CANADA
DOMINION BUREAU OF STATISTICS
MINING, METALLURGICAL AND CHEMICAL BRANCH

ANNUAL REPORT

OF THE

MINERAL PRODUCTION OF CANADA

DURING THE CALENDAR YEAR

1922

Published by Authority of the Hon. Thos. A. Low, M.P.,
Minister of Trade and Commerce

OTTAWA
F. A. ACLAND
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1924

73990—1

PREFACE

The present Annual Report on the Mineral Production of Canada is designed to supplement the Preliminary Reports on this subject issued by the Dominion Bureau of Statistics as for the six months ending June 30, 1922, and for the twelve months ending December, and to present the final figures for the whole of the calendar year.

Annual statistical reports on the mineral production of Canada have been published for many years, first by the Geological Survey, later by the Mines Branch of the Department of Mines, and, since 1921, by the Dominion Bureau of Statistics. The present report is issued in continuance of the series and while every effort has been made to ensure complete continuity of the record, certain new material has been introduced which it is believed will be found of value to the mineral industry.

The statistics relating to the different minerals and the general statistical tables have been prepared as formerly, and these have been supplemented by general reviews of the principal mineral industries, (e.g., the copper-gold industry, the silver-lead-zinc industry, the nickel copper industry, etc.), and a section on metallurgical works. In recent years the value of statistics of this character, covering capital, labour, equipment, etc., has become more generally recognized and the demand for such information has greatly increased.

A review of the metallurgical practice followed in a number of typical mills in Canada has been prepared by Mr. D. S. Halford, B.A. Sc., and has been included in this report for the information of the reader who may desire to obtain in concise form a general review of Canadian practice in the treatment of metalliferous ores.

To meet a demand for the names and addresses of concerns operating in the mineral industry, a list has been prepared and is included in this report; this departure from previous practice has much to commend it, and it is hoped that it will be found of value as a general reference.

The cordial thanks of the Bureau are tendered to the Dominion Department of Mines and to the several Provincial Department of Mines, which have without exception assisted materially in the preparation of the report. In reference to the co-ordination of the general work on mining statistics between the Provincial Departments and the Bureau, it has been found possible to arrange for the co-operative collection of monthly statistics of coal production with all the provinces in which such records are obtained, namely, Nova Scotia, New Brunswick, Saskatchewan, and Alberta. In the field of general mining statistics, co-operative arrangements with Ontario Department of Mines have been continued, thus preventing overlapping and duplication of work. The data collected by the Bureau on mining statistics are made available to the Dominion Department of Mines.

The thanks of the Bureau are also tendered to the mine and smelter operators, for assistance given and information made available. The railway and other transportation companies, as well as smelter operators outside of Canada, have also furnished data the receipt of which is gratefully acknowledged.

The report has been prepared under the direction of Mr. S. J. Cook, B.A., A.I.C., F.C.I.C., Chief of the Mining, Metallurgical and Chemical Branch of the Bureau, by Mr. A. C. Young B.Sc., who also directly supervised the work on metals and metalliferous ores. Mr. B. R. Hayden compiled the data on non-metalliferous products.

R. H. COATS,
Dominion Statistician.

DOMINION BUREAU OF STATISTICS, OTTAWA.
December 31, 1923.

TABLE OF CONTENTS

PAGE

List of Publications ..... Inside front cover
Preface 3

Part One—Production Statistics

Mineral Production of Canada 7
General Statistical Review 9

METALLICS—
Aluminium 23
Antimony 24
Cobalt 25
Copper 28
Gold 34
Iron Ore 45
Pig-Iron 45
Lead 46
Mercury 51
Molybdenum 51
Nickel 52
Platinum and Palladium 55
Silver 58
Tin 65
Zinc 65

NON-METALLICS—
Abrasives 69
Actinolite 71
Arsenic 71
Asbestos 73
Barytes 75
Chromite 76
Coal 77
Coke 89
Feldspar 89
Fluorspar 91
Graphite 92
Gypsum 93
Iron Oxides 94
Magnesite 95
Magnesium Sulphate 96
Manganese 96
Mica 97
Mineral Water 98
Natro-Alunite 99
Natural Gas 99
Peat 100
Petroleum 100
Phosphate 103
Pyrites 104
Quartz 105
Salt 106
Sodium Carbonate 107
Sodium Sulphate 107
Talc 107

STRUCTURAL MATERIALS AND CLAY PRODUCTS—
Cement 110
Clay and Clay Products 112
Lime 121
Sand and Gravel 123
Sand-Lime Brick 125
Slate 126
Stone 126

Part Two—General Statistics

Introductory Review and General Tables 132
United States Tariff Rates on Mineral Products 138
Review of Metallurgical Practice in Canada 140

METALLIC MINERAL INDUSTRIES—
Alluvial Gold 153
Auriferous Quartz 155
Copper-Gold-Silver 159
Nickel-Copper 161
Silver-Cobalt 163
Silver-Lead-Zinc 166
Metallurgical Works 171

NON-METALLIC MINERAL INDUSTRIES—

Asbestos 175
Coal 177
Feldspar 180
Gypsum 182
Mica 184
Natural Gas 185
Petroleum 190
Salt 193
Miscellaneous Non-Metallic Mineral Industries including Fluorspar, Grindstones, Iron Oxides, Magnesite, Quartz, Talc, etc. 195

STRUCTURAL MATERIALS AND CLAY PRODUCTS INDUSTRIES—

Cement 196
Clay Products 198
Lime Burning 200
Sand and Gravel 202
Stone Quarrying 204

Part Three—Directory

List of all concerns in the Canadian Mining Industry, operating in 1922.

METALLIC MINERAL INDUSTRIES—

Auriferous Quartz 208
Copper-Gold-Silver 209
Silver-Cobalt 210
Silver-Lead-Zinc 210

NON-METALLIC MINERAL INDUSTRIES—

Actinolite 212
Asbestos 212
Barytes 212
Coal 212
Feldspar 214
Fluorspar 215
Graphite 215
Grindstones 215
Gypsum 215
Iron Oxides 215
Magnesite 215
Magnesium Sulphate 215
Manganese 216
Mica 216
Natro-Alunite 216
Natural Gas 216
Peat 218
Petroleum 218
Pyrites 220
Quartz 220
Salt 220
Sodium Carbonate 221
Sodium Sulphate 221
Talc 221
Tripolite 221

STRUCTURAL MATERIALS AND CLAY PRODUCTS INDUSTRIES—

Cement 221
Clay Products (Brick and Tile, Clay Sewer-pipe, Firebrick and Fireclay, Kaolin, Stoneware and Pottery, etc.) 222
Lime 225
Stone Quarrying 226

Table 1.—Quantities and Values of Mineral Products from Canadian Sources, 1921 and 1922

		1921			1922		
		Quantity	Value	Per cent of total	Quantity	Value	Per cent of total
METALLIC			$			$	
Cobalt, metallic and contained in oxide	Lb.	251,986	755,958	0·44	569,960	1,852,370	1·00
Copper (b)	"	47,620,820	5,953,555	3·46	42,879,818	5,738,177	3·11
Gold	Fine oz.	926,329	19,148,920	11·14	1,263,364	26,116,050	14·17
Iron pig from Canadian ore	Tons	56,564	1,873,682	1·09	8,095	178,980	0·09
Iron ore sold for export	"	1,058	3,272	.....	1,781	4,938	.....
Lead (c)	Lb.	66,679,592	3,828,742	2·23	93,307,171	5,817,702	3·15
Nickel (d)	"	19,293,060	6,752,571	3·92	17,597,123	6,158,993	3·34
Palladium	Crude oz.	591	38,267	.....	724	47,060	0·02
Platinum (e)	"	292	21,910	.....	469	45,783	0·02
Rhodium, Osmium, Iridium	"	57	9,690	.....	392	31,360	0·01
Silver (f)	Fine oz.	13,543,198	8,485,355	4·94	18,646,439	12,576,758	6·82
Zinc	Lb.	53,089,356	2,471,310	1·44	56,290,000	3,217,536	1·74
Total		.....	**49,343,232**	**28·70**	.....	**61,785,707**	**33·50**
NON-METALLIC							
Actinolite	Tons	78	975	.....	50	575	.....
Arsenic	"	1,491	233,763	0·14	2,576	321,037	0·17
Asbestos	"	92,761	4,906,230	2·85	163,706	5,552,723	3·01
Barytes	"	270	9,567	.....	289	9,537	.....
Chromite	"	2,798	55,696	.....	767	11,503	0·06
Coal	"	15,057,498	72,451,656	42·14	15,157,431	65,518,497	35·55
Corundum	"	403	55,965	.....	.....	.....	.....
Feldspar	"	29,868	230,754	0·13	27,727	248,402	0·13
Fluorspar	"	5,519	136,267	0·08	4,503	102·138	0·05
Graphite	"	937	65,862	.....	597	31,353	0·01
Grindstones	"	1,281	64,067	.....	1,005	43,742	0·02
Gypsum	"	386,550	1,785,538	1·04	559,265	2,160,898	1·17
Magnesite	"	3,730	81,320	.....	2,849	76,294	0·04
Magnesium sulphate	"	2,029	39,506	.....	1,021	24,017	0·01
Manganese	"	68	3,400	.....	73	2,044	.....
Mica	"	702	70,063	.....	3,349	152,263	0·08
Mineral water	Gal.	328,273	21,716	.....	221,433	14,220	.....
Natro-alunite	Tons	30	1,500	.....	50	2,500	.....
Natural gas (g)	M cu. ft.	14,077,601	4,594,164	2·67	14,682,651	5,846,501	3·17
Oxides, iron	Tons	9,048	93,610	.....	7,285	110,608	0·06
Peat	"	1,666	6,664	.....	3,000	14,500	.....
Petroleum, crude	Bbl.	187,540	641,533	0·37	179,068	611,176	0·33
Phosphate	Tons	30	450	.....	190	1,796	.....
Pyrites	"	32,173	116,326	0·07	18,143	74,303	.....
Quartz	"	100,350	312,947	0·18	109,947	208,598	0·11
Salt	"	164,658	1,673,685	0·97	181,794	1,628,323	0·88
Sodium carbonate	"	197	14,775	.....	202	3,027	.....
Sodium sulphate	"	623	18,850	.....	504	11,980	.....
Talc	"	10,124	144,565	0·08	13,195	188,458	0·10
Tripolite	"	341	11,268	.....	219	5,781	.....
Total		.....	**87,842,682**	**51·09**	.....	**82,976,794**	**45·00**
STRUCTURAL MATERIALS AND CLAY PRODUCTS							
Cement, portland and puzzolan	Bbl.	5,752,885	14,195,143	8·26	6,943,972	15,438,481	8·38
Clay products—							
Brick, common	No.	220,438,243	3,567,503	2·08	294,919,113	4,714,658	2·56
Brick, pressed	"	80,947,398	1,738,293	1·01	90,577,826	1,839,549	0·99
Brick, moulded and ornamental	"	1,995,284	50,576	.....	41,851,765	865,664	0·47
Brick, paving	"	.....	.....	.....	150,813	5,972	.....
Firebrick	"	4,502,233	242,462	0·14	6,705,127	251,776	0·14
Fireclay	Tons	2,931	29,851	.....	10,196	55,185	0·02
Fireclay blacks and shapes	.....	.....	91,685	.....	.....	67,588	0·04
Fireproofing	.....	.....	452,296	0·26	.....	542,611	0·29
Hollow building brick or blocks	No.	3,627,777	177,273	0·10	4,892,504	448,674	0·24
Kaolin	Tons	124	1,888	.....	1,197	17,866	.....
Pottery	.....	.....	231,262	0·13	.....	266,391	0·14
Sewer-pipe	Tons	.....	1,686,584	0·97	75,932	1,766,347	0·96
Terra-cotta	"	.....	134,193	0·08	.....	188,789	0·10
Tile, drain	No.	.....	473,952	0·28	14,730,963	407,386	0·22
Lime	Bush.	6,879,067	2,781,197	1·62	8,972,971	3,165,005	1·72
Sand and gravel	Tons	11,574,862	2,537,249	1·48	11,666,374	3,502,935	1·90
Slate	"	.....	22,325	.....	1,899	14,871	.....
Stone—							
Granite	Tons	319,398	937,894	0·55	457,925	1,486,250	0·81
Limestone	"	3,322,024	5,155,046	3·00	3,152,124	4,175,941	2·27
Marble	"	1,650	172,720	0·10	1,912	231,894	0·13
Sandstone	"	28,426	78,036	.....	25,221	80,908	0·04
Total		.....	**34,737,428**	**20·21**	.....	**39,534,741**	**21·50**
Grand total		.....	**171,923,342**	**100·00**	.....	**184,297,242**	**100·00**

Table 2.—Increase or Decrease in Quantities and Values of Mineral Products from Canadian Sources, in 1922 as compared with 1921

		Increase (+) or Decrease (−)			Increase (+) or Decrease (−)	
		Quantity	%		Value	%
					$	
METALLIC						
Cobalt, metallic and contained in oxide	Lb.	+ 317,974	+ 126·1		+ 1,096,412	+ 145·0
Copper	"	− 4,741,002	− 10·0		− 215,378	− 3·7
Gold	Fine oz.	+ 337,035	+ 36·3		+ 6,967,130	+ 36·3
Iron pig from Canadian ore	Tons	− 48,469	− 85·7		− 1,694,702	− 90·5
Iron ore sold for export	"	+ 723	+ 68·3		+ 1,666	+ 50·9
Lead	Lb.	+ 26,627,579	+ 39·9		+ 1,988,960	+ 51·9
Nickel	"	− 1,695,937	− 8·8		− 593,578	− 8·8
Palladium	Crude oz.	+ 133	+ 22·5		+ 8,793	+ 22·9
Platinum	"	+ 177	+ 60·6		+ 23,873	+ 108·9
Rhodium	"	+ 335	+ 587·7		+ 21,670	+ 223·6
Silver	Fine oz.	+ 5,038,241	+ 37·1		+ 4,091,403	+ 48·2
Zinc	Lb.	+ 3,200,644	+ 6·0		+ 746,226	+ 30·1
Total					**+ 12,442,475**	**+ 25·2**
NON-METALLIC						
Actinolite	Tons	− 28	− 35·9		− 400	− 41·1
Arsenic	"	+ 1,085	+ 72·7		+ 87,274	+ 37·3
Asbestos	"	+ 70,945	+ 76·4		+ 646,493	+ 13·1
Barytes	"	+ 19	+ 07·0		− 30	− 0·4
Chromite	"	− 2,031	− 72·6		− 44,193	− 79·4
Coal	"	+ 99,933	+ 0·6		− 6,933,159	− 9·6
Corundum	"	− 403			− 55,965	
Feldspar	"	− 2,141	− 7·2		+ 17,648	+ 7·6
Fluorspar	"	− 1,016	− 18·5		− 34,129	− 25·1
Graphite	"	− 340	− 36·3		− 34,504	− 52·4
Grindstones	"	− 276	− 21·6		− 20,325	− 31·8
Gypsum	"	+ 172,715	+ 44·6		+ 375,360	+ 21·0
Magnesite	"	− 881	− 23·7		− 5,026	− 6·2
Magnesium sulphate	"	− 1,008	− 49·7		− 15,489	− 39·0
Manganese	"	+ 5	+ 7·3		− 1,356	− 39·9
Mica	"	+ 2,647	+ 377·0		+ 82,200	+ 117·3
Mineral water	Gal.	− 106,840	− 32·6		− 7,496	− 34·6
Natro-alunite	Tons	+ 20	+ 66·6		+ 1,000	+ 66·6
Natural gas	M cu. ft.	+ 605,050	+ 4·2		+ 1,252,337	+ 27·2
Oxides, iron	Tons	− 1,763	− 19·5		+ 16,998	+ 18·1
Peat	"	+ 1,334	+ 80·0		+ 7,836	+ 117·5
Petroleum, crude	Bbl.	− 8,472	− 4·6		− 30,357	− 4·8
Phosphate	Tons	+ 160	+ 533·3		+ 1,346	+ 299·1
Pyrites	"	− 14,030	− 43·7		− 42,023	− 36·2
Quartz	"	+ 9,597	+ 9·5		− 104,349	− 33·4
Salt	"	+ 17,136	+ 10·4		− 45,362	− 2·8
Sodium carbonate	"	+ 5	+ 2·5		− 11,748	− 79·6
Sodium sulphate	"	− 119	− 19·2		− 6,870	− 36·5
Talc	"	+ 3,071	+ 30·3		+ 43,893	+ 30·3
Tripolite	"	− 122	− 35·8		− 5,487	− 48·7
Total					**− 4,865,888**	**− 5·6**
STRUCTURAL MATERIALS AND CLAY PRODUCTS						
Cement, portland and pozzolan	Bbl.	+ 1,191,087	+ 20·7		+ 1,243,338	+ 8·7
Clay products—						
Brick, common	No.	+ 74,480,870	+ 33·7		+ 1,147,155	+ 32·1
Brick, pressed	"	+ 9,630,428	+ 11·8		+ 101,256	+ 5·8
Brick, moulded and ornamental	"					
Firebrick	"	+ 2,202,894	+ 48·9		+ 9,314	+ 3·8
Fireclay	Tons	+ 7,265	+ 248·7		+ 25,334	+ 84·8
Fireclay blocks and shapes					− 24,097	− 26·3
Fireproofing					+ 90,315	+ 19·9
Hollow building brick or blocks	No.	+ 1,264,727	+ 34·8		+ 271,401	+ 15·3
Kaolin	Tons	+ 1,073	+ 865·3		+ 15,978	+ 846·3
Pottery					+ 35,129	+ 15·2
Sewer pipe					+ 99,763	+ 5·9
Terra-cotta and tile other than drain					+ 54,596	+ 40·6
Tile, drain					− 66,566	− 14·1
Lime	Bush.	+ 2,093,904	+ 30·4		+ 383,808	+ 13·8
Sand and gravel	Tons	+ 91,512	+ 0·7		+ 965,686	+ 38·0
Slate					− 7,454	− 33·4
Stone—						
Granite	Tons	+ 138,527	+ 43·3		+ 548,356	+ 58·4
Limestone	"	− 169,900	− 5·2		− 979,105	− 19·2
Marble	"	+ 262	+ 15·8		+ 59,174	+ 34·3
Sandstone	"	− 3,205	− 11·3		+ 2,872	+ 3·6
Total					**+ 4,797,313**	**+ 13·8**
Grand total					**+12,373,900**	**+ 17·1**

DOMINION BUREAU OF STATISTICS, CANADA

R. H. COATS, B.A., F.S.S., F.R.S.C., Dominion Statistician

S. J. COOK, B.A., A.I.C., F.C.I.C., Chief of the Mining, Metallurgical and Chemical Branch

REPORT

OF THE

MINERAL PRODUCTION OF CANADA

DURING THE CALENDAR YEAR, 1922

General Review.—A marked recovery in metal mining in Canada was the principal contributing factor in raising the value of the year's output for the mining industry to a total of $184,297,242, an advance of 7·1 per cent over the production recorded in the previous year. The smelter output of metallic minerals, computed at average prevailing prices for the year, reached a total of $61,785,707 as compared with $49,343,232 in 1921; metallic minerals contributed 33·5 per cent of the total value of all mineral products for the year. Non-metallic minerals, including coal, contributed $82,976,794 to the year's production, a decline of 5·6 per cent from the value of $87,842,682 credited to this group in the previous year. In point of value, non-metallics constituted 45 per cent of the total production. Structural materials and clay products, valued at $39,534,741, showed an increase of 13·8 per cent over the $34,737,428 which represented the value of the output in 1921. The value of this group of products formed 21·5 per cent of the total output of the mining industry.

For statistical and comparative purposes it has always been customary to determine the value of the metals, copper, gold, lead, nickel, silver and zinc as far as possible on the basis of the quantities of metals recovered from Canadian ores smelted during the year, either in Canada or abroad and to compute the value of this production in each case at the average price of the refined metal in a recognized market. The value of the non-metallics, and of the structural materials is determined as the value received by the producer at point of shipment. In this report, no departure has been made from the practice previously followed. The New York market was used in the case of the principal metals since most sales of Canadian products are made on that market.

In comparison with preceding years the mineral production of Canada in 1922 was very creditable and was only exceeded in value by the records established in 1918 of $211,301,000 and in 1920 when the peak of $227,859,000 was reached.

The principal mineral-producing province of Canada in 1922 was Ontario, the value of its mineral production being determined as $65,866,029. British Columbia came second with a mineral production valued at $39,423,962; Alberta was third with $27,872,136; Nova Scotia ranked fourth with $25,923,499. The other provinces followed in the order named: New Brunswick, $2,263,692; Manitoba, $2,258,942; Yukon Territory, $1,785,573; and Saskatchewan, $1,255,470.

Seventeen products contributed 98·59 per cent of the total recorded value of the mineral production of Canada in 1922 and in order of the values assigned these were: coal, gold, cement, silver, clay products, nickel, stone, natural gas, lead, copper, asbestos, sand and gravel, zinc, lime, gypsum, cobalt and salt. Production values of these commodities ranged from $65,518,497 for coal to $1,628,323 for salt.

The outstanding feature of the metal production was the excellent gain made in the output of gold by the two important producing provinces, Ontario and British Columbia. The total gold production for Canada during the year amounted to 1,263,364 fine ounces, and, compared with the 1921 output, showed an increase of 36·3 per cent.

Increased prices and better markets for silver and lead were reflected in excellent gains. Silver advanced 37·1 per cent in quantity and 48·2 per cent in value while lead production rose 39·9 per cent and the value increased 51·9 per cent over the record for the previous year.

Nickel and copper were lower than in 1921, although the advance in the price of copper checked the decline in value to 3·78 per cent as compared with a 10 per cent decrease in quantity. Nickel fell off 8·8 per cent in both quantity and value. The smelter production of blister and converter copper in British Columbia was less than in 1921, but the recovery and rise in price of copper did not occur until about the middle of the year and some important copper mines which were active in 1921 did not appear on the shipping list until nearly the close of the year when there was a decided improvement in the copper industry. The inactivity of the smelting departments of the International Nickel Company in the earlier part of the year and of the British America Nickel Corporation throughout the entire year accounted for the small production of nickel.

The increase in the output of zinc was further emphasized by the rise in price of this metal to an average of 5·716 cents per pound for the year, as compared with 4·655 cents in 1921, both quotations from the St. Louis market. The 6 per cent increase in quantity resulted in a 30·1 per cent advance in the total value reported.

The year-end saw a marked revival in the production of cobalt which raised the year's production to 569,960 pounds valued at $1,852,370. Compared with 1921 data, these figures showed 126·1 per cent greater quantity and 145·0 per cent increase in value.

Among the non-metallics the output of coal, considering the great loss of time through strikes, was most encouraging.

The output of coal from Canadian mines during twelve months of the calendar year 1922 was 15,157,431 tons valued at $65,518,497 as compared with 15,057,493 tons valued at $72,451,656 in 1921; 16,946,764 tons valued at $82,496,538 in 1920; and 13,919,096 tons, valued at $55,622,670 in 1919. The great strike which tied up the United States coal mines for several months was reflected in Canada and resulted in a loss of 1,222,288 working days. Fifteen disputes between employees and employers occurred in the coal-mining industry in Canada during the twelve months ending December, thirteen of which were in Alberta and southeastern British Columbia, and the other two in Nova Scotia. In all 25,251 men were affected, and of the time lost, 931,960 days were lost in the strike which began on April 1st, and 290,328 days' time was lost in the short strikes originating later in the year. Having in mind the fact that over one million working days' time was lost by the employees of the coal mining industry during the year, the output of fifteen million tons may be considered quite satisfactory. Alberta coal mine output amounted to 5,990,911 tons, a little more than half of which was lignite and nearly all the balance bituminous. Nova Scotia contributed 5,569,072 tons and occupied second place among the coal-producing provinces. British Columbia accounted for 2,927,033 tons, and Saskatchewan and New Brunswick followed with 382,437 tons and 287,513 tons respectively.

Sales of cement during the year reached a total of 6,943,972 barrels or 1,191,087 barrels more than in the previous year, the production being about evenly divided between the plants in the provinces of Ontario and Quebec. Eleven plants were operated during the year.

The manufacture of clay products in Canada including brick, firebrick, fireclay, fire-proofing, hollow building blocks, sewerpipe, pottery, terra-cotta and drain tile was carried on in 232 plants in Canada during 1922, in which the total capital employed amounted to $31,168,903. Production showed a 29 per cent increase over the preceding year's production to a total of $11,438,456.

Building stone, both rough and dressed, was produced in greater quantity than in 1921 and monumental and ornamental stone also showed improvement in the quantity and value of the output. The kinds of stone quarried in Canada were granite (trap rock, syenite and other igneous rocks), limestone, sandstone, and marble. Total production of all grades was valued at $5,989,864.

The output of natural gas from Canadian fields in 1922 amounted to 14,682,651 thousand cubic feet valued at $5,846,601. The output was greater than in the preceding year and the total value assigned showed a very great increase, due to the fact that the price of the gas to the consumer was used in computing the value in 1922, whereas in previous years the values given were those reported as received by the producer. The difference in these quotations is accounted for by the existence of pipe-line companies who purchase gas from the producers and distribute it to a large number of individual consumers scattered over wide areas.

Asbestos mining in Quebec, in common with other asbestos-producing countries of the world, suffered a decline in 1921 which continued throughout the first half of 1922. Towards the close of the year there was a considerable revival in this industry and the production was much better than at any time previously in the last two years. The reduction in the percentage of royalty taxes imposed by the Provincial Government on all asbestos produced and sold will undoubtedly prove quite a stimulus to the industry as a whole. The manufacture of finished asbestos products is being looked forward to as a coming important industry in the province of Quebec, and the making of asbestos papers, shingles, brake linings and such other products will provide a more extensive outlet for the production than the export of the crude material. The amount of asbestos sold in 1922 was 76·4 per cent higher than in the previous year and sales amounted to 163,706 tons for which the producers received $5,552,723.

Sand and gravel production in 1922 was valued at $3,502,935, an increase of approximately 38 per cent over the value of the output in the preceding year. The tonnages produced in both years were about the same. Owing to the widely distributed deposits of sand and gravel in Canada, a great many pits were operated and the products included sands for building purposes, for foundry use, for the manufacture of glass and also very largely for the ballasting of railroad beds, and repairs to existing mines.

The production of lime increased 30·4 per cent in quantity and 13·8 per cent in value above the amounts reported for the preceding year. The improvement in the construction industry was largely responsible for the betterment of the production in the lime-burning industry.

The production of gypsum in recent years has contributed appreciably to the mineral production of Canada and in 1922 the sales were 44·6 per cent greater in quantity than in the previous year and the total value showed an advance of 21 per cent to $2,160,898. Production included lump or mine run, crushed, fine-ground and calcined gypsum sold, and calcined gypsum used in the calcining plants for the production of wall-plaster, alabastine and other gypsum products.

Ontario continued to be the chief producer of salt, contributing 97·2 per cent of the total sales for Canada. The 1922 production from all sources showed an increase of approximately seventeen thousand tons in quantity, although declining prices resulted in a decrease in the value of total sales amounting to about forty-five thousand dollars.

The increase in the production of metals during the year amounting to $12,442,475 in value marks a resumption of progress in the metal-mining field and points the way to greater prosperity. The slight decline in the production of non-metallics including coal amounted to $4,865,888 in value and since the greater part of this decrease was due to loss of production, caused through labour troubles, the slight set-back may be regarded as negligible. In the successful marketing of structural materials and clay products the revival of the building industry played a great part and during the year the production of these materials was considerably increased.

The recovery in mineral production as a whole to a total value of $184,297,242 may be considered as most propitious. Comparison with preceding years shows that 1920, 1918 and 1917 were the only years in which this valuation was exceeded.

Mineral Statistics.—There is some variation in the methods used by the several Provincial Governments in computing the value of the metallic mineral output. In the province of British Columbia the accepted method is "to determine as the value of the metal production of the province the amount of ore for which the smelter or mill returns have been received during the year." In Ontario, the general plan is the same except that the Provincial Government officers do not complete the compilation of the final reports for the year until full returns have been received by the mine operators from the smelters to which shipments were made. The practice in Quebec and the other provinces is similar to that followed in Ontario.

There seems to be reasonably complete agreement between the representatives of each of the provinces and of the Dominion in regard to reports on the production of non-metallic minerals and structural materials.

The apparent discrepancies between the mineral production reports issued from the Dominion Government and from the several Provincial Governments may be accounted for by the statement that different points of view have been held as to methods of procedure with the result that the questionnaires from the several offices have called for different information and even when the same data have been asked for, varying methods of compilation have been used in order to present to the reader the particular points of view held by the different offices.

The value of the mineral production of a province may be computed as the receipts by the mine and smelter operators from the mining and smelting industry in that province or it may be determined as the part of the world's mineral production contributed by the mines of the province. For many ores, return is made by a smelter for possibly one or two of the principal metals contained, and the mine operator is paid on this basis. Valuable by-products obtained by the smelter may be sold by it either as the finished product of commerce, or in the form of concentrates or residues. Again, as in the case of nickel, it may be that the Canadian smelter disposes of its product in the form of matte which has subsequently to be refined elsewhere.

For statistical and comparative purposes, it has always been customary to determine the value of the metals, copper, gold, silver, lead, nickel, and zinc as far as possible on the basis of the quantities of metals recovered from Canadian ores smelted during the year, either in Canada or abroad and to compute the value of this production in each case at the average price of the refined metal in a recognized market. The value of the non-metallics, and of the structural materials was determined as the value received by the producer at point of shipment. In this report, no departure has been made from the practice previously followed. The New York market was used in the case of the principal metals since most sales of Canadian products are made on that market.

While the foregoing plan results in data being obtained which show the value in the world's markets of the principal metals produced from Canadian ores during the year, it is possible to compute another set of figures showing more closely the actual returns to the companies operating mines or reduction plants. As an example of this method, Table 15 has been computed for Ontario, and while only Ontario production has been thus recorded, the table serves to present the method which, it is possible, may be applied to the returns from the other provinces in subsequent years, providing that the plan meets with general approval. Thus, two series of provincial tables would be shown; one presenting the production data at world market values; the other, indicating the return to the mine and smelter operators of the province.

In making up this statement for Ontario, the actual quantities sold have been recorded with the values as reported by the shippers. This record shows the net value accruing to the mine and smelter operators. Care has been taken to avoid possible duplication among the items in the table by including in the compilation for each item only the data supplied by the last operator in the province through whose hands the commodity passed. For example, concentrates shipped out of the province directly from a mine, have been valued at the sum received by the mine operator, f.o.b. shipping point; on the other hand, when a mine operator shipped to a smelter in Ontario, no record of such shipments were included but the shipments of products from the smelters have been given in detail.

The whole problem of the co-ordination of mineral statistics has been under study in the Bureau for some time and several improvements in procedure have already been introduced.

Table 3.—Exchange Table showing the amount paid in Canadian dollars for one United States dollar by months, 1920, 1921 and 1922

Month	1920	1921	1922
	$	$	$
January	1·1056	1·1437	1·0553
February	1,1497	1,1362	1,0351
March	1·1178	1·1337	1·0297
April	1·1112	1·1216	1·0208
May	1·1134	1·1164	1·0125
June	1·1381	1·1294	1·0138
July	1·1134	1·1328	1·0091
August	1·1275	1·1168	1·0023
September	1·1075	1·1106	0·9998
October	1·1016	1·0931	1·0011
November	1·1231	1·0904	0·9998
December	1·1643	1·0687	0·9966
Average for the year	**1·1227**	**1·1161**	**1·0145**

Table 4.—Metal Prices

—	Market	Unit	1918	1919	1920	1921	1922
			$	$	$	$	$
Antimony (ordinaries)	New York	Pound	0·12581	0·08190	0·08490	0·04957	0·05471
Arsenic, white	"	"	0·09	0·10	0·11	0·08850	0·08500
Cobalt	"	"	2·50	2·50	2·50	3·00	3·25
Cobalt oxide	"	"	1·85	1·65	–	–	2·00
Copper	"	"	0·24628	0·18691	0·17456	0·12502	0·13382
Lead	New York	"	0·07413	0·05759	0·07957	0·04545	0·05734
"	Montreal*	"	0·09250	0·06906	0·08940	0·05742	0·06219
Nickel	New York*	"	0·4628	0·45	0·45	0·35	0·35
Platinum	" *	Ounce	105·95	114·61	110·9	75·033	97·618
Silver	" *	"	0·96772	1·11122	1·009	0·62654	0·67528
Tin	"	Pound	0·88750	0·63328	0·48273	0·28576	0·31831
Zinc	St. Louis*	"	0·07890	0·06988	0·07671	0·04655	0·05716

*Quotations used in this report in computing value of mineral production.

Table 5.—Prices of Non-Metallic Minerals and Structural Materials, 1918-1922, showing the average returns received by producers, f.o.b. shipping points in Canada as computed from the total receipts and total shipments for the year

Commodity	Unit	1918	1919	1920	1921	1922
NON-METALLIC		$	$	$	$	$
Actinolite	Ton	11 00	11 00	11 60	12 50	11 50
Asbestos	"	56 68	68 93	74 12	52 89	33 92
Barytes	"	15 88	17 42	30 60	35 43	33 00
Chromite	"	39 42	26 80	22 82	19 90	15 00
Coal	"	3 68	3 99	4 86	4 81	4 32
Corundum	"	190 59	.....	125 24	138 87	.....
Feldspar	"	6 00	5 87	7 42	7 73	8 96
Fluor-spar	"	21 19	19 32	21 40	24 69	22 08
Graphite	"	79 91	73 69	75 62	70 29	52 52
Grindstones	"	27 01	29 96	36 06	50 00	43 52
Gypsum	"	5 40	4 06	4 41	4 62	3 86
Magnesite	"	25 82	29 14	27 90	21 80	26 78
Magnesium sulphate	"	7 47	12 35	20 49	19 47	23 52
Manganese	"	14 16	21 42	16 99	50 00	28 00
Mica	"	363 52	99 41	170 69	99 80	45 46
Mineral water	Gal	.....	.....	.....	0 07	0 06
Natro-alunite	Ton	.....	.....	.....	50 00	50 00
Natural gas	M. cu. ft	0 22	0 21	0 25	0 33	0 40
Oxides, iron	Ton	6 49	9 56	8 26	10 34	15 18
Peat	"	.....	6 65	4 10	4 00	4 83
Petroleum, crude	Bbl	2 90	3 06	4 19	3 42	3 41
Phosphate	Ton	8 57	13 79	.....	15 00	9 45
Pyrites	"	4 14	2 96	4 12	3 62	4 10
Quartz	"	2 34	5 55	3 65	3 12	1 90
Salt	"	9 75	9 43	7 36	10 16	8 96
Sodium sulphate	"	.....	.....	24 04	30 25	23 76
Talc	"	6 56	6 24	7 70	14 28	14 28
Tripolite	"	25 00	20 00	33 08	33 00	26 39
STRUCTURAL MATERIALS AND CLAY PRODUCTS						
Cement, portland and puzzolan	Bbl	1 97	1 96	2 22	2 47	2 22
Clay products—						
Bricks, common	M	11 39	13 21	15 94	16 18	15 99
Bricks, pressed	"	15 91	17 52	23 54	21 47	20 31
Bricks, hollow building	"	29 16	38 65	.....	48 88	91 72
Bricks, moulded and ornamental	"	79 26	27 95	21 03	25 35	20 68
Firebrick	"	.....	.....	.....	53 85	37 55
Fireclay	Ton	.....	.....	.....	10 18	5 41
Fireproofing and hollow porous blocks	"	8 07	8 34	12 05	.....	.....
Kaolin	"	22 36	18 11	22 00	15 23	14 92
Paving brick	M	.....	.....	.....	.....	39 81
Sewer-pipe	Ton	19 13	17 10	26 31	.....	23 26
Tile, drain	M	25 27	30 71	38 73	.....	27 65
Lime	Bush	0 29	0 32	0 41	0 40	0 35
Sand and gravel	Ton	0 21	0 26	0 37	0 22	0 30
Stone—						
Granite	Ton	.....	.....	.....	2 94	3 24
Limestone	"	.....	.....	.....	1 55	1 32
Marble	"	.....	.....	.....	104 67	121 28
Sandstone	"	.....	.....	.....	2 75	3 20

Table 6.—Annual Values of the Mineral Production in Canada since 1886

Year	Value of production	Value per capita
	$	$
1886	10,221,255	2·23
1887	10,321,331	2·23
1888	12,518,894	2·67
1889	14,013,113	2·96
1890	16,763,353	3·50
1891	18,976,616	3·92
1892	16,623,415	3·39
1893	20,035,082	4·04
1894	19,931,158	3·98
1895	20,505,917	4·05
1896	22,474,256	4·38
1897	28,485,023	5·49
1898	38,412,431	7·32
1899	49,234,005	9·27
1900	64,420,877	12·04
1901	65,797,911	12·16
1902	63,231,836	11·36
1903	61,740,513	10·83
1904	60,082,771	10·27
1905	69,078,999	11·49
1906	79,286,697	12·81
1907	86,865,202	13·75
1908	85,557,101	13·16
1909	91,831,441	13·70
1910	106,823,623	14·93
1911	103,220,994	14·32
1912	135,048,296	18·33
1913	145,634,812	19·35
1914	128,863,075	16·75
1915	137,109,171	17·44
1916	177,201,534	22·05
1917	189,646,821	23·18
1918	211,301,897	25·37
1919	176,686,390	20·84
1920	227,859,665	26·40
1921	171,923,342	19·56
1922	184,297,242	20·55

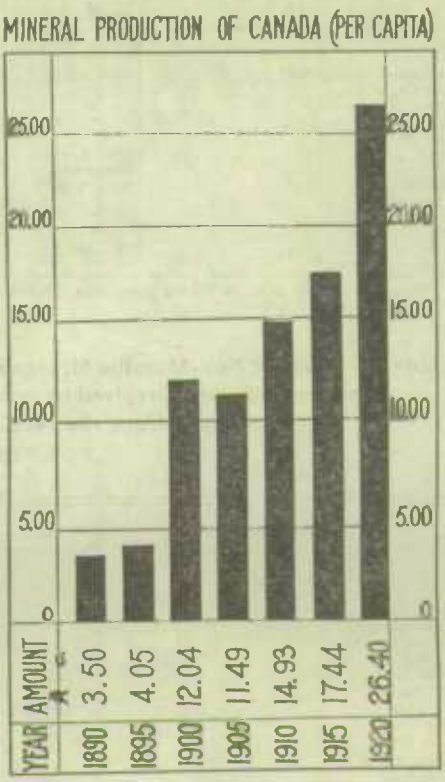


Table 7.—Annual Values of Metallic and Non-Metallic Mineral Production of Canada since 1907

Year	Metallic	Non-Metallic		Total
		Fuels and other non-metallics	Structural materials and clay products	
	$	$	$	$
1907	42,426,607	31,275,546	12,863,049	(a) 86,865,202
1908	41,774,362	32,142,784	11,339,955	(a) 85,557,101
1909	44,156,841	31,141,251	16,533,349	91,831,441
1910	49,438,873	37,757,158	19,627,592	106,823,623
1911	46,105,423	34,405,960	22,709,611	103,220,994
1912	61,172,753	45,080,674	28,794,869	135,048,296
1913	66,361,351	48,463,709	30,809,752	145,634,812
1914	59,386,619	43,467,229	26,009,227	128,863,075
1915	75,814,841	43,373,571	17,920,759	137,109,171
1916	106,319,365	53,414,983	17,467,186	177,201,534
1917	106,455,147	63,354,363	19,837,311	189,646,821
1918	114,549,152	77,621,946	19,130,799	211,301,897
1919	73,262,793	76,002,087	27,421,510	176,686,390
1920	77,939,630	108,027,947	41,892,088	227,859,665
1921	49,343,232	87,842,682	34,737,428	171,923,342
1922	61,785,707	82,976,794	39,534,741	184,297,242

(a) Total includes $300,000 allowed for products not reported.

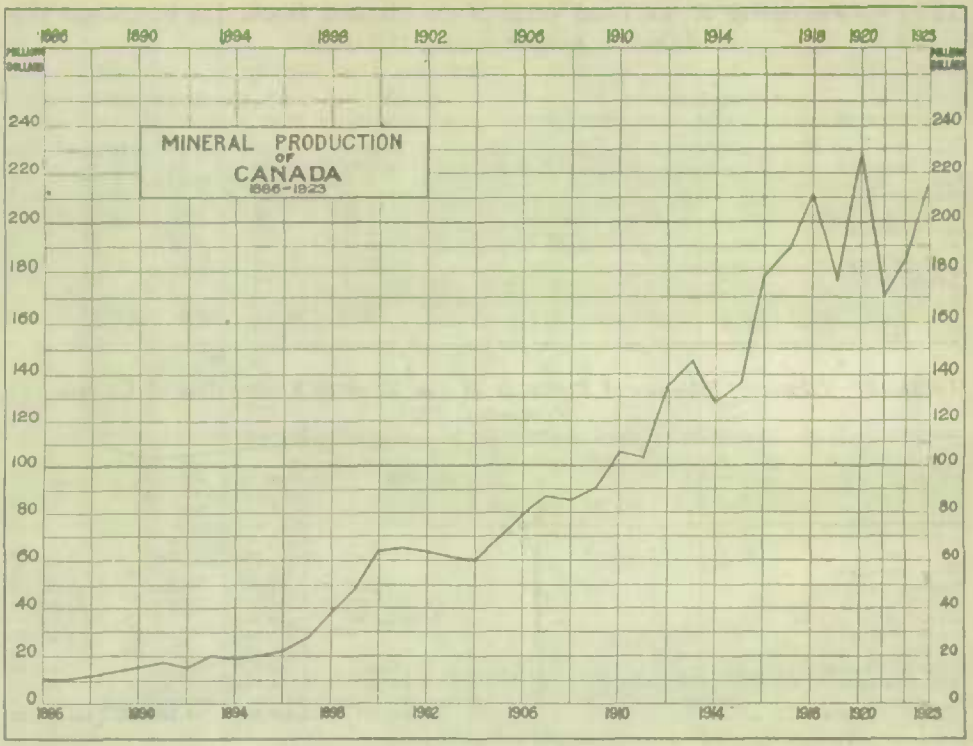


Table 8.—Values of the Mineral Production of Canada by Provinces, 1899-1922

Year	Nova Scotia*	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	Yukon	British Columbia
	$	$	$	$	$				$
1899	6,817,274	420,227	2,585,635	9,819,557		17,108,707			12,482,605
1900	9,298,479	439,060	3,292,383	11,258,099		23,452,330			16,680,526
1901	7,770,159	487,985	3,759,984	13,970,010		19,297,940			20,531,833
1902	10,686,549	607,129	3,743,636	14,619,091		16,127,400			17,448,031
1903	11,431,914	580,495	3,585,938	14,160,033		14,082,986			17,809,147
1904	11,212,746	550,913	3,688,482	12,582,843		12,713,613			19,325,174
1905	11,507,047	559,035	4,405,975	18,833,292		11,387,642			22,386,008
1906	12,894,303	646,328	5,242,058	25,111,682		10,092,726			25,209,600
1907	14,532,040	604,467	6,205,553	30,381,638	898,775	533,251	4,657,524	3,335,898	25,656,056
1908	14,487,108	579,816	6,372,949	30,623,812	584,374	413,212	5,122,505	3,669,290	23,704,035
1909	12,504,810	657,035	7,086,265	37,374,577	1,193,377	456,246	6,047,447	4,032,678	22,479,006
1910	14,195,730	581,942	8,270,136	43,538,078	1,500,359	498,122	8,996,210	4,764,474	24,478,572
1911	15,409,397	612,830	9,304,717	42,796,162	1,791,772	636,706	6,662,673	4,707,432	21,299,305
1912	18,922,236	771,004	11,656,998	51,985,876	2,463,074	1,165,642	12,073,589	5,933,242	30,076,635
1913	19,376,183	1,102,613	13,475,534	59,167,749	2,214,496	881,142	15,054,046	6,276,737	28,086,312
1914	17,584,639	1,014,570	11,836,929	53,034,617	2,413,489	712,313	12,684,234	5,418,185	24,164,039
1915	18,088,342	903,467	11,619,275	61,071,287	1,318,387	451,933	9,909,347	5,057,708	28,089,425
1916	20,042,262	1,118,187	14,406,598	89,461,323	1,823,576	590,473	13,297,543	5,491,610	39,009,962
1917	21,104,542	1,435,024	17,400,077	89,066,600	2,628,264	860,651	16,527,535	4,482,202	36,141,926
1918	22,317,108	2,444,017	19,605,347	94,694,093	3,120,600	1,019,781	23,109,987	2,355,611	42,935,333
1919	23,445,215	1,770,945	21,267,947	67,917,998	2,868,378	1,521,964	21,087,582	1,940,934	34,865,427
1920	34,130,017	2,491,787	28,886,214	81,715,808	4,223,401	1,837,468	33,586,456	1,576,726	39,411,728
1921	28,912,111	1,901,505	15,157,094	57,356,651	1,934,117	1,114,220	30,562,229	1,754,055	33,230,460
1922	25,923,499	2,263,692	17,647,939	65,866,029	2,258,942	1,255,470	27,872,136	1,785,573	39,423,962

*Includes a small production from Prince Edward Island.

Table 9.—Percentage of the Total Value of the Mineral Production of Canada produced by each Province, 1918-1922

Province	1918	1919	1920	1921	1922
Nova Scotia	10·36	13·27	14·98	16·82	14·12
New Brunswick	1·01	1·00	1·09	1·10	1·23
Quebec	9·28	12·04	12·68	8·82	9·57
Ontario	44·82	38·44	35·86	33·36	35·74
Manitoba	1·53	1·62	1·85	1·12	1·23
Saskatchewan	0·48	0·86	0·81	0·65	0·67
Alberta	10·94	11·94	14·74	17·78	15·13
British Columbia	20·27	19·73	17·30	19·33	21·39
Yukon	1·11	1·10	0·69	1·02	0·92
	100·0	100·0	100·0	100·0	100·0

Table 10.—Values by Classes of Products of the Mineral Production of Canada, by Provinces, 1922

—	Metallic	Non-Metallic	Structural Materials and Clay Products	Total
	$	$	$	$
Nova Scotia	21,598	25,285,789	616,112	25,923,499
New Brunswick	.....	1,846,133	417,559	2,263,692
Quebec	1,410	6,041,067	11,605,462	17,647,939
Ontario	37,937,252	7,669,350	20,259,427	65,866,029
Manitoba	3,239	440,974	1,814,729	2,258,942
Saskatchewan	.....	814,033	441,437	1,255,470
Alberta	.....	26,026,146	1,845,990	27,872,136
British Columbia	22,041,285	14,848,652	2,534,025	39,423,962
Yukon Territory	1,780,923	4,650	.....	1,785,573
Canada	**61,785,707**	**82,976,794**	**39,534,741**	**184,297,242**

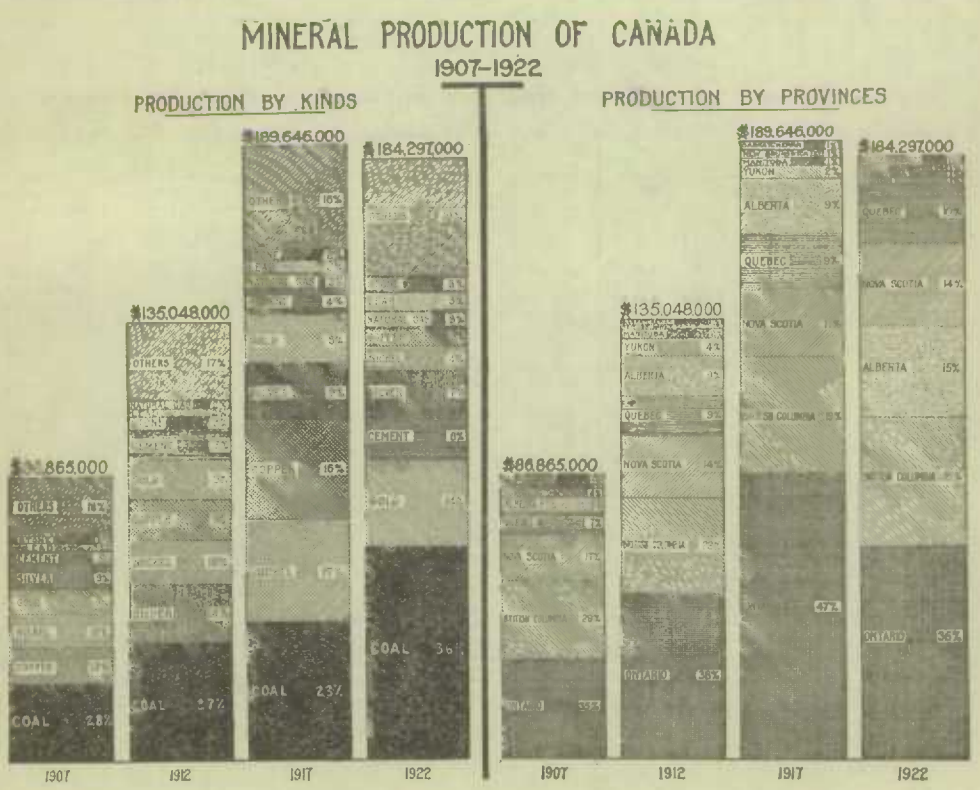


Table 11.—Mineral Production of Nova Scotia, 1920, 1921 and 1922

	1920		1921		1922	
	Quantity	Value	Quantity	Value	Quantity	Value
		$		$		$
METALLIC—						
Gold.....Fine oz.	690	14,263	*465	9,091	*1,128	21,598
NON-METALLIC—						
Barytes.....Tons	751	22,983	270	9,567	289	9,537
Coal..... "	6,429,291	32,238,129	5,734,928	27,782,050	5,569,072	24,629,921
Feldspar..... "	.....	.....	16	117	.....	.....
Grindstones..... "	211	8,440	183	6,990	102	3,692
Gypsum..... "	260,661	573,752	206,831	511,883	332,404	580,148
Manganese..... "	62	4,140	68	3,400	73	2,044
Salt..... "	3,023	32,000	2,638	23,269	5,053	54,666
Tripolite..... "	280	8,600	341	11,268	219	5,781
STRUCTURAL MATERIALS AND CLAY PRODUCTS—						
Clay Products.....	.....	541,114	.....	361,761	.....	431,618
Lime.....Bush.	201,500	40,300	25,914	6,085	.....	.....
Stone.....Tons	.....	420,175	58,923	116,602	87,955	119,492
Other products.....	.....	226,121	.....	† 70,028	.....	† 65,002
Total.....	.....	**34,138,017**	.....	**28,912,111**	.....	**25,923,499**

*Includes 25 oz. silver, value $16 in 1921, and 86 ounces silver, value $58 in 1922.
†Includes railway ballast from P.E.I., $1,433, in 1921; and $10,028 in 1922.

Table 12.—Mineral Production of New Brunswick, 1920, 1921 and 1922

Product	1920		1921		1922	
	Quantity	Value	Quantity	Value	Quantity	Value
		$		$		$
NON-METALLIC—						
Coal.....Tons	166,048	1,055,286	187,192	920,666	287,513	1,107,643
Grindstones..... "	2,233	79,696	1,098	57,077	903	40,050
Gypsum..... "	49,405	428,183	54,030	360,220	82,462	517,668
Natural gas.....M cu. ft.	682,502	130,506	708,743	139,375	753,898	148,040
Petroleum.....Bbl.	5,148	19,963	7,479	33,022	7,778	32,732
STRUCTURAL MATERIALS—						
Clay products.....	.....	73,484	.....	66,600	.....	75,425
Lime.....Bush.	701,859	365,030	562,447	203,084	560,834	187,895
Stone.....Tons	.....	280,167	15,125	97,290	12,027	104,730
Sand and gravel..... "	.....	59,472	239,192	24,171	448,322	49,509
Total.....	.....	**2,491,787**	.....	**1,901,505**	.....	**2,263,692**

Table 13.—Mineral Production* of Quebec, 1920, 1921 and 1922

Product		1920		1921		1922	
		Quantity	Value	Quantity	Value	Quantity	Value
			$		$		$
METALLIC—							
Copper	Lb.	880,638	153,724	352,308	44,045	.....	.....
Gold	Ozs.	955	19,742	635	13,127	.....	.....
Iron ore, sold for export	Tons	960	3,000	.....	.....	526	1,410
Lead	Lb.	905,472	80,949	595,881	34,215	.....	.....
Molybdenite	"	.....	.....	.....	.....	.....	.....
Silver	Ozs.	61,003	61,552	38,084	23,861	.....	.....
Zinc	Lb.	1,120,200	85,931	.....	.....	.....	.....
NON-METALLIC—							
Asbestos and asbestic	Tons	199,573	14,792,201	92,761	4,906,230	163,706	5,552,723
Chromite	"	11,016	251,379	2,798	55,696	767	11,503
Feldspar	"	649	10,052	9,737	80,180	12,472	127,826
Graphite	"	233	31,913	38	2,423	24	1,500
Magnesite	"	18,378	512,756	2,927	74,109	2,849	76,294
Mica	"	.....	281,460	484	41,172	1,360	97,748
Mineral water	Gal.	24,219	10,109	19,626	7,278	12,161	3,692
Iron oxides	Tons	19,128	157,909	8,879	92,765	7,282	110,488
Phosphate	"	.....	.....	30	450	131	1,320
Pyrites	"	14,817	44,451	1,986	10,463	.....	.....
Quartz	"	1,986	5,558	5,994	29,824	10,994	53,023
Talc	"	150	1,050	.....	.....	150	4,950
STRUCTURAL MATERIALS—							
Cement	Bbl.	3,013,463	6,545,054	2,135,631	5,410,275	2,660,935	5,907,300
Clay products		.....	2,361,007	.....	1,742,872	.....	2,476,370
Kaolin	Tons	683	15,022	124	1,888	1,197	17,866
Lime—							
Quicklime	Bush.	† 2,108,203	826,044	1,940,594	754,375	2,108,513	634,157
Hydrated lime	Tons			3,495	36,128	5,278	55,642
Slate	"	(a)	14,200	(b)	22,325	1,899	14,871
Stone	"	.....	2,189,325	719,499	1,662,641	987,355	2,342,316
Sand and gravel	"	.....	431,826	700,669	110,752	905,101	156,940
Total		.....	**28,886,214**	.....	**15,157,894**	.....	**17,647,839**

*There is also in this Province an important production of aluminium from imported ores.
†Bushels.
(a) 1,532 squares, and 240 tons of crushed material.
(b) 415 squares and 2,232 tons crushed material.

Table 14.—Mineral Production of Ontario, 1920, 1921 and 1922

Product	1920		1921		1922	
	Quantity	Value	Quantity	Value	Quantity	Value
		$		$		$
METALLIC—						
Cobalt ..... Lb.	546,023	1,365,058	251,986	755,958	569,960	1,852,370
Copper ..... "	32,059,993	5,596,392	12,821,385	1,602,930	10,943,636	1,464,477
Gold ..... Ozs.	564,995	11,679,483	708,213	14,640,062	1,000,340	20,678,862
Iron ore, sold for export ..... Tons	6,683	54,266	48	242	.....	.....
Iron, pig, from Canadian ore (a) ..... "	75,869	2,066,997	56,564	1,873,682	8,095	178,980
Lead ..... Lb.	2,255,520	201,643	3,312,493	190,203	2,890,397	180,216
Nickel ..... "	61,335,706	24,534,282	19,293,060	6,752,571	17,597,123	6,158,993
Platinum ..... Ozs.	578	36,961	269	20,184	458	44,709
Palladium ..... "	913	58,392	591	38,267	724	47,060
Rhodium, ruthenium, osmium ..... "	513	31,815	57	9,690	391	31,280
Silver ..... Ozs.	9,907,626	9,996,795	9,761,607	6,116,037	10,811,903	7,300,305
Zinc ..... Lb.	13,950	1,070	.....	.....	.....	.....
NON-METALLIC—						
Actinolite ..... Tons	100	1,160	78	975	50	575
Arsenious oxide ..... "	1,831	425,617	1,491	233,763	2,058	290,940
Corundum ..... "	196	24,547	403	55,965	.....	.....
Feldspar ..... "	37,224	270,843	20,115	150,457	15,255	120,576
Fluorspar ..... "	3,758	68,475	116	1,744	284	3,905
Graphite ..... "	1,957	133,704	899	63,439	573	29,853
Gypsum ..... "	74,707	404,162	84,790	433,053	110,227	621,668
Mica ..... "	1,466	94,562	218	28,891	1,989	54,515
Mineral water ..... Imp. gal	.....	14,473	308,647	14,438	209,072	10,528
Natural gas ..... M. cu. ft	10,529,374	2,920,731	8,422,774	3,080,130	8,060,114	4,076,296
Peat ..... Tons	4,550	18,650	1,666	6,664	3,000	14,500
Petroleum ..... Bbl.	180,071	726,286	172,859	559,198	164,732	526,316
Phosphate ..... Tons	.....	.....	.....	.....	59	476
Pyrites ..... "	148,652	618,283	27,785	101,306	11,233	30,763
Quartz ..... "	90,433	321,063	72,068	220,806	81,528	118,054
Salt ..... "	206,832	1,512,724	161,987	1,649,626	176,741	1,573,657
Strontium ..... "	75	2,625	.....	.....	.....	.....
Talc ..... "	21,411	162,784	9,967	140,390	12,854	178,728
STRUCTURAL MATERIALS AND CLAY PRODUCTS						
Cement ..... Bbl.	2,035,594	4,377,814	2,723,071	6,424,356	3,104,386	6,393,566
Clay products	.....	5,613,488	.....	5,183,125	.....	6,944,218
Lime—						
Quicklime ..... Bush.	(b)5,109,635	1,962,086	2,763,062	962,439	3,939,954	1,311,563
Hydrated ..... Tons			26,862	381,749	36,408	455,980
Sand-lime brick ..... No.	30,664,720	451,175	.....	.....	.....	.....
Stone ..... Tons	.....	4,035,478	2,716,080	4,167,582	2,317,265	2,969,926
Sand and gravel ..... "	.....	1,931,924	6,273,173	1,496,729	6,285,123	2,184,174
Total	.....	**81,715,808**	.....	**57,356,651**	.....	**65,866,02?**

(a) The total production of blast-furnace pig-iron in Ontario in 1920 was 749,068 tons, valued at $22,252,062; in 1921, 494,901 tons valued at $14,856,352, and in 1922, 293,662 tons valued at $6,493,513.

(b) Bushels.

Table 15.—Sales and Shipments from the Mineral Industries of Ontario. (Quantities shown are final shipments during the year; values given are those reported as received, f.o.b. shipping point, by the shippers.)

Metal Mining Industries		Quantity	Marketed value as reported
			$
SILVER COBALT INDUSTRY—			
Sold by South Ontario smelters—			
Silver bullion	Ozs.	1,814,874	1,245,329
Arsenic*	Tons	2,058	299,940
Cobalt oxide	Lb.	398,696	798,271
Cobalt metal	"	109,067	282,602
Nickel oxide	"	10,047	1,721
Nickel metal	"	106,318	31,035
Nickel sulphate	"	27,270	2,230
Mixed oxides	"	123,605	99,687
Copper sulphate	"	22,553	1,310
Arsenate of iron	Tons	38	938
Matte		.....	38,050
Residues exported	Tons	460	153,116
Sold direct from Ontario silver mines—			
Silver bullion	Ozs.	7,526,646	5,125,802
Ores, concentrates and residues exported	Tons	1,528	391,250
Total for Silver-Cobalt Industry		.....	**8,471,281**
NICKEL-COPPER INDUSTRY—			
Matte exported	Tons	19,831	3,681,503
Refined nickel	"	5,533	3,140,399
Nickel oxides	"	1,195	389,398
Converter copper	"	2,191	502,293
Precious metals		.....	13,663
Total for Nickel-Copper Industry		.....	**7,727,256**
GOLD MINING INDUSTRY—			
Crude bullion	Ozs.	1,259,378	20,745,268
Exchange premium		.....	208,717
Slags exported	Tons	33	13,484
Total for Gold-Mining Industry		.....	**20,968,469**
LEAD MINING AND SMELTING INDUSTRY—			
Lead bullion	Lb.	2,860,715	178,366
IRON MINING AND SMELTING INDUSTRY—			
Pig iron from Ontario ores	Tons	8,095	178,980
Totals—			
(a) Metal Mining and Smelting Industries		.....	37,524,352
(b) Non-Metallic Mineral Industries, as per Table 14		.....	7,369,410
(c) Structural Materials and Clay Products Industries, as per Table 14		.....	20,259,427
Grand Total of Sales		.....	**65,153,189**

*In Table 14 arsenic is included with Non-Metallics.

Table 16.—Mineral Production of Manitoba, 1920, 1921 and 1922

Product		1920		1921		1922	
		Quantity	Value	Quantity	Value	Quantity	Value
METALLIC—			$		$		$
Copper	Lb.	3,062,577	534,604	.....	.....	.....	.....
Gold	Ozs.	781	16,145	207	4,279	156	3,225
Silver	"	15,510	15,649	33	20	20	14
NON-METALLIC—							
Gypsum	Tons	44,371	487,894	40,859	480,282	34,072	440,914
Natural gas	M cu. ft.	200	60	200	60	200	60
STRUCTURAL MATERIALS AND CLAY PRODUCTS							
Clay products		.....	206,764	.....	208,982	.....	210,740
Lime	Bush.	605,399	210,984	413,283	136,375	382,184	163,799
Sand-lime brick	No.	10,278,802	197,734	.....	.....	.....	.....
Stone	Tons	.....	374,286	16,868	56,666	34,359	106,638
Other products*		.....	2,179,341	.....	1,047,453	.....	1,333,552
Total		.....	**4,223,461**	.....	**1,934,117**	.....	**2,258,942**

*Includes cement and sand and gravel.

Table 17.—Mineral Production of Saskatchewan, 1920, 1921 and 1922

Product		1920		1921		1922	
		Quantity	Value	Quantity	Value	Quantity	Value
			$		$		$
NON-METALLIC—							
Coal	Tons	343,475	819,320	335,632	823,180	382,437	802,053
Magnesium sulphate	"	2	103	2	120	.....	.....
Salt	"	.....	.....	33	790	.....	.....
Sodium sulphate	"	811	19,496	624	18,850	504	11,980
STRUCTURAL MATERIALS AND CLAY PRODUCTS							
Clay products		.....	471,448	.....	166,244	.....	134,704
Sand-lime brick (a)	No.	2,258,500	35,383	.....	.....	.....	.....
Sand and gravel	Tons	.....	491,718	.....	105,036	924,944	306,733
Total		.....	**1,837,468**	.....	**1,114,220**	.....	**1,255,470**

(a) Sand-lime brick not included under Mineral Production in 1921 and 1922.

Table 18.—Mineral Production of Alberta, 1920, 1921 and 1922

Product		1920		1921		1922	
		Quantity	Value	Quantity	Value	Quantity	Value
			$		$		$
METALLIC—							
Gold, alluvial	Ozs.	.....	.....	49	1,013	.....	.....
NON-METALLIC—							
Coal	Tons	6,833,500	29,849,608	5,909,217	27,246,514	5,990,911	24,351,913
Natural gas	M cu. ft.	5,633,442	1,181,345	4,945,884	1,374,599	5,867,459	1,622,105
Petroleum	Bbl.	11,032	75,986	7,203	49,313	5,608	52,128
STRUCTURAL MATERIALS AND CLAY PRODUCTS—							
Clay products		.....	786,430	.....	710,477	.....	700,063
Lime	Bush.	139,433	72,477	107,083	48,332	130,627	71,328
Sand-lime brick	No.	2,257,000	40,626	.....	.....	.....	.....
Stone	Tons	.....	4,415	2,962	13,750	554	7,300
Other products*		.....	1,575,569	.....	1,118,231	.....	1,067,299
Total		.....	**33,586,456**	.....	**30,562,229**	.....	**27,872,136**

*Includes cement and sand and gravel.

Table 19.—Mineral Production of British Columbia, 1920, 1921 and 1922

Product		1920		1921		1922	
		Quantity	Value	Quantity	Value	Quantity	Value
			$		$		$
METALLIC—							
Copper (a)	Lb.	45,319,771	7,911,019	34,447,127	4,306,580	31,936,182	4,273,700
Gold	Ozs.	124,808	2,580,010	150,792	3,117,147	207,370	4,286,718
Iron ore sold for export	Tons	1,212	7,272	1,010	3,030	1,255	3,528
Lead	Lb.	32,792,725	2,931,670	60,298,603	3,462,346	87,093,266	5,430,265
Platinum	Ozs.	17	719	23	1,726	12	1,154
Silver	"	3,327,028	3,356,971	3,350,357	2,009,133	7,150,937	4,828,384
Zinc	Lb.	38,729,762	2,970,909	53,089,356	2,471,310	56,299,000	3,217,536
NON-METALLIC—							
Arsenic	Tons	628	22,231	.....	.....	518	21,097
Coal	"	2,858,877	16,726,950	2,890,291	15,676,774	2,927,033	14,622,317
Fluorspar	"	7,477	171,971	5,403	134,523	4,219	98,233
Gypsum	"	.....	.....	40	100	100	500
Manganese	"	587	6,889	.....	.....	.....	.....
Magnesium sulphate	"	1,945	39,783	2,027	39,386	1,021	24,017
Magnesite	"	.....	.....	803	7,211	.....	.....
Natro-alunite	"	.....	.....	30	1,500	50	2,500
Oxides (iron)	"	.....	.....	169	845	3	120
Pyrites	"	11,275	56,376	3,597	4,557	6,908	34,540
Quartz	"	35,876	141,200	22,288	62,317	17,425	37,521
Sodium carbonate	"	.....	.....	197	14,775	202	3,027
Talc	"	110	3,100	167	4,175	191	4,780
STRUCTURAL MATERIALS AND CLAY PRODUCTS—							
Clay products		.....	596,172	.....	415,869	.....	447,452
Lime—							
Quicklime	Bush.	(b) 561,305	341,632	152,998	234,779	433,716	254,320
Hydrated	Tons			1,622	17,851	2,909	30,321
Stone	"	.....	276,505	142,041	229,165	197,670	324,591
Other products (c)		.....	1,270,298	.....	925,361	.....	1,477,341
Total		.....	**39,411,728**	.....	**33,230,469**	.....	**39,423,962**

(a) Smelter recoveries of copper. (b) Bushels. (c) Includes cement and sand and gravel.

Table 20.—Mineral Production of Yukon, 1920, 1921 and 1922

Product		1920		1921		1922	
		Quantity	Value	Quantity	Value	Quantity	Value
			$		$		$
METALLIC—							
Copper	Lb.	277,712	48,478	.....	.....	.....	.....
Gold	Ozs.	72,778	1,504,455	65,994	1,364,217	54,456	1,125,705
Silver	"	19,190	19,363	393,092	246,288	663,493	447,997
Lead	Lb.	.....	.....	2,472,615	141,978	3,323,508	207,221
NON-METALLIC—							
Coal	Tons	763	4,430	233	2,472	465	4,650
Total		.....	**1,576,726**	.....	**1,754,955**	.....	**1,785,573**

METALLICS

ALUMINIUM

Although aluminium was economically produced in the United States as far back as 1890 the production in Canada dates only from about the year 1903, when the Northern Aluminium Company developed its plant at Shawinigan Falls, Quebec. No commercial ores of aluminium have as yet been found in Canada and the consumers are dependent entirely upon imported ores or metals. The bulk of the ore consumed is drawn from the United States, but quantities are also imported from France; it is used in the manufacture of artificial abrasives as well as a source of aluminium.

Since there is but one firm engaged in the manufacture of aluminium in Canada, statistics of production as reported to the Bureau may not be separately shown. The manufacture of aluminium cooking utensils has, however, been considerably developed during the past few years, and there are now some eight companies engaged in the industry. A separate report by this Bureau is now available on this section of the trade.

Aluminium is reduced from its ores by electrical smelting in which small quantities of the mineral cryolite (imported from Greenland), are used. The resulting ingots are remelted and moulded into slabs, which after being rolled into plates form the raw product of the kitchen utensil trade. The uses for the metal are rapidly extending and it now enters into the production of power cables, especially in long spans where a light weight is desirable; in the manufacture of automobile bodies, cream separators, the frame work of airships, chemical vats, in the production of steel, where it is important in eliminating blowholes in castings and as mentioned above for cooking utensils.

The price of ingot aluminium which on the New York market for the year 1922 averaged 18·68 cents per pound has declined gradually to this level since August, 1920, when 32·21 cents was quoted. The following table shows the average monthly prices in cents per pound.

Table 21.—Monthly Average Prices of Ingot Aluminium

(at New York in cents per pound)

Month	1920	1921	1922
January	32·00	27·00	17·74
February	31·83	28·00	17·33
March	31·50	28·00	17·52
April	31·61	28·00	18·07
May	31·95	28·00	17·92
June	32·00	28·00	17·87
July	32·00	26·40	17·87
August	32·21	24·50	17·87
September	31·44	24·50	18·26
October	29·13	24·50	20·32
November	27·80	24·50	20·87
December	23·83	20·00	22·52
Average	**30·61**	**25·95**	**18·68**

Table 22.—Imports of Alumina and Aluminium into Canada and Exports of Aluminium during 1920, 1921 and 1922

	1920		1921		1922	
	Pounds	Value	Pounds	Value	Pounds	Value
		$		$		$
IMPORTS—						
Alumina	114,828,600	1,889,064	30,049,100	638,483	42,617,700	938,181
Aluminium—						
Ingots, blooms, bars	1,850,687	623,232	724,434	213,136	1,199,718	251,435
Tubing	20,049	10,501	15,846	8,291	34,157	16,594
Manufactures	.....	394,488	.....	258,885	.....	315,317
Leaf foil	.....	194,618	.....	97,332	.....	215,944
Household and hollow-ware	.....	367,702	.....	316,740	.....	544,784
Total	.....	**3,479,605**	.....	**1,532,867**	.....	**2,282,255**
EXPORTS—						
Aluminium—						
Ingots, bars, etc	19,716,300	6,094,628	5,399,800	1,259,703	9,614,200	1,637,147
Manufactures	.....	175,057	.....	273,401	.....	451,587
Total	.....	**6,269,685**	.....	**1,533,104**	.....	**2,088,734**

Table 23.—World's Production of Aluminium, 1913, 1918-1922

(Compiled from "The Mineral Industry, 1922")

(Short tons)

Country	1913	1918	1919	1920	1921	1922
Austria	5,510	8,816	5,511	2,204	2,204	4,408
Canada	6,519	16,530	16,530	11,020	6,612	9,918
France	14,880	13,249	13,444	13,224	11,020	13,224
Germany	882	27,550	16,530	11,020	11,020	13,224
Great Britain	11,020	15,428	11,020	8,816	5,510	10,469
Italy	963	1,890	1,844	1,364	820	694
Norway	2,755	8,265	4,408	5,510	4,408	6,612
Switzerland	11,020	16,530	16,530	13,224	11,020	13,224
United States	32,509	112,404	99,180	99,180	31,683	57,304
Total	**86,058**	**220,662**	**184,997**	**165,562**	**84,297**	**129,677**

ANTIMONY

Until the year 1917 the production of small quantities of antimony, either as ore, or as a constituent in the residues from the lead refining at Trail was more or less consistent. Since that time no production has been reported. The producers of this metal are the Consolidated Mining and Smelting Company, Trail, B.C., and the Antimony Products Corporation, formerly the North American Smelting Corporation, Limited, Lake George, N.B. This latter company, which was re-organized early in 1922, did not resume operations during that year.

The imports of antimony and antimony salts in 1922 were 421,696 pounds, valued at $26,001, as against 640,578 pounds, valued at $40,127, in 1921. No exports of antimony ore or regulus have been reported for the past three years.

Table 24.—Production of Antimony in Canada, 1886-1922

Calendar Year	Antimony ore		Refined regulus	
	Tons	Value	Pounds	Value
		$		$
1886	665	31,490	.....	.....
1887	584	10,860	.....	.....
1888	345	3,696	.....	.....
1889	55	1,100	.....	.....
1890	264	625	.....	.....
1891	10	60	.....	.....
1892-1897	.....	.....	.....	.....
1898	1,344	20,000	.....	.....
1899-1904	.....	.....	.....	.....
1905 (a)	527	.....	.....	.....
1906 (a)	782	.....	.....	.....
1907	2,016	65,000	63,850	5,108
1908 (b)	148	5,443	.....	.....
1909	35	1,575	61,207	4,285
1910	364	13,906	.....	.....
1911-1914	.....	.....	.....	.....
1915	1,341	81,283	59,440	11,888
1916	885	94,537	107,185	41,823
1917	361	22,000	.....	.....
1918-1922	.....	.....	.....	.....

(a) As recorded by the Nova Scotia Department of Mines: no value given.
(b) Exports.

Table 25.—Monthly Average Prices of Antimony, 1920, 1921 and 1922

(Compiled from quotations given in the Engineering and Mining Journal-Press—"Ordinaries" stand for Hungarian, Chinese, or other "Foreign" brands)

(at New York in cents per pound)

	1920	1921	1922
	Ordinaries	Ordinaries	Ordinaries
January	10·58	5·26	4·463
February	11·59	5·25	4·416
March	11·06	5·28	4·319
April	10·50	5·14	4·980
May	9·66	5·25	5·467
June	8·29	5·09	5·145
July	7·50	4·74	5·091
August	7·18	4·60	5·315
September	7·11	4·56	6·530
October	6·72	5·09	6·905
November	6·11	4·73	6·584
December	5·53	4·50	6·382
Average	**8·49**	**4·96**	**5·471**

Table 26.—Imports into Canada of Antimony, 1920, 1921 and 1922

	1920		1921		1922	
	Pounds	Value	Pounds	Value	Pounds	Value
		$		$		$
IMPORTS—						
Antimony or regulus of	1,059,249	86,803	619,287	34,641	405,646	22,340
Antimony salts	20,067	10,485	21,291	5,486	16,050	3,661
Total	**1,079,316**	**97,288**	**640,578**	**40,127**	**421,696**	**26,001**

COBALT

The cobalt production of Canada in 1922 was 569,960 pounds which at $3.25 per pound would be worth $1,852,370. These figures were obtained as the total of the metal cobalt contained in smelter products made in 1922 and cobalt in residues exported for treatment, valued at $3.25 which was the average New York quotation for cobalt during the year.

Until the discovery in 1903 of the famous silver-cobalt-nickel-arsenide ores at Cobalt in Northern Ontario, the main supply of cobalt metal was drawn from the mines of Europe. Upon the opening up of the Canadian field and the consequent development of metallurgical processes for the treatment of cobalt-bearing ores by the Deloro Smelting and Refining Company at Deloro and the Coniagas Reduction Company at Thorold, the production from the Canadian mines became the source of the major portion of the world's supply. Discoveries of cobalt ores have recently been reported in other countries, and some development work has been done. Deposits were reported in the state of Oregon in the United States, in Chile and the Argentine Republic in South America, and a small shipment of cobalt ore was made in 1921 from Queensland, Australia, to Swansea, Wales. Cobalt-bearing ores have also been treated at Fredericton, Missouri, but the production of cobalt or cobalt salts from other than Canadian ores has been small.

During 1922, three smelters in Ontario treating ores[1] and residues from the Cobalt District marketed cobalt oxide, metallic cobalt, and unseparated oxides. Most of the cobalt residues from the cyanide process were treated in Canada during 1922, although some of these, as well as smelter residues amounting in all to 518 tons containing 172,311 pounds of cobalt were shipped abroad for treatment. Small quantities of the metal were also contained in concentrates exported to the United States, but the cobalt contents were not paid for.

The historical summary of the production of cobalt in Canada which dates from the year 1904 is shown in the following table. The figures given for the years 1904 to 1910 inclusive were prepared by the Ontario Bureau of Mines, and represent the estimated cobalt contents of the ores shipped from the mines. From 1911 to 1920, inclusive, the quantities given are the cobalt contents of all smelter products sold or shipped, such as cobalt metal, the oxides, mixed oxides and residues, etc. For 1922 the practice has been changed to conform with the methods used for all other metals, and the metallic contents of products *made* by the smelters rather than sales or shipments have been shown.

Table 27.—Production of Cobalt in Canada, 1904-1922

Year	Pounds	Year	Pounds	Year	Pounds
1904	32,000	1911	1,704,000	1918	737,157
1905	236,000	1912	663,093	1919	530,371
1906	642,000	1913	865,937	1920	546,023
1907	1,478,000	1914	871,891	1921	251,986
1908	2,448,000	1915	504,212	1922	569,960
1909	3,066,000	1916	840,536		
1910	2,196,000	1917	1,079,572		

Table 28.—Summary of Cobalt Production Statistics

		1921		1922	
		Total Quantity	Cobalt Content	Total Quantity	Cobalt Content
Ores and residues treated	Tons	5,141	131,673	3,719	536,400
Output of Smelters—					
Metallic cobalt	Lb.	22,216	22,216	106,274	106,274
Cobalt oxide	"	216,875	151,812	360,495	252,347
Unseparated oxides	"	.....	.....	86,730	39,028
Residues	"	(a)	(a)	(a)	172,311
Total	"	.....	.....	.....	569,960
Computed Value		.....	.....	.....	$1,852,370
		Quantity	Value as Reported by Smelters	Quantity	Value as Reported by Smelters
Products Marketed—			$		$
Metallic cobalt	Lb.	32,718	98,228	109,067	282,602
Cobalt oxide	"	165,554	354,418	398,697	798,271
Unseparated oxides	"	105,676	113,865	123,605	99,687
Residues	"	294,497	53,139	1,036,000	(b)156,402
Total		.....	**619,650**	.....	**1,336,962**

(a) Not given. (b) Estimated.

[1] The Ontario Smelters and Refineries, Limited, which was one of the three smelters operating in 1922 made an assignment.

Table 29.—Imports into Canada and Exports of Cobalt, 1920, 1921 and 1922

	1920		1921		1922	
	Pounds	Value	Pounds	Value	Pounds	Value
		$		$		$
Imports—						
Ore	600	520	100	131	200	233
Total	**600**	**520**	**100**	**131**	**200**	**233**
Exports—						
Cobalt metal	304,382	493,425	60,035	141,199	111,830	288,776
Cobalt oxides and salts			190,483	405,300	430,024	770,511
Cobalt alloys	10,219	43,970	8,617	46,591	4,022	21,398
Ore		537,395		593,000		
Total		**1,074,790**		**1,186,189**		**1,080,685**

Table 30.—Imports of Cobalt into the United States, 1917-1922

(As given in the Preliminary Report on Mineral Resources of United States.)

Year	Cobalt, cobalt ore and zaffer		Cobalt oxide	
	Pounds	Value	Pounds	Value
		$		$
1917	223,794	360,050	276,406	275,821
1918	504,391	628,099	208,596	291,699
1919	77,556	144,282	131,424	184,751
1920	156,862	331,672	202,704	399,605
1921	46,099	108,774	164,003	342,426
1922	131,559	328,471	217,530	435,895

Uses.—Prior to the war the principal demand for cobalt in the form of oxide was for colouring in the ceramic industry. A small demand for cobalt metal now exists for use in making high-speed tools, such as "stellite" an alloy of cobalt, chrome, and tungsten, or molybdenum. A small amount is used for plating and for making salts, such as cobalt sulphate and cobalt carbonate, and also for making cobalt hydroxide. Small amounts of cobalt are also used in the form of oleate and resinate of cobalt as drying agents in the manufacture of varnishes.

Prices.—The market for cobalt which was very poor in 1915, gradually improved during the war. No quotations on the New York markets were available during 1918, 1919 and 1920 and a nominal Canadian price of $2.50 per pound has been used in this report. During 1921 the quotations given in the "*Engineering and Mining Journal-Press*" ranged from $3 to $3.50 per pound; the former value was used. In 1922 the average price was taken at $3.25 per pound.

Table 31.—Monthly Average Prices of Cobalt, 1920, 1921 and 1922

	(a) London in Shillings per Pound			(b) New York in Cents per Pound		
	1920	1921	1922	1920	1921	1922
January	10/6	30/-	14/-	(c)	510	325
February	10/6	30/-	13/-	(c)	450	325
March	10/6	25/-	14/-	(c)	450	325
April	14/-	20/-	12/-	(c)	425	325
May	14/-	19/6	12/-	(c)	400	325
June	14/-	16/3	12/-	275	400	325
July	14/-	17/-	12/-	275	325	325
August	14/-	17/-	11/-	300	325	325
September	30/-nom.	16/7	12/-	375	325	325
October	30/-	15/6	12/-	600	325	325
November	30/-	15/6	11/-	600	325	325
December	30/-	15/-	11/-	600	325	325

(a) From the Metal Information Bureau, Limited, 7 East India Ave., London, E.C.
(b) From the Engineering and Mining Journal-Press, New York. (c) Not available.

Bounties.—Under the provisions of the "Metal Refining Bounty Act," passed by the Ontario Legislature in 1907, bounties were paid to refineries amounting to $126,987.08 on cobalt metal, cobalt oxide, and salts of cobalt, and $43,153.85 on nickel metal, nickel oxide, and salts of nickel, or a total for both cobalt and nickel of $170,140.95. The quantities produced and the bounties paid each year are given in detail in the annual reports of the Ontario Bureau of Mines.

The bounty was at the rate of 6 cents per pound on the metallic contents of the oxides. The Act which expired in April, 1917, was not re-enacted.

COPPER

Canada

The production of copper during 1922 amounted to 42,879,818 pounds (21,439·9 tons), which at the average New York price for the year 13·382 cents per pound) was worth $5,738,177, as against 47,620,820 pounds (23,810·4 tons) valued at $5,953,555, or an average price of 12.502 cents per pound in 1921. The decrease amounted to 9·9 per cent in quantity and 3·6 per cent in total value.

The 1922 production included: (a) 29,595,440 pounds contained in blister copper, a part of which was exported and a part was refined in Canada; (b) 10,851,898 pounds contained in nickel-copper matte, some of which was exported and some refined in Canada; (c) 57,708 pounds contained in copper sulphate; and (d) 2,374,772 pounds, the estimated recoveries from ores and concentrates exported for smelting and refining.

The corresponding figures for 1921 were (a) 32,122,678, (b) 12,645,391 (c) 162,111 and (d) 2,690,640.

Refined copper was produced commercially in quantity for the first time in Canada in 1916 at the Trail Refinery of the Consolidated Mining and Smelting Company. The copper rod mill completed in 1921 was not operated during the period. The British America Nickel Corporation produced refined copper at their Deschenes plant for the first time in 1920. The total production of refined copper in Canada during the past seven years was as follows:—

Calendar year	1916	483	tons
" "	1917	3,901	"
" "	1918	3,809	"
" "	1919	3,467	"
" "	1920	2,590	"
" "	1921	2,143	"
" "	1922	365	"

Copper sulphate is produced at Trail, B.C., by the Consolidated Mining and Smelting Company and at Thorold, Ont., by the Coniagas Reduction Company. The amounts produced were 179,064 pounds in 1920; 643,910 pounds in 1921 and 230,835 pounds in 1922.

Copper sulphate is a by-product in the parting of gold and silver by the action of boiling concentrated sulphuric acid, the silver being dissolved as the sulphate and recovered by precipitating it with metallic copper. Copper sulphate may also be produced by treating scrap copper with a spray of dilute sulphuric acid in the presence of air. Copper sulphate forms blue crystals soluble in water. Heated to 240° C., it loses its water of crystallization and becomes a white anhydrous powder. Blue vitriol, or copper sulphate in solution, is used in the preparation of insecticides and germicides, and for many other purposes.

Table 32.—Production of Copper in Canada, 1886-1922

Year	Pounds	Value	Cents per Pound	Year	Pounds	Value	Cents per Pound
		$				$	
1886	3,505,000	385,550	11·00	1905	48,092,753	7,497,660	15·590
1887	3,260,424	366,798	11·25	1906	55,609,888	10,720,474	19·278
1888	5,562,864	927,107	16·66	1907	56,979,205	11,398,120	20·004
1889	6,809,752	936,341	13·75	1908	63,702,873	8,413,876	13·208
1890	6,013,671	947,153	15·75	1909	52,493,863	6,814,754	12·982
1891	9,529,401	1,226,703	12·87	1910	55,692,369	7,094,094	12·738
1892	7,087,275	818,580	11·55	1911	55,648,011	6,886,998	12·376
1893	8,109,856	871,809	10·75	1912	77,832,127	12,718,548	16·341
1894	7,708,789	736,960	9·56	1913	76,976,925	11,753,606	15·269
1895	7,771,639	836,228	10·76	1914	75,735,960	10,301,608	13·602
1896	9,393,012	1,021,960	10·88	1915	100,785,150	17,410,635	17·275
1897	13,300,802	1,501,660	11·29	1916	117,150,028	31,867,150	27·202
1898	17,747,136	2,134,980	12·03	1917	109,227,332	29,687,989	27·180
1899	15,078,475	2,655,319	17·61	1918	118,769,434	29,250,536	24·628
1900	18,937,138	3,065,922	16·19	1919	75,053,581	14,028,265	18·691
1901	37,827,019	6,096,581	16·117	1920	81,600,691	14,244,217	17·456
1902	38,804,259	4,511,383	11·626	1921	47,620,820	5,953,555	12·502
1903	42,684,454	5,649,487	13·235	1922	42,879,818	5,738,177	13·382
1904	41,383,722	5,306,635	12·823				

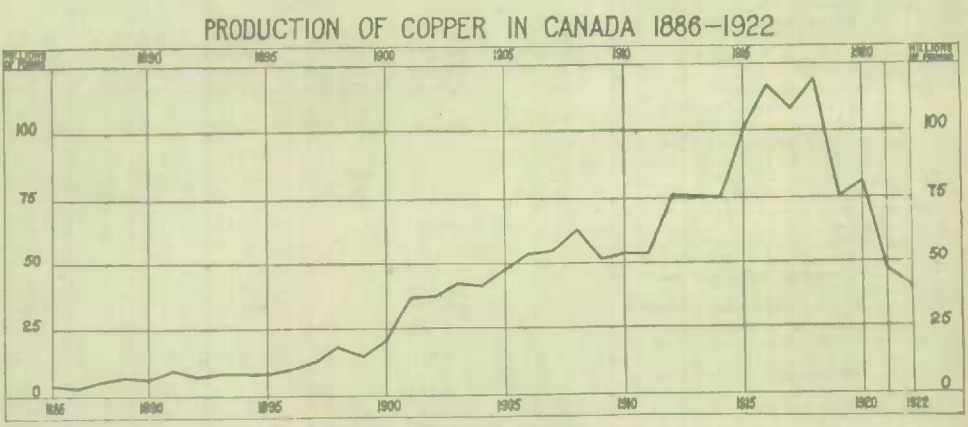


Table 33.—Production of Copper in Canada, by Provinces, 1920, 1921 and 1922

Province	1920			1921			1922		
	Pounds	Value	Per cent	Pounds	Value	Per cent	Pounds	Value	Per cent
		$			$			$	
Quebec	880,638	153,724	1·1	352,308	44,045	0·8	.....	.....	.....
Ontario	32,059,993	5,598,392	39·3	12,821,385	1,602,930	26·9	10,943,636	1,464,477	25·5
Manitoba	3,062,577	534,604	3·8	.....	.....	.....	.....	.....	.....
British Columbia	45,319,771	7,911,019	55·5	34,447,127	4,308,580	72·3	31,936,182	4,273,700	74·5
Yukon	277,712	48,478	0·3	.....	.....	.....	.....	.....	.....
Total	**81,600,691**	**14,244,217**	**100·0**	**47,620,820**	**5,953,555**	**100·0**	**42,879,818**	**5,738,177**	**100·0**

Exports and Imports.—The value of the imports into Canada of copper and copper products during the calendar year 1922 was $5,284,825 as against $3,956,382 in 1921. Both years showed a marked decline from the figures for 1920 when the imports of these commodities were valued at $10,744,117. This great recession in total values was due in part to the drop in copper prices and partly to the lessened demand reflected by decreases in quantities of the commodities entered. The decreases in the percentages of dutiable and free articles imported were about the same; for example the imports of copper in blocks, pigs or ingots which are dutiable were about 30 per cent lower in quantity in 1922 than in 1920, and the imports of old and scrap metal which are free also declined between 40 and 50 per cent during the same years.

In exports the values for the year 1922 showed a decrease in blister copper from previous years, but the 32,031,300 pounds given as exported was over 70 per cent of the total copper produced in Canada. The United States is by far the most important customer of Canada; nearly all the blister copper shown as exported is shipped to that country for refining. Large quantities of Canadian ore are also treated in the United States.

Table 34.—Imports into Canada and Exports of Copper, 1920, 1921 and 1922

	1920		1921		1922	
	Pounds	Value	Pounds	Value	Pounds	Value
		$		$		$
IMPORTS—						
Copper, in bars or rods, when imported by manufacturers of trolley, telegraph and telephone wires, electric wires and electric cables, for use only in the manufacture of such articles in their own factories	33,003,800	6,190,637	16,478,500	2,278,883	23,403,100	3,334,793
Copper, in bars or rods, in coil or otherwise, in lengths of not less than 6 feet, unmanufactured	903,500	218,080	789,400	140,422	445,900	80,701
Copper in blocks, pigs or ingots	9,236,575	1,784,370	925,452	135,563	1,145,463	159,671
Copper, old and scrap	2,481,100	404,161	307,900	37,955	1,470,900	205,447
Copper ore and concentrates	2,440,000	57,640	2,750,000	48,015	200	121
Copper, in strips, sheets or plates, not polished, planished or coated	1,716,300	550,769	1,833,800	426,854	2,293,800	497,013
Copper tubing in lengths of not less than 6 feet, and not polished, bent or otherwise manufactured	723,625	276,712	788,079	196,907	898,976	212,061
Copper wire, plain, tinned or plated	461,609	169,820	109,739	37,767	102,475	26,331
Copper wire cloth, or woven wire of copper	.....	21,962	.....	9,930	.....	13,510
Copper wire, single or several, covered with cotton, linen, silk, rubber or other material, including cable so covered	.....	205,189	.....	195,453	.....	232,872
Copper, all other manufactures of, n.o.p.	.....	662,806	.....	316,944	.....	351,694
Copper, precipitate of, crude	18	13	375	74	450	25
Anodes of nickel, zinc, copper, silver or gold	.....	7,911	.....	4,164	.....	2,757
Copper, sub-acetate of, or verdigris, dry	3,657	1,147	256	92	988	326
Copper, sulphate of (blue vitriol)	2,365,535	192,900	1,929,256	127,359	3,097,450	167,503
Total	.....	**10,744,117**	.....	**3,956,382**	.....	**5,284,825**
EXPORTS—						
Copper, fine, contained in ore, matte, regulus, etc	47,329,700	5,918,782	10,511,500	1,029,220	19,063,100	1,730,681
Copper, blister	38,198,900	8,701,184	33,078,700	5,167,915	32,031,300	4,204,136
Copper, old and scrap	774,400	113,265	1,571,100	161,378	3,324,000	334,673
Copper, pig	.....	.....	2,678,200	355,693	.....	.....
Copper in bars, rods, strips, sheets, plates and tubing	2,666,500	710,978	575,400	141,690	6,800	1,247
Copper wire and cable	.....	433,097	.....	569,648	.....	208,683
Copper mfrs., n.o.p.	.....	.....	.....	30,250	.....	53,569
Total	.....	**15,877,306**	.....	**7,455,794**	.....	**6,532,989**

Prices.—Trade conditions were severely affected by the decrease in prices during the last quarter of 1920. In 1921 the average price for the twelve months was 12·502 cents with markets inactive. The year 1922 saw little improvement and the slight increase in the price to an average of 13·382 cents per pound for the period, was not sufficient to enable producers to reopen their idle properties on a normal scale.

Table 35.—Monthly Average Prices of Copper, New York and London, 1920, 1921 and 1922

(From the Engineering and Mining Journal-Press.)

Months	Electrolytic Copper					
	New York in cents per pound			London, £ Sterling per ton of 2,240 pounds		
	1920	1921	1922	1920	1921	1922
January	18·918	12·597	13·465	123·238	79·119	72·321
February	18·569	12·556	12·864	126·950	75·925	66·125
March	18·331	11·976	12·567	118·348	71·190	65·739
April	18·660	12·438	12·573	111·500	71·786	64·028
May	18·484	12·742	13·111	109·200	74·298	66·554
June	18·065	12·697	13·575	101·909	75·682	69·333
July	18·576	12·170	13·654	106·455	75·286	70·321
August	18·346	11·634	13·723	111·143	72·705	69·932
September	18·144	11·948	13·748	111·905	72·295	70·917
October	15·934	12·673	13·632	104·905	73·476	70·693
November	14·257	13·035	13·598	94·614	74·386	70·216
December	13·188	13·555	14·074	85·905	74·525	70·132
Average	**17·456**	**12·502**	**13·382**	**108·839**	**74·223**	**68·859**

Quebec

In 1922, for the first time in thirty-seven years, there was no production of copper from Quebec mines, all the mines in the eastern townships having been closed down. The major portion of the copper-pyrite ores from these properties was formerly treated in Canada for the sulphur contained, but important shipments carrying gold and silver were also exported for treatment in the copper smelters of the eastern United States.

Table 36.—Production of Copper in Quebec, 1886-1922

Year	Pounds	Value	Year	Pounds	Value	Year	Pounds	Value
		$			$			$
1886	3,340,000	367,400	1900	2,220,000	359,418	1914	4,201,497	571,488
1887	2,937,900	330,514	1901	1,527,442	246,178	1915	4,197,482	725,115
1888	5,562,864	927,107	1902	1,640,000	190,666	1916	5,703,347	1,551,424
1889	5,315,000	730,813	1903	1,152,000	152,467	1917	5,015,560	1,363,229
1890	4,710,606	741,920	1904	760,000	97,455	1918	5,869,649	1,445,577
1891	5,401,704	695,469	1905	1,621,243	252,752	1919	2,691,695	503,105
1892	4,883,480	564,042	1906	1,981,169	381,930	1920	880,638	155,724
1893	4,468,352	480,348	1907	1,517,990	303,659	1921	352,308	44,045
1894	2,176,430	208,067	1908	1,282,024	169,330	1922	.....	.....
1895	2,242,462	241,288	1909	1,088,212	141,272			
1896	2,407,200	261,903	1910	877,347	111,757			
1897	2,474,970	279,424	1911	2,436,190	301,503			
1898	2,100,235	252,658	1912	3,282,210	536,346			
1899	1,632,560	287,494	1913	3,455,887	527,679	**Total**	**103,497,653**	**16,498,566**

Ontario

Most of the copper produced in Ontario is closely allied to the production of nickel and is derived principally from the nickel ores of the Sudbury district. A few tons are also recovered in residues from the treatment of silver-cobalt ores. The decline in the markets for nickel which was recorded during 1921 still obtained during the period under review and the production of copper in Ontario consequently did not register any again. During 1922 the production from this province amounted to 10,943,636 pounds valued at $1,464,477 as against 12,821,385 pounds valued at $1,602,930 in 1921. Detailed statistics for copper from the nickel-copper ores are given under the section on nickel.

Table 37.—Production of Copper in Ontario, 1886-1922

Year	Pounds	Value	Year	Pounds	Value	Year	Pounds	Value
		$			$			$
1886	165,000	18,150	1900	6,740,058	1,091,215	1914	28,948,211	3,937,536
1887	322,524	36,284	1901	8,695,831	1,401,507	1915	39,361,464	6,799,693
1888			1902	7,408,202	861,278	1916	44,997,035	12,240,094
1889	1,466,752	201,678	1903	7,172,533	949,285	1917	42,867,774	11,651,461
1890	1,303,065	205,233	1904	4,913,594	630,070	1918	47,674,475	11,593,502
1891	4,127,697	531,234	1905	8,779,259	1,368,686	1919	24,346,623	4,550,627
1892	2,203,795	254,538	1906	10,638,231	2,050,838	1920	32,059,993	5,596,392
1893	3,641,504	391,461	1907	14,104,337	2,821,432	1921	12,821,385	1,602,930
1894	5,207,679	497,854	1908	15,005,171	1,981,883	1922	10,943,636	1,464,477
1895	4,576,337	492,414	1909	15,746,699	2,044,237			
1896	3,167,256	344,598	1910	19,259,016	2,453,213			
1897	5,500,652	621,023	1911	17,932,263	2,219,297			
1898	8,375,223	1,007,539	1912	22,250,601	3,635,971			
1899	5,723,324	1,007,877	1913	25,885,929	3,952,522	**Total**	**513,733,128**	**92,508,029**

The bounty offered by the Ontario Government on copper, 95 per cent pure and on copper sulphate produced from ore mined and refined in the province was never gained, and the act known as the "Metal Refining Bounty Act" warranting this bounty which expired April 10, 1917, was not re-enacted.

Manitoba

During the years 1917 to 1920 the province of Manitoba was on record as one of the copper-producing provinces in Canada. The total production for the four years amounted to 9,866,328 pounds having a total value of $2,039,942. The record was as follows—1917—1,116,000 pounds, valued at $303,329; 1918—2,339,751 pounds valued at $576,234; 1919—3,348,000 pounds valued at $625,775 and 1920—3,062,577 pounds valued at $534,604. These amounts were estimated as the copper recovered from ores shipped by the Mandy Mining Company operating near Schist Lake in The Pas district of Northern Manitoba. During 1921 and 1922, with increasing production costs, high freight rates and other transportation difficulties it was found impossible to operate and no copper ores were shipped.

Much development has been carried on in this district during the past seven years. Towards the end of 1919 the Mandy Mining Company suspended operations, and has since sold its equipment, which has been installed on the Flin Flon group of claims on Flin Flon Lake in the same district.

British Columbia

The production of copper from British Columbia ores in 1922 amounted to 31,936,182 pounds, valued at $4,273,700 as against 34,447,127 pounds valued at $4,306,580 in 1921, a decrease of 7·2 per cent in quantity and 0·7 per cent in value. The British Columbia output amounted to 74·5 per cent of the total production in Canada for 1922 and 72·3 per cent of the total for 1921.

This production included the copper content of the blister copper produced, which was partly refined at Trail and partly exported for refining in the United States; the copper equivalent of the copper sulphate produced at Trail and the estimated recoveries of copper from ores and concentrates exported; but it did not include the copper derived from the treatment of foreign ores or from ores of other provinces which were treated in British Columbia smelters.

Table 38.—Production of Copper in British Columbia, 1894-1922

Year	Pounds	Value	Year	Pounds	Value	Year	Pounds	Value
		$			$			$
1894*	324,680	31,039	1905*	37,692,251	5,876,222	1916	63,642,559	17,312,046
1895*	952,840	102,526	1906*	42,990,488	8,287,706	1917	57,730,959	15,691,275
1896*	3,818,556	415,459	1907*	40,832,720	8,168,177	1918	62,865,681	15,482,560
1897*	5,325,180	691,213	1908	37,041,115	4,892,390	1919	44,502,079	8,317,884
1898*	7,271,678	874,783	1909	35,658,952	4,629,245	1920	45,319,771	7,911,019
1899*	7,722,591	1,359,948	1910	35,270,006	4,492,693	1921	34,447,127	4,306,580
1900*	9,977,080	1,615,289	1911	35,279,558	4,366,198	1922	31,936,182	4,273,700
1901*	27,601,716	4,448,896	1912	50,526,656	8,256,561			
1902*	29,636,057	3,445,488	1913	45,791,579	6,991,916			
1903*	34,359,921	4,547,735	1914	41,219,202	5,606,636			
1904*	35,710,128	4,579,110	1915	56,692,988	9,793,714	**Total**	**962,142,321**	**166,678,008**

*Metal contents of ores shipped as published by the Provincial Bureau of Mines.

Copper mining is one of the most important sections of the industry in the province, and in 1922 it contributed about 18 per cent of the total value from the metalliferous mines. The slump in the price of copper in 1921 and the large amounts of copper metal held in stock, continued to act as deterrents to production in the copper mining industry throughout 1922 and many mines which operated in 1919 and 1920 were compelled to reduce their operations or close down entirely. The main production of copper in British Columbia has been drawn from the large low-grade copper deposits of the Pacific Coast and the Cassiar district, representative properties in which are the Hidden Creek Group of Granby Mining, Smelting and Power Company and the properties of the Britannia Mining and Smelting Company.

Yukon

There are important deposits of copper-bearing ore known to exist in the Yukon Territory, some of which were operated during the period from 1906 until 1920. Since the latter year, no production of copper has been reported, and the grand total for the Territory remains at 12,912,507 pounds, or a little greater than that of Manitoba.

Table 39.—Production of Copper in Yukon to 1922

Year	Pounds	Value	Year	Pounds	Value
		$			$
1906 (and previous)	156,000	23,400	1914	1,367,050	185,946
1907	511,838	102,388	1915	533,216	92,113
1908	112,264	14,828	1916	2,807,096	763,586
1909	...	...	1917	2,460,079	668,650
1910	286,000	36,431	1918	619,878	152,663
1911	...	...	1919	165,184	30,874
1912	1,772,660	289,670	1920	277,712	48,478
1913	1,843,530	281,489	1921-1922	...	...
			Total	**12,912,507**	**2,690,516**

Table 40.—World's Production of Copper * 1913, 1918–1922

(Compiled from the Year Book of the American Bureau of Metal Statistics.)

(Short tons)

Country	1913	1918	1919	1920	1921	1922
North America—						
United States	614,255	968,687	604,642	635,248	238,420	511,970
Mexico	58,185	83,233	60,661	49,866	13,576	29,842
Canada	38,460	58,068	39,789	39,121	22,632	25,300
Cuba	3,747	13,595	10,991	7,491	8,600	11,788
Total, North America	**714,647**	**1,123,583**	**722,083**	**731,726**	**283,228**	**578,900**
South America—						
Bolivia	4,077	6,612	7,714	10,910	10,674	11,795
Chile	46,574	117,851	87,721	104,173	61,421	141,433
Peru	30,609	48,944	43,243	36,356	37,258	30,200
Total, South America	**81,260**	**173,407**	**138,678**	**151,439**	**109,353**	**192,428**
Europe—						
Austria-Hungary	4,518	2,755	713	1,747	4,690	4,630
Germany	27,881	16,641	17,384	19,015	20,944	18,739
Norway	3,021	3,147	482	613	1,486	2,205
Russia	37,358	...	...	...	...	2,205
Spain and Portugal	39,683	50,596	39,581	25,353	36,596	40,234
Sweden	4,645	4,172	4,442	1,793	1,268	...
Serbia	7,053	6,612	1,332	2,684	4,376	5,756
Total, Europe	**124,159**	**83,923**	**63,934**	**51,205**	**69,270**	**73,769**
Asia—						
Japan	73,283	99,583	86,468	74,727	59,626	60,365
Other Asia	...	...	1,098	593	933	992
Total Asia	**73,283**	**99,583**	**87,566**	**75,320**	**60,559**	**61,357**
Australia	49,901	49,284	18,118	29,327	20,869	13,754
Africa	25,236	34,233	34,548	33,708	42,501	59,616
Other Countries	4,188	5,510	5,510	5,510	5,510	7,716
Grand Total	**1,072,674**	**1,569,523**	**1,069,437**	**1,078,235**	**591,290**	**987,540**

* So far as possible, these statistics are based on blister copper, referred to countries wherein ore originated.

GOLD

Canada

The production of gold from all sources in Canada during the calendar year 1922 amounted to 1,263,364 fine ounces, valued at $26,116,050, or an increase of slightly over 36 per cent above the previous year, when 926,329 fine ounces, valued at $19,148,920 was produced.

The 1922 output was the second greatest annual production ever recorded for Canada, being exceeded only by the total of 1,350,057 ounces produced in 1900. Ontario's production exceeded the million-ounce mark for the first time.

The production for 1922 was derived from (a) alluvial gold, 72,017 ounces; (b) gold obtained from milling ores 1,017,961 ounces; (c) gold obtained from ores treated at Canadian copper and lead smelters, 41,516 ounces; and (d) the estimated gold recoveries from ores and concentrates exported, 131,870 ounces. The corresponding figures for the year 1921 were: (a) 77,246 ounces. (b) 711,121 ounces, (c) 52,822 ounces, and (d) 85,140 ounces.

The production of gold by provinces was: Nova Scotia, 1,042 ounces or about 0·08 per cent of the total for Canada; Ontario, 1,000,340 ounces, or 79·2 per cent; Manitoba, 156 ounces, or 0·02 per cent; British Columbia, 207,370 ounces, or 16·4 per cent; and the Yukon Territory, 54,456 ounces or 4·3 per cent.

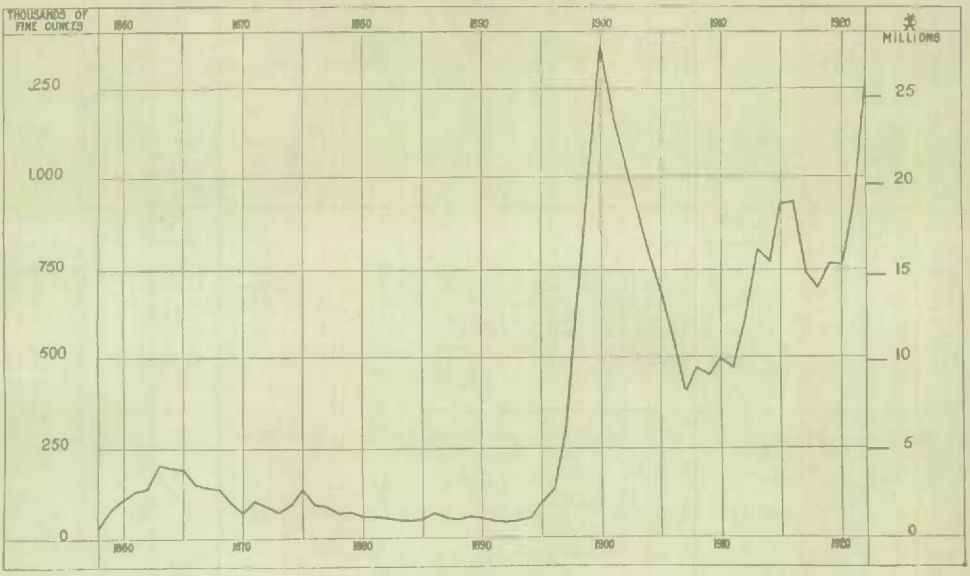
The large increase in the production of gold was due principally to the continued expansion of the operating gold mines in Ontario, the output from which exceeded the 1921 record by over 41·3 per cent. The output from British Columbia also increased by over 37 per cent, evidence of the recovery in gold mining which occurred in that province during the period. Nova Scotia's production increased from 439 to 1,042 fine ounces, while that of Yukon Territory and Manitoba decreased. Quebec for the first time since 1877 was not included as a producer of gold.

Table 41.—Production of Gold in Canada, 1858-1922

Year	Fine ounces*	Value	Year	Fine ounces*	Value	Year	Fine ounces*	Value
		$			$			$
1858	34,104	705,000	1881	63,524	1,313,153	1904	796,374	16,462,517
1859	78,129	1,615,072	1882	60,288	1,246,268	1905	684,951	14,159,195
1860	107,806	2,228,513	1883	53,853	1,113,246	1906	556,415	11,502,120
1861	128,973	2,666,118	1884	51,202	1,058,439	1907	405,517	8,382,780
1862	135,391	2,798,774	1885	55,575	1,148,829	1908	476,112	9,842,195
1863	202,498	4,186,011	1886	70,782	1,463,196	1909	453,865	9,382,230
1864	199,605	4,126,199	1887	57,460	1,187,804	1910	493,707	10,205,835
1865	192,898	3,987,562	1888	53,145	1,098,610	1911	473,159	9,781,077
1866	152,555	3,153,597	1889	62,653	1,295,159	1912	611,885	12,648,794
1867	145,775	3,013,431	1890	55,620	1,149,776	1913	802,973	16,598,923
1868	134,169	2,773,527	1891	45,018	930,614	1914	773,178	15,983,007
1869	102,720	2,123,405	1892	43,905	907,601	1915	918,056	18,977,901
1870	83,415	1,724,348	1893	47,243	976,603	1916	930,492	19,234,976
1871	105,187	2,174,412	1894	54,600	1,128,688	1917	738,831	15,272,992
1872	90,283	1,866,321	1895	100,798	2,083,674	1918	699,681	14,463,689
1873	74,346	1,536,871	1896	133,262	2,754,774	1919	766,764	15,850,423
1874	97,856	2,022,862	1897	291,557	6,027,016	1920	765,007	15,814,098
1875	130,300	2,693,533	1898	666,386	13,775,420	1921	926,329	19,148,920
1876	97,729	2,020,233	1899	1,028,529	21,261,584	1922	1,263,364	26,116,050
1877	94,304	1,949,444	1900	1,350,057	27,908,153			
1878	74,420	1,538,394	1901	1,167,216	24,128,503			
1879	76,547	1,582,358	1902	1,032,161	21,336,667			
1880	63,121	1,304,824	1903	911,559	18,843,590	Total	23,595,184	487,755,838

*Calculated from the value: one dollar=0·048375 oz.

PRODUCTION OF GOLD IN CANADA 1858-1922.



Refined Metal.—There were two refineries producing fine gold in Canada, namely, the Royal Mint, Ottawa, Ont., and that of the Consolidated Mining and Smelting Company of Canada, Ltd., at Tadanac, near Trail, B.C. From all ores treated during 1922, the latter company produced 18,940 fine ounces of gold. This gold was recovered principally, from the gold and copper ores, but also from silver-lead, and dry ores. Small quantities of imported ores were also treated by this company.

Table 42.—Refined Gold Produced at Trail, B.C.*

Year	Fine oz.	Year	Fine oz.
1904	4,336	1913	11,977
1905	8,602	1914	11,088
1906	9,993	1915	17,813
1907	10,395	1916	23,608
1908	15,346	1917	49,661
1909	18,241	1918	61,212
1910	13,298	1919	47,283
1911	15,270	1920	42,636
1912	12,118	1921	56,297
		1922	18,940

*Includes some gold derived from imported ores and from occasional shipments from Ontario, Manitoba, Alberta, and the Yukon.

Table 43.—Receipts of Gold Bullion at the Royal Mint, Ottawa, Ont.

Year	From Canadian Sources		From Foreign Countries	
	Oz. Gross	Value Gold Contents	Oz. Gross	Value Gold Contents
		$		$
1908	219·19	3,823 03		
1909	5,741·43	94,864 81	38·25	673 98
1910	65,009·35	1,079,223 42		
1911	89,463·11	1,469,087 43	511·24	9,128 55
1912	104,825·29	1,676,171 78	742·79	12,451 33
1913	212,076·41	3,363,870 30	633·23	11,609 84
1914	29,762·24	471,042 90	4,750·19	98,962 84
1915	89,231·47	1,402,605 19	871,693·79	15,838,222 01
1916	49,195·39	780,074 19	6,687,758·41	121,513,383 93
1917	55,779·96	840,265 33	8,196,151·04	148,919,793 48
1918	302,785·96	4,982,743 81	3,728,224·05	67,739,887 68
1919	654,906·28	10,865,770 57	8,917·02	134,756 38
1920	724,083·34	11,530,413 82		
1921	1,054,277·01	16,914,211 58	53·00	826 87
1922	1,376,863·35	22,469,160 42	345·22	5,387 93

In addition to the above, the Mines Branch of the Department of Mines operated the Vancouver Assay Office where crude bullion, nuggets and dust, were bought, melted, and sold.

Table 44.—Receipts at Dominion Assay Office, Vancouver, B.C.

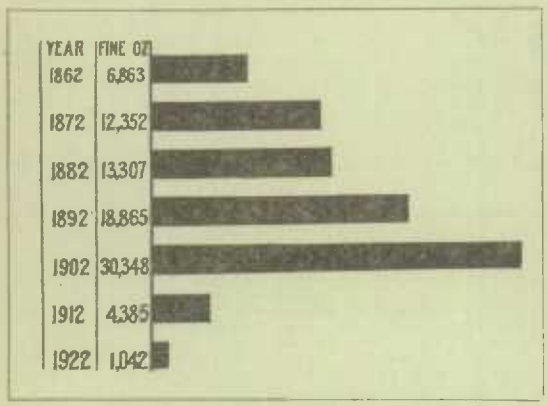
Year	Weight before melting	Weight after melting	Net Value	Year	Weight before melting	Weight after melting	Net Value
	ounces	ounces	$		ounces	ounces	$
1908 (a)	90,175·48	89,117·76	1,478,894 00	1915	183,924·49	179,751·68	2,736,302 31
1909	48,478·58	47,576·27	789,267 94	1916	180,292·83	175,393·10	2,828,239 65
1910	46,064·31	45,228·92	746,101 92	1917	191,626·04	187,884·48	3,257,220 71
1911	39,784·70	39,069·31	647,416·38	1918	241,762·77	238,245·07	4,099,595 80
1912	59,068·82	57,951·98	974,077 14	1919	209,026·14	205,947·57	3,547,624 93
1913 (b)	111,479·94	109,920·49	1,448,625 37	1920	150,869·17	147,718·25	2,499,174 41
1914	166,148·83	163,523·61	2,029,251 31	1921	163,070·56	160,803·48	2,834,499 61
				1922	129,891·63	125,758·41	2,105,989 64

(a) For 9 months only. (b) The removal of the assay charge in January 1913, accounts for the large increase.

Table 45.—Imports of Gold into Canada, 1920, 1921 and 1922

Item	1920	1921	1922
	$	$	$
Gold—			
Fringe	36,919	62,519	38,939
Manufactures of Gold and Silver—			
Leaf	108,788	47,123	63,276
Sweepings	6,605	2,771	5,471
Manufactures, n.o.p.	184,681	97,110	89,684
Electroplated ware	545,015	387,974	442,593

PRODUCTION OF GOLD IN NOVA SCOTIA, 1862-1922



Nova Scotia

The gold production in Nova Scotia has been derived almost entirely from quartz ores and in 1922 it amounted to 1,042 fine ounces valued at $21,540 as against 439 fine ounces valued at $9,075, in 1921.

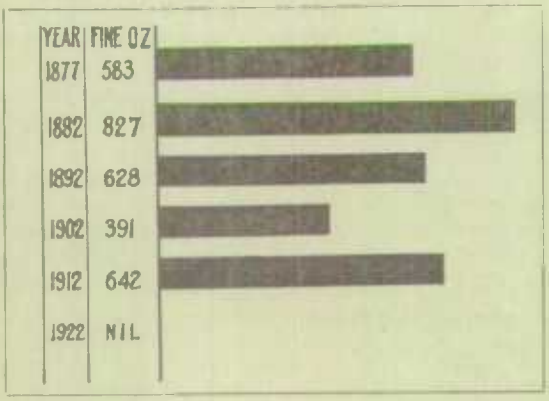
The most prosperous year in the history of gold mining in Nova Scotia was 1902 when 30,348 fine ounces was recovered. The production then gradually decreased, and the falling-off is attributed partly to the exhaustion of the mines and partly to the high cost of supplies and labour. Several small custom gold mills were formerly operated in this province but during 1922 only one such mill reported any operations.

Table 46.—Production of Gold in Nova Scotia, 1862-1922

Year	Tons treated	Fine ounces	Value	Yield of gold per ton	Year	Tons treated	Fine ounces	Value	Yield of gold per ton
			$	$				$	$
1862	6,473	6,863	141,871	21 91	1894	55,357	18,834	389,338	7 04
1863	17,000	13,180	272,448	16 02	1895	60,600	21,919	453,119	7 47
1864	21,431	18,883	390,349	18 21	1896	69,169	23,876	493,568	7 13
1865	24,421	24,011	496,357	20 32	1897	73,192	27,195	562,165	7 68
1866	32,157	23,776	491,491	15 28	1898	82,747	26,054	538,590	6 50
1867	31,384	25,763	532,563	16 96	1899	112,226	29,876	617,604	5 50
1868	32,259	19,377	400,555	12 41	1900	87,390	28,955	598,553	6 85
1869	35,144	16,855	348,427	19 91	1901	91,948	26,459	546,963	5 32
1870	30,824	18,740	387,392	12 56	1902	93,042	30,348	627,357	6 68
1871	30,787	18,139	374,972	12 17	1903	103,856	25,533	527,806	5 08
1872	17,089	12,352	255,349	14 94	1904	45,436	10,362	214,209	4 71
1873	17,708	11,180	231,122	13 05	1905	57,774	13,707	283,353	4 90
1874	13,844	8,623	178,244	12 87	1906	66,059	12,223	252,676	3 82
1875	14,810	10,576	218,629	14 76	1907	58,550	13,675	282,686	4 82
1876	15,490	11,300	233,585	15 08	1908	61,536	11,842	244,799	3 97
1877	17,369	15,925	329,205	18 95	1909	56,790	10,193	210,711	3 71
1878	17,989	11,864	245,253	13 63	1910	43,006	7,928	163,891	3 81
1879	15,936	12,980	268,328	16 83	1911	18,328	7,781	160,854	8 78
1880	13,997	12,472	257,823	18 42	1912	14,360	4,385	90,638	6 51
1881	16,556	10,147	209,755	12 66	1913	7,324	2,174	44,935	6 13
1882	21,081	13,307	275,090	13 04	1914	13,156	2,904	60,034	4 56
1883	25,954	14,571	301,207	11 60	1915	25,204	6,636	137,180	5 44
1884	25,186	15,168	313,554	12 44	1916	17,497	4,562	94,305	5 38
1885	28,890	20,945	432,971	14 98	1917	5,916	2,210	45,685	7 72
1886	29,010	22,038	455,564	15 70	1918	1,630	1,176	24,310	14 91
1887	32,280	20,009	413,631	12 81	1919	1,362	850	17,571	12 90
1888	36,178	21,137	436,939	12 08	1920	858	690	14,263	16 62
1889	39,160	24,673	510,029	13 02	1921	626	*418	8,641	13 80
1890	42,749	22,978	474,990	11 11	1922	6,142	1,042	21,540	3 50
1891	36,351	21,841	451,503	12 42					
1892	32,552	18,865	389,965	11 98					
1893	42,354	18,436	381,095	8 99	**Total**	**2,145,494**	**910,781**	**18,827,597**	**8 58**

*439 fine ounces reported as received by Royal Mint from Nova Scotia, 21 of which came from old ore dumps.

PRODUCTION OF GOLD IN QUEBEC, 1877-1922



Quebec

The production of gold in the province of Quebec, which was first recorded in the year 1877 had, by the end of 1921, reached a grand total of 26,834 fine ounces, valued at $534,671. Due to the inactivity of the zinc-lead mines in Portneuf county and the copper-pyrite mines of the eastern townships throughout the whole of 1922, no production was recorded for that year. Towards the end of the year however, important discoveries of gold were reported in Rouyn township in the northwestern part of the province and due east of the important gold fields in Teck and Lebel townships in Ontario. No alluvial gold production has been reported for a number of years.

Table 47.—Production of Gold in Quebec, 1877-1922

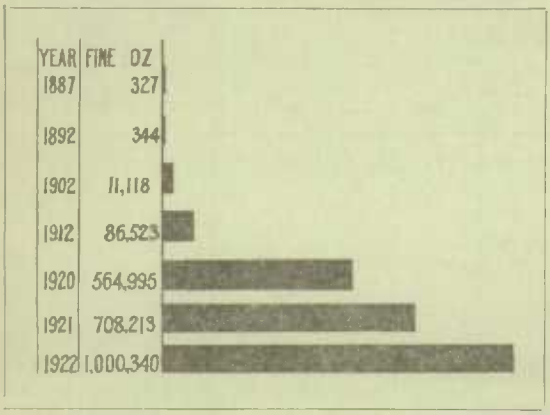
Year	Fine ounces*	Value	Year	Fine ounces*	Value	Year	Fine ounces*	Value
		$			$			$
1877	583	12,057	1894	1,412	29,196	1911	613	12,672
1878	868	17,937	1895	62	1,281	1912	642	13,270
1879	1,160	23,972	1896	145	3,000	1913	701	14,491
1880	1,605	33,174	1897	44	900	1914	1,292	26,708
1881	2,741	56,661	1898	295	6,089	1915	1,099	22,720
1882	827	17,093	1899	238	4,916	1916	1,034	21,375
1883	860	17,787	1900	.....	.....	1917	1,511	31,235
1884	422	8,720	1901	145	3,000	1918	1,939	40,083
1885	103	2,120	1902	391	8,073	1919	1,470	30,388
1886	193	3,981	1903	180	3,712	1920	955	19,742
1887	78	1,604	1904	140	2,900	1921	635	13,127
1888	181	3,740	1905	191	3,940	1922	.....	.....
1889	58	1,207	1906	165	3,412			
1890	65	1,350	1907	.....	.....			
1891	87	1,800	1908	.....	.....			
1892	628	12,987	1909	193	3,990			
1893	759	15,696	1910	124	2,565	**Total**	**26,834**	**554,671**

*Calculated from the value: one dollar = 0·048375 ounce.

Ontario

The gold production of Ontario in 1922 amounted to 1,000,340 fine ounces valued at $20,678,862 as against 708,213 fine ounces valued at $14,640,062 in 1921 showing an increase of more than 41 per cent.

PRODUCTION OF GOLD IN ONTARIO, 1887-1922



Since 1914 Ontario has become by far the largest producer of gold in Canada and this remarkable increase was brought about by the successful development of the Porcupine and Kirkland Lake districts and by the extension of milling facilities in these camps. The falling-off in production during 1917 and 1918 was due to the abnormal conditions created by the war. The production increased rapidly through the three following years and in 1922 was the greatest ever recorded. All gold being paid for in New York funds, the exchange premium paid by the Royal Mint proved an important feature of gold-marketing and while it was of importance from the close of the war until the end of 1921, the gradual recovery in the value of the Canadian dollar in the United States exchanges has greatly decreased the premiums made by Canadian mines. While in 1920 the United States dollar had an average exchange value in Canadian funds of $1·12270, the average exchange value in 1922 was $1·0145, or nearly par.

Table 48.—Production of Gold in Ontario, 1887-1922

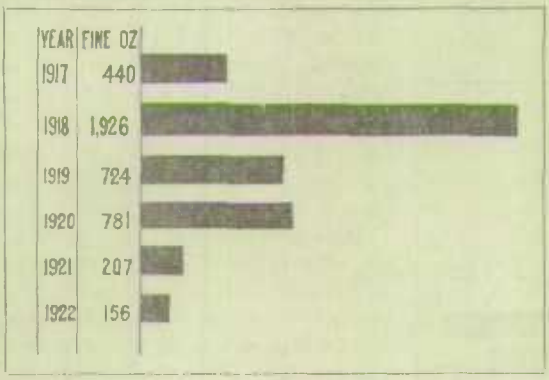
Year	Fine ounces‡	Value	Year	Fine ounces‡	Value	Year	Fine ounces‡	Value
		$			$			$
1887	327	6,760	1900	14,391	297,495	1913	219,801	4,543,690
1888	.....	.....	1901	11,844	244,837	1914	268,264	5,545,509
1889	.....	.....	1902	11,118	229,828	1915	406,577	8,404,693
1890	.....	.....	1903	9,096	188,036	1916	492,481	10,180,485
1891	97	2,000	1904	1,935	40,000	1917	423,261	8,749,581
1892	344	7,118	1905	4,402	91,000	1918	411,976	8,516,299
1893	708	14,637	1906	3,202	66,193	1919	505,739	10,454,553
1894	1,917	39,624	1907	3,212	66,398	1920	564,995	11,679,483
1895	3,015	62,320	1908	3,212	66,398	1921	708,213	14,640,062
1896	5,563	115,000	1909	1,569	32,425	1922	1,000,340	20,678,862
1897	9,157	189,294	1910	3,089	63,849			
1898	12,863	265,889	1911	2,062	42,625			
1899	20,394	421,591	1912	86,523	1,788,596	**Total**	**5,211,687**	**107,735,130**

‡Calculated from the value: one dollar = 0·048375 ounce.

Manitoba

The gold production in Manitoba during 1922 amounted to 156 fine ounces, valued at $3,225, as against 207 fine ounces valued at $4,279 in 1921; 781 fine ounces valued at $16,145, in 1920; 724 ounces, valued at $14,966, in 1919; 1,926 ounces, valued at $39,814, in 1918; and 440 ounces, valued at $9,095, in 1917. There was no production recorded prior to 1917.

PRODUCTION OF GOLD IN MANITOBA, 1917-1922



Late in 1921 interesting finds were reported from the Elbow Lake district north of The Pas and many claims were staked. Operations were also carried on east of Lake Winnipeg in the Managotogan district. A report on the geology and mineral resources of the Rice Lake and Oiseau River areas of Manitoba was published by the Geological Survey during the year

Saskatchewan

In the autumn of 1913 considerable interest was created in the reported gold discoveries at Beaver Lake (Amisk Lake). A number of prospectors went in with the opening of navigation. A good deal of prospecting was done during 1914, and some further work in 1915, but as yet no production has been reported.

Alberta

Small quantities of gold have been occasionally recovered in Alberta by prospectors, from the gravels of the Saskatchewan River; these are sold through the banks at Edmonton. During 1922, a few small lots found their way into commerce in this manner but reports indicated that the recoveries were made in British Columbia along the Peace River. No production, therefore, may be credited to Alberta for the year 1922. To date, the grand total of gold produced by this province amounted to 15,109 fine ounces and was valued at $312,333.

PRODUCTION OF GOLD IN ALBERTA, 1887-1922

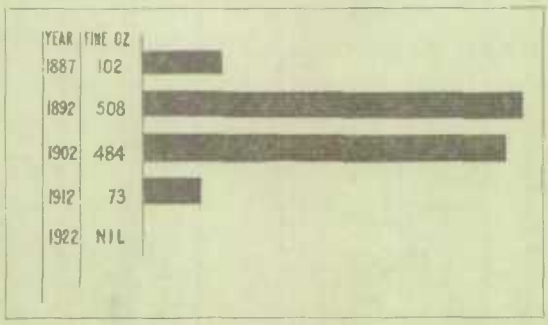


Table 49.—Production of Gold in Alberta, 1887-1922

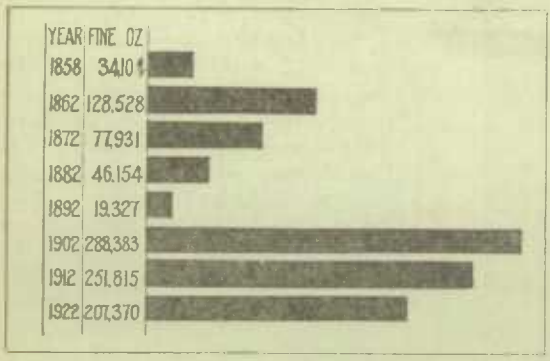
Year	Fine ounces‡	Value	Year	Fine ounces‡	Value	Year	Fine ounces‡	Value
		$			$			$
1887	102	2,100	1900	242	5,000	1913		
1888	58	1,200	1901	726	15,000	1914	48	992
1889	907	20,000	1902	484	10,000	1915	195	4,026
1890	193	4,000	1903	48	1,000	1916	82	1,695
1891	266	5,500	1904	24	500	1917		
1892	508	10,506	1905	121	2,500	1918	27	558
1893	466	9,640	1906	39	800	1919	24	500
1894	726	15,000	1907	33	675	1920		
1895	2,419	50,000	1908	50	1,037	1921	49	1,013
1896	2,661	55,000	1909	25	525	1922		
1897	2,419	50,000	1910	89	1,850			
1898	1,209	25,000	1911	10	207			
1899	726	15,000	1912	73	1,509	**Total**	**15,109**	**312,333**

‡Calculated from the value: one dollar=0·048375 ounce.

British Columbia

The increased production of gold in British Columbia was accounted for by the greater activity in placer mining, the re-opening of some former producing mines which were idle in 1921, and the considerable increase in the gold contents of ores exported to the United States. These increases more than offset the decrease in the gold recovered from smelter products. The production in 1922 amounted to 207,370 fine ounces, valued at $4,286,718 as against 150,792 fine ounces valued at $3,117,147 in 1921, or an increase of 37·5 per cent. The production from this province amounted to 16·41 per cent of the total for Canada.

PRODUCTION OF GOLD IN BRITISH COLUMBIA, 1858-1922



The production in 1922 included (a) alluvial gold 17,647 fine ounces or 8·5 per cent of the total for the province (b) bullion from milling ores, 17,294 fine ounces or 8·4 per cent, (c) smelter recoveries 41,296 fine ounces or 19·9 per cent and (d) the estimated recoveries from ores and concentrates exported, 131,123 fine ounces or 63·2 per cent. The corresponding quantities for 1921 were (a) 11,281 fine ounces or 7·5 per cent (b) 3,311 fine ounces or 2·2 per cent (c) 52,643 fine ounces or 34·9 per cent and (d) 83,557 fine ounces or 55·4 per cent.

The amounts shown for alluvial gold are as published by the Provincial Mineralogist, while those from milling ores, smelter recoveries and ores exported have been compiled from reports received from smelters and mine operators. The re-opening of the Nickel Plate mine of the Hedley Gold Mining Company, and the richness of the ores shipped from the Premier mine were important factors in the rise in gold production.

Table 50.—Production of Gold in British Columbia, 1858-1922

Year	Fine ounces‡	Value	Year	Fine ounces‡	Value	Year	Fine ounces‡	Value
		$			$			$
1858	34,104	705,000	1880	49,044	1,013,827	1902	288,383	5,961,409
1859	78,129	1,615,072	1881	50,636	1,046,737	1903	284,108	5,873,036
1860	107,806	2,228,543	1882	46,154	954,085	1904	275,975	5,704,908
1861	128,973	2,666,118	1883	38,422	794,252	1905	285,529	5,902,402
1862	128,528	2,656,903	1884	35,612	736,165	1906	269,886	5,579,039
1863	189,318	3,913,563	1885	34,527	713,738	1907	236,216	4,883,020
1864	180,722	3,735,850	1886	43,714	903,651	1908	286,858	5,929,880
1865	168,887	3,491,205	1887	33,558	693,709	1909	250,320	5,174,579
1866	128,779	2,662,106	1888	29,834	616,731	1910	261,386	5,403,318
1867	120,012	2,480,868	1889	28,489	588,923	1911	238,496	4,930,145
1868	114,792	2,372,972	1890	23,918	494,436	1912	251,815	5,205,485
1869	85,865	1,774,978	1891	20,792	429,811	1913	297,459	6,149,027
1870	64,675	1,336,956	1892	19,327	399,525	1914	252,730	5,224,393
1871	87,048	1,799,440	1893	18,360	379,535	1915	273,376	5,651,184
1872	77,931	1,610,972	1894	25,664	530,530	1916	219,633	4,540,216
1873	63,166	1,305,749	1895	61,289	1,266,954	1917	133,742	2,764,693
1874	89,233	1,844,618	1896	86,504	1,788,206	1918	180,163	3,724,300
1875	119,724	2,474,904	1897	131,805	2,724,657	1919	167,252	3,457,406
1876	86,429	1,786,648	1898	142,215	2,939,852	1920	124,808	2,580,010
1877	77,796	1,608,182	1899	203,295	4,202,473	1921	150,792	3,117,147
1878	61,688	1,275,204	1900	228,916	4,732,105	1922	207,370	4,286,718
1879	62,407	1,290,058	1901	257,292	5,318,703			
						Total	8,801,676	181,946,829

‡Calculated from the value: one dollar=0·48375 ounces

The statistics reported by the Provincial Bureau of Mines covering the 1921 and 1922 production follow. The quantities given for lode gold production, which are based on the metal contents of ores shipped, are as a rule, somewhat higher than the record of smelter recoveries.

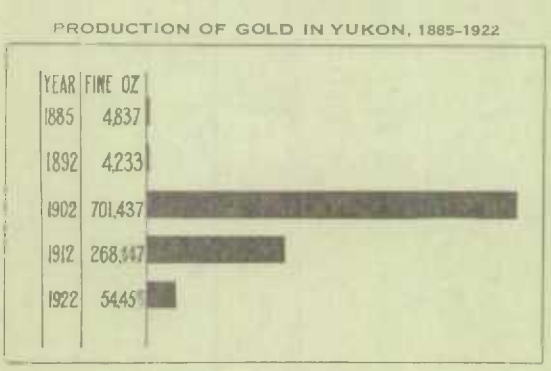
Table 51.—Production of Gold in British Columbia by Districts, 1921 and 1922

(From Annual Report of the Minister of Mines for British Columbia.)

Districts	1921				1922			
	Gold Placer		Gold Lode		Gold Placer		Gold Lode	
	Ounces	Value	Ounces	Value	Ounces	Value	Ounces	Value
		$		$		$		$
Cariboo:—								
Cariboo and Quesnel	3,370	67,400	.....	.....	9,615	192,300	.....	.....
Omineca	150	3,000	13	269	275	5,500	66	1,364
Cassiar:—								
Atlin, Liard and Stikine	7,210	144,200	3	62	7,450	149,000	3	62
Skeena, etc.	100	2,000	85,182	1,760,713	.....	.....	167,733	3,467,041
East Kootenay:—								
Fort Steele	180	3,600	1	20	150	3,000	.....	.....
Windermere and Golden	.....	.....	.....	.....	.....	.....	.....	.....
West Kootenay:—								
Ainsworth	.....	.....	11	227	.....	.....	25	517
Nelson	50	1,000	3,587	74,143	.....	.....	2,392	49,443
Slocan and Slocan City	.....	.....	19	393	.....	.....	224	4,630
Trail Creek	.....	.....	44,980	929,737	.....	.....	8,256	170,651
Revelstoke, etc.	50	1,000	8	165	50	1,000	4	83
Yale:—								
Grand Forks, Greenwood and Osoyoos	25	500	735	15,192	25	500	17,018	370,365
Similkameen, Nicola and Vernon	50	1,000	.....	.....	225	4,500	433	8,950
Yale, Ashcroft and Kamloops	50	1,000	.....	.....	150	3,000	364	7,524
Lillooet:—								
Lillooet	400	8,000	374	7,730	275	5,500	373	7,710
Southern Coast:—								
Vancouver Island	25	500	104	2,150	25	500	65	1,344
Mainland	.....	.....	646	13,353	.....	.....	.....	.....
Total	**11,660**	**233,200**	**135,663**	**2,804,154**	**18,240**	**364,800**	**197,856**	**4,089,684**

Yukon

The gold production from the Yukon in 1922 was derived from the alluvial sands of the Dawson and Whitehorse districts and showed a slight decrease from the quantity reported in the previous year. The output for 1922 was 54,456 fine ounces, valued at $1,125,705 which included 54,370 ounces from alluvial sands and 86 ounces from lead ores shipped to United States smelters, as against 65,994 fine ounces, valued at $1,364,217 in 1921. Of the 1921 production 78 ounces was recovered from lode mine shipments.



Bounty was paid on 67,961 crude ounces which included 54,370 fine ounces of gold valued at $1,123,927 and 12,233 fine ounces of silver valued at $8,259, a total value of $1,132,186. For 1921 the corresponding figures were 82,394 crude ounces, containing 65,916 fine ounces of gold, valued at $1,362,604, and 14,831 fine ounces of silver valued at $9,292 or a total value of $1,363,534.

The following table shows statistics of gold produced in the Yukon during the past 37 years. Between the years 1898 and 1906 the figures were based upon receipts of gold at the United States mints and receiving offices, credited to the Canadian Yukon.

Table 52.—Production of Gold in the Yukon, 1885-1922

Year	Fine Ounces‡	Value	Year	Fine Ounces‡	Value	Year	Fine Ounces‡	Value
		$			$			$
1885\			1899	774,000	16,000,000	1913	282,838	5,846,780
1886\	4,837	100,000	1900	1,077,553	22,275,000	1914	247,940	5,125,374
1887	3,386	70,000	1901	870,750	18,000,000	1915	230,173	4,758,098
1888	1,935	40,000	1902	701,437	14,500,000	1916	212,700	4,396,900
1889	8,466	175,000	1903	592,594	12,250,000	1917	177,667	3,672,703
1890	8,466	175,000	1904	507,938	10,500,000	1918	102,474	2,118,325
1891	1,953	40,000	1905	381,001	7,876,000	1919	90,705	1,875,039
1892	4,233	87,500	1906	270,900	5,600,000	1920	72,778	1,504,455
1893	8,514	176,000	1907	152,381	3,150,000	1921	65,994	1,364,217
1894	6,047	125,000	1908	174,150	3,600,000	1922	54,456	1,125,705
1895	12,094	250,000	1909	191,565	3,960,000			
1896	14,513	300,000	1910*	221,091	4,570,362			
1897	120,937	2,500,000	1911	224,197	4,634,574			
1898	483,750	10,000,000	1912	268,447	5,549,296	**Total**	**8,624,842**	**178,291,328**

‡Calculated from the value: one dollar = 0·048375 oz.

*Including a small production from lode mines, from 1910 to 1922 inclusive.

Since 1906 a royalty of two and one half-per cent on all gold produced has been collected by the Canadian Government which places a nominal value of $15 per crude ounce recovered. The statistics shown for these years are based on the returns supplied by the Mining Lands and Yukon Branch of the Department of the Interior, in which the fine gold is estimated as 80 per cent of all crude gold, fine silver as 12 per cent, and the remaining 8 per cent is regarded as worthless base metals.

The Vancouver Assay Office, which is operated by the Department of Mines, Ottawa, receives and melts a considerable portion of the placer gold from the Yukon. During 1922 there was deposited from this territory 69,161·19 ounces, valued, after all charges had been deducted at $1,126,702, or $16.29 per ounce, as against 82,219·92 ounces, valued at $1,340,224.97, or $16.30 per ounce in 1921.

Table 53.—Receipts from the Yukon, at the Dominion Government Assay Office, Vancouver, B.C., 1908-1922

Year	Weight before Melting	Net Value	Average Value	Year	Weight before Melting	Net Value	Average Value
	Ounces	$	$		Ounces	$	$
1908 (a)	60,132·00	1,000,296	16·63	1915	87,040·87	1,418,497	16·28
1909	5,003·12	83,871	16·75	1916	95,005·82	1,525,724	16·06
1910	3,594·87	62,094	17·27	1917	79,532·35	1,262,207	15·87
1911	2,073·61	34,944	16·88	1918	121,310·37	1,921,198	15·84
1912	2,211·88	36,481	16·41	1919	111,138·65	1,813,883	16·32
1913 (b)	15,235·29	247,189	16·22	1920	74,456·01	1,206,579	16·21
1914	56,564·83	915,914	16·21	1921	82,219·92	1,340,225	16·30
				1922	69,161·19	1,126,702	16·29

(a) For nine months only.

(b) The removal in 1913 of the assay charge accounts for the great increase.

Table 54.—Production of Crude Gold in the Yukon, 1920, 1921 and 1922

(Gross weight of dust, nuggets, and bullion in ounces)

Month	1920	1921	1922
January	280·78	813·77	18·90
February	18·00	622·22	815·64
March	9,497·14	22·85	295·52
April	140·52	36·18	82·30
May	44·42	...	...
June	10,505·24	14,717·00	14,360·08
July	11,018·56	13,585·40	10,288·07
August	12,865·26	14,742·48	8,062·47
September	8,575·41	11,773·73	15,635·29
October	32,243·87	22,106·00	11,697·89
November	3,992·30	3,183·19	4,613·04
December	1,756·72	791·75	2,092·53
Total	**90,938·22**	**82,394·57**	**67,961·73**

Between 1898 and March 31, 1923, a royalty to the extent of $4,834,913.81 was collected on the gold production of this district. The yearly amounts collected, as well as the annual production of gold as ascertained by the Department of the Interior, are shown below. The difference between these figures and those shown in the table of annual production, which are based on mint receipts of Yukon gold is probably due to three factors: (1) the fixing of the value of the gold for royalty purposes at $15 per ounce, (2) the probability that, in the earlier years of royalty collection, considerable quantities of gold dust left the camps unrecorded and escaped royalty payments, and (3) the fact that in the last few years there has been a small production from lode mines.

Table 55.—Gold Production in the Yukon and the Royalty Collected

(From the Report of the Mining Lands and Yukon Branch of the Department of the Interior, by Controller H. H. Rowatt)

Fiscal Year	Total Gold Production	Total Exemption	Royalty Collected on	Royalty Paid
	$	$	$	$ cts.
Ending June, 1898	3,072,773	339,845	2,732,928	273,292 82
Ending June, 1899	7,582,283	1,699,657	5,882,626	588,262 37
Ending June, 1900	9,809,464	2,501,744	7,307,720	730,771 99
Ending June, 1901	9,162,082	1,927,666	7,234,416	592,660 98
Ending June, 1902	9,566,340	1,199,114	8,367,226	331,436 79
Ending June, 1903	12,113,015	...	12,113,015	302,893 48
Ending June, 1903	10,790,663	...	10,790,663	272,217 96
Ending June, 1905	8,222,054	...	8,222,054	206,760 87
Ending June, 1906	6,540,007	...	6,540,007	163,963 25
Ending March, 1907	3,304,791	...	3,304,791	82,622 42
Ending March, 1908	2,820,162	...	2,820,162	70,504 05
Ending March, 1909	3,260,282	...	3,260,282	81,507 07
Ending March, 1910	3,594,251	...	3,594,251	89,844 10
Ending March, 1911	4,126,728	...	4,126,728	103,168 19
Ending March, 1912	4,024,237	...	4,024,237	100,606 29
Ending March, 1913	5,018,412	...	5,018,412	125,460 52
Ending March, 1914	5,301,508	...	5,301,508	132,537 69
Ending March, 1915	4,649,634	...	4,649,634	116,241 04
Ending March, 1916	4,458,278	...	4,458,278	111,457 19
Ending March, 1917	3,960,207	...	3,960,207	99,005 92
Ending March, 1918	3,266,019	...	3,266,019	81,650 55
Ending March, 1919	1,947,082	...	1,947,082	48,677 07
Ending March, 1920	1,660,450	...	1,660,450	41,501 12
Ending March, 1921	1,246,486	...	1,246,486	31,373 76
Ending March, 1922	1,230,987	...	1,230,987	30,774 68
Ending March, 1923	1,032,762	...	1,032,762	25,819 04
Total	**131,766,957**	...	**124,092,941**	**4,834,913 81**

Table 56.—World's Production of Gold*, 1913, 1918-1922

(In fine ounces).

	1913	1918	1919	1920	1921	1922
NORTH AMERICA—						
United States	4,299,784	3,320,784	2,918,628	2,476,166	2,422,006	2,375,019
Canada	802,973	699,681	766,764	766,913	924,374	1,230,000
Mexico	829,783	813,895	758,354	735,078	683,991	748,323
Total North America	**5,932,540**	**4,834,360**	**4,443,746**	**3,978,157**	**4,030,371**	**4,353,342**
Central America and West Indies	**131,661**	**164,475**	**159,638**	**145,125**	**120,937**	***121,000**
South America—						
Bolivia	8,467	242	242	242	290	
Chili		37,007	37,007	43,538	38,700	
Brazil	109,072	135,450	96,750	125,775	134,482	
Colombia	143,757	290,250	290,251	280,575	290,250	
Ecuador	19,665	38,700	38,700	36,281	37,710	
Peru	23,813	57,645	65,232	62,757	77,385	
Guiana—British	65,475	24,546	16,216	9,675	12,828	
Dutch	22,757	18,851	15,932	12,506	12,094	
French	147,571	57,741	53,212	43,538	48,375	
Venezuela	21,517	22,891	29,025	18,839	11,215	
Other countries	1,572	677	677	4,858	3,967	
Total South America	**563,666**	**684,000**	**643,244**	**638,584**	**667,296**	***667,000**
EUROPE—						
Austria-Hungary	105,425	8,708				
Czecho-Slovakia			6,076	8,761	11,413	11,400
France	102,912	24,187	7,298			
Great Britain	864			32		
Russia and Siberia	1,282,313	580,500	532,115	57,225	45,000	119,050
Other countries	24,290	1,903	1,446	9,116	9,646	9,600
Total Europe	**1,515,804**	**615,298**	**546,935**	**75,134**	**66,059**	**140,050**
AUSTRALASIA—						
New South Wales	149,657	87,044	65,830	48,907	51,173	25,000
Queensland	265,735	133,571	121,030	115,230	40,376	79,332
South Australia	6,556	6,189	3,224	1,697	2,628	2,600
Victoria	434,932	158,827	135,428	168,979	104,512	106,872
West Australia	1,314,043	876,508	734,066	617,842	664,950	538,245
New Zealand	343,595	208,654	222,063	124,375	124,375	*124,000
Tasmania	33,400	10,529	7,686	6,246	5,340	3,400
Other countries	21,393	9,232	12,508	12,502	9,779	*9,000
Total Australasia	**2,569,311**	**1,490,554**	**1,301,844**	**1,095,778**	**1,003,133**	**888,449**
ASIA—						
British India	589,109	485,236	507,260	499,068	470,000	427,000
China	176,999	174,150	159,637	125,000	100,000	*100,000
Chosen (Korea)	173,306	159,637	135,450	76,000	75,000	*75,000
British East Indies	65,402	35,556	31,444	29,025	24,188	*24,000
Dutch East Indies	163,852	88,836	92,592	90,920	94,168	*94,000
Formosa	39,406	24,850	20,186	13,500	12,000	*12,000
Japan	174,846	246,998	233,405	248,181	229,671	233,809
Other countries	24,596	20,727	39,810	29,366	30,637	*31,000
Total Asia	**1,407,516**	**1,235,990**	**1,219,784**	**1,111,060**	**1,035,664**	**996,809**
AFRICA—						
Belgian Congo	44,334	117,733	108,442	96,804	65,715	*66,000
Madagascar	60,769	23,887	22,505	16,686	14,660	14,500
Rhodesia	690,541	631,358	593,446	553,067	586,908	655,500
British West Africa	384,836	314,860	225,226	230,948	203,599	*200,000
Transvaal, Cape Colony and Natal	8,798,713	8,418,377	8,331,651	8,331,651	8,128,722	7,232,000
Other countries	45,623	26,028	33,476	26,905	31,724	30,000
Total Africa	**10,024,816**	**9,532,234**	**9,314,746**	**9,256,061**	**9,031,328**	**8,198,000**
Grand Total	**22,145,314**	**18,556,920**	**17,629,977**	**16,299,899**	**15,954,788**	**15,364,650**

*1913-1921, as reported by the Director of the Mint with the exception of the Mexican figures which have been revised. 1922, as compiled by American Bureau of Metal Statistics, conjectural figures (*) based on the 1921 outputs being inserted where necessary.

IRON ORE

The total shipments of iron ore from Canadian mines during 1922 amounted to 17,971 short tons, the net value of which was reported as $56,993 as compared with 59,509 tons shipped in 1921 with a value of $230,164. This production was the lowest recorded during the past 21 years, and included 300 tons of roasted siderite worth $937; roasted magnetites to the extent of 15,890 tons valued at $51,118, produced in Ontario; and 1,781 tons of exported magnetite ore valued at $4,938, of which 1,255 tons was mined in British Columbia and the remaining 526 tons was shipped from stocks in Quebec province.

Pig iron derived from Canadian ores smelted in Canadian blast furnaces during the period totalled 8,095 short tons which at the year's average price for pig iron of $22.11 per short ton had a computed value of $178,980.

No domestic ores were mined in Nova Scotia during the period but the British Empire Steel Corporation continued to operate their iron mines in Newfoundland. The shipments during 1922 which were about three times greater than those of the previous year comprised 1,123,327 tons valued at $2,187,344, of which 311,482 tons worth $614,394 was shipped to Nova Scotia, the balance being exported to European points.

Table 56a—Summary of Iron and Steel Statistics, 1920, 1921 and 1922

—	—	1920	1921	1922
	Short tons			
Iron ore shipped from mines	"	129,072	59,509	17,971
Canadian iron ore charged to blast furnaces	"	149,515	126,653	23,398
Imported " " "	"	1,957,738	1,141,007	778,141
Iron ore charged to steel furnaces	"	64,146	36,308	24,980
Pig-iron made in blast furnaces	"	1,081,561	664,993	428,923
" " electric furnaces	"	8,835	683	.....
" exported	"	102,628	2,685	17,236
" imported	"	57,483	18,636	58,796
Ferro-alloys made	"	28,173	24,594	23,239
" imported	"	7,908	2,295	3,771
" exported	"	25,422	10,031	20,350
Pig-iron and ferro-alloy consumption	"	1,181,228	708,278	477,143
" used in steel furnaces	"	732,486	465,750	313,000
Steel ingots and castings made	"	1,232,697	747,582	539,974
Steel rails made	"	255,322	298,110	140,970
Canadian coke used in iron blast furnaces	"	415,742	244,830	172,250
Imported " " "	"	788,795	590,199	300,269
Number of completed blast furnaces	No.	20	20	20
Number of men employed at blast furnaces	"	1,179	617	555
Wages paid at blast furnaces	$	2,186,779	922,276	769,584
Value of pig-iron produced	$	29,939,676	15,518,582	8,819,242
" iron and steel goods exported	$	84,357,906	32,620,942	41,800,812
" iron and steel goods imported	$	249,622,056	147,170,117	129,347,856

PIG IRON

The total production of pig iron in Canada in 1922 was 428,923 tons having a value of $8,819,242 as compared with a total production in 1921 of 665,676 tons valued at $15,518,582, a decrease of 36 per cent in quantity and 43 per cent in value. The production in 1922 was all from blast furnaces. Approximately 100 tons was made in an electric furnace for experimental purposes but no value was placed on it and the amount is not included in the tonnage produced. Of the 1921 total, 683 tons was made in electric furnaces from scrap metal.

The production of blast furnace pig-iron in Nova Scotia in 1922 was 135,261 tons as against 169,504 tons in 1921. In Ontario the production during 1922 was 293,662 tons against 495,489 tons in 1921.

By grades the 1922 production included: basic, 283,697 tons; foundry and malleable, 145,226 tons. The production in 1921 by grades included: basic 516,967 tons; foundry and malleable, 148,026 tons; low phosphorus iron (electric furnace) 683 tons.

The blast furnace plants operated during 1922 included those of the Dominion Iron and Steel Company at Sydney, Nova Scotia; the Steel Co. of Canada at Hamilton, Ont., and the Algoma Steel Corporation at Sault Ste. Marie, Ont. The Canadian Furnace Company at Port Colborne and The Midland Steel Company at Midland did not operate during the year.

Electric furnaces were operated for the production of ferro-alloys at Welland, Niagara Falls, Thorold and Hamilton, all of which are served by hydro-electric power from Niagara Falls.

The production of ferro-alloys including ferro-silicon and spiegeleisen in 1922 amounted to 23,239 tons valued at $828,834. In 1921 the production was 24,594 tons valued at $998,279.

The exports of pig-iron during 1922 were 17,236 tons, valued at $376,438 or an average of $22 per ton, and of ferro-alloys, 20,350 tons, valued at $897,272 or an average of $44 per ton.

The exports of pig-iron were all to the United States. The ferro-alloy exports included 19,267 tons to the United States, and 1,083 tons to other countries.

The imports into Canada during 1922 included 58,796 tons of pig-iron, valued at $1,266,268 or an average of $22 per ton, and 3,771 tons of ferro-alloys, valued at $237,574, or an average of $63 per ton, making a total import of pig-iron and ferro-alloys of 124,209 tons valued at $1,503,842. The United States trade records showed exports to Canada during 1922 of pig-iron and ferro-alloys amounting to 35,768 tons, valued at $655,767.

Detailed statistics of the iron and steel industry in Canada are given in a special Bureau report entitled "Iron and Steel and their Products."

LEAD

The production of lead in Canada in 1922 amounted to 93,307,171 pounds (46,653.58 tons) which at the average market price in Montreal for the year of 6·235 cents per pound, was valued at $5,817,702, as against 66,679,592 pounds (33,339.8 tons) valued at $3,828,742 in 1921 when the average price was 5·742 cents, per pound. The increase amounted to about 40 per cent in quantity and 52 per cent in value.

The production in 1922 included (a) 88,606,869 pounds (44,303·4 tons) of pig lead produced at Trail, B.C., and Galetta, Ontario; (b) 4,670,621 pounds (2,335·3 tons), the estimated recoveries from lead ores and concentrates exported to the United States, and (c) 29,681 pounds (14·8 tons), estimated as recovered from ores and concentrates exported from Cobalt to United States smelters.

The corresponding figures for 1921 were (a) 62,333,281 pounds (31,166·6 tons); (b) 4,343,611 pounds (2,171·8 tons) and (c) 2,700 pounds (1·3 tons).

This production was mainly from British Columbia, with small amounts from Ontario, Quebec and Yukon Territory.

Table 58.—Production* of Lead from Canadian Ores, 1887-1922

Year	Pounds	Value	Cents per pound	Year	Pounds	Value	Cents per Pound
		$				$	
1887	204,800	9,216	5·400	1905	56,864,915	2,676,632	4·707
1888	674,500	29,812	4·420	1906	54,608,217	3,089,187	5·657
1889	165,100	6,488	3·930	1907	47,738,703	2,542,086	5·325
1890	105,000	4,704	4·480	1908	43,195,733	1,814,221	4·200
1891	88,665	3,857	4·350	1909	45,857,424	1,692,139	3·690
1892	808,420	33,064	4·090	1910	32,987,508	1,216,249	3·687
1893	2,135,023	79,636	3·730	1911	23,784,969	827,717	3·480
1894	5,703,222	187,636	3·290	1912	35,763,476	1,597,554	4·467
1895	16,461,794	531,716	3·230	1913	37,662,703	1,754,705	4·659
1896	24,199,977	721,159	2·980	1914	36,337,765	1,627,568	4·479
1897	39,018,219	1,396,853	3·580	1915	46,316,450	2,593,721	5,600
1898	31,915,319	1,206,399	3·780	1916	41,497,615	3,532,692	8,513
1899	21,862,436	977,250	4·470	1917	32,576,281	3,628,020	11·137
1900	63,169,821	2,760,521	4·370	1918	51,398,002	4,754,315	9·250
1901	51,900,958	2,249,387	4·334	1919	43,827,699	3,053,037	6·966
1902	22,956,381	934,095	4·069	1920	35,953,717	3,214,262	8·940
1903	18,139,283	768,562	4·237	1921	66,679,592	3,828,742	5·742
1904	37,531,244	1,617,221	4·309	1922	93,307,171	5,817,702	6·235

*Previous to 1913 the figures reported show the metal content of the shipments and are somewhat in excess of the actual amount recovered. Since 1912 the data given represent the quantity of lead produced in Canada from domestic ores, together with the estimated lead recovery from lead ores and concentrates exported. From 1887 to 1908, average prices at New York; 1909 and 1910, average prices at Toronto; from 1911 to date, average prices in Montreal were used in making up the values shown, since 1920 the quotations used have been furnished by the Consolidated Mining and Smelting Co., Montreal, Que.

PRODUCTION OF LEAD FROM CANADIAN ORES 1887-1922.

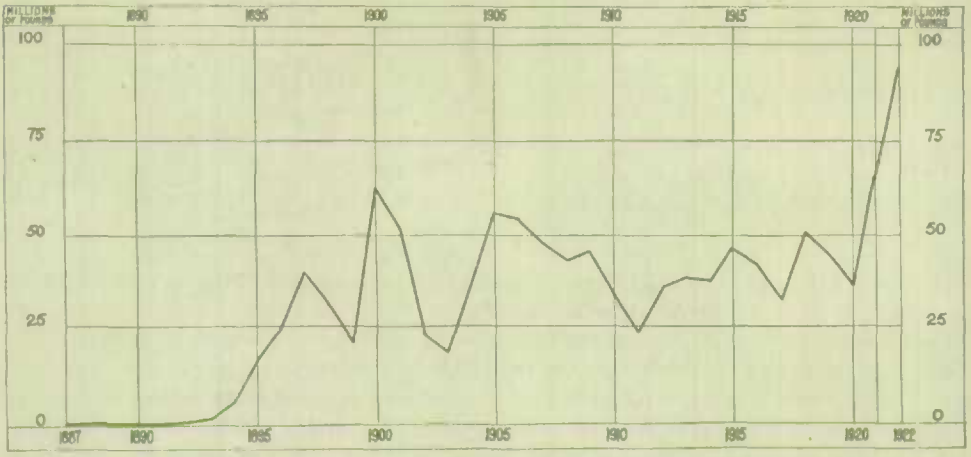


Table 59.—Production of Lead by Provinces, 1887-1922

Calendar Year	Quebec		Ontario		British Columbia		Yukon	
	Pounds	Value $	Pounds	Value $	Pounds	Value $	Pounds	Value $
1887					204,800	9,216		
1888					674,500	29,813		
1889					165,100	6,488		
1890	105,000	4,704						
1891	88,665	3,857						
1892					808,420	33,064		
1893	3,931	146			2,131,092	79,490		
1894					5,703,222	187,636		
1895					16,461,794	531,716		
1896					24,199,977	721,159		
1897	177,084	6,340			38,841,135	1,390,513		
1898	221,760	8,382			31,693,559	1,198,017		
1899					21,862,430	977,250		
1900	11,200	490			63,158,621	2,760,031		
1901	318,052	13,784			51,582,906	2,235,603		
1902	420,000	17,090			22,536,381	917,005		
1903			50,000	2,119	18,089,283	766,443		
1904			885,000	38,135	36,646,244	1,579,086		
1905			284,212	13,378	56,580,703	2,663,254		
1906			2,200,000	124,454	52,408,217	2,964,733		
1907					47,738,703	2,542,086		
1908					43,195,733	1,814,221		
1909					45,857,424	1,692,139		
1910					32,987,508	1,210,249		
1911					23,784,969	827,717		
1912					35,763,476	1,507,554		
1913			33,000	1,537	37,626,899	1,753,037	2,804	131
1914					36,249,845	1,625,422	47,920	2,146
1915	40,401	2,262	88,985	4,983	45,377,064	2,541,116	810,000	45,360
1916	698,760	59,485	685,932	58,393	39,157,701	3,33,496	955,222	81,318
1917	1,378,001	153,468	1,586,711	176,712	29,483,725	3,283,602	127,844	14,238
1918	2,110,059	195,189	1,684,366	155,804	47,594,328	4,402,475	9,249	856
1919	2,280,000	158,823	1,187,586	103,627	40,060,113	2,790,587		
1920	905,472	80,949	2,255,520	201,643	32,792,725	2,931,670		
1921	595,881	34,215	3,312,493	19,203	60,298,605	3,462,346	2,472,615	141,978
1922			2,890,397	180,216	87,093,266	5,430,265	3,323,508	207,221
Totals.....	9,354,266	739,177	17,444,202	1,251,202	1,128,850,472	60,294,499	7,749,162	493,248

Table 60.—Shipments of Lead Ores and Concentrates from Canadian Mines in 1922

	Lead Ores	Lead Concentrates	Dry Ores
Tons shipped	17,245	8,823	998
Reported value of shipments	$599,425	$754,370	$12,388
Metal Contents of Shipments—			
Gold.....fine ounces.	70	234	8
Silver..... " "	1,285,348	611,843	19,922
Lead.....pounds	11,245,579	9,363,313	4,264
Zinc..... "	1,233,901	.....	.....

Many of the ores of British Columbia contain both lead and zinc. Thus, in addition to the quantities noted in the above table there was 78,350,311 pounds of lead contained in zinc ores so termed because zinc was the predominating metal. Most of such shipments were from the Sullivan mine of the Consolidated Mining and Smelting Company.

Previous to 1904 lead ores mined in Canada were either exported as ore or smelted in Canadian furnaces and exported in the form of base bullion for refining. A lead refinery employing the Betts electrolytic process has been in operation at Trail, B.C. since 1904, treating the product from lead blast furnaces.

The production of refined lead at Trail amounted in 1922 to 39,276 tons, as against 28,820 tons in 1921; 13,237 tons in 1920 and 16,446 tons in 1919.

The Kingdon Mining, Smelting and Manufacturing Company, Limited, which is now smelting ores from the Kingdon mine at Galetta, Ont., has been in operation since early in 1919; the plant is operated by the Estate of James Robertson.

Table 61.—Refined Lead Produced in Canada,* 1904-1922

Year	Pounds of Refined Lead Produced	Year	Pounds of Refined Lead Produced	Year	Pounds of Refined Lead Produced
1904	7,519,440	1910	32,987,508	1916	33,087,474
1905	15,804,509	1911	23,525,050	1917	32,115,114
1906	20,471,314	1912	35,893,190	1918	31,571,112
1907	26,607,461	1913	37,923,043	1119	34,330,920
1908	36,549,274	1914	36,443,706	1920	28,720,030
1909	41,883,614	1915	43,518,618	1921	60,949,793
				1922	81,412,716

* Includes the electrolytic produced from Canadian and foreign ores at Trail, B.C., and also the pig-lead from Galetta, Ont.

The excellent position of lead in the world's markets has developed as a result of the unusually high prices prevailing for this metal. Although Canada's production of lead represents but a few per cent of the world's total output, the economic conditions governing its production in Canada are those which control the world's market as well. A comparison of the lead, copper and zinc situation in the United States as published in the "*Engineering and Mining Journal-Press*"[1] brings out some interesting facts bearing on the production of these metals: "The world's lead production did not show a great jump during the war and after. Furthermore the lead market was not plagued with exceedingly heavy stocks of surplus and second-hand metal after the Armistice. Then again the lead market (in the United States) is protected by a 2½ tariff. Another reason is that lead is insistently called for by European countries, whereas copper is not so much in demand as it should be. Lead producers for the last two years have been able to benefit by the flourishing condition of two great American industries—the building boom and automobile manufacture. The building trades use large amounts of lead in paints and pipe and every new automobile has a storage-battery with lead plates. Incidently the storage battery business received a strong impetus from the demand for radio apparatus. Compare this with the situation in zinc and the contrast is striking. Zinc producers are chiefly dependent upon two outlets for their production, the galvanizing industry and the brass and alloy manufactures. When these two industries refrain from buying the market is severely depressed."

[1]Vol. 116-No. 17—Page 744.

It may be of interest to point out some of the more salient features concerning Canada's production and trade in lead. Compared with the United States, the consumption by Canadian industries is very small and is not of such widespread character, but at the same time the conditions obtaining in the United States on lead consumption have a distinct bearing on similar Canadian industries.

The total value of the imports into Canada of lead and its products during the calendar year 1921 was $486,902 as compared with $3,003,258 in 1920. Data for 1922 show a slight gain over 1921. The decrease from the year 1920 while not proportional to the rise in the production of lead in Canada during the same period emphasizes the trend of the movements in the lead supply of Canada, and indicates to some extent that domestic lead is now supplying a greater portion of the home market. Much of the decrease may be accounted for by the lessened activity in manufacturing which was observed throughout 1921 and the greater part of 1922. The imports came principally from the United Kingdom, United States, Mexico and Japan. While the value of the Canadian imports has been decreasing, the record of the exports has been favourable and remarkable increases in the quantity of pig lead exported have been recorded. The best export customers for Canadian lead and its products during 1922 were Japan, the United Kingdom, and China in the order named. Small shipments were also made to Germany, Belgium and Newfoundland.

Table 62.—Imports into Canada and Exports of Lead, 1920, 1921 and 1922

	1920		1921		1922	
	Pounds	Value	Pounds	Value	Pounds	Value
		$		$		$
IMPORTS—						
Old and scrap, pig and block	27,002,717	2,206,200	1,781,230	87,228	2,001,987	105,527
Bars and sheets	768,726	67,872	236,696	15,411	263,612	17,957
Litharge	2,457,900	277,951	1,650,500	131,099	1,514,400	122,592
Acetate and nitrate of lead	152,584	21,491	171,561	18,471	217,487	20,330
Other manufactures		265,507		140,948		199,330
Pipe lead	48,769	5,185	72,238	5,026	90,716	6,458
Shots and bullets	117,224	10,497	14,152	1,081	10,324	4,173
Tea lead	251,273	34,119	140,259	12,586	225,729	21,530
Lead pigments:—						
Dry white lead	34,520	3,003	16,027	1,533	190,472	14,255
White lead, ground in oil	39,032	5,444	48,424	5,123	56,760	6,001
Dry red lead and orange mineral	967,533	110,989	795,275	68,486	966,846	74,921
Total		**3,008,258**		**486,902**		**593,074**
EXPORTS—						
Lead in ore	7,549,400	385,839	6,253,700	256,834	10,941,800	550,088
Pig-lead	18,800	1,846	23,779,700	992,485	41,481,900	1,877,050
Total	**7,568,200**	**387,685**	**30,033,400**	**1,249,319**	**52,423,700**	**2,427,138**

QUEBEC

Lead production in the province of Quebec dates from the year 1915 when some 40,000 pounds was produced, all of which was derived from the lead-zinc deposits of Notre Dame des Anges. The steady demand during the war led to the more active development of these deposits and in 1919 the output reached its maximum figure when over two-and-a quarter million pounds was produced. During 1922 no shipments were made from these mines.

ONTARIO

Production of lead in Ontario was carried on many years ago in Frontenac county, but it was not until 1913 when some 33,000 pounds was recovered that any statistical records have been kept. During that year the deposits in Carleton county were opened up and rapidly developed during the war period. The total Ontario production now comes from Galetta in Carleton County, where the Kingdon Mining, Smelting and Manufacturing Company operates its mine, mill and smelter. The peak of production came in 1921 when 3,312,493 pounds was recovered.

British Columbia

The production of lead in British Columbia is derived from the zinc-lead ores of the East and West Kootenays. During 1922 the smelter production from British Columbia ores amounted to 87,093,266 pounds valued at $5,430,265, which included the pig lead recovered in the treatment of Canadian ores in Canada and the quantities estimated as recovered from Canadian lead ores exported. Compared with the record for the year 1921, in which the production amounted to 60,298,603 pounds valued at $3,462,346, there was an increase of 44·4 per cent in quantity and 56·8 per cent in value.

Table 63.—Monthly Average Prices of Lead in Montreal, New York and London, 1920, 1921 and 1922

Month	Montreal—cents per pound			New York—cents per pound			London—in £ Sterling per ton of 2,240 pounds		
	1920	1921	1922	1920	1921	1922	1920	1921	1922
							£ s. d.	£ s. d.	£ s. d.
January	9·90	6·093	6·152	8·561	4·821	4·700	47 7 2	23 13 3	23 13 4
February	10·25	5·683	5·897	8·814	4·373	4·700	50 12 9	20 8 9	20 13 8
March	11·07	5·377	5·930	9·145	4·084	4·720	47 1 10	18 20 11	21 5 4
April	9·85	5·404	5·908	8·902	4·356	5·115	40 4 0	20 17 6	22 19 10
May	9·40	6·021	6·139	8·576	4·952	5·420	39 3 2	23 0 0	24 9 3
June	9·30	5·795	6·190	8·323	4·485	5·745	35 1 4	22 7 2	24 13 8
July	8·90	5·75	6·235	8·338	4·410	5·729	35 9 0	23 6 5	24 17 4
August	9·00	5·571	6·226	8·687	4·382	5·824	36 8 10	23 6 6	24 11 7
September	8·10	5·588	6·178	8·179	4·600	6·110	35 7 6	22 19 0	24 2 7
October	7·60	5·581	6·235	7·070	4·690	6·530	35 2 2	23 12 2	25 11 0
November	7·30	5·820	6·775	6·159	4·683	7·047	32 5 6	24 4 2	26 3 11
December	5·80	6·223	6·957	4·727	4·700	7·163	24 11 10	24 16 9	26 1 7
Average	**8·873**	**5·742**	**6·235**	**7·957**	**4·545**	**5·734**	**38 4 7**	**22 6 7**	**24 1 11**

Table 64.—World's Production of Lead, 1913, 1918-1922

(Compiled from the Year Book of the American Bureau of Metal Statistics)

(Short tons)

Country	1913	1918	1919	1920	1921	1922
North America—						
United States	435,665	556,233	454,797	476,125	402,479	470,000
Canada	18,822	25,692	21,903	18,187	34,381	45,842
Mexico	68,324	97,530	86,667	93,925	66,851	133,180
Total North America	**522,811**	**679,455**	**563,367**	**588,237**	**503,711**	**649,022**
South America—						
Argentina	.....	3,786	4,369	3,857	2,756	3,986
Other South America	2,729	1,482	2,865	3,047	2,385	2,558
Total South America	**2,729**	**5,268**	**7,234**	**6,904**	**5,141**	**6,544**
Europe—						
Austria	26,558	36,366	1,044	4,379	3,689	4,106
Belgium	59,056	22,734	4,656	17,681	32,793	39,683
France	31,756	14,081	12,043	13,224	11,023	13,200
Germany (including Upper Silesia)	207,176	82,231	56,753	65,036	82,675	93,696
Greece	20,177	4,510	4,233	5,547	6,140	5,181
Italy	23,885	20,202	18,216	17,578	13,763	11,960
Czecho-Slovakia and Jugo-Slavia	.....	.....	9,663	7,367	7,191	7,385
Poland (Upper Silesia excluded)	2,976	.....	.....	1,653	1,113	1,102
Russia	1,678	.....	.....	.....	.....	.....
Spain	219,110	187,019	138,545	138,890	135,583	106,923
Sweden	1,361	2,525	1,004	991	827	441
United Kingdom	20,304	12,213	11,506	12,275	5,777	3,307
Total Europe	**614,037**	**381,881**	**258,563**	**284,621**	**300,572**	**286,984**
Asia—						
Turkey	15,318	2,755	1,102	1,102	9,199	3,417
India (Burma)	6,535	21,357	20,747	26,679	37,737	43,919
Japan	4,162	11,774	6,360	4,607	3,459	3,307
Total Asia	**26,015**	**35,886**	**28,209**	**32,388**	**50,395**	**50,643**
Australia	**126,207**	**186,729**	**92,654**	**7,642**	**63,071**	**118,656**
Africa—						
Rhodesia	.....	10,257	14,171	16,353	19,808	22,062
Tunis	.....	18,224	11,380	12,574	13,911	14,457
Total Africa	.....	**28,481**	**25,551**	**28,927**	**33,719**	**37,419**
Grand Total	**1,291,799**	**1,317,700**	**975,578**	**948,719**	**956,609**	**1,149,268**

MERCURY

There has been no production of mercury recorded since 1897. The small production reported in 1895, 1896, and 1897, was derived from the deposits at the western end of Kamloops Lake, B.C. These deposits consist of quartz veins containing pockets of cinnabar, in a zone of decomposed tertiary volcanic rocks.

Mercury has also been reported as occurring in ores of the Cobalt district, and in the neighbourhood of Field, B.C., and Sechart, on the west coast of Vancouver Island.

The Kerr Lake Mines, Limited, of Cobalt, Ont., in its annual report to the shareholders, reported recoveries of mercury amounting to 545·5 pounds in 1918, and 137·5 pounds in 1919.

The imports of mercury during 1922 were 59,296 pounds, valued at $47,742, as against 30,894 pounds, valued at $20,570, in 1921.

Table 65.—Production of Mercury in Canada, 1895-1922

Year	Flasks	Price per flask	Total Value
		$	$
1895	71	33·00	2,343
1896	58	33·44	1,940
1897	9	36·00	324
1898-1922	.....	.....	.....

Table 66.—Imports into Canada of Mercury, 1920, 1921 and 1922

Year	Pounds	Value
		$
1920	209,020	272,152
1921	30,894	20,570
1922	59,296	47,742

Table 67.—Monthly Average Price of Mercury, 1920, 1921 and 1922

(At New York, Per Flask of 75 pounds)

Month	1920	1921	1922
	$	$	$
January	90·192	48·440	49·960
February	84·432	49·545	48·295
March	92·611	46·796	50·204
April	102·192	45·423	52·280
May	89·560	47·000	54·885
June	90·154	46·846	55·115
July	90·333	44·950	55·000
August	83·806	45·028	57·593
September	75·000	42·660	67·040
October	67·200	39·840	72·560
November	58·417	39·804	71·521
December	49·577	49·212	72·300
Average	**81·123**	**45·462**	**58·946**

MOLYBDENUM

There has been no production of molybdenite in Canada since 1919.

The war stimulated the demand for molybdenum ores to a considerable extent, but with the cessation of hostilities, the producers were left with considerable stocks on hand which could not very readily absorbed in peace times with the limited uses for the metal, apart from the making of ferro-molybdenum. The price declined accordingly to as low as 40 to 50 cents per pound for forced sales.

A few companies carried on development work during 1919 and 1920 but the only producer in 1919 was the Dominion Molybdenite Company, Limited, operating the property at Quyon, Que., for part of the year only.

The ore produced has been chiefly low-grade material carrying less than 2 per cent MoS_2 but included small quantities of ore running from 2 to 15 per cent MoS_2 and some higher grade hand-picked material.

All the ore produced in Canada has been concentrated in Canadian mills erected for the purpose, and marketed either as concentrates, molybdic acid, ammonium molybdate, or as ferro-molybdenum for the manufacture of which two electric furnace plants were established and operated during 1916, 1917, and 1918.

There has been no production of ferro-molybdenum since February, 1918.

There are molybdenite deposits in Nova Scotia, Quebec, Ontario, Manitoba, and British Columbia. The principal production has come from the Quyon mine, in Pontiac county, Quebec.

Prices.—The market quotations in January, 1922, for molybdenum ore, 85 per cent MoS^2 were 54 to 58 cents per pound of contained sulphide and in June were 50 cents per pound with a good demand. By the end of the year the price had risen to 70 cents.

Table 68.—Production of Molybdenite in Canada, 1902-1922

Year	Ores mined	Ores treated	Ores and concentrates shipped		MoS_2 Contents of shipments	MoS_2 production (probable recovery)	
	Tons	Tons	Tons	Value (a)	Pounds	Pounds	Value (b)
1902	3	.....	3·3	$ 400	(c)	(c)	(c)
1903	600	.....	85·0	1,275	(c)	(c)	(c)
1904-1913	.....	.....	.....	.....	.....	.....	.....
1914	168	.....	16·5	2,063	3,814	3,814	$ 2,063
1915	2,242	216	39·0	28,920	29,210	29,210	28,450
1916	13,522	9,106	610·0	188,316	156,461	156,461	156,461
1917	26,871	22,605	1,554·3	320,006	330,316	288,705	288,705
1918	34,030	33,935	461·3	428,807	378,482	378,029	434,733
1919	7,280	6,783	46·0	69,203	83,002	83,002	69,203
1920-1922	.....	.....	.....	.....	.....	.....	.....

(a) Value as given by the operators. (b) Estimated at the average market value of molybdenite.
(c) No figures available.

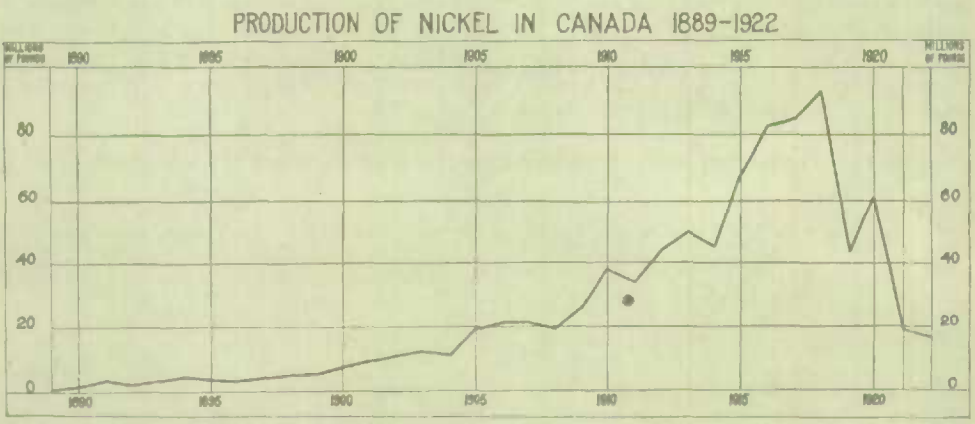
NICKEL

The nickel industry during 1922 was slowly recovering from the severe decline which set in at the end of the war. The slight advance in the price of the associated metal copper was of some benefit. In the month of August the International Nickel Company commenced shipping matte to its refinery at Port Colborne which resumed operations in September and the Mond Company which had produced at a reduced rate during the year increased its production and shipped large quantities of matte toward the end of the period.

Owing to the stagnant condition of the nickel market, the production of this metal in 1922 was lower than in any year since 1904, and compared with 1918, the banner year to date, the production of 1922 showed a decrease to only 19 per cent of the quantity and 16·7 per cent of the value. The output included 17,355,056 pounds contained in nickel-copper matte made by the Canadian smelters treating Sudbury ores and 242,067 pounds, the nickel contents of smelter products resulting from the treatment of silver-cobalt ores.

Table 69.—Production of Nickel in Canada, 1889-1922

Year	Pounds of nickel	Cents per pound	Value	Year	Pounds of nickel	Cents per pound	Value
			$				$
1889	830,477	60	498,286	1906	21,490,955	42	8,048,834
1890	1,435,742	65	933,232	1907	21,189,793	45	9,535,407
1891	4,035,347	60	2,421,208	1908	19,143,111	43	8,231,538
1892	2,413,717	58	1,399,956	1909	26,282,991	36	9,461,877
1893	3,982,982	52	2,071,151	1910	37,271,033	30	11,181,310
1894	4,907,430	38½	1,870,958	1911	34,098,744	30	10,229,623
1895	3,888,525	35	1,360,984	1912	44,841,542	30	13,452,463
1896	3,397,113	35	1,188,990	1913	49,676,772	30	14,903,032
1897	3,997,647	35	1,399,176	1914	45,517,037	30	13,655,381
1898	5,517,690	33	1,820,838	1915	68,308,657	30	20,492,597
1899	5,744,000	36	2,067,840	1916	82,958,564	35	29,035,497
1900	7,080,227	47	3,327,707	1917	84,330,280	40	33,732,112
1901	9,189,047	50	4,594,523	1918	92,507,293	40	37,002,917
1902	10,693,410	47	5,025,903	1919	44,544,883	40	17,817,953
1903	12,505,510	40	5,002,204	1920	61,335,706	40	24,534,282
1904	10,547,883	40	4,219,153	1921	19,293,060	35	6,752,571
1905	18,876,315	40	7,550,526	1922	17,597,123	35	6,158,993



During the year, 259,569 tons of nickel-bearing ore was mined in the Sudbury district. The smelters treated 314,120 tons and produced 17,324 tons of matte carrying 8,677·5 tons of nickel and 5,420·8 tons of copper. In 1921 the nickel-copper ore mined amounted to 257,154 tons, and smelted, 393,768 tons, from which was produced 19,497 tons of Bessemer matte carrying approximately 9,628·4 tons of nickel and 6,322·6 tons of copper.

The average metal recovery in matte from the ore treated in 1921 was 2·75 per cent nickel and 1·72 per cent copper; in 1922 the recoveries were 2·44 per cent nickel and 1·72 per cent copper.

Table 70.—Proportion of Nickel and Copper in Sudbury Matte, 1912-1922

Year	Percentage		
	Nickel	Copper	Total
1912	53·5	26·3	79·8
1913	52·7	27·4	80·1
1914	49·0	31·1	80·1
1915	50·3	29·0	79·3
1916	51·6	28·0	79·6
1917	50·6	26·9	77·5
1918	52·6	26·0	78·6
1919	51·6	28·3	79·9
1920	52·7	27·6	80·3
1921	49·4	32·4	81·8
1922	50·1	31·3	81·4

Monel metal is also produced directly from nickel-copper mattes, and contains about 22 per cent copper and 28 per cent nickel. The ability to resist the corrosive action and other solutions which readily attack steel has given this metal an importance in many lines of manufacturing. No production of monel metal was reported in 1922.

Refineries.—The new refinery erected at Port Colborne, Ontario, by the International Nickel Company of Canada, Limited, which started operations in July, 1918, was the first to produce refined nickel in Canada from Sudbury ores. This plant was idle throughout most of the year 1921, but was re-opened about the middle of 1922. The International Nickel Company formerly exported some of its matte to its plant at Bayonne, N.J. This plant was dismantled during the early part of 1922 and a portion of the Sudbury matte was treated at Huntington, W. Va., U.S.A. The British America Nickel Corporation refinery at Deschenes, Quebec, which was not operated during the period also, produces refined nickel and copper. The residues containing the precious metals are exported for treatment. The matte produced by the Mond company was all exported to Swansea, Wales, for further treatment.

The production from the refinery at Port Colborne in 1922 was (a) metallic nickel, 11,065,473 pounds (5532·7 tons) valued at $3,140,399 and (b) nickel oxides 2,389,840 pounds valued at $1,852,727.

The corresponding figures for the year 1921 which refer to the Deschenes refinery as well as the Port Colborne plant were (a) 5,419,174 pounds valued at $1,821,917 and (b) 7,812,673 pounds valued at $1,582,066.

There was also a small production of nickel from the silver-cobalt-nickel smelters, in the form of metallic nickel, nickel oxides, mixed oxides and the sulphate of the metal. The record of production from these plants is shown in the following table:—

Table 71.—Production from the Silver-Cobalt-Nickel Smelters of Eastern Ontario

Year	Metallic Nickel		Nickel-Oxides*		Nickel contents of recoveries
	Pounds	Value	Pounds	Value	Pounds
		$		$	
1912	.....	.....	* 91,377	9,137	‡
1913	.....	.....	*268,304	30,122	‡
1914	.....	.....	*392,512	34,883	‡
1915	55,325	22,130	†282,025	31,262	231,634
1916	79,360	31,538	†555,868	101,358	361,702
1917	265,896	108,334	†657,549	122,963	556,961
1918	243,186	88,720	†962,309	215,277	736,005
1919	397,884	137,435	†340,389	32,862	474,274
1920	204,537	71,287	†24,112	6,312	221,150
1921	10,973	3,442	†105,535	4,034	36,160
1922	106,318	31,035	†37,317	3,952	**137,619

*Does not include mixed oxides of cobalt and nickel. See Chapter on Cobalt.
†Nickel-sulphate included with nickel oxides.
‡Figures not available.
**Does not include 104,449 pounds contained in Residues.

The total estimated nickel contents of the compounds recovered by these silver smelters of Ontario from the treatment of silver-cobalt-nickel ores was somewhat greater than as shown above, including in addition a small quantity of nickel which was contained in residues exported. The total production in 1922 was 242,067 pounds as against 36,160 pounds in 1921 and 221,150 pounds in 1920.

Prices.—The average price of electrolytic nickel in New York during 1921 according to quotations published by the "*Engineering and Mining Journal-Press*" was 44 cents per pound for ingots and 41 cents for shot. Quotations were merely nominal owing to the depressed state of the market. During 1922 nickel was being increasingly used for new purposes. Whereas, prior to and during the war a very large proportion of the metal was consumed by armament manufacturing, the cessation of war activities followed by the Washington conference on the limitation of armaments, led the producers to investigate new outlets for nickel. These have in part been found in the adaptability of nickel for the cooking-utensil trade, resistance wires in electrical heating appliances, coinage, alloys, and the growing importance of the metal in the motor car industry. This consumption coupled with a much lower price has been the important factor in the renewed activity. The average price for the year 1922 was 35 cents per pound.

Table 72.—Imports into Canada and Exports of Nickel, 1920, 1921 and 1922

	1920		1921		1922	
	Pounds	Value	Pounds	Value	Pounds	Value
IMPORTS—		$		$		$
Nickel, nickel-silver, German silver, ingots and blocks	7,197	3,260	770	421	42,286	13,257
Nickel, nickel-silver, German silver, bars, rods, strips, sheets and plates	728,466	253,299	330,420	125,874	386,764	100,730
Mfrs. of German, Nevada and nickel-silver not plated	.....	570,984	.....	262,250	.....	203,838
Nickel plated ware n.o.p	.....	2,000,767	.....	1,279,501	.....	1,314,688
Total	.....	**2,828,310**	.....	**1,668,046**	.....	**1,632,513**
EXPORTS—						
Nickel, fine contained in ore, matte or speiss	51,701,000	9,006,140	8,064,600	1,418,490	16,768,200	2,536,347
Nickel, fine	8,498,300	2,982,717	4,794,500	1,684,454	14,449,700	4,287,941
Total	**60,199,300**	**11,988,857**	**12,859,100**	**3,102,944**	**31,217,900**	**6,824,288**

PLATINUM AND PALLADIUM

The most important sources of the metals of the platinum group in Canada are the nickel-copper ores of Sudbury, Ontario, but due to the fact that these metals occur in very small quantities per ton of ore and also that their recovery could only be made in the refining of the copper and nickel, the bulk of the Canadian platinum from this source has been recovered in foreign countries. It was not until 1918, when the International Nickel Company of Canada built its refinery at Port Colborne, that these metals were recovered in Canada. The British America Nickel Corporation Limited, opened its large refinery at Deschenes, Quebec, the following year. In both these plants, the precious metals are recovered as residues which are exported for further treatment. The mattes produced by the Mond Nickel Company which have all been treated in Swansea, Wales, are supposed to have a much richer content of platinum and its associated metals, but as yet no certified returns as to the precious metal content of its mattes have ever been received from this company.

For many years there has been a more or less regular recovery at the New Jersey plant of the International Nickel Company of metals of the platinum group from residues obtained in the refining of the Sudbury Nickel copper mattes; but as residues from other sources were treated with those of Canadian ores, the total recovery could not be regarded as of Canadian origin; nevertheless, it is believed that the Sudbury mattes have been the source of by far the greater part of the platinum group metals recovered. This New Jersey plant operated for a month or two only during 1922 and was then dismantled.

Platinum is also found in the alluvial sands of British Columbia, but the output which up to the present has been won by individual placer operators, is of small importance.

The recorded production during the year 1922 was a follows: International Nickel Company and British America Nickel Corporation refineries, 458 fine ounces platinum, 724 fine ounces of palladium and 391 fine ounces of rhodium, ruthenium, osmium and iridium combined. This production includes 282 fine ounces of platinum, 383 fine ounces of palladium and 266 fine ounces of the combined metals (rhodium, ruthenium, etc.), which were produced in previous years but credited to 1922 in order to complete the record. The British Columbia placers produced 11 fine ounces of platinum and 1 ounce of rhodium. The total for Canada during 1922 amounted to 469 fine ounces of platinum worth $45,783; 724 fine ounces of palladium valued at $47,060; and 392 fine ounces of the combined rhodium, ruthenium, osmium and iridium valued at $31,360. The values per ounce used were the average quotations for the year viz., $97.618 for platinum; $65 for palladium and $80 for the remaining metals.

Table 73.—Summary of Platinum Statistics, 1921 and 1922

	1921			1922		
	Platinum	Palladium	Rhodium, etc.	Platinum	Palladium	Rhodium, etc.
Produced by Canadian and United States refineries from Canadian mattes and residues, ... Fine ozs.	269	590	56	458	724	391
Value	$21,014	$26,613	$3,433	$44,709	$47,060	$31,280
British Columbia placers ..... Fine ozs.	23	.....	.....	11	.....	1
Value	$1,585	.....	.....	$1,074	.....	$80
Total for Canada..... Fine ozs	**292**	**590**	**56**	(a)469	(b) 724	(c) 392
Value	**$22,599**	**$26,613**	**$3,433**	**$45,783**	**$47,060**	**$31,360**

(a) includes 282 ounces Platinum
(b) includes 383 ounces Palladium
(c) includes 266 ounces of others
} Produced but not reported prior to 1922.

Table 74.—Production of Platinum in Canada from Alluvial Sands, 1887-1922

Year	Value	Year	Value	Year	Crude Ounces	Value
	$		$			$
1887	5,600	1897	1,600	1907-1912	.....	.....
1888	6,000	1898	1,500	1913	18	489
1889	3,500	1899	825	1914	.....	.....
1890	4,500	1900	.....	1915	23	1,063
1891	10,000	1901	457	1916	15	600
1892	3,500	1902	190	1917	57	3,823
1893	1,800	1903	.....	1918	39	2,560
1894	950	1904	420	1919	25	2,150
1895	3,800	1905	500	1920	17	719
1896	750	1906	.....	1921	23	1,585
				1922	12	1,154

Table 75.—Recovery at the International Nickel Company's Works*—New Jersey, U.S.A., 1907-1922

Year	Matte treated	Gold	Silver	Platinum	Palladium	Rhodium	Others
	Tons	Ounces	Ounces	Ounces	Ounces	Ounces	Ounces
1907	17·840	993·572	63,400·70	226·800	607·300	(a)	.....
1908	18·839	5,238·181	139,329·29	172·316	328·287	(a)	.....
1909	18·407	2,113·669	63.138·66	546·627	1,270·598	(a)	.....
1910	24·309	2,649·799	60,256·83	258·325	522·804	(a)	.....
1911	26·840	2,203·052	70,954·38	655·552	753·363	(a)	.....
1912	27·653	2,476·558	62,169·66	496·850	680·130	(a)	.....
1913	38·733	2,336·405	77,924·03	192·863	207·713	191·067	.....
1914	40·267	2,695·957	75,928·18	748·440	756·360	515·801	.....
1915	31·428	3,444·785	101,793·17	452·430	543·240	57·475	.....
1916	56·405	3,495·123	110,285·21	1,016·581	1,344·915	257·070	.....
1917	59·209	1,954·934	92,963·67	970·695	1,354·459	325·407	.....
1918	62·250	1,968·703	107,076·78	649·737	786·654	472·579	.....
1919	19·528	634·043	35,689·79	616·716	762·217	227·294	(b) 76·613
1920	30·740	613·338	81,882·78	488·901	739·158	390·336	(b)102·363
1921	(c)2,217·000	6·901	1,242·74	281·582	382·626	256·110	(b) 10·655
1922	(c)3,112·000	206·542	12,211·66	137·882	300·839	103·874	(b) 20·563

*Plant dismantled during 1922.
(a) Figures not given separately.
(b) Includes Osmium, Iridium and Ruthenium.
(c) These quantities bear no relation to the amounts of precious metals recovered.

Table 76.—Recovery of Platinum Black, Iridium Precipitate, and Palladium at the Royal Mint, Ottawa, 1919-1922

Year	Platinum		Iridium		Palladium	
	Ozs. gross	Value	Ozs. gross	Value	Ozs. gross	Value
1919	29·281	$ 2,711·59	20·782	$ 2,268·12	0·696	$ 87·00
1920	7·220	$ 400·56	.....	.....	.....	.....
1921	18·843	$ 1,160·73	.....	.....	.....	.....
1922	12·386	$ 1,102·35	.....	.....	.....	.....

Table 77.—Imports into Canada and Exports of Platinum, 1920, 1921 and 1922

Item	1920		1921		1922	
	Ounces	Value	Ounces	Value	Ounces	Value
		$		$		$
EXPORTS—						
Jewellers sweepings	.....	284,493	.....	229,525	.....	216,118
Ores and concentrates	473	53,956	876	63,380	35	3,626
Old and scrap	317	31,784	304	18,931	151	13,328
Total	.....	**370,233**	.....	**311,836**	.....	**233,072**
IMPORTS—						
Crucibles	.....	13,772	.....	6,198	.....	3,976
Wire and bars, strips, sheets or plates	.....	105,718	.....	84,011	.....	91,425
Retorts, pans, condensers, etc.	.....	6,487	.....	4,342	.....	887
Total	.....	**125,977**	.....	**94,551**	.....	**96,288**

Table 78.—Monthly Average Prices of Platinum*, 1920, 1921 and 1922

(From the Engineering and Mining Journal-Press)

(In dollars per fine ounce.)

Month	1920	1921	1922
	$	$	$
January	154·23	73·400	97·260
February	151·59	70·227	89·545
March	138·56	72·463	87·500
April	127·04	73·404	87·500
May	97·50	73·740	85·529
June	85·19	74·942	87·212
July	83·94	70·440	90·180
August	111·44	73·222	98·370
September	115·20	75·960	117·280
October	101·70	81·800	109·440
November	84·75	82·609	108·000
December	79·62	78·192	113·600
Average	**110·90**	**75·633**	**97·618**

Prior to the war the world's supply of platinum was derived almost entirely from the Ural mountains, Russia, but when hostilities commenced in the fall of 1914 the Russian production was reduced almost one-third. The subsequent internal troubles further crippled the platinum industry in that country and only a relatively small production has been made during the last few years.

SILVER

SPECIAL NOTE—Prior to 1922, the method used in compiling the statistics on the silver production of Canada was to include, except for Ontario, the quantities of silver produced from Canadian ores either in Canadian or foreign smelters. For Ontario, the sales of silver bullion from the mines and smelters were considered as the year's production. In order to bring the practice for Ontario into harmony with that used in computing the silver output for the other provinces, adjustments amounting to 1,222,450 ounces have been made for 1922 to take account of the stocks of silver bullion on hand at the end of 1921 which had not been previously included in the reports of the mineral production of Canada.

As above defined, the production of silver in Canada during 1922 amounted to 18,626,439 fine ounces which at the average price for the year of 67·521 cents an ounce was valued at $12,576,758 as against 13,543,198 fine ouuces valued at $8,485,355 for 1921, an increase of 37 per cent in quantity and 48 per cent in value.

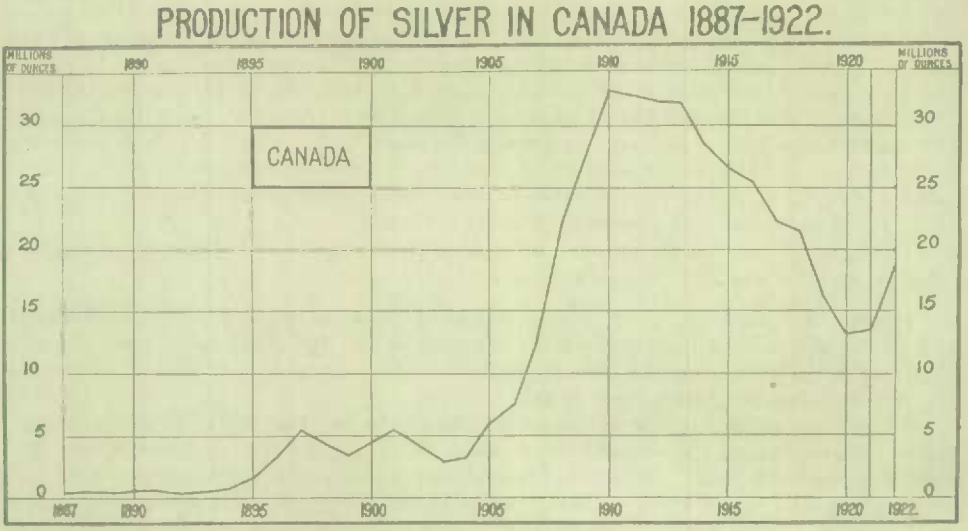
The production in 1922 included (a) silver contained in silver and gold bullion (including the adjustments noted above) 10,077,909 fine ounces or 54·1 per cent, (b) silver contained in blister copper and lead bullion, 3,572,554 fine ounces or 19·1 per cent, (c) silver estimated to have been recovered from ores, etc., exported, 4,975,976 fine ounces or 26·8 per cent. The corresponding figures for 1921 were (a) 9,080,718 ounces or 67 per cent, (b) 1,649,057 ounces or 12 per cent, (c) 2,813,423 ounces or 21 per cent.

Although no official statistics of the production of silver had been published prior to 1887, the annual reports of the operating companies showed that from 1869 to 1885 about four million ounces of silver with a probable value of $4,800,000 was produced. The producing mines were situated in the Port Arthur district in Ontario. From 1887 to 1893 the production ranged in value between $300,000 and $400,000 and was derived chiefly from Ontario and Quebec. The next three years saw a rapid increase in production due to the development of the silver-lead deposits of British Columbia, and in 1896 a production of over $2,000,000 was recorded. From that year until 1905 the production varied between $2,000,000 and $3,500,000 rising rapidly during the next six years to $17,580,455 in 1910, as a result of the discovery of the rich ores of the Cobalt district. Since then there has been a falling-off in quantity, but owing to the higher price of the metal, the value of the annual production increased to a maximum of $20,693,704 in 1918. It will be noticed in the table of production that the output for 1919 though only 50 per cent of that of 1910 or 1911, when the production was at its maximum, was more than equal in value.

Table 79.—Production of Silver in Canada, 1887-1922

Year	Ounces	Value	Cents per ounce	Year	Ounces	Value	Cents per ounce
		$				$	
1887	355,083	347,271	98·00	1906	8,473,379	5,659,455	66·79
1888	437,232	410,998	94·00	1907	12,779,799	8,348,659	65·33
1889	383,318	358,785	93·60	1908	22,106,233	11,686,239	52·86
1890	400,687	419,118	104·60	1909	27,529,473	14,178,504	51·50
1891	414,523	409,549	98·00	1910	32,869,264	17,580,455	53·49
1892	310,651	272,130	86·00	1911	32,559,044	17,355,272	53·30
1803	428,738	330,128	77·00	1912	31,955,560	19,440,165	60·83
1894	847,697	534,049	63·00	1913	31,845,803	19,040,924	59·79
1895	1,578,275	1,030,299	65·28	1914	28,449,821	15,593,631	54·81
1896	3,205,343	2,149,503	67·06	1915	26,625,960	13,228,842	49·68
1897	5,558,446	3,323,395	59·79	1916	25,459,741	16,717,121	65·66
1898	4,452,333	2,593,929	58·26	1917	22,221,274	18,091,895	81·417
1899	3,411,644	2,032,658	59·58	1918	21,383,979	20,693,704	96·772
1900	4,468,225	2,740,362	61·33	1919	16,020,657	17,802,474	111·122
1901	5,539,192	3,265,354	58·95	1920	13,330,357	13,450,330	100·900
1902	4,291,317	2,238,351	52·16	1921	13,543,198	8,485,355	62·654
1903	3,198,581	1,709,642	53·45	1922	18,626,439	12,576,758	67·521
1904	3,577,526	2,047,095	57·22				
1905	6,000,023	3,621,133	60·35				
				Grand total	**434,638,815**	**279,763,532**	**64·367**

Ontario has been the main producer of silver in Canada since the year 1906, its contribution increasing from 41 per cent of the total for Canada in 1905 to a maximum of 94 per cent in 1911. By 1914, it had fallen to 88·4 per cent and has been gradually decreasing each year reaching 25 per cent in 1921 and rising again to 48·2 per cent in 1922, excluding the corrective figures mentioned as included, in the special note at the beginning of this chapter.



The production of British Columbia which has fluctuated between two and five million ounces for the last twenty-five years from 1914 to 1917 between 11 and 12 per cent of the total Canadian production. In 1921 it was 24·8 per cent of the total and in1 922 the total reached 38·2 per cent.

The balance of the production, 3·8 per cent in 1922 as against 3·3 per cent in 1921 and 0·7 per cent in 1920 was derived from Manitoba and the Yukon Territory. This relatively large increase from 0·7 to 3·3 per cent in 1921 for these areas was accounted for by the rich shipments of argentiferous galena from Keno Hill in the Yukon Territory.

Table 80.—Production of Silver in Canada, by Provinces, 1887-1922*

Year	Ontario		Quebec		British Columbia		Yukon Territory	
	Ounces	Value	Ounces	Value	Ounces	Value	Ounces	Value
		$		$		$		$
1887	190,495	186,304	146,898	143,666	17,690	17,301	.....	.....
1888	208,064	195,580	149,388	140,425	79,780	74,993	.....	.....
1889	181,609	169,986	148,517	139,012	53,192	49,787	.....	.....
1890	158,715	166,066	171,545	179,436	70,427	73,666	.....	.....
1891	225,633	222,926	185,584	183,357	3,306	3,266	.....	.....
1892	41,581	36,425	191,910	168,113	77,160	67,592	.....	.....
1893	.....	8,689	.....	126,439	.....	195,000	.....	.....
1894	.....	.....	101,318	63,830	746,379	470,219	.....	.....
1895	.....	.....	81,753	53,369	1,496,522	976,930	.....	.....
1896	.....	.....	70,000	46,942	3,135,343	2,102,561	.....	.....
1897	5,000	2,990	80,475	48,110	5,472,971	3,272,289	.....	.....
1898	85,000	49,521	74,932	43,655	4,292,404	2,500,753	.....	.....
1899	202,000	120,352	40,231	23,970	2,939,413	1,751,302	230,000	137,034
1900	161,650	99,140	58,400	35,817	3,958,175	2,427,548	290,000	177,857
1901	151,400	89,250	41,459	24,440	5,151,333	3,036,711	195,000	114,953
1902	145,000	75,632	42,500	22,168	3,917,917	2,043,586	185,900	96,985
1903	17,777	9,502	28,600	15,287	2,996,204	1,601,471	156,000	83,362
1904	206,875	118,376	15,000	8,583	3,222,481	1,843,035	133,170	76,201
1905	2,451,356	1,479,442	19,620	11,841	3,439,417	2,075,757	89,630	54,093
1906	5,401,766	3,607,884	17,686	11,813	2,990,262	1,997,226	63,665	42,522
1907	9,982,363	6,521,178	16,000	10,452	2,745,448	1,793,519	35,988	23,510
1908	19,398,545	10,254,847	13,299	7,030	2,631,389	1,391,058	63,000	33,304
1909	24,822,099	12,784,126	13,233	6,815	2,649,141	1,364,387	45,000	23,176
1910	30,366,366	16,241,755	7,503	4,061	2,407,887	1,287,883	87,418	46,756
1911	30,540,754	16,279,443	18,435	9,827	1,887,147	1,005,924	112,708	60,078
1912	29,214,025	17,772,352	9,465	5,758	2,651,002	1,612,737	81,068	49,318
1913	28,411,261	16,987,377	34,573	20,672	3,312,343	1,980,483	87,626	52,392
1914	25,139,214	13,779,055	57,737	31,648	3,159,897	1,731,971	92,973	50,959
1915	22,748,609	11,302,419	63,450	31,524	3,565,852	1,771,658	248,049	123,241
1916	21,608,158	14,188,133	98,610	64,748	3,392,872	2,227,791	360,101	236,446
1917	19,301,835	15,714,975	136,194	110,885	2,655,994	2,162,430	119,605	97,379
1918	17,198,737	16,643,562	178,675	172,907	3,921,336	3,794,755	71,915	69,594
1919	12,117,878	13,465,628	140,926	156,600	3,713,537	4,126,556	27,556	30,621
1920	9,907,626	9,996,795	61,003	61,552	3,327,028	3,356,971	19,190	19,363
1921	9,761,607	6,116,037	38,084	23,861	3,350,357	2,099,133	393,092	246,288
1922	10,811,903	7,300,305	.....	.....	7,150,937	4,828,384	663,493	447,997
Grand total	**331,161,901**	**211,986,012**	**2,553,093**	**2,208,617**	**96,582,540**	**63,117,536**	**3,852,147**	**2,383,429**

*Does not include small productions from New Brunswick, Alberta, and Manitoba, in 1917, and from Manitoba from 1918 to 1922.

Important quantities of silver are being produced in Canada, both as fine metal and as bullion. Fine silver is produced at Trail, B.C., by the Consolidated Mining and Smelting Company of Canada, Limited, chiefly from the silver-lead ores, and in recent years from the copper-gold-silver ores of the province, and finds a market in Canada, the United States and China.

In Ontario, ores from the Cobalt district are treated by the Coniagas Reduction Company, Thorold, Ont.; the Deloro Smelting and Refining Company, Deloro, Ont.; the Ontario Smelters and Refiners, Ltd., with plants at Welland, Ont. Silver bullion varying in fineness from 850 to 998·2 is produced at these works, other products being white arsenic, metallic nickel and cobalt, nickel and cobalt oxides and salts of nickel and cobalt.

The silver bullion from Ontario as a rule finds a market in the United States and England, but important quantities are also shipped to the Orient.

Prices.—The monthly average during 1922 of the New York prices for silver which was 65·540 cents per ounce in January rose to 71·154 cents in May and then gradually declined until in December, the average quotaion was 63·805 cents. For the twelve months the average was 67·528 cents as against 62·654 cents in 1921.

The most important silver-producing countries in the world are, in order of importance, Mexico, United States, Canada and Peru, which accounted for 80·6 per cent of the total world's production in 1922. In all these countries important increases in production have been recorded and with the exception of United States, all the silver produced has been marketed at the above rates. In the United States the production was stimulated by the price of $1 per ounce, fixed by the Pittman Act. After the purchases during the year under this Act there remained a quantity in the neighbourhood of 60,000,000 ounces still to be purchased and it was expected that this would be completed in the year 1923.

Table 81.—Monthly Average Prices of Silver*, 1920, 1921 and 1922

	New York Cents per fine Ounce			London Pence per Standard Ounce		
	1920	1921	1922	1920	1921	1922
January	132·827	65·950	65·450	79·846	39·985	35·035
February	151·295	59·233	65·290	85·005	34·745	33·891
March	125·551	56·023	64·440	74·194	32·479	33·269
April	119·779	59·337	66·575	68·848	34·250	34·080
May	102·585	59·810	71·154	60·010	34·165	36·023
June	90·957	58·510	71·149	51·096	34·971	35·900
July	91·921	60·260	70·245	53·736	37·481	35·644
August	96·168	61·597	69·417	59·875	38·096	34·957
September	93·675	66·160	69·515	59·476	40·082	35·305
October	83·480	70·970	68·015	54·197	41·442	34·498
November	77·734	68·234	65·177	50·952	38·750	32·882
December	64·774	65·760	63·905	41·845	35·645	31·383
Average	**100·900**	**62·654**	**67·528**	**61·590**	**36·841**	**34·406**

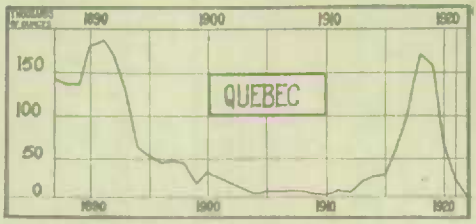
*From the "*Engineering Mining Journal-Press.*"

Table 82.—Exports from Canada and Imports of Silver, 1920, 1921 and 1922

	1920	1921	1922
	$	$	$
EXPORTS—			
In ore, concentrates, bullion	12,238,209	7,202,663	11,684,028
IMPORTS—			
Silver—			
Bullion in bars and blocks	2,453,450	581,861	657,760
Coins	100	2,083	.....
Sterling	314,869	174,788	178,223
Manufacture of gold and silver—			
Leaf	108,788	47,123	63,276
Sweepings	6,605	2,771	5,471
Manufactures, n.o.p.	184,681	97,110	89,684
Electroplated ware	545,015	387,974	442,593

Quebec

The small quantity of silver credited in former years to Quebec province represented the silver recovery from the pyritic ores mined at Eustis and Weedon in the eastern townships, and the lead-zinc ores of Notre-Dame-des-Anges, Portneuf County. In 1921, the production was 38,084 fine ounces valued at $23,861 but since the above-mentioned properties were all idle in 1922, no production was recorded.

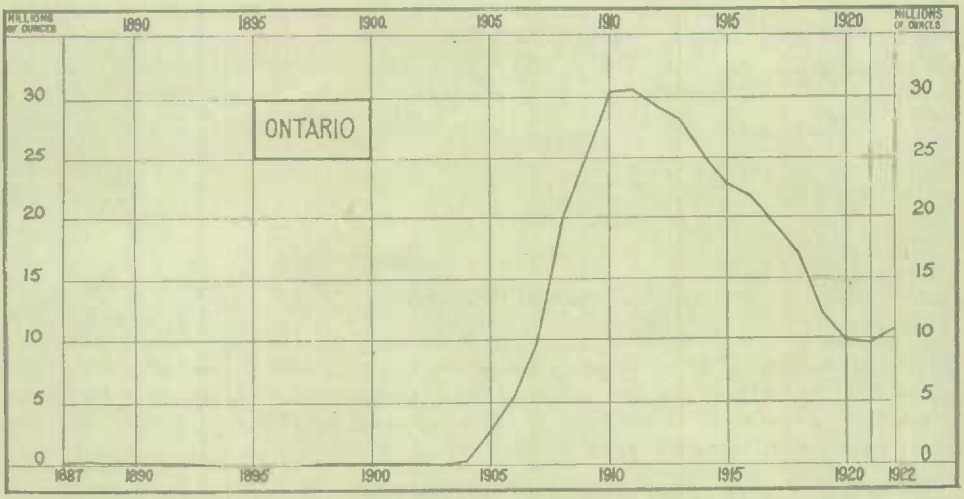


Ontario

The production of silver in Ontario in 1922 was 10,811,903 fine ounces valued at $7,300,305 as against 9,761,607 fine ounces valued at $6,116,037 in 1921. The total for 1922 includes an adjustment of 1,222,450 fine ounces valued at $825,410, which has been entered in order to take account of the stocks of silver bullion on hand at the end of 1921, as mentioned in the special note at the beginning of this section. On this basis the increase of the production of silver in 1922 compared with 1921 was 1,050,296 ounces or 10·7 per cent, and the increase in value was $1,184,268 or 19·4 per cent.

The production in Ontario reached its highest point in 1911 in which year over thirty million ounces were produced from the rich high-grade ores of Cobalt. Since that period the production has gradually decreased to a point around ten million ounces annually.

PRODUCTION OF SILVER IN ONTARIO, (1887-1922).



During 1922 a total of (a) 8,043,136 ounces or 74·4 per cent of the total Ontario production was produced as bullion in the Cobalt district; (b) 1,914,348 ounces or 17·7 per cent was recovered by the silver smelters of southern Ontario; and (c) 177,077 ounces or 1·6 per cent was contained in gold bullion and nickel refineries leaving a balance of (d) 677,342 ounces or 6·3 per cent recovered from Ontario ores and slags treated in the United States.

The corresponding figures for the year 1921 were (a) 5,060,454 ounces or 51·8 per cent; (b) 3,884,683 ounces or 39·8 per cent; (c) 120,336 ounces or 1·3 per cent and (d) 683,586 ounces or 7·1 per cent.

As indicated above, practically the whole Ontario silver production is derived from the Cobalt ores with which is included the silver produced by the nickel refineries and that contained in gold bullion. The recovery during the year from these sources was as follows: silver contained in gold bullion, 163,622 ounces as against 120,336 ounces in 1921; silver produced by the refineries of the International Nickel Company and the British America Nickel Corporation 13,455 ounces in 1922 as against 8,818 ounces in 1921.

The following table shows the percentage of production from the Cobalt Camp, the south Ontario smelters, and from ores exported to the United States.

Table 83.—Percentage of Silver Production Credited to each Group Treating Ontario Ores, 1914-1922

Producing Group	1914	1915	1916	1917	1918	1919	1920	1921	1922
	%	%	%	%	%	%	%	%	%
Cobalt district	41·0	41·0	39·5	51·1	55·0	48·7	58·6	51·8	74·4
Ontario smelters	36·0	43·0	44·7	33·9	29·0	36·4	33·7	41·1	19·3
Total for Ontario	77·0	84·0	84·2	85·0	84·0	85·1	92·3	92·9	93·7
U.S. smelters	23·0	16·0	15·8	15·0	16·0	14·9	7·7	7·1	6·3
Total	**100·0**	**100·0**	**100·0**	**100·0**	**100·0**	**100·0**	**100·0**	**100·0**	**100·0**

Manitoba

The silver production in Manitoba has been derived from the gold and copper ores of The Pas District. During the war several copper deposits were developed and in 1918, 1919 and 1920 considerable tonnages of copper ore were shipped from the Mandy Mine to Trail, B.C. The ore carried considerable silver and in the three years mentioned almost 50,000 ounces was produced. With the drop in the price of copper and the high freight rates no shipments of copper ores have been made, with the result that the production of silver has practically ceased. The historical record is shown below.

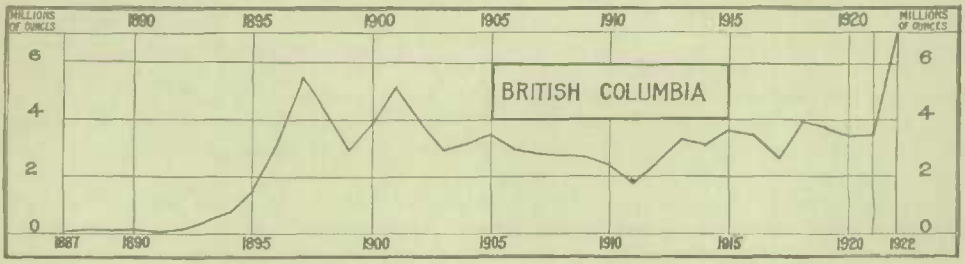
Table 84.—Production of Silver in Manitoba, 1918-1922

	Fine Ounces	Value
		$
1918	13,316	12,886
1919	20,700	23,069
1920	15,510	15,649
1921	33	20
1922	20	14

British Columbia

The chief sources of the silver production in British Columbia have been the silver-lead-zinc ores of the East and West Kootenays supplemented by the silver contained in the gold-copper ores of Rossland and the Boundary and Coast districts. During the last two years this production has been remarkably increased by the shipments of rich ores from the Premier mine near Stewart and the Dolly Varden Mines at Alice Arm.

PRODUCTION OF SILVER IN BRITISH COLUMBIA, (1887-1922).



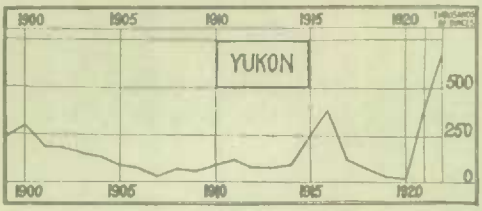
As shown in Table 80 the production in 1922 amounted to 7,150,937 fine ounces valued at $4,828,384 as against 3,350,357 fine ounces valued at $2,099,133 in 1921.

The production in 1922 included: (a) contained in blister copper 1,139,916 ounces or 15·9 per cent; (b) contained in lead bullion 2,362,451 ounces or 33·1 per cent; (c) in lead and zinc ores and concentrates exported 123,192 ounces or 1·7 per cent and (d) in gold, silver and copper ores exported 3,525,378 ounces or 49·3 per cent.

The corresponding figures for 1921 were (a) 549,596 ounces or 16·5 per cent (b) 1,090,643 ounces or 32·5 per cent; (c) 151,234 ounces or 4·5 per cent; and (d) 1,558,528 ounces or 46·5 per cent.

Yukon Territory

The development and shipments of the rich argentiferous lead ores of the Keno Hill district accounted for the increase in the production of silver in Yukon Territory. In the year 1900 as shown in Table 80 when placer gold had reached its maximum output, the silver content amounted to about 290,000 ounces. From that year until the discovery of the silver-bearing lead ores the production gradually decreased. During 1922 the output amounted to 663,493 ounces valued at $447,997 as against 393,092 ounces valued at $246,288 in 1921. The production which has almost been doubled was the highest yet recorded and was mainly due to the activities of the mines in the Keno Hill area.



The quantity of silver from placer gold is gradually decreasing; in 1922 it was only 12,233 fine ounces as against 14,831 fine ounces in 1921. The respective percentages of silver won from lode or placer mining were 98·2 per cent and 1·8 per cent in 1922 as against 96·2 per cent and 3·8 per cent in 1921.

The following table gives these percentages from 1916 to 1922. During the period 1918 to 1920 the silver-lead shipments had fallen off.

Table 85.—Percentage of the Silver Output in the Yukon won from Lode and Placer Mining, 1916-1922

	From Lode Mining	From Placer Mining
	%	%
1916	87·0	13·0
1917	66·8	33·2
1918	68·2	31·8
1919	26·0	74·0
1920	14·6	85·4
1921	96·2	3·8
1922	98·2	1·8

On an average about one ounce of silver is contained in each five ounces of crude bullion from alluvial workings.

Table 86.—World's Production of Silver, 1913, 1918-1922

(As reported in 1922 Year Book of the "*American Bureau of Metal Statistics*,"*)

(Fine ounces)

Country	1913	1918	1919	1920	1921	1922
NORTH AMERICA—						
United States	66,801,500	67,810,100	56,682,445	55,361,573	53,727,891	55,469,000
Canada	31,524,708	21,383,979	16,020,657	13,330,357	13,004,546	17,611,646
Mexico	55,486,431	62,517,000	65,904,224	66,516,354	64,465,347	81,076,899
Total North America	**153,812,639**	**151,711,079**	**138,607,326**	**135,208,284**	**131,197,784**	**154,157,545**
Central America and West Indies	**2,135,641**	**2,900,000**	**2,800,000**	**2,700,000**	**2,000,000**	**2,500,000**
SOUTH AMERICA—						
Argentina	35,271	25,000	25,000	30,000	25,000	*25,000
Bolivia and Chile	3,932,594	4,335,000	4,335,000	4,828,086	5,000,000	*5,000,000
Brazil	28,364	25,000	25,000	30,000	33,000	*33,000
Columbia	587,683	494,331	494,331	480,000	500,000	*500,000
Ecuador	22,642	40,000	40,000	35,000	40,000	*40,000
Peru	9,617,094	9,781,734	9,821,729	9,196,282	9,853,910	12,100,000
Other countries	51,111	11,000	12,100	12,000	13,700	*14,000
Total South America	**14,274,759**	**14,712,065**	**14,753,160**	**14,611,368**	**15,465,610**	**17,712,000**
EUROPE—						
Austria-Hungary	2,104,107	1,750,000	15,432	13,985	15,000	.....
France	1,005,266	272,278	164,222	321,500	321,500	.....
Czecho-Slovakia	.....	554,780	580,918	680,069	703,056	.....
Great Britain	128,543	79,636	68,415	76,344	12,229	.....
Germany	6,182,445	5,259,740	3,475,415	3,305,020	3,375,750	.....
Greece	803,750	175,015	160,000	220,935	192,900	.....
Italy	423,888	500,000	300,000	297,452	219,392	.....
Norway	300,602	312,016	341,433	323,172	202,115	.....
Portugal	205,822	.....	.....	.....	.....	.....
Russia	.....	400,000	400,000	50,000	40,000	.....
Serbia	28,758	20,000	20,000	15,000	15,946	.....
Spain	4,031,417	3,182,464	2,666,232	2,956,540	2,679,349	.....
Sweden	33,339	31,500	20,576	22,569	30,000	.....
Turkey	1,509,133	400,000	100,000	100,000	100,000	.....
Total Europe	**16,757,070**	**12,937,429**	**8,312,643**	**8,382,592**	**7,907,237**	***9,000,000**
AUSTRALASIA—						
New South Wales	14,504,889	9,259,961	6,304,818	675,332	4,241,890	.....
Queensland	604,979	152,499	92,048	274,235	195,328	.....
Victoria	16,195	6,333	6,121	6,231	5,204	.....
New Zealand	975,616	879,383	453,561	454,000	454,000	.....
Tasmania	765,187	294,396	525,343	623,359	348,658	.....
Other states	190,680	111,438	223,893	131,697	117,600	.....
Total Australasia	**17,057,546**	**10,704,010**	**7,605,784**	**2,164,854**	**5,362,680**	**12,000,000**
ASIA—						
India	125,209	1,971,783	2,165,606	2,906,397	3,587,587	4,250,000
China	.....	70,000	65,000	50,000	40,000	*40,000
Chosen (Korea)	15,048	26,000	20,000	1,200	1,000	*1,000
Dutch East Indies	465,980	1,286,000	1,006,842	1,027,950	1,021,994	*1,000,000
Japan	4,700,390	6,596,618	5,160,070	4,889,540	4,185,504	3,886,301
Other countries	51,763	27,900	32,269	25,179	18,437	*18,400
Total Asia	**5,358,390**	**9,978,301**	**8,449,787**	**8,900,272**	**8,854,522**	**9,195,701**
AFRICA—						
Algeria	.....	170,813	170,813	150,000	150,000	*150,000
Belgian Congo	1,454	10,500	10,000	10,674	5,819	*6,000
Rhodesia	121,537	175,722	180,591	164,865	161,383	178,000
Transvaal, Cape Colony and Natal	952,928	877,500	891,304	892,593	830,329	1,200,000
Other Countries	.....	21,980	18,986	15,116	13,362	*14,000
Total Africa	**1,075,919**	**1,256,515**	**1,271,694**	**1,233,248**	**1,160,393**	**1,548,000**
Grand Total	**210,471,964**	**204,199,399**	**181,800,394**	**173,200,618**	**171,948,726**	**206,113,246**

**Note*—The basis of this table is the information published by the Director of the Mint. However revisions and additions have been made so that the totals do not agree with the Mint Figures. For 1922 the figures are based on actual reports or reliable estimates, except where the asterisk is used indicating that the figure is conjectural.

TIN

Tin ores have not yet been found in sufficient quantities in Canada to be of economic importance.

The occurrence of tin ore has been reported from several localities, the most important perhaps being the discovery of cassiterite, near New Ross, Lunenburg county, N.S. Reports upon it may be found in the Summary Reports of the Geological Survey Branch of the Department of mines for 1907, 1908, 1910, 1911, and 1912.

Cassiterite occurs in a few scattered crystals in pegmatite dykes in the drainage basin of MacDougal creek, Lardeau division, B.C., and it has been found also in black sands in the Atlin district, B.C., and in the alluvial sands of Dublin gulch, Mayo district, Y.T.

The occurrence of tin has been noted in some bodies of sulphide minerals found in the vicinity of West Hawk and Star lakes, near the boundary line between Ontario and Manitoba. Attention is called to these occurrences not on account of their commercial importance, but for the interesting manner of occurrence and the mineral associations.

Ores of tin were formerly imported from South America and reduced in Canada by the Electro Tin Products Company of Brantford, Ontario. The plant comprised roasting furnaces, electric smelting and slag-cleaning furnaces.

Table 87.—Imports of Tin into Canada, 1920, 1921 and 1922

Item	1920		1921		1922	
	Pounds	Value	Pounds	Value	Pounds	Value
		$		$		$
Tin in blocks, pigs and bars	4,801,000	3,029,964	2,566,600	840,278	36,818	1,165,532
Tin foil	1,834,220	513,688	1,391,011	330,630	2,110,215	467,246
Tin in waste	128,120	5,082	19,098	469	11,875	247
Collapsible tubes		122,339		73,070		22,903
Tinware, etc. (*a*)		932,398		481,087		485,807
Tin crystals		(*b*)		(*b*)		(*b*)
Bichloride of tin	51,098	24,261	25,015	6,915	36,258	9,143
Total		**4,627,732**		**1,732,449**		**2,150,878**

(*a*) Tinware, plain, japanned or lithographed, and all manufactures of tin, n.e.s.
(*b*) Included with "Bichloride of Tin."

ZINC

The production of zinc in the refined state at Trail, B.C. during 1922 accounted for the whole Canadian production and amounted to 56,290,000 pounds or 28,145 tons which at the average St. Louis price of 5.716 cents per pound was valued at $3,217,536. During the year no mine operators reported having shipped zinc ores to the United States.

In 1921, the production was 53,089,356 pounds or 26,544·6 tons valued at $2,471,310 or 4·655 cents per pound on the St. Louis market. The output included 52,988,000 pounds of refined zinc produced at Trail, B.C., and 101,356 pounds, estimated as recovered from ores and concentrates exported.

The increase in 1922 amounted to 6 per cent in quantity and 30 per cent in value.

Small shipments of zinc concentrates were formerly made from Galetta, Ont., and the lead-zinc mines of Notre Dame des Anges, Quebec, also accounted for a small production, part of which was used in the manufacture of zinc oxide and part exported to the United States for treatment. The oxide plant operated in Quebec was destroyed by fire in 1920, and neither of these localities reported any shipments of zinc concentrates in 1920, 1921 or 1922.

With the exception of a small production in experimental work there was no recovery of zinc spelter or refined zinc in Canada prior to 1916. The production of zinc was therefore recorded in terms of the tonnage of ore shipped and its metal contents. The establishment of an electrolytic refinery at Trail placed the metallurgy of this metal in Canada on a similar basis to that of lead and copper and its production has since been recorded in the same way.

The production of zinc-bearing ores in British Columbia during 1922 received an impetus in the new tariff of smelter rates offered by the Consolidated Mining and Smelting Company at Trail. Although not paid for by the United States smelters, the lead in ore is considered as dutiable and as there is often a small lead content in the zinc ore or concentrates shipped, the lead duty applies. Whereas formerly these zinc ores were shipped at heavy cost to the United States and the producers suffered from the handicap of high freight rates, penalties and customs duties, the schedule now offered at Trail makes it possible for operators to have their zinc ores and concentrates treated in Canada. The opening up of this market and the resulting saving in freights and duties was reflected in the increase in shipments made during 1922 from the lead-zinc mines of the province.

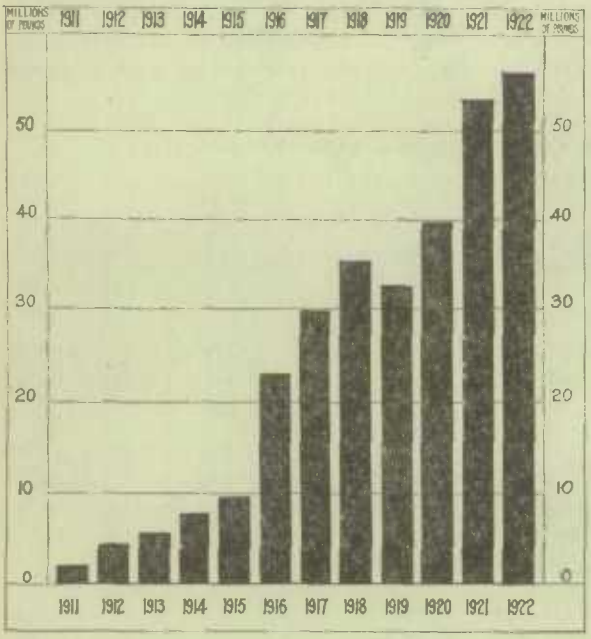


Table 88.—Production of Zinc in Canada, 1911-1922

Year	*Pounds	Total Value	Average price per pound
		$	Cents
1911	1,877,479	108,105	5·758
1912	4,283,760	297,421	6·942
1913	5,640,195	318,558	5·648
1914	7,246,063	377,737	5·214
1915	9,771,651	1,292,789	13·230
1916	23,364,760	2,991,623	12·804
1917	29,668,764	2,640,817	8·901
1918	35,083,175	2,862,436	8·159
1919	32,194,707	2,362,448	7·338
1920	39,863,912	3,057,961	7·671
1921	53,089,356	2,471,310	4·655
1922	56,290,000	3,217,536	5·716

*Estimated smelter recoveries, including for years 1916 to 1922 the actual zinc recovered at Trail, B.C.

Table 89.—Production of Refined Zinc at Trail, B.C., 1916-1922

Year	Short tons
1916	2,974
1917	9,985
1918	12,574
1919	12,326
1920	18,517
1921	26,494
1922	28,145
Total	**111,015**

The United States tariff of 1913 under which zinc ore containing 25 per cent or more of zinc was dutiable to the extent of 10 per cent on the zinc contained therein was changed on September 21, 1922, as follows:

"Zinc-bearing ore of all kinds, containing less than 10 per centum of zinc, shall be admitted free of duty; containing 10 per centum or more of zinc and less than 20 per centum, one-half of 1 cent per pound on the zinc contained therein; containing 25 per centum of zinc or more, 1½ cents per pound on the zinc contained therein."

There was also a duty of 15 per cent on metallic zinc imported into the United States, which is now changed under the new tariff as follows:

"Zinc in blocks, pigs, or slabs, and zinc dust, 1¾ cents per pound; in sheets, 2 cents per pound; in sheets coated or plated with nickel or other metal (except gold, silver, or platinum), or solutions, 2¼ cents per pound; old and worn-out, fit only to be remanufactured, 1½ cents per pound."

Prices.—The price of zinc in St. Louis averaged 5·716 cents per pound for the year 1922 as against 4·655 cents in 1921. There was a gradual rise in price throughout the whole of 1922 commencing in January at 4·691 cents, and quotations rose to their highest point, 7·10 cents in November. The New York prices are generally a fraction of a cent higher per pound corresponding to the difference in freight rates. The Canadian market is centered in Montreal and Toronto

to which the Consolidated Mining and Smelting Company is the most important shipper. The average monthly price of zinc in the Montreal market during January, 1922 was 6·561 cents per pound and in May rose to 6·809 cents. This point was never passed and the price closed in December at 6·673 cents per pound. Throughout the twelve months the variations in prices were less in Montreal than on the St. Louis market. The average price for the year in Montreal was 7·210 cents per pound.

Table 90.—Monthly Average Prices of Zinc (Spelter), 1920, 1921 and 1922

Month	Montreal (In cents per pound)			St. Louis (In cents per pound)			Ordinary Brands, in London, (Per long ton)					
	1920	1921	1922	1920	1921	1922	1920			1921		
							£	s.	d.	£	s.	d.
January	11·284	6·561	6·472	9·483	5·413	4·691	59	10	4	25	15	7
February	11·275	6·607	6·211	9·058	4·928	4·485	62	3	7	25	5	5
March	9·856	6·686	6·288	8·881	4·737	4·658	54	16	8	25	10	5
April	10·279	6·588	6·531	8·534	4·747	4·906	48	9	5	26	1	6
May	9·812	6·809	6·691	7·938	4·848	5·110	46	0	9	27	6	7
June	9·817	6·556	6·906	7·815	4·421	5·346	42	2	11	27	2	2
July	10·085	6·311	7·274	8·050	4·239	5·694	42	13	4	26	12	0
August	10·113	6·126	7·734	8·185	4·186	6·212	41	19	6	25	8	1
September	9·239	6·190	7·864	7·717	4·235	6·548	40	5	6	25	10	8
October	8·410	6·454	7·274	*	4·605	6·840	40	5	6	26	10	8
November	7·759	6·550	8·639	*	4·665	7·104	35	14	8	26	4	10
December	6·769	6·673	8·637	*	4·837	6·909	28	11	6	27	0	11
Average	**9·558**	**6·569**	**7·210**	**7·671**	**4·655**	**5·716**	**45**	**4**	**6**	**26**	**4**	**1**

Month	1922		
	£	s.	d.
January	26	6	5
February	24	4	3
March	25	9	4
April	26	11	6
May	27	6	0
June	27	17	10
July	29	0	10
August	31	3	4
September	31	15	0
October	34	10	6
November	38	0	2
December	37	15	1
Average	**30**	**0**	**0**

*No quotations for last three months 1920.

Imports and Exports.—Lead importations into Canada have fallen off since 1920 as production from Canadian smelters has increased. In the case of zinc, while Canadian production has materially increased, the excess production appears to have gone into the export trade, for the imports of zinc and zinc products unlike the imports of lead have apparently recovered from the slump of 1921 and are now greater than those for the year 1920. The figures for the imports were 27,922,351 pounds in 1922 as against 27,272,102 pounds in 1920. During 1921, only 17,386,277 pounds of zinc and zinc products was imported. The exports of zinc spelter in 1922 were more than seven times greater than the exports in 1920, while the exports in 1921 were not quite four times greater.

In addition to data on zinc and zinc products, imports of brass and brass manufactures are also given. Brass usually contains about 30 per cent of zinc. Where possible the zinc content is shown of all zinc and brass products.

Table 91.—Imports into Canada and Exports of Zinc and Brass, 1920, 1921 and 1922

	1920		1921		1922	
	Pounds	Value	Pounds	Value	Pounds	Value
		$		$		$
IMPORTS						
Zinc and Zinc Products—						
Zinc, in blocks, pigs and sheets	3,452,892	410,772	2,783,001	247,475	3,897,090	299,995
Zinc, as spelter	1,555,068	122,745	1,110,844	56,683	1,060,283	67,737
Zinc white (80% Zn.)	21,254,272	1,829,620	12,751,203	886,784	22,065,276	1,338,508
Zinc dust (90% Zn.)	378,556	50,597	434,981	46,440	313,652	27,390
Zinc, sulphate and chloride of (44% Zn.)	631,314	44,471	306,248	17,944	586,050	27,285
Total	27,272,102	2,458,205	17,386,277	1,255,326	27,922,351	1,760,975
Zinc, manufactures of		96,961		53,946		78,398
Grand total		**2,555,166**		**1,309,272**		**1,839,373**
Brass and Brass Products—						
Brass, in blocks, pigs and ingots (30% Zn.)	360,400	72,451	120,600	16,860	185,400	21,071
Brass, old and scrap (30% Zn.)	3,538,700	533,534	5,362,000	289,724	2,200,000	221,378
Brass, tubing (30% Zn.)	1,076,278	400,149	735,302	194,794	1,410,141	321,074
Brass, plain wire (30% Zn.)	259,957	90,987	235,906	64,125	551,081	117,496
Total	5,235,335	1,097,121	6,454,708	565,503	4,346,622	681,619
Brass, bars and rods	2,267,400	525,235	723,500	135,750	1,842,900	268,689
Brass, strips, sheets or plates	1,482,200	431,236	1,170,200	259,844	1,515,300	276,361
Brass, wire cloth, n.o.p.		485,198		345,327		317,290
Brass, cup for manufacture of shells		247,698		75,348		63,281
Brass, cups for electric batteries		7,508		5,073		4,743
Brass, hand-pumps		22,258		21,081		28,091
Brass, nails, tacks, etc.		9,050		2,044		2,666
Brass and copper rivets, burrs and washers		35,789		39,373		27,716
Brass, valves		562,153		186,036		164,014
Brass, other manufactures, n.o.p.		2,914,529		1,886,123		1,722,345
Carburetors of brass						278,002
Total		5,240,654		2,955,999		3,153,198
*Grand total		6,337,775		3,521,502		3,834,817
EXPORTS						
Zinc—						
Ore.....Tons	3,126	122,387	52	1,293	40	1,095
Spelter..... "	3,490	512,279	12,828	1,336,389	28,518	3,054,644
Brass—						
Old and scrap.....Lb.	3,439,800	475,809	2,096,700	126,832	6,726,500	459,846
Rods, sheets and tubing..... "	244,000	49,728	9,300	2,393	400	74
Valves		325,794		156,804		150,953
Mfrs. of brass, n.o.p.				12,222		38,753

*"Nails and tacks" also "Rivets, burrs and washers" of brass and copper are covered by one combined item, which appears, in Trade Reports, under "Miscellaneous Non-Ferrous Metals." As they are included in the above list, this total of "Brass" will not agree with totals appearing in reports of the External Trade Branch.

Table 92.—World's Production of Zinc, 1913, 1918-1922

(Compiled from the 1922 Year Book of the "*American Bureau of Metal Statistics*,".)

(Short Tons)

Country	1913	1918	1919	1920	1921	1922
United States	352,952	525,217	471,556	479,772	215,614	373,678
Canada		12,571	12,323	18,508	26,494	27,782
Belgium	225,050	10,188	21,886	92,880	72,917	124,710
France	74,815	20,218	11,902	21,659	33,069	41,887
Germany (including Silesia)	307,238	189,434	93,670	107,406	99,207	116,293
Great Britain	73,000	42,979	42,126	27,550	6,515	20,529
Italy		1,299	1,413	1,297	427	2,901
Austria-Hungary	23,921	13,224				
Jugo-Slavia and Czecho-Slovakia			4,419	6,612	6,614	9,921
Netherlands	26,804	750		2,238	7,060	14,327
Norway	10,234	2,044	3,731	2,024	2,205	2,039
Poland (excluding Silesia)	8,398	5,392	4,868	5,909	7,745	10,141
Spain	3,650	11,020	11,031	6,469	6,614	5,512
Sweden	2,204	4,753	2,648	6,458	3,858	2,094
Australia	4,614	10,023	9,128	10,825	1,883	26,447
Japan	992	43,979	21,837	17,356	11,435	11,023
Total	**1,113,872**	**893,091**	**712,538**	**806,963**	**501,657**	**789,284**

NON-METALLICS

ABRASIVES

Corundum.—Corundum is found in an area embracing several townships in Renfrew and Hastings counties, in the province of Ontario. The industry made its appearance there in 1900, the production reaching a maximum in 1906. From 1907 to 1913 the yearly production was smaller, but fairly uniform. Operations were indefinitely suspended during August, 1918, but were renewed again in 1919, since which time old tailings have been treated for the recovery of grain corundum.

No shipments of grain corundum were reported during 1922. In the previous year, 403 tons of grain corundum valued at $55,965 was exported to the United States.

Table 93.—Production of Corundum in Canada, 1900-1922

(Short Tons)

Year	Corundum-bearing rock treated	Grain Corundum graded	Per Cent Recovery	Shipments of Grain Corundum				Average price cents per pound
				Sold in Canada	Exported	Total Shipments	Total Value	
	tons	tons		tons	tons	tons	$	
1900	.....	60	.....	.....	.....	3	300	5·00
1901	4,134	434	10·7	85	302	387	46,415	5·97
1902	7,996	805	10·1	106	662	768	84,465	5·49
1903	(a) 8,877	839	9·5	85	618	703	77,510	5·51
1904	28,187	1,654	5·9	116	877	993	109,545	5·51
1905	23,571	1,681	7·1	140	1,504	1,644	149,153	4·48
1906	45,719	2,914	6·4	162	2,112	2,274	204,973	4·50
1907	60,532	2,682	4·4	164	1,728	1,892	177,922	4·70
1908	2,678	106	4·0	99	990	1,089	100,398	4·60
1909	35,894	1,579	4·4	129	1,362	1,491	162,492	5·45
1910	37,183	1,686	4·5	106	1,764	1,870	198,680	5·31
1911	41,075	1,641	3·9	92	1,380	1,472	161,873	5·50
1912	36,879	1,620	4·4	63	1,897	1,960	239,091	6·10
1913	12,290	763	6·2	23	1,154	1,177	137,036	5·82
1914	12,111	695	5·7	14	534	548	72,176	6·59
1915	1,724	116	6·7	21	240	262	33,138	6·33
1916	1,864	67	3·6	8	59	67	10,307	7·65
1917	4,659	188	4·0	16	172	188	32,153	8·55
1918	3·184	137	4·3	0	137	137	26,112	9·90
1919	1,300	26	2·0	0	0	0	0	0·0
1920	(b) 13,025	322	2·5	20	176	196	24,547	6·25
1921	(b) 11,256	407	3·6	0	403	403	55,965	6·94
1922	.....	.....	.....	.....	.....	.....	.....	.....
Total	**395,038**	**20,422**	.....	**1,449**	**18,071**	**19,524**	**2,104,251**	.....

(a) In addition to this amount which was milled in Canada, 267 tons of ore was mined and shipped to the United States for treatment there.

(b) Tailings only.

Grindstones, Pulpstones and Scythestones.—The production of grindstones, pulpstones and scythestones in Canada in 1922 amounted to 1,005 tons valued at $43,742. Of this quantity, quarries in New Brunswick accounted for 903 tons, while Nova Scotia contributed the balance or 102 tons. In 1921, sales totalled 1,281 tons valued at $64,067.

Table 94.—Production in Canada, Imports and Exports of Grindstones, 1920, 1921 and 1922

	1920		1921		1922	
	Quantity	Value	Quantity	Value	Quantity	Value
		$		$		$
PRODUCTION—						
Nova Scotia..... Tons	211	8,440	183	6,990	102	3,692
New Brunswick..... "	2,233	79,696	1,098	57,077	903	40,050
Total.....	**2,444**	**88,136**	**1,281**	**64,067**	**1,005**	**43,742**
IMPORTS—						
Grindstones.....		312,672		448,055		319,941
Burrstones in blocks, etc.....No.	343	1,655	668	4,844	400	910
Emery in bulk, crushed or ground.....		69,462		44,490		41,943
Emery and carborundum wheels and manufactures.....		471,853		197,049		209,356
Pumice and pumice stone ground.....		57,068		21,528		26,405
Iron sand or globules for polishing and sawing.....		17,032		13,723		11,820
Sandpaper, emery paper, etc.....		560,180		252,804		270,231
Artificial abrasives.....		251,260		74,083		163,542
EXPORTS—						
Grindstones, manufactured.....		41,705		24,915		17,018
Stone for the manufacture of grindstones.....Tons			91	2,686		
Abrasives—						
Natural, n.o.p.....Cwt.	81,330	236,569	34,285	83,773	52,752	128,934
Artificial, crude, including carborundum.....Cwt.	598,664	1,579,508	139,146	522,531	266,526	1,299,818
Artificial, made up into wheels, stones, etc.....		41,138		18,752		14,650

Table 95.—Production of Grindstones in Canada, 1886-1922

Year	Tons	Value	Year	Tons	Value
		$			$
1886.....	4,020	46,545	1906.....	5,363	59,814
1887.....	5,292	64,008	1907.....	5,414	60,376
1888.....	5,764	51,129	1908.....	3,843	48,128
1889.....	3,404	30,863	1909.....	4,275	54,664
1890.....	4,884	42,340	1910.....	3,973	47,196
1891.....	4,479	42,587	1911.....	4,566	52,942
1892.....	5,283	51,187	1912.....	4,412	52,090
1893.....	4,600	38,379	1913.....	4,837	51,325
1894.....	3,757	32,717	1914.....	3,976	54,504
1895.....	3,475	31,932	1915.....	2,580	35,768
1896.....	3,713	33,310	1916.....	3,478	52,782
1897.....	4,572	42,340	1917.....	2,523	45,754
1898.....	4,935	44,775	1918.....	3,072	83,005
1899.....	4,511	43,265	1919.....	2,020	60,516
1900.....	5,539	53,450	1920.....	2,444	88,136
1901.....	4,581	45,690	1921.....	1,281	64,067
1902.....	4,633	44,118	1922.....	1,005	43,742
1903.....	5,538	48,302			
1904.....	4,649	42,782	**Total**.....	**152,231**	**1,846,803**
1905.....	5,540	62,375			

Tripolite.—Shipments of tripolite in 1922 amounted to 219 tons valued at $5,871 as against 341 tons at $11,268 in the previous twelve months.

Tripolite is a silicious material closely related to quartz and is used extensively as an abrasive. It is usually given a preliminary calcine in rotary furnaces before shipment. The entire Canadian production is derived from a deposit of this commodity at Silica Lake, Colchester County, Nova Scotia; this property was worked by the Oxford Tripoli Company for five months of 1922.

Table 96.—**Production of Tripolite in Canada, 1896-1922**

Year	Tons	Value	Year	Tons	Value	Year	Tons	Value
		$			$			$
1896	644	9,960	1906			1916	620	12,139
1897	15	150	1907	30	225	1917	600	18,000
1898	1,017	16,660	1908	30	195	1918	500	12,500
1899	1,000	15,000	1909			1919	565	11,300
1900	336	1,950	1910	22	134	1920	260	8,600
1901	850	15,300	1911	20	122	1921	341	11,268
1902	1,052	16,470	1912	38	230	1922	219	5,781
1903	835	16,700	1913	620	12,138			
1904	320	6,400	1914	650	13,000	**Total**	**11,201**	**219,941**
1905	300	3,600	1915	317	12,119			

ACTINOLITE

No mining or milling operations were reported in this industry in Canada during 1922. Shipments from milled stock on hand to the United States amounted to 50 tons with a valuation of $575 as against 78 tons at $975 in 1921. The average price obtained was $11.50, while the quotation in the previous year was $12.50 a ton.

Actinolite is used as an ingredient for coal-tar roofing compounds, care being taken in the grinding so as not to destroy the fibre.

Production of actinolite in Canada has been confined to Elzevir and Kaladar townships in Hastings and Addington counties, province of Ontario, the centre of industry being at Actinolite.

Table 97.—**Production of Actinolite in Canada, 1897-1922**

Year	Tons	Value	Year	Tons	Value
		$			$
1897	205	1,815	1913	66	720
1898	57	4,872	1914	119	1,304
1899			1915	220	2,420
1900	303		1916	250	2,750
1901	521	3,126	1917	120	1,320
1902	550	4,400	1918	228	2,508
1903	550	3,108	1919	80	880
1904-1909			1920	100	1,160
1910	30	330	1921	78	975
1911	67	736	1922	50	345
1912	92	1,000			
			Total	**3,686**	**33,799**

ARSENIC

The production of arsenic (As_2O_3) from Canadian ores in 1922 amounted to 2,576 tons valued at $321,037, an increase of 73 per cent in quantity and 37 per cent in value over the shipments for the previous year. In the smelting of the silver-cobalt-nickel ores from the Cobalt district, 2,058 tons was obtained, and the balance, 518 tons was recovered from arsenical gold concentrates shipped by the Hedley Gold Mining Company, British Columbia, to the smelter operated by the American Smelting and Refining Company, Limited, at Tacoma, Washington.

The price of white arsenic on the New York market rose from 7 cents per pound in March to 13·5 cents in December with an average of 8·5 cents for the year, as against 8·85 cents in the previous year. The increase was due to the large demand for arsenical insecticides to combat the boll-weevil in the cotton districts of southern United States.

Arsenic is generally marketed in the form of white arsenious oxide (As_2O_3) and is used principally in the manufacture of insecticides (paris green, calcium arsenate and lead arsenate); the glass and tanning industries also consume considerable quantities.

Table 98.—Production of Arsenic in Canada, 1885-1922

Year	White Arsenic		Year	Arsenic in Ore*		White Arsenic	
	Tons	Value		Tons	Value	Tons	Value
		$			$		$
1885	440	17,600	1907	656	11,094	330	36,300
1886	120	5,460	1908	986	17,506	716	41,060
1887	30	1,200	1909	224	3,346	1,129	64,100
1888	30	1,200	1910	547	6,716	1,502	75,328
1889			1911			2,097	76,237
1890	25	1,500	1912			2,045	89,262
1891	20	1,000	1913			1,692	101,463
1892-3			1914			1,737	104,015
1894	7	420	1915			2,396	147,830
1895-8			1916			2,186	262,349
1899	57	4,872	1917	280	11,200	2,656	658,231
1900	303	22,725	1918	1,078	43,114	2,482	520,525
1901	695	41,676	1919	530	21,218	2,859	488,706
1902	800	48,000	1920	628	22,231	1,831	425,617
1903	257	15,420	1921			1,491	233,763
1904-5			1922	518	21,097	2,058	299,940
1906	201	14,058	Total	5,447	156,522	32,192	3,799,766

*Computed as As_2O_3.

Table 99.—Production in Canada, Exports and Imports of Arsenic, (As_2O_3), 1920, 1921 and 1922

	1920		1921		1922	
	Quantity	Value	Quantity	Value	Quantity	Value
		$		$		$
PRODUCTION—						
From arsenical concentrates exported Tons	628	22,231			518	21,097
White arsenic "	1,831	425,617	1,491	233,763	2,058	299,940
Total "	**2,459**	**447,848**	**1,491**	**233,763**	**2,576**	**321,037**
EXPORTS—						
Arsenic, metallic "					222	5,238
Arsenic, n.o.p. "	1,655	313,311	767	108,535	1,367	198,005
IMPORTS—						
White arsenic Lb.	962	201	1,847	230	441,168	32,520
Sulphide of arsenic "	337,153	43,445	185,685	26,348	525,246	39,264
Arseniate of soda "	48,863	10,568	11,993	3,002	7,961	1,402

Table 100.—World's Production of Arsenic (As_2O_3), 1913, 1918-1922

(Long tons)

Country	1913	1918	1919	1920	1921	1922
Canada	1,509	3,175	3,023	2,193	1,330	2,532
Australia (a)		878	64	2,141	624	(b)
Southern Rhodesia (a)		101	216	390	323	488
Union of South Africa		13	9	10	2	
United Kingdom—Arsenic crude and refined	1,693	2,346	2,527	1,997	1,032	(b)
Arsenical pyrites	35	477	75	1,178		(b)
China (exports)	538	138	57	49	98	(b)
France—White Arsenic		976	723	275		(b)
Ore	4,352	716	2,225	515	570	(b)
Germany	1,860	4,326	2,062	2,566	(b)	(b)
Greece		(b)	674	952	755	(b)
Japan	21	209	821	917	1,382	1,513
Mexico		1,849	2,208	2,146	772	267
Norway (a)		12	20			(b)
Portugal	909	(b)	527	642	263	(b)
Spain—White Arsenic	46	102	41	75		
Ore		246	148	389	321	(b)
United States	2,241	5,638	5,376	10,257	4,268	8,952

(a) Ore reported. (b) Data not available.
(c) Source—"Imperial Mineral Resources Bureau."
"Mineral Resources of United States, 1922."
"The Mineral Industry during 1922."

ASBESTOS

The total quantity of asbestos rock mined during 1922 amounted to 2,562,933 tons. Of this, 2,166,385 tons or 84·5 per cent was milled and 158,023 tons of asbestos was recovered in a marketable state. The sales for the year amounted to 163,706 tons for which the producers received $5,552,723 or an average of $33·92 per ton. During the previous year, the average value per ton was $52.89.

The amount of asbestos sold in 1922 was 78 per cent higher than in 1921 when only 92,761 tons was marketed. During the year, the Quebec Government reduced the royalty from 5 per cent of the gross value of asbestos shipped to 2·5 per cent as a measure of assistance to the industry. The entire Canadian production was derived from the eastern townships of Quebec.

Exports of Canadian asbestos (including sand and waste), in 1922 were approximately 76,600 tons in excess of those recorded for the previous twelve months. The tonnage shipped to Great Britian decreased some 47 per cent from the 1921 exports. Shipments of all grades to United States, totalled 139,828 tons or an increase of 53 per cent over the previous year's records. There was a considerable decrease in shipments to the Netherlands. Increased exportations to other European countries will be noted upon examining Table 103.

Table 101.—Production of Asbestos in Canada, 1880-1922

Year	Short Tons	Value	Year	Short Tons	Value
		$			$
1880*	380	24,700	1901	40,217	1,259,759
1881*	540	35,100	1902	40,416	1,148,319
1882*	810	52,650	1903	41,677	929,757
1883*	955	68,750	1904	48,465	1,226,352
1884*	1,141	75,097	1905	68,263	1,503,259
1885*	2,440	142,441	1906	82,185	2,060,143
1886*	3,458	206,251	1907	90,426	2,505,042
1887	4,619	226,976	1908	90,773	2,573,335
1888	4,404	255,007	1909	87,300	2,301,775
1889	6,113	426,554	1910	102,215	2,573,603
1890	9,860	1,260,240	1911	127,414	2,943,108
1891	9,279	999,878	1912	136,301	3,137,279
1892	6,082	390,462	1913	161,086	3,849,925
1893	6,331	310,156	1914	117,573	2,909,806
1894	7,630	420,825	1915	136,842	3,574,985
1895	8,756	368,175	1916	154,149	5,228,869
1896	12,250	429,856	1917	153,781	7,230,384
1897	30,442	445,368	1918	158,259	8,970,797
1898	23,785	491,197	1919	159,236	10,975,369
1899	25,536	485,849	1920	199,573	14,792,201
1900	29,141	748,431	1921	92,761	4,906,230
			1922	163,706	5,552,723
			Total	2,646,570	100,016,982

* Exports.

PRODUCTION OF ASBESTOS IN CANADA 1880-1922.

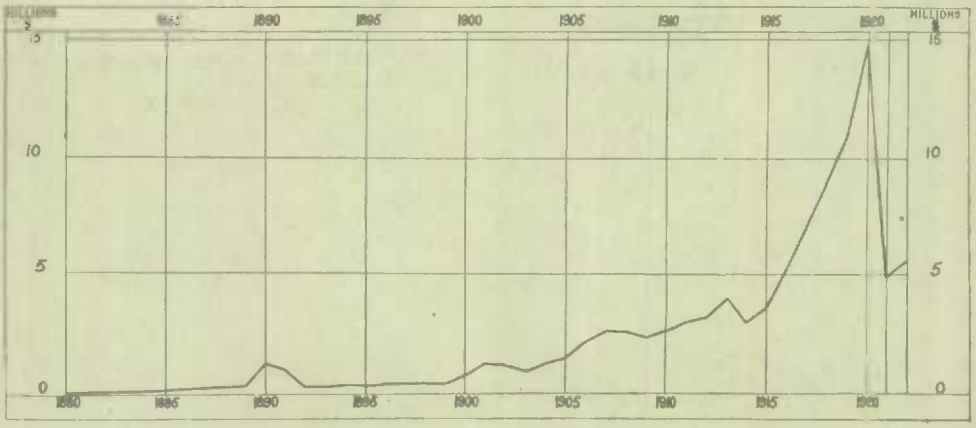


Table 102.—Output and Sales of Asbestos in Canada, 1921 and 1922

Classification	1921				1922			
	Total output	Sold or Shipped			Total output	Quantity	Total sales value at mill	Average value per ton
		Quantity	Total sales value at mill	Average value per ton				
	Tons	Tons	$	$	Tons	Tons	$	$
Crude No. 1	653	222	273,007	1,229 76	759	433	277,492	640 85
Crude No. 2	1,741	563	334,132	593 50	2,190	1,351	447,845	331 49
Fiberized crude	688	141	59,350	420 92	120	328	64,506	195 56
Spinning stocks	9,914	4,969	1,272,700	256 12	11,030	6,739	1,326,920	196 90
Shingle stocks	19,325	10,990	1,031,614	93 87	18,587	19,647	1,085,174	55 23
Mill board stocks	3,788	3,242	222,343	68 58	3,930	4,386	128,164	29 [illegible]
Paper stocks	32,595	26,944	1,263,266	46 88	43,196	44,135	1,426,533	32 [illegible]
Paper fillers	27,199	20,262	308,379	15 22	35,257	43,275	565,671	13 07
By-products (asbestos sand, finish, floats)	27,474	25,428	141,419	5 56	42,954	43,412	230,418	5 31
Total	**123,377**	**92,761**	**1,905,230**	**52 89**	**158,023**	**163,706**	**5,552,723**	**33 92**

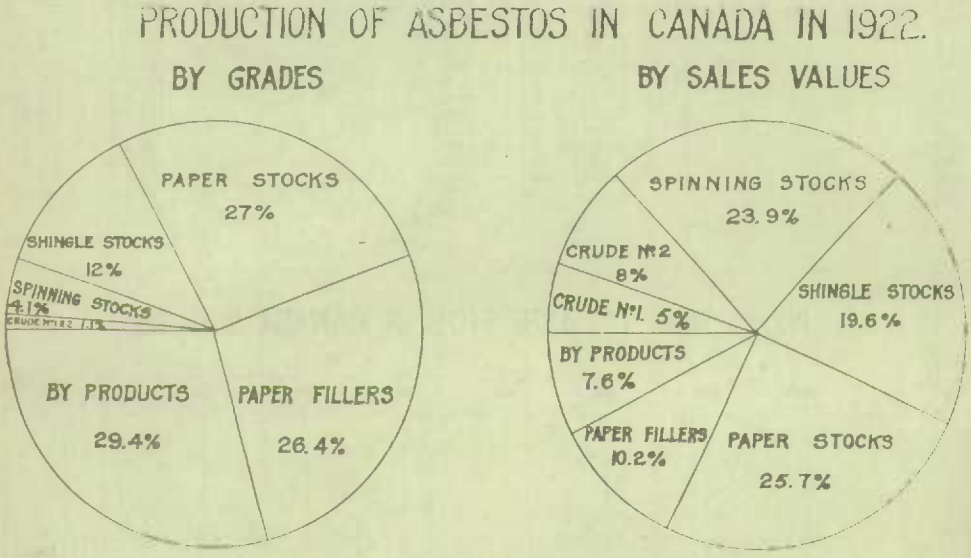


Table 103.—Exports of Canadian Asbestos by Countries of Destination, 1920, 1921 and 1922

Commodity and Destination	1920		1921		1922	
	Tons	Value	Tons	Value	Tons	Value
		$		$		$
ASBESTOS—						
Great Britain	11,881	1,270,172	4,423	512,009	2,334	271,298
United States	115,283	7,955,772	43,374	2,878,172	83,562	3,961,811
Australia	483	49,895	175	21,438	25	6,000
Belgium	8,251	698,615	3,524	418,518	4,853	343,491
France	2,011	216,867	1,932	348,504	3,080	282,222
Germany	3,265	396,933	3,437	493,024	6,867	779,808
Italy	2,390	290,609	230	32,100	416	32,566
Japan	4,863	293,344	1,842	148,430	2,770	159,870
Netherlands	1,695	152,783	3,923	560,873	987	142,499
Spain	440	32,050	.....	.....	50	4,500
Switzerland	5	390	.....	.....	.....	.....
Other countries	2,173	163,506	480	52,243	170	9,505
Total	**152,740**	**11,521,536**	**63,340**	**5,465,311**	**105,114**	**5,993,570**
SAND AND WASTE—						
Great Britain	30	300	141	2,869	139	1,689
United States	36,218	364,520	21,754	209,814	56,266	554,514
Other countries	55	1,100	159	3,278	480	6,020
Total	**36,303**	**365,920**	**22,054**	**215,961**	**56,885**	**562,223**
ASBESTOS MANUFACTURES INCLUDING ASBESTOS ROOFING—						
Great Britain	.....	13,270	.....	7,305	.....	10,184
United States	.....	67,544	.....	77,928	.....	74,430
British South Africa	.....	1,710	.....	.....	.....	821
France	.....	80,039	.....	157,457	.....	.....
Morocco	.....	14,826	.....	.....	.....	.....
New Zealand	.....	7,483	.....	.....	.....	249
Other countries	.....	11,201	.....	18,524	.....	10,142
Total	.....	**195,067**	.....	**261,274**	.....	**95,826**

Table 104.—World's Production of Asbestos[1], 1913, 1918-1922

(Long tons)

Country	1913	1918	1919	1920	1921	1922
Canada	118,361	128,086	136,669	178,190	82,823	146,166
Southern Rhodesia	259	7,655	8,696	18,823	19,528	14,248
Union of South Africa	859	3,280	3,512	7,112	5,123	4,384
Australia	.....	3,034	1,790	825	*	561
Cyprus (exports)	1,168	228	1,331	800	801	*
India	.....	357	388	1,818	316	*
New Zealand	.....	.....	.....	2	.....	*
China	.....	239	68	5	13	*
Finland	.....	.....	33	252	750	*
Germany	.....	*	12	28	*	*
Italy	172	59	96	102	413	492
Philippine Islands	.....	69	369	.....	.....	*
Russia	17,218	*	*	1,454	2,651	4,837
Spain	.....	.....	.....	.....	19	*
United States	982	891	1,036	1,471	742	24

*Data not available.
[1]Source—"Imperial Mineral Resources Bureau;" "Mineral Resources of United States in 1922;" "Asbestos."

BARYTES

The production of ground barytes in Canada in 1922 amounted to 289 tons valued at $9,537 as compared with 270 tons sold for $9,567 in 1921. These shipments were from the mill operated by the Brandram-Henderson, Limited, in connection with the Johnson Barytes mine at Lake Ainslie, Inverness County, Nova Scotia.

Table 105.—Production of Barytes in Canada, 1885-1922

Year	Tons	Value	Year	Tons	Value	Year	Tons	Value
		$			$			$
1885	300	1,500	1898	1,125	5,533	1911	50	400
1886	3,864	19,270	1899	720	4,402	1912	464	5,104
1887	400	2,400	1900	1,337	7,605	1913	641	5,410
1888	1,100	3,850	1901	653	3,842	1914	612	6,169
1889			1902	1,096	3,957	1915	550	6,875
1890	1,842	7,543	1903	1,163	3,931	1916	1,368	19,393
1891			1904	1,382	3,702	1917	3,490	54,027
1892	315	1,260	1905	3,360	7,500	1918	640	10,165
1893			1906	4,000	12,000	1919	468	8,154
1894	1,081	2,830	1907	1,344	3,008	1920	751	22,983
1895			1908	4,312	19,021	1921	270	9,567
1896	145	715	1909	179	1,120	1922	289	9,537
1897	571	3,066	1910			Total	39,882	275,825

Table 106.—Production in Canada and Imports of Barytes, 1920, 1921 and 1922

	1920		1921		1922	
	Tons	Value	Tons	Value	Tons	Value
		$		$		$
PRODUCTION—						
Nova Scotia—Barytes	751	22,983	270	9,567	289	9,537
IMPORTS—						
Barium peroxide	83	40,986	54	26,901	82	26,033
Blanc fixe and satin white	2,429	102,198	1,418	61,624	2,549	88,541
Barytes	2,998	74,314	1,439	40,374	2,954	64,186

CHROMITE

No mining operations were carried on in the chromite industry in Canada during 1922. Shipments amounting to 767 tons valued at $11,503 were reported from the Black Lake district in the eastern townships of Quebec. This quantity consisted entirely of concentrates shipped from stocks on hand and with the exception of a small quantity was all marketed in the United States. In 1918, some shipments of chromite were made from the Mastadon claim in the Grand Forks Division, British Columbia, but since that date this property has not been operated.

The average price of chromite (50 per cent Cr_2O_3), in the United States, as quoted in the "*Engineering and Mining Journal-Press*" was about $22.50 per ton throughout the year.

Table 107.—Production of Chromite in Canada, 1886-1922

Year	Short Tons	Value	Year	Short Tons	Value
		$			$
1886	60	945	1907	7,196	72,901
1887	38	570	1908	7,225	82,008
1888-93			1909	2,470	26,604
1894	1,000	20,000	1910	299	3,734
1895	3,177	41,300	1911	157	2,587
1896	2,342	27,004	1912-13		
1897	2,637	32,474	1914	136	1,210
1898	2,021	24,252	1915	12,341	179,543
1899	2,010	21,842	1916	(a) 27,517	311,460
1900	2,335	27,000	1917	(a) 36,725	499,682
1901	1,274	16,744	1918	21,994	867,122
1902	900	13,000	1919	8,541	228,898
1903	3,509	51,129	1920	11,016	251,379
1904	6,074	67,146	1921	2,798	55,696
1905	8,575	113,301	1922	1,087	19,566
1906	9,035	91,859	Total	184,489	3,130,956

(a) A portion of this ore was sold to a customs mill in the district and the final shipments of ores and concentrates in 1916 were 15,249 short tons valued at $310,902 or an average of $20.39 per ton: and in 1917, 23,713 tons valued at $581,796 or an average of $24.54 per ton.

Table 108.—Production in Canada, Imports and Exports of Chromite, 1920, 1921 and 1922

	1920		1921		1922	
	Tons	Value	Tons	Value	Tons	Value
		$		$		$
PRODUCTION—						
Quebec—Chromite	11,016	251,379	2,798	55,696	767	11,503
IMPORTS—						
Bichromate of soda	679	267,235	318	59,557	720	118,872
Bichromate of potash	8	5,650	32	9,070	48	10,283
EXPORTS	8,431	151,456	2,387	32,747	773	8,286

COAL

Output.—The output of coal from Canadian mines during the calendar year 1922 was 15,157,431 short tons, as compared with 15,057,493 tons in 1921 and the record output of 16,946,764 tons in 1920. Fifteen disputes between employees and employers occurred in the coal-mining industry in Canada during the twelve months ending December, thirteen of which were in Alberta and south-eastern British Columbia and the other two in Nova Scotia. In all 25,251 men were affected and 1,222,288 working days' time was lost. Of this time, 931,960 days were lost in the strike which began on April 1; 260,034 days were lost in the short strikes originating in August; 19,036 shifts were lost in short strikes in December and the rest of the time was lost in minor strikes during the year.

The value of the 1922 output was reported as $65,518,497, or an average of $4.32 per ton. Higher values were recorded in 1921 and in 1920. Table 109 gives an historical summary of the output and value of coal mined in Canada for each year since 1881.

In the first three months of the year, production was well maintained, but from April to August inclusive, in 1922, the monthly output of coal from Canadian mines varied between 600,000 tons and 900,000 tons; with the resumption of operations in September the output was greatly increased reaching a peak of 1,934,616 tons in October. This was the highest monthly output ever recorded in Canada.

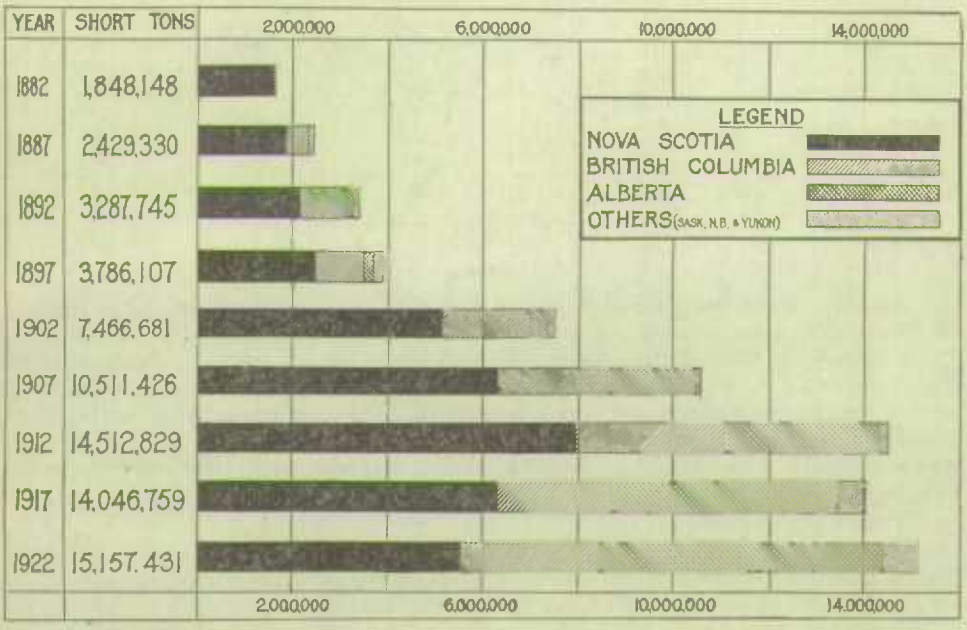
In spite of the losses occasioned by the strike, Alberta retained the premier position among the coal-producing provinces with an output of 5,990,911 tons. Nova Scotia was a close second with 5,569,072 tons and British Columbia mines contributed 2,927,033, placing that province in the third position. Saskatchewan and New Brunswick produced respectively 382,437 tons and 287,513 tons.

Table 109.—Output of Coal from Canadian Mines, 1785-1922

Year	Short tons	Value	Average per ton	Year	Short tons	Value	Average per ton
		$	$			$	$
1785-1880	16,426,253	28,190,518	1·72	1903	7,960,364	15,942,833	2·00
1881	1,537,106	2,688,621	1·75	1904	8,254,595	16,592,231	2·01
1882	1,848,148	3,248,446	1·76	1905	8,667,948	17,520,263	2·02
1883	1,818,684	3,109,635	1·71	1906	9,762,601	19,732,019	2·02
1884	1,984,959	3,593,831	1·81	1907	10,511,426	24,381,842	2·32
1885	1,920,977	3,417,807	1·78	1908	10,886,311	25,194,573	2·31
1886	2,116,653	3,739,840	1·77	1909	10,501,475	24,781,236	2·38
1887	2,429,330	4,388,206	1·81	1910	12,909,152	30,909,779	2·39
1888	2,602,552	4,674,140	1·80	1911	11,323,388	26,467,646	2·34
1889	2,658,303	4,894,287	1·84	1912	14,512,829	36,019,044	2·48
1890	3,084,682	5,676,247	1·84	1913	15,012,178	37,334,940	2·49
1891	3,577,749	7,019,425	1·96	1914	13,637,529	33,471,801	2·45
1892	3,287,745	6,363,757	1·94	1915	13,267,023	32,111,182	2·42
1893	3,783,499	7,359,080	1·95	1916	14,483,395	38,817,481	2·68
1894	3,847,070	7,429,468	1·93	1917	14,046,759	43,199,831	3·08
1895	3,478,344	6,739,153	1·94	1918	14,977,926	55,192,896	3·68
1896	3,745,716	7,226,462	1·93	1919*	13,919,096	55,622,670	3·99
1897	3,786,107	7,303,597	1·93	1920*	16,946,764	82,496,548	4·86
1898	4,173,108	8,224,288	1·97	1921*	15,057,493	72,451,056	4·81
1899	4,925,051	10,283,497	2·09	1922*	15,157,431	65,518,497	4·32
1900	5,777,319	13,742,178	2·38				
1901	6,486,325	12,699,243	1·96	Total	344,558,044	930,981,561	
1902	7,466,681	15,210,877	2·04				

*The tonnage shown is the total output from all mines in 1919, 1920, 1921 and 1922. For previous years the tonnage shown includes sales, colliery consumption, and coal used by the operators.

OUTPUT OF COAL BY PROVINCES
1882 TO 1922



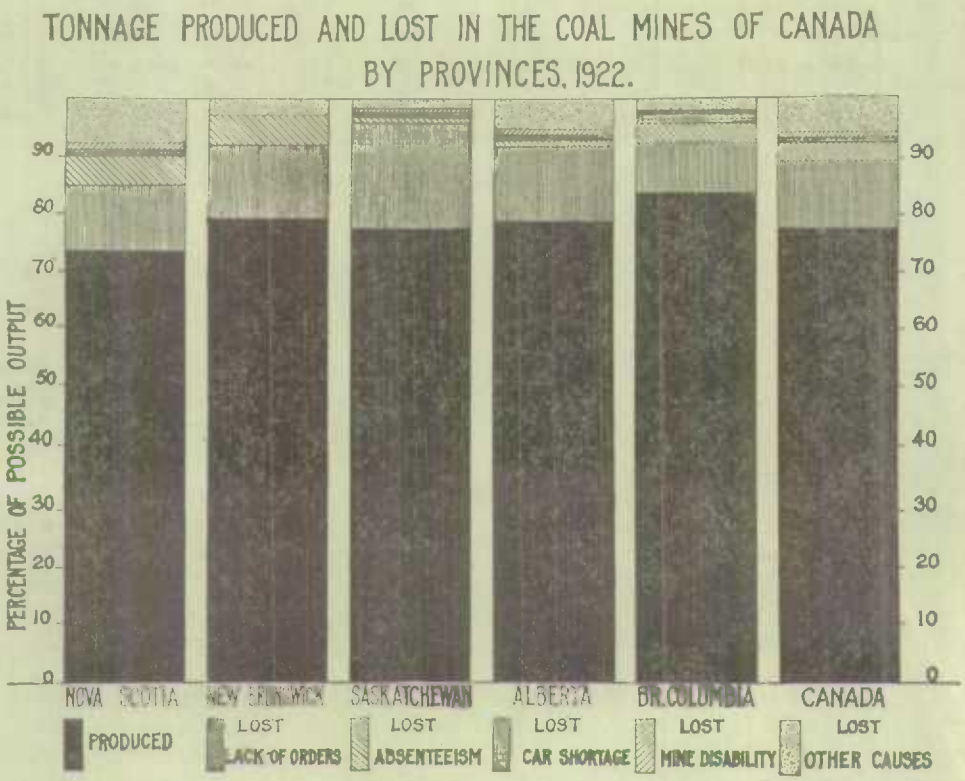
Tonnage Lost.—For the first time it has been possible to prepare a statement showing tonnage lost in all the coal mines of Canada; this table gives the percentage of the possible output produced, by provinces, with analyses of the tonnages lost through each of several different causes. It will be readily understood that in any statement of tonnage lost by operating mines the method of computing the data must be more or less arbitrary. A plan has been worked out by the Bureau which is now being applied in every coal-producing province, and the following outline of the procedure is given in order that the reader may clearly understand how the data in the "Tonnage Lost" tables are obtained.

For each month the actual output and the actual number of days' work done by all employees on the colliery pay-rolls are determined and from these two figures the output per man-day is deduced. The number of individual shifts lost by the men whose names are on the colliery pay-roll for the month is recorded, and the total number of shifts so lost is multiplied by the actual tonnage produced per man-day during the month. This lost tonnage plus the actual output of the mine during the month is regarded as the possible output and the percentages given in the tables showing the proportions produced and lost are computed from these figures. The tonnage lost is then analysed according to the cause of loss and the percentage figures are included in the tables.

Computed on the foregoing basis, the tonnage lost in Canadian coal mines during 1922 amounted to 23 per cent of the total output. Of this amount, 12·2 per cent was attributed to "lack of orders," and 6·2 per cent to "other causes." The tonnage lost through absenteeism was 3·1 per cent.

Table 110.—Tonnage Lost in the Coal Mines of Canada in 1922, showing by Provinces the Relative Percentages Produced and Lost with an Analysis of the Percentage Lost

Province	Per cent produced	Per cent lost	Percentage Lost Through				
			Absenteeism	Lack of orders	Car shortage	Mine disability	Other causes
Nova Scotia	73	27	5·1	11·9	0·7	0·5	8·8
New Brunswick	79	21	5·0	13·0	.....	.....	3·0
Saskatchewan	77	23	0·3	19·5	0·4	0·5	2·3
Alberta	78	22	1·3	13·3	0·9	0·4	6·1
British Columbia	84	16	3·2	9·0	2·4	.....	1·4
Canada	**77**	**23**	**3·1**	**12·2**	**1·1**	**0·4**	**6·2**



Disposftion.—In Table 111 the disposition of coal from Canadian mines during the past two years has been tabulated, but the items shown differ slightly from those in the similar tables which follow showing the disposition of coal by provinces, in that items have been made to show the tonnages supplied for ships' bunkers and railroads separately from the other shipments. In the subsequent tables, the tonnages for ships' bunkers and railroads have been included under "shipments." A further word of explanation may be given in connection with the items "put on bank" and "lifted from bank". The data show the total quantities put on bank at all mines during the year and the gross amount removed from bank during the year. Shipments of coal, excluding that for ships' bunkers and railroads, were considerably higher in 1922 than in the preceding year although the value of these shipments was appreciably less. On the whole, the disposition of the output in 1922 showed little change from the corresponding data for the preceding year.

Table 111.—Disposition of Coal from Canadian Mines, 1921 and 1922

(Short tons)

—	1921			1922		
	Total coal	Total value	Average value per ton	Total coal	Total value	Average value per ton
		$	$		$	$
Supplied to employees for domestic consumption	233,198	634,299	2·72	239,189	604,732	2·52
Used for Power Purposes—						
(a) Shops	16,228	54,364	3·35	19,445	59,951	3·08
(b) Colliery boilers	1,018,340	3,411,439	3·35	923,202	2,846,309	3·08
(c) Companies' railroads	77,825	260,714	3·35	89,504	275,949	3·08
(d) Harbour tugs and dredges	1,663	5,571	3·35	465	1,433	3·08
Shipped (See Table 114)—						
(a) Ships' bunkers	347,132	2,031,194	5·86	626,789	3,532,761	5·64
(b) Railroads	3,211,650	16,539,998	5·15	3,579,212	17,083,811	4·77
(c) Other	9,630,705	47,864,604	4·97	9,287,196	41,036,124	4·41
Used in making coke at the colliery	109,031	563,690	5·17	77,363	392,091	5·07
Used in making briquettes	57,213	139,028	2·43	20,569	27,357	1·33
Put on bank	493,723	2,364,933	4·79	689,111	3,309,460	4·80
Put on waste heap	409,503	110,566	0·27	336,506	6,425	0·02
Total Disposition	**15,606,211**	**73,983,400**	**4·74**	**15,888,551**	**69,176,403**	**4·35**
Lifted from bank	548,718	1,531,744	2·79	731,120	3,657,906	5·00
Total Output	**15,057,493**	**72,451,656**	**4·81**	**15,157,431**	**65,518,497**	**4·32**

Table 112.—Disposition of Coal from Canadian Mines, by Provinces, 1921

(Short tons)

—	Nova Scotia	New Brunswick	Saskatchewan	Alberta	British Columbia and Yukon	Total for Canada
Supplied to employees for domestic consumption	148,876	1,604	3,853	49,833	29,032	233,198
Shops, etc	16,228					16,228
Used under colliery boilers, etc	465,181	2,438	14,776	335,953	199,992	1,018,340
Used by companies' railroads	49,290		3,250	7,233	18,052	77,825
Shipped. (See Table 114)	5,006,015	181,001	309,919	5,406,109	2,286,443	13,189,487
Used for making coke at colliery					109,031	109,031
Harbour tugs and dredges	1,663					1,663
Used in making briquettes				57,213		57,213
Put on bank	321,402	11,026	2,456	75,853	82,926	493,723
Put on waste heap	40,486	51	3,456	73,144	292,366	409,503
Total Disposition	**6,649,291**	**196,120**	**337,710**	**6,005,338**	**3,017,842**	**15,606,211**
Lifted from bank	314,273	8,928	2,078	69,416	127,318	522,013
Lifted from waste heap				26,705		26,705
Total Output	**5,734,928**	**187,192**	**335,632**	**5,909,217**	**2,890,524**	**15,057,493**

Table 113.—Disposition of Coal from Canadian Mines, by Provinces, 1922

(Short tons)

—	Nova Scotia	New Brunswick	Saskatchewan	Alberta	British Columbia and Yukon	Total for Canada
Supplied to employees for domestic consumptions	150,657	2,785	4,095	51,904	29,748	239,189
Shops, etc	19,445					19,445
Used under colliery boilers, etc	439,083	5,786	15,602	275,831	186,900	923,202
Used by companies' railroads	49,880	58	3,066	8,702	27,198	89,504
Shipped. (See Tabe 114)	4,857,835	277,323	355,901	5,612,535	2,389,603	13,493,197
Used for making coke at colliery					77,363	77,363
Harbour tugs and dredges	465					465
Used in making briquettes				20,569		20,569
Put on bank	551,826	22,265	3,719	30,800	80,507	689,111
Put on waste heap	25,816	127	2,949	64,317	243,297	336,506
Total Disposition	**6,095,001**	**308,344**	**385,932**	**6,064,658**	**3,031,616**	**15,888,551**
Lifted from bank	525,929	20,831	3,495	73,747	107,118	731,120
Total Output	**5,569,072**	**287,513**	**382,437**	**5,990,911**	**2,927,498**	**15,157,431**

Shipments.—A compilation has been made in Table 114 to show the tonnages of coal shipped from Canadian mines by grades and destinations for the past two years. Domestic shipments, including under this heading all shipments direct from the mines to points in Canada, amounted to 7,996,485 tons in 1922, as compared with 7,796,342 tons so shipped in 1921. More Canadian coal was sold for ships' bunkers and for railroad consumption in 1922 than in the preceding year. For these two purposes, 4,206,001 tons was disposed of at the mines. The amount sold for railroad locomotive use was 3,579,212 short tons. The total consumption of coal by railroad locomotives was 9,041,087 tons. Thus, it appears that about one-third of the total consumption of coal by railroad locomotives last year was of Canadian origin. Foreign shipments reported by mine operators and including only the coal shipped direct from the mines for export trade amounted to 1,290,711 tons last year. The total tonnages of Canadian coal cleared through customs ports was 1,818,582 tons. The apparent discrepancy between these two totals is easily explainable and is due largely to the fact that brokers and others purchase considerable quantities of coal from the Canadian mine operators and then dispose of their purchases in the foreign market. Thus, the coal reported by the operator as sold by him for delivery to Canadian points is subsequently exported and this tonnage is included in the customs' records. There is also a difference between the time of shipment and the time of clearing through customs so that the tonnage of coal in transit appears in the one record but is excluded from the other.

From the foregoing, it appears that nearly eight million tons of Canadian coal was burned in Canada during 1922, and of this amount about one-half was consumed in the producing provinces and approximately four million tons of Canadian coal moved in interprovincial trade during the year. Shipments of Nova Scotia coal to other Canadian provinces principally New Brunswick, Prince Edward Island and Quebec amounted to almost 1,883,000 tons. The province of Quebec received about 1,454,000 tons of Canadian coal, an increase of 552,000 tons above the received about 1,454,000 tons of Canadian coal, an increase of 552,000 tons above the receipts of Canadian coal in the preceding year and fully five times as much as reached this province in 1920.

The restoration of the St. Lawrence trade to the normal pre-war figure of 2,000,000 tons per season was therefore almost overtaken during 1922. Shipments of Canadian coal into the province of New Brunswick were about 404,000 tons, while the shipments from that province to other points in Canada amounted to 63,000 tons. Only about 17,000 tons of Canadian coal was shipped into Central Ontario during the year. Manitoba and the section of Ontario lying west of Fort William and Port Arthur received approximately 720,000 tons. Saskatchewan's receipts of Canadian coal were about 1,255,000 tons, while the shipments from that province t other places in Canada were nearly 170,000 tons. Alberta coal to the extent of 1,882,000 tons found its way to other Canadian provinces and 47,000 tons of British Columbia coal was also shipped for consumption in other parts of Canada.

Table 114.—Shipments of Coal from Canadian Mines by Grades and Destinations, 1921 and 1922

(Short tons)

Destination	1921				1922			
	Run of mine	Screened	Slack	Total	Run of mine	Screened	Slack	Total
Nova Scotia	820,046	458,701	259,936	1,538,583	633,310	453,722	211,037	1,298,069
Prince Edward Island	20,198	51,417	469	72,084	13,982	56,537	476	70,995
New Brunswick	445,378	187,069	24,972	657,419	327,004	182,377	52,839	562,220
Quebec	823,093	22,350	56,313	901,756	1,186,408	17,239	250,669	1,454,316
Ontario	541	7,872	3,491	11,904	14,227	22,123	2,457	38,807
Manitoba	170,113	451,119	54,964	676,196	133,242	501,699	63,220	698,161
Saskatchewan	197,615	994,249	98,536	1,290,400	226,485	1,096,848	109,063	1,432,396
Alberta	257,405	851,553	250,405	1,359,363	263,409	851,790	258,295	1,373,494
British Columbia	175,875	718,979	383,909	1,278,763	120,197	713,777	233,593	1,067,567
Yukon	.....	8,842	32	8,874	300	81	79	460
Total Domestic Shipments	2,911,164	3,752,151	1,133,027	7,796,342	2,918,564	3,896,193	1,181,728	7,996,485
Railroads	3,014,260	163,181	34,209	3,211,650	3,220,113	186,024	173,075	3,579,212
Ships' bunkers	344,810	2,322	.....	347,132	301,799	321,081	3,909	626,789
Total Railroads and Ships' Bunkers	3,359,070	165,503	34,209	3,558,782	3,521,912	507,105	176,984	4,206,001
United States	627,658	251,357	199,609	1,078,624	568,912	348,060	147,263	1,064,235
Newfoundland	103,081	100,599	3,843	207,523	78,854	127,376	9,992	216,222
West Indies	935	.....	.....	935	.....	.....	.....	.....
Europe	365,962	6,104	.....	372,066	.....	386	.....	386
Other countries	115,676	57,344	1,871	174,861	1,718	7,868	112	9,698
Lost at Sea	384	.....	.....	384	.....	170	.....	170
Total Foreign Shipments	1,213,666	415,374	205,323	1,834,393	649,484	483,860	157,367	1,290,711
Total	7,483,900	4,333,028	1,372,559	13,189,187	7,089,960	4,887,158	1,516,079	13,493,197

Imports.—Since Canada's coal resources lie in the maritime provinces and in the three western provinces, central Canada has so far been largely dependent upon the United States for its supply of fuel. In 1922, owing to the great strike which tied up United States mines and some of those in Canada, quantities of coal were imported from Great Britain. Table 115, showing these imports by grades, has therefore been prepared. In all, about 819,000 tons was received, 639,000 tons of which was bituminous and nearly 180,000 tons was entered as anthracite. The receipts at customs ports in Quebec of this coal from Great Britain amounted to 762,108 tons and the balance was almost equally divided between Ontario and Nova Scotia. Undoubtedly, some of the coal cleared through the customs ports of Quebec was later shipped into Ontario. Imports of coal from the United States amounted to 13,438,294 tons comprising 10,924,045 tons of bituminous coal and 2,514,249 tons of anthracite. As compared with the records for the preceding year, the imports of bituminous coal were approximately 2,600,000 tons lower and the imports of anthracite were in the neighbourhood of 2,000,000 tons less.

Tables 116 and 117 show for anthracite and bituminous coal respectively the importations by provinces and by grades of coal for the past three years. These data have been supplemented in Table 118 by a compilation showing the average importations of anthracite and bituminous coal from all sources by grades and by provinces during the five years 1918-1922. Similar data for the principal fuel-consuming areas in Central Canada are shown in Table 119.

Table 115.– Imports of Coal into Canada from Great Britain, by Kinds and Grades and by Provinces, 1922

(Short tons)

Destination	Anthracite		Bituminous	
	Egg, Nut, etc.	Dust	Round and run-of-mine	Slack
Nova Scotia	5,645	.....	3,267	.....
Prince Edward Island	.....	.....	.....	.....
New Brunswick	19,420	.....	1,909	17,132
Quebec (a)	139,236	13,281	432,037	177,554
Ontario	900	.....	3,712	3,217
Manitoba	.....	.....	.....	.....
Saskatchewan	.....	.....	.....	.....
Alberta	.....	.....	.....	.....
British Columbia (b)	1,226	.....	504	.....
Yukon	.....	.....	.....	.....
Canada	**166,427**	**13,281**	**441,519**	**197,903**

(a) Includes Round and Run-of-Mine, 75 tons imported from Other Countries. (b) Imported from other Countries.

Table 116.—Imports of Anthracite Coal into Canada from United States by Kinds and Grades and by Provinces, 1920, 1921 and 1922

(Short tons)

Destination	1920		1921		1922	
	Egg, Nut, etc.	Dust	Egg, Nut, etc.	Dust	Egg, Nut, etc.	Dust
Nova Scotia	45,334	.....	62,203	42	21,363	56
Prince Edward Island	5,544	.....	6,613	.....	4,589	.....
New Brunswick	57,859	.....	82,509	.....	40,252	.....
Quebec	1,186,674	357,787	1,184,445	127,267	633,247	156,210
Ontario	3,124,575	116,889	3,024,304	45,913	1,573,515	70,016
Manitoba	12,520	4,989	30,724	2,749	10,975	3,740
Saskatchewan	162	44	254	.....	111	120
Alberta	341	176	66	.....	.....	.....
British Columbia	75	.....	249	2	34	1
Yukon	.....	.....	.....	.....	.....	.....
Canada	**4,433,084**	**479,889**	**4,391,397**	**175,973**	**2,284,106**	**230,143**

Table 117.—Imports of Bituminous Coal into Canada from United States by Kinds and Grades and by Provinces, 1920, 1921 and 1922

(Short tons)

Destination	1920		1921		1922	
	Round and run-of-mine	Slack	Round and run-of-mine	Slack	Round and run-of-mine	Slack
Nova Scotia	2,784	260	1,421	454	5,215	988
Prince Edward Island	513	.....	238	.....	619	736
New Brunswick	938	.....	18,019	23,931	23,982	37,240
Quebec	3,100,196	403,214	2,059,632	624,934	1,052,360	264,309
Ontario	10,497,651	1,839,252	8,851,893	1,851,851	7,917,917	1,529,676
Manitoba	23,601	19,946	25,815	51,018	20,491	45,357
Saskatchewan	535	.....	615	1,482	385	1,099
Alberta	348	259	797	1,032	538	609
British Columbia	9,372	3,756	16,926	155	9,604	3,798
Yukon	9	.....	5	.....	32	.....
Canada	**13,635,945**	**2,266,687**	**19,978,390**	**2,557,868**	**9,040,233**	**1,883,812**

Table 118.—Average Imports of Coal into Canada by Kinds and Grades and by Provinces for the Five Years, 1918-1922

(Short tons)

Destination	Anthracite			Bituminous			Grand Total
	Egg, Nut, etc.	Dust	Total	Round and run-of-mine	Slack	Total	
Nova Scotia	49,548	19	49,567	3,884	396	4,280	53,847
Prince Edward Island	6,190		6,190	300	147	447	6,637
New Brunswick	71,820	574	72,394	13,694	18,115	31,809	104,203
Quebec	1,158,820	219,073	1,377,893	2,373,182	638,129	3,011,311	4,389,204
Central Ontario	2,569,399	92,561	2,661,960	7,530,872	1,737,221	9,268,093	11,930,053
Head of Lakes	277,589	1,469	279,058	1,769,767	119,508	1,889,275	2,168,333
Total Ontario	**2,846,988**	**94,030**	**2,941,018**	**9,300,639**	**1,856,729**	**11,157,368**	**14,098,386**
Manitoba	13,552	2,391	15,943	20,697	34,880	61,577	77,520
Manitoba and Head of Lakes	**291,141**	**3,860**	**295,001**	**1,796,464**	**154,388**	**1,950,852**	**2,245,853**
Saskatchewan	105	41	146	586	661	1,247	1,393
Alberta	94	34	128	158	701	1,159	1,287
British Columbia	146		146	9,961	2,540	12,504	12,650
Yukon				18		18	18
Canada	**4,147,263**	**316,162**	**4,463,425**	**11,729,422**	**2,552,298**	**14,281,720**	**18,745,145**

Table 119.—Average Imports of Coal into Central Canada by Principal Areas for the Five Years, 1918-1922

(Short tons)

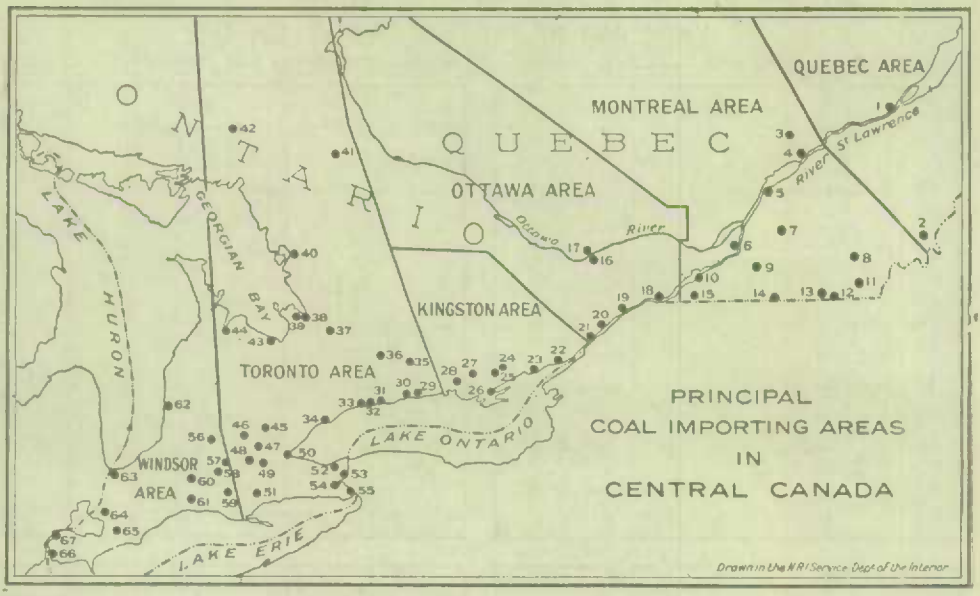
Destination	Anthracite			Bituminous		
	Egg, Nut, etc.	Dust	Total	Round and run-of-mine	Slack	Total
Quebec	114,214	19,040	133,254	243,110	51,349	294,459
Montreal	1,031,904	196,977	1,228,881	2,090,937	560,595	2,651,532
Ottawa	319,324	10,262	329,586	544,823	134,897	679,720
Kingston	137,412	729	138,141	81,019	84,835	165,854
Toronto	1,773,151	75,700	1,848,851	3,944,846	857,375	4,802,221
Windsor	326,878	6,312	333,190	2,107,553	439,569	2,547,122
Total	**3,702,883**	**309,020**	**4,011,903**	**9,012,288**	**2,128,620**	**11,140,908**

Table 120.—Stocks of Coal held by Wholesale and Retail Dealers, by Provinces at December 31, 1922

(Compiled in the Internal Trade Branch)

(Short tons)

Provinces	Anthracite From		Bituminous From			Canadian Lignite	Other	Total
	United States	Great Britain	United States	Great Britain	Canada			
Nova Scotia	3,184			1,696	7,676			12,556
New Brunswick	886	80		53	1,600		110	2,729
Prince Edward Island					2,203			2,203
Quebec	22,797	262	65,946		1,091		1,907	92,003
Ontario	53,219	880	309,300	250	749	212	269	361,879
Manitoba	23,505		65,720		8,343	20,480	237	118,285
Saskatchewan	2,419		13,717		3,419	52,750	512	72,877
Alberta	30		13,529		3,124	22,662		39,345
British Columbia	48		35		18,442	732		19,257
Canada	**106,088**	**1,222**	**468,247**	**1,999**	**46,677**	**96,836**	**3,065**	**724,134**



Key to the Ports of Entry Shown on the Map

Quebec Area—

1 Quebec City
2 Megantic

Montreal Area—

3 Shawinigan Falls
4 Three Rivers
5 Sorel
6 Montreal
7 St. Hyacinthe
8 Sherbrooke
9 St. John's
10 Valleyfield
11 Coaticook
12 Beebe Junction
13 Mansonville
14 St. Armand
15 Athelstan

Ottawa Area—

16 Ottawa
17 Hull
18 Cornwall
19 Morrisburg
20 Prescott
21 Brockville

Kingston Area—

22 Gananoque
23 Kingston
24 Napanee
25 Deseronto
26 Picton
27 Belleville
28 Trenton

Toronto Area—

29 Cobourg
30 Port Hope
31 Bowmanville
32 Oshawa
33 Whitby
34 Toronto
35 Peterboro
36 Lindsay
37 Orillia
38 Port McNicoll
39 Midland
40 Parry Sound
41 North Bay
42 Sudbury
43 Collingwood
44 Owen Sound
45 Guelph
46 Kitchener
47 Galt
48 Paris
49 Brantford
50 Hamilton

Toronto Area—Con.

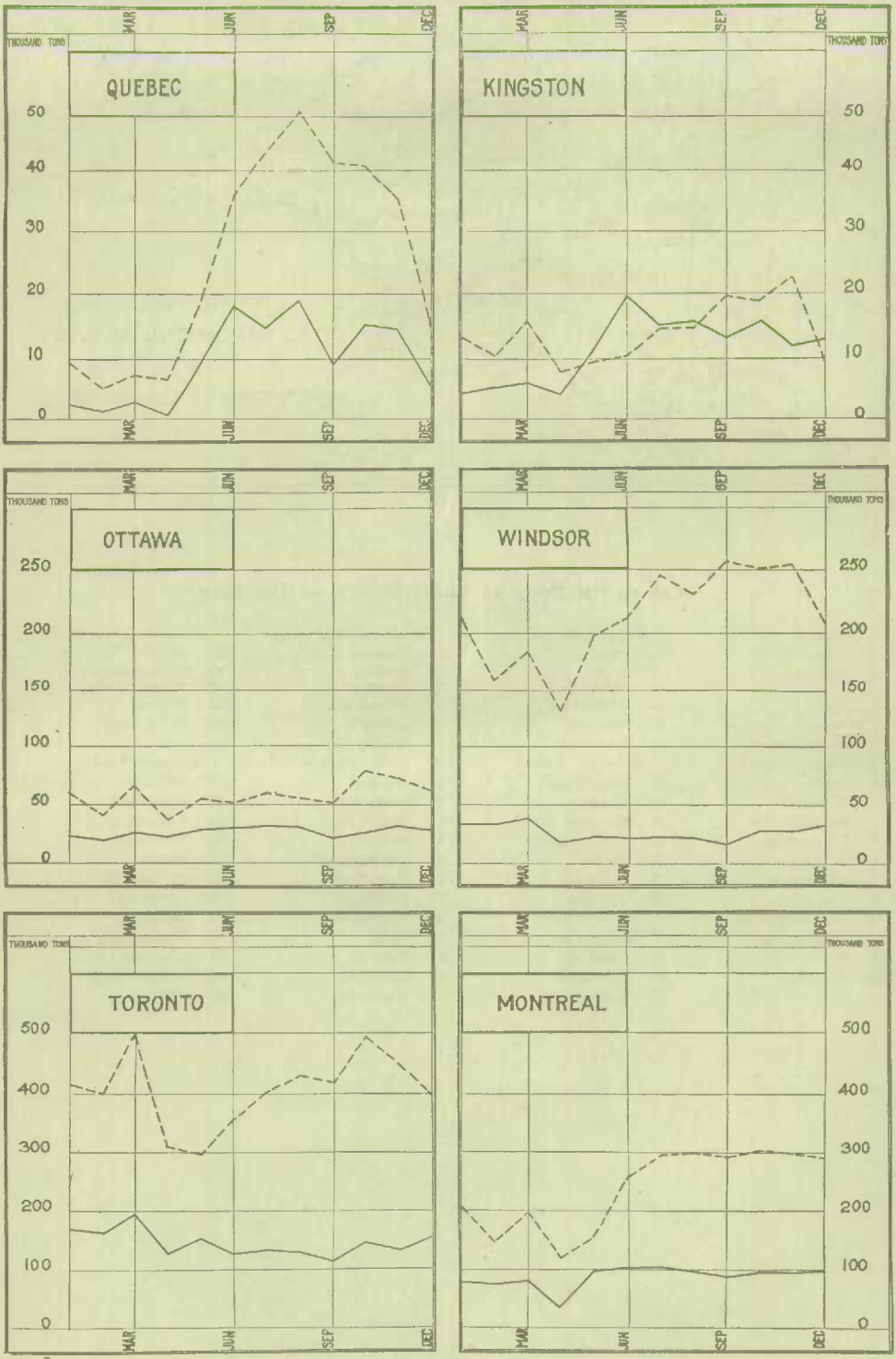
51 Simcoe
52 St. Catharines
53 Niagara Falls
54 Welland
55 Bridgeburg

Windsor Area—

56 Stratford
57 Woodstock
58 Ingersoll
59 Tillsonburg
60 London
61 St. Thomas
62 Goderich
63 Sarnia
64 Wallaceburg
65 Chatham
66 Amherstburg
67 Windsor

AVERAGE MONTHLY IMPORTS OF COAL INTO CENTRAL CANADA BY KINDS AND BY PRINCIPAL AREAS 1918–1922.

ANTHRACITE IN DOMESTIC SIZES ———— ; INDUSTRIAL FUEL INCLUDING ANTHRACITE DUST & ALL BITUMINOUS – – – – – –



Consumption.—Summary statistics have been prepared in Table 122 to show the output, exports, interprovincial shipments, imports and coal made available for consumption in Canada by provinces in 1922. Table shows the quantities of coal imported from Great Britain separately from the importations received from the United States.

The apparent consumption of coal in Canada during 1922 was 27,596,273 tons as compared with 31,173,837 tons in 1921 and 35,204,137 tons in 1920. The output figures shown in this table were reported by the companies operating producing mines. The data on interprovincial shipments were also compiled from the monthly statements sent in by the coal operators. The imports and exports items were compiled from data supplied by the Department of Customs and in the case of imports, the figures given show the total quantity of coal imported during the year. Imported coal dumped at the ports of Fort William and Port Arthur has been included in this table with the quantities cleared from customs in the ports of Manitoba since most of the coal unloaded at the Canadian ports at Head of the Lakes finds its way westward to points in Manitoba.

From the table it appears that in 1922, Canada produced 15·1 million tons, exported 1·8 million tons, imported from the United States 13·4 million tons and from Great Britain 0·8 million tons and thus apparently consumed 27·5 million tons. In 1921, when the output was 15 million tons, the quantity exported amounted to 1·9 million tons, imports 18·1 million tons and the apparent consumption was 31·2 million tons. While business conditions generally were somewhat depressed in 1922, the decreased consumption of coal was due in part to the difficulty experienced in obtaining sufficient supplies because of the shortage consequent upon the long-drawn-out strike in the coal-fields. As a matter of historical interest, Table 121 has been included showing the annual consumption of coal in Canada for the past twenty years.

Table 121.—Annual Consumption of Coal in Canada, 1903-1922

Year	Canadian		Imported		Total	Per capita
	Short tons	%	Short tons	%		
1903	6,005,735	52·2	5,491,870	47·8	11,507,605	2·005
1904	6,697,183	49·2	6,909,651	50·8	13,606,834	2·346
1905	7,032,661	48·9	7,343,880	51·1	14,376,541	2·362
1906	7,927,560	51·7	7,398,906	48·3	15,326,466	2·425
1907	8,617,352	45·0	10,549,503	55·0	19,166,855	2·947
1908	9,156,478	47·3	10,195,424	52·7	19,351,902	2·820
1909	8,913,376	47·9	9,711,826	52·1	18,625,202	2·682
1910	10,532,103	50·2	10,438,123	49·8	20,970,226	2·960
1911	9,822,749	40·5	14,424,949	59·5	24,247,698	3·365
1912	12,385,696	46·0	14,549,104	54·0	26,934,800	3·657
1913	13,450,158	42·6	18,132,387	57·4	31,582,545	4·196
1914	12,214,403	45·5	14,637,920	54·5	26,852,323	3·490
1915	11,500,480	48·1	12,406,212	51·9	23,906,692	3·041
1916	12,348,036	41·3	17,517,820	58·7	29,865,856	3·717
1917	12,313,603	37·2	20,810,132	62·8	33,123,735	4·049
1918	13,160,731	37·8	21,611,101	62·2	34,771,832	4·175
1919	11,849,040	41·1	16,982,773	58·9	28,831,819	3·401
1920	14,388,541	40·9	20,815,596	59·1	35,204,137	4·079
1921	13,070,217	41·9	18,103,620	58·1	31,173,837	3·547
1922	13,338,849	48·3	14,257,424	57·7	27,596,273	3·078

In the foregoing table the "Consumption" figures for each year from 1903 to 1918 were computed by adding production (sales, colliery consumption and coal supplied to employees) to imports, and deducting Canadian coal exported. Data for 1919-1922 were compiled as for Table 122.

Table 122.—Summary Statistics for 1922-Output, Exports, Interprovincial Shipments, Imports and Coal made Available for Consumption in Canada, by Provinces

(Short Tons)

Province	Canadian Coal				Imported from U.S.A.	Imported from Great Britain	Coal Available for Consumption
	Output	Received from other provinces	Shipped to other provinces	Exported			
Nova Scotia—							
Anthracite					21,419	5,645	27,064
Bituminous	5,569,072	39	1,882,787	641,304	6,233	3,267	3,054,520
Total	5,569,072	39	1,882,787	641,304	27,652	8,912	3,081,581
New Brunswick—							
Anthracite					40,252	19,420	59,672
Bituminous	287,513	403,742	63,067	66,460	61,222	19,131	642,081
Total	287,513	403,742	63,067	66,460	101,474	38,551	701,753
Prince Edward Island—							
Anthracite					4,589		4,589
Bituminous		70,995			1,355		72,350
Total		70,995			5,944		76,939
Quebec—							
Anthracite					789,447	152,517	941,964
Bituminous		1,454,214		55,275	1,316,669	609,591	3,325,199
Lignite		102					102
Total		1,454,316		55,275	2,106,116	762,108	4,267,265
Central Ontario—							
Anthracite					1,586,036	900	1,586,936
Bituminous		(a) 16,864		76	7,485,324	6,929	7,509,041
Total		16,864		76	9,071,360	7,829	9,095,977
Manitoba and Head of Lakes—							
Anthracite		10			72,240		72,250
Bituminous		94,607		2,082	2,037,117		2,129,642
Lignite		625,487					625,487
Total		720,104		2,082	2,109,357		2,827,379
Saskatchewan—							
Anthracite		796			231		1,027
Bituminous		147,209		5,040	1,484		143,653
Lignite	382,437	1,106,648	169,813				1,319,272
Total	382,437	1,254,653	169,813	5,040	1,715		1,463,952
Alberta—							
Anthracite	40,417		2,034				38,383
Bituminous	2,846,405	10,646	243,758	915	1,147		2,613,525
Lignite	3,104,089	588	1,636,498				1,468,179
Total	5,990,911	11,234	1,882,290	915	1,147		4,120,087
British Columbia and Yukon—							
Anthracite		1,228			35	1,226	2,489
Bituminous	2,927,498	38,172	46,876	1,047,430	13,494	504	1,885,362
Lignite		73,486					73,486
Total	2,927,498	112,886	46,876	1,047,430	13,529	1,730	1,961,337
Canada—							
Anthracite	40,417	2,034	2,034		2,514,249	179,708	2,734,374
Bituminous	11,630,488	2,236,488	2,236,488	1,818,582	10,924,045	639,422	21,375,373
Lignite	3,486,526	1,806,311	1,806,311				3,486,526
Total	**15,157,431**	**4,044,833**	**4,044,833**	**1,818,582**	**13,438,294**	(b) **819,130**	**27,596,273**

(a) Maritime coal. (b) Includes 1,805 tons from Other Countries.

COKE

Summary statistics relating to the production of coke and its by-products have been included in this report as a matter of interest. These production data refer only to by-product and beehive oven plants and do not include retort coke recovered by gas companies.

Table 123.—Summary Statistics of Coke and its By-Products in Canada, 1920, 1921 and 1922

		1920		1921		1922	
		Quantity	Value	Quantity	Value	Quantity	Value
			$		$		$
COKE—							
Coal charged to ovens—							
Domestic	Tons	960,148	5,211,982	586,185	3,305,922	487,907	1,657,835
Imported	"	977,364	5,651,652	910,845	7,351,428	565,496	3,447,928
Total	"	1,937,512	10,863,634	1,497,030	10,657,350	1,053,403	5,105,763
Output of coke, by Provinces—							
Nova Scotia	Tons	428,298	3,988,589	222,761	1,895,920	181,955	873,133
Ontario	"	690,406	5,627,878	664,214	7,798,720	410,183	3,510,173
British Columbia	"	151,618	1,907,624	124,872	1,354,729	107,960	1,176,877
Total	"	1,270,322	11,524,091	1,011,847	11,049,369	700,098	5,560,183
Recovery of coke in per cent of coal treated	%	65·5		67·5		66·4	
Imports of coke	Tons	586,406	6,458,596	228,030	1,766,101	336,270	3,094,042
Exports of coke	"	29,536	390,161	20,907	256,928	19,821	205,627
Consumption of coke	"	1,827,192	17,592,526	1,218,970	12,558,542	1,016,547	8,448,598
BY PRODUCTS—							
Production in Canada—							
Ammonium sulphate	Tons	18,880	1,435,418	16,303	1,122,382	11,143	553,159
Gas	M. cu. ft.	9,161,701	1,636,879	8,634,148	1,200,808	6,073,763	725,398
Light oils			379,190		452,571		37,110
Tar and tar products	Imp. gal.	12,423,412	481,019	11,258,212	387,934	7,616,433	233,978
Other products			205,224		136,682		297,935
Total			4,137,730		3,300,377		1,847,580
Imports—							
Ammonium sulphate	Tons	312	31,531	157	11,513	413	24,659
Coal tar and pitch	Gals.	3,527,667	256,740	4,091,424	235,896	4,289,683	248,986
Coal tar base or salt (paranitraniline)	Tons	42	51,395	21	17,677	141	53,917
Exports—							
Ammonium sulphate	Tons	18,329	1,896,660	14,648	784,628	10,285	532,983
Tar and pitch	Gals.	8,815,172	481,259	3,540,417	361,621	2,016,594	223,619

FELDSPAR

The demand for Canadian feldspar showed a slight falling-off during 1922. In the province of Quebec, the deposits in Derry township were operated throughout the year. Development work was carried on by the St. Lawrence Feldspar Company on their deposit at Quatechou-Manicouagan Bay, Saguenay County, Quebec. This property, it is expected, will be ready to ship feldspar in 1923. Ontario deposits in Bathurst township, Lanark county, Monteagle township, Hastings county, and Loughborough township, Frontenac county, were also operated during the year.

The total shipments reported in 1922 were 27,727 tons including 15,255 tons from Ontario and 12,472 tons from Quebec. Crude spar sold for $8.44 a ton; ground, $19.20; and dental, $22. In addition to the sales of the crude and ground grades, a quantity of crushed spar and dust was sold for use as stucco dash in the building industry. A shipment of dental spar was also made during the year.

This mineral in a finely ground condition is used in the enamelware, pottery and porcelain, washing compounds, abrasives, glass, roofing and paint industries and also in a coarser form as a constituent of artificial walls and floors. The Canadian production which is around 28,000 tons of feldspar per year is mainly exported in the crude form to United States for grinding. During 1922 seven of the twenty-five or more available feldspar grinding plants in the United States received and ground over 22,000 tons of Canadian spar. According to an article published

in the bulletin of the American Ceramic Society,[1] the largest consumers in the United States during 1920 were compelled to take active steps to secure a more satisfactory supply of the ground material. The outstanding features of the industry in that country were given as follows:—

(1) Many grinding companies do not own or control all or even a major part of their sources of crude material, but buy in job lots from many sources.

(2) There is a great need of more adequate engineering and chemical control over mines and mills.

(3) Out of date, inefficient methods and equipment for mining and grinding are in common use.

(4) Little or no co-operation exists between feldspar producers, but on the contrary many feldspar companies are exceedingly secretive. This tends towards (a) preservation of obsolete methods: (b) want of knowledge of the essential features of production, market requirements, and the relation between total milling and consuming capacities of the country; (c) inefficient and often mistaken trade practices; (d) unprofitable and even ruinous competition in dull periods.

(5) The small size of many feldspar deposits precludes maintenance of an efficient organization at each individual mine.

(6) Many of the best deposits of feldspar situated close to railroads are becoming depleted, which results in gradual lowering of grades, and increase in cost for better grades

(7) There is a lack of exact knowledge of the ceramic properties and behavior of feldspar by some consumers, which results in (a) purchase of feldspar on the basis of price alone, thus encouraging low production costs at the expense of quality, and (b) inefficient and expensive cross-hauling of both crude and ground feldspar.

(8) The grinding capacity of the country greatly exceeds the consuming capacity. There are more than 25 mills with a total capacity in excess of 300,000 tons per year, for a normal consumption of not more than 150,000 tons per year.

(9) There is a lack of uniform tests, specifications and standards of quality and fineness for different uses; and lack of standard definitions of grades.

Since the consumption of spar in Canada in the finely-ground condition is not much over 3,000 tons per annum, no difficulty has been experienced in securing raw materials of a quality suitable for any section of the industry. The bulk of the Canadian supply is now supplied by Canadian mills. With the large deposits of good grades of crude spar now available, it does not appear that Canadian industries will ever find any difficulty in securing a standard product.

The grinding plant at Ashbridges Bay owned by the Feldspar Milling Company of Toronto, was operated throughout the year. The capacity of this plant is about 6,000 tons per annum. A new plant with a capacity of 1,500 tons a year was completed by the Frontenac Floor and Wall Tile Company at Kingston, Ontario in 1921 and was operated in 1922.

Table 124.—Production of Feldspar in Canada, 1890-1922

Year	Tons	Value	Year	Tons	Value	Year	Tons	Value
		$			$			$
1890	700	3,500	1901	5,350	10,700	1912	13,733	30,916
1891	685	3,425	1902	7,576	15,152	1913	16,790	60,795
1892	175	525	1903	13,928	18,966	1914	18,060	70,824
1893	575	4,525	1904	11,083	22,166	1915	14,559	57,801
1894	.....	.....	1905	11,700	23,400	1916	19,488	71,407
1895*	.....	2,545	1906	16,948	40,890	1917	19,462	89,826
1896*	972	2,583	1907	12,584	29,819	1918	18,782	112,728
1897	1,400	3,290	1908	7,877	21,099	1919	14,679	86,231
1898	2,500	6,250	1909	12,783	40,383	1920	37,873	280,895
1899	3,000	6,000	1910	15,809	47,667	1921	29,868	230,754
1900	318	1,112	1911	17,723	51,939	1922	27,727	248,402
						Total	**374,707**	**1,696,515**

* Exports

[1] "Conditions in Feldspar Industry" Raymond B. Ladoo, Vol. 1—No. 1—Page 7.

Table 125.—World's Production of Feldspar 1913, 1918-1922

(Long Tons)

Country	1913	1918	1919	1920	1921	1922
United Kingdom†	66,626	36,999	47,869	76,467	35,976	*
Canada	14,991	16,770	14,236	32,907	26,068	24,756
Australia	.....	.....	.....	4	26	*
Germany (Bavaria)	*	2,711	6,422	5,756	7,132	*
Italy	.....	1,493	1,080	2,500	2,360	*
Norway (exports)	40,186	1,009	3,007	4,165	8,421	*
Sweden	37,269	17,563	12,698	‡17,232	‡19,917	*
United States	107,996	88,498	63,441	135,551	91,865	117,127

*Data not available.
†Including China Stone.
‡Exports.
SOURCE—Imperial Mineral Resources Bureau.
Mineral Resources of United States in 1922.

Table 126.—Production in Canada, Imports and Exports of Feldspar, 1920, 1921 and 1922

	1920		1921		1922	
	Tons	Value	Tons	Value	Tons	Value
		$		$		$
PRODUCTION (shipments)—						
Nova Scotia	.....	.....	16	117	.....	.....
Quebec	649	10,052	9,737	80,180	12,472	127,826
Ontario	37,224	270,843	20,115	150,457	15,255	120,576
Total	**37,873**	**280,895**	**29,868**	**230,754**	**27,727**	**248,402**
IMPORTS	1,991	44,330	1,050	25,120	1,454	31,408
EXPORTS	38,768	219,744	27,293	169,864	24,995	170,954

FLUORSPAR

The production of fluorspar in Canada in 1922, amounted to 4,503 tons or approximately 1,000 tons less than that recorded for 1921. The shipments consisted of 284 tons crude at $13.75 per ton and 4,219 tons of concentrates at $23.29 a ton.

The principal producer during the year was the Rock Candy mine at Archibald, near Grand Forks, British Columbia. A total of 7,094 tons of fluorspar was raised at this mine and 6,313 tons was milled in the decrepitation plant located on the same property. Rejects amounting to 2,186 tons, were re-treated by flotation at the Trail plant during the year. From these two processes, the concentrates mentioned were produced.

In Ontario, 198 tons of fluorspar was mined during the year. Shipments of crude fluorspar totalling 284 tons were reported by four operators in the Madoc district.

A part of the fluorspar produced in Canada was used in this country and the remainder was shipped to steel plants in the United States. The continued depression in the steel industry was again reflected in the production of fluorspar and improvement in the steel industry would probably closely followed by an increased fluorspar production.

Table 127.—Production in Canada, Imports and Exports of Fluorspar, 1920, 1921 and 1922

	1920		1921		1922	
	Tons	Value	Tons	Value	Tons	Value
		$		$		$
PRODUCTION—						
Ontario	3,758	68,475	116	1,744	284	3,905
British Columbia	7,477	171,971	5,403	134,523	4,219	98,233
Total	**11,235**	**240,446**	**5,519**	**136,267**	**4,503**	**102,138**
IMPORTS—						
Hydro-fluo-silicic acid	1·2	409	1·05	212	·06	15
Fluorspar	6,812	113,818	3,867	43,752	4,980	73,343
EXPORTS	6,900	109,683	4,625	51,470	2,944	32,914

GRAPHITE

Natural Graphite—Sales of graphite exceeded production in Canada in 1922 and pointed the way to renewed activity in this field. Only 100 tons was mined during the year but sales totalled 597 tons, valued at $31,353. The flake grade sold for approximately $170 a ton and dusts at $35 as compared with $196 for the former and $47 for the latter grade in 1921.

Shipments were reported by the Black Donald Graphite Company, Ltd., and the Quebec Graphite Company. While no mining was done by the former firm, its mill at Whitefish Lake, was operated intermittently during the year treating some 1,700 tons. The latter company's sales were made from stocks on hand.

The plant of the Standard Graphite Company, Limited, (now Canadian Graphite Corporation) at Guenette, Quebec, was completed during the year and 100 tons of ore was milled, mainly for experimental purposes.

The United States tariff legislation, passed in 1922, levied the following duties on importations of crude or refined graphite: amorphous, 10 per cent ad valorem; crystalline lump, chip or dust, 20 per cent ad valorem; crystalline flake, 1·5 cents per pound.

Table 128.—Production of Graphite in Canada, 1886-1922

Year	Tons	Value	Year	Tons	Value	Year	Tons	Value
		$			$			$
1886	500	4,000	1899	1,130	24,179	1912	2,060	117,122
1887	300	2,400	1900	1,922	31,040	1913	2,162	90,282
1888	150	1,200	1901	2,210	38,780	1914	1,647	107,203
1889	242	3,160	1902	1,095	28,300	1915	2,635	124,223
1890	175	5,200	1903	728	23,745	1916	3,955	325,362
1891	260	1,560	1904	452	11,760	1917	3,714	402,892
1892	167	3,763	1905	541	16,735	1918	3,114	248,870
1893	.....	.....	1906	387	18,300	1919	1,360	100,221
1894*	3	223	1907	579	16,000	1920	2,190	165,617
1895	220	6,150	1908	251	5,565	1921	937	65,862
1896	139	9,455	1909	864	47,800	1922	597	31,353
1897	436	16,240	1910	1,392	74,087			
1898	.....	13,698	1911	1,269	69,576	**Total**	**39,783**	**2,251,923**

*Exports.

Table 129.—Production in Canada, Imports and Exports of Graphite, 1920, 1921 and 1922

	1920		1921		1922	
	Tons	Value	Tons	Value	Tons	Value
		$		$		$
Ore milled	5,153	.....	1,500	.....	1,800	.....
Output, milled graphite	2,155	.....	.....	.....	.....	.....
PRODUCTION (shipments)—						
No. 1 Flake	196	40,382	149	29,187	597	31,353
No. 2 Flake	225	28,572				
No. 3 Flake and Dust	1,769	96,663	788	36,675		
Total	**2,190**	**165,617**	**937**	**65,862**	**597**	**31,353**
IMPORTS—						
Crucibles, plumbago	.....	90,092	.....	23,786	.....	39,061
Plumbago, not ground or otherwise manufactured	.....	4,352	.....	4,141	.....	1,007
Plumbago, ground and manufactures of, n.o.p.	.....	102,568	.....	47,463	.....	47,095
EXPORTS—						
Graphite or plumbago, crude or refined	2,142	159,817	614	40,809	452	16,619

Artificial Graphite.—Artificial graphite is manufactured in electric furnaces at Niagara Falls, Ontario, by the Acheson Graphite Company. The annual production over a period of fifteen years is shown in the following table:

Table 130.—Artificial Graphite made in Canada, 1908-1922

Year	Pounds	Year	Pounds	Year	Pounds
1908	428,540	1913	2,184,472	1918	1,808,608
1909	513,436	1914	1,234,239	1919	358,524
1910	2,442,166	1915	497,271	1920	267,180
1911	2,172,098	1916	525,048	1921	376,508
1912	2,302,625	1917	1,090,172	1922	724,524

GYPSUM

The total output of gypsum rock in Canada during 1922 amounted to 484,629 tons, of which quantity 145,954 tons or 30 per cent was calcined. The quantity quarried, by provinces was: Nova Scotia 281,861 tons; New Brunswick, 56,692 tons; Ontario, 106,829 tons; Manitoba, 39,147 tons; British Columbia, 100 tons.

For statistical purposes the production of gypsum is considered to be the sum of the quantities disposed of in the different marketable forms, care being taken to avoid duplication; the values used are those at point of shipment.

Shipments of all grades totalled 559,265 tons valued at $2,160,898, an increase of 172,715 tons and $375,360 over the 1921 production. The 1922 production included lump or mine run, crushed, fine ground and calcined gypsum sold; calcined gypsum used in the calcining plants for the production of wall plaster, alabastine and other gypsum products was also included. The average value per ton received by operators throughout Canada was, by grades; lump, $1.52; crushed, $2.26; fine ground, $6.22; and calcined, $10.67. Prices during the previous year averaged as follows: lump $1.78; crushed, $2.56; fine ground, $3.42 and calcined $10.61.

Table 131.—Production of Gypsum in Canada, 1886-1922

Year	Tons	Value	Year	Tons	Value	Year	Tons	Value
		$			$			$
1886	162,000	178,742	1899	244,566	257,329	1912	578,458	1,324,620
1887	154,008	157,277	1900	252,101	250,009	1913	636,370	1,447,739
1888	175,887	179,393	1901	293,709	340,148	1914	516,880	1,156,207
1889	213,273	205,108	1902	333,599	379,479	1915	474,815	854,929
1890	226,509	194,033	1903	314,489	388,459	1916	342,915	738,593
1891	203,605	206,251	1904	345,961	373,474	1917	336,332	881,984
1892	241,048	241,127	1905	442,158	586,168	1918	152,287	823,006
1893	192,568	196,150	1906	469,022	643,294	1919	299,063	1,215,287
1894	223,631	202,031	1907	485,921	646,914	1920	420,144	1,893,991
1895	226,178	202,608	1908	340,964	575,701	1921	386,550	1,785,538
1896	207,032	178,061	1909	473,129	809,632	1922	559,265	2,160,898
1897	239,691	244,531	1910	525,246	934,446			
1898	219,256	232,515	1911	518,383	993,394	**Total**	**12,436,163**	**24,088,066**

Table 132.—Summary of Statistics on Gypsum in Canada, 1920, 1921 and 1922

	1920		1921		1922	
	Tons	Value	Tons	Value	Tons	Value
		$		$		$
Ore mined	460,020		434,545		484,629	
Ore calcined	148,864		121,878		145,954	
PRODUCTION BY GRADES—						
Lump	262,442	457,158	195,456	347,186	350,650	534,160
Crushed	48,379	146,947	66,893	171,567	68,181	154,197
Fine ground	6,615	46,584	7,0[illegible]	24,029	5,769	35,880
Calcined	111,708	1,243,309	117,18[illegible]	1,242,762	134,665	1,436,661
Total	**429,144**	**1,893,998**	**386,550**	**1,785,538**	**559,265**	**2,160,898**
PRODUCTION BY PROVINCES—						
Nova Scotia	260,661	573,755	206,833	511,883	332,404	580,148
New Brunswick	49,405	428,183	54,030	360,220	82,462	517,668
Ontario	74,707	404,162	84,790	433,053	110,227	621,668
Manitoba	44,371	487,894	40,859	480,287	34,072	440,914
British Columbia			40	100	100	500
Total	**429,144**	**1,893,991**	**386,550**	**1,785,538**	**559,265**	**2,160,898**
EXPORTS—						
Crude	244,428	413,522	230,011	417,502	325,354	505,464
Ground	12,576	232,736	4,509	80,239	3,186	59,534
Total	**257,004**	**646,258**	**234,520**	**497,741**	**328,540**	**564,998**
IMPORTS—						
Crude	2,294	25,477	2,952	31,303	2,872	21,040
Ground	118	3,966	41	2,427	148	5,592
Plaster of Paris	2,822	48,859	2,635	42,325	3,657	49,015
Total	**5,234**	**78,302**	**5,628**	**76,055**	**6,677**	**75,647**

IRON OXIDES

The output of iron oxides in Canada is marketed in two forms—crude and calcined. The former is dried before shipment for use in the purification of illuminating gas, while the latter is calcined and ground for consumption in the paint industry.

Shipments of iron oxides in 1922 amounted to 7,285 tons valued at $110,608, comprising 4,880 tons crude and 2,405 tons calcined and ground.

In addition to the usual production of oxides from the bog iron ore deposits in the province of Quebec a trial shipment was made to Calgary, Alberta, by a small operator in the Windermere District, British Columbia.

Table 133.—Production of Iron Oxides in Canada, 1886-1922

Year	Tons	Value	Year	Tons	Value	Year	Tons	Value
		$			$			$
1886	350	2,350	1899	2,910	20,005	1912	7,654	32,410
1887	486	3,735	1900	1,966	15,398	1913	5,987	41,774
1888	397	7,900	1901	2,233	16,735	1914	5,830	51,725
1889	794	15,580	1902	4,955	30,495	1915	6,248	48,353
1890	275	5,125	1903	6,266	32,760	1916	8,813	58,711
1891	900	17,750	1904	3,925	24,996	1917	9,469	87,605
1892	390	5,800	1905	5,105	34,675	1918	17,317	112,440
1893	1,070	17,700	1906	6,758	56,125	1919	11,862	115,427
1894	611	8,690	1907	5,828	35,570	1920	19,128	157,909
1895	1,339	14,600	1908	4,740	30,440	1921	9,048	93,610
1896	2,362	16,043	1909	3,940	28,095	1922	7,285	110,608
1897	3,905	23,560	1910	4,813	35,185			
1898	2,226	17,450	1911	3,622	28,333	**Total**	**181,819**	**1,433,359**

Table 134.—Production in Canada, Imports and Exports of Iron Oxides, 1920, 1921 and 1922.

	1920		1921		1922	
	Tons	Value	Tons	Value	Tons	Value
		$		$		$
Production	19,128	157,909	9,048	93,610	7,285	110,608
Imports—						
Ochrey earths	3,231	182,997	1,217	61,576	1,766	73,115
Oxides	3,567	619,923	2,191	346,070	3,671	443,869
Exports *	1,528	78,913	1,491	66,631	1,259	60,104

* Mineral pigments, iron oxides and ochres.

MAGNESITE

The total quantity of magnesite mined in Canada during 1922 was 8,678 tons. Of this 8,292 tons was milled. Sales during the year totalled 2,849 tons valued at $76,294 as against 3,730 tons at $81,320 in 1921.

The average value obtained per ton of magnesite sold, by grades, was; calcined, $22.83; and deadburned, $29. During 1921, the prevailing prices were, crude, $8.98; calcined, $25.15; and dead-burned, $35.75.

The entire production of magnesite in 1922 came from deposits in Argenteuil county, Quebec. The North American Magnesite Producers, Limited, the Scottish Canadian Magnesite Company, Limited, and the International Magnesite Company, Limited, were as usual the only Quebec producers.

Dead-burned magnesite is consumed entirely in the metallurigcal industry as a refractory lining for furnaces. Calcined magnesite is used as a plastic material for floors and walls in buildings and also in the manufacture of pipe and furnace coverings.

The "New Tariff Act of 1922 on Imports into United States," which came into effect in September, 1922, provided the following duties on the various forms of magnesite; Crude magnesite, $\frac{5}{16}$ of 1 cent per pound; caustic calcined magnesite, $\frac{5}{8}$ of 1 cent per pound; dead-burned and grain magnesite, not suitable for manufacture into oxychloride cements, $\frac{2\,3}{4\,0}$ of 1 cent per pound.

On the Atlantic seaboard, in the United States, imported dead-burned magnesite, sold for $22 per ton in the month of August. In December, at Baltimore, the price quoted was $43.50, or an increase of $17.50 per ton.

Table 135.—Production of Magnesite in Canada, 1908-1922

Year	Tons	Value	Year	Tons	Value
		$			$
1908	120	840	1916	55,413	563,829
1909	330	2,508	1917	58,090	728,275
1910	323	2,166	1918	39,365	1,016,765
1911	991	5,531	1919	11,273	328,405
1912	1,714	9,643	1920	18,378	512,756
1913	515	3,335	1921	3,730	81,320
1914	358	2,240	1922	2,849	76,294
1915	14,779	126,584	Total	208,228	3,480,547

Table 136.—Production in Canada, Imports and Exports of Magnesite, 1920, 1921 and 1922

	1920		1921		1922	
	Tons	Value	Tons	Value	Tons	Value
		$		$		$
Crude, mined	31,040		9,311		8,678	
Crude, calcined	30,230		4,648		8,292	
PRODUCTION—						
Crude	4,296	39,779	1,673	15,024		
Calcined	3,154	64,402	684	17,200	1,026	23,430
Dead-burned	10,928	408,575	1,373	49,096	1,823	52,864
Total	**18,378**	**512,756**	**3,730**	**81,320**	**2,849**	**76,294**
IMPORTS—						
Magnesia	287	84,339	220	87,530	207	34,460
Magnesite	1,521	49,799	185	8,000	79	2,198
Magnesite firebrick		446,445		61,728		56,561
EXPORTS—						
Crude	155	1,662		5	800	1,800
Calcined	10,859	425,048	1,351	63,603	940	21,317

MAGNESIUM SULPHATE

The production of magnesium sulphate or crude epsom salts in Canada during 1922 amounted to 1,021 tons, valued at $24,017 as compared with 2,029 tons worth $39.506 in 1921. The total quantity extracted during the year was 1,300 tons, as against 1,428 tons in the previous twelve months.

Preliminary shipments were made in 1920 by the Basque Chemical Production Company, Ltd., from several lakes, containing these salts, on the Basque ranch, near Ashcroft, British Columbia. This company continued operations during 1921 and 1922, extracting and refining a considerable quantity. The Stewart-Calvert Company Inc. of Oroville, Washington, did not make any shipments of magnesium sulphate from their deposits in British Columbia. In 1920, this firm made some shipments from its property near Clinton, Lillooet, British Columbia.

The crude magnesium sulphate was sold for use principally in the tanning industry, although the textile and dyeing industries were also consumers. A small amount of the C.P. product was also sold to local dealers. The value of the products shipped varied according to the grades; crude, $9.42 a ton while the refined product brought $34.32 per ton. Although some of the product was sold locally, shipments were also made to points in the United States and as far east in Canada as Ontario and Quebec.

Table 137.—Production in Canada, Imports and Exports of Magnesium Sulphate, 1920, 1921 and 1922

	1920		1921		1922	
	Tons	Value	Tons	Value	Tons	Value
		$		$		$
PRODUCTION—						
Crude	1,947	39,886	1,412	18,425	443	4,183
Refined			617	21,081	578	19,834
IMPORTS		72,709		29,987	1,398	44,499
EXPORTS	743	3,737	120	4,562	142	4,838

MANGANESE

No mining operations were reported in the manganese industry in Canada during 1922. Shipments of 73 tons valued at $2,044 were made from stock on hand at New Ross, Lunenburg County, Nova Scotia. The deposits at Kaslo, British Columbia and the Hill 60 group of claims near Cowichan Lake, Vancouver Island were not worked throughout the year. In 1920, shipments were made from these properties to the Belrowe Alloys Company at Tacoma, Washington, U.S.A.

The manganese ores mined in eastern Canada are pyrolusite, manganite, pysilomelane and bog manganese. These are mostly ores with a high manganese content and are fairly free from deleterious constituents.

Table 138.—Production of Manganese Ore in Canada, 1886-1922

Year	Tons	Value	Year	Tons	Value	Year	Tons	Value
		$			$			$
1886	1,789	41,499	1899	1,581	20,004	1912	75	1,875
1887	1,245	43,658	1900	30	1,800	1913	.....	.....
1888	1,801	47,944	1901	440	4,820	1914	28	1,120
1889	1,455	32,737	1902*	172	4,062	1915	201	9,360
1890	1,328	32,550	1903	91	2,775	1916	957	89,544
1891	255	6,694	1904	66	2,740	1917	158	14,836
1892	115	10,250	1905*	22	1,720	1918	440	6,230
1893	213	14,578	1906*	93	925	1919	661	14,159
1894	74	4,180	1907*	1	22	1920	649	11,029
1895	125	8,464	1908	.....	.....	1921	68	3,400
1896*	124	3,975	1909	.....	.....	1922	73	2,044
1897*	15	1,166	1910	.....	.....			
1898	50	1,600	1911	6	300	**Total**	**14,401**	**442,060**

*Exports

Table 139.—Production in Canada, Imports and Exports of Manganese Ore, 1920, 1921 and 1922

	1920		1921		1922	
	Tons	Value	Tons	Value	Tons	Value
		$		$		$
PRODUCTION—						
Nova Scotia	62	4,140	68	3,400	73	2,044
British Columbia	587	6,889	.....	.....	.....	.....
Total	**649**	**11,029**	**68**	**3,400**	**73**	**2,044**
IMPORTS—						
Manganese oxide	1,510	93,062	636	47,159	935	43,845
Ferro-silicon, spiegeleisen and ferro-manganese	7,908	1,324,061	2,294	295,420	3,725	232,795
EXPORTS—						
Manganese ore	640	19,921	28	2,240	191	4,830
Ferro-silicon and compounds	25,422	1,297,720	10,031	504,842	20,350	897,272

MICA

Conditions in the mica industry in Canada during 1922 showed a considerable improvement over those prevailing in the previous year. The demand for ground mica for use in the manufacture of ready-roofing, materially increased during the twelve months under review.

The deposits of phlogopite mica in the Lièvre-Gatineau district, Quebec, and in Frontenac county, Ontario, continued to supply nearly the entire Canadian production. Sales reported totalled 3,349 tons valued at $152,263, as against 702 tons at $70,063 in 1921.

It will be noted that the stated value of the exports of Canadian mica exceeded by a considerable amount the value placed on shipments reported by operators. An explanation of this lies in the fact that the exportation consisted principally of mica splittings, shipped from large trimming shops, situated in Ontario and Quebec, while most of the shipments by the mines were of mica in its rough-cobbed form.

Under the United States "New Tariff Act" the duties on the different grades of mica are as follows: Mica, unmanufactured, valued at not above 15 cents per pound; 4 cents per pound; valued above 15 cents per pound, 25 per centum ad valorem; mica, cut or trimmed and mica splittings, 30 per centum ad valorem; mica plates, and built-up mica, and all manufactures of mica, of which mica is the component material of chief value, 40 per centum ad valorem; ground mica, 20 per centum ad valorem.

Table 140.—Production of Mica in Canada, 1886-1922

Year	Value	Year	Tons	Value	Year	Tons	Value
	$			$			$
1886	29,008	1899		163,000	1912	580	143,976
1887	29,816	1900		166,000	1913	1,104	194,304
1888	30,207	1901		160,000	1914	595	109,061
1889	28,718	1902		135,904	1915	417	91,905
1890	68,074	1903		177,857	1916	1,208	255,239
1891	71,510	1904		160,777	1917	1,166	358,851
1892	104,745	1905		178,235	1918	747	271,550
1893	75,719	1906		303,913	1919	2,754	273,788
1894	45,581	1907		312,599	1920	2,203	376,022
1895	65,000	1908		139,871	1921	702	70,063
1896	60,000	1909	369	147,782	1922	3,349	152,263
1897	76,000	1910	758	190,385			
1898	118,375	1911	590	128,677	**Total**		**5,464,775**

Table 141.—Production of Mica in Canada by Grades, 1921 and 1922

	1921			1922		
	Pounds	Value f. o. b. shipping point	Price per pound	Pounds	Value f. o. b. shipping point	Price per pound
		$	$ cts.		$	$ cts.
Rough cobbled	329,010	31,920	0·10	186,470	22,305	0·12
Ground mica	20,000	15	0·08	.....	.....	.....
Thumb-trimmed—						
1 x 1 inches	21,252	2,857	0·13			
1 x 2 "	7,683	1,718	0·22			
1 x 3 "	8,064	2,438	0·30			
2 x 3 "	4,207	2,115	0·50	95,702	25,837	0·27
2 x 4 "	4,891	4,544	0·92			
3 x 5 "	1,488	2,264	1·52			
4 x 6 "	655	1,240	1·89			
Splittings only	20,350	15,365	0·76	112,778	72,303	0·64
Scrap	986,230	5,282	0·005	6,302,157	31,818	0·005
Pattern	277	305	1·10	.....	.....	.....
Total	**1,404,107**	**70,063**	**0·05**	**6,697,107**	**152,263**	**0·02**

Table 142.—Production in Canada and Exports of Mica, 1920, 1921 and 1922

	1920		1921		1922	
	Tons	Value	Tons	Value	Tons	Value
		$		$		$
PRODUCTION—						
Quebec	737	281,460	484	41,172	1,360	97,748
Ontario	1,466	94,562	218	28,891	1,989	54,515
Total	**2,203**	**376,022**	**702**	**70,063**	**3,349**	**152,263**
EXPORTS—						
Cobbed	42	55,724	12	12,942	74	45,151
Splittings	522	725,946	185	195,479	286	366,974
Scrap and waste	2,739	33,963	967	12,061	3,473	41,949
Plate and manufactures	.....	8,474	.....	4,201	.....	10,438
Total	.....	**824,107**	.....	**224,683**	.....	**464,512**

MINERAL WATERS

Mineral waters produced in Canada during 1922 amounted to 221,433 gallons valued at $14,220 as compared with 328,273 gallons at $21,716 in the previous year. Mineral springs in Ontario and Quebec contributed the total Canadian production.

In the present compilation, there has been included a record of all known shipments of natural mineral waters sold to the general public for medicinal purposes. No record has been kept of the shipments made of ordinary spring waters.

The values given do not take into account any mineral waters used at the springs for drinking or bathing purposes but include only the shipments from the springs in bottles or other containers.

Table 143.—Production of Mineral Waters in Canada, 1888-1922

Year	Gals.	Value	Year	Value	Year	Gals.	Value
		$		$			$
1888	124,850	11,456	1900	75,000	1912		172,465
1889	424,800	37,360	1901	100,000	1913		173,677
1890	561,165	66,031	1902	100,000	1914		134,111
1891	427,485	54,268	1903	100,000	1915		115,274
1892	640,380	75,348	1904	100,000	1916		127,806
1893	725,096	108,347	1905	106,000	1917		145,814
1894	767,460	110,040	1906	100,000	1918		154,468
1895	739,382	126,048	1907	136,020	1919		71,015
1896	706,372	111,736	1908	151,053	1920		24,582
1897	749,691	140,477	1909	175,173	1921	328,273	21,716
1898	555,000	100,000	1910	199,563	1922	221,433	14,220
1899		100,000	1911	223,758			
					Total		3,758,726

Table 144.—Production in Canada, Imports and Exports of Mineral Waters, 1920, 1921 and 1922

	1920	1921		1922	
	Value	Imp. Gals.	Value	Imp. Gals.	Value
	$		$		$
Production, by provinces—					
Quebec	10,109	19,626	7,278	12,161	3,692
Ontario	14,473	308,647	14,438	209,272	10,528
Total	**24,582**	**328,273**	**21,716**	**221,433**	**14,220**
Imports—Mineral and aerated waters	204,907		159,092		156,420
Exports—Mineral and aerated waters	12,796		44,022		123,555

NATRO-ALUNITE

The deposit of natro-alunite located at Kyuquot Sound on the West Coast of Vancouver Island, British Columbia, which was operated during 1921 was idle throughout 1922. Milling operations were carried on for twenty-six days in March at the plant at Esquimalt, near Victoria, owned by the San Juan Mining and Manufacturing Company. The treatment of this ore consisted in crushing, grinding and roasting. The resultant product, calcined alunite, was used as a fertilizer, for its potash content. Shipments during the year amounted to 50 tons at $2,500 as against 30 tons worth approximately $1,500 in the previous twelve months.

NATURAL GAS

Natural gas produced in Canada during 1922 amounted to 14,682,651 thousand cubic feet, an increase of 605,050 thousand cubic feet, or 4·3 per cent over the 1921 production. The output from Ontario was 4 per cent less than that in 1921 but Alberta and New Brunswick showed substantially increased production.

The total value of the Ontario production as recorded was $4,076,296 or $996,000 higher than in the previous year, due to the fact that in 1922 the retail price of gas was used in obtaining the value, whereas, in previous years, the value as reported by the producers was used.

The Alberta production showed an increase in quantity of 923,000 M cu. ft. or 15 per cent to a total of 5,868,439 M cu. ft., and of $247,506 in value or 18 per cent to $1,622,105. In this province several large industrial concerns operated wells to supply their own demands, and in some instances, therefore a value for the product was not given, while in other cases only a nominal value was placed on the gas consumed. In order to obtain a value for this gas that would be comparable with the other records it was necessary to evaluate it at the average price paid by consumers throughout the province.

The production in the province of New Brunswick was 753,898 thousand cubic feet or 6 per cent over the output for the previous year.

Table 145.—Production of Natural Gas in Canada, 1892-1922

Year	Value	Year	Value	Year	M. cu. ft.	Value
	$		$			$
1892	150,000	1903	202,210	1914	21,692,504	3,484,727
1893	376,233	1904	328,376	1915	20,124,162	3,706,035
1894	313,754	1905	379,561	1916	25,476,458	3,958,029
1895	423,032	1906	583,523	1917	27,408,940	5,045,298
1896	276,301	1907	815,032	1918	20,140,309	4,350,940
1897	325,873	1908	1,012,660	1919	19,937,769	4,176,037
1898	322,123	1909	1,207,029	1920	16,845,518	4,232,642
1899	387,271	1910	1,346,471	1921	14,077,601	4,594,164
1900	417,094	1911	1,907,678	1922	14,682,651	5,846,501
1901	339,476	1912	2,362,700			
1902	195,992	1913	2,309,381	**Total**		**55,376,143**

Table 146.—Production of Natural Gas in Canada, 1920, 1921 and 1922

	1920		1921		1922	
	M cu. ft.	Value	M cu. ft.	Value	M cu. ft.	Value
		$		$		$
PRODUCTION—						
New Brunswick	682,502	130,506	708,743	139,375	753,898	148,040
Ontario	10,529,374	2,920,731	8,422,774	3,080,130	8,060,114	4,076,296
Alberta	5,633,442	1,181,345	4,945,884	1,374,599	5,868,439	1,622,105
Manitoba	200	60	200	60	200	60
Total	**16,845,518**	**4,232,642**	**14,077,601**	**4,594,164**	**14,682,651**	**5,846,501**

PEAT

The output of peat in Canada during 1922 amounted to 4,700 tons, of which quantity, 3,000 tons valued at $14,500 was sold. In 1921, shipments of 1,666 tons, valued at $6,664 were reported.

The total Canadian production of peat was derived from the Alfred bog, where experimental operations were conducted jointly by the Ontario and Federal Governments.

Table 147.—Production of Peat in Canada, 1900-1922

Year	Tons	Value	Year	Tons	Value	Year	Tons	Value
		$			$			$
1900	400	1,200	1908	60	180	1916	300	1,500
1901	220	600	1909	60	240	1917–18		
1902	475	1,663	1910	841	2,604	1919	986	6,561
1903	1,100	3,300	1911	1,463	3,817	1920	4,550	18,650
1904	800	2,400	1912	700	2,900	1921	1,666	6,664
1905	80	260	1913	2,600	10,100	1922	3,000	14,500
1906	474	1,422	1914	685	2,470			
1907	50	200	1915	300	1,050	**Total**	**20,110**	**82,281**

PETROLEUM

The total production of petroleum in Canada during 1922 amounted to 179,068 barrels valued at $611,176, a decrease of 8,473 barrels or 4·6 per cent in quantity and $30,357 or 4·8 per cent in value from the sales in the previous years.

Ontario continued to be the principal petroleum-producing province in Canada, contributing 164,732 barrels at $526,316 to the Dominion total. Entering into its sixty-first year of activity, the old Petrolia field produced 64,935 barrels, a decline of 3,549 barrels from the 1921 total.

Activities in this industry in the province of New Brunswick were as usual confined to the Stony Creek district, Albert county, where wells were operated by the New Brunswick Gas and Oilfields, Limited. The output of petroleum in this province amounted to 7,778 barrels with a selling value of $4.20 per barrel.

The Alberta production was 6,559 barrels, a decline of 644 barrels from the previous year's total and 4,473 barrels from the 1920 record. Wells near Black Diamond, Turner Valley field were responsible for the main portion of the production.

Under the "Petroleum Bounty Act," Canadian producers continued to be paid a bounty of 1½ cents per gallon on all oil of a specific gravity above 0·8235. The administration of this act is under the supervision of the Department of Trade and Commerce. Owing to the light character of the crude petroleum produced in Alberta, only a small part of the output earns the bounty.

Table 148.—Production of Crude Petroleum in Canada, 1881-1922

Year	Barrels*	Value	Year	Barrels*	Value	Year	Barrels*	Value
		$			$			$
1881	368,987		1896	726,822	1,155,647	1911	291,092	357,073
1882	389,573		1897	709,857	1,011,546	1912	243,336	345,050
1883	472,866		1898	758,391	1,061,747	1913	228,080	406,439
1884	571,000		1899	808,570	1,202,020	1914	214,805	343,124
1885	587,503		1900	710,498	1,151,607	1915	215,464	309,572
1886	584,061	525,655	1901	622,392	1,008,275	1916	198,123	392,284
1887	713,728	556,708	1902	530,624	951,190	1917	213,832	542,239
1888	695,203	713,695	1903	486,637	1,048,874	1918	304,741	885,143
1889	704,690	653,600	1904	503,474	935,895	1919	240,466	736,324
1890	795,030	902,734	1905	634,095	856,028	1920	196,251	822,235
1891	755,298	1,010,241	1906	569,753	761,760	1921	187,541	641,533
1892	779,753	984,438	1907	788,872	1,057,088	1922	179,068	611,176
1893	798,406	874,255	1908	527,987	747,102			
1894	829,104	835,322	1909	420,755	559,604	**Total**	**21,598,821**	**†28,122,881**
1895	726,138	1,086,738	1910	315,895	388,550			

*35 imperial gallons †From 1886.

Table 149.—Production of Crude Petroleum in Ontario*, by Fields, 1921 and 1922

Field	1921				1922			
	Barrels	Value less Bounty	Bounty Paid	Total Value	Barrels	Value less Bounty	Bounty Paid	Total Value
		$	$	$		$	$	$
Petrolia and Enniskillen	68,484	185,591	35,954	221,545	64,935	173,375	34,091	207,466
Oil Springs	40,967	111,020	21,507	132,527	43,214	115,380	22,687	138,067
Moore Township	7,536	20,423	3,957	24,379	7,275	19,424	3,819	23,243
Sarnia Township	4,068	11,026	2,136	13,162	3,224	8,607	1,692	10,299
Plympton Township	481	1,302	252	1,555	695	1,856	365	2,221
Bothwell	26,877	72,837	14,110	86,947	25,681	68,568	13,482	82,050
Tilbury East	1,003	2,717	526	3,243	127	338	67	405
West Dover	7,473	20,253	3,923	24,176	5,482	14,638	2,878	17,516
Raleigh Township	3,320	8,998	1,743	10,741	663	1,771	348	2,119
Dutton					387	1,033	203	1,236
Onondaga	566	1,534	297	1,832	489	1,307	257	1,564
Moga Township	10,764	29,171	5,651	34,822	11,959	31,932	6,279	38,211
Thamesville	1,320	3,576	693	4,269	383	1,024	202	1,226
Dawn Township					217	579	114	693
Total	**172,859**	**468,448**	**90,749**	**559,198**	**164,731**	**439,832**	**86,484**	**526,316**

*Supplied by the Supervisor of Crude Petroleum Bounties, Petrolia, Ont.

Table 150.—Production of Crude Petroleum in Canada, by Provinces, 1920, 1921 and 1922

Province	Year	Barrels	Value Less Bounty	Bounty Paid	Total Value	Value per barrel (including bounty)
			$	$	$	$ cts.
New Brunswick	1920	5,148	17,682	2,281	19,963	3 88
	1921	7,479	29,094	3,928	33,022	4 41
	1922	7,778	28,359	4,373	32,732	4 20
Ontario	1920	180,071	630,867	95,419	726,286	4 04
	1921	172,859	468,449	90,749	559,198	3 24
	1922	164,732	439,832	86,484	526,316	3 20
Alberta	1920	11,032	75,986		75,986	6 89
	1921	7,203	49,313		49,313	6 85
	1922	6,559	51,882	246	52,128	7 95
Canada	**1920**	**196,251**	**724,535**	**97,700**	**822,235**	**4 19**
	1921	**187,541**	**546,856**	**94,677**	**641,533**	**3 42**
	1922	**179,068**	**520,073**	**91,103**	**611,176**	**3 41**

Table 151.—Imports into Canada, and Exports of Petroleum and its Products, 1920, 1921 and 1922

—	1920		1921		1922	
	Gal.	$	Gal.	$	Gal.	$
IMPORTS—						
Crude petroleum in its natural state, ·7900 specific gravity or heavier at 60 degrees temperature, when imported by oil refiners to be refined in their own factories	290,736,366	20,814,899	355,300,352	20,010,091	419,559,952	21,602,247
Crude petroleum, gas oils other than naphtha, benzine and gasoline lighter than ·8235 but not less than ·775 specific gravity at 60 degrees	178,641	28,869	222,241	18,737	913,415	76,900
Petroleum (not including crude petroleum imported to be refined, or illuminating or lubricating oils) ·8235 specific gravity or heavier at 60 degree temperature	122,750,650	7,790,137	61,176,430	3,796,977	71,891,597	3,014,390
Petroleum, imported by miners or mining companies or concerns, for use in the concentration of ores of metals in their own concentrating establishments	16,249	1,344	18,022	3,579	17,672	4,075
KEROSENE AND ILLUMINATING OILS						
Coal oil and kerosene, distilled, purified or refined	14,971,509	2,359,621	10,544,281	790,468	3,673,234	314,514
Illuminating oils, composed wholly or in part of the products of petroleum, coal, shale or lignite, costing more than 30 cents per gallon	176,340	127,889	120,416	62,323	99,497	50,045
LUBRICATING OILS						
Lubricating oils, composed wholly or in part of petroleum, and costing less than 25 cents per gallon	881,102	175,478	2,032,361	374,596	3,898,930	720,223
Lubricating oils, n.o.p.	4,376,192	2,267,611	3,008,095	1,559,965	3,211,124	1,412,473
OTHER OILS						
Gasoline under ·725 specific gravity at 60 degrees temperature	8,515,545	2,404,488	21,101,146	4,665,200	24,743,275	5,411,972
Gasoline·725 specific gravity but not heavier than ·750 specific gravity at 60 degrees temperature (a)	.....	.....	.....	.....	13,466,769	2,579,643
Gasoline, n.o.p.	.....	.....	19,163,561	2,946,258	3,902,204	769,309
All other oils, n.o.p.	222,041	113,681	57,667	39,040	144,027	60,469
OTHER PRODUCTS OF PETROLEUM						
Grease, axle Lb.	8,408,394	803,848	3,289,526	296,971	2,851,550	177,575
Paraffine wax "	2,425,959	276,772	1,362,188	72,661	870,564	51,032
Paraffine wax candles "	538,285	124,764	201,906	45,729	199,762	39,299
Vaseline and all similar preparations of petroleum for toilet, medicinal or other purposes	.....	386,127	.....	219,886	.....	242,743
Petroleum, products of, n.o.p. Gal.	48,769,546	10,891,302	13,113,087	1,990,496	1,330,170	289,815
Total Petroleum and its Products, Imported	.....	**48,566,830**	.....	**36,892,977**	.....	**36,816,724**
EXPORTS—						
Oil, coal and kerosene, crude Gal.	2,684,427	293,325	5,384,751	375,820	7,036,627	288,828
Oil, coal and kerosene, refined "	1,243,335	205,999	1,466,422	209,282	1,471,947	136,834
Oil, gasoline and naptha "	160,433	59,432	762,080	212,638	1,976,244	510,037
Oil, mineral, n.o.p. "	.....	.....	105,499	31,279	1,155,865	206,709
Wax, mineral Cwt.	26,915	230,172	821	7,552	15,615	45,526
Total Petroleum and its Products, Exported	.....	**788,928**	.....	**836,571**	.....	**1,187,934**

(a) Included under "Gasoline, n.o.p.," prior to May 24, 1922.

Petroleum Refinery Statistics.—As a matter of interest there has been tabulated a record of the crude petroleum and other materials used in the oil refineries of Canada during the past three years and a list showing the quantities and values of the refined products made.

Table 152.—Materials Used and Products Made by the Oil Refineries of Canada, 1920, 1921 and 1922

	1920		1921		1922	
	Quantity	Value	Quantity	Value	Quantity	Value
		$		$		$
MATERIALS USED—						
Crude oil, product of Canadian wells.....Imp. gal.	6,711,070	835,870	5,899,881	503,714	5,849,442	514,746
Crude oil, imported..... "	288,865,457	34,586,671	366,122,361	32,794,456	388,289,613	34,538,969
Sulphuric acid (66° Be) (Not made by firm reporting).....Lb.	48,001,510	547,503	57,839,800	674,855	80,398,728	1,058,230
Sulphur (not used in acid manufacture) "	66,666	2,242	102,540	3,165	84,260	2,407
Caustic soda..... "	2,738,824	107,207	3,563,907	167,550	3,750,331	174,922
Litharge..... "	204,423	25,244	360,758	34,191	518,291	44,906
Clay..... "	251,065	3,812	223,432	3,123	159,840	2,733
Other materials.....	.....	716,344	.....	673,036	.....	1,792,967
Total.....	.....	**36,821,893**	.....	**34,854,090**	.....	**38,129,880**
PRODUCTS MADE—						
Gasoline.....Imp. gal.	86,193,664	28,272,902	119,887,613	31,026,136	143,959,893	34,428,189
Petroleum spirits..... "	2,447,489	577,028	2,055,227	431,649	3,124,828	561,498
Kerosene..... "	54,155,655	10,887,972	59,082,709	7,537,470	76,521,560	9,028,804
Fuel and gas oils..... "	96,462,792	10,341,946	129,716,045	6,611,261	106,975,976	6,142,927
Lubricating oils..... "	17,192,398	4,429,362	17,345,119	3,854,475	17,185,003	3,143,545
Grease.....Lb.	7,695,701	545,174	6,674,202	269,679	8,186,013	156,353
Petroleum coke.....Tons	33,576	297,400	65,305	621,912	70,422	597,806
Wax and candles.....Lb.	10,308,127	973,805	10,777,994	310,267	12,063,768	329,147
Other products.....	.....	1,350,087	.....	902,554	.....	1,597,552
Total.....	.....	**57,675,676**	.....	**51,565,403**	.....	**56,195,821**

PHOSPHATE

While no phosphate rock was mined during 1922, shipments amounting to 190 tons valued at $1,796 were made. The provinces of Quebec and Ontario were the only producers of this commodity, the former contributing 131 tons and the latter 59 tons.

Importations, principally Florida phosphate, recorded for the year amounted to 11,515 tons averaging $4.90 per ton as compared with 13,711 tons at $6.31 per ton in the previous year.

Table 153.—Production of Phosphate in Canada, 1886-1922

Year	Tons	Value	Year	Tons	Value	Year	Tons	Value
		$			$			$
1886.....	20,495	304,338	1899.....	3,000	18,000	1912.....	164	1,640
1887.....	23,690	319,815	1900.....	1,415	7,105	1913.....	385	3,043
1888.....	22,485	242,285	1901.....	1,033	6,280	1914.....	954	7,275
1889.....	30,988	316,662	1902.....	856	4,953	1915.....	217	2,502
1890.....	31,753	361,045	1903.....	1,329	8,214	1916.....	203	2,514
1891.....	23,588	241,603	1904.....	817	4,590	1917.....	149	1,486
1892.....	11,932	157,424	1905.....	1,300	8,425	1918.....	140	1,200
1893.....	8,198	70,942	1906.....	850	6,375	1919.....	24	331
1894.....	6,861	41,166	1907.....	824	6,018	1920.....	.....	.....
1895.....	1,822	9,565	1908.....	1,596	14,794	1921.....	30	450
1896.....	570	3,420	1909.....	998	8,054	1922.....	190	1,796
1897.....	908	3,984	1910.....	1,478	12,578			
1898.....	733	3,665	1911.....	621	5,206	**Total**.....	**202,596**	**2,209,343**

Table 154.—Production in Canada, Imports and Exports of Phosphate, 1920, 1921 and 1922

	1920		1921		1922	
	Tons	Value	Tons	Value	Tons	Value
		$		$		$
PRODUCTION—						
Quebec			30	450	131	1,320
Ontario					59	476
Total			**30**	**450**	**190**	**1,796**
IMPORTS—						
Phosphate rock	13,476	114,480	13,711	86,530	11,515	56,353
Acid phosphate (a)	1,728	369,105	1,545	253,644	1,756	224,577
Phosphorus	43	49,699	25	24,380	68	55,540
Phosphor tin and bronze	124	120,720	105	103,804	135	112,417
Superphosphate (b)		470,970		484,368		403,621
EXPORTS—Phosphate rock	76	645				

(a) Probably refined phosphate of lime and phosphate of soda.
(b) Probably for use as fertilizer.

PYRITES

The total mine output of pyritic ore (iron and copper sulphides) in Canada during 1922 was 17,867 tons. Shipments for the same period totalled 18,143 tons, comprising 11,235 tons from Ontario and 6,908 tons from British Columbia. Ontario operators received an average value of $3.54 per ton for their product while British Columbia producers obtained an average of $5 per ton.

The total sulphur content of the 1922 production was 6,900 tons; the percentage of sulphur varied from 37 per cent to 42 per cent with an average of 38 per cent.

No copper-pyritic ore was shipped by the Weedon mines in Quebec in 1922. The Caldwell mine and the Sulphide mine, owned respectively, by the Grasselli Chemical Company, Limited, and the Nichols Chemical Company, Limited, were the Ontario shippers. In British Columbia, the Hidden Creek mine at Anyox and the Sullivan mine at Kimberley were active during the year.

According to Customs records no exports of pyrites were made in 1922.

Table 155.—Production of Pyrites in Canada, 1886-1922

Year	Tons	Value	Year	Tons	Value	Year	Tons	Value
		$			$			$
1886	42,906	193,077	1899	27,687	110,748	1912	81,526	314,081
1887	38,043	171,194	1900	40,031	155,164	1913	158,566	521,181
1888	63,479	285,656	1901	35,261	130,544	1914	228,314	744,508
1889	72,225	307,292	1902	35,616	138,939	1915	286,038	985,190
1890	49,227	123,067	1903	33,982	127,713	1916	309,251	1,084,095
1891	67,731	203,193	1904	37,180	134,033	1917	416,649	1,610,762
1892	59,770	179,310	1905	33,339	125,486	1918	411,616	1,705,219
1893	58,542	175,626	1906	42,743	169,090	1919	176,487	522,704
1894	40,527	121,581	1907	46,243	212,491	1920	171,744	719,110
1895	34,198	102,594	1908	47,336	224,824	1921	33,368	116,326
1896	33,715	101,155	1909	64,644	222,814	1922	18,143	74,303
1897	38,910	116,730	1910	53,870	187,062			
1898	32,218	128,872	1911	82,666	365,820	**Total**	**3,506,791**	**12,912,454**

Table 156.—Production in Canada, Imports and Exports of Pyrites, 1920, 1921 and 1922

	1920		1921		1922	
	Tons	Value	Tons	Value	Tons	Value
		$		$		$
PRODUCTION—						
Quebec	14,817	44,451	1,986	10,463	.....	.....
Ontario	148,652	618,283	27,785	101,306	11,235	39,763
British Columbia	11,275	56,376	3,597	4,557	6,908	34,540
Total	**174,744**	**719,110**	**33,368**	**116,326**	**18,143**	**74,303**
Sulphur content	67,608	.....	12,213	.....	6,900	.....
IMPORTS—						
Brimstone or sulphur, crude or in roll or flour	144,733	2,113,713	78,762	1,272,619	123,158	1,700,604
EXPORTS—						
Sulphur contained in pyrites	119,136	458,403	7,875	31,500	.....	.....

Sulphuric Acid.—Eight firms manufactured sulphuric acid in Canada during 1922.

Statistics have been collected giving the production of this commodity in terms of the standard grades of 50° Bé and 60°Bé and 66°Bé. For comparative purposes it has been deemed advisable to reduce the first two grades to their equivalent in 66° Bé., acid.

Table 157.—Production,* Imports and Exports of Sulphuric Acid, 1920, 1921 and 1922

	1920		1921		1922	
	Tons	Value	Tons	Value	Tons	Value
		$		$		$
PRODUCTION—						
Sulphur used	13,524	.....	10,863	217,460	15,467	316,623
Pyrites used	44,398	.....	19,844	143,778	15,961	81,868
Acid made	82,811	.....	55,902	1,290,785	69,281	1,389,716
IMPORTS of acid	320	22,664	94	10,653	2,687	47,707
EXPORTS of acid	5,217	89,992	2,759	55,775	1,490	29,129

*Expressed in terms of 66° Bé acid. Record includes a small production of oleum and other grades, the strength of which is not specified. An approximate estimate of production in terms of 50° acid will be obtained by increasing these figures by 50 per cent.

QUARTZ

The output of quartz (silica) in Canada during 1922 amounted to 125,245 tons as compared with 97,260 tons in 1921. Shipments during the year totalled 109,947 tons, an increase of 9·5 per cent over those for the previous twelve months. The average selling price per ton was, by grades; crude, $1.62; and crushed, $5.05.

The quartz grinding plant at St. Canut, Quebec, owned by Silico, Limited, was in operation during the year. This plant grinds potsdam sandstone and markets a fine grade of silica sand which compares favourably with imported material from Illinois and Michigan. The average price of imported United States silica sand to consumers in Central Ontario was approximately $5.65 per ton in 1922.

Table 158.—Production of Quartz in Canada, 1890-1922

Year	Tons	Value	Year	Tons	Value	Year	Tons	Value
		$			$			$
1890	200	1,000	1907	56,585	124,148	1917	216,288	496,182
1891–2	.....	.....	1908	44,741	52,830	1918	288,155	629,813
1893	100	500	1909	56,924	71,285	1919	94,991	527,035
1894–5	.....	.....	1910	88,205	91,951	1920	128,295	467,821
1896	10	50	1911	60,526	83,865	1921	100,350	312,947
1897	.....	.....	1912	100,242	195,216	1922	109,947	208,598
1898	284	570	1913	78,261	169,842			
1899	600	1,260	1914	54,148	84,583	**Total**	**1,771,081**	**4,042,240**
1900–1905	.....	.....	1915	127,108	205,153			
1906	48,376	65,765	1916	136,745	251,226			

Table 159.—Production in Canada, and Imports of Quartz, 1920, 1921 and 1922

	1920		1921		1922	
	Tons	Value	Tons	Value	Tons	Value
		$		$		$
Production—						
Quebec	1,986	5,558	5,994	29,824	10,994	53,023
Ontario	90,433	321,063	72,068	220,806	81,528	118,054
British Columbia	35,876	141,200	22,288	62,317	17,425	37,521
Total	**128,295**	**467,821**	**100,350**	**312,947**	**109,947**	**208,598**
Imports—						
Silex	1,154	26,097	1,211	36,041	1,058	25,248
Flint	9,047	170,355	5,061	84,761	6,633	92,094

SALT

The output of salt from all sources in Canada during 1922 totalled 183,438 tons, of which quantity approximately 99 per cent or 181,794 tons valued at $1,628,323 was marketed. Compared with the sales for the previous year, the 1922 records showed an increase of 17,136 tons or 10·4 per cent in quantity and a decrease of $45,362 or 2·7 per cent in value.

Ontario continued to be the chief producer contributing 97·2 per cent of the total sales. Nova Scotia shipments, from the Malagash mine, amounted to 5,053 tons of common coarse, land and rock salt.

Table 160.—Production of Salt in Canada, 1886-1922

Year	Tons	Value	Year	Tons	Value	Year	Tons	Value
		$			$			$
1886	62,359	227,195	1899	59,339	254,390	1912	95,053	459,582
1887	60,173	166,394	1900	62,055	279,458	1913	100,791	491,280
1888	59,070	185,460	1901	59,428	262,328	1914	107,038	493,648
1889	32,832	129,547	1902	64,456	292,581	1915	119,900	600,226
1890	43,754	198,857	1903	62,452	297,517	1916	132,903	717,653
1891	45,021	161,179	1904	69,477	321,778	1917	138,909	1,047,792
1892	45,486	162,041	1905	67,340	320,858	1918	131,727	1,285,039
1893	62,324	195,926	1906	76,720	329,130	1919	148,301	1,397,929
1894	57,199	170,687	1907	72,607	342,315	1920	209,855	1,544,724
1895	52,376	160,455	1908	79,975	378,798	1921	164,658	1,673,685
1896	43,960	169,693	1909	84,037	415,219	1922	181,794	1,628,324
1897	51,348	225,730	1910	84,092	409,624			
1898	57,142	248,630	1911	91,582	443,004	**Total**	**3,137,623**	**18,088,685**

Table 161.—Production of Salt in Canada, by Grades, 1921 and 1922

	1921				1922			
	Quantity Manufactured	Quantity Sold	Value of Salt Sold (Not including packages)	Stocks on hand at end of Year	Quantity Manufactured	Quantity Sold	Value of Salt Sold (Not including packages)	Stocks on hand at end of Year
	Tons	Tons	$	Tons	Tons	Tons	$	Tons
Table and dairy	40,992	40,961	755,721	31	41,274	41,119	837,994	681
Common fine	41,398	36,074	455,204	6,526	35,758	34,684	329,475	6,853
Common coarse	33,442	30,905	327,279	3,935	28,096	28,580	282,336	3,703
Land salt	3,246	3,197	39,071	119	6,964	6,875	38,840	184
Other grades	3,017	2,989	27,713	28	7,636	6,826	72,621	547
Brine for chemical works (Salt equivalent sold or used)	50,532	50,532	68,697	.....	63,710	63,710	67,058	.....
Total	**172,627**	**164,658**	**1,673,685**	**10,639**	**183,138**	**181,791**	**1,628,324**	**11,968**

Table 162.—Imports, Exports and Consumption of Salt in Canada, 1920, 1921 and 1922

	1920		1921		1922	
	Tons	Value	Tons	Value	Tons	Value
		$		$		$
PRODUCTION	209,855	1,544,724	164,658	1,673,685	181,794	1,628,324
IMPORTS—						
Fine, in bulk[1]	54,338	356,389	45,677	294,543	61,913	321,380
In bags, barrels[2]	33,615	446,671	33,531	455,962	51,772	596,513
All other[3]	67,693	631,627	50,515	274,763	82,185	355,890
Total Imports	**155,646**	**1,434,687**	**129,723**	**1,025,268**	**195,870**	**1,273,783**
EXPORTS	303	9,181	348	7,584	740	10,053
CONSUMPTION OF SALT[4]	365,798	2,970,230	294,033	2,691,369	376,924	2,892,054

[1]Duty 5 cents per 100 pounds: [2]Duty 7½ cents per 100 pounds: [3]Free—Imported for use of sea or gulf fisheries. [4]Sum of production and imports, less exports.

SODIUM CARBONATE

The Lillooet Soda Company, Ltd., shipped some 202 tons of sodium carbonate crystals during 1922 as compared with shipments of 197 tons in 1921. These shipments were made from a deposit located near Clinton, Lillooet District, British Columbia. The production of soda ash from salt brine is now carried on in Canada on a very large scale.

This material is used in the manufacture of glass, soap and paper, for bleaching and washing linen, cotton, wool, etc.; dyeing and printing fabrics; preventing the formation of boiler scale and also to a small extent as a reagent in analytical chemistry.

SODIUM SULPHATE

Natural deposits of sodium sulphate in the province of Saskatchewan were operated during 1922. The total quantity of natural sodium sulphate sold during the year amounted to 504 tons valued at $11,980 as against 624 tons at $18,850 in the previous twelve months. The average prices per ton obtained by operators were: crude, $6.70; and refined, $32.

In the following table data showing the production of both natural and artificial sodium sulphate have been compiled.

Table 163.—Production and Imports of Sodium Sulphate, 1920, 1921 and 1922

	1920		1921		1922	
	Tons	Value	Tons	Value	Tons	Value
		$		$		$
PRODUCTION—						
Natural Sodium Sulphate—						
Crude	811	19,495	112	1,824	164	1,100
Refined			512	17,026	340	10,880
Artificial Sodium Sulphate—						
Sodium sulphate	5,524	111,983	2,418	54,804	2,583	59,804
Glauber's salt	1,781	50,336	1,239	42,719	1,905	54,899
IMPORTS—						
Soda, sulphate of, crude, known as salt cake	42,974	958,628	27,654	690,311	39,472	830,515
Glauber's salt	283	8,364	139	4,521	172	5,554

TALC

Mining and milling operations in the talc industry in Canada were carried on more extensively during 1922 than in the previous years. Some 15,155 tons on rock was milled. Shipments totalling 13,195 tons, consisting entirely of the milled product were made. Similar prices prevailed in the year under review as in 1921, namely; high-grade, $22; medium $13; and low-grade, $9.

The Ontario production was derived from deposits near Madoc in Hastings County. In British Columbia, mining operations were conducted on two deposits—one, at Wolf Creek, in the Victoria Mining Division, and the other, the "Gisby Group," near Keefers.

The Quebec contribution consisted of shipments of soapstone blocks to sulphate-process pulp mills for use in lining the alkali recovery furnaces.

Table 164.—Production of Talc in Canada, 1886-1922

Year	Tons	Value	Year	Tons	Value	Year	Tons	Value
		$			$			$
1886	50	400	1899	450	1,960	1912	8,270	23,132
1887	100	800	1900	1,420	6,365	1913	12,250	45,980
1888	140	280	1901	259	842	1914	10,808	40,418
1889	195	1,170	1902	689	1,804	1915	11,885	40,554
1890	917	1,239	1903	990	2,739	1916	13,104	49,423
1891			1904	840	1,875	1917	15,803	76,539
1892	1,374	6,240	1905	500	1,800	1918	18,169	119,197
1893	717	1,920	1906	1,234	3,030	1919	18,642	116,295
1894	916	1,640	1907	1,534	4,602	1920	21,671	166,934
1895	475	2,138	1908	1,016	3,048	1921	10,134	144,565
1896	410	1,230	1909	4,350	10,300	1922	13,195	188,458
1897	157	350	1910	7,112	22,308			
1898	405	1,000	1911	7,300	22,100	**Total**	**187,481**	**1,112,675**

Table 165.—Production in Canada and Exports of Talc, 1920, 1921 and 1922

	1920		1921		1922	
	Tons	Value	Tons	Value	Tons	Value
		$		$		$
PRODUCTION—						
Crude	11,820	48,939				
Refined	9,851	117,995	10,134	144,565	13,195	188,458
Total	**21,671**	**166,934**	**10,134**	**144,565**	**13,195**	**188,458**
EXPORTS		263,708	7,115	112,724	9,854	143,938

STRUCTURAL MATERIALS AND CLAY PRODUCTS

The resumption of activities in the building and construction industries in Canada during 1922 was reflected in the increased value of structural materials produced. During the year the total value of structural materials and clay products marketed was $39,534,741 as compared with $34,737,428 in 1921, an advance of $4,797,313 or 13·8 per cent. The principal increases in the value of production were, by industries: cement, 8·76 per cent; clay products, 29·13 per cent; lime, 13·80 per cent; and sand and gravel 38·06 per cent. The sales of stone and slate declined 33·39 per cent and 5·82 per cent respectively.

Contracts awarded for building and construction work during 1922 were evaluated at $331,843,800 ,an increase of $91,710,500 or 29·5 per cent over the figures for the preceding year. Building and construction in Ontario, to the value of $166,628,000 was undertaken during the year. This province accounted for approximately fifty per cent of the total for the Dominion. On the basis of total values of contracts awarded, the other provinces ranked in the following order—Quebec, British Columbia, Alberta, Manitoba, Nova Scotia, Saskatchewan, New Brunswick, and Prince Edward Island. Of the grand total for the year, 63·7 per cent or $211,343,000 represented the value of buildings, such as residences, schools, stores, factories, etc. The construction of roads, streets, sewers and watermains, bridges, etc., and general engineering, accounted for the balance.

Table 166.—Value of Structural Materials and Clay Products produced in Canada, 1921 and 1922

Province	1921	1922
	$	$
Nova Scotia	553,043	602,109
Prince Edward Island	1,433	14,003
New Brunswick	391,145	417,559
Quebec	9,741,256	11,605,462
Ontario	18,615,980	20,259,427
Manitoba	1,449,476	1,814,729
Saskatchewan	271,280	441,437
Alberta	1,800,790	1,845,999
British Columbia	1,823,925	2,534,025
Canada	**34,737,428**	**39,534,741**

Summary statistics of production, imports, exports and consumption relating to this phase of mineral production have been complied in the subjoined table. Detailed data for each industry are given under the individual sections.

Table 167.—Summary Statistics of Structural Materials and Clay Products, 1920, 1921 and 1922

		Production	Imports	Exports	Consumption
		$	$	$	$
Cement, portland and puzzolan	1920	14,798,070	130,919	2,193,626	12,735,363
	1921	14,195,143	82,615	650,658	13,627,100
	1922	15,438,481	96,310	699,738	14,835,053
Clay and Clay Products	1920	10,664,929	9,414,783	358,151	19,721,561
	1921	8,857,818	7,517,222	245,835	16,129,205
	1922	11,438,456	6,654,503	311,048	17,781,911
Lime	1920	3,818,553	48,790	381,899	3,485,444
	1921	2,781,197	19,512	247,112	2,553,597
	1922	3,165,005	27,942	270,724	2,922,223
Sand-lime brick*	1920	724,918	.....	.....	724,918
	1921	.....	.....	.....	.....
	1922	.....	.....	.....	.....
Sand and gravel	1920	4,291,067	267,950	193,503	4,365,514
	1921	2,537,249	114,575	201,711	2,450,113
	1922	3,502,935	175,667	116,121	3,562,481
Slate	1920	14,200	259,173	.....	273,373
	1921	22,325	267,599	.....	289,924
	1922	14,871	286,095	.....	300,966
Stone	1920	7,580,351	1,217,216	102,988	8,694,579
	1921	6,343,696	927,694	57,924	7,213,466
	1922	5,974,993	937,726	134,252	6,778,467
Total	**1920**	**41,892,088**	**11,338,831**	**3,230,167**	**50,000,752**
	1921	**34,737,428**	**8,929,217**	**1,403,240**	**42,263,465**
	1922	**39,534,741**	**8,178,243**	**1,531,883**	**46,181,101**

*Statistics of sand-lime brick production have been included among the secondary, or manufacturing industries since 1921, as both sand and lime are reported under primary production.

CEMENT

The sales of cement in Canada in 1922 of 6,943,972 barrels exceeded those of the previous year by 1,191,087 barrels. The total mill output amounted to 6,447,696 barrels, a decrease of 1,960 barrels from the 1921 total. No puzzolan cement was produced during the year.

Eleven plants, having in all a daily capacity of 35,338 barrels, were operated during the year. In addition to these, there were at least twelve other plants in Canada which were idle during the whole period.

Ontario and Quebec were the principal producing provinces; sales from the former amounted to 3,104,386 barrels averaging $2.06 per barrel and from the latter 2,660,935 barrels at an average price of $2.22. The average selling price f.o.b. plant in the other provinces was as follows: Manitoba, $2.62; Alberta, $2.33; and British Columbia, $3, with a Dominion average of $2.22 per barrel.

The consumption of cement in Canada during the year increased approximately nineteen per cent over the quantity used in 1921. It may be noted that the consumption in the twelve months under review was 38 per cent less than recorded for 1913.

Exportations in 1922 totalled 425,137 barrels, an increase of 182,792 barrels or 75 per cent over those for 1921. The value of imports of Portland cement in the current year showed a slight advance to $83,037.

The Canadian duty on cement from United States is 8 cents per 100 pounds, while a similar rate obtains for exportations to that country. The tariff on cement imported from Great Britain is 5 cents per 100 pounds.

Table 168.—Production of Cement in Canada, 1887-1922

Year	Barrels	Value	Year	Barrels	Value	Year	Barrels	Value
		$			$			$
1887	69,843	81,909	1899	396,753	633,291	1911	5,692,915	7,644,937
1888	50,668	35,593	1900	417,552	662,910	1912	7,132,732	9,106,556
1889	90,474	69,790	1901	450,394	660,030	1913	8,658,805	11,019,418
1890	102,216	92,405	1902	722,525	1,127,550	1914	7,172,480	9,187,924
1891	93,479	108,561	1903	719,993	1,225,247	1915	5,681,032	6,977,024
1892	117,408	147,663	1904	967,172	1,338,239	1916	5,369,560	6,547,728
1893	158,597	194,015	1905	1,360,732	1,924,014	1917	4,768,488	7,724,246
1894	108,142	144,637	1906	2,128,374	3,170,859	1918	3,591,481	7,076,503
1895	128,294	173,675	1907	2,441,868	3,781,371	1919	4,995,257	9,802,433
1896	149,090	201,651	1908	2,666,333	3,709,954	1920	6,651,980	14,798,070
1897	205,213	275,273	1909	4,067,709	5,345,802	1921	5,752,885	14,195,143
1898	250,209	397,580	1910	4,753,975	6,412,215	1922	6,943,972	15,438,481
						Total	95,628,600	151,432,697

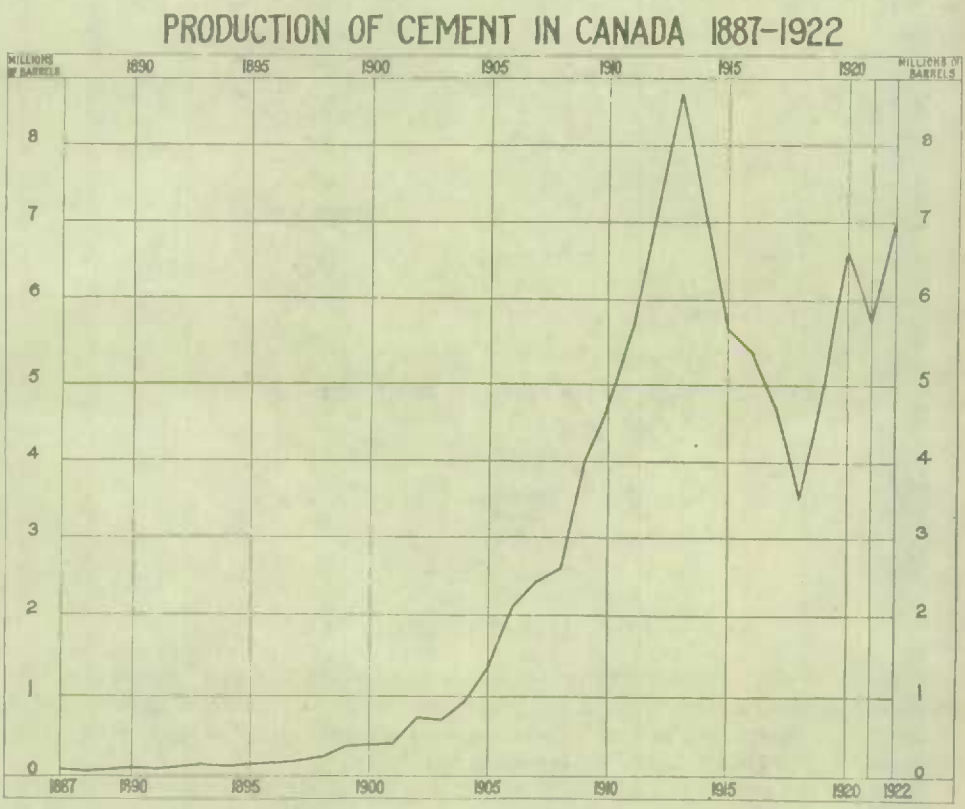
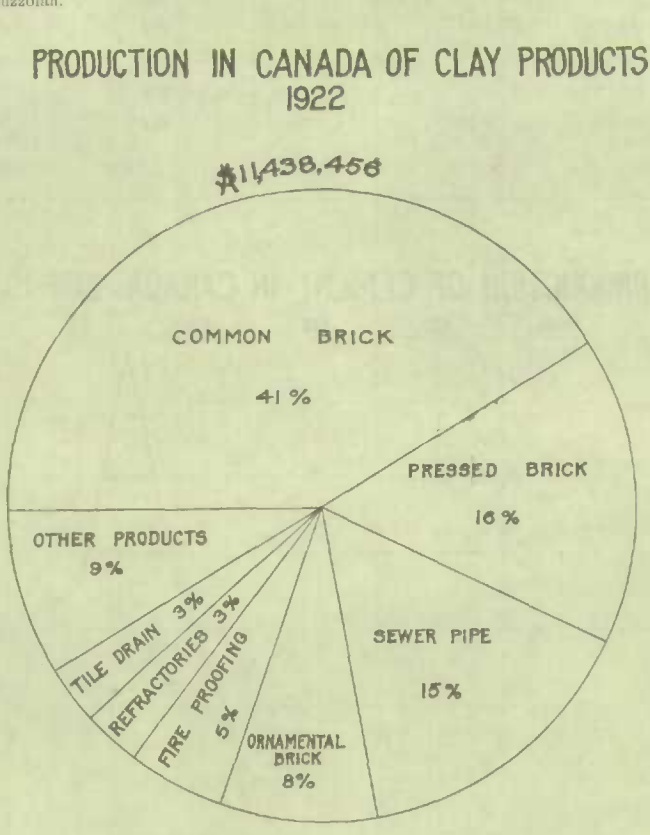


Table 169.—Summary Statistics of Cement in Canada, 1920, 1921 and 1922

	1920		1921		1922	
	Barrels	Value	Barrels	Value	Barrels	Value
		$		$		$
Made from Marl	(b) 86,171		(b) 10,676			
Made from Limestone	6,412,379		6,438,980		6,447,696	
Total made	**6,498,550**		**6,449,656**		**6,447,696**	
Sold or used	6,651,980	14,798,070	5,752,885	14,195,143	6,943,972	15,438,481
Stocks Dec. 31	936,173		1,603,215		1,106,939	
Imports—						
Portland Cement	32,963	112,466	12,057	75,670	30,914	83,037
Manufactures		18,453		6,945		13,273
Exports	(a) 835,667	2,193,626	212,345	650,658	425,137	699,738
Consumption	5,849,276		5,522,597		6,549,749	

(a) Quantity not recorded but estimated at the rate of 75 cents per cwt. or $2·62½ per barrel.
(b) Including puzzolan.



CLAY AND CLAY PRODUCTS

Under clay and clay products there have been included statistics relating to the production of (a) brick, common, pressed, moulded and ornamental and hollow building brick or blocks; (b) drain-tile and sewerpipe (c) pottery (d) architectural terra cotta (e) kaolin or china clay (f) refractories—fireclay, firebrick, and fireclay blocks and shapes.

The renewed activity in the building industry was reflected in the increased output in this industry during 1922, the total value of production being $11,438,456 as compared with $8,857,818 in 1921 and $10,664,929 in 1920. There was an increase of 29 per cent over the previous year's total and 7 per cent over the records for 1920.

Table 170.—Production in Canada, Imports and Exports of Clay and Clay Products, 1920, 1921 and 1922

		1920		1921		1922	
		Quantity	Value	Quantity	Value	Quantity	Value
			$		$		$
Output—							
Common brick	M	347,016		218,753	3,558,576	315,808	4,817,532
Pressed brick	M	102,868		83,165	1,769,840	91,356	1,719,691
Sales—							
Common brick	M	303,343	4,835,996	220,438	3,567,503	294,919	4,714,658
Pressed brick	M	85,137	2,004,537	80,947	1,738,293	90,578	1,839,549
Fireproofing	Tons	49,091	501,418		452,206		542,611
Hollow building blocks	M		302,261	3,627	177,273	4,893	448,674
Kaolin	Tons	683	15,022	124	1,888	1,197	17,886
Ornamental brick	M	3,515	73,926	1,905	50,576	41,852	865,664
Paving brick	"					151	5,972
Terra-cotta lumber			46,743		134,193		188,789
Pottery			209,171		231,262		266,391
Refractories—							
Fireclay	Tons	8,321	44,091	2,931	29,851	10,196	55,185
Firebrick	M	7,293	375,230	4,502	242,462	6,705	251,776
Other products	"		54,792		91,685		67,588
Sewerpipe	Tons	58,887	1,549,090		1,666,584	75,932	1,766,347
Tile, drain	M	14,527	562,652		473,952	14,731	407,386
Total			**10,664,928**		**8,857,818**		**11,438,456**
Imports—							
Bath brick			1,793		1,315		1,043
Building brick	M	2,944	94,314	4,269	126,765	7,468	174,321
Building blocks			153,250		120,980		79,689
Clays—							
China, ground and unground	Tons	13,445	234,668	8,130	138,775	12,898	173,988
Fire, " " "	"	50,611	267,180	31,282	148,059	30,792	138,995
Pipe " " "			2,804		866		2,864
Other clays			145,988		72,451		65,422
Drain tile, unglazed			5,744		5,815		692
Drain and sewerpipe			30,111		41,107		61,397
Earthen and chinaware			5,380,462		5,290,836		4,641,482
Firebrick (a)			1,388,390		630,132		611,564
Firebrick, n.o.p.			579,365		445,053		361,338
Magnesite brick			446,445		61,728		56,561
Silica brick			378,759		229,400		131,517
Paving brick	M	2,269	74,515	1,323	41,523	1,766	45,686
Other clay manufactures			230,995		162,417		117,952
Total			**9,414,783**		**7,517,222**		**6,664,503**
Exports—							
Building brick	M	8,073	115,627	2,136	29,778	2,418	31,383
Clay—							
Unmanufactured	Cwt.	4,738	2,175	2,095	885	2,589	1,777
Manufactures			196,222		80,009		104,933
Earthenware			44,127		135,163		172,955
Total			**358,151**		**245,835**		**311,048**
Consumption			19,721,561		15,861,580		17,791,911

(a) Duty free, of a kind not made in Canada.

Table 171.— Production of Clay Products in Canada, by Provinces, 1921 and 1922

Province	1921		1922	
	Sold or used	Per cent of total value	Sold or used	Per cent of total value
	$		$	
Nova Scotia	361,761	4·08	427,643	3·74
Prince Edward Island	.....	.....	3,975	0·03
New Brunswick	66,600	0·75	75,425	0·66
Quebec	1,744,760	19·69	2,494,236	21·81
Ontario	5,183,125	58·55	6,944,218	60·71
Manitoba	208,982	2·35	210,740	1·84
Saskatchewan	166,244	1·87	134,704	1·18
Alberta	710,477	8·02	700,063	6·12
British Columbia	415,869	4·69	447,452	3·91
Canada	**8,857,818**	**100·00**	**11,438,456**	**100·00**

Common Brick.—The sales of common brick in Canada during 1922 totalled 294,919 thousand valued at $4,714,658, or an average of $15.99 per thousand. In 1921, the production was 220,438 thousand at $3,567,503 with an average selling value for the Dominion of $16.18 per thousand.

The percentage of common brick sold in each province during the year under review was, Nova Scotia, 3·85; New Brunswick, 0·71; Prince Edward Island, 0·10; Quebec, 34·95; Ontario, 50·47; Manitoba, 3·37; Saskatchewan, 0·73; Alberta, 4·07; and British Columbia, 1·75.

Substantial increases in production occurred in all provinces with the exception of Saskatchewan. Calculated on a percentage basis the advance in sales of common brick in the different provinces was as follows: Nova Scotia, 16%; New Brunswick, 16%; Quebec, 47%; Ontario, 30%; Manitoba, 6%; Alberta, 67%; British Columbia, 40%, while Saskatchewan showed a 43% decrease in sales.

Table 172.—Production of Common Brick, in Canada, by Provinces, 1921 and 1922

Province	1921				1922			
	Manufactured	Sold or used			Manufactured	Sold or used		
		Quantity	Value	Per M.		Quantity	Value	Per M.
	M	M	$	$	M	M	$	$
Nova Scotia	9,947	9,817	108,250	11·03	12,233	11,364	131,686	11·59
Prince Edward Island	.....	.....	.....	.....	350	300	3,975	13·25
New Brunswick	2,500	1,800	26,300	14·61	2,631	2,087	33,425	16·02
Quebec	61,851	70,241	1,020,184	14·52	114,070	103,087	1,520,430	14·75
Ontario	119,275	114,583	2,025,643	17·68	157,682	148,831	2,614,120	17·56
Manitoba	9,759	9,358	169,219	18·08	8,098	9,945	166,023	16·70
Saskatchewan	4,666	3,789	50,718	13·39	1,111	2,153	27,058	12·57
Alberta	4,554	7,180	103,265	14·38	13,335	11,995	137,184	11·44
British Columbia	6,201	3,670	63,924	17·42	5,698	5,157	80,757	15·66
Canada	**218,753**	**220,438**	**3,567,503**	**16·18**	**315,808**	**294,919**	**4,714,658**	**15·99**

Pressed Brick.—Sales of pressed brick in Canada during 1922 totalled 90,577 thousand valued at $1,839,549 as compared with 80,947 thousand at $1,738,293 in the previous twelve months. Ontario was the chief producer of this commodity accounting for 73 per cent of the Dominion total. The other provinces, in order of production ranked as follows: Quebec, Alberta, British Columbia, Saskatchewan and Manitoba.

Increases in Quebec and Ontario of 27·3 per cent and 16·5 per cent, respectively, were responsible for the advance in the total sales for the Dominion. Slight decreases will be noted in the other producing provinces.

Table 173.—Production of Pressed Brick, in Canada, by Provinces, 1921 and 1922

Province	1921				1922			
	Manufactured	Sold or used			Manufactured	Sold or used		
		Quantity	Value	Per M.		Quantity	Value	Per M.
	M	M	$	$	M	M	$	$
Quebec	11,571	11,931	251,137	21·05	16,790	15,201	362,556	23·85
Ontario	58,884	57,027	1,194,580	20·95	65,479	66,484	1,289,278	19·39
Manitoba	1,362	623	22,837	36·66	.....	71	1,768	25·25
Saskatchewan	2,455	1,900	56,628	29·80	948	1,101	41,557	37·74
Alberta	7,785	8,358	164,049	19,62	6,552	6,619	98,803	14·93
British Columbia	1,108	1,108	49,062	44·28	1,586	1,102	45,587	41·37
Canada	**83,165**	**80,947**	**1,738,293**	**21·47**	**91,355**	**90,578**	**1,839,549**	**20·31**

Table 174.—Production of Building Brick (Common and Pressed), 1886-1906

Year	Value	Year	Value	Year	Quantity	Value
	$		$		M	$
1886	873,600	1893	1,800,000	1900	.....	2,275,000
1887	986,689	1894	1,800,000	1901	.....	2,400,000
1888	1,036,746	1895	1,679,000	1902	.....	2,593,000
1889	1,273,884	1896	1,600,000	1903	.....	2,832,000
1890	1,266,082	1897	1,600,000	1904	.....	2,983,000
1891	1,061,536	1898	1,900,000	1905	523,820	3,933,925
1892	1,251,034	1899	2,195,000	1906	523,390	4,102,590
				Total	.....	**41,435,886**

Table 175.—Production of Common Brick, 1907-1922

Year	M.	Value	Year	M.	Value	Year	M.	Value
		$			$			$
1907	439,016	3,455,524	1913	668,427	5,917,373	1919	291,470	3,850,219
1908	353,261	2,811,554	1914	457,514	3,653,861	1920	303,343	4,835,996
1909	539,229	4,212,424	1915	234,733	1,755,187	1921	220,438	3,567,503
1910	627,715	5,105,354	1916	237,035	1,826,844	1922	294,919	4,714,658
1911	645,551	5,420,890	1917	210,631	1,999,465			
1912	769,192	7,010,375	1918	164,970	1,879,811	**Total**	**6,457,441**	**61,817,038**

Table 175a—Production of Pressed Brick, 1907-1922

Year	M.	Value	Year	M.	Value	Year	M.	Value
		$			$			$
1907	78,922	794,722	1913	116,802	1,458,733	1919	74,424	1,304,162
1908	53,481	517,180	1914	93,635	1,115,556	1920	85,137	2,004,537
1909	57,265	630,677	1915	49,817	492,774	1921	80,947	1,738,293
1910	67,895	807,294	1916	44,947	492,355	1922	90,578	1,839,549
1911	87,351	1,094,582	1917	46,409	653,153			
1912	125,180	1,609,854	1918	40,147	639,083	**Total**	**1,192,937**	**17,192,504**

Moulded and Ornamental Brick.—The total quantity of moulded and ornamental brick produced in Canada during 1922, was 41,852 thousand valued at $865,664. In Ontario, separate production statements were obtained for (a) moulded and ornamental brick, and, (b) tapestry and rug brick. The former amounted to 234 thousand and the latter 41,206 thousand with average values per thousand of $35.06 and $20.54, respectively. The average price for the Dominion was $20.68 per thousand, ranging from $20.24 per thousand in Saskatchewan to $37.32, in Quebec. There was no production of this commodity reported for the provinces of Nova Scotia, New Brunswick, Manitoba and British Columbia.

Table 176.—Production of Moulded and Ornamental Brick in Canada, by Provinces, 1921 and 1922

Province	1921				1922			
	Manufactured	Sold or used			Manufactured	Sold or used		
		Quantity	Value	Per M.		Quantity	Value	Per M.
	M	M	$	$	M	M	$	$
Quebec	11	43	1,388	32·28	82	84	3,098	37·32
Ontario	2,200	1,878	46,795	24·92	47,440	41,441	854,762	20·62
Saskatchewan	.....	.....	.....	.....	.....	76	1,518	20·24
Alberta	246	74	2,393	32·34	255	251	6,286	25·04
Canada	**2,457**	**1,995**	**50,576**	**25·35**	**47,778**	**41,852**	**865,664**	**20·68**

Paving Brick.—In 1922, for the first time in six years, clay paving brick was produced in Canada. The year's sales totalled 150,813 bricks valued at $5,972, and consisted of paving brick made at Clayburn, British Columbia, from local deposits of clay. The production of this commodity in 1916 amounted to 1,590 thousand with a value of $30,144. Plants were operated during that year at West Toronto, Ontario, and Clayburn, British Columbia.

Table 177.—Production of Paving Brick*, 1897-1922

Year	Quantity	Value	Year	Quantity	Value	Year	Quantity	Value
	M	$		M	$		M	$
1897	4,568	45,670	1905	4,500	54,000	1913	4,208	75,669
1898	.....	.....	1906	3,000	45,000	1914	2,707	49,627
1899	5,300	42,550	1907	3,618	72,354	1915	1,228	20,694
1900	2,710	26,950	1908	3,720	59,456	1916	1,590	30,144
1901	3,689	37,000	1909	3,760	67,408	1917-1921	.....	.....
1902	4,211	42,000	1910	4,215	78,980	1922	151	5,972
1903	3,789	45,288	1911	5,220	79,444			
1904	4,436	55,450	1912	4,580	85,989	**Total**	**71,200**	**1,019,645**

*Figures prior to 1907 compiled by the Ont. Bureau of Mines.

Hollow Building Brick.—The sales of hollow building brick in 1922 amounted to 4,893 thousand valued at $448,674, as against 3,628 thousand at $177,273 in the previous twelve months. Ontario shipments increased 232 per cent; Quebec, 17 per cent; Manitoba, 37 per cent; and Saskatchewan, 42 per cent. Decreases were noted in the following provinces: Alberta, 34 per cent and British Columbia, 51 per cent.

For the province of Ontario, separate statistics were obtained of the quantity and value of interlocking tile produced, the records showed sales of 1,410 thousand interlocking tile with an average value of $122.71 per thousand.

Table 178.—Production of Hollow Building Brick or Blocks, in Canada, by Provinces, 1921 and 1922

Province	1921			1922		
	Manufactured	Sold or used		Manufactured	Sold or used	
		Quantity	Value		Quantity	Value
	M	M	$	M	M	$
Quebec	528	440	36,999	486	515	41,784
Ontario	585	607	31,486	2,276	2,017	272,118
Manitoba	697	626	16,926	500	860	15,310
Saskatchewan	406	281	11,897	450	495	37,550
Alberta	1,507	1,061	17,376	1,041	707	40,050
British Columbia	794	613	62,589	374	298	41,862
Canada	**4,517**	**3,628**	**177,273**	**5,127**	**4,892**	**448,674**

Pottery (*a*) **From Canadian Clay.**—Sales of pottery, made from domestic clay during 1922 were valued at $266,391, an increase of $21,627 or 9 per cent over previous year's records.

Five firms in Canada produced pottery, (using domestic clay) in the year under review. Stoneware, Rockingham ware, flower pots, etc., were made at St. John, New Brunswick, partly from Nova Scotia clay. Rockingham ware was also produced at Medicine Hat, Alberta, from Saskatchewan clay. Flower pots were produced in the following localities, Medicine Hat, Alberta, from Saskatchewan clay; and Toronto and Hamilton, Ontario, from local clay.

(*b*) **From Imported Clays.**—Six firms, using imported clays, operated in the pottery industry in Canada during 1922. Two of these companies were located at St. John's, Quebec and produced sanitary ware from American and English clays. Porcelain insulators were manufactured by two companies, one in Toronto, the other in Hamilton, Ontario. Earthenware was produced by one firm at Iberville, Quebec, and another at Hamilton, Ontario. The total sales of products from imported clays were valued at $1,186,083, comprising sanitary ware to the value of $437,346 and porcelain insulators and earthenware worth $748,737.

The imports of china clay, fire clay, pipe clay, and other clays were appraised at $381,269, in 1922. Canadian importations of ground or unground china clay from Great Britain totalled 6,888 tons valued at $85,237; and from United States 6,009 tons, at $88,717.

Table 179.—Production of Pottery, from Domestic and Imported Clays, in Canada, by Provinces, 1921 and 1922

Province	1921		1922	
	Made from		Made from	
	Domestic Clay	Imported Clay	Domestic Clay	Imported Clay
	$	$	$	$
New Brunswick	40,000	.....	42,000	.....
Quebec	.....	357,571	.....	445,346
Ontario	69,984	810,304	88,889	740,737
Alberta	121,278	.....	135,502	.....
Canada	**231,262**	**1,167,875**	**266,391**	**1,186,083**

Table 180.—Production of Pottery in Canada, 1888-1922

Year	Value	Year	Value	Year	Value	Year	Value
	$		$		$		$
1888	27,750	1897	129,629	1906	150,000	1915	64,900
1889	*	1898	214,675	1907	253,809	1916	61,069
1890	195,242	1899	185,000	1908	200,541	1917	122,878
1891	258,844	1900	200,000	1909	285,285	1918	130,242
1892	265,811	1901	200,000	1910	250,924	1919	185,474
1893	213,186	1902	200,000	1911	102,493	1920	209,171
1894	162,144	1903	200,000	1912	43,955	1921	231,262
1895	151,588	1904	140,000	1913	53,533	1922	266,391
1896	163,427	1905	120,000	1914	35,371	**Total**	**5,674,594**

*Not available.

Kaolin.—Up to the present date the only deposit of kaolin which has been developed in Canada, is located at Remi d'Amherst, near Huberdeau, Quebec. This deposit was operated during 1922 and 1,197 tons of white clay was shipped. In 1921, shipments were considerably lower amounting only to 124 tons.

In addition to the quantity of kaolin produced 117 tons of fire clay was sold in 1922. A record of these sales has been entered under the section dealing with refractories.

Table 181.—Production of Kaolin in Canada, 1912-1922

Year	Tons	Value	Year	Tons	Value	Year	Tons	Value
		$			$			$
1912	20	160	1916	1,750	17,500	1920	683	15,022
1913	500	5,000	1917	533	9,594	1921	124	1,888
1914	1,000	10,000	1918	863	19,299	1922	1,197	17,866
1915	1,300	13,000	1919	759	13,744			
						Total	**8,729**	**123,073**

Architectural Terra Cotta.—Under this heading there is also included floor and wall tile. The total Canadian production came from Ontario, Quebec, and British Columbia, in the order named. Sales were valued at $188,789 as compared with $134,193 in 1921, an increase of $54,596 or 41 per cent. This advance was due mainly to the increased production of floor tile in Ontario.

Table 182.—Production of Architectural Terra Cotta and Tile, other than Drain, in Canada, by Provinces, 1921 and 1922

Province	1921	1922
	$	$
Quebec	13,260	19,278
Ontario	120,594	169,297
British Columbia	339	214
Canada	**134,193**	**188,789**

Drain Tile and Sewer Pipe.—(*a*) *Drain Tile*—There was a slight falling-off in the value of drain tile sold in 1922, and sales were valued at $407,386 as compared with $473,952 in 1921.

Importations in 1922 of drain tile, unglazed, were evaluated $692, a considerable decrease from imports in the previous year.

(*b*) *Sewerpipe.*—The total sales of sewerpipe in 1922 were evaluated at $1,766,347 as against $1,666,584 in the previous year. Increases were general throughout the producing provinces in the Dominion and were as follows, Nova Scotia, 14 per cent, Quebec, 5 per cent; Ontario, 4 per cent; Alberta, 5 per cent; and British Columbia, 21 per cent, with an advance of 6 per cent in the total for Canada. Ontarion contributed 55 per cent of the total, the other provinces following in the order named—Quebec, Nova Scotia, Alberta and British Columbia.

Imports of drain and sewerpipe as shown by Customs records were valued at $61,397 in 1922 and at $41,107 in 1921.

Table 183.—Production of Sewer Pipe in Canada, 1888-1922

Year	Value	Year	Value	Year	Tons	Value
	$		$			$
1888	266,320	1900	231,525	1912	.....	884,641
1889	*	1901	248,115	1913	.....	1,035,906
1890	348,000	1902	301,965	1914	.....	1,104,499
1891	227,300	1903	317,970	1915	.....	799,446
1892	367,660	1904	440,894	1916	.....	716,287
1893	350,000	1905	382,000	1917	.....	783,762
1894	250,325	1906	530,045	1918	36,574	699,774
1895	257,045	1907	667,100	1919	62,821	1,074,146
1896	153,875	1908	514,362	1920	58,887	1,549,090
1897	164,250	1909	645,722	1921	.....	1,666,584
1898	181,717	1910	774,110	1922	75,932	1,766,347
1899	161,546	1911	812,716			
				Total	.....	**20,675,044**

* Data not available.

Table 184.—Production of Drain Tile in Canada, 1895-1922

Year	Value	Year	Value	Year	Value	Year	Value
	$		$		$		$
1895	210,000	1902	*250,000	1909	408,440	1916	359,387
1896	225,000	1903	275,000	1910	370,008	1917	434,708
1897	*225,000	1904	260,000	1911	339,812	1918	499,340
1898	225,000	1905	*260,000	1912	357,862	1919	616,519
1899	225,000	1906	290,000	1913	338,552	1920	562,652
1900	225,000	1907	260,699	1914	366,340	1921	473,952
1901	250,000	1908	298,561	1915	355,296	1922	407,386
						Total	9,369,415

* 1895-1906 (inclusive), marketed tile only.

Table 185.—Production of Drain Tile and Sewer Pipe, in Canada, by Provinces, 1921 and 1922

Province	1921		1922			
	Drain Tile	Sewer Pipe	Drain Tile		Sewer Pipe	
	$	$	M	$	Tons	$
Nova Scotia	3,702	213,042	105	3,909	13,174	243,455
Quebec	21,362	297,691	318	13,988	12,290	312,737
Ontario	397,104	939,463	13,790	368,189	42,679	973,824
Saskatchewan	33,000		85	6,200		
Alberta	3,717	161,952	58	3,480	5,448	170,229
British Columbia	15,067	54,436	372	11,629	2,343	66,102
Canada	**473,952**	**1,666,584**	**14,728**	**407,386**	**75,932**	**1,766,347**

Refractories (*a*) **Fireclay.**—Sales of fireclay or refractory clay sold as such, in Canada during 1922 were valued at $55,185 as compared with $29,851 in the previous year. The increase in value was $25,334 or 45·9 per cent. The provinces of Nova Scotia, Quebec, Ontario, Saskatchewan, Alberta and British Columbia were the producers of this commodity in the current year.

(*b*) **Firebrick.**—The production of firebrick in Canada from domestic clay during 1922 amounted to 6,705 thousand valued at $251,776 as compared with 4,502 thousand at $242,462 in the previous year. The increase in quantity was 48·9 per cent and in value 3·8 per cent. The province of British Columbia was the chief producer, contributing 72·9 per cent of the Dominion total. Ontario, Nova Scotia and Saskatchewan were the only other provinces producing this commodity.

Imports of firebrick into Canada in 1922 were appraised at $1,160,980. These importations consisted of magnesite brick, silica brick, firebrick of a kind not made in Canada and firebrick, n.o.p.

(*c*) **Fireproofing and Hollow Porous Blocks.**—The production of fireproofing and hollow porous blocks in Canada during 1922 was valued at $542,611 as compared with $452,296 in 1921, an increase of $90,315, or 20 per cent. The percentage of sales during the year by provinces were: Nova Scotia, 0·67 per cent; Quebec, 29·58 per cent; Ontario, 50·61 per cent; Manitoba, 5·10 per cent, and Alberta, 14·04 per cent.

(*d*) **Fireclay Blocks and Shapes.**—The total value of fireclay blocks and shapes in 1922 was $67,588, a decrease of $24,097 or 26·3 per cent from the sales in the preceding year. Nova Scotia, Quebec and British Columbia were the only provinces in which these commodities were made from domestic clays, but there are also many firms in Canada making firebrick, stove linings, etc., from imported American clays.

Table 186.—Production of Fire Clay in Canada, 1889-1922

Year	Tons	Value $	Year	Tons	Value $	Year	Tons	Value $
		$			$			$
1889	400	4,800	1901	3,979	5,920	1913	3,345	14,018
1890	.....	.....	1902	2,741	4,283	1914	2,171	12,875
1891	250	750	1903	2,639	3,523	1915	2,328	12,065
1892	1,991	4,467	1904	5,972	17,466	1916	9,206	30,767
1893	540	700	1905	5,088	13,917	1917	10,534	49,455
1894	539	2,167	1906	6,559	18,522	1918	8,732	44,351
1895	1,329	3,492	1907	.....	.....	1919	4,600	24,163
1896	842	1,805	1908	1,984	8,121	1920	8,321	44,091
1897	2,118	5,759	1909	4,405	12,390	1921	2,931	29,851
1898	670	1,680	1910	1,425	5,863	1922	10,196	55,185
1899	599	1,295	1911	7,532	24,128			
1900	1,245	4,130	1912	6,307	24,343	**Total**	**121,518**	**486,342**

Table 187.—Production of Fire Brick and Other Fire-Clay Products in Canada, 1907-1922

Year	Fire brick		Other Fireclay Products	Year	Fire brick		Other Fireclay Products
	Quantity	Value	Value		Quantity	Value	Value
	M	$	$		M	$	$
1907	4,323	113,322	18,000	1915	2,896	68,700	29,928
1908	2,416	70,429	31,752	1916	5,689	147,757	56,038
1909	1,059	32,742	33,000	1917	8,192	199,171	77,885
1910	1,375	29,352	15,000	1918	7,192	248,884	111,589
1911	2,368	44,122	20,880	1919	5,610	268,756	96,435
1912	3,430	67,192	34,050	1920	7,293	375,230	54,792
1913	3,667	86,164	42,556	1921	4,502	242,462	91,685
1914	2,816	72,299	22,394	1922	6,705	251,776	67,588
				Total	**69,533**	**2,318,358**	**803,572**

Table 188.—Production of Refractories, in Canada, by Provinces, 1921

Province	Fire clay		Fire brick			Fire clay blocks and shapes	Fire proofing and hollow porous blocks
	Sold or used		Manufactured	Sold or used			
	Tons	Value		Quantity	Value	Sold or used	Sold or used
		$	M	M	$	$	$
Nova Scotia	1,183	5,619	830	598	30,992	156	.....
New Brunswick	60	390	.....	.....	.....	.....	.....
Quebec	40	160	12	12	370	53,519	46,802
Ontario	463	7,756	992	1,094	62,891	17,782	269,047
Manitoba	.....	.....	.....	.....	.....	.....	.....
Saskatchewan	199	1,532	410	304	12,469	.....	.....
Alberta	.....	.....	.....	.....	.....	.....	136,447
British Columbia	986	14,484	2,494	2,494	135,740	20,228	.....
Canada	**2,931**	**29,851**	**4,738**	**4,502**	**242,462**	**91,685**	**452,296**

Table 189.—Production of Refractories, in Canada, by Provinces, 1922

Province	Fire clay		Fire brick			Fire clay blocks and shapes	Fire proofing and hollow porous blocks
	Sold or used		Manufactured	Sold or used			
	Tons	Value		Quantity	Value	Sold or used	Sold or used
		$	M	M	$	$	$
Nova Scotia	327	1,746	960	567	42,518	675	3,654
New Brunswick							
Quebec	117	580				41,448	160,471
Ontario	275	4,068	948	853	35,064		274,618
Manitoba							27,639
Saskatchewan	417	3,811	392	396	17,010		
Alberta	8,075	32,300					76,229
British Columbia	985	12,680	5,436	4,889	157,184	25,465	
Canada	**10,196**	**55,185**	**7,736**	**6,705**	**251,776**	**67,588**	**542,611**

LIME

The production of lime in Canada during 1922 totalled 8,972,971 bushels valued at $3,165,005 as compared with 6,879,066 bushels at $2,781,197 in the previous year. The average price obtained for quicklime in the twelve months under review, was 34 cents per bushel, while hydrated lime sold for $12.15 per ton. There was the customary variation in prices throughout the Dominion, the former product ranging in price from 30 cents in Quebec to 58 cents in British Columbia, and the latter from $10.45 per ton in British Columbia to $12.52 in Ontario.

The main increases noted in the sales of lime during the year were, to the building industry, chemical works, pulpmills, and to dealers. Minor decreases were apparent in the quantities sold for consumption in the following industries: smelting, sugar refining and agriculture.

Importations of lime into Canada during the current year, 2,555 tons, were slightly in advance of those in 1921. Exports amounted to 14,330 tons or an increase of 1,608 tons over the previous year's figures.

Table 190.—Production of Lime in Canada, 1886-1922

Year	Value	Year	Bushels	Value	Year	Bushels	Value
	$			$			$
1886	283,755	1899 (Estimated)		800,000	1912	8,475,839	1,844,849
1887	394,859	1900 "		800,000	1913	7,558,484	1,609,398
1888	339,951	1901 "		830,000	1914	7,028,582	1,360,628
1889	362,848	1902 "		892,000	1915	5,047,244	1,015,702
1890	412,308	1903 "		900,000	1916	5,493,250	1,091,463
1891	251,215	1904 "		780,000	1917	6,567,170	1,558,487
1892	411,270	1905 "		750,000	1918	6,363,951	1,876,025
1893 (Estimated)	900,000	1906	5,230,406	1,009,177	1919	7,147,504	2,316,607
1894	900,000	1907	4,755,316	974,595	1920	9,427,334	3,818,553
1895	700,000	1908	3,601,468	712,947	1921	6,879,066	2,781,197
1896	650,000	1909	5,592,924	1,132,756	1922	8,972,971	3,165,005
1897	650,000	1910	5,848,146	1,137,079			
1898 (Estimated)	650,000	1911	7,533,525	1,517,599	**Total**		**41,574,273**

Table 191.—Production of Lime in Canada, by Provinces, 1920,* 1921 and 1922

		Quicklime		Hydrated Lime		Total
		Sold or used		Sold or used		Sold or used
		Bushels	Selling value at kiln	Bushels	Selling value at kiln	Bushels	Selling value at kiln
			$		$		$
Nova Scotia	1920					201,500	40,300
	1921	25,914	6,085			25,914	6,085
	1922						
New Brunswick	1920					701,859	365,030
	1921	562,447	203,084			562,447	203,084
	1922	560,834	187,895			550,834	187,895
Quebec	1920					2,108,203	826,044
	1921	1,940,594	754,375	99,857	36,128	2,040,451	790,503
	1922	2,108,513	634,157	150,800	55,642	2,259,313	689,799
Ontario	1920					5,109,635	1,962,086
	1921	2,763,062	962,439	767,485	381,749	3,530,547	1,344,188
	1922	3,939,954	1,311,563	1,040,229	455,980	4,980,183	1,767,543
Manitoba	1920					605,399	240,984
	1921	413,283	136,375			413,283	136,375
	1922	525,184	163,799			525,184	163,799
Alberta	1920					139,433	72,477
	1921	107,083	48,332			107,083	48,332
	1922	129,827	70,992	800	336	130,627	71,328
British Columbia	1920					561,305	341,632
	1921	152,998	234,779	46,343	17,851	199,341	252,630
	1922	433,716	254,320	83,114	30,321	516,830	284,641
Canada	**1920**	**8,410,334**	**3,337,267**	**1,017,000**	**481,286**	**9,427,331**	**3,818,553**
	1921	**5,965,381**	**2,345,169**	**913,685**	**435,728**	**6,879,066**	**2,781,197**
	1922	**7,698,028**	**2,622,726**	**1,274,943**	**542,279**	**8,972,971**	**3,165,005**

*Separate statistics not available for Quicklime and Hydrated Lime, by Provinces in 1920.

Table 192.—Production of Lime in Canada, 1921 and 1922, showing Purpose for which Sold or Used

Purpose for which sold or used	1921				1922			
	Quicklime		Hydrated lime		Quicklime		Hydrated lime	
	Bushels	Value*	Tons	Value*	Bushels	Value*	Tons	Value*
		$		$		$		$
Building and whitewashing	1,237,158	480,665	26,069	380,042	1,334,769	450,861	34,500	440,433
Chemical works	971,387	313,721	746	8,448	1,772,786	605,547	2,194	18,697
Smelters	313,827	95,196			169,329	69,450		
Pulp and paper mills	1,405,886	541,521	1,523	14,422	2,044,777	498,550	3,173	32,513
Sugar factories	371,911	119,081			275,685	100,821		
Tanneries	35,845	14,340	1	13	43,979	15,145	3	37
Agricultural uses (fertilizers)	75,477	11,299	1,814	12,819	38,671	4,450	1,083	10,384
Dealers (uses unspecified)	801,415	503,830	1,526	16,579	1,363,309	621,493	3,418	37,948
Other purposes	602,475	265,816	300	3,405	654,723	256,409	252	2,267
Total sold or used	**5,965,381**	**2,345,469**	**31,979**	**435,728**	**7,698,028**	**2,622,726**	**44,623**	**542,279**

*Total selling value at kiln.

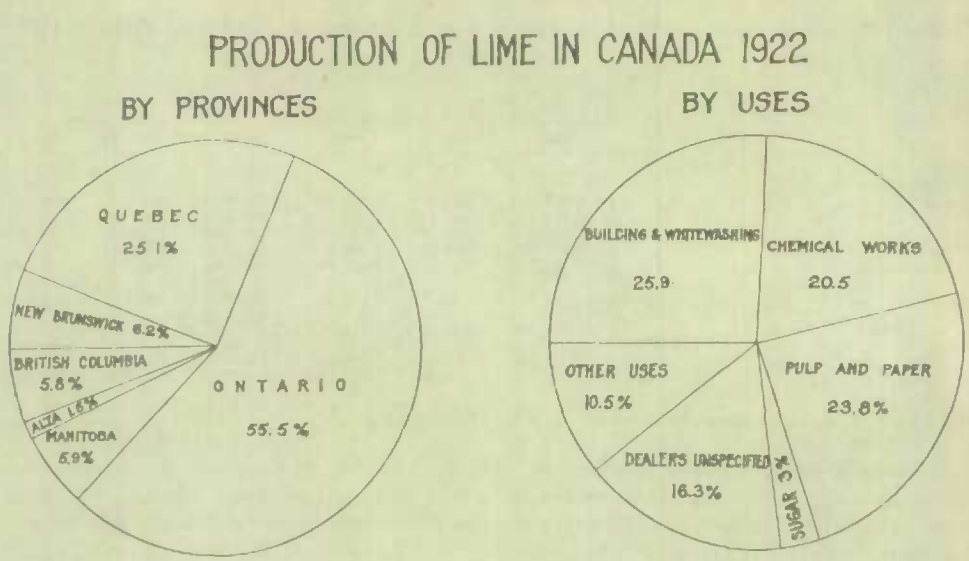


Table 193.—Imports into Canada and Exports of Lime, 1920, 1921 and 1922

	1920		1921		1922	
	Tons	Value	Tons	Value	Tons	Value
		$		$		$
Imports	2,739	48,790	1,211	19,512	2,555	27,942
Exports	23,016	381,899	12,722	247,112	14,330	270,724

SAND AND GRAVEL

The production of sand and gravel in Canada during 1922 totalled 11,666,374 tons valued at $3,502,935, an increase of 91,512 tons and $965,686 over records for the previous year. Statistics for 1921 showed a Canadian production of 11,574,862 tons at $2,537,249.

Increases over the preceding year, by grades, were as follows: moulding, 67,689 tons; other sands (blast, core and engine), 115,437 tons; sand and gravel for concrete, road-building, etc., 955,558 tons; and crushed gravel 16,251 tons. There was a decrease of 290,974 tons in the sales of building sand and sand for concrete and road-work, etc., and 872,314 tons in sand and gravel for railway ballast.

Imports of sand and gravel into Canada in 1922 were 350,992 tons or 112 per cent above those recorded for 1921. Exports showed a decrease amounting to 713,019 tons.

Table 194.—Production of Sand and Gravel in Canada, 1895-1922*

Year	Tons	Value	Year	Tons	Value	Year	Tons	Value
		$			$			$
1895	277,162	118,359	1905	306,935	152,805	1915		1,624,767
1896	224,769	80,110	1906	336,550	139,712	1916	8,156,207	1,838,320
1897	152,963	76,729	1907	298,095	119,853	1917	9,182,417	2,326,249
1898	165,954	90,498	1908	298,954	161,387	1918	11,262,282	2,367,018
1899	242,450	101,640	1909	481,584	256,166	1919	10,364,481	2,680,460
1900	197,558	101,656	1910	624,824	407,974	1920	11,530,795	4,201,067
1901	197,302	117,405	1911	573,494	408,110	1921	11,574,862	2,537,249
1902	159,793	119,120	1912		1,512,099	1922	11,666,374	3,502,935
1903	355,792	124,006	1913		2,258,874			
1904	399,809	189,803	1914		2,505,310	Total		30,119,751

*Exports prior to 1912. No production statistics collected.

Table 195.—Production in Canada, Imports and Exports of Sand and Gravel, 1920, 1921 and 1922

Kind	1920		1921		1922	
	Tons	Value	Tons	Value	Tons	Value
		$		$		$
PRODUCTION—						
Sand	1,375,812	935,107	1,755,086	596,980	1,464,112	963,037
Sand and gravel	2,103,418	1,354,912	2,635,957	802,133	3,591,515	1,198,156
Crushed gravel			70,215	63,454	186,466	117,372
Ballast	7,940,700	1,883,833	6,971,874	981,277	6,099,560	1,066,716
Moulding sand	44,353	59,271	91,680	70,254	159,369	107,738
			(a) 135	100		
All other	66,512	57,944	(b) 49,915	23,051	165,352	49,916
Total	**11,530,795**	**4,291,067**	**11,574,862**	**2,537,249**	**11,666,374**	**3,502,935**
IMPORTS	219,398	267,950	165,489	114,575	350,992	175,667
EXPORTS	1,491,786	193,503	1,396,728	201,711	683,709	116,121

(a) Glass sand. (b) Other sand including blast, core and engine sands.

Production by Railway Companies.—Statistics relating to the production of sand and gravel by railway companies in Canada have been tabulated separately from data regarding other producers. It will be noted in the table below that 88 per cent of the total output was utilized as railway ballast. In addition to this quantity, 776,151 tons or 11 per cent was produced for use in the road-building and construction industries, although an appreciable quantity was consumed as blast, core and engine sands and a minor amount for moulding purposes.

Table 196.—Railway Production of Sand and Gravel in Canada, 1921 and 1922

Kind	1921		1922	
	Tons	Value	Tons	Value
		$		$
Moulding sand	240	780	1,500	300
Building sand and sand for concrete road-work	31,911	6,270	24,379	9,468
Other sand (including blast, core and engine sands)	34,829	9,416	20,810	7,732
Sand and gravel for ballast	6,847,223	938,643	5,938,794	984,317
Sand and gravel for concrete, road-building, etc.	782,663	188,816	751,137	128,223
Crushed gravel			635	846
Total	**7,696,866**	**1,143,925**	**6,737,255**	**1,130,886**

Production by Other Operators.—Classified under this sub-heading are all sand and gravel operators in Canada other than railway companies. These producers numbered 289, comprising:—Nova Scotia, 11: New Brunswick, 6; Quebec, 11; Ontario, 232; Manitoba, 12; Saskatchewan, 8; Alberta, 4; and 5 in British Columbia.

With the exception of glass sand, considerable increases were recorded in the production of all grades of sand and gravel. The small amounts used in the Yukon were not important, relating only to local construction of foundations, etc.

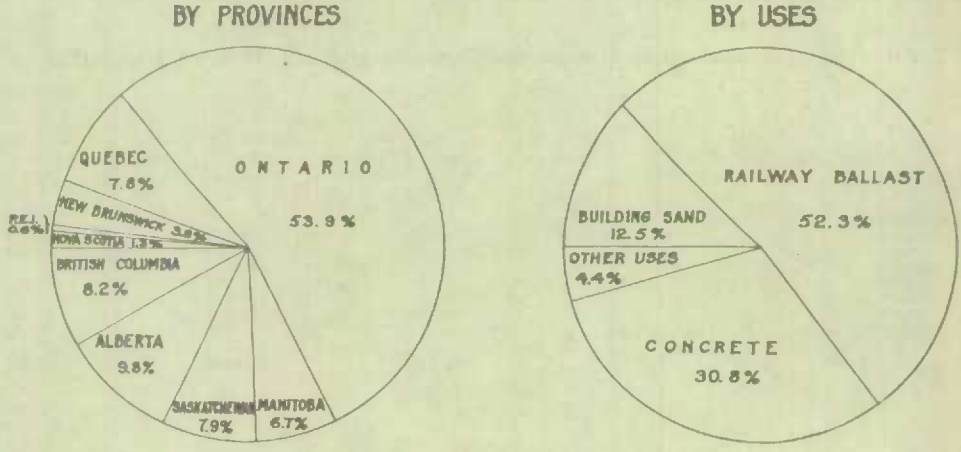
Table 197.—Production of Sand and Gravel by Other Operators in Canada, 1921 and 1922

Kind	1921		1922	
	Tons	Value	Tons	Value
		$		$
Glass sand	135	100		
Moulding sand	91,440	69,474	157,869	107,438
Building sand and sand for concrete road-work, etc.	1,723,175	590,710	1,439,733	953,569
Other sand (including blast, core and engine sands)	15,086	13,635	144,542	42,184
Sand and gravel for railway ballast	124,651	42,634	160,766	82,399
Sand and gravel for concrete, road building, etc.	1,853,294	613,317	2,840,378	1,069,933
Crushed gravel	70,215	63,454	185,831	116,526
Total	**3,877,996**	**1,393,324**	**4,929,119**	**2,372,049**

Table 198.—Production of Sand and Gravel in Canada, by Provinces, 1922

Kind		Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total for Canada
Moulding sand	Tons	159	.....	1,975	155,940	1,295	.....	.....	.....	159,369
	$	390	.....	417	106,104	767	.....	.....	.....	107,738
Building sand, etc.	Tons	14,656	70,673	43,209	1,178,098	32,175	4,463	6,176	114,662	1,464,112
	$	8,584	8,315	13,206	844,564	13,019	1,945	3,136	70,268	963,037
Other sand	Tons	480	560	10,031	108,637	6,767	7,315	1,756	29,806	165,352
	$	236	225	3,038	34,723	3,137	1,564	331	6,662	49,916
Sand and gravel—										
(a) for railway ballast	Tons	105,286	338,393	542,730	2,152,598	360,689	884,393	1,096,538	550,514	*6,099,560
	$	28,775	28,907	51,228	322,062	65,647	286,339	191,662	82,068	*1,066,716
(b) for concrete, etc.	Tons	27,263	38,696	307,156	2,576,464	378,837	28,773	16,005	232,899	3,591,515
	$	14,645	12,062	89,051	811,502	124,553	16,885	4,766	124,692	1,198,156
Crushed gravel	Tons	6,177	.....	.....	113,386	468	.....	19,486	32,371	186,468
	$	2,344	.....	.....	65,159	292	.....	29,196	20,381	117,372
Total	**Tons**	**154,021**	**448,322**	**905,101**	**6,285,123**	**780,231**	**924,944**	**1,139,961**	**960,251**	**11,666,374**
	$	**54,974**	**49,509**	**156,940**	**2,184,174**	**207,415**	**306,733**	**229,091**	**304,671**	**3,502,935**

* Includes 68,420 tons valued at $10,028 used in Prince Edward Island.



SAND-LIME BRICK

A record of the production of sand-lime brick in Canada has been included in all previous reports of mineral production, but owing to the fact that statistics relating to this industry will be treated in detail in the report on Non-Metallic Manufactures, only a few notes are included under this section.

The total output of sand-lime brick in 1922 as reported was, 52,749 thousand valued at $851,007 as compared with 43,457 thousand worth $662,744 in the previous year. The increase in quantity was, therefore, 9,292 thousand and in value $188,263.

The province of Ontario was the leading producer accounting for 94 per cent of the total quantity made, and 92 per cent of the value. Manitoba was next in order of production, with 3,800 thousand bricks with a value of $57,000. A small production was reported from Saskatchewan; the quantity being 500 thousand, valued at $7,235.

The number of plants active during the year was twelve, comprising nine in Quebec, two n Manitoba, and one in Saskatchewan.

Table 199.—Sand-Lime Brick Manufactured in Canada, by Provinces, 1921 and 1922

Province	1921		1922	
	Quantity	Value	Quantity	Value
	M.	$	M.	$
Ontario	36,482	534,531	48,449	786,772
Manitoba	6,403	116,926	3,800	57,000
Saskatchewan	572	11,287	500	7,235
Total	**43,457**	**662,744**	**52,749**	**851,007**

SLATE

The entire production of Canadian slate comes from deposits situated along the south shore of the St. Lawrence river in the province of Quebec. Mining of slate has been carried on in this province since about 1854, the maximum production, 6,935 tons valued at $119,160 occurring in the year 1889. In 1922 for the first time on statistical record, no roofing slate was produced from the quarries in Melbourne Township, Quebec. The total sales for the year amounting to 1,899 tons valued at $14,871, consisted of crushed green and red slate, for the manufacture of roofing paper. During 1921, the production amounted to 415 squares of roofing slate valued at $4,063 and 2,232 tons of crushed slate, valued at $18,262.

Imports of roofing slate increased 16 per cent over the record for the previous year. School writing slates and slate pencils were also imported in large quantities, while mantles and all other manufactures decreased 18 per cent in value. There were no exports of this commodity.

Table 200.—Production in Canada and Imports of Slate, 1920, 1921 and 1922

	1920		1921		1922	
	Quantity	Value	Quantity	Value	Quantity	Value
		$		$		$
PRODUCTION—						
Roofing.....Squares	1,532	12,362	415	4,063	.....	.....
Crushed.....Tons	240	1,838	2,232	18,262	1,899	14,871
IMPORTS—						
Roofing.....Squares	7,114	73,651	5,725	74,385	6,640	67,035
School-writing	.....	76,594	.....	93,589	.....	112,885
Pencils	.....	19,161	.....	9,462	.....	17,330
Mantles and manufactures of slate, n.o.p.	.....	89,767	.....	90,163	.....	73,974
Total	.....	**250,173**	.....	**267,599**	.....	**271,224**

STONE

The sales of stone in Canada during 1922 totalled 3,639,081 tons valued at $5,989,864 as against 3,671,498 tons at $6,343,696. The percentage of decrease in quantity was only 1 per cent and in value 6 per cent.

Building stone, rough and dressed, increased appreciably due mainly to the advance in production of limestone of both grades. Monumental and ornamental stone production was also greater and increases were noted in the output of flagstone, curbstones and paving blocks. Limestone for fluxing material increased 4 per cent and for chemical works, etc., 14 per cent. Rubble and riprap increased 156 per cent. Crushed limestone, granite, marble and sandstone decreased 7 per cent, thus accounting for the slight falling-off in the total sales for the year.

The kinds of stone quarried included granite (trap-rock, syenite and other igneous rocks), limestone, sandstone, and marble. The quantity of limestone quarried and used in the manufacture of lime by the operator was not included under this industry. Only the quantity and value of the lime produced is recorded in order to avoid duplication of entries under mineral production.

Table 201.—Production of Limestone and Sandstone in Canada*, 1909-1922

Year	Limestone	Sandstone	Year	Limestone	Sandstone	Year	Limestone	Sandstone
	$	$		$	$		$	$
1909	2,139,691	374,179	1914	2,672,781	487,140	1919	3,074,815	86,577
1910	2,249,576	502,148	1915	2,312,081	249,336	1920	5,665,693	165,149
1911	2,594,926	451,183	1916	2,244,691	146,244	1921	5,155,046	78,036
1912	2,762,936	329,352	1917	2,283,659	261,256	1922	4,175,041	80,908
1913	3,204,091	396,782	1918	2,342,403	102,750	Total	42,857,730	3,711,040

*Data not available prior to 1909.

Table 202.—Production of Granite and Marble in Canada, 1886-1922

Year	Granite	Marble	Year	Granite	Marble	Year	Granite	Marble
	$	$		$	$		$	$
1886	63,909	9,900	1899	90,542		1912	1,373,119	260,764
1887	142,506	6,224	1900	80,000		1913	1,653,791	249,975
1888	147,305	3,100	1901	155,000		1914	2,176,602	132,533
1889	79,624	980	1902	210,000		1915	1,525,553	158,027
1890	65,985	10,776	1903	200,000		1916	1,247,267	118,810
1891	70,056	1,752	1904	150,000		1917	639,412	55,820
1892	89,326	3,600	1905	226,305		1918	590,871	550
1893	91,393	5,100	1906	278,419		1919	850,563	213,982
1894	109,936		1907	194,712		1920	1,508,916	240,593
1895	84,838	2,000	1908	282,320	125,000	1921	937,894	172,720
1896	106,709	2,405	1909	454,824	158,441	1922	1,486,250	231,894
1897	61,934		1910	739,516	158,779			
1898	81,073		1911	1,119,865	162,783	Total	19,369,335	2,486,508

Table 203.—Production of Stone in Canada, by Provinces, showing Purposes for which used, 1921

——		Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Alberta	British Columbia	Total for Canada
Building—									
Rough	Tons	2,549		23,098	6,080	2,853	2,962	4,940	42,482
	$	14,006		108,120	14,672	20,992	13,750	44,960	216,500
Dressed	Tons		800	13,172	1,054				15,026
	$		4,500	379,610	11,953				396,063
Monumental and ornamental—									
Rough	Tons	550	3,114	3,057	1,951				8,672
	$	12,664	36,918	38,891	14,372				102,845
Dressed	Tons	75	55	1,371	73			130	1,704
	$	1,893	9,975	119,513	3,801			14,500	149,682
Flagstone	Tons		200		30				230
	$		4,800		552				5,352
Curbstone	Tons		141	1,253		304			1,698
	$		2,128	6,434		802			9,364
Paving blocks	Tons		1,351	6,317	7,677				15,345
	$		15,321	181,698	51,082				248,701
Limestone, for flux	Tons	41,974		1,000	55,742			30,604	129,320
	$	51,776		700	145,064			36,111	233,651
Limestone for sugar factories, chemical works, etc.	Tons			50,354	64,264			3,212	117,830
	$			46,068	82,190			6,425	135,683
Rubble and riprap	Tons	2,700		20,964	23,478	4,332		1,512	52,986
	$	4,085		21,632	21,089	9,860		1,512	58,178
Crushed	Tons	11,075	9,464	598,913	2,555,731	9,379		101,643	3,286,205
	$	32,178	23,648	759,975	3,821,207	25,012		125,657	4,787,677
Total	**Tons**	**58,923**	**15,125**	**719,499**	**2,716,080**	**16,868**	**2,962**	**142,041**	**3,671,498**
	$	**116,602**	**97,290**	**1,662,641**	**4,167,582**	**56,666**	**13,750**	**229,165**	**6,343,696**
Per cent of Total	Quantity	1·60	0·41	19·60	73·98	0·46	0·08	3·87	**100·00**
	Value	1·84	1·53	26·21	65·70	0·89	0·22	3·61	**100·00**

Table 204.—Production of Stone in Canada, by Provinces, Showing Purposes for which used, 1922

—		Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Alberta	British Columbia	Total for Canada
Building—									
Rough	Tons	1,380	319	30,981	47,340	1,250	.....	1,700	82,970
	$	7,888	3,624	86,486	58,526	14,960	.....	17,500	188,984
Dressed	Tons	.....	605	27,931	2,196	2,000	54	.....	32,786
	$	.....	9,494	743,506	19,360	57,623	4,300	.....	834,283
Monumental and Ornamental—									
Rough	Tons	275	1,121	2,992	217	.....	.....	8,280	12,885
	$	2,664	29,730	86,808	6,198	.....	.....	39,328	164,728
Dressed	Tons	150	263	11,379	624	200	.....	1,747	14,363
	$	13,200	38,985	112,253	17,076	641	.....	50,507	232,662
Flagstone	Tons	.....	.....	800	273	.....	.....	.....	1,073
	$	.....	.....	7,948	634	.....	.....	.....	8,582
Curbstone	Tons	.....	386	5,355	946	.....	.....	200	6,887
	$	.....	4,087	36,230	6,717	.....	.....	3,000	50,034
Paving blocks	Tons	.....	140	16,512	20,215	.....	.....	.....	36,867
	$	.....	3,036	177,699	222,385	.....	.....	.....	403,120
Limestone, for flux	Tons	66,892	.....	1,476	32,849	.....	.....	33,204	134,421
	$	51,536	.....	3,958	34,213	.....	.....	37,990	127,697
Limestone for sugar factories, chemical works, etc	Tons	172	.....	40,712	91,060	.....	.....	2,562	134,506
	$	1,400	.....	51,447	108,550	.....	.....	5,393	166,790
Rubble and riprap	Tons	5,728	.....	14,807	67,524	11,178	500	36,288	136,025
	$	10,179	.....	13,626	62,179	11,495	3,000	26,984	127,463
Crushed	Tons	13,358	9,193	834,410	2,054,021	19,728	.....	113,689	3,044,399
	$	32,625	15,774	1,022,355	2,434,088	21,919	.....	143,889	3,670,650
Total	**Tons**	**87,955**	**12,027**	**987,355**	**2,317,265**	**34,356**	**554**	**197,670**	**3,637,182**
	$	**119,492**	**104,730**	**2,342,316**	**2,969,926**	**106,638**	**7,300**	**324,591**	**5,974,993**
Per cent of Total	Quantity	2·5	0·3	27·2	63·7	0·9	0·0	5·4	100·0
	Value	2·0	1·8	39·2	59·7	1·8	0·1	5·4	100·0

Table 205.—Production of Stone in Canada, by Kinds and by Provinces, 1921

Province	Granite		Limestone		Marble		Sandstone	
	Tons	Value	Tons	Value	Tons	Value	Tons	Value
		$		$		$		$
Nova Scotia	11,822	47,101	44,269	55,436	.....	.....	2,832	14,065
New Brunswick	14,325	92,790	.....	.....	.....	.....	800	4,500
Quebec	19,608	378,021	679,446	1,072,572	1,650	172,720	18,795	39,328
Ontario	165,418	233,353	2,547,625	3,927,836	.....	.....	3,037	6,393
Manitoba	.....	.....	16,868	56,666	.....	.....	.....	.....
Alberta	.....	.....	.....	.....	.....	.....	2,962	13,750
British Columbia	108,225	186,629	33,816	42,536	.....	.....	.....	.....
Canada	**319,398**	**937,894**	**3,322,024**	**5,155,046**	**1,650**	**172,720**	**28,426**	**78,036**

Table 206.—Production of Stone in Canada by Kinds and by Provinces, 1922

Province	Granite		Limestone		Marble		Sandstone	
	Tons	Value	Tons	Value	Tons	Value	Tons	Value
		$		$		$		$
Nova Scotia	12,725	44,489	68,122	56,936	.....	.....	7,108	18,067
New Brunswick	11,389	95,352	.....	.....	.....	.....	638	9,378
Quebec	88,169	665,406	884,311	1,420,223	1,912	231,894	12,963	24,793
Ontario	185,738	412,995	2,128,769	2,547,561	.....	.....	2,758	9,370
Manitoba	.....	.....	34,356	106,638	.....	.....	.....	.....
Alberta	.....	.....	.....	.....	.....	.....	554	7,300
British Columbia	159,904	268,008	36,566	44,583	.....	.....	1,200	12,000
Canada	**457,925**	**1,486,250**	**3,152,124**	**4,175,941**	**1,912**	**231,894**	**25,221**	**80,908**

Table 207.—Production of Stone in Canada by Kinds, showing Purposes for which used, 1921

	Granite		Limestone		Marble		Sandstone	
	Tons	Value	Tons	Value	Tons	Value	Tons	Value
		$		$		$		$
Building—								
Dressed	4,660	21,926	8,883	229,337	683	140,300	800	4,500
Rough	9,869	93,913	26,694	67,076	472	27,363	5,447	28,148
Monumental and ornamental—								
Rough	8,672	102,845						
Dressed	1,680	148,574	24	1,108				
Flagstone	200	4,800	6	103			24	440
Curbstone	1,141	4,378	557	4,986				
Paving blocks	13,770	214,770	1,280	31,603			295	2,328
Limestone, for flux			129,320	233,651				
Limestone for sugar factories, chemical works, etc			117,830	135,683				
Rubble and riprap	1,512	1,512	48,114	51,055			3,360	5,611
Crushed	277,894	345,176	2,989,316	4,400,444	495	5,057	18,500	37,000
Total	**319,398**	**937,894**	**3,322,024**	**5,155,046**	**1,650**	**172,720**	**28,426**	**78,036**

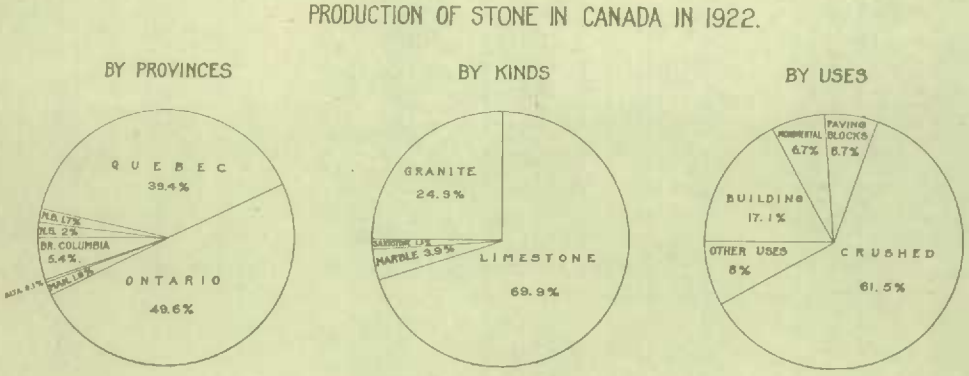
Table 208.—Production of Stone in Canada by Kinds, showing Purposes for which used, 1922

	Granite		Limestone		Marble		Sandstone	
	Tons	Value	Tons	Value	Tons	Value	Tons	Value
		$		$		$		$
Building—								
Rough	1,681	17,351	78,125	124,560	471	25,861	2,693	21,212
Dressed	5,479	208,229	25,613	410,281	1,115	203,419	579	12,354
Monumental and ornamental—								
Rough	12,821	161,660	64	68				
Dressed	14,131	230,987	232	1,675				
Flagstone	800	7,948	235	326			38	308
Curbstone	941	11,417	5,000	31,900			946	6,717
Paving blocks	36,404	398,952					463	4,168
Limestone, for flux			134,421	127,697				
Limestone for sugar factories, chemical works, etc			134,506	166,790				
Rubble and riprap	37,608	27,314	90,415	84,625			8,092	15,524
Crushed	348,060	419,392	2,683,513	3,228,019	326	2,614	12,500	20,625
Total	**457,925**	**1,486,250**	**3,152,124**	**4,175,941**	**1,912**	**231,894**	**25,221**	**80,908**

Table 209.—Production, Imports and Exports of Stone, by Kinds and by Provinces, 1920, 1921 and 1922

	1920		1921		1922	
	Tons	Value	Tons	Value	Tons	Value
		$		$		$
PRODUCTION, BY KINDS—						
Granite		1,508,916	319,398	937,894	457,925	1,486,250
Limestone		5,665,693	3,322,024	5,155,046	3,152,124	4,175,941
Marble		240,593	1,650	172,720	1,912	231,894
Sandstone		165,149	28,426	78,036	25,221	80,908
Total		**7,580,351**	**3,671,498**	**6,343,696**	**3,637,182**	**5,974,993**
PRODUCTION, BY PROVINCES—						
Nova Scotia		420,175	58,923	116,602	87,955	119,492
New Brunswick		280,167	15,125	97,290	12,027	104,730
Quebec		2,189,325	719,499	1,662,641	987,355	2,342,316
Ontario		4,035,478	2,716,080	4,167,583	2,317,265	2,969,926
Manitoba		374,286	16,868	56,666	34,356	106,638
Alberta		4,415	2,962	13,750	554	7,300
British Columbia		276,505	142,041	229,165	197,670	324,591
Canada		**7,580,351**	**3,671,498**	**6,343,696**	**3,637,182**	**5,974,993**
IMPORTS—						
Building stone		346,082		207,292		371,490
Granite		161,624		71,245		72,633
Marble		475,030		429,512		294,206
Refuse stone	461,813	235,078	236,024	129,645	328,679	199,397
Total		**1,217,214**		**927,694**		**937,726**
EXPORTS—						
Crushed	41,972	55,994	2,324	8,648	126,063	80,544
Ornamental, rough*	1,729	16,941	1,123	13,343	2,666	32,474
Building, rough†	9,612	16,246	3,523	8,996	2,357	13,364
Dressed		13,807		26,937		7,870
Total		**102,988**		**57,924**		**134,252**

*Granite, marble, etc., unwrought. †Freestone, limestone, etc., unwrought.



PART TWO

GENERAL STATISTICS

Supplementing the statistics reported in Part One, general reviews have been prepared showing for each principal group in the mineral industry of Canada, statistics of capital employed, number of employees, salaries and wages paid, fuel used, and miscellaneous operating expenses incurred. General tables present the principal statistics of the industry as a whole, as well as by groups, and by provinces. There are separate sections each dealing with the general statistics pertaining to a particular industrial group, as the copper-gold-silver industry, nickel-copper industry, asbestos industry, etc. Supplementing these is a section on metallurgical works, with a review of the processes used in typical Canadian mills in the several divisions of the industry.

73990—9½

GENERAL STATISTICS

INTRODUCTORY REVIEW

In those enterprises which carry on both mining and milling, in the concentrating, amalgamating and cyaniding mills of the gold mining industry, the large reduction works at Cobalt, and such metallurgical operations as the amalgamation of placer gold, it has been found impossible to make a separation of data regarding mining as distinct from metallurgical operations, and the survey which follows covers generally the mining and milling industry. In a later section the smelting and refining industry is described and that section covers those industries which smelt ores either by fire or electrical means.

The principal statistics for the year 1922 are shown under the three main headings Metallics, Non-Metallics, and Structural Materials and Clay Products. In the section on metallics, the net values given to ore shipped by the mines, were in many cases nominal and were made up from book values used by the companies in crediting the mining part of their enterprises. For instance, it was found in the copper-gold-silver section that in some important cases the ores shipped from the mines were valued at much lower figures than the metal contents would indicate. It must also be pointed out that the value of the products shown in the metallurgical section is approximate only, since absolute figures for cost of ores, etc., treated, could not be obtained.

The values of the metallic production as given in these tables are approximately one million dollars less than the figures given in the first part of this report, which were computed values calculated from average prices prevailing in world markets, while the data shown in these tables indicate more nearly the actual return to the different industries.

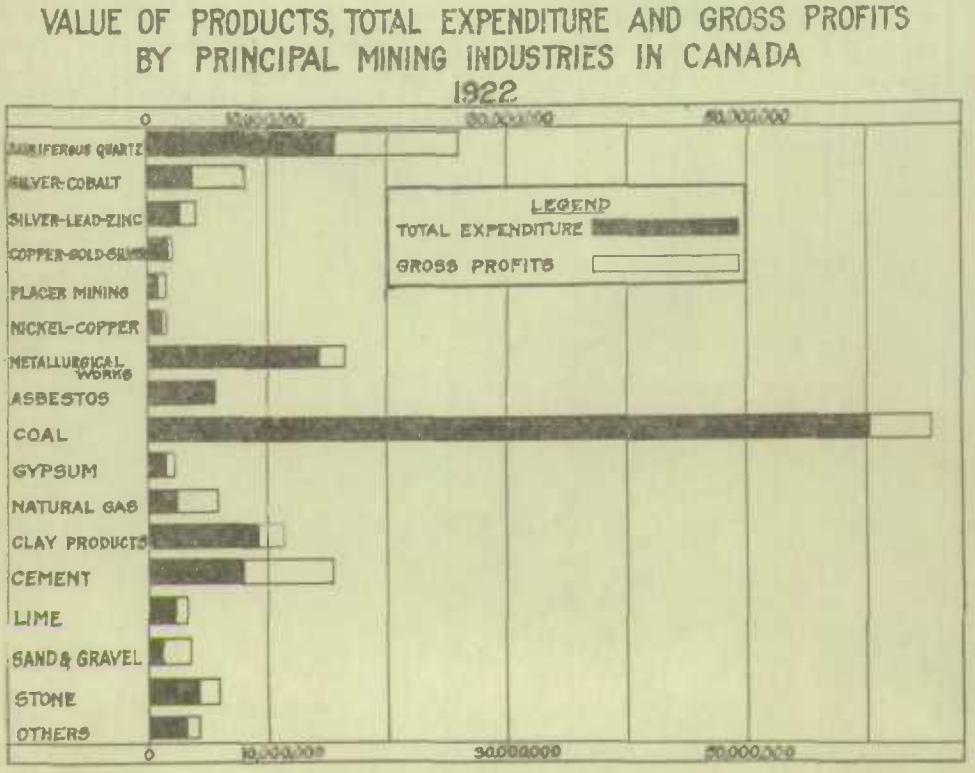


Table 210.—Summary of Principal Statistics Relative to the Mining, Metallurgical, Structural Materials and Clay Products Industries, Operating Plants in Canada, 1922

	Number of active operators	Number of operating plants or mines	Capital employed	Number of Employees	Salaries and wages paid	Miscellaneous expenses	Cost of fuel	Total expenditures	Net value of bullion, ore, concentrates or residues shipped from the mines, and products made by the smelters
			$		$	$	$	$	$
Metallics—									
Auriferous quartz mining and milling	79	79	[1] 35,368,094	5,441	8,011,682	7,383,516	353,453	15,748,651	26,082,169
Silver-cobalt mining and milling	26	30	29,459,603	1,403	1,532,736	2,271,186	98,242	3,902,164	8,222,303
Silver-lead-zinc mining and milling	75	91	[1] 6,828,980	994	1,371,645	1,150,595	83,530	2,605,770	4,173,812
Copper-gold-silver mining and milling	18	18	[2] 6,519,516	826	1,150,275	385,493	77,231	1,612,999	2,031,671
Placer mining	200	200	10,703,650	650	670,500	.....	.....	670,500	[8] 1,460,347
Nickel-copper mining and milling	2	5	8,455,183	440	582,042	608,809	5,828	1,196,679	1,557,414
Iron mining and briquetting	.....	.....	5,479,766	.....	.....	.....	.....	.....	56,993
Iron blast furnaces	.....	.....	.....	.....	.....	.....	.....	.....	[7] 106,980
Metallurgical works	8	[4] 13	63,160,551	3,384	5,042,787	[6] 8,140,628	1,031,572	[6] 14,214,987	16,465,205
Total	**408**	**436**	**165,975,343**	**13,138**	**18,361,667**	**19,948,227**	**1,649,856**	**39,951,750**	**60,156,894**
Non-Metallics—									
Asbestos	12	15	43,997,252	2,572	2,581,644	2,704,462	265,962	5,552,068	5,552,723
Coal mining	349	402	140,466,108	31,838	39,550,627	17,435,034	3,183,642	60,169,303	65,518,497
Feldspar	25	25	388,310	225	127,182	60,829	5,231	193,242	248,402
Fluorspar	4	4	323,337	52	25,580	33,588	10,084	69,252	102,138
Grindstones	3	3	259,666	40	31,199	25,972	3,351	60,522	43,742
Gypsum	13	14	4,092,090	1,055	909,072	436,705	127,246	1,473,023	2,160,898
Magnesite	3	3	1,835,938	132	58,578	49,627	7,159	115,364	76,294
Mica	20	20	441,802	147	64,641	45,825	1,807	112,273	152,263
Natural gas	132	[9] 1,981	31,373,817	921	939,194	1,458,675	.....	2,397,869	5,846,501
Oxides, iron	4	4	217,428	49	44,839	54,041	16,318	115,198	110,608
Petroleum	120	[9] 2,880	2,764,099	160	167,176	116,678	.....	283,854	611,176
Quartz	9	9	707,180	151	74,412	28,506	27,961	130,879	208,598
Salt	10	11	2,205,184	371	432,261	407,105	369,000	1,208,366	1,628,323
Talc	7	7	594,019	81	88,509	50,155	2,808	141,472	188,458
All other non-metallic	[11] 31	31	3,222,539	164	130,986	61,414	8,215	200,612	528,173
Total	**742**	**5,409**	**232,888,769**	**37,958**	**45,225,900**	**22,968,613**	**4,028,784**	**72,223,297**	**82,976,794**
Structural Materials and Clay Products—									
Clay products	227	232	31,168,903	4,681	4,752,341	2,487,710	1,969,092	9,209,143	11,438,456
Cement	6	11	41,573,737	1,753	2,315,240	2,976,152	2,457,456	7,748,848	15,438,481
Lime	57	62	4,984,910	1,110	1,013,486	522,222	725,168	2,260,876	3,165,005
Sand and gravel	342	342	4,098,928	750	684,620	445,222	99,069	1,228,917	3,502,935
Stone	182	182	13,004,233	2,859	2,673,241	1,259,552	157,139	4,099,932	5,989,864
Total	**794**	**809**	**94,830,711**	**11,153**	**11,438,934**	**7,690,858**	**5,417,924**	**24,547,716**	**39,534,741**
Summary by Classes—									
Metallics	408	436	165,975,343	13,138	18,361,667	19,940,227	1,649,856	39,951,750	60,156,894
Non-Metallics	742	5,409	232,888,769	37,958	45,225,900	22,968,613	4,028,784	72,223,297	82,976,794
Structural materials and clay products	794	809	94,830,711	11,153	11,438,934	7,690,858	5,417,924	24,547,716	39,534,741
Total	**1,944**	**6,654**	**493,694,823**	**62,249**	**75,026,501**	**50,599,698**	**11,096,564**	**136,722,763**	**182,668,429**

[1] Excluding capital invested by Consolidated Mining and Smelting Company, Trail; and Kingdon Smelter, Galetta.
[2] Excluding capital invested by Granby Consolidated Mining, Smelting and Power Company, Anyox.
[3] Estimate. Incorporated companies in Yukon Territory paid $514,196 in wages; also includes estimate for wages paid in British Columbia.
[4] Includes 2 silver smelters South Ontario; 5 plants nickel-copper smelters and refineries in Ontario and Quebec; 6 plants: copper, lead and zinc smelters, Ontario and British Columbia, and refineries in British Columbia and Ontario.
[5] Does not include $200,000 estimated cost of Chemicals.
[6] Does not include cost of ores concentrates and residues treated.
[7] Represents value of pig iron made from Canadian ore, deducting the net value of ores treated.
[8] Includes production of Yukon Territory, 82,394 crude ounces valued at $16 12 per ounce and production for British Columbia valued at $364,800.
[9] Number of wells.
[10] Incorporated companies of Yukon Territory.
[11] Includes actinolite, barytes, chromite, corundum, magnesium sulphate, manganese, mineral waters, peat, pyrites, sodium sulphate, and tripolite.
[12] Does not include railway fuel operations.

Table 210.—Summary of Principal Statistics Relative to the Mining, Metallurgical, Structural Materials and Clay Products Industries, Operating Plants in Canada, 1922—Concluded

	Number of active operators	Number of operating plants or mines	Capital employed	Number of Employees	Salaries and wages paid	Miscellaneous expenses	Cost of fuel	Total expenditures	Net value of bullion, ore, concentrates or residues shipped from the mines, and products made by the smelters
			$		$	$	$	$	$
Summary by Provinces—									
Nova Scotia	83	121	64,407,944	15,672	13,912,093	8,200,318	1,852,156	23,964,567	.....
New Brunswick	48	84	2,736,220	1,235	1,068,194	427,464	128,498	1,624,156	.....
Quebec	164	169	77,191,610	6,288	6,073,236	5,029,094	1,545,089	12,647,419	.....
Ontario	871	5,429	175,931,022	15,324	18,688,145	19,336,109	4,312,403	42,336,657	.....
Manitoba	32	33	5,714,508	638	651,585	411,367	347,980	1,410,932	.....
Saskatchewan	71	71	4,202,597	587	577,117	126,079	38,170	741,366	.....
Alberta	306	357	65,918,600	10,343	16,131,521	7,273,775	734,678	24,139,974	.....
British Columbia	246	267	85,600,408	11,680	17,121,493	9,752,943	2,097,615	28,972,051	.....
Yukon	123	123	11,991,914	482	803,117	42,549	39,975	885,641	.....
Canada	**1,944**	**6,654**	**493,694,823**	**62,249**	**75,026,501**	**50,599,698**	**11,096,564**	**136,722,763**	.....

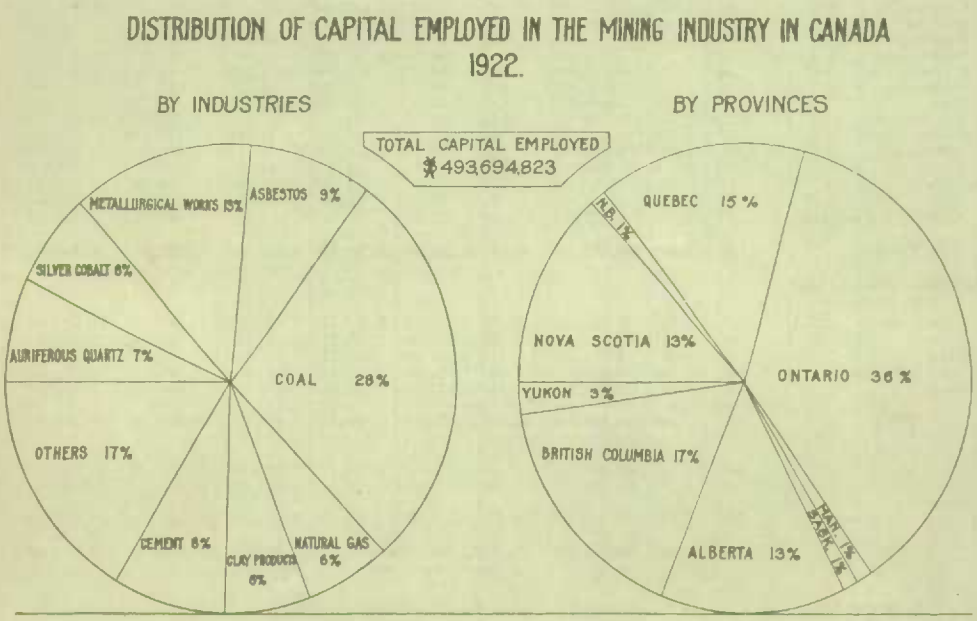


Table 211.—Fuel Used in the Mineral Industry in Canada, by Provinces, 1922

Kind	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia and Yukon	Total for Canada
Anthracite Coal...Tons	10	271	4,376	16,154	218	.....	15,520	182	36,729
Value $	200	2,847	38,506	134,075	1,335	.....	42,059	1,722	220,744
Bituminous Coal...Tons	522,790	12,235	197,074	421,346	30,888	1,210	127,466	292,402	1,605,411
Value $	1,836,648	67,760	1,348,406	3,370,170	260,038	12,644	567,169	1,323,855	8,786,690
Lignite Coal.....Tons	.....	.....	.....	264	115	20,954	169,059	.....	190,392
Value $	.....	.....	.....	1,468	1,097	23,977	102,662	.....	129,204
Coke.....Tons	.....	.....	2,547	5,033	119	.....	.....	27,396	35,095
Value $	.....	.....	27,393	70,730	1,719	.....	.....	393,970	493,812
Gasoline.....Imp. gal.	2,939	3,610	21,052	55,990	9	.....	2,073	31,172	116,845
Value $	1,184	1,477	12,027	19,578	4	.....	829	19,686	54,785
Fuel oil.....Imp. gal.	6,917	7,060	13,099	395,788	526	5,360	3,333	3,219,847	3,651,930
Value $	1,614	567	3,377	60,020	129	1,149	1,000	212,103	279,959
Wood.....Cord	3,360	9,504	21,411	106,886	15,407	55	2,230	21,521	180,374
Value $	12,160	49,562	112,833	576,888	83,658	400	8,718	119,754	963,973
Artificial and natural gas.....M Cu. ft	.....	3,835	4,062	311,594	.....	.....	474,123	103,128	896,742
Value $	.....	1,535	2,547	41,801	.....	.....	12,241	30,938	89,062
Other fuels.....Value $	350	4,750	.....	37,673	.....	.....	.....	35,562	78,335
Total...Value $	**1,852,156**	**128,498**	**1,545,089**	**4,312,403**	**347,980**	**38,170**	**734,678**	**2,137,590**	**11,096,564**

Table 212.—Fuel Used in the Mineral Industry in Canada, by Kinds and by Industries, 1922

Industry	Anthracite	Bituminous	Lignite	Coke	Gasoline and Fuel Oil	Gas	Wood	Other Fuel	Total Value
	Tons	Tons	Tons	Tons	Gal.	M cu.ft.	Cords	$	$
Metallic Mineral Industries—									
Auriferous Quartz Mining and Milling—									
Quantity	148	17,984	.....	233	253,615	.....	22,278	.....	.....
Value $	2,456	206,649	.....	4,744	52,523	.....	84,510	2,571	353,453
Copper-Gold-Silver Mining—									
Quantity	.....	5,451	.....	21	19,260	.....	652	.....	.....
Value $	.....	66,625	.....	336	2,912	.....	1,960	5,398	77,231
Nickel-Copper Mining-									
Quantity	.....	460	.....	.....	.....	.....	.....	.....	.....
Value $	.....	5,828	.....	.....	.....	.....	.....	.....	5,828
Silver-Cobalt Mining and Milling—									
Quantity	119	2,704	.....	.....	9,500	.....	3,818	.....	.....
Value $	2,134	34,705	.....	.....	1,183	.....	22,731	37,489	98,242
Silver-Lead-Zinc Mining and Milling—									
Quantity	182	4,340	.....	31	25,694	.....	2,026	.....	.....
Value $	1,722	33,850	.....	399	16,018	.....	31,541	.....	83,530
Metallurgical Works—									
Quantity	.....	38,349	.....	31,421	3,125,738	103,128	288	.....	.....
Value $	.....	330,440	.....	448,552	192,744	30,938	1,770	27,128	1,031,572
Total...Quantity	**449**	**69,288**	.....	**31,706**	**3,433,807**	**103,128**	**29,062**	.....	.....
Value $	**6,312**	**678,097**	.....	**454,631**	**265,380**	**30,938**	**142,512**	**72,586**	**1,649,856**

Table 212.—Fuel Used in the Mineral Industry in Canada, by Kinds and by Industries, 1922—Concluded

Industry	Anthracite	Bituminous	Lignite	Coke	Gasoline and Fuel Oil	Gas	Wood	Other Fuel	Total Value
Non-Metallic Mineral Industries—	Tons	Tons	Tons	Tons	Gals.	M Cu. ft.	Cords	$	$
Asbestos—									
Quantity	3,487	30,185		2,132	1,111				
Value $	31,931	211,132		22,455	444				265,962
Coal Mining—									
Quantity	15,520	832,295	184,801						
Value $	42,059	3,034,491	107,092						3,183,642
Feldspar—									
Quantity		225			419		645		
Value $		2,171			110		2,950		5,231
Fluorspar—									
Quantity		369			41,670		68		
Value $		4,416			5,418		250		10,084
Grindstones—									
Quantity		199			7,060		300		
Value $		1,784			567		1,000		3,351
Gypsum—									
Quantity		13,287		212	867	3,835	1,335		
Value $		117,199		3,114	338	1,535	5,060		127,246
Iron Oxides—									
Quantity		637			1,020		1,865		
Value $		6,443			521		9,354		16,318
Magnesite—									
Quantity		543			40		600		
Value $		6,268			13		878		7,159
Mica—									
Quantity	2	100					184		
Value $	41	995					771		1,807
Quartz—									
Quantity		2,249			3,000		550		
Value $		23,771			940		3,250		27,961
Salt—									
Quantity		54,248			5,080		566		
Value $		365,002			1,183		2,815		369,000
Talc—									
Quantity		280			500				
Value $		2,608			200				2,808
Miscellaneous Non-Metallic Mineral Industries—									
Quantity	4	102			413		1,779		
Value $	76	1,792			146		6,201		8,215
Total... Quantity	**19,013**	**934,719**	**184,801**	**2,344**	**61,180**	**3,835**	**7,892**		
Value $	**74,107**	**3,778,072**	**107,092**	**25,569**	**9,880**	**1,535**	**32,529**		**4,028,784**
Structural Materials and Clay Products Industries—									
Cement—									
Quantity	12	379,265			9,844		501		
Value $	186	2,450,630			3,317		3,323		2,457,456
Clay Products—									
Quantity	13,202	165,478	4,710	946	67,352	512,631	61,335		
Value $	115,638	1,392,286	17,070	12,538	22,648	32,854	375,409	649	1,969,092
Lime Burning—									
Quantity	2,928	35,028	115		6,739	274,948	78,459		
Value $	15,136	281,314	1,097		2,458	23,515	396,898	4,750	725,168
Sand and Gravel—									
Quantity	4	7,955	761	99	27,715		211		
Value $	51	82,202	3,900	1,674	9,631		1,611		99,069
Stone Quarrying—									
Quantity	1,121	13,678	5		162,138	2,200	2,914		
Value $	9,314	124,089	45		21,430	220	11,691	350	167,139
Total... Quantity	**17,267**	**601,404**	**5,591**	**1,045**	**273,788**	**789,779**	**143,420**		
Value $	**140,325**	**4,330,521**	**22,112**	**14,212**	**59,484**	**56,589**	**788,932**	**5,749**	**5,417,924**
Grand Total...									
Quantity	**36,729**	**1,605,411**	**190,392**	**35,095**	**3,768,775**	**896,742**	**180,374**		
Value $	**220,744**	**8,786,690**	**129,204**	**493,812**	**334,744**	**89,062**	**963,973**	**78,335**	**11,096,564**

Table 213.—Mine Production in Canada 1921 and 1922

—	1921			1922		
	Ores or minerals mined	Metals, ores concentrates or minerals shipped	Net value of shipments	Ores or minerals mined	Metals, ores concentrates or minerals shipped	Net value of shipments
	Tons	Tons	$	Tons	Tons	$
Metalliferous ores—						
Iron ores	43,208	59,509	230,104	1,255	17,971	56,993
Gold ores—						
Bullion shipped	1,880,356	31	14,774,037	2,431,340	43·8	21,246,998
Concentrates and residues		16,311	1,915,747		78,660	4,434,373
Silver-cobalt ores—						
Mine bullion shipped	398,931	173·5	6,316,812	426,445	259·2	8,222,303
Ore and concentrates		40,611			34,719	
Nickel-copper ores	262,593	262,593	1,575,558	259,569	259,569	1,557,414
Copper-gold-silver ores	1,197,624	1,042,135	2,589,314	1,004,097	911,587	2,031,671
Silver-lead-zinc ores—						
Lead ore and concentrates	390,073	15,352	678,337	505,773	27,203	1,803,575
Zinc ore and concentrates		297,406	1,498,716		356,194	2,370,237
Placer mining—						
Yukon		3	1,300,877		2·3	1,095,547
British Columbia		0·5	233,200		0·6	364,800
Total Metalliferous	4,172,785	1,734,125	31,112,762	4,628,479	1,686,209	43,183,911
Total Non-Metalliferous			87,842,682			82,976,794
Total Structural Materials			34,737,428			39,534,741
Total			**153,692,872**			**165,695,446**

Table 214.—Contents of Shipments, 1921 and 1922

—	Gold	Silver	Nickel	Copper	Lead	Zinc
1921	Ozs.	Ozs.	Tons	Tons	Tons	Tons
Milling gold ores—						
Bullion	711,121	120,751				
Concentrates	52,671	1,594,992		2·5		
Silver-cobalt ores—						
Mine bullion shipped		5,060,454				
Ore and concentrates		3,294,581				
Nickel-copper ores			6,995·8	4,745·6		
Copper-gold-silver ores	88,982	418,390		17,701·9		
Silver-lead-zinc ores—						
Lead ore and concentrates	1,468	1,000,587			4,760	147
Zinc ore and concentrates	8	856,842			29,248	49,399
Placer mining—						
Yukon	65,916	14,831				
British Columbia	11,281					
Total	**931,447**	**12,361,428**	**6,995·8**	**22,450·0**	**34,008**	**49,546**
1922						
Milling gold ores—						
Bullion	1,017,421	164,864				
Concentrates	134,316	4,489,723		1·5		
Silver-cobalt ores—						
Mine bullion shipped		7,526,646				
Ore and concentrates		4,530,808				
Nickel-copper ores			8,677·5	5,420·8		
Copper-gold-silver ores	48,453	409,723		16,262·4		
Silver-lead-zinc ores—						
Lead ore and concentrates	304	2,163,637			10,668	755
Zinc ore and concentrates	50	1,519,011			39,177	51,488
Placer mining—						
Yukon	54,370					
British Columbia	17,647					
Total	**1,272,561**	**20,864,412**	**8,677·5**	**21,684·7**	**49,845**	**52,243**

UNITED STATES TARIFF RATES ON MINERAL PRODUCTS IMPORTED

Since Canadian producers of mineral products market a large part of their annual output in the United States it was thought it might be of value to readers of this report to have at hand a guide to United States Tariff and the following tables were therefore compiled.

United States Tariff

Item Number	Material	Duty
	(a) On Metals, and Manufactures of.	
1508	Antimony ore	Free
1550	Cobalt metal and ore	Free
29	Cobalt, oxide, sulphate and all other Cobalt salts	30% ad val.
1556	Copper ore, regulus of, and black or coarse copper, and cement copper, old copper, fit only for manufacture, copper scale, clippings from new copper, and copper in plates, bars, ingots, or pigs not manufactured or specially provided for	Free.
1557	Copper sulphate or blue vitriol, copper acetate and subacetate	Free.
381	Copper in rolls, rods or sheets	2½ c. per lb.
	Engravers plates, not ground and seamless copper tubes and tubing	7c. per lb.
	Engravers plates ground and brazed copper tubes	11c. per lb.
	Brass rods, sheet brass, brass plates, bars, and strips, muntz metal sheathing bolts, piston rods and shafting	4c. per lb.
	Seamless brass tubes	8c. per lb.
	Brazed brass tubes, angles and channels	12c. per lb.
	Bronze rods and sheets	4c. per lb.
	Bronze tubes	8c. per lb.
1539	Bullion gold or silver	Free.
1634	Gold ores and sweepings	Free.
1597	Iron ore including manganiferous iron ore and residuum from burnt pyrites	Free.
1677	Sulphur in any form, and sulphur ore, and spent oxide of iron containing more than 25 per centum of sulphur	Free
392	Lead bearing ores and mattes—duty applied on lead contents, such duty shall not be applied to the lead contained in copper mattes unless actually recovered	1½c. per lb.
393	Lead bullion or base bullion, lead in pigs and bars, dross, reclaimed lead, scrap lead, antimonial lead, antimonial scrap lead, type metal, babbit, solder and all other combinations not specially provided for, duty to apply on lead contents	2½c. per lb.
	Lead in sheets, pipe, shot, glaziers lead and lead wire	2½c. per lb.
302	Manganese ore or concentrates containing in excess of 30 per centum of metallic manganese	1c. per lb. on metallic manganese content.
302	Molybdenum ore or concentrates	35c. per lb. on metallic molybdenum content.
302	Tungsten ore or concentrates	45c. per lb. on metallic tungsten content.
1634	Nickel mattes and ores of nickel	Free.
390	Nickel oxide	1c. per lb.
390	Nickel and nickel alloys in pigs, ingots shot, tubes and similar forms	3c. per lb.
390	Nickel in bars, rods, sheets, strips, tubing, etc	25% ad val.
390	In addition thereto on the foregoing if cold rolled, drawn or worked	10% ad val.
1596	Platinum, palladium and other metals of the platinum group	Free
394	Zinc-bearing ore of all kinds containing less than 10 per centum of zinc	Free.
	Containing more than 10 per centum of zinc and less than 20 per centum	½c. per lb. on metallic zinc contents.
	Containing more than 20 per centum of zinc and less than 25 per centum	1c. per lb. on metallic zinc contents.
	Containing 25 per centum of zinc or over	1¼ c. per lb. on metallic zinc contents.
395	Zinc in blocks pigs or slabs and zinc dust	1½c. per lb.
395	Zinc in sheets	2c. per lb.
395	Zinc scrap for re-manufacturing	1½c. per lb.
	(b) On Non-Metallic Minerals	
1619	Actinolite—crude, apparently classified as "minerals, crude, not specially provided for"	Free
214	Actinolite—ground, apparently classified as "earthy or mineral substances, wholly or partly manufactured, not specially provided for"	30% ad val.
1513	Arsenic—white or arsenious acid	Free
1512	Arsenic—Sulphide of	Free.
379	Arsenic—Metallic	6c. per lb.
1515	Asbestos—crudes, fibres, sand	Free.
1401	Asbestos—yarn	30% ad val.
69	Barytes—ore, crude	$4 per ton
69	Barytes—ore, ground	$7.50 per ton.
	Calcite—not mentioned by this name in the tariff. Chalk, crude, is free (Item 1545) and chalk, ground, is dutiable at 25% ad valorem (Item 20).	
1547	Chromite—chromite or chrome ore	Free
1570	Corundum—ore	Free
1415	Corundum—ground	1c. per lb.
1619	Feldspar—crude, apparently classified as "minerals, crude not specially provided for"	Free
214	Feldspar—ground, apparently dutiable as "earthy or mineral substances, wholly or partly manufactured, not specially provided for"	30% ad val.

United States Tariff—Concluded

Item Number	Material	Duty
207	Fluorspar	$5.60 per ton
213	Graphite or plumbago—crude or refined—Amorphous	10% ad val.
213	Graphite or plumbago—crude or refined—Crystalline lump, chip or dust	20% ad val.
213	Graphite or plumbago—crude or refined—crystalline flake	1½c. per lb.
236	Grindstones—finished or unfinished	$1.75 per ton
1643	Gypsum—crude	Free
205	Gypsum—ground	$1.40 per ton
75	Iron oxides—ochres, crude	¼c. per lb.
75	Iron oxides—ochres, washed or ground	¼c. per lb.
75	Iron oxides—"iron-oxide pigments not specially provided for"	20% ad val.
204	Magnesite—crude	5/10c. per lb.
204	Magnesite—caustic calcined	¼c. per lb.
204	Magnesite—dead burned and grain	23/40c. per lb.
50	Magnesium sulphate—(Epsom salts)	¼c. per lb.
302	Manganese—ore or concentrates, containing in excess of 30 per centum of metallic manganese	1c. per lb. on metallic Mn content
208	Mica—unmanufactured, valued at not above 15 cents per pound	4c. per lb.
208	Mica—unmanufactured, valued above 15 cents per pound	25 ad val.
208	Mica—cut or trimmed, and mica splittings	30% ad val.
208	Mica—ground	20% ad val.
808	Mineral waters	10c. per gal.
1640	Phosphate—"phosphates, crude"	Free
1677	Pyrites—"sulphur ore, such as pyrites or sulphuret of iron in its natural state, and spent oxide of iron, containing more than 25% of sulphur"	Free
83	Salt—in bags, sacks, barrels, or other packages	11c. per cwt.
83	Salt—in bulk	7c. per cwt.
83	Sodium sulphate—crystallized or Glauber salt	$1.00 per ton
1667	Sodium—sulphate, crude or salt cake	Free
207	Silica—crude, not specially provided for	$4 per ton
207	Silica—for use as pigment, not specially provided for	$7.50 per ton
209	Talc—crude	¼c. per lb.
209	Talc—ground, washed, powdered, or pulverized (except toilet preparations)	25% ad. val.
1675	Tripoli—crude or manufactured, not specially provided for	Free

(c) On Structural Materials and Clay Products

	Clay Products—	
201	Brick-bath, chrome and fire, n.s.p.f.	25% ad val.
1536	Brick—not specially provided for	Free
207	China clay or Kaolin	$2.50 per ton
207	Clays or earths, unwrought or unmanufactured, including common blue clay and Gross-Almerode glass pot clay, n.s.p.f.	$1.00 per ton
207	Clays or earths, wrought or manufactured, n.s.p.f.	$2.00 per ton
210	Earthenware—common yellow, brown or gray made of natural, unwashed, and unmixed clay, plain or embossed; common salt-glazed stoneware; stoneware and earthenware crucibles; all the foregoing not ornamented, incised, or decorated in any manner	15% ad val.
210	Earthenware—ornamented, incised, or decorated in any manner and manufactures wholly or in chief value of such ware, n.s.p.f.	20% ad val.
207	Earthenware—Rockingham	25% ad val.
203	Lime—not specially provided for	10c. per cwt.
203	Lime—hydrated	12c. per cwt.
237	Slates—slate chimney pieces, mantles, slabs for tables, roofing slates, and all other manufactures of slate, n.s.p.f.	15% ad val.
	Stone—	
203	Limestone—(not suitable for use as monumental or building stone) crude, or crushed but not pulverized	5c. per cwt.
235	Limestone, freestone, granite, sandstone, lava and all other stone suitable for use as monumental or building stone, except marble, breccia, and onyx, n.s.p.f., hewn, dressed, or polished, or otherwise manufactured	50% ad val.
235	Unmanufactured, or not dressed, hewn, or polished	15c. per cubic ft.
232	Marble, breccia and onyx, in block, rough or squared only	05c. per cubic ft
232	Marble, breccia and onyx, sawed or dressed, over two inches in thickness	$1.00 per cubic ft
232	Marble, breccia and onyx slabs and paving tiles, containing not less than four superficial inches, if not more than one inch in thickness	8c. per superficial foot
	If more than one inch and not more than one and one-half inches in thickness	10c. per superficial foot.
	If more than one and one-half inches and not more than two inches in thickness	13c. per superficial foot.
	If rubbed in whole or in part	3c. per superficial foot in addition.
	Mosaic cubes of marble, breccia, or onyx, not exceeding two cubic inches in size, if loose	One-fourth of one cent per lb. and 20% ad val.
	If attached to paper or other material	5c. per superficial foot and 35% ad val.
1675	Stone and sand: Burrstone in blocks, rough or unmanufactured; quartzite; traprock; rottenstone; tripoli and sand, crude or unmanufactured; cliff stone; freestone; granite and sandstone; unmanufactured and not suitable for use as monumental or building stone; all of foregoing not specially provided for	Free

REVIEW OF METALLURGICAL PRACTICE IN CANADA

BY DION S. HALFORD, B.A.Sc.

Introduction

Metallurgical practice as employed in Canadian mills, smelters and refineries for the recovery of the non-ferrous metals from their ores has been described by many writers in trade journals such as the *Engineering and Mining Journal-Press* and the *Canadian Mining Journal* and in papers presented at meetings of the Canadian Institute of Mining and Metallurgy, the American Institute of Mining Engineers and other scientific societies as well as in various Government reports, both Provincial and Dominion, but up to the present no general review embodying the principal features of the typical processes employed in each of the main divisions of the industry has been compiled for the convenient reference of the reader who desires to obtain a general conspectus of the industry.

In the following review the plan adopted has been to consider the principal metals separately and to describe the processes used in the principal plants in which the said metal is recovered. The description includes processes for the recovery of gold, silver, cobalt, nickel, copper, lead and zinc in the order named.

Gold, because of its importance in Ontario and in British Columbia, has been treated more extensively than the other metals and the review includes descriptive notes on the processes used in the following Ontario mines: Hollinger, Dome, McIntyre-Porcupine, Wright-Hargreaves, Kirkland Lake, Teck-Hughes, Lake Shore, Tough-Oakes, Montreal-Ontario-Kirkland; and in British Columbia, the Hedley, Premier, Nugget, and Belmont Surf Inlet.

Silver recovery has been described by reference to the processes used in the Nipissing, Cobalt Reduction Company and Coniagas mills.

Cobalt and its compounds are recovered by two smelters in south Ontario; the plants of the Coniagas Reduction Company at Thorold and the Deloro Smelting and Refining Company at Deloro, Ontario, have been described.

Nickel recovery operations in the plants of the International Nickel Company of Canada, Ltd., the Mond Nickel Company and the British America Nickel Corporation have been described.

Copper smelting and refining processes reviewed include those used by the Consolidated Mining and Smelting Company at Trail, the Granby Consolidated Mining, Smelting and Power Co., Ltd., at Anyox, B.C., and the Britannia Mining and Smelting Company, Ltd., Britannia, B.C.

Lead smelting as practised by the Consolidated Mining and Smelting Company at Trail has been described and notes have been included on the Silver Standard, Silversmith, and Alamo plants.

Zinc production, electrolytically, by the Consolidated Mining and Smelting Company at Trail and a description of the new Kimberley mill form the subject matter of the concluding section in this review.

Gold

Gold is found in Canada over widely-distributed areas and with a great variety of mineralogical associations. The associated minerals are the determining factor in the choice of a metallurgical treatment as the gold itself is seldom in chemical combination with any other element. Accordingly, we find in Canada several types of ore from which gold is extracted by different processes and which for convenience are classified under the following divisions:

(1) The placer or alluvial gold deposits of the Yukon and British Columbia where the gold occurs in coarse nuggets in sand and gravels requiring only a comparatively crude gravity concentration or amalgamation with mercury.

(2) The free-milling ores which are amenable to cyanidation and amalgamation. This is the most important type in Canada at present.

(3) Gold ores refractory to cyanide, that is to say, ores in which gold is the essential mineral but which contain some other mineral which prevents the use of the cyanide process.

The gold ores containing copper, the most notable of which are those of the Belmont Surf Inlet Mine at Surf Inlet, B.C., belong to this class. The copper would cause a very heavy consumption of cyanide so the ore is concentrated and the concentrates smelted.

The carbonaceous gold ores found in some of the veins in the Porcupine camp also belong to this class. The carbonaceous matter causes precipitation of the dissolved gold from solution due, it is thought, to occluded gases. A large amount of research work has been done on the treatment of these ores by the metallurgists of the McIntyre and Hollinger mines. A novel method of treatment has been worked out by Mr. André Dorfman of the McIntyre involving the agitation of the ore with oil which coats the carbon particles thereby rendering them inert. The Hollinger staff has done a large amount of laboratory work along similar lines but as yet we have no record of the use of this system in actual milling practice. The extent of this class of ore is small when compared with the free milling type.

(4) Gold associated with arsenic is found at many points particularly Mt. Uniacke, N.S., Deloro, Temagami, Howry Creek and Long Lake in Ontario, and at Hedley, B.C. At the latter point the Nickel-Plate mine, in 1922 as in former years, milled an arsenopyrite ore recovering gold in the form of bullion by the cyanide process and an arsenical concentrate which was shipped to United States smelters; payment was made for both gold and arsenic contents.

(5) In addition to the above, gold is recovered in large amounts from ores which are treated essentially from some other minerals. The chief source of such gold is in the smelting of copper ores of British Columbia and the nickel-copper ores of Ontario.

The greater portion of the gold produced in Canada in 1922 was recovered by the cyanide process. This process as practised in the mills of Northern Ontario varies from one plant to another in mechanical detail but in every case five essential steps are taken as follows:—

(1) Reducing the ore to a size small enough to free the gold particles;
(2) Dissolving the gold in a weak solution of sodium cyanide in water;
(3) Removing the solution containing the dissolved gold from the impoverished ore;
(4) Precipitating the gold from the pregnant solution by zinc;
(5) Refining the precipitates.

[redacted] mill of the *Hollinger Consolidated Gold Mines, Ltd.*, at Timmins, Ontario, has a capacity [redacted] tons of ore per day and is the largest in Canada. The cyanide process is used. During the year 1922 the ore reduction capacity was increased by the addition of rolls and the extraction losses reduced by the installation of Oliver filters. A competitive test was carried on between a rod mill and two ball mills. Results of this test were not made public, but it is significant that orders have been placed for rod mills to replace the stamps.

Reduction of the ore is accomplished by gyratory crushers followed by rolls until the size is one inch. The next step is primary grinding by means of stamps, ball mill or rod mill at present. From this step the ore passes to Dorr classifiers, which are in closed circuit with tube mills. In the tube mills Danish flint pebbles are used as the grinding medium.

The pulp overflowing the Dorr classifier passes to thickeners, from which the clear solution overflowing is ready for precipitation. The thickened pulp underflow is agitated in Dorr agitators and then concentrated on Deister tables. There are 25 double-deck and 88 single-deck tables. Table concentrates are reground and agitated in solution which contains more sodium cyanide than the ordinary mill solution.

This is practically the last operation in which extraction of the gold from the ore takes place. From this point the table tails and treated concentrates are sent to the decantation plant and from there to the Oliver filters. Both of these operations are for the purpose of removing solution containing dissolved gold from the impoverished ore. The decantation plant contains 8 rows of thickeners with 4 thickeners per row. The thickeners are of the tray type, 40 feet in diameter and 15 feet deep. In the filter plant there are seven 14 x 12 ft. Oliver filters.

HOLLINGER MILLING RESULTS IN 1922

(From the Annual Report of Hollinger Consolidated Gold Mines, Ltd.)

Tons of ore milled		1,491,381
Average value per ton	$	8·53
Gross value	$	12,726,550
Net value recovered	$	12,274,115
Average tons per day		4·097
Per cent of possible running time		90·5
Tons per 100 per cent running time		4,527
Stamp duty per 100 per cent running time		20·12
Solution precipitated per ton ore		1·85 tons
Value per ton in tailings	$	0·30
Cyanide consumed per ton of ore		0·490 lb.
Zinc dust consumed per ton of ore		0·133 "
Zinc dust consumed per ton of solution		0·072 "
Lime consumed per ton of ore		2·970 "
Lead acetate per ton of ore		0·008 "
Average value pregnant solution	$	4·43

At the *Dome Mines, Limited*, South Porcupine, the mill was changed around during 1922 to meet new conditions created by a higher grade of ore being milled than formerly. When the low-grade ore was being milled, the sands were separated from the slimes and treated separately. At present it is necessary to grind practically everything to 200-mesh in order to free the gold particles. However, the practice of impoverishing ore by amalgamation before cyaniding has been retained. The capacity of the mill is slightly over 1,000 tons per day.

After preliminary crushing in gyratory and jaw crushers, the ore goes to a trommel with 2-in. openings, from which the oversize goes to the stamp feed bin and the undersize to the ball mill feed bin. There are 60 stamps and three 8 ft. x 30 in. Hardinge ball mills. Both stamps and ball mills discharge into 5 Dorr classifiers. There are 5 tube mills using flint pebbles in closed circuit with these classifiers.

The overflow from the classifiers is pumped to the amalgamation plates. The gold amalgam is retorted. After flowing over the amalgamation plates the ore passes over a set of concentrating blankets. The concentrates from these blankets are treated in an amalgam barrel. After passing over the blankets the ore is classified in 12 Merrill cones, the overflow containing the fines going to the cyanide department, and the underflow to 2 tube mills which discharge on amalgam plates, the whole being in closed circuit with Dorr classifiers. The overflow is returned to the original amalgamation circuit, so that all of the ore must eventually be ground fine enough to overflow in the Merrill cones before cyaniding. This calls for fine grinding. The [redacted] of 4,500

In the cyanide department the pulp is de-watered in Dorr thickeners and the cyanide solution is added before agitation, which is accomplished in a continuous series of 10 Pachuca agitators followed by two mechanical agitators. The solution is removed from the impoverished ore in Merrill filters. The pregnant solution is clarified in five 40 ft. sand clarifiers and de-aerated by the Crowe vacuum process. Gold is precipitated by zinc dust in Merrill equipment.

The mill of the *McIntyre Porcupine Mines, Ltd.*, with the equipment added in 1922 now has a capacity of 1,000 tons a day. Preliminary crushing to 1 in. is accomplished in one gyratory crusher, followed by rolls. These operations are carried on at the shaft from which the ore is conveyed by an aerial tram to the mill. It is ground to 8-mesh by 3 Hardinge ball mills and then slimed in 5 tube mills operated in closed circuit with 5 Dorr Duplex Classifiers. The classifier overflow runs to the primary thickeners, from which the overflow is the pregnant solution. The underflow from the primaries is agitated in three series of Dorr agitators. Solution is removed from the impoverished ore by continuous countercurrent decantation. There are four rows of 30-ft. single thickeners, 4 tanks to a row, and one row of double-tray, 59-ft. tanks in the decantation department.

Gold is precipitated from the pregnant solution by zinc dust in combination with the Crowe vacuum process.

In addition to the mills described above, there are four other fully-equipped cyanide-plants in the Porcupine camp which were not operated in 1922, as well as two small mills equipped for amalgamation. The cyanide mills are on the following properties:

(1) The Porcupine Crown Gold Mines Limited.
(2) The Schumacher Gold Mines Limited.
(3) The Vipond Consolidated Mines Limited.
(4) The Consolidated West-Dome-Lake Mines Limited.

The amalgamation mills are on the Clifton Porcupine and Three Nations properties.

The mill of the *Wright-Hargreaves Mines, Limited*, at Kirkland Lake operated continuously in 1922. This mill was designed to treat 200 tons per day, and is generally looked upon as an ideal small mill from both mechanical and metallurgical standpoints. Crowding of machinery has been avoided, and altogether the safety and comfort of the operators given more consideration than usual.

Ore from the mine is crushed in two jaw-crushers and run to a 600-ton mill storage bin. Grinding is done in an 8-ft. Hardinge mill followed by two tube mills in closed circuit with two Dorr classifiers. The overflow of the classifiers runs to a Dorr thickener. Underflow from this thickener is agitated in three agitators and solution removed from the impoverished ore by continuous countercurrent decantation, for which a series of five thickeners is used. Water is added as a wash in the fifth tank and barren solution is added in the fourth. Overflow from the first tank is used for crushing solution and that from the thickener following the classifiers is the pregnant solution. The gold is precipitated from this solution by zinc dust used in a combination of the Crowe Vacuum and Merrill processes. The gold precipitates are smelted to crude bullion on the property, and the bullion is shipped to the Royal Mint.

Kirkland Lake Gold Mining Co., Ltd., operated their mill continuously in 1922. This mill has a capacity of 150 tons per day. Ore is ground in an 8 ft. x 30 in. Hardinge mill and 6 x 16 ft. tube mill. Solution is removed from impoverished ore by countercurrent decantation. Gold is precipitated by zinc dust.

Teck-Hughes Gold Mines operated their mill continuously in 1922. The capacity of the mill was 60 tons per day. The high value of ore milled presented new problems, due to the extra length of time necessary for complete impoverishment of the ore by cyanide, which was, of course attended by lowering of the mill capacity. A treatment involving the addition of sodium peroxide before agitation was worked out by the management and proved very successful.

Grinding is done by a 5 x 5 ft. P. & M. cylindrical ball mill followed by a 5 x 20 ft. P. & M tube mill. Agitation is done by 3 Dorr agitators and solution is removed by settling in one Dorr thickener and filtering in one 11 ft. 6 in. x 8 ft. Oliver filter. Gold is percipitated from the solution by zinc dust.

The Lake Shore Mines at Kirkland Lake, Ontario, is equipped with a mill, the capacity of which is approximately 60 tons per day. The standard practice of grinding to slime is followed in this mill. Dissolved gold is removed from impoverished ore by continuous countercurrent decantation.

The mill of the *Tough-Oakes* mine was operated intermittently in 1922. It has a capacity of 100 to 125 tons per day. The process is similar to the *Wright-Hargreaves* in essential details.

The *Montreal-Ontario-Kirkland Mine* is also equipped with a mill which was constructed in 1922. It has a capacity of about 100 tons per day, but was only operated for a short period. Standard practice was followed closely.

The Hedley Gold Mining Co., of Hedley, B.C., operates the Nickel Plate mine. The gold is associated with mispickle (arsenopyrite) in the ore. The mill uses a combination of cyanidation and concentration, the arsenic contents of the concentrates being paid for by the smelters as well as the gold. The ore is crushed in cyanide solution by 40 stamps and ground in 5 tube mills, which are in closed circuit with 5 Dorr classifiers. From the classifiers the pulp passes to 3 slime settlers, the overflow from which is the pregnant solution. This is clarified and the gold precipitated. The slimes from the settlers are agitated and then filtered by three 11 ft. 6 in. x 8 ft. Oliver filters. The pulp from the filters is agitated with water and concentrated on 12 Deister tables and 24 Frue vanners. The concentrates are de-watered and shipped to the United States. The mill capacity is in the neighbourhood of 200 tons per day.

The Premier Gold Mine at Premier, near Stewart, B.C., is equipped with a mill which was designed to treat 100 tons per day. On account of the complex nature of the ore a combination of concentration and cyanidation is used. Ore is first gound in a Marcy mill, classified and tabled. Table tails are reground in a ball mill in closed circuit with a Dorr bowl classifier, and then submitted to flotation. Table and flotation concentrates are shipped to smelters. The tailings from the flotation machine are thickened, filtered and then cyanided. Cyanide precipitates are shipped to the smelters for refining.

Nugget Gold Mines, Ltd., Salmo, B.C., operated the Motherlode mill. This mill has a capacity of 100 tons a day and is equipped for all-sliming cyanidation. The ore is crushed to 1½ in. in a Blake crusher, thence by 10 stamps and a tube mill in closed circuit with a Dorr classifier. Agitation is accomplished in 4 Pachucas and solution freed from impoverished ore by a Dorr thickener and Merrill filter presses. Gold is precipitated by zinc dust.

Belmont-Surf-Inlet. The ore from this mine, which is situated at Surf Inlet, B.C., is a pyritized quartz carrying chiefly gold values with a little silver and copper. The metallurgical treatment consists of straight concentration and is interesting from the fact that it is probably the only place in Canada where an ore mined essentially for gold is concentrated without previous impoverishment of gold values by amalgamation or cyanidation. The mill has a capacity of 300 tons per day. The ore is crushed in a gyratory crusher to 2 in. and then to 320-mesh by two 6 x 5 ft. ball mills. This product is tabled on 6 double-deck Wilfley tables. Table tails are de-watered and reground in four 5 x 16 ft. tube mills, which are run in closed circuit with Dorr classifiers. Flotation is the next step. This is accomplished by machines of the Jones-Belmont type. The oil mixture is 5 per cent pine oil, 35 per cent creosote and 60 per cent coal tar. Small amounts of sodium sulphide are also used. Flotation concentrates are de-watered by means of a Dorr thickener and an Oliver filter.

Silver

The mill of *The Nipissing Mining Co., Limited*, at Cobalt has a capacity of 250 tons per day. There are two departments, known locally as the low-grade mill and the high-grade mill. In the low-grade mill the ore is first concentrated and the tailings from this concentration cyanided. The concentrates are sent to the high-grade mill and cyanided by themselves, as they require a different treatment from the tailings.

The treatment in the low-grade mill may be summarized as follows:—

1. Crushing run-of-mine ore to 4 in. at the mine in 18 x 36 in. jaw crushers.
2. Crushing to 1½ in. at the mill in gyratory crushers.
3. Stamping to 4-mesh by 40 stamps.
4. Roughing on Wilfley sand tables.
5. Fine grinding in tube-mills to 8 per cent plus 200-mesh.
6. Roughing fines on Wilfley slime tables.
7. Final sliming in tube-mills with 1¼-in. iron balls.
8. Agitation for 50 hours in sodium cyanide solution.
   (strength 0.25 per cent KCN) in mechanical agitators.
9. Filtering in Butters filters.
10. Sodium sulphide precipitation.
11. De-sulphurizing precipitate of silver sulphide.
12. Melting and refining bullion.

In the high-grade mill the table concentrates and high-grade ore are charged to a tube mill and ground for 23 hours. The next step is a wash with 3 per cent sulphuric acid to remove cyanicides such as decomposed nickel compounds. The acid is washed off by diluting it with water, settling and decanting. The pulp from the acid treatment is pumped to the cyanide vats, where it is agitated with 0.5 per cent solution at a dilution of 35 parts of solution to 1 part of ore. After filtering, the silver is precipitated from the solution with sodium sulphide.

The following data on milling results at the *Nipissing* are taken from the 1922 annual report to shareholders:

"Based on tonnage treated of 82,025 tons the cost per ton attributed to the high-grade mill was $1·662, and to the low-grade mill $4·189.

LOW-GRADE MILL COSTS

	Cost per ton
Mine	$ 0·009
Crushing plant	0·064
Aerial tram	0·109
Surface tram	0·122
Crushing and elevating	0·284
Batteries	0·726
Tube mills	0·279
Concentration	1·641
Cyanide treatment	0·234
Filtering	0·192
Precipitation	0·070
Refining	0·264
Heating	0·054
Water service	0·018
Residue dam	0·040
Research	
Total	$ 4·189

ANALYSING THE COSTS IN ANOTHER WAY

	Cost per ton
Labour	$ 1·051
Supplies	2·252
Power	0·670
Shops	0·238
Total	4·211
Less credits	0·022
Total	$ 4·189

COST OF CHEMICALS AND MAIN SUPPLIES AT LOW-GRADE MILL

	Total pounds	Cost per pound	Pounds per ton	Cost per ton
				$
Sodium cyanide	527,523	0·1779	6·430	1·1443
Soda ash	525,200	0·0259	6·403	0·1659
Lime	462,300	0·0081	5·636	0·0462
Pebbles	228,200	0·0153	2·794	0·0429
Sodium sulphide	70,338	0·0464	0·858	0·0398
Caustic soda	34,560	0·0474	0·421	0·0201
Iron balls (1½)	3,257	0·0399	0·039	0·0542
Aluminium	3,250	0·2281	0·039	0·0091
Hydrochloric acid	5,452	0·0805	0·066	0·0053
Steam coal	2,453,000	0·0055	29·905	0·1635
				$ 1·6913

The ores from the mines of the *Mining Corporation of Canada* as well as customs ores from other mines, are treated by the *Cobalt Reduction Company*, a subsidiary company. The mill of this company is capable of treating about 300 tons per day. The ore is crushed in stamps, concentrated on tables, reground in tube mills and classified into sands and slimes. The sands are again tabled and the table tailings run to waste. The slimes are cyanided.

Table concentrates are ground to minus 200-mesh and treated with calcium hypochlorite which acts on the chief cyanicides, changing them to chlorides. These chlorides are then dissolved out by washing thoroughly with water and filtering on an Oliver filter. The pulp is then agitated with cyanide solution at a high dilution. The silver is precipitated out by sodium sulphide. When cyanidation is complete the pulp residue is sold to smelters for the cobalt content.

The mill of the *Coniagas Mines, Limited*, at Cobalt has a capacity of 300 tons per day. Concentration by gravity and flotation is employed, the concentrates being shipped elsewhere for further reduction.

After preliminary breaking in a jaw crusher and gyratory crusher, the ore is crushed by 60 stamps and tabled on Deister sand tables. The table tailings are classified in a drag classifier, from which the slime overflow goes to a thickener and the sand to three tube mills in which 4-in. iron balls are used as the grinding medium. Everything is ground to pass 80-mesh, and after classifying is passed over slime tables. The tailings from the slime tables are pumped to the flotation plant. The flotation unit consists of 4 treble-length Callow cells for roughing, 3 single-cell cleaners, and one recleaner. The oil mixture used is composed of coal-tar creosote,

pine oil and coal tar. Sulphur dissolved in the creosote is found to be beneficial from the standpoint of extraction, while sodium silicate used in the final cleaning raises the grade of concentrates.

Cobalt

Practically the whole of the world's supply of cobalt is produced from Ontario ores which are mined primarily for their silver contents. There are three smelters in Ontario in which the cobalt contents of these ores can be extracted. The complex nature of the ore with silver, arsenic, iron, copper, nickel and many gangue minerals being present, as well as the cobalt, makes the extraction of the latter both difficult and expensive.

Cobalt is used chiefly in the manufacture of stellite, an alloy for high-speed cutting tools, and as one of the main constituents of permanent magnets; it is also used as a catalytic agent in the hydrogenation of oils. The oxide is used mainly for colouring in the ceramic and enamel industries while the salts are used as driers in paints and varnishes.

In contrast to the metallurgy of other metals, very little seems to be known about the metallurgy of cobalt except by those engaged in the industry. Smelters for treating cobalt ores are situated at Deloro, Thorold and Welland, while others since dismantled were erected at Copper Cliff, Trout Lake, Orillia and Welland.

The smelter of the *Coniagas Reduction Company* at Thorold, Ontario, was erected in 1907. It produces refined silver, cobalt oxide and metal, nickel oxide and metal, white arsenic, and metallic arsenic. In the process used the ore is crushed, ground in a Krupp mill and sampled by a Venzin automatic sampler, two separate samples being taken. The ground ore is smelted in a blast furnace with limestone and iron ore, the products being impure metallic silver, an argentiferous speiss containing cobalt, nickel and iron, and also flue-dust and slag. The impure silver is cast into anodes and refined electrolytically. The speiss is treated with chemicals to recover cobalt, silver and nickel. Various grades of cobalt oxide containing from 60 to 76 per cent metallic cobalt are made depending on the demand of the market. A pure variety of arsenious oxide is produced by refining the arsenical fume from the dust flues and collectors.

The plant of the *Deloro Smelting and Refining Company* at Deloro is equipped to produce refined silver, cobalt oxide and metal, nickel oxide and metal and white arsenic. Plants connected with the smelter are equipped for producing stellite and insecticides. The ore is crushed to 15-mesh in a ball mill and sampled with a Snyder sampler. It is then mixed with the necessary fluxes and smelted in a blast furnace, the products being metallic silver, an argentiferous speiss, slag and flue-dust. The argentiferous speiss is recrushed, roasted in an oil-fired Bruckner furnace to get rid of arsenic and then given a chloridizing roast with salt.

The chloridized speiss is charged into agitating tanks where the silver is extracted by sodium cyanide. Residues from this treatment are dissolved in acid, but the similarity of the properties of iron, nickel and cobalt still remain. They are precipitated by alkaline hydrates or carbonates under special conditions. Cobalt is separated from nickel by precipitating it as cobaltic hydrate by hypochlorite solution. To insure purity the oxide is dissolved and again precipitated. In this operation chlorine gas is evolved and the handling of it is very troublesome.

The corrosive effect of solutions used in operations of so complex a nature is very great and the handling of them presents a problem at all times difficult to solve. The magnitude of the problem may be seen at once from the fact that in the production of one pound of cobalt it is necessary to handle 3,000 pounds of solution.

Nickel

The nickel-copper industry in Canada is centered around Sudbury, Ontario. The main ore deposits are classified as marginal and occur at the edge of a batholith whose axes on surface are approximately 35 and 15 miles. The ore is found along the contact of norite and granite gneiss. The copper is present in the ore as chalcopyrite and the nickel as pentlandite, both of which are very finely disseminated throughout pyrrhotite. As a rule, the pyrrhotite grades off into norite so that there are larger amounts of rock which might be worked profitably when metal prices are sufficiently high or if cheaper metallurgical processes could be found.

However, at the present time the known ore bodies are of tremendous size, the probable ore amounting to over 100,000,000 tons, and the problem since the war has been to find an outlet for nickel in commerce. The nickel companies have had large research staffs employed on the work of finding new uses for nickel and the results of this work have been very satisfactory. There is a growing demand for non-corrosive metals that can be rolled, and easily worked in machine shops. Monel metal produced by the International Nickel Company and "Corronil" the new alloy in the production of which the Mond company is interested, fill this demand.

The use of nickel for cooking utensils is on the increase particularly in England and will undoubtedly spread. The advantages claimed for solid nickel cooking utensils are that they are superior from a hygienic standpoint, wear better than others, and require practically no repairs. In the motor car industry, the use of nickel for trimmings and fittings is on the increase. Nickel coinage is becoming more popular and each year finds different countries increasing the amounts in circulation. Large amounts of nickel are consumed in the manufacture of resistance wires for electric heaters, grates, etc. The nickel-plating and nickel-steel industries have been well established for years.

During 1922 the International Nickel Company closed and dismantled their old refinery at Bayonne, N.J., and will in future produce all their refined nickel, nickel salts, etc., at Port Colborne, Ontario. However, they are increasing the output of their Monel plant at Huntington, West Virginia, and will continue to export matte to this point. The Mond Nickel Company is financially interested in the Henry Wiggin and Company, Limited, Birmingham, England, and the American Nickel Corporation with a plant at Clearfield, Pennsylvania. These plants turn out nickel rods, sheets, wires and also their new alloy, Corronil.

There are three companies engaged in the nickel-copper smelting industry in Canada, the third company being the British America Nickel Corporation. All three companies carry on operations in the Sudbury district up to the point where the metals are extracted from the ores in the form of matte. This matte which contains compounds of nickel and copper with sulphur as well as some iron and precious metals is shipped to refineries. While the refining operations of the three companies are based on widely differing principles, the metallurgy involved in the the production of matte is quite similar to standard metallurgical processes used in the treatment of pyritic copper ores. Preliminary treatment at each plant differs owing to the characteristics of the ores treated.

The International Nickel Company's ore from their most important mine, *Creighton*, is a heavy sulphide. It is crushed, hand-sorted and screened at the mine. The coarse ore is roasted in heaps in the open. Wood of cord-wood length is piled on end and the ore heaps built on top. The complete roasting of a heap takes several months. The reason for this roasting is to burn off sulphur so as to obtain higher grade matte in the blast furnaces and to oxidize the iron so that it will slag off. The roasted ore is loaded by steam shovels into standard railway cars and brought to Copper Cliff where it is bedded with green ore of a suitable fluxing nature and coke. From here it is charged to the blast furnaces of which there are eight. The fine ore is roasted in Wedge roasters and the calcines charged to one 110 x 20 ft. reverberatory furnace. This furnace is charged from the sides and uses pulverized coal for fuel both of which features tend to very efficient and economical operation. The products of these furnaces are matte and slag; the former is sent to converters and the slag is a waste product. The furnace matte contains high percentages of sulphur and iron which are taken out in converting.

Six Pierce-Smith barrel-shaped basic-lined converters are used. Air under a pressure of about 14 lb. per square inch is blown through the charge. The sulphur is burned off and quartz rock is added from time to time. The latter fuses with the iron to form slag which is skimmed off and returned to the blast furnaces. The converter matte which contains about 80 per cent nickel and copper as well as precious metals is shipped either to the refinery at Port Colborne or the Monel plant at Huntington, West Virginia. In the matte there are over two parts of nickel to one of copper.

The treatment at the *Mond Nickel Company's* smelter at Coniston differs in the preliminary treatment from that of the International. Part of the ore is concentrated by means of tables and oil flotation. These concentrates along with "fines" and flue dust are sintered on Dwight and Lloyd sintering machines and the sinter charged to the blast furnaces. Blast furnace matte is treated in Pierce-Smith converters and the converter matte shipped to Swansea, Wales. This

matte contains about 80 per cent nickel and copper, the metals being present in about equal proportions.

The smelter of the *British America Nickel Corporation* at Nickelton has been built more recently than the other two but follows closely the same metallurgical principles. The ore is smelted in two blast furnaces and furnace matte blown in converters of the Pierce-Smith type. The converter matte which contains about two parts of nickel to one of copper is granulated and shipped to the refinery at Deschenes, Quebec.

In the refinery of the *International Nickel Company* at Port Colborne the method employed is known as the Orford process. It consists of smelting the matte with salt-cake (sodium sulphate), the nickel concentrating in the "bottoms" and the copper in the "tops" of the cooled mass. Repeated smelting are necessary to complete the separation. The copper "tops" are blown in converters to blister copper while the "bottoms" are roasted and leached until completely changed to nickel oxide. The nickel oxide is smelted with charcoal in reverberatory furnaces and thereby reduced to metallic nickel. The precious metals are recovered as by-products but the Orford Process is rather inefficient as far as their recovery is concerned.

Matte for Monel metal is blown much freer of sulphur at Copper Cliff than the ordinary matte intended for the refinery. At the Monel plants the last traces of sulphur are removed. No precious metals are recovered from matte that goes into Monel metal.

The refinery of the *Mond Nickel Company* is situated at Clydach, near Swansea, Wales. The method employed was invented by Dr. Ludwig Mond and is based on the affinity of carbon monoxide for nickel. The matte is ground very fine, roasted, leached with sulphuric acid to remove most of the copper and the residue dried at a low heat. Carbon monoxide gas is passed over the material at a temperature of from 50° to 80° C. and a vapour known as nickel carbonyl is formed. The vapour is decomposed by passing it through a tower containing nickel shot heated to a temperature of 200° C. A layer of nickel is formed on the shot and the carbon monoxide is regenerated and returned to the volatizing towers. The nickel shot is alternately exposed to and withdrawn from the action of this gas until large enough for use. The product is remarkably pure containing 99·8 or 99·9 per cent of nickel. The copper is sold as copper sulphate. It is used chiefly as an insecticide in the vineyards of France and Italy. An interesting feature of the sale of this sulphate is that the Italian peasants demand that the sulphate be packed in oak casks which when emptied are sawed in two and used as tubs. Large numbers of these casks are made in Canada and in them the matte is shipped to the refinery where they are later filled with copper sulphate.

The refinery of the *British America Nickel Company* at Deschenes, Quebec, uses the Hybinette process which gets its name from the inventor, V. N. Hybinette, a metallurgist formerly connected with the Orford refinery and also the Kristianssands Company in Norway. The granulated matte upon reaching the refinery is first used for cementing copper out of used nickel electrolyte. The latter is pumped from the nickel tanks, heated and agitated in tanks with the granulated matte. Besides freeing the electrolyte of copper, quantities of nickel are dissolved out. The matte is then removed from the tanks, roasted in Wedge roasters and leached with sulphuric acid-copper electrolyte. The copper solution is sent to the electrolytic tanks where the copper is precipitated out. Lead anodes and copper cathodes are used. The copper is stripped from the cathodes, melted in a small reverberatory furnace and cast into ingots.

The matte from which the copper has been removed by leaching is fused in electric furnaces and cast into anodes. These anodes are enclosed in canvas covered frames before being placed in the tanks. Nickel sheets are used as cathodes. During electrolysis the nickel electrolyte is kept in circulation, the fresh solution from the cementation tanks being added inside the frame and the solution for the cementation tanks being drawn off from the body of the tank. After electrolysis the residual slimes are washed from the frames and any pieces of broken anodes are returned to the anode furnace. The slimes are dried and shipped in kegs to United States smelters where the precious metals are recovered.

The nickel after being stripped from the cathodes is melted in a tilting furnace and poured into ingots or shot in which form it is sold.

Copper

The Consolidated Mining and Smelting Company of Canada, Limited, Trail, B.C., operates more than twenty mines, in addition to one of the most diversified metallurgical plants on the continent. The present plant is equipped to produce electrolytic copper in ingots or wire-bars, copper sulphate, electrolytic and antimonial lead, electrolytic zinc and zinc dust, sulphuric and hydrofluoric acids, fine gold and zinc.

The plant at Trail is divided into four parts; the lead and copper smelting unit; the zinc unit; refinery unit; and the concentrator. In addition, a concentrator is under construction at Kimberley for the treatment of ore from the Sullivan mine.

The copper-smelting equipment consists of three blast furnaces, three fore-hearths or settlers, two Great Falls type converters served by a travelling crane, a Cottrell installation for the precipitation of flue dust, and a circular casting machine for casting blister-copper anodes. Copper ores are first crushed to four-inch size, sampled by a Vezin sampler and then bedded in the storage beds, from which the blast furnace charge is drawn. The three blast furnaces are arranged parallel to each other. Each furnace has a capacity of about 600 tons per day, the size being 42 x 420 in. The molten charge runs into settlers 9 ft. in diameter, in which the matte, being heavier, settles to the bottom and is drawn off through the tap-hole, while the slag is skimmed off. Slag and other waste products are dumped over the bluff above the Columbia river.

The matte, which is a combination of sulphides of iron and copper assaying about 18 per cent copper, is next treated in converters of the Great Falls type. Quartz or ore high in quartz is added and air under a pressure of between 10 and 15 pounds per square inch is forced through. In the converter the sulphur is burned off and the quartz unites with the iron to form slag, which, being lighter than the remaining matte, is poured off. No fuel is required, as the both reactions, *i.e.*, the burning of the sulphur and formation of slag give out enough heat to keep the products molten. Converter slag being comparatively rich in copper, is taken back and recharged to the blast furnace. The converters are blown, and silica charged, until all the sulphur and iron have been eliminated, leaving only copper and the precious metals. This copper, known as blister copper, is cast into anodes 34 x 24 in. and taken to the copper refinery.

The copper refinery is housed in a steel and concrete building. There are 188 electrolytic tanks, the dimensions of which are 9 ft. 6 in. x 2 ft. 6 in. x 3 ft. 6 in. The electrolyte consists of copper sulphate and sodium chloride dissolved in sulphuric acid. The electric energy required is from 4,000 to 4,500 amperes at from 50 to 100 volts. The copper is dissolved from the anodes and redeposited on the cathodes. The precious metals and insoluble impurities settle on the bottom of the tanks in the form of slime. The slime, after being screened to remove small bits of copper, is sent to the gold and silver refinery. The cathodes are melted and cast into ingots which are either shipped in that form or worked into wire-bars in the wire-bar mill.

The Granby Consolidated Mining, Smelting and Power Co., Limited, operates a smelter at Anyox, B.C., on Observatory Inlet, about 120 miles north of Prince Rupert. The plant has a capacity of 3,000 tons per day. Pyritic smelting is practiced. There are four blast furnaces, each 50 in. wide by 30 ft. long. These furnaces are the regular type of rectangular water-jacketted matting furnace and each is served by a 12 ft. and an 8 ft. settler. A low-grade furnace matte running about 15 per cent copper is made. While most of this is charged to the converters, some is run to large beds, where it is allowed to cool, then broken up and returned to the furnaces, where it has a beneficial mechanical effect on the rest of the charge. The smelter is equipped with three 12-ft. and two 20-ft. Great Falls type converters served by two 40-ton cranes. The grade of matte is brought up to 35 per cent in the two larger converters and finished in the smaller ones.

Flue-dust is collected in exceptionally large baffled chambers and sintered in a Greenawalt sintering machine.

Recently a small concentrator has been operated for experimental purposes. The company also owns and operates coal mines at Cassidy, B.C., as well as a complete by-product coking plant.

The Britannia Copper Company constructed a new concentrator of 3,000 tons capacity at Britannia Beach, British Columbia, during 1922, to replace the one destroyed by fire in 1920. It was completed and placed in operation early in 1923. The process used in the new mill is

one of concentration by differential flotation, inasmuch as the copper sulphides are floated and the greater part of the iron is left in the tailings. The ore is crushed to pass $2\frac{1}{2}$-in. rings at the mine before being sent to the mill, where it is reduced in successive steps by two sets of rolls until everything passes $\frac{1}{4}$-inch Hummer screen. It is then weighed by means of weightometers and sampled. Grinding is done in 18 tube mills, size 7 x 10 ft. in closed circuit with 18 Dorr classifiers. The overflow from the classifiers goes to six 14-cell flotation machines. These machines make finished concentrates, middlings which are retreated, and tailings. The reagent used is a mixture of coal-tar creosote, pine oil and lime with minute quantities of sodium resinate. The character of the froth can be varied within limits by the amount of lime used, so that the iron sulphides may be floated or dropped at will without affecting the recovery of copper to any great extent. Flotation concentrates are dewatered by means of 3 Dorr thickeners and 2 vacuum filters. The ratio of the concentration is expected to be between 6 and 7 to 1.

Lead

At the smelter of *The Consolidated Mining and Smelting Co. of Canada, Limited*, at Trail, B.C., the lead ore, 90 per cent of which is concentrates, is first dried and pre-roasted in Wedge roasters, then sintered in Dwight and Lloyd sintering machines. The object of the sintering is to agglomerate the particles into comparatively large masses for treatment in the blast furnaces and secondly to roast off the sulphur. There are 7 Dwight and Lloyd sinterers in use. The ore, which generally contains about 14 per cent sulphur at the start of sintering operations is first treated on three of the machines, the resulting sinter containing 9 per cent sulphur, being broken up and retreated on the remaining machines with the addition of some granulated slag from the lead blast furnace. The final sinter contains about 1.5 per cent sulphur.

There are 4 lead blast furnaces, each 45 x 180 in. with a capacity of 230 tons per day. The lead is recovered as blast furnace bullion. The slag, which assays 18 per cent SiO_2, 18 per cent zinc, 31·5 per cent iron, 9 per cent CaO, and 1.7 per cent lead, is discharged into a fore-hearth and then to a launder. It is granulated, part of it being kept for preparation of sinter and the remainder laundered to waste. The blast furnace bullion is drossed in 50-ton drossing kettles, the dross going back to the blast furnaces, while the lead is cast into anodes 29.5 x 26 x 1.125 in. weighing 320 lb. each, and taken to the lead refinery. The gases from the blast furnaces and sinterers are passed through Cottrell treaters, where the dust is precipitated. This dust forms part of the charge to sintering furnaces.

In the lead refinery the Betts electrolytic process is used. The plant has a capacity of 150 tons per day. There are 70 rows of tanks arranged seven in a row. The electrolyte contains 10 per cent hydrofluosilicic acid and from 6 to 7 per cent lead. It is quite expensive and therefore it is imperative that tanks should be leak-proof. They are made of concrete 4 in. thick, reinforced principally at the corners and lined with a mixture of oil, asphalt and sulphur. There are two sizes of tanks in use. The smaller hold 21 anodes and 22 cathodes, while in the larger there are 24 anodes and 25 cathodes. The electrolyte is cascaded from one tank to another down each row, the drop between cascades being 3 in. The average current density employed is 14.5 amperes per sq. ft. and the voltage drop 0.3 to 0.55 according to the age of the anodes and the thickness of adhering slime. Each anode is in the tank 8 days, but two crops of cathodes four days each, are taken. Slime is removed from the anodes by hand scrubbing and washing with electrolyte. Lead fluosilicate is washed out by dilute hydrofluosilicic acid and filtered off through a stationary filter. The latter is supplemented by filter presses.

The cathodes, after washing, are melted in 60-ton kettles, the melting period is 8 hours. Gradual heating follows for another 8-hour period, during which the molten lead is air-poled to remove any antimony present. During the last 8-hour period the lead is cast in stationary molds placed in a ring around the kettle. The pigs are skimmed free from dross and are then ready for shipment.

The Silver Standard Mill at Hazelton, B.C., was built in 1917 for the treatment of silver-lead-zinc ores. The mill has a capacity of 50 tons per day. The milling machinery consists of three sets of rolls, elevators, two sets of Faust jigs, three Faust tables, classifiers, screens, settling tanks, etc.

The Silversmith Mines, Limited, situated near Sandon, B.C., treated silver-lead-zinc ores in the Ivanhoe mill, which they bought and remodelled during 1922. The mill as it now stands has a capacity of 100 tons per day and produces both lead and zinc concentrates of marketable grade. The ore is reduced first by rolls, is carefully sized and concentrated in Hancock jigs which make lead concentrates. Jig tails are ground in a ball mill, classified hydraulically, and tabled on Wilfley and Deister Overstrom tables. Tables and jigs make lead concentrates only as it is not practical to separate zinc blende and spathic iron by this means. One 6 x 2 ft. Hardinge mill regrinds table tails to minus 80 mesh, the size required for flotation.

The flotation installation consists of 5 Callow cells. On the first cell a lead froth is taken off and sent to a cleaning cell, underflow from both these cells going to the third cell which is the zinc rougher. The remaining two cells are used as zinc cleaners.

The Alamo Concentrator.—This concentrator, designed for treating lead-silver ores of the Slocan district in British Columbia, is situated at Alamo on the Kalso-Nakasp Railway. The mill has a capacity of 150 tons per day. Power is furnished by a 225 h.p. Pelton wheel. The ore is ground in a Hardinge mill, classified closely in Callow travelling-belt screens and tabled on Wilfley tables of which there is a total of fifteen. The tables make lead concentrates. The table tails are reground in a Hardinge mill and the zinc sulphide recovered by flotation. The latter is done by Callow pneumatic cells. The installation consists of one double-rougher, two cleaner and one recleaner, cells. The final flotation product is tabled, the table concentrates being added to lead concentrates and the remainder which is the final zinc concentrate being dewatered by means of a Dorr thickener and an Oliver filter.

Zinc

The zinc ores of *The Consolidated Mining and Smelting Company* consist of an extremely intimate mixture of zinc in the form of blende (sulphide of zinc), lead in the form of galena (sulphide of lead) and iron in the form of pyrite and pyrrhotite (sulphides of iron), as well as gangue minerals. Ore of such complex character has been, until very recently, of little value owing to the fact that there were no methods of treatment known by which a sufficient recovery of the minerals could be made at a cost that would put the operation within the limits of economic feasibility. The ore cannot be smelted directly without the loss of the zinc and the specific gravities of the iron sulphides and blendes are so nearly alike that they cannot be separated by ordinary tabling. A system of concentration based on selective flotation has been worked out by the company's metallurgists which has proved successful in the Trail concentrator and is embodied in the new concentrator being erected by the company near Kimberley, B.C., for the treatment of ores from the Sullivan mine. As flotation is a selective and not an absolute phenomena, thoroughly clean lead and zinc concentrates are not produced but success has been attained in producing concentrates which can be successfully treated for extraction of the metals by available practical methods.

The new mill at Kimberley is designed for the treatment of 3,000 tons per day. It is situated about four miles from the Sullivan mine on a very desirable mill-site. The coarse crushing plant, however, is at the mine where the run-of-mine ore is crushed to 2½ in. size by means of a Buchanan jaw crusher followed by two Gates gyratories. It is then loaded into standard-gauge railway cars and hauled to the roll plant where it is weighed in the cars. In the roll plant the ore is reduced by successive steps in two sets of Alaska rolls to ¾-in. size. It is then sampled in the sample mill by bucket samplers and conveyed to the main mill-feed ore bin. Rotary feeders regulate the feed from the bins to the first Hardinge mills whence it is carried by conveyor-belts. There are two primary Hardinge mills 8 x 48 in. using 3-in. and 4-in. forged steel balls as the grinding medium. These mills discharge into a 10-way distributor which distributes the feed to 10 Dorr (model D) rake classifiers. These are in closed circuit with four 8 ft. x 48 in. Hardinge mills using 1¾-in. and 2¼-in. chilled balls. The overflow from the rake classifiers is pumped to 2 Dorr bowl classifiers. The sand discharge from the latter is pumped back to the ball mills and the overflow, after being sampled, goes to a 30 x 6 ft. mechanically agitated feed-stock tank. At this point grinding has reduced the ore until 95 per cent will pass through a 200-mesh screen. In ordinary flotation processes it is seldom necessary to grind so finely but it is imperative in this case on account of the close association of sulphides.

From the feed tank the ore goes to three, 18-cell Mineral Separation flotation machines, where at a pulp density of 1 : 1 and with a 1: 1 mixture of water-gas oil and coal-tar creosote, a rough lead concentrate is taken off. The tailing from these primary or lead machines forms the feed for the machines where the zinc is separated out. The lead froth is cleaned in a series of three 8-cell machines. The tailing from the first of these is returned to the grinding circuit and the froth from the third is the final lead concentrate.

There are four, 18-cell Mineral Separation machines to be used as primary zinc machines. Up to this point it is essential that the mill-water be strongly alkaline but here copper sulphate solution is added as well as coal-tar creosote. These machines make four products (1) zinc-lead froth, (2) final zinc concentrate, (3) zinc middlings, (4) tailings. The zinc-lead froth goes to the concentrating table section for further treatment, the zinc middlings are sent to a regrinding mill. The latter is an 8 ft., Hardinge in closed circuit with a Dorr rake classifier. The grinding medium is 1¾-in. and 2½-in. chilled white iron balls. The tailings from the primary cells are sent to a Dorr bowl classifier, the overflow from which is the final mill tailing and is run to waste while the product is sent to the regrinding circuit. The overflow from the rake classifier is sent to an 8-cell flotation machine from which the tailings are sent back to the zinc primary cells and the froth to the concentrating tables.

The table section is equipped with 24 Plato tables and eight No. 11 D. Wilfleys. The feed, as mentioned, consists of the lead-zinc concentrate and tailings from the zinc retreatment machines. Three products are made (1) a lead-iron concentrate which is returned to the primary grinding circuit, (2) a middling product which is returned to the regrinding mill and (3) zinc concentrate. This completes the concentration and the final step is the dewatering of the three mill products. The lead concentrates are dewatered in 2 Diamond-Stiles type Genter vacuum thickeners and filtered in two American filters. The zinc concentrates are dewatered in two 50-ft. Dorr thickeners and filtered in three American filters. The tailings, containing chiefly iron sulphide, are dewatered in one large vacuum thickener and pumped to the tailings pond. The concentrates are shipped by railroad to reduction plants at Trail.

The electrolytic zinc plant at Trail which has a capacity of 100 tons of concentrates per day uses a process which is based on the electrolytic precipiation of zinc from a solution of zinc sulphate.

The zinc ore and concentrates are calcined in Wedge roasters at pyrometrically-controlled temperatures until the sulphur content is below 0·75 per cent. The next step is to get the zinc into solution as zinc sulphate. This is done by agitating the calcines with spent acid electrolyte in Pachuca tanks and then separating the solution from the remaining solids by means of thickeners and filters. Manganese dioxide is added to precipitate iron. After agitation the sand is reground in a ball mill and all solids submitted to flotation. In this way zinc, that has not been thoroughly roasted and therefore cannot be dissolved, is recovered. The flotation concentrates are returned to Wedge roasters. Copper, cadmium, arsenic, antimony, etc., are precipitated from the pregnant solution by the addition of zinc dust as a final step before it is clarified and sent to the tank room. The solids, from which zinc has been dissolved and solution separated by filtering, are sent to the lead smelter.

There are two tank houses each with its own electric generator. There are 448 tanks in one house and 384 in the other. Tanks are arranged in series and each cell contains 17 anodes and 16 cathodes. The anodes are made of cast electrolytic lead while the cathodes are rolled aluminum sheet. The zinc is stripped from the cathodes melted in coal-fired reverberatories and cast into slabs.

METALLIC MINERAL INDUSTRIES

ALLUVIAL GOLD MINING INDUSTRY

Owing to the seasonal nature of placer mining and the difficulties in communicating due to the isolated location of some of the fields, the Bureau has experienced difficulties in presenting a complete description covering this important phase of metal mining. Almost complete returns have been received from operators in the Yukon and it is therefore possible to compile finished tables. In addition, the Mining Lands and Yukon Branch of the Department of the Interior has supplied copies of the yearly reports of the various Mining Recorders in that Territory, and the inclusion of parts of these have added materially to the value of this report. Due to the indifference of a few of the more important individuals and companies operating in British Columbia who failed to return statements, it is impossible to publish complete data for that province comparable to the figures given below for the Yukon Territory.

In the latter section, reports received accounted for over 93 per cent of the gold recovered; in British Columbia only a little more than 50 per cent of the known production as reported by the Department of Mines in British Columbia was accounted for by returns received at this Bureau. It is apparent, therefore, that the data for the latter province would be most incomplete and no information covering wages, employment or equipment has therefore been given. The gold not accounted for on returns from the Yukon, represents the small winnings of a number of isolated and itinerant prospectors with whom no communication could be had. The figures of placer gold production shown are as supplied by the Mining Lands and Yukon Branch and the Department of Mines in British Columbia.

In the Yukon, six joint stock companies and 40 establishments (partnerships and individuals), operated during 1922 and employed 353 men to whom $506,521 was paid in wages. A total 67,961·73 crude ounces of gold was recovered during the calendar year, on which export tax was paid.

The mining season commences generally in May of each year and closes around November 1st, after which time the gravel cannot be treated. Some dredges, however, are equipped to operate for a longer period. During 1922, the production from the hydraulic mines was materially affected by the exceptionally early and severe frosts which entirely shut off the water supply before the cuts could be properly cleaned up.

For purposes of governmental supervision the Yukon Territory is divided into two mining districts known as the Dawson and the White Horse Districts, over each of which a Mining Recorder is placed. The first mentioned district produced 67,799·92 crude ounces while White Horse accounted for only 161·81 crude ounces. The monthly record of this production is shown in the chapter on "Gold" in the first part of this report. An excerpt from the report of the Gold Commissioner at Dawson described the operations of a few of the more important producers in the Dawson district and is included here for the more detailed information it gives, as compared with the general tables below dealing with the whole area.

Yukon Gold Company

This company operated one dredge on Gold Run Creek during a dredging season of 130 days from May 25th to September 29th, handling 578,395 cubic yards of material.

Eight hydraulic mines were operated at the following points: Adams Hill, King Solomon, Oro Fino Hill, Trail Gulch, Lovett-Hosford, American Gulch, Cheechaco and Gold Hill, and 1,586,666 cubic yards was handled.

The hydro-electric power plant of the company on the Twelvemile River furnished adequate power for the dredging and other operations of the company requiring power. The daily average of men employed during the mining season was as follows:—

Dredges and thawing (April to October)			47
Hydraulic mines	"	"	42
Ditch	"	"	31
Otherwise employed	"	"	23
Total			**143**

Burrall and Baird, Limited

This company operated dredges Canadian Nos. 2 and 4 in the Klondike valley on Hydraulic Mining Leasehold No. 18 and Dredging Lease No. 24. Dredge No. 2 operated from the 14th of May to the 23rd of September, handling 1,559,329 cubic yards of material. Dredge No. 4 operated from the 12th of May to the 14th of December, handling 2,260,114 cubic yards.

In addition to these major operations, prospecting was carried on with a Keystone Drill and a prospecting tunnel was driven 940 feet into Jackson Hill with a view of carrying on hydraulic operations at this point during the coming summer.

The pumping plant of the company near the mouth of Hunker Creek was in operation during the summer. The company's machine shops at Bear Creek, and other auxiliary work was carried on as usual. An average of 76 men were employed by this company throughout the season.

The New North West Corporation, Limited

This company operated dredge North West No. 1 on Below Lower Discovery Dominion Creek from the 27th May to the 8th of November, and dredged in that period 373,064 cubic yards of material. Dredge North West No. 2 operated on the Granvill's Flat on Dominion Creek from the 3rd of June to the 7th of November, and handled 582,296 cubic yards of material.

The Hydro-electric power plant of the company at the North Fork of the Klondike River furnished adequate supply of power for the operation of these dredges, machine shops, etc., and also the dredges of the Burrall and Baird, Limited, operating in the Klondike valley. An average of 115 men were employed by this company throughout the season.

Highet Mining Company, Limited

This company, the successor of the Titus Dredging Company operated their dredge on Highet Creek throughout the season. An average of 20 men were employed in this operation.

Other Placer Operations

Mr. Nevill A. D. Armstrong carried on extensive prospecting operations on Russell Creek, a tributary of the MacMillan River, and reports a large area of ground suitable for dredging operations. Further work will be carred on during the coming summer.

Collins, Weinberg and Collins operated their ground on Miller Creek in an extensive manner, both winter operations, and hydraulicking during the summer with very satisfactory results.

In general the individual operations carried on throughout the various parts of the Camp were satisfactory to the operators.

Table 215.—Summary Statistics of Placer Mining in the Yukon Territory in 1921 and 1922

Item	1921	1922
Time in operation.....months	6–8	6–8
Number of wage-earners	428	374
Wages paid	$671,783	$514,196
Crude ounces gold recovered	82,394	67,962
Value of gold and silver	$1,343,022	$1,095,547
Quicksilver purchased.....lb.	320	576
Quantity of material handled.....cubic yards	†5,148,750	‡7,186,723
Length of ditches.....miles	186	184
Machinery installed—		
Giants	*34	58
Dredges	6	6
Capacity of dredges, cubic yards per 24 hours	3,000	3,000
Excavators	1	1
Scrapers	2	2

* Only 13 were used, on account of low water.
† Joint Stock Companies only.
‡ Includes all operators, several of whom could not report the yardage handled.

THE AURIFEROUS QUARTZ MINING INDUSTRY

The auriferous quartz mining industry includes that group of mines which produce an ore, the main constituent of which is gold and which may be recovered either by amalgamation or cyanidation. This group is important in Ontario where the noted mines of the Porcupine and Kirkland Lake areas are operated. The ores mined are treated, in cyanide mills on the properties. In British Columbia some mines of this group export their ores or concentrates. Another closely allied group is the copper-gold-silver comprising mines which concentrate their ores, shipping the gold or silver-bearing copper concentrates to smelters for treatment; this latter group, which is important in British Columbia is treated in the following section.

In Canada, during 1922, there were 74 auriferous quartz mines operating and of these 46 produced bullion or shipped ores while 28 carried on development operations only. In order of importance the provinces with the number of operating mines in each, were Ontario, 41; British Columbia, 18; Nova Scotia, 11; and Manitoba, 4 mines. The mines of the province of Ontario produced over 90 per cent of the gold derived from this group and despite the serious shortage of hydro-electric power which occurred early in the year the output was the greatest yet achieved, bringing the province of Ontario very prominently before the eyes of the mining world. In Table 218 there is a record for the years 1921 and 1922 giving comparative statistics for this group. The figures for 1922, showed 2,431,340 tons mined, as against 2,342,213 tons of ore cyanided (which included practically all ores milled). The increase over the 1921 figures in ores cyanided was 612,787 tons. Crude bullion shipped amounted to 1,279,266 ounces valued at $21,037,732 in 1922, as against 913,869 ounces valued by the mines at $14,774,037 in 1921. These figures which take no account of the gain made in exchange premiums give some indication of the important and far-reaching changes which are occurring in the gold mining industry particularly in the province of Ontario.

Economic conditions which were improving throughout the world during 1922, tended to intensify the urgent need for gold on the part of most countries. During the war and after, the world's annual production of gold actually declined about 23 per cent, owing to the increased cost of material and labour, so that in addition to the extra need of gold to make up the discrepancy between paper money and its gold-backing there is also the necessity of making good the deficiency in production. Conditions, therefore, clearly point to the importance of an increased gold production. The following figures emphasize the shortage in this metal and the increasing importance of Canada's position as a gold producer, as compared with South Africa, the world's greatest producer.

Table 216.—Comparative Figures of Gold Production, for the World, South Africa and Canada, 1922

Year	World's Output	South Africa's Output	Canada's Output
	fine ounces	fine ounces	fine ounces
1915	22,363,833	10,538,588	918,056
1921	15,954,788	9,031,328	926,329
1922	15,304,650	8,198,000	1,263,364

Rapid progress was made throughout 1922 at nearly all properties in both Porcupine and Kirkland Lake. The Hollinger, McIntyre, Dome, Clifton-Porcupine and Paymaster and many other properties in Porcupine operated at capacity and developed important deposits of gold-bearing veins at depth. In Kirkland Lake, the Teck-Hughes, Lake Shore and Wright-Hargreaves continued to develop to lower levels, while other companies carried on important operations. In Manitoba, much staking was done in the Elbow Lake country and new capital was reported as being invested in different well-known properties in that province. The Premier Mine in Northern British Columbia continued to produce high-grade gold-silver ore which was concentrated and exported mainly to the United States. The Nickel Plate Mine of the Hedley Gold Mining Company resumed operations and high-grade gold-bearing ore was exported from the I.X.L. Mine. In Nova Scotia a renewed interest in gold mining was noted and while the figures of production were low compared to the output of more prosperous times, the indications from the various activities displayed pointed to more important developments in the future.

The province of Quebec which is not yet represented in this group by producing mines, may yet take its place. During the last quarter of 1922 interesting finds of gold-bearing quartz were reported in Rouyn township, the section lying due east of Kirkland and Larder Lakes. Much staking of claims was reported by the end of the year.

Statistics of capital employed in the gold-mining industry for 1921 covered the following; capital invested in (1) cost of lands, buildings, plant, machinery and tools, (2) cost of supplies and stocks on hand and (3) cash, trading and operating accounts. Since many mining lands are held by organized companies in fee-simple having been crown-granted, the capital invested in the land is often represented largely by shares of the capital stock. There are also cases where sums of money have been paid out as part payment but on the whole the proportion of cash to stock would be small. For this reason the 1922 questionnaire for this group took no account of actual capital invested in land and the totals shown for the year refer to (1) cost of buildings, plant, machinery, and tools, (2) cost of supplies and stock on hand and (3) cash, trading and operating accounts. The compilations as made from these two sets of returns, notwithstanding the increase in the number of companies shows a much greater variation than might be expected. The figures show that for the year 1922 the capital employed in operating 76 mines was $35,368,094 as against $47,919,727 for 57 mines in 1921.

The number of producing mines increased from 32 in 1921 to 38 in 1922, and as pointed out above, showed remarkable gains not only in ores mined but also in quantities cyanided. But while the ores cyanided increased by about 35 per cent it is important to note that the number of crude ounces of bullion recovered, as reported by the operators increased by nearly 39 per cent, indicating that richer ores were treated in 1922 than in 1921. Bullion shipped rose from 913,869 crude ounces in 1921 to 1,279,266 ounces in 1922, with corresponding increases in the precious metal contents. In 1922 the net value of the bullion shipped was $21,037,732 as against $14,774,037 in 1921. These figures take no account of the gains made in the exchange premium. In 1921 this amounted to well over one million dollars and in 1922 to $209,266.

The shipments of ores by this group of mines were mostly from the province of British Columbia. The different fields in that province have not yet applied the cyanide process so generally as in Ontario, although at the Premier Mine, Nugget Gold Mine and the Nickel Plate Mine it is in use. In other cases the gold ores now being worked do not lend themselves so readily to the cyanide treatment, and the custom is generally to concentrate and ship the product to copper smelters. A case of this kind is that of the Hedley Gold Mining Company, the ore of which carries arsenic in addition to important quantities of gold and silver. Part of the precious metal was recovered by cyanidation, and the concentrates exported. Another property (IXL Mine) produced a high grade of gold ore, which was hand-picked and shipped direct to smelters.

The quantity shipped rose from 16,268 tons in 1921 to 78,627 tons in 1922, the net values of which to the mines were $1,915,747 and $4,872,904 respectively. This large gain was mainly accounted for by the continued development of the Premier Mine in the northern part of the province. This property produces a precipitate very heavy in silver and, in addition shipped high-grade ores and concentrates to Tacoma, Washington, U.S.A., and to Anyox, B.C.

There were increases in the number of salaried employees in both British Columbia and Ontario gold mines. The figures for Nova Scotia and Manitoba were small, since no large organizations for gold mining were in existence in those provinces. The number of major officers in the operating companies increased from 232 to 364, and salaries paid rose from $553,307 to $873,161.

Important increases occurred during 1922 in the number of wage-earners employed in the gold-mining group. In the more highly developed areas these increases were pronounced, and especially in Ontario, where the wages paid increased from $4,695,383 to $6,228,784. The number employed in Canada, both on surface in mill and below ground, which totalled 3,651 in 1921, increased gradually, until by the end of 1922, 5,060 were employed, or 38 per cent more than in the previous year, indicating a very considerable expansion in the industry.

During 1922 the fuel costs, both in Ontario and British Columbia, decreased, due to the fact that hydro-electric power was used to a larger extent, and that expenses for coal, fuel-oil and gasoline were greatly reduced. The value of wood consumed increased from $28,052 in 1921 to $83,491 in 1922 in the province of Ontario. This is usual where much of the timber

grown on the properties is consumed by newly organized companies in their initial development. Miscellaneous expenses increased from $5,474,607 in 1921 to $7,383,516 in 1922.

Table 217.—Capital Employed in the Auriferous Quartz Mining Industry in Canada, 1921 and 1922

Province	1921						1922					
	Producing		Operating but not producing		Total		Producing		Operating but not producing		Total	
	No.	Capital	No.	Capital	No.	Capital	No.	Capital	No.	Capital	No.	Capital
		$		$		$		$		$		$
Nova Scotia	8	391,834	0	.....	8	391,834	9	60,500	2	7,000	11	67,500
Ontario	11	28,752,321	22	9,746,603	33	38,498,924	13	25,299,933	33	5,994,959	46	31,294,892
Manitoba	2	*	.....	.....	2	*	2	*	.....	.....	2	*
British Columbia	11	8,612,079	5	416,890	16	9,028,969	14	3,925,278	6	80,424	20	4,005,702
Canada	**32**	**37,756,234**	**27**	**10,163,493**	**59**	**47,919,727**	**36**	**29,285,711**	**41**	**6,082,383**	**79**	**35,368,094**

* Data not available.

Table 218.—Ores Mined and Milled, Crude Bullion Produced and Shipped from the Gold Mines in Canada, 1921 and 1922

	Nova Scotia	Ontario	Manitoba	British Columbia	Canada
1921					
Number of producing mines	8	11	2	11	32
Ore mined ..... tons	726	1,867,848	683	39,029	1,908,286
Ore milled ..... "	696	372,083	484	200	373,463
Tailings retreated ..... "	.....	.....	.....	1,401	1,401
Bullion recovered by amalgamation ..... crude oz.	465	76,063	265	117	76,910
Ores cyanided ..... tons	.....	(a) 1,716,946	.....	(b) 12,480	1,729,426
Bullion recovered by cyanidation ..... crude oz.	.....	836,745	.....	5,117	841,862
Bullion shipped ..... "	(c) 451	907,572	305	5,234	913,869
Contents of bullion shipped—Gold ..... fine oz.	418	707,164	207	3,311	711,100
Silver ..... "	21	120,335	33	356	120,746
Net value ..... $	8,470	14,693,402	4,206	67,950	14,774,037
1922					
Number of producing mines	9	13	2	14	38
Ore mined ..... tons	6,107	2,272,866	.....	152,367	2,431,340
Ore milled ..... "	6,006	368,400	120	74,567	449,093
Tailings retreated ..... "	.....	.....	.....	3,000	3,000
Bullion recovered by amalgamation ..... crude oz.	768	135,066	103	1,042	136,979
Ores cyanided ..... tons	.....	(f) 2,268,736	.....	73,477	2,342,213
Bullion recovered by cyanidation ..... crude oz.	.....	1,123,902	.....	18,025	1,141,927
Bullion shipped ..... "	(d) 683	1,259,378	(e) 120	19,085	1,279,266
Contents of bullion shipped—Gold ..... fine oz.	555	999,469	103	17,294	1,017,421
Silver ..... "	33	163,622	13	1,196	164,864
Net value ..... $	12,389	20,745,268	2,131	277,945	21,037,732
Amount of exchange premium (g)	.....	208,717	9	539	209,266

(a) This 1,716,946 tons cyanided includes the tailings from the 372,083 tons amalgamated.
(b) This 12,480 tons cyanided does not include the tailings from the 200 tons amalgamated.
(c) 439 fine oz. reported as received at the Royal Mint, 21 fine oz. hand picked from old dumps.
(d) Royal Mint Report gives 1,042 fine oz. received from Nova Scotia, the difference being made up by small shipments consigned by prospectors and lessees.
(e) Does not include all of Manitoba's 1922 production. Royal Mint reported receipt of 156 fine oz., difference being made up by small consignments from individuals.
(f) Includes 368,400 tons amalgamated.
(g) Figures for exchange premiums in 1921 not available by provinces.

Table 219.—Ores, Concentrates and Slags Shipped from the Gold Mines in Canada, 1921 and 1922

	Ontario Mines Shipping		British Columbia Mines Shipping		Canada
	To Canadian Smelters	To American Smelters	To Canadian Smelters	To American Smelters	
1921					
Number of mines	.....	1	9	4	11
Tons of ore, etc., shipped	.....	43	9,787	6,481	16,311
Metal contents—					
Gold ozs.	.....	870	1,830	49,971	52,671
Silver "	.....	3,730	54,341	1,536,921	1,594,992
Copper lb.	.....	.....	2,192	2,808	5,000
Net Value $	.....	19,640	72,087	1,824,020	1,915,747
1922					
Number of mines	.....	2	7	7	15
Tons of ore, etc., shipped	.....	33	30,950	*47,677	78,660
Metal contents—					
Gold ozs.	.....	1,299	28,104	†104,913	134,316
Silver "	.....	2,084	848,839	3,638,800	4,489,723
Copper lb.	.....	.....	213	2,808	3,021
Net value $	.....	13,484	1,687,686	3,171,734	4,872,904

* Contains one ton of slags.
† Contains 731 ozs. crude base bullion.

Table 220.—Employees, Salaries and Wages in the Auriferous Quartz Mining Industry in Canada by Provinces, 1921 and 1922

Province	1921						1922					
	Number of Employees					Salaries and Wages	Number of Employees					Salaries and Wages
	On Salary	Wage-Earners			Total Employees		On Salary	Wage-Earners			Total Employees	
		Surface	Underground	Mill				Surface	Underground	Mill		
						$						$
Nova Scotia	6	21	19	13	59	48,065	4	30	19	(a)	53	25,973
Ontario	204	505	1,931	609	3,249	5,188,082	314	1,469	2,548	387	4,718	6,998,901
Manitoba	4	19	19	7	49	17,963	1	30	.....	(a)	31	8,457
British Columbia	24	331	135	42	532	816,208	62	364	213	(a)	639	978,351
Canada	**238**	**876**	**2,104**	**671**	**3,889**	**6,070,318**	**381**	**1,893**	**2,780**	**387**	**5,441**	**8,011,682**

(a) Mill employees included with Surface.

Table 221.—Number of Wage-Earners in the Auriferous Quartz Mining Industry in Canada by Months, 1922

Month	Mine		Mill	Total
	Surface	Underground		
January	1,301	2,252	357	3,910
February	1,274	2,299	353	3,926
March	1,345	2,356	358	4,059
April	1,538	2,296	371	4,205
May	1,713	2,467	392	4,572
June	1,886	2,724	390	5,000
July	1,878	2,857	399	5,134
August	1,897	2,849	400	5,146
September	1,978	2,918	394	5,290
October	1,982	2,740	400	5,122
November	1,961	2,853	408	5,222
December	1,817	2,885	396	5,098
Average	**1,893**	**2,780**	**387**	**5,060**

Table 222.—Miscellaneous Expenses in the Gold Mining Industry in Canada, by Provinces, 1921 and 1922

—	1921	1922
	$	$
Nova Scotia	18,615	7,804
Ontario	4,831,339	6,246,657
Manitoba	4,872	4,127
British Columbia	619,781	1,124,928
Canada	**5,474,607**	**7,383,516**

THE COPPER-GOLD-SILVER MINING INDUSTRY

The most important deposits of this group are found in British Columbia, from which province the greater portion of Canada's copper production is derived. This class of mines, as indicated by the group name, produces ores which are predominantly copper-bearing, although important quantities of gold and silver are also present. Broadly speaking, these ore deposits may be divided into two classes, viz., low-grade and high-grade copper ores, but there are many deposits which it is difficult to classify under either heading. The former class, which is presently the more important, comprises those areas which contain from one to two per cent of copper, and is represented by such properties as the Britannia on Howe Sound, and the Hidden Creek, near Anyox, in the northern part of the province. The higher grade deposits, of which there are many, have not been so well developed, and are smaller in size. This group was represented during 1922 by such mines as the Maid of Erin and the Venus, the copper content of the ores from these mines ranging from 20 per cent to 9 or 10 per cent. The entire group in 1922 consisted of 18 active mines only, 10 of which shipped ore. Of the 18 properties, 16 were located in British Columbia, 1 in Ontario, and 1 in Quebec, the last two mentioned carrying on development work only.

Due to the fact that the Britannia Mining and Smelting Company, formerly one of the largest producers, was inactive during 1922, and as the figures for capital employed by that company were as a consequence not included in the compilation, the capital employed in this industry is shown as $27,091,085 in 1922, as against $29,183,349 in 1921. There was included in these totals the actual capital invested by the Granby Mining, Smelting and Power Company, as copper-producing was the most important department of that large company, which, in addition to copper mines and a copper smelter, operates large coal mines, coke-making plants, quartz and limestone quarries. The figures for that company, which are included here, are not again repeated in the totals for capital employed in coal mines. The capital invested by the Consolidated Company at Trail and elsewhere, which company also produces copper ores, is included under the silver-lead-zinc section since its largest and most important property is a lead-zinc mine and the company's products are therefore principally lead and zinc in addition to copper. The capital employed by active mines does not show any great changes from year to year, unless several highly developed properties commence operating in a single twelve-month period. The figures given in the following table represent capital invested in tangible improvements and are relative only, in that they do not include important sums used for provisions, wages and so forth, spent in connection with prospecting.

The period under review was a difficult one for copper producers throughout the entire world. The continued dullness in the copper markets and the low price of 13½ to 14 cents, interfered largely with the output from this group. Both 1921 and 1922 were poor years, but the record for the latter period was much below that of the former. In 1921 some 1,042,135 tons of ore were shipped from the mines, while in 1922 the total only amounted to 911,587 tons. Despite the slackness in markets, some of the large producers in British Columbia undertook important improvements. The Granby Company enlarged its crushing department and improved the hydro-electric power plant. The Britannia Company replaced the large concentrator plant so unfortunately destroyed by fire during the previous year. The holdings of these two companies, along with those of the Consolidated Mining and Smelting Company, represent some of the most important in Canada, and under more favourable conditions could increase

the production of copper very largely. The province of British Columbia is by far the most important producer of copper in Canada, and might safely claim to be the largest in the British Empire.

There are also important copper deposits in Manitoba, Ontario, Quebec, some of which have passed the development stage. None of these properties shipped ore during 1922.

During 1922 the shipments of ores and concentrates from the mines fell off by over 100,000 tons, due to the continued idleness of some large properties and decreased shipments from those which continued to operate. As mentioned above, the price of copper, which remained around the low figure of 13½ cents, made it impossible for some mines, in the face of high costs for wages and materials, to operate economically. From an examination of the table given below it will be observed that the net value to the mines was approximately a half-a-million dollars less in 1922 than in 1921, and that while for the most part the tonnages shipped fell off, the quantity of ore exported to the United States increased from some fourteen thousand tons to more than thirty thousand. It should be pointed out, however, that there was a largely increased shipment of flue dust from Anyox. Deducting the quantities of flue dust shipped in both years, the record stands as 4,740 tons of ore exported in 1922, as against 7,855 tons in 1921.

Salaried officials dropped from 85 to 46 in number, while the salaries paid to them decreased from $197,685 to $98,939. The number of wage-earners decreased from 1,141 to 780 and wages paid from $1,878,776 to $1,051,336.

Table 223.—Capital Employed in the Copper-Gold-Silver Mining Industry in Canada, 1921 and 1922

	British Columbia		Ontario		Canada	
	1921	1922	1921	1922	1921	1922
	$	$	$	$	$	$
Producing Mines	28,735,938	26,961,448	.....	.....	28,735,938	26,961,448
Operating but not producing mines	447,411	123,637	.....	6,000	447,411	129,637
Total	**29,183,349**	**27,085,085**	.....	**6,000**	**29,183,349**	**27,091,085**

Table 224—Shipments from Copper-Gold-Silver Mines of Canada, 1921 and 1922

Destination	Quantity	Net Value	Contents as Determined by Settlement Assay			
			Gold	Silver	Copper	Sulphur*
1921	tons	$	fine ozs.	fine ozs.	pounds	pounds
10 Mines shipped to Canadian smelters—						
Ores	(a)1,002,935	1,755,559	50,852	377,849	32,408,805	1,166,734
Concentrates	715	12,830	738	931	29,021	.....
6 Mines shipped to foreign smelters—						
Ores	(b) 14,463	36,828	296	9,259	709,034	416,189
Concentrates	24,022	784,097	37,097	30,351	2,240,766	.....
Total	**1,042,135**	**2,589,314**	**88,982**	**418,390**	**35,387,626**	**1,582,923**
1922						
4 Mines shipped to Canadian smelters—						
Ores	(c) 870,579	1,062,426	15,252	399,113	29,432,782	.....
Concentrates	168	3,050	179	242	7,426	.....
5 Mines shipped to foreign smelters—						
Ores	(d) 30,740	269,976	466	38,833	1,792,327	.....
Concentrates	10,100	696,219	32,556	31,535	1,292,257	.....
Total	**911,587**	**2,031,671**	**48,453**	**469,723**	**32,524,792**	.....

* Not given in 1922.
(a) Includes 3,597 tons pyrites used for manufacture of sulphuric acid.
(b) Includes 6,608 tons flue dust.
(c) Included 4,819 tons pyrites valued at $5,460, sold for sulphur content.
(d) Includes 26,002 tons of flue dust.

Table 225.—Miscellaneous Expenses in the Copper-Gold-Silver Mining Industry in Canada, 1921 and 1922

—	1921	1922
	$	$
Producing Mines	1,159,843	374,478
Operating but non-producing mines	32,175	11,015
Total	**1,192,018**	**385,493**

Table 226.—Employees, Salaries and Wages in the Copper-Gold-Silver Mining Industry in Canada, 1921 and 1922

—	1921			1922		
	Number of Employees		Salaries and Wages	Number of Employees		Salaries and Wages
	Male	Female	$	Male	Female	$
SALARIED EMPLOYEES—						
Superintendents and managers	23	.....	90,592	12	.....	41,174
Technical employees	21	.....	43,759	10	.....	19,417
Clerks, stenographers	37	4	63,334	22	2	38,348
Total	81	4	197,685	44	2	98,939
WAGE-EARNERS—						
Surface	369	.....	1,378,776	318	.....	1,051,336
Underground	772	.....		462	.....	
Total	1,141	.....	1,378,776	780	.....	1,051,336
Grand Total	**1,222**	**4**	**1,576,461**	**824**	**2**	**1,150,275**

Table 227.—Number of Wage-earners in the Copper-Gold-Silver Mining Industry in Canada, by Months, 1922

Month	Number of Wage-Earners		
	Surface	Under-ground	Total
January	297	475	772
February	287	451	738
March	279	475	754
April	267	456	723
May	277	463	740
June	286	474	760
July	263	431	694
August	272	425	697
September	250	392	642
October	246	418	664
November	253	446	699
December	259	438	697
Average	**318**	**462**	**780**

THE NICKEL-COPPER INDUSTRY

The nickel-copper mining, smelting and refining industry, which is carried on almost entirely in the province of Ontario, has long been famous as the world's main source of a very large proportion of the nickel used in industry. The mines and smelters are situated in the vicinity of Sudbury, Ontario, where three companies are engaged in mining and smelting, producing a matte which runs on the average about 50 per cent nickel and 32 per cent copper the balance consisting of iron and sulphur. The three companies are the Mond Nickel Company, International Nickel Company of Canada, and the British America Nickel Corporation. The first of these companies has always shipped its matte to Swansea, Wales, for treatment; the second

operates a large refinery at Port Colborne, Ont., where in 1922 part of the matte was treated and the products made were converter copper, nickel shot, nickel oxide, and residues containing the precious metals: gold, silver, platinum and other metals of the platinum group. This company also exported some of its matte to Huntingdon, West Virginia, and in addition to the nickel-copper matte of the ordinary shipping grade produced monel metal, an alloy which contains about 78 per cent nickel and 22 per cent copper. The refinery of the British America Nickel Corporation is located at Deschenes, Que., where the matte from the smelter at Nickelton is treated electrolytically. The products made are electrolytic nickel, electrolytic copper, and residues containing gold, silver, and metals of the platinum group.

Table 228.—Capital Employed in the Nickel-Copper Industry in Canada, 1921 and 1922

	1921	1922
Buildings, plant machinery and tools:—		
Mines	$ 8,107,245	$ 8,082,571
Smelters	13,725,398	14,040,519
Refineries	8,578,187	9,202,003
Cost of materials and supplies on hand	10,467,385	4,108,969
Cash, trading and operating accounts and bills receivable	4,062,590	1,151,035
Total	**$44,940,805**	**$ 36,585,097**

Table 229.—Output from Nickel-Copper Mines and Smelters in Canada, 1921 and 1922

		1921	1922
Ore mined (a)	Tons	262,593	259,569
Ore shipped	"	262,593	259,569
Contents of ores, etc., shipped:			
Copper	Lb.	9,491,327	9,177,306
Nickel	"	13,991,604	14,127,554
Ore concentrates treated at smelters	Tons	393,768	314,120
Matte produced	"	19,497	17,324
Contents of matte:			
Copper	Lb.	12,645,391	10,841,647
Nickel	"	19,256,900	17,355,056
Matte shipped to Canadian Refineries	Tons	6,648	10,065
Matte exported to foreign refineries	"	10,465	19,831

(a) Includes ore from Bruce Mines, in 1921.

Table 230.—Output from Nickel-Copper Refineries in Canada, 1921 and 1922

		1921		1922	
		Quantity	Value	Quantity	Value
			$		$
Matte received	Tons	6,648	.....	10,065	.....
Matte treated	"	5,558	.....	10,340	.....
Products made—					
Refined nickel	Lb.	1,583,600	554,260	11,065,473	3,140,399
Nickel shot and ingots	"	3,835,574	1,267,657	.....	.....
Nickel oxide	"	7,812,673	1,582,066	2,389,840	389,398
Nickel castings	"	14,522	5,896	.....	.....
Converter and refined copper	"	2,926,407	330,084	4,382,922	502,283
Gold	Fine ozs	179	3,700	213	4,275
Silver	"	8,818	5,525	12,212	8,016
Platinum	"	269	20,184	49	4,662
Palladium	"	591	38,267	59	3,104
Iridium and rhodium	"	56	9,690	4	170
Total value		.....	**3,817,329**	.....	**4,052,317**

Table 231.—Salaried Employees by Classes, and Salaries Paid in the Nickel-Copper Industry in Canada, 1922

	At the Mines		At the Smelters			At the Refineries		
	Male	Salaries paid	Male	Female	Salaries paid	Male	Female	Salaries paid
		$			$			$
Superintendents, managers, etc.	10	40,276	13	.....	69,970	6	.....	44,100
Technical employees—								
Engineers, surveyors, chemists, draughtsmen, etc.	2	5,250	19	.....	45,385	17	.....	22,029
Clerks, stenographers, etc.	6	12,535	19	11	54,868	50	8	76,261
Total	**18**	**58,061**	**51**	**11**	**170,223**	**73**	**8**	**142,390**
Total for 1921	**39**	**109,385**	**74**	**4**	**242,790**	**71**	**7**	**150,816**

Table 232.—Number of Employees by Months and Wages Paid in the Nickel-Copper Industry in Canada, 1922

Month	At the Mines			At the Smelters	At the Refineries	Total
	Surface	Underground	Total			
	No.	No.	No.	No.	No.	No.
January	183	308	491	689	593	1,773
February	198	358	556	793	602	1,951
March	208	389	597	831	606	2,034
April	129	150	279	402	70	751
May	140	156	296	414	234	944
June	149	165	314	446	321	1,081
July	164	160	324	460	458	1,242
August	177	170	347	513	492	1,352
September	195	230	425	687	520	1,632
October	191	244	435	667	515	1,617
November	205	268	473	668	577	1,718
December	226	321	547	701	561	1,809
Total wages 1922	.....	.....	**$532,981**	**$799,831**	**$676,523**	**$2,009,335**
Total wages 1921	.....	.....	**$624,851**	**$953,582**	**$401,541**	**$1,979,974**

Table 233.—Miscellaneous Expenses in the Nickel-Copper Industry in Canada, 1921 and 1922

Branch of Industry	1921	1922
	$	$
Mines and mills	641,036	608,809
Smelters and refineries	1,729,995	4,015,618
Total	**2,371,031**	**4,624,427**

THE SILVER-COBALT MINING INDUSTRY

Due to the favourable development of the mines and a generally improved economic situation, the year 1922 marked an important advance over 1921 in the production of silver from the mines of the Cobalt district. The most important feature observed from comparative figures for the past years mentioned, was the decline in operating costs. In 1921, some 21 properties carried on active operations while 11 more, though not producing, made shipments from ores, mined in other years. In 1922 the producing properties totalled 20 in number; ore mined, increased from 398,931 tons to 426,445 tons, while the wages paid, notwithstanding the increased tonnage produced, fell from $1,440,144 to $1,176,279.

During the year the most prominent producer was the Nipissing Mines, Limited, from which some 3,864,000 ounces was produced. The Mining Corporation of Canada which operated the Buffalo, Townsite, City of Cobalt, and Cobalt Lake Mines, at Cobalt proper, and the Haileybury-

Frontier in the South Lorrain area, was the second largest producer with about 1,275,000 ounces, and was closely followed by the Coniagas and the O'Brien. The La Rose mine continued to produce during the period, having its ores treated on a customs basis at the Bailey customs concentrator, while the McKinley-Darragh resumed production towards the middle of the year. One of the important incidents was the leasing of the Beaver Mine by the Coniagas Mining Company which indicated the resumption of activity in the southern portion of the field. Among other new operations commenced the most important was on the Colonial Mine by the Menago Mining Co., Ltd. The indications during the period were that this enterprise would develop as a producer in the near future. Encouraging finds of silver were also made on the Genesee property at a depth of about 350 feet. In the South Lorrain field which is about 20 miles south of the Cobalt area, the Keeley Mines produced high-grade ore and ranked among the leaders of the district. At the close of the year the continued success encountered on this property indicated a prosperous future for the company. The Mining Corporation of Canada during the period secured a larger acreage in this field and at the end of the year controlled the Haileybury-Frontier, Little Keeley, Crompton, Forneri and Haileybury Silver. The production of silver from the Haileybury-Frontier was important and amounted to about 500,000 ounces. The ore from this property was hauled by tractor to Cobalt and there treated in the works of the company. The total silver contained in ore shipped from South Lorrain amounted to about 1,284,000 ounces. In Gowganda, a field situated about 30 miles west of Cobalt, the chief operators were the Miller Lake-O'Brien and the Castle-Tretheway. About 170,650 ounces in ore was produced and shipped from this camp during the period.

Treatment of the ore by concentration and cyaniding was carried on during the period by the Keeley Mines, Ltd., in South Lorrain, the Miller Lake-O'Brien Mine in Gowganda, and the Nipissing Mines, Ltd., Mining Corporation, including the Buffalo Mine and the Cobalt Reduction Company, Coniagas Mines, Dominion Reduction Company, McKinley-Darragh-Savage Mines, and by the Bailey Silver Mines in Cobalt. In the month of September, the O'Brien mill and cyanide plant was destroyed by fire. A little later in the year this company secured by purchase the customs concentrator known as the Bailey.

The total quantity of ore and tailings treated in 1922 was 521,797 tons and from this there was derived 5,480 tons of concentrates. Considerable portions of the concentrates obtained from the treatment of these ores were shipped to the Deloro Smelter and to the Coniagas Reduction Company's works at Thorold; some were also exported to the United States.

Table 234.—Capital Employed in the Silver-Cobalt Mining Industry in Canada, 1921 and 1922

Capital employed as represented by—	1921	1922
	$	$
Cost of lands, buildings, and equipment	21,913,897	22,190,416
Cost of supplies and stock on hand	1,580,871	960,121
Cash, trading and operating accounts and bills receivable	7,703,650	6,309,066
Total	**31,198,418**	**29,459,603**

Table 235.—Principal Statistics of Silver-Cobalt Mines and Mills Operating in Canada, 1921 and 1922

		1921	1922
Number of mines in operation		39	30
Ore mined	Tons	398,931	426,445
Ores treated	Tons	402,201	405,640
Tailings treated	Tons	20,139	91,369
Concentrates produced	Tons	4,290	5,099
Treated in Customs concentrators	Tons	36,972	24,788
Concentrates produced	Tons	671	381
Quantity of Material cyanided	Tons	211,729	273,597
Bullion recovered	Fine Ounces	5,452,773	6,820,686
Bullion sold	Fine Ounces	5,173,952	7,526,046
Net value to operators		$ 3,480,519	$ 5,125,802

Table 236.—Shipments of Ores, Concentrates and Residues from the Cobalt Camp, 1921 and 1922

Kind	Tons	Gross Value (a)	Net Value (b)	Metallic content paid for		
				Silver	Cobalt	Copper
1921		$	$	fine ozs.	lb.	lb.
To Canadian Smelters—						
Ores	431·19	611,970	589,712	833,211	97,100	.....
Concentrates	1,726·57	1,369,751	1,284,477	1,970,666	145,066	13,929
To Foreign Countries—						
Ores	202	35,181	27,436	45,527	.....	24,257
Concentrates	822	292,454	257,204	445,177	.....	.....
Total Shipments—						
Total ore and concentrates	3,181·76	2,309,356	2,158,829	3,294,581	242,166	38,186
1922						
To Canadian Smelters—						
Ores	804	971,221	912,387	1,442,551	235,454	.....
Concentrates (c)	7,852	2,096,735	1,992,062	2,576,011	461,740	17,024
To Foreign Countries—						
Ores (d)	20	10,972	10,505	15,994	.....	.....
Concentrates	1,450	435,228	371,655	660,307	128,849	8,146
Total Shipments—						
Total ore and concentrates	9,931	3,484,815	3,248,609	4,530,808	826,043	25,170

(a) Gross value means value of the metals paid for before deducting transportation and treatment charges, and includes exchange premium received.
(b) Net value is actual amount received by operator.
(c) Includes a quantity of residues shipped to foreign smelters.
(d) From North Western Ontario.

Table 237.—Employees, Salaries and Wages in the Silver-Cobalt Mining Industry in Canada, 1921 and 1922

	1921		1922	
	Number	Salaries and wages	Number	Salaries and wages
		$		$
SALARIED EMPLOYEES—				
Superintendents and managers	39	140,115	30	107,123
Technical employees	38	72,363	41	92,506
Clerks and stenographers	26	44,553	32	42,528
Total	103	257,031	103	242,157
WAGE-EARNERS—				
Mine	846	1,082,836	974	1,290,579
Mill	275	399,839	326	
Total	1,121	1,482,675	1,300	1,290,579
Grand Total	**1,224**	**1,739,706**	**1,403**	**1,532,736**

Table 238.—Number of Wage-earners in the Silver-Cobalt Mining Industry in Canada by Months, 1922

Month	Mine		Mill	Total
	Surface	Underground		
January	236	572	277	1,085
February	249	547	258	1,054
March	290	573	266	1,129
April	298	581	272	1,151
May	327	620	331	1,278
June	327	624	352	1,303
July	321	609	358	1,288
August	319	616	366	1,301
September	323	610	358	1,291
October	338	551	342	1,231
November	341	547	315	1,203
December	306	588	309	1,203
Average	342	632	326	1,300

Table 239.—Miscellaneous Expenses in the Silver-Cobalt Mining Industry in Canada, 1921 and 1922

	1921	1922
	$	$
Producing mines	1,784,694	2,207,743
Operating but non-producing	14,764	63,443
Total	1,799,458	2,271,186

THE SIVER-LEAD-ZINC MINING INDUSTRY

With lively markets for both lead and zinc and greatly increased prices for these metals prevailing throughout the year 1922, the silver-lead-zinc section of the Canadian mining industry showed large increases both in number of mines operated and in the quantity of ores raised and shipped. The greatest activity was observed in the Kootenays section of British Columbia, where Canada's most important lead-zinc mines are situated. The Yukon Territory was represented by two mines, both in the Mayo District, while Ontario again had one active shipping property. During the period under review, the lead-zinc mines of Quebec were idle and no shipments were made.

In Canada, there were 91 active mines, all but 3 of which as above noted, were situated in the province of British Columbia. Apart from the rise in the prices of lead and zinc and active markets both in the United States and the Orient, mining in the Nelson and Slocan districts was stimulated by the announcement that the Trail smelter would pay for the zinc in the silver-zinc ores and concentrates at a better rate than the United States smelter works with a consequent advantage to Canadian producers of ten dollars ($10.00) to twenty dollars ($20.00) per ton. The lead-zinc mines of the Consolidated Mining and Smelting Company, including the Sullivan, Molly Gibson, Highland and Number One shipped about 360,000 tons during the year. Other important shippers were the Silversmith, Alamo, Florence, Standard, Rambler and Bosun. Another feature of the mining development occurring during 1922 was the commencement of a large concentrating plant at Kimberley, British Columbia, designed to treat from 1,500 to 2,500 tons per day of the complex lead-zinc ores from the Sullivan Mine. Shipping the Sullivan ores to Trail has always entailed heavy transportation costs, and the increased production of ores from the mines in the Rossland District, it is expected, will provide sufficient material to keep the present concentrator in operation at Trail.

A comparison between the amounts of capital actually employed in the silver-lead-zinc industry in 1921 and 1922 does not show such an advance as might be expected by the increased number of mines operating. Many small mines made shipments in 1922, and in many cases as the claim itself was crown granted no value was given for the land. Data relating to the capital

employed in Trail smelters in British Columbia and the Kingdon Mining, Smelting and Manufacturing Company at Galetta, Ontario, which are given in the section on metallugical works, have been excluded from the tables for the silver-lead mining industry. One or two companies operating in 1921 were idle during 1922. The capital employed in 1922 was $6,828,980 of which $5,318,864 was invested in producing mines and $1,510,116 in the operating but non-producing properties. The major portion of capital was invested in British Columbia properties.

Of the 91 mines operating in 1922 in Canada, 75 made shipments, an increase over the previous year of 18 in the number of shipping mines and one in the operating but non-shipping group. The quantity of ores mined increased from 390,073 tons in 1921 to 505,773 tons in 1922 and the amount milled was also greater rising from 60,100 tons in 1921 to 90,282 tons in the year under review. The concentrates produced totalled 11,571 tons in 1922 as against 3,694 tons in 1921.

The total mine shipments increased from 312,758 tons in 1921 to 383,397 tons in 1922 with a corresponding increase in the metal contents of the ores, detailed figures of which are given in tables.

Previous to 1915 most of the lead ores mined in British Columbia were smelted and refined at Trail, B.C. From 1915 to date, with the exception of 1917, considerable tonnages of lead ores and concentrates were exported to the United States. In 1918 these exports amounted to over 27,000 tons of ores and concentrates, mostly from the Sullivan mine at Kimberley, while in 1919 they were reported as being about 7,500 tons and in 1920 as about 6,000 tons. During 1921 the exports of ores and concentrates dropped to 4,436 tons, which figure included small quantities of zinc ores and in 1922 they totalled 5,331 tons, none of which was zinc ore. In 1921, 12 mines shipped ores to the United States but in 1922 only 5 mines reported such consignments.

According to a report by the Gold Commissioner of the Yukon Territory, the year's operations in the silver-lead areas east of Dawson were of considerable importance; a section of this report as supplied by the Mining Lands and Yukon Branch of the Department of Interior reads as follows:—

"The confidence expressed in last year's report on the future development of silver-lead mining on Keno Hill and vicinity in the Upper Stewart District is amply borne out by the past year's operations.

"The development on the Keno Hill, Limited, property, has been satisfactory. The company has mined and hauled to Mayo for shipment on the opening of navigation approximately 4,300 tons of high grade ore, and in addition has blocked out ore for another year's operations on a larger scale. Prospecting on the 'Friendship' and 'Sadie' claims owned by this company has opened up bodies of high grade ore. Eighty-five men were employed by the company in these operations.

"The properties purchased by Mr. F. W. Bradley, known as the Wernecke Group, have been taken over by the Treadwell Yukon Company, Limited, organized for that purpose. Development work on these properties has been vigorously prosecuted throughout the year, the results exceeding all expectations. The plans formulated by the company in September last contemplated mining and shipping 2,000 tons of ore during the present winter. Such large high grade ore bodies, however, were developed during the winter that the company was able to mine and haul to Mayo approximately 4,500 tons of ore, in addition to which large quantities of shipping ore was mined that on account of lack of transportation it has not been possible to haul to Mayo.

"This company has revolutionized winter transportation in this country by the introduction of tractors. One ten-ton Holt tractor has hauled 4,500 tons of ore forty-five miles and as a back haul carried wood for use in and about the mine. As much as 80 tons of ore has been hauled to Mayo in one load. While exact figures are not available, it is assumed that ore may be hauled by tractors for 25 per cent of the cost of hauling with horses. Tractors will be used exclusively for hauling ore in the future.

"The two companies referred to are the only large shippers of ore, but high grade ore has been developed on a number of other properties, and shipments averaging from 25 to 100 tons hauled to the landing of Mayo for shipment.

"In general, it may be said that the development during the year has been entirely satisfactory. The plans now being made for next year contemplate the mining and hauling to Mayo of approximately 15,000 tons of high grade ore, and it is confidently expected by the operators

that in the extraction of these ores sufficient milling ore will be developed to warrant the installation of a mill."

Table 240.—Capital Employed in the Silver-Lead-Zinc Mining Industry in Canada, 1921 and 1922

Capital employed as represented by	1921				1922		
	Quebec	British Columbia	Yukon	Canada	British Columbia	Yukon	Canada
	$	$	$	$	$	$	$
Cost of lands, buildings and equipment	2,362,450	6,890,844	159,000	9,412,294	5,225,858	774,541	6,000,399
Cost of supplies and stock on hand	35,000	192,008	175,000	402,008	94,923	87,143	182,066
Cash, trading and operating accounts and bills receivable	5,000	69,119	.....	74,119	424,131	222,384	646,515
Total	**2,402,450**	**7,151,971**	**334,000**	**9,888,421**	**5,744,912**	**1,084,064**	**6,828,980**

Table 241.—Ore Mined and Milled in the Silver-Lead-Zinc Mining Industry, 1921 and 1922

Province	Ore Mined	Ore milled	Concentrates produced	Ore mined	Ore milled	Concentrates produced
	tons	tons	tons	tons	tons	tons
Quebec and Ontario	50,557	50,557	†2,315	36,138	36,138	1,455
*British Columbia	337,406	9,543	1,379	464,084	54,144	10,116
Yukon Territory	2,110	.....	.....	5,551	.....	.....
Total for Canada	**390,073**	**60,100**	**3,694**	**505,773**	**90,282**	**11,571**

*Does not include concentrator operated by Consolidated Mining and Smelting Company of Canada at Trail.
†Lead concentrates only.

Table 242.—Products Shipped by Silver-Lead-Zinc Mines in Canada, 1921 and 1922

Location of Mines	No. of Mines Shipping	Product shipped	Quantity shipped	Net value at shipping point	Total metal contents as determined by settlement assay			
					Gold	Silver	Lead	Zinc
			tons	$	ozs.	ozs.	lb.	lb.
1921								
Quebec, Ontario and Yukon	3	Lead ore	2,110	94,000	.....	378,261	2,472,615	.....
		Lead concentrates	2,315	132,500	376	37,895	3,422,090	.....
		Total	4,425	226,500	376	415,156	5,894,705	.....
British Columbia	54	†Lead ore	9,415	371,177	1,073	540,493	2,139,709	286,374
		*Lead concentrates	1,419	73,636	2	32,725	1,483,202	6,980
		Zinc ore	297,241	1,486,597	.....	839,624	58,476,369	98,675,414
		Zinc concentrates	165	12,119	8	17,218	20,482	123,679
		Dry ore	93	7,024	17	11,213	3,239	.....
		Total	308,333	1,950,553	1,100	1,441,273	62,123,001	99,092,447
Total for Canada	**57**	.....	**312,758**	**2,177,053**	**1,476**	**1,857,429**	**68,017,706**	**99,092,447**
1922								
Ontario and Yukon	3	Lead ore	4,150	471,522	.....	951,932	4,419,744	277,054
		Lead concentrates	2,425	145,500	.....	.....	2,910,610	.....
		Total	6,585	617,022	.....	951,932	7,330,354	277,054
British Columbia	72	Lead ore	14,194	562,183	70	599,862	7,552,793	1,233,901
		Lead concentrates	6,423	624,370	234	611,843	6,452,703	.....
		Zinc ore	350,504	2,075,144	16	1,312,505	78,303,030	98,057,915
		Zinc concentrates	5,592	282,705	26	186,584	47,281	4,918,049
		Dry ore	98	12,388	8	19,922	4,264	.....
		Total	376,811	3,556,790	354	2,730,716	92,360,071	104,209,865
Total for Canada	**75**	.....	**383,397**	**4,173,812**	**354**	**3,682,648**	**99,690,425**	**101,486,919**

†Includes 5,506 tons of silver ore (Dolly Vardon Mine).
*Includes 44 tons of silver concentrates.

Table 243.—Destination of Shipments from Silver-Lead-Zinc Mines in Canada, 1921 and 1922

Product shipped	Tons shipped	Net value at shipping point	Total Metal Contents as determined by Settlement Assay			
			Gold	Silver	Lead	Zinc
1921		$	ozs.	ozs.	lb.	lb.
To Canadian Smelters—						
Lead ore	8,641	295,530	1,063·0	433,364	1,595,278	282,294
Lead concentrates	2,349	113,241	1·6	28,189	3,397,895	.....
Zinc ore	297,211	1,486,134	0·3	838,759	58,476,369	98,652,785
Zinc concentrates	28	1,952	8·0	3,875	4,634	11,167
Dry ore	93	7,024	16·8	11,213	3,239	.....
Total	**308,322**	**1,903,881**	**1,089·7**	**1,315,400**	**63,477,415**	**98,946,246**
To United States Smelters—						
Lead ore	2,884	169,647	9·9	485,390	3,017,046	4,080
Lead concentrates	1,385	92,895	376·2	42,431	1,507,397	6,980
Zinc ore	30	463	.....	865	.....	22,629
Zinc concentrates	137	10,167	.....	13,343	15,848	112,512
Dry ore	.....	.....	.....	.....	.....	.....
Total	**4,436**	**273,172**	**386·1**	**542,029**	**4,540,291**	**146,201**
1922						
To Canadian Smelters—						
Lead ore	13,642	500,302	52	537,313	6,820,558	1,233,901
Lead concentrates	8,230	704,980	218	544,331	8,508,526	.....
Zinc ore	350,504	2,075,144	16	1,312,505	78,303,030	98,057,915
Zinc concentrates	5,592	282,705	26	186,584	47,281	4,918,049
Dry ore	98	12,388	8	19,922	4,264	.....
Total	**378,066**	**3,575,519**	**320**	**2,600,655**	**93,773,659**	**104,209,865**
To United States Smelters—						
Lead ore	4,713	533,403	18	1,014,481	5,151,979	277,054
Lead concentrates	618	64,890	16	67,512	764,787	.....
Total	**5,331**	**598,293**	**34**	**1,081,993**	**5,916,766**	**277,054**

Table 244.—Shipments of Lead Ores from Canadian Mines, 1913-1922

Year	Lead ores shipped		Lead Contents in Pounds	Silver Contents in Ounces
	Tons	Value		
		$		
1913	85,978	3,276,812	53,807,570	2,564,155
1914	70,207	2,652,802	50,527,130	2,501,820
1915	73,752	2,958,394	48,708,005	2,954,175
1916	84,516	4,568,500	54,124,628	2,582,952
1917	46,799	3,866,862	38,696,116	1,670,064
1918	75,256	4,705,573	46,843,602	2,314,542
1919	54,508	3,044,839	32,147,989	2,185,376
1920	69,493	2,985,848	36,325,507	2,882,178
1921	15,259	671,313	9,517,616	989,374
1922	27,203	1,803,575	21,335,850	2,163,637

Table 245.—Shipments of Zinc Ores from Canadian Mines, 1898-1922

Year	Zinc ore shipped		Metallic zinc in ore shipped	Year	Zinc ore shipped		Metallic zinc in ore shipped
	Tons	Value	Pounds		Tons	Value	Pounds
		$				$	
1898	1,162	11,000	788,000	1910	5,063	120,003	4,361,712
1899	865	18,165	814,000	1911	2,590	101,072	2,346,849
1900	261	4,810	212,000	1912	6,415	215,119	5,354,700
1901*				1913	7,889	186,827	7,069,800
1902	158	1,659	142,200	1914	10,893	262,563	9,101,460
1903	1,000	10,500	900,000	1915	14,895	554,938	12,231,439
1904	597	3,700	477,568	1916	82,077	1,086,249	48,498,078
1905*	9,413	139,200	*	1917	116,489	1,323,985	64,655,713
1906*	1,154	23,800	*	1918	121,200	1,228,195	63,026,464
1907*	1,573	49,100	*	1919	135,535	1,049,493	59,959,709
1908*	452	3,215	*	1920	249,136	1,157,844	91,033,202
1909†	18,371	242,699	16,468,204	1921	297,406	1,498,716	98,799,093
				1922	356,096	2,357,846	102,975,964

*Figures not available. †Includes 7,424 tons shipped late in 1908.

Table 246.—Employees, Salaries and Wages in the Silver-Lead-Zinc Mining Industry in Canada, 1921 and 1922

Class	1921				1922			
	British Columbia		Canada*		British Columbia		Canada	
	Number	Salaries and Wages	Number	Salaries and Wages	Number	Salaries and Wages	Number	Salaries and Wages
		$		$		$		$
SALARIED EMPLOYEES—								
Superintendents and managers	23	48,363	31	71,425	19	52,977	24	77,177
Technical employees	12	21,201	15	25,886	11	26,575	17	37,318
Clerks and stenographers	14	15,625	25	26,235	16	17,484	23	29,399
Total	49	85,189	71	123,546	46	97,036	64	143,894
WAGE-EARNERS—								
Surface and mill	202	657,217	258	841,025	359	880,019	432	1,226,751
Underground	314		432		380		498	
Total	516	657,217	690	841,025	739	880,019	930	1,226,751
Grand Total	**565**	**742,406**	**761**	**964,571**	**785**	**977,055**	**994**	**1,370,645**

*Totals for Canada include data for three other mines—1 in Quebec, 1 in Ontario and 1 in the Yukon.

Table 247.—Number of Wage-earners in the Silver-Lead-Zinc Mining Industry in Canada, by Months, 1922

Month	Surface	Underground	Total
January	284	440	724
February	285	439	724
March	266	426	692
April	274	421	695
May	352	418	770
June	406	446	852
July	462	476	938
August	483	451	934
September	435	521	956
October	454	490	944
November	478	538	1,016
December	441	523	964
Average	**432**	**498**	**930**

Table 248.—Miscellaneous Expenses in the Silver-Lead-Zinc Mining Industry in Canada, 1921 and 1922

Province	1921	1922
	$	$
Quebec, Ontario and Yukon	39,212	131,862
British Columbia	409,867	1,018,733
Canada	**449,079**	**1,150,595**

METALLURGICAL WORKS

It was found impossible in several instances to draw any line of demarcation between mining proper and those operations which were carried on above ground by those establishments that give treatment of one kind or another to the crude ore after it is mined, since it has been the custom to consider this preparation for market or for further treatment, as part of the mining operations.

In a number of instances, however, it has been possible to obtain certain statistics regarding smelting and refining plants operated in conjunction with mines, and the present section has been designed to present in a correlated manner the principal data furnished by these concerns and by similar plants operated independently of mines, in which the reduction of ores either by fire or by electricity was carried on for the production of the non-ferrous metals or compounds of them.

The operations carried on by the metallurgical works closely reflected the conditions in those sections of the mining industry most dependent on these plants. In British Columbia, while the lead and zinc departments were active and produced to capacity, the copper smelters greatly reduced their operations. In Ontario the nickel-copper industry was almost at a standstill, and did not show any marked recovery until the early fall months. The three smelters in Ontario treating the ores from the Cobalt district curtailed their activities and one company passed out of existence during the period. The lead smelter at Galetta, Ontario, continued to produce to capacity, with an output around three million pounds of lead per annum. Offsetting the general decline, however, was the favourable development and operation of the large silver and gold mills of northern Ontario throughout the entire year 1922 but, while the recovery operations carried on there are metallurgical in character, they have not been included in this section for the reasons already mentioned, and the decline in the record for 1922 as compared with that of 1921, as shown in the following tables, is as a consequence more pronounced. The names of the companies and their principal products follow:—

British Columbia

The Consolidated Mining and Smelting Company of Canada, Ltd., Trail, B.C., operating many mines in addition to a large smelter and refineries producing gold, silver, lead, copper, copper sulphate, and zinc.

The Granby Consolidated Mining, Smelting and Power Company, Ltd., Anyox, B.C., operating mines and a copper smelter and producing copper, gold and silver.

Ontario

The International Nickel Company of Canada, Ltd., Copper Cliff, Ont., operating several mines and a smelter near Copper Cliff, and a refinery for matte at Port Colborne, Ontario, producing nickel and compounds of nickel, copper, monel metal and small amounts of the precious metals such as gold, silver, platinum and others of the platinum group;

The Mond Nickel Company, operating mines and a smelter at Coniston, Ontario, but shipping the smelter matte to Wales for refining;

The British America Nickel Corporation, operating mines and a smelter near Sudbury, and refining the matte at Deschenes, Que., producing nickel and nickel compounds, copper and some precious metals;

The Coniagas Reduction Company, operating a smelter in St. Catharines, Ontario, and producing silver bullion, the metals and oxides of cobalt and nickel, metallic arsenic, white arsenic and copper sulphate;

The Deloro Smelting and Refining Company, operating at Deloro, Ontario, smelting cobalt ores and producing silver bullion, metals and oxides of cobalt and nickel, white arsenic, the alloy "stellite" and insecticides.

The Kingdon Mining, Smelting and Manufacturing Company, Galetta, Ont., producing a pig lead from galena ores;

The Canadian Zinc Products Company operated their zinc oxide plant for a short time during 1921, but it was partially destroyed by fire in August of that year, and did not re-open throughout the entire period of 1922.

New Brunswick

The North American Antimony Smelting Company, Lake George, producing antimony regulus (idle). The company has been reorganized and is now known as the Antimony Products Corporation.

Smelting and reduction works treating only foreign ores, such as the Electro Tin Syndicate, Brantford, Ontario (idle in 1922); the Shawinigan Electro Metals Co., Shawinigan Falls, P.Q. (idle in 1922), and the Northern Aluminium Co., Shawinigan Falls, P.Q., and all furnaces used in recovering the non-ferrous metals from scrap have been excluded, as their activities have been reviewed in the report on the "Manufactures of the Non-Ferrous Metals."

As it is not permitted to publish statistics relating to an industry unless it is represented by three or more companies, it was necessary in some cases to include in one class, plants of different kinds, for instance, copper smelters and refineries with lead and zinc plants.

The groups selected were: The nickel-copper smelting and refining group, comprising three companies which operated three smelting establishments, all in Ontario, and two refineries, one of which was in Ontario and the other in Quebec; the silver-cobalt smelters and refineries, including two companies engaged in treating silver ores from the Cobalt camp; and the copper-lead-zinc smelters and refineries in which three companies were active, two being in British Columbia and one in Ontario.

It may be pointed out that the tables showing capital employed will in part duplicate information already given in the mining section, since there was no known basis on which the amounts to be allocated to mining or to metallurgy could be calculated. The data given on nickel-copper smelting and refining, which have already been included in the mining section, are here given separately. Apart from the points just mentioned, the data following relate to the metallurgical industry only.

In the table for "Capital Employed" in the metallurgical works in Canada, the data given show a decline of almost 20 million dollars from the previous year, but the bulk of this decrease occurred in the value of materials on hand, etc., and in working capital.

Table 249.—Capital Actually Employed in the Metallurgical Plants of Canada, 1921 and 1922

	1921				1922			
	Lands, buildings plant, machinery and tools	Materials on hand, supplies finished products ore on dump	Cash, trading, and operating accounts bills receivable	Total	Lands, buildings, plant, machinery and tools	Materials on hand, supplies finished products ore on dump	Cash trading and operating accounts bills receivable	Total
	$	$	$	$	$	$	$	$
Nickel-copper smelters and refineries	22,303,585	10,467,385	4,062,590	36,833,560	23,242,522	3,736,357	1,151,035	28,129,914
Silver-cobalt smelters	1,433,442	2,105,786	444,096	3,983,324	1,415,656	227,042	1,125,225	2,767,923
Copper, lead and zinc smelters and refineries	31,823,524	9,234,445	812,092	41,870,061	24,273,706	7,094,677	894,331	32,262,714
Total	**55,560,551**	**21,807,616**	**5,318,778**	**82,686,945**	**48,931,884**	**11,058,076**	**3,170,591**	**63,160,551**

In Table 251 the average price for the year 1921 in a recognized market was used in computing the values except in the case of nickel-copper matte for which as it was impossible to secure figures from the operators, a value of 10 cents per pound on the copper content and of 25 cents per pound on the nickel content was used. For the year 1922 the values represent more nearly the actual amounts which might have been received had the entire production been sold. These figures were arrived at by finding the selling value from the sales made and reported.

The total quantities and values given will not agree with those shown in Part One as the mineral production of Canada since a portion of the metal produced in the smelters was derived from foreign ores treated in Canada, and large amounts of gold and silver, recovered in mining and milling operations, did not pass through the plants described in this section.

It will be observed that the total value given in the table showing products made, is not the net value to the metallurgical companies and therefore cannot be used as a value to be included with the manufacturing industry of Canada. In order to secure such figures it would be necessary to deduct the costs of raw materials used, e.g., ore, concentrates and residues, or in other words the values accruing to the mining and milling industry of these raw materials treated during the period.

Table 250.—Ores, Concentrates, etc., Treated in Canadian Smelters, 1921 and 1922

Group	1921	1922
	Tons	Tons
Nickel-Copper—		
Ores treated	393,768	314,120
Matte produced	19,497	17,324
Matte exported for refining	10,465	29,108
Matte treated in Canadian refineries	5,558	10,340
Silver-Cobalt-Nickel—		
Ores treated	141	252
Concentrates treated	2,005	1,556
Residues treated	2,994	2,068
Copper, Lead and Zinc—		
Copper, ores and concentrates	1,016,302	895,691
Lead ores	8,403	15,283
Lead concentrates	48,013	63,119
Gold ores	7,380	10,507
Zinc residues	32,019	44,948
Other ores	381	569
Zinc concentrates	106,239	109,942

Table 251.—Products made by the Metallurgical Industry in Canada, 1921 and 1922

Item	Unit	1921		1922	
		Quantity	Value	Quantity	Value
			$		$
White arsenic	Pounds	3,509,921	310,627	3,335,613	243,500
Cobalt	"	22,216	66,648	110,274	275,250
Cobalt oxide	"	216,875	464,112	360,495	720,990
Mixed oxides	"	105,675	113,865	86,730	69,384
Copper blister	"	†36,051,554	4,506,444	‡33,668,122	4,608,507
Copper refined	"			730,000	112,069
Copper sulphate	"	548,481	30,166	208,282	11,455
Gold	Fine ozs.	64,879	1,341,168	19,153	395,892
Iridium, osmium, rhodium, ruthenium	"	56	9,520	21	1,680
Lead	Pounds	62,333,281	3,579,177	81,412,716	3,317,787
Matte*—nickel-copper and silver-copper	Tons	14,336	3,902,091	**19,841	3,719,553
Nickel	Pounds	5,458,659	1,835,737	11,084,262	3,146,036
Nickel castings	"	14,522	5,896		
Nickel oxide	"	7,879,055	1,595,508	2,505,181	409,156
Nickel sulphate	"	3,139	204	27,270	2,231
Palladium	Fine ozs.	591	38,415	341	22,165
Platinum	"	269	20,175	176	17,177
Silver	"	5,415,128	3,392,704	3,844,485	2,395,835
Zinc	Pounds	52,988,000	2,416,501	56,290,000	3,317,536
Residues	"	294,497	53,139	920,660	51,002
Total			**23,732,277**		**23,637,205**

*Exported or not refined.
†Total copper contents of blister converter and refined copper.
‡Includes 1,124,777 oz. silver and 31,894 oz. gold.
**Mattes containing 27,829,941 lbs. nickel, 19,868,639 lbs. copper and 59,718 oz. silver.

From the statements of mine operators showing net values received for all ores and concentrates, etc., shipped during the period, it was possible to make a fairly close estimate of the cost to the smelters. For ores, etc., treated by the silver-cobalt smelters an approximate average value per ton was easily found, and with the exception of the nickel-copper no difficulty for any ore was met with. As it was impossible to secure good figures for nickel-copper ore, a nominal value of $6.00 per ton was used. Where residues passed through various plants from one process to another as at Trail, British Columbia, it was impossible to arrive at close figures, and as the total residues amounted to but a fraction of the commodities treated, they were left out of the compilation. Other residues have had values applied to them, based on their mineral content, where known, or from figures showing receipts from sales.

A tabulation showing approximately the total expenses incurred during 1921 and 1922 follows.

Table 252.—Summary of Expenditures in Metallurgical Works in Canada, 1921 and 1922

	1921	1922
	$	$
Estimated cost of ores, etc. treated, in silver-cobalt smelters	2,150,000	1,070,000
Estimated cost of ores, etc., treated, in nickel-copper smelters	2,350,000	1,839,000
Estimated cost of ores etc., treated, in copper, lead and zinc smelters	3,900,000	4,213,000
Total salaries and wages	4,406,957	5,056,464
Cost of chemicals used	254,627	*200,000
Cost of fuel	3,097,514	1,031,572
Miscellaneous expenses	6,441,846	8,229,941
Total expenditures	**22,600,944**	**21,689,977**

*Estimated—Data not collected in 1922.

Table 253.—Employees, Salaries and Wages in the Metallurgical Works in Canada, 1921 and 1922

Group	1921				1922			
	On Smelter Pay-roll		On Refinery Pay-roll		On Smelter Pay-roll		On Refinery Pay-roll	
	No. of Employees	Salaries and Wages	No. of Employees	Salaries and Wages	No. of Employees	Salaries and Wages	No. of Employees	Salaries and Wages
		$		$		$		$
Nickel-Copper Smelters and Refineries—								
Salaried employees	78	242,790	78	150,816	62	170,223	81	142,390
Wage-earners	1,073	953,582	462	401,541	605	799,831	462	676,523
Silver-Cobalt-Nickel Smelters and Refineries Combined—								
Salaried employees	47	111,115	.....	.....	45	95,317	.....	.....
Wage-earners	231	325,466	.....	.....	220	187,193	.....	.....
Copper-Lead-Zinc Smelters and Refineries—								
Salaried employees	93	191,830	19	41,106	176	40,137	.....	.....
Wage-earners	1,217	1,088,711	.....	.....	1,733	2,570,173	.....	.....
All the Metallurgical Works—								
Superintendents	37	165,307	16	62,913	55	247,287	6	44,100
Technical employees: engineers, chemists, draughtsmen, etc.	47	106,797	41	94,718	104	215,110	17	22,029
Clerks, stenographers, etc	134	273,631	40	34,291	124	204,280	58	76,261
Total—Salaried employees	218	545,735	97	191,922	283	660,677	81	142,390
Wage-earners	2,521	3,267,759	462	401,541	2,558	3,557,197	462	676,523
Grand total	**2,739**	**3,813,494**	**559**	**593,463**	**2,841**	**4,223,874**	**543**	**818,913**

Table 254.—Number of Wage-earners in the Metallurgical Works in Canada, by Months, 1922

Month	Nickel-Copper Smelters and Refineries	Silver-Cobalt Nickel Smelters and Refineries	Copper-Lead Zinc Smelters and Refineries	Total
January	1,282	155	1,606	3,043
February	1,395	126	1,652	3,173
March	1,437	116	1,787	3,340
April	472	128	1,723	2,323
May	648	150	1,742	2,540
June	767	189	1,710	2,666
July	918	183	1,725	2,826
August	1,005	208	1,755	2,968
September	1,207	255	1,765	3,227
October	1,182	262	1,728	3,172
November	1,245	288	1,745	3,278
December	1,262	283	1,756	3,301
Average	**1,067**	**220**	**1,733**	**3,020**
Average in 1921	**1,535**	**231**	**1,217**	**2,983**

Table 255.—Miscellaneous Expenses Chargeable to Smelting and Refining Operations in Canada, 1921 and 1922

	Nickel-Copper Smelters and Refineries	Silver-Cobalt Smelters and Refineries	Copper, Lead and Zinc Smelters and Refineries	Total
	$	$	$	$
Cost of purchased power	142,633	24,786	490,758	658,177
Cost of general supplies	589,316	103,845	3,239,240	3,932,401
Royalties	57,179	1,287	80,268	138,734
Taxes—Municipal	127,621	13,216	28,798	169,635
Taxes—Provincial	2,477	.....	103,112	105,589
Taxes—Dominion	42,243	.....	30,046	72,289
All other sundry expenses	768,526	60,352	536,143	1,365,021
Total for 1921	**1,729,995**	**203,486**	**4,508,365**	**6,441,846**
Total for 1922	**4,015,618**	**165,189**	**4,049,134**	**8,229,941**

NON-METALLIC MINERAL INDUSTRIES

ASBESTOS

The eastern townships area in the Province of Quebec furnishes about 90 per cent of the world's production of asbestos. Rhodesia, the second producer, markets only the longer fibre stocks, and is therefore an important competitor, as Canadian mines ship both long and short fibre. The Union of South Africa and Russia have also become more important sources of supply, particularly to European markets; several other countries annually produce asbestos, but in less amounts.

Asbestos, owing to its fibrous structure and to the fact that it will not burn, finds many uses as a fire-proofing material, particularly in felts, sheets, theatre drop-curtains, mitts, etc., and also as a principal component of roofings, shingles, pipe-coverings, brake linings and wall board, to mention only a few of the better-known uses.

The industry in Canada was represented in 1922 by 12 firms operating 15 mines at which there were mills for the grading of the product. In the 1921 issue of this report, there was a description of the method used in grading asbestos in the Quebec mills.

The amount of capital employed, comprising the value of lands, buildings, plant equipment, cost of materials and supplies on hand at the end of the year, and working capital including cash balances and bills receivable was $43,997,252, an increase of 206 million dollars over the total reported for the preceding year.

Employment was furnished to 2,572 persons including 154 salaried employees and the total disbursements in salaries and wages amounted in all to $2,581,644. The trend of employment was upward throughout the greater part of the year, rising from 1,552 wage-earners in January to a peak of 2,782 in August. There was a slight falling-off in the number employed in October and November and the year closed with 2,614 men on the rolls.

The extreme depression in the market for asbestos noted in 1921, extended into the first quarter of 1922, but beginning in April and continuing throughout the rest of the year, there was a better demand for this commodity although prices declined still further. The selling value for Crude No. 1 which was $2,750 per ton in December, 1920, averaged $2,065 in 1921 and $867 in 1922.

United States asbestos operators who reported a 50 per cent decline in production in 1921 produced only a very small amount in 1922. South Africa showed a considerable falling-off from the 1921 record although there was a slight recovery towards the end of the year.

In checking over the list of operating firms it will be noted that three companies, namely, the General Asbestos Company; Windsor Asbestos Company, Limited; and the Canada Asbestos and Chrome Company which operated in 1921 were inactive during the period under review.

Table 256.—Principal Statistics of the Asbestos Industry in Canada, 1920-1922

Year	Number of Firms	Capital Employed	Number of Employees	Salaries and Wages	Cost of Fuel	Miscellaneous Expenses	Selling Value of Products
		$		$	$	$	$
1920	17	21,839,090	3,776	4,765,305	395,976	5,420,559	14,792,201
1921	15	41,357,161	2,694	2,657,425	318,633	2,713,440	4,906,230
1922	12	43,997,252	2,572	2,581,644	356,962	2,701,462	5,552,723

Table 257.—Capital Employed in the Asbestos Industry in Canada, 1921 and 1922

Capital Employed as represented by	1921	1922
	$	$
Cost of lands, buildings, plant machinery and tools	35,348,977	37,291,835
Cost of supplies and stock on hand	4,299,792	2,717,312
Cash, trading and operating accounts and bills receivable	1,708,392	3,988,105
Total	41,357,161	43,997,252

Table 258.—Employees, Salaries and Wages in the Asbestos Industry in Canada, 1921 and 1922

	1921				1922			
	Number			Salaries and Wages	Number			Salaries and Wages
	Male	Female	Total		Male	Female	Total	
				$				$
SALARIED EMPLOYEES:—								
Salaried officers of corporation					22	1	23	157,840
Superintendents and managers	27		27	106,960	27		27	87,832
Technical employees, engineers, etc.	32		32	60,391	21		21	42,739
Clerks and stenographers	60	5	65	90,668	69	14	83	105,494
Total	119	5	124	258,019	139	15	154	393,905
WAGE-EARNERS:—								
Mine	1,684		1,684	1,598,734	1,613		1,613	1,537,805
Mill	886		886	800,672	805		805	649,934
Total	2,570		2,570	2,399,406	2,418		2,418	2,187,739
Grand Total	**2,689**	**5**	**2,694**	**2,657,425**	**2,557**	**15**	**2,572**	**2,581,644**

Table 259.—Number of Wage-earners in the Asbestos Industry in Canada by Months, 1922

Month	Number		Month	Number	
	Mine	Mill		Mine	Mill
January	1,023	529	July	1,821	847
February	1,076	547	August	1,935	852
March	1,193	596	September	1,890	871
April	1,141	582	October	1,681	834
May	1,343	714	November	1,663	852
June	1,569	807	December	1,758	856
Average for 1921					**2,570**
Average for 1922					**2,418**

Table 260.—Miscellaneous Expenses in the Asbestos Industry in Canada, 1921 and 1922

	1921	1922
	$	$
Cost of purchased power for mine and mill use	419,056	Individual items not available
Cost of all materials and supplies used in the mine or mill	1,128,462	
Royalties paid	165,462	
Taxes—		
Municipal	58,515	
Provincial	12,134	
Federal	170,002	
All other sundry expenses	761,809	
Total	**2,713,440**	**2,704,462**

Table 261.—Monthly Average Prices of Asbestos by Grades, 1922

(Price per short ton)

(Computed from quotations in the Engineering Mining Journal-Press)

Month	Crude No. 1	Crude No. 2	Spinning Fibres	Magnesia and Compressed Sheet Fibres	Shingle Stock	Paper Stock	Cement Stock	Floats Stock	Long Spinning Fibre*
	$	$	$	$	$	$	$	$	$
January	1,250	725	312	200	115	55	20	8	.....
February	1,100	625	250	155	105	50	15	9	.....
March	900	625	250	137	95	45	15	8	.....
April	900	625	250	137	95	45	15	8	.....
May	825	450	187	125	85	40	16	7	300
June	1,050	525	300	125	107	45	25	15	425
July	888	525	269	125	100	41	20	12	388
August	725	400	237	125	82	31	15	8	250
September	725	400	238	125	82	31	15	8	250
October	700	350	238	137	75	34	15	9	200
November	650	337	238	187	75	32	16	10	225
December	675	375	238	150	75	37	13	9	200
Average	**867**	**490**	**252**	**144**	**98**	**40**	**17**	**9**	**293**

* Prices not quoted for the first four months.

COAL

Canada's coal reserves are estimated to constitute more than 16 per cent of the world's known available supply and most of these deposits are located in the western provinces although coal of good quality has been mined in the maritime provinces for a great many years, and it is probable that operations in that field will be continued for many years to come.

In 1922, there were 506 coal mines operated in Canada, of which 357 were in Alberta, 59 in Saskatchewan, 57 in Nova Scotia, 19 in New Brunswick, 13 in British Columbia, and 1 in the Yukon.

The total capital employed by these mines amounted to $140,466,108, of which 59·1 million dollars was invested in Nova Scotia mines; 47·2 million dollars in Alberta mines and 29·2 million dollars in British Columbia properties.

Salaried employees to the number of 1,742 were employed in 1922, and salaries paid amounted to $3,777,626. There was an increase both in the number of salaried employees and in the salaries paid as compared with the previous year, the number of such employees on the rolls in 1921 being 1,626, and the amount paid in salaries, $3,717,238.

The average number of wage-earners engaged in the coal-mining industry in Canada (exclusive of salaried employees) increased very appreciably in the first three months of the year reaching a peak of 40,682 on the rolls in March. The closure of a considerable number of mines because of the strike which commenced on April 1st resulted in the April employment figures dropping to 21,514 and the number employed remained practically unchanged until August when the average rose to 28,685. There was a continued increase in the number employed during the next three months to 35,170 in November. A slight decline was noted in December and the year closed with 34,178 men on the rolls. The average number employed throughout the year was 30,096.

By provinces, Nova Scotia was easily the leader with an average of 14,068 employees for the year and a maximum of 23,161 employed in March. Alberta coal mines furnished employment on the average to 8,815 men during the year, the maximum employment being recorded in November when 13,383 names were on the rolls. Table 264 shows the average number of employees in the coal mines of Canada by provinces for each month and Table 265 shows for 1922 the number of employees by classes and by provinces.

Closely related in point of interest to the number of employees are the data concerning the number of days' work done and the wages paid. Of the 30,096 employees, 7,714 worked on the surface and 22,382 were employed underground. The surface men worked on the average 259 days during the year as compared with 254 days in 1921 and the underground employees worked 219 days on the average or precisely the same number as in 1921. Only one more day's work was done on the average by all employees in the coal mines in 1922 than in 1921, the total for the year being 229 days. Earnings per man-day were $5.18 as compared with $6.20 in the previous year and the total wages paid amounted to $35,773,001 or approximately seven million dollars less than the total of $42,758,471 paid in 1921.

Table 262.—Capital Employed in the Coal Mines of Canada, as at December 15, 1922

Capital Employed as represented by	Nova Scotia	New Brunswick	Saskatchewan	Alberta	British Columbia	Yukon	Canada
	$	$	$	$	$	$	$
Value of buildings, plant, machinery and tools	52,657,170	1,092,610	2,874,545	39,912,406	25,702,375	202,500	122,441,606
Cost of supplies on hand and coal on bank	2,639,514	53,949	46,298	1,339,634	664,379	1,096	4,745,470
Cash, trading and operating accounts and bills receivable	3,889,786	306,435	148,960	6,037,835	2,896,016	.....	13,279,032
Total	**59,186,470**	**1,452,994**	**3,069,803**	**47,289,875**	**29,262,770**	**204,196**	**140,466,108**

Table 263.—Salaried Employees and Salaries Paid on Coal Mine Staffs in Canada, by Provinces, 1922

—		Nova Scotia	New Brunswick	Saskatchewan	Alberta	British Columbia and Yukon	Canada
Salaried officers of the corporation	No.	39	6	3	106	26	180
	Salary	$ 163,603	$ 19,000	$ 12,400	$ 348,902	$ 157,300	$ 701,205
General superintendents and managers	No.	166	12	11	292	51	532
	Salary	$ 416,728	$ 34,365	$ 29,295	$ 807,768	$ 180,455	$ 1,468,611
Technical experts, accountants, etc	No.	122	4	7	169	105	407
	Salary	$ 241,973	$ 4,340	$ 8,290	$ 253,804	$ 238,446	$ 746,853
Clerks, stenographers and salesmen	No.	247	11	11	248	106	623
	Salary	$ 304,416	$ 15,108	$ 16,583	$ 340,087	$ 184,763	$ 860,957
Totals	**No.**	**574**	**33**	**32**	**815**	**288**	**1,742**
	Salary	**$ 1,126,720**	**$ 72,813**	**$ 66,568**	**$ 1,750,561**	**$ 760,964**	**$ 3,777,626**

Table 264.—Number of Employees in the Coal Mines of Canada by Months and by Provinces, 1922

Month	Nova Scotia	New Brunswick	Saskatchewan	Alberta	British Columbia and Yukon	Canada
January	10,988	642	589	11,744	6,525	30,488
February	17,951	623	555	11,022	6,588	36,739
March	23,161	649	487	9,871	6,514	40,682
April	12,314	526	383	3,295	4,996	21,514
May	12,733	555	338	3,518	5,083	22,227
June	12,271	586	342	3,679	5,033	21,911
July	12,870	580	342	3,739	5,170	22,701
August	13,087	619	325	8,075	6,579	28,685
September	12,973	647	388	11,700	6,810	32,518
October	13,253	650	534	13,158	6,746	34,311
November	13,679	651	642	13,383	6,815	35,170
December	13,527	593	599	12,604	6,855	34,178
Average 1922	14,068	611	460	8,815	6,142	30,096
Average 1921	12,626	449	435	10,019	6,694	30,223

Table 265.—Number of Employees, in the Coal Mines of Canada, by Classes and by Provinces, 1922

Classification	Provinces					Total for Canada		
	Nova Scotia	New Brunswick	Saskatchewan	Alberta	British Columbia and Yukon	Surface	Underground	Total
SURFACE—								
Administration	119	14	12	162	34	258	83	341
Foremen and clerks	198	17	14	254	146	589	40	629
Screenmen and loaders	730	18	19	527	184	1,389	89	1,478
UNDERGROUND—								
Officials	441	2	6	289	182	14	906	920
Hand cutters and helpers	2,061	399	251	2,324	2,068	77	7,026	7,103
Machine cutters	1,509	2	3	348	78	.....	1,940	1,940
Machine loaders and helpers	1,502	2	8	1,129	35	1	2,675	2,676
Horse haulage employees	839	4	42	680	392	48	1,909	1,957
Mechanical haulage employees	1,551	1	5	307	398	83	2,179	2,262
Ventilation employees	375	.....	.....	92	55	14	508	522
Roadmakers	295	.....	6	141	113	4	551	555
Timbermen	685	9	12	331	168	15	1,198	1,205
Pumpmen	195	2	7	58	42	9	295	304
MISCELLANEOUS—								
Enginemen	296	11	8	178	93	535	51	586
Firemen	351	4	8	163	62	542	46	588
Machinists	357	1	2	84	94	497	41	538
Carpenters and masons	106	2	6	102	112	365	23	388
Other mechanics	289	13	6	201	114	410	213	623
All other white employees	2,109	110	45	1,445	945	2,451	2,203	4,654
Japanese	.....	.....	.....	.....	78	8	70	78
Chinese	.....	.....	.....	.....	740	399	341	740
Indians	.....	.....	.....	.....	9	6	3	9
Total	14,068	611	460	8,815	6,142	7,714	22,382	30,096

Table 266.—Number of Employees, Work Done and Wages Paid in the Coal Mines of Canada, by Months, 1922

Month	Number of Employees			Days' Work Done			Total Wages Paid
	Surface	Underground	Total	Surface	Underground	Total	
							$
January	7,626	22,862	30,488	160,339	399,946	560,285	Monthly Records not available
February	8,758	27,981	36,739	168,414	439,722	608,136	
March	9,110	31,572	40,682	175,912	451,864	627,776	
April	5,674	15,840	21,514	107,625	244,820	352,445	
May	6,047	16,180	22,227	121,147	256,283	377,430	
June	6,147	15,764	21,911	131,394	304,843	436,237	
July	6,389	16,312	22,701	144,027	331,649	475,676	
August	7,799	20,886	28,685	139,459	293,872	433,331	
September	8,577	23,941	32,518	214,897	507,544	722,441	
October	8,873	25,468	34,341	217,831	585,368	803,199	
November	8,801	26,369	35,170	204,579	559,604	764,183	
December	8,763	25,415	34,178	209,584	533,321	742,905	
Total				1,995,208	4,908,836	6,904,044	35,773,001
Average	7,714	22,382	30,096	259 days per year	219 days per year	229 days per year	5·18 per day

Table 267.—Miscellaneous Coal Mine operating expenses, by Provinces, 1921 and 1922

Province	Miscellaneous Expenses, 1921							Total miscellaneous expenses in 1921	Total miscellaneous expenses in 1922
	Cost of purchased power for mine use	Cost of all materials and supplies used in or about the colliery	Taxes Paid				All other sundry expenses		
			Royalties	Municipal	Provincial	Federal			
	$	$	$	$	$	$	$	$	$
Nova Scotia	1,757,304	2,976,801	584,632	180,048	57,949	35,599	2,962,028	8,554,361	7,935,607
New Brunswick	24,143	102,412	18,796	3,576	3,323	5,400	38,955	196,105	300,499
Saskatchewan	1,684	53,976	10,847	7,555	389	2,903	32,826	110,180	107,313
Alberta	73,335	3,131,099	473,399	100,571	166,652	149,802	1,743,569	5,838,427	6,239,290
British Columbia		2,729,506	202,918	12,740	61,895	61,488	453,305	3,521,852	2,752,325
Yukon			138					138	
Canada	1,856,466	8,993,794	1,290,730	304,490	290,208	255,192	5,230,683	18,221,563	17,435,034

FELDSPAR

The first record of production in the feldspar industry in Canada dates back to about the year 1890. The production during that year was approximately 700 tons and since that date the records show an increase until in 1920, nearly 38,000 tons was produced.

The initial development work in this industry was made on deposits located in Templeton and Hull townships, in the province of Quebec. In the townships of Bedford and Portland, Ontario, near Bedford and Verona, development work was started on large feldspar deposits in the year 1900. The activities of these Ontario feldspar properties during the next few years, owing to their proximity to the American market (potteries located in New Jersey), were responsible for the almost complete cessation of work on Quebec deposits. A small quantity of high-grade dental spar has been produced from the Villeneuve quarry in Portland township, Quebec, for a number of years.

Plants for the fine-grinding of feldspar in Canada are located at Kingston, Toronto and Oshawa; the first two establishments were operated during 1922 producing about 2,200 tons of ground spar. The grinding capacity of these two plants is approximately 7,500 tons per annum.

Although feldspar occurs in many deposits throughout Canada, operations in this industry in 1922 were confined to the provinces of Ontario and Quebec. With the exception of some 3,000 tons used for domestic purposes, the entire Canadian output was shipped to United States grinding plants in the form of crude spar for use in the ceramic industry.

Twenty-five firms reported operations in 1922; of these, the most outstanding one was the "Derry Mine," near Buckingham, Quebec. This deposit was located in 1920 and is now considered the most important body of feldspar in Canada.

Table 268.—Principal Statistics of the Feldspar Industry in Canada, 1920-1922.

Year	Number of Firms	Capital employed	Number of Employees	Salaries and Wages	Cost of Fuel	Miscellaneous Expenses	Selling Value of Products
		$		$	$	$	$
1920	20	(*)	277	152,379	(*)	(*)	280,895
1921	23	484,633	143	146,776	4,237	55,628	230,754
1922	23	388,310	225	127,182	5,231	60,829	221,778

(*) Data not available.

Table 269.—Capital Employed in the Feldspar Industry in Canada, 1921 and 1922

Capital employed as repre ented by:	1921	1922
	$	$
Cost of lands, buildings, plant, machinery and tools	427,310	336,507
Cost of supplies and stock on hand	45,214	15,530
Cash, trading and operating accounts and bills receivable	12,109	36,273
Total	**484,633**	**388,310**

Table 270.—Employees, Salaries and Wages in the Feldspar Industry in Canada, 1921 and 1922

Year		Number			Salaries and Wages
		Male	Female	Total	
					$
Salaried employees	1921	11	1	12	18,223
	1922	11	1	12	17,252
Wage-earners	1921	131	.....	131	128,553
	1922	213	.....	213	109,930
Total	**1921**	**142**	**1**	**143**	**146,776**
	1922	**224**	**1**	**225**	**127,182**

Table 271.—Number of Wage-earners in the Feldspar Industry in Canada, by Months, 1922

Month	Number	Month	Number
January	179	July	130
February	146	August	148
March	152	September	128
April	101	October	188
May	128	November	209
June	133	December	224
Average for 1922			**213**
Average for 1921			**131**

Table 272.—Miscellaneous Expenses in the Feldspar Industry in Canada, 1921 and 1922

	1921	1922
	$	$
Cost of all materials and supplies used	39,364	
Taxes—		
Municipal	13	Individual
Provincial	114	Items not
Royalties paid	5,722	available.
All other sundry expenses	10,415	
Total	**55,628**	**60,829**

GYPSUM

The first record of the production of gypsum in Canada shows that in 1822 minor operations, consisting of the extraction of a few tons of this commodity for use as fertilizer, were conducted on a bed of gypsum near Paris, Ontario. The first mill for manufacturing gypsum was erected in 1823. Since that date operations in this district have been carried on almost continuously. At the present time the Ontario Gypsum Company is the only producer, operating at Lythmore and Caledonia.

Prior to 1833, activities in the gypsum industry in Nova Scotia consisted principally of minor operations carried on by individual producers. The crude material was shipped to mills located in the United States. Several attempts were made by local producers to work up the crude rock, but these were not successful owing to the almost total dependence on the American market. When the United States duty was made prohibitive all local milling operations ceased. During 1922, two mills were in operation in this province, one situated at Iona and the other at Windsor.

The centre of activities in the gypsum industry in New Brunswick is near Hillsborough, Albert County. Operations have been carried on in this district since 1847. In 1854 there was a change in the ownership of the quarries, and shortly after this date a plaster mill was erected to supply both local and American consumers. At the present time two companies are carrying on extensive operations in this district.

Developments in the gypsum industry in Manitoba are of comparatively recent date, the year 1901 marking the first active intensive work on deposits in the province. The Manitoba Union Mining Company in that year erected a crushing and calcining mill at the head of Portage Bay on Lake Manitoba.

The principal gypsum deposits operated in Canada during 1922 were located in the following centres: Hants and Victoria counties, Nova Scotia; Albert county, New Brunswick; Haldimand county, Ontario; Gypsumville, Manitoba; and in the Lillooet District, British Columbia.

Of the nine firms producing gypsum in the Maritime provinces, six were controlled by American capital. The output of these six mines was exported in the raw form to the United States, where it is treated in the manufacturing plants owned by the same interests. The remaining three firms quarried and calcined their own output principally for consumption in Canada.

In Ontario and Manitoba the raw gypsum was used mainly in the manufacture of cement, wall plaster, wall-board, fire-proof tile and blocks and plaster of paris. The British Columbia deposit was operated rather as a continuance of experimental work from the previous year and the resultant product was sold to the farmers for use on the land.

Operations in this industry were conducted by thirteen producers, eleven of which were incorporated companies and two individual producers in British Columbia.

Comparative figures for the capital employed by operating gypsum companies in 1921 and 1922 are shown in the following table. Owing to the fact that there was only one operator in Ontario, one in Manitoba, and two in British Columbia, statistics regarding these provinces have been combined.

Table 273.—Principal Statistics of the Gypsum Industry in Canada, 1920-1922

Year	Number of Firms	Capital Employed	Number of Employees	Salaries and Wages	Cost of Fuel	Miscellaneous Expenses	Selling Value of Products
		$		$	$	$	$
1920	11	*	1,016	955,602	*	*	1,893,991
1921	11	3,849,776	1,039	774,551	116,554	565,839	1,785,528
1922	13	4,092,090	1,055	909,072	127,246	436,705	2,160,898

*Data not available.

Table 274.—Capital Employed in the Gypsum Industry in Canada by Provinces, 1921 and 1922

Capital employed as represented by:	1921				1922			
	Nova Scotia	New Brunswick	Ontario, Manitoba and British Columbia	Canada	Nova Scotia	New Brunswick	Ontario, Manitoba and British Columbia	Canada
	$	$	$	$	$	$	$	$
Cost of lands, buildings, plant machinery and tools	879,960	439,099	1,426,328	2,745,387	1,495,717	268,100	1,317,177	3,080,994
Cost of all materials and supplies on hand	118,214	113,372	182,999	414,585	109,909	60,778	157,140	327,827
Cash, trading and operating accounts and bills receivable	410,250	86,550	193,004	689,804	420,548	3,903	258,818	683,269
Total	**1,408,424**	**639,021**	**1,802,331**	**3,849,776**	**2,026,174**	**332,781**	**1,733,135**	**4,092,090**

Table 275.—Employees, Salaries and Wages in the Gypsum Industry in Canada, 1921 and 1922

	1921				1922			
	Number			Salaries and Wages	Number			Salaries and Wages
	Male	Female	Total		Male	Female	Total	
SALARIED EMPLOYEES—				$				$
Salaried officers of corporation					8		8	41,059
Superintendents, managers, etc.	20	1	21	54,634	21	1	22	50,170
Technical employees, engineers, etc.	4		4	8,645	9		9	16,825
Clerks, stenographers, etc.	7	4	11	9,635	7	6	13	16,204
Total	31	5	36	72,914	45	7	52	124,258
WAGE-EARNERS—								
Mine	516		516	402,890	723		723	518,268
Mill	250		250	298,747	280		280	266,546
Total	766		766	701,637	1,003		1,003	784,814
Grand total	**797**	**5**	**802**	**774,551**	**1,048**	**7**	**1,055**	**909,072**

Table 276.—Average Number of Employees in the Gypsum Industry in Canada by Provinces, 1922

Months	Nova Scotia		New Brunswick		Ontario		Manitoba		Total for Canada	
	Mine	Mill	Mine	Mill	Mine	Mill	Mine	Mill	Mine	Mill
January	137	15	97	105	50	57	54	26	338	203
February	148	15	116	105	65	66	58	27	387	213
March	292	15	119	102	49	76	69	16	529	209
April	382	16	200	120	62	65	85	21	729	222
May	433	20	174	110	82	70	83	32	772	232
June	481	25	192	142	87	71	86	35	846	273
July	457	22	175	165	90	74	86	35	808	296
August	487	25	171	160	97	75	85	22	840	282
September	474	25	182	150	95	80	84	22	835	277
October	502	67	164	150	114	81	80	22	860	320
November	533	63	162	140	101	72	71	18	867	293
December	507	49	153	110	58	53	61	17	779	229
Average	**409**	**56**	**159**	**130**	**80**	**69**	**75**	**25**	**723**	**280**

Table 277.—Miscellaneous Expenses in the Gypsum Industry in Canada, 1921 and 1922

	1921	1922
	$	$
Cost of purchased power	23,876	Individual
Cost of all materials and supplies used	428,905	
Royalties paid	495	Items
Taxes—		
Municipal	20,941	not
Federal	3,125	
All other sundry expenses	88,497	Available
Total	**565,839**	**436,705**

MICA

There was a considerable increase in the sales of mica during 1922 owing to the revival of activity in the building and automobile industries. Large quantities of ground scrap mica are also used in the manufacture of roofing material. Sheet mica is consumed in the electrical industry in the manufacture of spark plugs, generators, condensers and starters. The consumption of mica in Canadian industries during 1922 was reported as follows: roofing materials, 359 tons; wall paper, 200 tons; electrical goods, 31 tons; lubricants, 30 tons; and rubber, 22 tons.

The important deposits of mica in Canada are located in the counties of Ottawa and Labelle in Quebec, and Lanark, Leeds and Frontenac in Ontario. The product of these mines, in the main part is shipped first to mica-trimming shops, conveniently located, where it is either roughcobbed or split and trimmed prior to exportation to the United States or Great Britain.

Twenty operators in Canada reported shipments of mica during 1922. Of this number fourteen were in Quebec, and six in Ontario.

Statistics relating to the extensive mica-trimming shops in Ontario and Quebec have not been included in this report, but will be treated under a separate heading in the report on "Manufactures of Non-Metallic Minerals."

Table 278.—Principal Statistics of the Mica Industry in Canada, 1920-1922

Year	Number of Firms	Capital Employed	Number of Employees	Salaries and Wages	Cost of Fuel	Miscellaneous Expenses	Selling Value of Products
		$		$	$	$	$
1920	20	(a)	186	145,247	(a)	(a)	376,022
1921	20	576,237	104	74,432	4,354	19,743	70,063
1922	20	441,802	147	64,641	1,807	45,825	152,263

(a) Data not available.

Table 279.—Capital Employed in the Mica Mining Industry in Canada by Provinces, 1921 and 1922

Capital employed as represented by	1921			1922		
	Quebec	Ontario	Canada	Quebec	Ontario	Canada
	$	$	$	$	$	$
Cost of lands, buildings, plant machinery and tools	137,080	86,073	223,153	41,401	52,183	93,584
Cost of all materials and supplies on hand	21,654	294,644	316,298	22,911	271,844	294,755
Cash, trading and operating accounts and bills receivable	23,933	12,853	36,786	40,610	12,853	53,463
Total	**182,667**	**393,570**	**576,237**	**104,922**	**336,880**	**441,802**

Table 280.—Number of Wage-Earners, by months, and Wages Paid in the Mica Industry in Canada, 1922.

Month	Number		Month	Number	
	Mine	Mill		Mine	Mill
January	38	35	July	66	49
February	39	34	August	58	62
March	38	34	September	56	93
April	51	34	October	56	109
May	61	43	November	52	127
June	75	46	December	37	109
Average for the year		**134**			
Total wages paid in 1921					**$ 66,694**
Total wages paid in 1922					**$ 51,603**

Table 281.—Miscellaneous Expenses Incurred in the Mica Industry in Canada by Provinces, 1921 and 1922

	Quebec	Ontario	Canada
	$	$	$
In 1921—			
Cost of purchased power	50	.....	50
Cost of all materials and supplies used	6,041	2,083	8,124
Royalties paid	85	.....	85
Taxes (Municipal)	636	60	696
Taxes (Provincial)	105	59	701
Taxes (Federal)	3,338	.....	3,338
All other sundry expenses	2,101	4,648	6,749
Total	**12,356**	**7,387**	**19,743**
In 1922—			
Total	**35,608**	**10,217**	**45,825**

NATURAL GAS

No records are available prior to 1892, as to the production of natural gas in Canada. An estimate of the value of gas produced during that year was placed at $150,000.

The extensive developments of the oilfields in Ontario made available for consumption large quantities of natural gas. From 1892 to 1902 inclusive, Ontario was the only contributor of this commodity. In 1903, the first production from other provinces was recorded. The value of natural gas produced during 1903 was approximately $202,000 and from that year onward there was an annual increase in production until in 1917, the grand total value was $5,045,298. From that date until 1922, considerable decreases in valuation were recorded.

A summary of the natural gas industry in Ontario during 1922 is provided in the following excerpt from the report issued by Col. R. B. Harkness, Commissioner of Gas for Ontario:—

"The decline in production, which began in 1918, is becoming more gradual from year to year. This situation is attributed to a natural decline in rock pressure, a raise in rates, the stoppage of leaks in transmission lines and improvement in burning appliances, the last two having been the special effort of the Department in 1922. Drilling activities in 1922 were stimulated by a raise in rates, but results were somewhat disappointing, one company in Lambton and Kent counties having drilled ten deep wells from which only a small flow of gas was obtained, the majority being abandoned. More success attended drilling in Haldimand and Norfolk counties where a small field was discovered. Two fairly good wells were drilled at Point Abino in Welland county. Four "wildcat" wells in Halton and Peel have brought to light a shallow field of considerable extent, but with light pressure, 65 pounds".

The producing fields in Alberta, during 1922 were, the Medicine Hat; Bow Island (about 40 miles west of Medicine Hat); and the Turner Valley gas field (35 miles southeast of Calgary). The total number of wells reported as producing at the end of the year was 60, as compared with 64 wells reported active in 1921. In addition to the fields mentioned previously, wells have also been bored successfully in the Viking gas field situated approximately 80 miles southeast of Edmonton.

The producing wells in the province of New Brunswick are confined to the Stony Creek field in Albert County, about eight miles south of Moncton. The natural gas produced is used largely for power, domestic heating and lighting purposes in Moncton. At the end of 1922 there were 19 wells in operation, one less than was reported active at the beginning of the year.

Table 282.—Principal Statistics of the Natural Gas Industry in Canada, 1920-1922

Year	Number of Firms	Number of Wells	Capital Employed	Number of Employees	Salaries and Wages	Miscellaneous Expenses	Selling Value of Products
			$		$	$	$
1920	104	1,954	(a)	616	643,320	(a)	4,232,642
1921	103	2,021	30,368,478	885	882,907	1,405,222	4,594,164
1922	132	1,981	31,373,817	921	939,194	1,458,675	5,846,501

(a) Data not available.

Table 283.—Capital Employed in the Natural Gas Industry in Canada by Provinces, 1921 and 1922

Capital employed as represented by	1921				1922			
	New Brunswick	Ontario	Alberta	Canada	New Brunswick	Ontario	Alberta	Canada
	$	$	$	$	$	$	$	$
Cost of lands, buildings, plant machinery and tools	.....	13,795,996	12,030,245	**25,826,241**	.....	14,293,093	12,442,114	**26,735,207**
Cost of all materials and supplies on hand	.....	201,074	392,916	**593,990**	.....	216,009	472,310	**688,319**
Cash, trading and operating accounts and bills receivable	.....	3,331,687	407,187	**3,738,874**	.....	3,260,562	488,665	**3,749,227**
Total	**209,373**	**17,328,757**	**12,830,348**	**30,368,478**	**291,064**	**17,769,664**	**13,403,089**	**31,373,817**

Table 284.—Employees, Salaries and Wages in the Natural Gas Industry in Canada, 1921 and 1922

	1921				1922			
	Number			Salaries and Wages	Number			Salaries and Wages
	Male	Female	Total		Male	Female	Total	
				$				$
SALARIED EMPLOYEES—								
Salaried officers of corporation					23	2	25	53,121
Superintendents, managers, etc.	43		43	92,374	41		41	62,164
Technical employees, engineers, etc.	6		6	10,425	7		7	12,960
Clerks, stenographers, etc.	41	35	76	75,100	109	49	158	114,362
Total	90	35	125	177,899	180	51	231	242,607
WAGE-EARNERS—Total	760		760	705,008	690		690	696,587
Grand Total	**850**	**35**	**885**	**882,907**	**870**	**51**	**921**	**939,194**

Table 285.—Number of Wage-earners in the Natural Gas Industry in Canada, by Months and by Provinces, 1922

Month	New Brunswick	Ontario	Alberta	Canada
January	8	524	143	**675**
February	8	507	131	**646**
March	12	472	132	**616**
April	12	471	159	**642**
May	13	513	160	**686**
June	19	572	154	**745**
July	13	517	168	**698**
August	16	509	178	**703**
September	16	508	169	**693**
October	21	552	169	**732**
November	19	587	163	**769**
December	13	510	130	**653**
Average	**15**	**520**	**155**	**690**

Table 286.—Miscellaneous Expenses in the Natural Gas Industry in Canada, 1921 and 1922

	1921	1922
	$	$
Cost of purchased power	10	Individual items not available
Cost of all materials and supplies used	113,445	
Royalties paid	39,033	
Taxes (Municipal)	64,418	
Taxes (Provincial)	54,485	
Taxes (Federal)	122,947	
All other sundry expenses	1,010,884	
Total	**1,405,222**	**1,458,675**

Table 287.—Number of Gas Wells in Canada, by Provinces, 1920, 1921 and 1922

—		New Brunswick	Quebec	Ontario	Manitoba	Alberta	Canada
Productive wells at beginning of year	1920	23	*6	1,872	1	67	1,969
	1921	21	*6	1,862	1	64	1,954
	1922	20	.....	1,930	1	64	2,615
Number of productive wells drilled	1920	.....	.....	93	.....	.....	93
	1921	.....	.....	105	.....	3	108
	1922	.....	.....	87	.....	1	88
Number of dry wells drilled	1920	.....	.....	24	.....	2	26
	1921	1	.....	21	.....	.....	22
	1922	1	.....	37	.....	.....	38
Number of wells abandoned	1920	2	.....	117	.....	3	122
	1921	1	.....	112	.....	.....	113
	1922	1	.....	118	.....	1	120
Productive wells at end of year	1920	21	*6	1,862	1	64	1,954
	1921	20	*6	1,930	1	64	2,021
	1922	19	.....	1,901	1	60	1,981

*Idle.

Table 288.—Natural Gas Wells in Ontario, by Townships, 1922

Township	No. of Producing Wells in operation Dec. 31, 1922	No. of Wells abandoned this year	No. of Dry Wells drilled this year	No. of Producing Wells drilled this year
Amabel	1	1	.....	.....
Barton	2	.....	.....	.....
Bayham	55	1	.....	.....
Bertie	84	14	2	4
Binbrook	69	4	.....	.....
Caistor	49	1	.....	.....
Canboro	159	6	2	6
Cayuga, North	62	1	1	1
Cayuga, South	59	3	.....	.....
Charlotteville	16	.....	.....	2
Crowland	49	1	1	.....
Dawn	5	.....	4	3
Dorchester, North	3	.....	.....	3
Dover, West	9	.....	2	1
Dunn	17	2	.....	.....
Dunwich	.....	1	.....	.....
Enniskillen	3	.....	.....	.....
Euphemia	6	.....	.....	.....
Gainsboro	2	.....	.....	.....
Glanford	27	.....	.....	.....
Gosfield	.....	1	.....	.....
Houghton	.....	3	.....	.....
Humberstone	107	11	.....	.....
Mersea	4	.....	2	.....
Middleton	19	2	.....	.....
Malahide	2	1	.....	1
Moulton	103	3	2	19
Oneida	30	1	3	8
Onondaga	50	.....	.....	.....
Rainham	113	7	.....	.....
Raleigh	23	2	.....	1
Romney	97	4	1	.....
Sarnia	16	.....	3	1
Seneca	162	15	9	12
Sherbrooke	12	1	1	.....
Tilbury, East	137	13	1	10
Wainfleet	48	3	1	.....
Walpole	167	7	2	12
Walsingham, North	6	.....	.....	.....
Walsingham, South	14	1	.....	.....
Windham	5	.....	.....	.....
Willoughby	44	7	.....	.....
Woodhouse	65	1	.....	3
Total	**1,901**	**118**	**37**	**87**

Table 289.—Consumption of Natural Gas in Ontario, by Municipalities, 1922

Place	Domestic				Industrial		Total	
	No. of Users		Gas used		No. of Users	Gas used	No. of Users	Gas used
	Pay	Free	Pay	Free				
			M cu. ft.	M cu. ft.		M cu. ft.		M cu. ft.
Aylmer	700	.....	39,475	.....	.....	.....	700	39,475
Brantford	4,312	.....	117,789	.....	39	5,184	4,351	122,973
Bartonville	106	.....	4,612	.....	.....	.....	106	4,612
Bridgeburg	580	4	36,110	203	.....	.....	584	36,313
Binbrook	4	.....	418	.....	.....	.....	4	418
Belmont	106	.....	4,187	.....	.....	.....	106	4,187
Belle River	165	2	19,572	199	5	813	172	20,584
Blenheim	539	3	68,813	1,556	3	886	545	71,255
Chatham	3,600	.....	593,756	.....	50	10,083	3,650	603,839
Comber	150	.....	20,309	.....	6	2,891	156	23,200
Chippawa	62	.....	2,120	.....	.....	.....	62	2,120
Caledonia	453	.....	49,295	.....	.....	2,213	453	51,508
Canfield	33	.....	3,491	.....	.....	.....	33	3,491
Crystal Beach	630	.....	11,129	.....	.....	.....	630	11,129
Cayuga	207	.....	26,437	.....	.....	.....	207	26,437
Dorchester	123	.....	10,758	.....	.....	.....	123	10,758
Dutton	261	7	29,594	572	5	1,135	273	31,301
Dunnville	922	9	101,707	6,392	18	5,875	949	113,974
Delhi	256	.....	22,103	.....	6	1,487	256	23,590
Dundas	1,040	.....	35,646	.....	10	585	1,050	36,231
Dresden	540	.....	57,034	.....	3	1,372	543	58,406
Eden	23	4	1,722	218	1	222	28	2,162
Essex	455	.....	56,610	.....	12	5,714	467	62,324
Fingal	47	2	4,163	44	1	208	50	4,415
Fairground	15	.....	892	.....	.....	.....	15	892
Fort Erie	353	.....	27,012	.....	.....	.....	353	27,012
Ford	438	.....	55,122	.....	.....	.....	438	55,122
Galt	1,431	3	52,962	774	37	2,402	1,471	56,138
Glenwood	.....	1	.....	2,506	.....	.....	1	2,506
Hamilton	21,884	.....	572,431	.....	15	32,752	21,899	605,183
Hagersville	369	.....	35,997	.....	.....	.....	369	35,997
Highgate	119	4	15,562	674	.....	.....	123	16,236
Ingersoll	1,190	.....	82,366	.....	5	1,117	1,195	83,483
Jarvis	184	.....	24,030	.....	2	1,448	186	25,478
Kingsville	557	1	82,759	183	5	25,059	563	108,001
Lambeth	88	.....	6,245	.....	.....	.....	88	6,245
Lyndoch	40	.....	3,406	.....	.....	.....	40	3,406
Leamington	1,175	.....	180,694	.....	5	227	1,180	180,921
Malsee	6	1	350	29	.....	.....	7	379
Niagara Falls	2,549	.....	135,138	.....	.....	.....	2,549	135,138
Petrolia	800	.....	108,039	.....	11	2,297	811	110,336
Port Burwell	235	2	15,396	26	.....	.....	237	15,422
Paris	570	1	25,945	158	4	530	575	26,633
Port Dover	470	.....	55,071	.....	5	1,133	475	56,204
Port Rowan	244	1	19,724	492	.....	.....	245	20,216
Rodney	238	3	30,576	109	2	235	243	30,920
Ridgetown	630	3	79,140	2,076	10	3,272	643	84,488
Sandwich	443	.....	55,751	.....	.....	.....	443	55,751
St. Catharines	3,407	13	172,812	711	5	3,489	3,425	177,012
Sarnia	4,010	.....	460,019	.....	7	5,387	4,017	465,406
Shedden	89	2	8,191	46	6	1,251	97	9,488
St. George	125	.....	5,761	.....	2	18	127	5,779
Straffordville	71	3	6,489	109	.....	.....	74	6,598
Simcoe	1,303	15	185,659	7,840	16	11,703	1,334	205,202
St. Williams	99	.....	7,024	.....	1	349	100	7,373
Selkirk	137	1	18,097	83	2	955	140	19,135
Smithville	156	.....	13,786	.....	.....	.....	156	13,786
Thorold	480	3	25,325	467	.....	.....	483	25,792
Tillsonburg	908	14	78,274	866	6	2,084	928	81,224
Tecumseh	145	.....	19,069	.....	.....	.....	145	19,069
Tilbury	402	2	51,428	301	8	2,873	412	54,602
Tupperville	47	.....	5,438	.....	4	1,124	51	6,562
Vienna	120	.....	10,698	.....	.....	.....	120	10,698
Vittoria	71	.....	6,146	.....	.....	.....	71	6,146
Walkerville	1,395	.....	172,134	.....	.....	11,697	1,395	183,831
Windsor	7,189	.....	893,029	.....	.....	3,424	7,189	896,453
Woodstock	2,046	.....	94,892	.....	.....	.....	2,046	94,892
Wallacetown	65	1	6,105	24	1	672	67	6,801
West Lorne	211	7	28,441	428	4	920	222	29,789
Welland	1,911	3	93,108	115	.....	.....	1,914	93,313
Wellandport	38	.....	1,284	.....	.....	.....	38	1,284
Wheatley	221	.....	31,572	.....	9	3,305	230	34,877
Wallaceburg	1,014	.....	136,458	.....	19	180,628	1,033	317,086
Total	**74,996**	**115**	**5,512,787**	**27,201**	**350**	**339,019**	**75,461**	**5,879,007**

Table 290.—Consumption of Natural Gas in Ontario, by Townships in 1922

Township	Domestic				Industrial		Total	
	No. of Users		Gas used		No. of Users	Gas used	No. of Users	Gas used
	Pay	Free	Pay	Free				
			M cu. ft.	M cu. ft.		M cu. ft.		M cu. ft.
Aldboro	21	1	2,735	434			22	3,169
Ancaster	51		4,263				51	4,263
Bayham	31	11	2,883	1,836			42	4,719
Brant	169		10,061				169	10,061
Barton	860		66,039		1	89	861	66,128
Binbrook	56	37	8,120	7,477	1	260	94	15,857
Bertie	568	69	33,203	20,858			637	54,061
Cayuga, N.	22	16	2,659	3,075			38	5,734
Cayuga, S.	67	28	4,579	5,327			95	9,906
Canboro	72	46	7,157	8,767			118	15,924
Caistor	61	4	5,702	818			65	6,520
Crowland	8	3	547	906			11	1,453
Charlotteville		9		1,557			9	1,557
Chatham	80	1	11,666	244			81	11,910
Camden	20		2,916				20	2,916
Dorchester et	32		2,363				32	2,363
Dunn	65	3	6,203	556			68	6,759
Dunwich	60	1	5,930	34			61	5,964
Dumfries S.	9		274				9	274
Dover	234	1	34,226	98			235	34,324
Dawn	3		437				3	437
Enniskillen	68		9,919				68	9,919
Glanford	102	3	15,101	750	1	307	106	16,158
Grantham	19		1,290				19	1,290
Gainsboro	12		20				12	20
Gosfield N.	143	4	9,002	62			147	9,664
Gosfield S.	282	2	34,511	91	81	24,091	365	58,693
Harwich	410	6	63,139	1,640			416	64,779
Howard	151	2	22,470	520			153	22,990
Humberstone	103	36	6,486	10,892			139	17,378
Louth	5		317				5	317
Malahide	61		2,640				61	2,640
Moulton	114	17	8,178	3,253	2	1,160	133	12,591
Middleton		7		1,239			7	1,239
Mersea	264	3	44,310	985	130	33,009	397	78,304
Maidstone	53	3	7,728	584			56	8,312
Moore	440		64,164				440	64,164
Oxford	82	1	13,557	106	1	7	84	13,670
Oneida	54	9	5,347	1,664			63	7,011
Onondaga		12		1,709			12	1,709
Raleigh	724	48	107,861	11,228	13	12,421	785	131,510
Rainham	116	31	14,818	7,014	1	173	148	22,005
Romney	106	34	14,075	10,229			140	24,304
Rochester	166	6	24,207	1,247			172	25,454
Southwold	107	3	8,280	121	2	1,463	112	9,864
Saltfleet	16		2,821				16	2,821
Seneca	51	28	6,746	5,629			79	12,375
Stamford		3		910			3	910
Sandwich E.	211	2	30,775	230			213	31,005
Sandwich W.	20		2,915				20	2,915
Sandwich S.	44		6,416				44	6,416
Sombra	130		18,958		6	1,988	136	20,946
Sarnia	3	1	437	227	15	5,032	19	5,696
Townsend	35		4,973				35	4,973
Tilbury E.	274	91	39,995	36,918	2	19,411	367	96,324
Tilbury W.	18		2,624				18	2,624
Tilbury N.	20	1	2,916	88			21	3,004
Westminster	140	7	14,962	1,083	1	99	148	16,144
Wainfleet	89	26	5,191	9,188			115	14,379
Willoughby	23	29	1,439	8,758			52	10,197
Windham	14		1,904				14	1,904
Woodhouse	154	20	22,792	3,458			174	26,250
Walpole	242	48	31,627	9,855	2	288	292	41,770
Walsingham		9		1,512			9	1,512
Total	**7,555**	**722**	**887,474**	**183,177**	**259**	**99,798**	**8,536**	**1,170,449**

PETROLEUM

The production of petroleum in Canada dates back to 1857, when a shallow well was dug near Enniskillen (now known as Oil Springs), in the province of Ontario.

Early in January, 1862, a pioneer oil prospector brought in the first flowing well at Oil Springs, Ontario, and before the fall of the same year there were approximately 35 producing wells in operation. According to information available some of these wells produced from 3,000 to 6,000 barrels per day.

In 1865, Petrolia came into existence as a large producer and since that date has maintained its position among the leading oil-fields in Canada. Prior to this discovery, oil deposits were located in Kent county, at Bothwell.

Although Petrolia, Oil Springs and Bothwell are by far the oldest producing fields in Canada, these three fields continue to rank as the premier producers in this country.

On December 31, 1922 there were 2,867 wells in operation in the province of Ontario while at the end of the previous year, 2,997 wells were reported active.

The first attempt to develop the oil deposits in Westmoreland County in New Brunswick, was made in 1859. The four wells drilled then were not successful as fresh water seeped in, ruining them. No further drilling was attempted until 1879, then two more wells were sunk, one at St. Joseph and the other at Dover. From 1900 to 1906 some 72 wells were drilled. The distribution of this number was as follows; 67 in Westmoreland county, 4 in Albert county and 1 in Kent county. This marked the opening up of the present Stony Creek oil and gas field. At the end of 1922 there were 9 petroleum wells in operation in this district as compared with 7 reported as active on December 31, 1921.

In May, 1914, considerable interest was taken in the Turner Valley oil field in Alberta. The centre of this field is about 25 miles south of Calgary. Since 1914 operations have been carried on in this district by some 5 companies. In 1922 only 3 companies, operating 4 petroleum wells reported production.

The new oil fields in the Mackenzie district of the North West Territories have been the scene of considerable activity during the past several years. The Imperial Oil Company commenced drilling operations in this district, about 40 miles below Fort Norman, early in 1920.

In the Coutts-Sweetgrass district, southern Alberta, a number of companies carried on drilling operations during 1922. Although no production of petroleum was reported, drilling continued throughout the year.

Tables 292 to 295 inclusive do not contain any data regarding New Brunswick wells as these have been included under "Natural Gas."

Table 291.—Principal Statistics of the Petroleum Industry in Canada, 1920-1922

Year	Number of Firms	Number of Wells	Capital Employed	Number of Employees	Salaries and Wages	Miscellaneous Expenses	Selling Value of Products
			$		$	$	$
1920	122	3,027	(a)	202	182,787	(a)	822,235
1921	120	3,009	3,214,159	190	215,791	136,277	641,533
1922	120	2,880	2,764,099	160	167,176	116,678	611,176

(a) Data not available.

Table 292.—Capital Employed in the Petroleum Industry in Canada, by Provinces, 1921 and 1922

Capital employed as represented by	1921			1922		
	Ontario	Alberta	Canada	Ontario	Alberta	Canada
	$	$	$	$	$	$
Cost of lands, buildings, plant machinery and tools	1,797,746	1,111,968	2,909,714	1,910,967	770,585	2,681,552
Cost of all materials and supplies on hand	19,766	19,997	39,763	13,117	27,571	40,688
Cash, trading and operating accounts and bills receivable	44,710	219,972	264,682	31,284	10,575	41,859
Total	1,862,222	1,351,937	3,214,159	1,955,368	808,731	2,764,099

Table 293.—Employees, Salaries and Wages in the Petroleum Industry in Canada, by Provinces, 1921 and 1922

	1921			1922		
	Ontario	Alberta	Canada	Ontario	Alberta	Canada
SALARIED EMPLOYEES—						
Salaried officers of corporation.....No.				7	1	8
Salaries	$			$ 9,302	$ 4,800	$ 14,102
Superintendents, managers, etc.....No.	7	6	13	9		9
Salaries	$ 11,930	$ 16,858	$ 28,788	$ 11,665		$ 11,665
Technical employees, engineers, etc. No.	1		1	1		1
Salaries	$ 772		$ 772	$ 1,910		$ 1,910
Clerks, stenographers, etc.....No.	2	3	5	2	1	3
Salaries	$ 970	$ 1,349	$ 2,319	$ 1,220	$ 1,020	$ 2,240
Total.....No.	10	9	19	19	2	21
Salaries	$ 13,672	$ 18,207	$ 31,879	$ 24,097	$ 5,820	$ 29,917
WAGE-EARNERS—						
Total.....No.	147	24	171	134	5	139
Wages	$ 149,395	$ 34,517	$ 183,912	$ 132,402	$ 4,857	$ 137,259
Grand Total.....No.	157	33	190	153	7	160
Salaries and Wages	$ 163,067	$ 52,724	$ 215,791	$ 156,499	$ 10,677	$ 167,176

Table 294.—Monthly Average Number of Wage-Earners in the Petroleum Industry in Canada, by Provinces, 1922

Month	Ontario	Alberta	Canada
January	130	3	133
February	131	3	134
March	134	2	136
April	132	4	136
May	134	3	137
June	135	5	140
July	135	4	139
August	136	5	141
September	136	6	142
October	140	4	144
November	137	6	143
December	134	6	140
Average	**134**	**5**	**139**

Table 295.—Miscellaneous Expenses in the Petroleum Industry in Canada, by Provinces, 1921 and 1922

	Ontario	Alberta	Canada
In 1921—	$	$	$
Cost of purchased power	18,013		18,013
Cost of all materials and supplies used	58,379	899	59,278
Royalties paid	7,463		7,463
Taxes—			
Municipal	6,011	114	6,125
Provincial	872	1,064	1,936
Federal	15,733		15,733
All other sundry expenses	27,146	583	27,729
Total	**133,617**	**2,660**	**136,277**
In 1922—**Total**	**105,820**	**10,858**	**116,678**

Table 296.—Petroleum Wells in Canada, 1920, 1921 and 1922

—		New Brunswick	Ontario	Alberta	British Columbia	Canada
Productive wells at beginning of year	1920	6	3,139	5	.....	3,150
	1921	7	3,015	5	.....	3,027
	1922	7	2,997	5	.....	3,009
Number of wells drilled	1920	1	56	6	4	67
	1921	1	9	.....	.....	10
	1922	2	7	.....	.....	9
Number of wells abandoned	1920	3	353	1	2	359
	1921	1	113	.....	.....	114
	1922	.....	95	.....	.....	95
Number of productive wells at end of year	1920	7	3,015	5	.....	3,027
	1921	7	2,997	5	.....	3,009
	1922	9	2,867	4	.....	2,880

SALT

The production of salt in the province of Ontario was first recorded in 1866. A company was formed in that year to drill for oil on the north bank of the Maitland river, and, while no success attended the efforts of the drillers in their search for oil, a bed of rock salt was found at a depth of 964 feet. In September, 1866, this company (incorporated under the name of the Goderich Petroleum Company, later changed to "Goderich Salt Company") commenced pumping brine. In the initial working in connection with these deposits the refining was done by the kettle method, which was soon discarded and replaced by the pan method of evaporation.

Wells were drilled and plants erected at Clinton and Seaforth, Ontario, and four refineries were in operation at Goderich in 1879; at the present time there are only two firms operating at Goderich.

In 1922, wells were operated in Ontario at Windsor, Sandwich, Courtright, Goderich, Sarnia, Warwick, Wingham and in Anderdon township.

The mining of rock salt was carried on by one firm in Nova Scotia, at Malagash, Cumberland county. Considerable quantities of coarse salt, rock salt and land salt were sold during the year. The last-named was found to contain potash, and was used to some extent as a fertilizer.

For the whole of Canada, ten firms, operating eleven salt works, reported activity during 1922. Two of these plants were engaged primarily in the production of brine for use in the manufacture of caustic soda and soda ash in the chemical works of the producing companies.

Table 297.—Principal Statistics of the Salt Industry in Canada 1920-1922

Year	Number of Firms	Capital Employed	Number of Employees	Salaries and Wages	Cost of Fuel	Miscellaneous Expenses	Selling Value of Products
		$		$	$	$	$
1920	12	2,221,606	345	472,031	531,880	409,493	1,544,724
1921	12	2,267,708	277	411,832	527,013	381,126	1,673,685
1922	10	2,205,184	371	432,261	369,000	407,105	1,628,323

Table 298.—Capital Employed in the Salt Industry in Canada, 1921 and 1922

Capital employed as represented by—	1921	1922
	$	$
Cost of lands, buildings, machinery and tools	1,417,078	1,399,424
Cost of all materials and supplies on hand	452,746	228,860
Cash, trading and operating accounts and bills receivable	397,884	576,900
Total	**2,267,708**	**2,205,184**

Table 299.—Employees, Salaries and Wages in the Salt Industry in Canada, 1921 and 1922

	1921				1922			
	Number of Employees		Total	Salaries and Wages	Number of Employees		Total	Salaries and Wages
	Male	Female			Male	Female		
SALARIED EMPLOYEES—				$				$
Salaried officers of corporation	3	.....	3	8,200	7	.....	7	28,582
General superintendents and managers	15	.....	15	38,528	11	.....	11	26,797
Technical experts, engineers, chemists, accountants	9	1	10	17,960	10	.....	10	11,714
Clerks, stenographers, salesmen and other salaried employees	18	7	25	26,641	11	9	20	27,506
Total	45	8	53	91,329	39	9	48	94,599
WAGE-EARNERS—								
Total	245	32	277	320,503	293	30	323	337,662
Grand total	**290**	**40**	**330**	**411,832**	**332**	**39**	**371**	**432,261**

Table 300.—Number of Wage-earners in the Salt Industry in Canada, by Months, 1922

Month	Number		Month	Number	
	Male	Female		Male	Female
January	237	30	July	301	29
February	275	31	August	298	29
March	271	31	September	290	33
April	246	30	October	299	32
May	261	29	November	282	30
June	276	30	December	244	27

Table 301.—Miscellaneous Expenses in the Salt Industry in Canada, 1921 and 1922

	1921	1922
	$	$
Rent of offices, works and machinery	2,539	
Cost of purchased power	8,711	
Insurance (premium for the year, only)	26,154	Individual
Taxes—		
Municipal	3,108	Items
Provincial	5,735	
Federal	28,351	not
Royalties, use of patents, etc	360	
Advertising expenses	25,769	available
Travelling expenses	15,161	
Repairs to buildings and machinery	89,742	
All other sundry expenses	175,501	
Total	**381,126**	**407,165**

MISCELLANEOUS NON-METALLIC MINERAL INDUSTRIES

Table 302.—Capital Employed in the Miscellaneous Non-metallic Mineral Industries in Canada, 1921 and 1922

Industry	1921				1922			
	Lands, Buildings, Plant, Machinery and Tools	Cost of all Materials and Supplies, on hand	Cash, Trading and Operating Accounts and Bills Receivable	Total	Lands, Buildings, Plant Machinery and Tools	Cost of all Materials and Supplies on hand	Cash, Trading and Operating Accounts and Bills Receivable	Total
	$	$	$	$	$	$	$	$
Fluorspar	138,399	6,791	18,067	163,257	317,943	5,394	.....	323,337
Grindstones	216,390	15,000	55,603	286,993	203,657	20,892	35,117	259,666
Iron Oxides	175,630	28,678	3,259	207,567	184,750	7,678	25,000	217,428
Magnesite	1,956,533	152,694	40,000	2,149,227	1,705,708	85,087	45,143	1,835,938
Quartz	607,779	63,424	272,015	943,238	659,051	42,224	5,905	707,180
Talc	428,053	27,596	31,394	487,073	487,028	22,523	84,468	594,019
Other non-metallics[1]	2,007,053	371,236	20,453	2,398,742	2,727,951	468,375	26,213	3,222,539
Total	5,529,837	665,419	440,791	6,636,097	6,286,088	652,173	221,846	7,160,107

[1]Includes actinolite, barytes, chromite, corundum, magnesium sulphate, manganese, mineral waters, pyrites, sodium sulphate and tripolite.

Table 303.—Employees, Salaries and Wages in the Miscellaneous Non-metallic Mineral Industries in Canada, 1921 and 1922

		1921					1922				
		Superintendents and managers	Technical Employees	Clerks and Stenographers	Wage Earners and Wages	Total	Superintendent and managers	Technical Employees	Clerks and Stenographers	Wage Earners and Wages	Total
Fluorspar	No.	3	1	.....	77	81	1	.....	1	50	52
	Salaries $	3,761	900	.....	24,761	29,422	2,490	.....	120	22,970	25,580
Grindstones	No.	6	.....	1	50	57	6	.....	1	33	40
	Salaries $	9,798	.....	742	44,645	55,185	8,298	.....	1,000	21,901	31,199
Iron oxides	No.	2	.....	1	29	32	1	.....	1	47	49
	Salaries $	4,800	.....	900	36,993	42,693	3,000	.....	1,200	40,639	44,839
Magnesite	No.	5	2	3	71	81	3	1	2	126	132
	Salaries $	7,550	3,600	3,856	73,650	88,656	6,476	1,659	2,417	48,026	58,578
Quartz	No.	4	1	3	86	94	6	2	.....	143	151
	Salaries $	8,866	6,000	4,611	104,772	124,249	14,094	2,660	.....	57,658	74,412
Talc	No.	3	.....	2	34	39	6	2	2	71	81
	Salaries $	16,900	.....	2,825	44,978	64,703	20,334	3,800	2,450	61,925	88,509
Other non-metallics[1]	No.	12	3	7	312	334	18	3	12	131	164
	Salaries $	31,133	4,135	9,176	205,972	250,416	29,814	4,800	11,771	84,601	130,986
Total	No.	35	7	17	659	718	41	8	19	601	669
	Salaries $	82,808	14,635	22,110	535,771	655,324	84,506	12,919	18,958	337,720	454,103

[1]Includes actinolite, barytes, chromite, corundum, magnesium sulphate, manganese, mineral waters, pyrites, sodium sulphate and tripolite.

Table 304.—Number of Wage-earners, by Months, in the Miscellaneous Non-metallic Mineral Industries in Canada, 1922

Month	Fluor-spar	Grind-stones	Iron-Oxides	Magne-site	Quartz	Talc	Other Non-Metallics	Total
January	1	10	34	162	25	29	73	334
February	3	4	34	106	16	30	92	285
March	3	5	34	52	14	31	110	249
April	1	14	34	46	14	39	90	238
May	7	38	37	96	70	48	105	401
June	95	69	47	138	101	58	124	632
July	85	47	53	123	156	59	123	646
August	82	38	58	134	150	69	119	650
September	67	30	55	134	134	83	116	619
October	4	38	59	113	160	76	94	544
November	5	36	41	127	121	75	61	466
December	.....	23	37	121	78	77	60	396
Average	**50**	**33**	**47**	**126**	**143**	**71**	**131**	**601**

Table 305.—Miscellaneous Expenses in the Miscellaneous Non-metallic Mineral Industries in Canada, 1921 and 1922

	Industry							Total
	Fluorspar	Grind-stones	Iron Oxides	Magne-site	Quartz	Talc	[1]Other Non-metallics	
In 1921—	$	$	$	$	$	$	$	$
Cost of purchased power	36	.....	3,120	5,169	2,808	14,166	7,335	32,634
Cost of all materials and supplies used	12,000	6,552	16,991	55,964	75,155	17,585	69,486	253,733
Royalties paid	.....	.....	.....	643	2,277	16,962	1,850	21,732
Taxes (Municipal	.....	304	.....	1,633	183	431	558	3,109
Taxes (Provincial	54	103	370	2,056	666	.....	21,193	5,442
Taxes (Federal	.....	556	.....	550	2,682	5,017	40	8,845
All other sundry expenses	3,226	5,018	11,584	89,081	52,145	11,446	37,068	209,568
Total	**15,316**	**12,533**	**32,065**	**155,096**	**135,916**	**65,607**	**118,530**	**535,063**
In 1922—								
Total	**33,588**	**25,972**	**54,041**	**49,627**	**28,506**	**50,155**	**59,223**	**301,112**

[1]Includes actinolite, barytes, chromite, corundum, magnesium sulphate, manganese, pyrites, sodium sulphate, and tripolite.

STRUCTURAL MATERIALS AND CLAY PRODUCTS

CEMENT

In 1922, Portland cement was the only variety produced in Canada. The essential elements entering into the production of this commodity are lime, silica and alumina. These materials are found in limestone and clay; the Trenton variety of limestone being used principally. Puzzolan cement made from blast furnace slag by one company in Nova Scotia, was manufactured in 1921 and in former years, but there was no production reported in the year under review.

Six companies, operating 11 plants with a total daily capacity of 35,338 barrels, were active during 1922. These plants were located in Quebec, Ontario, Manitoba, Alberta and British Columbia. In addition to these, there were at least twelve other cement mills equipped and available for the manufacture of this product.

No data regarding the distribution of ownership in this industry were collected in the current year. According to statistics compiled for 1921, the cement industry is controlled almost entirely by Canadian capital. Of the total par value of all securities issued, approximately 86.5 per cent was owned in Canada; 10.6 per cent in Great Britain, 1.9 per cent in United States, and the balance in other countries.

Table 306.—Principal Statistics of the Cement Industry in Canada, 1920-1922

Year	Number of Plants	Capital Employed	Number of Employees	Salaries and Wages	Cost of Fuel	Miscellaneous Expenses	Selling Value of Products
		$		$	$	$	$
1920	13	44,941,686	2,301	3,757,641	3,457,796	1,738,152	14,798,070
1921	14	49,160,180	2,751	3,443,884	2,788,820	2,602,029	14,195,143
1922	11	41,573,737	1,753	2,315,240	2,457,456	2,976,152	15,438,481

Table 307.—Capital Employed in the Cement Industry in Canada, 1921 and 1922

Capital employed as represented by	1921	1922
	$	$
Cost of lands, buildings and fixtures	31,893,101	35,930,486
Cost of machinery and tools	4,741,607	
Cost of materials and supplies on hand	10,027,533	2,920,895
Cash, trading and operating accounts and bills receivable	2,497,939	2,722,356
Total	**49,160,180**	**41,573,737**

Table 308.—Employees, Salaries and Wages Paid in the Cement Industry in Canada, 1921 and 1922

Classes of Employees	1921		1922	
	Number of Employees	Salaries and Wages	Number of Employees	Salaries and Wages
		$		$
Officers, superintendents and managers	48	226,443	23	91,932
Clerks, stenographers and other salaried employees	295	503,715	86	125,526
Wage-earners	2,408	2,713,726	1,644	2,097,782
Total	**2,751**	**3,443,884**	**1,753**	**2,315,240**

Table 309.—Number of Wage-earners in the Cement Industry in Canada, by Months, 1922

Month	Number	Month	Number
January	1,002	July	1,843
February	1,109	August	1,842
March	1,185	September	1,934
April	1,448	October	1,922
May	1,755	November	1,907
June	1,860	December	1,719
Average for 1922			**1,644**
Average for 1921			**2,408**

Table 310.—Miscellaneous Expenses in the Cement Industry in Canada, 1921 and 1922

—	1921	1922
	$	
Rent of offices, works and machinery	7,540	Individual items not available
Cost of purchased power	559,966	
Insurance (premium for the year only)	238,091	
Taxes (municipal, provincial and federal)	182,086	
Royalties, use of patents, etc.	48,050	
Advertising expenses	88,135	
Travelling expenses	17,210	
Repairs to buildings and machinery	556,789	
All other sundry expenses (not elsewhere specified)	904,162	
Total	**2,602,029**	**$ 2,976,152**

CLAY PRODUCTS

The production of clay products in Canada for the past three years has been tabulated in considerable detail in another section of this report, and the object of this description is a consideration of the statistics regarding the more important financial aspects and the general conditions of the industry.

The clay products industry was divided into five main groups as follows: brick and tile, clay sewer pipe, fire brick and fireclay, stoneware and pottery, and kaolin and other clays. The numbers and location by provinces of the different plants for 1921 and 1922 are shown in the subjoined tables.

There was an increase of 12 in the number of active plants throughout the Dominion during 1922, all of which were producers of brick and tile, and located in the province of Ontario. The increase in building and construction throughout Canada in general and Ontario in particular would account for this gain.

Capital employed, as represented by the value of lands, buildings, fixtures, machinery and tools, finished stocks on hand and available cash, for the whole clay products industry was greater by about $2,600,000 than in the preceding year, practically the whole of the gain being in the brick and tile section. The capital employed by firms in the firebrick, stoneware and kaolin industries increased slightly, while a small decrease was observed in the capital of the clay sewer-pipe establishments. The changes, however, were small and are indicative of the gradual and sure development in this industry.

The principal fuel employed was bituminous coal, and as most brick plants are located in the neighbourhood of large industrial centres, the industry is largely dependent on imported coal, though wood is used by many of the smaller plants in outlying parts.

Table 311.—Principal Statistics of the Clay Products* Industry in Canada, 1922

—	Brick and Tile	Clay Sewer Pipe	Firebrick and Fireclay	Stoneware and Pottery
Number of active plants	216	5	5	4
Capital employed	$ 23,821,180	$ 3,057,149	$ 1,705,753	$ 280,467
Salaried employees	309	34	17	8
Salaries paid	$ 509,867	$ 114,290	$ 45,916	$ 12,970
Average number of wage-earners	3,595	414	165	104
Wages paid	$ 3,252,474	$ 433,121	$ 218,632	$ 111,605
Fuel cost	$ 1,644,463	$ 217,228	$ 82,298	$ 12,652
Miscellaneous expenses	$ 2,112,700	$ 282,705	$ 53,015	$ 22,010
Value of products sold or used	$ 8,911,539	$ 1,571,464	$ 683,266	$ 252,889

* Not including Kaolin and Other Clays.

Table 312.—Establishments reporting Shipments in the Clay Products Industry in Canada, by Provinces, 1922

Province	Number of Establishments in Groups Indicated					
	Brick and Tile	Clay Sewer Pipe	Firebrick and Fireclay	Stoneware and Pottery	Kaolin and Other Clays	Total
Nova Scotia	7	1	1		1	10
Prince Edward Island	1					1
New Brunswick	5			1		6
Quebec	17	1	1		1	20
Ontario	148	3	2	2		155
Manitoba	6					6
Saskatchewan	8					8
Alberta	13		1	1		15
British Columbia	11					11
Canada	**216**	**5**	**5**	**4**	**2**	**232**

Table 313.—Capital Employed in the Clay Products Industry in Canada, by Provinces, 1921 and 1922

	1921				1922			
	Lands, buildings plant machinery and tools	Cost of supplies and products on hand	Cash, trading and operating accounts	Total	Lands, buildings plant machinery and tools	Cost of supplies and products on hand	Cash, trading and operating accounts	Total
	$	$	$	$	$	$	$	$
Brick and tile—								
Nova Scotia	1,057,750	33,176	81,296	1,172,222	1,081,795	42,750	38,276	1,162,821
New Brunswick	59,240	12,025	3,006	74,271	109,246	5,349	3,046	117,641
Quebec	6,115,038	386,377	183,918	6,685,333	6,126,526	403,693	269,995	6,800,214
Ontario	7,298,113	1,037,204	727,505	9,062,822	9,695,211	961,039	1,097,043	11,753,892
Manitoba	526,028	134,333	61,245	721,606	257,462	103,622	45,719	406,803
Saskatchewan	888,626	74,005	24,646	987,277	690,218	130,283	12,967	833,468
Alberta	1,183,702	214,889	53,974	1,452,565	1,002,618	199,199	47,468	1,249,285
British Columbia	723,555	120,266	138,198	982,019	960,759	194,749	350,548	1,506,056
Total for Canada	17,852,052	2,012,275	1,273,788	21,138,115	19,923,835	2,032,284	1,865,061	23,821,180
Clay sewer pipe—								
Total for Canada	2,524,430	530,738	121,868	3,177,036	2,435,980	440,763	180,406	3,057,149
Firebrick and fireclay products—								
Total for Canada	1,287,240	218,357	137,525	1,643,122	1,086,356	200,317	419,080	1,705,753
Stoneware and pottery—								
Total for Canada	138,990	67,587	68,688	275,265	135,464	77,260	67,743	280,467
Kaolin and other clays—								
Total for Canada	2,276,462	2,880	3,048	2,282,390	2,300,698	1,919	1,737	2,304,354
Total for clay and clay products—								
Nova Scotia	1,565,317	133,924	89,288	1,788,529	1,585,050	109,087	40,932	1,735,069
New Brunswick	73,271	24,379	8,649	106,299	123,277	17,703	8,689	149,669
Quebec	9,070,703	520,717	226,080	9,817,500	9,102,627	525,158	524,377	10,152,162
Ontario	9,509,785	1,416,459	917,809	11,844,053	11,806,012	1,283,658	1,273,662	14,363,332
Manitoba	526,028	134,333	61,245	721,606	257,462	103,622	45,719	406,803
Saskatchewan	888,626	74,005	24,646	987,277	690,218	130,283	12,967	833,468
Alberta	1,721,889	407,754	139,002	2,268,645	1,356,928	387,683	277,133	2,021,744
British Columbia	723,555	120,266	138,198	982,019	960,759	194,749	350,548	1,506,056
Canada	**24,079,174**	**2,831,837**	**1,604,917**	**28,515,928**	**25,882,333**	**2,752,513**	**2,534,027**	**31,168,903**

Table 314.—Employees, Salaries and Wages in the Clay Products Industry in Canada 1921 and 1922

	1921				1922			
	Number			Salaries and Wages	Number			Salaries and Wages
	Male	Female	Total		Male	Female	Total	
				$				$
Salaried Employees—								
Salaried officers of Corporation	77	3	80	216,996	107	1	108	259,663
General superintendents or managers	90	.....	90	209,259	128	.....	128	201,216
Technical experts, engineers, chemists, accountants, etc.	30	1	31	52,095	17	.....	17	26,520
Clerks, stenographers, salesmen and other salaried employees	65	22	87	105,410	83	34	117	130,444
Total	262	26	288	582,760	335	35	370	707,843
Wage-earners—Total	4,080	38	4,118	3,187,493	4,269	42	4,311	4,044,498
Grand total	**4,342**	**64**	**4,406**	**3,770,253**	**4,604**	**77**	**4,681**	**4,752,341**

Table 315.—Number of Wage-earners in the Clay Products Industry in Canada, by Months and by Industries, 1922

Month	Brick and Tile	Clay Sewer Pipe	Firebrick and Fireclay	Stoneware and Pottery	Kaolin and Other Clays	Total for Clay and Clay Products
January	1,426	336	135	99	27	2,023
February	1,646	363	130	99	27	2,265
March	2,111	389	137	105	27	2,769
April	2,589	389	175	110	27	3,290
May	3,604	419	181	108	27	4,339
June	4,135	442	179	100	27	4,883
July	4,279	455	189	95	27	5,045
August	4,163	439	191	105	27	4,925
September	3,921	426	172	104	27	4,650
October	3,472	439	172	112	27	4,222
November	2,899	435	174	107	32	3,647
December	2,420	434	147	104	34	3,139
Average*	**3,595**	**414**	**165**	**104**	**33**	**4,311**

* Average computed by totalling the average number of wage-earners employed by each reporting company.

Table 316.—Miscellaneous Expenses in the Clay Products Industry in Canada, by Provinces, 1921 and 1922

	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Canada
	$	$	$	$	$	$	$	$	$
In 1921—									
Rent of offices, works and machinery		200	3,594	32,820	15,126	530	84,700	2,015	138,985
Cost of purchased power			41,929	89,879	2,703		4,710	10,810	150,031
Insurance premium (for the year only)	5,821	560	29,289	61,609	5,619	4,818	11,837	10,849	130,402
Taxes—Municipal	2,754	514	5,489	58,633	5,843	1,299	9,107	2,322	85,961
Provincial	1,873	50	2,492	13,626		1,141	1,092	3,423	24,297
Federal	3,239	780	6,655	40,494	1,157	348	0,821	3,114	65,608
Royalties, use of patents, etc.				8,663		1,308	1,150	4,487	15,608
Advertising expenses		447	2,979	16,215	739	1,240	3,119	2,892	27,631
Travelling expenses	2,539	50	8,570	14,405	581	2,106	13,487	5,696	47,435
Repairs to buildings and machinery	12,415	2,850	85,765	216,111	6,099	11,185	18,467	34,280	387,172
All other sundry expenses	9,675	280	71,916	410,587	10,756	7,226	37,453	29,426	577,319
Total	**38,316**	**5,731**	**258,678**	**963,042**	**48,623**	**31,201**	**195,543**	**109,315**	**1,650,149**
In 1922—									
Total	**128,268**	**10,875**	**730,141**	**1,451,496**	**14,821**	**12,261**	**80,992**	**58,856**	**2,487,710**

LIME BURNING

The greatest development in Canada in the business of lime burning has been in Ontario and to a less extent in Quebec. Apart from the fact that the chemical and physical properties of the limestone in these provinces make it suitable for burning in kilns, the more extensive building and construction operations in these provinces provide a ready market for the burned lime. In the whole of Canada during 1922, there were 63 producing firms, 31 plants being located in Ontario, 17 in Quebec, 5 in New Brunswick, 4 in Manitoba, 3 in Alberta and 3 in British Columbia.

The total capital employed as reported by the operators, including the value of lands, buildings, fixtures and machinery, etc., and the working capital, showed a slight decline from the preceding year, but still approximated five million dollars in all. While Ontario and Quebec with 48 plants reported only $2,766,202, capital employed, the 3 plants in the province of British Columbia showed $1,188,046 under this item.

In the manufacture of lime, fuel is one of the principal items of cost. Wood fuel was widely used throughout Ontario and Quebec where the supply is plentiful and where many of the kilns are small, but considerable quantities of coal were also used. In the British Columbia plants, wood only was used. No radical change in the methods of firing in 1922 was reported; the fuel costs, however, were considerably higher in 1922 than in 1921.

Table 317.—Principal Statistics of the Lime Industry in Canada, 1920-1922

Year	Number of Firms	Capital Employed	Number of Employees	Salaries and Wages	Cost of Fuel	Miscellaneous Expenses	Selling Value of Products
		$		$	$	$	$
1920	58	(a)	1,069	1,314,186	(a)	(a)	3,818,553
1921	66	4,990,969	931	949,966	698,992	407,620	2,781,197
1922	63	4,984,910	1,110	1,013,486	725,168	522,222	3,165,005

(a) Data not available.

Table 318.—Capital Employed in the Lime Industry in Canada, by Provinces, 1922

Capital employed as represented by	New Brunswick	Quebec	Ontario	Manitoba	Alberta	British Columbia	Canada
	$	$	$	$	$	$	$
Cost of lands, buildings, machinery and tools	161,860	877,132	1,294,868	496,281	191,155	1,094,262	4,115,558
Cost of materials and supplies on hand	46,153	90,920	120,988	29,430	6,750	60,549	363,790
Cash, trading and operating accounts and bills receivable	72,979	131,430	241,864	3,858	22,196	33,235	505,562
Total	**280,992**	**1,099,482**	**1,666,720**	**529,569**	**220,101**	**1,188,046**	**4,984,910**

Table 319.—Employees, Salaries and Wages in the Lime Industry in Canada, by Provinces, 1922

Occupation	New Brunswick	Quebec	Ontario	Manitoba	Alberta	British Columbia	Canada
SALARIED EMPLOYEES:—							
Salaried officers of corporation—							
Male	5	3	13	1	1	2	25
Female			1				1
Salary	$ 6,650	$ 11,000	$ 31,374	$ 1,800	$ 2,000	$ 3,900	$ 56,724
Superintendents and managers—							
Male	1	7	11	2	2	4	27
Salary	$ 1,500	$ 16,612	$ 20,632	$ 3,720	$ 3,700	$ 13,385	$ 59,549
Technical experts, engineers, chemists, accountants, etc.—							
Male	1	1	1	1			4
Salary	$ 1,500	$ 1,800	$ 900	$ 1,800			$ 6,000
Clerks, stenographers, salesmen—							
Male	3	6	3	2		2	16
Female	1	2	7			3	13
Salary	$ 4,000	$ 7,303	$ 6,761	$ 2,400		$ 8,880	$ 29,344
Total—							
Male	10	17	28	6	3	8	72
Female	1	2	9			3	15
Salary	$ 13,650	$ 36,715	$ 59,667	$ 9,720	$ 5,700	$ 26,165	$ 151,617
WAGE-EARNERS—							
Total—							
Male	87	246	441	77	22	145	1,018
Female		4	1				5
Wages	$ 62,673	$ 198,321	$ 408,731	$ 51,850	$ 15,921	$ 124,373	$ 861,869
Total Employees	**98**	**269**	**479**	**83**	**25**	**156**	**1,110**
Total Salaries and Wages	**$ 76,323**	**$ 235,036**	**$ 468,398**	**$ 61,570**	**$ 21,821**	**$ 150,538**	**$1,013,486**

Table 320.—Number of Wage-earners in the Lime Industry in Canada, by Provinces and by Months, 1922

Month	New Brunswick	Quebec	Ontario	Manitoba	Alberta	British Columbia	Canada
January	60	196	282	45	5	101	689
February	63	221	294	58	5	105	746
March	87	222	559	73	11	96	1,048
April	101	207	348	77	14	110	857
May	96	243	405	73	22	137	976
June	96	250	443	98	23	167	1,077
July	91	233	432	96	24	156	1,032
August	94	253	429	87	17	159	1,039
September	89	245	454	86	12	146	1,032
October	89	256	490	78	12	144	1,069
November	103	244	493	79	13	161	1,093
December	80	193	467	66	11	134	951
Average	**87**	**259**	**442**	**77**	**22**	**145**	**1,023**

Table 321.—Miscellaneous Expenses in the Lime Industry, in Canada, by Provinces, 1921 and 1922

	New Brunswick	Quebec	Ontario	Manitoba	Alberta	British Columbia	Canada
	$	$	$	$	$	$	$
In 1921—							
Rent of offices, works and machinery	56	4,230	4,641	2,381	.....	204	11,512
Cost of purchased power	145	9,131	11,886	251	.....	6,635	28,048
Insurance (premium for one year only)	2,617	6,802	4,687	3,178	215	.....	17,499
Taxes—							
Municipal	23?	4,457	4,902	1,802	156	.....	11,549
Provincial	.....	1,126	2,304	.....	11	2,440	5,881
Federal	13	4,939	1,342	.....	459	4,338	11,091
Royalties, use of patents, etc	.....	419	1,769	.....	.....	125	2,313
Advertising expenses	75	220	1,459	.....	.....	570	2,324
Travelling expenses	125	1,021	3,665	9,209	1,562	3,447	19,029
Repairs to buildings and machinery	2,863	40,575	35,109	3,730	2,707	7,877	92,861
All other sundry expenses	26,079	61,217	106,580	6,923	4,283	431	205,513
Total	**32,205**	**134,137**	**178,344**	**27,474**	**9,393**	**26,067**	**407,620**
In 1922—							
Total	**23,879**	**125,068**	**282,951**	**19,950**	**16,975**	**53,399**	**522,222**

SAND AND GRAVEL

For statistical purposes, the sand and gravel industry has been divided into two parts comprising the operations of (1) railway companies producing sand and gravel for ballast and other purposes; (2) all other producers.

The railway companies which produce their own gravel for ballasting purposes from company-owned pits usually assign nominal values based on the actual cost of production which are not at all comparable with the output values reported by sand and gravel companies supplying the different consuming industries. In 1922, the figures of production were, railway companies, 4,990,559 cubic yards valued at $1,130,886; and other operators, 3,651,148 cubic yards valued at $2,372,049.

The figures given in the following tables do not include the operations of railway companies except where specifically mentioned. The railway companies were not asked to furnish any statistics for this industry other than the figures for production, as, owing to the varied nature of their operations, it would have been impossible for them to give the detailed data generally required. Among the other operating plants in this industry, of which there were 289, in Canada in 1922, it was often found that the production of sand and gravel was quite a subsidiary part of the business transacted. On this account the figures shown for capital employed in 1922 refer in small part to other industries, but on the whole relate as closely as possible to the industry under review. No figures for capital invested were compiled for the year 1921.

It will be readily apparent from an inspection of the tables on salaried officials that totals do not represent the actual number of persons engaged in the industry as a great many of the smaller operators had no paid help. Also, in some instances the labour was provided by those requiring sand and gravel. The following tables which show comparative figures for salaried officials, wage earners, fuel costs and miscellaneous expenses are self-explanatory.

Table 322.—Principal Statistics of the Sand and Gravel Industry in Canada, 1920-1922

Year	Number of Firms	Capital employed	Number of Employees	Salaries and Wages	Cost of Fuel	Miscellaneous Expenses	Selling Value of Products
		$		$	$	$	$
1920	186	(a)	1,546	1,343,212	(a)	(a)	4,291,067
1921	218	(a)	590	454,910	47,641	265,403	2,537,249
1922	342	4,098,928	750	684,626	99,069	445,222	3,502,935

(a) Data not available.

Table 323.—Capital Employed in the Sand and Gravel Industry by Provinces, 1922

Capital employed as represented by	Nova Scotia	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Canada
	$	$	$	$	$	$	$	$
Cost of lands, buildings, plant, machinery and tools	22,107	309,258	2,302,482	292,701	39,750	182,898	496,703	3,645,899
Cost of supplies and products on hand	1,000	4,474	89,891	8,083	.....	.....	1,084	104,532
Cash, trading and operating accounts	6,832	6,991	231,302	76,540	.....	1,165	25,667	348,497
Total	**29,939**	**320,723**	**2,623,675**	**377,324**	**39,750**	**184,063**	**523,454**	**4,098,928**

Table 324.—Employees, Salaries and Wages in the Sand and Gravel Industry in Canada, by Provinces, 1921 and 1922

Province	1921				1922			
	Number of Employees			Salaries and Wages	Number of Employees			Salaries and Wages
	On Salary	On Wages	Total		On Salary	On Wages	Total	
				$				$
Nova Scotia	2	23	25	9,679	3	31	34	17,670
New Brunswick	.....	11	11	1,221	.....	12	12	2,549
Quebec	7	39	46	35,202	8	84	92	50,416
Ontario	36	307	343	294,101	69	404	473	449,869
Manitoba	1	24	25	20,769	7	40	47	57,426
Saskatchewan	7	120	127	22,992	.....	7	7	5,292
Alberta	3	30	33	12,669	2	30	32	18,181
British Columbia	9	36	45	58,277	9	44	53	83,223
Canada	**65**	**590**	**655**	**454,910**	**98**	**652**	**750**	**684,626**

Table 325.—Number of Wage-earners in the Sand and Gravel Industry in Canada, by Months and by Provinces, 1922

Month	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Canada
January	21	11	37	167	7	1	.....	38	282
February	16	11	40	156	7	1	1	39	271
March	15	1	53	185	6	1	1	39	301
April	26	1	84	268	37	7	1	42	466
May	26	2	84	329	44	7	37	46	575
June	30	2	90	360	43	7	17	47	596
July	27	2	89	387	44	7	9	48	613
August	26	2	105	366	42	7	40	47	635
September	26	1	90	396	39	7	33	47	639
October	25	1	99	378	39	7	36	57	642
November	24	1	89	340	39	7	35	47	582
December	16	1	52	243	13	1	1	45	372
Average	**31**	**12**	**84**	**404**	**40**	**7**	**30**	**44**	**652**

Table 326.—Miscellaneous Expenses in the Sand and Gravel Industry in Canada, by Provinces, 1921 and 1922

Kind	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Canada
	$	$	$	$	$	$	$	$	$
In 1921—									
Cost of purchased power	.....	.....	.....	12,341	.....	.....	.....	5,400	17,741
Cost of all materials and supplies used in the pit	.....	87	2,227	68,102	14,872	500	3,987	19,169	108,944
Royalties paid	120	.....	.....	24,006	1,291	1,804	.....	.....	27,221
Taxes—									
Municipal	31	.....	255	5,553	410	.....	304	.....	6,553
Provincial	.....	.....	89	1,146	.....	.....	66	662	1,963
Federal	.....	.....	513	3,455	720	125	.....	.....	4,813
All other sundry expenses	1,226	.....	6,613	72,147	1,256	615	10,811	5,500	98,168
Total	**1,377**	**87**	**9,697**	**186,750**	**18,549**	**3,044**	**15,168**	**30,731**	**265,403**
In 1922—									
Total	**4,595**	**201**	**23,773**	**309,954**	**53,579**	**3,051**	**14,292**	**38,777**	**445,222**

STONE

Operations in the stone-quarrying industry in Canada in 1922 were carried on by 162 firms. By provinces, the number of producers was as follows: Nova Scotia, 10; New Brunswick, 9; Quebec, 54; Ontario, 73; Manitoba, 2; Alberta, 1; and British Columbia, 13. During the year under review 103 deposits of limestone; 48 granite; 1 marble; 8 sandstone and 2 of slate were operated.

The statistics collected under mineral production for the stone industry are confined to quarrying operations and stone-dressing works conducted in conjunction with the quarry. It must, of course, be borne in mind when reviewing the tabulated statistics for this industry that there is a considerable quantity of stone quarried by farmers, etc., for local foundation and concrete work, of which no accurate general information can be obtained.

Table 327.—Principal Statistics relating to the Stone Quarrying Industry in Canada, 1920-1922

Year	Number of Firms	Capital Employed	Number of Employees	Salaries and Wages	Cost of Fuel	Miscellaneous Expenses	Selling Value of Products
		$		$	$	$	$
1920	168	(a)	3,487	3,302,253	(a)	(a)	7,580,351
1921	145	11,138,035	2,067	2,017,272	141,442	2,369,130	6,343,696
1922	162	13,004,233	2,849	2,673,241	167,139	1,259,582	5,989,864

(a) Data not available.

Table 328.—Capital Employed in the Stone Quarrying Industry in Canada, by Provinces, 1921 and 1922

Province	1921				1922			
	Capital represented by			Total	Capital represented by			Total
	Cost of lands, buildings, plant machinery and tools	Cost of supplies and stock on hand	Cash, trading and operating accounts and bills receivable		Cost of lands, buildings, plant machinery and tools	Cost of supplies and stock on hand	Cash, trading and operating accounts and bills receivable	
	$	$	$	$	$	$	$	$
Nova Scotia	1,180,113	137,648	57,752	1,375,513	1,089,519	31,277	7,333	1,128,129
New Brunswick	107,593	32,227	30,568	170,388	68,160	6,908	4,212	79,280
Quebec	3,652,611	183,981	281,998	4,118,590	4,269,234	278,080	694,900	5,242,214
Ontario	3,976,992	219,658	310,827	4,507,477	5,144,976	239,651	582,593	5,967,220
Manitoba	607,457	60,000	.....	667,457	154,820	1,000	20,000	175,820
Alberta	5,000	50	600	5,650	1,800	100	300	2,200
British Columbia	270,782	6,490	15,688	292,960	330,814	12,832	65,724	409,370
Canada	**9,800,548**	**640,054**	**697,433**	**11,138,035**	**11,059,323**	**569,848**	**1,375,062**	**13,004,233**

Table 329.—Employees, Salaries and Wages in the Stone Quarrying Industry in Canada, by Provinces, 1922

Occupation		Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	British Columbia	Canada
SALARIED EMPLOYEES—								
Superintendents and managers	No.	5	7	60	45	2	9	128
	Salaries	$ 5,900	$ 7,864	$ 129,833	$ 103,327	$ 3,414	$ 22,341	$ 272,679
Technical employees	No.	4	.....	12	7	.....	.....	23
	Salaries	$ 1,343	.....	$ 21,815	$ 8,427	.....	.....	$ 31,585
Clerks, stenographers, etc.	No.	3	.....	31	22	2	1	59
	Salaries	$ 1,390	.....	$ 30,086	$ 20,269	$ 1,540	$ 240	$ 53,531
Total	No.	12	7	103	74	4	10	210
	Salaries	$ 8,633	$ 7,864	$ 181,734	$ 132,023	$ 4,960	$ 22,581	$ 357,795
WAGE-EARNERS	No.	124	74	1,376	846	61	163	*2,649
	Wages	$ 56,624	$ 47,172	$1,184,817	$ 800,694	$ 47,467	$ 174,194	$*2,315,146
Total—Employees		**136**	**81**	**1,479**	**920**	**65**	**173**	*2,859
Salaries and wages		**$ 65,257**	**$ 55,036**	**$1,366,551**	**$ 932,717**	**$ 52,427**	**$ 196,775**	$*2,673,241

* Includes 5 wage-earners receiving $4,478 in Alberta.

Table 330.—Miscellaneous Expenses Incurred in the Stone Quarrying Industry in Canada, by Provinces, 1921 and 1922

—	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Alberta	British Columbia	Canada
	$	$	$	$	$	$	$	$
In 1921—								
Cost of purchased power	2,525	8,000	69,783	74,861	4,548	.....	651	160,368
Cost of all materials or supplies used in the quarry	16,367	.....	198,889	371,029	3,751	1,640	34,058	625,734
Royalties paid	553	471	27,081	3,349	.....	150	2,323	33,927
Taxes—Municipal	1,138	268	7,240	8,085	2,023	11	32	18,797
Provincial	794	61	3,184	7,146	282	91	1,030	12,588
Federal	4,339	.....	2,049	13,827	.....	.....	1,363	21,578
All other sundry expenses	13,102	4,321	124,770	1,344,006	2,749	1,113	6,077	1,496,138
Total	**38,818**	**13,121**	**432,996**	**1,822,383**	**13,353**	**3,005**	**45,534**	**2,369,130**
In 1922—								
Total	**34,777**	**11,716**	**590,347**	**566,760**	**11,042**	**204**	**44,706**	**1,259,552**

PART THREE

DIRECTORY

In the following pages the names and addresses of all the principal operators in the Canadian mineral industry are given, and the location of the properties worked in 1922 is also shown.

METALLIC MINERAL INDUSTRIES

The Auriferous Quartz Mining Industry

Name of Operator	Address	Name of Mine	Location of Mine
NOVA SCOTIA			
*Bradford Mines, Ltd.	20 Broad St., New York	Bradford	Halifax Co.
Hilchey Mining Co.	Caribou Gold Mines	Hall and Hilchey	Halifax Co.
*Malaga Gold Mines	Malaga	Malaga	Queens Co.
Sherbrooke Mines and Power Co.	Goldenville	Sherbrooke	Guys Co.
Six individual lessees and prospectors.			
ONTARIO			
*Kirkland Lake Area—			
*Bidgood Gold Mines, Ltd.	Haileybury	Bidgood	Lebel Tp.
*Canadian Kirkland Gold Mining Co.	Haileybury	Canadian Kirkland	Teck Tp.
*Continental Mines, Ltd.	Sudbury		Lebel Tp.
*Goodfish Gold Mines, Ltd.	Kirkland Lake	Goodfish	Morrisette Tp.
*Harvey Kirkland Mines, Ltd.	Kirkland Lake	Harvey Kirkland	Lebel Tp.
*Hunton Kirkland Gold Mines, Ltd.	Haileybury		Kirkland Lake
*King Kirkland Gold Mines, Ltd.	Toronto, 33 Richmond St. W.	King Kirkland	Lebel Tp.
*Kirkland Gateway Gold Mines, Ltd.	Swastika	Kirkland Gateway	Teck Tp.
Kirkland Lake Gold Mining Co., Ltd.	Toronto, 810 Lumsden Bldg.	Kirkland Lake	"
Kirkland Lake Proprietary (1919), Ltd.	Kirkland Lake	Tough Oakes	"
		Burnside	Lebel Tp.
Lake Shore Mines, Ltd.	Kirkland Lake	Lake Shore	Teck Tp.
Montreal Ontario Gold Mines, Ltd.	Kirkland Lake		Lebel Tp.
*Queen-Lebel Gold Mines, Ltd.	Kitchener	Queen Lebel	Lebel Tp.
Teck Hughes Gold Mines, Ltd.	Kirkland Lake	Teck Hughes	Teck Tp.
Wright-Hargreaves Mines, Ltd.	Bridgeburg	Wright-Hargreaves	"
*Larder Lake Area—			
*Argonaut Gold, Ltd.	Dane	Argonaut	Gauthier Tp.
*Crown Reserve Mining Co., Ltd.	Larder Lake	Pancake	Larder Lake
*Lightning River Area—			
*Blue Quartz Gold Mines, Ltd.	Toronto	Blue Quartz	Painkiller Lake
*Hattie Gold Mines, Ltd.	Matheson, P.O.	Hattie	Coulson Tp.
*Lightning River Gold Mines	Kirkland Lake	Lightning River	Holloway Tp.
*Northwestern Ontario Area—			
*Contact Bay Mines, Ltd.	Toronto, 120 Bay St.	Contact Bay	Van Horn Tp.
*Goudreau Gold Mines	Toronto	Goudreau	Algoma Dist.
*Grace Mining Co., Ltd.	Fort Erie	Grace	Eagle Lake.
*Jackson Development Co.	Port Arthur	Jackson	Nipigon
*Porcupine Area—			
*Beaumont Gold Mines, Ltd.	Toronto, 1601 Royal Bank Bldg	Beaumont	Tisdale Tp.
*Canadian Gold Mines Corporation	Timmins		"
Clifton Porcupine Mines, Ltd.	South Porcupine	Clifton	Deloro Tp.
Dome Mines Company, Ltd.	South Porcupine	Dome	Tisdale Tp.
*Hayden Gold Mines Co., Ltd.	Buffalo	Hayden	Deloro Tp.
Hollinger Consolidated Gold Mines, Ltd.	Timmins	Hollinger	Tisdale Tp.
*Kerr Lake Mining Co., Ltd.	Cobalt	Goldale	"
*March Gold, Ltd.	South Porcupine	March Gold	Deloro Tp.
McIntyre Porcupine Mines, Ltd.	Toronto, 602 Standard Bank Bldg.	McIntyre	Tisdale Tp.
*Night Hawk Peninsula Mines, Ltd.	Connaught Station	Night Hawk	Cody Tp.
*North Crown Porcupine Mines, Ltd.	Larder Lake	North Crown	Tisdale Tp.
*Porcupine Davidson Gold Mines, Ltd.	Toronto, 4-5 King Edward Hotel	Davidson	Tisdale Tp.
Porcupine Paymaster Mines, Ltd.	South Porcupine	Paymaster	Deloro Tp.
*Vipond Consolidated Mines, Ltd.	Timmins	Vipond	Tisdale Tp.
*Southern Ontario—			
*Cobalt Frontenac Mining Co.	Flinton	Cobalt	Kaladar Tp.
*Ore Chimney Mining Co.	Northbrook	Ore Chimney	Barrie Tp.
*Sudbury Area—			
*Buckingham Mines, Ltd.	West Shining Tree	Buckingham	Asquith Tp.
*Kibble Mines, Ltd.	Toronto, 404 C.P.R. Bldg.	Wasapika	Shining Tree
White Rock Mining Co., Ltd.	Sudbury	White Rock	MacMurchy Tp.
MANITOBA			
*Bingo Gold Mines, Ltd.	Winnipeg	Bingo	Pas Dist.
Stewart and Papineau	Winnipeg	Kingfisher	Rice Lake.

* Operating but not shipping.

The Auriferous Quartz Mining Industry—Concluded

Name of Operator	Address	Name of Mine	Location
BRITISH COLUMBIA			
*Bullock Gold Mines, Ltd	Poplar Creek	Bullock	Poplar Creek
California Mining Co., Ltd	Spokane, Wash.	California	Nelson.
*Carmi Gold Mining Co.	Carmi.	Carmi	Yale
*Fairview Mining Co.	Fairview	Susie	Yale
Golskiesh Mines, Ltd	Vancouver	Golskiesh	Nass River
Hedley Gold Mining Co., Ltd.	Hedley	Nickel Plate	Similkameen
I.X.L. Mining and Milling Co.	Kimberley	I.X.L.	Rossland
Jeremaison, D., and Anderson, A.	Vancouver	Esperanza	Nass River
Johnson, Ole, and Co.	Chu Chua	Windpass	Yale
Kitselas Mountain Copper Co., Ltd.	Usk	Cordillera	Omineca
Liberator Mining Co., Ltd.	Vancouver	Emancipation	Yale
*MacKinnon, Margaret D.	Rossland	Golden Drip	Kootenay
McKay, James, and Bibeau, C.	Stewart	Lake View	Portland Canal
McLellan, J.	Queen Charlotte	Early Bird	Queen Charlotte
Nugget Gold Mines Ltd.	Vancouver	Nugget	Saluco
Patterson, F.	Refuge Bay	Patterson	Coast District
*Paxton, D. C.	Lillooet	Wayside	Lillooet District
Pioneer Gold Mines, Ltd.	Vancouver	Pioneer	Lillooet District
Premier Gold Mining Co., Ltd.	Premier	Premier	Skeena
*Texas Yankee Girl Mining Co.	Ymir	Yankee Girl	Kootenay

* Operating but not shipping.

The Copper-Gold-Silver Mining Industry

Name of Operator	Address	Name of Mine	Location
QUEBEC			
Eustis Mining Company	Eustis	Eustis	Ascot
ONTARIO			
Algomont Mines, Ltd.	18 Toronto St., Toronto	Algomont	Rose Tp.
BRITISH COLUMBIA			
Belmont Surf Inlet Mines, Ltd.	Surf Inlet	Surf Inlet	Skeena District, Queen Charlotte.
Consolidated Mining & Smelting Co. of Canada, Ltd.	Rossland	Rossland Group	West Kootenay, Nelson Division.
Federal Mining & Smelting Co. (Lasqueti Mining Co.)	Telkwa	Venus	Lasqueti Sound, Nanaimo Division.
*Gabbro Copper Mines, Ltd.	415 Sayward Bldg., Victoria	Gabbro	Jordan River District, Victoria Division.
Granby Consolidated Mining, Smelting and Power Co., Ltd.	Anyox	Hidden Creek Group	Observatory Inlet, Nass Division.
Kamloops Copper Co.	Duluth, Minn.	Iron Mask	Kamloops Division
*Kickbush, F. C.	Chilliwack	Empire	Lillooet District
*Kleanza Co., Ltd.	Usk	Kleanza Group Valhalla Group	Skeena, Omineca Div'n.
Le Roi No. 2, Ltd.	Rossland	Le Roi No. 2 Group	West Kootenay, Nelson Division.
McDaniels, M.	Nelson	Mountain Chief	Lower Arrow Lake, Slocan Division.
Maid of Erin Silver Mining Co., Ltd.	Haines, Alaska	Maid of Erin	Rainy Hollow, Atlin Division.
*Maple Leaf Mines, Ltd.	Grand Forks	Maple Leaf	Grand Forks, Atlin Div.
*Molly Gibson Burnt Basin Mining Co., Ltd.	Box 107, Rossland	Molly Gibson	" " "
Osborne and Howard	Tulameen	Spokane	Tulameen
Silverado Mining Co.	Stewart	Silverado Group	Bear River, Portland Canal Division.
Tidewater Copper Co.	619 Alaska Bldg., Seattle, Wash.	Indian Chief	Sidney Inlet, Clayoquot Division.
*Woodworth, J. B.	Thorley Park, Vancouver	Alaska	Vancouver

* Operating but not shipping.

The Silver-Cobalt Mining Industry

Name of Operator	Address	Name of Mine	Location
ONTARIO			
*Alpine Silver Mines, Ltd	Haileybury	Alpine	Gowganda
Bailey Silver Mines, Ltd	134 King St. E., Toronto	Bailey	Cobalt
Canadian Lorrain Silver Mines, Ltd	Haileybury	Canadian Lorrain	South Lorrain
Canadian Casey Cobalt Mining Co., Ltd	1512 Bank of Hamilton Bldg., Toronto	Casey	Casey Tp.
*Cane Silver Mines, Ltd	New Liskeard	Cane	Cane Tp.
*Casey Mountain Operating Syndicate, Ltd	Judge	Casey Mountain	Casey Tp.
Cobalt Silver Queen, Ltd	Cobalt	Silver Queen	Coleman Tp.
Coniagas Mines, Ltd	50 Ontario St., St. Catharines	Coniagas	"
		Trethewny	"
Crown Reserve Mining Co., Ltd	Larder Lake	Crown Reserve	"
*Dickson Creek (Cobalt) Silver Mines, Ltd	Haileybury	Dickson Creek	Bucke Tp.
Dominion Reduction Co., Ltd	Cobalt	Dominion	Coleman Tp.
*Genesee Mining Co., Ltd	Cobalt	Genesee	"
Hermo Mining Co., Ltd	Cobalt	Reliance	"
Islet Exploration Co., Ltd	509 Allworth Bldg., Duluth, Minn	Silver Islet	Sibley Tp.
Keeley Silver Mines, Ltd	Haileybury	Keeley	South Lorrain
*Kerr Lake Mining Co., Ltd	Cobalt	Kerr Lake	Coleman Tp.
La Rose Mines, Ltd	Cobalt	La Rose	"
Lorrain Operating Co	Toronto, 1512 Bank of Hamilton Bldg.	Haileybury-Frontier	South Lorrain
McKinley-Darragh-Savage Mines of Cobalt, Ltd	Cobalt	McKinley-Darragh-Savage	Coleman Tp.
*Menago Mining Co., Ltd	Sudbury	Colonial	"
		Buffalo	"
Mining Corporation of Canada, Ltd	1512 Bank of Hamilton Bldg., Toronto	Townsite	"
		City of Cobalt	"
		Townsite Extension	"
Nipissing Mining Co., Ltd	Cobalt	Nipissing	"
O'Brien, M. J., Ltd	Cobalt	O'Brien	"
		Miller-Lake-O'Brien	Gowganda
*Oxford Cobalt Silver Mines, Ltd	Woodstock	Oxford Cobalt	Gillies
Trethewny Silver-Cobalt Mines, Ltd	Standard Bank Bldg., Toronto	Castle	Gowganda
*Victory Silver Mines, Ltd	Box 261, St. Catharines	Victory	Coleman Tp.

* Operating but not shipping.

The Silver-Lead-Zinc Industry

ONTARIO			
Kingdon Mining, Smelting and Manufacturing Co., Ltd	Galetta	Kingdon	Galetta
BRITISH COLUMBIA			
Ainsworth Mining Division—			
Burgess, W. H	Kaslo	Whitewater	Retallack
Consolidated Mining & Smelting Co. of Canada, Ltd	Rossland	Highland	Ainsworth
*Cork-Province Mines, Ltd	Kaslo	Cork-Province	Zwicky
Florence Silver Mining Co., Ltd. (D. E. Sanders)	518 Sutton Blk., Spokane, Wash	Florence	Ainsworth
Foulkes, G. and Roberts	Kaslo	Dublin	Zwicky
Giegerich, H	Kaslo	Silver Hoard	Ainsworth
Grant and Peterson (lessees)	Ainsworth	Number One	"
Hansen, Thos. B	Nashton	Black Bear	Kaslo Creek
*Henry and Currie	Ainsworth	Violet	Woodberry Creek
*Lake Shore Mining Co	Ainsworth	Lake Shore	Ainsworth
McCready, G. E	Zincton	Caledonia	Blaylock
McDougall, James	Ainsworth	Spokane-Trinket	Ainsworth
		Neosho	Ainsworth
New Canadian Metal Co., Ltd. (S. S. Fowler)	Riondel	Blue Bell	Riondel
*Shepherd Mining Co	Kaslo	Kirby	Ainsworth
Thompson, J. H (lessee)	New Denver	Lincoln	Blaylock
Utica Mines, Ltd. (T. R. French)	Kaslo	Utica	Adamant
Atlin Mining Division—			
Atlin Silver-Lead Mines (J. M. Ruffner)	Atlin	Cherokee & Barber	Atlin
Cariboo Mining Division—			
*North Point Mining Co	Prince George	Atlas	Fort George
Fort Steele Mining Division—			
Consolidated Mining and Smelting Co. of Canada, Ltd	Kimberley	Sullivan	Kimberley
*Guindon Mining & Milling Co	Moyie	Guindon	Moyie
Golden and Windermere Division—			
Bruce, R. Randolph	Invermere	Paradise	Toby Creek
MacPhail, J. R	525 Seymour St., Vancouver	Monarch	Field

*Operating but not shipping.

The Silver-Lead-Zinc Industry—Concluded

Name of Operator	Address	Name of Mine	Location
BRITISH COLUMBIA—*Concluded*			
Grand Forks Mining Division—			
Williams, Wm	Edgewood	First Chance	Lightning Peak
Greenwood Mining Division—			
Barrett, G. M	Beaverdell	Revenge Group	Beaverdell
Drum, James	Greenwood	Twin	Greenwood
Duhamel, J. H	Box 543, Greenwood	Ethiopia	"
*Jack Paul Mining Co	610 Hutton Blk. Spokane, Wash	Riverside	"
McKeller and Hallett	Greenwood	Highland Lass	Wallace Mountain
Morrison and McGillis	Greenwood	Tam O'Shanter	Deadwood Camp
Paton, J. N. (McIntosh & Crane)	Beaverdell	Bell	Wallace Mountain
Rambo, W. H	Beaverdell	Standard Fraction	Wallace Mountain
Sutherland, James	Beaverdell	Rob. Roy & Castor Fraction	Beaverdell
Wallace Mountain Mines, Ltd	Box 176, Penticton	Sally Group	"
Nelson and Arrow Lake Mining Divisions—			
Consolidated Mining and Smelting Co. of Canada, Ltd. (to lessee)	Trail	Molly Gibson	Kokanee Creek
*Forster, H. E	Wilmer	Millie Mack	Cariboo Creek
Turner, W. J	Salmo	Emerald	Salmo
	Salmo	Silver Dollar	"
Wolverton, R. W	Cascade	Granite-Poorman	Taghum
Omineca Mining Division—			
*Duthie, J. F. (John R. Turner)	Smithers	Mamie	Hudson Bay Mtn.
Silver Standard Mining Co	506 Winch Bldg., Vancouver	Silver Standard	Hazelton
Portland Canal Mining Division—			
*American Mining & Milling Co	470 Granville St., Vancouver	Betty & Sullivan Group	Salmon River
Young, A. E	Stewart	Sunshine	Glacier Creek
Slocan and Slocan City Mining Divisions—			
Byrne, M. J	Sandon	Gem	Carpenter Creek
Cartwright, C. E	302 North West Bldg., Vancouver	Black Prince & Two Friends	Lemon
Clarke & Mavin	Sandon	Carnation	Sandon
Clever, R	New Denver	Mollie Hughes	New Denver
Cunning, R	Sandon	Last Chance	London Ridge
Cunningham, C	Alamo	Alamo, Eureka Hewitt, Idaho, Queen Bess, Richmond, Sovereign, Wonderful	Alamo
Dunsmuir & Sons (Paul Lincoln)	Sandon	Noble Five	Sandon
Edwards, Frank	New Denver	Mountain Chief, Mammoth	New Denver
Harris and Kelly	Sandon	Number One	Sandon
Hedley, R. R	Slocan	Arlington	Springer Creek
Johnson and Kirk	Sandon	Mountain Con	Sandon
Long and Buchanan	Slocan	Meteor	Slocan
Long, G	Sandon	Lilly B	Springer Creek
MacAulay & McFarlane	Sandon	Metallic	Slocan
		Payne	Sandon
		Ore-Bin	"
Noonday Mines Co	Box 1772, Spokane, Wash	Noonday	Sandon
O'Neail, D. B	Slocan	L. T. Group	Slocan
Ottawa Mining & Milling Co	Slocan	Ottawa	"
Rambler-Cariboo Mines, Ltd. (W. A. Cameron)	New Denver	Rambler-Cariboo	Three Forks
Rosbery-Surprise Mining Co., Ltd	New Denver	Bosun	New Denver
Rosbery-Surprise Mining Co., Ltd	(Lessees)	Monitor	Three Forks
		Surprise	Sandon
Silversmith Mines, Ltd	Box 1772, Spokane, Wash	Silversmith	Sandon
Slocan Silver Mines, Ltd	Alamo	McAllister	Three Forks
*Soho Consolidated Mines, Ltd	Spokane, Wash	Soho	Carpenter Creek
Standard Silver-Lead Mining Co	Silverton	Standard	Silverton
Sunderland, J. B	Vancouver	Ruth	Sandon
Wafer, Barker and Maurer	Slocan City	Hampton	Springer Creek
Zimmerman, Kurt	Slocan City	Anna	Springer Creek
Trail Creek, Trout Lake, Revelstoke & Lardeau Mining Divisions—			
Lanark Mining Co	Illecillewaet	Lanark	Illecillewaet
*Multiplex Mining Co	Box 436, Revelstoke	Multiplex	Camborne
*Silver Crown Mining Co	426 Rookery Bldg., Spokane, Wash	Ethel	Trout Lake.
*True Fissure Mining Co	229E. 6th St. Cincinnati, Ohio.	True Fissure	Ferguson
YUKON			
Keno Hill, Ltd	120 Broadway, New York	Keno Hill	Keno Hill, Mayo Division
Treadwell Yukon Co., Ltd	Crocker Bldg., San Francisco, Cal	Ladue	" "

*Operating but not shipping.

NOTE.—Ontario reported only one company which is included among the shippers given above, and all Quebec lead-zinc mines were reported idle.

In the Yukon Territory development operations were carried on by many individual operators and by a few incorporated companies in the Keno Hill area.

NON-METALLIC MINERAL INDUSTRIES

Actinolite Mining Industry

Name	Address	Location
The Actinolite Mining Co., Ltd.	Bloomfield, N.J.	Kaladar Township, Ont.

Asbestos Mining Industry

Name	Address	Name of Mine	Location of Mine
QUEBEC—			
Asbestos Corporation of Canada, Ltd.	Canada Cement Bldg., Montreal	King	Thetford Tp.
		Beaver	Coleraine Tp.
		British Canadian	
		Fraser	Broughton Tp.
Asbestos Mines, Ltd.	282 St. Catherine St., Montreal	Boston	Broughton Tp.
Bell Asbestos Mines	Thetford Mines	Bell	Thetford Tp.
Bennett-Martin Asbestos and Chrome Mines, Ltd.	Thetford Mines	Vimy Ridge	Ireland Tp.
		Thetford	Thetford Tp.
Black Lake Asbestos and Chrome Co., Ltd.	282 St. Catherine St., Montreal	Union	Coleraine Tp.
		Imperial	Colerraine Tp.
		Southward	Coleraine Tp.
Canadian Johns-Manville Co., Ltd.	450 St. James St., Montreal	Jeffrey	Shipton Tp.
Consolidated Asbestos, Ltd.	145 St. James St., Montreal	Thetford	Thetford Tp.
Federal Asbestos Co.	145 St. James St., Montreal	Federal	Thetford Tp.
Johnson's Company	Thetford Mines	Johnson's	Thetford Tp.
		Johnson's	Coleraine Tp.
Maple Leaf Asbestos Corp., Ltd.	Thetford Mines	Maple Leaf	Coleraine Tp.
Pennington Asbestos Co.	Thetford Mines	Pennington	Thetford Tp.
Quebec Asbestos Corporation	East Broughton	Quebec	Broughton Tp.

Barytes Mining Industry

Name	Address	Location
Brandram-Henderson, Ltd.	Montreal, P.Q.	Lake Ainslie, Inverness County, N.S.

The Coal Mining Industry*

Name of Operator	Address	Location of Mine
NOVA SCOTIA—		*District*
Acadia Coal Co.	New Glasgow	Pictou.
Anglo Coal Co., Ltd.	Box 100, Glace Bay	Cape Breton.
Athol Coal Co., Ltd. (formerly Export Coal Co.)	Box 754, New Glasgow	Cumberland.
Bras d'Or Coal Co.	Little Bras d'Or Bridge	Cape Breton.
Carter Coal Co.	Box 68, Amherst	Cumberland.
Dominion Coal Co.*	Sydney	Cape Breton.
Emerson Coal Co., Ltd.	16 Rupert St., Amherst	Cumberland.
Fundy Mining Co.	49 Gottingen St., Halifax	Cumberland.
Greenwood Coal Co.	Thorburn	Pictou.
Indian Cove Coal Co.	Sydney Mines	Cape Breton.
Intercolonial Coal Mg. Co., Ltd.	Westville	Pictou.
Inverness Ry. & Collieries, Ltd.	Inverness	Inverness.
Maritime Coal, Ry. & Power Co., Ltd.	Joggins Mines	Cumberland.
Minudie Coal Co., Ltd.	River Hebert	Cumberland.
Nova Scotia Steel and Coal Co.	New Glasgow	Cape Breton.
Prendegast, Denis (formerly Port Hood Collieries)	Port Hood	Inverness.
Provincial Mining Co. (Twin Seam Coal Co.)	Maccan	Cumberland.
River Hebert Coal Co., Ltd. (formerly Marsh Mine)	River Hebert	Cumberland.
Sterling Coal Co.	River Hebert	Cumberland.
NEW BRUNSWICK—		*County*
Avon Coal Co., Ltd.	Box 940, St. John	Queens.
McDougal Bros.	Minto	Queens.
Minto Coal Co., Ltd.	Minto	Queens.
Miramichi Lumber Co.	Minto	Queens.
Reade, L. W., c/o Grand Lake Coal Co.	768 Brunswick St., Fredericton	Queens.
Rothwell Coal Co., Ltd.	Rothwell	Queens.
Welton, Harvey & Wood	Minto	Queens.
Welton & Henderson	Minto	Queens.
SASKATCHEWAN—		*Municipality*
Bienfait Commercial Co., Ltd.	Bienfait	Near Bienfait.
Bienfait Mine	Bienfait	Near Bienfait.
Crescent Collieries, Ltd.	Bienfait	Near Bienfait.

*Operators producing 500 tons or over per month.

The Coal Mining Industry—Continued

Name of Operator	Address	Location of Mine
SASKATCHEWAN—*Concluded*		
Estevan Coal and Brick Co., Ltd.	Estevan	Estevan.
Manitoba and Sask. Coal Co., Ltd	503 Avenue Blk., Winnipeg, Man.	Bienfait.
Nicholson, H.	Estevan	Estevan.
Shand Coal and Brick Co., Ltd.	Shand	Shand.
Western Dominion Collieries, Ltd.	305 Trust and Loan Bldg., Winnipeg, Man.	Taylorton.
Western Collieries, Ltd.	Roche Percee	Roche Percee.
ALBERTA—		*District*
Anthracite—		
Canadian Pacific Railway (Bankhead Mine)	Department of Natural Resources, Calgary	Banff.
Bituminous—		
Alexo Coal Mining Co., Ltd.	Saunders	Brazeau.
Balkan Coal Co., Ltd.	Coalspur	Yellowhead Pass.
Blackstone Coal Co., Ltd.	Blackstone Mine	Yellowhead Pass.
Ballarai & Sobotin		
Vithuy Coal Co., Ltd		
Stupor, Oakley & Co.		
Blue Diamond Coal Co., Ltd.	Brule Mines	Jasper Park.
Brazeau Collieries, Ltd.	Nordegg	Brazeau.
Cadomin Coal Co., Ltd.	282 Main St., Winnipeg, Man.	Mountain Park.
Canmore Coal Co., Ltd.	Canmore	Canmore.
Coal Valley Mining Co., Ltd.	Coal Valley	Yellowhead Pass.
Foothills Collieries, Ltd.	Lovettsville	Yellowhead Pass.
Harlech Coal Co.	Nordegg	Brazeau.
Hillcrest Collieries, Ltd.	Hillcrest	Crow's Nest Pass.
International Coal and Coke Co., Ltd.	Coleman	Crow's Nest Pass.
Luscar Collieries, Ltd.	Mountain Park	Mountain Park.
McGillivray Creek Coal & Coke Co.	Coleman	Crow's Nest Pass.
McLeod River Hard Coal Co., Ltd.	Coalspur	Yellowhead Pass.
Mohawk Bituminous Mines, Ltd.	Bellevue	Crow's Nest Pass.
Mountain Park Coal Co., Ltd.	708 Tegler Bldg., Edmonton	Mountain Park.
Sterling Collieries, Ltd. (formerly Oliphant-Munson)	509 Tegler Bldg., Edmonton	Yellowhead Pass.
Saunders Alberta Collieries, Ltd.	Saunders, via Rocky Mountain House	Brazeau.
Saunders Creek Collieries, Ltd.	Saunders	Brazeau.
West Canadian Collieries, Ltd.	Blairmore	Crow's Nest Pass.
Yellowhead Coal Co.	Coalspur	Yellowhead Pass
Lignite—		
Alberta Block Coal Co., Ltd.	Drumheller	Drumheller.
Alberta Coal Mining Co., Ltd.	Bank of Montreal Bldg., Edmonton	Cardiff.
Anderson, William John	Sheerness	Hanna.
Atlas Coal Co., Ltd.	Drumheller	Drumheller.
Banner Coal Co., Ltd.	121 Adair Block, Edmonton	Cardiff.
Big Valley Collieries	Box 34, Big Valley	Big Valley.
Bish Bros. & Le Gear	Forestburg	Battle River.
Blackfoot Indian Agency	Gleichen	Brooks.
Bush Mine Coal Co., Ltd.	Box 161, Beverley	Clover Bar.
Callie Coal Co., from April 1, 1921 (formerly The Drumheller Land Co., Ltd.)	Drumheller	Drumheller.
Canada West Coal Co., Ltd.	Taber	Taber.
Canadian Dinant Coal Co.	Dinant	Camrose.
Canadian Pacific Railway Co.	Department of Natural Resources, Calgary	Lethbridge, Taber.
Carbon Coal Co.	Box 166, Carbon.	Carbon.
Carbon Stopp Mining Co. (formerly International Construction & Mfg. Co.)	Box 178, Carbon	Carbon.
Cardiff Collieries, Ltd., The	Cardiff	Cardiff.
Celtic Coal Co. (formerly Hamilton Coal Co.)	Wayne	Drumheller.
Chinook Coal Co., Ltd.	117 Sherlock Blk., Lethbridge	Lethbridge.
City of Lethbridge Coal Mine	Lethbridge	Lethbridge.
Clover Bar Coal Mine Co., Ltd.	Box 180, Beverley	Clover Bar.
Crown Coal Co. (Penn. Mine Coal Co.)	1351-82nd Street, Edmonton	Edmonton.
Daly Mine	Clover Bar	Clover Bar.
Dawson Coal Co., Ltd.	9 McDougall Court, Edmonton	Edmonton.
Dobell Coal Co., Ltd.	Box 140, Tofield	Tofield.
Donaldson & Tennant (formerly Federal Coals)	Box 628, Lethbridge	Lethbridge.
Edmonton Collieries, Ltd.	Fraser Flats, 92nd St., Edmonton	Edmonton.
Elgin Coal Co., Ltd.	Drumheller	Drumheller.
Ellis Coal Co., Ltd.	Box 46, Three Hills	Three Hills.
Excelsior Collieries, Ltd.	Wayne	Drumheller.
Fraser-Mackay Collieries, Ltd.	10455-101 St., Edmonton	Clover Bar.
Gibson Collieries, The	Box 29, Drumheller	Drumheller.
Great West Coal Co., Ltd. (Black Diamond Mine)	10026-101 "A", Edmonton	Clover Bar.
Great West Coal Co., Ltd. (The Star Mine)	Aerial	Drumheller.
Humberstone Coal Co., Ltd.	Box 506, Beverly	Clover Bay.
Hy-Grade Coal Co., Ltd.	Drumheller	Drumheller.
Ideal Coal Co., Ltd.	107-3st E., Calgary	Drumheller.
Jewel Collieries, The	Wayne	Drumheller.
Keith and Fulton	Clover Bar	Clover Bar.
Kelly, Mrs. E. (formerly Namao Collieries, Ltd.)	Namao	Namao.
Kleenbirn Collieries, Ltd.	Eyremore	Brooks.
Lakeside Coals, Ltd.	711 Tegler Bldg., Edmonton	Wabamun.
Lethbridge Coal Co., Ltd.	Lethbridge	Lethbridge.
McPeak, P. J.	112th Ave., & 76th St., Edmonton	Edmonton.
Marens Collieries, Ltd.	Clover Bar	Clover Bar.
Marzoli & Co. (formerly Miller, Smith & Miller)	Rosedale Station	Drumheller.

The Coal Mining Industry—Concluded

Name of Operator	Address	Location
ALBERTA—*Concluded*		
Lignite—Concluded		
Midland Collieries, Ltd.	Midlandvale	Drumheller.
Mid-West Collieries, Ltd.	Box 387, Drumheller	Drumheller.
Moonlight Coal Co., Ltd.	Rosedale Station	Drumheller.
North American Collieries, Ltd.	McLeod Bldg., Edmonton	Drumheller, Lethbridge, Pembina and Red Deer.
North Star Coal Co. (formerly Tredway Coal Co.)	Cardiff	Cardiff.
Newcastle Coal Co., Ltd.	Drumheller	Drumheller.
Newcastle Junior Mg. Co., Ltd.	Drumheller	Drumheller.
Oscar Collieries, Ltd.	Sheerness	Hanna.
Ottewell, R. P. Coal Mine	Clover Bar	Clover Bar.
Oliphant, John	Medicine Hat	Medicine Hat.
Palisade Coal Co., Ltd. (formerly Blue Gem Collieries, Ltd.)	Three Hills	Three Hills.
Parker Creek Collieries, Ltd.	1011 Herald Bldg., Calgary	Trochu.
Peerless Carbon Coal, Ltd.	Carbon	Carbon.
Premier Coal Co., Ltd.	Drumheller	Drumheller.
Reed & Brown	74th Street, Edmonton	Edmonton.
Redcliff Brick and Coal Co., Ltd.	Redcliff	Medicine Hat.
Regal Collieries, Ltd.	Taber	Taber.
Rock Springs Coal Co.	Taber	Taber.
Rosedale Coal Co., Ltd.	Rosedale	Drumheller.
Rose Deer Coal Mining Co., Ltd.	Wayne	Drumheller.
Round Hill Collieries, Ltd., The	Round Hill	Camrose.
Scranton Coal Co., Ltd.	Drumheller	Drumheller.
Sheffield Collieries, Ltd.	Wayne	Drumheller.
Spicer Coal Co., Ltd.	Dinant	Camrose.
Stoney Creek Collieries, Ltd.	Camrose	Canmore.
Sunshine Coal Co., Ltd.	Wayne	Drumheller.
Tofield Coal Co., Ltd.	Tofield	Tofield.
Western Commercial Co.	Wayne	Drumheller.
Western Gem Mining Co., Ltd.	Drumheller	Drumheller.
BRITISH COLUMBIA—		*District*
Canadian Collieries (Dunsmuir)	600 Belmont Bldg., Victoria	Comox, Wellington } Island
Coalmont Collieries, Ltd.	705 Yorkshire Bldg., Vancouver	Inland.
Corbin Coal & Coke Co., Ltd.	Corbin	Crows Nest.
Crows Nest Pass Coal Co., Ltd.	Fernie	Crows Nest.
Fleming Coal Co., Ltd.	Merritt	Inland.
Granby Cons. Mg. S. & P. Co.	Cassidy, Vancouver Island	Island.
Middlesboro Collieries, Ltd.	Middlesboro	Inland.
Nanoose Wellington Coal Co.	Wellington	Island.
Princeton Coal & Land Co., Ltd.	Princeton	Inland.
Western Fuel Corporation of Canada	Nanaimo	Island.

The Feldspar Industry

MINES—		
QUEBEC—		
Buckingham Feldspar Company*	Buckingham	Derry Tp.
Cameron, J. J.	Box 11, Buckingham	Buckingham Tp.
Couture Bros.	Glen Almond	Buckingham Tp.
Gowan, William	Holland Mills	Portland Tp.
McMillan, A. J.	Buckingham	Buckingham Tp.
O'Brien and Fowler	Bk. of Nova Scotia Bldg., Ottawa, Ont.	Derry Tp.
Podnaud, G.	Glen Almond	Buckingham Tp.
Winning, Bush	N.D. de Salette	Portland Tp.
ONTARIO—		
Canadian Non-Metallic Minerals, Ltd.	Aylen Lake	Dickens Tp.
Campbell, A. M.	Box 30, Perth	Bathurst Tp.
Cleveland Feldspar and Products Co.	327 Union Bldg., Cleveland, Ohio, U.S.A.	Monteagle Tp.
Dillon and Mills	Hartington	Loughboro Tp.
Federal Feldspar, Limited	250 Slater St., Ottawa	Bedford Tp.
Feldspars, Limited	293 Bay St., Toronto	Bedford, Portland and Loughboro Tps.
Feldspar Mines, Corp., Ltd.	Toronto	Monteagle Tp.
Feldspar Quarries, Limited	60 Front St. E., Toronto	Portland Tp.
Industrial Minerals Corporation of Canada, Ltd.	805 Bank of Hamilton Bldg., Toronto	Monmouth Tp.
McPhee Bros.	Wanapitei	Dryden Tp.
Orser-Kraft Feldspar, Ltd.	563 William St., Buffalo, N.Y., U.S.A.	Bathurst Tp.
Orser and Wilson	Perth	Loughboro Tp.
Rock Products Company	Nicholas Bldg., Toledo, Ohio, U.S.A.	Bathurst Tp.
Treadwell, W. C.	Hartington	Loughboro Tp.
Verona Mining Company	404 Harrison Bldg., Philadelphia, Pa.	Monteagle Tp.
MILLS—		
Feldspar Milling Co., Limited	33 Richmond St. W., Toronto	Toronto, Ont.
Frontenac Floor and Wall Tile Co., Ltd.	Kingston	Kingston, Ont.

*Sold to Mahoney and Rich, 88 Bank St., Ottawa, on August 10, 1922.

The Fluorspar Industry

Name	Address	Location
ONTARIO—		
Cross and Wellington	Madoc	Huntingdon Township.
Mineral Products, Ltd.	Madoc	Madoc Township.
Wallbridge G. M.	Madoc	Madoc Township.
BRITISH COLUMBIA—		
Consolidated Mining & Smelting Co. of Canada, Ltd	Trail, B.C	Grand Forks Division.

The Graphite Industry

QUEBEC—		
Quebec Graphite Co., Ltd.	4 Fenchurch, London, E.C	Lochaber Township
Standard Graphite Co., Ltd.	228 Sherbrooke St., Montreal	Boyer Township.
ONTARIO—		
Black Donald Graphite Co., Ltd.	Calabogie, Ont.	Brougham Township.

The Grindstone Industry

NOVA SCOTIA—		
Mic-Mac Grindstone Co., Ltd.	Woodburn	Woodburn.
NEW BRUNSWICK—		
The Miramichi Quarry Co., Ltd.	Quarryville	Quarryville.
The Read Stone Co., Ltd.	Sackville	Stonehaven.

The Gypsum Industry

NOVA SCOTIA—		
Iona Gypsum Products Co.	Iona, C.B	Iona.
Newark Plaster Co.	Newark, New Jersey	Ottawa Brook, Victoria Co.
Rock Plaster Corp.	10 Rector St., New York, N.Y.	Walton, Hants Co.
Wentworth Gypsum Co., Ltd.	Windsor	Wentworth, Hants Co.
Windsor Gypsum Co.	Newburgh, N.Y.	Windsor, Hants Co.
Windsor Plaster Co., Ltd.	Windsor	Windsor, Hants Co.
NEW BRUNSWICK—		
Albert Manufacturing Co.	Hillsborough	Hillsborough, Albert Co.
Hillsborough Plaster, Quarrying and Manufacturing Co.	Hillsborough	Edgetts Landing, Albert Co.
ONTARIO—		
The Ontario Gypsum Co., Ltd.	[illegible]	Caledonia, Seneca Tp.
		Lyalmmes, Canada Tp.
MANITOBA—		
Manitoba Gypsum Co.		
BRITISH COLUMBIA—		
Hammond, W.		

The Manganese Mining Industry

Name	Address	Location
Consolidated Manganese Co.	Portland, Maine, U.S.A.	New Ross, Lunenburg Co., N.S.

The Mica Industry

QUEBEC—		
Ahearn, W. A.	538 McLaren St., Ottawa, Ont.	Hull Tp.
Argall, W. A.	Laurel	
Blackburn Bros.	134 Wellington St., Ottawa, Ont.	Templeton Tp.
Burns, John	High Falls	Portland West.
Cheslock, Isidore	High Falls	Portland West.
Flynn, H. T.	106-8 Montcalm St., Hull	Hull Tp.
Gauthier and Gibault	Buckingham	Portland Tp.
Gowan, Wm.	Holland Mills	Portland West Tp.
Laurentide Mica Co., Ltd.	119 Queen St. West, Ottawa, Ont.	East Templeton Tp.
McGlashan Mining Syndicate	Cantley	
O'Brien and Fowler	Bank of Nova Scotia Bldg., Ottawa, Ont.	Portland and Templeton Tp.
Sherbrooke-Saguenay Mica, Ltd.	139 King St. W., Sherbrooke	Bergeronnes Tp.
Watts, Edward	Dodds Lake	Portland West, Que.
Winning, Bush	Notre Dame de la Salette	Portland Tp.
ONTARIO—		
Bennett, H. B.	Perth	Loughborough Tp.
Kent Bros. and Estate J. M. Stoness	Kingston	Bedford Tp.
Martin, A. G.	231 Besserer St., Ottawa	Loughborough Tp.
The Loughborough Mining Co., Ltd.	Sydenham	Loughborough Tp.
Tory Hill Marble and Mica Co., Ltd.	Tory Hill	Glamorgan Tp.
Wildman and Burke	Perth	Elmsley Tp.

The Natro-Alunite Mining Industry

San Juan Mining & Manufacturing Co.	918 Government St., Victoria, B.C.	Kyuquot, Vancouver Island.

The Natural Gas Industry

New Bru[illegible]		[illegible]y Creek, Albert Co.

...ood	Winnipeg	Gypsumville.
...ining & Products Co., Ltd	Ashcroft	Lillooet district.
	12 Bank of Hamilton Bldg., Vancouver	Lillooet district.

The Iron Oxide Mining Industry

QUEBEC—		
Argall, Thos. H	Three Rivers	Point du Lac, St. Maurice Co
Canada Paint Co., Ltd	572 William St., Montreal	Red Mill, Champlain Co.
Champlain Oxide Co	Three Rivers	Champlain, Champlain Co.
BRITISH COLUMBIA—		
McDonald, R. W	823 Fifth Ave. West, Calgary, Alta.	Windermere District, B.C.

The Magnesite Industry

QUEBEC—		
International Magnesite Co., Ltd	1005 Bank of N.S. Bldg., Montreal	Harrington Township.
North American Magnesite Products, Ltd	127 Board of Trade Bldg., Montreal	Grenville Township.
Scottish Canadian Magnesite Co	Montreal, Que	Grenville Township.

The Magnesium Sulphate Mining Industry

Basque Chemical Production Co., Ltd	349 Railway St., Vancouver, B.C.	Basque, B.C. (near Ashcroft)

New Brunswick Gas and Oilfields, Limited	Box 196, Moncton	[illegible]
ONTARIO—		
Aldrich Gas and Oil Co., Ltd	Merchants' Bank Bldg., Hamilton	Rainham, Moulton Tp.
Alter, J. D	Dunnville	Onondaga Tp.
Axon, Jos. J	Middleport	North Cayuga Tp.
Azoff Gas Co	Canfield	Wainfleet Tp.
Barrick, Arthur E	Marshville	Wainfleet Tp.
Barrick, Oscar	Marshville	Wainfleet Tp.
Barrick, R. P. and Stouth	Marshville	Moulton Tp.
Battle Natural Gas Co., Ltd	Hamilton	Romney Tp.
Beaver Oil and Gas Co., Ltd	518 Jackson Bldg., Buffalo, N.Y.	Binbrook Tp.
Berr, Geo	Binbrook	Bertie Tp.
Bertie Natural Gas Co., Ltd	Ridgeway	Binbrook Tp.
Binbrook Gas Co	Binbrook	Moulton Tp.
Bradley, Alex	R.R. 1, Lowbanks	Onondaga Tp.
Bressett, J. E	Middleport	Wainfleet Tp.
Brown, E. R. & C. A	Marshville	Onondaga Tp.
Brown, Walter	Gainsville	Wainfleet Tp.
Camby, B. F	R.R. 2, Marshville	Rainham, Seneca Tp.
Canboro Gas & Oil Co	Selkirk	Dunn Tp.
Canada Cement Co., Ltd	Montreal, Que	Cayuga N. Tp.
Canfield Natural Gas Co	Canfield	Dunn Tp.
Carter, Henry	Dunnville	Euphemia Tp.
Castle Oil & Gas Co	Imperial Bank Chambers, Niagara Falls	Willoughby Tp.
Chippawa Development Co., Ltd	Chippawa	Caistor, Gainsboro Tp.
Chippawa Oil & Gas Co., Ltd	Tavistock	Moulton Tp.
Clover Gas and Oil Co	704 Mutual Life Bldg., Buffalo, N.Y	Wainfleet, Gainsboro Tp.
Coleman, J. A	Welland Port	Onondaga Tp.
Cowie, Alex	Caledonia	Canboro, North Cayuga Tp.
Darling Road Co-operative Gas Co	Canfield	Onodaga Tp.
Deagle and Brown	R.R. 2, Caledonia	Onondaga Tp.
Deagle, Edwin	Middleport	Onodaga Tp.
Deagle, John	Middleport	Wainfleet Tp.
Dean, C. & F	R.R. 2, Marshville	Wainfleet Tp.
Dean F	R.R. 2, Marshville	Canboro
Diener, Eugene F	R.R. 5, Dunnville	

The Natural Gas Industry—Continued

Name	Address	Location
Dominion Natural Gas Co., Ltd	518 Jackson Bldg., Buffalo, N.Y	Bayham, Binbrook, Caistor Canboro, Cayuga N., Cayuga S., Charlotteville, Dunn, Dunwich, Glanford, Houghton, Malahide, Middleton, Moulton, Oneida, Onondaga, Rainham, Seneca, Walpole, Walsingham N., Walsingham S., Windham, Woodhouse Tps.
Dougherty, R	Middleport	Onondaga Tp.
Douglas, James	Caledonia	Onondaga
Douglas, W. A	R.R. 1, Caledonia	Onondaga
Dunn Natural Gas Co., Ltd	Dunnville	Dunn, Sherbrooke Tps.
Duxbury, J. Henry	Hagersville	Walpole Tp.
Eastside Gas Co	R.R. 2, Lowbanks	Sherbrooke
Ellsworth, Fletcher	Port Colborne	Wainfleet Tp.
Emmerson, Geo	R.R. No. 2, Dunnville	Moulton Tp.
Emerson, Laidlaw and Troughton	R.R. 1, Attercliffe Station	Canboro Tp.
Empire Limestone Co	19 Hudson St., Buffalo, N.Y	Humbertstone Tp.
Evans, Thos	R.R. 1, Glanford Station	Binbrook
Fenton, H. R	R.R. 3, Hannon	Barton Tp.
Fisherville Gas Co	Fisherville	Rainham Tp.
Fletcher, J. D	R.R. 1, Hannon	Binbrook
Fulton, Thos	Cainsville	Onondaga Tp.
Gilmore, M. W	R.R. 2, Caledonia	Onondaga Tp.
Glenwood Natural Gas Co., Ltd	518 Jackson Bldg., Buffalo, N.Y	Gosfield S., Mersea, Raleigh, Romney, Tilbury Tps.
Graybeil, Elisha	Port Colborne	Humberstone Tp.
Graybell, S. B	Burnaby	Wainfleet
Hager, Calvin	Middleport	Onondaga Tp.
Hager, Hamilton	Middleport	Onondaga Tp.
Hamilton Gas and Oil Co	17 Main St. E., Hamilton	Seneca Tp.
Hart and Harrington	Attercliffe Station	Canboro Tp.
Halka, Fred	Fisherville	Rainham Tp.
Hendee Gas Co	Cayuga	South Cayuga Tp.
Hoffman, Albert	Dunnville	Moulton Tp.
Hoover, J. E	R.R. 1, Selkirk	Walpole Tp.
Howell, H. H	Cainsville	Onondaga Tp.
Industrial Natural Gas Co., Ltd	Thorold	Bertie, Crowland, Humberstone Tps.
Jasperson, B	Kingsville	Tilbury East Tp.
Jones, J. S	Port Maitland	Dunn Tp.
Kindly, D. and Son	Selkirk	Rainham
King, Ralph, Gas Co	Hamilton	Charlotteville, Middleton, Rainham, Seneca, Walpole Tps.
Kohl, Mrs. E	R.R. 1, Sarnia	Sarnia Tp.
Lalor, F. R	Dunnville	Moulton Tp.
Lalor and Yokes (now A. C. May)	Dunnville	Walpole Tp.
Lamb, Alfred	Selkirk	Walpole Tp.
Lambert, E. C	Lowbanks	Moulton Tp.
McBay, John	R.R. 3, Dunnville	Moulton Tp.
McDonald, Mrs. J	Canfield Junction	N. Cayuga
McKee, Jacob	Hannon	Barton Tp.
Maple Leaf Gas Co	48 St. John's Rd., Buffalo, N.Y	Moulton Tp.
Marshall, Jas	Hamilton	Barton, Glanford, Seneca Tps.
Martin, E	Port Maitland	Dunn Tp.
Medina Natural Gas Co., Ltd	Box 339, Chatham	Bayham, Houghton Tp.
Michener, E. C	Marshville	Wainfleet Tp.
Mickle and McKechnie	Ridgetown	Canboro Tp.
Midfield Gas Co., Ltd	9 Maple Ave., Hamilton	N. Cayuga, Oneida Tp.
Moore, C. A	Perry Station	Wainfleet Tp.
Morrell, F	Middleport	Onondaga Tp.
National Gas Co., Ltd	503 Bank of Hamilton Bldg., Hamilton.	Binbrook, Rainham, Seneca Tps.
Nie, Jos	Attercliffe Station	Moulton Tp.
Niece, Hosea and Son	Lowbanks	Sherbrooke Tp.
Northern Gas & Gasoline Co	Hepworth	Amabel Tp.
North Shore Gas Co., Ltd	Merchants Bank Bldg., Hamilton	Rainham Tp.
Oil Springs Oil & Gas Co., Ltd	Oil Springs	Enniskillen Tp.
Petrol Oil & Gas Co., Ltd	1804-6 Royal Bank Bldg., Toronto	Dover, West Tp.
Pilkington Bros., Ltd	Thorold	Crowland Tp.
Port Colborne-Welland Natural Gas and Oil Co., Ltd	Port Colborne	Oneida, Onondaga, Seneca Tps.
Powell, Jno. W	Burnaby	Wainfleet Tp.
Progressive Oil & Gas Co	212 Main & Hughson St., Hamilton	N. Dorchester Tp.
Provincial Natural Gas & Fuel Co., of Ontario, Ltd	103 Queen St., Niagara Falls	Bertie, Crowland, Humberstone, Wainfleet, Willoughby Tp.
Richardson, J. W	R.R. 2, Caledonia	Seneca Tp.
Richmond Oil & Gas Co., Ltd	Scane Bldg., Chatham	Bayham Tp.
Sarnia Gas & Oil Co	145½ Front St., Sarnia	Sarnia Tp.
Shurr, Wm	Marshville	Wainfleet Tp.
Sparham, A. F	Caledonia	Glanford Tp.
Springvale Gas & Oil Co	Hagersville	Walpole Tp.

The Natural Gas Industry—Concluded

Name	Address	Location
Steel, G. G.	R.R. 1, Sarnia	Sarnia Tp.
Sterling Gas Co., Ltd.	Port Colborne	Humberstone, Moulton, Sherbrooke, Wainfleet Tps.
Stevensville Gas & Fuel Co., Ltd.	Stevensville	Bertie Tp.
Sundy Gas & Oil Co.	Dunnville	Canboro Tp.
Sykes, Edward	Merlin	Raleigh, Tp.
Tate, J. W.	R.R. 2, Cayuga	N. Cayuga Tp.
Union Exploration Co.	Chatham	Dawn, Dover, Tilbury E., Colchester S. Tps.
Union Natural Gas Co. of Canada, Ltd.	48½ Market St., Chatham	Dover W., Raleigh, Romney, Tilbury E. Tps.
United Gas Companies, Ltd.	518 Jackson Bldg, Buffalo, N.Y.	Canboro, Cayuga N., Moulton, Seneca, Wainfleet. Tps.
Vacuum Oil & Gas Ltd.	509 Lumsden Bldg., Toronto	Dover West, Middleton Tp.
Van Sickle, A. W.	Onondaga	Onondaga
Wainfleet-Moulton Gas Co.	R.R. 1, Lowbanks	Moulton, Wainfleet Tp.
Walker, Thomas	R.R. 2, Caledonia	Onondaga Tp.
Wardell, Theo.	R.R. 5, Dunnville	Canboro Tp.
Weylie, Wm.	R.R. 2, Glanford Station	Glanford Tp.
MANITOBA—		
Haskill, E. C.	Treherne, Box 64	Treherne
ALBERTA—		
Alberta Clay Products Co., Ltd.	Box 672, Medicine Hat	Medicine Hat
Canada Cement Co. Ltd.	Canada Cement Co. Bldg., Montreal, Que.	Dauntless
Canadian Pacific Ry. Co.	Montreal, Que.	Medicine Hat
Canadian Western Natural Gas, Light, Heat & Power Co., Ltd.	215–6 th Ave. West, Calgary	Near Bow Island Near Barnwell, Near Dunmore, Near Brook, Near Calgary
Canadian Western Power and Fuel Co.	Redcliff	Redcliff
Dominion Glass Co., Ltd.	285 Beaver Hall Hill, Montreal, P.Q	Redcliff
Gas City Brick Co. Ltd.	Medicine Hat	Medicine Hat
Hedley Shaw Milling Co., Ltd.	Medicine Hat	Medicine Hat
Medicine Hat, Corporation of	Medicine Hat	Medicine Hat
Ogilvy Flour Mills Co. Ltd.	Montreal, Que.	Medicine Hat
Redcliffe Brick & Coal Co. Ltd.	Redcliff	Redcliff
Royalite Oil Co. Ltd.	239–6th Ave.	Turner Valley
Southern Alberta Gas Co., Ltd.	Box 677, Medicine Hat	Suffield
Town of Bow Island	Bow Island	Bow Island
Wetaskiwin, Corporation of	Wetaskiwin	Wetaskiwin
United Electric & Engineering Co. Ltd.	1721–11th St. West, Calgary	Bassano

The Peat Industry

Peat Committee (Federal-Ontario)	Mines Branch, Ottawa, Ont.	Alfred, Ont.

The Petroleum Industry

NEW BRUNSWICK—		
New Brunswick Oil and Gasfields, Ltd.	Box 196, Moncton	Stony Creek, Albert Co.
ONTARIO—		
Ajax Oil and Gas Company	509 Lumsden Bldg., Toronto	Raleigh Tp.
Anderson Bros. & Thompson	Oil Springs	Enniskillen Tp.
Anderson, J. H.	Oil Springs	"
Armstrong, J. G.	Petrolia	"
Atkinson, John	R.R. No. 3, Petrolia	Plympton Tp.
Bailey, John R.	R.R. No. 3, Petrolia	Moore Tp.
Balls, E. H.	R.R. No. 3, Petrolia	Sarnia Tp.
Banting, Albert E.	Wyoming	Plympton Tp.
Barrett, C. H.	Petrolia	Enniskillen Tp.
Bothwell Oil Co., Ltd.	120 Bay St., Toronto	Zone Tp.
Boges, M. J.	Petrolia	Enniskillen Tp.
Bowls, J. H.	R.R. No. 3, Petrolia	Sarnia Tp.
Braybrook, J. T.	R.R. No. 3, Petrolia	Enniskillen Tp.
Brock, Thos. A.	Petrolia	"
Brydges, Burt	Petrolia	"
Brydges, Ed. O.	R.R. No. 3, Petrolia	"
Canada Crude Oil Products Co.	Confederation Life Bldg., Toronto	"
Carleton, George	R.R. No. 2, Petrolia	"
Canadian Oil Co., Ltd.	707 Excelsior Life Bldg, Toronto	"
Canadian Oil Producing and Refining Co., Ltd.	Petrolia	"
Carman and Fairbank	Petrolia	Zone Tp.
Chester, George and Son	R.R. No. 3, Petrolia	Sarnia Tp.
Coulter, Jas.	Petrolia	Moore Tp

The Petroleum Industry—Continued

Name	Address	Location
ONTARIO—*Continued*—		
Crocker-Parks Oil Co., Ltd.	Oil Springs	Enniskillen Tp.
Crotty and Elliott	Bothwell	Zone Tp.
Darling, Arthur C.	Petrolia	Enniskillen Tp.
Dempsey, James	Petrolia	"
Dennis, H. S.	R.R. No. 3, Petrolia	Plympton Tp.
Donald, Geo.	Oil Springs	Enniskillen Tp.
Duncan Bros.	Petrolia	Moore Tp.
Edward, A. C., Estate	Petrolia	Enniskillen Tp.
Edward, F. H.	Petrolia	"
Elliott, Clarence H.	R.R. No. 3, Petrolia	Sarnia Tp.
Elliott, Henry C.	R.R. No. 3, Petrolia	Moore Tp.
Eureka Oil and Gas Co., Ltd.	37 Sun Life Bldg., Toronto	Raleigh Tp.
Fairbank, E. O.	Petrolia	Zone Tp.
Fairbank, J. H., Estate	R.R. No. 4, Petrolia	Enniskillen Tp.
Fowler, John H.	R.R. No. 4, Petrolia	"
Goodie, John	R.R. No. 3, Petrolia	"
Griffin, Geo.	R.R. No. 1, Sarnia	Sarnia Tp.
Hamlin, Mrs. Samuel	Box 259, Petrolia	Enniskillen Tp.
Heal, John	Corunna	Moore
Hillis, James T. and Sons	Oil Springs	Enniskillen Tp.
Hoskin, John	Sarnia	Sarnia Tp.
Houston, King, Estate of	382 Richmond St., London	Enniskillen Tp.
Howlett, Fred	Box 3, Petrolia	"
Hussey, W. J.	Petrolia	"
Jewell, Dan	Oil Springs	"
Jones, C. E.	Oil Springs	"
Johnson, Thos.	Petrolia	"
Josh, John	Petrolia	"
Kerr, John, Estate	Petrolia	"
Kerr, Mrs. Ross	Sarnia	"
Kirk, Elmer	R.R. No. 3, Petrolia	Moore Tp.
Kirk, John	R.R. No. 1, Sarnia	Sarnia Tp.
Lern, Chas.	Petrolia	Moore Tp.
Lewis, John J.	Oil Springs	Enniskillen Tp.
Logan, Herbert	R.R. No. 3, Petrolia	Sarnia Tp.
Logan, Leslie	Petrolia	"
Lucas, Ed.	Sarnia	"
McAlpine, T. A.	R.R. No. 3, Petrolia	Enniskillen Tp.
McCrie, William	R.R. No. 2, Sarnia	Sarnia Tp.
McDougall, D.	Petrolia	Enniskillen Tp.
McGillivray, Geo. A.	London	"
McKay, Jno.	Sarnia	Sarnia Tp.
McLellan, Jas.	R.R. No. 3, Petrolia	Mooore Tp.
McLellan, Peter	Corunna	Moore Tp.
McPhedran, John	R.R. No. 3, Petrolia	Enniskillen Tp.
McManus, Alex.	R.R. No. 1, Wyoming	Plympton Tp.
Maitland, Jas. B.	R.R. No. 2, Sarnia	Sarnia Tp.
Maw, Frank	R.R. No. 3, Petrolia	Enniskillen Tp.
Miller, Frank J.	R.R. No. 2, Sarnia	Sarnia, Tp.
Miller, S. M.	R.R. No. 3, Petrolia	Moore Tp.
Miller, W. W.	R.R. No. 3, Petrolia	"
Montgomery, Thos.	R.R. No. 3, Petrolia	Enniskillen Tp.
Morningstar, R. B. & L. H.	Oil Springs	"
Morris, Geo.	Petrolia	"
Mott, Edward J.	Oil Springs	"
Mutual Oil Producing Co.	Box 539, London	"
Napper, Fred	Petrolia	"
Neath, Arthur	Chatham	Raleigh Tp.
Onondaga Oil and Gas Ltd.	Room 8, Temple Bldg, Brantford	Onondaga Tp.
Ontario Lands and Oil Co., Ltd.	Petrolia	Enniskillen Tp.
Ontario Petroleum Co.	Glencoe	Mosa Tp.
Osborne Oil Producers, Ltd.	Box 700, Petrolia	Moore Tp.
Parks, E. M. & W. H.	R.R. 3, Petrolia	Enniskillen Tp.
Paul, John D.	R.R. No. 1, Wyoming	Plympton Tp.
Petrol Oil and Gas Co., Ltd.	804-6 Royal Bank Bldg., Toronto	Dover West Tp.
Porter, H. & G. S.	Petrolia	Mosa Tp.
Quillinan, J. F.	Imperial Bank Chambers, Niagara Falls	"
Rainsberry, Ed. L.	Petrolia	Sarnia Tp.
Rainsberry, Nicholas J.	R.R. No. 3, Petrolia	"
Rainsberry, Walter and Sons	Petrolia	Enniskillen Tp.
Rawson, Andrew and Sons	R.R. No. 3, Petrolia	"
Robinson, John	Box 91, Petrolia	"
Rowe, E. P.	292 Rushton Rd., Toronto	Zone Tp.
Rowe, Geo.	Corunna	Sarnia Tp.
Ruckle, Harry	Petrolia	"
Sanson, Mrs. Carrie	Petrolia	Enniskillen Tp.
Schumacher, Bowen W.	Room 1010, No. 112 West Adams St., Chicago, Ill.	"
Scott, Rodger	Petrolia	"
Smith, Thos.	R.R. No. 2, Sarnia	Sarnia Tp.
Sproule Bros.	Oil Springs	Enniskillen Tp.
Sproule and Johnston	Oil Springs	"
Stevens, N.	R.R. No. 3, Petrolia	Moore Tp.
Taylor, P. V. & Co.	1331 Lumber Exchange Bldg., Chicago, Ill.	Zone Tp.

The Petroleum Industry—Concluded

Name	Address	Location
ONTARIO—*Concluded*		
Walker Oil and Gas of Bothwell	129 Chatham St. W., Windsor	Zone Tp.
Wallen, Alex. C.	Oil Springs	Enniskillen Tp.
Wallen, John, Estate	Oil Springs	"
Wallen and Wallen Estate	Oil Springs	"
Walsh, Mrs. Thos	Petrolia	"
Warwick, Jos	Oil Springs	"
Watt, P. J.	River & View Aves., London	"
Wilson, James	R.R. No. 1, Sarnia	Sarnia Tp.
Winnett, J. W. G.	418½ Talbot St., London	Bothwell Tp.
Woodward, J.	Oil Springs	Enniskillen Tp.
Woodward, W.	Oil Springs	"
Yerks, Carleton	Petrolia	"
ALBERTA—		
Canada Southern Oil and Refining Company	Black Diamond	Okotoks Oil Field.
Sheep River Oil Company	406 Grain Exchange Bldg., Calgary	Turner Valley Oil Field.
Southern Alberta Oils, Ltd.	407 Grain Exchange Bldg., Calgary	" "

The Pyrites Industry

ONTARIO—		
Grasselli Chemical Co., Ltd.	Hamilton, Ont.	Blythefield Tp.
Nichols Chemical Co., Ltd.	Montreal, Que.	"Northpines Mine," Drayton Tp.
		"Sulphide Mine," Hungerford Tp.
BRITISH COLUMBIA—		
Consolidated Mining & Smelting Co. of Canada, Ltd.	Trail B.C.	"Sullivan Mine, Kimberley.
Granby Consolidated Mining, Smelting & Power Co., Ltd.	Anyox, B.C.	"Hidden Creek," near Anyox

The Quartz Industry

QUEBEC—		
Bonell, J.	Buckingham	Buckingham Tp.
Gorman, J. B.	Buckingham	Buckingham Tp.
O'Brien & Fowler	c.o. M. J. O'Brien, Ltd., Ottawa, Ont.	Derry Tp.
Pedneaud, G.	Glen Almond	Buckingham Tp.
Silico, Limited	103 St. Francois-Xavier, Montreal	Parish of St. Canut.
ONTARIO—		
Dominion Mines and Quarries, Ltd.	Canada Life Bldg., 46 King St. West, Toronto	District of Algoma. (East Neebish Quarry.)
Electro Metals, Ltd.	Welland	Killarney.
Mond Nickel Co., Ltd., The	Coniston	Neelon Tp.
Orser-Kraft Feldspar, Ltd.	Perth	Bathurst, Tp.
Wright & Co.	960 Queen St., Sault Ste. Marie	Deroche Tp.
BRITISH COLUMBIA—		
Granby Consolidated M. S. & P. Co., Ltd.	Anyox	Anyox.

The Salt Industry

NOVA SCOTIA—		
Chambers & MacKay	New Glasgow	Malagash, Cumberland Co.
ONTARIO—		
Brunner-Mond, Canada, Ltd.	Canada Bank of Commerce Bldg., Toronto	Amherstburg, Essex Co.
Canadian Salt Co., Ltd.	719 Sandwich St. W., Windsor	Windsor, Essex Co.
Exeter Salt Works, Co., Ltd.	Exeter	Exeter, Huron Co.
The Elarton Salt Work Co., Ltd.	Warwick	Watford, Lambton Co.
Western Canada Flour Mills Co., Ltd.	Goderich	Goderich, Huron Co.
The Wingham Salt Works	Wingham	Wingham, Huron Co.
The Western Salt Co., Ltd.	43 Victoria St., Toronto	Courtright, Lambton Co.
The Dominion Salt Co., Ltd.	412 N. Front St., Sarnia	N. Front St., Sarnia, Lambton Co.
The Goderich Salt Co., Ltd.	Goderich	Goderich, Huron Co.

The Sodium Carbonate Mining Industry

Name	Address	Location
Lillooet Soda Co., Ltd.	502 North West Bldg., Vancouver, B.C.	Lillooet.

The Sodium Sulphate Mining Industry

Bishopric and Lent Co.	Cincinnati, Ohio, U.S.A.	Frederick Lake, Sask.
Salts & Chemicals, Ltd.	44 Edward St., Kitchener, Ont.	Maskakee Lake, Sask.
Sodium Sulphate Co. of Saskatchewan, Ltd.	1753 Rose St., Regina, Sask.	Near Hardy, Sask.

The Talc Mining Industry

QUEBEC—		
Robertsonville Soapstone Quarry, Ltd.	Robertsonville	Thetford Tp.
ONTARIO—		
Asbestos Pulp Co., Ltd.	Belleville	"Connolly Mine," Huntingdon Tp.
Henderson Mines, Ltd.	Madoc	"Henderson Mine," Huntingdon Tp.
Gillespie Co., Ltd., Geo. H. (Mill)	Madoc	Plant at Madoc.
Wood, H. H.	Mine Centre	Mine Centre.
BRITISH COLUMBIA—		
Eagle Talc and Mining Co.	W. G. Dickinson, 627 Yates St., Victoria	Victoria Mining Division.
Canadian Talc and Silica Co.	734 Rogers Bldg., Vancouver.	

The Tripolite Mining Industry

Oxford Tripoli Co., Ltd.	Oxford, N.S.	Silica Lake, N.S..

STRUCTURAL MATERIALS AND CLAY PRODUCTS

The Cement Industry

Name	Address	Location
QUEBEC—		
Canada Cement Co., Ltd.	Canada Cement Co. Bldg., Montreal	East Montreal
		Hull
ONTARIO—		
Canada Cement Co., Ltd.	Canada Cement Co. Bldg., Montreal Que.	Belleville
		Port Colborne
Hanover Cement Co., Ltd.	Hanover	Hanover
St. Mary's Cement Co., Ltd.	49 Wellington St. E., Toronto	St. Mary's.
MANITOBA—		
Canada Cement Co., Ltd.	Canada Cement Co. Bldg., Montreal, Que.	Winnipeg
Commercial Cement Co., Ltd.	918 Union Bank Bldg., Winnipeg,	Babcock
ALBERTA—		
Canada Cement Co., Ltd.	Canada Cement Co. Bldg., Montreal, Que.	Exshaw
Marlboro Cement Co.	21 Dominion Bank Chambers, Edmonton	Marlboro
BRITISH COLUMBIA—		
British Columbia Cement Co., Ltd.	305 Belmont Bldg., Victoria	Bamberton

The Clay Products Industry—Brick and Tile

Name	Address	Location
NOVA SCOTIA—		
Brooks, Geo.	New Glasgow	Plymouth
Brooks, Stephen, and Sons	Box, 559, New Glasgow	New Glasgow.
Miller, Jas. B.	Elmsdale	Barney's Brook
Nova Scotia Clay Works, Ltd	Elmsdale	Lantz Siding
Shaw, Ltd., L. E.	Avonport	Avonport
PRINCE EDWARD ISLAND—		
Prince Edward Island Brick and Tile Company	Summerside	Richmond
NEW BRUNSWICK—		
Loggie Co., Ltd., W. S.	Chatham	Nelson
Mooney and Sons, Ltd.	112 Queen St., St. John	Fairville
Northampton Brick Co., Ltd.	Woodstock	Northampton
Ryan and Sons, M.	Box 575, Fredericton	Fredericton, Woodstock Rd.
Tondreau, Jos. A.	Box 223, Bathurst	Bathurst
QUEBEC—		
Alex. Mills Brick Co., The	Crinstown	Ormstown
Ascot Tile and Brick Co., Ltd.	Ascot Corner, Sherbrooke	Ascot Corner, Sherbrooke
Bell, W. and D.	1286 St. Valier St., Quebec	Little River Rd., Que.
Citadel Brick and Paving Block Company, Ltd.	421 St. Paul St., Quebec	Montmorency, Boischatel Co.
Granby Clay Products, Ltd.	P.O. Box 266, Granby	Granby Tp.
George, Emile	St. Felix de Valois	St. Felix de Valois
Hodgins, David G.	Box 148, Shawville	Shawville
Laliberte, L.	Deschaillons	Deschaillons
La Cie de Briques de l'Abitibi	Amos	Amos
La Cie de Briques de l'Islet	L'Islet	L'Islet Station
La Cie de Briques de Matane	Matane	Matane
La Cie de Briques St. Laurent, Ltd.	71 St. James St., Montreal	Laprairie
La Cie de Tuyaux de Drainage, Ltée.	L'Islet Station	L'Islet Station
L'Industrielle de St. Tite, Ltée.	St. Tite	St. Tite
Laliberte, E.	Deschaillons	Deschaillons
National Brick Co. of Laprairie, Ltd.	511 St. Catherine St. W., Montreal	Delson and Laprairie
Proulx Bros.	P.O. Box 384, Richmond	Richmond
ONTARIO—		
Alvinston Brick & Tile Co., Ltd.	Alvinston	Alvinston
Armstrong Bros.	Fletcher	Fletcher
Atlas Brick Co., Ltd.	30 Toronto St., Toronto	Milton Heights
Baird, H. C. and Son	Park Hill	Park Hill
Bechtel Reid Co.	148 Essex St., Waterloo	Waterloo
Bay of Quinte Brick Works	Belleville	Belleville
Bennet, Robert	Dunnville, Box 21	Dunnville
Bond and Bird	Woodstock, R.R. No. 5	Woodstock
Booth Brick & Lumber Co., The	New Toronto	Etobicoke
Brampton Pressed Brick Co.	Brampton	Brampton
Broadwell, B., and Son	Kingsville	(Near) Kingsville
Brownscombe, H. & Sons	Box 47, Cargill	Cargill.
Campbell, Neil F.	R.R. No. 1, West Lorne	West Lorne.
Canadian Pressed Brick Co., Ltd.	Rm. 36, Sun Life Bldg., Hamilton	Bartonville.
Chapman, John	Napanee	Napanee.
Cheeseman, Peter	670 King St.W., Hamilton	Hamilton.
Cooksville Shale Brick Co., Ltd.	20 Queen St. E., Toronto	Cooksville.
Cooper, W. H.	104 Clyde Bldg., Hamilton	Hamilton.
Cornhill, James & Sons, Ltd.	Grand Ave. E., Chatham	Chatham.
Crang, Jethro	202 Oakwood Ave., Toronto	Toronto.
Crawford Bros.	451 King St. W., Hamilton	Hamilton.
Curtin, Frank	R.R. No. 4, Lindsay	Lindsay.
Curtis Bros.	Peterboro	Peterboro.
Dalton, Maurice	R.R. No. 3, Dresden	Dresden.
DeLaplante, J. E.	Dawes Rd., Coleman P.O., Toronto	Dawes Road.
Deller Bros.	R.R. No. 2, Norwich	(Near) Norwich.
Dockhart Brick & Tile Works	Arnprior	Arnprior.
Dolan, John	R.R. No. 2, Watford	Warwick.
Dominion Sewer Pipe and Clay Industries, Ltd.	Swansea	Aldershot.
Don Valley Brick Works	714 Dominion Bank Bldg., Toronto	Todmorden.
Dublin Brick & Tile Yard	Dublin	Dublin S.
Elliott, Charles	Bluevale	Bluevale.
Elliott, Wm.	Glenannan P.O.	Glenannan.
Elliott, James, Jr.	519 Wellington St., Sault Ste. Marie	E. Korah Tp.
Erie Clay Products, Co.	Port Dover	Port Dover.
Foreman, Stephen	R.R. No. 5, St. Mary's	St. Mary's.
Fort William Brick & Tile Co.	Fort William	W. Fort William.
Fox, Geo. J.	Box 243, Dresden	Dresden.
Fraser, Charles & Leith	Blyth	Blyth.
Frid Brick Co., Geo.	Main St. W., Hamilton	Hamilton.
Frid Bros.	Macklin St. & Dundas Road, Hamilton	Hamilton.
Frontenac Floor and Wall Tile Co., Ltd.	Box 214, Kingston	Kingston.
Gardiner, Wm.	Blenheim	Blenheim.
Godfrey, Thomas & Co.	Carleton Place	Carleton Place.
Grigg, Wm.	Thedford	Thedford.
Haines, W. H. J.	58 Wellington St., Toronto	Tamworth.
Hallatt, Herbert & Son	Box 93, Comber	Comber.
Hallatt, Wm. S.	Merlin	Merlin.

The Clay Products Industry—Brick and Tile—Continued

Name	Address	Location
ONTARIO—*Continued.*		
Halton Brick Co.	28 Symes Rd., Toronto	(Near) Terra Cotta.
Hamilton Pressed Brick Co.	Kensington Ave. S., Hamilton	Hamilton.
Hill, A. W.	R. R. No. 1, Coatsworth	Stevenson.
Hill, James S. & Son	Box 124, Madoc	Madoc.
Hill, Araon	Essex	Essex.
Hinde Bros.	134 Northlands Ave., West Toronto	West Toronto.
Hiroock Bros. & Co.	Bowmanville	Bowmanville.
Hitch, D. A.	Erie St. N., Ridgetown	Ridgetown.
Hitch, Thos.	1st Ave., Box 254, St. Thomas	St. Thomas.
Hodder, J. H.	Dutton	Dutton
Holland, Wm. and Son	Box 20, Ruscomb	Ruscomb.
Howlett, Fred.	Box 3, Petrolia	Petrolia.
Interprovincial Brick Co. of Canada, Ltd.	30 Toronto St., Toronto	Cheltenham.
Jackson Bros.	290 Rawdon St., Brantford	Brantford.
Janes, D. A.	R.R. No. 1, Mt. Brydges	Mt. Brydges.
Jamieson Lime Co.	Renfrew	Renfrew.
Jasperson B. Brick & Tile Yards	Kingsville	Coatsworth.
Jervis, John	Dorchester Station	Dorchester Station.
Johnson, James, Sr.	R. R. No. 3, Pembroke	Pembroke.
*Kerr, Frederick	Crediton	Crediton E.
Kerr and Pettman	Goderich	Ben Miller.
Koebel, Joseph Z.	St. Clements	St. Clements.
Kruse Bros.	Seaforth	Tuckersmith.
Kuhn, Henry J.	Centralia	Crediton E.
Labey and Son	Foxboro	Foxboro
Lindsay, Earl	R.R. No. 2, Wallaceburg	Tupperville.
Lisbon Brick & Tile Yard	R.R. No. 1, Wellesley	Lisbon.
Lowes, Gordon	R.R. No. 3, Chatham	Chatham East.
McCoomb, Chester	Denfield	Elginfield.
McCormick Bros.	R.R. No. 5, Watford	Kingsford Junction.
McCrie, T. J.	Kincardine	Kincardine.
McGregor & Cammage	R.R. No. 2, Dresden	Dresden.
McIvor Bros.	Division St., Cobourg	Cobourg.
McMahon, Robert	R.R. No. 2, Kerwood	Strathroy.
Mackay Bros.	Dutton	Dutton.
Martin, David, Estate	Thamesville	Thamesville.
Merkleys, Ltd.	9 Fraser Bldg., Ottawa	Billings Bridge.
Middleton, C.	Wyoming	Wyoming.
Midland and Penetanguishine Brick Works	Box 143, Penetanguishine	Penetanguishine.
Milton Pressed Brick Co., The	Milton	Milton and Streetsville.
*Miner, M. F.	Kingsville	Kingsville.
Missouri Tile Yard (W. H. Deller)	Thorndale, R.R. No. 4	Thorndale.
Moscow Brick and Tile Works	R.R. No. 1, Greenock	Riverdale.
National Fire Proofing Co.	601 Dominion Bank Bldg, Toronto	Waterdown
New, Edward	133 George St., Hamilton	Hamilton.
O'Dell Bros.	R.R. No. 1, Ingersoll	Ingersoll.
Ollmna Bros.	Macklin St., Box 241, Hamilton	Hamilton.
Ontario Paving Brick Co., Ltd.	Weston Rd. South, West Toronto	S. Toronto.
O'Reilly, T. E.	320 Bay St., Ottawa	Hogs Back.
Ottawa Brick Mfg. Co., Ltd., The	53 Queen St., Ottawa	Hogs Back.
Ott Brick & Tile Mfg. Co., Ltd., The	21 King St. E., Kitchener	Kitchener.
Owen Sound Brick Co., Ltd., The	859-2nd Ave. E., Owen Sound	Owen Sound.
Parks, Henry W.	Box 477, Dresden	Dresden.
Paxton & Bray	230 Queenston St., St. Catharines	St. Catharines.
Pears, James and Son	200 Eglinton Ave. W., Toronto	Toronto.
Pembroke Brick Co., The	Pembroke	Pembroke.
Phillips, Thomas & Son	R.R. No. 2, Lucknow	St. Helens.
Phinn Bros.	238 Briscoe St., London	London.
Phippen & Field	150 Dawes Rd., Toronto	Toronto.
Piggott, C. E., & Co.	20 Guestville Ave., Mt. Dennis	Mount Dennis.
Port Credit Brick Co., Ltd., The	Port Credit	Port Credit.
Port Rowan Brick & Tile Co.	Port Rowan	Port Rowan.
Price and Cumming	Salisbury Ave., Humber Bay	Humber Bay.
Price, John, Ltd.	395 Greenwood Ave., Toronto	Toronto.
Price and Smith	458 Greenwood Ave., Toronto	Toronto.
Provincial Brick Plant	Parliament Bldg., Toronto	Mimico.
Red Star Brick & Tile Yard (W.H. Barnhardt)	Stratford	Stratford.
Richardson, Jas. & Son	Kerrwood	Kerrwood.
Reid, Jas.	R.R. No. 3, Belmont	South Dorchester.
Russell, Jos.	40 Blake St., Toronto E.	Toronto E.
Russell Shale Brick Ltd.	100 Standard Bank Bldg., Ottawa	Russell.
St. Joseph Brick & Tile Yard	Zurich	Zurich.
Shale Products Ltd.	Inglewood	Inglewood.
Smith, Alex. & Son	R. R. No. 2, Dutton	Dutton.
Snelgrove, A.	Beaverton	Beaverton.
Sproat, Wm. M.	R.R. No. 4, Seaforth	Seaforth.
Standard Brick Co., Ltd., The	363 Broadview Ave., Toronto	Toronto.
Steele, Edwin	Vankleek Hill	Vankleek Hill.
Stevens Bros. (Huntsville Brick Co.)	Box 308, Huntsville	Huntsville.
Staples Brick & Tile Co.	Staples	Staples.
Streetsville Brick Co., Ltd., The	Streetsville	Streetsville.
Stroh, M. C.	Conestogo	Conestogo.
Sun Brick Co., Ltd.	32 Toronto St., Toronto	Todmurden.
Superior Tile Co., Ltd.	426 Victoria Ave., Fort William	Slate River.
Tilbury Brick & Tile Co.	Tilbury	Tilbury.
Tope, Richard, Estate	171 Queen St., S., Hamilton	Hamilton.

The Clay Products Industry—Brick and Tile—Concluded

Name	Address	Location
ONTARIO—*Concluded.*		
Toronto Brick Co., Ltd.	60 Victoria St., Toronto	Milton.
Tweed Brick & Tile Works	Tweed	Tweed.
Wagstaff, Charles	R.R. No. 4, Lindsay	Lindsay.
Wagstaff, A. H. & Co.	336 Greenwood Ave., Toronto	Toronto.
Waite, John E.	Foresters Falls	Foresters Falls.
Wallace R. & Sons	Box 305, North Bay	North Bay.
Warwick Brick Works	647 Grosvenor St., London	London.
Watson Brick Co.	Crediton	Crediton.
Whitby Brick & Clay Products Co., Ltd.	Whitby	Whitby.
Wilson, S. & Sons	R.R. No. 2, Paisley	Lovet.
Winch Bros.	Paisley	Paisley.
Windsor Brick & Tile Co.	201 Exchange Bldg., Windsor	(Near) Kingsville.
Woodslee Brick & Tile Yards	South Woodslee	Woodslee.
Wright, John C.	Proton Station	Proton.
Wright, Geo. & Sons	Comber	Comber.
MANITOBA—		
Alsip Brick, Tile & Lumber Co., Ltd.	200 Tribune Bldg., Winnipeg	Winnipeg.
Balmoral Brick Co., Ltd.	214 Avenue Bldg., Winnipeg	Balmoral.
McArthur, J. D. Company, Ltd.	1003 McArthur Bldg., Winnipeg	Lac du Bonnet.
Marion, Joseph A.	Box 30, St. Boniface	Plinguet St., St. Boniface.
Sidney Brick & Clay Works, Ltd.	Sidney	Sidney.
Snyder, A. & Company, Ltd.	Box 1401, Portage la Prairie	Portage la Prairie.
SASKATCHEWAN—		
Bruno Clay Works, Ltd.	Bruno	(Near) Bruno.
Christian Community of Universal Brotherhood, Ltd., The	Box 122, Verigin, Sask.	Yorkton.
Dominion Fire Brick and Clay Products, Ltd., The	Box 99, Moosejaw	Claybank, Sask.
Elliott, W. H. & Son	1320-3rd Ave. N., Saskatoon	N. Saskatoon.
Estevan Coal and Brick Co., Ltd., The	Estevan	Estevan.
Meota Brick Co.	Meota	Meota.
Saskatchewan Penitentiary	Prince Albert, Sask.	Penitentiary, Prince Albert.
Shand Coal and Brick Co.	Shand	Shand.
ALBERTA—		
Acme Brick Co., Ltd., The	125 Alberta Block, Edmonton	Canada.
Alberta Brick Co., Ltd.	10936-123rd St., Edmonton	Canada.
Bruce, John	Commerce	Lethbridge.
Canada Cement Co., Ltd.	Canada Cement Co. Bldg., Phillips Sq., Montreal, Que.	Sandstone.
Collins, Peter	307-15th Ave. W., Calgary	Cochrane.
Cranbell Pressed Brick & Sandstone Co.	607 McLean Block, Calgary	Brickburn.
Gas City Brick Co., Ltd.	Box 650, Medicine Hat	Medicine Hat.
Little, J. B. & Sons	Water St., Riverdale, Edmonton	Water St., Riverdale.
Redcliff Brick and Coal Co., Ltd.	Box B. 5, Redcliff	Redcliff.
Redcliff Pressed Brick Co., Ltd.	Box 87, Redcliff	Redcliff.
Redcliff Premier Brick Co., Ltd.	Box C 2, Redcliff	Redcliff.
Zuchkam, Mike	Box 11, Smoky Lake	Smoky Lake.
BRITISH COLUMBIA—		
Armstrong Brick Works	Armstrong	Armstrong.
Bazan Bay Brick & Tile Co.	Bazan Bay N. Saanich, Vancouver Island	Bazan Bay.
Christian Community of Universal Brotherhood, Ltd., The	Brilliant	Grand Forks. Kilgard.
Clayburn Co., Ltd.	304 Credit Foncier Bldg., Vancouver	Clayburn.
Enderby Brick Co., Ltd.	Enderby	Enderby.
Gabriola Shale Products Ltd.	104 Moodie Blk., Victoria	Gabriola Is.
Humber Brick Co.	740 Topaz Ave., Victoria	Victoria.
Johnstone & Co., Ltd.	Kamloops	Near Kamloops.
Port Haney Brick Co., Ltd., The	846 Howe St., Vancouver	Port Haney.
Victoria Brick Co., Ltd.	Douglas St., Victoria	Victoria.

The Clay Products Industry—Clay Sewer Pipe

NOVA SCOTIA—		
Dominion Iron and Steel Co., Ltd.	Sydney	Sydney
Standard Clay Products, Ltd.	New Glasgow	New Glasgow.
QUEBEC—		
Standard Clay Products, Ltd.	St. John's	St. John's.
ONTARIO—		
Dominion Sewer Pipe and Clay Industries, Ltd.	Swansea	Swansea.
Hamilton and Toronto Sewer Pipe Co., Ltd., The	Wentworth St. N., Hamilton	Hamilton.
Ontario Sewer Pipe and Clay Products, Ltd.	Mimico	Mimico.

The Clay Products Industry—Firebrick and Fireclay

Name	Address	Location
NOVA SCOTIA—		
Dominion Iron and Steel Co., Ltd.	Sydney	Sydney
Intercolonial Coal Mining Co., Ltd.	Westville	Westville.
QUEBEC—		
Canada Firebrick Co., Ltd.	371 Aqueduct St., Montreal	Montreal.
*Montreal Terra Cotta Co., Ltd.	511 St. Catharines St. West, Montreal	Lakeside.
ONTARIO—		
Algoma Steel Corporation Ltd.	Sault Ste. Marie	Sault Ste. Marie
*Bailey, Geo., & Co.	321 Albany St., Toronto	Toronto.
National Fire Proofing Co. of Canada, Ltd.	601 Dominion Bank Bldg., Toronto.	Aldershot.
ALBERTA—		
Alberta Clay Products, Ltd.	Box 672, Medicine Hat	Medicine Hat.

The Clay Products Industry—Kaolin and other Clays

NOVA SCOTIA—		
Nova Scotia Steel and Coal Co., Ltd.	Sydney	Shubenacadie.
QUEBEC—		
Canadian China Clay Co., Ltd.	Room 37-43 Victoria St., Toronto.	Amherst-Labelle Co.

The Clay Products Industry—Stoneware and Pottery

NEW BRUNSWICK—		
Foley Pottery, Ltd.	St. John	St. John.
QUEBEC—		
*Canadian Potteries, Ltd.	2 Longueuil St., St. John's	St. John's.
*Canada Stoneware Works	Iberville	Iberville.
*Dominion Sanitary Pottery Co., Ltd.	189 St. James St., St. John's	St. John's.
ONTARIO—		
*Campbells Sons, B.	100 Locke St., S., Hamilton	Hamilton.
*Canadian General Electric Co.	212 King St. West, Toronto	Peterborough.
*Canadian Porcelain Co., Ltd.	Paradise Rd., Hamilton	Hamilton.
Dawes, John and Sons	1967 Yonge St., Toronto	Toronto.
Foster Pottery Co.	Main St. W., Hamilton	Hamilton.
ALBERTA—		
Canadn Pottery, Ltd.	Medicine Hat	Medicine Hat.
Medalta Stoneware, Ltd.	Medicine Hat	Medicine Hat.

*Imported clays only.

The Lime Industry

NEW BRUNSWICK—		
Peters, C. H. & Sons, Ltd.	Ward St., St. John	Torryborn.
Provincial Lime Co., Ltd.	Box 968, St. John	Lawlor's Lake.
Purdy and Green	323 Main St., St. John	St. John.
Randolph and Baker, Ltd.	Randolph	Randolph.
Setson, Cutler & Co., Ltd.	Campbellton	Indiantown, St. John.
QUEBEC—		
Armand and Beaudry	Joliette	Joliette.
Baron, Adolphe	St. Dominique de Bagot	St. Dominique de Bagot.
Beauregard, Delphis	North Stukely	North Stukely.
Boivin, Arthur	Pont Rouge	Pont Rouge.
Canada Cement Co., Ltd.	Montreal	Plant No. 3, Hull.
Carswell, Robt. B.	Bryson	Bryson.
Desilets, Achille	St. Louis de Champlain	St. Louis de Champlain.
Dominion Lime Co., The	Box 149, Sherbrooke	Lime Ridge.
Laurentian Stone Co., Ltd.	250 Catherine St., Ottawa, Ont.	Hull.
Limoges, Olivier, Estate of	40 rue Pouport, Montreal	Montreal.
McCambley, Thos.	Kazubazua	Kazubazua.
Montreal Lime Co.	31 Prenouveau St., Montreal	Montreal.
St. Vincent de Paul Penitentiary	Dept. of Justice, Ottawa, Ont.	St. Vincent de Paul Penitentiary.
Sanche, Placide	St. Therese de Blainville	St. Therese de Blainville.
Sovereign Lime Works, Ltd.	Deborimier Ave., and C.P.R. Tracks, Montreal	Montreal.
Standard Lime Co., Ltd.	Joliette	St. Marc des Carriers. St. Paul de Joliette, Que.
ONTARIO—		
Alabastine Co., Ltd., The	Paris	Elorn. Teeswater.
American Cyanamid Co.	511-5th Ave., New York City	Niagara Falls.
Beachville White Lime Co., Ltd.	Beachville	Beachville.
Bergin, Pat	Napanee	North Fredericksburg.
Brunner-Mond (Canada), Ltd.	Canadian Bank of Commerce Bldg., Toronto	Anderdon Township.
Biederman, Albert G.	R.R. No. 1, Golden Lake	Golden Lake.
Cameron, W. M.	Carleton Place	Carleton Place
Canada Lime Co., Ltd.	177 Kent St., Lindsay	Coboconk, Victoria Co.

The Lime Industry—Concluded

Name	Address	Location
ONTARIO—*Concluded*		
Chalmers Lime Works	689 Seventh St. West, Owen Sound	Owen Sound.
Christie Henderson & Co., Ltd	201 Crown Office Bldg., Toronto	Hespeler.
		Kelso and Puslinch.
Dominion Sugar Co., Ltd	Chatham	Chatham.
		Wallaceburg.
		Kitchener.
Flieler, Ed	Fernleigh	Fernleigh.
Gallagher Lime and Stone Co	James Street, Hamilton	Hamilton.
Harvey, Ltd., E	328 Woolwich St., Guelph	Rockwood.
Jamieson, J. M	Forresters Falls	Forresters Falls.
Jamieson Lime Co	Hall St., Renfrew	Renfrew.
Marshall, James	Hamilton	Hamilton
O'Donohue, Michael	Rear Street, Campbellford	Seymour Tp.
Parks Bros	Troy	Troy.
Robertson Co., Ltd., D	201 Crown Office Bldg., 26 Queen St. East, Toronto	Nassagaweya Tp.
Smith, John	R.R. No. 3, Kincardine	Kincardine.
Standard White Lime Co., Ltd	Douglas St., Guelph	Beachville.
		Guelph.
Standard Chemical Co., Ltd	906 Drummond Bldg., Montreal, Que	Eganville.
Toronto Brick Co., Ltd	60 Victoria St., Toronto	Coboconk.
Toronto Lime Co., Ltd	26 Queen St., Toronto	Dolly Varden.
Vogan, Samuel	Gould St., Wiarton	Wiarton.
Weppler, Henry	R.R. No. 2, Priceville	Priceville.
MANITOBA—		
Bowman, D., Coal and Supply Co., Ltd	461 Main St., Winnipeg	Oak Point.
Gillis Quarries, Ltd	Spruce and Richard Sts., Winnipeg	Gorson.
Moosehorn Lime Co., Ltd., The	214 Avenue Bldg., Winnipeg	Moosehorn.
Winnipeg Supply and Fuel Co., Ltd	214 Avenue Bldg., Winnipeg	Stonewall.
ALBERTA—		
Frank Lime Co., Ltd	214 Avenue Bldg., Winnipeg, Man	Frank.
Locher Lime Co., Ltd	Kananaskis, Alta	Kananaskis.
Summit Lime Works	803-6th Avenue S., Lethbridge	14 miles east of Crows Nest.
BRITISH COLUMBIA—		
Hedley Gold Mining Co., Ltd	Hedley	Hedley.
Pacific Lime Co., Ltd	602 Pacific Bldg., Vancouver	Blubber Bay, Texada Island
Rosedale Lime Co	602 Pacific Bldg., Vancouver	Esquimalt Harbour.

The Stone Quarrying Industry—Granite

NOVA SCOTIA—		
Fairview Crushed Stone Co., Ltd	Roy Bldg., Halifax	Fairview.
Hoyt, C. M	Middleton	Nictaux W.
Nova Scotia Supply Co., Ltd	603 Barrington St., Halifax	Halifax.
Rice, Elmer	Laurencetown	Nictaux W.
Rice, W. D	Bear River	"
NEW BRUNSWICK—		
Granite Street Pavement and Construction Co., Ltd	Evandale	Hampstead.
McGrattan, Henry and Sons	St. George	St. George.
Keating, Epps, Company, Ltd	St. George	"
Milne and Coutts & Co., Ltd	St. George	"
Mooney, B. and Sons, Ltd	112 Queens St., St. John	Queens County.
O'Brien and Baldwin	St. George	St. George.
Public Works, Department of	St. John	St. John.
QUEBEC—		
Bernier, Auguste	Roberval	Roberval.
Bertrand, Louis	41-4th St. Shawinigan Falls	Almaville.
Brodie's Limited	128 Bleury St., Montreal	Guenette, Mt. Johnson, Graniteville.
Brunet, Joseph	663 Cote des Neiges Rd., Montreal	Chatham Tp.
Dumas and Frere	Riviere à Pierre	Riviere à Pierre.
Duncan, Wm	Graniteville	Household.
La Carriere Buissière, Limitée	St. Sebastien	St. Sebastien.
Lacasse, J. C	Beebe	Beebe.
La Cie du Granit de Charlesbourg, Limitée	St. Pierre de Charlesbourg	St. Pierre de Charlesbourg.
Norton, S. B	Beebe	Beebe.
Rogers, Thomas	1701 Iberville St., Montreal	Montreal.
Scotstown Granite Corporation	Scotstown	Scotstown.
Stanstead Granite Quarries Co., Ltd	Beebe	Graniteville.
Tilton, Melvin	Beebe	Stanstead Tp.
Wright-Bullock	Beebe	Graniteville.
Voyer, F., and Frère	Riviere à Pierre	Riviere à Pierre.
ONTARIO—		
Abrams, J. M	Gananoque	Gananoque.
Bruce Mines Trap Rock Co., Ltd	Sault Ste. Marie, Mich	Bruce Mines.
Brown, A. C	Lyndhurst	Leeds Tp.
Campbell and Lattimore	Canadian Pacific Railway Bldg., Toronto	Findlay.
Corporation of City of Fort William	City Hall, Fort William	Fort William.
Gordon, D	Gananoque	Leeds Co.
Horne, Wm	31 Rothesay Apt., Winnipeg, Man	Butler.
Mond Nickel Co., Ltd	Coniston	Drury and Lavack Tps.
Morrison Bros	Bancroft	Wollaston.
Ontario Rock Co., Ltd	410 Crown Office Bldg., Toronto	Belmont Tp.

The Stone Quarrying Industry—Granite—Concluded

Name	Address	Location
ONTARIO—*Concluded*		
Reece-Hall, R.	Parry Sound	McDougall Tp.
Streets and O'Brien	47 Yonge St., Toronto	Gananoque.
BRITISH COLUMBIA—		
Campbell and Ritchie	507 Front St., Nelson	Nelson.
Canadian Pacific Railway Company	Montreal, Que	Mountain Sub-division.
Coast Quarries, Limited	837 Hasting St., Vancouver	Granite Falls.
Gilley Brothers, Ltd	902 Columbia St. W., New Westminster	Coquitlam Municipality.
Granite Island Quarries, Ltd	7th Avenue and Main St., Vancouver	Granite Island.
Nelson, City of	Box 1028, Nelson	Nelson.
Vancouver Granite Co., Ltd	815 Bower Bldg., Vancouver	Nelson Island and Gabriola.
Vernon Granite and Marble Company	Box 289, Vernon	Yale Dist.

The Stone Quarrying Industry—Limestone

NOVA SCOTIA—		
Eastern Lime Co.	Windsor	Windsor.
Nairn, John S.	24 Whitney Ave., Sydney	Scotch Lake.
Nova Scotia Steel & Coal Co., Ltd.	Sydney, C.B.	Pt.Edward,C.B.and Orangedale.
QUEBEC—		
Canada Carbide Co., Ltd.	Power Bldg., Craig St.W., Montreal	Bedford.
Canada Cement Company	Montreal	Hull.
Cousineau, Alderic	848 rue du Rosaire, Montreal	Montreal.
Doguire Quarry Company	Suite 2, 207 St. James St., Montreal	St. Laurent.
DeLorimier Quarry Company	1952 Iberville St., Montreal	Montreal.
Deraiche, Frank	L'Anse à la Barbe	Gaspe.
Deschambault Quarry Corporation	52 rue St. Paul, Quebec	St. Marc (Portneuf).
Deschambault Stone Co., Ltd.	St. Marc des Carrieres	St. Marc des Carrieres.
Dessault, Art.	St. Marc des Carrieres	"
Dessault, A. W. & Co.	Mt. Laurier	Mt. Laurier.
Garmon, Martin	3595 rue St. Herbert, Montreal	Montreal.
Gravel, Ed. L.	Chateau Richer	Chateau Richer.
Institution des Sourds, Muets.	3600 rue St. Laurent, Montreal	St. Laurent.
Kennedy Const. Co., Ltd.	310 Shaughnessy Bldg., Montreal	St. Francois de Sales.
Lapierre, J. O.	830 Des Carrieres, Montreal	St. Vincent de Paul.
Lapointe, Jos.	74 Montée St. Laurent, Montreal	St. Laurent.
Lapointe, Elzear	St. Dominique	St. Dominique.
Laurentian Stone Co., Ltd.	Ottawa	Hull.
Lecrenier, Victor	Cap St. Martin	Cap St. Martin.
Mahaney and Rich.	88 Bank St., Ottawa	Merivale Rd.
Maissonneuve Quarry Co., Ltd.	2855 Rosemont Blvd., Montreal	Montreal.
Martineau, O., & Son, Ltd.	371 Marie Anne Est., Montreal	St. Marc (Portneuf).
Montreal Crushed Stone Co., Ltd.	590 Union Ave., Montreal	St. Vincent de Paul.
Montreal Quarry Ltd.	800 Belle Classe St., Montreal	Central Park, Montreal.
Naud, Jos. D.	St. Marc des Carrieres	St. Marc des Carrieres.
O'Connor Bros.	Huntingdon	Huntingdon.
Penitentiary, Dept. of Justice, St. Vincent de Paul Penitentiary	Ottawa	St. Vincent de Paul.
Quinlan Cut Stone, Ltd.	4414 St. Catherine St., Westmount	Montreal.
Roberge Carriere, Ltd.	Chateau Richer	Chateau Richer
St. Laurent Quarry, Limited	Cap St. Martin	Cap St. Martin.
Tremblay, Nap.	Joffre Ave., Hull	Hull.
Verreault, Elzear	191 rue du Pont, Quebec	Giffard.
Villeroy, The, Quarry Co., Ltd.	848 du Rosaire St., Montreal	Montreal.
ONTARIO—		
Belton, Peter	St. Catharines	Grantham.
Bergin, Pat.	Napanee	Napanee.
Britnell & Co., Ltd.	Rear C.P.R. Yonge St. Station, Toronto	Burnt River.
Brunner Mond Canada Ltd.	Canadian Bank of Commerce Bldg., Toronto	Anderdon Tp.
Cayuga Stone Company	21 Central Chambers, Ottawa	North Cayuga.
Caldwell Bros.	Limehank	Gloucester Tp.
Canada Crushed Stone Corporation, Ltd.	Dundas	West Flamboro Tp.
Carleton, County of.	No. 71½ Sparks St., Ottawa	Osgoode-Gloucester-Nepean.
Cook & Son, J. S.	Wiarton	Amabel Tp.
Crushed Stone, Ltd.	47 Yonge St., Toronto	Kirkfield.
Crystalline Milling Company	120 Bank St., Toronto	Herschell.
Farmer, Geo. & Sons	450 Bertrand Ave.	Osgoode Tp.
Farr, L. G.	Haileybury	Haileybury.
Foster, R. R.	278 Echo Drive, Ottawa	City View.
Gallagher Lime & Stone Co.	James St., Hamilton	Barton Tp.
Gavard, L. H.	12 Delorimier St., Hull	Gloucester Tp.
Gosselin, Chas.	Quarries	"
Gow, James	Fergus	Fergus.
Hagersville Contracting Co., Ltd.	Hagersville	Walpole Tp.
Hagersville Crushed Stone Co.	Hagersville	Oneida Tp.
Hagersville Quarries, Ltd.	4 Flora St., St. Thomas	Walpole Tp.
Haldimand County Good Roads System	Hagersville	Rainham & Walpole Tp.
Hanover Cement & Stone Co.	157 Bay St., Toronto	Walkerton.
Halliday, Fred.	297 Booth St., Ottawa	Gloucester Tp.
Hildreth, Chas.	R. R. No. 4, Hamilton	Barton Tp.
Innerkip Stone Quarry	Innerkip	Innerkip.

The Stone Quarrying Industry—Limestone—Concluded

Name	Address	Location
ONTARIO—*Concluded*		
Kingston Penitentiary	Portsmouth	Portsmouth.
Kirby, T. Sidney Co., Ltd	213 Sussex St., Ottawa	Gloucester Tp.
Lally, M	Smithville	South Grimsby.
Law Construction Co., Ltd., The	107 Hillsdale Ave., Toronto	Bertie Tp.
Lincoln County of, Rd. Department	St. Catharines	North Grimsby.
Longford Quarry Co., Ltd	Longford Mills	Rama Tp.
MacDonald, A. G	Bronte	.....
MacDonald, A. N	Bronte	.....
Markus, Wm., Ltd	Pembroke	Pembroke Tp.
Marshall, Jas	Hamilton	Barton Tp.
McNeely, D. R	Carleton Place	Carleton Place.
Mills, Jas	Napanee	Napanee.
Oliver Rogers Stone Co., Ltd	841 Fourth Ave. E., Owen Sound	Owen Sound.
Ontario Hydro Electric Commission	Toronto	Walkerton.
Ontario Reformatory Industries	Parliament Bldgs., Toronto	Guelph Tp.
Ontario Stone Corporation, Ltd	611 Excelsior Life Bldg., Toronto	Whitoff.
Ottawa Improvement Commission	53 Queen St., Ottawa	Ottawa.
Perkins, Geo. A	830-6th Ave. W., Owen Sound	Owen Sound (West Hill).
Pichard, L	Bronte	.....
Pt. Anne Quarries, Ltd	Ft. of Jarvis St., Toronto	Thurlow Tp.
Public Highways, Dept. of	Toronto	.....
Robertson, D. & Co	201 Crown Office Bldg., Toronto	Nassagaweya Tp.
Robillard, H. & Son	195 Nicholas St., Ottawa	Gloucester Tp.
Roddy & Monk	24 Elm Rd., Kingston	Kingston.
Standard White Lime Co., Ltd	15 Douglas St., Guelph	Beachville.
Thames Quarry Co., Ltd., The	St. Mary's	St. Mary's.
Walker Bros	Thurold	Stamford Tp.
Wallace, R. & Sons	116 Patrick St., Kingston	Kingston.
Wattam, Geo. H	Shelburne	Ammnath Tp.
Webber, John	Dunnville	Dunn Tp.
Webster, Jas. S	2 Augusta St., Galt	Galt.
Wehman, John	251 Division St., Kingston	Kingston.
Wentworth, County of	Court House, Hamilton	Waterdown.
Woodhouse Crushed Stone Co., Ltd	Port Dover	Woodhouse Tp.
Wentworth Quarry Co., Ltd	Binemount	Saltfleet Tp.
MANITOBA—		
Tyndall Quarry Co., Ltd	1591 Erin St., Winnipeg	Winnipeg.
Winnipeg, City of	Winnipeg	Stony Mountain.
BRITISH COLUMBIA—		
Cons. Mining & Smelting Co., Ltd	Trail	Fife.
Land Lime, Ltd	Armstrong	Armstrong.
Powell River Co., Ltd	Powell River	Texada Island.
Wing, A. B	Vancouver	Swamp Pointe.

The Stone Quarrying Industry—Marble

QUEBEC—		
Wallace Sandstone Quarry, Ltd	120 St. James St., Montreal	Philipsburg, Missisquoi County.

The Stone Quarrying Industry—Sandstone

NOVA SCOTIA—		
Wallace Sandstone Quarries, Ltd	120 St. James St., Montreal	Wallace.
NEW BRUNSWICK—		
Dobson, Frank L	Dorchester	Dorchester.
Miramichi Quarry Co., Ltd	Quarryville	Quarryville.
QUEBEC—		
Kirby Co., Ltd., Sidney	213 Sussex St., Ottawa	Two Mountains.
Richelieu Quarry Co	St. Jean	St. Luc.
ONTARIO—		
Rogers, F. & Co	1193 West Queen St., Toronto	Terra Cotta.
ALBERTA—		
Oliver, Wm. & Co	1823-16th St. W., Calgary	Calgary.
BRITISH COLUMBIA—		
Haddington Quarry Co., Ltd	1571 Main St., Vancouver	Haddington Island.

The Stone Quarrying Industry—Slate

QUEBEC—		
British Canadian Marble Co., Ltd	St. Joseph de Beauce, Que	St. Joseph de Beauce.
Slate Products Co. of Canada, Ltd	Southam Bldg., Montreal	Melbourne Tp.