroleum and Natural Gas Rights Held, 1969–1978

	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
	Acres	Acres	Acres	Acres	Acres	Acres	Acres	Acres	Acres	Acres
Petroleum and natural gas permits	31,893,990	21,379,461	18,726,137	19,891,946	17,410,475	16,227,862	13,292,568	13,252,878	12,929,825	12,496,271
Petroleum and natural gas leases	8,837,265	7,765,668	7,226,320	6,493,633	6,196,570	6,405,086	5,574,381	5,899,025	7,194,899	7,759,188
Natural gas licences	------	------	------	------	20,781	15,565	7,809	7,175	36,374	18,678
Natural gas leases	475,419	472,964	471,919	470,260	479,754	479,960	487,739	503,555	516,721	565,967
Petroleum leases	------	------	1,284	1,284	1,284	1,284	3,180	3,180	3,180	3,835
Drilling reservations	350,546	292,402	337,656	452,079	419,878	360,807	317,693	525,151	836,870	1,052,921
Totals	41,557,220	29,910,495	26,763,316	27,309,202	24,528,742	23,490,564	19,683,370	20,190,964	21,517,869	21,873,776

Table 4-2—Petroleum and Natural Gas Revenue, 1947–1978

	1947–69	1970	1971	1972	1973	1974	1975	1976	1977	1978	1947–78
Rentals and Fees	$	$	$	$	$	$	$	$	$	$	$
Permits	44 319 824	1 426 448	1 615 619	1 729 829	1 524 431	2 224 111	2 150 965	2 114 161	2 128 190	1 882 589	61 116 167
Drilling reservations	1 072 614	48 156	79 120	107 537	77 344	85 481	75 635	124 196	172 078	266 654	2 108 815
Natural gas licences	68 254	------	------	------	803	8 057	4 156	3 838	------	47 502	132 609
Leases (all)	70 409 573	7 699 844	7 733 584	6 976 517	6 500 830	9.678 015	10 242 543	11 925 123	13 680 926	16 782 862	161 629 817
Total rentals	115 870 265	9 174 448	9 428 323	8 813 883	8 103 408	11 995 664	12 473 298	14 167 318	15 981 194	18 979 607	224 987 408
Crown Reserve Disposition Bonuses											
Permits	59 683 407	9 506 074	14 688 570	13 818 020	7 877 134	15 434 510	6 623 647	27 548 820	60 017 393	49 518 449	264 716 024
Drilling reservations	26 621 174	1 825 404	2 486 763	3 011 025	3 108 092	2 669 318	2 708 463	6 152 419	30 633 861	64 467 213	143 683 732
Leases	63 191 017	5 008 323	5 101 918	3 666 617	6 791 215	4 851 506	3 417 137	9 525 202	34 816 472	63 473 986	199 752 393
Crown reserve disposition totals	149 495 598	16 339 801	22 186 251	20 495 662	17 776 441	22 955 334	12 749 247	43 226 441	125 467 726	177 459 648	608 152 149
Crown Royalties											
Gas	21 136 934	3 948 356	4 209 793	5 580 434	6 061 250	2 843 329	2 848 930	173 315	180 951	72 728	47 056 020
Oil	43 086 598	9 483 937	10 415 656	9 845 125	14 543 621	48 296 036	44 782 489	43 925 220	41 015 470	42 191 350	307 585 502
Processed products and penalties	969 275	42 314	42 517	44 379	42 675	134 180	570 321	711 810	888 799	1 075 378	4 521 648
Gas revenue from B.C. Petroleum Corp.	------	------	------	------	------	26 000 000	172 150 000	149 850 000	174 250 000	159 400 000	681 650 000
Crown royalties totals	65 192 807	13 474 607	14 667 966	15 469 938	20 647 546	77 273 545	220 351 740	194 660 345	216 336 220	202 739 456	1 040 813 170
Miscellaneous fees	282 617	21 843	35 604	42 775	27 028	19 104	18 541	32 248	64 583	69 392	613 735
Total petroleum and natural gas revenue	330 841 287	39 010 699	46 318 144	44 822 258	46 554 423	112 243 647	245 592 826	252 086 352	357 848 723	399 248 103	1 874 566 462

Table 4-3—Established Hydrocarbon and Byproduct Reserves, December 31, 1978

December 31, 1978

	Crude Oil, MSTB	Raw Gas, BSCF	Marketable Gas, BSCF[1]	Propanes, MSTB[2]	Butanes, MSTB[2]	Pentanes, MSTB[2]	Sulphur, MLT[2]
Original hydrocarbon in place	1 414 198.4	17 954.6	------	------	------	------	------
Initial reserves, current estimate	489 747.9	14 181.0	11 582.4	16 720.3	24 367.4	47 412.6	9 475.9
Cumulative production to December 31, 1977	291 307.0	5 109.6	4 191.7	8 021.1	11 231.6	22 006.0	1 787.7
Remaining reserves estimated at December 31, 1977	166 810.3	8 270.1	6 744.0	7 890.6	11 956.3	23 038.1	7 256.3
Drilling in 1978	+16 677.6	+752.1	+599.1	+566.8	+836.8	+1 659.2	+778.0
Revisions in 1978	+14 953.0	+49.2	+47.6	+241.8	+342.7	+709.3	−346.1
Production in 1978	−12 609.2	−352.9	−285.8	−410.6	−600.5	−1 149.1	−130.7
Production adjustment	+98.5	------	------	------	------	------	------
Remaining reserves at December 31, 1978	185 930.2	8 718.5	7 104.9	8 288.6	12 535.3	24 257.5	7 557.5

NOTES –

MSTB – Thousand of stock tank barrels, where one barrel contains 34.9723 Canadian gallons.
BSCF – Billions of standard cubic feet at 14.65 psia and 60° F.
MLT – Thousand of long tons.

[1] Figures in this column are estimates of marketable gas, i.e., the gas available to the transmission line after removal of acid gases and a percentage of liquid hydrocarbons.

[2] Figures in these columns are estimates based on average gas analyses and estimated plant recoveries. Actual recoveries of propane, butane, pentanes, and sulphur were 539.9, 670.4, 1 137.8 MSTB, and 99.9 MLT respectively.

Table 4-4—Wells Drilled and Drilling, 1978

Well Authorization Number	Well Name	Date Spudded	Date Rig Released	1978 Depth	Status at December 31, 1978
4390	ATAPCO HBOG Klua c-38-G	78 03 15	78 04 17	2 344.5	Debolt gas.
4276	ATAPCO PCP Klua d-90-B	78 02 01	78 03 10	2 331.7	Pine Point gas.
4281	AmMin Hyperion b-29-J	78 02 10	78 02 23	655.3	Abandoned-dry.
4271	AmMin Tattoo d-92-J	78 01 16	78 03 20	2 005.0	Abandoned-dry.
4238	AmMin Thetlaandoa b-26-C	77 12 31	78 01 23	557.8	Debolt gas.
4250	AmMin Thetlaandoa d-33-C	78 01 24	78 02 08	549.3	Abandoned-dry.
4438	Anadarko et al Boudreau 7-8-84-21	78 07 26	78 09 07	2 048.0	Halfway gas.
4422	Anadarko et al Buick d-45-I	78 11 28	------	------	Drilling.
4207	Aquit et al Donnamarie a-93-C	77 12 28	78 02 20	1 859.3	Abandoned-dry.
4435	Ashland et al Birch d-37-E	78 06 12	78 07 08	1 209.8	Dunlevy gas.
4224	Ashland et al W Buick c-96-E	78 01 17	78 01 28	1 214.6	Bluesky gas.
4620	Ashland et al Fireweed d-37-G	78 11 17	78 12 01	1 360.0	Dunlevy gas.
4499	Ashland Numac Fireweed d-91-B	78 07 28	78 08 09	1 326.0	Dunlevy gas.
4484	Ashland Numac Fireweed b-4-G	78 07 14	78 07 26	1 368.0	Dunlevy gas.
4404	Ashland Numac Jeans d-71-B	78 06 08	78 06 24	1 362.5	Dunlevy gas.
4549	Ashland Numac Jeans d-13-G	78 09 19	78 10 01	1 329.0	Dunlevy gas.
4599	Ashland et al La Garde 6-2-88-15	78 10 30	78 11 13	1 384.0	Abandoned-dry.
4262	Ashland et al Mariposa 6-10-88-19	78 01 19	78 02 07	1 508.5	Abandoned-dry.
4432	Ashland et al Pocketknife d-1-I	78 11 04	------	------	Drilling.
4467	Ashland Numac Red Creek 10-16-85-21	78 06 26	78 08 09	1 661.2	Doig oil and Halfway gas.
4580	Ashland Stoddart 11-20-86-19	78 10 08	78 10 26	1 836.0	Charlie Lake oil and Belloy gas.
3987	BP AEG Bullmoose a-22-E	77 12 04	78 06 25	3 551.0	Abandoned-dry.
4430	BP et al W Doe 11-1-81-15	78 06 07	78 08 31	3 327.6	Bluesky and Wabamun gas.
3947	BP et al Lesellen b-86-F	78 01 23	78 03 08	2 432.6	Abandoned-dry.
4029	BP et al Murray d-48-I	77 08 23	78 01 26	2 865.1	Baldonnel gas.
4431	BP AEG W Sukunka c-45-J	78 07 01	------	------	Drilling.
4330	BP et al N Tenaka d-26-D	78 02 08	78 03 14	2 563.4	Abandoned-dry.
4285	BVX Focus et al Fireweed b-6-A	78 03 25	78 04 28	2 039.7	Baldonnel gas.
4415	BVX Focus Fireweed b-28-D	78 06 16	78 07 09	1 688.0	Abandoned-dry.
4118	BVX Sun et al Lily b-7-J	78 01 02	78 04 21	2 651.8	Debolt gas.
4319	BVX et al Nogah c-74-D	78 02 11	78 03 18	2 087.9	Abandoned-dry.
4210	Baay et al Otter 6-31-88-15	77 02 30	78 01 10	1 273.5	Gething gas.
4577	Baay et al Otter 11-32-88-15	78 09 21	78 10 31	1 273.0	Dunlevy gas.
4570	Baay et al Otter 9-36-88-16	78 10 05	78 10 19	1 275.0	Halfway gas.
4458	Baay Seagull Wilder 10-18-83-19	78 07 31	78 10 14	1 982.0	Halfway gas.
4427	Brent BXL W Flatrock 10-26-84-17	78 10 16	78 11 31	1 903.0	Halfway gas.
4997	CDCOG et al Dahl d-33-J	78 01 13	78 02 02	1 206.4	Bluesky gas.

Table 4-4—Wells Drilled and Drilling, 1978 – Continued

Well Authorization Number	Well Name	Date Spudded	Date Rig Released	1978 Depth	Status at December 31, 1978
4270	CDCOG et al Dahl a-41-J	78 02 27	78 03 11	1 213.1	Bluesky gas.
4261	CDCOG et al Dahl d-73-J	78 02 07	78 02 14	1 147.6	Bluesky gas.
4225	CDCOG et al Tooga a-77-F	78 01 04	78 02 14	2 127.5	Abandoned-dry.
4308	CDCOG Woodrush d-93-H	78 02 17	78 02 25	1 125.3	Halfway gas.
4455	CEGO et al W Stoddart 7-28-87-21	78 06 26	78 07 31	2 100.0	Abandoned-dry.
4288	CZAR et al Aspen d-17-J	78 01 16	78 02 05	1 623.1	Coplin gas.
4651	CZAR et al Aspen c-40-J	78 11 30	78 12 29	1 674.0	Coplin gas.
4375	CZAR et al Aspen d-73-K	78 08 04	78 09 09	1 675.0	Abandoned-dry.
4594	CZAR et al Birch b-26-I	78 10 24	78 11 08	1 316.0	Baldonnel gas.
4203	CZAR et al Birch d-77-I	77 12 16	78 01 11	1 311.6	Baldonnel gas.
4512	CZAR et al Birch b-88-I	78 11 11	78 11 25	1 348.5	Baldonnel gas.
4610	CZAR et al Callisto 10-1-83-21	78 11 27	78 12 29	1 500.0	Halfway gas.
4522	CZAR et al Callisto 7-16-83-21	78 10 25	78 11 24	1 625.0	Halfway gas.
4282	CZAR Orbit Evergreen c-32-B	78 01 24	78 02 03	1 200.9	Abandoned-dry.
4369	CZAR Orbit Fina Fireweed b-26-D	78 03 14	78 04 04	1 709.1	Dunlevy gas and Dolg oil.
4150	CZAR et al Fireweed b-68-D	78 06 28	78 07 31	2 090.0	Bluesky and Dunlevy gas.
4563	CZAR et al Flatrock 7-19-85-15	78 09 23	78 10 17	1 544.0	Abandoned-dry.
4445	CZAR et al E Flatrock 10-9-84-15	78 06 03	78 06 21	1 508.8	Abandoned-dry.
4447	CZAR et al E Flatrock 10-28-84-15	78 06 10	78 06 23	1 609.6	Abandoned-dry.
4328	CZAR et al Goldenrod b-88-C	78 02 09	78 03 18	1 770.9	Baldonnel gas.
4329	CZAR et al Goldenrod b-24-F	78 09 24	78 10 20	1 783.0	Baldonnel gas.
4405	CZAR Lochiel Fireweed d-39-D	78 05 12	78 06 04	1 685.0	Dunlevy gas.
4334	CZAR et al Maple a-27-E	78 02 07	78 02 24	1 313.7	Abandoned-dry.
4465	CZAR et al Maple d-31-H	78 06 24	78 07 12	1 350.0	Abandoned-dry.
4349	CZAR Ashland Maple d-33-H	78 02 27	78 03 11	1 214.0	Dunlevy gas.
4466	CZAR et al Oval 7-27-86-14	78 07 05	78 07 24	1 460.0	Gething gas.
4219	CZAR et al Oval 10-28-86-14	78 01 01	78 01 19	1 417.3	Halfway gas.
4495	CZAR et al Pluto 10-32-85-16	78 07 17	78 08 18	1 825.0	Abandoned-dry.
4506	CZAR et al Squirrel 7-26-87-19	78 08 24	78 09 16	1 525.0	Coplin oil.
4627	CZAR et al Squirrel 14-35-87-19	78 11 23	78 12 11	1 512.0	Abandoned-dry.
4678	Cairn et al Oak 14-31-85-17	78 12 09	78 12 24	1 410.0	Coplin oil.
4497	Calco et al Stoddart 11-7-86-18	78 08 23	78 09 13	1 842.0	Belloy gas.
4592	Can Del Scurry Falcon d-11-D	78 12 09	78 12 28	1 188.0	Abandoned-dry.
4347	Canhunter et al Beargrass 10-4-88-25	78 03 07	78 04 19	1 578.9	Halfway gas.
4194	Canhunter et al Bernadet 7-19-87-24	77 12 07	78 08 13	1 868.4	Dunlevy and Halfway gas.
4557	Canhunter et al Bernadet 10-11-88-25	78 09 30	78 12 19	1 930.0	Halfway gas.

4569	Canhunter Blair a-65-E	78 12 14	------	------	Drilling.
4232	Canhunter et al Bluebell d-69-I	78 01 08	78 03 11	2 374.4	Debolt gas.
4268	Canhunter et al Graham b-90-K	78 02 04	78 06 11	3 170.0	Dunlevy gas.
4286	Canhunter et al Gundy a-63-G	78 03 14	78 05 28	2 393.0	Belloy gas.
4144	Canhunter N Julienne a-89-D	77 11 08	78 01 25	2 688.3	Halfway gas.
4460	Canhunter Kobes c-56-A	78 08 23	78 09 16	1 223.2	Dunlevy gas.
4205	Canhunter W Kobes c-74-B	78 01 04	78 03 07	2 560.3	Abandoned-dry.
4398	Canhunter Moose b-24-B	78 10 15	------	------	Drilling.
4517	Canhunter et al Squaw c-74-E	78 11 06	------	------	Drilling.
4487	Canhunter N Townsend c-54-J	78 08 04	78 10 03	2 389.0	Debolt gas.
4571	Canhunter Wapistan c-A56-E	78 10 03	78 12 07	2 305.8	Debolt gas.
4464	Canhunter Wapistan c-56-E	78 07 24	78 09 15	1 249.0	Abandoned-dry.
3876	Canso HB Gleam c-56-D (re-entry)	77 01 10	78 02 09	1.5	Abandoned-dry.
4216	Canso BP Silver c-76-L	77 12 18	78 01 11	1 290.8	Halfway gas.
4514	Cdn Res Bougie d-11-F	78 09 10	78 12 18	3 258.0	Debolt and Slave Point gas.
4256	Cdn Res et al Dahl a-1-A	78 01 25	78 02 02	1 050.0	Bluesky gas.
4241	Cdn Res et al Dahl d-19-A	77 12 29	78 01 04	1 034.8	Bluesky gas.
4253	Cdn Res et al Dahl b-24-A	78 01 08	78 01 22	1 023.0	Abandoned.
4255	Cdn Res et al Dahl a-41-A	78 01 06	78 01 17	999.7	Bluesky gas.
4235	Cdn Res et al Dahl c-56-A	77 12 27	78 01 04	976.9	Abandoned.
4370	Cdn Res et al Dahl b-62-A	78 03 01	78 03 22	1 356.4	Water disposal.
4254	Cdn Res et al Dahl a-83-A	78 01 31	78 02 06	946.4	Bluesky gas.
4317	Cdn Res et al Dahl a-9-C	78 02 17	78 02 26	1 082.0	Bluesky gas.
4316	Cdn Res et al Dahl a-67-C	78 02 07	78 02 15	952.5	Bluesky gas.
4304	Cdn Res et al Dahl a-5-D	78 02 10	78 02 17	1 024.1	Bluesky gas.
4307	Cdn Res et Dahl a-45-D	78 02 18	78 02 25	996.7	Bluesky gas.
4306	Cdn Res et al Dahl d-73-D	78 02 08	78 02 16	981.7	Bluesky gas.
4258	Cdn Res et al Dahl d-15-H	78 01 28	78 02 05	951.0	Bluesky gas.
4257	Cdn Res et al Dahl d-19-H	78 01 20	78 01 27	952.2	Abandoned-dry.
4351	Cdn Res et al Hoss b-2-J	78 02 10	78 03 03	2 033.0	Abandoned-dry.
4353	Cdn Res et al E Kotcho b-71-E	78 02 14	78 03 19	1 985.8	Abandoned-dry.
4227	Cdn Res Dome Cons Suhn b-5-A	78 12 31	78 02 02	1 888.2	Slave Point gas.
4228	Cdn Res et al S Suhn b-42-I	77 12 26	78 02 04	1 820.3	Abandoned-dry.
3976	Cdn-Sup Fina Ojay b-57-G	78 07 27	78 04 03	3 998.7	Dunlevy gas.
4300	Chaut Dunbar Beaverdam a-27-L	78 01 26	78 02 09	1 164.6	Halfway gas.
4389	Chaut Dunbar Currant c-74-K	78 03 10	78 03 20	1 235.3	Abandoned-dry.
4659	Chaut et al Eagle 15-19-84-18	78 12 31	------	------	Drilling.
4595	Chaut et al Eagle 7-30-84-18	78 11 03	78 11 28	1 784.2	Belloy oil.
4177	Chaut et al Eagle 16-30-84-18	77 12 05	78 01 09	1 872.4	Belloy oil.
4293	Chaut Dunbar Melanie b-88-K	78 02 25	78 05 08	1 222.2	Abandoned-dry.
4291	Chaut Dunbar Peejay d-93-E	78 02 11	78 02 23	1 174.4	Abandoned-dry.
4450	Chaut et al Stoddart 6-29-86-19	78 07 05	78 07 17	1 340.0	Abandoned-dry.
4222	Chevron Cabin b-6-K	78 01 08	78 02 25	2 167.1	Slave Point gas.
4367	Chevron Amoco Ekwan b-56-E	78 03 16	78 03 29	517.6	Mississippian gas.

Table 4-4—Wells Drilled and Drilling, 1978 — Continued

Well Authorization Number	Well Name	Date Spudded	Date Rig Released	1978 Depth	Status at December 31, 1978
4230	Chevron Amoco Ekwan d-65-E	78 01 24	78 03 14	1 780.0	Slave Point gas.
4688	Chevron Amoco Ekwan d-48-F	78 12 29	------	------	Drilling.
4220	Chevron CCL Imp Helmet a-66-G	78 01 11	78 02 11	1 855.3	Slave Point gas.
3924	Chevron N Helmet a-81-A	78 02 16	78 03 03	2 045.2	Jean Marie gas.
4310	Chevron CCI Kykis d-95-F	78 12 15	------	------	Drilling.
4292	Chevron W Milo c-40-H	78 02 06	------	------	Drilling.
4161	Coseka et al W Gundy a-24-B	78 01 15	78 02 03	1 250.0	Dunlevy and Baldonnel gas.
4040	DWOG et al Snyder c-40-K	78 06 14	78 06 25	1 258.8	Dunlevy gas.
4195	Decalta et al Buick c-54-D	78 03 13	78 03 21	1 109.5	Abandoned-dry.
4429	Decalta et al Buick 11-33-88-20	78 09 21	78 10 12	1 457.0	Abandoned-dry.
4248	Dome et al Antelope a-89-L	78 01 06	78 01 22	1 117.1	Abandoned-dry.
4589	Dome N Buick d-79-F	78 10 22	78 11 09	1 455.1	Dunlevy gas.
4641	Dome HB Buick b-10-H	78 12 04	78 12 19	1 183.0	Bluesky gas.
4421	Dome Buick a-29-H	78 06 11	78 06 23	1 090.0	Dunlevy gas.
4551	Dome Buick b-48-H	78 09 14	78 09 26	1 137.0	Dunlevy gas.
4522	Dome Buick b-50-H	78 08 30	78 09 10	1 120.0	Baldonnel gas.
4649	Dome et al Doe 6-15-81-14	78 12 15	------	------	Drilling.
4397	Dome Donis c-98-C	78 03 16	78 03 25	1 188.7	Abandoned-dry.
4186	Dome Amoco Dunedin c-95-L	78 01 24	78 04 08	2 292.1	Abandoned-dry.
4680	Dome et al Ekwan c-44-G	78 12 29	------	------	Drilling.
4566	Dome et al Fireweed d-79-A	78 11 12	78 12 01	1 381.0	Baldonnel gas.
4503	Dome et al Fireweed d-69-E	78 08 02	78 08 23	1 415.0	Baldonnel gas and Dunlevy oil.
4496	Dome et al Fireweed d-39-H	78 09 29	78 10 19	1 355.0	Dunlevy oil.
4425	Dome Ft St John SE 10-18-83-17	78 05 30	78 06 29	2 015.3	Abandoned-dry.
4476	Dome et al Martin c-34-E	78 07 13	78 07 30	1 284.0	Bluesky gas.
4655	Dome et al Martin d-55-E	79 12 29	------	------	Drilling.
4294	Dome Amoco Silver b-10-C	78 02 12	78 02 20	1 150.0	Bluesky gas.
4296	Dome Amoco Silver c-32-D	78 02 22	78 02 28	1 082.0	Bluesky gas.
4386	Dome Siphon 7-6-87-15	78 03 28	78 04 10	1 371.6	Abandoned-dry.
4387	Dome Siphon A10-12-87-16	78 03 06	78 03 13	1 200.9	Baldonnel and Siphon gas.
4185	Dome Total Tupper 6-10-77-14	77 11 29	78 02 06	3 073.9	Abandoned-dry.
4295	Dome et al Velma b-88-D	78 01 24	78 02 08	1 112.5	Water disposal.
4419	Dome Woodrush b-44-H	78 06 26	78 07 07	1 131.0	Abandoned-dry.
4583	Esso et al Mica 14-4-82-14	78 10 20	78 11 03	1 510.0	Abandoned-dry.
4201	Exalta Conuco et al Cabin b-44-B	78 01 19	78 02 20	2 196.7	Abandoned-dry.
4264	Exalta Conuco W Hostli b-81-E	78 02 25	78 03 28	2 014.7	Abandoned-dry.

4199	Exalta Conuco Ladyfern c-52-G	78 01 24	78 01 30	1 112.5	Abandoned-dry.
4200	Exalta Conuco Ladyfern b-68-H	78 02 04	78 02 10	1 010.4	Bluesky gas.
4263	Exalta Conuco Ring b-22-A	78 02 16	78 02 26	1 025.7	Gething gas.
4340	Exalta Conuco Slave b-68-I	78 03 02	78 03 22	1 463.0	Gething gas.
4454	Fina Orbit CZAR Fireweed b-6-D	78 06 21	78 07 17	1 695.0	Dunlevy gas and Dolg oil.
4374	Focus Scurry Eagle 6-14-85-19	78 03 30	78 04 22	1 912.6	Belloy oil.
4373	Focus et al Mallard 6-8-85-19	78 04 25	78 05 21	2 001.0	Belloy oil.
4479	Focus et al Stoddart 14-32-85-19	78 08 02	78 08 26	1 930.6	Abandoned-dry.
4520	Focus et al Stoddart 6-28-86-19	78 08 24	78 09 25	1 862.0	Abandoned-dry.
4559	Focus et al Stoddart 6-29-85-19	78 09 26	78 10 27	1 982.0	Belloy oil.
4524	Focus Scurry Stoddart A8-14-85-19	78 08 30	78 09 21	1 859.0	Belloy oil.
4472	Focus Scurry Stoddart 16-15-85-19	78 07 02	78 07 28	1 905.0	Belloy oil.
4426	Focus Scurry Stoddart 6-27-85-20	78 06 01	78 06 28	1 983.0	Belloy oil.
4468	Focus Cherokee W Stoddart 6-15-87-20	78 07 01	78 07 26	1 955.0	Belloy gas.
4346	GAO Ashland Mike d-72-H	78 02 28	78 03 14	1 249.7	Abandoned-dry.
4269	GAO CS Silver d-77-J	78 02 10	78 02 26	1 278.9	Abandoned-dry.
4461	GAO Stoddart 6-35-85-20	78 06 23	78 07 23	1 944.6	Belloy oil.
4528	GAO W Stoddart 6-26-85-20	78 08 30	78 09 27	1 945.0	Belloy oil.
4541	GAO W Stoddart 16-26-85-20	78 09 29	78 10 30	1 959.0	Belloy oil.
3958	GAO BP Yoyo c-56-L	77 03 08	78 01 26	2 254.0	Abandoned-dry.
4601	GEOG et al Boudreau 10-14-84-21	78 10 31	78 11 28	1 688.0	Dolg gas.
4652	GEOG Boundary 16-36-83-15	78 12 01	78 12 15	1 330.0	Abandoned-dry.
4417	GEOG S Boundary 6-33-83-15	78 09 14	78 09 05	1 540.0	Abandoned-dry.
4684	GEOG et al Martin 6-23-H	78 12 29	------	------	Drilling.
4309	GEOG et al Martin d-39-E	78 07 28	78 08 11	1 306.0	Baldonnel gas.
4500	GPD Eagle 14-32-84-18	78 08 20	78 09 16	1 944.0	Belloy oil.
4448	GPD Murphy Eagle 6-5-85-18	78 07 13	78 08 07	1 951.6	Belloy oil.
4554	GPD Murphy Eagle 8-5-85-18	78 09 14	78 10 10	1 897.0	Belloy oil.
4544	GPD Murphy Eagle 14-5-85-18	78 10 12	78 10 28	1 950.0	Belloy oil.
4239	Getty Skelly Petitot b-84-D	78 02 25	78 03 30	2 077.2	Abandoned-dry.
4156	Gulf POOC Butler a-65-C	77 12 13	78 02 13	1 923.3	Abandoned-dry.
4326	Gulf Cheves b-23-G	78 02 22	78 06 07	2 962.7	Standing.
4643	Gulf BCRIC Cheves c-82-B	79 01 18	------	------	Drilling.
4226	Gulf Conroy d-35-A	78 01 28	78 02 12	1 204.0	Abandoned-dry.
4208	Gulf Conroy a-81-B	78 02 16	78 03 01	1 133.9	Abandoned-dry.
4170	Gulf Peppermint d-37-E	77 12 19	78 01 28	1 648.4	Abandoned-dry.
4358	Gulf Peppermint b-90-F	78 03 04	78 03 23	1 545.3	Abandoned-dry.
4449	Gulf Dome Norcen Thunder a-38-I	78 08 04	------	------	Drilling.
4372	Gulf Trutch a-49-B	78 05 16	78 06 11	1 691.0	Debolt gas.
4092	HB et al Pocketknife c-38-L	77 11 25	78 02 20	1 716.9	Abandoned-dry.
4609	HB et al N Pocketknife d-50-D	78 11 24	------	------	Drilling.
3031	Heritage Yoyo b-4-I (re-entry)	71 12 22	78 03 21	36.6	Water disposal.
4586	Highfield et al Aspen a-81-F	78 10 20	78 11 18	1 705.0	Baldonnel gas.
4547	Highfield et al Beavertail c-12-F	78 10 10	78 10 30	1 306.0	Dunlevy gas.

Table 4-4—Wells Drilled and Drilling, 1978 – Continued

Well Authorization Number	Well Name	Date Spudded	Date Rig Released	1978 Depth	Status at December 31, 1978
4593	Highfield et al Boudreau 11-19-83-21	78 11 02	78 12 07	1 625.0	Halfway gas.
4410	Highfield et al N Cache b-62-I	78 06 16	78 07 16	1 664.2	Doig gas.
4530	Highfield et al N Cache c-80-L	78 09 05	78 10 06	1 650.0	Doig gas.
4451	Highfield Hidroges Maple b-42-E	78 08 17	78 09 08	1 359.0	Abandoned-dry.
4217	Highfield Hidroges Prespatou c-100-E	78 03 21	78 03 27	883.9	Notikewin gas.
4433	Highfield Two Rivers A14-32-82-16	78 08 12	78 08 29	1 382.0	Abandoned-dry.
4171	Highfield et al Wargen c-54-C	78 01 14	78 01 26	1 302.4	Abandoned-dry.
4600	Home et al Blackhawk a-91-D	78 12 07	------	------	Drilling.
4493	Home et al Farmington 11-9-80-15	78 08 04	78 08 15	850.8	Cadotte gas.
4492	Home et al Farmington 10-11-80-15	78 07 19	78 07 30	869.0	Cadotte gas.
4480	Home Wainoco Sundown c-34-B	78 07 31	78 11 11	3 100.0	Halfway gas.
4611	Huber Flatrock 6-3-85-16	78 11 05	78 11 22	1 519.1	Abandoned-dry.
4621	Huber Cdn-Sup Total Nig b-22-A	78 12 18	------	------	Drilling.
4546	ICG Shelter Inga 11-34-87-23	78 09 18	78 10 04	1 448.5	Gething gas.
4575	ICG Shelter Teal 6-32-86-22	78 11 19	78 12 30	2 163.0	Abandoned-dry.
4206	IOE et al Red Creek 11-25-85-22	77 12 11	78 02 01	1 789.8	Abandoned-dry.
4236	IOE Pac Inga 11-17-87-23	78 02 04	78 03 07	1 662.4	Baldonnel gas.
3945	Imp Fina Altares a-3-H	77 10 23	78 01 17	2 039.1	Bluesky gas.
4538	Imp et al Boundary 11-2-85-14	78 10 01	78 10 19	1 280.0	Boundary oil.
4452	Imp Pac Westcoast Eagle 16-26-84-19	78 06 22	78 07 24	1 927.0	Belloy oil.
4469	Imp Pac Westcoast Eagle 16-10-85-19	78 07 26	78 08 25	1 987.0	Abandoned-dry.
4470	Imp et al Ft St John 16-18-84-18	78 08 28	78 09 28	1 900.0	Belloy oil.
3908	Imp Junior c-81-C	77 02 23	78 01 28	1 930.3	Slave Point gas.
4434	Imp Kelly a-85-G	78 07 02	78 10 26	3 445.0	Abandoned-dry.
4333	Imp et al Mica 8-33-81-14	78 03 09	78 03 27	1 569.7	Mica oil.
4086	Imp et al Mica 6-35-81-14	78 06 07	78 06 20	1 575.2	Abandoned-dry.
4418	Imp et al Mica 16-33-81-14	78 05 19	78 06 05	1 774.0	Mica oil.
4399	Imp et al Mica 8-34-81-14	78 05 02	78 05 18	1 581.9	Mica oil.
4086	Imp et al Mica 6-35-81-14	78 06 07	78 06 20	1 575.2	Abandoned-dry.
4482	Imp et al Mica 6-4-82-14	78 11 05	78 12 01	1 605.0	Mica oil.
4275	Imp Union Uno-Tex Noel c-34-F	78 01 18	78 03 14	2 675.5	Duntevy gas.
4400	Imp Union Uno-Tex Windsor b-82-A	78 05 20	78 08 02	2 926.1	Fahler gas.
4413	Imp Union Uno-Tex Windsor a-89-A	78 08 10	78 11 28	3 153.0	Abandoned-dry.
4498	Imp Union Uno-Tex Windsor b-2-B	78 12 15	------	------	Drilling.
4672	Joffre et al E Bulrush d-13-K	78 12 11	------	------	Drilling.
4642	Joffre et al Goose 10-22-84-21	78 12 05	78 12 24	1 550.0	Charlie Lake gas.
4585	Joffre et al Two Rivers 7-2-83-16	78 11 27	78 12 24	1 587.0	Halfway oil.

4446	Kilo et al Buick a-41-D	78 06 24	78 06 30	1 107.0	Dunlevy gas.
4344	Kilo et al Buick d-51-D	78 03 05	78 03 13	1 099.4	Dunlevy gas.
4667	Kilo et al Bulrush c-20-K	78 12 29	------	------	Drilling.
4510	Kilo et al Cache d-35-L	78 08 24	78 09 13	1 635.2	Abandoned-dry.
4639	Kilo Currant d-97-K	78 12 10	78 12 22	1 240.0	Abandoned-dry.
4534	Kilo Crush d-37-F	78 09 16	78 09 28	1 181.0	Abandoned-dry.
4457	Kilo et al N Pine 6-13-85-18	78 07 04	78 08 08	1 938.0	North Pine oil.
4392	Kilo N Pine 6-28-85-18	78 03 15	78 04 07	1 844.0	Belloy gas.
4215	Kilo et al S Wargen b-10-J	77 12 29	78 01 12	1 313.7	Abandoned-dry.
4625	Ladd Osborn d-33-L	78 11 22	78 12 08	1 290.0	Baldonnel gas.
4608	Landbank et al Boundary 10-8-86-14	78 11 04	78 11 18	1 401.0	Halfway oil.
4401	Melear Stoddart 7-3-86-19	78 04 04	78 04 24	1 841.9	Belloy gas.
4237	Mobil Fontas d-96-F	78 01 19	78 02 27	2 193.7	Abandoned-dry.
4324	Mobil Kykis b-15-B	78 02 14	78 03 29	2 347.0	Abandoned-dry.
4613	Mobil Kykis b-39-B	78 11 25	------	------	Drilling.
4640	Mobil Sahtaneh a-8-B	78 12 07	------	------	Drilling.
4198	Mobil Sahtaneh d-29-L	78 01 04	78 03 14	2 329.9	Pine Point gas.
4332	Mobil Sahtaneh d-95-I	78 03 04	78 03 12	721.2	Abandoned-dry.
4560	Mobil Sierra a-20-C	78 10 15	78 12 05	2 180.0	Pine Point gas.
4202	Mobil S Sierra a-51-L	78 01 14	78 03 14	2 325.6	Pine Point gas.
4182	Mobil S Sierra d-64-K	77 12 05	78 02 06	2 209.8	Pine Point gas.
4193	Mobil Sierra a-76-C	77 12 13	78 02 05	2 055.6	Pine Point gas.
4331	Mobil et al E Sunset d-98-B	78 02 11	78 03 25	2 347.0	Bluesky gas.
4660	Mobil E Yoyo b-97-F	78 12 16	------	------	Drilling.
4348	Murphy Osprey c-92-K	78 03 15	78 03 30	1 204.9	Bluesky gas.
4615	Norcen Eagle 16-32-84-18	78 11 26	78 12 22	1 925.0	Lower Belloy gas.
4637	Norcen Murphy Eagle 16-5-85-18	78 12 31	------	------	Drilling.
3893	Norcen Medana d-99-F	78 01 13	78 02 05	1 553.0	Abandoned-dry.
4440	Norcen BP Two Rivers 10-1-83-16	78 06 07	78 07 10	2 104.0	Abandoned-dry.
4356	Northstar et al N Boundary 6-5-88-14	78 06 30	78 07 17	1 358.0	Abandoned-dry.
4486	Northstar et al Buick b-4-G	78 06 21	78 08 02	1 212.0	Bluesky gas.
4489	Northstar et al N Buick d-31-F	78 11 29	78 12 16	1 245.0	Dunlevy gas.
4681	Northstar Ft St John 6-25-83-18	78 12 21	------	------	Drilling.
4516	Northstar et al Siphon 6-25-86-17	78 08 29	78 09 21	1 403.0	Siphon gas.
4604	Northstar et al N Sunrise 10-33-79-16	78 11 11	78 11 23	785.0	Cadotte gas.
4442	OIL Bulrush d-66-F	78 06 16	78 06 28	1 154.6	Abandoned-dry.
4242	OIL Bulrush d-86-F	78 06 02	78 06 12	1 140.0	Abandoned-dry.
4192	OIL et al W Buick d-37-G	77 12 04	78 01 08	1 190.0	Abandoned-dry.
4337	OIL et al Niteal c-32-I	78 03 02	78 03 18	778.1	Abandoned-dry.
4473	OIL et al Silverberry 10-2-88-20	78 08 09	78 08 26	1 455.0	Abandoned-dry.
4508	OIL Wolf d-80-A	78 09 01	78 12 27	1 265.0	Halfway oil.
4564	Orbit et al N Boundary 7-22-87-14	78 12 28	------	------	Drilling.
4406	Orbit et al Flatrock 10-18-84-15	78 03 25	78 04 09	1 520.0	Abandoned-dry.
4509	Orbit et al Montney 11-2-87-19	78 08 04	78 08 24	1 555.0	Halfway oil.

Table 4-4—Wells Drilled and Drilling, 1978 – Continued

Well Authorization Number	Well Name	Date Spudded	Date Rig Released	1978 Depth	Status at December 31, 1978
4420	Orbit et al Rigel 10-32-87-17	78 05 31	78 06 12	1 365.8	Dunlevy gas.
4381	PCP Gulf Bivouac d-99-C	78 03 03	78 03 12	563.9	Debolt gas.
4711	PCP Murphy Elm c-94-C	78 12 30	------	------	Drilling.
4284	PCP Milligan d-75-J	78 02 11	78 02 24	1 164.3	Abandoned-dry.
4246	PCP Willow c-98-H	78 01 16	78 02 09	1 402.4	Gething gas.
4515	Pacific WP Airport 5-3-84-17	78 08 12	78 09 15	1 970.5	Halfway oil.
4490	Pacific HB Boucher 7-11-82-23	78 08 23	78 10 02	1 606.0	Halfway gas.
4249	Pacific HBOG Boucher 8-26-82-23	78 01 02	78 01 27	1 591.4	Halfway gas.
4325	Pacific Buffalo c-94-J	78 02 01	78 02 15	571.5	Gething gas.
4378	Pacific WP N Buick d-33-F	78 05 08	78 05 24	1 483.5	Dunlevy gas.
4444	Pacific et al W Buick c-74-C	78 07 01	78 07 13	1 240.6	Abandoned-dry.
4043	Pacific Burch c-31-K	77 10 01	78 01 08	2 723.7	Dunlevy gas.
4543	Pacific Imp Clarke a-75-L	78 11 05	78 12 13	1 915.0	Slave Point gas.
4612	Pacific Imp Clarke a-92-L	78 12 17	------	------	Drilling.
4395	Pacific et al Dahl c-100-H	78 03 19	78 03 29	1 225.9	Bluesky and Halfway gas.
4471	Pacific et al Fireweed d-91-A	78 07 17	78 07 27	1 222.0	Dunlevy oil.
4439	Pacific WP Ft St John 7-14-84-19	78 06 03	78 07 06	2 049.8	North Pine gas and Halfway gas.
4391	Pacific Gutah a-87-C	78 03 06	78 03 16	998.5	Abandoned-dry.
4252	Pacific Union Kelly b-28-I	78 12 28	78 02 12	2 452.1	Cadotte gas.
4311	Pacific Kestrel d-51-K	78 02 18	78 03 07	1 226.8	Abandoned-dry.
4591	Pacific et al Laprise c-72-E	78 10 26	78 11 22	1 215.0	Baldonnel gas.
4436	Pacific et al Laprise d-93-E	78 08 03	78 08 17	1 267.0	Baldonnel gas.
4414	Pacific et al Ojay c-12-L	78 07 24	78 12 08	3 517.0	Baldonnel gas.
4354	Pacific Prespatou d-51-A	78 03 10	78 03 26	1 200.9	Bluesky gas.
4323	Pacific Redeye d-97-B	78 02 01	78 02 14	1 173.5	Abandoned-dry.
4523	Pacific et al Siphon 12-27-86-16	78 10 08	78 10 20	1 166.0	Dunlevy gas.
4475	Pacific Stoddart A11-18-86-19	78 07 09	78 07 23	1 333.8	Abandoned-dry.
4259	Pacific et al Suhm d-73-D	78 01 16	78 01 25	533.4	Abandoned-dry.
4345	Pacific et al Tooga a-71-B	78 02 20	78 02 28	716.3	Detrital gas.
4474	Pacific PEX Weasel d-53-B	78 07 13	78 07 27	1 180.0	Abandoned-dry.
4240	Pacific GAO Yoyo c-20-L	78 01 19	78 03 02	2 197.0	Pine Point gas.
3660	Pacific Yoyo c-36-I (re-entry)	75 12 08	78 01 14	92.7	Slave Point and Pine Point gas.
4157	Petromark HG Goose 10-18-85-21	78 01 07	78 02 03	1 780.0	North Pine gas.
4289	Petromark Canhunter E Osborn b-46-J	78 02 09	78 02 21	1 127.8	Baldonnel oil.
4371	Petromark HG et Red 7-3-86-21	78 03 02	78 03 23	1 713.0	Abandoned-dry.
4122	Petromark HG Stoddart 6-35-86-20	77 11 30	78 01 01	1 926.3	Abandoned-dry.

4581	Petrorep et al Boundary 10-18-87-13	78 10 25	78 11 16	1 485.4	Bluesky gas.
4327	Petrorep W Stoddart 7-33-86-20	78 05 28	78 06 21	1 638.0	Abandoned-dry.
3932	Quasar Chevron et al Etsho d-77-J	78 02 22	78 01 30	2 737.1	Abandoned-dry.
4081	Quasar Grizzly d-13-A	78 10 23	78 03 14	2 813.0	Dunlevy gas.
4550	Quasar N Grizzly d-41-G	78 12 17	------	------	Drilling.
4136	Quasar N Grizzly c-74-G	78 09 04	------	------	Drilling.
4542	Quasar et al Murray a-89-E	78 09 27	------	------	Drilling.
4168	Quasar Wolverine c-20-C	78 03 21	78 10 18	3 371.7	Dunlevy gas.
4221	Quasar Pacific Wolverine b-64-L	78 05 21	------	------	Drilling.
4555	Quasar et al Wolverine d-77-K	78 10 15	------	------	Drilling.
4343	Quintana et al Elleh h-8-K	78 02 10	78 03 20	2 040.6	Slave Point gas.
4702	Quintana PCP Helmet a-32-C	78 12 19	------	------	Drilling.
4211	Quintana et al Klua c-14-F	78 12 30	78 02 05	2 045.2	Slave Point gas.
2955	Quintana et al Klua a-35-F (re-entry)	78 07 24	78 02 17	26.5	Water disposal.
4654	Ranger Turbo Osborn 6-34-88-15	78 11 30	78 12 14	1 280.0	Gething gas.
4607	Rem et al Two Rivers 3-27-83-16	78 11 24	------	------	Drilling.
4502	Remington et al Boundary 7-4-86-14	78 08 03	78 08 17	1 430.0	Halfway gas.
4553	Remington et al Cache 10-17-88-22	78 09 21	78 10 19	1 658.0	Doig gas.
4507	Renaissance et al Buick b-44-I	78 08 07	78 08 19	1 201.0	Dunlevy gas.
4441	Renaissance et al N Pine 11-36-85-18	78 06 01	78 07 03	1 754.7	Abandoned-dry.
4518	Renaissance et al Rigel d-15-C	78 09 21	78 10 03	1 341.0	Dunlevy gas.
4315	Riva Ladyfern c-18-L	78 03 14	78 03 24	1 082.0	Abandoned-dry.
4191	Sabine Wainoco Numac Fox 11-11-86-21	77 12 14	78 01 25	2 053.4	Abandoned-dry.
4488	Sabine Wainoco Red 10-12-86-22	78 08 26	78 10 25	2 119.1	Halfway gas.
4412	Sceptre et al E Siphon 11-14-86-15	78 06 08	78 06 30	1 463.0	Abandoned-dry.
4603	Scurry CEGO Eagle 6-20-84-18	78 12 17	------	------	Drilling.
4494	Scurry CEGO Eagle 14-22-84-18	78 07 31	78 08 24	1 869.0	Belloy oil.
4382	Scurry CEGO Eagle 8-31-84-18	78 03 11	78 04 02	1 880.6	Belloy oil.
4574	Scurry CEGO Eagle 14-31-84-18	78 10 13	78 11 15	1 871.1	Belloy oil.
4187	Scurry CEGO Eagle 15-25-84-14	78 12 10	78 01 17	1 874.5	Belloy oil.
4339	Scurry CEGO Eagle 16-36-84-19	78 08 03	78 08 29	1 863.6	Belloy oil.
4596	Scurry CEGO Eagle 8-6-85-18	78 03 20	78 04 08	1 913.3	Belloy oil.
4383	Scurry CEGO Eagle 16-6-85-18	78 03 20	78 04 08	1 919.3	Belloy oil.
4287	Scurry CEGO Eagle 6-7-85-18	78 01 18	78 02 08	1 892.8	Belloy oil.
4385	Scurry CEGO Eagle 16-7-85-18	78 05 30	78 06 24	1 937.0	Belloy oil.
4188	Scurry CEGO Eagle 15-1-85-19	78 01 26	78 02 08	1 865.4	Belloy oil.
4631	Scurry CEGO Eagle 16-2-85-19	78 11 25	78 12 13	1 893.6	Belloy oil.
4422	Scurry CEGO Eagle 16-11-85-19	78 05 30	78 06 23	1 883.7	Belloy oil.
4453	Scurry CEGO Eagle 16-12-85-19	78 06 25	78 07 18	1 857.0	Belloy oil.
4363	Scurry et al W Inga 10-32-86-24	78 02 19	78 03 16	1 685.5	Abandoned-dry.
4536	Scurry et al Red Creek 6-18-85-20	78 09 01	78 10 08	2 117.0	Standing.
4423	Scurry et al Red Creek 6-13-85-21	78 05 27	78 06 23	2 121.4	Abandoned-dry.
4511	Scurry et al Stoddart 16-22-85-20	78 08 15	78 09 07	1 931.0	Belloy oil.
4320	Scurry et al Stoddart 6-33-85-20	78 02 06	78 03 02	2 041.3	Belloy oil.

Table 4-4—Wells Drilled and Drilling, 1978 – Continued

Well Authorization Number	Well Name	Date Spudded	Date Rig Released	1978 Depth	Status at December 31, 1978
4357	Scurry et al Stoddart 6-34-85-20	78 02 14	78 03 08	1 983.3	Belloy oil.
4513	Scurry et al W Stoddart 16-23-85-20	78 08 15	78 09 07	1 948.0	Belloy oil.
4545	Scurry et al W Stoddart 16-27-85-20	78 09 15	78 10 08	1 913.9	Belloy oil.
4578	Scurry et al W Stoddart 8-34-85-20	78 10 08	78 10 31	1 911.0	Belloy oil.
4535	Scurry et al W Stoddart 16-34-85-20	78 09 14	78 10 06	1 900.0	Belloy oil.
4602	Scurry et al W Stoddart 14-34-85-20	78 11 04	78 11 23	1 943.0	Belloy oil.
4424	Scurry et al W Stoddart 6-4-86-20	78 07 20	78 08 12	1 967.0	Belloy oil.
4290	Shell Foxglove d-68-A	78 02 17	78 03 23	2 788.9	Abandoned-dry.
3917	Shell Quintana Jackfish b-64-K	78 12 29	78 02 09	2 420.7	Abandoned-dry.
4163	Shell Klikerran 10-23-77-14	78 11 09	78 01 16	2 798.9	Abandoned-dry.
4223	Shell Ostate b-48-L	78 01 29	78 04 03	2 926.4	Abandoned-dry.
4519	Siebens CZAR et al Buick 10-29-88-29	78 10 06	78 11 16	1 854.0	Charlie Lake gas.
4521	Signalta et al W Buick b-A50-C	78 10 07	78 10 17	1 124.0	Dunlevy gas.
4597	Signalta OIL Nig d-91-G	78 11 22	78 12 22	1 394.0	Abandoned-dry.
4267	Signalta et al Stoddart 7-26-86-20	78 07 20	78 08 15	1 946.0	Abandoned-dry.
3915	Skelly Getty C S Commotion a-23-D	78 06 15	78 05 17	4 572.0	Baldonnel gas.
4411	Skelly Getty C S Commotion c-29-C	78 06 17	------	------	Drilling.
4428	Skye et al Buick d-36-I	78 07 19	78 08 08	1 414.5	Abandoned-dry.
4416	Sundance Airport 6-36-83-18	78 05 05	78 05 24	1 588.0	North Pine oil.
4478	Sundance et al Nig b-44-C	78 08 27	78 09 15	1 597.0	Dunlevy gas.
4139	Sundance Nig b-84-C	77 12 01	78 01 01	1 588.0	Gething and North Pine gas.
4588	Texaco et al Boundary 4-28-85-14	78 11 23	78 12 04	1 311.5	Boundary Lake oil.
4589	Texaco et al Boundary 11-21-85-14	78 12 07	78 12 17	1 335.0	Boundary Lake oil.
4265	Texex Dahl c-74-J	78 02 28	78 03 08	1 109.5	Bluesky gas.
4213	Texex Silver a-7-C	78 03 11	78 03 21	1 223.8	Bluesky gas.
4525	Tri Star et al Laprise b-70-C	78 09 17	78 10 05	1 267.0	Baldonnel gas.
4409	Turbo et al Gopher 10-26-85-16	78 06 01	78 07 04	1 854.4	Belloy gas.
4408	Turbo et al Gopher 11-33-85-16	78 10 18	78 12 29	3 057.0	Abandoned-dry.
4402	Turbo Ranger Pluto 10-14-86-17	78 03 28	78 04 15	1 402.1	Halfway gas.
4532	Union W Buick a-61-E	78 10 06	78 10 16	1 252.0	Dunlevy gas.
4529	Union W Buick d-71-E	78 10 18	78 10 29	1 215.0	Dunlevy oil.
4364	Union et al Crush b-59-F	78 11 01	78 11 11	1 180.0	Halfway oil.
4606	Union et al Wildmint c-56-A	78 11 13	78 11 21	1 152.8	Halfway oil.
4365	Union HB Woodrush c-52-H	78 11 23	78 12 02	1 125.0	Halfway gas.
4096	Uno—Tex BP Notsah b-7-L	77 12 17	78 02 15	3 124.0	Abandoned-dry.
4403	Weinoco et al Cache b-48-L	78 06 17	78 07 27	1 645.0	Coplin gas.

4576	Wainoco et al Coplin 4-3-86-23	78 10 11	78 11 07	1 737.8	Abandoned-dry.
4298	Wainoco et al Dahl b-68-H	78 03 17	78 03 25	1 204.0	Bluesky gas.
4297	Wainoco et al Dahl b-84-G	78 03 06	78 03 15	1 200.9	Bluesky gas.
4260	Wainoco Ft St John 16-23-84-19	78 05 28	78 06 26	1 929.1	Belloy oil.
2503	Wainoco et al Moberly 10-22-82-22 (re-entry)	78 02 23	78 08 30	1 596.7	Halfway gas.
4189	Wainoco Monias 6-22-82-21	77 12 28	78 01 18	1 482.9	Halfway gas.
4277	Wainoco Monias 11-24-82-21	78 06 30	78 08 01	1 560.0	Halfway gas.
4605	Wainoco Sabine Numac Red 10-30-86-21	78 11 12	78 12 24	2 085.0	Belloy gas.
4565	Wainoco BCRIC Sojer a-47-K	78 10 30	78 11 22	1 329.2	Baldonnel gas.
4526	Wainoco et al Tea 6-34-84-20	78 09 02	78 10 07	2 140.0	Belloy gas.
4617	Westburne et al Wildmint d-78-A	78 12 22	78 12 06	1 155.0	Abandoned-dry.
4540	Westcoast et al Goose 2-28-84-21	78 09 08	78 10 15	1 575.0	Doig gas.
4650	Westcoast Ft St John SE 10-30-82-17	78 12 04	------	------	Drilling.
4214	Westcoast Numac Pickell b-30-D	77 12 28	78 01 10	1 287.6	Abandoned-dry.
4477	Westcoast et al Progress 6-1-97-16	78 08 09	78 10 17	2 637.0	Abandoned-dry.
4582	Westcoast GAO N Red 10-27-86-21	78 10 18	78 11 28	2 059.7	Dunlevy gas.
4234	Westcoast et al Redeye a-83-I	78 02 06	78 02 17	1 204.0	Abandoned-dry.
4179	Westcoast et al N Snyder c-83-K	78 12 17	78 01 31	1 743.5	Abandoned-dry.
4359	Westcoast et al Temple d-57-I	78 02 20	78 03 05	1 150.6	Halfway gas.
4393	Westcoast et al Velma d-59-L	78 03 09	78 03 17	1 219.2	Bluesky gas.
4614	Wilshire et al Conroy b-84-D	78 11 21	78 12 05	1 368.0	Abandoned-dry.
4314	Wincan et al Dahl a-21-G	78 03 01	78 03 10	1 197.9	Bluesky gas.
4244	Wincan et al Dahl a-41-G	78 01 17	78 01 28	1 188.7	Bluesky gas.
4313	Wincan et al Dahl b-44-G	78 02 17	78 02 27	1 197.9	Bluesky gas.
4251	Wincan et al Dahl d-A91-J	78 01 05	78 01 14	1 066.8	Bluesky gas.
4467	Woods Ashland Beavertail d-95-D	78 06 28	78 07 10	1 333.0	Abandoned-dry.
4485	Woods Boudreau 11-9-84-21	78 07 21	78 08 20	1 370.0	Halfway gas.
4491	Woods N Julienne d-A33-H	78 10 23	78 11 05	638.0	Abandoned-junked.
4618	Woods N Julienne d-B33-H	78 11 08	------	------	Drilling.
4174	Woods Wainoco Monias 6-26-82-21	78 12 28	78 01 22	1 484.7	Halfway gas.
4559	Woods Wainoco Monias 7-34-82-21	78 09 24	78 10 21	1 510.0	Halfway gas.
4561	Woods et al Oak 14-32-85-17	78 09 29	78 10 17	1 472.0	Abandoned-dry.
4626	Woods Wainoco Oak 11-26-86-18	78 11 19	78 12 05	1 469.9	Abandoned-dry.
4443	Woods Anadarko Siphon 10-36-86-17	78 06 05	78 06 24	1 388.7	Abandoned-dry.
4377	Woods N Siphon 11-25-87-16	78 03 22	78 04 06	1 303.0	Dunlevy gas.
4437	Woods W Stoddart 6-7-86-20	78 05 31	78 06 29	2 059.0	Belloy oil.
4463	Woods W Stoddart 8-7-86-20	78 07 01	78 08 03	2 041.0	Abandoned-dry.
4407	Woods W Stoddart 8-13-86-21	78 04 04	78 04 30	2 008.3	Belloy oil.
4593	Woods Dome S Wilder 6-10-83-20	78 10 26	78 11 15	1 552.0	Abandoned-oil.
4616	Zephyr et al Birch b-50-I	78 11 13	78 12 05	1 305.0	Baldonnel oil.
4245	Zephyr et al Black a-27-F	78 12 12	------	------	Drilling.

Table 4-5—Summary of Drilling and Production Statistics, 1978

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Totals
Well authorizations issued	79	45	21	11	25	42	22	38	28	34	59	62	466
Well authorizations cancelled	2	-----	1	-----	-----	-----	-----	2	-----	4	6	2	17
Wells spudded	46	54	41	3	17	35	30	35	26	34	43	32	396
Rigs operated (during month)	65	65	23	25	22	36	38	42	43	44	53	57	71[1]
Rigs operating (at month end)	54	50	7	7	18	27	28	35	38	34	43	42	-----
Metres drilled—													
Development	16 476.0	25 471.5	30 774.1	14 490.5	3 065.4	22 047.7	25 536.7	31 802.5	17 188.4	38 658.3	18 709.7	25 872.0	270 092.8
Exploratory outpost	27 236.6	28 322.6	43 065.5	12 068.5	5 982.0	16 604.0	21 936.5	11 650.3	19 162.5	18 107.8	24 796.7	21 685.8	250 608.8
Exploratory wildcat	17 955.2	29 912.5	22 585.9	10 005.7	4 572.0	7 772.1	-----	4 232.1	1 525.0	7 888.0	3 153.0	13 325.0	122 726.5
Totals	61 667.8	83 706.6	96 425.5	36 564.7	13 619.4	46 423.8	47 473.2	47 684.9	37 875.9	64 454.1	46 659.4	60 882.8	643 428.1
Oil wells*	2	3	3	5	3	6	7	8	8	11	7	8	71
Gas wells*	23	31	33	10	3	8	14	16	8	21	15	20	202
Abandoned wells	17	24	24	4	-----	11	12	9	7	5	7	9	129
Service wells	-----	2	2	-----	-----	-----	-----	-----	-----	-----	-----	-----	4
Standing wells	-----	-----	-----	-----	-----	1	-----	-----	-----	1	-----	-----	2
Totals	42	60	62	19	6	26	33	33	23	38	29	37	408
Producible oil wells	735	737	742	744	748	753	758	766	775	786	790	798	-----
Producing oil wells	528	511	512	491	491	544	541	557	559	565	556	564	-----
Production in barrels	1 097 476	952 196	1 009 591	1 009 550	864 577	1 089 171	774 273	1 161 521	1 167 826	1 186 089	1 134 363	1 169 272	12 609 176[3]
Average daily production	35 402	34 007	32 567	33 652	27 890	36 306	24 977	37 472	38 928	38 261	37 812	37 718	-----
Producible gas wells	1 271	1 298	1 329	1 339	1 349	1 360	1 376	1 393	1 400	1 421	1 438	1 465	-----
Producing gas wells	460	474	475	473	468	461	426	321	407	508	560	572	-----
Production in MSCF[2]	36 346 739	32 041 954	32 704 445	28 589 083	25 167 652	18 597 906	19 498 833	20 944 907	21 909 376	26 481 580	35 930 639	41 072 001	341 051 255[3]
Average daily production	1 172 475	1 144 356	1 054 982	952 969	812 505	619 930	628 995	675 642	730 313	854 245	1 197 688	1 324 903	-----

SUMMARY FOR 1978

Drilled		*Completions*	
Locations drilled	388	Oil wells*	71
Multizone wells	15	Gas wells*	202
Re-entries	5	Service wells	4
Total	408	Standing	2
		Abandoned	129
		Total	408

[1] Rigs operated during 1977.

[2] Nonassociated gas production only.

[3] Year-end amendments not included.

*Each zone of a multizone well is counted as one well.

Table 4-6—Monthly Crude-Oil and Condensate Production by Fields and Pools, 1978

Field and Pool	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Totals
Aitken Creek—													
Gething	12 495	19 309	25 926	21 428	25 225	22 043	12 523	23 181	20 365	20 624	15 555	24 731	243 405
Gething[1]	650	1 060	1 710	1 675	1 406	1 081	852	901	1 655	1 657	1 791	1 888	16 336
Field totals	13 145	20 389	27 636	23 103	26 631	23 124	13 375	24 081	22 020	22 281	17 346	26 619	259 741
Bear Flat—North Pine	2 439	2 162	2 270	2 200	1 858	1 985	1 950	1 954	1 777	2 054	1 931	1 979	24 562
Beatton River—Halfway	32 122	20 640	13 506	28 353	32 007	30 306	19 754	27 986	29 066	31 783	27 429	31 339	324 291
Beatton River West—Bluesky	26 669	24 465	25 301	22 303	23 006	17 010	11 062	19 588	22 206	23 242	26 297	19 433	260 582
Blueberry—Debolt	17 502	15 032	20 657	18 589	22 573	39 287	37 112	40 728	20 162	42 723	39 458	40 523	354 346
Boundary Lake—													
Baldonnel[1]	84	67	55	45	57	27	33	52	74	72	55	171	792
Cecil	515	612	846	772	744	617	360	451	560	497	518	495	6 987
Boundary Lake	520 352	413 406	400 470	428 218	285 811	552 124	349 665	547 279	539 277	498 479	505 167	506 178	5 546 426
Halfway	5 384	5 296	3 363	4 291	4 224	5 586	2 856	7 468	7 165	5 450	7 360	6 935	65 378
Halfway[1]	3	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	3
Field totals	526 338	419 381	404 734	433 326	290 836	558 354	352 914	555 250	547 076	504 498	513 100	513 779	5 619 586
Boundary Lake North—													
Halfway	896	975	792	1 072	804	1 312	1 247	851	1 326	1 431	1 369	1 212	13 287
Halfway[1]	689	277	1 000	728	526	372	-----	-----	-----	143	1 087	553	5 375
Field totals	1 585	1 252	1 792	1 800	1 330	1 684	1 247	851	1 326	1 574	2 466	1 765	18 662
Buick Creek—													
Bluesky[1]	190	38	162	19	4	26	-----	-----	19	3	35	14	510
Dunlevy	-----	-----	-----	-----	-----	-----	-----	188	184	211	228	-----	811
Dunlevy[1]	956	535	631	657	275	246	940	1 520	1 598	2 038	2 008	2 040	13 444
Doig	464	8 761	4 297	-----	-----	2 324	4 198	4 398	7 060	7 613	8 673	4 386	52 174
Field totals	1 610	9 334	5 090	676	279	2 596	5 138	6 106	8 861	9 865	10 944	6 440	66 939
Bulrush—Halfway	2 710	2 519	7 407	7 179	4 539	5 646	5 341	4 761	4 372	2 798	1 654	2 143	51 069
Cache Creek—Halfway[1]	170	77	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	247
Cecil Lake—													
Cecil	1 826	5 812	4 113	-----	5 057	5 504	3 554	3 157	3 246	3 299	3 197	3 307	42 072
North Pine	4 317	2 187	1 283	635	336	566	653	644	1 662	1 971	1 743	1 698	17 695
Field totals	6 143	7 999	5 396	635	5 393	6 070	4 027	3 801	4 908	5 270	4 940	5 005	59 767
Crush—Halfway	6 712	5 588	6 827	4 568	4 862	3 757	1 968	3 877	2 960	3 120	4 134	4 197	52 570
Currant—Halfway	6 069	4 518	3 869	3 365	6 039	3 482	3 072	4 261	4 849	3 262	3 369	2 749	48 904
Dahl—Bluesky[1]	-----	-----	25	-----	-----	-----	-----	-----	-----	-----	-----	-----	25
Eagle—													
Siphon	1 014	976	121	-----	-----	210	651	750	1 112	751	779	722	7 086
Belloy	58 357	52 533	64 498	59 284	58 578	81 470	61 486	111 166	121 725	134 822	103 370	100 569	1 007 858
Field totals	59 371	53 509	64 619	59 284	58 578	81 680	62 137	111 916	122 837	136 573	104 149	101 291	1 014 944
Fireweed—													
Dunlevy	-----	-----	-----	-----	-----	-----	-----	-----	-----	1 085	666	1 513	3 264
Dunlevy[1]	883	1 037	960	623	600	166	62	23	25	10	12	200	4 601
Field totals	883	1 037	960	623	600	166	62	23	25	1 095	678	1 713	7 865

[1]Condensate

Table 4-6—Monthly Crude-Oil and Condensate Production by Fields and Pools, 1978 — Continued

Field and Pool	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Totals
Flatrock—													
Boundary Lake	-----	-----	-----	-----	-----	470	187	147	123	157	95	207	1 386
Halfway	2 383	4 909	4 813	1 117	571	3 290	3 290	3 238	3 001	653	1 006	3 119	31 389
Field totals	2 383	4 909	4 813	1 117	571	3 760	3 477	3 385	3 124	810	1 101	3 326	32 775
Fort St. John—Pingel	3 019	2 604	4 637	4 764	3 601	5 890	5 362	4 937	5 135	3 439	4 816	6 044	54 248
Inga—Inga	130 170	121 932	128 027	128 582	119 730	93 026	83 441	112 474	105 898	114 569	105 697	128 137	1 372 583
Jedney—													
Baldonnel[1]	86	67	77	57	57	31	60	-----	-----	119	89	124	767
Halfway[1]	34	27	23	16	12	-----	14	-----	-----	37	57	39	259
Field totals	120	94	100	73	69	31	74	-----	-----	156	146	163	1 026
Laprise Creek—Baldonnel[1]	100	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	100
Mica—													
Boundary Lake	879	486	549	533	501	465	93	348	473	464	148	224	5 163
Mica	1 720	1 385	1 569	1 378	1 607	1 694	2 182	6 412	4 607	5 098	5 199	4 434	37 285
Field totals	2 599	1 871	2 118	1 911	2 108	2 159	2 275	6 760	5 080	5 562	5 347	4 658	42 448
Mike—Gething	3 638	3 391	2 402	-----	-----	-----	-----	-----	-----	-----	2 131	3 608	15 170
Milligan—Halfway	39 452	36 698	44 696	44 878	39 032	27 922	32 609	38 672	39 118	43 590	43 193	47 108	476 988
Nig Creek—													
Baldonnel	-----	-----	-----	-----	-----	-----	354	19	390	75	-----	-----	838
Baldonnel[1]	-----	483	265	152	642	500	435	424	612	454	209	49	4 225
Field totals	-----	483	265	152	642	500	789	443	1 002	529	209	49	5 063
North Pine—North Pine	-----	42	-----	-----	-----	-----	-----	427	2 344	558	-----	-----	3 371
Oak—													
Cecil[1]	120	215	230	271	209	-----	-----	-----	-----	-----	117	196	1 358
Halfway	7 150	4 060	2 969	8 450	9 709	10 493	5 957	11 575	10 407	10 052	9 366	6 850	97 038
Halfway[1]	3 719	3 119	3 662	2 046	2 006	5 037	2 794	-----	-----	2 601	4 390	4 161	33 535
Field totals	10 989	7 394	6 861	10 767	11 924	15 530	8 751	11 575	10 407	12 653	13 873	11 207	131 931
Osprey-Halfway	2 531	3 223	2 977	2 333	1 539	2 070	1 535	983	1 364	2 071	2 243	1 007	23 876
Peejay—													
Halfway	101 528	96 721	113 055	104 494	102 845	87 345	50 389	89 711	92 766	99 813	93 046	91 829	1 123 542
Halfway[1]	86	16	-----	38	7	54	6	-----	-----	-----	-----	-----	207
Field totals	101 614	96 737	113 055	104 532	102 852	87 399	50 395	89 711	92 766	99 813	93 046	91 829	1 123 749
Peejay West—Halfway	1 871	2 013	2 570	2 082	2 028	2 391	1 768	2 824	2 118	4 436	2 974	1 156	28 231
Rigel—Dunlevy	2 901	2 687	3 147	2 644	2 774	2 886	3 006	2 895	2 841	2 830	1 398	1 423	31 432
Silverberry—Coplin[1]	95	110	122	102	42	82	109	-----	-----	400	-----	156	1 218
Siphon—													
Dunlevy[1]	95	229	157	66	50	-----	17	-----	-----	86	58	54	812
Siphon[1]	8	41	61	22	17	-----	33	-----	-----	85	63	69	399
Halfway[1]	371	127	111	160	82	-----	32	-----	-----	159	125	131	1 298
Field totals	474	397	329	248	149	-----	82	-----	-----	330	246	254	2 509
Siphon East—Bluesky[1]	79	99	-----	-----	-----	-----	-----	-----	-----	91	-----	-----	269

Stoddart–													
Cecil	2 817	2 878	2 038	2 257	2 524	3 778	3 385	2 713	2 887	2 809	2 622	1 849	32 557
Belloy	2 110	1 862	2 121	1 331	1 501	2 059	2 139	2 061	1 688	2 030	1 802	1 695	22 399
Belloy[1]	75	93	59	70	146	38	293	205	277	195	157	129	1737
Field totals	5 002	4 833	4 218	3 658	4 171	5 875	5 817	4 979	4 852	5 034	4 581	3 673	56 693
Stoddart South–Confidential	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2 151	2 151
Stoddart West–													
Belloy	1 100	1 742	3 374	1 561	1 636	3 520	2 954	7 548	6 449	13 207	16 841	27 712	87 644
Belloy[1]	3 098	2 651	3 337	2 713	2 969	2 408	2 330	1 655	2 445	2 166	2 794	2 194	30 760
Field totals	4 198	4 393	6 711	4 274	4 605	5 928	5 284	9 203	8 894	15 373	19 635	29 906	118 404
Velma–Charlie Lake	140	.....	290	.....	.....	.....	.....	.....	.....	.....	.....	.....	430
Wessel–Halfway	73 663	58 210	69 263	72 185	73 287	43 070	38 229	48 539	69 882	66 822	62 481	60 190	735 801
Wessel West–Halfway	6 177	7 440	8 038	6 701	7 822	2 622	.....	.....	2 913	7 690	8 299	7 389	65 091
Wildmint–Halfway	13 060	15 908	20 122	18 430	17 744	17 972	12 673	19 699	19 619	16 683	15 658	13 505	201 073
Willow–													
Gething	1 204	842	843	511	457	409	748	246	481	1 026	1 230	1 368	9 365
Halfway[1]	297	131	174	54	109	99	.....	.....	.....	52	.....	233	1 149
Field totals	1 501	973	1 017	565	566	508	748	246	481	1 078	1 230	1 601	10 514
Wolf–Halfway	4 119	2 294	2 668	1 865	2 674	2 512	2 359	3 040	4 799	4 370	6 507	6 674	43 881
Other Areas–													
Bluesky[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Gething[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
North Pine	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
North Pine[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Halfway	.....	.....	.....	.....	.....	.....	.....	.....	.....	161	.....	1 527	2 070
Dolg	.....	.....	.....	.....	.....	.....	.....	1 316	425	.....	.....	.....	1 741
Confidential	.....	.....	17	.....	.....	2 482	5 503	603	.....	1 133	1 657	927	12 322
Field totals	.....	.....	17	.....	.....	2 482	5 503	1 919	425	1 133	1 657	2 034	16 133
Totals–													
Crude	1 100 415	952 196	1 000 468	1 003 254	865 478	1 088 079	774 117	1 162 876	1 168 365	1 186 120	1 138 342	1 269 272	12 609 176
Condensate	14 010	14 879	19 057	15 053	11 159	11 828	10 483	5 190	7 280	14 152	18 330	18 444	159 671
Crude and condensate	1 114 425	967 075	1 019 525	1 018 307	876 637	1 099 907	784 600	1 168 066	1 175 645	1 200 272	1 156 672	1 187 716	12 768 847

[1]Condensate

Table 4-7—Monthly Nonassociated and Associated Gas Production by Fields and Pools, 1978

Field and Pool	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Totals
Airport–													
Bluesky	-----	-----	-----	-----	-----	-----	-----	33 814	30 846	14 982	14 878	6 755	101 275
Dunlevy	-----	-----	-----	-----	-----	7 421	-----	-----	5 748	22 309	26 680	28 220	90 378
Field totals	-----	-----	-----	-----	-----	7 421	-----	33 814	36 594	37 291	41 558	34 975	191 653
Aitken Creek–													
Gething	64 117	48 469	96 143	100 462	11 172	-----	3 564	119 007	130 551	47 574	52 520	91 860	765 439
Gething[1]	127 258	148 048	202 622	187 499	224 893	169 411	175 773	163 963	181 836	214 840	185 151	193 216	2 174 510
Field totals	191 375	196 517	298 765	287 961	236 066	169 411	179 337	282 970	312 387	262 414	237 671	285 076	2 939 949
Bear Flat–North Pine[1]	53 034	46 821	52 081	52 427	52 704	49 793	51 365	51 459	50 086	51 719	49 774	52 144	613 347
Beatton River–Halfway[1]	8 894	6 534	4 217	7 091	10 432	11 242	6 886	6 891	7 180	11 021	8 236	12 164	100 778
Beatton River West–Bluesky[1]	7 760	7 003	8 011	6 960	7 267	5 319	3 989	6 053	6 009	5 680	5 448	7 076	76 515
Beaverdam–Halfway	69 883	55 502	63 717	60 891	64 233	42 959	42 378	1 995	-----	34 442	47 280	35 397	518 677
Beaver River–													
Matteson	137 652	107 803	134 829	123 244	99 209	69 652	55 273	53 874	32 153	6 261	-----	-----	819 950
Banff	17 996	-----	-----	-----	-----	-----	-----	5 488	1 702	-----	-----	-----	25 186
Nahanni	44 190	22 800	49 944	59 785	136 868	119 219	92 379	63 979	36 699	-----	-----	-----	635 863
Field totals	199 838	130 603	184 773	193 029	236 077	188 871	147 652	123 341	70 554	6 261	-----	-----	1 480 999
Beavertail–Gething	396 898	347 698	397 490	389 689	276 786	202 966	142 993	32 610	212 145	328 558	363 371	390 754	3 481 958
Beg–													
Baldonnel	287 708	242 624	271 207	255 263	117 713	54 840	85 456	-----	15 508	145 204	313 618	289 641	2 078 782
Halfway	139 023	229 406	247 875	185 630	186 067	126 960	67 777	5 782	18 127	113 369	204 695	274 091	1 797 791
Field totals	426 731	471 029	519 082	440 893	303 780	181 790	153 233	5 782	33 635	258 573	518 313	563 732	3 876 573
Birch–													
Gething	2 500	-----	-----	-----	-----	-----	17 623	7 722	13 875	24 761	17 876	12 501	96 858
Baldonnel	-----	-----	-----	-----	-----	-----	25 886	11 037	-----	40 086	15 491	24 434	116 934
Halfway	3 000	-----	-----	-----	-----	-----	31 573	32 020	16 113	50 875	43 611	43 791	220 983
Field totals	5 500	-----	-----	-----	-----	-----	75 082	50 779	29 988	115 722	76 978	80 726	434 775
Blueberry–													
Dunlevy	67 143	66 249	72 336	71 914	69 042	47 008	43 580	34 298	25 703	45 074	49 475	59 023	650 844
Debolt[1]	157 961	154 004	120 657	136 058	56 671	71 269	68 236	123 077	76 229	102 449	84 530	116 377	1 267 518
Field totals	225 104	220 253	192 992	207 972	125 713	118 277	111 816	157 375	101 932	147 523	134 005	175 400	1 918 362
Blueberry West–Baldonnel	22 641	18 894	21 433	7 587	29 636	8 817	-----	-----	-----	-----	21 077	25 750	155 835
Boundary Lake–													
Bluesky	-----	-----	-----	-----	-----	-----	-----	-----	-----	12 334	10 383	10 966	33 683
Gething	53 132	45 920	53 826	46 384	52 791	39 945	-----	23 228	58 748	63 723	38 226	51 080	527 003
Baldonnel	64 811	64 459	71 112	62 753	63 394	55 760	-----	34 224	62 992	41 779	61 674	63 070	646 028

Boundary Lake—*Continued*													
Cecil[1]	266	240	368	342	332	255	165	219	328	310	269	320	3 414
Boundary Lake[1]	231 251	184 828	194 985	207 108	153 646	234 760	180 055	247 594	263 962	240 117	230 571	243 800	2 612 677
Basal Boundary	9 775	9 243	10 453	9 815	9 821	7 658	----	4 873	9 328	8 717	7 383	8 972	96 038
Halfway	3 400	----	----	----	----	----	----	----	----	----	----	----	3 400
Halfway[1]	3 346	3 518	3 298	3 805	2 848	4 795	5 311	5 842	6 919	4 942	7 429	25 428	77 479
Field totals	365 981	308 208	334 042	330 207	282 832	343 173	185 531	315 980	402 277	371 922	355 936	403 634	3 999 722
Boundary Lake North—													
Halfway	109 632	90 721	138 213	135 670	108 776	34 007	----	----	----	43 858	94 342	80 405	835 654
Halfway[1]	1 791	1 226	642	926	761	1 275	1 032	1 391	1 422	1 750	1 469	1 196	14 881
Field totals	111 423	91 947	138 855	136 596	109 537	35 282	1 032	1 391	1 422	45 608	95 811	81 601	850 535
Bubbles—Baldonnel	179 635	154 174	68 876	165 621	99 970	----	----	----	24 674	169 497	262 369	198 001	1 322 817
Bubbles North—Halfway	----	----	----	----	----	----	----	----	----	4 780	----	----	4 780
Buick Creek—													
Bluesky	107 601	95 545	141 713	161 363	125 736	20 990	24 130	81 094	126 911	116 653	171 690	141 191	1 314 617
Gething	22 398	33 380	31 170	----	----	----	----	----	----	8 899	4 683	29 217	129 747
Dunlevy	1 047 423	898 928	1 058 668	1 005 388	923 585	597 132	501 812	693 958	999 960	913 679	1 075 903	1 312 414	11 028 850
Dunlevy[1]	----	----	----	----	----	----	----	219	541	233	87	----	1 080
Cecil	3 737	460	----	----	----	----	----	----	----	----	----	----	4 197
Dolg[1]	3 697	12 588	6 227	----	----	25 854	34 610	35 369	58 093	42 537	75 290	33 366	327 631
Field totals	1 184 856	1 040 901	1 237 778	1 166 751	1 049 321	643 976	560 552	810 640	1 185 505	1 082 001	1 327 653	1 516 188	12 806 122
Buick Creek North—													
Bluesky	116 817	141 849	129 355	110 053	129 418	150 750	129 210	116 920	134 700	167 452	154 105	175 989	1 655 618
Dunlevy	201 501	157 334	105 660	75 556	104 287	117 588	86 031	109 116	127 270	130 429	104 024	159 736	1 478 531
Field totals	318 318	299 183	235 015	185 609	233 705	268 338	215 241	225 035	261 970	297 881	258 129	335 725	3 134 149
Buick Creek West—													
Bluesky	241 676	237 710	280 985	150 572	132 273	121 252	127 406	213 071	260 255	180 744	175 781	251 988	2 373 713
Dunlevy	105 593	122 213	118 785	102 549	120 941	111 452	85 613	94 028	97 306	119 343	111 939	103 263	1 293 025
Baldonnel	4 317	2 857	457	4 319	6 240	10 420	6 274	2 664	12 424	10 723	14 507	7 927	83 129
Field totals	351 586	362 780	400 227	257 440	259 454	243 124	219 293	309 763	369 985	310 810	302 227	363 178	3 749 867
Bulrush—Halfway[1]	67 962	63 408	72 279	58 814	45 871	78 145	89 018	100 687	91 759	69 393	36 143	45 593	819 072
Cabin—Slave Point	319 156	252 057	308 068	292 125	214 823	198 867	173 398	132 644	173 759	305 713	282 571	273 997	2 926 998
Cache Creek—													
Coplin	95 896	80 713	92 788	57 969	52 459	47 700	46 195	50 140	35 481	40 630	76 449	88 495	764 914
Halfway	44 389	4 341	92 402	51 754	22 020	21 232	33 932	----	----	6 192	17 642	----	294 624
Field totals	140 284	85 054	185 190	109 723	74 479	68 932	80 127	50 140	35 481	47 542	94 091	88 495	1 059 538
Cecil Lake—													
Cecil[1]	509	1 765	1 292	----	1 553	1 746	1 067	1 099	1 043	1 036	989	1 008	13 107
North Pine[1]	18 431	3 670	2 238	437	69	244	377	133	3 325	5 038	5 010	4 195	43 167
Field totals	18 940	4 535	3 530	437	1 622	1 990	1 444	1 232	4 368	6 074	5 999	5 203	56 274

[1] Associated gas

Table 4-7—Monthly Nonassociated and Associated Gas Production by Fields and Pools, 1978 – Continued

Field and Pool	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Totals
Clarke Lake—Slave Point	5 373 774	5 388 506	4 482 875	3 628 641	3 678 827	1 654 377	3 742 112	4 576 617	3 779 141	3 291 646	4 834 607	5 253 608	49 684 731
Crush—Halfway[1]	17 329	16 634	19 052	17 761	9 606	10 079	9 677	17 099	13 404	13 191	10 968	12 946	167 746
Currant—Halfway[1]	27 582	21 372	12 334	8 462	24 998	62 002	2 963	10 345	13 533	7 676	37 372	11 825	240 464
Currant West—Halfway	-----	62 631	61 669	37 770	24 114	32 789	24 124	-----	-----	22 816	65 181	61 796	392 890
Dahl—Bluesky	-----	6 756	4 183	-----	-----	230 927	49 091	-----	-----	8 764	228 705	403 104	931 520
Dilly—Slave Point	-----	-----	-----	-----	-----	81 809	54 176	26 180	90 874	78 612	69 964	83 752	485 367
Eagle—													
Siphon[1]	796	776	-----	629	7	324	565	427	671	920	979	846	6 940
Cecil	-----	-----	30 164	69 419	39 705	32 424	31 606	43 731	56 136	51 092	51 960	55 227	461 463
Belloy[1]	44 670	54 738	75 354	65 068	62 023	93 987	69 815	102 047	98 081	92 321	94 901	85 119	938 124
Lower Belloy	-----	-----	-----	-----	3 114	11 414	15 541	12 995	11 815	12 103	10 958	9 788	87 728
Field totals	45 466	55 514	105 518	135 116	104 849	138 149	117 526	159 200	166 703	156 136	158 798	150 980	1 494 255
Farrell Creek—													
Charlie Lake	72 366	55 285	38 658	45 478	-----	-----	-----	-----	-----	46 633	69 131	77 763	405 314
Halfway	35 475	29 623	16 313	30 544	-----	-----	-----	-----	-----	29 667	36 575	37 120	215 257
Field totals	107 781	84 908	54 971	76 022	-----	-----	-----	-----	-----	76 300	105 706	114 883	620 571
Fireweed—													
Bluesky	188 597	110 033	142 688	141 526	85 935	164 238	117 745	49 763	14 650	166 329	164 563	150 431	1 496 484
Dunlevy	421 278	365 467	392 204	322 028	328 078	272 907	270 412	100 935	115 816	243 381	435 330	474 021	3 741 857
Dunlevy[1]	-----	-----	-----	-----	-----	-----	-----	-----	-----	505	512	1 384	2 401
Baldonnel	6 584	10 013	8 530	2 934	6 995	8 834	7 670	5 164	4 983	8 205	7 351	6 444	83 707
Debolt	-----	3 012	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	3 012
Field totals	616 459	488 525	543 422	466 488	421 008	445 979	395 827	155 862	135 449	418 416	607 746	632 280	5 327 461
Flatrock—													
Siphon	-----	-----	-----	-----	-----	-----	7 951	-----	-----	24 277	63 354	70 452	166 034
Boundary Lake[1]	-----	-----	-----	-----	-----	671	545	586	414	498	395	540	3 650
Halfway	224 261	209 499	214 292	216 087	135 083	91 467	125 629	-----	33 940	120 242	184 143	210 832	1 765 475
Halfway[1]	524	1 816	1 404	-----	-----	1 050	2 730	5 374	5 244	-----	-----	1 026	19 168
Field totals	224 785	211 315	215 696	216 087	135 083	93 188	136 855	5 960	39 598	145 018	247 892	282 850	1 954 327
Flatrock West—Halfway	61 598	77 651	38 476	26 007	36 168	44 226	39 499	-----	-----	48 504	99 720	107 887	577 736
Fort St. John—													
Baldonnel	96 527	11 151	130 226	107 285	110 060	116 387	115 074	-----	11 865	61 539	111 776	135 927	1 007 817
Charlie Lake[1]	18 359	6 027	27 896	25 885	13 609	37 198	30 059	37 803	36 136	26 062	41 641	59 633	360 308
Halfway	127 667	85 440	137 783	130 031	98 917	124 851	88 880	-----	27 299	61 732	96 819	49 869	1 029 294
Belloy	17 063	2 126	34 639	25 827	21 931	24 335	25 280	-----	1 512	14 807	28 762	24 886	221 168
Field totals	259 616	104 744	330 544	289 028	244 517	362 777	259 293	37 803	76 812	164 140	278 998	270 315	2 618 587

Fort St. John Southeast–													
Baldonnel	6 317	25 327	38 037	47 736	7 852	39 782	39 494	------	------	25 849	31 355	31 212	292 261
Siphon	32 074	88 395	74 907	81 312	13 266	------	53 830	------	------	39 406	57 243	76 707	517 140
Halfway	7 397	23 045	43 984	44 747	10 399	51 713	41 165	------	------	35 099	42 139	53 719	353 407
Belloy	29 037	88 708	91 176	92 121	14 366	107 075	114 555	------	------	70 756	70 537	90 878	769 209
Field totals	74 825	225 476	248 104	265 916	45 883	198 570	249 044	------	------	171 110	201 274	252 516	1 932 717
Goose–North Pine	------	------	------	------	------	------	------	------	------	28 189	103 749	107 534	239 472
Gote–Sulphur Point	233 111	197 205	224 394	157 786	68 384	13 936	------	35 054	106 300	136 755	146 000	146 000	1 464 985
Grizzly North–Dunlevy	------	------	------	------	------	------	------	------	------	------	------	162 783	162 783
Grizzly South–Dunlevy	------	------	------	------	------	34 780	------	------	------	------	------	687 063	721 843
Gundy Creek–													
Dunlevy	2 389	1 863	------	2 880	3 009	2 257	1 830	------	------	------	2 546	1 919	18 693
Baldonnel	102 108	85 079	74 948	75 668	82 083	93 579	77 136	------	------	------	62 225	80 063	732 889
Field totals	104 497	86 942	74 948	78 548	85 092	95 836	78 966	------	------	------	64 771	81 982	751 582
Gundy Creek West–													
Dunlevy	------	26 443	99 563	95 461	100 635	78 033	54 163	37 070	129 735	138 397	110 553	89 539	959 592
Baldonnel	------	42 275	94 845	90 504	85 688	86 901	69 101	11 819	108 355	106 476	68 785	66 906	831 655
Field totals	------	68 718	194 408	185 965	186 323	164 934	123 264	48 889	238 090	244 873	179 338	156 445	1 791 247
Helmet–													
Jean Marie	12 800	44 768	23 652	36 645	48 338	34 670	41 145	25 612	22 568	32 384	23 953	23 246	369 781
Slave Point	1 655 749	1 491 205	1 630 875	710 028	870 671	752 886	806 694	875 068	955 715	1 125 540	1 682 205	1 900 008	14 456 644
Field totals	1 668 549	1 535 973	1 654 527	746 673	919 009	787 556	847 839	900 680	978 283	1 157 924	1 706 158	1 923 254	14 826 425
Inga–													
Dunlevy	140 939	125 314	140 066	99 807	104 552	107 825	96 527	31 574	24 031	69 276	124 519	100 125	1 164 355
Gething	------	21 052	19 771	17 597	15 999	10 566	7 756	4 916	4 422	4 916	9 397	9 961	126 353
Inga	603 990	467 700	556 687	444 240	200 723	164 643	182 557	------	41 450	616 070	609 716	859 576	4 546 362
Inga[1]	191 264	178 773	179 187	192 959	187 898	145 591	140 831	181 130	189 351	173 747	165 908	192 694	2 099 333
Coplin	66 785	58 324	63 451	63 001	32 570	41 257	38 350	------	------	40 904	63 951	62 034	529 627
Field totals	1 001 978	851 163	958 162	817 604	541 742	469 882	465 821	217 620	239 264	904 913	973 491	1 024 390	8 466 030
Jedney–													
Baldonnel	617 770	548 728	581 842	566 826	278 385	436 917	451 414	------	29 884	372 269	582 860	563 283	5 030 158
Halfway	534 053	485 106	498 657	459 437	235 439	284 905	381 011	------	25 528	211 350	450 980	435 187	4 001 653
Field totals	1 151 823	1 033 834	1 080 499	1 026 263	513 804	721 822	832 425	------	55 412	583 619	1 033 840	998 470	9 031 811
Julienne Creek–Halfway	26 583	24 045	30 802	29 495	20 529	24 843	28 508	------	1 055	15 551	25 809	25 549	252 769
Julienne Creek North–Debolt	------	------	------	------	------	------	47 793	------	38 451	78 050	71 261	91 026	326 581
Julienne Creek South–Debolt	------	76 043	95 058	49 857	87 966	22 320	------	------	64 442	77 357	68 819	56 945	598 807
Klua–													
Debolt	------	------	------	------	------	------	------	------	------	------	1 132	2 466	3 598
Slave Point	300 375	293 711	321 545	285 275	394 051	314 453	170 088	236 222	338 364	492 859	576 721	631 804	4 355 468
Pine Point	------	------	------	------	------	------	------	------	------	------	------	60 860	60 860
Confidential	------	------	------	------	------	------	------	------	------	------	89 430	159 224	248 654
Field totals	300 375	293 711	321 545	285 275	394 051	314 453	170 088	236 222	338 364	492 859	667 283	854 354	4 668 580

[1] Associated gas

Table 4-7—Monthly Nonassociated and Associated Gas Production by Fields and Pools, 1978 – *Continued*

Field and Pool	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Totals
Kobes–Townsend–													
Duntevy	19 785	18 013	9 670	16 765	.....	.....	.....	.....	.....	7 680	14 722	16 202	102 837
Charlie Lake	14 713	12 678	7 968	41 051	.....	.....	.....	.....	.....	28 950	69 645	64 490	239 495
Halfway	251 812	151 875	144 074	213 279	.....	.....	.....	16 067	57 891	113 486	307 900	339 785	1 596 169
Debolt	70 984	62 943	69 548	54 758	.....	.....	.....	.....	.....	.....	21 508	64 912	344 653
Field totals	357 294	245 509	231 260	325 853	.....	.....	.....	16 067	57 891	150 116	413 775	485 389	2 283 154
Kotcho Lake–Slave Point	197 430	201 426	300 925	271 239	285 807	278 397	281 320	266 219	291 692	273 083	300 410	322 471	3 270 419
Kotcho Lake East–													
Bluesky	57 106	61 707	49 039	58 632	17 695	.....	.....	.....	5 983	70 921	41 203	51 280	413 566
Slave Point	377 746	432 434	367 688	488 108	278 611	150 418	158 541	164 125	132 056	274 890	325 953	296 599	3 407 159
Field totals	434 852	494 131	416 727	506 740	296 306	150 418	158 541	164 125	138 039	345 811	367 156	347 879	3 820 725
Laprise Creek–													
Gething	7 659	11 658	7 923	5 025	7 782	7 778	6 555	4 070	4 276	2 458	6 168	.....	71 361
Baldonnel	2 511 459	2 259 892	2 507 502	2 244 971	2 184 423	1 488 101	1 197 146	1 670 258	2 044 391	1 557 870	1 707 633	2 119 943	23 493 589
Nancy	.....	.....	.....	10 113	30 848	31 526	31 801	21 759	25 263	30 081	34 463	32 439	246 293
Field totals	2 519 118	2 271 550	2 515 434	2 260 109	2 223 053	1 527 405	1 235 502	1 696 087	2 071 930	1 590 409	1 748 264	2 152 382	23 811 243
Louise–Slave Point	57 782	50 134	55 200	58 702	58 290	55 632	130	.....	21 682	68 580	61 534	63 129	550 795
Mica–													
Boundary Lake[1]	1 528	1 220	1 303	1 060	1 077	896	160	340	287	1 424	147	305	9 747
Mica[1]	1 494	1 249	1 362	1 050	1 536	1 518	2 981	5 179	3 058	2 874	5 092	5 058	32 541
Field totals	3 022	2 469	2 665	2 110	2 613	2 414	3 141	5 519	3 345	4 298	5 239	5 363	42 198
Mike–Gething[1]	2 956	6 232	8 788	.....	.....	.....	.....	.....	.....	.....	871	3 937	20 784
Milligan Creek–													
Gething	5 970	8 075	7 934	8 345	6 333	5 384	3 658	8 257	4 874	4 172	5 265	5 168	73 435
Halfway[1]	13 622	14 233	16 206	14 622	11 803	5 478	8'575	13 646	13 377	16 183	13 033	13 616	154 394
Field totals	19 592	22 308	24 140	22 967	18 136	10 862	12 233	21 903	18 251	20 355	18 298	18 784	227 829
Milligan Creek West–Halfway	20 539	97 420	136 254	124 647	88 466	62 124	72 563	27 344	852	32 518	108 686	107 286	878 729
Monias–Halfway	.....	.....	.....	.....	.....	584 345	.....	.....	.....	17 741	634 769	842 009	2 078 864
Montney–Confidential[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	469	.....	.....	469
Nettle–Halfway	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	23 270	23 270
Nig Creek–													
Baldonnel	754 515	666 553	627 928	640 766	433 060	328 187	204 761	432 668	379 795	560 220	706 725	752 155	6 487 333
Baldonnel[1]	.....	.....	.....	.....	.....	.....	1 674	471	1 062	279	.....	.....	3 486
Field totals	754 515	666 553	627 928	640 766	433 060	328 187	206 435	433 139	380 857	560 499	706 725	752 155	6 490 819
North Pine–North Pine	37 767	8 010	.....	18 118	36 437	1 227	33 745	28 475	33 244	26 636	11 728	23 715	259 102
North Pine–North Pine[1]	.....	1 782	.....	.....	.....	.....	.....	632	10 741	4 605	.....	.....	17 260
Field totals	37 767	9 792	.....	18 118	36 437	1 227	33 745	29 107	43 985	31 241	11 728	23 715	276 862

Oak–													
Cecil	256	459	491	579	447	.....	.....	.....	.....	.....	256	329	2 817
Halfway	234 992	188 009	225 406	185 215	140 964	249 137	204 469	.....	.....	141 039	248 205	220 761	2 038 197
Halfway[1]	5 910	2 838	2 075	8 011	13 754	11 431	7 413	14 435	13 422	14 533	13 345	11 823	118 990
Field totals	241 158	191 306	227 972	193 805	155 165	260 568	211 882	14 435	13 422	155 572	261 806	232 913	2 160 004
Osprey–													
Bluesky	.....	3 093	.....	.....	.....	.....	.....	.....	.....	.....	.....	5 200	8 293
Gething	44 585	42 695	28 080	739	25 078	18 510	25 717	259	6 468	14 868	2 736	.....	209 735
Halfway	34 344	20 747	11 668	2 524	.....	.....	.....	.....	.....	.....	.....	.....	69 283
Halfway[1]	5 858	6 363	6 466	6 131	7 179	8 097	5 120	2 913	6 992	8 242	7 527	4 051	74 939
Field totals	84 787	72 898	46 214	9 394	32 257	26 607	30 837	3 172	13 460	23 110	10 263	9 251	362 250
Paradise–Halfway	.....	.....	.....	.....	22 962	47 071	39 321	.....	.....	41 046	57 595	36 318	244 313
Parkland–Wabamun	343 990	320 528	330 720	330 355	343 232	225 458	303 897	346 493	341 525	363 014	293 280	339 259	3 871 751
Pesjay–													
Gething	48 420	37 698	42 671	36 261	22 320	38 590	19 888	1 571	24 645	29 246	37 214	34 647	373 171
Baldonnel	86 474	68 740	77 014	56 247	43 812	21 102	.....	5 315	45 694	58 593	80 408	61 646	605 046
Halfway	118 464	83 407	112 196	81 451	45 235	55 513	37 100	2 154	26 625	73 792	100 353	113 807	850 097
Halfway[1]	53 139	48 786	55 982	53 117	50 517	47 177	32 004	47 023	51 079	58 145	50 881	51 807	599 657
Field totals	306 497	238 631	287 863	227 076	161 884	162 382	88 992	56 064	148 043	219 776	268 856	261 907	2 427 971
Pesjay West–Halfway[1]	60 021	59 802	88 654	65 396	46 935	56 600	42 756	66 648	43 213	69 017	40 652	12 007	651 701
Petitot River–Slave Point	228 330	167 234	210 276	206 294	155 808	146 899	69 583	149 007	182 006	202 301	170 919	186 489	2 075 046
Red Creek–Halfway	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	12 176	8 535	20 711
Rigel–													
Bluesky	10 389	9 342	10 199	9 399	8 047	7 939	7 158	7 570	8 405	6 315	7 492	8 966	101 221
Dunlevy	1 345 068	1 250 878	1 361 169	1 192 826	708 283	729 022	542 008	877 896	1 231 710	723 111	978 361	1 230 274	12 170 626
Dunlevy[1]	29 481	29 946	38 504	38 400	37 194	30 858	40 059	36 358	38 126	37 626	30 316	34 088	420 856
Field totals	1 384 958	1 290 166	1 409 872	1 240 625	753 524	767 819	589 225	921 824	1 278 241	766 952	1 016 169	1 273 328	12 692 703
Rigel East–Gething	87 147	75 725	80 201	53 302	54 335	39 059	26 346	40 796	70 071	65 546	77 287	89 314	759 129
Roger–Pine Point	975 740	887 008	942 645	469 621	570 743	393 977	356 796	471 523	515 818	737 114	889 666	987 100	8 197 051
Sierra–													
Pine Point	3 728 058	2 947 212	2 598 276	2 055 694	1 764 065	1 328 235	1 686 936	2 310 120	1 737 835	2 059 008	2 909 176	3 226 046	28 330 661
Confidential	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	319 487	319 487
Field totals	3 728 058	2 947 212	2 598 276	2 055 694	1 764 065	1 328 235	1 686 936	2 310 120	1 737 835	2 059 008	2 909 176	3 545 533	28 650 148
Silver–													
Bluesky	.....	.....	.....	.....	.....	168 155	253	.....	.....	7 526	316 671	419 006	911 611
Halfway	.....	.....	.....	.....	.....	10 354	31 435	558	.....	.....	62 084	79 541	183 972
Field totals	.....	.....	.....	.....	.....	178 509	31 688	558	.....	7 526	378 755	498 547	1 095 583
Silverberry–Coplin	45 065	42 822	42 414	31 699	29 466	26 474	27 751	21 245	44 593	28 442	28 814	40 180	408 963
Siphon–													
Dunlevy	274 209	240 906	261 471	189 136	120 619	9 434	36 354	.....	.....	166 259	273 306	259 851	1 830 545
Siphon	48 176	29 635	34 089	25 747	18 412	306	3 822	.....	1 728	29 860	45 835	45 970	283 580
Halfway	103 351	81 654	108 367	98 452	60 581	5 931	13 761	84	.....	74 246	119 885	87 301	753 613
Field totals	425 736	352 195	403 927	313 335	199 612	15 671	53 937	84	1 728	269 365	439 026	393 122	2 867 738

[1] Associated gas

Table 4-7—Monthly Nonassociated and Associated Gas Production by Fields and Pools, 1978 – Continued

Field and Pool	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Totals
Siphon East–Bluesky	259 947	260 970	298 459	187 876	173 714	21 792	------	60 660	85 899	65 671	145 717	155 606	1 716 311
Stoddart–													
Baldonnel	------	------	------	------	------	3 941	4 262	------	------	------	------	------	8 203
Cecil[1]	7 912	3 258	254	4 264	2 946	10 062	12 815	5 696	7 018	6 657	5 190	3 424	69 496
Belloy	712 827	512 469	530 989	927 565	991 880	632 601	648 966	730 331	946 883	846 972	892 552	978 973	9 352 008
Belloy[1]	3 319	3 069	3 472	2 367	1 647	1 978	2 962	2 831	2 190	2 643	2 970	2 435	31 883
Field totals	724 058	518 796	534 715	934 196	996 473	644 641	664 743	738 858	956 091	856 272	900 712	984 832	9 453 387
Stoddart South–Confidential	------	------	------	------	------	------	------	------	------	------	------	350	350
Stoddart West–													
Cecil	------	------	------	------	------	------	------	------	------	------	4 920	74 593	79 513
Belloy	236 859	215 734	196 304	237 286	231 776	161 354	199 709	114 433	196 417	235 628	291 760	258 858	2 576 118
Belloy[1]	420	3 807	6 109	2 267	886	5 863	5 754	8 036	7 540	11 860	18 892	38 672	110 106
Field totals	237 279	219 541	202 413	239 553	232 662	167 217	205 463	122 469	203 957	247 488	315 572	372 123	2 765 737
Sunrise–Cadotte	------	------	13 672	19 319	19 303	16 508	17 270	16 602	15 546	15 114	13 315	13 897	160 546
Town–													
Baldonnel	52 377	46 826	51 968	22 072	9 795	29 807	48 567	------	------	7 686	37 364	41 288	347 850
Halfway	88 128	73 448	76 552	35 279	52 999	77 761	57 855	------	------	29 850	79 837	66 282	637 991
Field totals	140 505	120 274	128 520	57 351	62 794	107 568	106 522	------	------	37 536	117 201	107 570	985 841
Tsee–Slave Point	96 462	5 267	43 951	54 749	118 519	91 815	103 867	96 816	111 072	107 751	102 005	87 674	1 019 948
Two Rivers–Halfway	123 214	111 257	121 246	120 068	77 396	44 279	32 520	------	17 994	110 674	99 416	119 148	977 212
Velma–													
Gething	------	------	------	------	------	150 652	51 909	------	------	18 164	143 200	248 429	612 354
Charlie Lake[1]	461	------	160	------	------	------	------	------	------	------	------	------	621
A Marker	------	------	------	------	------	36 931	9 414	------	------	1 146	551	32 141	80 183
Field totals	461	------	160	------	------	187 583	61 323	------	------	19 310	143 751	280 570	693 158
Wessel–													
Baldonnel	2 349	1 481	1 478	1 641	2 580	1 531	354	1 428	1 543	1 436	1 735	1 990	19 546
Halfway[1]	29 007	24 164	33 267	32 510	36 765	27 756	21 494	23 204	33 999	31 602	30 813	28 955	347 536
Field totals	31 356	25 645	34 745	34 151	39 345	29 287	21 848	24 632	35 542	33 038	32 548	30 945	367 082
Wessel West–Halfway[1]	3 126	3 132	3 327	3 034	3 549	727	------	------	1 269	2 662	3 615	3 287	27 728
Wilder–													
Halfway	200 315	205 818	270 054	260 354	178 505	248 300	110 360	------	32 380	275 033	270 643	271 690	2 323 452
Belloy	2 942	4 380	9 511	9 500	5 126	------	------	------	------	1 579	18 163	7 831	59 032
Field totals	203 257	210 198	279 565	269 854	183 631	248 300	110 360	------	32 380	276 612	288 806	279 521	2 382 484
Wildmint–													
Bluesky	7 942	5 680	6 983	6 119	3 626	4 650	4 868	5 121	5 618	7 234	6 171	6 112	69 024
Halfway	852	2 164	3 081	746	24 239	3 316	4 760	1 944	2 681	1 191	4 280	2 246	51 510
Halfway[1]	10 105	10 672	14 584	14 193	29 425	17 921	16 770	20 982	21 535	20 576	16 252	17 327	210 342
Field totals	18 909	18 516	23 648	21 058	57 290	25 887	26 398	28 047	29 734	29 001	26 703	25 685	330 876

Willow–													
Gething[1]	7 709	5 797	6 581	3 743	3 311	3 147	5 574	1 534	4 360	7 529	8 185	7 924	65 394
Halfway	138 956	118 968	144 364	59 834	67 528	26 804	52 221	8 269	253	34 152	115 003	78 326	844 698
Field totals	146 665	124 765	150 945	63 577	70 839	29 951	57 795	9 823	4 613	41 681	123 188	86 250	910 092
Wolf–Halfway[1]	8 637	7 062	5 320	2 851	2 799	2 797	1 919	1 624	2 555	2 893	3 644	9 068	51 169
Wolverine–Dunlevy	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	91 457	91 457
Woodrush–Halfway	127 862	78 430	.....	22 681	61 785	52 437	50 295	3 743	.....	22 826	86 705	129 928	636 692
Yoyo–Pine Point	7 075 019	5 965 674	5 610 053	5 506 006	5 164 724	3 028 149	3 620 508	5 010 723	4 471 747	5 458 909	6 895 323	7 356 147	65 162 982
Other Areas–													
Bluesky	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Gething[1]	.....	3 928	6 230	.....	.....	.....	.....	.....	.....	.....	.....	.....	10 158
Dunlevy	.....	.....	.....	.....	.....	.....	.....	.....	.....	10 115	36 999	40 385	87 499
Baldonnel	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Inga	.....	.....	.....	.....	.....	.....	.....	.....	3 128	.....	.....	.....	3 128
Nancy	.....	.....	3 547	.....	.....	.....	.....	.....	.....	.....	.....	.....	3 547
North Pine[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Halfway	.....	.....	.....	.....	.....	.....	.....	.....	.....	800	.....	5 205	6 005
Doig[1]	.....	.....	.....	.....	.....	.....	.....	1 888	619	.....	.....	.....	2 507
Belloy	.....	.....	.....	.....	.....	.....	.....	1 362	.....	.....	.....	.....	1 362
Upper Kiskatinaw	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	7 890	9 026	16 916
Debolt	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Slave Point	.....	99 034	.....	.....	72 121	25 743	37 809	34 806	36 245	33 619	55 562	29 287	424 226
Sulphur Point	.....	.....	.....	.....	50 310	34 393	40 932	43 686	66 145	45 091	48 367	40 453	369 376
Confidential	.....	.....	172 892	.....	.....	.....	.....	.....	.....	11 131	96 809	66 784	347 616
Confidential[1]	.....	.....	.....	.....	.....	3 200	17 223	1 887	.....	918	3 523	1 970	28 721
Field total	.....	102 962	182 669	.....	122 431	63 336	95 964	83 628	106 137	101 674	249 150	193 110	1 301 061
Totals–													
Nonassociated	36 247 203	32 409 104	32 813 446	28 640 863	25 268 421	19 034 264	19 738 675	21 032 106	21 928 256	26 447 785	36 031 285	41 018 163	340 609 671
Associated	1 227 389	1 151 169	1 280 788	1 225 267	1 106 531	1 234 516	1 100 322	1 354 134	1 348 008	1 366 525	1 297 860	1 351 441	15 043 950
Totals	37 474 592	33 560 273	34 094 234	29 866 130	26 374 952	20 268 780	20 838 997	22 386 240	23 276 264	27 814 310	37 329 145	42 369 604	355 653 621

[1]Associated gas

Table 4-8—Monthly Supply and Disposition of Crude Oil/Pentanes Plus, 1978

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Totals
Supply													
British Columbia production—													
Crude oil	1 097 476	952 196	1 009 591	1 009 550	864 577	1 089 171	774 273	1 161 621	1 167 826	1 186 089	1 134 363	1 169 272	12 609 176
Field condensate	13 922	14 747	18 367	14 610	11 084	11 732	10 055	4 673	6 626	12 096	16 895	18 444	159 671
Plant condensate	93 405	87 503	92 511	92 265	75 385	64 899	60 836	46 221	66 726	83 887	103 949	110 495	978 082
Total British Columbia	1 204 803	1 054 446	1 120 469	1 116 425	951 046	1 165 802	845 164	1 212 515	1 241 178	1 282 072	1 255 207	1 298 211	13 746 929
Alberta imports—													
Pipeline	3 728 683	3 920 693	3 318 124	3 282 108	4 431 725	4 197 187	3 037 139	3 488 909	3 947 531	4 171 045	4 159 447	4 652 685	46 335 276
Rail	6 024	7 155	5 557	3 509	530	5 418	5 221	4 439	1 469	2 872	-----	-----	42 194
Total Alberta	3 734 707	3 927 848	3 323 681	3 285 617	4 432 255	4 202 605	3 042 360	3 493 348	3 949 000	4 173 917	4 159 447	4 652 685	46 377 470
Total supply	4 939 510	4 982 294	4 444 150	4 402 042	5 383 301	5 368 407	3 887 524	4 705 863	5 190 178	5 455 989	5 414 654	5 950 896	60 124 399
Disposition													
Inventory changes—													
Field	−5 547	−1 708	12 226	3 233	7 484	−9 884	2 572	−7 076	−434	1 619	−7 755	3 769	−12 270
Plant	12 544	8 608	−1 649	9 890	2 588	−14 572	−8 430	−22 804	29 156	5 033	−494	11 821	31 695
Transporters	43 517	34 952	−119 634	102 148	253 090	181 570	−587 874	−294 616	324 119	98 244	−89 532	150 613	96 597
Totals	50 514	41 852	−109 057	115 271	263 162	157 114	−593 732	−324 496	352 841	104 896	−97 781	166 203	116 022
Losses and adjustments—													
Field	−2 278	1 152	−11 349	−5 996	−2 165	−112	−1 286	−4 088	−518	-----	5 491	172	−19 070
Plant	5 674	2 510	5 734	4 709	6 372	4 071	3 767	1 918	−1 023	5 273	10 965	3 246	53 216
Transporters	−2 721	−9 550	1 582	−4 11[illegible]	9 200	−986	7 655	−2 810	700	6 361	−2 941	10 358	12 736
Totals	675	−5 888	−4 033	−5 399	13 407	2 973	10 136	−4 980	−841	11 634	13 515	13 776	46 882
Transfers	43 278	34 952	39 340	35 038	35 014	34 005	37 395	25 860	26 404	54 353	39 466	42 317	447 422
Deliveries—													
To British Columbia refineries—													
British Columbia production	1 139 758	1 107 231	1 199 720	1 006 372	936 068	1 183 516	1 148 667	1 262 828	1 215 574	1 338 733	1 409 119	1 465 276	14 425 528
Alberta production	3 164 948	3 369 500	2 789 332	2 881 322	3 767 992	3 754 006	2 912 693	3 451 701	3 199 923	3 406 306	3 459 595	3 656 665	39 813 983
Totals	4 304 706	4 476 731	3 989 052	3 887 694	4 704 060	4 937 522	4 061 360	4 714 529	4 415 497	4 745 039	4 868 714	5 121 941	54 239 511
To export—													
British Columbia production	24 570	36 413	47 553	25 463	36 256	34 256	29 457	38 420	11 762	4 909	46 554	39 232	374 845
Alberta production	529 430	399 872	454 208	334 332	336 871	235 739	342 422	330 946	387 224	581 770	548 095	578 646	5 059 555
Totals	554 000	436 285	501 761	359 795	373 127	269 995	371 879	369 366	398 986	586 679	594 649	617 878	5 434 400
Reporting adjustment	−13 663	−1 638	27 087	9 643	−5 469	−33 202	486	−74 416	−2 709	−46 612	−3 909	−11 219	−159 838
Total disposition	4 939 510	4 982 294	4 444 150	4 402 042	5 383 301	5 407	3 887 524	4 705 863	5 190 178	5 455 989	5 414 654	5 950 896	60 124 399

British Columbia refineries

Receipts—													
British Columbia crude	1 135 925	1 088 179	1 015 841	869 800	824 164	1 164 329	1 110 202	1 346 543	1 233 758	1 325 030	1 461 036	1 434 117	14 008 924
British Columbia condensate	43 278	34 952	39 340	35 038	35 014	39 423	37 395	25 860	26 404	54 353	39 466	42 317	452 840
Totals	1 179 203	1 123 131	1 055 181	904 838	859 178	1 203 752	1 147 597	1 372 403	1 260 162	1 379 383	1 500 502	1 476 434	14 461 764
Alberta crude	2 891 684	3 117 571	2 799 554	2 552 912	3 425 228	3 319 251	2 657 818	3 072 471	2 866 248	3 073 378	2 952 192	3 221 889	35 950 196
Alberta condensate	279 253	259 110	203 736	473 989	451 094	434 783	260 101	398 222	335 893	335 844	472 966	434 851	4 339 842
Totals	3 170 937	3 376 681	3 003 290	3 026 901	3 876 322	3 754 034	2 917 919	3 470 693	3 202 141	3 409 222	3 425 158	3 656 740	39 989 038
Total receipts	4 350 140	4 499 812	4 058 471	3 931 739	4 735 500	4 957 786	4 065 516	4 843 096	4 462 303	4 788 605	4 925 660	5 133 174	54 751 802
Disposition													
Inventory changes	−358 696	−117 999	190 616	−95 141	39 191	156 698	−359 538	241 454	−113 158	−94 542	58 418	74 468	−378 229
Losses and adjustments	581	22	511	1 270	−118	440	−379	36 975	922	1 855	709	739	43 527
Refinery runs—													
British Columbia production	1 247 252	1 138 836	930 803	898 462	910 873	1 221 739	1 176 287	1 395 326	1 291 011	1 347 556	1 379 916	1 320 869	14 258 930
Alberta production	3 461 003	3 478 953	2 936 541	3 127 148	3 785 554	3 578 909	3 249 146	3 169 341	3 283 528	3 533 736	3 486 617	3 737 098	40 827 574
Totals	4 708 255	4 617 789	3 867 344	4 025 610	4 696 427	4 800 648	4 425 433	4 564 667	4 574 539	4 881 292	4 866 533	5 057 967	55 086 504
Total disposition	4 350 140	4 499 812	4 058 471	3 931 739	4 735 500	4 957 786	4 065 516	4 843 096	4 462 303	4 788 605	4 925 660	5 133 174	54 751 802

Table 4-9—Monthly Supply and Disposition of Natural Gas, 1978

(Volumes in MSCF at 14.65 psia and 60° F)

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Totals
Supply													
British Columbia production—													
Nonassociated gas	36 346 739	32 041 954	32 704 445	28 589 083	25 187 652	18 597 906	19 498 833	20 944 907	21 909 376	26 481 580	35 930 639	41 072 001	341 051 255
Associated gas	1 159 876	1 151 299	1 279 232	1 227 955	1 086 693	1 219 340	1 085 211	1 242 098	1 340 236	1 205 791	1 252 733	1 297 603	14 633 648
Less injected	−108 663	−101 711	−105 610	−83 189	−53 743	−85 407	−96 721	−114 332	−107 673	−107 007	−69 610	−70 153	−1 126 425
Net British Columbia production	37 397 952	33 091 542	33 878 067	29 733 849	26 220 602	19 731 839	20 487 323	22 072 673	23 141 939	27 580 364	37 113 762	42 299 451	354 558 478
Imports—													
Alberta	3 163 944	5 578 699	4 506 505	4 300 670	4 680 406	2 987 254	3 319 816	3 785 088	3 379 179	3 281 842	5 384 401	6 182 598	54 227 069
Northwest Territories	2 236 364	1 988 355	1 913 413	1 604 868	1 757 128	970 563	1 327 423	1 827 453	1 612 443	1 678 469	1 588 456	2 233 022	20 737 957
Yukon	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Total imports	5 400 308	7 575 954	6 419 918	5 905 538	6 437 534	3 957 817	4 647 239	5 612 541	4 991 622	4 960 311	6 972 857	8 415 620	74 965 026
Total supply	42 798 260	40 667 496	40 297 985	35 639 387	32 658 136	23 689 656	25 134 562	27 685 214	28 133 561	32 540 675	44 086 619	50 715 071	429 523 504
Disposition													
Flared—													
Field	326 602	350 931	450 551	228 384	253 818	343 571	281 210	459 123	488 738	305 001	338 556	302 343	4 281 047
Gathering systems	9 232	24 168	18 849	50 179	4 975	3 213	2 598	2 358	2 877	-----	3 087	7 440	128 976
Plant	1 908	909	6 346	29 941	3 897	4 319	8 725	1 986	4 350	1 476	6 593	2 992	72 442
Totals	337 742	376 008	475 746	308 504	262 690	351 103	292 533	463 467	495 965	306 477	347 236	312 775	4 482 465
Fuel—													
Field	284 556	350 931	316 001	301 245	254 441	226 514	192 020	178 691	187 964	241 965	318 615	370 899	3 214 543
Plant	26 844	28 980	41 955	27 001	26 788	17 780	14 933	41 726	63 445	−14 945	33 391	27 622	335 520
Compressor	1 686 071	1 489 261	1 581 973	1 467 747	1 408 931	1 192 374	1 307 107	1 198 339	1 229 854	1 484 495	1 705 412	1 843 191	17 594 755
Totals	1 997 470	1 869 172	1 939 929	1 795 993	1 690 160	1 436 668	1 514 060	1 418 756	1 481 263	1 711 515	2 057 418	2 241 712	21 144 818
Line pack changes	9 545	−3 284	−7 866	15 993	−7 654	−2 745	−3 106	344	672	14 823	11 023	12 979	40 724
Losses and adjustments—													
Field	493 371	910 552	785 099	391 878	445 729	156 490	230 932	453 306	499 171	790 475	1 233 927	1 254 119	7 715 196
Plant	32 580	11 092	54 480	29 587	51 861	28 931	13 880	13 428	9 935	5 864	-----	-----	250 910
Gathering system	601 835	703 369	673 740	566 667	470 841	799 870	470 090	681 030	575 522	202 531	779 522	614 249	7 139 266
Totals	1 127 786	1 625 013	1 513 319	988 132	968 431	985 291	714 902	1 147 764	1 084 628	998 870	2 013 449	1 868 368	15 105 372
Processing shrinkage	3 874 438	3 284 619	3 184 496	2 799 277	2 559 606	1 806 949	2 182 245	2 338 056	2 205 878	2 694 806	3 663 241	3 942 010	34 535 621
Available marketable gas in NEBC	39 214 553	33 936 527	33 402 709	29 750 195	27 269 971	19 666 312	20 605 554	22 423 023	22 774 809	22 774 809	36 447 559	41 651 233	354 898 949
Reporting adjustment	−440 700	−420 559	−210 348	−18 707	−85 068	−553 976	−171 626	−106 196	90 346	142 538	−435 307	685 994	−684 445
British Columbia Transporters Supply													
Available marketable gas in NEBC	39 214 553	33 936 527	33 402 709	29 750 195	27 269 971	19 666 312	20 605 554	22 423 023	22 774 809	26 671 646	36 447 559	41 651 233	353 791 415
Imports to SEBC—													
Alberta	39 750 886	36 122 689	37 791 217	35 033 337	32 150 925	29 975 665	28 735 183	28 866 476	29 292 001	30 439 123	35 249 650	39 495 882	402 903 034
Total supply	78 965 439	70 059 216	71 193 926	64 783 532	59 420 896	49 641 977	49 340 737	51 289 499	52 066 810	57 110 769	71 697 209	81 147 115	756 694 449

Disposition													
Fuel	2 141 238	1 706 967	1 514 103	1 190 816	910 601	541 920	605 280	632 008	732 502	970 199	1 926 258	2 706 673	15 578 565
Losses and adjustment	104 884	417 343	122 170	245 739	56 177	208 835	21 955	180 888	6 938	–125 628	–105 295	–167 976	966 030
Line pack changes	–16 934	49 534	78 455	55 766	90 934	–139 428	406 394	108 940	–3 939	22 440	–2 871	–24 755	624 536
Deliveries to British Columbia distributors–													
North	486 948	405 588	353 517	268 956	190 152	131 942	115 497	140 851	175 075	243 828	319 028	511 696	3 343 078
Interior	6 748 825	5 804 944	5 283 880	4 467 140	4 219 118	3 434 468	3 705 511	3 834 183	4 010 128	4 911 349	6 349 403	6 971 671	59 740 620
Lower Mainland	9 843 811	8 271 559	7 788 176	6 752 559	5 581 116	3 963 100	3 527 366	3 804 699	4 764 149	6 246 089	9 507 468	10 392 990	80 443 082
Totals	17 079 584	14 482 091	13 425 573	11 488 655	9 990 386	7 529 510	7 348 374	7 779 733	8 949 352	11 401 266	16 175 899	17 876 357	143 526 780
Export–													
From NEBC	21 231 485	18 955 597	19 605 749	18 057 031	17 413 807	12 553 566	13 377 763	14 673 395	13 973 028	15 289 557	20 042 006	23 602 850	208 775 834
From SEBC	38 514 040	34 512 958	36 534 690	33 853 660	31 076 793	28 885 340	27 739 041	27 994 968	28 390 918	29 552 476	33 901 885	37 972 674	388 929 443
Totals	59 745 525	53 468 555	56 140 439	51 910 691	48 490 600	41 438 906	41 116 804	42 668 363	42 363 946	44 842 033	53 943 891	61 575 524	597 705 277
Reporting adjustment	–88 858	–65 274	–86 814	–108 135	–117 802	62 234	–158 070	–80 433	18 011	459	–240 673	–818 708	–1 706 739
Total disposition	78 965 439	70 059 216	71 193 926	64 783 532	59 420 896	49 641 977	49 340 737	51 289 499	52 066 810	57 110 769	71 697 209	81 147 115	756 694 449
British Columbia Distributors													
Receipts–													
From transporters	17 644 430	14 773 658	13 657 057	11 882 838	10 134 846	7 614 863	6 951 453	7 654 367	9 016 722	11 523 114	16 649 007	18 495 800	145 998 155
From storage	68 993	16 561	10 377	9 523	.....	665	.....	.....	.....	.....	.....	446 596	552 715
Other receipts	1 155	1 673	1 272	1 223	717	.....	141	226	330	513	1 085	18 821	27 156
Total receipts	17 714 578	14 791 892	13 668 706	11 893 584	10 135 563	7 615 528	6 951 594	7 654 593	9 017 052	11 523 627	16 650 092	18 961 217	146 578 026
Disposition													
Fuel	56 129	51 607	31 152	33 323	9 482	–10 810	27 335	26 142	19 630	26 535	43 201	55 779	369 505
Losses and adjustments	40 691	–1 802 265	–56 330	–1 418 175	–2 012 551	–1 440 581	–742 916	313 396	339 220	2 120 100	4 376 434	3 345 955	3 062 978
Line pack changes	–6 276	14 757	1 281	17 232	–3 850	–6 101	1 835	–6 091	4 452	12 975	100 420	6 051	136 685
To storage	.....	.....	.....	.....	61 482	105 225	23 936	.....	.....	2 347	.....	.....	192 990
Transfer	330 582	271 333	110 276	.....	265	.....	.....	.....	.....	.....	.....	.....	712 456
Sales–													
Residential	6 306 609	6 068 992	4 464 072	3 950 622	3 658 112	2 130 891	1 400 791	1 147 225	1 598 292	1 873 084	3 169 126	5 088 730	40 856 446
Commercial	5 623 501	5 120 997	3 938 825	4 127 854	3 183 593	2 144 247	1 746 370	1 472 323	2 085 257	2 220 789	3 528 271	4 855 014	40 047 011
Industrial	5 311 423	5 027 649	5 136 496	5 128 307	5 187 723	4 660 165	4 464 738	4 670 268	4 933 199	5 229 053	5 362 035	5 544 569	60 665 615
Electric power	52 019	38 822	42 934	54 421	41 307	32 492	29 505	31 330	37 002	38 774	70 605	65 129	534 340
Total sales	17 293 452	16 256 460	13 582 327	13 261 204	12 080 735	8 967 795	7 641 404	7 321 146	8 653 750	9 361 670	12 130 037	15 553 432	142 578 026
Total disposition	17 714 578	14 791 892	13 668 706	11 893 584	10 135 563	7 615 528	6 951 594	7 654 593	9 017 052	11 523 627	16 650 092	18 961 217	146 578 026

Table 4-10—Monthly Supply and Disposition of Propane, 1978

(Quantities in barrels at 34.9723 Canadian gallons at 60° F)

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Totals
Supply													
British Columbia production—													
Plant	52 173	43 723	41 899	38 863	39 831	38 309	33 488	47 370	53 981	55 536	50 481	44 272	539 926
Refinery	71 545	67 506	61 787	48 566	59 312	64 710	59 319	54 064	49 689	57 795	69 903	73 472	737 638
Totals	123 718	111 229	103 686	87 429	99 143	103 019	92 807	101 434	103 640	113 331	120 384	117 744	1 277 564
Alberta imports	260 472	297 479	358 815	179 431	201 817	278 104	257 651	271 463	285 165	288 284	372 816	321 462	3 372 959
Total supply	384 190	408 708	462 501	266 860	300 960	381 123	350 458	372 897	388 805	401 615	493 200	439 206	4 650 523
Disposition													
Inventory change	4 670	1 117	−2 754	664	−4 259	2 727	3 722	−3 495	−1 541	923	−825	3 982	4 931
Fuel	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Losses and adjustments	1 579	1 483	1 649	1 405	781	1 275	916	552	749	664	324	1 296	12 673
Sales of British Columbia production—													
British Columbia	89 482	80 317	69 215	29 919	73 648	77 791	61 676	80 952	81 232	94 089	111 759	110 781	960 861
Alberta	1 042	-----	-----	9 532	19 125	-----	2 360	720	-----	----	-----	-----	32 779
Northwest Territories	1 745	2 912	899	663	1 083	-----	211	209	-----	1 722	1 561	1 720	12 715
United States	-----	-----	5 296	20 746	8 765	14 503	23 922	22 496	23 200	15 933	7 565	−35	142 391
Offshore	25 200	25 400	29 391	24 500	-----	6 723	-----	-----	-----	-----	-----	-----	111 214
Total British Columbia	117 469	108 629	104 791	85 360	102 621	99 017	88 169	104 377	104 432	111 744	120 885	112 466	1 259 960
Sales of Alberta production—													
British Columbia	104 612	82 937	87 238	71 628	46 501	35 570	52 664	32 021	72 281	74 542	100 747	129 615	890 367
Offshore	155 860	214 542	271 577	107 803	155 316	242 534	204 987	239 442	212 884	213 742	272 069	191 846	2 482 602
Total Alberta	260 472	297 479	358 815	179 431	201 817	278 104	257 651	271 463	285 165	288 284	372 816	321 462	3 372 959
Total sales	377 941	406 108	463 606	264 791	304 438	377 121	345 820	376 840	389 597	400 028	493 701	433 928	4 632 919
Total disposition	384 190	408 708	462 501	266 860	300 960	381 123	350 458	372 897	388 805	401 615	493 200	439 206	4 650 523

Table 4-11—Monthly Supply and Disposition of Butane, 1978

(Quantities in barrels at 34.9723 Canadian gallons at 60° F)

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Totals
Supply													
British Columbia production—													
Plant	58 465	50 308	54 844	60 253	56 970	51 803	51 767	45 564	57 150	60 039	58 752	64 464	670 369
Refinery	47 702	47 905	27 164	30 631	66 115	67 664	67 644	69 190	64 223	43 459	22 660	29 406	583 763
Totals	106 167	98 213	82 008	90 884	123 085	119 467	119 401	114 754	121 373	103 498	81 402	93 870	1 254 122
Alberta imports	2 273	209	6 467	6 407	1 556	782	601	4 543	1 107	2 364	9 409	15 792	51 510
Total supply	108 440	98 422	88 475	97 291	124 641	120 249	120 002	119 297	122 480	105 862	90 811	109 662	1 305 632
Disposition													
Inventory change	4 190	−3 460	1 254	936	18 615	−11 059	390	−9 663	3 932	−8 084	−6 550	4 282	−5 217
Gasoline enrichment	19 189	17 724	15 245	17 748	13 528	13 195	13 778	11 258	10 511	18 369	18 247	19 493	188 285
Losses and adjustments	−1	770	−2	230	------	------	------	703	1	------	1	4	1 706
Sales of British Columbia production—													
British Columbia	54 983	44 963	43 920	16 292	41 933	47 000	35 076	30 799	42 133	34 524	38 046	35 297	464 966
Alberta	------	6 504	7 683	10 518	28 953	48 153	41 527	49 978	22 576	27 803	3 032	------	246 717
United States	27 806	31 712	13 908	45 160	20 825	22 188	28 630	31 679	42 220	30 886	28 626	34 794	358 434
Totals	82 789	83 179	65 511	71 970	91 711	117 331	105 233	112 456	106 929	93 213	69 704	70 091	1 070 117
Sales of Alberta production—													
British Columbia	2 273	209	6 467	6 407	787	782	601	4 543	1 107	2 364	9 409	15 792	50 741
Total sales	85 062	83 388	71 978	78 377	92 498	118 113	105 834	116 999	108 036	95 577	79 113	85 883	1 120 858
Total disposition	108 440	98 422	88 475	97 291	124 641	120 249	120 002	119 297	122 480	105 862	90 811	109 662	1 305 632

Table 4-12—Monthly Supply and Disposition of Sulphur, 1978

(Quantities in long tons)

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Totals
Supply													
British Columbia production	10 162	7 359	10 778	10 381	8 507	7 044	6 322	3 507	3 107	7 235	11 972	12 764	99 138
Disposition													
Inventory change	6 991	1 834	2 617	−1 138	−1 917	−1 047	−2 736	−5 839	−3 512	−1 948	2 352	3 357	1 108
Losses and adjustments	------	------	------	------	------	------	------	------	------	------	------	------	------
Sales—													
North America	1 582	3 449	5 802	6 114	6 613	4 113	3 856	5 382	4 462	5 793	7 105	7 392	61 663
Offshore	1 589	2 076	2 359	5 405	3 811	1 884	5 202	3 964	2 157	3 390	2 515	2 015	36 367
Totals	3 171	5 525	8 161	11 519	10 424	5 997	9 058	9 346	6 619	9 183	9 620	9 407	98 030
Total disposition	10 162	7 359	10 778	10 381	8 507	7 044	6 322	3 507	3 107	7 235	11 972	12 764	99 138

Table 4-13—Crude-Oil Pipelines, 1978

Company	Fields Served	Size and Mileage of Main and Lateral Lines		Pumping-stations		Present Capacity (Bbl./Day)	Gathering Mileage	Throughout (Bbl./Day)	Storage Capacity (Bbl.)
		Size (In.)	Mileage	Number	Capacity (Bbl./Day)				
Blueberry-Taylor Pipeline Co.	Aitken Creek, Blueberry	12 3/4	2.2	------	------	------	------	------	------
		8 5/8	62.8	1	5 000	12 000	37.4	1 667	65 000
	Fort St. John	------	------	------	------	------	------	184	------
	Inga	6 5/8	1.7	1	12 500	12 500	------	4 105	1 000
	Stoddart	------	------	------	------	------	------	74	------
CDC Oil & Gas Limited	Inga	6 5/8	3.2	------	------	------	------	------	------
		4 1/2	8.7	1	10 000	10 000	13.9	4 000	------
		3 1/2	2.0	1	1 600	------	------	------	------
Norcen Pipelines Ltd.	Beatton River, Beatton River West, Boundary Lake, Bulrush, Currant, Milligan Creek, Osprey, Peejay, Weasel, Wildmint, Willow, Wolf	------	------	1	36 000	52 000[1]	84.6	36 370	160 000
		4 1/2	77.0	2	45 000	45 000[2]	------	------	------
		6 5/8	42.9	------	------	------	------	------	------
		8 5/8	104.0	------	------	------	------	------	------
		12 3/4	39.1	------	------	------	------	------	------
Westcoast Petroleum Ltd.		12	507.0	12	70 000	70 000	------	28 087	586 000

[1]Boundary Lake.

[2]Terminal to Westcoast Petroleum Ltd.

Table 4-14—Crude-Oil Refineries, 1978

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	Complete	1936	B.C. and Alberta	35 000	1 946 000	Catalytic-fluid	8 500	Catalytic polymerization, catalytic reformer, lube-oil blending plant, asphalt.
Gulf Canada Limited	Kamloops	Complete	1954	B.C. and Alberta	9 300	627 000	Catalytic-fluid	2 790	Catalytic polymerization, catalytic reformer, distillate, desulphurization, merox, asphalt, naphtha.
Gulf Canada Limited	Port Moody	Complete	1958	B.C. and Alberta	37 200	1 763 000	Catalytic-fluid	11 400	Catalytic reformer, distillate, desulphurization, aklylationsulphuric acid, naphtha-desulphurization, merox, sulphur.
Husky Oil Ltd.	Prince George	Complete	1967	B.C.	10 000	900 000	Catalytic-fluid	3 000	Unifiner, reformer, asphalt, sulphur gas concentration.
Imperial Oil Limited	Ioco	Complete	1915	B.C. and Alberta	41 200	3 055 000	Catalytic-fluid	11 800	Catalytic polymerization, powerformer, tuluene extraction, sulphur, LPG plant, desulphurization.
Pacific Petroleums Ltd.	Taylor	Complete	1960	B.C.	14 300	1 100 000	Catalytic-fluid	4 650	H.F. alkylation, asphalt, pentane splitter, platformer unifiner, HDS unit, DDS unit.
Shell Canada Limited	Shellburn	Complete	1932	B.C. and Alberta	22 000	2 455 300	Catalytic-fluid	6 000	Catalytic polymerization, platformer, vacuum flashing, solvent fractionation, distillate hydrotreater, sulphur recovery.

Table 4-15—Natural Gas Pipelines, 1978

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	Horsepower		Size (In.)	Mileage	
British Columbia Hydro and Power Authority	Westcoast Transmission Co. Ltd.	42	18.6	-----	-----	605 880	-----	4 095.0	Lower Mainland of British Columbia.
		30	38.8	-----	-----	-----	-----	-----	
		24	18.7	-----	-----	-----	-----	-----	
		20	46.8	-----	-----	-----	-----	-----	
		18	19.4	-----	-----	-----	-----	-----	
		16	17.2	-----	-----	-----	-----	-----	
		12	57.4	-----	-----	-----	-----	-----	
		10	14.9	-----	-----	-----	-----	-----	
		8	27.4	-----	-----	-----	-----	-----	
		6	30.8	-----	-----	-----	-----	-----	
		4	13.1	-----	-----	-----	-----	-----	
Columbia Natural Gas Ltd.	Alberta and Southern Gas Co. Limited	8	55.5	-----	-----	85 500	8	1.8	Cranbrook, Fernie, Kimberley, Creston, Sparwood, Elk Valley, Skookumchuk, Elko, Elkford, and Yahk.
		6	70.7	-----	-----	-----	6	4.7	
	Westcoast Transmission Co. Ltd.	4	20.2	-----	-----	-----	4	9.8	
	Inland Natural Gas Co. Limited	3	28.1	-----	-----	-----	3	24.6	
		2	0.8	-----	-----	-----	2	48.2	
		-----	-----	-----	-----	-----	1 1/4	66.5	
		-----	-----	-----	-----	-----	3/4	142.4	
		-----	-----	-----	-----	-----	5/8	4.3	
Gas Trunk Line of British Columbia	Beg field	-----	-----	-----	-----	-----	16	27.4	To Westcoast Transmission Co. Ltd.
		-----	-----	-----	-----	-----	6 5/8	5.9	
	Boundary Lake field	-----	-----	-----	-----	-----	16	31.4	
		-----	-----	-----	-----	-----	6 5/8	2.9	
	Jedney and Bubbles field	-----	-----	-----	-----	-----	12 3/4	31.5	
		-----	-----	-----	-----	-----	10 3/4	7.0	
	Laprise Creek field	-----	-----	-----	-----	-----	12 3/4	23.8	
	Nig Creek field	-----	-----	1	1 800	-----	16	28.3	
Inland Natural Gas Co. Limited	Westcoast Transmission Co. Ltd.	12	357.5	3	2 200	207 000	8	12.4	Peace River, Prince George, Cariboo, Thompson, Okanagan, and Kootenay areas.
		10	119.1	-----	-----	-----	6	39.8	
		8	33.1	-----	-----	-----	4	200.1	
	Alberta and Southern Gas Co. Limited	6	108.4	-----	-----	-----	3	90.9	
		4	144.8	-----	-----	-----	2	627.3	
		3	70.2	-----	-----	-----	1 1/2	20.7	
		2	72.2	-----	-----	-----	1 1/4	300.0	
		1 1/4	1.3	-----	-----	-----	-----	-----	
Northland Utilities (B.C.) Ltd.	Peace River Transmission Co.	3	2.0	-----	-----	10 900	10	0.4	Dawson Creek, Pouce Coupe, and Rolla.
		2	0.4	-----	-----	-----	8	1.6	
		1 1/4	3.2	-----	-----	-----	6	2.7	
		-----	-----	-----	-----	-----	4	12.6	

Northland Utilities (B.C.) Ltd.—*Continued*		-----	-----	-----	-----	-----	3	5.4	
		-----	-----	-----	-----	-----	2	26.1	
		-----	-----	-----	-----	-----	1 1/2	0.4	
		-----	-----	-----	-----	-----	1 1/4	17.6	
		-----	-----	-----	-----	-----	3/4	0.6	
Pacific Northern Gas Ltd.	Westcoast Transmission Co. Ltd.	10 3/4	274.3	2	3 150	54 000	6	2.5	Vanderhoof, Fraser Lake, Burns Lake, Smithers, Terrace, Prince Rupert, Kitimat, Houston, Fort St. James.
		8 5/8	92.4	-----	-----	-----	4	10.5	
		6 5/8	36.0	-----	-----	-----	3	20.5	
		4 1/2	14.0	-----	-----	-----	2	51.0	
		3 1/2	43.7	-----	-----	-----	1 1/4	46.1	
		2 7/8	17.8	-----	-----	-----	3/4	31.4	
		2 3/8	30.1	-----	-----	-----	1/2	0.1	
		1 2/3	4.0	-----	-----	-----	-----	-----	
Plains Western Gas & Electric Co. Ltd.	Westcoast Transmission Co. Ltd.	6	0.3	-----	-----	12 000	4	14.5	Fort St. John, Taylor, Grandhaven, Charlie Lake, Airport, Baldonnel.
		4	20.9	-----	-----	-----	3	3.6	
		3	4.6	-----	-----	-----	2 1/2	1.5	
		2	2.0	-----	-----	-----	2	54.9	
		-----	-----	-----	-----	-----	1 1/2	4.5	
		-----	-----	-----	-----	-----	1 1/4	0.3	
		-----	-----	-----	-----	-----	1	12.7	
		-----	-----	-----	-----	-----	3/4	12.1	
Westcoast Transmission Co. Ltd.	Alberta	26	32.5	-----	-----	215 000	-----	-----	
	Taylor-Willow Flats	36	23.2	-----	-----	-----	-----	-----	
		30	76.3	-----	-----	-----	-----	-----	
	Willow Flats-Huntingdon	30	570.3	13	279 640	1 360 000	-----	-----	
		36	465.0	-----	-----	-----	-----	-----	
	Aitken Creek	-----	-----	-----	-----	-----	12 3/4	19.5	
	Alaska Highway system	-----	-----	-----	-----	-----	26	37.5	
		-----	-----	-----	-----	-----	20	18.1	
		-----	-----	-----	-----	-----	18	17.9	
		-----	-----	-----	-----	-----	12 3/4	9.9	
	Beaver River	24	110.9	1	39 000	270 000	-----	-----	
	Blueberry West field	-----	-----	-----	-----	-----	8 5/8	6.7	
	Boundary Lake field	-----	-----	1	4 000	-----	16	0.5	
	Bubbles field	-----	-----	1	660	-----	-----	-----	
	Buick Creek field	-----	-----	-----	-----	-----	26	1.8	
		-----	-----	-----	-----	-----	10 3/4	7.3	
	Buick Creek East field	-----	-----	-----	-----	-----	8 5/8	6.6	
	Buick Creek West field	-----	-----	1	1 980	-----	20	16.2	
	Bullmoose field	-----	-----	-----	-----	-----	8	8.1	
	Cache Creek field	-----	-----	-----	-----	-----	6	8.6	
	Charlie Lake field	-----	-----	-----	-----	-----	6 5/8	2.3	
	Clarke Lake field	-----	-----	-----	-----	-----	16	27.8	
	Dahl field	-----	-----	-----	-----	-----	-----	95.7	
	Dawson Creek field	-----	-----	-----	-----	-----	8 5/8	5.4	
	Fireweed field	-----	-----	-----	-----	-----	10 3/4	15.3	
	Fireweed field	-----	-----	-----	-----	-----	6 5/8	4.2	
		-----	-----	-----	-----	-----	3 1/2	5.0	
	Flatrock field	-----	-----	-----	-----	-----	3 1/2	5.0	

Table 4-15—Natural Gas Pipelines, 1978 – 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	Horsepower		Size (In.)	Mileage	
Westcoast Transmission Co. Ltd.—*Continued*	Fort St. John field	------	------	3	1 980	------	18	7.8	
		------	------	------	------	------	10 3/4	0.9	
		------	------	------	------	------	8 5/8	0.7	
	Fort St. John Southeast field	12	7.0	------	------	------	12 3/4	4.0	
	Fort Nelson plant	30	220.8	4	93 400	858 000	------	------	
	Fort Nelson-Willow Flats	36	45.6	------	------	------	------	------	
	Gundy Creek field	------	------	------	------	------	10 3/4	6.1	
	Grizzly field	------	------	------	------	------	24	35.1	
		------	------	------	------	------	20	51.4	
		------	------	------	------	------	10	9.2	
	Helmet field	------	------	------	------	------	16	31.4	
		------	------	------	------	------	10	12.6	
		------	------	------	------	------	8	3.6	
	Kobes-Townsend field	------	------	1	6 000	------	12 3/4	18.9	
		------	------	------	------	------	8 5/8	5.5	
	Kotcho Lake field	------	------	------	------	------	12	9.7	
	Kotcho Lake East field	------	------	------	------	------	10 3/4	11.5	
	Laprise Creek field	------	------	1	5 160	------	6 5/8	2.5	
	Milligan-Peejay system	------	------	1	4 000	------	12	32.2	
		------	------	------	------	------	10 3/4	23.4	
		------	------	------	------	------	8 5/8	13.2	
		------	------	------	------	------	6 5/8	6.8	
	Montney field	------	------	------	------	------	4 1/2	7.4	
	Nig field	------	------	------	------	------	6 5/8	2.4	
	Oak field	------	------	------	------	------	16	20.7	
		------	------	------	------	------	6	0.9	
	Parkland field	------	------	------	------	------	8 5/8	6.7	
	Petitot-Louise system	------	------	------	------	------	10 3/4	11.8	
		------	------	------	------	------	12 3/4	15.8	
		------	------	------	------	------	16	6.5	
		------	------	------	------	------	20	25.9	
	Red Creek	------	------	------	------	------	4 1/2	7.7	
	Rigel field	------	------	1	6 800	------	12 3/4	11.1	
		------	------	1	1 400	------	10 3/4	11.5	
	Rigel North field	------	------	------	------	------	6	6.6	
	Sierra field	------	------	------	------	------	12	6.8	
		------	------	------	------	------	16	6.8	
	Stoddart field	------	------	1	1 400	------	8 5/8	6.3	
	Yoyo field	------	------	------	------	------	24	48.0	

Table 4-16—Gas-Processing Plants, 1978

Operator	Location	Fields Served	Plant Type	Year of First Operation	Plant Capacity Million SCF/Day In	Plant Capacity Million SCF/Day Out	Natural Gas	Residual Gas to—
Esso Resources Canada	S.E. 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	21	17	Pentanes plus, propane-butane mix	Westcoast Transmission Co. Ltd.
Mobil Oil of Canada Ltd.	Unit 91, Block D, N.T.S. Map 94-I-14	Sierra	Inlet separator, dry desiccant dehydration.	1969	127	125		Westcoast Transmission Co. Ltd.
Pacific Petroleum Ltd.	Sec. 36, Tp. 82, R. 18, W6M	All British Columbia producing gasfields except Parkland and Boundary Lake that are between 56° 00′ and 58° 00′ latitude	Inlet separator, M.E.A. treating, dry desiccant dehydration, oil absorption, distillation	1957	500	455	Condensate, pentanes plus, propane, butanes	Westcoast Transmission Co. Ltd.
Westcoast Transmission Co. Ltd.	N.W. ¼ Sec. 10, Tp. 85, R. 14, W6M	Boundary Lake	M.E.A. absorption, dehydration	1961	9.4	8.9	Condensate	Westcoast Transmission Co. Ltd.
Westcoast Transmission Co. Ltd.	Unit 85, Block G, N.T.S. Map 94-J-10	All British Columbia producing gasfields except Sierra north of 58° 00′ latitude	Potassium carbonate, M.E.A., D.E.A. absorption, dehydration	1965	1 075	850		Westcoast Transmission Co. Ltd.

Table 4-17—Sulphur Plants, 1978

Name	Location	Raw Material	Principal Product	Year of First Operation	Capacity (Long Tons per Day)
Westcoast Transmission Co. Ltd.	Taylor	Hydrogen sulphide	Sulphur	1957	260
Westcoast Transmission Co. Ltd.	Fort Nelson	Hydrogen sulphide	Sulphur	1976	400

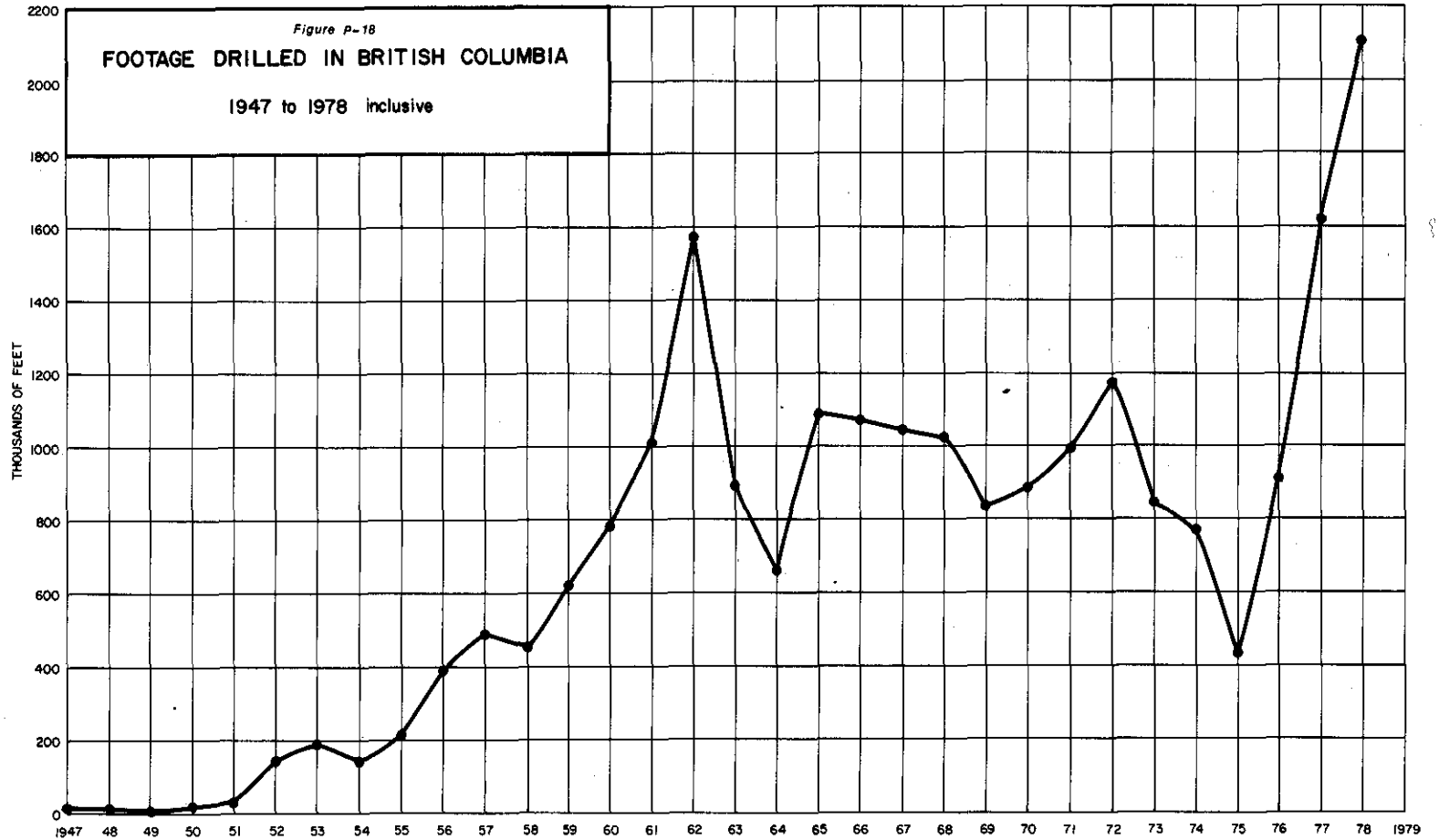

Figure 4-1—Footage Drilled in British Columbia, 1947—1978

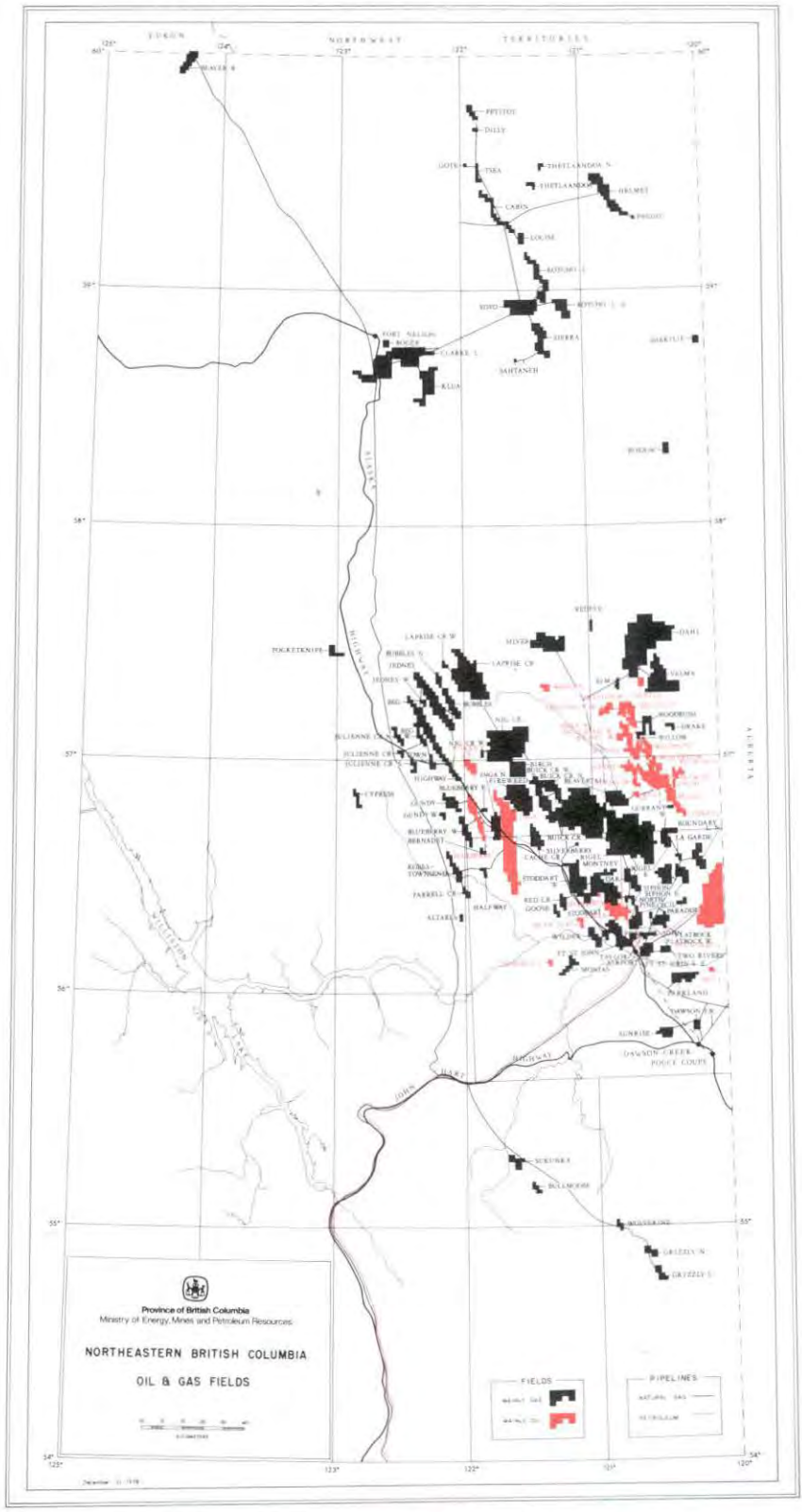

Figure 4-2—Petroleum and Natural Gas Fields in British Columbia

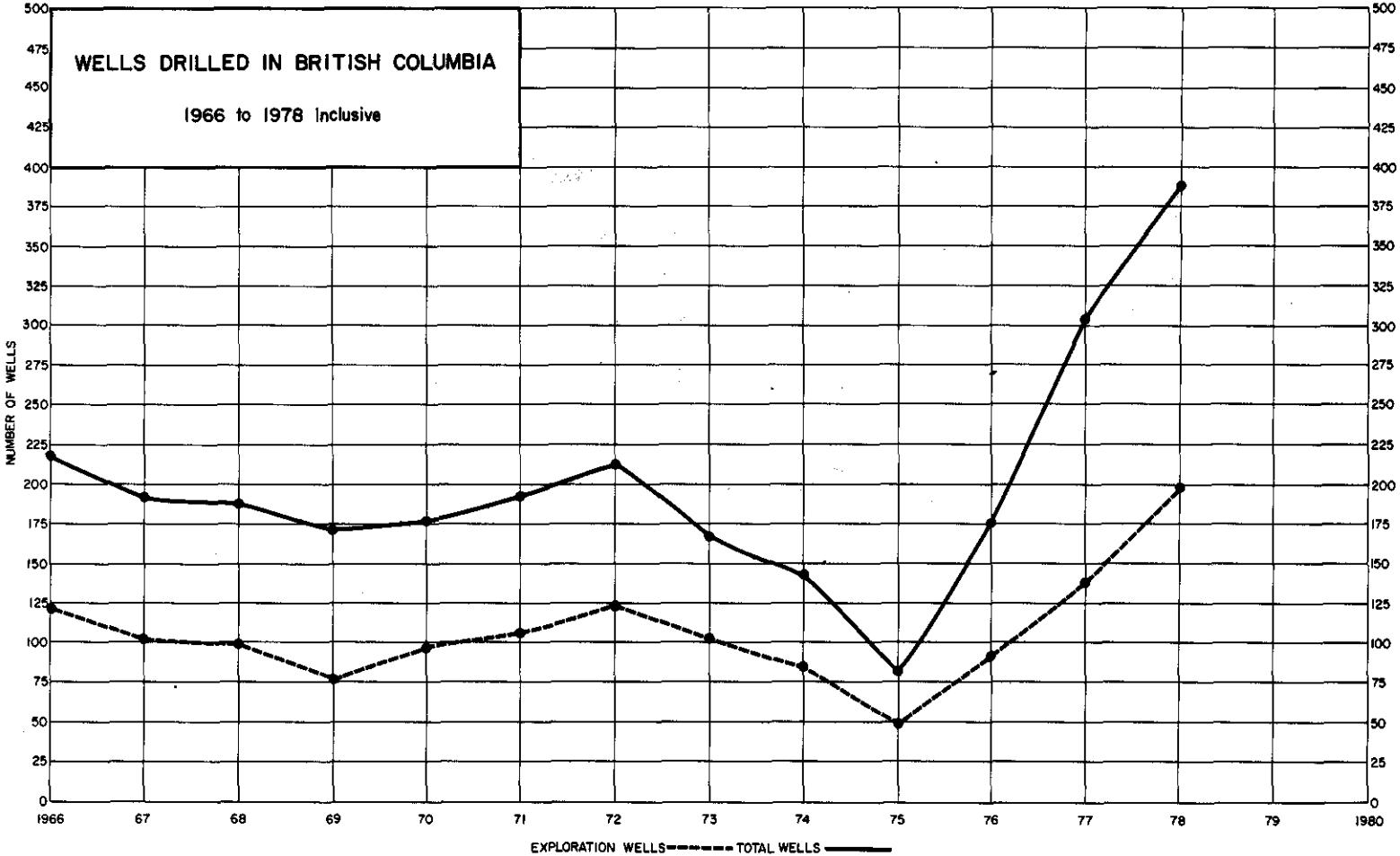

Figure 4-3—Wells Drilled in British Columbia, 1966—1978

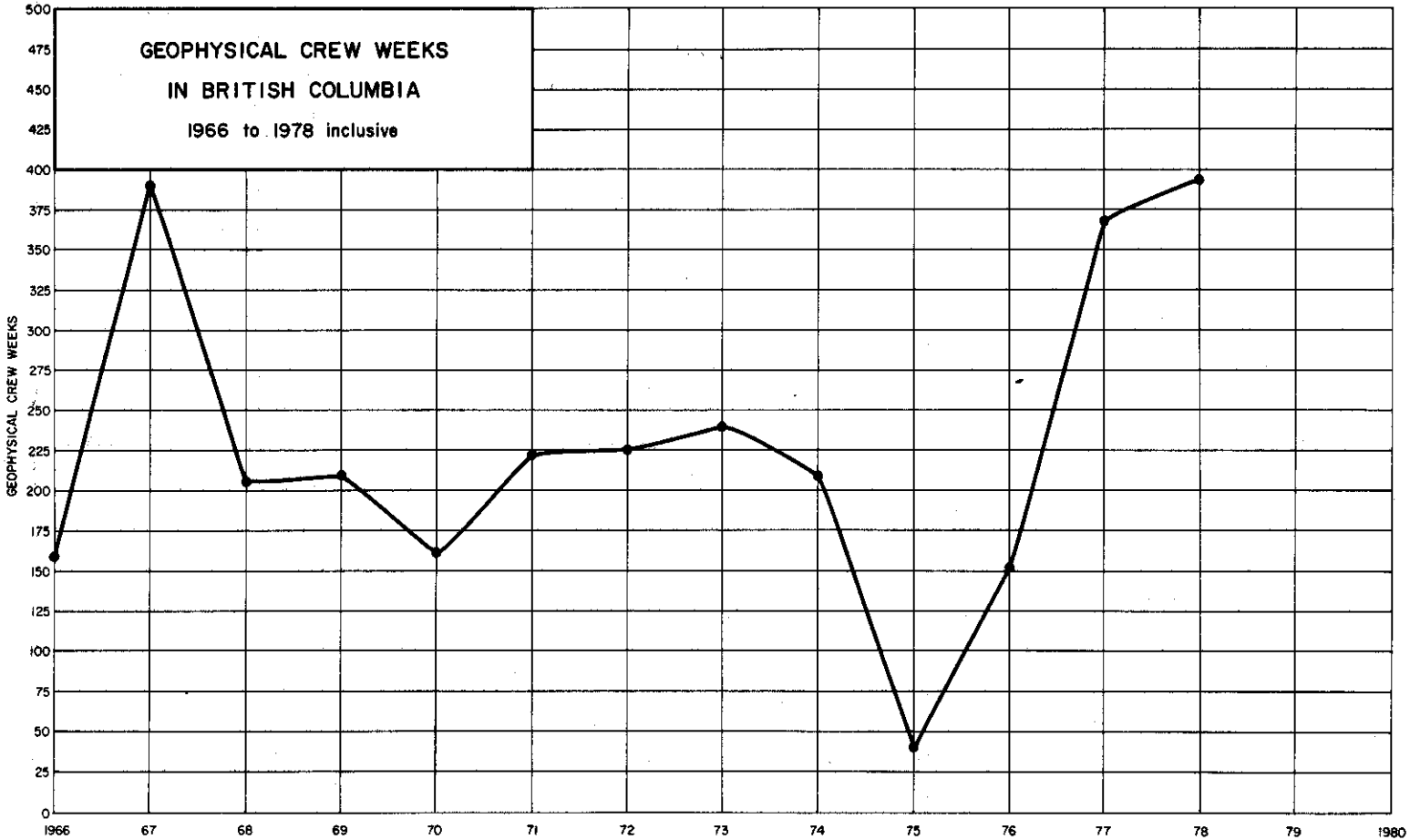

Figure 4-4—Geophysical Crew Weeks in British Columbia, 1966–1978

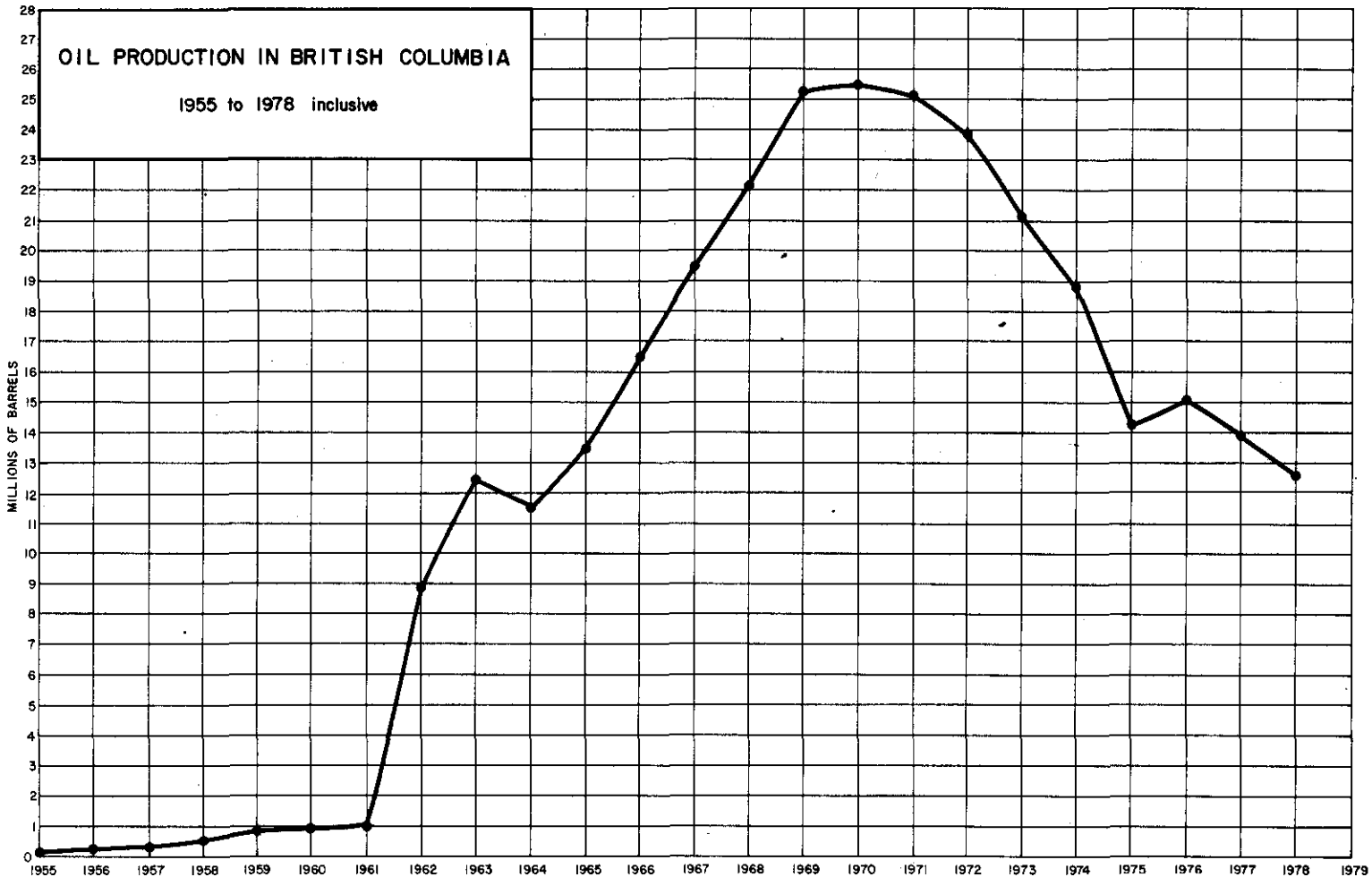

Figure 4-5—Oil Production in British Columbia, 1955—1978

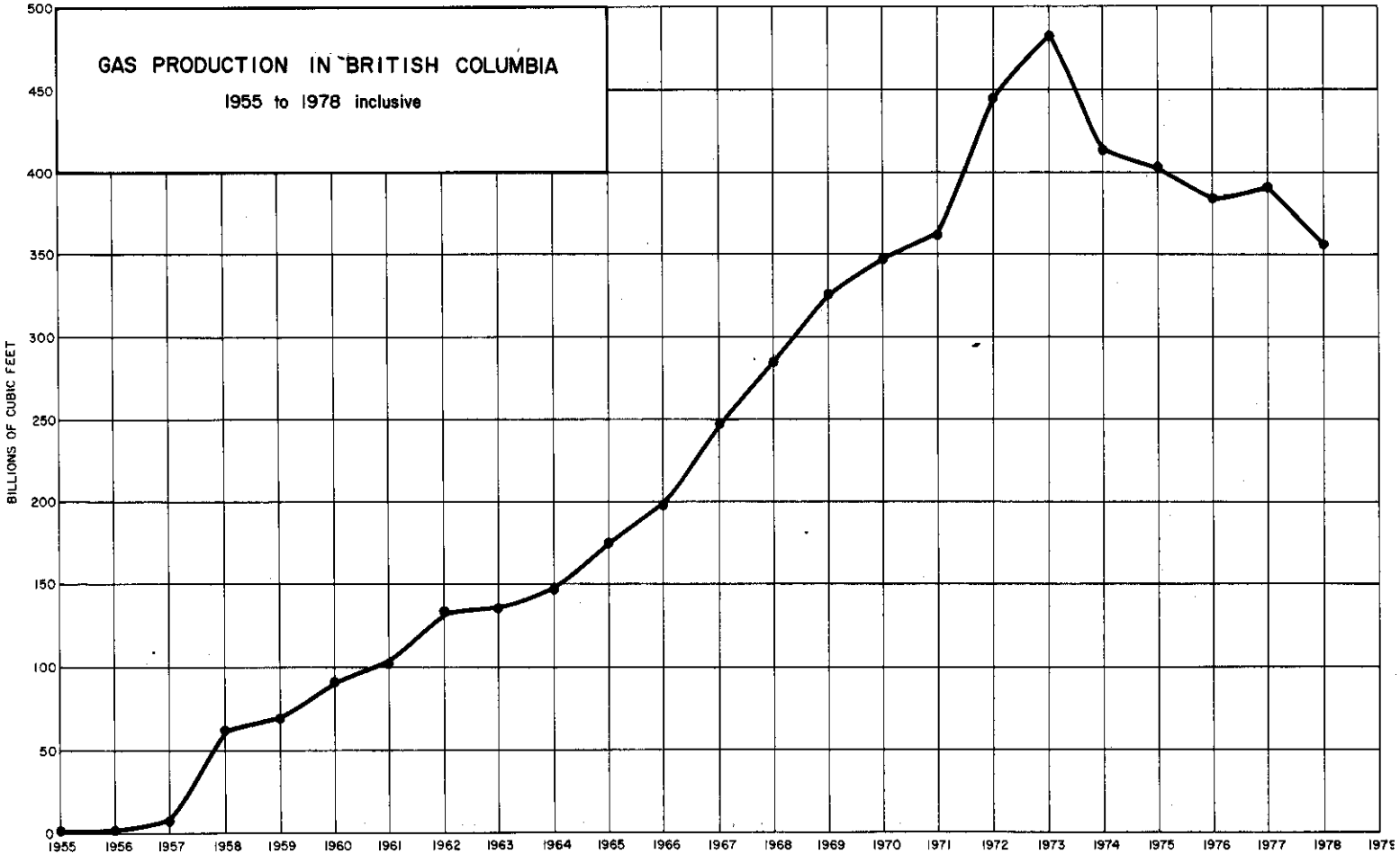

Figure 4-6—Gas Production in British Columbia, 1955—1978

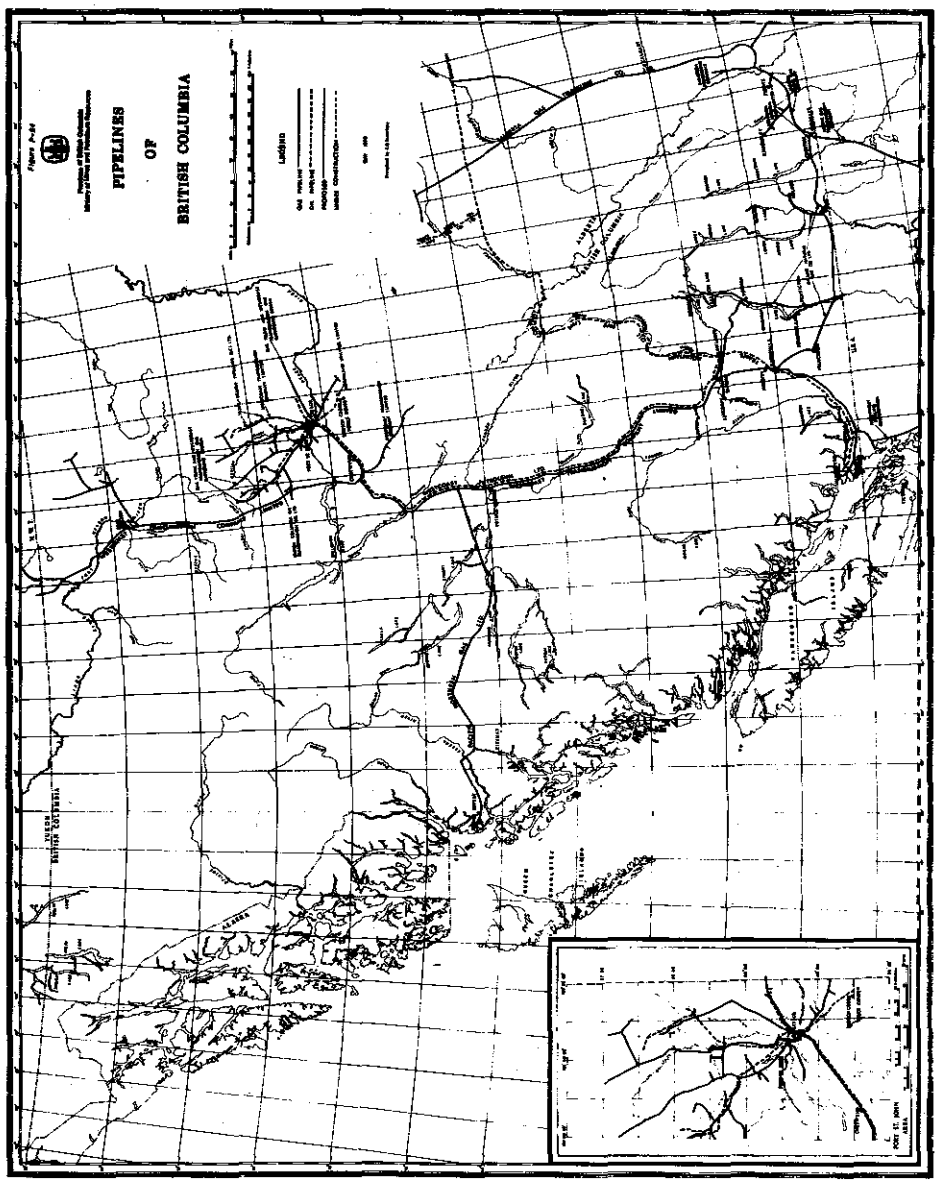

Figure 4-7—Pipelines of British Columbia

Directory

(as at November 30, 1979)

Hon. R. H. McClelland (Minister)	Room 310, Parliament Buildings	387-5295
R. Illing (Deputy Minister)	Room 406, Douglas Building	387-5445
Dr. James T. Fyles (Senior Assistant Deputy Minister)	Room 409, Douglas Building	387-6242
P. D. Meyers (Solicitor for Ministry)	609 Broughton Street	384-4434

PERSONNEL

N. K. Gillespie (Director)	Room 442D, Douglas Building	387-3776
Cathie Green (Personnel Clerk)	Room 442D, Douglas Building	387-3776

FINANCE AND ADMINISTRATION DIVISION

R. R. Davy (Director)	Room 434, Douglas Building	387-6243, 5651
Rosalyn J. Moir (Assistant Editor)	Room 422, Douglas Building	387-5496, 5631
Sharon Ferris (Library)	Room 430, Douglas Building	387-6407

MINERAL REVENUE DIVISION

W. W. M. Ross (Director)	525 Superior Street	387-6991
B. A. Garrison (Assistant Director)	525 Superior Street	387-6991

ENERGY RESOURCES BRANCH

Dr. H. Swain (Assistant Deputy Minister)	525 Superior Street	387-1916
T. France (Economist)	525 Superior Street	387-3787
D. Horswill (Director, Energy Policy Division)	525 Superior Street	387-6265

MINERAL RESOURCES BRANCH

E. R. Macgregor (Assistant Deputy Minister)	Room 409, Douglas Building	387-5489

INSPECTION AND ENGINEERING DIVISION

Victoria Office:

W. C. Robinson (Chief Inspector)	525 Superior Street	387-3781
V. E. Dawson (Deputy Chief Inspector—Coal)	525 Superior Street	387-3781
A. J. Richardson (Deputy Chief Inspector—Metal)	525 Superior Street	387-3781
H. Dennis (Senior Coal Inspector)	525 Superior Street	387-3781
T. Carter (Senior Mechanical/Electrical Inspector)	525 Superior Street	387-3781
J. Cartwright (Electrical Inspector)	525 Superior Street	387-3781
G. J. Lee (Senior Mine-rescue Co-ordinator)	525 Superior Street	387-3781
J. D. McDonald (Senior Reclamation Inspector)	525 Superior Street	387-3781
D. M. Galbraith (Reclamation Inspector)	525 Superior Street	387-3781
J. C. Errington (Reclamation Inspector)	525 Superior Street	387-3781
P. E. Olson (Engineer)—Mining Roads	525 Superior Street	387-3781

INSPECTION AND ENGINEERING DIVISION (*Continued*)

Vancouver Office:

B. M. Dudas (Inspector)	2747 East Hastings Street, V5K 1Z8	254-7171/72
S. Elias (Inspector, Environmental Control)	2747 East Hastings Street, V5K 1Z8	254-7171/72

Kamloops Office:

D. Smith (Inspector)	101, 2985 Airport Drive, V2B 7W8	376-7201
E. S. Sadar (Inspector)	101, 2985 Airport Drive, V2B 7W8	376-7201
J. MacCulloch (Inspector)	101, 2985 Airport Drive, V2B 7W8	376-7201
Nelson Office: J. B. C. Lang (Inspector)	310 Ward Street, V1L 5S4	352-2211 ext. 213/342
Fernie Office: D. J. R. Henderson (Inspector)	Box 1290, V0B 1M0	423-6222
Nanaimo Office: J. W. Robinson (Inspector)	2226 Brotherstone Road, V9S 3M8	758-2342
Prince Rupert Office: [vacant] (Inspector)	Box 758, V8J 3S1	624-3245 ext. 202
Smithers Office: S. J. Hunter (Inspector)	Box 877, V0J 2N0	847-4411 ext. 237/245
Prince George Office: T. Vaughan-Thomas (Inspector)	1652 Quinn Street, V2N 1X3	562-8131 ext. 322/323

GEOLOGICAL DIVISION

Dr. A. Sutherland Brown (Chief Geologist)	Room 418, Douglas Building	387-5975

ANALYTICAL LABORATORY

Dr. W. M. Johnson (Chief Analyst)	541 Superior Street	387-6249
P. F. Ralph (Deputy Chief Analyst)	541 Superior Street	387-6249

PROJECT GEOLOGY

Dr. N. C. Carter (Senior Geologist)	Room 418, Douglas Building	387-5975

Geologists

R. D. Gilchrist	626 Superior Street	387-5068
Dr. T. Höy	626 Superior Street	387-5068
D. G. McIntyre	626 Superior Street	387-5068
Dr. W. J. McMillan	626 Superior Street	387-5068
Dr. V. A. Preto	626 Superior Street	387-5068
Dr. P. A. Christopher	630 Superior Street	387-5068
Dr. B. N. Church	630 Superior Street	387-5068
Dr. G. E. P. Eastwood	630 Superior Street	387-5068
Dr. D. E. Pearson	630 Superior Street	387-5068

RESOURCE DATA AND ANALYSIS

[vacant] (Senior Geologist)	Room 418, Douglas Building	387-5975

Geologists

Special Projects: Dr. K. E. Northcote	Room 416, Douglas Building	387-5975
Industrial Minerals: Z. D. Hora	630 Superior Street	387-5068

RESOURCE DATA AND ANALYSIS (*Continued*)

Mineral Inventory:		
T. Kalnins	Room 427, Douglas Building	387-5975
J. E. Forester	Room 424, Douglas Building	387-5975
Coal Inventory: A. Matheson	625 Superior Street	387-6588
Co-ordinator, Data Processing: G. L. James	Room 432, Douglas Building	385-5600

APPLIED GEOLOGY AND PROSPECTORS' ASSISTANCE

Dr. E. W. Grove (Senior Geologist)	525 Superior Street	387-5538
A. F. Shepherd (Geologist)	525 Superior Street	387-5538

District Geologists

Fernie: D. A. Grieve	Box 1290, V0B 1M0	423-6222
Fort St. John: R. H. Karst	Box 7438, V1J 4M9	785-6906
Kamloops: G. P. E. White	101, 2985 Airport Drive, V2B 7W8	376-7201
Nelson: G. G. Addie	310 Ward Street, V1L 5S4	352-2211 ext. 213
Prince George: G. H. Klein	1652 Quinn Street, V2N 1X4	562-8131 ext. 322/323
Smithers: T. G. Schroeter	Box 877, V0J 2N0	847-4411 ext. 277

TITLES DIVISION

E. J. Bowles (Chief Gold Commissioner)	Room 417, Douglas Building	387-6245
R. Rutherford (Deputy Chief Gold Commissioner)	Room 433, Douglas Building	387-5517
D. I. Doyle (Gold Commissioner, Vancouver)	800 Hornby Street, V6Z 2C5	668-2672
E. A. H. Mitchell (Gold Commissioner)	Room 411, Douglas Building	387-6255, 6246
A. R. Corner (Coal Administrator)	Room 411, Douglas Building	387-5687

Mineral Claims Inspectors

Vancouver: F. A. Reyes	800 Hornby Street, V6Z 2C5	668-2672
Kamloops: H. Turner	212, 2985 Airport Drive, V2B 7W8	554-1445
Quesnel: D. Lieutard	401, 350 Barlow Avenue, V2J 2C1	7751-260
Smithers: R. Morgan	Box 877, V0J 2N0	776-278

ECONOMICS AND PLANNING DIVISION

F. C. Basham (Acting Director)	525 Superior Street	387-3787
W. P. Wilson (Statistician)	525 Superior Street	387-3787

PETROLEUM RESOURCES BRANCH

J. D. Lineham (Assistant Deputy Minister, Chief of Branch)	Room 404, 405, Douglas Building	387-3485, 6256

ENGINEERING DIVISION

A. G. T. Weaver (Chief Engineer)	Room 436A, Douglas Building	387-5993
B. T. Barber (Senior Reservoir Engineer)	Room 436, Douglas Building	387-5993
P. K. Huus (Reservoir Engineering Technician)	Room 403, Douglas Building	387-5993
W. L. Ingram (Senior Development Engineer)	Room 401, Douglas Building	387-5993

ENGINEERING DIVISION (*Continued*)

M. B. Hamersley (Development Engineering Technician)	Room 401, Douglas Building	387-5993
D. L. Johnson (District Engineer)	Box 6880, Fort St. John, V1J 4M9	758-6906

GEOLOGICAL DIVISION

W. M. Young (Chief Geologist)	Room 402A, Douglas Building	387-5993
R. Stewart (Senior Reservoir Geologist)	Room 440, Douglas Building	387-5993
J. A. Hudson (Senior Economic Geologist)	Room 442, Douglas Building	387-5993

TITLES DIVISION

W. J. Quinn (Commissioner)	Room, 446, Douglas Building	387-3333

3,700-879-4722